

# Challenges concerning training in green jobs at national and local level

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## Brief overview of CSFPM and about its involvement in adult training in green occupations

**CSFPM** - Sectoral Committee on Professional Formation in Environmental Protection – is a Social Dialogue institution of Public Utility, with legal personality. Established since 2004, CSFPM actively and responsibly involved itself in developing the national framework of qualifications harmonized with the EQF, competence-based training and assessment systems for the workforce in the sector and at national level, developing and imposing the occupational standards as a unique reference for training and assessment, fostering the close relation between workforce training and labour market actual demands. Also CSFPM acted as promotor or partner in many European projects jointly with NCA - National Qualifications Authority and with other national and international organizations having similar interests in the sector. In the institutional form in which it operates today, CSFPM was reconstituted in 2006, according to Law no. 132/1999 with subsequent amendments. Employers and Unions, members of CSFPM, pursue a common interest in terms of training and enhancement of professional skills of the specialists working in the environmental sector.

## Brief overview of CSFPM and about its involvement in adult training in green occupations



## All occupations / qualifications of CSFPM immediate concern are specific for the environmental protection sector and therefore they are from the primary / pure category of green jobs / occupations

Just two exemples:

### TECHNICIAN HYDROGEOLOGIST

**Hydrogeologist technician** activity takes place in the office and in the field

- Provide direct collection and primary processing of hydrogeological data.
- Processing of raw data from hydrogeological boreholes
- Measurements springs and other groundwater catchments
- Monitor the impact of accidental pollution
- Running experimental pumping activities
- Organizing the work hydrogeological workers



## All occupations / qualifications of CSFPM immediate concern are specific for the environmental protection sector and therefore they are from the primary / pure category of green jobs / occupations

### TECHNICIAN IN ENVIRONMENT

The Environment Technician work mainly consists of sampling, sample processing and management needed to monitor the developments in environmental quality in location and proximity to locations where the organization conducts current activities (production, delivery services, etc.)

Basically the environmental protection technician performs on organization locations, on sites and around them, the following:

- Observing site to identify the potential breaches of environmental legislation,
- Identify places and points of measurement / analysis or sampling of environmental factors in organization sites
- Place the measuring equipment suitable for measurable environmental factors parameters
- Carrying out analysis and field measurements,
- Take samples for laboratory analysis
- Perform laboratory
- Draw up documents, reports
- Manage the data collected.





## All occupations / qualifications of CSFPM immediate concern are specific for the environmental protection sector and therefore they are from the primary / pure category of green jobs / occupations

All of these required job activities are described in terms of competencies (knowledge, skills, abilities, attitudes etc.) in Occupational Standards associated with each occupation. All of them right connected and interconnected make the man competent for the job.



Occupational Standards are a unique referential both for training and for assessing the acquired professional skills

**However there are many other occupations, specific to others economic sectors (power energy, manufacturing, public services, mining, transport, etc) which are "green" or may be turned to "green" with adequate construction of their specific Occupational Standards in which the environmental protection competencies must be must be correctly imposed on.**

In this regard CSFPM is striving to foster providing its cross sectorial expertise according to its mission and objectives:

**Awareness and promoting the importance of environmental component in all occupations from any sector, as a prerequisite for a pragmatic approach to sustainable development**



# What Is a Green Job?

You are probably hearing the term “green jobs” everywhere these days, but what exactly does it mean? **Green jobs are simply jobs that help to improve the environment and lessen the destructive impact that we have on our planet.**



# What Is a Green Job?

Politicians, activists and businesses all over the world are working hard to define exactly what these jobs are.

## Is Green Collar the New Blue Collar?

Green jobs are not limited to manufacturing. However when it comes about "green jobs" almost everyone is thinking on green construction which includes:

- **New construction like wind mills, solar panels and large environmentally friendly buildings.**
- **Transforming existing buildings to make them more environmentally friendly by improving or replacing windows, HVAC systems, and plumbing and electrical systems.**



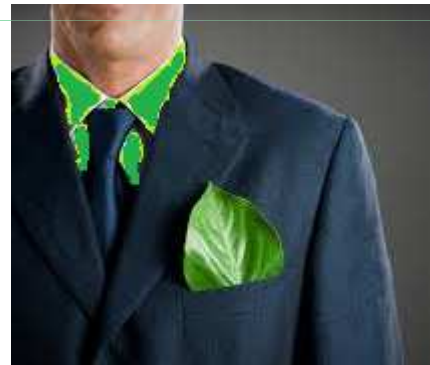


# What Is a Green Job?

**Green Collar** can also be **the New White Collar**

All of the green manufacturing and construction being done will need people for research, design, planning and development. Some fields that will see an increase in demand for people with green expertise include:

- Engineering
- Architecture
- Energy related careers
- Teaching
- Farming and agriculture
- Government planning
- Fundraising
- Many more



# Training for Green Jobs

The idea of a large, green workforce is new, but CSFPM consider, based on the analysis of labor market realities that many of the workers / engineers already possess many of the skills necessary to land a green job. Manufacturing experience and HVAC, plumbing and electrical know how are skills needed for many green jobs.

Many experts believe that the first step to gaining the knowledge to get **a green job** is go green in your daily life (recycle, practice energy conservation at home, buy and use recycled goods etc.). **Green training will be different for each job but some general green skills include:**

- **General knowledge of conservation**
- **Understanding techniques for reducing pollution**
- **Knowing how to use green building materials in both manufacturing and construction**
- **The ability to implement and sustain conservation practices**



# Training for Green Jobs

Every Occupational Standard associated with a green job/ occupation should contain at least three categories of competences:

- Fundamental
- General
- Specific

If not in "Fundamental" category, at least in "General" it should be included **environmental literacy**

**When it comes to environmental literacy, one of the training/retraining program's main goals is to get the learners up to speed.**

**It is to be emphasized that "In a democratic sustainable society, we have an obligation as citizens to be environmentally literate in order to participate in some of the great debates of our time and to affect change on a local and global scale." Teaching methods will take a holistic approach, drawing from historical and social evidence, with an emphasis on innovation within the context of cultural, economic, and ecological factors.**



# Training for Green Jobs

The "General" category should contain:

- The use of ICT
- Ensuring the safety and health at work (including prevention and firefighting)
- Environmental protection
- However not everyone (regardless of the sector the green job is related with) is entitled to decide which are the environmental protection skills. These should be unitary and coherently set by CSFPM, or at least approved by CSFPM



# Green jobs in the field of electricity, gas, steam and air conditioning supply

Green jobs are central to sustainable development and respond to the global challenges of environmental protection, economic development and social inclusion. By engaging governments, workers and employers as active agents of change, the ILO promotes the greening of enterprises, workplace practices and the labor market as a whole. These efforts create decent employment opportunities, enhance resource efficiency and build low-carbon sustainable societies



# Green jobs in the field of electricity, gas, steam and air conditioning supply

A **green job**, also called a **green-collar job** is, according to the United Nations Environment Program, "work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute(s) substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution".





# Green jobs in the field of electricity, gas, steam and air conditioning supply

Green jobs are organized in 2 main types:

- A. Jobs in businesses that produce goods and provide services that benefit the environment or conserve natural resources.
- B. Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.

From the point of view of training the workforce to enter green jobs is more convenient in response to high unemployment and a distressed economy where workers need skills that are relevant to their specific geographical locations. **"Instead of making green jobs we need to make (existing) jobs green"**



# Green jobs in the field of electricity, gas, steam and air conditioning supply

The principal values that help to define a person who has “gone green” are listed below. However, it’s not a checklist. There is no absolute list of **green values** or agreement on how to define them. But together these and other green values reflect an approach to life — including home, family, community and work — that centers on an awareness of our impact on the planet and its people:

- Environmental protection/preservation
- Eco-friendly design
- Sustainable development
- Renewable energy
- Organic/natural products
- Fair trade
- Holistic health
- Clean technology
- Peace and justice
- Social conscience



# What is a green career?

Green careers involve working in green jobs that are focused on sustainability and/or environmental protection and preservation.

These jobs can be defined either by the nature and purpose of the job or by the nature and purpose of the employer

# What is a green career?

A sustainable business or organization generally means that they are committed to:

- Conserving energy
- Using renewable energy sources
- Preventing pollution
- Reducing waste
- Conserving water



# What is a green career?

Our definition of “green careers” includes jobs at every level of skill and experience, including manual labor jobs as well as the environmental science and engineering professions that form the traditional foundation for green/environmental work. But the definition also includes a wide variety of other career fields, including those of management, support and administrative staff that can be found in virtually all industries — if and when those jobs meet our green jobs criteria.



# Where Are the Green Jobs?

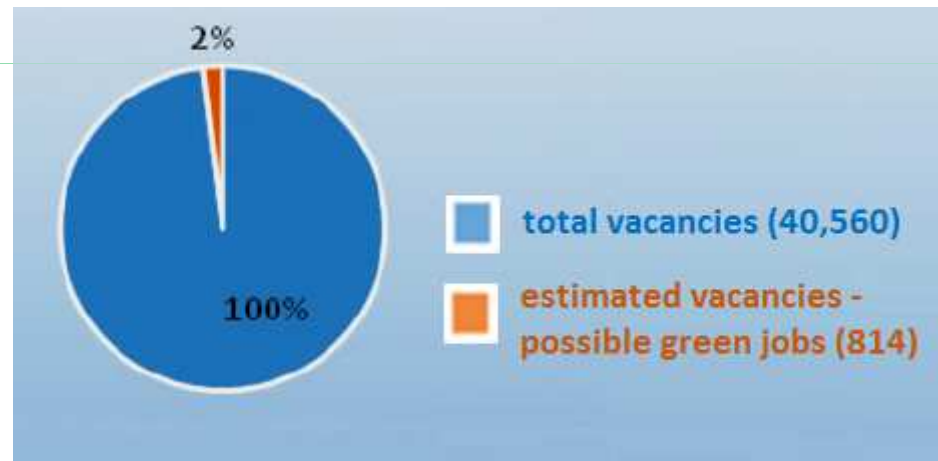
In response to climate change and other concerns, our society is going green, and that includes the workplace. Many employers are creating new green jobs and changing their existing jobs in terms of how the work is done. Others are starting up new businesses built on a foundation of green values.

Although we don't know the exact number of green jobs in Romania, some recent studies are now suggesting that five to seven percent of the jobs are green jobs, and that percentage is expected to increase significantly through 2030 to where green jobs may account for one of every four or five jobs. So it is clear that both the number and the percentage of green jobs is growing. It is also clear that green jobs now represent a wide variety of occupational choices that didn't exist just two to three years ago. They can now be found in every corner of the workplace and economy.



# Where Are the Green Jobs?

However an analysis of the ANOFM database of job vacancies in June 2013 (stocks plus entries) identifies quite a few possible vacancies green jobs. Thus, there have been identified an estimated 814 vacancies possible green jobs, which represents about 2% of the total vacancies (40,560).



# Where Are the Green Jobs?

There have been identified approximately 62 "green" occupations calling for personnel to be employed and mainly there are looking for "unskilled workers in forestry", which is approx. 31.5% of the total vacancies possible "green". Next it weights occupations such as "caretaker Lawn /green areas" - 9.7%, "Sanitation worker" - 7.8%, "sanitation worker for public paths" - 6.8%, "worker-sorting recyclable waste" - 5.8%, "sanitation worker Lawn" - 3.8%, "worker for plantations and green land area fitting" - 3.4% etc.

As a result of a further analysis it seems that labor force is generally prepared, in terms of qualifications, to face **a transition to a green economy**, provided additional training, where appropriate, some specific training modules on environmental protection or resource management, or upgrading skills to meet the requirements of new environmental technologies.

# Where Are the Green Jobs?

The conclusion is that the definition of **green jobs** is quite complicated, and that "barrier" between occupations "green" and the other is very "thin" and give room for interpretations. Hence the need when defining green occupation / workplace is to be taken into account also other criteria, such as " up to 50% of working time to be allocated to activities specific for environmental protection and resource management objectives ", criterion useful mainly for organizations delivering environmental goods and services even if their main activity is not environmental.



# Where Are the Green Jobs?

The concept of **green economy / green job** that is a new one in Romania as well as at EU level. The national employment policy is trying to accommodate the employment and economic development **green strategies** with the directions identified and developed at European level.

# Where Are the Green Jobs?

Sustainable Development Strategy of Romania, the government program and policies and strategies for environmental protection and climate change already set specific measures, but punctual, respectively in various fields: water, air, soil, protected areas, CO2 emissions, etc. But yet there is no unifying strategy on environment protection and transition to green economy covering all aspects of sustainable development including the human resources training / re-training to respond adequately to all possible changes in the labor market and to the need of new skills or qualifications.

# Where Are the Green Jobs?

However, there is a commitment of most Sectoral Committees, which are joined in ANCSR to prepare the basis for an adequate training and evaluation system for the workforce to get necessary competences needed especially for green jobs and consequently for green economic development.

On the other hand, although in all institutions with implications in this area was realized to some extent the importance of green jobs and the need of development of this field, in general, there is no cohesive action for this area.

Furthermore, since **green job** is a new concept even at EU level, there is no unanimous accepted definition for **green job**, and opinions vary regarding a possible definition, even within the same institution.



# Top Sectors within the Green Industry

The green industry is one of the fastest growing in the economy today. Not only does it provide a wide range of intellectually stimulating, challenging and rewarding careers for prospective applicants, it offers excellent pay in a number of fields, opportunity for travel and great long-term career prospects. So, for savvy people looking to get into the green industry, these are the top five areas to target their training and experience with a view of securing employment in the near future.



# Top Sectors within the Green Industry

## Eco-consultancy

Consultancy is a huge area for businesses right now, as the corporate world adapts to the demands of a green and sustainable lifestyle made by governments, regulators and even customers. If specialists understand 'green' to a tee, love to share knowledge, help businesses work according to frameworks and gain accreditations in sustainable business, this could be the field for them.

Sustainable consultants tell businesses how they can operate in a more environmentally friendly way. They also work with individuals and groups to coach them on leading greener lives. Work ranges from implementing community based sustainability projects to helping businesses lower their carbon footprint and achieve accreditations.



# Top Sectors within the Green Industry

## Urban Planner

This involves building or reconstructing existing buildings, urban transport systems and more. There are a range of environmental planning jobs available, looking at areas such as green space creation, sustainable building management, green transport (such as electric buses, pedestrian zones and car pools) and more. Ideal for those interested in building greener cities.



# Top Sectors within the Green Industry

## Business and Marketing

A core function of all businesses, but with a green slant. Areas of focus will include environmentally friendly business practices and communication of corporate green strategies, decisions about recycled products, cruelty-free ingredients, local distribution and more.

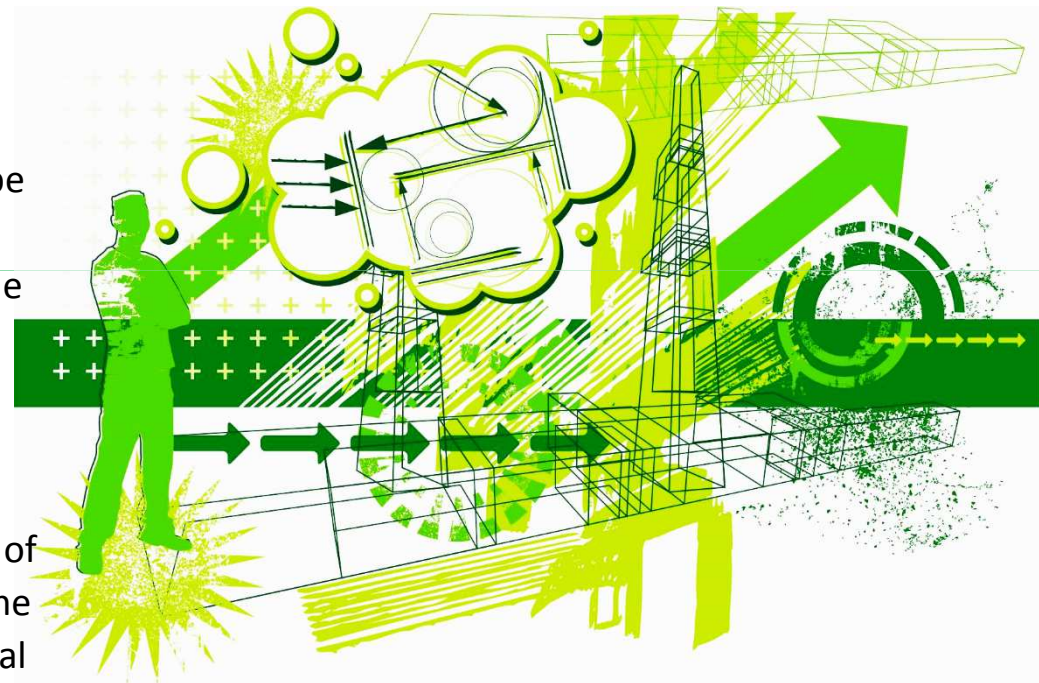




# Top Sectors within the Green Industry

## Science

One of the most valued roles for jobs in sustainability, this is a field in which a vast number of roles are opening up. You might be involved in researching endangered species, global warming, local emission impacts or the medicinal properties of rainforest plants. Scientists provide the blueprint for a sustainable future. They advise on most environmental issues, from the effects of pollution on our children's health to the age of corals and ancient trees. They also analyze the long-term effects of climate change on animal behavior.



# Top Sectors within the Green Industry

## Renewables

It should come as no surprise that renewable technology is the biggest area of sustainable employment at the moment and it is set to grow in the future. **Wind power, geothermal energy, nuclear power, hydro and solar power;** as the world runs out of fossil fuels, the focus turns to clean energies and how they can be effectively harnessed. A great number of jobs are set to rise in plant construction and management of these new renewable energy providers, with all the attendant management, engineering, administration, analyst and research roles required to make such ventures a success.





# Top Sectors within the Green Industry

## Renewable Energy

Renewable energy is generally defined as energy that comes from resources which are naturally replenished on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat.

Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services.

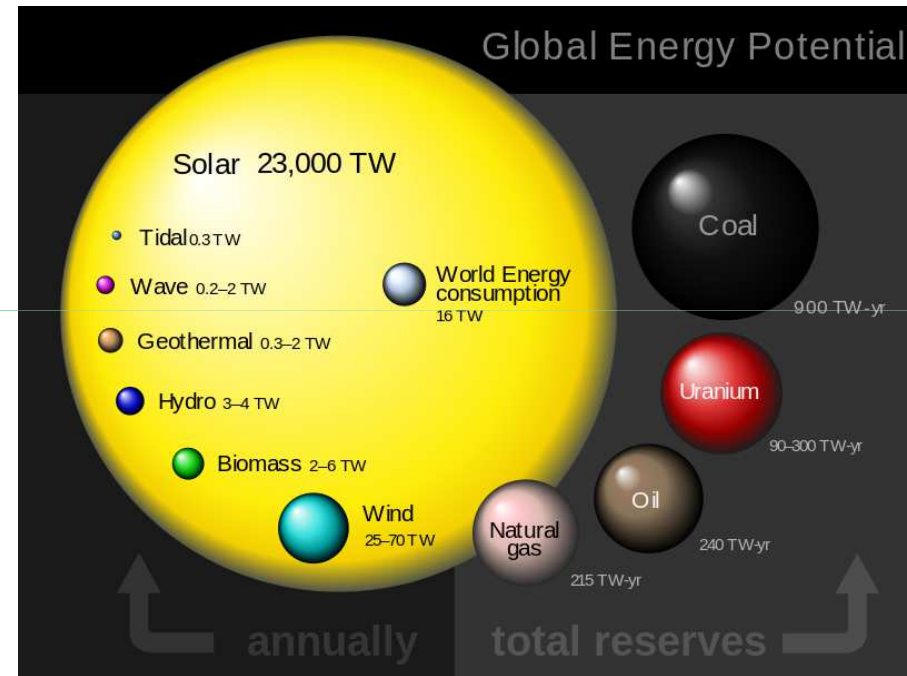
While many renewable energy projects are large-scale, renewable technologies are also suited to rural and remote areas and developing countries, where energy is often crucial in human development. It is said that renewable energy has the ability to lift the poorest nations to new levels of prosperity



# Top Sectors within the Green Industry

## Renewable Energy

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources.

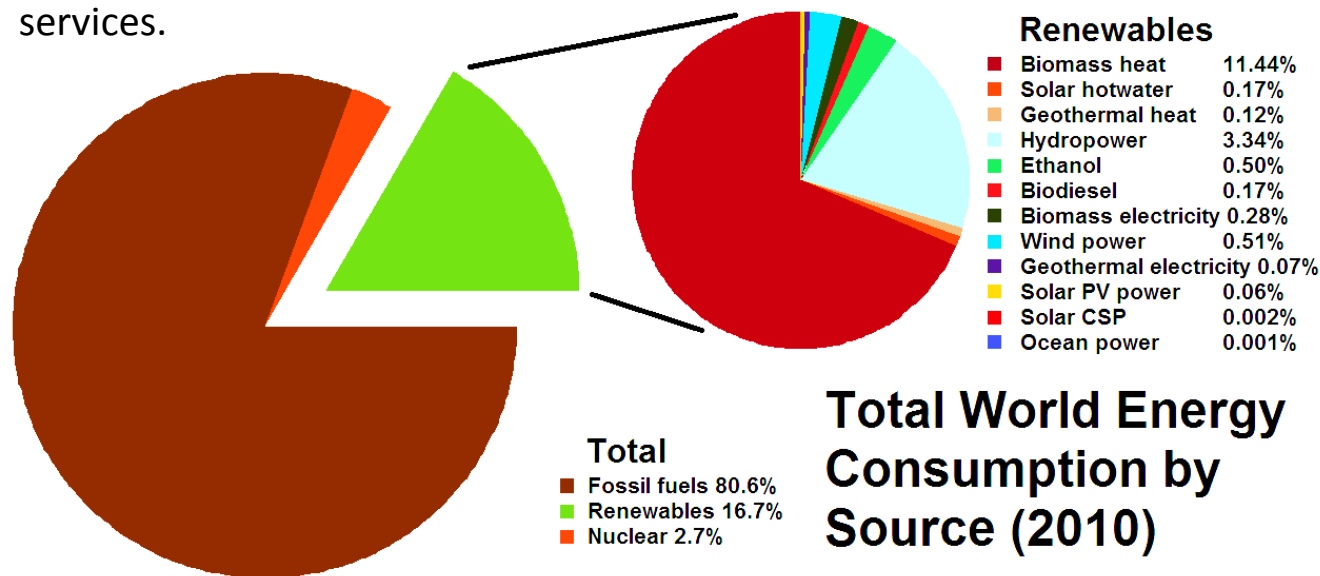


Global energy potential by source

# Top Sectors within the Green Industry

## Renewable Energy

Renewable energy resources and significant opportunities for energy efficiency exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency, and technological diversification of energy sources, would result in significant energy security and economic benefits. Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services.



**Global energy  
consumption by  
source**

**Renewables  
accounted for  
17% in 2010**

# Top Sectors within the Green Industry

## Power generation

Renewable energy provides 21.7% of electricity generation worldwide as of 2013.

Renewable power generators are spread across many countries, and wind power alone already provides a significant share of electricity in some areas.



# Top Sectors within the Green Industry

## Heating

Solar hot water makes an important contribution to renewable heat in many countries, most notably in China, which now has 70% of the global total (180 GWth). Most of these systems are installed on multi-family apartment buildings and meet a portion of the hot water needs of an estimated 50–60 million households in China.

Worldwide, total installed solar water heating systems meet a portion of the water heating needs of over 70 million households. The use of biomass for heating continues to grow as well. In Sweden, national use of biomass energy has surpassed that of oil. Direct geothermal for heating is also growing rapidly.





# Top Sectors within the Green Industry

## Transport fuels

Renewable biofuels have contributed to a significant decline in oil consumption all over the world since 2006. The 93 billion liters of biofuels produced worldwide in 2009 displaced the equivalent of an estimated 68 billion liters of gasoline, equal to about 5% of world gasoline production.



As of 2011, small solar PV systems provide electricity to a few million households, and micro-hydro configured into mini-grids serves many more. Over 44 million households use biogas made in household-scale digesters for lighting and/or cooking, and more than 166 million households rely on a new generation of more-efficient biomass cook stoves.



# Top Sectors within the Green Industry

## Transport fuels

At the national level, at least 30 nations around the world already have renewable energy contributing more than 20% of energy supply. National renewable energy markets are projected to continue to grow strongly in the coming decade and beyond, and some 120 countries have various policy targets for longer-term shares of renewable energy, including a 20% target of all electricity generated for the European Union by 2020. Some countries have much higher long-term policy targets of up to 100% renewables. Outside Europe, a diverse group of 20 or more other countries target renewable energy shares in the 2020–2030 time frame that range from 10% to 50%.

# Top Sectors within the Green Industry

## Transport fuels

Climate change and global warming concerns, coupled with high oil prices, peak oil, and increasing government support, are driving increasing renewable energy legislation, incentives and commercialization. New government spending, regulation and policies helped the industry weather the global financial crisis better than many other sectors. According to a 2011 projection by the International Energy Agency, solar power generators may produce most of the world's electricity within 50 years, reducing the emissions of greenhouse gases that harm the environment.

Renewable energy sources, that derive their energy from the sun, either directly or indirectly, such as hydro and wind, are expected to be capable of supplying humanity energy for almost another 1 billion years, at which point the predicted increase in heat from the sun is expected to make the surface of the earth too hot for liquid water to exist



# Top Sectors within the Green Industry

## Wind power

Airflows can be used to run wind turbines. Modern utility-scale wind turbines range from around 600 kW to 5 MW of rated power, although turbines with rated output of 1.5–3 MW have become the most common for commercial use; the power available from the wind is a function of the cube of the wind speed, so as wind speed increases, power output increases up to the maximum output for the particular turbine

Globally, the long-term technical potential of wind energy is believed to be five times total current global energy production, or 40 times current electricity demand, assuming all practical barriers needed were overcome. This would require wind turbines to be installed over large areas, particularly in areas of higher wind resources, such as offshore



# Top Sectors within the Green Industry

**What's inside a wind turbine?**



# Top Sectors within the Green Industry

The most efficient wind turbine:



# Top Sectors within the Green Industry

## Hydropower

Energy in water can be harnessed and used. Since water is about 800 times denser than air, even a slow flowing stream of water, or moderate sea swell, can yield considerable amounts of energy. There are many forms of water energy:

- Hydroelectric energy is a term usually reserved for large-scale hydroelectric dams. The largest of which is the Three Gorges Dam in China .
- Micro hydro systems are hydroelectric power installations that typically produce up to 100 kW of power. They are often used in water rich areas as a remote-area power supply (RAPS).
- Run-of-the-river hydroelectricity systems derive kinetic energy from rivers and oceans without the creation of a large reservoir.





# Top Sectors within the Green Industry

## Hydropower

Hydro power station Iron Gates I, with an installed capacity of 1080 MW and Iron Gates II, with installed capacity by 250 MW



# Top Sectors within the Green Industry

## Hydropower

Hydropower is produced in 150 countries, with the Asia-Pacific region generating 32 percent of global hydropower in 2010. China is the largest hydroelectricity producer, with 721 terawatt-hours of production in 2010, representing around 17 percent of domestic electricity use. There are now three hydroelectricity stations larger than 10 GW: the Three Gorges Dam in China, Itaipu Dam across the Brazil/Paraguay border, and Guri Dam in Venezuela.

Wave power, that captures the energy of ocean surface waves, and tidal power, converting the energy of tides, are two forms of hydropower with future potential, however, not yet widely employed commercially, while ocean thermal energy conversion, that uses the temperature difference between cooler deep and warmer surface waters, has currently no economic feasibility.

# Top Sectors within the Green Industry

**Australia's Oceanlinx just launched the world's first 1 megawatt wave power plant in Port MacDonnell, South Australia**



# Top Sectors within the Green Industry

## Solar energy

Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, concentrated solar power, solar architecture and artificial photosynthesis.

Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air.

Active solar technologies encompass solar thermal energy, using solar collectors for heating, and solar power, converting sunlight into electricity either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP).



# Top Sectors within the Green Industry

## Solar energy

A photovoltaic system converts light into electrical direct current (DC) by taking advantage of the photoelectric effect. Solar PV has turned into a multi-billion, fast-growing industry, continues to improve its cost-effectiveness, and has the most potential of any renewable technologies together with CSP. Concentrated solar power (CSP) systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Commercial concentrated solar power plants were first developed in the 1980s. CSP-Stirling has by far the highest efficiency among all solar energy technologies.

In 2011, the International Energy Agency said that "the development of affordable, inexhaustible and clean solar energy technologies will have huge longer-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating climate change, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence the additional costs of the incentives for early deployment should be considered learning investments; they must be wisely spent and need to be widely shared



# Top Sectors within the Green Industry

## Biomass

Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-derived materials which are specifically called lignocellulosic biomass. As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified into: thermal, chemical, and biochemical methods.

Wood remains the largest biomass energy source today; examples include forest residues (such as dead trees, branches and tree stumps), yard clippings, wood chips and even municipal solid waste. In the second sense, biomass includes plant or animal matter that can be converted into fibers or other industrial chemicals, including biofuels. Industrial biomass can be grown from numerous types of plants, including miscanthus, switchgrass, hemp, corn, poplar, willow, sorghum, sugarcane, bamboo, and a variety of tree species, ranging from eucalyptus to oil palm (palm oil).



# Top Sectors within the Green Industry

## Biomass

Plant energy is produced by crops specifically grown for use as fuel that offer high biomass output per hectare with low input energy. Some examples of these plants are wheat, which typically yield 7.5–8 tones of grain per hectare, and straw, which typically yield 3.5–5 tones per hectare in the UK. The grain can be used for liquid transportation fuels while the straw can be burned to produce heat or electricity. Plant biomass can also be degraded from cellulose to glucose through a series of chemical treatments, and the resulting sugar can then be used as a first generation biofuel.



# Top Sectors within the Green Industry

## Biomass

Biomass can be converted to other usable forms of energy like methane gas or transportation fuels like ethanol and biodiesel. Rotting garbage, and agricultural and human waste, all release methane gas – also called "landfill gas" or "biogas". Crops, such as corn and sugar cane, can be fermented to produce the transportation fuel, ethanol. Biodiesel, another transportation fuel, can be produced from left-over food products like vegetable oils and animal fats. Also, biomass to liquids (BTLs) and cellulosic ethanol are still under research. There is a great deal of research involving algal, or algae-derived, biomass due to the fact that it's a non-food resource and can be produced at rates 5 to 10 times those of other types of land-based agriculture, such as corn and soy. Once harvested, it can be fermented to produce biofuels such as ethanol, butanol, and methane, as well as biodiesel and hydrogen.

# Top Sectors within the Green Industry

## Biofuel

Biofuels include a wide range of fuels which are derived from biomass. The term covers solid biofuels, liquid biofuels, and gaseous biofuels. Liquid biofuels include bio alcohols, such as bioethanol, and oils, such as biodiesel. Gaseous biofuels include biogas, landfill gas and synthetic gas.



# Top Sectors within the Green Industry

## Biofuel

Bioethanol is an alcohol made by fermenting the sugar components of plant materials and it is made mostly from sugar and starch crops. These include maize, sugar cane and, more recently, sweet sorghum. The latter crop is particularly suitable for growing in dryland conditions, and is being investigated by ICRISAT for its potential to provide fuel, along with food and animal feed, in arid parts of Asia and Africa. With advanced technology being developed, cellulosic biomass, such as trees and grasses, are also used as feed stocks for ethanol production. Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. Bioethanol is widely used in the USA and in Brazil. The energy costs for producing bio-ethanol are almost equal to, the energy yields from bio-ethanol. However, according to the European Environment Agency, biofuels do not address global warming concerns.

Biodiesel is made from vegetable oils, animal fats or recycled greases. Biodiesel can be used as a fuel for vehicles in its pure form, but it is usually used as a diesel additive to reduce levels of particulates, carbon monoxide, and hydrocarbons from diesel-powered vehicles. Biodiesel is produced from oils or fats using transesterification and is the most common biofuel in Europe.

Biofuels provided 2.7% of the world's transport fuel in 2010.

# Top Sectors within the Green Industry

## Geothermal energy

Geothermal energy is from thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. Earth's geothermal energy originates from the original formation of the planet (20%) and from radioactive decay of minerals (80%). The geothermal gradient, which is the difference in temperature between the core of the planet and its surface, drives a continuous conduction of thermal energy in the form of heat from the core to the surface. The adjective geothermal originates from the Greek roots geo, meaning earth, and thermos, meaning heat.

The heat that is used for geothermal energy can be from deep within the Earth, all the way down to Earth's core – 4,000 miles (6,400 km) down. At the core, temperatures may reach over 9,000 °F (5,000 °C). Heat conducts from the core to surrounding rock. Extremely high temperature and pressure cause some rock to melt, which is commonly known as magma. Magma convects upward since it is lighter than the solid rock. This magma then heats rock and water in the crust, sometimes up to 700 °F (371 °C). From hot springs, geothermal energy has been used for bathing since Paleolithic times and for space heating since ancient Roman times, but it is now better known for electricity generation



# Occupations/qualifications related to green jobs

In Romania, only in 2010, after the adoption of the International Classification Standard of Occupations - ISCO 08 were introduced the following occupations / qualifications related to **green jobs**:

- Installer of solar photovoltaic systems - code 713702
- Installer of solar thermal systems - code 713614
- Fitter of solar installations - code 713615
- Operator of renewable energy sources - code 816118

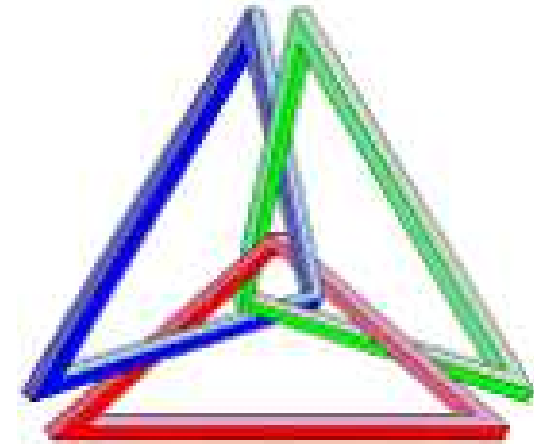
The analysis of existing training programs in the use of sources of Renewable energy is seen as lacking specific training programs, determined mainly by the lack training standards for these occupations.



# Training in green jobs

Efficient training in all green jobs should be based on:

- Occupational Standards specific to each occupation
- The same core of environmental protection competencies
- Intensive use of ICT
- A close relation between labor market needs and the training programs



# Synergy between education / training, research and innovation

Synergy is a term that describes a condition in which a whole gets something better and more meaningful by integration of its subsystems. Education, research and innovation are the vertices of a knowledge triangle around which the subsystems that are the basis of the progress of modern society are organized. The process of circling of knowledge triangle assumes developing mutual interaction of these subsystems, which leads to mutual reinforcement of each of the subsystems, and the integration into a single system with a new added value.



# Thank you!

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