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Proposals for the statistical definition and measurement of green jobs[1]

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1 Introduction

1. Over the past few years, the international community has emphasized the implications of climate change for economic and social development, for production and consumption patterns and therefore for employment, incomes and poverty. Many have stressed the importance of shifting toward a green and sustainable economy.

2. The concept of the green economy has thus become a focus of policy debate and has been mainstreamed into the work of the United Nations and its specialized agencies. Much of the discussion has focused on the potential of the green economy to provide significant opportunities for investment, growth, and jobs. This has led to an increasing need for the statistical community to deal with the difficult task of defining and measuring the concept of "green jobs" in order to produce internationally harmonized statistics that would inform the ongoing policy debate on the economic and employment impact of "greening" the economy.

3. The United Nations Conference on Sustainable Development (Rio+20 Conference), held in Rio de Janeiro in June 2012, considered that the green economy was an important pathway to sustainable development. According to the Outcome document of the conference, *The future we want* [2], the Rio+20 Conference:

   - considers green economy as one of the important tools available for achieving sustainable development (para 56);
   - invites governments to improve knowledge and statistical capacity on job trends, developments and constraints and integrate relevant data into national statistics, with the support of relevant United Nations agencies within their mandates (para 62);
   - invites the United Nations system, in cooperation with relevant donors and international organizations, to coordinate and provide information methodologies for evaluation of policies on green economy in the context of sustainable development and poverty eradication (para 66);
   - promotes access to reliable, relevant and timely data in areas related to the three dimensions of sustainable development (para 76).

4. Measurement of the production and employment of the green sector of the economy has also been strongly requested by policy departments and businesses which need reliable internationally harmonized statistics on green jobs for (i) gaining a better understanding of the impact of "greening the economy" on the labour market, and (ii) ensuring that effective policy measures and tools are formulated to respond to this shift to a greener economy. The ILO, in particular, has seen a growing demand for both statistical data and for conceptual guidelines on the measurement of green jobs.

5. The demand for statistics on green jobs is increasing in step with the challenges of managing the environment. Climate change, biodiversity loss and the demand for natural resources are among a growing list of environmental issues about which decisions need to be made.

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[2] The Future We Want - Outcome document of the United Nations Conference on Sustainable Development available at http://www.uncsd2012.org/futurewewant.html#IIIc

6. The need to develop a response to this demand for the comprehensive collection, organization and analysis of data on green jobs (in terms of the size, composition and contribution of the specific groups of workers and economic units to the green economy) that would enrich existing labour market information at international and country levels, represents a significant challenge for the statistical community. It underlines the importance of developing a standard conceptual framework along with appropriate operational definitions and measurement methods that would facilitate the development and production of harmonised and comparable data. The ILO has already tried to measure the number of green jobs in various countries. From this exercise it became clear that the concept is extremely complex and that practical measurement aspects should not be neglected.

7. In October 2013, the ILO will host the 19th International Conference of Labour Statisticians (ICLS). This offers the opportunity to promote discussion of the issues amongst the international statistical community and to seek advice on proposals for a statistical definition of green jobs, guidelines for statistical measurement, as well as future steps in developing relevant international statistical standards. To achieve this, the ILO plans to present a concept paper that reviews current practice in selected countries, and suggests a standardized definition that could be applied by countries in all regions and at all stages of economic and social development. This paper will need to draw on other international statistical work in related fields, such as environmental accounts and energy statistics and discuss methodological issues, potential data sources and further work needed to reach agreement on an international statistical standard.

8. The purpose of the present paper is to expose preliminary ILO thinking on the conceptual and measurement framework for defining and identifying green jobs, including on the international definition of green jobs for statistical purposes. In its current form it may be seen as the first draft of the paper that will be discussed at the ICLS, and requires further expansion in a number of areas. We hope to receive comments from others working on environmental and labour market statistics and policy that will assist in further developing the proposals. The final aim is to agree on a flexible definition of "green jobs" which could provide a basis for any method of data collection, reference period or time unit and that could refer to all workers.

Structure of the Report

9. The paper is organized as follows.

   - Chapters 1 and 2 provide general background information and describe the policy context related to the green economy, giving some examples of recent national and international developments.
   - Chapter 3 discusses the uses of statistics on green jobs;
   - Chapter 4 discusses existing practices in defining green jobs and proposes definitions of concepts for the statistical measurement of green jobs
   - Chapter 5 discusses possible sources of data;
   - Chapter 6 suggests the type of data and indicators that could be produced.

10. Finally an overview of existing concepts and definitions related to the green economy is included as Appendix 1

2 Policy context

11. The concepts of the green economy and green jobs are relatively new. Green economy refers to the way in which natural resources are used to produce goods and services for the population. It involves a new form of production and a new way of relating to our environment. The term "green jobs" tends to be used to describe people working in green, sustainable or environmentally jobs. They notion of green jobs has gained importance over the last couple of years to a large extent because they provide a response to the multiple crises that the world has been facing in recent years – the climate, food and economic crises – with an alternative paradigm that offers the promise of economic growth and job creation while protecting the earth's ecosystems and, in turn, contributing to poverty alleviation

12. There is no widely accepted definition of the green economy, but the term emphasizes the crucial point that economic growth and environmental sustainability complement each other.

13. The ILO has had a long-standing involvement with sustainable development and with environmental issues related to the world of work. This has included active participation in the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, in the World Summit on Sustainable Development, held in Johannesburg in 2002, and in the United Nations Conference on Sustainable Development, held in Rio de Janeiro in June 2012.

14. In 2007 the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the International Trade Union Confederation (ITUC) jointly launched the Green Jobs Initiative. The International Employers Organization (IEO) joined the Initiative in 2008. This initiative was launched as one of a number of initiatives aimed at addressing multiple and interrelated global crises which are having an impact on the international community, namely the financial crisis, the food crisis and the climate crisis.

15. One of the objectives of the Green Jobs Initiative was to *assess, analyse and promote the creation of decent jobs* as a consequence of the policies needed to address the global environmental challenges, among others, climate change. The main outputs of the initiative are the reports *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*[3] (Sept.2008), and *Working towards sustainable development: Opportunities for decent work and social inclusion in a green economy*[4] **(**June 2012).

16. *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World* was the first comprehensive report on the emergence of a "green economy" and its impact on the world of work in the 21st Century. It also presented a definition of the concept of green jobs for policy purposes.

17. The 2012 report *Working towards sustainable development: Opportunities for decent work and social inclusion in a green economy* argued that a green economy would create more and better jobs, lift people out of poverty and promote social inclusion if

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[3] http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf

[4] http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_181836.pdf

accompanied by the right policy mix. It also asserted that employment and social inclusion must be an integral part of any sustainable development strategy**.**

18. The report *Towards a Green Economy. Pathways to Sustainable Development and Poverty Eradication (*UNEP, 2011)[5], noted that green investments contribute to reducing environmental damage while boosting economic growth and creating jobs, thus achieving sustainable development for both developed and developing countries. This report also defined the concept of green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." In this connection, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.

19. Numerous definitions of the green economy have been produced by different organizations. Various reports have also offered and introduced or referred to other related concepts such as green growth (Towards green growth, OECD 2011)[6], green-collar worker (How Green is my occupation classification, New Zealand. 2010[7]), low carbon economy, a circular economy, greening economy, transition to greener economies, sustainable development, environmental development, green investments, green skills, green workplace, green labour market, etc. An overview of existing concepts and definitions related to green economy is provided in Appendix 1.

20. Some of these terms such as 'green', 'environmental' and 'sustainable' are often used interchangeably to describe companies, people or technologies that do 'greenish' things. They do not mean the same thing, however. Although these terms are not synonymous, all approaches do go in the same direction: showing a path towards a new economic model that is based on ecologically compatible use of resources and economic efficiency. Many of the approaches have the added dimension of promoting social justice and decent work. As there is no single, agreed definition of the green economy discussions are ongoing as to what might be its relation to sustainable development.

21. The relationship between these concepts, but also their relationship with other concepts, has not been clearly articulated. "Green" has become a shorthand term to describe the wide range of issues, processes, products and services that relate to sustainability and the environment. The debate on green economy focusses on the need for ecological, economic and social development. On the other hand the debate on green growth, which is considered as a way to pursue economic growth and development while preventing environmental degradation, tends to focus more strongly on questions of market regulation and economic incentives.

22. The green economy and, in particular green jobs, remain something of a mystery from the statistical perspective since there is no clear statistical definition of the green economy and of green jobs. There any comprehensive data on green jobs. While the System of Environmental-Economic Accounting (SEEA) Central Framework provides a

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[5] http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf

[6] http://www.oecd.org/greengrowth/48012345.pdf

[7] http://www.victoria.ac.nz/vms/industrial-relations-centre/irc-events/lew-conference-welcome/lew-papers/D5_LEW14_final_paper_-_Hancock.pdf

measurement framework for the development of integrated national accounts for the environment and defines and describes those activities to be counted as environmental activities, it does not provide any guidelines on the measurement of employment in these activities. Its coverage is also limited to enterprises whose primary activity is the production of any environmental good or service. It does not take into account the fact that there may be green employment within enterprises that do not produce green outputs but do use green technologies and processes.

23. Another factor that should be taken into account is that, although initially limited to climate change and reduction of carbon emissions, the green economy concept has evolved in recent years and expanded to cover the investments and actions necessary to respond to all environmental management challenges. In other words, the green economy is no longer limited to climate change and reduction of carbon emissions. Moreover, the concept of green economy has evolved from achieving short-term green economic growth into strategically transforming economic development paradigms in order to achieve both long-term sustainable development and the promotion of decent work. This includes the greening of whole economy.

3 Objectives and uses of statistics on green jobs

General requirements and types of user

24. Statistics on green jobs may serve a variety of users, including but not restricted to the general public, including media and civil society, decision and policy makers concerned with policies on economic growth, jobs creation, environmental protection, climate change and sustainability, as well as analysts, experts and advisors, academia, training institutions, government officials and international agencies

25. Different users need statistics on green jobs with different levels of aggregation and disaggregation, and with specific depths of information and description, depending on the purpose and nature of the analysis to be undertaken. Users may also be in need of cross-cutting datasets of environmental statistics, and in other cases they may only be interested in particular topics and themes pertaining to environmental statistics for specific sectoral analysis and policy making.

26. Most of the users are interested in the size of the contribution of the green economy to economic growth, especially to turnover, employment (number of people employed directly or indirectly, their skill levels) value added, investments, exports, etc. The size of the green economy in terms of the number of enterprises, the number of employees and the total turnover of the green economy are of special interest.

27. The volume of employment in green jobs, however we might define them, is seen by many as an important indicator of overall progress towards a greener, more environmentally sustainable economy. This highlights the need for an internationally agreed definition of the concept, as well as for guidelines on measurement, in order to provide a sound basis for international comparison.

28. More specifically, statistics on "green jobs" may provide governments with a tool for monitoring the transition to a greener economy, for designing and evaluating environmental and labour market policies, and for assessing the extent to which the economy is responding to various public policies and initiatives. They may also help establishments to supervise their own transition, and identify areas where improvements may be made. For these purposes "green jobs", which include a wide and highly heterogeneous set of jobs, may need to be analysed separately by types of greenness, because each type of greenness may reflect a different underlying phenomenon which may require different measures to be directed towards different target groups.

29. Distinguishing between different types of green jobs is important, not only because of their diversity but also because of the different uses to which statistics on green jobs may be put. When the type of green jobs being analysed is related to the *functioning* of establishments (e.g., energy efficiency, recycling) the focus may be on particular types of technology and methods of production. In contrast, when the type of green jobs is being analysed is related to the *outputs* of establishments (e.g., production of organic food), relevant characteristics of production output may be the most appropriate factors to be considered.

30. Statistics are needed to provide information on changes over time and on the transition to low-carbon economic and industrial activities by providing information on the economic growth in specific industrial activities and on the corresponding job creation or loss. For

this purpose the statistics on green jobs should be linked to the statistics on environmental output and/or environmental expenditure.

31. Statistics are also needed, however, to inform the development of and evaluate the impact of specific policy initiatives aimed at promoting environmentally sustainable employment or at making industrial production more environmentally friendly and sustainable.

Specific policy questions for which statistics are required

32. It can be seen from the above discussion that statistics on green jobs need to be conceived in such a way that they will help to answer a number of questions on many different aspects of environmental, economic and labour market policy. Some of the specific policy questions for which information is needed are identified below.

Job creation and loss

- What is the net employment creation effect arising from a particular type of investment, climate change policy, or environmentally motivated economic stimulus?
- What is the overall impact of environmental and economic policies on the labour market?
- What is the potential for green employment growth?
- What is or will be the employment shifts across and within sectors? Which are the industries and types of workers that are negatively affected?

Changes in occupational and skills needs

- What is or will be the employment shifts across occupation? For which occupations will there be increasing demand, and for which occupations will demand decrease?
- What new occupations are being created and what existing occupations are becoming greener?
- What new skills need to be developed, and what are the consequences for education and training systems in order adapt to the development of new areas of growth and new technologies?
- Are there skills bottlenecks, and if so, in which sectors and occupations, and what are the skills gaps? How many people need to be trained in what skills in a green economy?

Organizational restructuring

- How many enterprises restructure their organization and production processes to use less energy, reduce emissions use cleaner technologies and/or produce green products and services?
- What are the consequences of such restructuring for workers?

Decent work

- Are newly created green jobs good and decent? Is transition to the low carbon green economy socially just? Which groups are affected in a positive way, and which groups may be disadvantaged? Are newly created green jobs accessible to all?

33. All of these requirements imply the need, not only for a general definition and measurement of total employment in green jobs, but also for more detailed information on

employment classified by type of environmental activity, occupation and economic activity (industry)

Statistical monitoring of green jobs to inform the development and evaluation of public policy

34. Statistical monitoring of green jobs is necessary to facilitate the adjustment of policy interventions in a wide range of areas. It will allow evaluation and adjustment of policies aimed at promoting the green economy and environmental sustainability to reflect changing conditions during implementation and to provide a basis for the development of improved strategies in subsequent periods. Moreover, together with appropriate reporting procedures, monitoring promotes public interest and information on sustainable development.

35. Identification of green economic activities and measurement of employment in these activities may be used to take decisions regarding industries that require appropriate support (subsidies, access to credit and perhaps some level of protection). It may also allow assessment of the extent to which enterprises restructure their organisation and production processes and facilitate assessment of how skills, education and training systems need to adapt to the development of the green economy.

36. Statistics can also help create labour market projections. These can help minimize risk and uncertainty for training providers and enable businesses and governments to strategically plan and invest in new opportunities to drive innovation. The resulting information will be useful for evaluating policy initiatives and the labour market impact of economic activity related to protecting the environment and conserving natural resources.

37. Statistics on the size, employment and share in trade of the green economy can also be used to measure the positive side effects of environmental policies such as innovation take-up, market development or export growth. They can equally be used to measure and project less desirable side effects such as potential job loss in ‘brown’ industries and is the geographic regions where these industries are located.

4 Existing practices and proposals for the definition and measurement of green jobs

Definitions of green jobs used in the employment and environment policy contexts

38. The concept of green jobs has not been universally agreed as yet. Many organizations have developed their own definitions. Although the exact definition of green varies across organisations, there are more similarities than differences in what constitutes a green economy. A common theme is preserving or restoring the environment. Most of the studies also attempt to identify products and services that meet one of several criteria for a green economy. Information about the range of existing definitions related to the green economy, green growth and green jobs is provided in Appendix 1.

39. For products and services, most definitions include:

    1. Environmentally friendly and enhancing products and services
    2. Renewable energy products and services
    3. Clean transportation and fuels
    4. Green buildings

40. Some definitions also include the processes by which these products and services are produced. These include:

    1. Energy efficient manufacturing, distribution, and construction
    2. Reduction of energy, materials, and water consumption through high efficiency strategies
    3. Switching from carbon to non-carbon components.

41. Various efforts have also been made to define green jobs by focusing on the environment and sectors of the economy such as forestry and renewable energy or by looking at different occupations and how they contribute to the greening of the economy.

42. Most if not all of these attempts have a number of limitations, as they use definitions that are too broad or too focused on selected industries and/or occupations.

43. As a means to understand the concept of green jobs that we should ideally measure in these statistics, a useful starting point is the definition that was agreed for the purposes of the joint ILO UNEP report: *Green Jobs: Towards Decent Work in a Sustainable Low Carbon World (2008).* According to this definition, green jobs are defined as:

    > "...work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute 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."

44. Whilst this definition is reasonably comprehensive, it seems to exclude, perhaps not deliberately, the possibility that green jobs might exist in activities such as mining, quarrying, construction and energy supply.

45. According to the ILO, green jobs also have to be decent jobs. This is reflected in the broader definition currently used by the ILO Green Jobs Programme:

> "Jobs are green when they help reduce negative environmental impact ultimately leading to environmentally, economically and socially sustainable enterprises and economies. More precisely green jobs are decent jobs that:
>
> - Reduce consumption of energy and raw materials
> - Limit greenhouse gas emissions
> - Minimize waste and pollution
> - Protect and restore ecosystems" [8]

46. This definition is reasonably comprehensive and reflects the main policy goals and issues which statistics on green jobs may need to inform. The need to capture the decent work dimension as well as the environmental dimension is an important consideration.

Operational definition of concepts for the statistical measurement of green jobs

47. Compared to definitions suitable for policy purposes, a definition of green jobs for statistical purposes needs to be formulated with sufficient precision to guide the development of operationally viable methodologies for the consistent production of statistics. Moreover, in order to provide statistics that will adequately inform environmental policies as well as labour market, social and economic policies, it is necessary to provide information independently about both the environmental and decent work dimensions. It is proposed, therefore, to develop statistical standards that will facilitate the production of datasets that include separate statistics on both 'employment in environmental activities' and relevant decent work indicators. This implies the need for separate definitions pertaining to employment in environmental activities and to decent work.

48. We propose to define the environmental dimension with reference to environmental activities as specified in the most recent System Environmental-Economic Accounting (SEEA)[9], adopted by the UN Statistical Commission. The decent work dimension should be measured according to relevant indicators selected from the ILO manual on Decent Work Indicators currently under development.

49. The SEEA definition of environmental activities covers a similar range of activities to those covered in the ILO Green Jobs Programme definition, but provides specific guidance on those activities that are to be included or excluded. This approach ensures that the determination of those activities that are environmentally beneficial (or green) is

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[8] http://www.ilo.org/empent/units/green-jobs-programme/lang--en/index.htm, extracted on 17 July 2012

[9] The SEEA is a system for organizing statistical data for the derivation of coherent indicators and descriptive statistics to monitor the interactions between the economy and the environment and the state of the environment to better inform decision-making.

SEEA framework was not set up specifically to address sustainable /green development and therefore does not, at least not yet, take into account the social pillars. Nevertheless, some of these concerns are being addressed through efforts both to expand the system by incorporating human capital and to explore the possibility of linking the frameworks with social accounting matrices (SAM) which have been developed in consistency with the national accounts.

the responsibility of the group of experts in environmental accounts who maintain the SEEA, whilst the measurement of employment, jobs and decent work remains the responsibility of the ILO and its constituents. It also facilitates coherence between statistics on green jobs, environmental production and expenditure, and decent work.

Units of observation and analysis

50. Two basic units of analysis, the job and the person, are relevant to the measurement of green jobs depending on the objective and measure pursued. Whilst data are likely to be most frequently provided by establishments and household, the usual unit of analysis for green jobs statistics is the job. The job is defined with reference to the latest relevant resolution of the International Conference of Labour Statisticians (ICLS), for example on statistics of employment and work, occupation or working time. According to the most recent draft of 19th ICLS resolution concerning statistics of work and of the labour force a job is defined 'as a set of tasks and duties performed, or meant to be performed by one person for a single economic unit, including for an employer or in self-employment, or in other forms of work.'

51. A job can be formal or informal and can refer to work in employment or in other forms of work. The occurrence of multiple job holding exists within employment, and may also take place within volunteer work, unpaid trainee work and other unpaid work. Most statistics on green jobs will relate to employment, which refers to activities carried out by persons to produce goods or services mainly to generate income. The conceptual model for statistics on green jobs also allows for the production of green jobs statistics for other forms of work.

Environmental activities

52. The System of Environmental-Economic Accounting Central Framework, adopted by the UN Statistical Commission at its 43rd session in 2012, defines 'environmental activities' as *those economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources.* These various activities are grouped into two broad types of environmental activity – environmental protection and resource management.

53. Environmental protection activities are defined in the SEEA as those activities whose primary purpose is the prevention, reduction and elimination of pollution and other forms of degradation of the environment. These activities include, but are not limited to, the prevention, reduction or treatment of waste and wastewater; the prevention, reduction or elimination of air emissions; the treatment and disposal of contaminated soil and groundwater; the prevention or reduction of noise and vibration levels; the protection of biodiversity and landscapes, including their ecological functions; monitoring of the quality of the natural environment (air, water, soil, groundwater); research and development on environmental protection; and the general administration, training and teaching activities oriented towards environmental protection.

54. Resource management activities are defined as those activities whose primary purpose is preserving and maintaining the stock of natural resources and hence safeguarding against depletion. These activities include, but are not limited to, reducing the withdrawals of natural resources (including through the recovery, reuse, recycling, and substitution of natural resources); restoring natural resource stocks (increases or recharges of natural resource stocks); the general management of natural resources (including monitoring,

control, surveillance and data collection); and the production of goods and services used to manage or conserve natural resources.

55. The Classification of Environmental Activities (CEA) included in Annex 1 of the SEEA provides detailed description and specification of those activities to be counted as environmental activities and provides advice on those activities not to be included where there are borderline issues.

Employment in Environmental activities

56. It is proposed to define Employment in Environmental activities as follows:

> " All employment in activities that lead to the production of environmental goods and services for consumption by other economic units or for consumption by the establishment in which the activity is performed. Environmental goods and services are the products of environmental activities as defined in the most recently updated version of the SEEA. This includes activities that improve the establishment's processes in order to reduce or eliminate pressures on the environment or to make more efficient use of natural resources."

57. Employment in environmental activities is thus made up of two components:

> (a) Employment in production of environmental outputs and
> (b) Employment in environmental processes.

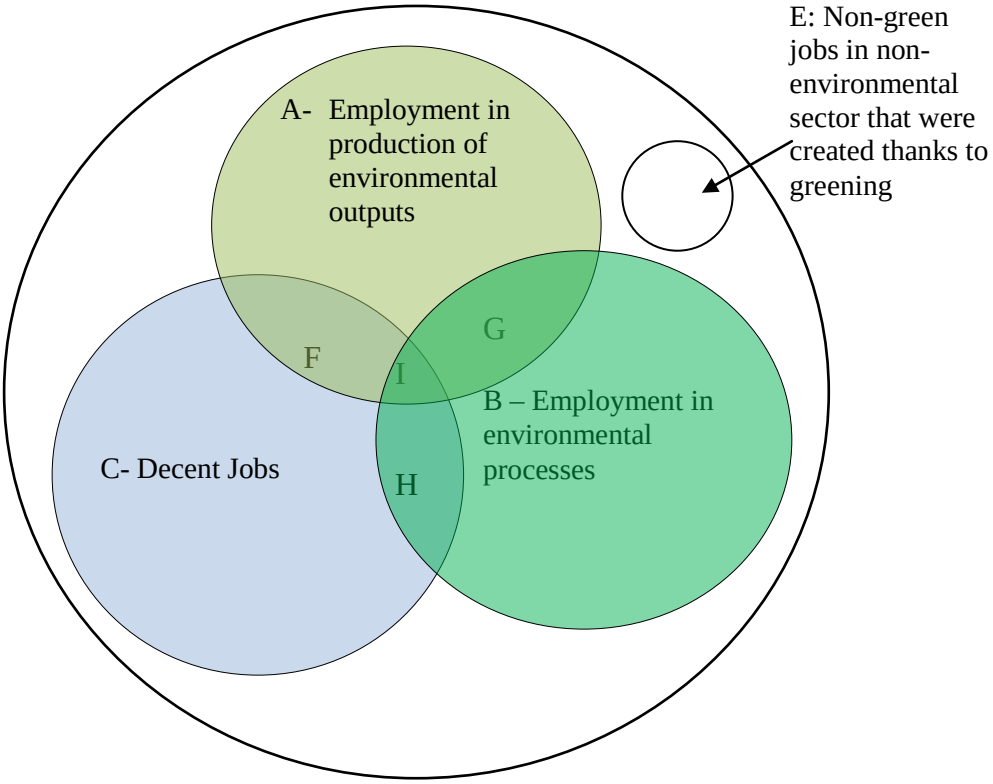
58. *Employment in production of environmental outputs*, is defined as employment in the production of environmental goods and services for consumption outside the producing unit. It includes all jobs or all persons who, during a given reference period, were employed in at least one green enterprise, irrespective of whether it was their main or a secondary job. This would include managers, professionals, technicians, trades and other workers with specific environmental skills as well as clerical, services, and sales workers plant and machine operators and elementary workers who work in these EGSS enterprises.

59. *Employment in environmental processes* is defined as employment in the production of environmental goods and services for consumption by the producing unit It consists of all jobs, carried out in EGSS on non-EGSS enterprises, or as all persons *engaged in green or greening production process*[10] during a given reference period. These are jobs in which workers' duties involve making their establishment's production processes more environmentally friendly (reduce the pollution or use fewer natural resources). These workers research, develop, maintain, or use technologies and practices to reduce the environmental impact of their establishment, or train the establishment's workers or contractors in these technologies and practices. This definition includes workers within enterprises that may not e be considered as environmental. These workers may be managers, professionals and technicians who have specific green skills and responsibilities, but also workers in many other occupational groups

60. The two components refer to different aspects of the 'greening' of employment.

[10] A list of green processes/technologies may need to be developed.

61. According to these definitions of of employment in environment outputs and employment in environmental processes and the concept of decent work, all jobs could be classified according to various categories of green, as shown on the following diagram, which also covers a number of additional dimensions of "green jobs".



62. Based on these categories, policy makers can derive various groupings depending on the decision of what they want to measure, so that:

- Employment in Environmental activities= A+B-G
- Employment thanks to greening = A–G +E
- Employment in Environmental activities that is decent= F+H-I

Each of these groups may require different measurement strategies. The next chapter proposes methodologies for estimating A and B.

5 Measurement issues and methods

Employment in production of environmental outputs

63. For the purposes of measuring employment in production of environmental output, *environmental sectors* are defined as consisting of those enterprises where all or at least some of the goods or services produced belong to the environmental goods and services domain.

64. E*mployment in the production of environmental outputs*, could not be directly measured because of the lack of information on employment associated with the production at the product code level. Where direct estimates of employment in the production of environmental goods and services cannot be obtained, it can be estimated using the data on output (sales) for environmental goods and services. First, the value of environmental goods and services produced is calculated as a proportion of the value of the total production of establishments[11]. The same proportion can then be applied to total employment in the establishment to estimate employment in production of environmental outputs. Thus if 100% of an establishment's outputs are environmental goods and services, 100% of employment in the establishment is included. If 50% of the output is environmental then 50% of employment is included. Whilst this method of measurement does not deal with situations where production of particular types of goods and services might be more or less labour intensive than others, it ensures that the labour inputs of workers in areas such as administration, accounts, information technology, cleaning services and so forth, who contribute indirectly to environmental production, are also counted.

65. For establishments that do not generate revenue (e.g. non-profit organizations, government agencies, research organizations, and new businesses that provide environmental goods and services without generating income), information about proportion of their employment involved with the production of environmental goods and services may need to be collected.

66. Adding up the imputed or estimated employment levels at the enterprise level, yields total employment in the ***production of environmental outputs.***

Identification of industries producing environmental goods and services

67. A key step in the process of identifying green jobs in the environmental sector is the identification of industries producing environmental goods and services.

68. The environmental sector itself is highly diverse. It includes activities carried out by a wide range of enterprises from manufacturing enterprises to consulting, from public administration to educational institutions.

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[11] In case the data on environmental output are not available at individual enterprise level, the ratios at industry level may be applied. However, using industry level data instead of products may over estimate or underestimate the size of the green economy if enterprises within industry produce a mix of green and non-green products and services. Expert advice could also be used particularly for industries where the relationship between patterns of employment and the output of environmental goods and services may vary considerably from the average.

69. Some producers are quite easily identified by ISIC codes. Examples of typical ISIC classes that are *entirely environmental* ' are waste collection, treatment and disposal activities, materials recovery' and 'remediation activities and other waste management'. Other environmental goods and services producers could be identified in accordance with ISIC classes using relevant information that may be available from other sources of information, e.g economic censuses. Identification of producers of environmental goods and technologies may also be done through CPC classification or other technologies and products classifications. However, most of the producers of environmental foods and services it would be very difficult to be identified because their main activity is not production of environmental goods and services.[12] They could hardly be identifies without conducting specially adapted establishment surveys/or censuses.

70. The main reason for this difficulty is that the environmental sector is not recognised by standard statistical nomenclatures as a distinctive sector as is, for example, the iron and steel industry. It regroups activities from many different economic sectors. Thus, a complete and comprehensive list of environmental activities cannot be established *a priori* using standard statistical classifications like ISIC. Therefore, the identification of the environmental sector population is the first and most important step. Since it is not possible to identify and classify producers of environmental goods and services using exclusively standard statistical classifications, specially adapted establishment surveys/or censuses would be needed..

71. Once the identification has been made, surveys can be used to either estimate a direct count of green employees or to estimate it through the revenue received from environmental goods and services. Depending on the level of reliability, the employment data could be then be regrouped by ISIC code and classified by environmental domains.

72. The recent revision[13] of the UN System of Environmental-Economic Accounts (SEEA)[14] can help with the identification and grouping of these industries/producers. The classifications and lists contained in the SEEA revised central framework are those for:

    1. Classification of Environmental Activities (CEA)
        a) Environmental Protection
        b) Resource Management
    2. Classification of Land Use
    3. Listing of Land Cover Types
    4. List of Solid Waste Categories

[12] The evidence suggests that environmental goods and services are being produced in wide range of industries as secondary or ancillary activity

[13] *http://unstats.un.org/unsd/statcom/doc12/2012-8-EnvAccounting-E.pdf*

[14] SEEA contains the internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationship with the economy.

Producers outside the scope of environmental sectors[15]

73. For statistical purposes, producers that provide components of an environmental technology or product to the main producer when these components are not to be used exclusively in environmental technologies should be excluded. Also excluded are the activities selling goods already produced (the distributors of the final good). This means that the suppliers of non-exclusively environmental components and the distributors of environmental technologies and products are not part of the environmental goods and services sector.

74. According to many studies, however, indirect and induced jobs created in the transition to the low carbon economy are extremely relevant for policy makers in terms of employment creation and skills needs. Employment in these groups will increase as economies go green. It is therefore important to find a way to estimate these jobs (i.e. steel workers producing steel for windmills – Group E in Figure 1), As tracking the whole economy's value chain may be a very complex task, quantitative modelling could be a solution for measuring the indirect and induced effects.

Employment in environmental processes[16]

75. The second component, employment in environmental processes, can be measured by asking establishments to provide information on the number of workers employed in activities leading to the production of environmental goods and services for consumption within the establishment. This is more difficult to measure and requires types of questions that are not routinely included in economic censuses and surveys aimed at measuring economic production. Due to the increased respondent burden, information on this component is likely to be collected less frequently than information on employment in the production of environmental outputs.

76. Since the measurement of each of these two components requires different methods, separate statistics should be produced for each component. A combined total can be provided for both components when the necessary information is available for the same establishment, in order to calculate total employment in environmental activities.

77. The two components cannot, however, be aggregated as this would double count workers producing goods or services for consumption within the establishment, when the establishment also produces environmental goods or services for external consumption. To calculate the combined total, Employment in processes should be adjusted in inverse proportion to the value of environmental outputs. In this way if 100% of total output is environmental, then 0% of employment in environmental processes is counted in the combined total. If there are no environmental outputs, but 10% of employment is in internal environmental activities, then all of the 10% is included in the combined total. If 70% of an establishment's outputs are environmental goods and services then 30% of environmental processes are included.

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[15] Non-green jobs in non-environmental sector created thanks to greening (category E)

[16] **ISO 14000** is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.

6 Sources of data

78. Various sources may be used for assessing how many green jobs exist in specific sectors. The following are the principal sources of data:
    - Economic (including agricultural) censuses;
    - Establishment surveys covering the whole economy or specific economic activities;
    - Household surveys especially for those active in agriculture and the informal economy;
    - Population censuses
    - Inventories of producers of environmental goods and services;
    - Projects and special studies undertaken to fulfil domestic or international demand;
79. Inventories, if repeated consistently over a prolonged period, can also provide a useful measure of the extent of the employment realised by policies aimed at developing employment in sustainable sectors. In practice multiple sources may need to be used in combination.
80. In situations where the data are incomplete input-output analysis and Social Accounting Matrices (SAMs) and other Computable General Equilibrium and related complex models may need to be used in order to estimate employment. These latter models take the work of input-output analysis and SAMs a step further by simulating full economy responses to exogenous changes. Typically they combine empirical data with a series of economic equations designed to comprehensively capture the dynamism and complexity of an entire economy. In this way, they can explore the effects of policies over time on a variety of different macroeconomic parameters, including future employment scenarios. These models allow policy-makers the opportunity to calculate the long-term impacts of policies.

The case of informal sector

81. Collecting statistics on green jobs in countries with a large informal sector constitutes a big challenge. Establishment surveys are probably not the best option to collect information but other methods can complement the little information available, such as interviews with experts in certain sectors.
82. In Bangladesh[17], *core environment-related jobs* were identified based on the environmental performance of the sector or activity measured against standards, benchmarks, codes, and compliance with regulations (where possible). These jobs were estimated by means of literature review, interviews with experts, sector specific studies and investment-job ratios within individual sectors.
83. These core environment-related jobs formed the basis for all subsequent analysis. In terms of decent work, they were screened to determine whether they provided acceptable working conditions according to the ILO definition (what they called green jobs). The data on decent work indicators were gathered from published sources and stakeholder

[17] http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_159433.pdf

interviews. The quality of the information for decent work differs by type of environment related activity or sector and was not reliable enough to provide an exact estimate of the share of green jobs.

7 Types of data collected and indicators produced

The set of green jobs indicators listed below is a starting point rather than a final list and will be further elaborated as new data become available and as concepts evolve.

- Employment by economic activity
- Employment by occupation
- Employment by environmental domain
- Type of green technologies used
- Type of green technology used by economic activity
- Percentage of companies using green technologies
- Employment by sex

APPENDIX 1

Existing concepts and definitions related to green economy

Sustainable development

United Nations Brundtland Report (1987)

The United Nations Brundtland Report (1987) included what is now one of the most widely recognised definitions: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [1]

According to the same report, the above definition contains within it two key concepts:

- the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. [8]

Green growth

OECD (2011) (http://www.oecd.org/dataoecd/37/33/48224574.pdf)

Green growth is about fostering economic growth and development while ensuring that the natural assets continue to provide the resources and environmental services on which our well-being relies. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities. (OECD. 2011. Towards Green Growth: Monitoring Progress OECD Indicators)

ESCAP (United Nations Economic and Social Commission for Asia and the Pacific)

(http://www.greengrowth.org)

Green growth is environmentally-sustainable economic progress that fosters low-carbon, socially inclusive development. It articulates concise and clear entry points and policy approaches for making real gains in eco-efficiency and transferring to low-carbon development: synergizing climate action with development goals. Green Growth comprises six, mutually-reinforcing "Paths", or entry points, through which policy makers can focus interventions: Sustainable Consumption and Production (SCP), Greening Business and the Markets (GBM), Sustainable Infrastructure (SI), Green Tax and Budget Reform (GTBR), Investment in Natural Capital (INC), and Eco-efficiency Indicators (EEI).

Green economy

Various agencies of the United Nations system have identified green economy as “investment in sectors such as energy efficiency technologies, renewable energy, public transport, sustainable agriculture, environment friendly tourism and sustainable management of natural resources, including ecosystems and biodiversity” aimed at generating new areas of production, quality jobs and an increase in income, while serving to mitigate climate change and protect biodiversity (United Nations).

UNEP (2011)

(http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf)

The United Nations Environment Programme (UNEP) defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive. In a green economy, growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. These investments need to be catalysed and supported by targeted public expenditure, policy reforms and regulation changes. The development path should maintain, enhance and, where necessary, rebuild natural capital as a critical economic asset and as a source of public benefits, especially for poor people whose livelihoods and security depend on nature. (UNEP. 2011. Towards a Green Economy – Pathways to Sustainable…)

XVII Meeting of the Forum of Ministers of Environment of Latin America and the Caribbean – held in Panama City, Panama, from 26 to 30 April 2010

This meeting defined a Green Economy as a system of economic activities related to the production, distribution and consumption of goods and services that results in improved human well-being over the long term, whilst not exposing future generations to significant environmental risks and ecological scarcities. It is environmentally friendly and ecological, and for many groups, it is also socially just."

UNCTAD

The United Nations Conference on Trade and Development *(*UNCTAD*)* defines green economy as a productive process resulting from the improvement of human well-being and the reduction of inequalities, while limiting the significant scarcity risks at the environmental level for future generations.

Greening the economy

Greening the economy is a strategy under consideration by countries to enhance the quality of life of their citizens and to pursue sustainable development goals. The transformation of traditional economies into green economies is ***based on making investments in technologies***, systems and infrastructures that enhance productive economic activities while optimizing natural resource utilization and minimizing environmental impacts. The objective is to foster investments supporting social and environmental goals that would act as drivers for, instead of barriers to, sustainable economic growth.

Transition to greener economies

Transition to greener economies implies the *formulation of an overarching integrated approach that links social, economic and environmental* policies and actions designed to ensure sustainable development and poverty eradication. Green growth strategies in developing countries need to be undertaken within this context and should ultimately address major priorities such as: providing basic education, housing and employment; ensuring food security and health coverage; and delivering essential services such as access to modern energy, water, sanitation, waste treatment and transport.

Green industries/ Environmental Goods and Services Sector (EGSS)

Eurostat Handbook (2009) – Based on OECD/Eurostat definition in 1999

(http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-09-012/EN/KS-RA-09-012-EN.PDF)

The Environmental Goods and Services Sector (EGSS) includes producers of technologies, goods and services that:

1) Measure, control, restore, prevent, treat, minimize, research and sensitize environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity and landscapes. This includes "cleaner" technologies, goods and services that prevent or minimize pollution.
2) Measure, control, restore, prevent, minimize, research and sensitize resource depletion. This results mainly in resource-efficient technologies, good and service that minimize the use of natural resources.

Green industry statistics in the Republic of Korea ***(***Lee Jae-Won from Statistics Korea at the UNEP Workshop, Nov 2011, on Measuring "Green…)

The green industries are defined as those industries that produce goods and services that enhance energy- and resource efficiency, reduce greenhouse gases and improve the environment. These are determined on the basis of the green products classification system, for which a concordance table with the classification system of the EGSS has been developed.

Green jobs

The ILO and UNEP (2008)

(http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf)

Green jobs are defined "as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute 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" But according to the ILO, green jobs have to be decent jobs as well.

The World Bank (2012) (http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2012/03/07/000158349_20120307084323/Rendered/PDF/WPS5990.pdf)

In a loose sense, 'green' jobs can be regarded as those associated with environmental objectives and policies.

IILS Defining "green" for the purposes of the EC-ILO joint study" (2011?)

(http://www.ilo.org/public/english/bureau/inst/research/ecinst/dp10.pdf)

This study narrows down the scope of all ecological functions of the environment to only those that concern climate. Since the emission of GHGs is the principal human contribution to climate change, they define: "Green Jobs are those jobs maintained or created in the transition process towards a green economy that are either provided by low-carbon-intensive

industries (enterprises) or by industries (enterprises) whose primary output function is to greening economy."

Green economy is an economy in which a sufficient level of output is generated without producing a level of CO2 emissions that contributes to significantly increasing the risk of raising the Earth's average temperature."

US Department of Commerce (2010)

(http://www.esa.doc.gov/sites/default/files/reports/documents/greeneconomyreport_0.pdf)

A green economy is defined as a "clean and energy-efficient economy".

"The jobs that are created and supported in businesses that produce green products and services are green jobs"

The definition used for identifying green products and services are: Those whose predominant function serves one of both of the following:

- Conserve energy and other natural resources: this includes products and services that conserve energy to reduce fossil fuel use and promote water, raw material, land and species and ecosystem conservation, or
- Reduce pollution: this includes products or services that provide clean energy or prevent, treat, reduce, control or measure environmental damage to air, water and soil. The remediation, abatement, removal, transportation or storage of waste and contaminations also are considered to reduce pollution.

The US Bureau of Labor Statistics (2010) *(http://www.bls.gov/green/#definition)*

Green jobs are either:

A. Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources. **(**OUPUT APPROACH**)**

B. Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. **(**PROCESS APPROACH)

Taxonomy of occupations in Australia and New Zealand (2009)

(http://www.eianz.org/sb/modules/news/attachments/71/Green%20Collar%20Worker%20report%20Final.pdf)

Green collar workers consists of the following: 1) Managers, professionals and technicians who work in green organizations or who have green skills and responsibilities within other organizations that may not be considered as green, and 2) Services, clerical, sales and semi-skilled workers who work in green organizations.

New Zealand – How green is my occupation classification (2010)

(http://www.victoria.ac.nz/vms/industrial-relations-centre/irc-events/lew-conference-welcome/lew-papers/D5_LEW14_final_paper_-_Hancock.pdf)

'Green jobs are jobs that produce goods or provide services that benefit the environment or conserve natural resources through the use of sustainable, environmentally friendly, processes and technologies.'

The Netherlands (2011) (http://www.cbs.nl/NR/rdonlyres/65FA4466-853C-4223-8B69-7C7872E37DC3/0/2011p44pub.pdf)

"Green jobs measure the employment in companies and institutions that produce goods and services that measure, prevent, limit, minimise or correct environmental damage, resource depletion and resource deterioration".

ECO Canada. Environmental Statistics. Measuring Green Collar Jobs in British Columbia. (2010) (http://www.docstoc.com/docs/42797176/Measuring-Green-Collar-Jobs-in-British-Columbia---Environmental)

Environmental employment is the performance of employment activities that seek to manage the use of, impact on, and enhance the sustainability of the environment. These activities, which could relate to the governance of environmental activities, the supply of environmental products and services, or the development and dissemination of environmental knowledge, may be categorized in any of the following sectors:

a) Environmental protection,

b) Conservation & preservation of natural re-sources, and

c) Environmental sustainability.

Green Jobs in Bangladesh (2008) (http://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/meetingdocument/wcms_099401.pdf)

"Green jobs" refers to the direct employment which reduces environmental impact ultimately to the levels that are sustainable. This includes jobs that help to reduce the consumption of energy and raw materials, decarbonize the economy, protect and restore ecosystems and biodiversity, and minimize the production of waste and pollution.

Estimating Green Jobs in Bangladesh (2010) *(http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_159433.pdf)*

Core environment-related employment refers to jobs which are sustained by activities that are more environmentally sustainable (as defined by compliance with relevant standards and other performance indicators in the study process) but which have not been 'filtered' for decency of work.

The US Workforce Information Council (WIC) (2009)
(https://greenjobs.workforce3one.org/command/view.aspx?look=4010933457155966419&mode=&pparams=)

A green job is one in which the work is essential to products or services that improve energy efficiency, expand the use of renewable energy or support environmental sustainability. The job involves work in any of these green economic activities:

- renewable energy and alternative fuels,
- energy efficiency and conservation,
- pollution, waste and greenhouse gas management, prevention and reduction,
- environmental clean-up and remediation, and waste clean-up and mitigation
- sustainable agriculture and natural resource conservation,

education, regulation, compliance, public awareness and training and energy trading

Greening of occupations

*The US National Center for O*NET Development (2009)*

(http://www.onetcenter.org/dl_files/Green.pdf) and (http://www.onetcenter.org/reports/Green.html)

"Greening of the World of Work: Implications for O*NET, SOC and New and Emerging Occupations (2009)."

The 'greening' of occupations refers to the extent to which green economy activities and technologies increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements."