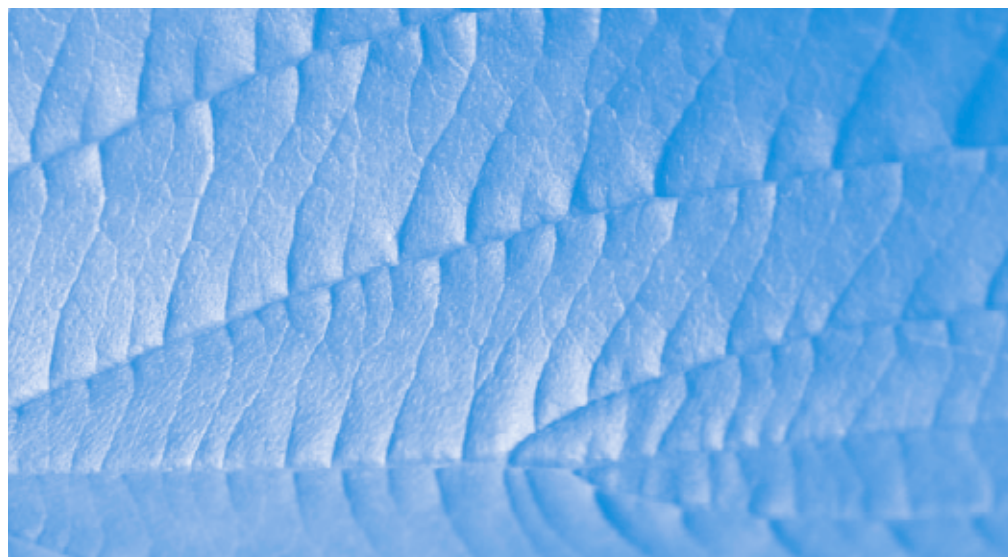


Environmental Sustainability in the European Union: Trends, Challenges and Prospects

THE IMPLEMENTATION OF ENVIRONMENTAL REGULATIONS IN THE REGION SUGGEST THAT THERE ARE STILL SUBSTANTIAL CHALLENGES TO ACHIEVE NEAR AND LONG-TERM GOALS OF ENVIRONMENTAL SUSTAINABILITY

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Over the last decades, the European Union (EU) has developed comprehensive regulation to improve environmental quality and safeguard the life quality for its citizens. Health risks associated with pollution have been one of the main reasons to justify action. Estimates show that poor environmental quality amounts to hundreds of billions of euros in health-related costs. For air pollution alone, the EU Commission (2013) estimated these costs between €330 and €940 billion per year. While a wide array of policies and measures have been devised, environmental performance has been uneven across countries when compared to policy targets. The implementation of environmental regulations in the region suggests that there are still substantial challenges to achieve near and long-term goals of environmental sustainability. This article reviews the EU experiences in the implementation of two climate change mitigation and air quality regulations, aiming to illustrate common challenges faced when improving environmental outcomes. Finally, possi-



ble approaches are proposed to overcome the barriers to environmental sustainability.

Experiences in the Implementation of Climate Change Mitigation and Air Quality Regulations

Air quality

Air pollution is considered the largest environmental health risk in Europe. Most air pollutants are released due to human activities in economic sectors such as transport, energy generation and use, agriculture, industrial production, or waste management. Exposure to air pollutants may lead to adverse health impacts such as respi-

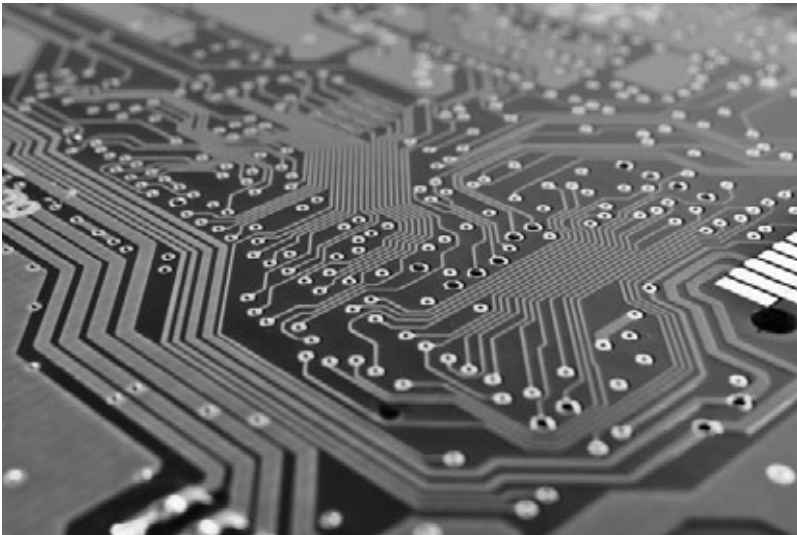
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ratory and cardiovascular diseases, and even cancer. It is estimated that more than 400,000 premature deaths per year are attributable to exposure to poor air quality. These are mostly concentrated in urban areas.

At the EU level, air quality regulation had an approach based on three pillars: (i) setting ambient air quality standards, i.e., limits on the amount of pollutant concentrations for the air people breathe; (ii) setting standards on pollutants' emissions sources, such as electricity production, heating, industry or road transport; (iii) implementing air quality

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adjustments to improve environmental sustainability will imply structural changes that will shift activities away from these consolidated industries. This will likely produce significant losses in jobs and earnings in pollution intensive sectors, creating additional resistance for change. For instance, it has been estimated that phasing out coal in Europe can affect more than 200,000 coal related jobs in coal regions.

The level of environmentally friendly technology readiness and penetration is uneven. Alternative options need to be available both for producers and consumers to adopt environmentally friendly technologies. In some cases, technologies are already competitive in the market but have not been scaled up. In other cases, technologies are still being developed for commercial use. The electricity sector is a good example. While intermittent renewable energy sources (wind and solar) have become competitive and more widely adopted, current electric power systems still require natural gas fired power plants, based on fossil fuels, to balance the fluctuations of these

new sources. Energy storage technologies have the potential to address the intermittency issue, however they have yet to prove their viability for large-scale deployment. A similar issue occurs in transportation. Electric and hydrogen-based vehicles are yet to demonstrate their potential as viable alternatives to massively replace gasoline and diesel vehicles. *Financial resources available to cover environmental sustainability investments are still limited when compared to needs.* The investment needs to achieve established environmental targets are substantial. The European Commission estimated, for example, that achieving the EU's 2030 climate and energy targets will require more than EUR 1 trillion of investments in transport and buildings in the period 2021-2030 and EUR 80 billion for power generation and the electricity grid. The public sector alone does not have the capacity to finance all the needs, hence the private sector and consumers will also need to bear the costs.

In the past, the financial system has had a limited coverage of sustainability investments due to

several barriers. First, the financial system has traditionally had less experience and understanding of sustainability business models compared to other sectors. Second, sustainability investments may have less attractive risks and return profiles, as the positive impacts on the environment are not captured in their financial returns. Finally, in some sectors there is a shortage of finance-ready projects of a certain size. This has happened, for example, in energy efficiency investments that are small and distributed across many households and businesses resulting in high-transaction costs.

Policy design and implementation has been fragmented and local capacity has been uneven. Environmental regulation tends to overlap and oftentimes be inconsistent with other sectoral policies. For example, urban development and transport plans tend to be prepared separately from air quality plans and by different agencies within government institutions. These sectoral plans do not always incorporate air pollution aspects adequately. On another hand, local governments are typically responsible for implementing regulations. They oftentimes lack technical and financial capacity for the design and implementation of sustainability measures.

Monitoring and enforcement have not provided enough incentives for implementation. While monitoring mechanisms have been put in place, they are still not comprehensive in terms of frequency and coverage to assess existing pressures and environmental quality. This becomes even more complex as Europe depends on natural resource use and production activities that occur in other parts of the world. The existing environmen-

tal footprints of the global supply chains are difficult to monitor.

On another hand, the capacity to perform compliance assurance and enforce regulations has been limited. The EU and national institutions responsible for enforcement have been slow to respond to infringements. In some cases, citizens have contributed to enforcement through civil lawsuits. Although National Courts have ruled in favor of protecting the environment, the validation of corrective actions tends to be prolonged in time, failing to guarantee improved environmental outcomes.

Public awareness has increased but has not generated enough buy-in for implementation. Information campaigns about the risks of poor environmental quality have been undertaken. However, they have not always been effective in raising awareness about how citizens and enterprises are part of the solution to improve environmental outcomes. As a result, not all relevant stakeholders have supported the proposed measures from environmental regulations. For example, vehicle use restrictions to improve air quality in cities have faced opposition and backlash against local authorities. Ultimately, the existing sustainability challenges will require citizens to change how they live, travel, and consume. Raising awareness is a fundamental pillar to generate behavioral change.

OVERCOMING THE BARRIERS TO ENVIRONMENTAL SUSTAINABILITY

This section presents possible responses to the challenges identified for improving environmental outcomes. It is based on lessons learned from international past experiences as well as emerging trends.

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Incorporating the costs of pollution to decision-making. At the policy level, there have been several initiatives to improve the measurement of societal progress with respect to environmental sustainability. The United Nations Sustainable Development Goals and other environmental indicators have been proposed to assess progress with respect to environmental outcomes. On another hand, progress has been made in integrating environment-related information in the system of national economic accounts, following the System of Environmental-Economic Accounting Framework. This framework allows to understand the interactions between environmental factors (for example, pollution and natural resource use), households, enterprises, and the economy, providing a more comprehensive estimate of net wealth. These types of information can enhance policymaking and the public debate on sustainability.

At the enterprise level, environmental profit and loss accounts have been pioneered for large companies. These accounts quantify the environmental cost of a company's operations footprint, including its supply chain. While most of the quantified costs do not have direct financial impact at the company level, they were developed to assess the potential exposure to changes in regulation and sustainability risks. There are other examples of companies that have adopted this approach for their greenhouse gas emissions. Putting a value on their emissions allows them to gauge the carbon price risks they could be subject to in the future.

More broadly, there has been a widespread movement towards rating companies' environmen-

tal sustainability, both in terms of their environmental impacts and the impacts of environmental trends on their operations and business model. Traditional financial ratings are now complemented with sustainability ratings to cater to new demands from investors that want to understand the impacts of their investment decisions on the environment. Even financial regulators are now concerned about the impacts that environmental issues such as climate change can have on the financial system. Central Banks are now recommending climate related financial disclosures such that companies understand their exposure to climate risks and disclose it to investors.

Beyond the improvements in measuring the impacts and costs of environmental pollution, policymakers have used market-based instruments to adjust the prices associated with pollution activities. Both taxes and cap and trade systems have been used to explicitly price the emissions of pollutants. There have been successful experiences in the introduction of carbon taxes, particularly in overcoming resistance due to social acceptability and distributional impacts. For example, Sweden introduced an economy-wide carbon tax based on the carbon content of fuels in 1991. The revenue raised was used to reducing income taxes to the population. In other countries, direct transfers were made to lower income households.

Addressing the negative impacts that regulations may have on specific sectors. When major structural changes are required to improve sustainability, governments may need to step in to address the negative impacts on specific sectors. Historically a range of poli-

cy approaches have been used to address the impacts of structural sector changes on workers, firms, and regions. This has occurred for example in the coal industry. Approaches have gone from direct compensation for job earnings and assets lost, to more active re-orientation policies such as worker retraining programs, assistance to firms to reorient their technologies and markets, and assistance to regions for economic diversification. *Accelerating the development and diffusion of sustainable technologies.* While regulation can provide incentives to internalize the cost of environmental degradation, alternative sustainable production and consumption options need to be available to achieve results. This will imply the emergence and upscaling of a diverse set of innovations. Public sector funds will need to be channeled to support basic R&D since the uncertain returns from these activities tend to deter private investment. Support should, however, be as neutral as possible to level the playing field among all the alternative sustainability technologies. For technologies that have reached the commercialization stage but still have uncertain financial returns, public support may be provided in the form of loans when private financial resources are not available. When it comes to broadening the diffusion of technologies, public efforts can contribute through more general initiatives such as tax credits for the acquisition of sustainable technologies. In some cases, complementary public investments in infrastructure will be needed, for example, electricity grids or transport systems. Public support efforts should be carefully assessed to avoid redundancy, e.g. financing projects that could have

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had access to private financing. *Steering the financial system towards sustainability investments.* More emphasis is now placed in mobilizing private sector finance for sustainability. Sustainability rating methods are now provided to guide asset managers and institutional investors in their investment decisions. An EU sustainability taxonomy has also been adopted to guide investment decisions and provide a blueprint for sustainability finance reporting. While Green Banks have been created with public sector capital, private investment banks are now creating specialized branches with a focus on sustainable investing. Sustainability business models are now better understood and private financing provided has a longer-term approach. Mechanisms such as 'blended finance' are also being used. This implies public sector financing covering the high-risk parts of investments to make them more attractive for private sector financing. Finally, new financial instruments such as green bonds are being used to involve large-scale institutional investors. *Multi-sectoral policy approaches and local capacity support can enhance implementation effectiveness.* Environmental sustainability problems need to be addressed through a holistic approach that considers all the economic sectors involved and their inter-relationship, i.e., through a systems approach. At an institutional level, sector silos need to evolve into inter-sectoral policy committees. Sustainability policies must be consistent with sector-specific policies and responsibilities and incentives for implementation must be distributed to the respective sector agencies. For example, while an air quality management plan can be led by an environment

department, urban development, transport, and energy departments must be onboard for its design and implementation. On another hand, national level specialized programs (such as air quality) can be created to provide support to local governments. These programs can provide: i) results based financing from central government funds; ii) a set of standardized best-practice measures eligible for financing, reducing the arbitrary use of funds; iii) technical assistance to develop investment portfolios based on best-practices; iv) standardized monitoring and reporting of results, facilitating coordination and supervision. *While monitoring of sustainability can be strengthened through the adoption of new technologies, the enforcement process must be streamlined.* The emergence of new technologies such as low-cost sensors, satellite monitoring and artificial intelligence can improve the capacity to monitor the evolution of environmental quality and its pressures. The frequency and coverage of monitoring can be increased, providing a better understanding of trends and implementation progress. Additionally, information on sustainability risks can be made publicly available such that companies, rating agencies, and citizens are informed and can act on it. New technologies and increased transparency will also be critical to validate and ensure the accountability of sustainable finance. On another hand, compliance assurance and enforcement need to be streamlined. They can benefit from an improved monitoring process but will also need additional capacity to respond adequately to compliance breaches. Specialized environmental units

