Transitioning to Green Jobs as a Pathway to Sustainable Development: "An Analytical Study of Leading International Experiences"

Abdelkader CHIBANI *
Salhi Ahmed University of Naama (Algeria)
chibani.abdelkader@cuniv-naama.dz

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Abstract:

This study examines the transition to a green economy as a pioneering model adopted by numerous countries to optimize energy consumption and enhance the efficiency of natural resource utilization. The research emphasizes combating unemployment through the creation of green jobs, drawing on selected global case studies to underscore the importance of this shift. Employing a descriptive methodology, the study concludes that nations must adopt this model to restructure and expand employment opportunities, thereby mitigating unemployment and poverty while promoting the sustainable use of natural resources to safeguard environmental sustainability in pursuit of sustainable development.

Keywords: Economy; Green Jobs; Sustainable development; Experiments

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* Corresponding author.

Introduction:

The global financial crisis of 2008, unprecedented in scale, undermined efforts to attain developmental objectives and realize sustainable development. In its aftermath, many governments re-evaluated traditional economic paradigms of wealth and prosperity. Mounting evidence of risks posed by climate change and unsustainable ecological degradation spurred renewed discourse on the green economy concept.

The green economy encompasses related notions, including green jobs, with studies highlighting their role in achieving high employment rates for skills aligned with green technologies, thereby eradicating unemployment, alleviating poverty, and contributing to sustainable development.

This raises the central research question: What is the significance of transitioning to a green economy and generating green jobs in advancing sustainable development?
To address this, the study is structured into three axes:

- **Theme (1):** the imperative for transitioning to a green economy.
- **Theme (2):** transformations in labour market job structures under the green economy.
- **Theme (3):** pioneering global experiences in green job creation.

Significance of the Study:

The importance of this study derives from the critical nature of its thematic variables, as it addresses radical and sustainable solutions tailored for developing countries, particularly rentier economies. The green economy represents one of the modern economic paradigms that serve as instruments for achieving sustainable development across multiple dimensions, including the provision of green jobs, amid pressing environmental challenges such as risks and resource scarcity. This renders its adoption imperative for national economies a trend already observable globally. Furthermore, the green economy plays a pivotal role in realizing sustainable development from economic, social, environmental, and even cultural perspectives.

Objectives of the Study:

This research paper aims to elucidate the following:

- Highlight the significance of the green economy concept and the importance of transitioning to this model to achieve sustainable development.
- Examine the transformations in the nature of required jobs under the shift toward a green economy.
- Review a selection of successful global experiences in green employment initiatives.

I- Imperative for Transitioning to the Green Economy:

The concept of the green economy gained further international prominence when the United Nations General Assembly, pursuant to its resolution 64/236 adopted in December 2009, resolved to convene the United Nations Conference on Sustainable Development. This conference was designated to focus on the central theme of the green economy within the context of sustainable development and poverty eradication.

I.1. Defining the Green Economy:

According to the United Nations Environment Programme (UNEP), the green economy is defined as "an economy in which growth in income and employment is driven by public and private investments that enhance resource efficiency, reduce carbon emissions, waste, and pollution, and prevent biodiversity loss and ecological system degradation".(United Nations, 2011)

Karl Burkart conceptualizes it as an economy grounded in six principal sectors: renewable energy, clean transportation, water management, heavy water recycling, and land management; notably, this definition omits explicit reference to the human element. (Redas & Aati, 2019,p96).

It promotes improvements in human well-being and social equity while substantially mitigating environmental risks and ecological resource scarcity; in its simplest form, the green economy reduces carbon emissions, boosts resource-use efficiency, and

accommodates all social categories. (United Nations Environment Program, 2011)

I. 2. Benefits of Transitioning to the Green Economy:

The green economy yields multifaceted benefits encompassing economic, social, and technological domains.

- **Maximizing natural capital value and investment:** The green economy acknowledges natural capital as a key determinant of human welfare and a source of quality employment; it invests in its components as inputs while building ecological system services to achieve sustainability.

- **Eradicating poverty:** A hallmark of the green economy is its pursuit of diverse, equitable opportunities for economic and social development (e.g., education, healthcare, income), sustainably eliminating poverty without depleting natural resources particularly vital for poor nations where such services constitute a major livelihood share (green agriculture, clean water, energy efficiency, ecotourism).

- **Job creation and social equity:** Green recovery plans post-2008 crisis, especially in Korea and China, demonstrated marked employment growth; further potential lies in green sector investments, with small and medium enterprises plus start-up's promising the largest gains (0.5-2% of global employment, or 15-60 million additional jobs).

- **Adopting sustainable modern technologies over fossil fuels:** Expanding renewable energy supply mitigates risks from high, volatile fossil fuel prices; the current fossil-based system drives climate change, accounting for two-thirds of greenhouse gas emissions, with adaptation costs projected at $50-170 billion by 2030 (over half borne by developing countries) and potential 40% emissions cuts.

- **Enhancing resource and energy efficiency:** Resource scarcity or external costs of inputs necessitates profitable, society-wide management, leading to efficient resource and energy use for

sustainable consumption; effective natural resource utilization entails non-trivial costs.

- **Superior growth rates versus traditional economy:** A green investment scenario at 2% of global GDP delivers long-term growth (2011-2050) at least matching optimistic conventional approaches, while averting major risks like climate impacts, water scarcity, and ecosystem service losses; primary energy demand returns to current levels by 2050 (nearly 40% below conventional projections), alongside lower energy prices.

I. 3. Green Jobs and Sustainable Development under Environmental Sustainability:

Among the key challenges confronting nations this century in their pursuit of sustainable development are poverty eradication and the provision of decent jobs through enhanced productive capacities to attract labour. These objectives must be pursued while accounting for environmental degradation and preserving ecological gains to attain environmental sustainability. Consequently, job creation and productivity increases should be intrinsically linked to environmental sustainability, with green and decent work offering a solution that reconciles productivity with ecological preservation.

Furthermore, green job creation necessitates consideration of proceeding and subsequent processes, as pre-implementation and post-implementation roles are also impacted within production and value chains. Rising demand for sustainable output in certain countries generates green employment opportunities elsewhere or in other regions via interconnected production chains, and vice versa.

Work environments must also be addressed, with physical spaces for green jobs capable of adopting green attributes themselves; innovative energy efficiency upgrades in buildings represent one of the most cost-effective methods to bolster environmental sustainability.

Finally, firm commitments to environmental sustainability may adversely affect specific jobs; yet transitional policy frameworks can mitigate these effects through shared dedication to development of

green employment within sustainable confines. (International Centre for Sustainable Development Law - United Nations, 2012)

II– Impact of Green Economy Transition on Labour Market Job Structures:

The shift by numerous countries toward the green economy has profoundly influenced overall employment structures and patterns, transforming them from those characteristic of the traditional brown economy.

II. 1. Indicators of Transition to the Green Economy:

Measuring the extent of transition to a green economy poses a significant challenge for countries implementing transition strategies, given the absence of universal consensus on indicators to gauge progress toward this model. These indicators can nonetheless be categorized into three primary groups:

- **Economic indicators**, such as the share of sectorial or aggregate investments contributing to resource and energy efficiency, waste or pollution reduction, or the proportion of sectorial/aggregate output or employment meeting established sustainability standards.
- **Environmental indicators linked to economic activity**, including resource-use efficiency or pollution intensity at sectorial or economy-wide levels (e.g., energy or water quantities per unit of GDP).
- **Aggregate indicators on progress and social welfare**, such as comprehensive economic aggregates reflecting natural capital consumption, including those proposed in environmental-economic accounting frameworks or the "Beyond GDP" initiative, which capture health dimensions and other facets of social well-being. (United Nations, 2011)

II. 2. Green Transformation to Enhance Employment Opportunities:

Transitioning to a sustainable and more environmentally compatible economy offers substantial opportunities for social development.

- It generates additional jobs, improves the quality of a broad range of existing positions, and promotes widespread social inclusion.
- More employment opportunities emerge in environmentally friendly economies through the production of green goods and services; these roles typically require higher qualifications, offer greater security, and provide better wages compared to analogous positions in similar sectors.
- Environmental challenges can be addressed through robust incentives for workforce training and support in adopting low-impact production methods, encompassing skill enhancement, enterprise development, value chain optimization, regulation, and investments in social protection and infrastructure
- Efforts to promote cost-effective renewable energy can urgently create needed labour for its production while significantly boosting productivity in impoverished areas, serving as a potent mechanism to align environmental and social objectives.

Transition processes not only alter overall employment levels and composition but also influence job quality. The content and characteristics of numerous occupations are evolving, alongside working conditions, due to modern technologies, processes, and practices; newly created jobs must thus be not only environmentally sound but also decent-productive, with adequate income and social protection, while respecting workers' rights.

II. 3. Emergence of Green Jobs:

A joint report by the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), the International Organization of Employers, and the International Trade Union Confederation (2008) provides a general definition of a green job as any decent work that contributes to preserving or restoring

environmental quality, whether in agriculture, industry, services, or administration. Practically, these jobs are characterized by:

- Reducing energy and raw material consumption.
- Limiting greenhouse gas emissions.
- Minimizing waste and pollution.
- Protecting and restoring ecosystems.
- Enabling enterprises and local communities to adapt to climate change. (ILO, 2013, P22)

Green jobs constitute a vital component of employment gains, essential for rendering the transition technologically viable and economically sustainable. Without skilled and motivated workers in emerging green growth sectors and key occupations across all economic sectors, capital investments and deployed technologies will fail to yield anticipated sustainable development benefits.

The shift toward a green economy will inevitably "green" certain sectors and their activities by prioritizing sustainable environmental protection, generating direct green jobs that facilitate this sectorial transformation. Intersectorial linkages (outputs as inputs) will expand supporting sectors, creating indirect jobs (green or otherwise). The renewable energy industry, for instance, provided approximately 2.3 million direct and indirect jobs in 2006 per UN assessments, rising to 7.7 million by 2014, with about 60% in emerging economies such as China, India, and Brazil.

This necessitates income redistribution by stakeholders and governments to secure green investments and innovations supporting the transition, with net job creation depending on demand, investment and trade volumes, and labour market flexibility (retained and new jobs). Evaluating the transition's employment impact (net gains/losses) requires accounting for workers compelled to change jobs, those displaced, and those gaining new green positions, elucidating transition scale/nature, net effects, and future labour prospects. (ILO, 2013, P25)

The pivot to renewables led to a loss of 1.5 million fossil fuel jobs, declining to 9.8 million by 2014 amid investments targeting 40% emissions reductions by 2030. (Busch et Renner, 2015)

III– Pioneering Global Experiences in Green Job Creation:

This section we address a set of international experiences that demonstrate the importance of the green economy through the creation of green jobs in achieving high employment levels, eliminating unemployment and poverty, and thereby improving individuals' living standards. These cases have been selected due to their significant impact in strengthening this orientation, despite being city-based experiences with limited scope compared to full national transitions.

III. 1. Anavra Village, Greece: Sustainable Local Development for Green Jobs and a Thriving Environment:

Nestled in the mountains of southeast Greece, Anavra village successfully harnessed its natural potential in a commendable manner, particularly following the crisis that afflicted it alongside other Greek towns and villages. Village leaders, in collaboration with local residents, pursued ecological solutions to adoptive sustainable local development and create green jobs.

Between 2000 and 2010, unemployment dropped to zero, the population nearly doubled from 300 to 550 residents, and citizens' quality of life improved markedly. Anavra's environmental transformation garnered international attention, elevating this once-poor, isolated village into a model for sustainable local development; the shift began in the mid-1990s, encompassing major changes across various local economic sectors.

Traditional shepherds transitioned to integrated organic farming, establishing three farms housing a total of 25,000 animals, allowing sheep, goats, and cattle to graze freely on hillsides. Residents constructed a public slaughterhouse with a certified organic section meeting global quality standards.

Simultaneously, to achieve energy self-sufficiency, Anavra built a wind farm comprising 20 turbines with a cumulative output of 17.5 megawatts-sufficient to power 12,500 to 13,000 homes. Two additional wind farms under construction feature 23 turbines totalling around 20 megawatts, expected to generate 20 permanent jobs and

approximately 100 temporary positions. Surplus electricity sales yielded about 60,000 euros annually from the first farm alone; in 2010, the village partnered with a local technical college to explore a small hydroelectric plant and centralized biomass heating system.

Finally, Anavra opened a 120-hectare environmental and cultural park, boosting ecotourism with over 8,500 visitors between 2010 and 2012.

Beyond job creation and private income growth, Anavra's sustainable development plan enabled community-led public infrastructure enhancements, improving residents' quality of life: locals installed water pumps, built communal spaces, a rural clinic, educational and sports facilities, an elderly home, and a homeless shelter. Unemployment and crime rates stand at zero, with youth exodus halted.

Anavra's prosperous socioeconomic status is especially striking amid Greece's severe economic crisis: in 2012, GDP per capita was just 75% of the EU average, and unemployment reached 27.8% in 2013 (160% of the EU average). Official estimates suggest Greece could create 210,000 green jobs, including 27,000 permanent ones, by placing its economy on a sustainable path. (Greens-efa.eu, 2014)

III. 2. London's Public Transport: Replacing Private Vehicles and Creating 147,000 Jobs:

London's transport plan exhibits substantial growth potential through the development and maintenance of public transport systems as alternatives to car travel, particularly in this densely populated city. Public transport usage has surged, especially for suburban routes to the capital, with 90% of morning peak-hour commuters to central London relying on it.

The extensive public transport network employs 43,600 in buses and taxis, plus 3,300 in rail predominantly drivers and technicians, with some in management or kiosks and includes directly related roles like design office engineers and rail construction technicians.

Despite broad coverage and a relatively large current workforce, expansion opportunities persist by enhancing accessibility through additional staff (drivers, technicians, station personnel) to assist disabled customers or those with luggage/children. Beyond direct jobs, indirect and induced positions are significant: current estimates indicate 100 direct rail jobs support 140 indirect ones, versus just 48 for the automotive industry. (UNECE, 2011)

III. 3. Curbing Jobless Growth: Gabon's Experience:

In Denmark today, 30% of electricity production comes from wind energy thanks to its sustainable policy, significantly reducing the country's energy bill. In this regard, Africa has nothing to envy Europe; on the contrary, especially in terms of solar energy. This would bring major economic benefits, particularly in terms of employment. Rent-based economies, on which Africa has relied for decades, are in fact unproductive.

This phenomenon, termed "jobless growth," describes scenarios where economic expansion fails to generate jobs; for instance, the oil sector employs few locals and rarely reinvests profits domestically. A deeply rooted African challenge; it was recently addressed by Maixent Accrombessi, Director of the Gabonese Presidential Office: "Gabon must develop local processing of extractive industries to generate greater value added and more jobs in these traditionally non-inclusive sectors. The national industrialization strategy, framed accordingly, illustrates how local transformation can build an industrial base in Gabon." Accrombessi has long advocated green development in Gabon; at the 2014 New York Forum Africa, he warned of jobless growth risks plaguing extractive-dependent economies, which create few opportunities and leave many below the poverty line.

Gabon exemplifies this well: post-2009 difficulties prompted a re-evaluation of its economic model, yielding the Emerging Gabon Strategic Plan with profound impacts. As a key architect, Accrombessi recalls: "Gabon's economy averaged 3,500 jobs annually from 2000-2009, rising to 12,000 per year between 2010-2015 a significant leap for a nation of under two million". He adds: "Gabon's national GDP

must triple by 2025 without increasing its carbon footprint." (mediaterre.org, 2016)

III. 4. Burgenland State, Austria: Sustainable Local Energy for Green Jobs:

In 1997, Austria's Burgenland state set a target to achieve energy independence by 2050 through electricity production from locally available renewable sources. The aim was to bolster local employment, stimulate economic development, and reduce reliance on fossil fuels (derived from coal, lignite, natural gas, or oil) alongside regional energy costs. This goal was realized by 2013, making Burgenland Europe's first region to meet its electricity needs entirely from local renewables, including wind, solar, and biomass, thereby creating 5,560 new jobs in a state of 284,000 residents. GDP per capita rose from 71% (1995) to 81% (2008) of the EU average.

Among 250 launched renewable projects, Güssing town focused on biomass production, leveraging local forest and agricultural resources to build multiple centralized heating plants and power stations. These initiatives attracted biomass experts to Burgenland, leading to the establishment of the European Centre for Renewable Energy, known as the Technikum. This research network enabled Güssing to refine biomass-to-energy technologies, generating over 1,000 new jobs in a town of 26,507 inhabitants. Over the past two decades, more than 50 new companies were founded or relocated there, positioning Güssing as a model for regions seeking effective climate protection measures.

Authorities devoted significant time, effort, and resources to communication and awareness campaigns, deliberately informing citizens on contributing to Burgenland's energy independence and the benefits of its adopted sustainable, environmentally friendly approach. (Greens-efa.eu, 2014,P39)

III. 5. Green Economy Initiatives in Algeria:

Interest in green jobs in Algeria began through supportive and incentive government programs aimed at investment in green entrepreneurship as a key pillar of the ecological transition of

production systems. This is expected to contribute to economic recovery beyond hydrocarbons, owing to the role of green entrepreneurship in fostering economic development.

In 2021, the Ministry of Environment and Renewable Energies launched the first green entrepreneurship incubator in order to promote environmental citizenship, alongside the introduction of training and qualification programs in the field of green jobs. These efforts also included the creation of specialized branches for recycling, without neglecting support and financial and technical assistance programs, as well as specialized institutions responsible for this domain. (Among them is the establishment of the National Waste Agency by Decree No. 02/175 dated 20 May 2002) to ensure the success of the economic and social transition and to guarantee environmental security.

The following table outlines the most important sectors targeted for the establishment of green institutions:

Table (1) : Main Sectors Targeted for the Establishment of Green Institutions

Sector	Activities
Waste management	Collection of municipal, industrial, and commercial waste; recycling and waste recovery
Water sector	Treatment and desalination of water; wastewater treatment
Green spaces	Landscaping and erosion control; green spatial planning
Construction sector	Construction works and insulation
Environmental-related services	Communications; education; auditing and training

The source : (Wahiba Qahham, 2016, p. 374)

The National Agency for Cooperation for Development indicated, in one of its studies, that the green economy has the potential to create employment opportunities estimated at **1,421,619 jobs** across several fields that are attracting strong demand from young people and women seeking employment. These fields include the recovery of household waste, agriculture, and renewable energy. Statistics further show that **9.7% of women registered in the commercial register** work in the field of green jobs. (Zan Mariam, 2023, p. 378)

The following table presents employment potential in green industries:

Table (2) : Employment Potential in Green Industries

Industry sector	2015	2017	2020	2025
Renewable energy	7.500	13.700	52.500	137.000
Waste management	50.656	105.918	138.154	18.58
Water management	48.812	52.785	56.587	65.600
Green buildings	98.663	190.246	363.802	722.994
Environmental-related services	3.473	3.829	4.432	5.657
Green space management	4364.880	387.101	422.996	490.368
Total green jobs	564.984	753.579	1.038.471	1.421.619

The source : (Wahiba Qahham, 2016, p. 375)

The table illustrates projected green job growth across various sectors, based on trends observed among employers and the workforce within the green construction industry. The projections suggest positive and plausible growth patterns, pending official confirmation from government authorities.

Conclusion:

The green economy emerges as a paramount mechanism for transforming national economies toward sustainable development, provisioning decent employment via green jobs to counter poverty and unemployment, while safeguarding societal rights through heightened efficiency and prudent natural resource management. This explains the global inclination toward this ecological economic system, notwithstanding its substantial financing demands, which financially and technologically constrained developing and poor nations have struggled to meet thereby tempering these efforts despite concurrent promotion and encouragement.

The study yields the following key findings:

- The green economy stands as a successful model for attaining sustainable development and environmental sustainability, as evidenced by outcomes in pioneering adopting nations.
- Transitioning to the green economy enhances not only energy efficiency and environmental preservation but also combats poverty and unemployment by furnishing decent work through green jobs.
- It can generate equivalent levels of growth and employment to the traditional economy and surpass it in the medium to long term while delivering substantial environmental and social benefits.
- Governments bear a primary responsibility to cultivate national skills and capacities, establish international markets, and develop legal infrastructures to facilitate the green economy shift.
- Essential financing and enabling conditions must be provided to support this transition materially and technologically, particularly in developing countries endowed with vast energy resources and natural wealth.

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