Evaluation of the Potential of Green Jobs in Mexico

International Labour Organization

GREEN JOBS PROGRAM OF THE ILO IN MEXICO

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For the ILO, the concept of green jobs summarizes the transformation of economies, businesses, work environments and job markets towards a sustainable economy that provides decent jobs with low carbon consumption.

In Mexico there is a shortage of quantitative employment data related to productive activities destined to reduce carbon emissions and pollution, promote energy and resource efficiency, and prevent loss of biodiversity and ecosystem services. Thus, the ILO has undertaken the task to estimate for the first time the number and potential of green jobs in Mexico.

Methodology

To estimate the potential of green jobs in Mexico a five step methodology[1] was used:

1. **Describe the overall economic and employment structure in Mexico.**
2. **Identify key green activities in the country.**
3. **Estimate the size of environmental sectors (production and employment).**
4. **Estimate the potential of green jobs - multiplier effect.**
5. **Analyze the net impact of change towards green activities.**

The main results of this methodology related to environmental employment are presented in this summary.

1. Green jobs definition

In this study a green job is defined as any job that: (i) produces a product or service related to environmental conservation and management; or (ii) that makes processes more sustainable within any industry, and (iii) that has decent work conditions.

Furthermore, two terms are crucial for the analysis: (i) environmental jobs: those that diminish environmental impact due to their service, product or process; and (ii) green jobs: those that have an environmental component and include decent work conditions.

Green jobs are set in the centre of a sustainable economy. One of their fundamental characteristics is to provide decent jobs with adequate wages, professional and personal growth opportunities, and a decent and safe lifestyle (ILO, 2007). For example, jobs in the recycling industries largely contribute to lower negative environmental impacts, however working conditions in these activities are usually precarious, operating informally, with dangerous work conditions, and low incomes; as a result they cannot be considered as green jobs. For an economy to be sustainable, it must internalize both environmental and social costs.

1.Jarvis, A. Varma, A. y Ram. J. (2011). *Assessing Green Jobs Potential in Developing Countries: A Practioners's Guide*. International Labor Organization, Geneva.
ILO (2007). *Decent work for sustainable development -The challenge of climate change.* International Labor Organization Governing Body, 300th Session, Geneva.

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GDP and employment share by industry and informal employment

Gross Domestic Product (GDP) by Sector. Million pesos at current prices.

Economic sector	GDP		Employment			% of per sector	% of per sector
	(millions)	%	Total (thous)	Formal (thous)	Informal (thous)		
1. Agriculture, forestry, hunting and fishing	$521,917	4%	6,052	252	5,800	89%	11%
2. Extractive and electricity industry	$1,587,789	11%	326	291	36	85%	15%
3. Manufacturing industry	$2,524,073	18%	6,189	3,250	2,939	62%	38%
4. Construction	$933,838	7%	3,123	502	2,622	96%	4%
5. Commerce	$2,241,670	16%	8,064	2,120	5,945	49%	51%
6. Restaurants and lodging services	$303,864	2%	2,791	602	2,189	41%	59%
7. Transport, communication, mail and storage	$1,374	10%	1,892	733	1,160	87%	13%
8. Professional, financial and corporate services	$2,616,911	19%	2,670	1,367	1,303	62%	38%
9. Social services	$1,118,084	8%	3,057	2,369	688	37%	63%
10. Diverse services	$326,344	2%	4,401	434	3,967	47%	53%
11. Government and international organisms	$2,241,670	16%	8,064	2,120	5,945	49%	51%
Total	**$14,126,188**	**100%**	**40,551**	**13,569**	**26,983**	**63%**	**37%**

Source: National Institute of Statistics and Geography. Mexican National Accounting System, and 2011's third trimester of the National Occupation and Employment Survey (ENOE).

2. Employment, vulnerability and gender

Total employment in Mexico in 2011 reached 40.5 million jobs, half of these are concentrated in three sectors: commerce (20%), manufacturing industry (15%) and agricultural sector (15%) (ENOE, 2011). Women represent 37% of the work force, and a similar proportion of men and women work informally (Ibid.).

Of the 40.5 million occupied people, 66.5% (26.9 million) work informally (ENOE, 2011); these include subsistence farming, paid housework, and workers within the informal sector.

Even though the unemployment rate is 5.6% (ENOE, 2011), the main problem in the Mexican labour market are the poor working conditions; where more than 46% of employees lack contracts and 40% do not have benefits[2] .

Moreover, another problematic indicator is wage inequality. The average national monthly income is $5,690 Mexican pesos, with a considerable variation between sectors. For example, the average income of extractive activities is $9,661 Mexican pesos, while in agriculture it is $2,636 Mexican pesos (Labor Observatory, 2011).

2. Based on the 30 million paid workers and subordinates.

ENOE (2011). National Occupation and Employment Survey. National Institute of Statistics and Geography (INEGI).

Labor Observatory (2011). Annual Panorama 2011.

3. Green activities

In order to estimate the number of green jobs in Mexico, the first step was to identify economic activities that support environmental employment, based on available data[3]. To differentiate traditional activities from green activities, environmental performance was measured by using national standards and certifications to objectively determine whether an activity is green.

The nine *key green activities* identified in the country and the specifications considered within them are listed below:

1. **Sustainable agriculture:** organic agriculture.
2. **Sustainable forestry activities:** national voluntary certifications (NMX-AA-143_SCFI-2008) and international certifications (FSC).
3. **Renewable electric energy:** wind, solar, hydropower, bioenergy and geothermal.
4. **Clean industry:** certification such as PROFEPA´S *Industria Limpia* (Clean Industry) and ISO14001.
5. **Sustainable construction:** sustainable edification and green infrastructure (sanitation and water distribution, and renewable energy infrastructure).
6. **Waste management:** recycling of solid urban waste.
7. **Sustainable tourism:** certified hotels, ecotourism and adventure tourism.
8. **Public mass transport:** urban and suburban collective transport, school and personnel transport, and railway transport.
9. **Federal government activities:** SEMARNAT (Ministry of Environment and Natural Resources) and sustainability programmes.

4. Employment generated by green activities

The purpose of this section is to estimate the production and employment size of the nine green activities to have a better understanding of the profiles of the environmental activities. Due to the limited information on green economy available in Mexico, a lot of assumptions are made in order to estimate and analyse green jobs; therefore the results found in this study should only be considered as indicative. Information is mainly based on secondary sources and specialist consultations; surveys were not conducted. Several methods for estimating direct environmental employment were used: case studies, coefficients for job estimates per unit of green activity, and labour-output ratios from conventional sectors. Furthermore, a sectorial approach was used to quantify environmental jobs; this means that all workers within an economic activity were considered.

A total **1.815 million direct environmental jobs** were found. These represent **about 4.5% of the workforce** in 2011.

3. The restriction of data available and the amount of certified activities limits the sample considered to estimate the number of green jobs.

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Summary of output and employment size of environmental activities

Sectors	GDP per sector		Total Employment	Formal Employment	Informal Employment
	MXN$ millions of mexican pesos	% of the total (% green from conventional)	(thousands)	%	
Primary Activities	**521,917**	**4%**	**6,052**	**4%**	
Agriculture	**367,712**		**5,100**	**3%**	
Organic Agriculture	7,424	(2%)	290		
Forestry	**6,895**		**173**	**7%**	
Sustainable Forestry	582	(8%)	14.7		
Secondary Activities	**5,045,700**	**36%**	**9,634**	**42%**	
Energy	**184**		**97**	**97%**	
Renewable Energy	46	(25%)	21.8		
Manufacture	**2,524,073**		**6,190**	**53%**	
Clean Industry	176,685	(7%)	459		
Construction	**933,838**		**3,123**	**16%**	
Sustainable Construction	63,170	(7%)	349		
Tertiary Activities	**8,558,570**	**61%**	**24,840**	**37%**	
Waste Management	**320,232**		**102**	**23%**	
Recycling	1,737	(1%)	12.2		
Tourism	**355,951**		**2,790**	**22%**	
Sustainable Tourism	6,507	(2%)	51.3		
Transport	**963,802**		**1,462**	**28%**	
Public Mass Transport and Railways	133,773	(14%)	582	15%	
Government	**3,706,922**		**1,810**	**83%**	
SEMARNAT and Sustainability Programmes	74,412	(2%)	35		
NATIONAL TOTAL	**$14,126,188**		**40,526**		

Source: Developed by the authors

The penetration of environmental jobs is similar to results found in other countries. For example, the percentage of environmental jobs in Mauritius is 6% (Harsdroff, 2012), 4% in South Korea (Phillips and Harsdroff, 2012), 3% in Spain (Ibid.), and between 1% and 5% in Bangladesh (GHK, 2010). These percentages are used only as a reference, since estimations cannot be compared between countries due to the diversity of methodologies used to calculate green jobs.

Sectors that show a greater percentage of environmental jobs out of the total workforce in each sector are: renewable electric energy (22%), recycling (12%), sustainable construction (11%), sustainable forestry and reforestation (8%), and clean industry (7%). The sectors that have a penetration of environmental employment of 6% or less are: organic agriculture (6%), sustainable tourism (2%) and government (2%).

A Decent Work Index was developed in order to analyse work conditions and screen environmental jobs to estimate green jobs. This index ranges from 0 to 100, where a result of 70 or higher shows that a job can be considered decent. This index is based on conventional economic activities and is further extrapolated to green activities.

Harsdorff, M. (2012). *Assesing current and potencial Green Jobs: the case of Mauritius*. International Labor Organization, Geneva.
GHK (2010). *Estimating green Jobs in Bangladesh.* Report elaborated for the International Labor Organization by GHK. United Kingdom.
Philips, D. y Harsdoff, M. (2012). *Methodologies for assessing Green Jobs: Policy Brief.* International Labor Organization, Geneva.

The variables used for the analysis are: (i) Adequate wage (monthly income); (ii) Decent working hours (weekly working hours); (iii) Work security and stability (written contract); (iv) Social protection (access to social security). A weight is assigned to each variable, where income was assumed to have a higher weight since it determines the potential to acquire other benefits such as insurance and retirement funds (Leschke et al., 2008). The weighted average formula is presented below, where Z_1 represents the normalized monthly income and Z_2, Z_3 and Z_4 represent each of the other variables used[4]

Decent Work Index = $(50\% \times Z_1) + (16.6\% \times Z_2) + (16.6\% \times Z_3) + (16.6\% \times Z_4) = 70$

Quantity of environmental jobs and work quality deficit

Sector	Environmental Jobs (Thousands)	Decent Work Index (Conventional sector)
Sustainable Agriculture	290	28
Sustainable Forestry*	14.7	100
Renewable Energy	21.8	79
Clean Industry	459	68
Sustainable Construction	349	43
Waste Management	12.2	41
Sustainable Tourism	51.3	52
Public Mass Transport	582	29
Government	35	69
Total	1,815	

**Based on certifications that include job decency.*

Source: Developed by the authors

The main causes for low index scores are lack of access to medical institutions and lack of written contracts; this is consisted with the data that 60% of the labour force in Mexico works informally.

Results also show that job quality varies considerably between sectors. The sustainable forestry and energy generation sectors present better work conditions. While the rest of the sectors' index are below 70; therefore decent working conditions is a major issue to tackle in order to ensure a just transition to a green economy.

5. Multiplier effect

Green activities normally use production resources more efficiently (energy, water, raw materials, among others) or reduce use of inputs (i.e. agro-chemicals in organic agriculture). Modelling these changes in an input-output (I-O) matrix is particularly important to estimate the net impact of adopting green activities, as output and employment coefficients are adjusted accordingly.

The indirect employment related to the nine key green activities were estimated. This is done by splitting sectors and integrating new green economic activities in the 2008 I-O matrix, and by calculating output and employment multipliers (Type I). The output multiplier indicates the total of all outputs required to produce one additional unit of output in one industry. The employment multiplier shows the total increase in employment generated in the economy, by increasing by one unit the final demand of a sector.

4.A simple index was calculated with the selected variables, weighted and normalized. Each variable was normalized using the following formula, because variables represent different units: $Z = \frac{X - \min}{\max - \min} \times 100$

Where *min* is the minimum value for the indicator, max is the maximum value set for the indicator and *X* is the market value. .

Results show that green sectors generate 971 thousand indirect jobs, totalling 2.19 million direct and indirect jobs.

All green activities analysed have an employment multiplier higher or equal to their conventional activities. This is reasonable since most green activities are more labour intensive. For example, for each million pesos increase in agricultural output, the agriculture activity generates 16 jobs, while organic agriculture generates 45 jobs through the same increase in final demand. The sectors that have a higher employment multiplier than their conventional counterpart are: organic agriculture, green construction, and renewable energy.

Results show that out of the 1.815 million direct environmental jobs, another 971 million indirect jobs are created, adding to a total of 2.786 million jobs. This shows that environmental activities are highly integrated in the national economy.

The green activities that generate the greatest amount of indirect jobs (in relation to the number of direct jobs) are: manufacturing industry, renewable electric energy, waste management, and temporal lodging services.

Output and Employment Multipliers (Type I) for green and conventional subsectors, Mexico 2008

Subsectors	Output multipliers	Employment multipliers (jobs per million pesos increased in final demand)
Agriculture	**1.25**	**16**
Agriculture - Green	1.26	45
Sustainable forestry	**1.20**	**5**
Electric energy generation, transmission and supply	**2.19**	**1**
Electric energy generation, transmission and supply - Green	1.84	2
Construction	**1.67**	**4**
Construction - Green	1.67	6
Manufacturing	**1.55**	**4**
Manufacturing – Green	1.55	3
Mass public transport	**1.46**	**3**
Waste management and remediation services	**1.73**	**3**
Temporal lodging services	**1.49**	**2**
Temporal lodging services - Green	1.48	2
National average	**1.5**	**5**

Source: Developed by the authors with data from the 2008 I-O matrix.

6. Net effect of transitioning to greener activities

To demonstrate the economic impacts of shifting from conventional activities towards more sustainable activities, we modelled the net effect of substituting 10% of final demand in agriculture, electric energy, construction, manufacturing industry and tourism sectors to their correspondent green activities. This results in a net decrease in output of $8,653 million pesos, which represents 0.04% of production in Mexico; whereas it has a **net increase of 736,376 jobs, representing a 2% increase in total employment**. This exercise is useful to foresee the effects of public policies focused on increasing the final demand of green sectors. However, it is important to highlight that the results are based on a static model that assumes prices remain equal, and to consider that the integration of green activities in the I-O table were based on many assumptions.

Leschke, J. y Watt, A. con Finn, M. (2008). *Putting a number on job quality? Constructing a European Quality Index*. European Trade Unidon Institute for Research, Education and Health and Safety (ETUI-REHS).

Conclusions and recommendations for the promotion of green jobs in Mexico

The whole economy is benefited by shifting to greener activities; less energy and inputs are used while the wellbeing of the population increases when pollution and emissions decrease. Four sectors stand out as a result of the study undertaken: renewable energies, organic agriculture, sustainable construction and clean industry.

Considering the national climate change policy and its objectives for 2030, renewable energy generation must be encouraged, since it is the economy's second most productive sector. Even though the generation of conventional electric energy is even more productive than renewable energy, it depends on finite fossil fuels inputs. Furthermore, the growth of renewable energy production is mainly based on services, construction and manufactured inputs, strengthening local economic activities. This is reflected in the large number of indirect jobs generated by this sector (double the amount of direct jobs). In addition, employment in these activities can be considered as green jobs, since the Decent Work Index equals 79, indicating good working conditions. Thus, by promoting and incentivizing these activities, the government would stimulate output and generate direct and indirect jobs with decent working conditions.

Organic agriculture has the highest employment multiplier, alongside a superior output multiplier than its conventional counterpart. It should be promoted as an inclusive rural development mechanism, since work conditions are better than traditional agriculture due to the elimination of harmful chemicals. In order to promote organic agricultural activities, sectorial policies and incentives are needed to stimulate the low national demand for organic products (which currently depend on international markets). In addition, it is essential to increase organic training programmes for farmers.

Green construction and manufacturing activities have an equal or superior employment multiplier – and an equal output multiplier – as their conventional counterparts. Besides reducing inputs and diminishing pollution, their growth generates a large quantity of jobs. However, they hold a high rate of informal employment. Consequently, it is necessary to promote an increase in wages and the formalization of workers in these sectors.

When analysing the transition to a green economy, it is important to consider a holistic approach, where the objective is not only to increase the quantity of green jobs, but create an overall increase in wellbeing for the population by making economic activities more efficient, sustainable and decent. A systemic vision is required, which includes transversal policies, social dialogue and participation of all governmental levels.

The promotion of green activities analysed in this study would increase the demand of some occupations, while it would require further training for others. This would require employment, education and professional training policies to be linked with environmental policies such as the National Climate Change Law and the National Programme for Sustainable Production and Consumption, with the objective of matching labour supply and demand.

Activities to further develop the green labour market could include: sectorial policies for green activities, policies and regulations that promote green businesses (i.e. fiscal incentives), training and green skill development programmes, an information system on the green labour market, research and development, and fiscal reforms which include the implementation of a neutral green tax.

Finally, further research is needed to deepen the understanding and knowledge on the green labour market dynamics, and skills and competences needed within the context of green growth. It is recommended to carry on with the green jobs research, in particular with sectorial studies and analysis of different public policy scenarios.

Regina Galhardi, Senior Employment Development Specialist, Office of the ILO for Mexico and Cuba, coordinated this study. It was executed by Catalina Jáuregui and Orly Goldsmith from the organization EMPLEOS VERDES (El Nexo Verde S.C.) with the collaboration of Héctor González during 2012. It is a pioneering contribution proposed by the ILO to its constituents and civil society in general.