

Green Economy and Occupational Health and Safety: Potential Impacts and Preventive Policies

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Over last decades, climate change and environmental degradation are seriously jeopardizing the future environmental and economic sustainability at global level arousing interest in the "green growth paradigm" [1].

In 2012, during the United Nations Conference on Sustainable Development (UNCSD or Rio+20), the world leaders, together with the thousands participants coming from Governments, private sectors, non-governmental organizations (NGOs) and other groups, identified the green economy as a new solution to both traditional challenges for development represented by poverty, malnutrition, economic stagnation and to all new global threatens represented by climate change and environment deterioration [2].

Few months before, the Europe 2020 strategy for "smart, sustainable and inclusive growth", calls for the Member States of the European Union (EU) to aim to a sustainable growth "... separating the economic growth from the use of resources, building up a sustainable and competitive economy, targeting the

development of new processes and technologies, including green technologies [3].

The shift to a sustainable, greener economy offers major opportunities for social development: the creation of more jobs, improvement in the quality of large numbers of jobs and social inclusion on a massive scale [4]. However, the transition towards a greener economy poses new challenges for occupational health and safety (OHS). On the one hand, green jobs aim to safeguard environmental quality and/or produce green goods or services but, on the other, it is not yet clear whether they are safe for workers. Besides traditional work-related risks (chemical, physical, biological, etc.), green workers could potentially be exposed to "emerging" risks related to the introduction of new technologies, substances, processes, workforce changes, etc. [5].

In the photovoltaic (PV) sector, for example, health and safety risks affect the whole lifecycle of every plants: design and planning, manufacture, transportation, installation, integration with the

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infrastructure, dismantling, disposal/recycling. In manufacturing of PV cells, workers' health may be adversely affected by toxicity, corrosivity, flammability, and explosiveness of chemicals and materials such as hydrofluoric acid (HF) employed to clean silicon wafers, and silane gas (SiH₄) which is extremely inflammable and explosive. In the field of new generation PV cells the major hazard is the toxicity and carcinogenicity of cadmium telluride. In addition to the risk of injuries from slips, trips and falls, also musculoskeletal disorders (MSDs) may be frequently observed due to an increase in loads handling and ergonomic risks. Adverse weather conditions such as extreme temperatures increase the risks of cold or heat stress. Exposure to sun radiation may lead to sunburns, eye disorders and certain types of cancers [6].

In the view of the International Labour Organization (ILO), a transition towards a green economy needs to project a vision of a greener, but also decent, safe and healthy jobs integrating safety and health aspects into policies. A healthy workforce, in fact, is a prerequisite for social and economic development as well as for workers' productivity. At this end, in 2007 the issue of the relationship between health and safety of workers and policies for sustainable development was included among the priorities of the World Health Organization (WHO) Global plan of action on workers' health. Since then, several initiatives aimed at analyzing the potential impact of green jobs on OHS have been conducted at global level [7-10].

The way forward a safe job is possible through three categories: research, education and policy. In the research area, for example identifying hazards in new green technologies and investigating design alternatives, anticipating emerging risks or eliminating occupational and environmental hazards at their source according to the Prevention through Design (PtD) framework [11]. Despite great emphasis has been placed today on the green economy, OHS issues still remain scarcely addressed, as already stressed by previous studies and research [6].

In terms of education and training by incorporating occupational safety and health in professional curricula, textbooks, accreditation, and

certification examinations or by specific training programme. The promotion of OHS culture, and education and training will play a decisive role in boosting awareness of the conditions for health and safety of green workers. Indeed, the identification of these new professionals, or the redefinition of the traditional works in ecological perspective, involves different and more defined skills at the fore-front of technological development and innovation above all those related to the OHS field and new challenges for workers and employers [12].

Finally, active OHS policies in the green sector appear fundamental not only for designing and implementing rules concerning OHS issues but also for promoting concrete prevention and protection actions at the organizational level based on risk management and hazard analysis/elimination criteria [6].

In order to address the possible implications of the "greener" labor market for workers' health and safety, an inclusive policy-making approach is required because it concerned with adequate inclusion of all parties in the process of policy design and delivery favoring a deeper analysis. First of all, forecasts and estimates of potential new and emerging risks related to OHS are needed before they arise, particularly for green jobs. The need for forward-looking efforts to "anticipate new and emerging risks" has already been identified in the framework of the Community Strategy 2002-2006; the second Community strategy 2007-2012 highlighted in particular the "risks related to new technologies" as a sector in which the forecast of these risks should be improved. The European Strategic Framework on health and safety at Work 2014-2020 is aimed at improving prevention of work-related injuries and diseases by tackling new and emerging risks without neglecting existing risks [13-15].

This process requires multidisciplinary input not only from OHS experts. It is necessary a cooperation of various key actors (e.g. health and safety professionals, designers, business owners, environmentalists, insurance companies and government), across several disciplines, including OHS, environmental protection and from the different sectors in which green jobs are developing.

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