

# Green Building Handbook for South Africa

## Chapter: EcoBuilding and Job Creation

Marinda Kolev  
CSIR Built Environment

### 1. Introduction

*When we build, let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such work that our descendants will thank us for; and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and people will say, as they look upon the labor and wrought substance of them, See! this our parents did for us!*  
John Ruskin (1819-1900)

“Global warming” and “climate change” are no longer inconvenient buzzwords that politicians, on the other side of the globe, use to impress or scare voters. It is a scientific fact<sup>1</sup> and it is a growing threat to the way we live our lives. We need to change the way we travel, build, cook, generate and consume energy, and heat and cool our living and office spaces. We need to change the way we think about our surroundings, our families and our jobs.

We need to change our behaviour.

The current worldwide economic crisis needs strong global leaders who are able to breath new life into the economy in a way that will focus on the need to create jobs as well as stabilise the climate change, increase food production using less water and pesticides, and stimulate economic growth with greater equality of incomes. These leaders will have to address the economic, environmental and social issues of today with firm determination and create strong global alliances<sup>2</sup>. Policies, regulation and legislation will have to be implemented worldwide with the support of all governments.

At the G-20 meeting in Washington (November 2008), the (then) US President-elect Barack Obama stated that the creation of green jobs is a priority and he made the commitment that one million home will be retrofitted per year<sup>3</sup>. This will contribute to the green industries that are already experiencing strong growth, despite the global credit crunch.

### 2. Green Economy

‘Green’ has become buzzword in its own right. Journalists write of a ‘green economy’, ‘green technology’, ‘green politics’ and ‘green (collar) jobs’. Companies claim to be ‘green’ and scientists try to measure the effect of ‘green technology on the job market’, but what does it mean?

---

<sup>1</sup> [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf).

Also see [http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/science/findings-of-the-ipcc-fourth-2.html](http://www.ucsusa.org/global_warming/science_and_impacts/science/findings-of-the-ipcc-fourth-2.html)

<sup>2</sup> <http://www.worldwatch.org/node/5935>

<sup>3</sup> <http://www.canberratimes.com.au/news/opinion/editorial/general/economic-stimulus-programs-should-think-green/1362343.aspx>

In general, 'green' means that something is good for the environment and that it is sustainable. For the purpose of this chapter we will look at the following:

### **Green Economy**

One source describes the 'green economy' as a "rapidly growing billion-dollar sector that includes renewable energy sources, organic produce and products, green buildings, alternative fuel vehicles, and more"<sup>4</sup>. It is an economy that protects the environment and creates jobs that cannot be outsourced overseas – they would require the local workforce to do the work: retrofitting buildings, installing solar panels and building wind turbines<sup>5</sup>.

The UN has launched (2008) a 'Green Economy Initiative'<sup>6</sup> with the objective to assist global leaders and policymakers in the economic, financial, trade and environmental sectors to acknowledge effect that environmental investments have on economic growth, decent job creation and poverty reduction. Policies should focus on the conservation of ecosystems, clean and efficient technology, renewable energy, chemical and waste management, biodiversity based business as well as sustainable cities, buildings, construction and transport.

### **Green Building**

'Green building' refers to "designing and building structures that are environmentally sound and follow the codes of sustainability. Such buildings consume less energy, are durable and can be recycled. During all phases, the building saves resources and places fewer burdens on the environment, protects workers and minimises health exposures<sup>7</sup>."

### **Green Technology**

'Green technology' is "the application of the environmental sciences to conserve the natural environment and resources, and to limit the negative impacts of human involvement. Sustainable development is the core of environmental technologies. When applying sustainable development as a solution for environmental issues, the solutions need to be socially equitable, economically viable, and environmentally sound<sup>8</sup>."

### **Green Jobs**

According to a report by UNEP/ILO/ITUC/IOE (2008)<sup>9</sup> 'green jobs' can be described 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 minimise 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 labour movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organise labour unions".

---

<sup>4</sup> <http://www.ellabakercenter.org/page.php?pageid=29&contentid=32>

<sup>5</sup> [http://www.wral.com/lifestyles/house\\_and\\_home/blogpost/3934974/](http://www.wral.com/lifestyles/house_and_home/blogpost/3934974/)

<sup>6</sup> <http://www.unep.org/greeneconomy/>, also <http://www.unep.ch/etb/initiatives/GreenEconomy.php>

<sup>7</sup> <http://www.lehighcement.com/Education/Lehigh-Education-Glossary.htm#G>

<sup>8</sup> [http://en.wikipedia.org/wiki/Environmental\\_technology](http://en.wikipedia.org/wiki/Environmental_technology)

<sup>9</sup> UNEP, ILO, IOE, ITUC, 2008. *Green Jobs: Towards Sustainable Work in a Low Carbon World*. UNEP, Nairobi, Kenya

We will also look at 'decent work' as it forms an integral part of the International Labour Organisation's goals for work. The report *Green Jobs: Towards Decent work in a Sustainable, Low-Carbon World* (2008) warns that new green jobs can be "dirty, dangerous and difficult"<sup>10</sup> and it is therefore important that the elements of decent work are kept in mind when creating green jobs.

The SA Minister of Labour said the following at the 19th Annual Labour Law Conference in 2006: "As a member of the International Labour Organisation (ILO) and as a signatory to its conventions and practices, South Africa unequivocally supports and is committed to the ILO's Decent Work Agenda. [...] In addition, our commitment to the decent work agenda should be reflected in our attempts to reduce poverty and to achieve equitable, inclusive and sustainable development."<sup>11</sup>.

Decent Work has four pillars: the creation of more and better jobs, the extension of social protection, respect for fundamental principles and rights at work, and the promotion of social dialogue<sup>12</sup>.

### 3. Global Situation

Better energy efficiency in buildings has the biggest potential to reduce carbon emissions – not only in industrialised countries but also in developing countries. A major reduction (20 to 30%) can be achieved by reducing the need for heating and cooling in buildings<sup>13</sup>.

The UN Environmental Programme (UNEP) estimates that the market for clean energy technology could be worth \$1.9 trillion by the year 2020, representing potentially a substantial increase in investment and jobs<sup>14</sup>.

Global investment in renewable energy soared some 60% to \$148bn in 2007. Wind power attracted the most capital last year at \$50.2bn or a third of all clean energy investment, according to the UNEP *Global Trends in Sustainable Energy Investment 2008* report<sup>15</sup>. Investment in solar energy soared by 254% to \$28.6bn last year, while the bio-fuel sector foundered with funds falling nearly one third to \$2.1bn. Overall, clean energy accounted for 23% of all new installed capacity in 2007. Public investment in renewable energy via the markets more than doubled to \$23.4bn, up from \$10.6bn in 2006. Investment in Africa's clean energy sector grew fivefold to \$1.3bn in 2007, reversing a gradual decline that started in 2004. The renewable-energy sector is expected to grow to \$450bn in 2012 and up to \$600bn by 2020<sup>16</sup>.

According to UNEP, clean energy projects rose to almost \$121 billion worldwide in 2007, 60% more than in 2006. 23% of the total new power generation added worldwide in 2007 were sustainable energies. More than \$23 billion was spent on solar energy, an annual growth rate of 254% since 2004. Europe continued to lead

---

<sup>10</sup> <http://www.unep.org/Documents/Multilingual/Default.asp?DocumentID=545&ArticleID=5929> &l=en

<sup>11</sup> <http://www.labour.gov.za/media-desk/speeches/2006/19th-annual-labour-law-conference-1>

<sup>12</sup> [http://www.ilo.org/global/About the ILO/Media and public information/Press releases/lang-en/WCMS\\_094092/index.htm](http://www.ilo.org/global/About%20the%20ILO/Media%20and%20public%20information/Press%20releases/lang-en/WCMS_094092/index.htm)

<sup>13</sup> Poschen, P. 2007. *Green jobs: Facing up to "an inconvenient truth"*.

ILO. [http://www.ilo.org/wow/Articles/lang-en/WCMS\\_083900/index.htm](http://www.ilo.org/wow/Articles/lang-en/WCMS_083900/index.htm)

<sup>14</sup> [http://www.ilo.org/global/About the ILO/Media and public information/Press releases/lang-en/WCMS\\_082988/index.htm](http://www.ilo.org/global/About%20the%20ILO/Media%20and%20public%20information/Press%20releases/lang-en/WCMS_082988/index.htm)

<sup>15</sup> UNEP, 2008. *Global Trends in Sustainable Energy Investment 2008*.

<http://sefi.unep.org/english/global-trends-main-report.html> accessed 15 October 2008

<sup>16</sup> [http://www.news24.com/News24/Technology/News/0,,2-13-1443\\_2350263,00.html](http://www.news24.com/News24/Technology/News/0,,2-13-1443_2350263,00.html)

the world in clean energy investment with the US being second. The combined share of China, India and Brazil grew dramatically from 12% in 2006 to 22% in 2007<sup>17</sup>.

It has been estimated that there are currently 2.3 million people worldwide who have jobs resulting directly or indirectly from the renewable energy sector.

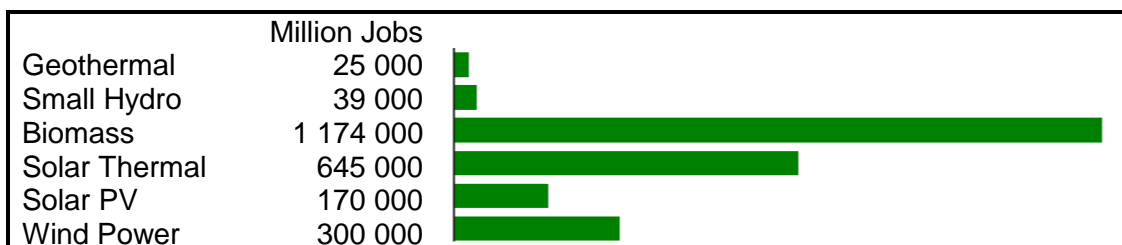


Figure 1: Worldwide employment in renewable energy, 2006<sup>18</sup>

Expected jobs per megawatt can be tabulated as follows:

Table 1: Jobs per megawatt of average capacity<sup>19</sup>

	Average Employment over Life of Facility		
	Manufacturing, Construction, Installation	Operations and Maintenance/Fuel Processing	Total
<b>Solar PV</b>	5.76 - 6.21	1.2 - 4.80	6.96 - 11.01
<b>Wind Power</b>	0.43 - 2.51	0.27	0.70 - 2.78
<b>Biomass</b>	0.40	0.38 - 2.44	0.78 - 2.84
<b>Coal-fired</b>	0.27	0.74	1.01
<b>Natural Gas-fired</b>	0.25	0.70	0.95

The UNEP/ILO/ITUC/IOE report<sup>20</sup> (2008) on green jobs summarises the estimated jobs as follows:

Table 2: Estimated Employment in the Renewable Energy Sector for Selected Countries and World (where figures were available), 2006<sup>21</sup>

Renewable Energy Source	World	Selected Countries	
<b>Wind</b>	300 000	Germany	82 100
		United States	36 800
		Spain	35 000
		China	22 200
		Denmark	21 000
		India	10 000
<b>Solar PV</b>	170 000	China	55 000
		Germany	35 000
		Spain	26 449
		United States	15 700
<b>Solar Thermal</b>	624 000-plus	China	600 000
		Germany	13 300

<sup>17</sup> [http://www.enn.com/top\\_stories/article/37628](http://www.enn.com/top_stories/article/37628)

<sup>18</sup> Renner, M. 2003. *Jobs in Renewable Energy Expanding*. www.worldwatch.org

<sup>19</sup> UNEP, ILO, IOE, ITUC, 2008. *Green Jobs: Towards Sustainable Work in a Low Carbon World*. UNEP, Nairobi, Kenya

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

		Spain	9 142
		United States	1 900

The following needs to be kept in mind when looking at these figures: different studies used different methodologies and hypotheses, and the results were presented in different formats. It is almost impossible to make comparisons or inferences about the true characteristics of the renewable-energy job sector. Some studies attempt to determine the number of jobs per megawatt of renewable energy while others posit that the number of jobs is dependant on investments made in the renewable-energy sector. Different target dates also make comparisons difficult.

Some studies report on jobs that are created – or can be created – directly and others on the spin-off jobs as well. This is not always indicated clearly. However, it is safe to extrapolate that renewable energy generates more jobs than employment in fossil fuels.

## 4. South Africa

### 4.1. Employment Profile for the Construction Industry

Some 450 000 people are formally employed in building and construction (excluding manufacturing and distribution) with a further three to four informal subcontracting employees per each formal worker. Formal employment will grow by 30-60% to between 600 000 and 700 000 by 2010. It is estimated that some 200 000 to 300 000 are employed in the manufacturing and distribution of building and construction materials. The growth to 2010 in this employment will be less than 10%<sup>22</sup>.

When looking at the cumulative investment from 2008-2015, the total projected investment in home improvement is R196.65 billion. If the above-noted ratio of investment to job creation in the South African building industry is used, around 837 750 jobs would be created over the estimated seven year period. The nature of these jobs is not clear.

Estimates of potential job creation often seem rather over optimistic. However, the estimates quoted above are based on findings of an official report for the Construction Industry Development Board (cidb). In spite of this, caution in accepting them at face value is recommended. Other reports indicate much lower employment expectations for major investments in other related sectors in South Africa.

The R124 billion investment in the electricity and transport networks that is expected to produce only 55 000 jobs over a five year period is to be noted (Business Report, 2006). Nevertheless, even if there is uncertainty about exact employment figures it can be certain that the planned investment in construction and refurbishment will have an important employment effect that will be much higher than other sectors<sup>23</sup>.

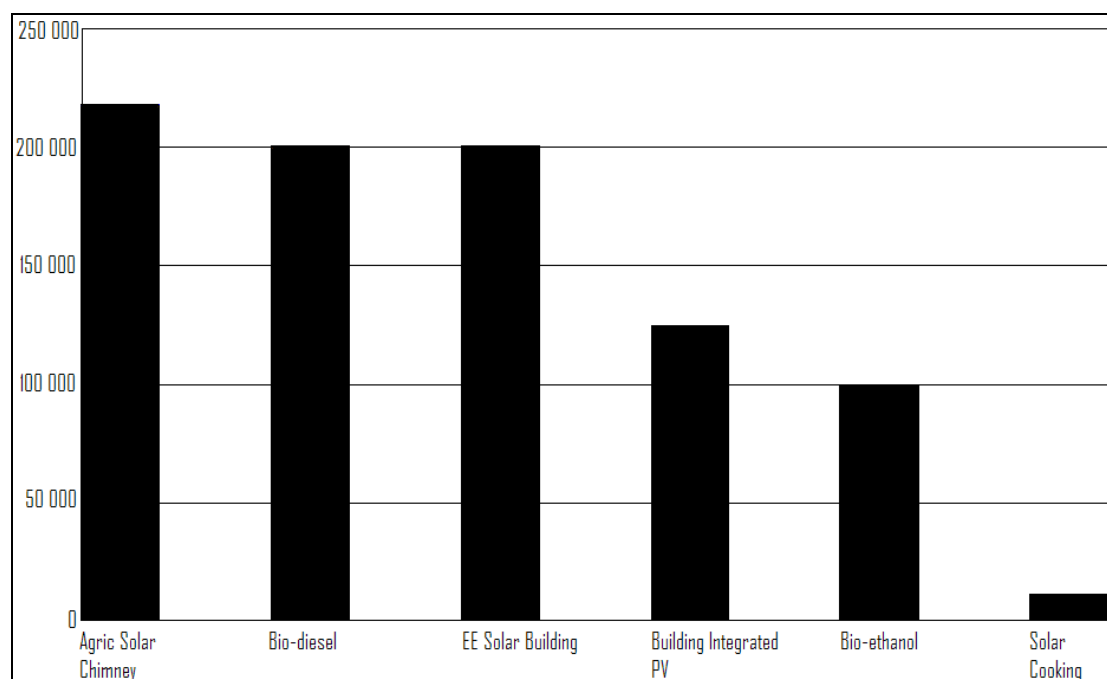
### 4.2. Potential Employment, Renewable Energy and Energy Efficiency

<sup>22</sup> BMI Building Research Strategy Consulting Unit CC, 2008. *Strategic research into the opportunities for job creation, new enterprise development and empowerment in the value system of the building industry*. The Construction Industry Development Board and The Department of Trade and Industry. Pretoria.

<sup>23</sup> Kievani, R, Tah, J.H.M. et al, 2008. *Green Jobs Creation through Sustainable Refurbishment in the Developing Countries*. Oxford Brookes University, Oxford.

The report<sup>24</sup> by AGAMA Energy noted that, if South Africa generated just 15% of the total electricity use in 2020 by using renewable-energy technologies, it would create 36 400 direct jobs, without any job loss in the coal-based electricity industry. Over 1.2 million direct and indirect new jobs would be generated, if a portion of South Africa's total energy needs, including fuels, were sourced with renewable-energy technologies by 2020.

The AGAMA Energy study stated that it is possible to employ more people in the renewable energy sector as renewable energy generation is more intensive than the generation of conventional energy. Renewable energy is also decentralised and this could lead to the creation of many jobs in the rural areas of South Africa where unemployment and poverty are the highest.



**Figure 2: Job creation due to energy efficiency and renewable energy in South Africa (Source: Holm, 2005)**

In a study<sup>25</sup> done by the CSIR for the International Labour Organisation (ILO) the following was estimated:

- If the energy demand grows at an average rate of 5.5% between 2008 and 2020, South Africa will require 28 839 MW of additional power in 2020.
  - Using renewable sources for bulk energy generation will lead to a net increase in the number of jobs at a rate of approximately 154 jobs per % of the total energy generated by renewables. This estimate is sensitive to the proportional mix of renewables chosen<sup>26</sup>, and in particular to the proportion of

<sup>24</sup> AGAMA Energy. 2003. *Employment Potential of Renewable Energy in South Africa*. Prepared for The Sustainable Energy and Climate Change Partnership. Agama Energy, Pretoria

<sup>25</sup> Van Wyk, L., Kolev, M., Osburn, L., De Villiers, A., and Kimmie, Z. 2008. Research on the employment aspects of energy-related improvements in construction in South Africa. CSIR. Pretoria.

<sup>26</sup> Four possible scenarios were developed for the supply of the additional 28 839MW required by 2020:  
 A. All of the additional power is supplied by a mixture of coal (80%) and nuclear power (20%).  
 B. 5% of the additional power is supplied by renewable sources and the remaining 95% by a mixture of coal (80%) and nuclear (20%).  
 C. 3% of the power supplied by renewable sources the remaining 95% by a mixture of coal (80%) and nuclear (20%).  
 D. 1% of the power supplied by renewable sources the remaining 95% by a mixture of coal (80%) and nuclear (20%).

solar energy (which produces significantly more jobs than other energy sources) included.

- Energy savings and substitution of energy sources in office buildings will lead to a net loss of 986 jobs. This estimate is sensitive to the proportion of the total energy savings we expect from renewable sources (solar heating of water) compared to reduction in demand due to engineering or architectural changes. Our estimate assumes that about 20% of the reduction in office demand will be due to alternative sources and that the remaining reductions will not have any significant employment effects.
- The use of solar heating for water in homes will result in a net increase of 826 jobs. This estimate is sensitive to the proportion of the home energy demand accounted for by the heating of water, which we estimate this at 40%.

We can thus conclude that, as indicated in the table below, generating 1% of our bulk energy from renewable sources will lead to a -6 change in net employment, while generating 5% of our bulk energy from renewable sources will lead to a 610 change in net employment.

These effects do not include any potential employment impact due to local manufacture of renewable energy equipment.

**Table 6: Employment impact of renewable energy, by proportion of bulk generation**

<b>% bulk energy</b>	<b>net employment effect</b>
1%	-6
3%	302
5%	610

The implementation of the Green Star rating system will also create unique employment opportunities, e.g. for energy auditors.

## **5. Conclusion**

Green energy is already creating several thousands of jobs world-wide. Various forecasts suggest that it is just the tip of the proverbial iceberg. The same can be expected for South Africa. The main job-creation opportunities will most probably be found in the manufacturing side of energy-efficient technologies. It would be advantages for the South African job sector if the introduction of energy-efficient technologies happens in conjunctions with a new manufacturing capability.

With regard to buildings, the immediate low-hanging fruit lies in the non-residential sector, and mainly in the introduction of energy-efficient lighting and HVAC systems.

The residential sector is more restricted, because the houses in South Africa are general not artificially heated, and very seldom artificially cooled. Opportunities in this sector will be found in lighting, solar-water heating and energy-efficient appliances. This reduces the job-creation impacts because the current labour force can do all of the above. Jobs created here will arise out for the additional volume.

It is very possible for new green jobs to be quality jobs, i.e., offering permanent or non-casual employment in a safer, cleaner and more secure working environment because of the higher skills base required.





## 6. Bibliography

AGAMA Energy, 2003. *The Employment Potential of Renewable Energy in South Africa*.

<http://www.earthlife->

[ct.org.za/Upload/Employment\\_Potential\\_of\\_Renewable\\_Energy.pdf](http://www.earthlife-ct.org.za/Upload/Employment_Potential_of_Renewable_Energy.pdf)

BMI Building Research Strategy Consulting Unit CC, 2008. *Strategic research into the opportunities for job creation, new enterprise development and empowerment in the value system of the building industry*. The Construction Industry Development Board and The Department of Trade and Industry. Pretoria.

Buys, P., Deichmann, U., Meisner, C., That, T.T., Wheeler, D. 2007. *Country Stakes in Climate Change Negotiations: Two Dimensions of Vulnerability*. The World Bank.

<http://www->

[wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2007/08/02/000158349\\_20070802104550/Rendered/PDF/wps4300.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2007/08/02/000158349_20070802104550/Rendered/PDF/wps4300.pdf)

DME, 2003. *White Paper for Renewable Energy*. Department of Mines and Energy, Pretoria.

Faniso, M. 2006. *Infrastructure projects to add 55 000 jobs - Transnet*. Business Report 23 January 2006.

<http://www.busrep.co.za/index.php?fSectionId=552&fArticleId=3077074>

Holm, D. 2005. *Renewable Energy Future for the Developing World*. ISES International Solar Energy Society, Germany.

Kievani, R, Tah, J.H.M. et al, 2008. *Green Jobs Creation through Sustainable Refurbishment in the Developing Countries*. Oxford Brookes University, Oxford.

Poschen, P. 2007. Green jobs: Facing up to "an inconvenient truth". ILO.

[http://www.ilo.org/wow/Articles/lang--en/WCMS\\_083900/index.htm](http://www.ilo.org/wow/Articles/lang--en/WCMS_083900/index.htm)

South African Yearbook 2007/2008. (2008) *Mineral, Energy and Geology. Government Communications and Information Systems*. Pretoria

Zhang, X., F.W. Zwiers, G.C. Hegerl, F.H. Lambert, N.P Gillett, S. Solomon, 2007: *Detection of human influence on twentieth-century precipitation trends*. Nature 448, 461-465 (26 July 2007) Published online 23 July 2007.

<http://www.nature.com/nature/journal/v448/n7152/abs/nature06025.html>

Van Wyk, L., Kolev, M., Osburn, L., De Villiers, A., and Kimmie, Z. 2008. *Research on the employment aspects of energy-related improvements in construction in South Africa*. CSIR. Pretoria.

UNEP, 2008. *Global Trends in Sustainable Energy Investment 2008*.

<http://sefi.unep.org/english/global-trends-main-report.html> accessed 15 October 2008

Bezdek, R., Wendling, R. and DiPerna, P. 2002. *Environmental Protection, the Economy, and Jobs: What is the Bottom Line?*

[http://www.enn.com/top\\_stories/article/15919](http://www.enn.com/top_stories/article/15919)

Renner, M. 2003. *Jobs in Renewable Energy Expanding*. [www.worldwatch.org](http://www.worldwatch.org)

SAPA. 2008. *Million New 'Green' Jobs Possible – US*, <http://www.harmoniousliving.co.za/News/Environment/4.2-Million-New-Green-Jobs-Possible-US/> 01 October 2008

Global Insight. 2008. *Current and Potential Green Jobs in the U.S. Economy*. Global Insight, Inc. Lexington, MA

RACE. 2008. *Green-Collar Jobs: The New Cash Crop*. <http://www.lngpollutes.org/article.php?id=1177>

American Solar Energy Society (ASES). 2007. *Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century*. <http://www.lngpollutes.org/article.php?id=1177>

ILO. 2008. *Green Jobs: Facts and Figures*. [http://www.ilo.org/global/About\\_the\\_ILO/Media\\_and\\_public\\_information/Factsheets/language--en/docName--WCMS\\_098484/index.htm](http://www.ilo.org/global/About_the_ILO/Media_and_public_information/Factsheets/language--en/docName--WCMS_098484/index.htm)