

# Science for Environment Policy

## How eco-innovations improve environmental performance within and across sectors

**A team of Italian scientists has published a study highlighting the important role of intersectoral linkages and eco-innovations in shaping industry's environmental performance** (a measure of its ability to meet environmental targets and objectives) across Europe. The research indicates that eco-innovation can produce positive effects, both directly (in the sector where it is developed) and indirectly (in linked sectors at home and abroad). These insights are relevant to corporate and policy governance strategies aimed at maximising the environmental and economic potential of **novel green technologies**.

**'Eco-innovation' refers to the development of products or processes that contribute to sustainability while also offering customer and business value.** To date, say the researchers, relatively little research has been conducted on the real-world impact of eco-innovation on environmental performance and the mechanisms through which such an effect takes place. In particular, the role of intersectoral links in production systems has not been fully accounted for, resulting in a lack of empirical evidence relating to the extent to which new technologies, knowledge and practices might indirectly influence the environmental performance of corporations in other sectors or countries.

In order to fill this knowledge gap, the research team analysed a wide dataset covering a large sample of sectors and countries over 14 years. Environmental performance was characterised in terms of emission intensity (tonnes of emission per employee) and modelled using data on different types of polluting emissions from the environmental accounts of the World Input-Output Database (WIOD). In total, the researchers examined data from 27 EU countries dating from between 1995 and 2007, separated into 14 manufacturing sectors that include major polluting industries and industries with high levels of eco-innovation. (While analysing data at the firm level rather than the aggregated sector level would likely produce more in-depth insights, the availability of such data is limited).

Sectoral eco-innovation was measured in terms of patent stock for green technologies. Specifically, the group examined the impact of environmental-specific technological innovations such as:

- renewables (e.g. wind energy, solar energy, geothermal energy, marine energy, hydro energy, bio-fuels and fuel from waste);
- general environmental management (e.g. air- and water-pollution abatement, waste management, soil remediation and environmental monitoring);
- energy efficiency in buildings and lighting (e.g. insulation, heating and lighting);
- emission abatement and fuel efficiency in transportation (e.g. internal combustion engines, electric motors, hybrid propulsion and fuel-efficiency-improving vehicle design);
- technologies contributing to climate-change mitigation (e.g. capture, storage, sequestration or disposal of greenhouse gases);
- technologies with potential or indirect contribution to emission mitigation (e.g. energy storage, hydrogen technology and fuel cells);
- combustion technologies with mitigation potential (e.g. technologies for improved output and input efficiency).

*Continued on next page.*

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The aim of the study was to empirically determine:

- the direct environmental impact of eco-innovations developed by industrial sectors on within-sector environmental performance;
- the indirect environmental impact of eco-innovation activities developed in upstream industries on downstream industries (sectors that process the output of other industries — e.g. agro processors which transform raw agricultural materials into a different physical or chemical state);
- the importance of both domestic and international intersectoral relationships as channels through which the indirect environmental impacts of eco-innovations can benefit production sustainability.

The study was conducted under the EU-funded Horizon 2020 [ISI-Growth](#) project.<sup>1</sup>

The results demonstrate the effectiveness of eco-innovation as an approach to achieving a more sustainable, low-carbon economy. Overall, the scientists found eco-innovations can not only directly improve the environmental performance of production in the sectors where they originate by reducing harmful emissions, but also indirectly increase the environmental performance of other sectors connected via market transactions. This indirect channel existed for both domestic and international industry links, with [green technologies](#) developed at the national and international level consistently producing environmental performance benefits in downstream sectors. The strength of these impacts varied across the value chain depending on the technology adopted and the type of pollutant under scrutiny (for example, eco-innovations in renewables, transport and emissions mitigation appear to have the most significant influence on CO<sub>2</sub> intensity reduction).

This study highlights the important role of supply chains as a mechanism through which green technologies can spread through the economy and improve [production sustainability](#). From a corporate governance perspective, the researchers emphasise the value of promoting environmental gains across the whole supply chain, and recommend the implementation of mechanisms that facilitate this, particularly in the context of international linkages.

From a public policy perspective, the findings reinforce the value of promoting eco-innovation as a means of improving environmental performance across diverse industrial sectors. The researchers recommend, therefore, that policymakers pay specific attention to the considerations of sustainable value chains and also design policy instruments that incentivise eco-innovation and more sustainable production at every stage of the production chain.

