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The Possible Effects of Green Economy on Employment

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Abstract
Green economy activities reduce environmental risk and minimize pollution by using cleaner technologies, products and services. These activities also use green jobs in key economic sectors (renewable energy, buildings and construction, transportation, basic industry, agriculture and forestry). The pace of green job creation is likely to accelerate in the years ahead. Opinions about the employment effects of green jobs show up in two opposite ways. According to first opinion, by the new types of job opportunities for millions of workers that created by green jobs, not only unemployment but also social problems such as poverty and inequality will be reduced. And in the future, blue-collar workers may fairly quietly be transformed into green-collar workers. As second opinion, because of the raising marginal costs and decreasing sales as a side effect of the green jobs, the unemployment will be increased. This paper investigates the relationship between green jobs and employment by looking for the answers: What is green-collar? What makes it different from blue- or white-collar? Will green jobs have the staying power to solve the problems of the nation's job market or cause a new kind of unemployment problem because of the old manufacturing jobs they are replacing?

Keywords: green economy, green-collar, green jobs, job opportunities.

JEL Code: Q20, Q32, Q52

1. Introduction

Today, the world is very different, physically and philosophically, from the one that Adam Smith, David Ricardo and other early economists knew. Nowadays, key features of conventional economics which are humanity's relationship to the natural world, the understanding of the sources of wealth, the purpose of economies and the evolution of markets; governments and individuals as economic actors become dysfunctional for the twenty-first century. All these dimensions of economic activity have changed so much over the last two centuries that they signal the close of one economic era and the need for a new economic beginning.

In Smith and Ricardo's time, nature was perceived as a huge and seemingly inexhaustible resource. Global population was roughly one billion, which was one-seventh the size of today's, and extractive and production technologies were far less powerful and environmentally invasive (Worldwatch, 2008: 4). Because of all these events, several environmental problems, which are threatened the worlds' today and future, have been occurred. In this situation governments need to take the steps for a better world.

Governments have played major roles in controlling and supervising the environmental issues. Governments not only procure, distribute and develop the natural environment, but also regulate and tax the natural resources by exercising incentives, regulations and pricing mechanisms with the intention of controlling the environmental pollution and enhancing the environmental revitalization (Kun Lui, 2010: 84).

A fair and sustainable economy needs to protect the natural environment and offer well-paying, decent jobs. But when we look to today's economy, it can be seen that it fares poorly on both scores. Additionally to energy problems, pollution and climate change, hundreds of millions of people worldwide remain either unemployed or contend with highly insecure jobs. It is now widely accepted that employment losses from not addressing the environmental crisis are likely to be very serious.

This paper aims to investigate the environmental issues and their effects to global economy, by looking for the answers to these questions; what are the effects of environmental issues to

job market? What is green-collar? What makes it different from blue- or white-collar? Will green jobs have the staying power to solve the problems of the nation's job market or cause a new kind of unemployment problem, because of the old manufacturing jobs they are replacing? We also would like to bring out the dilemma about the opinions for the green economy.

2. The Three "F" of Global Crises: Financial, Fuel and Food

When we look for a view of today's world, for the past years, the U.S. economy has suffered from a serious economic slowdown caused by the collapse of the housing market bubble, the destabilizing effects of the housing implosion on financial markets and the sharp rise in oil prices. The resulting increase in unemployment is in fact even worse when taking into account a labor market where people are working fewer hours than they wish, taking pay cuts or becoming discouraged from looking for work (Pollin et. al., 2008: 3). This crisis that has taken the start from U.S., widened the whole world economy and became a global financial crisis. Indeed, the world today is in the grip of multiple crises. These are financial, food and fuel crises (UNEP, 2009:2).

A common thread running through the three "F" crises is "investment". This is a financial crisis, because too much investment has gone into housing bubbles and the underlying cheap credits, aided and abetted by financial derivatives without creating enough decent jobs for youth and for overcoming poverty. At the same time this is a fuel crisis, because investment in renewable energy capacity was 160 billion dollar in 2007, up 60 percent from 2006, which is encouraging but dwarfed by the annual 300 billion dollar subsidy mostly for carbon emitting fossil fuels. As a last one this is also food crisis, because agriculture development assistance from the World Bank decreased from 30 percent of its development assistance in 1980 to only 8 percent today (UNEP, 2008: 1).

All these crises collectively compound and exacerbate persistent social problems of job losses, socio-economic insecurity and poverty which threaten social stability in developed, as well as developing countries. Although the causes of these crises vary, at a fundamental level, they share a common feature: the gross misallocation of capital. In the last two decades, much capital has been poured into property, fossil fuels and structured financial assets with embedded derivatives, but relatively little has been invested in renewable energy, energy efficiency, public transportation, sustainable agriculture, land and water conservation (UNEP, 2009:3).

3. Environmental Issues

Environmental issues involve difficult technical, economic and political questions. Consider the following side effects of modern economic activity caused by environmental problems are (Worldwatch, 2008:3):

- Atmospheric carbon dioxide levels are at their highest level in 650,000 years, the average temperature of Earth is "heading for levels not experienced for millions of years," and the Arctic Ocean could be ice-free during the summer as early as 2020.
- Nearly one in six species of European mammals is threatened with extinction, and all currently fished marine species could collapse by 2050.
- The number of oxygen-depleted dead zones in the world's oceans has increased from 149 to 200 in the past two years, threatening fish stocks.
- Urban air pollution causes 2 million premature deaths each year, mostly in developing countries.
- The decline of bees, bats and other vital pollinators across North America is jeopardizing agricultural crops and ecosystems.
- The notion of an approaching peak in the world's production of oil, the most important primary source of energy, has gone from an alarming speculation to essentially conventional wisdom; the mainstream World Energy Council recently predicted that the peak would arrive within 15 years.

These and other environmental consequences of the push for economic growth threaten the stability of the global economy. For a fair, sustainable economy and a cleaner world there should be taken some steps for environmental protection. This seems only possible with a transformation to a low carbon society and an embracing of a Green Economy, one where companies are rewarded for resource efficiency and innovation rather than inefficiency and maintaining the technological status quo.

4. From Brown to Green Economy

Brown economy is an economy which depends on low-energy efficiency, non-sustainable energy sources, high materials use, unsustainable use of ecological commons and a high degree of climate risk (UNEP, 2009: 8).

In opposition to brown economy, green economy consists of activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air, and soil, as well as problems related to waste, noise and eco-systems. These include cleaner technologies, products and services which reduce environmental risk and minimize pollution (OECD, 1999: 9). In addition to these air pollution control; waste water management; solid waste management; remediation/clean-up of soil and water; noise/vibration abatement; environmental monitoring, analysis and assessment; environmental research and development; and environmental construction and engineering could be count as environmental activities (WTO, 1998).

One of the key economic sectors of these activities is "Renewable Energy Industry". Obviously, the renewable energy industry includes technologies such as wind energy, photovoltaic, solar thermal energy and biomass. According to Bezdek et.al. (2008: 21) the following industries and technologies can be also added to these technologies: Hydro-small and large, geothermal, fuel cells, hydrogen, energy conservation and energy efficiency products, electric and hybrid vehicles, passive, solar/green, sustainable buildings and energy-smart design, day lighting.

Expanding the use of renewable energy is not only good for our energy self-sufficiency and the environment; it also has a significant positive impact on employment. The correlation among environmental protection, the economy and jobs has been an issue of harsh contention for decades (Bezdek et.al., 2008).

There are a wide variety of professions available in the renewable energy industry. This fact can make it challenging to find the right professional niche, but it also provides the opportunity for individuals with many different types and degrees of training to get involved with renewable energy.

According to the document prepared by U.S. Department of Energy (DOE/GO, 2001), some jobs such as those in communications, community outreach, sales or marketing and business support (for example; corporate planning and finance, accounting, human resources, law, and information technology) can be found in almost every renewable energy field. Other jobs are

specific to individual renewable energy technologies of the five main renewable energy power sources: wind, solar, bio-energy, geothermal and hydropower.

In the United Nations Environment Programme's (UNEP) 2008 report titled "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World", examined the "jobs versus the environment" argument. The report concludes that a global shift toward a low-carbon, sustainable economy can be an engine for development, adding large numbers of green jobs across many sectors. It argues that the global pace of green job creation is likely to accelerate in the years ahead, but that increased investment is essential to develop these jobs and facilitate a just transition.

A green economy is based on the efficient use of energy, reducing polluting emissions and the use of renewable sources of power. A green economy uses these investments to create new opportunities, good jobs and stronger communities (Pollin and Wicks-Lim, 2008:2). As investment in the green economy has exploded in recent years, observers have noted that millions of good-paying jobs (decent jobs) are being created across the nation in new and existing industries (Bezdek, 2007).

5. Green Jobs

5.1. Definition of Green Jobs

Before analysing of green jobs there is required a comprehensive and clear definition that identifies the distinctive elements of a green job. The definition has implications for how jobs are measured, tracked and created, as policies to develop these jobs depend on some form of classification. The definition will also reflect particular principles and values about a green economy. Without a concrete definition the term can be empty rhetoric and be open to manipulation by special interests. A very loose definition could allow businesses with harmful environmental practices to claim to be creating green jobs, while a very narrow definition may leave out workers and union members who are engaged in jobs that are be contributing to a sustainable economy (Kojola, 2009).

Green collar jobs are blue collar jobs in green businesses, that is, manual labor jobs in businesses whose products and services directly improve environmental quality. Green collar jobs are located in large and small for-profit businesses, non-profit organizations, social enterprises, and public sector institutions. What unites these jobs is that all of them are

associated with manual labor work that directly improves environmental quality (Pinderhughes, 2006:2).

A green job has to do something useful for people and it has to be helpful to or at least not damaging to the environment. A useful framework for characterizing green jobs was created by the United Nations Environmental Program (UNEP) along with the International Labor Organization (ILO), International Trade Union Council, International Organization of Employers and the World Health Organization in a 2008 report. Green jobs are defined as "work in agriculture, manufacturing, research and development, administrative and service activities that contributes substantially to preserving or restoring environmental quality. Specifically, 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." (UNEP/ILO/IOE/ITUC, 2008:3)

After this comprehensive definition, to give a list of representative jobs will be suitable to clarify the areas of green jobs. On the table 1, it is provided a list of the six green economy areas that includes; building retrofitting, mass transit, energy-efficient automobiles, wind power, solar power, and cellulosic biomass fuels.

Table 1. Jobs Represent the Green Economy

Areas for Green Economy	Representative Jobs
Building Retrofitting	Electricians, Heating/Air Conditioning Installers, Carpenters, Construction Equipment Operators, Roofers, Insulation Workers, Carpenter Helpers, Industrial Truck Drivers, Construction Managers, Building
Mass Transit	Civil Engineers, Rail Track Layers, Electricians, Welders, Metal Fabricators, Engine Assemblers, Production Helpers, Bus Drivers, First-Line Transportation Supervisors, Dispatchers
Energy-Efficient Automobiles	Computer Software Engineers, Electrical Engineers, Engineering Technicians, Welders, Transportation Equipment Painters, Metal Fabricators, Computer-Controlled Machine Operators, Engine Assemblers, Production Helpers, Operations Managers
Wind Power	Environmental Engineers, Iron and Steel Workers, Millwrights, Sheet Metal Workers, Machinists, Electrical Equipment Assemblers, Construction Equipment Operators, Industrial Truck Drivers, Industrial Production Managers, First-Line Production Supervisors

Solar Power	Electrical Engineers, Electricians, Industrial Machinery Mechanics, Welders, Metal Fabricators, Electrical Equipment Assemblers, Construction Equipment Operators, Installation Helpers, Laborers, Construction Managers
Cellulosic Biofuels	Chemical Engineers, Chemists, Chemical Equipment Operators, Chemical Technicians, Mixing and Blending Machine Operators, Agricultural Workers, Industrial Truck Drivers, Farm Product Purchasers, Agricultural and Forestry Supervisors, Agricultural Inspectors

From Pollin, Robert, Heidi Garrett-Peltier, James Heintz, and Helen Scharber. 2008. *Green Recovery: A Programme to Create Good Jobs and Start Building a Low-Carbon Economy.* Center for American Progress, Washington DC. P.3.

Furthermore UNEP emphasises that green jobs need to be decent work (good jobs), which offer adequate wages, safe working conditions, job security, reasonable career prospects, and worker rights. Table 2 shows the clear examples for green and decent jobs.

Table 2. Green and Decent Jobs? A Schematic Overview

Green, but not decent *Examples:* • Electronics recycling without adequate occupational safety • Low-wage installers of solar Panels • Exploited bio-fuels plantation days laborers	**Green and decent** *Examples:* • Unionized wind and solar power jobs • Green architects • Well-paid public transit employees
Neither green nor decent *Examples:* • coal mining with adequate safety • Women workers in the cut flower industry in Africa and in Latin America • Hog slaughterhouse workers	**Decent, but not green** *Examples:* • Unionized car manufacturing workers • Chemical engineers • Airline pilots

Source: UNEP/ILO/IOE/ITUC, 2008: Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World, p. 40.

Unions want green employment to provide decent jobs that offer career pathways and include livable wages and full benefits, which break the trend towards low-wage, dead-end jobs. The

ILO defines decent work as being productive and secure, respecting labor rights, providing adequate income, offering social protection and including social dialogue, union freedom, collective bargaining and worker participation. (Kojola, 2009)

A green collar job can be determined as a vocational job in an ecologically responsible trade. For instance; installing solar panels, weatherizing buildings, constructing and maintaining wind farms, materials re-use and recycling, doing organic agriculture, etc.

On the other side, a green-collar job can be anything that helps put the world on the path to a cleaner, more energy efficient future. These new green jobs exist in: manufacturing, construction, operation and maintenance and installation. Most require more education than a high school diploma, but less than a four-year degree. Some are a stepping stone to high-skill professional jobs or green entrepreneurial opportunities. The shift from dirty energy sources, like oil and coal to cleaner energy sources like solar, wind, and bio fuels will produce hundreds of thousands of new jobs.

5.2. Green Job's Dilemma

Environmental regulations bring out some costs with themselves. These costs include, for example, investments in pollution control equipment and personnel, scientific studies to test pesticides and chemicals, the cleanup of hazardous wastes, and the bill the citizens pay to their local garbage collectors etc. While this tremendous increase in environmental spending represents a real cost in terms of other goods and services have been had to forgo by citizens, it has, of course, also generated jobs (Goodstein, 1994:7). There comes out the dilemma of green jobs. On the one hand, it is believed that green jobs have the staying power to solve the problems of the nation's job market. On the other hand there are also ideas that green jobs causes a new kind of unemployment problem because of the old manufacturing jobs they are replacing. Table 3 demonstrates the employment effects of green economy by different aspects.

Table 3. The Effects of Green Economy on Employment

Type of Effect	Observation
Positive and negative employment effects	• Green policies and business practices can create new or preserve existing jobs. • On the other hand, environmental regulations can, in theory, have negative job consequences (by raising costs, reducing demand, or rendering a factory or company uncompetitive). This, however, has proven to be an exceedingly rare

	outcome.
New job creation and job preservation	• To some extent, green jobs will be created through the development of new technologies and emergence of new industries (wind turbines, solar photovoltaic, fuel cells, biofuels, etc.). • As established firms and industries green their operations, existing jobs may be transformed, and thus preserved against possible loss (implying changes in work methods, retraining).
Direct and indirect employment effects	• Jobs are directly created through increased demand and output induced by environment-related expenditures. • Indirect employment effects are due to higher demand for intermediate goods and services and due to multiplier effects (increased wage incomes that generate further demand and employment).
Temporary and sustainable jobs	• Construction and installation jobs (for instance, of a wind turbine) are usually of a temporary nature (as are jobs that are supported by a specific policy measure or program). • Manufacturing and maintenance jobs, on the other hand, are in principle of a longer-lasting nature.
Part-time and full-time employment	• Part-time jobs may be expressed in terms of full-time equivalents (reflecting the aggregate amount of employment generated)

Source: OECD, 2004: Environment and Employment: An Assessment, Working Party on National Environmental Policy, p. 9-10. (http://www.oecd.org/dataoecd/13/44/31951962.pdf.)

Theory also alone yields an ambiguous prediction of the over-all employment effects of environmental regulation. Existing empirical studies have likewise yielded mixed results on these employment effects (Jaffe et al., 1995).

A wide range of research efforts have been used to address the connection between environmental regulation and employment, including aggregate policy modeling (macroeconomic and general equilibrium), economy-wide microeconomic studies, industry specific studies, and analyses of plant location and growth. Estimates of the economy-wide job impacts of environmental regulations traditionally are based on simulations of large macroeconomic and general equilibrium models (Morgenstern et al, 2002: 414) .

Table 4. Economy-wide Studies of Jobs and the Environment

Study	**Type of Study**	**Employment Impact**
Haveman (1978)	Summary of macro-model studies	Positive
Hollenbeck (1978)	General-equilibrium	Negative
Data Resources Inc.(1979)	Macro-model	Positive
Data Resources Inc.(1981)	Macro-model	Positive

Muller (1981)	Summary of three macro-model studies	Two positive /One mixed*
Wendling and Bezdek (1989)	Input-output	Positive
Meyer(1992, 1993)	Cross-sectional regression	Positive
Morgenstern et al. (2002)	Industry specific studies	Positive
Berman and Bui (2001)	Analysis of plant location	Positive

Source: Goodstein, E. 1994: Jobs and the Environment: The Myth of a National Trade-off. *Economic Policy Institute*: Washington, DC., p. 10.
*Positive short-run effects, negative long-run effects.

In the resource of Morgenstern et al, they found strong positive employment effects in industries where environmental activities are relatively labor intensive and where demand is relatively inelastic, such as plastics and petroleum. In others, where labor already represents a large share of production costs and where demand is more elastic, such as steel and pulp and paper, there is little evidence of a significant employment consequence either way (Morgenstern et al, 2002: 429).

The devolved nature of environmental regulation generates rich regulatory variation across regions, industries and time. Berman and Bui (2001) exploited this variation, using direct measures of regulation and plant data, to estimate employment effects of sharply increased air quality regulation in Los Angeles. The authors found no evidence that local air quality regulation substantially reduced employment. In fact, they exposed small employment effects because regulated plants are in capital and not labor-intensive industries.

Actually the great majority of economy-wide studies show also a small positive effect of environmental regulation on overall employment.

Small employment effects are probably due to the combination of three factors: (a) regulations apply disproportionately to capital-intensive plants with relatively little employment; (b) these plants sell to local markets where competitors are subject to the same regulations, so that regulations do not decrease sales very much; and (c) abatement inputs complement employment.(Berman-Bui, 2001:269)

5.2.1. Optimist Point of View

Green jobs will be in both old and new sectors and will require new skills as well as traditional skills. New occupations will be created in alternative energy technology and

building retrofitting, like energy auditors, wind technicians and engineers and solar installers and technicians (White-Walsh, 2008:16).

New job activities will certainly be created in building the green economy and implementing global warming solutions, such as installing solar panels and researching new ways to build efficient bio-fuel engines. But the vast majority of green jobs are in the same areas of employment that people already work in today, in every region and state of the country. 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 re-lies, among others, on roofers, insulators and building inspectors. Expanding mass transit systems employs civil engineers, electricians, and dispatchers. So green jobs don't just mean new jobs, they can also mean greater job security for people who already work in these fields (Pollin and Wicks- Lim, 2008:4). Jobs in energy efficiency will involve constructing green buildings that follow Leadership in Energy and Environmental Design (LEED) standards, retrofitting buildings and manufacturing components for green construction, which will require occupations like electricians, carpenters, laborers and plumbers (Ibid.:7).

Pinderhughes (2007) gives example for the kind of green jobs as bicycle repair and bike delivery services, car and truck mechanic jobs, production jobs and gas-station jobs related to biodiesel, energy retrofits to increase energy efficiency and conservation, green building, green waste composting on a large scale, hauling and reuse of construction materials and debris (C&D), hazardous materials clean-up, landscaping, manufacturing jobs related to large scale production of appropriate technologies (i.e. solar panels, bike cargo systems, green waste bins, etc.), materials reuse, non-toxic household cleaning in residential and commercial buildings, parks and open space expansion and maintenance, printing with non-toxic inks and dyes, public transit jobs related to driving, maintenance, and repair, recycling and reuse, small businesses producing products from recycled materials, solar installation, tree cutting and pruning, peri-urban and urban agriculture, water retrofits to increase water efficiency and conservation, whole home performance, including attic insulation, weatherization.

A report by the University of Massachusetts in conjunction with the Center for American Progress, estimates that a 100 billion dollar investment in green infrastructure over the next two years will create 2 million new jobs, including jobs in heavy manufacturing (Pollin et. al., 2008:2).

Table 5. Employment Implications of Durable, Repairable, and Upgradable Products

Product Life-Cycle Phase	Observations	Possible Job Effects
Design and Engineering	Intense redesign of products (and production processes) required	Positive
Energy and Materials Inputs	Fewer products; therefore, fewer raw material inputs needed but more robust materials required	Negative
Manufacturing/ Assembly	Fewer products; but production more attentive to durability and quality, and likely performed in smaller-batch mode	Mixed
Distribution/ Transport	Fewer products shipped to end consumer, but increased (local) circulation from users to repair shops, remanufacturers, salvagers, etc., and back to consumers materials	Mixed
Maintenance	Revitalizing almost-abandoned functions; labor-intensive	Positive
Re-Manufacturing	Currently limited; more labor-intensive than initial manufacturing	Positive
Upgrading	Currently limited; labor-intensive	Positive
Consulting/ Performance Contracting	Advice on maximizing product utility and extending product-life; guidance on substituting services for goods	Positive
Disposal at End of Life-Cycle/ Reuse and Recycling	Fewer products to be disposed of, but more recycling and disassembly of parts and components for reuse; more labor-intensive than landfilling and incineration	Positive

Source: UNEP/ILO/IOE/ITUC, 2008: Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World, p. 76.

Table 5 offers a rough conceptual exploration of the likely employment implications. A fuller evaluation would require detailed assessments of the specific changes and how they translate into job losses and opportunities for new employment.

It is expected that, there will be greater opportunity and incentive to maintain, repair, upgrade, recycle, reuse, and remanufacture products, and thus there will be more job potential throughout the life of a product. These activities are all more labor-intensive and far less energy-intensive than producing new goods from virgin materials.

5.2.2. Pessimist Point of View

Not everyone agrees that green jobs are on the rise or that the trend toward green jobs is a good thing. In fact, it is believed that these benefits of green economy do not come without cost. Even studies by green jobs supporters, labor unions and environmentalist groups confirm that many green jobs; require expensive taxpayer subsidies to create, pay low wages, and kill existing jobs to pay for creating new green jobs. To pay for expensive green jobs programs and subsidies, green jobs supporters propose government spending of hundreds of billions of dollars.

Some experts argue that many of the "new" sustainable positions are merely existing ones being recast under a green name. Critics also maintain that creating green jobs will not result in a net employment gain. They cite a recent academic study that examined the consequences of Spain's promotion of green jobs in that country. According to the report by Universidad Rey San Juan Carlos, for every four green jobs created, nine regular ones were lost. Also, only 10 percent of the green jobs were "permanent" ones (Arias, 2009:154).

Coal mining sector can be exemplified to this unfavorable situation. Employment in coal mining would suffer severely, amounting by 2020 to more then half of all jobs in the coal mining sector. There would also be declines in employment in electric and gas utilities that are numerically larger though smaller in percentage terms. Jobs would also be lost in the production of other fossil fuels and in the rail transportation of coal. Only a portion of this shrinkage can be absorbed by normal turnover. Extremely small job losses are seen in a few other industries that are either energy-intensive or are suppliers to the energy industries (Barret et. al., 2002:2).

Green jobs estimates promise greatly expanded employment, but there are few thoughts that this promise will not come true. Promoting more jobs instead of more productivity leads to low-paying jobs in less desirable conditions The green jobs model is built on promoting inefficient use of labor. The studies favor technologies that employ large numbers of people rather than technologies that use labor efficiently. In a competitive market, the factors of production, including labor, are paid according to productivity. Economic growth does not come from political mandates; it comes from increases in productivity. The studies generally ignore the millions of jobs that will be destroyed by the restrictions imposed by governments on disfavored products and technologies (Morris et. al., 2009:3).

Key stakeholders, such as labor unions and trade groups, typically focus on gross job changes and the cost of rearranging workers within an industry (Morgenstern et al, 2002: 413). Divisions over green jobs have also arisen within unions between the international and local levels. Local unions are not as focused on larger policy issues and are unlikely to be supportive of green jobs until there are real signs of job growth and shifts to green industries (USW, 2006).

Environmental regulations can have negative effects on particular regions or industries, mostly mining, timber, chemical and paper industries, which helps explain why some unions

have resisted certain regulations (Obach,2002:85). Building support and easing fear about green jobs will require demonstrating to union members that green skills are not new and that their current jobs can become green.

Businesses have an interest in cutting energy use because it helps reduce input expenditures. Unions are beginning to consider traditional polluting industries as a thing of the past and want to move their members into more secure sustainable industries. According to a United Steel Workers report, dirty jobs that destroy the environment will eventually disappear and future growth depends on a sustainable economy.

However, even the most cost-effective energy efficiency policies create both winners and losers in the near term. Some workers in fossil fuel industries and perhaps other energy-intensive industries, could lose their jobs if policies to reduce the use of fossil energy are adopted. The severity of this problem depends in large part on how energy policies are designed. The injury to workers will be much smaller if the policies have been designed to help prevent such job losses where possible and, where it is not, ensure that these workers, their families, and their communities can land on their feet. (Pollin et al., 2008: 6)

As it clearly explain in the report that prepared by U.S. Senate in 2009 (Green Jobs and the New Economy Yellow Light on Green Jobs Ranking Member Report), renewable energy manufacturers have every right to pay their workers at competitive rates, including those competitive to the plant's location. In these difficult economic times, communities welcome such investment and new jobs. However, nearly all of the surveyed green job production workers earned hourly wages below the level needed in their location to match the median family wage (22.26 dollar), and some were just above the federal poverty wage for a family of four (10.19 dollar). That does not make these green jobs bad jobs or these providers bad companies, but it does mean that green jobs are not providing the overwhelming financial benefits that green jobs supporters ascribe.

According to a United Steel Workers (USW, 2006) report, the only answer is to link environmental reform with economic justice. Cleaning up the environment and improving public health should never be accomplished on the backs of workers. In particular, income protection and job retraining should be automatic for those who are displaced because of new environmental regulations, or the failure of their employers to adapt.

6. Green Economy in the Future

As to Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World Report, the potential for further green job growth is unknown, but obviously tremendous. Table 6 offers a broad look at the greening potential of different sectors of the economy; 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 6. Green Job Progress: To-Date and Future Potential

Sectors		Greening Potential	Green job Progress (To-date)	Long-term Green job (Potential)
Energy	Renewables	Excellent	Good	Excellent
	CCS	Fair	None	Unknown
Industry	Steel	Good	Fair	Fair
	Aluminum	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	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	Excellent	Good	Excellent

	Forestry Management			

Source: UNEP/ILO/IOE/ITUC, 2008: Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World, p. 301.

Although there are plenty of optimist expectations about future of the green job creation, it should not be omitted some pressing and unavoidable realities. These include: (UNEP/ILO/IOE/ITUC, 2008: 302)

- Green jobs are expanding, but are not yet growing rapidly enough
- Green employment has gained an important foothold in the developed world; however, it is still quite exceptional in most developing countries.
- The rising level of informality in the global economy constitutes a major challenge to green job growth.
- Unsustainable business practices are still prevalent, and often remain more profitable than green ways of doing business.

Regardless of optimism or skepticism about job creation, anyone who needs workers to fill environmental-based jobs knows that hiring them means little if the new employees don't have an idea how to perform their duties. Corporations are engaging in on-site green training programs, while colleges are adding sustainability to the curriculum (Arias,2009).

Research has shown that both green and conventional construction projects are being bid and worked on by similar contractors, implying that green construction work does not require specialized workers (Pollin and Wicks-Lim, 2008).

Another argument for the future is that stricter environmental standards will force plants to close down factories or move them overseas (Repetto, 1995: 2). Environmental protection expenses alone are simply not large enough to cripple an otherwise healthy plant. However, stringent pollution regulations might serve as the straw that forces the plants by making production at certain locations unprofitable. As there could be shut downs, the movement of new investments might be expected to occur in poorer countries with less-strict pollution regulations.(Goodstein, 1994:12, 17)

7. Conclusion

The effects of the environmental destruction are getting worse increasingly. At the macroeconomic level, it has been argued that global warming is one of history's greatest market failures and that to preclude the prospect of severe economic and social consequences in the future a transition to a low carbon economy is urgently needed. A green economy that creates manufacturing and construction jobs while advancing environmental sustainability and mitigating climate change is a win-win situation for both the economy and the environment. Green jobs could be a solution to two of the most pressing political and social issues facing the world: global climate change and global economic downturn. Policies and programs to support this transition are one way of viewing the green jobs movement.

However, theory alone yields an ambiguous prediction of the over-all employment effects of environmental regulation. Existing empirical studies have likewise yielded mixed results on these employment effects. Overall, the existing evidence on the possible jobs versus the environment tradeoff presents a bit of a puzzle. Here the key question should be not whether employment increases or decreases on balance, but whether cleaning up waste sites is worth the costs. If we want it to produce a clean environment along with other goods and services, the industries that contribute to a clean environment will have higher output and employment; those that do damage to the environment will have less. While jobs in particular industries may rise or fall, total employment will not be systematically affected. Because job loss is not a real social cost to the extent that a job lost in one area or industry would be quickly replaced in another.

To sum up, in the long run, the real choice is not jobs or the environment. It's both or neither. Securing next generation's world, ensuring clean jobs, and planning a decent future are too important to leave to management alone. Jobs can be lost in any time of change, and the changes ahead are enormous.

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