Green Jobs

Case Study of the Republic of Macedonia

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FOREWORD

In 2011 USAID and Habitat for Humanity Macedonia signed a Cooperative Agreement whose aim is to jointly implement a complex, four-component project named: *Energy Efficiency for the Housing Sector in Macedonia,* a rare and innovative effort to develop a set of activities that will help Macedonian households living in collective apartment buildings reduce their vulnerability to energy price increase, at the same time bearing in mind the climate change issues. In a more general manner, the project also aims at raising the awareness among stakeholders in the residential energy efficiency sector, in that way contributing to resolving today's global problems of climate change, energy security, economic uncertainty, and poverty.

Based on the assessment of the challenges in the Macedonian housing sector, including the patterns of energy use and costs, project's baseline was that the energy consumption in Macedonia is high, unaffordable, environmentally degrading and inefficient. While obtainable technologies provide a high potential to a significantly reduced energy use in housing, the sector actually does little to overcome the outdated and inefficient practices. Much more energy is used than necessary, the contribution of housing to CO2 emissions is high, many residents do not have affordable or "clean" energy available and much of the related business potential is unexploited.

The Green Jobs study presented in this publication, authored by Professor Pece Nedanovski and assisted in its early stage by Mr. Panos Papantonopoulos, actually addresses many of these challenges. Being a subcomponent of the project's Component C: *Facilitate investment, entrepreneurship and job creation on EE,* it introduces key concepts and raises policy issues in Macedonia that lack attention of the policy makers, from green businesses and climate change to labor market, from the supply and demand for green jobs to the possible measures and recommendations that could lead to creation of green jobs via implementation of solutions for energy efficiency with particular focus on the low-income residential sector.

As such, the study is of immense importance and adds value to the future work of Habitat for Humanity, dedicated to providing simple, decent and affordable housing solutions for those living in poverty, subsequently transforming their lives and promoting positive long-term social and economic change in Macedonia.

Habitat for Humanity Macedonia

EXECUTIVE SUMMARY

1. The "weatherization programs" that addressed the need to save/conserve energy in buildings were first introduced in North America during the 1970's during the OPEC fossil fuel crisis under the banner of "Energy Conservation". The fossil fuel crisis has irreversibly triggered an increasingly globalized concern about Energy Conservation and the increasing scarcity of natural resources under the classical post-World War II model of economic growth. Since then, society has increasingly studied, and now clearly understands the harsh reality, that the same growth model cannot continue to be based on an ever-expanding consumption of fossil fuel energy.

Globally, a debate is taking place on energy and the environment, including what constitutes green economic activity and green jobs. At the same time, initiatives and investments in renewable energy, greater energy efficiency, and environmental sustainability are increasing. The result has been increased demand for information about employment in the "greening" economy.

2. The nature of green jobs and their labor market trajectory remain highly contested topics in the labor market literature. Though it is commonly understood that green jobs are in some way related to improving, protecting, and maintaining the environment, there is still no agreed upon framework that can delineate the basic characteristics of green jobs, determine the nature of the work, establish methods for capturing this information and accurately count green jobs.

Despite the conceptual and practical challenges in defining and counting, green jobs do exist and they can serve as a model to explore the impact of evolving green technologies and practices on the nature of work and the dynamics of the green labor market.

Indeed, the literature presents three definitions of green jobs, each in some way helping to promote a particular framework for what counts as a green job. These definitions, which include three viewpoints, are as follows:

- Industrial - The work is essential to the products and services that improve the environment and/or the job involves work in green economic activity;
- Occupational - The extent to which green economic activity and technology shape occupational demand and work requirements;
- Normative - Jobs that improve the environment and provide good wages, equal opportunity, and pathways out of poverty.

There are several interesting issues related to the above definitions:

- The idea that the "greening" of the economy may be a better characterization than the "green economy."
- The use of the term "green jobs" raises many different opinions and awakens political and philosophical interests, so it may result in response bias on surveys.

- The notion that the concept or definition of green can change over time. Bearing in mind the characteristics of the given technological progress and the urgent need for improvement, the dividing line between efficient and inefficient must raise over time. Seen in this context, "green jobs" is a relative and highly dynamic concept.

In terms of the dynamics of the green labor market, the evidence suggested that green jobs were skilled jobs that offered meaningful work with *advancement opportunities* and that required *skills in short supply.* But there is little evidence to suggest that green jobs have low barriers to entry, or that there are shortages of workers in the core industries that are becoming green. In addition, literature is silent on whether green jobs could be outsourced and whether company restrictions on job training funds are leading to a lack of support for training in the core skills of occupations in the green sector.

From a broad conceptual perspective, employment will be affected in at least four ways as the economy is oriented toward greater sustainability: first, in some cases, additional jobs will be created - as in the manufacturing of pollution-control devices added to existing production equipment; second, some employment will be substituted - as in shifting from fossil fuels to renewables; third, certain jobs may be eliminated without direct replacement - as when packaging materials are discouraged or banned and their production is discontinued; fourth, it would appear that many existing jobs (especially such as plumbers, electricians, metal workers, and construction workers) will simply be transformed and redefined as day-to-day skill sets, work methods, and profiles are greened.

Green jobs span a wide array of skills, educational backgrounds, and occupational profiles. This is especially true with regard to so-called indirect jobs - those in supplier industries. Measurable definition of a green job says the following: A green job is one *in which the work is essential to providing products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability.* The job involves work in any of the green economic activity categories: renewable energy and alternative fuels; energy efficiency and conservation; pollution, waste and GHG management, prevention and reduction; environmental cleanup and remediation and waste clean up and mitigation; sustainable agriculture and natural resource conservation; education, regulation, compliance, public awareness and training and energy trading.

3. Today we need a series of quantifications, estimates, and projections of green jobs in order to overcome the substantial data gaps. Governments must establish statistical reporting categories that recognize and help capture relevant employment in both newly emerging industries and green employment in established sectors. Also, governments should commission in-depth modeling and econometric efforts to analyze not just direct green jobs, but also those that are related in a more indirect manner. Business associations and trade unions can play a useful part as well. They have begun to do job surveys and profiles, but far more of these kinds of efforts are needed. Attention also needs to be given to disaggregating data on the basis of gender in order to ensure that there is equality of opportunity for women and men for green jobs.

However, studies focusing on green jobs face additional challenges, the first of which is defining what constitutes a green job. Many green technologies are relatively new, representing a small share of the market and lacking sufficient economies of scale to have achieved their long-term cost structure with the possible exception of onshore wind. Although it is reasonable to expect that at least some of these technologies will continue to evolve and that their costs will be reduced, it is difficult to compare all of these technologies and identify front-runners. Unless these paths of technology evolution are well understood,

how many people will be employed by which technology, what skills these jobs will need, what kind of wages they will pay, what kind of market entry support these technologies will need and many more questions will remain difficult to answer. Without these answers, the accuracy of cost, price, and wage assumptions made during modeling exercises will remain questionable.

A survey approach appears to be the best method of estimating green jobs since the official statistical classifications are not structured to differentiate "green" workers from other workers in the same industries or occupations. So, there is a need for a survey that establishes a standard set of definitions and methodologies, and a need for flexibility within a state to modify definitions of green jobs.

When estimating employment in the green economy, the job is the unit of observation. Jobs exist within business establishments (i.e., the industry), and can be classified according to the product or service produced, the type of work performed (i.e., the occupation), as well as by geography. Therefore, a business survey is likely the best method to estimate and track trends in green jobs. The survey should be designed to identify green activity conducted by business establishments, and the jobs related to these activities.

Job creation statistics and the opportunity cost of green investments in terms of job creation deserve special attention. Comparison of economic impacts of similar investment in other segments of the economy (energy or non-energy) is often lacking. Some studies offer investment in green jobs as a solution to economic slowdown or recession. If this Keynesian approach were to be followed, there are other sectors of the economy that could create more jobs for the same denar (MKD) of investment.

Estimating economic impact, including creation of jobs, of any major investment scheme is difficult as multiplier effects can change over time and there are often unintended consequences. The longer the time horizon, the less dependable input-output coefficients become for predicting future jobs. With green jobs, there are further complications such as their definition and assumed labor intensities. Many of these industries are relatively new; some technologies are not even deployed in commercial scale. As such, the estimates of jobs per denar investment or per unit of energy output depend on a small data set, which probably renders them less reliable. Government support in the form of subsidies, tax breaks, direct investment grants, domestic content requirements and the like complicate the analysis further as these policies distort comparative cost advantages and often lead to adoption of more expensive technologies that impact the rest of the economy. All of these uncertainties add to the inherent lack of precision in any modeling exercise and necessitate additional scenario and sensitivity analyses to cover all reasonable paths of development.

Among economists, it is well understood that governments do not create jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services does. From this point of view, many green jobs studies are riddled with economic errors, incorrect methods, and dubious assumptions. Economic policy should not be based on such faulty analysis. Serious economic studies of costs and benefits are desperately needed before the adoption of any green jobs proposal. In viewing the creation of jobs as a benefit, green job studies and advocates all make a fundamental error. Jobs are a cost in the process of production. Green job advocates often claim that sustainable technology for power generation, transport, or food production will require more labor per unit of output than do conventional methods. This is a major cost of their proposals – not a benefit as they claim. Decreased labor productivity is the path to poverty.

4. On the basis of current experience in various areas - from vehicle fuel economy to carbon trading - it appears that a purely market-driven process will not be able to deliver the changes needed at the scale and speed demanded by the climate crisis. In order to examine the voluntary initiatives and mandatory regulatory binding decisions that address or directly influence the green jobs (GJs) formation, the analysis of world experiences starts with a *"top-down" approach from the world and regional-governance levels,* while when going to GJs policy paradigms it could examine concrete practices and results from the *"bottom-up" level of social formations, such as those of our communities, states and nation-states,* all of whom hopefully are conscious and sharing the minimum common understanding of the reasons and the need for greening our societies, if not the responsibility itself.

Consequently, *major systematic GJs initiatives* were examined in more detail. These initiatives were *financed and promoted by three key Western governmental entities:* The Federal Government of the United States of America, the European Union (examples of several member-states), as well as the example of Australia. For all these cases, examples of policies and practices at their State and Country levels have been selected on the base of two criteria: their ranking and reputation on the performance of measures to implement energy efficiency (EE) and to create GJs; and, whenever possible, upon their relevance to the case of Macedonian particularities (size, climate, state of the economy, administrative history and level of regional integration).

Case studies and supported literature from Europe, America and Australia argue with examples that to help turn operational a deep and wide building energy efficiency retrofit (BEER) and residential energy efficiency retrofit (REER) potentials that can embrace the quasi-totality of our built environment, today's urgent need for a Green Labor movement is to become organized for re-training and up-skilling and be available to supply to the short-to-medium term, increasingly complex and new Green Skills. For this, curricula, job descriptions and skills necessary are elaborated for the specialties needed in order to perform the packages of work-breakdown necessary for the management, operations and control needed for the field work performed in Energy Efficiency retrofits. Furthermore, it is imperative to start in parallel, if not earlier, from the preparation of Green concept communication specialists and of the training of tomorrow's trainers, to produce grass roots leadership that shall be able to organize the housing communities and to raise the consciousness of energy savings and benefits among the households.

Therefore, it seems that for a GJs Initiative movement to be able to mobilize demand for BEER-REER it needs not only to supply the appropriate green skills necessary to perform the EE retrofits of tomorrow internally, but above all needs to be preemptively involved from the bottom-up in the fashioning and the "positioning in mind" of the household energy consumer of the potential benefits from EE. In addition, it needs to identify and create EE leadership within the neighbors and communities.

In order for the GJs initiative to create job opportunities, it needs partnerships and alliances that can unbind the potential of the BEER-REER markets. The bulk opportunity and self-interest for labor resides in the priority opening-up of the residential energy retrofit markets. Green Jobs opportunities, however, should not be limited to workers and employees only. A sustainable GJs initiative should focus upon the multiplier medium- to low-term effect upon jobs creation that only the establishment and multiplication of innovative medium and small enterprises can guarantee. In fact, US Federal and EU Governance initiatives are currently earmarking "green money" to stimulate the creation of innovative applied research in SMEs in the EE and RE sectors.

5. The Republic of Macedonia as a full EU membership candidate country is faced with the challenge of efficiently implementing serious reforms in the economic and social systems. Among those reforms, the fields of energy and energy efficiency are crucial for the country's overall development.

The direction in which the energy sector in Macedonia develops has huge implications for national economic growth, for environmental protection and for living standards. For many households in Macedonia, monthly energy bills and food, respectively, account for the highest proportion of the family budget. Municipalities in Macedonia can no longer lean on the ministry departments for having their local costs covered. Now they also have the new and expensive responsibility of managing their own energy usage. Industries in Macedonia spend more energy per product unit than many comparable industries in Europe. Therefore, they face a competitive disadvantage in the export markets.

The existing technologies are not optimal, which leaves room for technology promotion. The fact that the necessary technologies do not have to be high technologies is encouraging. Former economic policies and decisions point out that there are numerous opportunities for improvement through adopting verified technologies that are available at the moment, such as controls and insulation. What is more important, the wide application of these technologies can create new businesses and new jobs in a very short period of time and in an economical manner.

Macedonia has limited reserves of resources for commercial energy and it will become more and more dependent on energy imports. However, energy efficiency practices can moderate this dependence, increase domestic reserves and postpone the need for investments in new energy infrastructure. Each of these outcomes are cheaper than investments to increase reserves and to expand the existing infrastructure.

Even under difficult economic circumstances that many Macedonians face who are jobless and with no income, energy saving can be of economic and financial value. Traditionally, business activities in energy efficiency, together with the wide application of energy efficient technologies in the key sectors, are characterized with high labor force intensity and create new jobs. In countries where energy efficiency is currently ignored to a large extent, there is higher potential to create new jobs. Energy efficiency trends are a lower priority to those who are chronically unemployed and to low-income individuals and families, especially if they are a matter of investments. In such cases it is necessary to provide forms of social aid because the improvement of their energy usage is economically justified at national level.

Creating new legislation or amending current laws (for example establishing an Energy Efficiency Fund) can be much more difficult than implementing the existing legal framework. Allocating the government budget and resources or creating new jobs in a period when the government is faced with fiscal restrictions can be quite difficult. Therefore, priority should be given to the creation of a new framework that enables energy efficiency improvements on a commercial basis.

The labor market in the Republic of Macedonia, during the period of transition, appeared to be pretty imbalanced. During the whole period, labor supply was significantly higher than labor demand. This imbalance resulted high rates of unemployment for a long period of time. Labor market flexibility and the structure of the labor force represent significant aspects of the investment climate. The rigid labor market and unsuitable labor force structure, especially from the perspective of the degree of education, age and the employment waiting time, have a negative influence on the creation of a favorable investment environment.

Additional measures should be undertaken by the Government to improve the labor force structure, especially from the aspect of educational attainment. Besides the formal education, pretty significant is the role of vocational education. For that purpose the focus should be put on active labor market policies.

Three types of institutions influence the final performance of the labor market: Government and government institutions; the branch labor unions in the Association of Labor Unions of Macedonia; and the employers through associations of their own. All of these institutions create special policies that refer to different segments of the labor market and influence its performance in different ways. These institutions make the labor market more or less flexible to the changes that happen in the environment. Some of their activities and policies are intended to increase labor market flexibility, whereas others do the opposite.

All the facts mentioned above give an image of a non-flexible labor market. In fact, these institutions contributed to the fact that an informal economy and an informal labor market operate in the Republic of Macedonia. According to some calculations from the International Bureau of Labor, almost one third of the labor force earns a living from the informal economy, including seasonal work, part-time employment and the overtime work. The calculations show that the informal economy in Macedonia comprises between 25 and 40 percent of the GDP.

Concerning the expectations on the workforce dynamics, there is no clear shortage of workers in the traditional professional activities such as concrete worker, reinforcement worker, mason, carpenter, plumber, electrician, roofer, installer of window frames, thermal insulation installer, water-proofing installer and shuttering-worker, among others. Approaching the year 2020 it is presumed that a certain portion of workers will leave the labor force. To prepare for that eventuality, it will be necessary to train an additional 20 percent of new workers, preferably young people from socially vulnerable strata of the population. However, due to the stable penetration of low-energy solutions in the mainstream construction practice, it is supposed that nearly all workers would be engaged (although at different levels) in continuing vocational training activities dedicated to main energy efficiency principles, either on-site or through specialized training programs.

On the other side, the supply of specialists for installation and maintenance of main renewable energy systems in buildings and the level of qualification of the workforce are quite limited. There is a clear shortage of installers in each of the studied systems (small biomass-fired boilers, photovoltaic and solar thermal systems, geothermal systems and heat pumps and mini wind turbines). New specialized training schemes should be developed and introduced in the training system, with growth rates similar or even exceeding the expected rate of introduction of the specified systems.

6. There are a significant numbers of barriers related to the creation of green jobs in Macedonia. It is hardly possible to assign those barriers to a specific market or policy area and to propose a coherent framework. Many of the issues are overlapping and concern, albeit to varying extents, construction companies and professionals, vocational education practitioners, producers and suppliers of building products and technologies, policy makers, households, as well as other entities. Barriers could prevent individuals and businesses to use the opportunities for energy efficiency. These barriers include, but are not limited to:

- Barriers in the behavior and organization barriers;
- Market/financial barriers;

- Legal-regulatory and policy barriers;
- Technical barriers,
- Barriers in the construction sector, and
- Barriers in the system of vocational education and training.

7. Possible measures and recommendations that could lead to the creation of green jobs via implementation solutions for energy efficiencies with particular punctuation on the residential sector are divided in several fields as following:

- Legal and regulatory measures: changes and amendments of the law on building, and preparation of energy codes for buildings,
- Support mechanisms/measures for the purpose of increasing the number of energy efficiency projects in Macedonia. Together with the legal-regulatory measures, there is also a necessity for several measures for enhancing the capacity and the institutional development, all for the purpose of guaranteeing a continuous break of the energy efficiency measures in various sectors. These measures can contain the following:
    - Assistance for establishing companies for energy services (ESCO) and contracts for performance of energy services.
    - To prepare a sound base for establishing an Energy Efficiency Fund (EEF). Before being established this EEF should be justified and conceptualized in a manner that it shall provide clear operative framework, sub-legal acts and actions.
    - Public-private partnerships (PPP) of the communal public administration for energy services shall enable access to private capital, experience in project implementation, more advanced management practices, cost reduction skills and better service and focus on consumers.
- Institutional and capacity building
- Education and training measures: professional and higher education capacity building; education and raising awareness at all levels; preparation of proposals for changes in the regulatory framework aimed at improvement of the employers', employees' and state institutions' awareness.
- Economic and fiscal measures. If being generalized, these initiatives fall under one of the following generic categories: rationalized determining of both the price of energy supplies and the tariff policy as well, tax policy - lower tax or no tax on energy efficient equipment and household appliances, convenient customs fees for energy efficient equipment, capital mobilization for the purpose of forming investment funds, loan guarantees, regulations and standards for rational usage of energy, campaigns for informing and raising awareness about this issue.
- Labor market policies and measures. The Macedonian government in the forthcoming period should direct the active labor market policies both towards upgrading the actual and developing new programs, as well as towards determined target groups for new green jobs. The focus should be put on the following:
    - Implementing programs for labor force training.

- Programs that shall stimulate employment in the private sector, such as subsidizing the salaries of the newly-employed individuals, allocating grants for self-employment, tax releases for newly-employed individuals etc.
- Programs that shall educate the unemployed how to look for a job.
- Programs for stimulating the employment of younger persons.

INTRODUCTION

The "weatherization programs" that addressed the need to save/conserve energy in buildings were first introduced in North America during the 1970's during the OPEC fossil fuel crisis under the banner of "Energy Conservation". The fossil fuel crisis has irreversibly triggered an increasingly globalized concern about Energy Conservation and the increasing scarcity of natural resources under the classical post-World War II model of economic growth. Since then, society has increasingly studied, and now clearly understands the harsh reality, that the same growth model cannot continue to be based on an ever-expanding consumption of fossil fuel energy.

While there has been some progress towards a new energy consumption policy, further progress should be faster, more global, and altogether more equitable than anything yet seen in human history. Such a rapid and comprehensive change will require governments, businesses, and civil societies to rethink their traditional roles. A new balance between competing interests needs to be struck so that commonly established targets and objectives can be pursued.

Globally, a debate is taking place on energy and the environment, including what constitutes green economic activity and green jobs. At the same time, initiatives and investments in renewable energy, greater energy efficiency, and environmental sustainability are increasing. The result has been increased demand for information about employment in the "greening" economy.

A central feature of the next transformation will be green jobs. This report will discuss how green jobs are already emerging. On the evidence presented here, the potential for an increase in the numbers of green jobs is almost unlimited. However, it is also clear that only a very tiny portion of the work being performed in the world today can be described as green.

Under different historical circumstances, the pace of green job growth might be considered satisfactory, and in some respects even impressive. However, in just two or three decades the entire global economy will need to be well on the way to being low-carbon and sustainable. The historical circumstances therefore demand that bold measures be taken to both expand the green economy and grow green jobs at a much faster pace in the developed world, and to ensure that the same process begins in earnest in developing countries.

Today, sustainability should be non negotiable, as should the notion of an equitable transition. If these were to become the main principles guiding policy, business practices, and over time the behavior of individuals, then green jobs and decent work can be expected to grow both exponentially and hand in hand.

1. GREEN JOBS DEFINITION

1.1. A context of Evolving Needs: Continuity from the Old to the New

Aggregate societal needs are usually first expressed as a demand in marketplaces seeking a supply-side solution. Then, if persistent and growing, these needs often build up and are transformed to civil society's organized concerns for the establishment of collective norms and regulation plus measures and practices.

It is therefore useful to keep in mind that the human need for living and growing in an "ambient environment", protected from perceived uncomfortable climatic conditions – being that of cold or heat - preexists perhaps as a basic need of any concept or need for *energy conservation* or for *energy efficiency*, which are linked not to the sphere of human existence but rather to that of human development and growth.

Therefore, both the needs-demand and the services-supply of "climatically ambient environments" have been a practice well before the appearance of the fossil fuel crisis of the 1970s. In particular, organized society's actions for the promotion and regulation of these markets through voluntary or mandatory measures have be in place for quite some time.

"Feeling good" vis-a-vis the diverse climatic conditions is dependent on and relative to the natural geographical conditions of living and on the material, technological and economic means available at a specific period of human society. It is only natural that market means and measures have been developed and have been translated to administrative measures, first in economically developed, high-latitude countries. Canada and Scandinavian countries like Sweden, therefore, offer the best cases to observe paradigms and accumulated socially imposed administrative and regulative experience on energy-efficiency retrofit under its "weatherization" and even "deep-green" version of buildings retrofit practices and measures.

The need for fossil fuel imports and energy security was first defined during the era of fully independent nation-states and their protectionist economies. During this time, which is ongoing, the economic aspects of today's "innovative view" of the interplay between energy use and energy conservation/efficiency were formulated.

Indeed, securing of energy and raw materials markets were contributing factors to outbreaks of World War I (WWI) and World War II (WWII) in that both of these factors were location specific and therefore crucial for nationally bound industrial production and economies.

The *energy imports and energy security* factor is the product of the ever growing human need that has prompted the contemporary interest in the subject of EE. The factor has also given birth to the socialized concepts and practices of energy conservation, energy efficiency, renewable energies, green growth, green business and green jobs. These concepts all owe their development to the 1973 oil crisis, during which developed countries that heavily depended upon imported fossil fuels were forced to take urgent measures to tackle

the problem of steeply rising fossil fuel prices.

A third human needs factor that has grown in parallel only to converge with the previous one is that of an increasing consciousness of the intrinsic links between limitless and wasteful growth and the need to protect nature and the human-built environment.

Visionary urban economists and planners launched the first warnings about the way we deal with environment, the landscape and our cities struggling against urban poverty during the late 1960s. But it was only in the early 1970s that the prospects for a fossil fuel scarcity first shook our candid confidence in "unlimited growth" *(Meadows: The Limits of Growth, 1972)*. This realization gave impetus to systematic research on Earth's limited resources and more particularly on our wasteful patterns of growth *(Mesarovic: Mankind at the Turning Point, 1974)*. Particularly in the USA, a series of government reports *(National Petroleum Council: Report on US Energy Future, 1971)* and authoritative monographs written by experienced statesmen attracted the wide interest of the international learned community *(S. Udall: The Energy Balloon, 1974 – S.D. Freeman: Energy The New Era, 1974)*.

During the second half of the 1970s, countries under threat took their first steps to enact legislation in favor of energy conservation *(Energy Conservation and Production Act,* USA, 1976*)*.

Tools for evaluating and comparing alternative energy policies gathered under the title of *"energy analysis"* begun to generate a great deal of interest *(Energy Analysis: A New Public Policy Tool*, 1978*)*. By the end of the decade, public policies started dealing explicitly with technological options for improving *energy conservation in residential and commercial buildings (*J. Sawhill*: Energy Conservation and Public Policy,* The American Assembly, 1979*)*, while various technical monographs attempted to link energy with the built environment *(*R. G. Stein: *Architecture and Energy,* 1977*)*, investigating the role of energy efficiency and the life-cycle costs of the buildings (*Conception et Cout Global de l' Habitat: Actes de Colloques,* France 1979).

Between 1975 and 1977, the Central Mortgage and Housing Corporation of Canada widely distributed illustrated manuals on "*Conservation of Energy in Housing*", detailed "*Community Energy Audit Guidelines*" and even "*Green Roof Decks Design Guidelines*" to the engineering community and community authorities. Likewise, the *Office of Energy Conservation* distributed informative illustrated manuals on *"100 ways to save energy and money at home"* and on *"How to save energy and money by wasting less"* to households.

Thus, "weatherization programs" addressing the need to save and conserve energy in buildings were first introduced in North America during the 1970s following the OPEC fossil fuel crisis under the banner of "energy conservation." Since then, the fossil fuel crisis has triggered an irreversible and increasingly globalized concern about energy conservation and the increasing scarcity of natural resources under the classical post-WWII model of economic growth.

Since then, numerous studies have shown that if the same growth model based on an ever expanding consumption of fossil fuel energy continues unabated, it will drive the Earth's climate to a state that endangers the sustainable existence of the human race and that this will likely occur faster than initially thought.

As a consequence, today we must become conscious that while we continue to "weatherize" our buildings to the satisfaction of our primary need for an ambient living home envi-

ronment, this time we must perform such an operation not only in a way to attain energy savings in the sense of conserving the quantity of energy (i.e. to consume less energy) but:

- In order to produce and consume smaller amounts of energy more efficiently (EE) so as to reduce our CO2 signal.
- By producing increasing amounts of renewable non-polluting energies for the same reason.
- Because the climate change threat constitutes a danger for all of humanity as global warming, protracted drought, hurricanes and flooding have no boundaries. The climate change threat is contrary to that of depleting fossil fuels and rising fuel prices, both of which could be conceived as penalizing import dependent developed countries while having minimal negative impact or even benefitting the exporter countries.

Therefore, in this last new context, previous concerns for *energy conservation* clearly give way to concerns for *energy efficiency*. This time, however, the concerns are global.

Last, it is perhaps worth noticing that back in the late 1970s, America was still attempting to deal with urban poverty and minority rights through a massive and unparalleled community and neighborhood participatory movement based upon federal subsidies for urban renewal. At the same time, early 'energy analysis' economists had begun under this context to pay due attention to the *interplay between energy and employment linking energy efficiency with employment policies.* In his article "Energy and Employment Impacts of Policy Alternatives" (1978), Bullard said that when conventional energy resources are becoming quite scarce and unemployment is high, for practical reasons it is important to consider the energy and employment impacts of policy decisions. In this sense, of special concern are those policies directed at alleviating energy or unemployment problems.

For the rest, while the energy-to-employment relation is continues to be refined and debated among labor academics, today's green jobs initiatives have attained the level of becoming global policies linked to the need of our increasingly costly survival perspectives on Earth.

Since *turning the economy "green"* under the spectrum of climate change, it seems clear that the *building energy efficiency retrofits* (BEER) sector *and residential sector (REER)* must be widely regarded as a fast-track tool for job creation.

Therefore, opportunities for green jobs are to be combined with the imperative of retrofitting our built environment. Residential construction has always been among the favorite tools of economists calculating fixed capital formation *(*Kuznets - *USA early 1940s)* as a strong indicator of future growth for all the post-War II years as it was linked with urbanization and industrial growth for basic housing goods in a developing economy. It had also been a powerful and proven Keynesian tool for generating employment during crises.

Today, in the middle of a crisis and with most of our urban fixed capital maturing and in need of renovation, green retrofitting of buildings, and particularly a deep green retrofitting touching energy-consuming appliances, can serve all previous causes, raise values and lower our CO_2 signature considerably (win-win).

REER and BEER are uniform, sizable and labor-intensive sectors with the best potential to employ a balanced mix of existing semi-skilled, unskilled and skilled unemployed workers and technicians, and to continue absorbing through step-by-step apprentice pathways

a chronically unemployed youth. In addition, it can produce employment and business carriers for university graduates with frontier-breaking, innovative *techno-entrepreneurial ideas* in energy-related technologies and services, including integrated ICT automations and software, energy efficiency assessments, creative green banking, green mortgage finance and law, risk-assessment and green real estate value appraisal. In addition, it can benefit those with innovative *socio-organizational* entrepreneurship skills who can propose and implement higher-order and complexity *partnerships and alliances* between the local administrations, user/owner associations, construction businesses, labor organizations, academia and technical schools, to work out together deeper EE and GJ schemata for larger projects on greening the economy and lifestyles.

1.2. Contemporary Challenges for the Concept of Green Jobs

Many studies that lay out pathways toward a sustainable economy proclaim a future of green jobs - but few present specifics. This is no accident. There are still huge gaps in our knowledge and available data, especially as they pertain to the developing world. Furthermore, serious programs do not always back up green jobs rhetoric.

Addressing the environmental and climate challenge will require a range of far-reaching policies. For example, the development of more benign technologies, a boost in the efficiency with which energy and raw materials are being used, a critical reassessment of lifestyle and consumption choices, as well as economic structures, environmental restoration and mitigation efforts. It will also require adaptation to those changes that now seem inevitable and perhaps irreversible. These changes amount to a fundamental ecological transformation of the economy.

But these changes will not happen automatically. Without initiative and impulse from both government action and private investment, needed change will not happen sufficiently fast.[1] Subsidies, tax structures, and accounting methods that permit the continued "externalization" of severe environmental costs - and that therefore make unsustainable practices appear to be sustainable and profitable - remain fundamental barriers to more rapid change.

Meanwhile, the world faces equally challenging employment problems. Outright unemployment stands at roughly six percent, affecting some 190 million people. But even among the world's three billion jobholders aged 15 or older, many confront vulnerable employment situations. About 487 million workers do not earn enough to rise above the one dollar-a-day line of extreme poverty; some 1.3 billion earn less than two dollars a day. Particularly in developing countries, many people work informally, in situations typically marked by very low pay, dangerous work conditions, and a lack of health insurance.

The scope of available studies varies considerably. Individual analyses are based on widely diverging assumptions and scenarios, methodologies, variables, base years, and future

1 Vowing to pump $150 billion into green technology over the next decade, US. President Barack Obama has made big promises about his environmental agenda. "It will also help us transform our industries and steer our country out of this economic crisis by generating 5 million new green jobs that pay well and can't be outsourced," he said in November 2009. At that time, British Prime Minister Gordon Brown similarly called for an international "Green New Deal" to create a "low-carbon recovery." The United Nations wants a full one percent of global GDP to go to environmental initiatives. Rich countries such as Canada, Japan, and South Korea are obliging, spending billions to promote ecofriendly projects and green businesses. Even the US. Congress is considering a range of measures to reduce greenhouse gases - from regulatory mandates, such as raising vehicle fuel economy or requiring electric utilities to produce more of their power from renewable sources, to carbon taxes and a cap-and-trade system for electric utilities.

time horizons for estimates and forecasts. While available studies allow certain conclusions to be drawn, their findings cannot be aggregated or extrapolated. The result is more of an impressionistic picture than a precise set of job figures.

1.3. Green Economy or Greening the Economy

Given the broad scope of the needed technological change and economic transformation and restructuring, there are many aspects and dimensions to *greening the economy.* According to the Organisation for Economic Co-operation and Development (OECD), "environmental protection consists of activities to measure, prevent, limit, minimize, or correct environmental damage to water, air, and soil, as well as problems related to waste, noise, and ecosystems. This includes activities, cleaner technologies, products, and services that reduce environmental risk and minimize pollution and resource use."

There are many technologies, work processes, and products and services that reduce humanity's environmental footprint, making the economy become more sustainable. Given the urgent nature of the environmental crisis, however, these improvements must be very substantial. Marginal changes are inadequate and may simply be overwhelmed by a combination of growing per-capita consumption and rising human numbers.

In an ideal state of affairs, a green economy is one that does not generate pollution or waste and is hyper-efficient in its use of energy, water, and materials. Using this green utopia as a yardstick would mean that currently there are few, if any, green jobs. A more realistic, pragmatic approach is process-oriented rather than fixated on an ideal yet elusive end state. In other words, green jobs are those that contribute appreciably to maintaining or restoring environmental quality and avoiding future damage to the Earth's ecosystems.

The urgent need to move toward a more sustainable economy further complicates these issues. It at once poses a profound challenge for governments, companies, communities, and individuals, but also offers vast business and employment opportunities. Indeed, the pursuit of green jobs will be a key economic driver in the 21st century, as the world sets out into the largely uncharted territory of achieving a low-carbon global economy. Greening the economy should involve large-scale investment in new technologies, equipment, buildings, and infrastructure, and could thus be a major stimulus for much-needed employment.

Developing renewable energy and raw materials, as well as efficient and waste-avoiding technologies, production processes, products, and services is crucially important to greening the economy. For example, producing aluminum from recycled scrap is environmentally preferable to virgin production because it is far less energy-intensive. But equally important are the structures and spatial arrangements that characterize an economy. To the extent that great distances – between industries and their suppliers, between stores and homes, between homes and workplaces – are a feature of an economy, there is a built-in need for large-scale motorized transportation services. That need can be met by more fuel-efficient vehicles, but it is a less optimal solution than one that allows for public transit or one that minimizes the need for such transportation.

Especially in OECD countries, there is a rapidly growing literature on the subject of environment and employment. However, the proliferation of studies and reports does not necessarily permit a straightforward aggregation of results. One key reason is the lack of a commonly accepted, consistent definition of "green" - the boundaries of renewable energy,

energy efficiency, clean technology, sustainable transport, organic agriculture, and so on.

In part, this requires a greening of education, skill building, and on-the-job training. But making the economy more sustainable will also require a just transition for those who now hold jobs in carbon-intensive and polluting industries.

Alternative energy technologies, energy efficiency and conservation and other environmentally friendly programs have benefits ranging from lower emissions to enhanced energy security, albeit at different levels for different technologies or approaches. But adding "net jobs" cannot be defended as another benefit of investing in these technologies. Models can be developed to analyze alternative scenarios that can show net job gains over a certain period of time, but these are based on aggressive and unrealistic assumptions of continuous and fast technological innovation, rapid progression of economies of scale, global implementation of similar green policies, adoption of protectionist measures such as tariffs or local content requirements and others.

However, the realities of the global energy scene are:

- Most green technologies are far away from the scale that is needed to replace conventional fuels in a significant way. Although it is reasonable to expect improvements in technology and cost structure in the future, it is difficult to predict the development path that can be included in modeling exercises.
- These technologies are more expensive than conventional technologies and hence need subsidies, tax incentives and mandates to gain market share (some more than others).
- They face integration problems due to their intermittency, immaturity of technology, scalability limits, inability to communicate with existing infrastructure, and other technical or power market economics constraints.
- Consumers, especially at the residential level, are often reluctant to adopt new technologies if they are not certain they will get the same benefits as those from current technologies and even more reluctant when it comes to changing their energy consumption behavior, which is often based on habit rather than conscious decision making.[2]
- Pushing aggressively to increase the share of these technologies, though clearly possible, will cost large sums of money and will increase cost of energy to society, negatively impacting purchasing power, employment and GDP.

1.4. The Problem of Defining a Green Job

One of the critical issues surrounding the discussion of green jobs is that there is no agreed understanding of the term or measures to ensure claims of 'greenness'. Nor is there clarity about the type of social relations in which green jobs are achievable. For example, the International Labor Organisation (ILO) defines a green job as one which simply 'reduce(s) the environmental impact of enterprises and economic sectors, ultimately to levels that are (ecologically) sustainable'. However, the notion of *ecological sustainability* is highly

2 Consumer behavior is an interesting area of research and one that attracts a lot of attention from promoters of energy efficiency, smart grid and similar technologies because consumers do not always behave as expected when it comes to buying green equipment or changing their consumption habits and there are gaps between what they say in polls and what they do.

problematic. It has been conceptualized, particularly by corporate and political interests, to represent the sustainable economic growth through technology and market based environmental solutions such as emission trading schemes. A more comprehensive vision of ecological sustainability sees it as requiring *the maintenance of biodiversity, ensuring ecological integrity, maintaining the stock of natural capital and providing for intergenerational equity*. Determining what is ultimately sustainable has become highly contested, resulting in the 'green' label being applied to a wide range of occupations. This ambiguity is best illustrated by the Australian Workers Union's (AWU) claim that jobs in the steel industry should be classified as green, because steel is recyclable and is an essential component of renewable energy technologies such as wind turbines.

The ambiguity concerning what can be characterized as a green job has resulted in attempts to distinguish 'classes' or 'shades' of green work. For example, the Australian Conservation Foundation divides green jobs into two streams:

- 'Deep green jobs' such as the construction of energy efficient homes
- 'Light green jobs' such as mining workers involved in land rehabilitation.

The Australia Institute highlights five 'classes':

- Transformational, a job which actively contributes to long-term ecological sustainability
- Low-impact, a job that reduces our ecological footprint
- Remediation, a job which repairs ecological damage
- Natural appreciation, a job that improves access to the natural environment
- Environmental education, a job that informs others about the need to reduce environmental impacts

From the other side, Kate Crowley divides green jobs into three categories: deep, mid and light green, as shown in Table 1.1. below.[3] This typology is useful as it provides a framework within which the green credentials of occupations can be evaluated.

Table 1.1. Green Jobs Typology

	Deep Green	**Mid Green**	**Light Green**
Mode	Proactive	Integrative	Reactive
Scope	Long Term	Intermediate Term	Short Term
Nature	Transforming	Reforming	Conforming
Objective	Redefine Growth	'Ecologize' Growth	Enhance Growth
Operation	Rejectionist	Reinventionist	Accommodationist
Aim	Ecological Sustainability	Ecological Modernity	Sustainable Development
Jobs	Preserving Nature	Greening Industry	Remedying Ecological Decline

Source: Crowley, K. ibid.

Crowley's category of light green jobs and its aim of 'sustainable development' are com-

3 Crowley, K. (1999): "Jobs and environment: the "double dividend" of ecological modernization?" International Journal of Social Economics, No. 26, pp. 1013-1026.

patible with a 'business as usual' approach to ecological sustainability. The mid green job category focuses on the pragmatic integration of environmental concern into existing industries, for example the greening of the auto industry. Mid green jobs require the development of market mechanisms and technologies to 'ecologically reform' the economic development, but the mid green job aim of 'ecological modernity' is achievable within the social relations. By contrast, the deep green job category is focused on being both proactive, such as through the design and manufacture of renewable energy technologies, and socially transformative, by confronting capitalism's essential drive for growth. The deep green jobs aim of 'ecological sustainability' ultimately requires the development of an alternative to the existing social relations and its ecologically destructive character.The use of the terms green jobs or green-collar jobs has obvious appeal to those who are concerned to emphasize opportunities, rather than threats, arising from climate change mitigation and other environmental policies. However, the interpretation of what constitutes a green-collar job remains contentious. In much of the available research there tends to be an implicit assumption that it is any job that results from the implementation of green policies, such as increased energy-efficiency. However, according to the Worldwatch Institute, it can said that the defining of the energy efficiency sector is a vexing problem, since most of the relevant forms of employment are embedded in a broad range of existing industries such as vehicle manufacturing, construction, lighting, heating and cooling equipment, electronics and appliances, and so on.

Annandale (2004) defines green jobs as occurring across a spectrum, from innovations reducing the impact of dirty industries to jobs that are developed primarily to address specific sustainability measures. They note the tensions in designating what are green jobs in particular instances, e.g. in a recycling plant that produces emissions. These authors consider that, given these tensions, the simplest definition of a green job may be one which reduces the negative impact made on the environment, relative to the *status quo*.

The Newcastle researchers also add social criteria to their interpretation of green jobs, designating these jobs as necessarily secure, well-paid and environmentally-friendly and producing a list of what they regard as necessary government supports for workers and industries transitioning to sustainability (Bill *et al.* 2008). This theme of green jobs as socially just as well as ecologically sustainable is echoed in other publications. The importance of integrating the ethical and economic aspects of climate change mitigation policies is thereby given a broad working class perspective, emphasizing areas of employment growth that are skilled, well paid and sustainable. This preoccupation clearly reflects the fact that much of this literature emanates from labor and progressive organizations concerned with their future direction in a changing environment. University of Colorado Law Professor Maxine Burkett wisely notes that "the campaign for green-collar jobs is just as much about economic and social recovery for (environmental justice) communities as it is about environmental dividends. The green-collar economy includes all 'green jobs' like construction work on green buildings, organic farming, solar panel manufacturing, and bicycle repair."[4]

Some studies from US labor sources also posit green-collar work as a means of countering the shift towards off-shoring of jobs, emphasizing the desirability of maintaining localized, trades-based work of the kind typically considered blue-collar, where traditional union power is still strong. Economic nationalist and protectionist tendencies are evident in some of this campaign material, responding to the problem of the race-to-the-bottom that arises when employment is relocated in nations where standards of environmental

4 Maxine Burkett, Just Solutions to Climate Change, 56 Buff. L. Rev. 169, 225–26 (2008), p. 225.

and labor regulations are relatively lax. In Australia the proposal to introduce green tariffs reflects a similar concern to ensure that imported goods do not have an unreasonable market advantage because they originate in countries where producers do not have to meet the full environmental costs.

These attempts to position the prospective growth of green-collar jobs within a social justice agenda reflect the broader concerns of the labor movement. As Phil Angelides, the head of the US-based Apollo Alliance, argues, a green-collar job has to pay decent wages and benefits that can support a family.[5] It has to be part of a real career path, with upward mobility. And it needs to reduce waste and pollution and benefit the environment. However, while the trade union movement is understandably concerned with both sustainability and quality of jobs, those latter concerns with wages, security and conditions are obviously not restricted to green collar jobs. It may be useful to think in terms of three principles:

- Whether the job is environmentally sustainable
- Whether it is a quality job in the sense of being well-paid and secure
- When it replaces another, non-green job, whether it is located in the same community and targeted to the same worker

Where these concerns with environmental issues, job characteristics and location come together is in the strategic aspects of managing transitions.

1.5. Green Job Definitions

While entering the second decade since the GJs concept has started to become the subject of targeted initiatives, policies and laws on both sides of the Atlantic, the debates over the definition and spectrum of green job qualifications is still hotly debated.

In the most recent article, the World Bank (WB) review of green jobs progress notices provocatively that the Federal Green Job Act in the USA has been initiated and workable pragmatic State initiatives for GJs creation have been implemented in the absence of definitions.

The topic of green job is still highly contested in the labor market literature. Despite the fact that there is common understanding that green jobs are in some way related to improving, protecting, and maintaining the environment, there is still no agreed upon framework that can delineate the basic characteristics of green jobs.

Despite the conceptual and practical challenges in defining and counting green jobs, green jobs do exist and they can serve as a model to explore the impact of evolving green technologies and practices on the nature of work and the dynamics of the green labor market.

To adequately focus a definition of green jobs, it is needed to review larger, fundamental concepts of green. Definitions that seem suited to previous objectives are highlighted below.

Environmental Sustainability - maintaining practices that contribute to the long-term quality of the environment. (Note: this is a generic definition that includes a wide range

5 The Apollo Alliance was formed in 2004 by a group of business, environmental, labor and community groups and has been actively campaigning for policies to promote clean energy and 'green-collar jobs'. The term Apollo was selected to indicate a similar vision and technological challenge to that of the earlier Apollo space program in the USA: www.apolloalliance.org/about.php.

of factors such as environmental preservation and conservation, pollution control, waste disposal, natural resource management, etc.)

Green Economy - "The green economy encompasses the economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy" (Dierdorff, et. al., 2009).

Green-Related Industry - an industry sector that is likely to include establishments that produce products or services that are related to the green economy.

Green Economic Activity Category - a category of activities that impacts positively on greater use of renewable energy, increased energy efficiency, or environmental sustainability.

Green-Related Occupations - occupations that are likely to include jobs where the work activity supports the production of green products and services, or "greener" processes regardless of whether the establishment produces green products.

The above definitions provide a larger conceptual framework for understanding green jobs. *Perhaps the most significant of these, is the green economic activity category.* The concept of a green job necessarily requires a link to a green economic activity. Moreover, that connection may be a step beyond the primary purpose of a product or service. For example, the primary purpose of a consumer purchasing a new central air conditioning unit to replace an existing unit is to cool a home. A secondary outcome may be that the new unit is more efficient and over time will lower monthly bills. A green-related outcome is that the unit contributes to reduced energy use (energy efficiency) and reduced carbon emissions (if the electricity is generated by fossil fuels) *relative to the older, less efficient unit*. In this example, it might seen a green job as one that is essential to the manufacturing of the air-conditioning unit; another might be the installer or service mechanic for the unit.

The literature presents three definitions of green jobs, each in some way helping to promote a particular framework for what counts as a green job. These definitions, include the *industrial,* the *occupational*, and the normative points of view:

- Industrial: The work is essential to the products and services that improve the environment and/or the job involves work in green economic activity.[6]
- Occupational: The extent to which green economic activity and technology shape occupational demand and work requirements.[7]
- Normative: Jobs that improve the environment and provide good wages, equal opportunity, and pathways out of poverty.[8]

The three definitions of green jobs, including the industrial, the occupational /process, and the normative, are all operative. For example, green jobs were talked about as being related to specific industries, like the solar industry. Green was also described as a process by which existing jobs are retrofitted with new specialty skills to take on new green-related work.

In the literature, few employers pretend having created totally new jobs while they have

6 Gregson, J. A. (2010). "A conceptual framework for green career and technical education: Sustainability and the development of a green-collar workforce", Journal of Technical Education and Training, 2(1), 123-135.

7 Dierdoff, E. C, Norton, J. J., Drewes, D. W., Kroustalis, C. M., Rivkin, D., & Lewis, P. (2009). Greening the world of work: Implications for O'NET-SOC and new and emerging occupations (O*NET Research & Tech. Reps.) Washington, DC: US Department of Labor.

8 Woods, J. (2009). Measurement and analysis of employment in the green economy: Workforce information council green jobs study group final report. Washington, DC: US. Department of Labor, Bureau of Labor Statistics.

the need for enhanced specialty skills to be added to the core functions of existing jobs and occupations. Even renewable energy (RE) employers and scientists collaborating on advanced new wind blades were admitting that the repair technicians' training and certification for this new Green occupation required a core set of mechanical and trade skills that already existed in the labor market. Aspects of the normative definition were also affirmed as being instrumental in the literature as almost everyone talks about the social value of green jobs and how the image of green work energizes incumbent workers and attracts new recruits to technical fields. While all proponents of normative definitions agree that green jobs provide opportunity for meaningful work, some acknowledge that the working conditions are difficult and that the pay is not always enough to keep pace with the cost of living and to qualify as "good job" from this point of view. The seasonal nature of some of the jobs also creates insecurities that raise questions about whether green jobs are good jobs. But in general, literature on the green industry and green workforce development affirms many of the above features of the green jobs.

In terms of the dynamics of the green labor market, evidence in both cases suggested that green jobs were skilled jobs that offered meaningful work with advancement opportunities and that required skills in short supply. But there is little evidence to suggest that green jobs have low barriers to entry, or that there are shortages of workers in the core industries that are becoming green. In addition literature is silent on whether green jobs could be outsourced and whether company restrictions on job training funds are leading to a lack of support for training in the core skills of occupations in the green sector.

1.6. Approach to Measurable Definition of Green Jobs

To understand the significance of changes in energy and environmental products, services, and business practices, with their incumbent effect on employment and the need for workers, it is useful to undertake rigorous studies that measure and analyze green economic activities and jobs. The foundation for such analysis is a definition of green jobs that is specific and clear enough for use in measurement. Some principles for developing a measurable definition of green jobs include:

- Concepts and definitions must tie directly to green economic activities. The definition of a green job starts with an economic activity and then identifies jobs related to the activity.
- Green-related definitions must be actionable for the purpose of the data collection effort to be undertaken.
- The job is the unit of observation for occupational employment measurement.
- Data should be categorized by industry (product or service produced) and by occupation (type of work performed) using official statistical/classification systems.
- The definition of green jobs for statistical measurement should conceptually recognize three elements; jobs that are:
    - Involved in producing green products;
    - Involved in greening production processes; or
    - In the supply chain to produce green products and services. Methods and the degree to which each of the above can be measured are still open to question and require further development.

- The definition should be based solely on economic activity and not include factors such as wages, or benefits.

Generally, green jobs are jobs in which the work relates directly to the production or delivery of green products or services related to green economic activity categories. The most common terms reference environmental and energy issues including: conservation, clean up, use of alternative energy, and energy efficiency. These common elements are also noted when definitions of the green economy are considered.

Table 1.2. presents four alternative definitions of green jobs. The first three are basic definitions currently used in some studies, and the fourth is a working definition for possible use by countries or governments in conjunction with the green economic activity categories. The suggested definition is intended as a definition for measuring green jobs and ultimately green-related occupational employment.

Table 1.2. Alternative Green Definitions

Source	Definition	Comment
Generic	A green job provides products or services in any of the green economic activity categories.	A high level concept that must be spelled out for practical use in measurement.
Variation of early WA state definition	Jobs that directly support environmental protection and clean energy in one of the green economic activity categories.	This variant provides some information in the definition itself before the reference to the categories, and could stand alone without the reference.
UNEP Report: Green Jobs: Towards decent work in a sustainable, low carbon world	Green jobs: positions in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities that contribute substantially to preserving or restoring environmental quality.	Definition stands by itself by specifying types of positions that contribute to environmental quality. The UNEP document elaborates on the definition including (but is not limited to) jobs that "protect and restore ecosystems and biodiversity, reduce energy, materials, and water consumption… de-carbonize the economy, and minimize…all forms of waste and pollution." The UNEP report adds additional criteria related to "good jobs."
Definition Constructed from the Workforce Information Council to measure green jobs	A green job is one in which the work is essential to products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability. The job involves work in any of the green economic activity categories.	The definition specifies work that is essential (while this is subjective, it does provide some notion of the degree of the relationship).

Source: Workforce Information Council – Green Jobs Study Group, Final Report (2009):Measurement and Analysis of Employment in the Green Economy, October, p. 19.

The definition of green jobs alone is insufficient to determine the parameter or the extent of what we can measure. It is the combination of the definition, the green economic activity categories, and instructions on the survey instrument that provide the full context for measuring green jobs.

- In the definition: *work is essential.* It implies that there is some level of importance

and relevance of the work to a green-related activity, and that without the work, the product or service would not be provided. From a measurement standpoint it is important the interpretation of 'essential' in determining whether a job qualified as "green."

- Green Economic Activity Categories - the green economic activity categories are important in measuring and analyzing green jobs in several respects:
  - They provide more specific information to support measurement than the definition alone.
  - The categories help survey respondents better determine whether the jobs meet the green criteria specified by the combination of definition and green activities.
  - The categories may be used at a level for collecting data.

From the analysis of various definitions, a proposed list of green economic activity categories could be presented as follows:

Table 1.3. Proposed Green Economic Activity Categories

Green Economic Activity	Activities Included (but not limited to)
Renewable Energy and Alternative Fuels	Manufacturing, production, construction, design, research, delivery, operation, storage and maintenance of wind, solar, biomass, hydro, alternative transportation fuels, geothermal, ocean, methane, and waste incineration as a fuel source.
Energy Efficiency and Conservation	Manufacturing, construction, installation, production of energy efficient products, energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements (smart grid), transportation technology, and battery development and storage improvement.
Pollution, Waste, and GHG Management, Prevention, and Reduction	Activities related to controlling commercial, transportation, and industrial emissions and pollution; water treatment, recycling operations, waste product management and treatment. Includes controlling and reducing emissions of CO_2, other greenhouse gases, waste water, and other pollutants.
Environmental Cleanup and Remediation and Waste Clean-up and Mitigation	Environmental remediation including the cleanup and disposal of pollution, waste, and hazardous materials; Superfund/Brownfield redevelopment; and landfill restoration.
Sustainable Agriculture and Natural Resource Conservation	Products and services to conserve, maintain, and improve natural resources and environment, including low carbon agriculture, land management, water management and conservation, wetlands restoration, and environmental conservation.
Education, Regulation, Compliance, Public Awareness and Training, and Energy Trading	Activities to educate the public, business, and government on energy efficiency, renewable energy, energy rating systems certifications, and more efficient energy consumption. Also informing appropriate parties about enforcing compliance requirements and regulations, promoting state energy standards and plans, and training on effective use of energy related products and processes. In theory, energy trading could include buying and selling of power or fuels related to energy efficiency and renewable energy as well as cap and trade activity to control pollution.

Source: Workforce Information Council – Green Jobs Study Group, Final Report (2009): Measurement and Analysis of Employment in the Green Economy, October, p. 17.

This is a working framework of green economic activities. One may prefer to vary some of

the categories to focus more specifically on important sectors in the economy. The above provides a basis from which one might start and against which specific differences can be documented to facilitate any sharing or comparison of studies and green-related employment estimates. With green economic activity concepts in hand, attention is turned back to defining a measurable definition of green jobs.

A measurable definition of green jobs includes several components and supporting information including:

- A general one or two sentence description relating the job to the greening economy.
- A direct relationship to green economic activity area categories.
    - The categories set the scope of what is green and what is not.
    - A degree of relationship of the work to the green economic activity categories should be indicated. For example, the work related to the green economic activity is essential to the work, a primary function, or characterized by a percentage relationship. This relationship can be specified in the basic definition.

Finally, as a measurable definition could be proposed the following: *A green job is one in which the work is essential to providing products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability*. The job involves work in any of the green economic activity categories: renewable energy and alternative fuels; energy efficiency and conservation; pollution, waste and GHG management, prevention and reduction; environmental cleanup and remediation and waste clean-up and mitigation; sustainable agriculture and natural resource conservation; education, regulation, compliance, public awareness and training and energy trading.

Some degree of jobs in the supply chain also could be collected. For example, jobs related to manufacturing of wind turbines may be counted if the respondent considers the product as green. However, the definition does not adequately address how far along a supply chain products be included as green. For example, it would be problematic if manufacturers of bolts indicated that bolts were a green product because they were used in building wind turbines. Further research on supply chain relationships and methods of measurement would be useful both in measuring and interpreting empirical results.

1.7. Changes in Employment

From a broad conceptual perspective, employment will be affected in at least four ways as the economy is oriented toward greater sustainability:

- First, in some cases, additional jobs can be created, as in the manufacturing of pollution control devices added to existing production equipment.
- Second, some employment will be substituted - as in shifting from fossil fuels to renewables, or from landfilling and waste incineration to recycling.
- Third, certain jobs may be eliminated without direct replacement - as when packaging materials are discouraged or banned and their production is discontinued.
- Fourth, it would appear that many existing jobs (especially plumbers, electricians, metal workers, and construction workers) will simply be redefined as day-to-day

skill sets, work methods, and profiles are greened. It goes without saying that this last aspect is by far the hardest to document and analyze, and the hardest for which to foresee the full implications.

Highly aggregated findings of employment impacts of green policies and business ventures are of somewhat limited utility: the job effects necessarily vary for different firms, industries, regions, and countries

There is also the question of to what extent specific communities, regions, or countries benefit from green employment. In part, this is linked to the questions of to what extent energy and materials need to be imported, what share of revenues is captured by local producers as opposed to middlemen and globally-operating companies, and whether the necessary industrial and knowledge base, as well as infrastructure, exist in a particular country, region, or other locality.

Countries that become leaders in green products, services, and technology development want to press their advantage and capture export markets in addition to serving their own domestic markets. Indeed, countries like Germany and Japan see the environment as a key dimension of their future economic strategy. This implies that the bulk of green business revenues and jobs in research and development (R&D) and manufacturing operations accrues to a relatively small group of countries, at least until other countries catch up. By contrast, jobs in operations and maintenance tend to be created in or near the location where wind turbines, solar panels, efficient windows, etc. are installed and used; they cannot be easily outsourced.

Like any other economic activity, investment in environment-friendly economic activities - generates a certain number of direct jobs (design, construction, operations, maintenance) and indirect jobs (in supplier industries). Aggregate employment figures, however, can hide important dimensions such as the spatial distribution of jobs - where will jobs be created, and which regions will benefit most? To a large extent, this depends on the technology, skill, and manufacturing base of a given country or region. Particularly in the energy, extractive, and agricultural sectors of the economy, a key question is where processing of raw materials takes place, and thus where the "value-added" from such operations is accrued.

Economic science also speaks of "induced jobs." These jobs are supported by the everyday consumer spending of those in direct and indirect jobs. Of course, any sector in the economy entails such induced employment, and one might question whether induced jobs should even be considered here. However, there are two important distinctions:

- One concerns wage levels: better-paid jobs translate into greater purchasing power and thus more induced employment.
- The second distinction relates to the composition of purchases of food, clothing, etc., and where these goods and services were produced; in other words, to what extent money spent circulates in the local or regional economy or "leaks" out into the broader world economy.

Some green jobs are easily identifiable - such as people employed in installing a solar panel or operating a wind turbine. Others, particularly in supplier industries, may be far less so. For instance, a particular piece of specialty steel may be used to manufacture a wind turbine tower without the steel company employees even being aware of that fact. Thus, some jobs come with a clear "green badge," whereas others - in traditional sectors of the

economy, may not have an obvious green look and feel.

A crucial question is whether investments in environment-friendly economic activities support more, or fewer, jobs per unit of spending than expenditures in more polluting and waste generating industries. In other words, are they more or less labor-intensive?

Having in mind all of the previous, it is worthy to notice two concepts that are very important:

- First, not all green jobs are equally green. One could employ the term "shades of green" to indicate that some policies will yield greater environmental benefits than others. Pollution avoidance is better than pollution control. A similar picture unfolds with regard to the question of whether green jobs are decent jobs. There is an enormous range in terms of skill requirements, occupational profiles, career prospects, and wages among green jobs. And there is a panoply of working conditions and worker rights. Green jobs can be good jobs, but this depends to some extent on technical aspects (that is, the extent to which certain types of work expose workers to hazards), and on the degree to which union organizing and collective bargaining are permitted.
- Second, the creation of green employment in key parts of the economy has the potential to "radiate" across large swaths of the economy, thus greening commensurately large sections of the total workforce. For instance, providing clean energy supplies means that any economic activity has far less environmental impact than today, when fuels and electricity are still produced largely from dirty sources. Likewise, greening vehicles (that is, producing cars, trucks, and buses that run on cleaner fuels and are more efficient) means that the many millions of jobs in transportation services are by implication also greener. Green buildings to an extent help green the jobs of those who work in them. Nonetheless, such effects do not obviate the need for additional environmental measures, such as phasing out the use of toxic materials, reducing waste, and so on. But it does imply that beyond the numbers of green jobs that can be quantified in specific sectors, such as renewables, there is a far greater realm of sustainable employment.

1.8. Potentials and Challenges for Green Jobs Growth

The potential for further green job growth is tremendous. Renewable energy is poised for continued expansion, and may generate many million jobs in wind and solar alone over the next two decades. If most or all new buildings were constructed according to higher efficiency standards, it would revolutionize the construction industry. Many additional green jobs can be created through extensive weatherization and retrofitting of existing buildings.

Imagine if economic stimulus packages and other government and business programs around the world were truly aimed at spawning a revolution in innovative green technologies - that is, they provided funds to retrofit buildings so they no longer require heavy air conditioning in the summer and expensive heating in the winter.

The numbers of additional green jobs that could be generated through such path breaking measures is unknown, but obviously enormous. Table 1.4. offers a broad look at the greening potential of different sectors of the economy with a special attention to buildings (Construction); that is, the extent to which their environmental impacts can be reduced.

It also characterizes green job growth in these areas to-date and offers orders-of-magnitude estimates of future green job growth. In doing so, it demonstrates the wide variety of greening potential, and the diverging degree to which this potential has so far been translated into reality.

Table 1.4. Green Job Progress To-Date and Future Potential

		Greening potential	Green jobs progress to-date	Long-term green jobs potential
Energy	Renewables	Excellent	Good	Excellent
	CCS	Fair	None	Unknown
Industry	Steel	Good	Fair	Fair
	Aluminium	Good	Fair	Fair
	Cement	Fair	Fair	Fair
	Pulp and paper	Good	Fair	Good
	Recycling	Excellent	Good	Excellent
Transportation	Fuel-efficient cars	Fair to good	Limited	Good
	Mass transit	Excellent	Limited	Excellent
	Rail	Excellent	Negative	Excellent
	Aviation	Limited	Limited	Limited
Buildings/ Construction	Green buildings	Excellent	Limited	Excellent
	Retrofitting	Excellent	Limited	Excellent
	Lighting	Excellent	Good	Excellent
	Efficient equipment and appliances	Excellent	Fair	Excellent
Agriculture	Small-scale sustainable farming	Excellent	Negative	Excellent
	Organic farming	Excellent	Limited	Good to excellent
	Environmental services	Good	Limited	Unknown
Forestry	Reforestation/afforestation	Good	Limited	Good
	Agroforestry	Good to excellent	Limited	Good to excellent
	Sustainable forestry management	Excellent	Good	Excellent

Source: Worldwatch Institute (2008) Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World, Worldwatch Institute with technical assistance by the Cornell University Labor Institute, for the United Nations Environmental Program (UNEP), Nairobi, p. 301.

Regarding Buildings/Construction, buildings are responsible for between 30 to 40 percent of all primary energy use, greenhouse gas emissions, and waste generation at the global scale. Because of these two realities - the large environmental footprint and the capability to significantly reduce emissions – buildings have emerged as a critical area for climate change mitigation and the move toward environmental sustainability.

Fortunately, most of the changes required in the shift from conventional building practices toward energy-efficient buildings can be done primarily with existing technology with little or no net cost. Perhaps more importantly for businesses, individuals, and policymakers, energy-efficient measures in buildings have the potential of having a negative net cost over time, as the initial investment pays back over a period of time and can be reinvested back into the community.

The IPCC report states: "most studies agree that energy-efficiency will have positive effects

on employment, directly by creating new business opportunities and indirectly through the economic multiplier effects of spending the money saved on energy costs in other ways."[9] The positive result of both environmental improvements and employment increases from energy efficiency measures is known as the double dividend.

Energy-efficient measures in the building sector lead to direct, indirect, and induced jobs. Jobs are created directly in the building sector. This is significant because most of the sector is comprised of small and medium-sized enterprises: 90 percent of global construction still occurs in microfirms that have ten or less employees. Even the largest companies in the sector are small in comparison to the leading multinationals in other major industries like energy, banking and investment, and retail. The jobs created in the building sector are mainly performed directly at the development site, and therefore are typically local. Indirect jobs are created mainly in the manufacturing sector, and induced jobs are created as money that would have previously been spent on energy is freed up and re-spent in the community. Not only are jobs created in building operations and construction, but they are also created in manufacturing, administration, and consulting.

The building and construction sector employs more than 111 million people worldwide, or approximately five to ten percent of total employment at the country level. Changes in how buildings are designed, built, and operated, along with how building components are manufactured and energy is used, are likely to affect job numbers and types of employment.

The energy-efficiency measures in the building sector - green building, retrofitting, and building components (including water heaters, cooking equipment, domestic appliances, office equipment, electronic appliances, heating, ventilation and air conditioning systems, and lighting), have great potential to both reduce greenhouse gas emissions and create jobs. But they remain underutilized. New green building initiatives are also a step in the right direction, but only represent a small fraction of the potential in this sector.

Since *energy efficiency work* generally focuses on existing buildings that otherwise would not have been improved, it creates new job opportunities, along with entirely new specializations. Jobs in energy efficiency are also, by necessity, local jobs, since they deal with "end-use solutions" - reducing energy use at the site of consumption.

Energy efficiency projects and jobs are diverse, but in general, increasing efficiency in existing buildings involves some or all of the following types of workers: engineers, designers, buildings trades and construction professionals, building maintenance and operations staff, and IT (information technology) specialists.

The following sections describe the types of green collar jobs, the skills required, and the opportunities and barriers to growing jobs in three major areas: *energy efficiency upgrades, efficient building operations,* and *energy management.*

Many techniques and technologies help improve an existing building's energy efficiency. Building owners often implement multiple upgrade measures following an analysis, or "audit," of the building's energy use. Measures implemented in these comprehensive building upgrades - retrofits – vary from project to project. Many projects, especially in larger buildings, involve replacing, rebuilding, or installing new energy-using systems. Other projects, particularly in smaller buildings and homes, may focus on repairs and improvements to the building's shell - sometimes referred to as its envelope – and other

9 IPCC (2007): Mitigation of Climate Change, Cambridge University Press, Cambridge UK and New York, p. 417.

basic measures. In general, upgrades can include:

- Replacing boilers
- Installing air-conditioning chillers
- Improving indoor air circulation systems (including duct work, blowers, and fans)
- Improving electrical systems (including installing light sensors and thermostat controls)
- Installing renewable energy systems (including solar photovoltaic power, solar heating, and geothermal systems)
- Installing new roofs (including green roofs or cool roofs)
- Replacing lighting fixtures
- Adding or replacing insulation (including insulating pipes)
- Replacing windows with insulated glass
- Replacing appliances with energy efficient appliances
- Caulking around windows
- Replacing light bulbs (replacing incandescent with compact fluorescents)
- Replacing doors and adding sweeps under doors to minimize heating and cooling loss

Regardless of project size or scope, a building energy upgrade is usually a three-stage process: Stage 1: Auditing/Assessment, Stage 2: Pre-Construction, and Stage 3: Construction.

Efficiency upgrades involve a number of skilled professionals and construction trade workers. The majority of new jobs created are similar to existing jobs. They require general construction or engineering knowledge, plus some additional skills. In contrast, building auditing is a relatively new field with emerging titles, qualifications, and career pathways.

Finally, optimistic assessment of the potential for future green job growth must, however, be seen against the backdrop of some pressing and unavoidable realities. These include:

- Green jobs are expanding, but are not yet growing rapidly enough - especially when one considers the fact that the global labor market is expanding by some tens of millions every year. Moreover, employment levels are generally lagging behind the supply of new workers. In 2006, the International Labor Organization (ILO) reported that the number of unemployed people is at record levels - 195.2 million. Together, the unemployed and underemployed (working hard without earning sufficient income) amount to one in three of the world's workers. Unemployment has hit young people (aged 15-24) the hardest, with 86.3 million young people representing 44 percent of the world's total unemployed in 2006.
- Green employment has gained an important foothold in the developed world; however, it is still quite exceptional in most developing countries. Yet these same countries account for some 80 percent of the world's workforce. China and Brazil appear to be making progress in this regard, but much more needs to be done to ensure that green employment becomes a truly global phenomenon.
- The rising level of informality in the global economy constitutes a major challenge

to green job growth. Moreover, the chronic and worsening levels of inequality both within and between countries are a major impediment. The effort to advance decent work and pro-poor sustainable development is critical to building green jobs across the developing world in particular.

- Unsustainable business practices are still prevalent and often remain more profitable than green ways of doing business. Short-term pressures of shareholders and financial markets are not easily overcome. The early adopters of green business practices have to contend with companies - manufacturers and retailers - that command consumer loyalty through low prices achieved on the back of "externalized" costs. And surprisingly often, market failures, coupled with lack of green knowledge, impede action.

1.9. Winners and Losers

As the move toward a low-carbon and more sustainable economy gathers momentum, growing numbers of green jobs will be created. Overly aggregated job numbers, however, may hide important distinctions, exceptions, and disparities. For instance, local communities and regions could want to ensure that green jobs are created within their jurisdictions; governments and unions could watch closely whether green development could benefit the domestic economy or companies and communities in other countries.

Not everyone could be a winner. There will also be losers - at least temporarily. These include employees of companies that are slow to rise to the environmental challenge, heavily polluting industries, and regions where many livelihoods depend on them. The policy challenge is not to let these distinctions become permanent features. The transition to sustainability and greener employment needs to be well planned.

Environmental regulations can have "technology-forcing" effects - stimulating safer and more benign products and production processes - that give companies a competitive edge rather than putting them at a disadvantage. Smart innovations and modifications to the production process offer substantial savings in outlays for energy and raw materials, in operating costs, and in avoided waste, disposal expenses, and associated liabilities. Such advantages will loom larger as governments move more aggressively to counter climate change and to direct economies toward greater sustainability through full-cost accounting and other measures.

Unlike the conventional energy industries of coal, oil, and natural gas, the winners in the development of renewable energy sources are determined less by natural endowment (i.e., where extractable resources are located) than by policies in support of technological development and training the required skilled labor. However, in contrast to manufacturing activities, the installation of solar panels and wind turbines, or the weatherization of buildings and retrofitting of industrial equipment, are activities that are by definition far more local.

Companies, countries, and regions that become leaders in green innovation, design, and technology development are more likely to retain and create new green jobs. This will translate into tremendous market and export opportunities for the early actors. The laggards, however, may well incur substantial business and job penalties. In the automotive industry, for example, Toyota has been a leader in hybrid technology. US. automakers have long been reluctant to pursue this technology (and fuel efficiency more generally). Now losing market share, they have announced heavy layoffs in recent years.

Public policy can and should seek to minimize disparities among putative winners and losers that arise in the transition to a green economy. Although the losers, with regard to employment, are likely to be far outnumbered by the winners, some workers can undoubtedly be hurt in the economic restructuring toward sustainability - primarily those in mining, fossil fuels, and smokestack industries. At least some, perhaps many, of the displaced individuals will not have the requisite skills for the new jobs without retraining. A laid-off coal miner cannot easily switch to a job installing solar panels. Also, new green jobs may arise primarily in locations other than those shedding jobs in polluting industries. Regions and countries that depend heavily on extractive and polluting industries can confront a substantial challenge to diversify their economies.

Resource extraction and heavily polluting industries are likely to feel the greatest impact of moving toward sustainability. But blocking environmental action would not save jobs in these industries. The rapid pace of automation and resource depletion means that employment in many of these industries is still shrinking even as output grows. In fact, in many industries jobs are more likely to be at risk where environmental standards are low and where innovation in favor of cleaner technologies is lagging. And as the urgency of more sustainable practices rises over time, so do the costs of a do-nothing strategy that misses opportunities for early action that can be phased in and are thus less disruptive in impact.

1.10. Green Jobs as Decent Jobs

Green jobs span a wide array of skills, educational backgrounds, and occupational profiles. They occur in research and development; professional fields such as engineering and architecture; project planning and management; auditing; administration, marketing, retail, and customer services; and in many traditional blue-collar areas such as plumbing or electrical wiring. Also, green jobs exist not just in private business, but also in government offices (standard setting, rule-making, permitting, monitoring and enforcement, support programs, etc.), science and academia, professional associations, and civil society organizations (advocacy and watchdog groups, community organizations, etc.).

Environmental awareness and applied green literacy will become increasingly important in many professions. But not all green jobs can be new ones, and in fact, it is likely that in most workplaces low-key changes in day-to-day work practices and methods will predominate. Blue-collar workers may fairly quietly be transformed into green-collar workers. Indeed, a November 2007 report published by the American Solar Energy Society (ASES) finds that, "the vast majority of the jobs created by renewable energy and energy efficiency (RE&EE) are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc. In fact, most of the workers employed in these jobs may not even realize that they owe their livelihood to RE&EE." [10] The ASES study emphasizes that renewables and efficiency-related parts of the economy employ workers at all educational and skill levels.

A narrow definition of green jobs may focus solely on the green credentials of a job. However, green jobs also need to be decent jobs - pairing concerns like efficiency and low emissions with traditional labor concerns including wages, career prospects, job security, occupational health and safety as well as other working conditions, and worker rights. Of course, the precise nature and quality of jobs across the planet varies enormously. While desirable, there will be no single global standard for the foreseeable future. But even ac-

10 Bezdek Roger, Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century, Boulder, CO: American Solar Energy Society, 2007, pp. 5, 21.

cepting the inevitability of differentials in pay and other characteristics, certain standards need to be upheld. People's livelihoods, rights, and sense of dignity are bound up tightly with their jobs; jobs need to provide equal hope for the environment and the jobholder. A job that is harmful, or fails to pay a living wage (or worse, condemns workers to a life of poverty) can hardly be called green.

Ideally, the future of employment will increasingly be marked by jobs that are respectful and protective not only of the natural environment, but also of workers' health, human needs, and rights. However, there are today millions of jobs in sectors that are nominally in support of environmental goals - such as the electronics recycling industry in Asia, for instance - but whose day-to-day reality is characterized by extremely poor practices, exposing workers to hazardous substances that endanger their health and lives. Decent work conditions need to be as important to advocates for the environment as environmental concerns to advocates for labor. Today, far more information is available about quantities of jobs than about their quality. But to make the term "green jobs" meaningful, considerations such as wages, working conditions, and workers' rights will have to become an integral aspect of future policies and strategies. Only then can we truly speak of fair and sustainable development. Governments, communities, businesses, and labor unions all have a role to play in ensuring a satisfactory outcome.

1.11. Transition to Green and Sustainable Economy

The transition to a sustainable, low-carbon economy is a social process. It involves technological innovations, shifts in business and investment strategies, as well as a new set of policies – all of which are products of social interactions and negotiations.

The transition involves businesses, workers, communities, and movements. It produces new green jobs and the greening of some existing jobs. However, it also results in job losses and jeopardized livelihoods in certain regions, communities, industries, and economic sectors. Faced with this scenario, calls are emerging for a "fair and just transition," (or just transition) whereby those harmed by the changes are adequately assisted, and the new opportunities created are shared by specific groups of workers, social constituencies, and communities.

There appears to be an emerging framework that allows for a just transition to operate on several levels, ranging from the global-societal level down to workplaces and local communities. This framework is grounded in some well-established social practices in the face of job challenges, and is reflected in the ongoing work of the ILO, the trade unions, national and local governments, businesses and industries, and community-based organizations. However, it is a framework that has been structured around a principle and a goal. The *principle* holds that the costs and benefits of a transition to sustainability should be shared widely across society. The goal is to generalize this principle at the level of policy. Steps are being taken here and there to turn the just transition approach into reality, but there is still a long way to go before it becomes a policy norm.

While major economic transitions in the past have led to significant social and economic progress for society, it is also necessary to note that fair and just transitions have not happened often in history. In fact, the story of the social impacts of economic change throughout history is replete with countless examples of often serious hardships. In recent decades, deindustrialization in the developed world and the impact of structural adjustment programs and excessive liberalization in some developing countries as well as in the

post-socialist countries, there are examples of these poorly managed transitions. Overall, modern society often has struggled to deal effectively with the social negatives triggered by major economic turbulence and change. This history weighs heavily on the shoulders of those who hope to ensure that the next great economic transition - the transition to a green and sustainable economy - will depart from this often discouraging script.

The story of economic change is, however, also a story about political choices. More often than not, these choices have put the accumulation of wealth before the needs of the majority. Policymakers have also shown a propensity to let accommodations to economic change be left to market forces, especially given the fact that economic transitions are occurring all the time and such changes are often socially and economically beneficial. However, the transition to a sustainable economy and the qualitative expansion of green employment is likely to resemble no other transition in human history. It is a transition that will be assisted by market forces to some extent, but other market forces will push against the needed changes. The scope of the transition should be global and it needs to proceed at a pace that's more or less unprecedented in economic and social history. In just two or three decades, probably the entire global economy will need to be well on the road to a low-carbon and sustainable future. Markets cannot drive the transition alone, and neither can they be relied upon to deal with the problems that the transition will inevitably create.

Thus, the effort to expedite a transition to a green and sustainable economy will also involve a new set of approaches and policy options. The need to green the world economy presents an opportunity to make the right policy decisions, but there is nothing intrinsically fair or just about either the process of becoming green or the end result - this must be pursued politically within the overall paradigm of sustainable development whereby the social dimension is fully and equitably integrated into the economic and environmental dimensions.

Fortunately, the effort to create a transition can draw encouragement from the long tradition of social and labor legislation put in place to protect the poor and disadvantaged, to facilitate and enable the creation of socially necessary work, and to embed social solidarity in the fabric of economic life. But perhaps the key to understanding the potential of a just transition is not to view it simply as some kind of safety net, but as a means to bring economic life into a democratic and sustainable framework, one grounded in meaningful social dialogue and driven by broadly shared economic and social priorities. The issue, then, is not simply about the transition itself, but what follows the transition - the goal being a new mode of production and consumption that allows for greater social inclusion, equity, and opportunity.

Solid research and development (R&D), engineering, and manufacturing capacities are the critical aspect of building green industries and jobs. Indeed, some occupations in the renewables sector or in energy efficiency require highly educated and even quite specialized personnel, including a variety of technicians, engineers, and skilled trades. At the cutting edge of technology development for wind turbine or solar PV design, for instance, specialization has progressed to the point where universities need to consider offering entirely new study fields and majors. Still, green employment is not limited to high-end skills. There are many positions that demand a broad array of skill and experience levels, especially in installation, operations, and maintenance.

In both developing and industrialized countries, there is increasing need for what some have termed "green collar" training in a broad range of occupations besides the most high-

ly educated positions. This is important both to prepare the workforce/labor force, at large for the skill requirements inherent in green jobs and to ensure that green industries and workplaces do not face a shortage of adequately trained workers. It is also important as a commitment to people in poorer and disadvantaged communities - providing a ladder out of poverty and connecting green jobs with social equity.

Promoting such job training is equally important in developing countries. A variety of U.N. and other international agencies such as UNEP, ILO, UNIDO etc, working in conjunction with business, trade unions, and community organizations, could play a critical role in setting up green training and expertise centers in developing countries.

In all countries, it is important to link green subsidies, tax breaks, and other incentives provided to companies with job quality and training standards, to ensure the creation of "high-road jobs" - decent pay and benefits and safe working conditions. Training and education for green jobs will also need to emphasize gender equality.

2. GREEN JOBS MEASURING AND CREATION - THE ROLE OF THE GOVERNMENT

2.1. Need of Green Jobs Measurement and Prediction

The interest in green jobs has reached extraordinary levels. With this interest has come an infectious optimism regarding the potential of green employment. In a sense, the green job has become something of an emblem for both a new and sustainable economy and a more just society.

Much of the present optimism around green jobs is justified. The growth of green employment in many countries is already very significant. There are series of quantifications, estimates, and projections of green jobs around the world, in addition to anecdotal and circumstantial evidence of green jobs growth and potential.

There are, of course, many remaining data gaps. Governments must establish statistical reporting categories that recognize and help capture relevant employment in both newly emerging industries and green employment in established sectors. Governments should also commission in-depth modeling and econometric efforts to analyze not just direct green jobs but also those that are related in a more indirect manner. Business associations and trade unions can play a useful part as well. Some have begun to do job surveys and profiles, but far more of these kinds of efforts are needed. Attention also needs to be given to disaggregating data on the basis of gender in order to ensure that there is equality of opportunity for women and men for green jobs. And greater scrutiny of supply chains is warranted, to better understand just how much many traditional businesses and occupations are positively affected and reinvigorated by the greening of the economy.

Conventional industries tend to be well captured in government and other statistics. By contrast, of the totality of what can be characterized as green economic activities, employment data are available only for certain segments (industries or countries). Even where such data are available, they tend to be snapshots rather than time series, and to be estimates and projections more than firm figures. New industries - such as the renewable energy sector or energy auditing - can be identified relatively easily. But other changes that help green the economy are much harder to define and capture: for instance, new technologies, business practices, and shifts in professions and occupations that yield improved energy, materials, and water efficiency; methods and techniques that help avoid or minimize the generation of waste; or new structures and infrastructures that generally make an economy less reliant on material inputs. Many of these changes will occur in existing companies and industries, but are difficult to separate out.

Greater efficiency is a core requirement of an economy that is less environmentally damaging - achieving the same economic output (and level of wellbeing) with far less material input. But efficiency is a relative and highly dynamic concept. There is no easily agreed threshold or cutoff point that separates efficient and inefficient. How much more efficient is sufficient? And, given technological progress and the ever-present need to minimize environmental impacts associated with energy and materials consumption, can yesterday's

level of efficiency still be regarded as adequate tomorrow? Thus, while the basic definition of a green job may stay the same, its essence keeps changing over time.

For newly emerging "green" sectors of the economy, such as renewables, employment estimates may alternatively be derived from industry surveys, from analyses that generate employment coefficient estimates (such as jobs per unit of production or production capacity installed, or jobs per unit of investment spending), or from macroeconomic models (such as input-output models that seek to capture direct and indirect employment and estimate net employment impacts).[11] The modeling exercises are usually based on a key underlying assumption, such as meeting a specific policy goal (for instance, generating a portion of energy supplies from clean sources by a given target year), spending a given amount of money, or implementing a policy tool (such as a carbon tax). These different approaches result in findings that cannot simply be aggregated or extrapolated.

Other studies, based on macro-economic calculations, do not focus on green industries but seek to determine the likely overall effect on the economy arising from policies aiming to reduce greenhouse gas emissions or other environmental impacts. They focus on the ways in which production costs may change, how demand for products and technologies may be altered by new regulations and standards, etc.

The results of such analyses are heavily influenced by the basic assumptions that go into them. For instance, how will the costs of energy and material inputs evolve? A basic assumption among environmentalists and ecological economists is that prices for energy and materials will have to rise in order to stimulate greater conservation and efficiency measures. But how fast will prices rise, and will this change occur as part of a deliberate, far-sighted policy or as a consequence of unforeseen and unwanted shocks? How well do companies adapt, and to what extent do they attempt to green their operations in a proactive fashion or resist such change?

The nature of these and other assumptions inevitably colors the general nature of the findings. Thus, skeptical assumptions about reducing greenhouse gas emissions or other environmental measures will likely produce studies that predict job losses, just as more positive assumptions will yield upbeat results. Most studies agree, however, that the likely impact is a small positive change in total employment.

2.2. Green Jobs Survey

A survey approach appears to be the best method of estimating green jobs since the official statistical classifications are not structured to differentiate "green" workers from other workers in the same industries or occupations. So, there is a need for a survey that establishes a standard set of definitions and methodologies, and a need for flexibility within a state to modify definitions of green jobs.

11 No one can omit the warning that input-output analysis could be inappropriate for green jobs proposals. Input-output analysis assumes that technology does not change to enable some inputs to produce more output while requiring the price ratios of the various inputs to remain constant. Yet green jobs proposals clearly violate both of these assumptions since they assume alternative energy technology will improve and they assume a move to higher cost energy which would change the relative price ratio of energy inputs to other inputs!

2.2.1. Principal Purposes of Green Jobs Surveys

There are many ways and levels at which green-related employment can be examined. As such, establishing the purpose of the survey is paramount to effective survey design. The following questions may be considered when clarifying the purpose of the survey:

- Is the survey intended to measure the number of green jobs? If so, is it intended to measure the number of green jobs by green economic activity categories?
- Is the survey intended to measure other items in addition to or instead of the number of green jobs (e.g., wages, demographics, training requirements, green business practices)?
- At what level of industry and occupational classification and geography will green job data be grouped?
- Is the survey focused on the entire economy or segments that might be considered part of the green economy (e.g., employment related to renewable energy or to pollution abatement)?

2.2.2. Designing a Green Jobs Survey

One institution or government interested in undertaking a survey can learn from the experience of others and should consider the following when planning the process and developing the timeline for the effort:

1. Planning - developing the scope of the study.
2. Response modes - determining survey implementation and response mode(s) - mail, phone, Internet, or a combination.
3. Survey instrument - designing, developing the survey instrument.
4. Testing the survey instrument.
5. Sampling - determining the sample and drawing the sample of establishments to be surveyed.
6. Follow-up procedures to obtain desired response rate.
7. Data editing and data capture - processing responses and assigning classification codes.
8. Estimation.
9. Data analysis, presentation and dissemination.

1. Planning. The purpose and context of a survey is to establish the basic framework for the green-related data to be collected. To determine the type of information to be collected and analyzed, it is necessary to develop a thorough knowledge of customers (requesting or using the output) and their needs. Steps to consider could be the following:

- Clearly define goals and purposes.
- Identify what is to be measured.
- Develop definitions of terms (e.g. green jobs, green activity).
- Build in sufficient time to plan the project, review the definition and other aspects

of the plan, develop and pretest the instrument, undertake a cognitive review, implement, and follow-up with respondents.

- Include a cognitive review. As an evaluative approach, cognitive review can focus on the entire survey - administration process or solely on the questionnaire. A cognitive review is to be conducted so that unnecessary hurdles in the response process are removed. The cognitive review ensures that instructions are clear, questions are understood as intended, and that responses meet the requirements of survey sponsors.

It is important to state that measuring and analyzing green jobs are different from the traditional measurement and analysis of occupations and industries.

- Green activity is crosscutting and involves jobs in many industries and occupations.
- The term "green jobs" raises many different opinions and poses significant risks of response bias, so careful design and testing is important. It might be useful to simply classify jobs by the economic categories they impact and not use the term green jobs or overemphasize the term in the questionnaire.
- The concept or definition of green can change over time. For example, is a product that is energy efficient today still energy efficient five years from now relative to more efficient products that may be developed? By implication, shifting definitions of green products and services over time could impact counts of workers involved in those activities.

Planning should include key stakeholders in the process. The potential of scope creep must be considered:

- The risk of serving multiple masters can become real and overburden a study.
- There is a fine balance between reviewing definitions and reaching consensus.
- One approach is to review definitions through a large constituency, but pursue final consensus with a smaller group using input from the broader range of partners.
- The study must be objective.

Scope decisions: in the planning phase, it is important to consider whether the survey:

- Includes all industries;
- Excludes industries deemed not likely to include green jobs;
- Focuses only on pre-identified candidate green-related industries; and
- Includes the private sector and/or the public sector.

2. Response Modes. Obviously, there are a variety of response modes, but it is important to notice the following:

- Web-based online response capability should be considered.
- Although it is often assumed that giving a respondent a choice of response mode may reduce non-response, some studies have shown that offering a larger number of response methods in the initial contact or mailing package can lead to a somewhat lower response rate.

3. Survey Instrument. Understanding that a job is the unit of analysis it seems critical to defining green employment for occupational employment purposes and designing the survey process and instrument.

- Collecting information on "green jobs" makes it possible to do internal microanalysis of establishments that have green jobs, and analyze and publish information on green-related occupations and green-related industries.
- Estimates of green jobs can be aggregated at the industry and occupational level.
- Optimally, estimations of jobs within establishments should be done to the most detailed level possible.

Green definitions should be included on the instrument and should:

- Link definition to defined green economic activity categories;
- Establish a degree of relationship (such as the work is essential to the activity);
- Reference a time period (such as a quarter or a year); and
- Include specific examples of what should and should not be included under a green economic activity category.

The initial screening question on whether the respondent needs to continue the survey is critical. It should be clarified that the survey will be returned even if the establishment does not have the types of activities being studied. Without these returns, response bias is a danger. It is useful to obtain the total employment of firms that do not produce green products and services. Also, it is important to design the survey questions to minimize handoffs at the establishment. Cognitive review and pre-testing may help identify whether handoffs are likely and may suggest design changes to avoid them.

Ideally, the survey should be designed so that one person can provide the response. The extent to which a single respondent can accurately respond to all of the questions may improve response rates. In this sense, the instructions may be part of the survey instrument or included as an enclosure.

The instrument should include clear definitions of green jobs and economic activities along with examples of elements to be included or excluded under each category. The survey instrument can be associated with enclosures including endorsements. Some surveys may pick up jobs related to green processes within an establishment whether or not the establishment produces green output.

4. Testing of the Survey Instrument. Unclear or poorly worded questions can deter responses, elicit biased responses, or produce information that is not what was intended to be studied. Formal cognitive review and pre-tests are recommended to improve response rates and to reduce response bias.

Examples of items to consider in testing include:

- Are the questions clear and effective?
- Can the respondent provide the requested information?
- Is the instrument well-designed?

5. Sampling. In developing a sample, one may need to explore options:

- What stratification should be used (e.g., by establishment size, industry, area)?
- What sampling method will be used?
- Assigning sampling weights for use in estimation.
- Is there value in over-sampling industries that have been pre-identified as potential green industries, while still surveying all industries?

6. Follow-up Procedures. If respondents self-identify green jobs, it is important to ensure that phone interviewers do not provide direct advice on whether to categorize any item as green or not. Ad-hoc surveys require extensive follow-up to get acceptable response rates. The significant non-response prompting is needed, especially on a one or first-time survey. Training phone interviewers proved important in collecting data by phone or following up with non-respondents.

7. Data Editing, Data Capture, Processing Responses, and Assigning Classification Codes. Generally most jobs should be coded relatively easily to appropriate categories based on official statistical practice/experience. Online entry tools for Web responses should include features that allow respondents to save partial responses for subsequent completion.

8. Estimation. Generally the study should weigh the results to represent all industries included in the survey scope to compute estimates of the green jobs by industry and by occupation.

9. Data Analysis, Presentation, and Dissemination.

- Looking at how much growth comes from existing firms versus births - might provide some linkages to other things like venture capital and patents;
- Examining companies that responded if they have green jobs to see how long they have been in business and to compare green to non-green businesses;
- Exploring other business dynamics.

These lessons learned provide an invaluable laboratory of experience that may serve as a starting point for the development of a survey and study.

2.2.3. Context of How Survey Data Can Be Used

It is equally important to establish how the survey data will be used in conjunction with other data and to design the survey to facilitate use of its result with other data. For example, one survey might be designed to estimate green jobs but not to collect wage data - instead using official wage data in the analysis. Another might collect wage data for green jobs directly, which would require different questions and survey design.

While there is much in common among the surveys presented, it is clear that the data collected and the way in which it is used will vary. Each survey collects data to develop an estimate of green jobs of some type, but key differences in the researcher's interest and needs affect design of the survey and questionnaire including, but not limited to:

- The range of jobs to be included.
- Collection of wage data through the green-related jobs survey.
- Obtaining information on education or training needs via the survey.
- Identifying key green business practices.

These differences demonstrate the variation in how a researcher customizes surveys to meet his/her specific needs. These variations can inform future survey initiatives and enable a researcher to learn from and possibly apply findings from other surveys without collecting identical information. They also illustrate the importance of clearly establishing the purpose and context of the survey to provide a broad framework for collecting green-related data.

2.2.4. Definitions and Categories of Green Jobs Used in a Survey

As discussed earlier, clear definitions of green jobs linked to defined green economic activity categories are necessary to any study.[12] The magnitude of green jobs estimates will depend, to a significant degree, on the definitions used. The definition, purpose, and context of use of the survey influence the scope of the survey, the population to be surveyed, questionnaire design, and sampling methods. The definitions of green jobs and green economic categories not only direct the questionnaire design, but also guide respondents completing the survey, providing a basis for determining which jobs to include as green.

2.2.5. Survey Questionnaire Items

Questionnaire design flows directly from fundamental decisions about purpose, use, and definitions of key terminology, as well as from decisions on the collection mode.

1. *Qualifying or Screening Question:* Each survey includes a basic screening question that determines whether the respondent fills out the entire survey or just certain questions. Variations among screening questions, may be instructive to future survey design.

   The screening question is important in several ways. Primarily, the screening question provides information that helps the respondent determine whether his/her firm provides products or services that meet the green criteria. In addition, basic information, such as total employment and type of business, from firms that do not produce green-related output is valuable. At a minimum, asking if a firm provides green products or services offers a point of comparison of how many responding establishments produce green products and services and how many do not. When coded to an appropriate level, this becomes an important ratio in any analysis as to what percent of the establishments within an official classification produce "green" output. It also may allow internal analysis at a more detailed level than can be

12 Remember that one can define green jobs as positions in agriculture, manufacturing, construction, installation, and maintenance, as well as scientific and technical, administrative, and service-related activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect and restore ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency and avoidance strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution. But green jobs, also need to be good jobs that meet longstanding demands and goals of the labor movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organize labor unions.

published to better determine which type of establishment is most engaged in the green economy. The questionnaire must clearly ask and encourage respondents who answer "no" to the screening question to return the survey.

2. *Survey Items* on Number Employed in Green Jobs: Although slight variations exist, the survey should:

   - Collect the total number of employees in the establishment. This is important since the percentage of green jobs in an establishment or industry is a basic measure for analysis.
   - Distinguish how strongly the work relates to a green activity to be included as green.
   - Focus on collecting detail on direct green jobs.
   - Use green jobs as the unit of observation.
   - Collect information on the number of employees by green job titles and employment by the particular green economic activity categories. Collecting data at this level provides a perspective on the relationships of occupations to green economic activities. This level of detail also requires the respondent to make distinctions by the core area.

3. *Survey Items Related to Green Job Duties, Skills, or Wages*: each survey usually collects some additional information related to green jobs.

4. *Survey Items Related to Education Requirements, Training Needs, and Hiring Concerns*: Information on current and anticipated education and training requirements is of great interest to education, business, and government. While many studies indicate that the majority of green-related jobs do not require significantly different skills, many require some OJT or modest skills training. It is unlikely that such information can or should be collected in detail through an ongoing green jobs survey, but establishing some baseline information for future study, similar to the unique skills discussion above, could be useful.

As discussed earlier, surveys are likely the best method to estimate and track trends in green employment. However, before undertaking a survey it is important for researchers to review existing labor market information and to identify the scope and purpose of their study to determine what data will need to be collected. Alternative research methods include the analysis of existing labor market information data combined with information from reports produced by associations, business web sites, and public agencies.

2.3. Considerations for Development of Nationwide Information on Green-Related Employment

The demand for labor market information to measure green economic activity is ever-increasing. State labor market information (LMI) units and Bureau of Labor Statistics (BLS) are expected to provide information and analysis on green economic activities that can be used to support planning and policy development by private and public organizations and individuals. The challenge now is to build from the experience of early foreign efforts

to measure green jobs to conceptualize and plan how a nationwide employment statistics system can incorporate and measure green employment as part of its output.

To measure and track green employment requires clear and rigorous thinking on how information is collected and used. Any nationwide system to measure and analyze green jobs must be viewed as a part of the overall LMI system; green is simply one aspect of the larger system. It requires special attention, however, because it is crosscutting among products and services, jobs, and industries.

Establishing a benchmark or foundation of green job employment and subsequent tracking will require survey-based data. Design of a national survey rests with State Statistical Office of the Republic of Macedonia (SSO). There are, however, items to consider in the planning of any survey of green jobs.

- *Sampling.* Among issues that might be considered is whether over sampling predetermined green-related industries/sectors is useful to maximize data on green jobs. A survey of all industries would seem appropriate for any initial national survey effort. Some stratification or over sampling might be considered.

- *Desirable outcomes*. Ideally green jobs estimates would be developed through a nationwide survey with data produced at the state/country level.

- *Frequency of survey.* No matter how tight the definitions and instructions are in a survey, there may be some variations based on response bias that impact measuring year-to-year changes. Until some nationwide survey results are available, it will not be clear as to what degree annual surveys can pick up year-to-year changes in green jobs. However, an annual industry-based estimate of green jobs (without occupational detail) would seem an essential feature of a nationwide system to measure year-to-year changes and trends over several years. A national survey to generate occupational detail might be modeled with data collected over two or three years to develop green-related occupational estimates to ensure sufficient occupational/industry detail.

Several other efforts and issues might be considered for future study.

- *Understanding* occupation and industry relationships. Developing information on industry-occupation relationships in key green economic activities, including supply-chain relationships, green products and services, and potential impacts of large public or private initiatives on employment, may help inform analysis of survey data. Understanding relationships between industries/sectors also will help illustrate what the potential magnitude in employment growth is and whether more detailed coding may be needed for some industries. It also may help establish upper bounds on what growth might be expected or is realistic. Until survey data are available, consideration might be given to developing a green industry-occupation matrix by combining the occupation and industry worksheets. This would be a subset of the national industry-occupation matrix, including only occupations and industries that have been pre-determined - informed by the completed state surveys - as likely green candidates.

- *Tracking green businesses* and new green jobs. Some thought might be given to

identifying and tracking a sample of green businesses - businesses that are strongly related to the green economy. It would also be useful for a nationwide system to track potential new occupations. None of the studies completed so far around the world identified new green jobs suggestive of a new emerging occupation. Consideration should be given to a concerted effort to investigate the use of online job and employment listings to monitor new job titles, emerging skills, and possible new occupations. Collecting and deriving data on green-related company births would be valuable. It would be useful to identify new companies with new products, as these may become significant sources of new job (and emerging occupations) creation.

- *Monitoring major developments.* Efforts should be made to monitor private investments, major policy, and public initiatives in the energy and clean environment arenas for possible impact on future employment needs. Keeping informed on major private or public certifications related to green economic activity areas also is useful.

These considerations outline only a few possible ideas that might be considered as the nationwide employment statistics includes green employment measurements.

The purpose of introducing these elements is to encourage further dialogue and action toward conceptualizing and incorporating green designations into to the existing system. SSO is facing some major issues with the greening of the Macedonian economy. They need a significant work for the nationwide labor market system to respond to the fundamental need for basic information to help us define and measure green jobs in the Macedonian economy. There are no hard and fast solutions, but for sure there are two goals that should be realized:

Goal 1 - Define "green jobs" and describe what needs to be measured about them.

1. Develop an understanding of the issue and the various existing attempts at measurement.
2. Identify and examine the issues and questions surrounding the measurement "green jobs", drawing on the work mentioned above. The following is an initial list of issues and questions:

- What kind of data and information do policymakers and the public need about "green jobs"? What questions need to be answered?
- What is the definition (or alternative definitions) of "green jobs" for purposes of policy analysis and workforce and economic development? Can this definition become operational for purposes of measurement?
- Are "green jobs" concentrated in certain industry or occupational groups? If so, which ones?
- Are entire industries or occupations "green"? If so, what are they and are they identifiable within existing classification systems?
- When are portions of jobs in certain industries or occupations "green"? Can this be measured?
- What are the educational and training requirements of "green jobs"? Are they similar to those of non-green jobs? Are certain certifications or licenses required specifically for "green jobs"?

- What are the wages paid by "green jobs"?
- What kinds of skills are required by "green jobs" and how are these similar to or different from skills required by other jobs? Are these skills obtained through relatively short-term training of workers in existing or related occupations, or do they require longer specific training?
- Are "green jobs" concentrated in certain areas of the country? If so, what types of jobs are concentrated in what areas?

Goal 2 - Develop alternatives for measuring "green jobs", including estimating costs of measurement.

1. Develop proposals for providing the data and information policymakers and the public need about "green jobs." These proposals should include:
    - Identifying what would be measured: the outputs or products.
    - Identifying the measurement methods that could be used. Different measurement methods may be needed for different outputs or products.
    - How frequently should measurement be conducted to measure trends?
    - What criteria should be used in evaluating the measurement methods?
    - Estimating the approximate costs and time requirements for the data collection and analysis activities.

2.4. Measurement and Prediction of Green Jobs: Estimating Empirical Approaches

Estimating economic impact, including creation of jobs, of any major investment scheme is difficult as multiplier effects can change over time and there are often unintended consequences. The longer the time horizon it is, the less dependable do input-output coefficients become for predicting future jobs. With green jobs, there are further complications such as their definition and assumed labor intensities. Many of these industries are relatively new; some technologies are not even deployed at the commercial scale. As such, the estimates of jobs per denar investment or per unit of energy output depend on small data sets, which probably render them less reliable. Government support in the form of subsidies, tax breaks, direct investment grants, domestic content requirements and the like complicate the analysis further as these policies distort comparative cost advantages and often lead to adoption of more expensive technologies that impact the rest of the economy; can be transitory; can be redirected to different technologies; and can change over time. All of these uncertainties add to the inherent lack of precision in any modeling exercise and necessitate additional scenario and sensitivity analyses to cover all reasonable paths of development.

Overall, it can be concluded that adding "net jobs" cannot be defended as another benefit of investing in green energy (alternative energy technologies, energy efficiency and conservation). Each option offers benefits such as lower emissions and a more diversified portfolio, albeit at different levels.[13]

13 Global Insight (October 2008. US. Metro Economies: Current and Potential Green Jobs in the US. Economy, for The United States Conference of Mayors and the Mayors Climate Protection Center) counts nuclear industry jobs, agricultural jobs supplying corn to ethanol plants and government jobs in environmental administration as green

However, studies focusing on green jobs face additional challenges, first of which is defining what constitutes a green job. Many green technologies are relatively new, representing a small share of the market and lacking sufficient economies of scale to have achieved their long-term cost structure with the possible exception of onshore wind. Although it is reasonable to expect that at least some of these technologies will continue to evolve and that their costs will be reduced, it is difficult to compare all of these technologies and identify front-runners. Unless these paths of technology evolution are well understood, how many people will be employed by which technology, what skills these jobs will need, what kind of wages they will pay, what kind of market entry support these technologies will need and many more questions will remain difficult to answer. And without these answers, the accuracy of cost, price, and wage assumptions made during modeling exercises will remain questionable.

Despite different approaches in a wide range of studies, some common issues and inconsistencies could be identified.

- Perhaps most importantly, the different definitions of "green" jobs used by different studies demonstrate clearly the fundamental problem of comparing various studies' results.[14]
    - Jobs created are not always separated between construction jobs, which are temporary, and operation jobs, which are long-term.[15]
    - Some studies assume that green jobs will be higher paying than conventional energy industry jobs or average wage; but in the absence of more granular look at types of jobs and skill levels, this assertion is hard to justify. For example, there is no a priori reason to expect a generic construction job at a wind farm site will pay more than a similar position at another power plant site.
    - Jobs may not be "new" in that already employed people will be doing "green" work. Given the challenge of defining these jobs, counting an existing job as "new" doubles the chance of a miscount. A related complication is that some people may be doing green work while continuing to work in conventional fuel industries as well.
- Often, there is no analysis of job losses.
    - Increased cost of energy to businesses and households will reduce consumption on other goods and services given the same budget, which will translate into job losses in these other sectors. As some of the studies recognize, green technologies generate more expensive electricity or yield more expensive fuels with current technology. With economies of scale and more R&D, many of

jobs. As the authors acknowledge, many in the environmental community would not accept nuclear technology as green. Also, hydro and biomass are counted as green alternatives. But, there is opposition to hydro facilities, especially larger dams, due to their negative impact on the ecology around their reservoirs and flow paths. Collection and combustion of biomass is not free of emissions, and hence of opposition, either. The net balance of energy and emissions for corn-ethanol can be worse than conventional fuels in a life-cycle basis.

14 The Bureau of Labor Statistics (BLS) in the US. recognizes this fact in stating that, "There is no widely accepted standard definition of "green jobs." While this topic is of interest across government, academia, and the business community, various studies define the term differently." In its effort to standardize the definition, BLS classifies "jobs involved in economic activities that help protect or restore the environment or conserve natural resources" as green jobs, which includes recycling, pollution reduction, organic farming, and similar non-energy activities. As such, if one was focusing on the impact of renewable energy technologies, counting all of these categories in their analysis would inflate the results.

15 Counting construction jobs going forward introduces an upward bias based on an implicit assumption that there will be constant or even increasing level of new construction.

these technologies will have lower costs in the future but there is no agreement in what time frame and by how much.

- ° Loss of traditional industry jobs. Green technologies will replace demand for conventional fuels and technologies, which will undoubtedly lead to lay-offs in these industries.

- Some macroeconomic benefits such as increased productivity, higher disposable income, and lower cost of doing business are not backed up by any evidence and are inconsistent with the realities of green technologies and energy markets. For example, higher labor intensity and higher energy costs that result from rapid expansion of green technologies will increase cost of doing business and reduce disposable income ceteris paribus.
- Usually, these kinds of studies depend on very aggressive growth assumptions for renewable power, far above official government forecasts.
- Most studies do not address how much it would cost both in terms of capital investment and, more importantly, end-user prices of electricity and transportation fuels. There are lump-sum stimulus assumptions in some studies but they are not directly related to investment. Investment requirements and time frame assumptions vary widely between the studies. Resulting job creation estimates also differ significantly.
- An implicit, and sometimes explicit, assumption in many studies is that there is an unlimited supply of labor that will be ready to fill green job openings. Although this may be true for unskilled construction jobs, which are temporary, some skilled jobs may not be that easy to fill. The existence of many training programs for wind, solar and biofuels industries indicate that some additional skill development is necessary. It may be more difficult to attract experienced employees for such positions.
- Many studies count on protectionist policies (tariffs on imports, local content requirements, etc.) to support the cultivation of domestic industries. But, the industry is already globally competitive; Chinese, Indian, Korean companies compete with established companies from Europe and the US. in wind, solar and other technologies and offer cost advantages. Protectionist policies will lead to higher cost products, hence amplifying the higher cost impact of green technologies on consumers and businesses.
- Job creation statistics and the opportunity cost of green investments in terms of job creation deserve special attention. Comparison of economic impacts of similar investment in other segments of the economy (energy or non-energy) is often lacking. Some studies offer investment in green jobs as a solution to economic slowdown or recession. If this Keynesian approach were to be followed, there are other sectors of the economy that could create more jobs for the same denar of investment.

To conclude, there is a high level of uncertainty surrounding the jobs estimates of these studies, partly because they use different definitions of a green job. But the estimates in separate studies differ significantly also because the studies in most cases use different models to estimate job creation and different investment scenarios. Also, there is little to no effort to balance the potential positive impacts with potential negative impacts of job losses and higher energy costs. In a sense, many studies are cost-benefit analyses without adequate cost considerations.

However, often creating jobs is also offered as a benefit associated with investment in these energy technologies. Some take it further and offer green jobs as a way out of recession (especially after the economic collapse in 2008) and a path into a sustainable growth economy. Such studies claim that investment in these technologies would create more jobs than investment in other energy industries, which would be true only if they require more labor per dollar (denar) than conventional technologies they replace. This argument is economically problematic as it implies lower productive efficiency and hence higher labor cost of production, with its negative impact on consumer budget and competitiveness of businesses in the global market.

Some alternative technologies may in part be more expensive than established technologies due to lack of economies of scale; and their costs may decline with expansion. Also, mitigation of some of this cost disadvantage via incentive programs may be justified based on environmental and diversification benefits green technologies may provide; but if they are also more labor-intensive and will likely remain so, their cost disadvantage may remain permanent. The enduring higher cost structure seems to be the case at least for the biofuels industry that depends on the agricultural, animal farming and forestry sectors that tend to be more labor intensive. Even the wind generation costs that have declined consistently over the years have been experiencing inflation in recent years. Promoting the job creation aspect of green technologies may in fact undermine their expansion.

2.5. Government and Green Jobs Creation

2.5.1. About Green Jobs Creation

The creation of a green job makes work for someone and it diverts resources from elsewhere in the economy. If the green job is a net benefit it has to be because the value the job produces for consumers is greater than the cost of performing the job. In fact the opposite, that it takes more work to provide the same amount of energy, is often argued as a benefit. The energy itself is the benefit, the work that goes into creating energy is a cost that we benefit by minimizing. The green jobs literature is riddled with this fundamental misunderstanding.

Many reports are mistakenly arguing that a cost is actually a benefit. We value the services and products that are provided when workers perform a job – not the actual performing of the work. The work that the job entails is a cost we must endure in order to receive the benefit the work provides. People generally prefer leisure to work – in fact that's why employers pay employees and not vice versa!

An alternative job creation proposal might make this point more clear. The government could create a program to hire half of all unemployed people to dig holes for eight hours a day and the other half of all unemployed people to follow around the first half and fill them back in. Millions of jobs would be created but it should be obvious to all that there would be no benefit for society. Nothing new would be created for anyone to consume. At a minimum, society would have lost the value that all of the diggers would have placed on their leisure.

Such a program would obviously have to pay the hole-diggers but this pay must come from somewhere. The government would either have to tax others, borrow, or print the money. This would shift real resources away from people's preferred consumption bundle

and towards hole digging. In the process some jobs that were providing services consumers valued would be lost. A "hole-digging" jobs program is bad for the economy because it creates nothing that people value and it takes real resources in terms of lost leisure and other lost consumer goods.

When green jobs studies accept the creation of "green jobs" themselves as benefits, they are essentially committing the "hole-digging" fallacy. The creation of a green job gives someone work by allocating resources that would have gone elsewhere in the economy. If green jobs are to be beneficial it derives from the fact that the value the jobs produce is greater than the costs of hiring workers to do the jobs. In fact, the opposite is often argued as a benefit: that it takes more work (or more green jobs) to provide the same amount of energy.[16] Minimizing the cost (doing more with fewer workers) should be the desired outcome. But green job studies desire more jobs in the production of less energy.

Also, the opportunity cost of "green" investment is almost always ignored in green jobs studies. When a dollar is invested in alternative technologies, the same dollar is not available for other sectors. When governments provide subsidies, grants, or tax breaks to expand more expensive technologies, be it renewables or nuclear, resources need to shift away from other sectors in the economy. If the purpose of investing is to create jobs, there are other sectors where the money could be spent more productively. As compared to the overall economy and some sectors in particular, investment in energy projects lead to job losses. "Net jobs" is the difference between jobs created with incentives in each activity minus estimates of jobs normally created per $1 million invested but that are *lost* due to diverted investment.

The process of economic development that has resulted in vast segments of the human population escaping the wretched poverty that humanity experienced for most of its existence is a direct result of increasing labor productivity. Unfortunately many in the Third World have not participated fully in the process of growth and increasing labor productivity driven by economic freedom. Intentionally designing policies to limit labor productivity condemns them to future poverty and limits the increases that the more developed world could enjoy as well.

Increased labor productivity does not result in unemployment. There is no fixed pool of work to be accomplished. As we get more productive we put those unemployed by technology to work doing other jobs.

The reality is that humans have limitless desires for goods and services and will always find ways to employ those whose current jobs are displaced by productivity enhancements. If there is a justification for the creation of environmental jobs it has to be the environmental benefits that it provides to humans – not the simple fact that it forces humans to work more to get less.

The issue for subsidy for the "self-financing energy efficiency" as an additional benefit claiming that money spent now on energy efficiency will pay for itself through lower energy bills over the long term is a controversial one. In some cases this is no doubt true. However, investments that are truly self-financing require no government subsidies since both private businesses and consumers would seek out these energy efficiency improvements.

Private businesses are generally long-term profit maximizers. When presented with market incentives, they can increase their profits by making their businesses more energy

16 If creating green jobs by forcing the consumption of more expensive forms of power is pursued one would have to investigate how increased power prices will slow growth in other industries.

efficient. If private businesses need such subsidies in order to induce them to undertake energy efficiency "improvements" then that is a strong indication that the decreased energy costs would not actually offset the true cost of the improvement. In other cases, in which the cost savings does offset the improvement cost, businesses would have made the investments anyway and such subsidies are a waste. Either the energy savings is not self-financing – or the program needlessly subsidizes investments that would have been made anyway.

2.5.2. On the Role of the Government

Whenever one Government heavily subsidizes an industry, it makes it profitable for firms in the industry to expand, and we can expect that there will be additional hiring within the industry. When the industry in question is involved in the production of renewable or clean energy, the additional jobs created in those industries are described as green jobs.

Those who support aggressive green jobs initiatives make the argument that there is an urgent need - because of the global warming threat - to move away from traditional energy sources and toward renewable sources. The hope is that this transition will not only mitigate the threat of global warming but that it will also be a significant source of jobs and economic growth, as millions of workers will be hired to build thousands of windmills, manufacture and deploy solar panels, harvest biofuel feedstock and so on.[17]

To understand the fallacy of governments creating green jobs through subsidies and regulations[18], we have to reach back to the writing of French economist Frédéric Bastiat. In 1850, Bastiat explained the fallacy that underlies such thinking in an essay about the unseen costs of such efforts. Bastiat explained it in terms of the broken window fallacy.[19]

Among economists, it is well understood that governments do not create jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services does. All that governments can do is subsidize some industries while raising costs for others. In the green case, governments will destroy jobs in the conventional energy sector, and most likely in other industrial sectors, through taxes and subsidies given to new green companies that will use taxpayer dollars to undercut the competition. The subsidized jobs that will be "created" are, by definition, less efficient uses of capital than market-created jobs are. This means they are less economically productive than the jobs

17 Politicians across the world have been touting green jobs plans for many years. Former British Prime minister Gordon Brown claimed that his green job plan was going to create 400,000 green jobs over the next eight years. Former US. Vice-president Al Gore has approvingly cited a study claiming that a green jobs strategy in the United States could create 1.7 million jobs in that country. President Barack Obama is even more ambitious, claiming that his plan for green jobs will actually create five million new green jobs.

18 A study by the Universidad Rey Juan Carlos (Alvarez Calzada Gabriel, Jara Merino Raquel, and Julián Juan Ramón Rallo, 2009: Study of the effects on employment of public aid to renewable energy sources, Universidad Rey Juan Carlos, March) evaluates Spain's recent initiative to create green jobs. Spain has been at the forefront of the creation of green jobs. The study found that for every four jobs created by green subsidies, nine jobs were lost in non-subsidized areas.

19 He explained the fallacy as follows: Imagine some shopkeepers have their windows broken by a rock-throwing child. People sympathize with the shopkeepers until someone claims that the broken windows are not that bad. After all, they create work for the glassmaker, who might then be able to buy more food, benefiting the grocer; or buy more clothes, benefiting the tailor. If enough windows are broken, the glassmaker might even hire an assistant, thereby creating a job. Similar to this, Bastiat in his famous "Petition by the candle-makers", he ridiculed the intentions of protectionist entrepreneurs by comparing them to candle-makers clamoring for the state to crowd-out the sun, which was competing with them unfairly when providing light. In their opinion, if the sun was barred from providing light, numerous jobs would be created in the candle manufacturing industry. Obviously, this is not so: precisely by not being able to profit from the sun's light we would be wasting scarce resources in the production of candles instead of producing other goods and services that would increase our wealth.

they displace and contribute less to economic growth. Finally, the good produced by government-favored jobs is inherently a non-economic good that has to be maintained indefinitely, often without an economic revenue model, as in the case of roads, rail systems, mass transit, and probably windmills, solar powered installations, etc.

2.5.3. Public Investment in Renewable Energy: Creation or Destruction of Green Jobs

Public investment in renewable energy has job creation as one of its explicit goals, which, given the current economic crisis, suggests an intention of seeding a future recovery with "green job" subsidies. The problem with this plan is that the resources used to create "green jobs" must be obtained from elsewhere in the economy. Therefore, this type of policy tends to create not just a crowding-out effect but also a net destruction of capital insofar as the investment necessary must be subsidized to a great extent and this is carried out by absorbing or destroying capital from the rest of the economy.

The money spent by the government cannot, once committed to "green jobs", be consumed or invested by private parties and therefore the jobs that would depend on such consumption and investment will disappear or not be created.

Investment in green jobs will only prove convenient if the expense by the public sector is more efficient at generating wealth than the private sector. This would only be possible if public investment were able to be self-financing without having to resort to subsidies, i.e., without needing to absorb wealth generated by the rest of the economy in order to support a production that cannot be justified through the incurred incomes and costs.

In order to know how many net jobs are destroyed by a green job program for each one that it is intended to create, two different methods were used:

- First, comparing the average amount of capital destruction (the subsidized part of the investment) necessary to create a green job against the average amount of capital that a job requires in the private sector;
- Second, comparing the average annual productivity that the subsidy to each green job would have contributed to the economy had it not been consumed in such a way, compares with the average productivity of labor in the private sector that allows workers to remain employed.

In order to obtain the annual public consumption of resources devoted to renewable energy one can calculate the average annuity value during the next 25 years of subsidies. Now, what should be the rate at which one can discount the annuities? In a private enterprise, the adequate rate would be the ROA (return on assets) because this is the rate of additional return that it would be obtained over a year if one had allocated, in the private sector, the annual cost of renewables.

For an entire economy, the closest thing to a ROA is the relationship between the annual income of capital and the stock of capital in the economy, that is, a ratio of the annual return on that stock of capital.

This figure must be compared with the annual average productivity per worker in the rest of the economy. This data can be obtained by dividing the total income of labor in the economy by the number of workers.

For instance, the solar energy is significantly less competitive given that it requires more than twice the amount production of subsidy per megawatt compared to wind energy. By putting the per megawatt subsidy data in relation to the mean amount of capital resources, it can be obtained the number of jobs lost as a result of each kind of subsidized renewable energy source. Although solar energy may on paper appear to employ many workers (essentially in the plant's construction), the reality is that for the plant to work, it requires consumption of great amounts of capital that would have instead created many more jobs in other parts of the economy. Inversely, wind power, while still noxious in its economic impact when coercively introduced through state intervention, wastes far fewer resources per megawatt of installed capacity and thus does not destroy as many jobs in the rest of the economy.

Finally, it is worth considering the distribution of the destroyed jobs across the economy. Obviously, the specific productive sectors affected will depend on how the government finances the subsidies to renewable energy. One can basically separate the approaches intro three groups: increases in energy rates, increase in taxes or an increase in public debt.

- The first method aims to correct the rate deficit, which in part is caused by the subsidies to the renewables, evidenced by a higher future electric cost.
- The second method reduces the amount of income that consumers or businesses have available, reducing consumption and/or investment.
- Finally, the subsidy to pay for "green jobs" or renewables could be financed by issuing public debt. This strategy poses a similar effect to the previous method but spread out over time (since it implies higher future taxes). However, debt has an additional effect: a restriction of present available credit that a business could use to refinance its debt or undertake new investments. Thus, employees of the most leveraged businesses or of investment projects that would need cheaper credit to be undertaken will suffer the costs of the renewables.

2.5.4. Creating Green Jobs' Drivers

What are the key drivers of green employment? Green innovation helps businesses stay at the cutting edge, retaining existing jobs and creating new ones. While some companies have barely progressed past green sloganeering - or worse, "green washing" - a growing number have announced ambitious goals to reduce their carbon footprint or make their operations "carbon neutral."

Market forces and voluntary means alone will not be enough to translate green potential into reality as rapidly as is needed in light of climate change and other environmental urgencies. So, despite all of the previous, forward-thinking government policies remain indispensable. They are important for providing funding of green projects; overall goal- and standard-setting beyond the time horizons typical in the business world; providing infrastructure that private enterprises cannot or will not create; and creating and maintaining a level playing field for all actors. Key policies include:

- *Public investment and procurement programs.* These programs/policies can be important tools for governments to push the economy in a greener direction. From the national to the local level, government authorities spend trillions of dollars on public purchases every year. By buying environmentally preferable products, they can exert a powerful influence on how products are designed, how efficiently they function, how long they last, and whether they are handled responsibly at the end

of their useful lives. Well-designed purchasing rules can drive technological innovation and help establish green markets.

- *Subsidies.* Phase out subsidies for environmentally harmful industries, and shift a portion or all of those funds to renewable energy, efficiency technologies, clean production methods, and public transit.
  A key ingredient in shifting the economy to a more sustainable footing is phasing out subsidies for industries that pollute or use natural and financial resources inefficiently. Numerous subsidies allow the prices of fuels, timber, metals, and minerals (and products incorporating these commodities) to be far lower than they otherwise would be, encouraging greater consumption. Limits in data availability prevent a complete accounting of subsidies for environmentally harmful activities, and underlying methodologies and definitions may differ from study to study. But a 2002 report by the Organization for Economic Co-operation and Development (OECD) estimated global subsidies at about $1 trillion a year, with OECD member states accounting for three-quarters of the total.[20]

  Various types of renewables subsidies have had considerable success in a number of countries. Providing favorable financing through low-interest loans for individuals and businesses can help create a market that otherwise might take a very long time to emerge and to climb to a scale where significant cost reductions become feasible. Germany's Solar Roofs program (started as a 1,000 Roofs program in 1991 and expanded to 100,000 Roofs in 1998) is one such well-designed initiative. In China, the government supports biogas, solar energy, small hydro, and wind projects with low interest loans (at rates typically half those of a standard loan). In Nepal, the government subsidizes 75 percent of the cost of small biogas plants and solar-powered drinking water pumps used by families. Bangladesh's Grameen Bank has operated a loan program for household photovoltaic systems since 1996. Micro-lending for renewables could play a huge role in many developing countries and help create jobs.

  A distinction needs to be made between fossil fuel subsidies for producers and for consumers. On the consumer side, subsidies are often essential for the poor to gain access to energy and energy services. The poor often spend a much higher share of their income on heating fuels, electricity for cooling, and other forms of energy than those in the middle class, let alone the wealthiest in society. Without subsidies, they may not be able to afford commercial energy sources critical for their wellbeing and survival, or they may rely on highly polluting energy such as wood burning. A phase-out of fossil fuel-related subsidies needs to be accompanied by measures that make alternative energy affordable. This is yet another instance where environmental and social objectives need to be integrated.

- *Carbon markets.* Official development assistance accounts for a very small share of global financial flows, and analysts have pointed to alternative funding mechanisms. Carbon trading in general, the Clean Development Mechanism (CDM) and Joint Implementation (JI) instruments included in the Kyoto Protocol in particular, have been cited as potential large-scale sources to support the development of renewable energy and energy efficiency, and thus green jobs. Companies and governments can acquire carbon credits by supporting specific emissions reduction projects, using either of these two mechanisms (with the CDM, targeting developing nations, so far playing a much larger role than the JI). The European Union's

20 Organisation for Economic Co-operation and Development (OECD), Towards Sustainable Consumption: An Economic Conceptual Framework, Paris: Environment Directorate, 2002, p. 41.

Emission Trading Scheme (EU-ETS) - which currently accounts for the bulk of all carbon trading - specifically provides for such transactions.

- *Tax reform.* Current tax systems discourage job creation even as they encourage resource consumption. Carbon taxes, levies on the use of nonrenewable energy and virgin materials, landfill fees, and other waste and pollution charges provide an incentive for manufacturers to move away from heavy fossil fuel use, to boost energy and materials productivity, and to curtail the generation of wastes and emissions. Rather than merely imposing a new tax, though, it makes sense to advance a shift in taxes. Current systems make natural resource use far too cheap and render labor too expensive. Using eco-tax revenues to lighten the tax burden now falling on labor (by deploying tax revenues to finance national health or social security funds that are now typically funded through payroll taxes) would help lower indirect labor costs and could thus boost job creation without hurting workers' interests.

  Discussed theoretically since the late 1970s, ecological tax shifting started to become a reality in the 1990s in a growing number of European countries. Denmark, Germany, Italy, the Netherlands, Norway, Sweden, and the United Kingdom introduced reforms linking a variety of green taxes to reductions in social security contributions. Before adjustment for inflation, environmental tax revenues in the EU more than quintupled between 1980 and 2004, to $364 billion (€266 billion). The bulk of these revenues are derived from taxes on gasoline and diesel, and on motor vehicles. Unfortunately, eco-taxes are frequently weakened by a variety of loopholes - granting exemptions to certain industries or energy sources, applying reduced tax rates to energy-intensive firms, or making companies eligible for partial reimbursements. Often, this is done in the name of preserving the competitiveness of domestic industries on the world market.

- *Targets and mandates.* Regulatory tools play a crucial role in the drive to develop greener technologies, products, and services - and thus green employment. This includes land-use policies (for which jurisdiction tends to be on the local and regional, rather than national, level), building codes, various kinds of energy efficiency standards, and targets for renewable energy production. A growing number of governments have mandated efficiency standards for household appliances. By 2000, for instance, 43 countries had such programs in place - seven times as many as in 1980. Most of these were in Europe and Asia. The European Commission (EC) has issued directives on the energy performance of buildings and on the final uses of energy and energy services. The first, adopted in December 2005, asks member states to define national action plans that will yield annual energy savings of one percent during 2008–2017. The second came into effect in January 2006 and requires member states to establish minimum standards of energy performance for new buildings and large renovated buildings. The EC also issued a directive on the promotion of cogeneration in 2004.

There are other alternative drivers (or policies) that governments can pursue by themselves:

- *Energy alternatives.* Adopt innovative policies to overcome barriers to renewable energy development, including feed-in laws that secure access to the electrical grid at guaranteed prices.
- *Product take-back.* Adopt "extended producer responsibility" laws (requiring companies to take back products at the end of their useful life) for all types of products.

- *Eco-Labeling.* Adopt eco-labels for all consumer products to ensure that consumers have access to information needed for responsible purchasing decisions (and hence encouraging manufacturers to design and market more eco-friendly products).
- *Budgets for Research and Development.* Reduce support for nuclear power and fossil fuels and provide greater funding for renewable energy and efficiency technologies.
- *International Aid.* Reorient the priorities of national and multilateral development assistance agencies as well as export credit agencies away from fossil fuels and large-scale hydropower projects toward greener alternatives.

Modern economies mobilize enormous quantities of fuels, metals, minerals, lumber, and agricultural raw materials. Although some changes have been made in past decades to reduce the world economy's environmental impact, these gains are insufficient and may simply be overwhelmed by continued economic growth.

In view of the gathering environmental crisis, and especially the specter of climate change, there is an urgent need to make economies far more sustainable and thus to re-examine the prevailing production and consumption model. Concepts such as dematerialization, remanufacturing, "zero-waste" closed-loop systems, durability, and replacing product purchases with efficient services (such as "performance contracting") have been discussed for some time and tested in some instances, but by and large have yet to be translated into reality.

Economic systems that are able to churn out huge volumes of products but require less and less labor to do so pose the dual challenge of environmental impact and unemployment. In the future, not only do jobs need to be greener, their very essence may need to be redefined. A number of countries and companies have wrestled with proposals to reduce individuals' work time in order to share available work better among all those who desire work.

3. GREEN JOBS IN USA, EUROPEAN UNION, AND AUSTRALIA

3.1. International Experience with Green Jobs: Methodological Remarks

The review of relevant international green jobs (GJs) literature has attempted to cover the subject of green jobs from the point of view of its contemporary causal dimension; that of a trans-border, global effort for climate change mitigation. Necessity has already dictated that such an effort and its consequences must be undertaken not under the 'old-fashioned' nation-state ideology of the early 20th century, but under a global coercive consensus initiative, gathering this time on the world table major old and new international organizations and initiatives of highly regionalized groups of states, countries and nations as the key players.

Therefore, there was made an effort to examine the voluntary initiatives and mandatory regulatory binding decisions that address or directly influence the GJs formation, by starting "top-down" from the world and regional-governance levels, while when going to GJs policy paradigms to be able to examine concrete practices and results from the "bottom-up" level of social formations. For example, those of our living communities, states and nation-states, hopefully all conscious and sharing, if not the responsibility, but the minimum common understanding of the reasons and the need for greening our societies.

Therefore in this chapter a review is examined in detail of the major systematic GJs initiatives, financed and promoted by the two key western regional governance formations: The Federal Government of the United States of America and The European Union Governance of its country nation-states, as well as the case of Australia.

For these cases, examples of policies and practices at their State and Country levels have been selected on the base of two criteria:

- Their ranking and reputation on the performance of measures to implement energy efficiency (EE) and to create GJs
- Whenever possible upon their relevance to the case of Macedonian particularities (size, climate, state of the economy, administrative history and level of regional integration)

International experience shows that in the last few years we have witnessed to a slowdown in the process of green jobs creation, due to the fact that it is difficult to turn the expressed needs for retrofitting to retrofitted products. To this point, it seems that the major problem is not labor supply, but the expansion of the energy efficiency retrofitting market.

On the one hand, numerous "market potential" studies examining the energy savings potential of BEER-REER show that EER savings pay-back with a reward the necessary retrofitting capital within a reasonable time. Also, experimental evidence and numerous surveys show that there is a lack of information among *owners and real estate manage-*

ment professionals and a lack of specific know-how among *financial intermediaries* on the amounts to be saved in EE and on the level of risk associated with such cash flows.

But again literature shows that there are signs that markets are increasingly learning from failures and difficulties and we assist to a proliferation of creative business models and financial instruments that are either pilot tested or remain to be tested and refined.

On the other hand, best practices gathered from the international literature (global, continental, state and local) show that the labor market for green jobs shall have to be matched in the future with the particular new characteristics of the specific evolving BEER-REER markets.

Under the impetus of society's concern for the mitigation of climate change effects, international initiatives, regional and national/state energy efficiency laws and building energy efficiency regulations, all call for the attainment of increasingly higher levels of energy efficiency – a deeper retrofitting – for buildings.

Market rationality calls for the assembling/bundling of several individual EE operations under optimal scales that can provide both cheaper and deeper retrofitting by integrating the end-use with the production-distribution EE performance needs under common schemes (example of ESCO services for EE and for RE grids).

Therefore, to avoid the "lock-in" effect proper to the low-level weatherization type of retrofitting operations, governments, communities, home owners and retrofit service suppliers have both interest to devise concerted forms of retrofit organizations by grouping, bundling, and clustering these operations. For the purposes of clarity, the "lock-in" effect refers to the consumption of the owner's limited financial resources for sub-optimal energy efficient results. For example, once the retrofitting operation has been completed, it "locks" this building at a level of energy efficiency performance lower than that which could be attained through the application of a deeper retrofitting plan using multi-unit scale economies, better expertise, leveraged financing, change of technologies and appliances, and other measures.

Case studies from Europe, America and Australia argue with examples that to help turn operational a deep and wide BEER-REER potential that can embrace the quasi-totality of our built environment, today's urgent need for a green labor movement is to become organized for re-training and up-skilling and be available to supply to the short-to-medium term, increasingly complex and new green skills. For this, curricula, job descriptions and skills necessary are elaborated for the specialties needed in order to perform the packages of work-breakdown necessary for the management, operations and control needed for the field work performed in Energy Efficiency retrofits. Furthermore, it is imperative to start in parallel, if not earlier, from the preparation of Green concept communication specialists and of the training of tomorrow's trainers, to produce grass roots leadership that shall be able to organize the housing communities and to raise the consciousness of energy savings and benefits among the households.

For this, Business, Law and Economics schools as well as Social Work and Behavioral studies Departments, in cooperation with technical universities and vocational education colleges, often open up new curricula aiming to up-skill and trans-skill the existing skills within the labor trades but also the skills of banking, insurance, real estate and law firm employees in new instruments and the characteristics of this new and sizable market.

The fact that according to the international experience, an increasing number of green job

curricula and career pathways need not in the near future to be linked with the construction trades but that shall refer to new GJs skills for green employees and engineers in the municipalities, government, utilities, credit institutions and in the academia and vocational institutions, needs not to be overstressed here. Green Jobs opportunities, however, should not be limited to workers and employees only. A sustainable GJs initiative should focus upon the multiplier medium- to low-term effect upon jobs creation that only the establishment and multiplication of innovative medium and small enterprises can guarantee. In fact, US Federal and EU Governance initiatives are currently earmarking "green money" to stimulate the creation of innovative applied research in the SMEs in EE and RE sectors.

To this effect, small and medium local enterprises and industries linked to the building industry are not the only entities that should be identified to be up-skilled, trans-skilled or inno-skilled in green skills and to become members of the GJs initiative. In addition, universities of all specializations (business, law, technical) should rethink their curricula and/or enrich their services by offering extra courses in specific green skills. They should assist gifted students with demonstrated quality research results to undertake entrepreneurial activities and the commercialization of their innovative ideas on products and services directly and indirectly linked with the promotion and attainment of energy efficiency (e.g. software, control instruments, mathematical models, special green materials, etc).

3.2. USA

3.2.1. Introduction

When the 2007 recession hit, the US. government looked to the green economy as a source of innovation, economic growth, and job creation. This resulted in an unprecedented US. investment of US$500 million in the Green Jobs Training Act of 2007. Yet, the labor market trajectory of green jobs is highly contested. Although it is commonly understood that green jobs are in some way related to improving, protecting, and maintaining the environment (Dierdoff et al., 2009), there is still no agreed-on framework that can delineate the basic characteristics of green jobs, determine the nature of the work, and establish methods for capturing this information and for counting green jobs.

Although placing workers in green jobs is made more difficult by a lack of common understanding of what counts as a green job in the first place, the pressure on workforce development practitioners to deliver jobs is exacerbated by a myriad of challenges related to the emerging nature of the green jobs labor market. These challenges include evolving nature and emerging structure of green industries and jobs that make the industry hard to serve, challenges related to a lack of synchronization between supply and demand in the labor market, and workforce development strategies and policies that make it difficult to develop and deliver programs that support long-term, yet slow, economic growth in emerging industries.

These programmatic challenges suggest that workforce development practitioners who run green programs must be prepared to grapple with deep structural flaws in the training and development system, and the labor market to develop a robust green jobs career pathways model and programs.

The current focus on green jobs came about as the United States tried to raise itself out of the recent economic crisis. There was a widespread fear that factory-based jobs would be

left out of the recovery as better-educated workers eventually found new positions. Carnevale, Smith, and Strohl (2010) indicated the share of jobs that require a postsecondary credential has risen from 29 percent in 1973 to 59 percent in 2008.[21] Thus, the green jobs initiative was part of an effort to integrate advanced job training and job stimulation. Policy makers recognized individual learning alone could not solve the problems of poverty and systemic unemployment. Community - and industry - wide efforts would be required to build new structural opportunities to provide individuals with access to education and work that will place them on a pathway out of poverty.

This approach is aimed first at job training, but it also emphasizes innovation in the workplace and green energy. Green jobs are sometimes portrayed as a wonderful innovation that will change the economy and be the savior for the American worker.

3.2.2. Government's Role

Proponents of "green collar" jobs promise that government subsidization of these jobs will create a net increase in employment, economic growth, recovery from the current crisis, and energy savings, all in addition to environmental benefits. Unfortunately, these claims are based on seriously flawed economic analysis. Despite this fact, green jobs are becoming increasingly politically popular.

During the presidential campaign, then candidate Barack Obama promised to create 5 million new green jobs. Now, as President, he plans to have the government invest $150 billion over 10 years to:

"Accelerate the commercialization of plug-in hybrids, promote development of commercial scale renewable energy, encourage energy efficiency, invest in low emissions coal plants, advance the next generation of biofuels and fuel infrastructure, and begin transition to a new digital electricity grid."[22]

He claims this plan will "help the private sector create 5 million new green jobs, good jobs that cannot be outsourced." President Obama's budget for the last few fiscal years also contains a cap and trade policy that is supposed to reduce carbon emissions by 14 percent by 2020 from their 2005 levels. Obama and the federal government are not alone. Many states and cities are considering subsidizing the creation of green jobs and implementing cap and trade emissions limitations.

3.2.3. Federal Funds for Residential Re-Insulation

Currently, there are a number of federally-funded programs available to stimulate the residential re-insulation market. These include, but are not limited to, the Weatherization Assistance Program, insulation tax credits for homeowners, ENERGY STAR programs, and Energy Efficiency and Conservation Block Grants (EECBG). Most of these programs are receiving funding through 2010 by the 2009 American Recovery and Reinvestment Act. Other federal programs using federal money to focus broadly on energy efficiency improvements include the US. Department of Housing and Urban Development, and the US. military.

21 Carnevale, A. P., Smith, N., & Strohl, J. (2010). Help wanted: Projections of jobs and educational requirements through 2018. Washington, DC: Center on Education and the Workforce, Georgetown University.

22 Barack Obama and Joe Biden, "New Energy for America," (March 2008) http://www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf.

The Weatherization Assistance Program (WAP), founded in 1976, was created to help low-income households invest in home energy efficiency to reduce their energy costs and improve their overall health and environment. Air sealing and installing insulation are two of the typical improvements made to homes through the WAP. President Obama set a goal to weatherize one million homes per year during 2009 and 2010 through the WAP, funded by $5 billion from the 2009 American Recovery and Reinvestment Act (ARRA). Funding is directed primarily through the Department of Energy and the Department of Health and Human Services via the Low Income Home Energy Assistance Program (LIHEAP) Block Grants. Households at or below 200 percent of the federal poverty line qualify for the WAP, with ARRA funding at $6,500 per household, up from the former $2,500. The WAP requires that work funded through the program be completed by trained professionals. Weatherization is estimated to have an average annual household savings of $350.

For those who do not meet the WAP low-income qualifications, the 2009 ARRA instituted an insulation tax credit that enables homeowners to deduct 30 percent of the cost of insulation and air sealing products, purchased during 2009 and 2010, for their home up to $1,500. The credit was applicable only for products whose primary purpose was for insulation or air sealing and the tax credit cannot be applied to labor costs.

The Seal and Insulate with Energy Star program is a program whose mission was to increase homeowner awareness of the energy saving impact of air sealing and insulation. The Home Performance with Energy Star program also was available to help middle and upper-income families identify qualified home energy auditors who can determine the most cost-effective ways to improve energy efficiency in their homes. In partnership with Energy Star, state-sponsored organizations develop programs to help homeowners decrease their energy use through changes such as adding insulation, air sealing, replacing heating or cooling systems, repairing ducts and replacing windows.

Finally, the Energy Efficiency and Conservation Block Grants (EECBG) and the State Energy Program, also supported by the 2009 ARRA, allowed states to finance weatherization or other residential home energy efficiency projects in their communities. The 2009 ARRA was providing $3.2 million for the EECBG and $3.1 million for the State Energy Program through the US. Department of Energy.

Employment opportunities in the residential re-insulation industry are growing despite the housing downturn. Much of the growth in 2009 and 2010 was in response to funding from the 2009 American Recovery and Reinvestment Act. According to the Bureau of Labor Statistics, in 2006 there were 32,000 insulation workers who worked on installing floor, ceiling, and wall insulation in the United States. The states with the greatest number of insulation workers per capita in 2008 were Montana, Nebraska, Wyoming, Delaware, Idaho, Vermont, Utah, Alabama, Colorado, and Louisiana.

According to the Weatherization Assistance Program (WAP) Economic Stimulus Expansion Plan, weatherizing 1,000,000 homes per year required more than 68,000 part-time or full-time jobs in the WAP network, approximately 55,000 new positions since 2008. The most difficult position to fill was that of an energy auditor, which required meeting strict competency requirements and completing six to eight months of formal training.

Insulation manufacturing and material suppliers also were affected by increased funding for weatherization and demand for homeowner energy efficiency improvement projects. Employment opportunities in distributor and contractor networks vary based on involvement in the Weatherization Assistance Program and homeowner demand for insulation products.

3.2.4. Scientific Approach/Research of the Issue on Green Jobs

Most of the studies and modeling of projections in the USA are very comprehensive. Kammen, Kapadia and Fripp, for example, project a range of labor market scenarios for the USA, based on the expectation that 20 percent of electricity generation will come from different combinations of renewable energy by 2020. [23] They focus on jobs arising from energy creation and distribution in two clusters construction/manufacturing/installation and operation/maintenance/fuel processing. Modeling the differing scenarios shows the distribution of job numbers between the two sectors. Each scenario shows at least a doubling of the overall number of jobs compared to the "business as usual" fossil fuel scenario. It should be noted, however, that this study assumes that most of the manufacturing will be undertaken within the host nation, rather than relocated in other nations: international cost comparisons for production, transportation and distribution are likely determinants of this latter aspect of the employment outcome in practice.

From the other side, differing methods have been used to assess likely regional impacts. In the US one particularly interesting research project, sponsored by the Green Jobs for America campaign, has been undertaken by the Political Economy Research Institute (PERI) at the University of Massachusetts. It seeks to identify the sectors in which there is prospect of employment growth in the new environmental economic conditions. The emphasis is on identification of opportunities for particular occupational groups in different areas. The report gives labor snapshots for twelve US States. It seeks to demonstrate that the majority of jobs created by greening industry will draw on existing skills and occupations in new configurations. According to the report, for example, constructing wind farms creates jobs for sheet metal workers, machinists and truck drivers, among many others. Increasing the energy efficiency of buildings through retrofitting relies, among others, on roofers, insulators and building inspectors. What makes these entirely familiar occupations green jobs is that the people working in them are contributing their everyday labors toward building a green economy.

This reasoning is evidently intended as a reassurance to the labor movement that the embrace of responsible environmental policies poses no threat indeed, that it opens many more employment opportunities.

Global Insight's report for the United States Conference of Mayors attempts to count the current stock of green jobs in the United States and forecast the future growth of green jobs.[24] Unlike the other reports, Global Insight does not overtly claim that creating more green jobs is beneficial or should be the object of government policy. Instead it seeks to forecast how market demand and legislative efforts will impact the creation of green jobs.

Global Insight estimates that there were approximately 750,000 green jobs in the United States in 2006. They define green jobs as: any activity that generates electricity using renewable or nuclear fuels, agriculture jobs supplying corn for transportation fuel, manufacturing jobs producing goods used in renewable power generation, equipment dealers and wholesalers specializing in renewable energy or energy-efficiency products, construction and installation of energy and pollution management systems, government administration of environmental programs, and supporting jobs in the engineering, legal, and research and consulting fields.

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23 Kammen, D, Kapadia, K. and Fripp, M. (2004) Putting renewables to work: how many jobs can the clean energy industry generate? RAEL report, University of California Berkeley.

24 Global Insight for US. Conference of Mayors "US. Metro Economics: Current and Potential Green Jobs in the US. Economy (October 2008), http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf.

The report then discusses areas in which Global Insight believes there is potential for green job growth and estimates how many new jobs will be created. They separate jobs into three broad categories: Renewable power generation, Residential and commercial retrofitting, and Renewable transportation fuels. Global Insight estimates that there is the potential to add 4.2 million new green jobs to the US. economy by 2038. They estimate that approximately 1.2 million jobs will be created in Renewable power generation, 81,000 in Residential and commercial retrofitting, 1.5 million in Renewable transportation fuels, and an additional 1.4 million jobs in related support fields.

Global Insight's report is the least objectionable of the three analyzed here. It never attempts to argue that the creation of jobs, green or otherwise, is good. Nor does it argue that green policies are cost-benefit efficient. It simply tries to forecast how many green jobs will be created given legislative desires and market conditions.

The criticisms thus far have been of the misuse of Global Insight's work, not the work itself. However, there is a major problem with even its own forecast of the number of green jobs that will be created. It is based entirely on a set of assumptions in a single scenario that is not well defended as being most likely or even a plausible scenario.

Global Insight simply assumes:

- 40 percent of electricity must come from alternative resources (of this, 30 percent will be generated by wind, 20 percent from solar, 10 percent from incremental hydropower, 10 percent from geothermal and 30 percent from biomass);
- Energy consumption by the current stock of residential and commercial buildings must fall by 35 percent; and
- 30 percent of gasoline and diesel for passenger cars and light trucks will be satisfied by alternative fuels.

These drastic changes in power generation and energy consumptions are never given empirical support. The realism of the assumptions is never justified nor are probability distributions attached to these or alternative scenarios. They are simply assumed and then green jobs are forecast with these radical assumptions. Global Insight admits: "It is important to recognize these forecast results depend heavily on our chosen scenarios. Altering any of the assumptions regarding the share of electricity to be generated from alternative resources, the extent of retrofitting, or the share of transportation fuels from renewable sources would obviously change the results."

3.2.5. Community Education and Green Jobs

The Green Jobs movement in the United States was gaining momentum for several years when the Green Jobs Act was introduced in Congress in 2007. The purpose of the bill was "to amend the Workforce Investment Act of 1998 to establish an energy efficiency and renewable energy worker training program" (Green Jobs Act of 2007). The bill's sponsor, Hilda Solis, then representative from California, recognized the demand for training and the opportunity for US. workers to get in on the green movement. If prospective green jobs openings could be filled by trained American workers in the United States, those jobs would not have to be filled overseas. The bill was passed by Congress within the Energy Security and Independence Act of 2007 but was never funded. By 2009, the US. economy was in deeper trouble, and Congress recognized the need for intervention. The American

Recovery and Reinvestment Act (ARRA) was introduced January 26 and signed by the president on February 17, 2009. This piece of legislation intended to address the economic emergency with broad strokes that provided, among other things, investment in green infrastructure in a variety of ways, including training.

Green jobs are currently a much-discussed topic in political, economic, and educational forums. Millions of Americans would be very glad to have one, but what are they exactly? Or more pointedly, what should they be and how can the field of adult education support their development? From the perspective of environmental education, green jobs should be more than environmentally friendly employment, as defined by the Bureau of Labor Statistics (2012). They should serve to advance the development of sustainable societies. To do this, there are three elements that, woven together, can create green jobs that will serve society in significant ways. These three elements: a) workforce development; b) science, technology, engineering, and mathematics (STEM) education; and c) sustainability values, are existing movements within the American society. Unifying these elements could create a web that would strengthen each of them and create an interlocking support system in which green jobs address economic, environmental, and societal concerns.

Currently, a significant share of sustainability education is concentrated in the sphere of formal education. At a minimum, there are at least 200 associate's, minor's, bachelor's, master's, PhD, and certificate programs offered by universities in the United States. Although this supports the development of green jobs, community education is another realm that can support a transformational shift in the society, providing an additional impetus for transitioning to a green economy Community education that incorporates sustainability values carries the intention of building the capacity of communities and citizens to understand the natural world and their place within it.

These are only two examples of the ways in which workforce development and community education are intertwined to support green jobs. Emerging from a community education context, the Sustainable Living Center has developed a pathway for its participants to be creators of green jobs, putting the sustainability values they gained toward implementing community-level and higher solutions.

The Sustainable Living Center at Flint Hills Technical College in Emporia, Kansas, helps communities develop their capacity for creating sustainable neighborhoods and developing future green jobs. The center's mission is to help the community and region address environmental and energy concerns through training programs, workshops, classes, and conferences. The center's community education focus on individual and community needs created awareness that an additional step was needed to help people create their own green jobs.

A second program working to educate citizens and promote the development of green jobs is *Breaking the Silence/Building a Sustainable Earth Community,* based in Kansas City, Kansas. This organization serves an urban population and uses regional partnerships to create opportunities for environmental literacy learning. An important end goal of this effort is to diversify and increase the number of young people interested in and qualified for green jobs.

3.2.6. The Issue of Just Transition

In the United States, the idea of a Just Transition has been captured in proposed Congressional legislation on climate protection. As of early 2008, legislation developed by Sena-

tors Lieberman and Warner (the Lieberman-Warner bill) contained several path-breaking provisions to help workers displaced by the effects of emissions-reduction measures. These provisions include quality job training to any workers displaced, temporary wage assistance, health care benefits to workers in training programs, and other measures. The draft legislation also puts in place mechanisms to transition workers into new jobs created by the legislation and "to provide skilled workers to enterprises developing and marketing advanced technologies and practices that reduce greenhouse gas emissions." The assistance to workers also includes "travel costs incidental to participation in a training program" and "a portion of the cost of relocating to a new job.

3.3. European Union

The Commission Communication Renewable Energy Road Map of January 2007 laid the foundation for the 2007 Spring European Council, where the European heads of state and government endorsed a new EU energy policy, the 'European Energy Action Plan'. To the 20 percent overall renewables goal (including ten percent biofuels in the transport sector, overall as well as in each Member State), the Action Plan added the twin goals of a 20 percent reduction in greenhouse gas emissions (relative to 1990 levels) and a 20 percent improvement in overall energy efficiency. Together, the three 20 percent targets constitute the EU's current 2020 goals.

The 2020 goals officially became part of EU legislation with the enactment of the 2009 Renewable Energy Directive, which replaced the previous directives on renewable electricity and biofuels. The act constituted a landmark decision as it marked the first time that the EU had issued legally binding renewables targets for its Member States. The 2020 targets have since been incorporated into the broader 'Europe 2020' growth strategy formally adopted by the European Council in June 2010.

The EU is considered to be a leader in climate policy and the European 'green job market' has developed very rapidly in recent years. Fears that climate policy may cause large-scale job losses have thus far turned out to be unjustified. Most of the decrease in employment has occurred in extractive and energy-intensive industries, where it is largely due to automation, market liberalization and outsourcing, and not related to climate protection measures. On the contrary, products associated with a 'green economy' usually tend to be more labor-intensive than products associated with traditional fossil fuel based industries.[25]

Available figures show that in Europe close to 400,000 jobs have been created in the renewable energy sector. About 2.1 million people are employed in efficient transport and over 900,000 in industries that supply energy efficient goods and services. These jobs span a wide range of professions, skill levels and salaries. Green jobs include, for example, the manufacturing, installation and maintenance of wind turbines and solar panels, and con-

25 If one were to look at the environmental goods and services (EGS) sector as a source of new jobs one would require qualitative data about occupational patterns including the level of education and skills. Available information across most advanced countries, including EU ones, indicates that the environment goods and services industry is generally a labor-intensive economic activity principally hiring people in the following occupations: scientists and technicians, craft and service occupations, machine operators as well as helpers and laborers. In a way the sector is bunched at the two ends of the qualification spectrum of high-skill and low-skill areas. Many of the day-to-day operations rely on relatively unskilled workers. However, these jobs would not exist were it not for the highly qualified service experts and skilled technicians and management executives who plan and develop the operation. The latter comprise about one-third of the workforce in the sector. However, there are various roles in the EGS sector which require skills and qualifications of the higher order. One of these is environmental consulting and monitoring.

struction work related to improving energy efficiency in buildings. They offer a wide array of opportunities for large sections of the labor force. It is estimated, furthermore, that there are another five million indirect jobs created by related branches. Job opportunities in public transportation, building sectors, wind power, solar photovoltaic and bio-energy businesses have been on the rise in recent years. Compared to 130 million jobs in the EU altogether, the number of green jobs remains small. However, it exceeds the 2.8 million jobs in more carbon-intensive industries such as mining, electricity, gas, cement and the iron and steel sectors. This is a trend that experts expect to continue in the coming years. Between 2000 and 2008, employment in these areas had an annual growth rate of 6.7 percent.

In total, the EU-27 eco-industry had a turnover of €232 billion in 2004 and €319 billion in 2008, which corresponds to 2.2 percent and 2.5 percent of GDP, respectively. Adjusted for inflation, the annual growth rate of the eco-industry within the EU-27 is 5.9 percent. The four largest sub-sectors are waste management (32 percent), water supply (21 percent), waste-water management (11 percent) and recycled materials (18 percent). The global market for eco-industries is currently around €1 trillion per year and is expected to triple by 2030; the EU has roughly 33 percent of the global market share.

According to an 'Advanced Renewable Strategy' modeling exercise supported by the EU, 2.5 million net jobs in the European renewable energy sector could be reached by 2020. In the area of wind energy, Europe has the potential to grow from today's 154,000 direct and indirect jobs to about 329,000 jobs in 2020 and 377,000 in 2030. The market leaders would be Germany, Spain and Denmark followed by France, the UK and Portugal.

Germany, as a leading global producer of solar cells, accounts for almost two-thirds of Europe's photovoltaic (PV) related employment of about 90,000. The remaining third is almost entirely covered by Spain. By 2020, the EU's PV workforce is expected to reach 727,000 jobs and potentially 1.4 million jobs by 2030. Concentrating solar power (CSP), in contrast, is a very young industry. Nevertheless, companies from Spain, Germany, Belgium and the UK are expected to contribute to the production of collectors, mirrors/reflectors and other components by 2020. Precise capacity predictions, however, are not available. Another young but quickly emerging industry is solar thermal heating. In this sector alone, Germany employs more than 17,000 people, Spain 9,000 and Italy about 3,000.

In the area of bio energy, again, studies suggest a potential of 580,000 jobs in biomass heating, 424,000 in biofuels and 2.7 million in the biogas industry. Most facilities today are in Germany and Austria, but the sector is also booming in Eastern Europe. The development of the second and third generation of biofuels will offer considerable additional opportunities.

Another area with substantial employment potential is urban public transport. Today, more than 900,000 people are employed in this area and every direct job creates another 2-2.5 indirect jobs. The expansion and modernization of transit systems, therefore, can lead to the creation of a significant number of new jobs in operating transport systems, manufacturing buses, light rail and subways, maintaining rolling stock and infrastructure etc.

These numbers show that the European eco-industry has great potential to serve as a driver for growth and employment. Nevertheless, it is at the same time confronted by daunting challenges. Over one-third of global annual revenues from eco-industries (€600 billion)

are generated in the EU. In renewable power generation, the Union has over 40 percent of the global market share and European waste management and recycling technologies account for 50 percent of the global market. The bulk of the remaining global turnover for eco-industries is generated by Japan and the US. Although the European Union is the global leader in green technologies, its eco-industry still has to deal with serious hurdles.

Furthermore, it must be acknowledged that – despite great efforts to reduce barriers in this area - a single labor market has not yet been achieved. Labor market regulation still remains a complex issue for states, even though the mobility of people within Europe has increased significantly. Additionally, the absence of a global market makes it difficult for the EU to attract a competent workforce from other global regions. In order to deal with this situation and to stay competitive, it will inevitably be necessary to revise inflexible labor market regulations and to further develop the education and training of the current labor force in order to effectively meet the altered technological demands of the European eco-industry.

Last but not least it should be noted that, according to several studies, European companies generate on average a lower rate of profit than their competitors in the rest of the world, even those that are less productive. The European eco-industry is in a state of flux. Member States in the East still lag behind the EU-15 in terms of the development of various sub-sectors and, although strong development and improved investment conditions can be expected for the coming years, there are still substantial differences in competitiveness. The major challenge for the future competitiveness of the EU eco-industry is certainly access to finance.

Investments in environmental technology are usually considered riskier than other technology investments, a situation which, in turn, has a negative impact on capital injections. SMEs especially are affected, as they have to rely on risk-averse local banks for their funding, whereas larger companies find it easier to mobilize private capital from international venture capitalists. Furthermore, local banks in many cases do not have the capacity and technological know-how to evaluate the risks involved in eco-industry projects. Long repayment periods, the relatively high level of uncertainty and the current financial crisis have meant additional strains on the efforts of SMEs to raise capital. The creation of an attractive investment climate will, therefore, be crucial for the future competitiveness of the European eco-industry.[26]

Given this major financial challenge and competitive markets that currently attract more private capital, the future competitiveness of Europe's green economy will depend on the ability to mobilize private investments. At the same time, the projected financial gaps make clear that an early cutback of public financing of renewable energy does not appear realistic if the EU wishes to retain its 20-20-20 targets. Nevertheless, improvements within the realms of policy and financing instruments are possible.

3.3.1. Spain

Spain has long been considered as a leader in the drive to renewable power.[27] But the story

26 Unlike the European eco-industry, economic considerations in the eco-industries of the US and Japan have played a more important role and public funds primarily serve to finance investment proposals. Especially in the US, private investments and venture capitalists are showing growing interest and readiness to invest in the eco-industry. In Japan, too, institutional investors, financial institutions and numerous third-party organizations have been increasingly cooperating to develop capital markets for the country's green industry.

27 Even, President Barack Obama singled out Spain as an example. In a 2009 speech, the President noticed the renew-

of Spain's renewable/green jobs leadership took a series of hits. In March 2009, researchers Gabriel Calzada Álvarez and colleagues at the Universidad Rey Juan Carlos released a study in which they examined the economic and employment impact of Spain's aggressive push into renewable energy.[28] What they found confounds the usual green job rhetoric:

- The study calculates that since 2000 Spain spent €571,138 to create each 'green job', including subsidies of more than €1 million per wind industry job.
- The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,500 jobs elsewhere in the economy, or 2.2 jobs destroyed for every 'green job' created.
- Principally, the high cost of electricity affects costs of production and employment levels in metallurgy, nonmetallic mining and food processing, beverage and tobacco industries.
- Each 'green' megawatt installed destroys 5.28 jobs on average elsewhere in the economy: 8.99 by photovoltaics, 4.27 by wind energy, 5.05 by mini-hydro.
- These costs do not appear to be unique to Spain's approach but instead are largely inherent in schemes to promote renewable energy sources.

Alvarez and his colleagues' study has come under criticism from some quarters. However, other research and a recent policy retreat in this field on the part of the Spanish government suggest that Alvarez and his colleagues' finding that green energy spending has destroyed more jobs than it has created in Spain is correct. For example, a leaked Spanish government document confirmed that spending on green jobs has not been a net job creator. The government of that time Spanish Prime Minister Zapatero has consistently been publicly bullish about its green jobs program, so the leak of an internal government document confirming the essential finding of Alvarez's independent study is an important development that strongly suggests these initiatives have failed.

In addition to research suggesting that Spain's green jobs initiatives were not generating economic development, the fact that Spain has quietly scaled back its once ambitious green energy projects strongly suggests that the expensive programs are not creating jobs or growth. Far from generating a new source of economic growth, job creation and government revenue, Spain has found its foray into renewable energy to be unsustainable and has cut spending in important areas.

Major wind energy producer firms, such as Gamesa, have begun cutting their workforces, while trying to find sales outside Europe, helped by a weaker Euro. In addition and due to Spain's highly exposed deficit finance status, making it a target for market speculators betting its bond rates must rise, the Spanish government was also likely to cut financial backing to existing renewable energy power plants, built with an expectation of guaranteed prices and government subsidies for 25 years.

In Spain, government agencies, employers, and unions have worked hard to establish mechanisms for social dialogue on climate protection in several sectors, namely energy, oil refining, iron and steel manufacturing, glass and ceramics, cement production, pulp and paper production, and (most recently) transportation and construction. Among other things, these "social dialogue roundtables" are empowered to monitor progress toward

able energy and transportation, as sectors where Spain has been a worldwide leader.

28 Alvarez Calzada Gabriel, Jara Merino Raquel, and Julián Juan Ramón Rallo (2009): Study of the effects on employment of public aid to renewable energy sources, Universidad Rey Juan Carlos.

reaching emissions targets, and developing criteria to allocate emissions for each installation (based on the sectoral allocations approved by the European Commission.) However, the roundtables are also concerned with identifying and reducing adverse social effects, in particular those related to competitiveness and employment as the result of Spain's efforts to comply with the Kyoto Protocol.

3.3.2. Italy

A similar situation has played out in Italy, also a leader in wind and solar power deployment. For instance, if one compares the average stock of capital per worker in the RES (Renewable Energy Sources) with the average stock of capital per worker in the industry and the entire economy, would find an average ratio of 6.9 and 4.8, respectively. To put it otherwise, the same amount of capital that creates one job in the green sector, would create 6.9 or 4.8 if invested in the industrial sector or the economy in general, respectively, although differences exist between RES themselves, with wind power more likely to create jobs than photovoltaic power. This fact is particularly relevant because it was not even considered the non-trivial value of the renewable energy produced, but the focus was on pure subsidies. If one had considered the energy value, the average stock of capital per worker would result even higher. Since subsidies are forcibly taken away from the economic cycle, and allocated for political purposes, it is especially important to have a clear vision of what consequences they beg.

For the case of Italy, a negative picture is even more negative by the fact that the vast majority of the green jobs created were temporary: using what one can see as inflated estimates, from various sources, of already-existing green jobs, one can take between 9,000 and 26,000 jobs in wind power, and between 5,500 and 14,500 in photovoltaic energy, as the starting point. From there, one can calculate that thanks to the subsidies Rome has promised, the number of people working in the green economy will rise to an aggregate total of between 50,000 to 112,000 by 2020. However, most of those jobs - at least 60 percent - will be for installers or other temporary work that will disappear once a photovoltaic panel, or a wind tower, is operative.

3.3.3. Germany

Germany's foray in to renewable energy started in earnest in 1997, when the European Union adopted a goal of generating 12 percent of its electricity from renewable sources. Germany's method for achieving such targets was the institution of a feed-in law that required utilities to purchase different kinds of renewable energy at different rates.

This massive subsidization of wind and solar power attracted many investors. After all, if the government is going to guarantee a market for several decades and set a price high enough for renewable producers to make a profit, capital will flow into the market. Germany became the largest producer of wind energy after the United States, and its investment in solar power was aggressive.

However, things have not worked out as Germany's politicians and environmentalists said they would. Rather than bringing economic benefits in the form of lower cost energy and a proliferation of green jobs, the implementation of wind and solar power raised household energy rates by 7.5 percent. Further, while greenhouse gas emissions abated, the cost was astonishingly high: over $1,000 per ton for solar power and over $80 per ton for wind

power. Given that the carbon price in the European Trading system was about $19.00 per ton at the time, greenhouse gas emissions from wind and solar were not great investments.

So, German renewable energy policy, and in particular the adopted feed-in tariff scheme, has failed to harness the market incentives necessary to ensure a viable and cost-effective introduction of renewable energies into the country's energy portfolio.[29] To the contrary, the Government's support mechanisms have in many respects subverted these incentives, resulting in massive expenditures that show little long-term promise for stimulating the economy, protecting the environment, or increasing energy security. In the case of photovoltaics, Germany's subsidization regime has reached a level far exceeding average wages, with per-worker subsidies as high as €175,000.

Although Germany's promotion of renewable energies is commonly portrayed in the media as setting a 'shining example in providing a harvest for the world,' it would instead regard the country's experience as a cautionary tale of massively expensive environmental and energy policy that is devoid of economic and environmental benefits.

Germany is finding it hard to continue to subsidize wind and solar power at existing levels. In May 2011, the German parliament cut back the subsidy for domestic rooftop solar photovoltaic systems by 16 percent, with freestanding systems cut by 15 percent.

Since 2000, the number of jobs created in the German solar industry has increased from some 11,000 to about 83,000 in 2009. Currently, there are approximately 10,000 solar companies in Germany that have a total turnover of roughly €19.1 billion (including suppliers), export revenue of more than €6.5 billion and have paid over €40 billion in taxes to date (€1.4 billion in 2010). However, despite substantial investments of €27.9 billion in the sector in 2010, solar power still only represents 3.3 percent of Germany's total electricity generation, of which renewables accounted for about 20 percent in the first half of 2011.

In Germany, a broad coalition of government, industry, unions, and environmental NGOs have collaborated around initiatives to renovate buildings for climate protection purposes, while at the same time creating sustainable jobs and improving social conditions. The job creation aspect of a Just Transition has been demonstrated through the Alliance for Work and Environment, which aims to renovate 300,000 apartments, create 200,000 jobs, reduce two million tons of CO_2 emissions annually, and lower heating bills for tenants, landlords, and the state by about €3 billion, through reduction of unemployment costs, increased income taxes, etc.

29 The institutional backbone of the increased spread of solar energy (alongside other forms of renewable energy) has been a generous system of subsidies that has its roots in the 1990s but that did not truly materialize on a large scale until 2000 when the Erneuerbare-Energien-Gesetz (EEG), or German Renewable Energy Act, was passed. The EEG's core is a system of feed-in tariffs that guarantee grid access to renewable energy producers as well as payments exceeding those for conventional forms of energy. Rates of remuneration differ for different sources of energy, depending on the cost of generation, and gradually decrease over time. The concept is based on the idea that young industries cannot initially compete on their own against mature ones. Institutional support through guaranteed feed-in tariffs is supposed to lower start-up costs in order to attract investors who would otherwise shy away from exploring new industries given the uncertainties and risks involved. Another justification for higher remuneration for renewable energy is that the price for conventional forms of energy does not reflect a large number of externalities or unintended consequences, such as carbon emissions. The Renewable Energy Act precipitated a boom in renewables, including in the solar sector. Over time, the share of solar power in overall German energy consumption has steadily increased; solar power currently covers the annual electricity demand of over 3.4 million German households, according to the German Solar Industry.

3.3.4. Denmark

Denmark is yet another country that made wind power a hallmark of its energy policy. US. President Obama praised the Danes for their aggressive wind power program, telling an Earth Day audience in Iowa, "Today, America produces less than 3 percent of our electricity through renewable sources like wind and solar. Now, in comparison, Denmark produces almost 20 percent of their electricity through wind power." The US. Energy Information Administration tells America's children, Denmark ranks 9th in the world in wind power capacity, but generates about 20 percent of its electricity from wind."

Opposite to the previous statements, some studies and reports found that rather than generating 20 per cent of its energy from wind, Denmark generates the equivalent of about 19 percent of its electricity demand with wind turbines, but wind power contributes far less than 19 percent of the nation's electricity demand.[30] The claim that Denmark derives about 20 percent of its electricity from wind overstates matters. Being highly intermittent, wind power has in 2006 met as little as five percent of Denmark's annual electricity consumption with an average over the last five years of 9.7 percent. According to the CEPOS study, Denmark can only produce and consume as much wind power as it does because of a convenient circumstance: neighboring countries have a lot of hydro power that can quickly and effectively balance the flow of electricity on its energy grid, allowing Denmark to export surplus wind capacity. Denmark manages to keep the electricity systems balanced given the benefit of its particular neighbors and their electricity mix. Norway and Sweden provide Denmark, Germany and Netherlands access to significant amounts of fast, short term balancing reserve, via interconnectors. They effectively act as Denmark's 'electricity storage batteries'. Norwegian and Swedish hydropower can be rapidly turned up and down, and Norway's lakes effectively 'store' some portion of Danish wind power. Over the last decade, West Denmark has exported (couldn't use), on average, 57 percent of the wind power it generated and East Denmark an average of 45 percent. The correlation between high wind output and net outflows makes the case that there is a large component of wind energy in the outflow indisputable.

Finally, the Danish consumers are the ones who take it on the chin. Denmark's electricity prices are the highest in the European Union. Their greenhouse gas reduction benefits are slim. Since the exported wind power replaces hydropower, it does not significantly reduce greenhouse gas emissions. The wind power consumed in Denmark does displace some fossil fuel emissions, but it does so at a cost of $124 per ton, which is nearly six times the price on the European Trading System.

With regard to green jobs, the effect of the government subsidy has been to shift employment from more productive employment in other sectors to less productive employment in the wind industry. As a consequence, Danish GDP is approximately 1.8-billion DKK ($270-million0 lower than it would have been if the wind sector workforce was employed elsewhere. Not surprisingly, Denmark, like other early adopters of renewable power, is finding it unsustainable and is backing away from the technology. So, the Danish state owned power industry would no longer build onshore wind turbines, and consumers are complaining about high energy rates and environmental despoliation.

30 According to CEPOS, a Danish think-tank, that issued a 2009 report titled: "Wind Energy, The Case of Denmark."

3.3.5. Sweden

In 1997, the Swedish central government launched a large-scale investment programme to support ecological sustainability at the local. The Local Investment Programme for Ecological Sustainability (LIP – 1998-2003) made 6.5 billion Swedish kronor (SEK) available for the modernization of buildings, infrastructure and energy systems at the local level. It was hoped that the Programme would enhance the capacity of the local level to promote sustainable development in Sweden.

From a comparative European perspective, the launch of LIP was unusual. First, it is exceptional that governments promote sustainable development through large-scale, state-funded investment programs. Most EU member states have confined their actions to the elaboration of general policy frameworks. Typically, implementation strategies rely upon regulatory mechanisms backed up by market instruments, although there are some notable exceptions. Secondly, targeting funding at the local level, in this case at the municipalities, while in keeping with Swedish tradition, appears, from a comparative perspective, to be ahead of its time. At the time of the launch of LIP, many member states were still only at the stage of defining and operationalizing policies at the national, as opposed to the sub-national, level.

LIP was also innovative, placing trust in the willingness and capacity of three local-level actors, namely municipal authorities, locally based economic actors and citizen groups, which have, from a comparative European perspective, a varying track record in the promotion of sustainable development. However, that strong discursive practice in Sweden, had developed at the local level prior to LIP, especially through Local Agenda 21 and supported at national level. Against this background, there are potentially strong ecological and political benefits to be derived from funding projects that mobilize interests at the local level. As member states, and countries beyond the borders of the EU, struggle to implement their commitment to promote sustainable development there is widespread interest in ascertaining whether, and to what extent, the focus on, and trust in, sub-national, local level actors has proved justified.

LIP placed trust in an array of actors that are seen as key to the development of 'new' ways of governing many contemporary problems, not just those related to the promotion of sustainable development. This also makes LIP of interest to those engaged in research on 'governance'. LIP was launched on the assumption that making provision for physical infrastructure developments could promote sustainable development, but with the added advantage that this investment could create new jobs as well. LIP was, therefore, both an instrument for ecological conversion and a macroeconomic policy tool, used in the latter case to address downturns in the labor market and in employment levels.

The decision to couple the promotion of ecological sustainable development with the provision of employment also allows LIP to be viewed as an example of Swedish 'ecological modernization' strategy. This strategy aims to promote sustainable development at the same time as taking advantage of the opportunities that adjustment will offer Sweden. Ecological modernization in Sweden is seen as heralding a long period of growth and stable employment, which should help to create jobs in many different sectors and thus to improve the prospects of growth even in vulnerable regions.

However, the goal of creating new jobs was downplayed as the Programme developed, even to the extent that job creation was not specifically addressed in the series of evaluations. Further, allocations of LIP funding were never specifically targeted towards mu-

nicipalities with higher than average unemployment rates. This can, at least in part, be explained by the decline in the unemployment rate from seven percent to four percent over the period of time that elapsed from the formulation of LIP to its implementation. This made the employment goal lose some of its immediacy and political attractiveness.

Nevertheless, LIP did help create new green jobs, mainly in environmental management, as is broadly understood. According to the self-reporting system for LIP-funded projects, a total of 8,400 jobs (measured as permanent new jobs, lasting for five years) were created. Another four hundred jobs are estimated to have been created indirectly. These figures, however, must be taken with caution, since the substitution effects have not been assessed. It is unclear whether these 'new' jobs were genuinely contributing to employment creation, whether they would have been created without LIP support, or whether they were a result of re-designation of job titles. Some municipalities re-designated the job title of their existing coordinators, calling them instead 'LIP coordinators', a practice that, of course, does not contribute to an overall increase in the number of those employed.

One way that LIP could have supported the creation of new jobs was to link the Programme to other job-creation initiatives, especially those aimed at regional development. However, LIP was never integrated with county-level regional development and regional growth agreements and plans.

3.3.6. United Kingdom

The United Kingdom has pursued an ambitious wind power agenda. At that time the prime minister Gordon Brown, in his speech at a Labor Party conference in 2008, asked the climate change committee to report by October on the case for, by 2050 not a 60 percent reduction in the carbon emissions, but an 80 percent cut, and he believed that they could create in modern green manufacturing and service industry one million new jobs. From the other side, Ed Miliband, at that time Leader of the Opposition, was also big fan on wind power.

Party affiliation does not seem to be a factor in green-job boosting. The current British Prime Minister (and Conservative Party leader), David Cameron, while discussing a deal to work on wind turbines with India, said, "'(I)nnovation and creativity of business won't just help us save the planet, but is expected to create millions of jobs and billions of revenue in the green goods and services market.'"

However, the United Kingdom has fared no better than the other countries discussed above in their pursuit of the new green energy/ green jobs economy.

One study produced by Verso Economics is particularly interesting because its methodology is seems to be the superior to the methodology used in the Spanish and Italian studies. Verso used the input/output tables to estimate the number of jobs that were foregone in the United Kingdom economy in favor of the green jobs that were created through governmental subsidization. Verso's conclusion aligned neatly with the other studies:

- The report's key finding is that for every job created in the UK in renewable energy, 3.7 jobs are lost. In Scotland there is no net benefit from government support for the sector, and probably a small net loss of jobs.
- The main policy tool used to promote renewable energy generation is the Renewables Obligation, which effectively raises the market price paid for electricity from

renewable sources. This scheme cost electricity consumers £1.1-billion in the UK and around £100-million in Scotland in 2009/10.

- Verso used the Scottish Government's own macroeconomic model for Scotland to assess the impact of identified costs on jobs. The Scottish Government used a similar model to measure the opportunity cost of the cut in value added tax (VAT0) implemented in 2008-09. On this basis, policy to promote renewable energy in the UK has an opportunity cost of 10,000 direct jobs in 2009/10 and 1,200 jobs in Scotland.
- In conclusion, policy to promote the renewable electricity sector in Scotland and the rest of the UK is economically damaging. Governments should not see this as an economic opportunity.

Bearing in mind the previous conclusions, the United Kingdom and Scotland learned something that the warmer countries did not, and it is a lesson particularly relevant to Canada and the northern United States: wind turbines freeze over in winter! Not only do they cease to put out power, they need to be heated. As reporter Richard Littlejohn points out in the United Kingdom's Daily Mail: "Over the past three weeks, with demand for power at record levels because of the freezing weather, there have been days when the contribution of our forests of wind turbines has been precisely nothing. It gets better. As the temperature has plummeted, the turbines have had to be heated to prevent them seizing up. Consequently, they have been consuming more electricity than they generate. Even on a good day they rarely work above a quarter of their theoretical capacity. And in high winds they have to be switched off altogether to prevent damage."

3.3.7. The Netherlands

The Netherlands is another country that went big for wind power, particularly offshore wind. The Netherlands is the world's third-largest producer of offshore wind power. While there is no data available about green jobs in the Netherlands, there is evidence that the Netherlands will not be producing many through its green power plans, because their conservative government has radically reversed course and is slashing subsidies to wind and solar power.

According to the journal *Energy Debate,* the Dutch government has lost its faith in windmills. The government in the Netherlands has taken exception to the massive subsidies required to build and operate wind farms and, in this case, to the expected export of $6.2-billion in subsidies to a German company (Bard Engineering) that would have built, owned, and operated the wind farms.

On November 30, 2010, the government unveiled its new renewables plan, slashing annual subsidies from $5.5-billion to $2-billion. In addition, not only are the subsidies cut back, what remains was redirected well away from wind power. In the new system the Government allocated subsidies in an entirely different and rather complicated way.

Subsidies were made available in four 'stages' (on the basis of first-come, first-served):

- In the first stage, a government subsidy of 9 eurocents per kWh (or 79 eurocents per m^3 for gas) is offered, but only to producers of technologies that have 'deficits' of less than 9 eurocents.
- If there is still money left after this first stage, the second stage will be opened up, in

which a subsidy of 11 eurocents per kWh (or 97 eurocents per m^3) will be offered. This stage will be open to producers of onshore wind power and fertilizer-based gas.

- Again, if there is money left, there will be a third stage with subsidies of 13 eurocents per kWh or 114 cents per m^3. This will be open to producers of hydropower and small-scale biomass.
- The fourth and last stage (15 eurocents per kWh or 132 eurocents per m^3) will be open to electricity produced from all-purpose fermentation processes. Not included in any of the four categories, because they are too expensive, are solar power, large-scale biomass and, indeed, offshore wind power.

Another change in the Netherlands government's attitude toward renewables is how to pay for the subsidies. In the past, subsidies were paid for out of the general budget. Moving forward, consumers saw a surcharge on their energy bills.

According to reports, the Government was planning on a nuclear power renaissance to generate electricity, and one could certainly argue that such a plan would generate green jobs. However, in the wake of the tragic Japanese earthquake and tsunami in March 2011, one has to assume that such a plan will also come in for a great deal of scrutiny. The irony here is rich. The Dutch, who have been enamored of wind power for hundreds of years, may have finally had enough tilting at windmills. If even they cannot make it work, one has to wonder if anyone can.

In the light of the previous, the national "Green4Sure" project aims to develop a comprehensive energy plan to halve the country's greenhouse gas emissions by 2030, based on 1990 levels. The effort has been spearheaded by unions, in partnership with environmental organizations. The main focus of the study was the policy instruments used by the government to reach the emissions target. The policies in question concerned the development and deployment of new technologies, greater use of climate-neutral energy sources, and inducing behavioral change. One of the goals of the plan was to create a pathway for these emissions reductions that does not seriously impact incomes and leads to no net loss of jobs.

3.4. Australia

3.4.1. Australia's Green Jobs Agenda

In the 2007 Federal election the Labor opposition, led by Kevin Rudd, made climate change and the environment a key policy platform. Labor's victory in that election marked a substantial shift in Australian environmental policy and debate. The Rudd government quickly ratified the Kyoto Protocol and began developing an Emissions Trading Scheme (ETS) with the assistance of its policy advisor Professor Ross Garnaut and his report *The Garnaut Climate Change Review.* The proposed ETS was expected to have a substantial impact on jobs associated with highly polluting industries, driving a shift towards employment in less environmentally damaging industries. A prominent green jobs policy agenda was not developed by the Labor government, however, until the global financial crisis at the end of 2008.[31]

31 The Australian State Department of Education and Training commissioned a survey to provide previously unavailable information on the current state of the green jobs sector in Western Australia. (Green Skills, 2003, Envi-

Within Australia the most visible promotion of a green jobs agenda within the government's economic stimulus package was a $2.7 billion home insulation program. According to the then Prime Minister Rudd, the scheme was designed 'to support jobs and set Australia up for a low carbon future' (2009). The policy was reactive, short term, accommodating of economic interests and aimed at remedying or adapting to ecological decline to maintain and enhance economic growth rather than preserving nature. In the space of nine months the Labor government also announced a number of other environmental policy commitments, in the form of $6.2 billion to 'A New Car Plan for a Greener Future' program, a program for 50,000 new green jobs, traineeships and apprenticeships, funding commitments to renewable energy programs such as the solar homes and schools policy, and the establishment of a green loans program, which provided free home sustainability assessments and interest free loans to purchase energy saving technologies. The government also announced in the 2010 Federal election that it would establish a 'cash for clunkers' program to promote the purchase of greener vehicles.

The green jobs that the Rudd/Gillard government's environmental policy agenda sought to create largely sit within light green job category. The policies were motivated by and reactive to economic circumstances, rather than originating from environmental concerns. Direct responsibility of implementing the programs was largely left to the market. Many of the policies were one-off programs or received short-term budgetary funding, while some of these green job programs supported established industry which had been retrospectively classified as green. Critically, green job policies aimed at enhancing and accommodating economic growth are consistent with policy approaches taken by successive Australian governments over the last twenty years.

During 2010-11 even the light green jobs agenda has been deferred or abandoned. This process began with the axing of the home insulation program, after it experienced a number of serious issues relating to health and safety. The Labor government then delayed and later abandoned its Emission Trading Scheme, only to subsequently announce a fresh carbon tax/ETS to be implemented by the middle of 2012. The proposed new policy, unlike the Rudd ETS, is expected to have a fixed price (tax) on carbon emission for the first three to five years before moving to a permit-based ETS. More recently the Gillard government abolished or cut funding to a number of climate change and green industry programs. Funding for the Green Start program, a replacement of the Green Loans program, was also abolished, while investment in carbon capture and storage was also reduced.

Although many of the abandoned policy initiatives plainly reached for the light green 'low hanging fruit', they did represent an increased level of commitment from the government to green jobs and the environment not previously seen within Australian public policy. The Gillard governments carbon tax/ETS, whatever its faults, may potentially lead to a substantial growth of 'mid green' jobs. Significantly, though the government has failed to spell out the considerable job implications of the policy, and has instead focused on issues of economic compensation to households and industry. The government's commitment to green jobs and industries evidently runs a poor second to the maintenance of economic growth and established polluting industries.

ronmental Jobs in Western Australia: results of the 2002 Employer Survey.) This report defines a green job as a job which reduces the negative impact made on the environment, relative to the status quo. These jobs occur across all industry sectors. This broad definition would allow green jobs to be thought of as occurring across a spectrum from innovations that reduce the environmental impact of traditionally "dirty" industries (for example, aluminum smelter), to jobs that are entirely new and have been initiated primarily to address specific environmental problems. Hence these jobs occur across all industry sectors. Jobs and businesses that have been created to primarily address specific environmental needs are referred to as environment industries.

3.4.2. The Challenge for Unions

The future of employment, working conditions and the types of work people will undertake depends significantly on responses to environmental challenges such as climate change. It has resulted in a diversity of positions ranging from positive engagement to resistance and suspicion. The potential benefits of green jobs and industries to workers and the community in Australia has been promoted by the ACTU (Australian Council of Trade Unions), in tandem with the Australian Conservation Foundation (ACF) since the early 1990s. The ACTU understands that its role as the peak union body is to ensure that any ecological transformation of Australia's economy is a positive change for workers and their families. In 2008 the ACTU and ACF released a report entitled 'Green Gold Rush', which argues that green industries could create approximately 500,000 jobs by 2030, and build the foundation for Australia's future economic prosperity. According to this report, the potential for a 'Green Gold Rush' relies on the implementation of three broad strategies. First, the state should develop and facilitate a long term environmental industry framework; second, the state needs to implement an environmental market, such as an Emission Trading Scheme (ETS), while also strengthening industry codes and standards; and third, there must be an increased investment in environmental research, technologies, skills and training.

The energy sector is one in which the impacts of carbon emissions reduction policies can be expected to be particularly pronounced. One could posed questions about what sorts of policies affecting this sector might effectively complement an emissions trading regime. The preliminary modeling suggested that, in a range of possible scenarios, there would be around 5,000 more jobs in the energy sector at large by 2050 if steps were taken to reduce emissions, largely due to the labor-intensive nature of such activities. More ambitiously, the ACTU and ACF report suggests that policies stimulating renewable energy markets could form part of the wider strategy they propose for generating 500,000 new jobs for Australia.

While the reconfiguration of industries and jobs need not cause unemployment in the aggregate, there are clearly significant transition and adaptation issues. The highly regionalized nature of the energy generation industry poses particular challenges for planning how existing workers can be re-trained or re-distributed effectively into newer jobs and industries. The changes to the energy labor market will largely be dependent on the kinds of alternate energy solutions that Australia adopts. Reliance on an ETS leaves this issue open: under such a regime the pattern of energy supply is market-determined, not directed by government. Therein lies considerable uncertainty, including how that part of the expected revenue from an ETS that the government has set aside for the promotion of renewable energy will actually be used. All alternate energy outcomes are not equal when considering the number of new jobs generated and the location of these jobs.

As already noted, there are already strong signs of this commitment from the ACTU and key unions like the Australian Manufacturing Workers Union (AMWU). There are important lessons to draw from the wider international experience about which policies and strategies are best suited for handling the transitions towards a greener economy, because Australia is relatively behind on the uptake of green power, compared with Germany, for example.

Producing reports on possible policy developments is not the same as achieving outcomes, of course. It must be conceded that the Australian experience to date has not been encouraging. Australia has not had the tradition of systematic interventionist industry and labor

retraining policies that has existed in Sweden and other Scandinavian nations, for example. A proposal from the labor movement in Australia two decades ago predating concern about climate change put the case for those sort of interventionist industry development policies on more conventional socio-economic grounds. Although quite thoroughly argued, that initiative lacked the necessary political support within the ALP government and its principal policy recommendations were not implemented.

There is no necessary reason to assume that the current focus on environmental concerns changes this situation fundamentally. Certainly, the proposed ETS will not do the trick since its hands off market orientation is the antithesis of a more social democratic approach to managing transitions. A corporatist policy approach does not seem to be on the agenda either, since business organizations, government and the trade unions all eschew institutional engagements that are redolent of the Accord in the 1980s. Material circumstances, in conjunction with influential ideas, can transform what is politically possible though. In the current conditions of sudden economic downturn as of October 2008 there is widespread recognition that neoliberal economic policy has had adverse outcomes. The coexistence of economic and environmental crises opens up both the possibility and the necessity for alternative approaches. Indeed, the importance of linking policies for the immediate economic crisis to policies for longer-term sustainability has gained particular urgency.

3.4.3. Job Loss on the Way to Sustainable Economy?

There are both threats and opportunities in labor market responses to climate change policies. One can anticipate that some industries and occupations will suffer job loss as the Australian economy is driven towards becoming more sustainable, while others can anticipate gains. Simply, one can anticipate that employment will tend to fall in industries whose product prices will be higher after the introduction of an ETS, while job growth can be expected in industries whose products become relatively cheaper. However, inertia in the forms of technology that are used in industry and in the buying habits of consumers will moderate the rates of change. Complex inter-industry links, of the sort that can be modeled using input-output analysis, will also influence which industries are impacted most strongly.

One sector of the economy that is likely to be quite quickly affected is manufacturing. The Australian Manufacturing Workers Union has produced a significant report on the relevant issues and principles that need to be faced (AMWU 2008). Building on this initiative, there is a need to develop a disaggregated analysis of prospects for the different industries within this broad sector.

Industries most likely to be negatively affected by climate change mitigation policies are those with high power and resources usage, and those directly involved in the energy supply chain. Workers employed in coal mining and electricity generation are particularly vulnerable. Other industries like aluminum refining, which have relied on low-priced electricity to remain viable, are directly threatened by the rising cost of energy. These industries are overwhelmingly concentrated in non-metropolitan areas where they are important to local regional economies. They are lobbying vigorously for special concessions under the ETS because they are exposed to international competition from producers in other countries that lack equivalent environmental economic policies.

Will the sectors where new job growth occurs more than compensate for the declines in

the less ecologically sustainable sectors? Assessing the net effects is a complex process. The modeling commissioned from the Australian Conservation Foundation found that even quite a rapid transition to sustainability does not need to have a negative overall impact on the total number of jobs. Other econometric modeling has suggested that the medium term net impact of adopting energy efficiency measures in Australia would be to create more jobs nationwide than would otherwise be the case. The labor-intensive nature of making improvements in energy-efficiency is a key aspect of projections that emphasize the prospects of net employment growth.

4. GREEN JOBS POTENTIAL IN MACEDONIA

4.1. Business Environment in Macedonia

During last five or six years Macedonia has made significant improvements in its business environment. Its rank in "ease of doing business" in the 2010 World Bank Group *Doing Business* Report was 32 out of 185 countries. In 2010, Macedonia was recognized as the third overall "top reformer" in the world. As a result of a new law on business registration, the time to register a company was cut from 48 days in 2006 to one day in 2011 (even to few hours and in electronic format in 2012). The cost to register a company is less than €50. Business regulation has been also reduced by introducing a *regulatory guillotine,* which reviewed more than 2,000 laws and by-laws, out of which 64 laws and 482 by-laws were amended.

In 2006/07 the Ministry of Finance proposed significantly cutting tax rates that were accepted by the Government and the Parliament. Corporate and personal income tax rates have been cut to a flat rate of ten percent, which represent one of the lowest rates in Europe. Additional exemptions have been introduced to reinvest profits. These measures are designed to complement broader efforts underway to improve the business environment and reduce the impediments to investment, including ensuring Macedonian labor remains competitive in Europe.

An ambitious payroll tax reform should additionally reduce the burden of hiring and retaining workers. Indeed, the government has made wage competitiveness and access to the EU market a key element of a global marketing campaign for attracting more foreign capital. As a part of this strategy, the government has reduced social insurance contributions, which have been cut from 32.5 percent of gross income in 2008 to 27 percent in 2010. Payroll tax reforms have been carried out while managing fiscal implications by expanding the tax base, harmonizing income bases for social security, and moving from a net wage to a gross wage basis for calculating contributions. These reforms have had positive effects on the labor market in general. Consequently, labor participation has jumped by five percentage points since 2004.

The reforms of the real estate market and courts usually are very difficult to perform. In the Macedonian case, reforms in the real estate cadastre have resulted in the coverage of 99 percent of the territory and shortened the period for transaction registration. Also, the number of mortgages nearly tripled and the number of registered transactions doubled. For the time being, 70 percent of all transactions are registered in one day, and 30 percent between three and eight days. This is dramatic improvement from the 60 to 90 days required in 2005. In addition, significant improvements have been made to the judicial and legal framework. The court system is better organized and new laws, including one on administrative procedure, are reducing the backlog of cases and strengthening the enforcement of court judgments. Similarly, a new bankruptcy law has helped shorten the average court processing time from around four years to just over two years.

The Macedonian Government has made a particular commitment to the transport sector. Over the past 15 years, more than 200 km of motorway roads have been rehabilitated

and the average border entry and exit time has decreased threefold. A new EU-compliant railway law, for example, has helped strengthen the entire sector. Macedonian Railways (MR) has been reformed to improve the financial viability, productivity, and effectiveness of railway operations. In addition, the energy sector is more efficient. MEPSO (the public electric power transmission company) has increased the capacity of the transmission network by completing the power transmission line to Greece, and restored 38 transformer stations throughout the country, including the main power transformation station for the capital of Skopje. This work has led to a significant reduction of technical losses and an increase in the stability of the power system.

Consistent with EU requirements, Parliament has approved a new public procurement law, and the government has established an independent appeals commission and independent public procurement bureau (PPB) under the Ministry of Finance. Authorities have developed an e-procurement system as well. These improvements to the procurement system are helping to level the playing field for all domestic and foreign investors.

Since 2006/2007, the government has paid particular attention to improving the education system. Poor performance of this system in the beginning of the new millennium triggered wide reforms. Key challenges were directed toward strengthening enrollment. Between 2004 and 2008, secondary enrollment increased from 85 to 95 percent, and dropout rates for primary school decreased to below two percent. A market for teacher training was established, along with criteria for accreditation and monitoring of teacher training. The State Matura examination, the national assessment of student achievement, was given for the first time in 2008 in all four-year general and vocational schools. From 2004 to 2007, less than one half of school managers and teachers reported improvements in students' achievements. The improvement is mainly in planning and assessment processes, but also in attendance and participation.

4.2. Institutional and Legal Framework - Analysis of the Relevant Documents, Strategies, and Laws

The Republic of Macedonia as a full EU membership candidate country is faced with the challenge of efficiently implementing serious reforms in the economic and social systems. Among those reforms, the fields of energy and energy efficiency are crucial for the country's overall development.

Within the frameworks of the Government, the Ministry of Economy is in charge of the energy sector. Parts of the competences related to energy are under the competence of the Ministry of Environment and Physical Planning and the Ministry of Transport and Communications as well. In order to provide support from the Government for the purpose of implementing energy policy the *Energy Agency* was established.

The Energy Regulatory Commission of Macedonia executes the affairs that refer to regulating certain issues regarding the performance of energy operations that are determined with the law on energy.

The council of the *municipality*, such as the Council of the City of Skopje, adopts a program for energy development of the municipality. This occurs upon the Mayor's proposal, and after previously provided opinion from the Ministry of Economy. They are responsible for energy operations that are of public interest and of local importance.

For the purpose of efficient implementation of the latest legal framework of the energy sector, it is necessary to *enhance* their capacities. Numerous duties of the *Ministry of Economy-Energy Sector, Regulatory Commission, Energy Agency and the units of the local self-government* are derived from this legal framework.

The direction in which the energy sector in Macedonia develops has huge implications for national economic growth, for environmental protection and for living standards. For many households in Macedonia, monthly energy bills and food, respectively, account for the highest proportion of the family budget. Municipalities in Macedonia can no longer lean on the ministry departments for having their local costs covered. Now they also have the new and expensive responsibility of managing their own energy usage. Industries in Macedonia spend more energy per product unit than many comparable industries in Europe. Therefore, they face a competitive disadvantage in the export markets.

The existing technologies are not optimal, which leaves room for technology promotion. The fact that the necessary technologies do not have to be high technologies is encouraging. Former economic policies and decisions point out that there are numerous opportunities for improvement through adopting verified technologies that are available for the time being, such as controls and insulation. What is more important, the wide application of these technologies can create new businesses and new jobs in a very short period of time and in an economical manner.

Macedonia has limited reserves of resources for commercial energy and it will become more and more dependent on energy imports. However, energy efficiency practices can moderate this dependence, increase domestic reserves and postpone the need for investments in new energy infrastructure. Each of these outcomes are cheaper than investments to increase reserves and to expand the existing infrastructure.

Even under difficult economic circumstances that many Macedonians face who are jobless and with no income, energy saving can be of economic and financial value. Traditionally, business activities in energy efficiency, together with the wide application of energy efficient technologies in the key sectors, are characterized with high labor force intensity and create new jobs. In countries where energy efficiency is currently ignored to a large extent, there is higher potential to create new jobs. Energy efficiency trends are a lower priority to those who are chronically unemployed and to low-income individuals and families, especially if they are a matter of investments. In such cases it is necessary to provide forms of social aid because the improvement of their energy usage is economically justified at national level.

Creating new legislation or amending current laws (for example establishing an Energy Efficiency Fund) can be much more difficult than implementing the existing legal framework. Allocating the government budget and resources or creating new jobs in a period when the government is faced with fiscal restrictions can be quite difficult. Therefore, priority should be given to the creation of a new framework that enables energy efficiency improvements on a commercial basis.

Macedonia signed and ratified the Agreement on Energy Charter, The Agreement on Energy Community, The United Nations Framework Convention on Climate Changes and The Kyoto Protocol.

According to the Agreement on Energy Community, Macedonia adjusts its legislation with the actual legal regulation of the European Union (acquis communautaire) on energy, environment and competition, renewable sources of energy, energy efficiency and oil

reserves. Strategic determinations of Macedonia in the energy sector, among which is the determination on complying with acquis communautaire are implemented within the law on energy. For the purpose of making the provisions from the law on energy operative some sub-legal acts were adopted. Also there were adopted many laws and sub-legal acts in the field of environment protection and other relevant fields. What follows is the completion of the law regulation on the energy sector and in certain cases its improvement.

Pursuant to the Accession Partnership priorities, in February 2011 the new Energy Law was adopted. With that adoption came harmonization with the EU legislation in the part of the internal market of energy, energy efficiency, as well as with the liabilities arising from the Agreement for establishment of the energy community that refer to the exchange of energy. The new Law enabled further liberalization of energy markets, as well as strengthening the role of the regulatory commission. In the following mid-term period activities for preparation of the by-laws necessary for the full implementation of the law followed. Pursuant the recommendations in the 2011 EC Progress Report, the government program, subventions of the electricity bills of the socially vulnerable households continued to be implemented.

The law on energy stipulates that energy efficiency policy should be realized through measures and activities for efficient usage of energy, by adoption of programs and plans for improving and promoting energy efficiency and their implementation, by giving services for energy efficiency and energy controls, as well as by meeting the requirements of the public sector in the direction of energy efficiency and energy saving.

With the policy for energy efficiency there is provided that the following goals could be achieved:

- Sustainable energy development,
- Reduction of the negative influence on environment while performing energy operations as well as reduction of energy consumption,
- Improvement of the safety during the energy supply, and
- Fulfilling the international obligations of the Republic of Macedonia regarding the reduction of greenhouse gas emission.

In its Article 130, the law determines the policy on efficient usage of energy with the Strategy on Energy Efficiency, which ought to be adopted by the government, and which refers to the period of ten years, something that is in compliance with the Strategy on Energy Development. The Strategy on Energy Efficiency should give an overview and assessment on the conditions regarding the gross final consumption of energy, assessment on the potential regarding the combined production of highly-efficient combined plants, indicators of energy efficiency, measures for improving and promoting energy efficiency and long-term objectives that are to be met with those measures, as well as incentive measures for implementing energy efficiency.

For the purpose of fulfilling the objectives defined with the Strategy on Energy Efficiency the Government could establish mechanisms for financial support. The means for the financial support are provided from:

- The budget of the Republic of Macedonia
- The budgets of the local self-government units

- Grants, donations and sponsorships
- Credits
- State aid in accordance with the Law on State Aid

For the purpose of efficient implementation of measures and achievement of the indicative goals defined with the action plans on energy efficiency, there is a possibility a law could establish a fund for energy efficiency. Through this law, support shall be given to both the public and the private sector for the purpose of implementation of the obligations for energy efficiency improvement.

Interestingly, the law on energy defines ESCO as a legal entity that provides energy services or other measures for the purpose of improving energy efficiency with its beneficiaries and it accepts a certain degree of financial risk during the operations' performance, whereas the payment for the services is entirely or partially based on the achieved improvement of energy efficiency or on the fulfilling of other arranged criteria.

During 2011, preparations to realize the *strategy for energy development* got started. The program determined the measures, conditions, manner and dynamics of realization of the strategy, as well as the liabilities of the state institutions, the institutions of local self-government units (LGUs) and of the executors of energy activities who have liability to secure an adequate public service. In line with the efforts of the Macedonian government to fulfill the targets in the "Europe 2020" strategy, the action plan for energy efficiency was adopted in 2011. The plan envisages various measures and activities for obtaining nine percent energy efficiency by 2018, compared to the average energy consumption in the period between 2002 and 2006. Since then, various bylaws were prepared which regulate energy efficiency in buildings, implementation of energy controls and strengthening of the capacities of the involved institutions in the implementation of the policies for energy efficiency.

Taking into consideration the recommendations of the "Europe 2020" *strategy for promoting electricity* generated from renewable sources of energy on the internal market, the government adopted an *action plan* for renewable sources of energy in 2012. The action plan envisages measures and activities for reaching the strategic goal of having 20 percent of final energy consumption come from renewable sources by 2020. In line with this goal, the program for subvention of part of the expenses for installation of solar thermal collectors continues as well.

During the past period, the program for small hydro power plants (HPPs) was continuously being implemented which enabled for 47 agreements for concession for total of 47 small (HPPs) with installed capacity of about 35 MW to be signed. With regards to that, there is possibility for construction of more small HPPs around the country, thus the activities for granting concession for water should continue during the next medium term period.

During last few years, there have been several legislative changes related to the labor market, mainly in the *law on employment* and unemployment insurance and the Law for Mandatory Social Security Contributions related to the employment policy and labor market. From a general perspective, it is apparent that with the proposed changes in the laws, the government is making an effort to streamline the national labor legislation, to reduce the leakages from the system, as well as to correct wrong incentives. Such measures are coupled with a measure to increase worker protection by adopting a law to establish a national minimum wage. Such policies are in line with the EC recommendations for shared

responsibility between the unemployed and the authorities.

The law on employment is very important with respect to developing new green jobs. According to the law, the employee is entitled to continuous education, career upgrade and training in accordance with the needs of the working process. The purpose of all this is to promote the job skills at the position, as well as to preserve the job post.

In Macedonia, the employer is obliged to provide continuous education, career upgrade and training to employees if required by the working process. The employer is also obliged if education, career upgrade and training could prevent that the employment contract is cancelled due to personal or business reasons. In compliance with the needs for education, career upgrade and training, the employer has the right to send the employee to further his or her education, upgrade his or her career or to train, whereas the employee has the right to apply for these benefits on individual basis. The duration of the education, career upgrade and training as well as the rights and duties of the contracting parties before and after the completion of education, career upgrade and training should be regulated with a separate contract or with collective agreement.

The employee who educates himself, has career upgrade or is subject to training upon individual interest is entitled to paid absence from work for the purpose of taking exams.

Finally, the law on building has some important articles when the issue on energy efficiency is analyzed. Namely, according to this law, the building and its heating, cooling and ventilation appliances should be set up in accordance with the climate conditions of the location. They shall provide that the energy consumption shall be equal or lower than a defined level, and that they should meet the requirements for energy efficiency. Also, it is of high importance to note that in order to perform operations for interior setting of the building such as light installation, painting, flooring, tiling, door and window setting, plumbing, terrain arrangement and other craftsmanship operations, the supplier of these operations should be registered in the Central Register and according to this law the supplier is not obliged to have any license or authorization.

4.3. Labor Market in Macedonia - Trends and Structure

4.3.1. Unemployment in Macedonia

The labor market in the Republic of Macedonia, during the period of transition, appeared to be pretty imbalanced. During the whole period, labor supply was significantly higher than labor demand. This imbalance resulted high rates of unemployment for a long period of time.

The high rate of unemployment was inherited from the period prior to the transition. Namely, Macedonia had a rate of unemployment of 22.6 percent at the end of the 1980s. This rate of unemployment continuously increased during the period of transition and reached the highest level of 37.3 percent in 2005. Over the last ten years, the GDP growth rate was smaller than the economic growth rates of the countries that were candidates for EU accession or of those that became EU member countries during the period mentioned above. The exception to this was 2001 when the economic growth rate was 4.5 percent due to a conflict within the state.

4.3.2. Labor Market and Labor Force

Labor market flexibility and labor force structure are both significant dimensions of the investment climate. The rigid labor market and unsuitable labor force structure, especially from the perspective of educational attainment, age and the employment waiting time, have negative influences on the creation of a convenient investment environment. For instance, 90 percent of the unemployed in Macedonia in 2008 had four years of secondary education. The highest rate of unemployment, above 50 percent, is with the individuals who have no education, whereas with the individuals with four years of secondary education, the rate of unemployment is around 35 percent. Individuals with higher education face a 20 percent unemployment rate, the lowest in the country.

Chronic unemployment is also problematic in Macedonia. In 2008, 65 percent of the unemployed had been without work for at least four years. The structure of unemployment viewed from the age perspective is also unfavorable. Individuals aged 24 and under face an unemployment rate of 60 percent, which is the highest rate for all age cohorts. Unemployment rates tend to decrease as age cohorts increase.

Such an unfavorable unemployment structure negatively influences the investment climate. Further measures that are to be undertaken by the government should be in the direction of improving the labor force structure, especially from the aspect of educational attainment, including non-formal education. For that purpose, the focus should be put on the labor market activity policies, which is where EU member countries focus their attention. For example, in 2006 Germany devoted three percent of its GDP to these policies. At 41.1 percent, training expenditures comprise the largest part of the total cost for active policies in EU member countries, followed by 24.2 percent for promoting private employment initiatives.

4.3.3. Institutions and Labor Market

Macedonia is still going through transition process. There is a high degree of government involvement in all spheres of society, and there is a long tradition of syndical organization. The influence of these institutions on the final performance of the labor market is something that cannot be neglected.

The influence of institutions on the labor market in Macedonia does not cover only unemployment. Institutions also influence the rate of activity, the job-hunting process, determination of salaries, changes in the quality of labor, employment protection and income taxation.

Three types of institutions influence the final performance of the labor market: Government and government institutions; the branch labor unions in the Association of Labor Unions of Macedonia; and the employers through associations of their own. All of these institutions create special policies that refer to different segments of the labor market and influence its performance in different ways. These institutions make the labor market more or less flexible to the changes that happen in the environment. Some of their activities and policies are intended to increase labor market flexibility, whereas others do the opposite.

These institutions are typical for EU member states, and in the case of Macedonia four types of institutions can be analyzed:

- Labor unions and collective agreements
- Active policies on the labor market
- Passive polices on the labor market
- Legislation referring to employment protection

Syndical organization has a long tradition in Macedonia, although it was much more intense in the period prior to independence. During that time, some activities had unionization rates of more than 90 percent. However, in the period of transition, in parallel with the privatization and the restructuring of Macedonian economy, many employees lost their jobs, many activities stagnated in their development, and consequently the organization of employees in labor unions decreased.

The labor union (through its branch labor unions) actively participated in the process of collective contraction. In the law on employment that regulates syndical operation in Macedonia, there are three types of collective agreements: *General Collective Agreement* at national level, Special for each branch of activity, and Separate for each employer (Law on Employment, Article 203, p. 78)[32]. The law on employment shows that in Macedonia there are strict rules for syndical organization and that it is determined that the collective agreements have an overall validity of two years, with a possibility to prolong them, which leads to both freezing the salaries of the employees in the following two years and to having a decreased labor market flexibility. But if it is taken into account that the scope of the collective agreements is not that large because two-thirds of the employees are employed in the private sector where collective agreements are more difficult to conclude, primarily due to the pressure of the employers via their associations, then one could conclude that in this segment the labor market is flexible.

The regulation in the Republic of Macedonia that refers to the determination and payment of salaries has been in compliance with international practice, but there has been a delay in its implementation. At the end of 2011 the country adopted a minimum wage law according to which the determined minimum wage amounts to €132 (8,100 MKD), or 39 percent of the average net salary in the country. Up until the adoption of this law, there were effective provisions from the law on employment. In this law, the minimum wage was not determined as a concrete amount, but there was a provision stating that this amount cannot be below the salary determined with the law or with a collective agreement. This gave an opportunity for the minimum wage to be determined with some other law that could not contradict the law on employment or collective agreements.

As an EU membership candidate, the Republic of Macedonia has to meet the criteria from the Lisbon Agenda. One of the criteria states that the rate of female participation in the labor force shall not be under 60 percent (for EU member countries). The rate of female participation in Macedonia is 45 percent. However, some labor market research in Macedonia shows that the increase in the minimum wage decreases the gap between the rate of male and female participation in the labor force.

Labor market flexibility is also determined with the flexibility of the working hours according to the law on employment. In Macedonia, the solutions covered with this law provide greater flexibility in working hours and in the labor market. In reality, however, this does not function because the actual implementation of these legal solutions is lack-

32 Up to year 2010 there were concluded two types of general collective agreements at national level: General collective agreement on economy and General collective agreement on the public sector. Besides these two, up to present time, in Macedonia there have been concluded around 30 sectoral agreements and agreements at enterprise level.

ing. Most private sector employers do not keep records of overtime work, and they also limit a full-time employee's ability to have an additional part-time work engagement with another employer. These practices make the labor market less flexible.

Active policies have a big influence on the labor market in Macedonia. The activist approach of the Macedonian government was accentuated at the very beginning of the transition period. The realization of the project on social reforms and technical assistance, organized on behalf of the Macedonian Government and the European Bank for Reconstruction and Development (EBRD), started at the end of 1993 and the beginning of 1994.

Passive policies also have significant influence on the performance of the labor market in Macedonia. The greatest range of these policies negatively correlates with the rate of unemployment. The opportunity to use health insurance in case of unemployment as well as getting allowance on various grounds lowers the motivation of unemployed persons in their pursuit of formal employ. Decreasing the health insurance and the range of the allowance program in the case of unemployment shall decrease the rate of unemployment in Macedonia.

Paradoxically, although there is a high rate of unemployment, legal protections concerning employment are strong. The situation becomes more complicated with the fact that in the field of unemployment there is an increase in the number of persons who become part-time employees, and for them the flexibility of the legislation on employment protection is small.

These details offer an image of a non-flexible labor market. In fact, these institutions contribute to the high rate of participation in the informal economy. According to some calculations made on behalf of the International Bureau of Labor, almost one third of the labor force works exclusively in the informal economy, including seasonal work, part-time employment and the overtime work. Calculations show that the informal economy in Macedonia comprises 25 to 40 percent of the GDP. Some researchers maintain that from 2000 to 2005, the informal economy in Macedonia was around 36 percent, which is lower than the 40 percent average of other transitioning economies.

Concerning the expectations on the workforce dynamics, there is no clear shortage of workers in the traditional professional activities such as concrete worker, reinforcement worker, mason, carpenter, plumber, electrician, roofer, installer of window frames, thermal insulation installer, water-proofing installer and shuttering-worker, among others. Approaching the year 2020 it is presumed that a certain portion of workers will leave the labor force. To prepare for that eventuality, it will be necessary to train an additional 20 percent of new workers, preferably young people from socially vulnerable strata of the population. However, due to the stable penetration of low-energy solutions in the mainstream construction practice, it is supposed that nearly all workers would be engaged (although at different levels) in continuing vocational training activities dedicated to main energy efficiency principles, either on-site or through specialized training programs.

On the other side, the supply of specialists for installation and maintenance of main renewable energy systems in buildings and the level of qualification of the workforce are quite limited. There is a clear shortage of installers in each of the studied systems (small biomass-fired boilers, photovoltaic and solar thermal systems, geothermal systems and heat pumps and mini wind turbines). New specialized training schemes should be developed and introduced in the training system, with growth rates similar or even exceeding the expected rate of introduction of the specified systems.

It is also worth noticing that the system of secondary vocational training and education is very different compared to the traditions and practices in most other EU member states. One of the key recommendations should be to foster practical trainings during this stage of education, both through enhanced cooperation with producers and suppliers of materials and technologies and through inclusion of intensive practical training on actual construction sites in the training programs.

The legislation on employment protection has significant influence on the final performances of the labor market in Macedonia. One significant aspect of economic and social reform in favor of the transition to a market system was the promotion of legislation that was expected to depict the new reality of the labor market. The purpose of these reforms was to give an opportunity to the enterprises to cancel the employment contract out of economic reasons. It was also intended to protect employees against unjustified termination of their employment, at the same time giving them some time to find another job or giving them severance pay. Considering the fact that legislation on employment protection directly involved both the employers and the employees, this influences labor costs, the employment and labor productivity. In places where the labor market is less flexible and institutions do not operate successfully, unemployment is higher and more persistent. The stricter legislation on employment protection increases the labor market segmentation by creating a greater gap between the insiders and the outsiders. On the other hand, the stricter legislation on employment protection leads to having greater social stability, division of the costs for compliance between the society and the business sector, greater acceptance of the new technologies as a result of the pressure put on the enterprises, with positive influence of productivity.

4.4. Potentials for Improvement of the Business Environment

Economic theory states that continued growth and employment creation depend on sustained macroeconomic stability. Consequently, a prudent policy framework would narrow the fiscal and external imbalances over the medium term to ensure debt sustainability and manage the risks of new shocks and crises. At the same time, the structural problems of the Macedonian labor market need to be addressed to ensure that high economic growth rates also translate into employment generation. In the short term, this requires sustaining employment growth, including in the low-wage sector. Over the medium term, it requires upgrading skills and enhancing productivity to boost employment outcomes. Finally, business environment reforms support growth but also help "formalize" the economy and contribute to better and more secure jobs.

Economic growth is certainly an important prerequisite for further job creation, but other factors can help to create more and better jobs. On the labor supply side, analysis shows that lack of skills (especially "soft skills"), high reservation wages due to remittances and/or high public sector wages, and discouragement are among important factors contributing to poor labor market outcomes. Enhancing skills would not only increase productivity and the quality of employment outcomes, but might also help reduce unemployment in cases of skills mismatch. On the legal and institutional side, the labor code has been reformed and institutional strengthening is ongoing – however, considerable efforts are still needed.

Since 1991 Macedonia has made remarkable results in improving its business climate but more can be done to build on recent improvements. Areas where further efforts can pay

off include administrative procedures, improving contract enforcement, and facilitating foreign trade. Advances are needed in safeguarding property rights and the rule of law, facilitating competition through improved market entry and exit, and improving access to financing. The remaining gaps in the financial sector framework could be addressed to safeguard its stability and enhance its role in supporting growth. Continuation of reforms of social security contributions could help wage competitiveness, but further reductions in labor taxation should not endanger the sustainability of public finances. Though the burden of excessive regulations has been reduced it still impedes economic activity in certain areas. The establishment of an Investor Aftercare Function can provide a venue for institutional dialogue with businesses and identification of excessive regulation. Licensing and permit issuance, including construction permits, remain critical concerns voiced frequently by business representatives.

In order to ensure the rise of its competitiveness, Macedonia should put more attention on educating its population and achieving the national goal of becoming a "country of knowledge." The government's strategy for education containing the introduction of nine-year primary education, compulsory secondary education, and revised curriculums which promote outcome oriented and interactive teaching and learning, early learning of English language and information technology skills, can be evaluated as a positive step forward. In addition, budget increases for education are sought to reach the Organization for Economic Co-operation and Development (OECD) expenditure target of five percent of GDP. This should help strengthen the capacity of domestic institutions to foster skills applicable to the EU market and increase the competitiveness of the labor force.

4.5. Potentials and Prerequisites for Creating New and "Green Jobs"

To the end of creating a coherent strategic framework for unemployment reduction, in cooperation with the social partners, National Employment Strategy (2011-2015) was adopted in 2011, defining the key priorities, goals and policies to contribute to increased participation and opening of jobs on the medium term by:

- Further improvement of business climate and competitiveness and increased level of investments;
- Reduction of operating costs and social insurance contributions, as well as improvement of labor market mechanisms, such as determining salaries, social insurance, social protection system, etc.;
- Improvement of educational system and human resources in line with the needs on the labor market;
- Efficient labor market services by further modernization and improvement of both quantity and quality of services;
- Implementation of active labor market policies;
- Development of efficient and functional social dialogue, etc.

According to the National Employment Strategy, national goal as regards employment rate (20-64 years of age) for 2015 is set at 55 percent, which is a step forward in realizing the determined strategic priorities, being in line with the "Europe 2020" Strategy. Specific activities to realise strategic priorities are set in the National Employment Action Plan and

they are in line with the "Europe 2020" integrated guidelines for economic policies and employment policies of the EU Member States.

Taking into account the specific needs and conditions on the labor market in Macedonia, institutional capacities, as well as possibilities for public financing, aimed at reducing unemployment, i.e. increasing the participation in the labor market and reducing structural unemployment, following measures could be seen as the most important:

- Support to self-employment for starting own businesses;
- Additional employment with grants for each newly employed person in companies registered under the self-employment measures;
- Preparation for employment through training, re-qualification or additional qualification of unemployed persons so as to acquire knowledge and skills to increase the possibility for their employment;
- Training in certain professions being deficient on the labor market according to the needs of the labor market indicated in the previous year;
- Formalizing informal businesses so as to reduce gray economy;
- Training as support for first employment for young persons up to the age of 27.

The Employment Agency of the Republic of Macedonia (EARM), as a public institution, implements and monitors employment policies and assesses the success of labor market policies, and continuously undertakes activities to strengthen administrative and institutional capacities. In the coming period, EARM faces the need to implement the activities, which are expected to contribute to the harmonization of the services of the EARM with the EU standards:

- Implementation of active employment programs and measures and development of employment services in order to extend the scope of beneficiaries and to strengthen individual access as regards activities with unemployed persons, in particular persons with lower possibilities on the labor market;
- Frequent analysis of the needs for skills on the labor market in Macedonia.

4.6. Market for Green Jobs or Supply and Demand for Green Jobs

In order to analyze the opportunities and potential for establishing green jobs in Macedonia, one should evaluate the possible market for the improvement of energy efficiency in the residential sector. Namely, we should analyze both sides of the market:

- The supply side, such as potential for businesses that offer or need these services
- The demand side, such as households and needs for energy efficiency in the residential sector.

Analyses of the supply side should identify the circumstances in the framework of the businesses in regards to conducting energy efficiency activities in Macedonia. When assessing the energy saving potential of an average participant, four major priority sectors can be identified:

- Residential sector
- Commercial and service sector
- Industrial sector
- Transportation sector

In 2006, these four sectors spent 96.5 percent of the total energy in Macedonia. Traditionally speaking, professionals in the energy sector are focused on creating new reserves of energy, new systems of production and transportation of energy, new refineries and pipelines. Energy efficiency with the end consumption is usually a lower priority. This especially is the case in Macedonia where there are many opportunities for decreasing the amount of energy needed for performing the same tasks. However, there are no studies that monitor how energy efficiency contributes to the economy.

In Macedonia, there are no surveys on the market breakthrough or on the distribution of products that use energy, which is a necessary starting point for estimating the potential of energy savings. Besides these restrictions, the experience of the country and the extensive work in this field of neighboring countries clearly show that the potential for energy savings is huge and that energy efficiency has to be a priority in the energy sector. The Statute on Energy Efficiency of Buildings, adopted in 2008, made the first significant step in the direction of energy control and marking of buildings by determining the maximum values of the insulation's heat-penetration of these objects. However, it should be mentioned that these rules are voluntary, not compulsory.

Even in cases when banks provide commercial financing, the terms of the commercial loans are often unacceptable to enable borrowing funds for realization of measures for energy efficiency. The projects for energy efficiency could have a longer period for the repayment of funds, sometimes no guarantee can be offered for them. These loans might be needed by legal and physical entities that are not experienced in preparing appropriate technical project and application.

In order to support the efforts for reaching energy efficiency, it seems it is necessary to establish an Energy Efficiency Fund. This fund shall finance the projects pertaining to energy efficiency, including grants for conveying market study, preparation of projects, energy controls, raising public awareness. Funding should be provided only if the projects are found suitable to the technological and economic features of energy efficiency projects. The fund shall be available to be used either for direct loans or for co-financing of loans through commercial banks, or it could provide guarantees for loans that commercial banks give through their own capital.

Collecting means for the fund is a constant goal, and it should be a high priority for the government. The government can use its own funds and other options offered by the EU, international financial institutions like the IMF and other agencies like European Reconstruction and Development Bank, the World Bank, the European Commission, USAID, the Austrian Development Agency/Austrian Development Cooperation and GTZ. The ultimate purpose is to identify possible sources of funding to support initiatives for energy efficiency in the country. In addition, the government could promote the benefits from these investments in energy efficiency in front of the entire financial community to alleviate the investments in the private sector.

The level of public awareness about energy efficiency and also about it economic benefits are limited to a small number of professionals in the country. This group should be ex-

panded through programs for local impact range in order to make the methodologies and the energy efficiency practices become implemented in the mind of those who are the key actors in the energy sector.

Macedonia is lucky to have a small group of professionals who are active in the field of economic efficiency, but this group should be expanded in order to become a critical mass. To that end, the government has to make good use of the transfer channels that shall enable the development of skills and knowledge within the business community and shall also provide an opportunity for professional upgrade and development of business in this area.

Countries that adopted energy efficiency as general goal discovered that it could be implemented in a very fast and economic manner. There is a proportional increase in the business activity and in the number of jobs at all levels of economy.[33] According to estimates by the World Bank and its experiences in Macedonia, investments of €1 million in the field of energy efficiency could open ten to thirty workplaces (opportunities for engaging local people, qualified or not-qualified).[34] Although the activities for energy efficiency imply development of new technologies, the technologies have been already proven and well established and do not require skills bigger than those that are usually available in the industrial and commercial business activities. The provision of additional skills training for the staff becoming capable of implementing methodologies and practices for energy efficiency appears to be relatively simple and economical.

Concerning the demand side for these kinds of services, the analyses should concentrate on households. In general, the Republic of Macedonia has very low energy consumption per capita and it has very high consumption per GDP unit in all sectors. Regardless, it is highly dependent on energy import. Since 2000, Macedonia started importing electricity in addition to the oil and gas it was already importing. Energy imports have been increasing recently, especially with respect to electricity.

The consumption of energy is concentrated in five sectors: industry, households, traffic and commercial and service sector:

- Industry 33.8%
- Traffic 20.5%
- Agriculture and Forestry 1.8%
- Households 29.2%
- Commercial and Service Sector 13.1%
- Non-energy Needs 1.7%

In comparison with the developed European countries, Macedonia has a very low presence of gas despite high electricity consumption. This is especially true in the case of households. In 2007 households accounted for 36 percent electricity consumption, the large consumers accounted for 26 percent, small industry accounted for 9 percent, and the loss accounted 19 percent.

33 An extensive study of municipal building retrofits in Canada, conducted by the Federation of Canadian Municipalities, estimated that every $1 million invested in building retrofits creates 20 person-years of employment, mainly in the construction phase. The duration, specific job types, and job numbers in the construction phase vary widely from project to project. Depending on the project, the specific areas of work and job types in this stage could include different positions.

34 Sekerinska Liljana, Activities in the field of energy efficiency supported by the World Bank, power point presentation at Conference "Improvement of energy efficiency in the Republic of Macedonia", September 2012, Skopje.

Analysis of households' energy consumption for different purposes is made from the aspect of determining the future demand for the period that follows. In order to get real data on energy consumption, the unit of analysis is one conventional family. This is done because in this sector energy consumption per capita is less representative, having in mind the fact that consumption mainly depends on the apartment (heating, light, appliances, excepting the hot water), where the number of persons in one family is not that important.

The number of apartments/houses is not taken as number of units that consume energy. Rather, it is only the number of families in the country, and this number does not cover empty apartments such as weekend cottages that do not have continuous energy consumption. This means that in the country there are more apartments than families.

Monitored unit		household
1.	Number of households	564,296
2.	Number of habitats	697,529
3.	Average number of family members	3.6
4.	Average household area	70.6 m^2
5.	Average number of rooms in urban settlements	3 rooms
6.	Age of the apartment fund	
	• *Before 1919*	*1.11%*
	• *1919-1945*	*3.95%*
	• *1946-1870*	*30.12%*
	• *1971-1989*	*47.80%*
	• *After 1991*	17.02%
Average energy consumption per household		*0.96 toe/per year*

Source: Ministry of Economy of the Republic of Macedonia (2011): Strategy for Improvement of Energy Efficiency in the Republic of Macedonia up to year 2020, Skopje, p. 93.

An average family spends 57 percent of energy for heating, 22 percent for household appliances (oven, fridge, vacuum cleaner, washing machines, air-conditioning, ventilators, televisions, and computers), as well as part for the street light, 12.7 percent for preparing hot water and 8 percent for light. Energy for heating accounts for the greatest proportion of consumption.

The analysis should take into consideration the fact that the net salary over the last few years on average increases by 4.95 percent a year, while the living costs increase by 3.41 percent. According to the statistical data for the last years, one average family, after it covers the expenses for the average consumer, has at its disposal only 15 to 25 percent of the average salary to cover the rest of the expenses.

Keeping in mind Macedonia's the high rate of poverty, it cannot be expected that the energy efficiency program for a period of one year shall cover all the qualifying low-income households. Therefore, in order to work in the existing social structure, priority should be given to the most vulnerable families. Such families shall receive a greater part of energy efficiency assistance during a certain year. As an alternative, the government could put

its focus on the most vulnerable groups in society, such as the elderly and families with children. In coordination with the social care authorities, a program for energy efficiency should be designed for low-income households.

The analysis of the measures for reducing energy consumption with households should point out potential demand for green jobs. It takes into consideration the following factors:

- Living standards;
- Number of built homes;
- Population and the number of families;
- Measures (legal and sub-legal acts, training, promotion materials) for improving energy efficiency, especially the one of household appliances and the homes;
- Automatic control of energy consumption.

Practices and surveys from the neighbor countries show that there is a comparable inefficiency of energy consumption for heating buildings.

In order to start to efficiently implement energy efficiency measures, it is necessary to adopt low-cost measures that can voluntarily be used by a wide range of consumers. These measures do not require large investments but give direct results. Basic measures that can be immediately implemented in the residence homes cover:

- For windows, it is necessary to have advanced low-energy techniques for multi-layer window setting, filing and vacuum sealing;
- Proper closing of entrance doors with tape for closing;
- Improvement of the passive ventilation systems. Infiltration of air in the apartments often overcomes the norms for ventilation in west countries, and the decrease in the air infiltration could result in significant energy saving, without lowering the quality of air in homes;
- Upgrading the windows near the stairs. The loss on the joint stairs can be significant due to the bigger infiltration of air from the outside;
- Thermal insulation of outside walls (façade);11
- Thermal insulation of the inside cover board;
- Additional insulation of the attic;
- Insulation of the basement's ceiling;
- Installation of thermostatic valves on the radiators;
- System balancing;
- Insulation of the hot-water pipes;
- Installation of reflecting panels behind the radiators;
- Automation of the sub-stations and the counters for the heating installation;
- Energy efficiency appliances;
- Buying energy efficient appliances.

The average single return on investments in the residential sector is 8.3 years according to the actual prices of energy, but it shall be only 4.1 years if the liberalized market prices of electricity after year 2015 are factored in. It is expected that the financial investments of households in Macedonia regarding residential buildings, for the purpose of improving energy efficiency, to be around €80 million for the period between 2012 and 2018."[35]

4.7. Energy Efficiency and Creating Green Jobs in Macedonia: Analyses of the Possibilities in Macedonian Circumstances

It is clear that for the last few years there has been *enhanced activity with respect to energy efficiency (EE) and renewable energy sources (RES)* in Macedonia. Activities for accelerated and more significant breakthrough of RES and for accelerated and more significant improvement of energy efficiency are visible in:

- Introduction of privileged tariffs for using RES and in the adoption appropriate guidelines for their implementation;
- Preparation of the first National Action Plan for Energy Efficiency and appropriate guidelines for this field;
- Financial relieves and financial support for usage of solar energy for heating;
- Preparation activities (analyses and measurements) for building wind power plants;
- Activities that are underway for greater usage of geothermal energy, of the waste biomass and biogas;
- Activities for greater and clearly defined participation of bio-fuels;
- Increased interest of donors and credit lines.

From the other side, the Macedonian case has several weaknesses in regards to raising the issue of energy efficiency and creating "green jobs". The most important of them are the following:

1. *Weak economic power of the population regarding investments in energy efficiency*. The Republic of Macedonia, with a GDP per capita of €3,645 (at current exchange rate) lists itself among the countries with low GDP and with low economic power for investments. [36] Actually, in 2006 Macedonia's GDP fell to the level of 1990 and significantly lagged behind both the developed European countries and the less developed ones. With an average growth of 3.5 percent per year in the period from 2003 to 2006, Macedonia is among the countries with the lowest economic growth in the region of Europe and Central Asia. With $3,460 GDP per capita (in USD) in 2007, Macedonia was ranked 111st in the world. In 2007 growth reached a rate of 5 percent, but the global economic crisis that appeared at the end of 2008, had and still has a highly negative influence both on the economic growth and on the economic power of the state regarding investments in energy sector as well as on the economic power of the households for investments in the energy efficiency in the residential sector.

35 Ministry of Economy of the Republic of Macedonia (2011): First Action Plan for Energy Efficiency in the Republic of Macedonia 'till 2018, Skopje (in Macedonian), p. 43.

36 According to the data from State Statistical Office, GDP per capita in the Republic of Macedonia for 2009 was €3,269, and €3,434 in 2010.

2. *Incomplete secondary legislation on energy efficiency and RES.* Secondary legislation, which refers to the efficient usage of energy, has not been yet completed. Besides the full completion of secondary legislation, it is necessary to remove all the administrative obstacles that impede the realization of projects up to the level of them becoming entirely unprofitable. Lacking is legislation that defines national goals for OIE and that saves energy, as well as programs and action plans with regulatory and economic measures, specified roles of institutions, time schedule and financing.
3. *Insufficient institutional capacities.* Capacities of the Ministry of Economy – the Energy Sector, of the Regulatory Commission, of the Energy Agency and those of the units of the local self-government are not sufficient for efficient implementation of the new legal framework of energy sector, out of which derive numerous obligations of theirs. Insufficient are also capacities for research, development and introduction of new technologies in the energy sector.
4. *The country is poor with domestic energy resources and is highly dependent on energy import.* Macedonia has a pronounced energy deficiency. It imports the all of its oil, natural gas and quality coal, and in 2000 it began importing electricity as well. Energy import has been increasing in recent years, and over the last few years there has been a rapid increase in the import of electricity.
5. *Low energy efficiency in the production, transport, distribution and usage of energy.* One of the basic characteristics of the energy sector in Macedonia is the high consumption of energy per GDP unit, besides the low consumption of energy per capita. Low energy efficiency is a result of the long-term absence of investments and outdated production equipment, distribution and usage of energy, the absence of incentives for energy saving and the lack of incentive for energy saving due to the depreciated price of electricity, high commercial losses the distribution of electricity, as well as insufficient awareness campaigns regarding the importance of energy, its price and the need for rational usage.
6. *Methodological barriers.* So far, official statistics in the Republic of Macedonia do not define green jobs as an official category.

Obviously, there are few opportunities for realizing energy efficiency projects and creating "green jobs" in Macedonia. For example:

1. *Energy Community.* Membership in the Energy Community enables Macedonia to have close cooperation with all other members. In addition, it enables the creation of a stable regulatory and market framework that attracts investments in transit and transfer infrastructure for gas and electricity as well as investments in capacities for production of electricity. All of this enables a stable and continuous supply of natural gas and electricity. By providing unique regulatory framework in the region of South-East Europe, opportunities are being created for connecting with natural gas reserves in the Caspian, North Africa and the Middle-East of natural and also for exploitation of domestic reserves of natural gas, coal and hydro-energy potential. Membership in Energy Community also enables development of competition, liquidity and the usage of economies of scale. In the Contract on Energy Community's establishment, special place is given to environmental improvement related to natural gas and electricity by improving the energy efficiency and the usage of renewable sources of energy.

2. *Additional employment in the energy sector and additional engagement of other domestic companies.* The building of large energy projects enables bigger domestic companies to be engaged in the realization of certain segments such as production, construction and assembling affairs. Activities in the field of energy efficiency, the renewable sources of energy and the introduction of natural gas in households enables a more significant inclusion of small and medium enterprises. The transfer and the spread of technologies for sustainable energy enable the development of specialized national private companies that will undertake the financing and the realization of technological breakthrough. This also counts for the energy services companies (ESCOs).

3. *In the context of current conditions in the country, energy efficiency is economically feasible.* Energy efficiency could be very important for the economy in the country because it has the capacity to create new jobs, to improve the quality of life, to reduce energy import and to improve the chances for the county's EU accession. In addition, energy efficiency protects the environment and is economically feasible under the current circumstances. "One euro invested in energy efficiency prevents investment of €2.2 on the side of the energy supply."[37]

4. *High consumption of electricity in households.* Over the years, the depreciated price of electricity led to relatively high participation of electricity in the total consumption of energy in households. Growth has been continuous and more than twice as high compared to European countries.

By and large, nobody can omit the possible threats for an intensified energy efficiency 'climate' and for creating "green jobs" in Macedonia, coming primarily from:

1. *Changes in the price of energy imports and in the production capacities.* More significant rise in the price of energy and the equipment gained through import shall represent a serious threat to Macedonia, which is an importer of energy and energy equipment. On the other hand, one can see this as an opportunity because the households should be pushed by the higher price of the energy to be more energy efficienct. Greater change in the ratio of price of certain energy supplies is also a threat to Macedonia, which has insufficient diversity of usage.

2. *Investments return.* It seems that the investments in the residence sector do not have fast a return on invested means due to the fact that the potential for savings and investments necessary for the sum include a list of individual sub-measures with a wide range of capital intensity. For example, solar systems or replacement of stoves impose new investments with long a repayment period as opposed to promotion campaigns and legal reform on energy characteristics of buildings, which results in isolating from the climate conditions for little or no cost. Besides that, the residence sector consumes energy that is with crossed-subsidized tariffs, which in turn retards the return on investments. However, even according to current prices of energy, the measures for improving energy efficiency in the residential sector have a significant non-monetary social effect. This strategy seeks to cover the measures at the lowest cost through raising public awareness, legal reform and the increased access to finance. However, there are also measures with a high cost that require technologies to be changed because these technologies contribute to energy independence, to reaching the goals for environmental protection as well

37 Filkoski V. Risto, Energy efficiency in the industry – multiplied gains, power point presentation at Conference "Improvement of energy efficiency in the Republic of Macedonia", September 2012, Skopje.

as because of their effect as a market catalyst. The expected liberalization of the electricity market in 2015 should result in higher energy prices, thus resulting in better performance (half the period of simple return on investments) of investments made in the residential sector. Some measures have an intensive cost, such as replacement windows and facade insulation. In this sense, the following expectations contained in Strategy for Promoting Energy Efficiency in the Republic of Macedonia up to year 2020 could be very relevant:

Table 4.1. Energy savings per sector (ktoe)

Sectors	2012	2013	2014	2015	2016	2017	2018	2019	2020
Residential Sector	7.63	11.4	15.74	20.42	26.52	33.49	40.51	48.32	57.14
Commercial and Service Sector (public objects)	4.96	7.53	10.83	14.85	18.43	21.62	24.19	26.54	28.60
Industrial Sector	40.96	45.32	63.53	72.49	80	84.06	90.45	90.76	91.09
Transport Sector	12.55	17.86	22.99	28.21	33.20	38.70	44.63	51.94	60.48
Total	66.10	82.15	113.09	135.97	158.16	177.87	199.78	217.56	237.31

Source: Strategy for Promoting Energy Efficiency in the Republic of Macedonia up to year 2020, p. 5.

Table 4.2. Annual Break Down Of Financial Savings Per Sector-

In Million EUR (per year)

Sectors	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Residential Sector	4.34	6.49	8.87	11.43	14.75	18.50	22.55	27.40	33.04	147.36
Commercial and Service Sector (public objects)	3.90	5.91	8.49	11.63	14.15	16.46	18.41	20.22	21.85	121.01
Industrial Sector	35.20	38.94	54.59	62.29	68.74	72.23	77.72	77.99	78.27	565.96
Transport Sector	12.26	17.45	22.46	27.56	32.43	37.80	43.60	50.74	59.08	303.39
Total	55.7	68.8	94.4	112.9	130.1	145.0	162.3	176.3	192.2	1137.72

Source: Strategy for Promoting Energy Efficiency in the Republic of Macedonia up to year 2020, p. 6.

Cumulative financial savings in the residential sector shall be bigger than the cumulative investments in the period observed, but the average period for simple return on investments is 8.3 years. In the commercial and the service sector (public buildings) the average period for simple return on investments is 6.2 years. In the industrial sector, depending on the year of monitoring, it amounts to 1.3 to 4.6 years, and in the transport sector this period is 4.1 years. In each of the sectors the wide range of suggested measures are such that they have various characteristics regarding their economic performance and they vary from being very attractive measures with a fast return on funds to measures for which there needs a decade for them to start being paid off. The measures mentioned above shall

have significantly more attractive periods of return on funds with the higher prices of energy that are expected after 2015 – a date that is projected for the liberalization of the energy market.

4.8. Capacities of the Macedonian Construction/Building Sector Regarding Energy Efficiency and Renewable Energy Sources

4.8.1. State of the Art Analyses

The construction sector is of strategic importance for the Republic of Macedonia, since it provides buildings and infrastructure to the benefit of society. According to data of the State Statistical Office (SSO), it has an important place in the national economy. It has been generating nearly 6 percent of the national GDP in recent years (5.5 percent in 2010, and 6 percent in 2011), and ensuring employment for 5.7 percent of all employed persons (2011). In this way the construction sector is turning into one of the biggest industrial employers in the country. In 2011, the sector comprised 4,400 enterprises, which in terms of legal categories of employment may be distributed as follows: 3,552 micro, 422 small, 57 medium and six big companies. The trend of participation of construction in the gross value added to the national economy remains above six percent (between 6.0-6.8 percent) for the period 2000 to 2006. What is even more important, the share of construction in the gross fixed capital formation in the Macedonian economy was around 30 percent for the period between 2000 and 2006.

If we want to analyse the activities quarterly, then it is obvious that the Macedonian construction sector has a seasonal character, noticeable by the lower activity level in the first quarter of each year.[38] In almost the entire period (2005 to 2011) the construction sector in Macedonia, as a share of the value added, registers a stable trend. The lowest registered level is 3.7 percent in the first quarter of 2007, while the highest level is 7.9 percent in the third quarter of 2011. In the years after the economic crisis from 2007, a small annual decrease can be noticed in the construction share in the gross value added, having the largest fall on an annual basis in 2008 (14.7 percent). Yet, data for 2010 (6.3 percent), as well as on the first three quarters of 2011 (6.6 percent) show a return to the pre-crisis level (6.4 percent in 2006 and 6.6 percent in 2007).

If we compare the data from 2007 with data on value added in the European Union members, we can notice that the share of the construction sector in value added is almost one third higher than in Macedonia. While in the EU countries construction contributes approximately 9 percent of the value added, in Macedonia its share is 6.6 percent.

The analysis of the number of employees in the construction sector shows an average fall of 4.5 percent in the last five years. However, this reduction is not directly related to the beginning of the economic crisis in 2007, since the trend of reduction of the number of employees in the construction sector begins in 2005, having the largest annual fall of seven percent in 2010. The persistent decrease in the number of employees in the construction sector caused a decrease in its share in the total number of employees in the economy. If in 2005, seven percent of the total number of employees belonged to the construction sector, in 2010 this share was reduced to five percent. In regard to the salaries, it can be noticed that salaries in construction continually are around 25 percent lower than the average

38 The data on trends of construction sector in Macedonia in this case is to a certain degree limited, because the time series of data analyzed starts in 2005.

gross salaries in the entire economy. Despite this, the salaries in the construction sector have risen in the past six years at almost the same pace as the average gross salary in the economy.

The significant place of total construction work in Macedonia belongs to activities related to construction of individual dwellings. On average, for the period between 2005 and 2010, the share of activities related to construction of individual dwellings in total construction activities was 34.1 percent. These activities had the most significant influence in the period from 2005 to 2007 when it was 39.3 percent on average). In the following three years, by contrast, this share has declined. The largest annual fall was in 2008 (10.3 percent). Other construction activities had a higher influence on the increase in construction activities for the period between 2008 and 2010, due in large part to the "Skopje 2014" project.

According to the available data, construction costs for new individual dwellings went up 21.4 percent between 2005 and 2011. Material costs and labor costs, the two main components, also increased. Labor costs had a higher growth intensity than material costs: the cumulative increase in labor costs in from 2005 to 2011 was 34 percent and is two times higher than the increase in material costs for the same period, which was 17.1 percent. Despite the higher increase in labor costs, the direction and intensity of movement of construction costs for new individual dwellings, on average, is almost equally determined by the movement of both components - material and labor costs. This is due to the relatively higher share of material costs (about 73 percent), compared to the 27 percent share of labor costs in the total construction costs for new individual dwellings.

The trend of material costs has been the main determinant of the movement of total construction costs for new dwellings. Up to 2007, material costs registered a significant annual increase with an average growth rate of approximately ten percent. At the same time, the average annual growth of labor costs has been more moderate at around two percent. But since the second quarter of 2007, labor costs have registered more significant increases compared to material costs, due to which in most of this period they appear as the main determinant of the movement of total construction costs for new dwellings. This was relevant for 2008 and 2009, when labor costs registered high annual growth rates (10 percent and 17 percent respectively), and in the same time the material costs had rates of three percent and two percent, respectively.

In 2010 there was a decrease in total construction costs for new individual dwellings (around two percent) coming from the decrease in material costs (around two percent) and labor costs (around three percent). The decrease in these costs in 2010 mostly corresponds to the lower aggregate demand, which resulted from the world recession trends and their spillover effects on the Macedonian economy. In 2011, under the influence of increased demand, there is a certain increase in construction costs for new individual dwellings, mainly because of higher labor costs.

The peak of new built dwellings in Macedonia was in 2006, with 6,493 total new dwellings. Directly following the financial crisis in 2007, there was a fall of 10.4 percent for a number of years. The decreasing trend lasted until 2010, when compared to 2009, the number of built dwellings increased by 9.4 percent, but was still 20.6 percent lower than the 2006 level. Analyses of built dwellings by room numbers for the whole period show that in all years there was a larger offer of two-room and three-room dwellings.

As expected, the highest intensity in regard to construction of individual dwellings is in the Skopje region. The number of built dwellings there in 2007 accounted for 29 percent of

all built dwellings in Macedonia. In 2010 the figure grew to 40 percent, showing that this region is by far the most attractive market for residential real estate.

The Polog region is the second most significant region, with a share of 31 percent in total built dwellings in 2007. But it showed a decrease of built dwellings for the period from 2007 to 2010. The fall is a result of the decrease in built dwellings in all municipalities in the Polog region. In the same period the number of built dwellings in the southwest region also registered a decrease. In 2007, the share of this region in the total number of built dwellings was 18 percent, while in 2010 it fell to 14 percent.

Based on the previous data one can conclude that apart from the decreasing trend of total built dwellings in the period starting from 2007, the Skopje region as a whole shows signs of growth in finished dwellings. This trend confirms that the Skopje region is the most attractive place for living and as a place that the people recognize as a possibility for a long-term capital investment.

4.8.2. Construction Sector's Development Trends in Regard to Energy Efficiency and Renewable Energy Sources[39]

Construction sector's vitality is secured by small businesses (20 to 50 employees with long-term contracts) and businesses highly specialized in specific market segments (residences, luxury apartments, adaptation of business premises). Former construction giants that used to employ as many as 10,000 workers have made considerable adjustments to the market, reducing the number of employees to a maximum 500 to 1,000 persons.

Overall, the construction sector and related businesses in the Republic of Macedonia presently employ 40,000 workers, whereas the building sector alone employs 25,000 workers (excluding installation and finishing jobs).

The volume and structure of investments, as well as the vitality of construction businesses abroad, have conditioned all development stages in construction.

The number of construction enterprises has been growing since 1990. The trend has been maintained following the privatization that increased the number of small and medium enterprises. In 1990, for example, there were 317 registered companies, while their number in 2012 rose to 4,400.

The labor force represents huge potential in the Macedonian construction sector. Around 56 percent of the total labor force is employed in architectural engineering, 15.5 percent in civil engineering and 18.5 percent in installation and finishing jobs.

Out of the total number of employees in the construction sector, between eight and ten percent are engineers, 15 percent are technicians, and 75 percent are qualified or low-profile workers. The last category is mostly made up of workers over 50 years of age.

The added-value share of construction sector in GDP structure in the past decade has been ranging between 5.1 percent and 7.9 percent. In times of greater investments it has even peaked to 12 or 13 percent of GDP. At present, its added-value ranges between 480 and 520 million Euros annually, which constitutes six percent of GDP. When the added value of the non-formal sector accumulated by construction of private projects unrecord-

39 According to: Build up skills – Macedonia: Report on the capacities of the construction sector in the field of Energy Efficiency and Renewable Energy Sources, Skopje, December 2012, p. 16, 17, and 21. (in Macedonian).

ed in official State Statistical Office data is taken in consideration, the total contribution to the national economy is estimated at 700 million Euros, or seven percent of GDP.

Investments in the construction sector in 2010 represent 34.7 percent of total investments in assets of the Republic of Macedonia.

The number of employees in construction has been fluctuating in the past four years, rising as high as six percent of the total workforce and eight percent of the workforce in the private sector.

Construction enterprises are still not sufficiently interested in boosting their EE and RES implementation activities. Energy price pressures and the need for training direct EE and RES workers influence profitability and increase both construction expenses and work efficiency. Low interest in worker training comes from the additional costs incurred by enterprises when sending their workers to training (absence of workers during training, higher wage disbursement to highly qualified workers).

Educational institutions are still not accredited for EE and RES trainings. They are lagging in providing trainers, definition of trainings leading to tests for acknowledgement of qualifications obtained and the ability to provide intensive trainings that will valorize the attendees' knowledge.

Workers directly employed in architectural engineering are low-profile, they are paid low salaries and are not interested in improving their skills in EE and RES. They consider training a waste of time and potential earnings, but are also unaware of the possibility of increasing their earnings as a result of certified qualifications.

4.8.3. Investments and Labor Force for Introducing EE Requirements in the Construction Sector

"Introducing EE requirements will cost somewhere in between 180 and 250 Euros per square meter depending on the age of the building. Implementing the EU recommendations for the renovation rate per year of housing and public building stock in terms of energy efficiency will thus cost around 200 million Euros per year, with 166 million Euros a year for the private housing stock and 39 million per year for public buildings."[40]

Table 4.3. Investments, Savings, Advantages Based on the Adopted National Strategy For Improving Energy Efficiency, 2010-2020.

in millions of Euros

Subsectors	Investments	Savings with present energy prices	Savings after liberalized energy prices	$ktCO_2$	Economic, environmental & social benefits upon introduction of EE measures in buildings
Residential sector	279.6	151.3	311.9	1407	• Comfort and health • Smaller budget • Anti-poverty energy measure

Source: Build up skills – Macedonia: Report on the capacities of the construction sector in the field of Energy Efficiency and Renewable Energy Sources, Skopje, December 2012, p. 37. (in Macedonian).

40 Build up skills – Macedonia: Report on the capacities of the construction sector in the field of Energy Efficiency and Renewable Energy Sources, Skopje, December 2012, p. 37. (in Macedonian).

Table 4.4. Investments Necessary to Reach National EE Strategy Targets By 2020

in millions of Euros –

Build sector	Total investment	Government of Republic of Macedonia as investor	Municipality as investor	Foreign donation	Private sector
Private apartments	279.56	4.0	0.7	44.9	229.9

Source: Ministry of Economy of the Republic of Macedonia (2011): Strategy for Improvement of Energy Efficiency in the Republic of Macedonia up to year 2020, Skopje, (in Macedonian).

Table 4.5. Dynamics of Necessary Financial Investments for Introduction of EE in the Build Sector

in millions of Euros –

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Private sector	12.4	17.2	18.9	19.6	26.2	31.8	34.5	43.9	52.4
Commercial sector	8.9	10.1	12.3	15.5	14.0	14.8	14.8	14.9	15.0
Total	21.3	27.3	31.2	35.1	40.2	46.6	49.3	58.8	67.4

Source: Ministry of Economy of the Republic of Macedonia (2011): Strategy for Improvement of Energy Efficiency in the Republic of Macedonia up to year 2020, Skopje, (in Macedonian).

The number of persons employed in construction in the past four years has been fluctuating, reaching 6.5 percent of the total size of the labor force in the Republic of Macedonia, or eight percent in private sector employment. In 2011, there were 45,000 total workers employed in the construction industry.[41]

"The necessary direct labor force to implement the planned dynamic for introduction of EE requirements in the building sector in the Republic of Macedonia calculated by time necessary for renovation of necessary area in meters squared and the cost of work per diem. The dynamic of repairing existing buildings is 2.9 percent in the case of private housing stock and five percent in the case of public buildings and the construction of new buildings (housing and public) following recent trends."[42]

Tables 4.6/7. Size of the Labor Force Needed to Introduce EE Requirements When Renovating Existing Stock of Buildings and New Buildings

Existing buildings (m^2)	Renovation (%)	Area renovated (m^2/year)	Single value for renovation (daily rate/ m^2)	Necessary labor force (daily rate/ year)	Daily rates per year	Size of labor force
Private	2.9	832,300	3.1	2,580,130	250	10,320
Public	5	130,000	4.0	520,000	250	2,080
Total	7.9	962,300	7.1	3,100,130	500	12,400

41 According to: Build up skills – Macedonia, ibid. p. 44.

42 Build up skills – Macedonia, ibid. p. 38.

New buildings	New area (m^2/year)	Single value of renovation (daily rate/year)	Necessary labor force (daily rate/year)	Daily rates per year	Size of labor force
Housing buildings	700,000	10	7,000,000	250	25,200
Public buildings	200,000	15	3,000,000	250	12,000
Total	900,000	25	10,000,000	500	40,000

Source: Build up skills – Macedonia: Report on the capacities of the construction sector in the field of Energy Efficiency and Renewable Energy Sources, Skopje, December 2012, p. 39. (in Macedonian).

The total size of the labor force directly engaged in the building sector necessary to build new EE buildings or to renovate of exist buildings to comply with EE and RES measures is 52,400 workers. The current number of workers directly engaged in construction amounts to almost 43,600… These data show that there is room for employment of additional 9,000 workers directly involved in construction, pending their appropriate training and qualifications (certificates) for mounting energy efficiency equipment or RES equipment.[43]

43 According to: Build up skills – Macedonia, ibid. p. 39.

5. GREEN JOBS POLICY ISSUES IN MACEDONIA

5.1. Barriers and Draft Solutions

A significant numbers of barriers related to the creation of green jobs in Macedonia could be identified. It is hardly possible to assign those barriers to a specific market or policy area and to propose a coherent framework; many of the issues are overlapping and concern – albeit to a different extent – construction companies and professionals, vocational education practitioners, producers and suppliers of building products and technologies, policy makers and households. However, for the sake of better organization of the results of the analysis, a general distinction will be explored. Barriers could prevent individuals and businesses from using the opportunities for energy efficiency. They include, but are not limited to:

- Organization barriers
- Market/financial barriers
- Legal-regulatory and policy barriers
- Technical barriers
- Barriers in the construction sector
- Barriers in the system of vocational education and training

5.1.1. Organization Barriers

These barriers primarily refer to the potential *lack of institutional capacity* of government and state institutions. The actual institutional capacity in charge of development, promotion, monitoring, evaluation and information about the measures on energy efficiency in Macedonia is weak. The limited human resources of the energy sector at the Ministry of Economy (ME), together with the insufficient staff of Energy Agency (EA) do not possess sufficient capacity necessary for implementing both the Strategy and the appropriate action plan regarding the energy efficiency. In order to overcome this barrier, the capacity of the institutions in charge should be enhanced with human resources. There should be capacity building with a set of tools for task implementation that should be clearly delegated to the EA and the various agencies and ministries.

- One potential barrier for effective usage of the policy and these programs is *the absence of coordination among the institutions in charge* (the ministries and the agencies) and the involved parties, which are something that could further postpone and even stop the realization of energy efficiency programs. This barrier can be overcome by setting up a coordination scheme for effective inter-agency cooperation on designing and implementing strategic actions.
- *Lack of information, awareness and knowledge.* In many cases, the insufficient awareness and the resistance to changes can impede the progress of infiltrating

solutions with great efficiency. Individuals and firms are not always in a position to make effective decisions that include complex and insecure results. In fact, when faced with complexity, insecurity and risk, for the understanding of which it is necessary to make significant investments of time and energy, individuals and firms can adopt simple rules for decision-making that shall lead to fulfillment of the minimum requirements instead of leading to behavior with optimizing effect. There is a lack of information and training on the latest technologies and their economic and financial effect on the return on investments rate. That combined with the risk aversion related to the premature adoption of new technologies and techniques could initiate investors such as banks to continue supporting old technologies, even when they do not appear to be the most efficient or when they do not give the best return on investments. Practices show that traditional mediators like banks often show resistance to supporting energy efficiency projects because of the limited information on the expected cash flow, the technical performance and the real risks.

Programs for education and for raising awareness, together with marking schemes, are designed to overcome these problems. Such programs should be adapted to the various groups of beneficiaries, as well as for the financiers and the decision-makers.

The opening of the markets is something that had positive effect on energy efficiency. There is not a sufficient number of companies that provide efficient solutions that are paid from the energy savings (ESCO). These companies need the support of a policy in the form of support for expanding their activities, the quality standards and the access to finance, because they are still in an early phase of development.

There shall be promoted a market of professional energy controls and energy services for the purpose of enabling access to competitive advice for improving energy efficiency, which shall result in alleviating optimal decision-making. Campaigns for raising consumers' awareness, programs for training professionals on energy efficiency and branding appliances can help in eliminating this barrier.

The rate of unemployment and energy poverty in society shall strongly influence the implementation of energy efficiency solutions in general. Therefore, there is a need for programs for energy efficiency intended for low-income households that shall make investing in energy efficiency easier regarding vulnerable households.

5.1.2. Financial Barriers

- Weak price signals. The increasing price of energy is a strong incentive for programs for energy efficiency. Subsidies in this field give counter-results. The vouchers for energy (social aid to individuals with low income or no income at all) can impede the realization of energy efficiency programs.
- High cost of low-energy renovations. Higher costs and low current levels of comfort contribute to unacceptable return rate of investment for low-energy building renovations. Step-by-step renovations are not recognized by the market.
- Lack of market for new technologies and products. Although most energy efficient solutions could be delivered, the small size of the market means higher costs and

imbalanced positioning are common. For many of the materials and details, prices are higher than on European market. This is also recognized as an important a barrier, especially to on-site and on-demand trainings.

5.1.3. Legal-regulatory and Policy Barriers

- It is necessary to quickly adjust the Macedonian legislation to the EU legislation. This adjustment shall lead to having faster penetration of the EU directives regarding the energy efficiency sector. The realization of the projected measures depends on the necessary changes and amending of the actual acts and the preparation of new ones. That shall impose changes and amendments in the actual sub-legal acts with rules, recommendations and standards in compliance with the EU directives on energy efficiency.
- Flat owners who are responsible for investing in the object's improvement might not directly experience lower energy bills or increased comfort. Similarly, those who rent apartments might not want to invest in homes or objects that are not in their ownership or that they do not intend to rent for a longer period of time. Programs with stimulating measures, such as aid to flat owners for them to isolate their property and to implement minimum standards, is something that could help this situation to be overcome.
- *Lack of incentives* for high-end, low-energy new building and renovation projects. No national programs for support of new nearly zero energy buildings (NZEB) exist. The current programs support (partial or total) renovations with no relation to the expected standards for NZEB.
- *Urban planning.* In general, urban planning is not consistent with the requirements for NZEB. There is no coherent planning for optimized use of prospective solar gains, geothermal sources, or other such measures.
- *Quality assurance and assessment.* No actual measures against underachieving of the energy performance indicators of the new buildings and total renovations are provisioned in the existing legislation. There is no clear evidence if the declared energy efficiency characteristics on the project level meet the actual energy performance of the buildings. Differences may well relate to the low quality of execution of construction works and need further training.
- *Lack of pilot and demonstration projects.* Almost, no NZEB pilot and demonstration projects have been implemented on a national or local level of governance. The current projects (mainly for renovations of multifamily buildings) are not based on high-energy efficiency standards. This leads to an obvious lack of understanding and appreciation of the current EU trends by both construction companies and the workforce.
- *Lack of coordination between crafts and professions.* Better coordination between crafts and professions should be sought after, resulting in broader knowledge of related construction works and avoiding the problem of overspecialization. Moreover, additional controlling instruments are necessary to avoid execution of specialized construction activities by workers with no formal training, which is very common in the practice and especially in the informal economy.

5.1.4. Technical Barriers

- *The lack of standardization of equipment and of components that spend energy* can also impede the fast effect of new technologies with energy efficiency on the market. Controls are not developed in the industrial sector and in the building sector. Their introduction should be compulsory, especially when it comes to the large energy consumers. The control schemes are a practical way of informing consumers about the possible actions for improving energy efficiency.

5.1.5. Barriers in the Construction Sector

- *Impact of the financial crisis.* It is without question that the abrupt end of the building boom in Macedonia in 2009 lead to a significant change in the priorities of the construction companies, which had to cut most of their expenses, by most accounts starting with the investments in the professional development of their employees. This conclusion is valid for companies of all sizes, including bigger ones, but not surprisingly mostly affecting SME, which, in turn, represent the major part of the sector.
- *Lack of coherent human resources policies.* Closely related to the previous obstacle, corporate HR policies and activities suffered a major pullback, resulting not only from a lack of access to vocational training but also from the stability of the jobs and prospects for career development of skilled workers.
- *Lack of loyalty.* Due to the smaller number of building projects, the main loyalty factor – the remuneration package – is not reaching levels from previous years. As the work force is highly mobile and open to job opportunities in the EU open labor market, investments in continuing vocational training and qualification are perceived as highly risky by most of the employers.
- *Migration of the work force to other countries, especially toward the EU and neighbor countries.* There is a visible phenomenon of qualification "export" explained by:
    - Difference between wage levels, working and living conditions in general (security, sanitation, infrastructure, banking) between the migrants' home country (Macedonia) and their destination country (Italy, Germany, Montenegro).
    - Policies and strategies of member states and non-EU countries for attracting labor.

Earnings for migrant workers (getting an income which ensures reproduction of labor, enhancing savings and investment in sustainable goods or in their own business, profes-

Example: At the initiative of the Ministries of Labor, Economy and Employment Agency, Germany has launched two internet platforms for informing and attracting qualified workforce, since this 'locomotive' of the European economy is facing a serious shortage in this area. One of the platforms benefits from a website that addresses qualified personnel from outside Germany (www.make-it-in-germany.com) praises the quality of life in Germany and aims to facilitate the search of jobs for foreigners. Thus, in a country experiencing an accelerated process of aging and a very low unemployment rate (6.7 percent in 2012), the German Government has made a priority of recruiting qualified personnel with view that "in 2025, Germany will experience a shortage of up to six million people of working age, due to purely demographic reasons" (statement by the German Labor Minister, Ursula von der Leyen).

sional gains: knowledge, skills, inter-human relations, labor discipline, work safety, participation in community life) are compensated by economic as well as social disadvantages, like discrimination when compared with domestic labor or other migrant workers, the risk of failure by the employer to comply with the terms of the employment contract, frictions with the native workers, difficulties in adapting to the new environment which lead to reduced efficiency at work, causing dissatisfaction from both the employer as well as the employee, reduced or inadequate social protection materialized in unsatisfactory security and work conditions.

- *Fragmentation of the labor market;* regional discrepancies. Most building projects are concentrated in the Skopje and Polog Region; seasonal workers are usually not interested in participating in training, even if on-site training approaches are undertaken.
- *Motivation of the workforce.* The existing working force is generally not interested in participation in vocational training activities. There are numerous reasons for this, most of them related to insecurity of the jobs and project-by-project employment, but also to the low general education level of the workers.
- *Low educational level of the workforce; language and literacy barrier.* The low education level of the workforce is a constant threat to both active participation in trainings and implementation of new building concepts, technologies and materials. A large part of the workers engaged in conventional building crafts, mostly representatives of other language speaking minorities, has problems with literacy in Macedonian language. Training other than "learning-by-doing" are hardly possible.

  The significant change toward social sciences of the general educational level in Macedonia is also an obstacle, resulting in more efforts for mastering of high-end use of technologies and materials due to the larger gap between existing skills and required know-how. Additionally, to improve professional skills, an emphasis on key competences in the national vocational education system should also be put.

- *Low prestige of the profession.* In connection to the previous barriers, the unfavorable public perception of the builder's profession is a major barrier to attracting young and ambitious people. The relatively high salaries during the construction boom overcame this barrier to some extent, but it still exists and is very formidable in the crisis period.
- *Age structure of the workforce.* Another related problem is the large number of construction workers in the later stages of their careers. Older workers usually do not manifest interest in continuing vocational training and new technologies; on the other side, the access to career development of young people is hindered.
- *Lack of experience.* Construction of nearly-zero energy building or passive buildings is virtually "terra incognita" for most of the small and medium companies. Due to the lack of experience, the need for further training is not generally recognized.
- *Lack of practice for nearly-zero energy renovations.* There is very small or no regular practice of low energy building renovations. Especially in multifamily buildings, each apartment owner implements energy efficiency measures with no relation to the characteristics of the building as a whole. The two most common measures – glazing and external insulation – are usually applied by workers without any formal training in construction. No practice in step-by-step renovation is evidenced.

- *No access to new technologies, processes, know-how.* Among other activities of the construction companies, the financial crisis has significantly reduced the introduction of new technologies, processes and know-how in the building practice, which hampers the opportunities for on-site training and skilling up of the construction workers.
- *Low level of penetration of renewable energy sources (RES) technologies in buildings.* Although no relevant statistical data is available, the integration of RES in buildings is estimated to be very low, which virtually means no experience in installation, monitoring and maintenance of such technologies.
- *Gray economy.* Many construction workers are involved in informal economical activities, meaning no access to formal training.

5.1.6. Barriers in the System of Vocational Education and Training

- *Access to training of trainers.* There are no facilities or programs for further qualification of teachers in professional disciplines in the national education system. Further solutions should also be found for qualification of construction specialist willing to enter the training system, probably with the participation of the higher educational establishments. Incentives for additional qualification of trainers are also missing.
- *Anticipation of training needs.* There is no institution for anticipation of training needs. Intensive cooperation between all interested stakeholders is crucial, including training and education establishments, professional chambers and associations, NGOs, and, most importantly, relevant representatives of the Government.
- *New training programs.* As the national system for vocational education is quite conservative and changes are implemented at a slower rate compared to the relevant technology developments, introduction of new elements in the education plans and the specific programs is generally perceived as a major problem. Updates of the programs should be easier and applied regularly, also in better coordination with the relevant stakeholders. New programs reflecting emerging new skills should also be under constant consideration.
- *Cooperation with business actors.* Although there are examples of cooperation with representatives of the business community, they cannot be classified as common practice. Further efforts should be taken for intensive exchange of knowledge, coordination of interests and concrete partnership projects leading to better preparation of trainees for entering the labor market.
- *Lack of a national system for forecasting new skills.* The national system for forecasting new skills (specific-sector skills, transversal skills, emerging professional skills) has not been established in the Macedonian vocational education system yet. The cooperation between all stakeholders, the creation of appropriate organizational and financial conditions, the equal distribution of responsibilities, should be the cornerstone for successful establishment and further implementation of medium-term and long-term surveys in this particular area. Through such surveys the Macedonian vocational education system will increase its attractiveness and strengthen the link between education and work.

- *Unattractiveness of the professions, lack of adequate professional orientation.* Most students and adult trainees are attracted by different professions, predominantly in the areas of economics and computer science. Broad public communications campaigns and initiatives are necessary in order to market the opportunities created by the new developments of energy efficiency and renewable energy sources.

5.2. Policy Measures

A lot of separate recommendations for energy efficiency that can create green jobs can be found in different documents and strategies, but they are not interconnected or comprehensive. For instance, the Strategy for Promoting Energy Efficiency in the Republic of Macedonia up to year 2020 contains the following proposals:

- Stimulating the participation in the private sector for the purpose of providing services for improving the energy efficiency on commercial bases. The profit and the competition shall motivate private owners in the industrial and the commercial sector to implement individual programmes for energy efficiency
- Promoting energy efficiency as an optimal measure for dealing with energy poverty
- Improving energy usage from renewable sources
- Investing in scientific research, education and promotion of technologies and appliances with high-energy efficiency

5.2.1. Active and Passive Employment Programs/Measures

The active policies of the labor market in Macedonia were implemented during the whole period of transition. Each year operation plans are prepared for realization and monitoring of the realization of the active programs and measures for employment. In Macedonia, nine active programs and measures for employment were prepared during 2009, as presented in Table 5.1.

Table 5.1. Active Programs of the Labor Market in year 2009

Program	Year 2008	Year 2009
	Scope/Persons EUR	Scope/Persons EUR
Self-employment Program	500 1.581.067	600 2.073.826
Program for Formalization of Existing Businesses	107 294.902	250 764.228
Program for Employment Preparation	5928 997.782	6180 1.248.457
Program for Employment Subsidy	600 1.791.057	959 4.127.073
Internship Program	30 5.853	650 219.512
Public Affairs Organization	-	644 471.220
Pilot – Survey on Job Vacancies	-	90 10.570
Economic Enhancement of Women-Victims of Family Terror	-	- 536.585
Program for Supporting Employment of Roma Population	-	200 81.300

Source: Operation plans on active programs and measures for employment for 2008 and 2009, Employment Agency of the Republic of Macedonia.

As shown in Table 5.1., the most comprehensive is the Program for Employment Preparation, which covers more persons compared to the number of persons covered with all the programs together. This program, in the period from 2000 to 2007, covered almost 25,000 unemployed persons, out of which almost 80 percent managed to find job. Also, the greatest participation in these programs, or an average of 70 percent for the period from 2001 to 2007, is from persons who prepared themselves for operating in the textile industry.

The total number of persons covered with all these active programs for employment in year 2009 amounts 9,573 persons or 2.7 percent of the unemployed population in Macedonia. If we assume that the efficiency of all these programs is the same as the efficiency of the Program for Employment Preparation then it could be concluded that in year 2009 there were around 7,700 persons who got employment or 2.2 percent of the number of unemployed in Macedonia.

Passive policies and programs also are implemented on the labor market in Macedonia. Actually, there is a wide range of programs that refer to unemployment insurance, but they are also focused on the pensions of the elderly population. The previous points out the fact that the social model in Macedonia is closest to the European continental model (Austria, Belgium, France and Luxembourg), which is the most extensive one when it comes to coverage of both unemployment insurance and social security for the elderly population. In Macedonia, passive policies of the labor market are primarily a function of contributing to the preservation of social stability. The most obvious example of this is the entitlement of healthcare for all the persons who are registered as job seekers in the Em-

ployment Agency. The data from this agency point to the fact that in December of 2008, 20.8 percent of the registered unemployed persons stated that they had registered with the agency solely for the purpose of exercising the right to healthcare. This means that active job seekers are 79.2 percent of the total number of registered unemployed persons in the Employment Agency.

The number of people who are allowance beneficiaries is large. This social measure has a negative influence on the people in this group, because they stop seeking a job due to the fact that they are also health insurance beneficiaries, and allowance beneficiaries as well. In the period from 1998 to 2008, an average of 37,000 persons were allowance beneficiaries. Keeping in mind that the average number of unemployed persons for that same period was 358,099, the conclusion can be drawn that an average of more than ten percent of the unemployed persons for the above mentioned period of time were allowance beneficiaries. Since many of these are persons with low qualifications, the money allowance reduces their incentive to continue their job search because the salary that they would get if they got employed would be low. Therefore, they prefer to remain unemployed and become allowance and health insurance beneficiaries rather than becoming employed and receiving a salary. For example, in 2005 the money allowance for all the categories had an average of €81, which is 39.7 percent of the average real net salary of €204 for that same year.

5.2.1.1. Employment for People with Disabilities

In order to improve the employment opportunities as well as the operation of people with disabilities, the Government of the Republic of Macedonia, envisages the following measures:

- Allocating non-refundable assets for full-time employment of an unemployed person with disability, for adaptation of the working place where this person is intended to work, if needed, and supply of equipment in accordance with criteria and in a manner determined with the act passed on behalf of the Minister of Labor and Social Policy
- Tax payment release and provision of assets for contributions payment
- Provision of financial support during the operation

The employed person with disability, whose disability is determined by law[44], is released from paying personal income tax. The assets for paying pension and invalid insurance, health insurance and employment contribution are to be provided from the budget of the Republic of Macedonia. The budget of Macedonia provides the funds to the total amount of the contributions paid to the nominal value two net salaries paid in Macedonia in the previous month.

For the purpose of employment of people with disabilities in Macedonia, there are protection companies which act as trade companies. A protection company can be established only of it offers full-time employment for five people out of which at least 40 percent are disabled. From those, half must have a disability as defined in the law. The newly established protection company is obliged within a period of 90 days to employ all the employees calculated from the day of the first full-time employment of a person with disability.

44 Employment law for people with disabilities, Official Gazette of the Republic of Macedonia No.87 from 17 October 2005.

If this is not the case, this company shall not gain the status of a protection company and shall not be allowed to act as such in the following five years, a period within which the founder or close family member of the founder shall not be allowed to establish a new protection company.

Work training, as defined by the law, is training offered to a person with disability for this person becoming capable of practical work in a certain field according to the needs of both the employer and the person with a disability. The unemployed person with a disability becomes a subject to employer's training under the direction of the Employment Agency of the Republic of Macedonia.

The unemployed person with disability who is not trained to perform certain tasks shall be subjected to training under the employer's direction. The work training can be realized on the employer's premises or elsewhere in accordance with special programs, under conditions and in the manner defined with the Employment Agency's Act.

A person with a disability can get employed at a position for which he or she possesses the skills and qualifications. For example, he or she can get employed or redirected to another job position if he or she meets the general and the specific provisions for that position, or is trained to perform tasks for that position and has been estimated to have the skills necessary for operating at the given position.

For the purpose of financing the actions undertaken to improve the employment conditions and the operation of persons with a disability, as well as for the purpose of adapting the working place and providing the necessary equipment, ten percent of the total assets collected within the actual employment contribution fund are being allocated at the sub-account in the Employment Agency (the Special Fund), not later than the 30th day of the actual month, for meeting the needs of the previous month. The Agency is obliged to use the funds separated in the Special Fund solely for the previous purposes. The agency concludes a deal with the beneficiary of these funds.

The means from the Special Fund are allocated as non-refundable for the following purposes:

- Full-time employment of a person with a disability as defined by the law, the amount of the allocated funds being 20 average salaries paid in the Republic of Macedonia for the year preceding the employment. That is, 40 average salaries paid in the Republic of Macedonia for the year preceding the employment in case when employing a person with full sight disability and person with physical disability who needs a wheel chair in order to move
- Adaptation of the working place, the amount of the allocated funds being 100,000 MKD which can be reused when necessary to be done according to the changes in the technical and technological process or the type and the degree of disability of the person
- Supply of equipment in a total of 200 average salaries paid in the Republic of Macedonia in the preceding year, when the claimer of funds should participate in the accounted value of the program with 20 percent of his or her own funds, such as a bank loan or personal funds of the owner of the company. The amount of the allocated funds can be in total equal to the value of the property and the capital defined in the claimer's books (constitutional debt, equipment, building and business facilities, stores) whereas the claimer shall be expected to show a mortgage with a ratio of 2:1 or a bank guarantee in the amount of the total of the allocated funds.

The claimer can use the funds for the previously defined purposes if he has been active in business for a period not shorter than three years.

The means of the Special Fund shall be provided from:

- Value Added Tax and the Customs Tax paid on behalf of the protection companies into the Budget of the Republic of Macedonia, which shall be in total disposed to the sub-account of the Special Fund not later than the 15th day of the month, for the previous month
- Gifts and legacies
- Other sources

5.2.2. National Legislation for EE and for Creating "Green Jobs"

5.2.2.1. Legal Framework

- *Law on Energy* is adopted at the meeting of the Assembly of the Republic of Macedonia held on 3 February 2011. It is published in the Official Gazette of the Republic of Macedonia, No.16 from 10.02.2011, and came into force on 18.02.2011 (Chapter XI refers to Energy Efficiency)
- *The law on amending the Law on Energy* is adopted at the meeting of the Assembly of the Republic of Macedonia held on 28 September 2011. It is published in the Official Gazette of the Republic of Macedonia, No.136 from 03.10.2011, and came into force on 10.10.2011.

The following list contains the most reliable sub-legal acts (by-laws) in this field:

- *Provisions on indicative objectives for energy saving* (Official Gazette of the Republic of Macedonia, No.112/2011),
- *Provisions on eco-design of products* (Official Gazette of the Republic of Macedonia, No.100/2011),
- *Guidelines for highly-efficient combined facilities* (Official Gazette of the Republic of Macedonia, No.128/2011),
- *Guidelines for determining the consumption of energy and other sources of energy for the products that use energy* (Official Gazette of the Republic of Macedonia, No.154/2011),
- *Guidelines for changing and amending the Guidelines for determining the consumption of energy and other sources of energy for the products that use energy* (which is in a phase of adoption) *(for new determination of air-conditioners)*.
- *Guidelines for energy features of buildings* (in a preparation phase)
- *Guidelines for energy control* (in a preparation phase)
- *Instructions on how to apply the energy efficiency and energy saving measures while determining the features of goods and services that are subjects to public procurements* (...) adopted and published on the Internet web site of the Energy Agency
- *Network regulations for energy and gas distribution* (EVN Macedonia – adopted, District Heating of Skopje-in a phase of preparation)

Several obligations and activities for the local self-government units and the public sector units in regards to EE could be found in the previous mentioned laws and by-laws. For instance, the obligations for the local self-government units are as follows:

- To adopt three-year programs on energy efficiency
- To adopt annual plans for realization of energy efficiency programs
- To prepare information on the implementation of energy efficiency programs for each year respectively

From the other side, the obligations for the public sector units are:

- To adopt three-year energy efficiency programs and to implement the measures determined with the program
- To make annual analyses of the energy consumption and to organize monitoring on the energy consumption
- To provide at least once in three years energy control of all the buildings or construction units in which they perform their operations
- To provide a certificate on energy features of the buildings or the construction units that are in the ownership of the entities from the public sector
- When buildings new or making significant renovations to buildings or that are in their ownership to install sun collectors for hot water if that appears to pay off economically, and in doing so to comply with the actual sub-legal regulations
- When implementing the public purchase procedures to define that obligatory criterion for selection of the most favorable offer shall also represent the energy efficiency of the item that is a subject to public procurement
- When leasing business premises, to require that the building or the construction unit where the business space, is has a certificate on energy features
- To organize training and exams for energy auditors/controllers, as well as training for energy auditors/controllers skills upgrade
- To give authorization to the energy controllers
- To make energy controls
- To meet the minimum requirements for energy efficiency regarding the new buildings or the construction units that are subject to significant renovation
- To control the compliance of the buildings and the construction units, equipment and facilities with the Guidelines on Buildings Energy Efficiency
- To meet the requirements for designing and building new facilities or renovating of the current ones regarding their energy efficiency as determined with the Guidelines on Energy Efficiency of Buildings
- To issue a certificate for energy features of new buildings and/or buildings that are subject to significant renovation, or to public buildings
- To release the market products that use energy, labeled in accordance with the relevant sub-legal regulations

- To release the market products that use energy and that also meet the requirements and the demands for eco design, as defined with the relevant sub-legal regulation
- To keep records of highly-efficient combined facilities and to issue a guarantee for the origin of electrical energy produced by the highly efficient combined facilities
- To allocate tasks to the operators of the systems for distribution of a certain type of energy or gas, as well as to the suppliers of energy and materials to boost the implementation of energy efficiency measures
- Opportunities for concluding deals for energy services

5.2.2.2. Strategic Documents for Energy Efficiency in Macedonia

The national legislation for meeting energy policy targets includes:

- *Energy Development Strategy of the Republic of Macedonia, 2008-2020 aiming towards 2030,* January 2009
- *Strategy on Promoting Energy Efficiency in the Republic of Macedonia until 2020*
- *Strategy for the Use of Renewable Energy Sources in the Republic of Macedonia until 2020*
- *First Action Plan on Energy Efficiency in the Republic of Macedonia until 2018.*
- *Second NPAA (National Action Plan)* for EE 2008-2020. The Government of the Republic of Macedonia should develop additional measures in view of 14.5 percent energy reduction until 2020, closing in on EU's set target of 20 percent energy reduction by 2020
- *Decree on the Indicative Measures for Energy Saving in the Republic of Macedonia* (Official Gazette 112 - 24.08.2011)
- *Guidelines (Draft) on building energy characteristics,* 2012
- *Guidelines (Draft) on energy control,* 2012.

In their final phase of preparation are:

- *Program for realization of the Strategy on Energy Development of the Republic of Macedonia*
- *National Program for EE in public buildings.*

5.2.2.3. Basic Objectives of the Strategy on Energy Development in the Republic of Macedonia

Strategy on Energy Development of the Republic of Macedonia was prepared by the Macedonian Academy of Science and Arts and was adopted by the Government of the Republic of Macedonia in April 2010.

For the purpose of providing safe and quality energy supply to end-consumers, the Strategy sets out the following basic objectives:

- To maintain, revitalize and modernize the actual infrastructure and to build new, modern infrastructure for the purpose of meeting the needs for energy production and usage

- To improve energy efficiency in the production, transport, distribution and the usage of energy
- To use domestic resources (the reserves of lignite, hydro-energy potential, wind and solar energy) for the purpose of electrical energy production
- To increase the usage of natural gas
- To increase the usage of renewable resources of energy
- To integrate the energy sector of the Republic of Macedonia in the regional and European market of electrical energy and natural gas

The strategy's measures for EE in the residential, commercial, industrial and transport sector are as follows:

- Energy efficiency in social housing
- Energy codices for building facilities and certification
- Labeling and standards for energy features of electrical appliances and equipment
- Information centers, information campaigns for EE
- Financial support to physical entities, investments for EE
- Solar energy collectors
- Street lights
- Energy Management
- Inspections of boilers/air-conditioning systems
- Combined energy production
- Improved heating systems
- Mechanisms for clean development
- Renewal of national car park
    - Introduction of tramway in Skopje
    - Promotion of wider usage of bicycles
- Quality of fuel - standards
- No Automobiles Day
- Wider usage of railway transport.

5.2.3. National Educational Policy and Strategy for EE and for "Green Jobs" Education

The National education system in the Republic of Macedonia covers formal and non-formal education. Formal adult education is institutionalized education carried out in state and private universities as full or part-time education, following appropriate plans and curricula.

5.2.3.1. Policy and Legislation[45]

In 2006, the Assembly of the Republic of Macedonia adopted the *National Program for Development of Education, 2005-2015. The Program for Adult Education in the Republic of Macedonia* is an integral part of the National Program, providing for the adoption of Law on Adult Education (January 2008) and the establishment of a public institution - Center for Adult Education. This law defines adult education as a constitutive part of the general education system in the Republic of Macedonia.

The Center for Adult Education was established by a legal act as a public institution for adult education in the Republic of Macedonia and as a separate legal entity founded by the government of the Republic of Macedonia. The center's mission is to create a functional, contemporary and EU compatible system of adult education and provide opportunities for attainment of qualifications meeting the needs of the population.

The center, among other things, develops the professional curriculum standards for adult education, verifies the education curricula for adults, publishes a catalogue of adopted education curricula for adults and makes it public on the Ministry website, publishes a catalogue of verified and licensed bodies and institutions for adult education and makes it public on the ministry website. The Council of Adult Education gives suggestions on the strategy for development of adult education.

The national legislation regulating non-formal education includes:

- Labor Law (Official Gazette 80/93-2007).
- Law on Adult Education (Official Gazette of the Republic of Macedonia 7/08, 17/11, 51/11).
- Guidelines of the contents and the form of documentation and registry kept by bodies and institutions for adult education.

5.2.3.2. National Educational System [46]

According to the National Registry of Professions in the Republic of Macedonia there are 23 groups of professions and 113 specific professions in the build sector, 79 of which are directly involved in implementing EE and RES requirements.

Implementation of the national indicative measures in the field of energy efficiency directly depends on the engagement of 9,000 additional workers in 23 professions who should have priority in skill-improvement trainings. Future workers should be secured from the

45 According to: Build up skills – Macedonia: Report on the capacities of the construction sector in the field of Energy Efficiency and Renewable Energy Sources, Skopje, December 2012, p. 28. (in Macedonian).

46 According to: Build up skills – Macedonia, ibid. p. 4.

list of registered unemployed persons (12,978 persons) or from technical high school graduates.

The types of skill-improvement training for these specific construction works falling within the domain of EE and RES should be additionally specified.

A legally regulated national system for vocational training and education with implementing authorities is in place. Implementing authorities for non-formal adult education were established in 2011, but they have small experience and capacity to verify EE and RES programs. Moreover, there is no strategy for green jobs and for introduction of EE and RES in high school curricula.

The national accreditation and certification system foresees applicable guidelines for verification of programs and implementing authorities for providing vocational trainings for adults. Program and institution verification procedures last between six and nine months.

So far, three programs were verified in the Republic of Macedonia: training of carpenters, training of plasterers and fitters, and training of exterior plasterers. Only eight institutions have been verified as providers of technical craft training. In this regard, there is no data on the interest and number of attendees completing the trainings annually. The electrical installation training program is the only one providing training for solar energy and pavement heating installation.

There are some trainings provided beyond the vocational education and training system, offered by equipment and construction material producers as well as by institutions authorized for adult education. Trainings are organized as one- or two-day seminars, weekly trainings (five-day seminars) or courses (40 hours over 32 months).

5.2.3.3. Accreditation Bodies and Relevant Training Institutions[47]

A number of institutions in the Republic of Macedonia make up the education for adults system. State and public institutions are the main providers in charge of adult education in the country: Ministry of Education and Science of the Republic of Macedonia, Center for Adult Education, Council of Adult Education, and Ministry of Labor and Social Policy.

Yet, there are also other service providers in the field of adult education. According to the Law on Adult Education they can be public and private adult education bodies, adult education institutions, professional development centers, employers and social partners, associations of citizens or individual trainers.

Adult education providers include, among others: public and private specialized institutions for adult education (worker's universities, educational consulting firms, training centers, foreign language centers, computer literacy centers, advisory centers, adult education elementary schools), high schools, trade unions, chambers and associations, employment agencies, professional bodies, universities, non-governmental organizations etc.

According to the Center for Adult Education there are 11 verified adult education programs in Macedonia, none of which in the field of EE or RES. Closest to it is the training for joinery installers covering 220 hours subdivided in 70 hours of theory plus 140 hours of practical work plus 10 hours of testing, both oral and written exams. EE or RES are not mentioned, however.

47 According to: Build up skills – Macedonia, ibid. p. 50.

There are 15 vocational universities in the Republic of Macedonia whose work should soon be regulated by a Law on Civic Universities. Their main scope of activity is in vocational empowerment for low profile jobs providing practical knowledge and skills in various labor areas of up to two years, such as vocational qualification levels as well as non-formal education for empowerment and specialization of young people and adults.

5.3. Possible Measures and Recommendations

The task for the rest of the paper is to try to propose, in a systematic way possible, measures and recommendations that could lead to creation of green jobs via implementation solutions for energy efficiencies with particular punctuation on the residential sector.

5.3.1. Legal and Regulatory Measures

- *Changes and amendments of the Law on Building,* for the purpose of determining the obligation for preparation of energy efficiency study during the phase of project designing, as a precondition for obtaining a building license, which shall guarantee implementation of the measures determined with the Law on Energy and with the Guidelines for Energy Efficiency of Buildings
- *Preparation of Energy Codes for Buildings,* intended for the new buildings the purpose of which shall be to guarantee that the new buildings shall be built in a manner that is energy efficient and economically reasonable. Regulatory and administrative measures that boost energy efficiency consist of thorough preparation of measures and legislation for their support, instructions on the minimum level of acceptable energy efficiency, and standards and marks. Other policy measures can boost standardization of equipment, staff education and training, and quality of technical documentation.

5.3.2. Support Mechanisms/Measures for the Purpose of Increasing the Number of Energy Efficiency Projects in Macedonia

Together with the legal-regulatory measures, there is also a necessity for several measures to enhance the capacity and the institutional development, all for the purpose of guaranteeing a continuous break in of the energy efficiency measures in various sectors. These measures can contain the following:

- *Assistance for establishing companies for energy services (ESCO) and contracts for performance of energy services.*[48] The framework of ESCO and the contracts for performance of energy services shall be developed together with the necessary secondary legislation and together with the form of the performance contract that shall be adapted to the circumstances in Macedonia.

48 Businesses that develop, install, and finance energy-efficiency projects are called ESCOs, or Energy Service Companies. ESCOs pay for the initial capital investment and are paid back over time through the energy savings, therefore covering the initial upfront costs and making energy-efficiency programs attractive to building owners. Since the 1970s, ESCOs have provided funding for $20 billion worth of projects worldwide, of which approximately $7 billion has gone for labor employment. The Lawrence Berkeley National Laboratory estimates that ESCOs have provided $4 billion in energy-efficiency investment in the United States, of which 25-30 percent is spent directly on labor to design, install, operate, and maintain efficiency programs in the building sector. This area has enormous potential to grow and create jobs.

There is a possibility to establish companies for energy services (ESCO) in private ownership or such related to public services, all for the purpose of providing services based upon performance contracts. In wider terms, there could be provided a stimulus for both the activities of ESCO and the activities related to market transformation. In addition to all institutional and financial restrictions, the greatest obstacle for ESCO at the moment is the economic climate that requires fast return on investments, due to the perceived risks regarding the long-term investments.

The current political, social and business environment does not provide support for establishing energy services industry. The vagueness and the absence of political will for energy efficiency with appropriate financial stimulus, in combination with the limited transparency and trust in the settled arrangements, makes the appearance and even the existence of ESCO difficult. The best option for initiating energy services performance contracts shall be contracts with certain kind of guarantees provided by the government, the contracts that are to be concluded with the ministry departments or agencies, or with the municipalities.

However, the concept of object's management based on contract can cover realization of certain savings arrangements such as those of the services offered by ESCO. In fact, one managerial firm shall be stimulated to improve its efficiency, in addition to the current responsibility for everyday object management and maintenance. It shall impose that the object managers are trained and prepared in order to be competent of fulfilling this role, but it is in fact the type of contracts that appeared to be efficient in other countries for gradually introducing the efficiency measures. However, this can function only in cases when the objects are under somebody's ownership or are leased to one subject who is further responsible for paying the energy bill.

What is necessary is a framework that shall regulate the relations among the consumer, the bank and the providers of ESCO. The framework for ESCO and the energy services contracts shall be developed together with the necessary secondary legislation and the form of the energy services contract that has to be adapted to the circumstances in Macedonia.

- *To prepare a sound base* for establishing an *Energy Efficiency Fund*: Before being established this EEF should be justified and conceptualized in a manner that it shall provide clear operative framework, sub-legal acts and actions.
- *Public-private partnerships* (PPP) of the communal public administration for energy services shall enable access to private capital, experience in project implementation, more advanced management practices, cost reduction skills and better service and focus on consumers.

  It is necessary to increase the activity of the business sector related to energy efficiency. Energy efficiency has to be achieved through building partnerships with the private sector that can make energy efficiency investments under the cap of convenient government policies, through capacity building and establishment of financial stimulating measures, as well as through other resources necessary for both education and training of staff and also for stimulating the multiplication of measures intended for the target sectors of economy. Private sector entities have a significant role as potential implementers and investors in energy efficiency as well as primary energy consumers. Although the potential in the private sector for creation of demand and provision of services for energy efficiency is high, Mace-

donia's participation in this area is limited. Profit and competition shall motivate private owners from the industrial and the commercial sector to realize separate energy efficiency programs. In some cases, implementation of these programs shall refer to making radical refurbishments or replacement of inefficient technology, whereas in other cases the organizational and technical measures for energy saving will be sufficient.

By engaging certain policy instruments, coordinated between the government and the private sector, energy efficiency and the renewable resources should be turned into a driving force of the overall economic development of Macedonia. Some of these instruments refer to issues related to the general policy, the regulatory and legal aspects, the institutional framework, as well as to the fiscal policy, taxes and the price-making policy.

The more developed the energy efficiency market gets, the bigger the demand of energy efficient products. This need puts pressure on two policy actions. First, procedures for importing energy efficiency products could be simplified. Second, the local production of energy efficienct products could be supported by the government. Therefore, energy efficiency could turn into an industry and a job market, which shall result in excellent secondary benefits for the GDP and the country's social indicators.

- The existing *non-government organizations* (NGOs) can have effective contribution to the realization of the energy efficiency programs, by providing training, local contact with the consumers and services for raising public awareness. They can also have important role in the preparation and realization of energy efficiency projects. Some NGOs that work on energy efficiency and environment protection have shown their leadership in organizing campaigns on raising public awareness about energy efficiency, training for energy efficiency and self-government units' management, NGOs that acted as catalysts of life styles that are environmentally friendly, NGOs that give lectures and seminars on issues related energy efficiency which result in generating public dialogue and stronger perception on this issue.

5.3.3. Institutional and Capacity Building

5.3.3.1. Education and Training Measures

- *Professional and higher education capacity building.* Introduction of new programs that refer to energy efficiency (EE) measures in the education sector on all vertical levels (elementary education, secondary education, universities). Support for the applied scientific research like new laboratory equipment, and grants for higher education such preparation of master and doctoral papers at prominent universities abroad.
- *Education and raising awareness at all levels.* Probably the best method for saving of energy quickly, public awareness and education initiatives shall refer to all groups of consumers and shall be launched on national, regional and local level. These initiatives shall cover wide range of issues, from information that helps decision-making about what household appliances to buy up to decision-making on issues related to energy efficiency planning at national and municipal level.

- *Preparation of proposals* for changes in the regulatory framework aimed at improvement of the employers', employees' and state institutions' awareness; worked out policies for regulatory promotion of lifelong learning and career development as a major components of the so-called "flexible safety"; application and recognition of the results from the information system for evaluation of competences at the national level and creation of prerequisites for integration in the so-called "e-government" and raising the awareness of employers, employees and state institutions.
- *Preparation of basic analyses and studies* related to the current state and trends on the labor market and the workforce; skills, qualification and competences of the employees and the workforce by branches and regions; evaluation of the competences of the workforce.
- *Professional training – authorization of energy auditors:* the training and the authorization of energy auditors may help in correctly identifying energy efficiency improvements and in the recommendations intended for buildings and industrial objects as well as of having these recommendations be uniform across the country. Consumers shall feel more comfortable if the energy auditors they hire are be capable of demonstrating that they have successfully completed the authorization program and that they are competent when it comes to the energy controls' techniques and the principles.

5.3.3.2. Energy Efficiency Fund (EEF) shall be established for the purpose of providing support to the outlining of a successful program for energy efficiency and investments promotion.[49] Key principles of this fund shall cover, but shall not be limited to, the following:

- The fund shall be maintained and managed by a subject outside the government. For example, it shall be managed by commercial banks on the basis of them currently giving loans. The fund shall be used for giving soft loans or for providing guarantees for the loans that commercial banks give from their own capital.
- Initial financing shall be provided form several different sources, and from the income programs inclusively (such as building license fees and demands for natural gas), government subsidy for heating fuels and gas, from individual contributions and probably from donor sources as well.
- The fund shall implement promotional programs in order to promote energy efficiency in different fields. These cover, but are not limited only to the ESCO's support and the conclusion of contracts for performing energy services, municipal energy management.

5.3.4. Economic and Fiscal Measures. In different countries there are different economic and fiscal initiatives for the purpose of trying to boost investments in energy efficiency. Generally, these initiatives fall under one of the following generic categories: rationalized determining of both the price of energy supplies and the tariff policy as well, tax policy – lower tax or no tax on energy efficient equipment and household appliances, convenient

49 Here it must be mentioned that the proposal for establishing EEF has to get approval from the Ministry of Finance. Namely, in 1997/98 upon the initiative of the Ministry of Environment and Physical Planning (MOEPP) it was established Environmental Fund, as a separate entity. Unfortunately, after 5-6 years of successful work, the Fund was closed down as a result of intervention of the mission of International Monetary Fund (IMF) in Macedonia. The explanation was that this would lead to better control from the Ministry of Finance (MF) over the public finances spending.

customs fees for energy efficient equipment, capital mobilization for the purpose of forming investment funds, guarantees for the commercial banks, regulations and standards for rational usage of energy, campaigns for informing and raising awareness about this issue.

- *Fiscal policy measures* are an important way to initiate changes in the behavior and in the usage of new products that spend less energy. The improvements in the tax policy for the purpose of guaranteeing that the polluter really pays, without at the same time increasing the total levels of taxation is one of the options for dealing with these bottlenecks.
- *Financial stimulation measures* more and more lean on the tax initiatives rather than on direct subsidies. EU could promote tax measures that boost or prevent a certain type of behavior. Macedonian tax policy is still often used as a simple tool that serves the budget, without its large coherence with the goals of other policies and it is overburdened with exceptions that are required on behalf of the member states for various ways of perception.
- *Direct subsidies* as investments for economic efficiency still remain popular. Due to the fact that they are often considered expensive and with non-bearable effect, these same measures are now better targeted. Subsidies are perceived as a temporary measure for mobilization of consumers, for preparation of new regulations or for promotion of energy efficient technologies by creating a bigger market than the one that could have existed in the opposite case, for the purpose of lowering the cost for subsidized energy efficient technologies. However, these subsidies can have a negative effect on the markets that appear in cases when these measures are applied without real continuity.
- *Fiscal stimulating measures,* such as tax relief and accelerated depreciation, are usually considered cheaper than the direct subsidies, especially when it comes to households, because they are the ones which have lower transaction costs. They can function well if the tax payment rate is high enough. These measures usually have weak performance in the economy that is undergoing a recession or is in transition.
- A set of measures that combine several instruments are more effective. For example, direct subsidies plus financing, economic stimulating measures plus notes of quality, regulations plus subsidies or mechanisms for financing and notes of quality.
- Good information is of essential importance, but it should be accompanied with these stimulating measures or with regulations and with financial stimulating measures as well. These complimentary measures should be implemented in parallel, not one after another.
- Giving incentives for boosting energy efficiency of homes that are subject to lease is a difficult task because the owner of the building usually does not pay the electricity bill and therefore does not have an economic interest to invest in improving energy efficiency, such as putting insulation or double windows.
- Although crossed subsidies are largely directed towards protecting vulnerable groups of consumers, those that could be negatively influenced if the prices increase, the more influential consumers with greater consumption have greater benefit from this social policy. Therefore, crossed subsidizing and the general pressure

on the prices of electricity should be eliminated in order to enable that in the methodology of price determination are built-in energy efficiency initiatives, instead of these being replaced with subsidies and measures for social care of certain target groups that are exclusively designed for low-income households. This will likely become a problem regarding increasing tariffs for the purpose of increasing the coverage of investment costs, and as the greater discipline of payment becomes more effective. The prices of electricity are relatively low and do not provide stimuli for energy efficiency.

- The increase of prices is unavoidable because the tariffs should be adapted in order to reflect the real cost of the service. The introduction of market prices of energy shall provide significant motivation for energy savings on behalf of the consumers. However, the reform in price determination should be promoted in advance and should be combined with a social care network as well as with stimulating measures for the purpose of having the electro-energetic companies offer their consumers energy services.

5.3.5. Labor Market Policies and Measures In the coming period, the Macedonian government should direct labor market policies towards upgrading the current programs and developing new ones, as well as towards determining target groups for new green jobs. The focus should be put on the following:

- Implementing programs for labor force training. The purpose of these programs should to enable that the labor force supply structure adapts to the structure of labor force demand from the aspect of education and professional qualifications.
- Programs that shall stimulate employment in the private sector, such as subsidizing the salaries of newly employed individuals, allocating grants for self-employment, tax releases for newly employed individuals, and the like. Through these employment programs in the private sector should be made more appealing than employment in the public sector.
- Programs that shall educate the unemployed how to look for a job. Those are programs that cover a wide range of courses on how to fill out applications, how to attend interviews, work clubs, and other employment skills.
- Programs for stimulating the employment of younger persons. Those programs should offer a variety of training programs for unemployed young persons, including subsidizing salaries and covering training cost if they find work.

In principle, active policies and measures on the labor market in Macedonia are contained in these groups of active policies. However, in the future, their range should be widened and new programs should be realized. For example, the most comprehensive program – the program for preparing for employment, covered 25,000 people between 2000 and 2007, or around 3,000 per year. This means that its annual coverage is around one percent of the total unemployed population. However, it should also be taken into consideration that in this program 70 percent are those preparing to work in the textile industry. This means that the coverage of other business activities is quite small. Also, the total number of persons covered with all the active employment programs in 2009 amounts 9,573 persons, or 2.7 percent of the overall unemployed population. This challenges the government to increase the range of the active labor market policies and to direct a part of it towards development of skills for green jobs.

On the other hand, it is evident that passive policies have significant influence on the performances of the labor market in Macedonia. The greatest range of these policies negatively correlates with unemployment rate. The opportunity to use health insurance in case of unemployment as well as getting allowance on various grounds, in fact removes the incentive of the unemployed to find formal employment and encourages them to engage in informal education. Decreasing the health insurance and allowance programs for the unemployed shall decrease the rate of unemployment in Macedonia, but this is socially unacceptable if one has in mind that the rate of poverty in Macedonia is over 30 percent.

Also, due to the fact that in Macedonia there is a high level of employee protection, it happens that there is a segmentation of the labor market by creation of a wider gap between the insiders who are employed in the enterprises, have full-time employment, are most often organized in labor unions and are significantly protected with legislation, and the outsiders who are not employed in enterprises, or are employed but with part-time engagement, or are seasonal workers. In short, they are a population that is not covered with the legislation on employee protection. This only confirms the validity of the so-called theory of insiders-outsiders on the labor market in Macedonia.

ANNEX: Interview with Mr Slavco Gjorgjiev

Case study: Mr. Slavco Gjorgiev is a General Manager of the company "Ekspro" from Strumica. "Ekspro" is a construction company involved in the construction business especially in creation and construction of so called "passive buildings" (buildings that are very energy efficient, especially from the point of view of heating and cooling). "Ekspro" could be perceived as a pioneer in this sense in Macedonia. Bearing in mind all of this, we asked Mr. Gjorgjiev to answer three questions in the framework of the *Questionnaire - Green jobs in Macedonian Economy*. Here are the responses given by Mr. Gjorgjiev:

> **Q**: *According to your estimate, what is legal legislation in Macedonia like (e.g. Law on Building, Law on Energy etc.) perceived from the available opportunities for your doing business? The question refers to certain legal privileges or obstacles that you experience during your everyday operations. We are interested in your opinion, not your comment about the laws.*

S. Gj.: What is missing is a regulation in the field of energy efficiency, technical rules that shall regulate this field, like in the EU countries for example. The fact that up to now we do not have such regulations is due to the unperceived (incorrectly estimated) importance of the role of energy in our economy. Energy is most often treated as an investment in new production capacities and as information on the amount of import made. Less attention is paid to energy needs and to where and how much of it is spent. Not having an overall perception about the portion the consumed energy has in heating energy, about what the energy suppliers that participate in it are, and about how many there are, is something that does not give an opportunity to appropriately set up of a strategy for energy survival during the critical periods that are ahead of us. When we recognize the fact that heating energy has a significant stake in the energy business, and that the energy consumed in heating and cooling in poorly designed and non-insulated objects up to 70 percent represents a direct loss, then it is sure that other goals shall be set for the purpose of preventing us from consuming non-productive energy. We will be heading in the right direction when we have at our disposal the amount of unreasonably spent energy that is useful in industrial capacities, traffic, and so on. To make investments in improving energy efficiency of a building, it is necessary for the investment to have fast return through the less consumed energy, and after the period of return of the investments, the investor to have greater purchasing power which provides additional potential in the economy. The entire economy will benefit from this and it is due to this that the emission of harmful gases is lower and the environment is better protected. Investments in improving heating protection and the implementation of systems for rational heating energy consumption should have equal treatment with the building of a new energy producer like a power plant. Then, energy efficiency shall take its rightful place in laws and technical regulations in the sense of its being limited, directed to, boosted and stimulated.

For the purpose of correct functioning of the building works, the central place has to be taken by the investor, and it is on him that the building industry, the designers, the building firms, the local economy and the overall economy in the country depend.

For the money he invests, he should get an object of appropriate quality for which even during the building phase it should be known how much energy it spends, all this being

stipulated with the regulations. The current regulations do not have this direction.

Construction engineering should be heading in the direction of constructing energy efficient buildings as well as towards consuming renewable heating energy. This, in turn, will create more green and eco-buildings.

Under the current circumstances, the largest part in the improvement of energy efficiency is made by the market. It is the higher price of energy supplied that press investors to build new objects as well as to think about the current objects of theirs in the direction of having these objects have appropriate protection. All these are mostly random actions, without any coherent solutions, with no technically solid projects or any analyses with draft measures of their realization, all for the purpose of improving energy efficiency of the object by perceiving the energy and environmental value of the suggested measures. With partial solutions there is no way to express the real value of the advantages contained in expert knowledge. In this manner, there is still space to improvise, during which the greatest loser appears to be the investor himself.

> **Q:** *Based on that opportunities for your business, how do you estimate the economic condition in Macedonia? Are there any possible privileges or obstacles that you experience during your everyday operations that result from the work itself as well as from the economic policy of the government.*

S. Gj.: Many of the countries realized the huge role energy has in the future development of the economy, thus making their own strategies regarding this area. A special set of measures are undertaken regarding the part referring to the improvement of energy efficiency as a first and the most significant measure for dealing with energy crisis that is ahead of us.

The current economic conditions, especially with respect to the financial condition of most investors, does not enable good operation nor increase in the amount of work.

The banks should be especially interested in this, primarily in the placement, because they have investors in front of them who have object (which has mortgage security). The investor does not need have an additional budget for repaying the loan because he provides this through savings made with less energy consumed.

> **Q:** *What are the possibilities for engaging a professional labor force to realize the energy efficiency projects in the building works you do? For example, trained individuals for facade works that are performed for the purpose of having better insulation, or trained staff to replace windows and doors with new ones that have better insulation.*

S. Gj.: Energy efficiency of the objects is measured and calculated with the amount of energy needed for heating and cooling. The standard measure is kWh for 1м^2 per year.

In order to really improve energy efficiency of an existing object it is necessary to conduct an elaborate analysis of the current condition, according to which measures are being drafted to improve efficiency, such as installation of insulation systems in the covering layer, replacement of doors and windows as a replacement for heating systems and the opportunity for energy supply replacement. At the same, there should be an economic evaluation of each separate measure to assess the value of the measures from an environmental perspective. For this purpose technical staff is needed, but we do not have enough at this time. This means that we should train and create a technical staff capable of making quality plan from which the investor could precisely know what he invests and how much he will save.

There is a need for materials and systems verified by appropriate institutes that shall guarantee the declared values, so that the designers and the contractor could provide the investor with the necessary benefits from the investment. Thus, we need increased engagement of competent professionals and entire teams in the construction industry that can work on creating materials and systems that have bigger effects. Contractors should have precisely designed systems that they are in compliance with certain technology and procedures determined by the system manufacturer. With this way of organization we can enable many competent professionals that are engaged in the building: architects, civil, construction and electrical engineers, economists, and other professional occupations.

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