

The Governance of Regulators



The Role of Economic Regulators in the Green Transition

DRIVING SUSTAINABLE CHANGE IN NETWORK SECTORS



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Foreword

Climate change and other environmental threats require urgent government action. One of the priorities for governments looking to mitigate risks associated with such threats is the transformation of utilities, or “network” sectors. Achieving the “green transition” will require the profound transformation of the water, energy, e-communications, and transportation sectors, which are typically highly resource intensive and have a significant environmental impact. Furthermore, biodiversity protection, greenhouse gas emissions reduction, and resource efficiency all depend to some extent on achieving the green transition in utility sectors. Governments will need to find the appropriate tools and institutional frameworks to enable this transition.

Regulation is one of the main instruments governments can use to enable and encourage progress toward environmental goals. As leading public bodies in the governance of utility sectors, the activities of economic regulators can significantly affect environmental outcomes. Through their actions and decisions, economic regulators can influence how operators and consumers consider environmental sustainability in their decisions and choices. This raises questions about the appropriate role of economic regulators in supporting the green transition and contributing to environmental goals.

This publication surveys economic regulators’ contribution to the green transition in the sectors they oversee, considering the changing responsibilities and context economic regulators need to navigate. Analysis of newly available survey data shows economic regulators are already responding to demands to contribute to environmental goals. However, there is significant variation in the degree and scope of regulators’ contributions, with several common challenges and barriers observed. After highlighting the numerous ways in which economic regulators may contribute by describing the tools that connect regulators’ functions to environmental outcomes, the publication focuses on issues relating to governance.

The impact that regulators can have on environmental goals will depend on governance arrangements. Changes to these arrangements may help overcome observed challenges and barriers. Today, not all economic regulators have been set objectives relating to environmental sustainability, or hold the legal powers to consider environmental sustainability in decision making. Ultimately, this will be a matter for government or legislature to consider. However, for those regulators that are empowered to contribute, challenges still emerge, such as competing objectives and role clarity. In addition, more could be done to co-ordinate efforts amongst institutions, adapt regulatory tools and processes, and meet the demand for resources to deliver on expectations.

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Reader's guide

Background

It has not always been possible to establish, especially at an aggregate level, how far economic regulators are responding to growing demands for action on environmental issues and how far they are contributing to green transition within the sectors they oversee. This publication leverages new data on the “green governance” of economic regulators (the “green governance survey”), collected as part of the 2023 edition of the Governance of Sector Regulators (GSR) indicators survey,¹ to address this knowledge gap and shed light on the state of play across 42 countries and for five network sectors: energy, water, e-communications, rail and air transport. Quantitative survey data was collected and validated during 2023 and 2024, with preliminary results presented at the 21st session of the OECD Network of Economic Regulators (NER) in December 2023. Survey questions related to various aspects of governance, such as regulators’ objectives, powers, and processes of co-ordination, impact assessment and capability-building.

This publication considers the green governance survey data alongside OECD normative guidance and earlier work on “governing green” conducted by the NER, including case studies and outputs developed since 2022, to develop a valuable evidence base and unique perspective on the governance challenges surrounding environmental sustainability and the regulation of network sectors. As such, the publication complements OECD work analysing the public sector transformations required to deliver on climate and environmental goals (OECD, 2022^[1]), including the Policy Paper on “Better Regulation for the Green Transition” (OECD, 2023^[2]). This new evidence base will be especially valuable to economic regulators, governments and legislators with responsibilities for designing regulatory frameworks, deciding the mandate of national regulators, or co-ordinating public institutions’ actions toward the green transition and improving environmental sustainability.

The publication organises the quantitative and qualitative evidence into three substantive chapters. Chapter 1 outlines the changing context and roles for economic regulators and explores how economic regulators are already responding to emerging risks, responsibilities, and expectations. Chapter 2 highlights the numerous ways in which economic regulators may contribute to environmental goals by providing an overview of the tools that connect regulators’ functions to environmental outcomes. Chapter 3 connects economic regulators’ contribution to green transition to governance arrangements, discussing the importance of issues such as role clarity, adapting regulatory tools and processes, and capacity and resources.

Whilst the publication focuses on data provided by economic regulators of network sectors,² the scope of regulatory tools discussed may extend to regulatory functions beyond those associated with issues of economic regulation (e.g., the regulation of natural monopolies). To align with the full and expanded mandates of the institutions surveyed, relevant regulatory tools may therefore include, for example, environmental and consumer protection regulation.

Data coverage

The green governance survey noted above is a key source of data analysed in this publication. The full survey questionnaire is provided in Annex B and the full list of respondents is provided in Annex C, by country and sector. Responses were collected for 42 countries and a total of 184 sector/country combinations, noting that data on additional countries and regulators may be added to the 2023 survey database in the future. Table 1 shows the number of responses registered for each sector.

Annex C also includes an overview of the regulatory authorities included in surveying, by country and sector. The total sample size is 184, reflecting all regulatory authority responses for all sector/country combinations. However, due to the fact that in some jurisdictions the same institution is responsible for regulating multiple sectors, so called “multi-sector” regulators, the number of unique institutions is lower (151). Amongst respondents there were 24 multi-sector regulators and 127 single-sector regulators.

The data analysis also differentiates between independent bodies with adjudicatory, rule-making or enforcement powers (“independent regulators”) and ministerial bodies (“ministerial regulators”). Of the 184 regulatory authorities, 140 are categorised as independent regulators, and 44 as ministerial regulators. The database primarily reflects arrangements in place for regulators operating at the national level in their jurisdiction, although in a few cases sub-national regulators are included in absence of a national regulator.

Table 1. Survey responses, by sector

Sector	No. of regulatory authorities
Energy	43
Water	27
E-Communications	41
Air Transport	37
Rail Transport	36
TOTAL	184

Methodology

The green governance survey was issued as part of the 2023 edition of the Governance of Sector Regulators (GSR) indicators survey. The GSR indicators survey in turn was distributed along with the PMR survey, usually to contacts within the economic or finance ministries participating countries. At the time of distribution, the OECD Secretariat informed NER delegates of the respective contact points in their central government administration and invited delegates to co-ordinate with these contact points to support the quality of the survey response.

Upon receiving the completed survey, the OECD Secretariat validated the responses by assessing the respondents' understanding of the questions, adherence to drop-down menu categories for closed-ended questions, accuracy of answers, and completeness of responses. Where possible, the OECD Secretariat used public sources such as legislation, websites and annual reports to validate survey responses. Where these were not available, the validation focused on assessing the plausibility and coherence of responses.

Following the initial validation of the survey response, the OECD Secretariat sent follow-up questions to respondents to clarify any outstanding matters. This includes cases where the OECD Secretariat required additional evidence to verify the survey response, questions may have been misunderstood, or the response appeared to be incoherent with other questions or regulators in the same country. Upon finalisation of the survey file for a specific regulator, the Secretariat informed respondents of any changes made to the survey response.

A first round of survey distribution was conducted in December 2022, with a request to provide survey responses by March 2023. A second round of the survey was conducted in early 2024 for a select group of additional countries. This group included several OECD accession countries, non-OECD EU countries and certain OECD Members that had not nominated a contact point for the first round of survey distribution. The publication includes those survey responses for which the data validation was concluded by the end of April 2024.

Survey responses³ reflect the situation as of 1 January 2023.⁴ Survey responses refer only to laws, policies and regulations that are in force as of this date and do not consider any enacted or envisaged policy reforms or laws and regulations that came into force after this date.⁵

Key terms

This publication, with its focus on economic regulators and the widely discussed issues of “environmental sustainability” and “green transition”, involves certain terminology and data which, if not commonly defined and interpreted, may prompt different conclusions in the context of analysis. Definitions of key terms, appropriate to their use in this publication, are therefore provided in Table 2.

Table 2. Key terms

Term	Definition
Consumer standards	Consumer standards can include standards for consumer services (e.g. network coverage and quality of service standards). This can also include processes aimed at facilitating switching from one operator to another.
Co-ordination mechanisms	For the purposes of this publication and the green governance survey, formalised co-ordination mechanisms refer to any formal document specifying certain aspects of co-ordination or co-operation, such as a Memorandum of Understanding or a co-operation agreement, or an institutionalised meeting or co-ordination mechanism.
Data collection powers	the legal power to collect data refers to the ability of the regulator to make a mandatory request to entities in the sector to submit such data.
Environmental CSOs	Environmental Civil Society Organisations (CSOs) includes non-governmental organisations, foundations or other collectives that are focused specifically on the promotion of environmental considerations.
Environmental sustainability of the sector	The environmental sustainability of the sector refers to the impact of the sector on outcomes relating to environmental sustainability. For the purposes of this publication, environmental sustainability is defined broadly, to include decarbonisation and greenhouse gas reduction, circular economy, sustainable resource management, biodiversity preservation or rehabilitation, reducing water and air pollution, or improving waste management. These aspects align with options available to respondents to the ‘green governance’ survey (see Annex B). These areas reflect common actions and challenges within network sectors, though survey respondents were able to specify further aspects if applicable.
<i>Ex post</i> evaluation	Refers to the process of assessing the effectiveness of policies and regulations once they are in force. It can be the final stage when new policies or regulations have been introduced and it is intended to know the extent of which they met the goals they served for. It can also be the initial point to understand a particular situation as a result of a policy or regulation in place, providing elements to discuss the shortcomings and advantages of its existence. Evaluations may be conducted by regulators, central government or specialist bodies.
External professionals	External professionals are professionals that are employed by a company or body outside the organisation and that are contracted to provide services for the organisation. External professionals can include, among others, consultants, and external IT and administrative support.
Green transition	For the purposes of this publication, ‘green transition’ refers to the transition within network sectors (water, energy, air and land transportation, e-communications) to a more environmentally sustainable state.
Industry standards	Industry standards refer to technical requirements to be followed by industry participants. They can include, for example, grid codes or safety requirements.
Network sectors	For the purposes of this publication, refers to those sectors related to mandates of participant members of the OECD Network of Economic Regulators, namely energy, telecommunications, transportation (air and land), and water.
Price regulation	A price is regulated when its level (exact number, maximum or minimum cap) is set or constrained by a government agency, a ministry or a regulatory authority.
Regulation	Is the diverse set of instruments by which governments set requirements on enterprises and citizens. Regulation includes all laws, formal and informal orders, subordinate rules, administrative formalities and rules issued by non-governmental or self-regulatory bodies to whom governments have delegated regulatory powers. Examples of environmental regulation are compulsory environmental quality standards; limits on total emissions of various pollutants during a given time period;

Term	Definition
	and limits on the concentration of various pollutants in emissions to air or water. For the purposes of this publication, regulatory tools are identified based on a broad definition of regulation, to encompass all activities pursued by economic regulators in line with the above, regardless of whether activities are focused purely on “economic regulation”.
Regulatory delivery	Refers to the implementation phase of the regulatory governance cycle. Delivery includes licensing and permitting, regulatory enforcement and inspections aim to ensure effective compliance with and implementation of rules and regulations. Regulatory delivery also represents an important opportunity to reduce the overall level of regulatory burdens imposed on businesses and citizens while saving public resources and protecting health and security of citizens as well as the environment.
Regulatory impact assessment (RIA)	Is the systematic process of identification and quantification of benefits and costs likely to flow from regulatory or non-regulatory options for a policy under consideration. A RIA may be based on benefit-cost analysis, cost-effectiveness analysis, business impact analysis etc. Regulatory impact assessment is also routinely referred to as regulatory impact analysis, sometimes interchangeably.
Regulatory management tools	Comprise different tools available to implement regulatory policy and foster regulatory quality. In particular, the 2017 Indicators of Regulatory Policy and Governance survey focuses on quality control of three regulatory management tools in particular: Regulatory Impact Assessment (RIA), stakeholder engagement, and <i>ex post</i> evaluation.
Regulatory objectives and mandates	Regulatory objectives are statutory objectives for the regulator either defined in establishing legislation or another piece of legislation. A regulators mandate, or obligation to act, may derive from such statutory objectives, but may also originate from an understanding of wider legislation addressing the sector, or a regulator’s interpretation of another directive, such as principles enshrined in the constitution of a country or its regulatory framework.
Regulatory policy	Is the set of rules, procedures and institutions introduced by government for the express purpose of developing, administering, and reviewing regulation. Regulatory quality is about enhancing the performance, cost effectiveness, and legal quality of regulation and administrative formalities. The notion of regulatory quality covers process, i.e. the way regulations are developed and enforced. The notion of regulatory quality also covers outcomes, i.e. regulations that are effective at achieving their objectives, efficient, coherent and simple
Regulatory powers	Refer to powers defined in law that allow the regulator to perform a given act.
Sector targets	Refer to quantitative targets for the sector, which could for example include emission caps, emission reduction targets or renewable resource targets.
Stakeholder engagement	Refers to the process by which economic regulators inform all interested parties of proposed changes in regulation and receives feedback. For this publication, particular attention is paid to regulators’ engagement with environmental civil society organisations (CSOs).

References

OECD (2023), “Better regulation for the green transition”, *OECD Public Governance Policy Papers*, No. 40, OECD Publishing, Paris, <https://doi.org/10.1787/c91a04bc-en>. [2]

OECD (2022), *Building Trust and Reinforcing Democracy: Preparing the Ground for Government Action*, OECD Public Governance Reviews, OECD Publishing, Paris, <https://doi.org/10.1787/76972a4a-en>. [1]

Notes

¹ A separate OECD publication addressing the related Governance of Sector Regulators indicators data is forthcoming, expected to be available in Q4 2024.

² Please refer to Table 2 for further definitions.

³ Specifically for Bulgaria, Cyprus, Malta and Peru, survey responses reflect the situation as of 1 January 2024, due to a later survey distribution date for these countries.

⁴ Note by Türkiye.

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus” issue.

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⁵ Please note, whilst every effort has been made to provide guidance and ensure a common understanding during surveying, and subsequently to validate results, the survey results should be understood to reflect respondent’s interpretations of the questionnaire.

Abbreviations and acronyms

ACCC	Australian Competition and Consumer Commission
ACMA	Australian Communications and Media Authority
ADEME	<i>Agence de la transition écologique</i> (Agency for the Ecological Transition, France)
AER	Australian Energy Regulator
AI	Artificial Intelligence
ANAC	<i>Autoridade Nacional de Aviação Civil</i> (National Authority of Civil Aviation, Portugal)
ANACOM	<i>Autoridade Nacional de Comunicações</i> (National Communications Authority, Portugal)
ANATEL	<i>Agência Nacional de Telecomunicações</i> (National Telecommunications Agency, Brazil)
ANTT	<i>Agência Nacional de Transportes Terrestres</i> (National Agency for Land Transport, Brazil)
ARCEP	<i>Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse</i> (Regulatory Authority for Electronic Communications, Post and Print Media, France)
ARERA	<i>L'Autorità di Regolazione per Energia Reti e Ambiente</i> (Regulatory Authority for Energy, Networks, and Environment, Italy)
ARESEP	<i>Autoridad Reguladora de los Servicios Públicos</i> (Regulatory Authority of Public Services, Costa Rica)
ART	<i>Autorità di Regolazione dei Trasporti</i> (Transport Regulation Authority, Italy)
BEREC	Body of European Regulators for Electronic Communications
BIPT - IBPT	<i>Belgisch Instituut voor postdiensten en telecommunicatie - Institut belge des services postaux et des télécommunications</i> (Belgian Institute for Postal Services and Telecommunications)
BNetzA	Bundesnetzagentur für Elektrizität, Gas, Telekommunikation, Post und Eisenbahnen (Federal Network Agency, Germany)
CEER	Council of European Energy Regulators
CNA	<i>Consejo Nacional Ambiental</i> (National Environmental Council, Colombia)
CNA	<i>Consejo Nacional de Agua</i> (National Environmental Council, Colombia)
ComReg	Ireland Commission for Communications Regulation
CRC	<i>Comisión de Regulación de Comunicaciones</i> (Communications Regulatory Commission, Colombia)

CRE	<i>Commission de Régulation de l'Énergie</i> (Energy Regulation Commission, France)
CSO	Civil Society Organisation
DWI	UK Drinking Water Inspectorate
EEA	European Environment Agency
EFRWS	European Forum on the Regulation of Water Services
EICom	Federal Electricity Commission, Switzerland
ERU	Energy Regulatory Office, Czechia
EU	European Union
GHG	Greenhouse Gases
GSR	OECD Governance of Sector Regulators
HAKOM	<i>Hrvatska regulatorna agencija za mrežne djelatnosti</i> (Regulatory Authority for Network Industries, Croatia)
ICT	Information and Communication Technologies
IFT	<i>Insituto Federal de Telecomunicaciones</i> (Federal Institute of Telecommunications, Mexico)
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Assessment
MIAC	Ministry of Internal Affairs and Communications, Japan
NER	OECD Network of Economic Regulators
NGOs	Non-Governmental Organisations
NMHH	National Media and Infocommunications Agency, Hungary
NZTA	New Zealand Transport Agency
Ofgem	Office of Gas and Electricity Markets, UK
Ofwat	Water Services Regulation Authority, UK
RTR	<i>Rundfunk und Telekom Regulierungs-GmbH</i> (Regulatory Authority for Broadcasting and Telecommunications, Austria)
SUTEL	<i>Superintendencia de Telecomunicaciones</i> (Telecommunications Superintendency, Costa Rica)
TKK	<i>Telekom-Control-Kommission</i> (Telecommunications Regulatory Commission, Austria)
UCPD	EU Unfair Commercial Practices Directive
UKRN	UK Regulators Network
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
UNOPS	United Nations Office for Projects
UN-WATER	United Nations Water programme
URE	<i>Urząd Regulacji Energetyki</i> (Energy Regulatory Office, Poland)
VDA	<i>Valsts Dzelzceļa Administrācija</i> (State Railway Administration, Latvia)
WAREG	Association of European Public Authorities for drinking water and wastewater

Executive summary

Regulation in water, energy, e-communications, and transport sectors may be one of government's most effective tools for driving the "green transition".

As leading public bodies in the governance of utility sectors, the activities of economic regulators can significantly affect environmental outcomes. Economic regulators may thus represent an under-utilised resource for achieving environmental sustainability. The urgent need for a green transition raises questions around current regulatory approaches and the role of sector regulators. Whilst these questions are not new, political attention is bringing them to the fore.

For economic regulators, regardless of the frameworks set by government, the green transition brings a set of common organisational, political, social, and technical challenges, which present institutional and operational risks. Regulators face the challenge of simultaneously managing disruption in the short term and anticipating and adapting to emerging risks in the longer term, even if their remit only relates to core economic regulation.

The evidence presented in this report shows economic regulators can make a positive contribution to the green transition in network sectors. However, their potential contribution to environmental goals depends on several considerations around internal governance, the arrangements and tools the regulator itself chooses to implement, as well as external governance, the arrangements put in place or tools mandated by government or the legislature.

Key findings

There is large variation in the degree and scope of regulators' contributions to the green transition and environmental sustainability. This variation is driven by differing institutional frameworks, which determine regulators' objectives and functions, as well as their powers to consider environmental sustainability in decision making and execution of regulatory functions (Chapter 1; Chapter 2). These overarching arrangements shape the internal governance of regulators and choices made around tools, processes, capacity, and resourcing (Chapter 3).

There is currently no standard approach to the role of economic regulators in environmental sustainability:

- While close to half of regulators report having objectives relating to environmental sustainability set in legislation, one-third of regulators surveyed do not. An additional share are required to adhere to overarching environmental objectives for public institutions.
- Many regulators report that objectives can be vaguely defined and the regulator's own interpretation and concern for acting beyond remit may limit potential action beyond information gathering and knowledge building, based on publicly available or voluntarily provided data.

- Regardless of whether regulators have defined objectives, a significant proportion (42%) lack the legal power to consider environmental sustainability in decision making. Moreover, 10% lack the relevant legal powers, despite having objectives defined. These findings suggest a mismatch between mandates and relevant legal powers for some regulators.
- Additionally, more than one-quarter of regulators who have been set environmental objectives lack data collection powers. For those who have the relevant powers, the nature of data collection varies significantly: close to one-third do not systematically collect data on the environmental sustainability of the sector despite having the power to do so.
- Rail transport and e-communications regulators more often display a lack of defined objectives, powers to consider environmental sustainability in decision making, and powers to collect relevant data from the sectors they oversee, relative to regulators in other network sectors.

For those regulators that have the power to consider environmental sustainability, these powers tend to apply to specific issues and decisions, rather than across the full array of environmental challenges and regulatory decision-making:

- Most regulators report that their ability to consider environmental sustainability only applies to specific areas. More regulators report that their powers apply to issues of greenhouse gas reduction, decarbonisation and water and air pollution, with fewer focused on resource management, waste management, circular economy, or biodiversity.
- More than half of regulators with the legal powers to consider environmental sustainability report that they apply these powers in regulating prices or issuing guidelines and/or codes of conduct. Fewer regulators consider environmental sustainability in decisions relating to industry or consumer standards, or when issuing licenses and authorisations.

A broadened remit will require regulators to balance multiple objectives and may increase the complexity of their tasks, including the management of potential trade-offs:

- Amongst economic regulators with the powers to consider environmental sustainability, close to half have encountered or anticipate trade-offs between “green” objectives and other policy objectives. Improving cost effectiveness is most frequently identified as conflicting with environmental goals, followed by promoting competition and promoting consumer welfare or social inclusion.
- Regulators may face demands to consider a range of issues related to environmental sustainability, presenting even more complex decisions on trade-offs.

Co-ordination between economic regulators and other public institutions becomes vital in the context of a broadened mandate encompassing economic, social, and environmental objectives, given the complex interactions among these areas:

- Less than half of regulators surveyed have formalised co-ordination mechanisms in place with other public authorities for issues related to environmental sustainability. However, co-ordination is more frequent for those regulators tasked with achieving or contributing to environmental objectives.
- Overarching targets and objectives can help guide action across government and within sectors, though these measures alone are not sufficient. Around one third of regulators report that the sectors they oversee have quantitative targets relating to environmental sustainability that the regulator considers in decision making. For most regulators, however, decision-making is not affected since no quantitative targets have been set for the sector they oversee.

Regulators could take advantage of regulatory management tools and processes to support broadened remits. At the same time, regulators may need to reassess engagement processes and build sufficient capacity and capability:

- Less than one-quarter of regulators are required to assess the impact of the regulatory framework or regulatory decisions on environmental outcomes.
- For most regulators, environmental civil society organisations (CSOs) do not receive a specific request to participate but are nevertheless able to respond as part of an open call for comments. However, there are cases where environmental CSOs have no avenue for participating in the regulatory decision-making process.
- More than one-third of regulators have built internal capacity in environmental sustainability expertise or plan to build capacity in the near future. Whilst some regulators make use of external expertise, a sizeable share of regulators are not building capacity in this area at all.

1 Economic regulation for the green transition: Where are we today?

This chapter highlights the connection between policy action on climate change and other environmental issues, the need for transformation in network sectors, and the implications for economic regulators as leading bodies in the governance of those sectors. After outlining the changing context and role for economic regulators, the chapter draws on recent survey results to describe how economic regulators are responding to emerging risks, responsibilities, and expectations. The state of play, in terms of the degree and scope of regulators' contributions to environmental sustainability, is presented at a high-level. The chapter concludes by highlighting some of the shared perspectives of regulators, particularly those common challenges and opportunities that should be understood by regulators themselves, but also those governments and legislators responsible for the regulatory policy framework.

A changing context and role for economic regulators

Climate change and other environmental challenges require urgent government action if current alarming and unsustainable trends are to be reversed. Urgent action is required to reverse current trends in biodiversity loss, water and air pollution, hazardous land-use, and the depletion of natural resources, in addition to the climate impacts associated with increasing greenhouse gas emissions. Focused and co-ordinated action is needed to address the wide-ranging impacts of these environmental issues, some of which will be felt across borders and generations, as fairly as possible. In the case of greenhouse gas emissions especially, urgent action is required to avoid tipping points being breached, beyond which the rate and severity of climate change effects and the costs of adaptation or mitigation increase significantly.

In response, most governments have made binding international commitments to reduce greenhouse gas emissions through the Paris Agreement, with the goal of limiting global warming to well below two degrees Celsius compared to pre-industrial levels (UNFCCC, 2015^[1]). To be successful, these commitments require domestic reforms that touch on virtually all sectors of the economy and society. Furthermore, citizens expect their governments to take action urgently – for example, a majority (56%) of Europeans think that national governments are responsible for tackling climate change, and a higher proportion (67%) think their national government is not doing enough to tackle climate change (European Union, 2023^[2]). The recent OECD Survey on Drivers of Trust in Public Institutions (henceforth “OECD Trust Survey”) found around a fifth (21%) of OECD country respondents identified climate change and other environmental threats as among the three most important policy issues facing their country. Climate change and environmental threats were identified among the top five policy issues in 14 out of 24 OECD Members. The OECD Trust Survey results suggest a link between action on climate and trust in government - the most effective drivers of trust are related to complex, global, and long-term policy issues where citizens do not always feel they have a say and policy decisions are not always viewed to be taken based on the best available evidence (OECD, 2024^[3]).

Network sectors have a significant impact on the environment and will require profound transformation as part of the journey to a more sustainable state. Whether looking at the pathways to reach net-zero emissions, reduce pollutants, or address biodiversity loss, achieving environmental targets depends to some extent on the green transition of network sectors, which are typically highly resource intensive. In 2019, approximately 34% of total greenhouse gas (GHG) emissions came from the energy supply sector and 15% from transport (IPCC, 2022^[4]). In Europe, transport is the only major sector where GHG emissions have increased since 1990 and remains the largest contributor to nitrogen oxide emissions (EEA, 2024^[5]). The ICT sector consumed around 4% of global electricity production and contributed around 1.4% of global GHG emissions, as well as generating significant amounts of e-waste¹ (Malmudin et al., 2024^[6]) (UNITAR, 2024^[7]) (GSMA, 2024^[8]). The improper handling of e-waste poses significant environmental hazards, with substances such as lead commonly released into the environment through open burning practices. In the water services sector, treating and pumping water uses large amounts of energy, and poorly maintained infrastructure can lead to the discharge of raw sewage into rivers. Around 42% of household wastewater globally is estimated to be not treated properly, damaging ecosystems and human health (UN-Water, 2023^[9]), though this rate is much lower amongst OECD countries². Looking across sectors, infrastructure-based emissions are a significant driver of overall GHG emissions, for example contributing 37% of emissions in the energy sector and 16% in the transport sector (UNOPS, 2021^[10]).

Regulating can be one of the most appropriate and effective methods to drive the green transition. Whilst governments have various tools available to address these challenges – through setting taxes and subsidies, investing in technology and innovation, and participating in international trading schemes – an appropriate and effective method for achieving change can be regulation. When well-designed and implemented, regulation can address environmental challenges and encourage the “green transition” whilst

also targeting innovation and growth (OECD, 2021^[11]). Governments may draw on known regulatory principles and practices to better regulate for the green transition but face several gaps and challenges in implementation, as discussed in detail in the OECD paper *Better Regulation for the Green Transition* (OECD, 2023^[12]).

The significant environmental impact of network sectors and the need for transformation brings into question regulatory approaches and the role of the institutions that oversee these sectors. The regulation of network sectors has traditionally been concerned with addressing overtly economic issues and achieving the efficient and effective functioning of competitive markets, alongside assuring public health and safety. Efficiency and effectiveness in this context are defined from an economic perspective (i.e. allocative efficiency) and regulation typically deals with problems of industry structure, pricing, investment and so forth from a narrowly defined “market failure” perspective, which does not always integrate environmental externalities, or not to the extent required to achieve current environmental sustainability goals. Conscious of the limitations and challenges associated with traditional economic tools, regulators have developed alternative approaches and governance tools (see Chapter 2; Chapter 3), though these are not systematically implemented across sectors.

Fundamentally, the regulation of network sectors, and the independent or governmental agencies (“economic regulators”) tasked with its design and delivery, can affect environmental outcomes. Alongside other measures to exploit the potential of better regulation for the green transition (OECD, 2023^[12]) – adopting a green lens to regulatory design and evaluation, prioritising risk-based approaches, and connecting regulatory regimes internationally – governments may consider the merits of prioritising the better regulation of network sectors for the green transition, by reviewing the role of economic regulation and economic regulators in supporting its design, delivery and implementation.

Economic regulators may represent an under-utilised resource considering recent surveying on green governance and economic regulators’ contribution to environmental sustainability. Based on results for 184 regulatory authorities from 42 countries, a third of regulators (36%) have no objectives relating to the environmental sustainability of their sector defined, whilst a further 22% only need to adhere to certain overarching objectives for public institutions defined in legislation or the constitution. Around 42% of regulators have objectives defined in their establishing legislation and/or another piece of legislation relating to the environmental sustainability of the sector(s) they oversee. Looking by sector, the opportunity to define objectives for regulators is highest in the e-communications and rail transport sectors – 66% and 58% of regulators report no objectives have been defined, respectively (see How are economic regulators responding?).

Box 1.1. A growing role in implementing the green transition for France’s CRE

The French Energy Regulatory Commission (CRE) regulates the electricity and gas markets in France, as provided for by the French Energy Code, contributing to the smooth functioning of those markets for the benefit of end consumers and in line with the objectives of the energy policy. CRE’s missions can therefore be divided into three areas:

- A mission to regulate the networks, aimed at ensuring the performance of the network operators: cost control, quality of service, access conditions, investments, innovation, construction of the internal market.
- A mission to regulate the markets to allow the opening of the markets and innovation for the benefit of the consumer: setting the tariffs, regulation of nuclear power, capacity mechanism, monitoring of the wholesale and retail markets, consultation on market rules.

- A mission to serve the energy transition: support for renewable energy (examination of calls for tenders), calculation of public service energy charges, electricity mix in the non-interconnected areas.

In addition, in order to set out a vision and objectives for the actions of its Board and departments for the years 2023 and 2024, CRE published its roadmap in February 2023, with a focus on the ecological transition and carbon neutrality. Its first axis focuses on making grid regulation and energy system transformation a lever for accelerating the ecological transition.

Note: Roadmap available at: <https://www.cre.fr/actualites/toute-lactualite/la-cre-publie-sa-feuille-de-route-pour-2023-et-2024.html>. Please refer for Annex A for the full case study submission.

Source: Information submitted by CRE, 2024.

Questions about the appropriate role of economic regulators in environmental sustainability are not new, but the growing political attention to environmental issues in recent years is bringing the issue back to the fore. As leading public bodies in the governance of sectors with a significant environmental impact, economic regulators' role and responsibilities in relation to environmental issues have been part of the policy debate for many years. Institutional questions arose in the context of the sustainable development agenda that emerged out of the United Nations Earth Summit in Rio in 1992 (for example (Owen, 2006^[13])). More recently jurisdictions have published policy papers setting out the expectations for regulators' to contribute to national environmental sustainability goals (e.g. (BEIS, 2022^[14])). Reviews investigating regulatory policy reform and the capacity of regulators to meet specific challenges, such as the stimulation of green technologies and innovation to support the wider green transition, are ongoing in some countries (HM Treasury, 2023^[15]). Whilst in other countries, economic regulators' mandates have already been adjusted or expanded, recognising the value of existing institutional capacity and capability (Box 1.1; Box 1.2).

Furthermore, the growing expectation for urgent action on issues like climate change is associated with an expectation for whole-of-government action and a vision for "green governance". In some jurisdictions, economic regulators may be part of a broader movement for a more responsive regulatory state. The case for a whole-of-government approach is set-out in the OECD's *Building Trust and Reinforcing Democracy: Preparing the Ground for Government Action* (OECD, 2022^[16]) and strengthened by the view that, at times, the focus of regulators on predominantly economic concerns may compromise the attainment of environmental goals (Owen, 2006^[13]). Complex challenges like climate change are pushing public institutions – including independent or arms-length agencies – out of their silos to ensure a coherent and co-ordinated approach. (Bartle and Vass, 2007^[17]) argue in favour of this more integrated regulatory state, "in which regulators are more clearly a part of a greater whole". This coherence and co-ordination should however respect the individual roles of institutions, including the need for independent economic regulators to support trust in impartial decision making.

Box 1.2. Agency involvement in the assessment of the environmental footprint of digital technologies in France

Recent investigations by the French government revealed that digital technologies and their enabling infrastructure currently contribute to 3-4% of global greenhouse gas emissions and 2% of the national carbon footprint. Without intervention, it could rise to 6.7% of France's carbon footprint by 2040. In response, France enacted the law on the fight against waste and the circular economy (*Loi anti-gaspillage pour une économie circulaire*) in February 2020, leveraging European regulations.

To address this, the government tasked Arcep, the French communication regulator, and ADEME, the French Environment and Energy Management Agency, with an 18-month mission to assess France's

digital environmental footprint and recommend actions to mitigate it. The study, presented in three parts, included a forward-looking assessment projecting the digital environmental footprint in France up to 2030 and 2050. It concluded that without intervention, the carbon footprint from digital technology could triple and its energy consumption nearly double between 2020 and 2050.

Since 2020, Arcep has been actively engaged in developing the annual survey “Achieving Digital Sustainability”, focused on gathering environmental data from digital entities. The aim of the survey is to track the environmental footprint of digital players over time. In support of these efforts, the government strengthened Arcep’s authority to collect environmental data from electronic communications operators, online communications service providers, data centre operators, consumer device manufacturers, network equipment suppliers and operating system providers through the “Chaize Act” in 2021.

Note: Arcep surveys and data publications are available on their website: [Maps & Data - Page 1 - 50 results per page | Arcep. Law 2020-105 \(Anti-Waste Law\)](#).

Source: Information provided by Arcep, 2024.

For economic regulators, the prevalence of environmental issues and their interaction with regulators’ traditional areas of activity create new challenges. This is particularly noticeable in the realms of consumer protection and market transparency. Issues such as “greenwashing”³ have arisen since companies and service providers have become aware of customer concerns around environmental impact and their preferences (and potential increased willingness to pay) for “green” and “sustainable” products. As companies exploit the marketing opportunity of “green”, regulators must ensure consumers are protected from unfair practices. Therefore, regardless of whether regulators’ mandates integrate environmental sustainability, the deep, horizontal impact of environmental issues demands attention from economic regulators, even if solutions are sought within traditional remits and areas of intervention. Regulators are experiencing pressure from government and legislature, as well as regulated entities, environmental stakeholders, and citizens, to address emerging risks and new priorities, all while maintaining a focus on the regulator’s core statutory duties.

Economic regulators with responsibilities during the infrastructure lifecycle, relating to infrastructure planning, use and operation, are dealing with pressing questions relating to resilience and environmental sustainability. The regulation of infrastructure in the water, energy, e-communications, and transport sectors, due to increased environmental risks, must increasingly ensure resilience to external shocks and better preparedness. Related questions have been brought to the fore following the COVID-19 crisis and periods of extreme weather in many countries, including flooding and wildfires (Box 1.3). Furthermore, resilience and environmental sustainability objectives are not always compatible and may present trade-offs.

The regulatory policy landscape is always adapting and changing, though traditionally the importance of stability for market actors, producers and consumers, has meant change has occurred at a steady pace. Stability is still held as an important principle in regulatory policy, however, the urgency with which governments are starting to respond to the climate crisis and other environmental challenges has meant that economic regulators can experience an accelerated pace of change and be faced with choices that hold substantial implications for the regulators’ institution and organisation.

Economic regulators can make a positive contribution to the green transition of network sectors. As discussed in more detail in Chapter 2, economic regulators can, through their actions and decisions, have a strong impact on how operators and consumers consider environmental sustainability and the choices they make (Bartle and Vass, 2007^[17]). At the same time, integrating environmental considerations into regulatory decision-making alongside more traditional social and economic objectives, can lead to more coherent and environmentally beneficial outcomes (OECD, 2023^[12]). Finally, regulatory institutions

provide a pool of civil servants with specialist knowledge, who through collaboration and co-operation can be a positive force for change and learnings for the public sector as a whole (OECD, 2022^[18]).

However, the potential contribution of economic regulators to environmental goals, including improving sustainability and supporting the green transition in network sectors, rests on several important considerations around governance. As discussed in more detail in Chapter 3, first and foremost, economic regulators require clarity on their role in relation to meeting environmental goals. This is ultimately a question for governments to address when considering the regulatory and institutional framework needed to deliver on environmental goals. Where this question remains uncertainly or insufficiently answered, the risk is that the institutions best placed to support and deliver on change will remain on the sidelines, unengaged.

Box 1.3. Dealing with extreme weather and climate in Australia's electricity market

The Australian Energy Regulator (AER) is part of the Australian Competition & Consumer Commission (ACCC), supervising the wholesale electricity and gas markets in Australia.

Australia's energy sector faces significant challenges in managing the impacts of wildfires and extreme weather events. The transmission network plays a crucial role in mitigating the effects of fires by implementing measures such as derating interconnectors to manage heat and smoke. While this reduces the risk of damage, it can lead to reduced electricity flows, potentially impacting customers.

The recent wildfires across the east coast have severely affected the electricity network, causing power outages for tens of thousands of homes, particularly in rural towns and areas on the edge of the grid lacking backup or contingency plans.

The National Electricity Rules (NER) establish the functions for the AER, enabling it to set the maximum revenues that electricity network business can obtain. The AER revises the proposals received by network business operators based on different factors (projected demand for electricity, operating and financial costs, network reliability and safety standards) and establishes the revenue caps for periods of usually five years.

Recently the AER has approved a \$26.7 million cost pass through application to reimburse Endeavour Energy for replacing and repairing power lines and infrastructure damaged by bushfires in the Blue Mountains, Southern Highlands, and South Coast. AER Chair Clare Savage emphasised that while the regulator does not propose the spending for these repairs, it ensures consumers do not overpay for necessary works. This decision, based on the principle of consumers paying only what is necessary for safe and reliable energy, will increase average annual bills by approximately \$5 for households and AUD 19 for small businesses from July 2021 to June 2024, totalling an additional AUD 15 for households and AUD 57 for small businesses over the period. The AER's role, under the National Electricity Rules, involves assessing such cost pass through applications to allow network businesses to recover costs from natural disasters like bushfires that were not covered in their existing revenue determinations.

Source: [Endeavour Energy - Cost pass through for the 2019–20 bushfire natural disaster](#).

How are economic regulators responding?

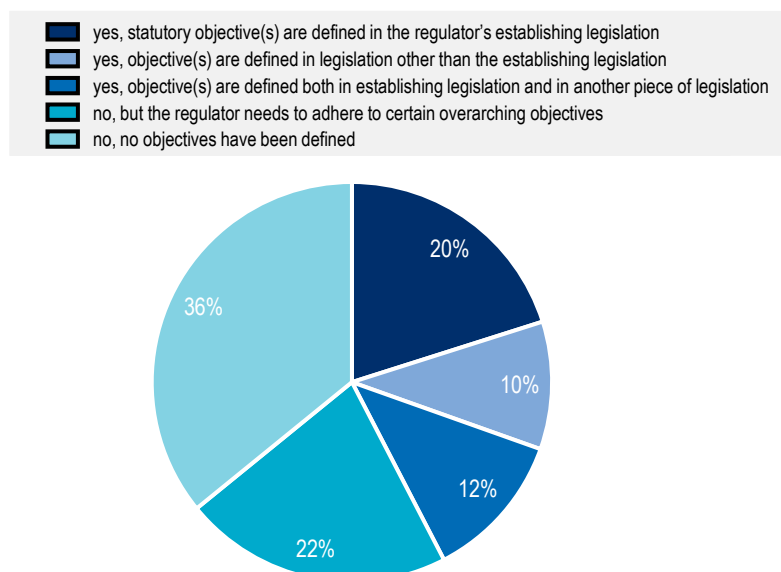
It has not always been easy to establish, especially at an aggregate level, how far economic regulators are responding to these growing demands for action and how far they are contributing to environmental sustainability and the green transition within the sectors they oversee. This publication leverages new data on the “green governance” of economic regulators (the “green governance survey”) collected as part of the 2023 edition of the Governance of Sector Regulators (GSR) indicators survey, to address this

knowledge gap and shed light on the state of play across 42 countries. For more information on the data sources used in this publication, please refer to the Reader's Guide and Annex B.

Survey data reveals large variation in the degree and scope of regulators' contributions to environmental sustainability. Economic regulators are already starting to respond and contribute to environmental policy objectives, for example by collecting data on the sustainability of the sectors they oversee or assessing environmental impacts as part of regulatory management processes, though there is currently no standard approach to what the role of economic regulators should be. The variation observed between sectors and countries is closely related to the variation seen in regulators' mandate and powers to intervene, which provide both confidence and legitimacy, but may also define the mechanisms through which regulators can contribute.

Close to half of regulators report objectives relating to environmental sustainability have been set in legislation. Around 20% of regulators surveyed responded they have statutory objectives defined in the regulator's establishing legislation (37 of 184), a further 10% responded they have objectives defined in a piece of legislation other than establishing legislation, and 12% responded they have objectives defined in both establishing and other legislation (Figure 1.1). In total, 78 of 184 regulators (42%) therefore have been set explicit objectives relating to environmental sustainability. There is significant variation across sectors: the proportion of regulators that have environmental objectives is lowest in the e-communications sector (10% of e-communications regulators⁴) and highest in the energy and air sector (67% and 62%, respectively) (Figure 1.2). Regulators have already noted that these results can be partly explained by the distinction made between economic regulators and environmental agencies in certain sectors and countries, with a clearer mandate prescribed for environmental agencies in some cases.

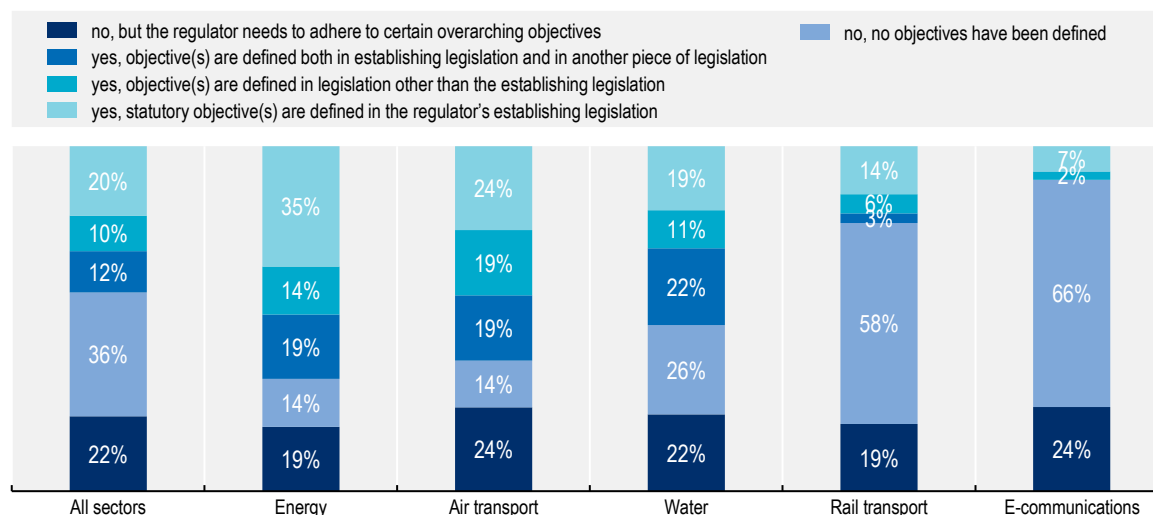
Figure 1.1. What proportion of regulators have been set objectives relating to environmental sustainability in legislation?



Note: A total 184 regulatory authorities provided an answer to the survey question, based on their country and sector context.

A third of regulators surveyed do not have objectives relating to environmental sustainability defined. One third (36%), or 66 of 184 regulators surveyed, do not have any objectives defined explicitly in legislation. This proportion is higher for regulators in the e-communications (66%) and rail transport (58%) sectors.

Figure 1.2. What proportion of regulators have been set objectives relating to environmental sustainability in legislation?

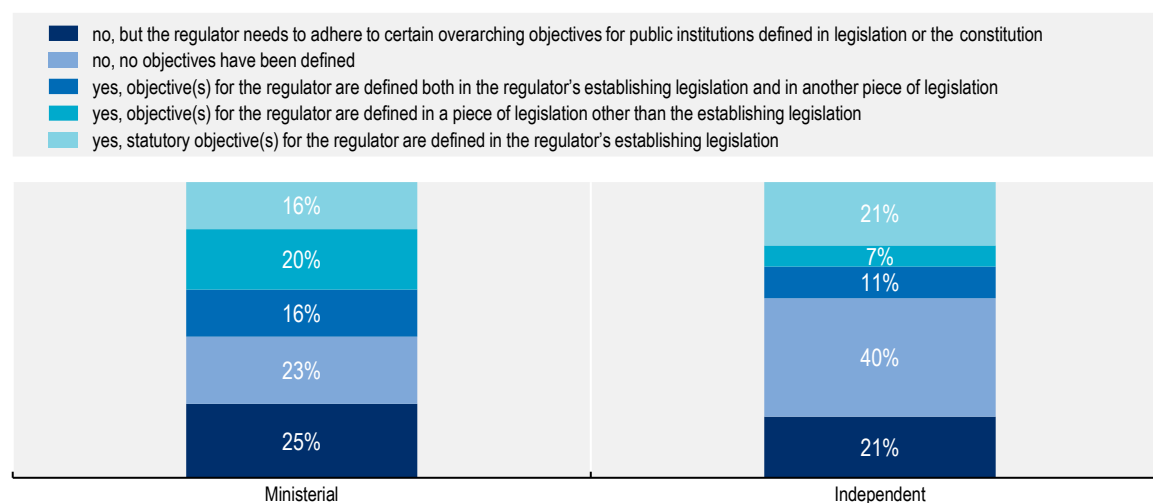


Note: A total 184 regulatory authorities provided an answer to the survey question.

Nevertheless, an additional share of regulators adhere to certain overarching objectives for public institutions defined in legislation or the constitution. Around 22% of regulators, or 40 of 184 responded they need to adhere to certain overarching objectives for public institutions relating to the environmental sustainability of the sector, which have been defined in legislation or the constitution (Figure 1.1) (Box 1.4). Overall, it is more common for ministerial regulators to adhere to overarching objectives for public institutions or have defined objectives. Whereas 23% of ministerial regulators, or 10 of 44, report having no objectives defined in legislation, 40% of independent regulators, or 56 of 140, report the same. Furthermore, 25% of ministerial regulators state they need to adhere to overarching objectives for public institutions (versus 21% for independent regulators), and a similar proportion again (20%) report their objectives are defined in a piece of legislation other than their establishing legislation (versus 7% for independent regulators) (Figure 1.3).

Figure 1.3. What proportion of regulators have been set objectives relating to environmental sustainability in legislation?

Ministerial versus independent regulators



Note: A total 184 regulatory authorities provided an answer to the survey question.

Box 1.4. Ofwat considers the Government's Strategic Policy Statements relating to resilience, biodiversity, net-zero and climate change adaptation in strategic planning and objective-setting

Ofwat, the economic regulator of the water sector in England and Wales, has a crucial role in promoting environmental sustainability. Though not the primary environmental regulator, Ofwat follows the UK and Welsh Governments' Strategic Policy Statements (SPSs) to address resilience, biodiversity, net zero, and climate change adaptation. Ofwat's strategy commits to meeting long-term challenges while delivering benefits for customers, society, and the environment. Key objectives include climate change mitigation, demand management, nature-based solutions, natural capital accounting, and river water quality improvement.

Ofwat collaborates with environmental regulators, the UK government, and Welsh Government to ensure water sector plans deliver strategic benefits for both customers and the environment. Ofwat's focus on climate change involves setting expectations for water companies to align with national governments' net zero targets and prioritise greenhouse gas reductions. Standardised annual reporting of operational and embedded emissions was introduced, and operational emission reductions will be incentivised in the next price review (2025-30). Additionally, Ofwat plays a role in the Water Industry National Environment Programme (WINEP), a programme outlining actions water companies in England must take to meet most of their environmental obligations. The current WINEP accounts for approximately GBP 5.2 billion of asset improvements, investigations, monitoring and catchment interventions between 2020 and 2025.

Source: Information provided by Ofwat, 2023.

More than half of regulators report holding the legal power to consider environmental sustainability in their regulatory decision making, though a significant proportion still lacks this power.

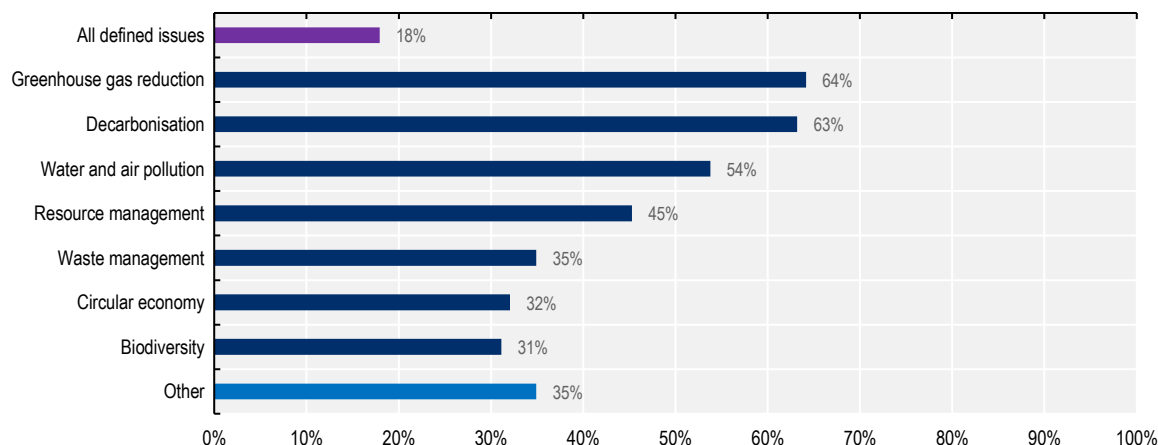
Regardless of the existence of statutory objectives, around 58% of regulators report they hold the legal power necessary to consider elements relating to environmental sustainability in regulatory decision making. However, 42% lack these powers.

Economic regulators differ further in terms of where their legal powers to consider environmental sustainability apply when making decisions, considering both areas of regulatory activity and aspects of environmental sustainability.

For those regulators that hold the power to consider environmental sustainability, powers tend to apply to specific issues, such as decarbonisation, rather than across the full array of environmental challenges. Most regulators report their ability to consider environmental sustainability only applies in specific issue areas, with regulators specifying three distinct issue areas on average. Nineteen regulators have powers that apply across all the seven environmental issue areas listed. More regulators report their powers apply to issues of greenhouse gas reduction (64%), decarbonisation (63%) and water and air pollution (54%) (Figure 1.4). This may relate to the fact that a higher proportion of air transport (70%), water (78%), and energy (84%) regulators report "powers to consider", relative to e-communications (27%) and rail (33%), and how issues of decarbonisation, GHG reduction, and pollution of air and water have been closely linked to outcomes for these sectors and identified as clearer priorities. Most regulators (83%) specified holding powers to consider environmental sustainability in relation to at least one of the defined issue areas, the remaining 17% specified only "other" issues.

Figure 1.4. Proportion of regulatory authorities with the legal power to consider environmental sustainability in regulatory decision making

By issue area



Note: Only regulators who responded they have the legal power to consider environmental sustainability in their decisions are included in this analysis – the relevant sample consists of 106 regulatory authorities.

For those regulators that specified only “other” issues, some clarified their decisions may have to consider “sustainable development”, which was interpreted to combine multiple issue areas and other economic considerations beyond those listed. Noise pollution is one additional issue area noted by multiple air transport regulators, including the Swedish Transport Agency (Transportsyrelsen), ANAC in Portugal, and the Civil Aviation Authority of Israel. Further issues relating to energy were mentioned by regulators across sectors, such as the energy regulators of Poland (URE) and Czechia (ERU), and Finland’s transport regulator (Traficom), for who decisions can relate to energy efficiency and the uptake of clean and renewable energy sources. Portugal’s e-communications regulator, ANACOM, raised the issue of protection and resilience of the environment to wildfires, considered in relation to infrastructure planning, development, and maintenance.

Some regulators hold a very narrowly defined set of powers to tackle specific issues. Regulators specifying their powers to consider environmental sustainability apply to “other” decision situations, or “other” issues areas, tend to face a specific and limited scope of powers, vaguely defined issue areas, or both. For example, in the case of Austria’s e-communications regulator (TKK & RTR), the regulator noted it has obligations only when considering decisions on the co-location and sharing of network elements. In the case of Switzerland’s energy regulator (ElCom), limited environmental objectives apply for when the regulator is consulted on transmission network development – to assess whether, for example, overhead or underground cables would be most beneficial considering environmental and economic costs and benefits.

Other regulators may be presented with vague definitions of what constitutes environmental sustainability and a broad set of objectives for their sector which require further interpretation and planning. For example, Austria’s TKK and RTR have obligations to “protect the environment”, not defined further in legislation, in relation to network decisions. For the rail transport regulators in Latvia (VDA) and New Zealand (NZTA) too, powers may refer to “environmental sustainability” as a consideration but are not defined further regarding the aspects of environmental sustainability. Other regulators, such as e-communications regulators in Japan (MIAC) and Ireland (ComReg) (Box 1.5) and the water regulator for England and Wales (Ofwat) are required to translate long-term environmental policy goals into action, for example through their strategic planning process.

Box 1.5. Communications regulators' mandates and initiatives for environmental sustainability

At present, some communication regulators in OECD countries have an explicit mandate related to the environment, while others are co-ordinating the efforts of the environmental sustainability of networks as part of a whole-of-government approach. In some countries, communication regulators are contributing to a green transition by general national targets guiding also the national regulatory work.

In Costa Rica, Law No. 7593 establishes the obligation for the Superintendency of Telecommunications (*Superintendencia de Telecomunicaciones*, SUTEL) to ensure environmental sustainability in relation to the deployment of communication networks.

In France, the Minister for electronic communication and the communication regulator, Arcep (*Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse*), have had environmental protection as a general objective since the 2010 Law on National Commitment for the Environment.

In Hungary, the general objectives of the 2003 Act C on Electronic Communications include the enforcement of environmental protection requirements concerning communication networks and services. Among others, the Act stipulates that NMHH may order provisional protective measures for the protection of the environment (Section 37), and that radio equipment shall be installed in accordance with environmental and nature protection regulations (Section 80).

In New Zealand, the Resource Management Regulations (National Environmental Standards for Telecommunication Facilities) from 2016 are standards that provide national consistency in the rules surrounding the deployment of communication infrastructure across New Zealand, while ensuring the effects on the environment are minimised and managed appropriately.

In Ireland, the Climate Action and Low Carbon Development (Amendment) Act, enacted on 2 February 2021, establishes a legally binding framework with clear targets and commitments, whereby relevant public bodies are obliged to perform their functions in a manner consistent with national climate policies, including the annual climate action plans. The Irish electronic communications regulator, ComReg, is one such relevant body, requiring a climate action roadmap for the organisation. These roadmaps call for public sector bodies to reduce GHG emissions by 51% by 2030 (Government of Ireland, 2021^[19]). ComReg contributes to the annual Adaptation Scorecard questionnaire for the Communications Sector, which is issued yearly by the Climate Change Advisory Council (CCAC) to the Department of Environment, Climate Change and Communication (DECC). The CCAC secretariat is staffed by the Irish Environmental Protection Agency (EPA), which is conducting a National Climate Change Risk Assessment (NCCRA) (due for publication Q4, 2024), and for which ComReg sits on the Expert Group.

Many regulators that at present do not have direct mandates on environmental sustainability issues, may still share the opinion that the impacts of the communication sector are increasingly relevant. This has led to own initiatives by communication regulators, such as in Belgium, Spain, and the United Kingdom. In Belgium, sustainability competencies are not within the remit of the authority on the national level, as environmental protection is a regional competence in which the federal Institute for Postal services and Telecommunications (BIPT) cannot interfere directly. Nevertheless, in BIPT's strategic plan 2020-22, the regulator has engaged itself to support any innovative initiatives which stimulate the sustainability of communications networks such as the sharing of network elements between operators (BIPT, 2019^[20]).

Source: (OECD, 2022^[21]) "Communication regulators of the future"; OECD (forthcoming) "Environmental sustainability of communication networks".

What common challenges do economic regulators share?

Despite a mix of starting points, economic regulators are aware of the challenge and have individually and collectively begun work to map how they may contribute to a green transition. This may involve strategic planning and proactive engagement at different levels and with a variety of stakeholders. For example, the Body of European Regulators for Economic Communication (BEREC) released its first report on the topic in 2022 (BEREC, 2022^[22]). Similarly, the Council of European Energy Regulators (CEER) strategy 2022-2025 sets out how European energy regulators can promote the energy transition and contribute to a carbon-neutral society and economy (CEER, 2021^[23]). The Association of European Public Authorities for drinking water and wastewater (WAREG) also holds a regular forum (EFRWS) focused on the EU Green Deal targets and has focused on tools to encourage innovation and environmental sustainability in its outputs (WAREG, 2023^[24]).

Regardless of the regulatory and governance frameworks set out by government, economic regulators will face common challenges, emerging risks, and will remain accountable as key state actors. Whilst it is important to acknowledge economic regulators differing operating environments and highlight the variation shown by survey responses regarding the state of play, it is also clear that regulators share some common perspectives and challenges. It is with consideration for these common challenges and risks that the consolidated experience and analysis of the tools with which economic regulators can directly contribute to environmental sustainability (Chapter 2) and the governance arrangements that may enable their contribution (Chapter 3), becomes most valuable.

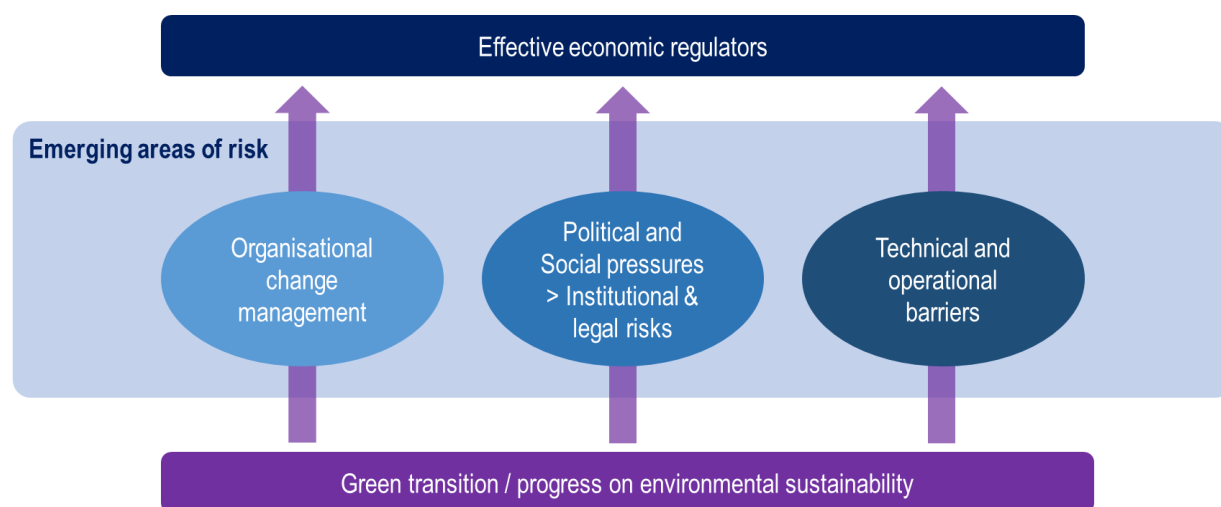
Whether regulators have a direct and active role in delivering environmental sustainability via their regulatory activities, or not, regulators will be impacted by a period of transition in network sectors.

A variety of risks and issues can arise for all economic regulators. From an organisational perspective transition brings the challenge of managing change and its impact on people, political and social pressure can create institutional risks, including legal risks, and new duties and external threats may require new ways of thinking and working, incorporating new tools and techniques (Figure 1.5):

- Regulators will face **organisational** challenges associated with change, which may be further understood as economic in nature, or related to organisational leadership and culture. For some regulators, volatility in network sectors can impact current funding arrangements, whilst new duties and objectives require revised strategies, leadership and buy-in from the organisation. Efficient and effective delivery will be essential based on the urgency with which governments are seeking action from institutional partners.
- Regulators will face **political and social pressures** that bring **institutional and legal risks**. As noted above, stakeholders of all institutions involved in the governance of network sectors, given the dependency on the transformation of these sectors for achieving environmental sustainability goals, will be expected to explain their role and responsibilities. Regulators may increasingly find themselves pressured to act “ahead of the curve”, in situations where guidance is lacking, roles are not yet clearly defined, and yet action is urgently required.
- Regulators may need to overcome **technical or operational barriers** which involve the review, restructuring and development of capacity and capability within the organisation to deal with changes in the sectors they oversee (e.g., new data collection methods, adjusted approaches to valuation, increase use of risk assessment, accompanying development of new systems, and so forth).

There will always be certain complicating and disruptive factors at play. Regulators face the challenge of simultaneously managing disruption in the short-term and anticipating and adapting to emerging risks in the longer term, even if, for some, remits relate only to a set of narrowly defined functions in economic regulation, i.e., focused on issues of competition, cost effectiveness, and safety.

Figure 1.5. Emerging risks for economic regulators from green transition



Conclusion

In conclusion, economic regulators are operating within a changing and challenging context, considering the urgent need for green transition in the sectors they oversee, the increased scrutiny of stakeholders and growing expectations of citizens, and the complicating and disruptive impact of emerging trends on traditional remits relating to economic regulation. Across countries and sectors, recent surveying suggests economic regulators may represent an under-utilised resource given the large variation in the degree and scope of their contributions to the green transition and environmental sustainability. Evidence shows that economic regulators can make a positive contribution to the green transition of utility sectors (Chapter 2). However, whilst many economic regulators are already responding to the challenge and expectation to contribute to environmental goals, their potential contribution rests on the ability to effectively manage the risks listed above as well as several important considerations around governance (Chapter 3).

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Notes

¹ Electronic waste (e-waste or WEEE) describes all types of old, end-of-life or discarded electrical and electronic equipment. E-waste contains a complex mixture of materials, some of which are hazardous.

² Data on wastewater treatment for OECD countries is available here: [Wastewater treatment | OECD](#).

³ Defined as self-declared environmental claims used as a corporate marketing tool (OECD, 2011_[25]).

⁴ For supplementary data on e-communications regulators please refer to Box 3.3.

2 Leveraging economic regulation for the green transition: The regulator's toolbox

This chapter highlights the numerous ways in which economic regulators may contribute to environmental goals by providing an overview of the tools connecting regulators' functions to environmental outcomes. Each regulatory tool and its potential use to further environmental sustainability and the green transition is described and illustrated through examples and case studies.

The regulator's toolbox

Several functions that economic regulators routinely carry out can have important impacts on environmental outcomes and are therefore potential tools to contribute to environmental goals.

The decisions and actions that regulators take when fulfilling their various functions may directly or indirectly impact environmental outcomes, for example through monitoring and enforcing compliance (direct) or shaping investment conditions to incentivise investment in green technologies (indirect).

Generally, regulators achieve their goals by influencing the behaviour of operators, businesses and consumers. To achieve this objective, regulators have similar tools to other government bodies, for example they may be empowered to enforce compliance, set economic incentives, change administrative processes, or provide information. Some of these tools are more applicable to, or more often used in relation to either operators or consumers, and some may be classified as “hard” regulation (e.g. mandatory standards or prohibitions) or “soft” regulation (e.g. communication campaign). Considering the typical functions of economic regulators in network sectors, this chapter focuses on the following tools: price regulation and tariff-setting; the regulation of network infrastructure; influencing consumer behaviour; influencing operator behaviour; collecting, analysing and communicating data; the monitoring and enforcement of standards or sector targets; and more broadly the choice of regulatory approach.

Whilst not all regulators hold the legal powers to consider environmental sustainability in their decision making, more than half of those that do report their powers apply in decisions relating to regulating prices or issuing guidelines and/or codes of conduct. Close to half (45%) of regulators may consider environmental sustainability when issuing or revoking licenses or authorisations. Whilst a third or more (between 33% and 39%) report having the powers to consider environmental sustainability when issuing industry standards, issuing consumer standards, or providing binding guidance or reviewing and/or approving contract terms (Figure 2.1). Around one-third (31%) of regulators apply powers to consider environmental sustainability in sector-specific scenarios (see To what extent are economic regulators utilising these tools today?).

Choice of regulatory approach

Before choosing to implement price regulation, collect data, launch communications, or pursue any of the other regulatory tools discussed above, economic regulators need to identify the overarching approach to be taken and ensure their actions are appropriate for meeting the applicable regulatory objectives. Whilst the rationale and aims of environmental regulation will typically be defined by government and set out in primary legislation, the exact approach taken to achieve regulatory objectives may be left to the discretion of regulators, or defined through secondary processes to which regulators provide input. When providing this input, regulators will need to understand whether traditional prescriptive regulatory approaches are suitable and ask questions about how their roles in regulatory design and delivery can be best managed. For managing the complexity associated with multiple objectives relating to sustainability, networks and consumers, regulators may benefit especially from the use of outcome-based, risk-based, and agile approaches, including experimentation.

For example, **outcome-based** rather than traditional input-based regulatory approaches may be more appropriate when there is a need to encourage innovation or retain flexibility, due to uncertainty on the part of the regulator or regulated entity. This approach may still involve the setting of targets or standards as part of the outcome framework, but these will naturally be more forward-looking and strategic than the compliance requirements regulated entities typically face. An outcome-based approach allows regulated entities the flexibility to find the most efficient and effective ways to achieve regulatory goals, which may be particularly appropriate in periods of transformation or crisis. The energy market is a clear example where specific outcomes relating to access, affordability and decarbonisation need to be managed and

where periods of uncertainty, or volatility, for consumers and operators may merit a more flexible regulatory approach.

Relatedly, an **agile regulatory approach** may be particularly applicable to the green transition as regulations will need to be adaptable to new technologies, business models and market developments. Agile regulatory governance involves adapting regulatory frameworks and processes to be more flexible, responsive and iterative. Overall, an agile approach aims to promote regulatory effectiveness and efficiency by embracing uncertainty, promoting innovation, and fostering collaboration between regulators and regulated entities.

Regulatory experimentation in the form of rapid prototyping and testing of regulatory interventions fits within this agile approach (OECD, 2024^[1]). Regulatory experimentation through regulatory sandboxes, pilot projects and pilot regulations can also be used to harness innovations that will have a beneficial environmental impact (Box 2.1).

Box 2.1. Regulatory experimentation in France's energy sector

The energy sector is changing rapidly. The achievement of global objectives to reduce CO₂ emissions requires a massive development of electricity production from renewable energies. The often-intermittent nature of these renewable energies means that the electricity system must be made more flexible, to always ensure the right balance between supply and demand. At the same time, the development of new uses such as electric vehicles or self-consumption requires more intelligent and flexible networks. It is essential that the regulatory framework evolves to support these changes in the energy sector. The law of 8 November 2019 on energy and climate, known as the “Energy-Climate Law”, introduced a “regulatory sandbox” in the French energy sector. This regulatory sandbox allows France's Energy Regulatory Commission (*Commission de régulation de l'énergie*, CRE) to grant exemptions to the conditions of access to and use of networks and facilities for the experimental deployment of innovative technologies or services in favour of the energy transition and smart grids and infrastructures. This new system provides a framework adapted to projects that allow testing of innovations that would ultimately require changes to the applicable regulatory and legislative framework.

Source: Information provided by CRE, 2023.

Risk-based approaches can help prioritise regulatory resources and interventions based on the level of risk posed by different activities, industries, or entities. This approach may be particularly helpful where regulators are faced with competing objectives and limited resources – a risk-based approach aims to allocate resources where they will have the greatest impact in managing the relevant defined risks, which may include risks to safety, health, or the environment. Risk assessment, risk management, and prioritisation techniques are useful to decision-making at many levels of an organisation. In the context of designing a regulatory approach, these techniques can help identify proportional measures to mitigate risks and choose between the applicability of, for example, outcome-based and input-based approaches.

Price regulation and tariff-setting

Price regulation describes interventions to set or control prices for goods or services in a market. In the network and utility sectors, tariffs generally refer to the regulated prices that operators charge for services, such as the delivery of electricity, gas, and water, or for accessing infrastructure. Tariffs can take various

forms and can be differentiated and targeted at different stages of the value chain. In the energy sector, tariffs may impact the production, transmission, distribution, or consumption of energy. In some cases, tariffs are used to incentivise certain behaviour, recover costs for a specific purpose, or address social issues, such as access and affordability. Often, tariff-setting represents a mechanism through which externalities (such as the costs associated with pollution or carbon emissions) are internalised, and passed through to end-users.

Economic regulators' role in directly regulating prices (e.g. through price floors and price caps) or setting tariffs has the potential to shape environmental outcomes. Price is an important mechanism for influencing supply and demand factors and can be leveraged to promote certain behaviour on the part of both operators and service consumers. Approximately 85% of economic regulators report a direct role in price regulation and tariff setting (OECD, forthcoming¹). Furthermore, results from the green governance survey show approximately 54% of regulators (57 of 106) have the power to consider environmental sustainability in decisions relating to price regulation, though this ability is more prevalent among energy and water regulators.

In the energy sector, the use of dynamic tariff structures could increase the flexibility of energy systems – incentivising demand to respond to periods in which there is a high supply of renewable resources. In the water sector, tariff setting methodologies can also be used to encourage both efficiency and sustainability outcomes, largely by acknowledging the costs associated with meeting environmental outcomes and allowing tariffs to become more cost-reflective. For example, Latvia's PUC has amended the water tariff methodology to recognise the costs associated with energy efficiency and energy neutrality improvement measures (Box 2.2). Similarly, in Italy, the water sector regulator ARERA has recently approved a new tariff methodology that recognises costs associated with four key environmental sustainability objectives, including energy efficiency and energy recovery, plastic pollution, and water re-use (see Annex A).

Tariff-setting is also a tool that applies in the context of infrastructure regulation. Economic regulators can address infrastructure challenges through tariff setting arrangements in a number of different ways. Italy's ARERA, in its revised water tariff methodology, has taken a wider view of the value stream to incorporate critical infrastructure and has allowed fixed and variable costs associated with the management and maintenance of large upstream infrastructure to be considered as resource costs. Italy's transport regulator ART employs tariff modulation to regulate pollution levels across air, road and rail traffic and requires tariff levels to be reduced (i.e., limited cost recovery) where annual sustainability targets have not been met by operators (see Annex A). Other regulators are utilising a hybrid approach that incorporates tariff-setting alongside access rules and other incentive schemes (Box 2.3).

Box 2.2. Accounting for energy efficiency investments through tariff-setting in Latvia's water sector

Since 9 November 2022, in Latvia's water sector, according to the Methodology for Calculating Tariffs for Water Management Services, regulated service providers have the obligation to reduce the costs included in the draft tariff by the unforeseen revenue and the right to increase the costs included in the draft tariff by the unforeseen costs incurred in the previous period. The unforeseen costs and revenue originally consisted of changes in payments if one public water management service provider procured water management services from another public water management service provider, and changes in payments for the purchase of electricity, heating fuel, thermal energy, and gas.

On 28 December 2023, PUC made new amendments to the Methodology by adding the possibility to include in the unforeseen costs the capital costs (depreciation of fixed assets and return on capital) and credit interest payments and repayment of principal sum of the previous period (not longer than two

years) related to energy efficiency improvement and energy neutrality promotion measures (Methodology p17). Usually, those measures include installation of solar panels, replacement of electrical equipment with more energy-efficient ones and insulation of buildings. Up till the end of 2023 capital costs and credit payments of such measures could be included only in the next draft tariff according to the residual value (as it is now with all the other capital costs). As a result of these latest amendments, service providers can recover the capital costs of the previous period related to the measures that were implemented with the aim to save energy resources and reduce the operational costs. It is also a kind of incentive not to delay the implementation of energy efficiency improvement and energy neutrality promotion projects.

Source: Information provided by PUC, 2024.

Tariffs also present a source of revenue which, with consideration for budgetary context and best practices, may be utilised for the promotion of green innovation and protection of vulnerable consumers, for example by creating a redistributive fund for use in periods of stress. With the costs of green transition often being passed on to consumers through tariffs, it is valid for regulators to consider distributive impacts and the need for addressing resulting inequalities in access.

Box 2.3. Combining access and tariff regulation to increase biomethane production in France

In France, biomethane production targets have been met thanks to a favourable framework, which CRE supports and is tasked to implement. To fulfil its potential and play its role in the decarbonisation of the gas sector, biomethane production needs to access the network, access the market, and be profitable. In this regard, the legal and regulatory framework consists of 3 main instruments:

- A “right to injection” principle, which eases the access of biomethane production plants to the gas network;
- A regulated feed-in tariffs system for small to medium-sized installations, which provides economic viability of the sector.
- New schemes for bigger installations that will be soon implemented: tenders and biomethane production certificates.

First, CRE has acted on connection zoning: CRE has already validated 369 zonings and around 468 reinforcement works (over EUR 253 million in investments for distribution and around EUR 90 million for backhauls). In the medium term, over 1 200 projects (1,288 to date) could be carried out based on these validated zones, representing over 27.78 TWh.

Second, biomethane producers have also been benefitting since 2011 from a feed-in tariff. Since the end of 2020, the feed-in tariffs have been limited to small installations (< 25GWh). Production subsidies are guaranteed in France for 15 years, span from EUR 78 to EUR 188/MWh depending on the size of the production facility (maximum production capacity) and on the nature of the waste or organic material used; and have increased a lot during the last months because of the inflation and of the cost of electricity.

Third, for large-scale facilities (25 GWh annual production) which currently cannot receive public support, new tendering was implemented in February 2024.

From 2026, biomethane production certificates (an extra-budgetary mechanism) will also be implemented. Producers who do not receive public support will receive biomethane production certificates (number depending on volumes produced): these certificates will then be sold to gas suppliers with an obligation to purchase a certain volume depending on their level of gas consumption.

Source: Information provided by CRE, September 2024.

Revenue-setting and price controls

If not becoming directly involved in setting prices and tariffs, economic regulators may still incentivise environmentally sustainable decisions and investment by setting the overarching framework governing operators' allowed revenues. So called price control frameworks can take various forms depending on the attributes of the sector, the ways prices are established in the market, and the objectives the regulator has in mind to achieve through the framework. The main distinction is between rate of return and incentive-based models. Regardless, these frameworks can be adjusted to consider the investments required to operate the network more sustainability, including more significant infrastructure change.

This is a complex and technical area of regulation where stability is also important to allow operators to plan effectively. Economic regulators are considering how the requirements of the green transition can therefore be best implemented within price control frameworks, which are often set for a period of around 5 years, with minimal interim adjustment periods (Box 2.4).

Box 2.4. Ofgem's approach to addressing future needs through price control regulation

Ofgem is the national independent regulatory authority for gas and electricity markets in Great Britain. Ofgem's role is to protect consumers now and in the future by working to deliver a greener, fairer energy system. Ofgem operates within a statutory framework set by Parliament, which establishes the authority's duties and powers. Whilst government is responsible for setting policy for the sector, Ofgem has a clear role to play to support policy issues such as decarbonisation.

Adapting price control frameworks for the green transition

Ofgem is consulting on proposals to change the design of the price control framework that helps regulate the electricity and gas transmission and distribution networks. In the UK, decarbonisation goals will require a major transformation of the energy system, including investing, upgrading and relocating capacity, and reconsidering use of the existing network based on forecast needs.

Whilst price controls will still need to address traditional outcomes for consumers – high levels of service and everyday operation and maintenance delivered at efficient costs – and provide certainty for investors to reduce the cost of capital, they are also a tool that can be adapted to ensure the infrastructure that is needed is built before the demand for it materialises, and in an efficient manner.

In the UK, system planning will need to move away from the “connect and manage” regime that has led to high constraint costs and delayed connections to an “invest and connect” approach following system operator plans, which also meet net-zero targets at least cost to consumers. Alongside changes to network price controls, regulation of network charging, grid connection, and the ways in which planning interacts with energy markets will all need to be adapted. Ofgem's aim therefore, is to make effective whole system plans the foundation of future price controls in gas and electricity. Furthermore, changing

technology, digitalisation, and the increased availability of information makes new and alternative arrangements possible, and more attractive.

Future network price control options

Ofgem has proposed three alternatives for future network price controls.

The current *ex ante* RIIO (Revenues = Incentives + Innovation + Outputs) framework has several built-in mechanisms to deal with change and uncertainty during the control period, which could be incrementally adjusted to meet future needs. This is included as one archetype in Ofgem's consultation ("*ex ante* incentive regulation"). However, this kind of framework remains best suited to deal with low value/high volume expenditure over a given period, rather than reacting dynamically to high value/low volume strategic expenditure. There is also a risk that further adjustments to this framework make it burdensome and complex to configure and manage, leading to misaligned incentives and network companies being distracted from the key task of delivering transformation for the benefit of consumers.

Therefore, Ofgem also propose two further price control archetypes. A "Plan and Deliver" archetype relies on information asymmetries being reduced by the needs being defined by the new strategic planning processes, with economic regulation taking advantage of this to make intelligent use of competitive tendering or other forms of efficient procurement to ensure that customers benefit from low costs. A 'Freedom and Accountability' archetype relies on increased ease of monitoring to allow companies bounded freedom in their choices: network companies pass costs through where they can demonstrate *ex post* that their expenditure forms part of an agreed plan to achieve net zero objectives at low cost. These alternatives may be more relevant because of the changed landscape presented both by institutional changes (Future System Operator), and opportunities from digitalisation.

For more information on how these archetypes may apply to electricity and gas transmission and distribution networks, and the detailed analytical framework, please refer to Ofgem's consultation document.

Source: [Consultation on frameworks for future systems and network regulation: enabling an energy system for the future | Ofgem](#).

Regulation of network infrastructure

Looking across the lifecycle, infrastructure assets could be better designed, delivered, operated, and removed, from a sustainability perspective, considering environmental impact as well as social and economic impacts. As institutions with responsibilities in the governance of network sector infrastructure, economic regulators will need to respond to these heightened risks and new objectives, with many countries considering infrastructure investment as, simultaneously, a way to design-in resilience and a lever to achieve the green transition (e.g., resilient renewable energy sources, nature-based solutions for safeguarding physical infrastructure, green building techniques for reduced resource-use and long-term energy efficiency).

Economic regulators are not the only actors involved in the governance of infrastructure but may interact with the operators of infrastructure throughout the infrastructure's lifecycle — from the identification of needs, through planning, construction, and maintenance to its eventual decommissioning. There are therefore various moments when regulators may intervene to ensure more environmentally sustainable outcomes. Economic regulators are rarely involved in the detailed decision-making at each stage of the infrastructure project. Rather, regulators seek to influence the decisions taken by operators and investors to achieve efficient and effective outcomes (OECD, 2017^[2]). For example, standards accompanied by an appropriate incentive framework of inspections and penalties can ensure proactive asset maintenance, and the proper planning and supervision of infrastructure decommissioning and site restoration. Linking to

their role in price regulation, economic regulators may be involved in monitoring the prices and quality of regulated monopoly assets based on an agreed level of service, which may be defined to include or manage outcomes and risks related to environmental sustainability.

Infrastructure planning and lifecycle management

Regulators that have the function to approve infrastructure investment plans could ensure that such plans are coherent and aligned with environmental goals and targets, such as greenhouse gas (GHG) emissions reduction. This could involve requiring comprehensive Environmental Impact Assessments at the infrastructure planning stage that account for a broad range of environmental topics and impacts over the lifetime of the asset's use. Planning and designing for environmental sustainability can be promoted through the tendering and concession process, or contractual drafting process if there is a clear link between the governing contracts and the management of the infrastructure. This is the case in Brazil's road and rail transport sectors where concession contracts link to environmental licences and indicators (see Annex A – ANTT). As part of its task of processing calls for tenders for new renewable energy capacity, such as solar PV, the French energy regulator (CRE) has developed a tender evaluation methodology that allocates points based on various criteria (including the project's price and environmental impact), with a significant portion of points dedicated to the embodied carbon content of the solar panels and equipment used. This approach incentivises developers to select equipment with a lower carbon content and directly impacts the selection of solar panels based on their manufacturing origin due to the differing carbon emissions associated with their production.

Regulators can also promote the re-use of existing physical infrastructure, the co-ordination of civil works and the co-location or sharing of infrastructure to reduce environmental impact (WIK-Consult and Ramboll, 2021^[3]) (OECD, 2022^[4]).

As noted, economic regulators may be involved too in monitoring the prices and quality of regulated infrastructure assets based on an agreed level of service, during the design, implementation or adjustment of price control frameworks, for example. As such, economic regulators are required to audit the asset base and understand the asset owner's future capital and operating expenditure and the risks associated with those infrastructure assets. For key infrastructure assets across the water, energy, e-communications, and transport sectors, considering the lifetime of assets and the costs of retrospective maintenance (or "retrofitting"), the most efficient way to mitigate the risks of climate change, which will be felt incrementally and fully materialise in two decades or more, is to account and plan for these impacts in advance, at the time of construction and design of regulatory controls. For this reason, some regulators are already taking action to review price control frameworks, which are typically set for a relatively short-term of around five years, with limited interim adjustments. A challenge that may arise for regulators in this regard is around the justification for greater incentives and the recovery of costs that are required today, the benefits of which will materialise beyond the framework period and be enjoyed by future consumers.

Infrastructure access and use

In some sectors, regulators' functions in approving access to infrastructure and resources could be used to promote environmental objectives. For example, spectrum management functions held by some e-communications regulators may offer possibilities to promote environmental sustainability objectives, for example by assigning radio spectrum rights to uses that enable reductions in GHG emissions, such as smart grids (WIK-Consult and Ramboll, 2021^[3]) (OECD, 2022^[5]).

Regulators are in a unique position to provide input, based on their experiences designing, implementing and enforcing regulation, into reviews of the regulatory stock. Regulators can recommend or take responsibility for steps to adapt existing regulatory requirements to ensure flexibility and the removal of burden from the regulatory processes surrounding infrastructure development (Box 2.5). Doing so can promote the acceleration of green infrastructure deployment across sectors. In the energy sector, in many

jurisdictions, there is an urgency to accelerate the integration of renewable energy sources and address issues that delay grid connection, such as the need to invest to accelerate grid expansion or the removal of unnecessary burdens and delays from the licensing and operational testing process. Action in this area could amount to a saving of 58 gigatons CO₂ emissions. In some countries, such as Germany, the regulator has become more deeply involved in transmission line siting, with responsibilities to approve the overall framework for network expansions, revising and approving the network development plans of transmission system operators. In this case, parliament also assess the environmental impact of transmission projects and may allow early construction to begin, before final planning approval is obtained (RETA, 2024^[6]).

Box 2.5. Encouraging investment in geothermal energy in Hungary

Europe's energy shortage is significantly impacting citizens and industries, highlighting the urgent need for efficient, green, and secure energy solutions. One promising alternative is geothermal energy, which Hungary is leveraging to achieve energy security. Recognising the potential of geothermal energy, the Supervisory Authority for Regulatory Affairs set a target for 2022 to streamline its use. This initiative aims to reduce administrative burdens and address project management bottlenecks.

To promote this, a one-stop shop system was introduced on 1 March 2023, centralising responsibilities under the Mining Authority. This system simplified and accelerated the administration of geothermal projects by maintaining a public register of exploration areas. Key measures included standardising procedures for exploration, licensing, and regulatory supervision, and reforming rules to expedite project preparation and implementation.

Additionally, the Supervisory Authority for Regulatory Affairs introduced instruments to boost geothermal energy use. A new complex research program was launched, focusing on data-driven approaches to support market needs and feasibility studies for investors. Under the new regulations, geothermal energy extraction requires a fixed-term contract with the Mining Authority, conditioned upon an agreement for its use and the reinjection of extracted water whenever feasible. Prior to these reforms, the complexity of procedures hindered geothermal project initiation, involving multiple authorities, and complicating the promotion of sustainable green energy.

Source: Information provided by MEHK, 2024.

Influencing consumer behaviour

Regulators can use communications, awareness raising and other behaviourally informed techniques to encourage consumers to adjust their consumption patterns to reduce environmental impact (OECD, 2019^[7]). For example, consumers shifting the timing of their energy use (flexibility) will play an important part in the transition to net zero GHG emissions (Ofgem, 2013^[8]) (Ofgem, 2021^[9]). Regulators can encourage the use of smart appliances or smart heating that help consumers use energy flexibly. Informing and empowering consumers with environmental information (“sunshine regulation”) could also create incentives for operators to move to more sustainable practices. At the same time, informing and empowering consumers can enable them to be better protected against unfair practices, such as greenwashing, a focus of recent legislation within the European Union (Box 2.8).

Approximately 47% of economic regulators report duties relating to issuing consumer standards (OECD, forthcoming²). Furthermore, results from the green governance survey show approximately 33% of regulators (35 of 106) currently have the power to consider environmental sustainability when issuing such standards. Relatedly, 36% of regulators may consider environmental sustainability when providing binding guidance or approving contract terms between regulated actors and consumers or other market actors.

Influencing operator behaviour

Aside from tariff and price regulation, different tools and techniques to influence operators' behaviour can be envisaged. Regulators could help identify and encourage environmentally friendly practices developed by the industry with relevant authorities (BEREC, 2022^[10]). Regulators can develop codes of conduct to steer regulated entities towards more sustainable practices, or design reward tools to incentivise utilities to offer products and services with positive environmental externalities (Box 2.6), such as reducing GHG emissions (WAREG, 2021^[11]). In these cases too, the use of sunshine regulation may forewarn operators and provide the incentives and necessary encouragement to adopt more sustainable practices.

Approximately 78% of economic regulators report duties relating to issuing industry standards (OECD, forthcoming²). Results from the green governance survey show approximately 39% of regulators (41 of 106) currently have the power to consider environmental sustainability when issuing such standards. Relatedly, 45% of regulators may consider environmental sustainability when issuing or revoking licenses or authorisations, and 52% when issuing guidelines or codes of conduct.

Box 2.6. ART's use of incentives in public transport service contracts in Italy

In Italy, while ecological transition constitutes a key axis of the national *Recovery & Resilience* and 2030 *Energy and Climate* plans, no specific duties or mandates are placed on the transport regulator concerning environmental sustainability.

However, some regulatory tools can be deployed to promote more environmentally sustainable behaviour. ART has provided for regulatory incentives to apply in several areas falling within its remit. To be enacted, these measures must be incorporated in contractual agreements between third parties (awarding authorities/regulated companies).

Regulating public service contracts

Concerning the regulation of services, incentives apply in different phases of the administrative procedure leading to the award and in the performance of the contract concerning public transport services. Starting with planning, ART's regulation on the design of service supply areas, including transport by rail, bus and waterborne transport, provides that "*the most sustainable multimodal solution should be preferred.*" Additionally, solutions alternative to public financing, such as pollution charges and congestion charges, should be sought to compensate for service contracts. With regard to the tendering phase, for the award of transport services by bus, efficiency KPIs may include environmental standards upon which a pricing/penalty system is applied. In addition, in the case of transport by rail, tariff updates are conditional, among others, upon the efficient use of energy and fuels. Similar provisions are under way in transport by bus.

Source: Information provided by ART, 2024.

Note: Please refer to full case study submissions provided in Annex A.

Data collection and analysis

Regulators' detailed knowledge and understanding of the sectors they oversee rests on the data and information that they collect. Furthermore, for regulators' decisions to remain evidence based and to act on emerging trends, or remedy any harmful market practices regulators require a detailed and up-to-date view of the sector. With regards to the environmental sustainability of the sector, survey results indicate

that 45% of regulators (82 of 184) hold the legal power to collect relevant data, with only 21% regularly collecting such data.

Early work on environmental sustainability by European e-communications regulators has concentrated on data and measurement issues, in particular to understand the impact that the sector has on environmental sustainability (BEREC, 2022^[10]) (Box 2.7). In this regard, many regulators have stressed the potential role that they could play in developing common methodologies to ensure comparable and reliable data (WIK-Consult and Ramboll, 2021). Regulators could also initiate studies into relevant aspects of environmental sustainability to expand the knowledge base – a recent study by Finland’s Traficom implemented a pilot data collection on the energy consumption of networks for the largest telecommunications operators in the country (see Annex A).

Box 2.7. Arcep’s Achieving Digital Sustainability Surveying

Measuring environmental impact to identify levers for action

The French Government tasked the communication regulator, Arcep (Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse), and the agency for ecological transition (Agence de la transition écologique, ADEME), to carry out a study quantifying the current and future environmental footprint of digital technologies. The first two volumes of the study were delivered in January 2022 and assessed the current impact of digital technologies on the environment. In the study the two agencies made a life cycle assessment (LCA) of the environmental footprint generated by one year of digital (uses and goods) in France in 2020 applying a multicriteria, multi-tier and multi-stage methodology. A prospective assessment of the evolution of footprints to 2030 and 2050 was also provided, identifying a number of levers for action to initiate and amplify the development of digital uses that are less carbon- and resource-intensive.

Arcep began collecting environmental data from the four main telecoms operators in 2020 (the only players for which it had collection powers at that time), which led to the publication of the first edition of the annual survey in April 2022, covering 3 categories of indicators (GHG emissions, network energy consumption and the sale, collection, recycling and reconditioning of mobile phones). In 2021, the data collection was enriched with new indicators on the reconditioning and recycling of Internet boxes and TV set-top boxes, and led to the publication of the second edition of the annual survey in April 2023, still covering telecoms operators.

Source: Information provided by Arcep, 2024.

As noted in Chapter 1, the prevalence of environmental issues and their interaction with regulators’ traditional areas of activity are creating new challenges. One noticeable example in the realm of consumer protection is the issue of greenwashing (Box 2.8), which has arisen since companies and service providers have become aware of customer concerns around environmental impact and their preferences for ‘green’ or “sustainable” products. Building awareness among businesses and consumers on the regulations against unfair practices is one way to combat this issue. Regulators may also collect and share information relating to the environmental claims of service providers and operators to allow consumers to make more informed choices. In this regard, data collection and sharing is in itself a “soft” mechanism for influencing consumer and operator behaviour, as well as being a process that underpins the regulator’s decision-making in relation to other tools or mechanisms that may be classified as “hard” regulation (e.g. standards and prohibitions).

Box 2.8. Protecting consumers from unfair practices and greenwashing – examples from the EU and Australia

Greenwashing by Businesses in Australia

Building on its functions established by the Competition and Consumer Act (2010), the ACCC conducts research on consumer-related matters and informs consumers about their rights and obligations under Australian law. Thus, the ACCC plays a critical role in educating businesses and consumers, accepting reports on misleading claims, and conducting research to guide consumers. However, the ACCC does not resolve individual disputes or provide legal advice, focusing instead on broader compliance and enforcement.

In this light in December 2023, the ACCC published its Greenwashing by Businesses in Australia report, providing guidance for businesses who make environmental claims. The report states that businesses must ensure their environmental claims are accurate and substantiated, avoiding broad and unqualified statements. Important information should not be hidden, and any conditions or qualifications should be clearly explained. Claims should use clear language, and visual elements should not mislead. Transparency about sustainability efforts is crucial to maintaining consumer trust.

EU Directive on greenwashing

In January 2021, the European Commission and national consumer authorities released the results of a website screening (“sweep”) to identify breaches of EU consumer law, focusing for the first time on greenwashing. This analysis covered various business sectors such as clothes, cosmetics, and household equipment. The findings revealed that in 42% of cases, environmental claims were exaggerated, false, or deceptive, potentially qualifying as unfair commercial practices under EU rules.

The sweep found that in more than half of the cases, sellers did not provide adequate information. In 37% of cases, claims included vague and general terms like “conscious,” “eco-friendly,” and “sustainable”, giving unsubstantiated impressions of environmental benefit. Additionally, in 59% of cases, traders did not provide easily accessible evidence to support their claims. This lack of transparency highlights the need for stricter regulations, as 86% of EU consumers desire better information on product durability.

In response, the new EU Directive amends the Unfair Commercial Practices Directive (UCPD) to introduce stricter rules on environmental claims; the Directive must be incorporated into national legislation by March 27, 2026, and enforced starting September 27, 2026. The Directive defines misleading environmental claims as any commercial communication implying a product or trader has a positive or less damaging environmental impact without substantiated evidence. The aim is to ensure that environmental claims are accurate and verifiable, promoting consumer trust and genuine sustainability in the market.

Source: [Making environmental claims: A guide for business](#); Directive EU 2024/825 of the European Parliament and of the Council.

Monitoring and enforcement of standards and targets

Economic regulators may have functions to monitor whether regulated entities meet environmental standards, or are compliant with other policies relating to environmental sustainability, which will be underpinned by a regulators ability to collect and analyse data as note above. Colombia’s transport regulator (Aerocivil) verifies compliance amongst aeronautical officials, airline companies, workshops, training centers and users of the air transport sector in general with requirements originating in legislation.

Costa Rica's energy regulator, ARESEP, has a duty to verify providers' compliance with environmental protection obligations and sanction in the case of non-compliance.

In the water sector, regulatory authorities can be tasked with monitoring whether water utilities meet standards for storm discharge flows, which have been put in place to protect the environment and public health. In fact, many standards used in the water sector are closely related to issues of environmental sustainability, typically being concerned with sustainable use, pollution, and outcomes for human health (for example, see the macro-indicators set by ARERA – Annex A). In Brazil's transport sector, new highway concession contracts are aligned with the 17 Sustainable Development Goals and the Paris Agreement and ANTT closely monitors environmental performance (Box 2.9). Similarly, in Italy, the ART may include environmental standards in tenders and service contracts. In some jurisdictions, reflections are ongoing whether the goal of achieving climate neutrality could be monitored by sectoral regulatory authorities (European Commission, 2022^[12]).

Other regulators monitor compliance with policies relating to environmental sustainability and may have enforcement powers to sanction non-compliance.

Box 2.9. Data management and indicators for sustainability at Brazil's ANTT

ANTT has a data management approach to measure sustainability, which incorporates an indicator called IDA, which evaluates various aspects of environmental performance.

ANTT's actions include granting concessions for highways and railways, providing permits and licenses for interstate and international transportation, and registering road freight transportation companies. Before granting concessions, ANTT requires a social environmental study to assess environmental risks and, even after obtaining the concession, highway concessionaires must provide documentation showing they are taking actions to obtain necessary environmental licensing. New contracts are aligned with the 17 Sustainable Development Objectives and the Paris Agreement.

To influence the behaviour of operators, Brazil's National Agency of Land Transportation (*Agência Nacional de Transportes Terrestres*, ANTT) uses an indicator of environmental performance (*Índice de Desempenho Ambiental* – IDA) that considers water and effluent use and treatment, solid waste, biodiversity, environmental accidents, governance, culture and community, energy efficiency and emissions. The indicator is currently used for highways and railway concessions and there are plans to develop an indicator similar to IDA for the road freight transportation. Highway concessionaires are required to report on their social and educational actions, and ANTT monitors their progress in obtaining environmental licenses and taking specific actions to decrease environmental impact. The agency monitors concessionaires' environmental progress through biannual reports and monthly meetings with environmental entities. ANTT also requires highway concessionaires to report on their social and educational contributions, which are then made public on the regulator's website. Railway concessionaires also voluntarily report on good environmental practices. All of these activities involve collecting and managing sustainability-related data.

The implementation of the IDA by ANTT is part of the Social Environmental and Territorial Agenda of the Ministry of Transport and aims to verify the qualitative evolution and socio-environmental commitment of the sector and shall serve as a parameter to evaluate the efficiency and quality of environmental management in transport infrastructure projects, evaluating and stimulating good practices in socio-environmental management. The adhesion to the indicator is voluntary. Nevertheless, in 2022, 18 of the total 22 highway concessionaires and 11 of the 16 railway concessionaires and sub-concessionaires agreed to be evaluated.

Source: Information provided by ANTT, 2023.

Regulators' actions around data, monitoring and enforcement have already led, naturally, to the development of environmental sustainability indicators (BEREC, 2023^[13]). Such indicators could be considered as a common tool in all sectors to build momentum and a common understanding of progress. However, indicator development and use rests first on the availability and accessibility of data. In its first sustainability report, BEREC noted the significant challenges, particularly the scarcity of data and the need for unified methodologies and standards to evaluate the environmental effects of digital technologies (BEREC, 2022^[10]). BEREC's most recent report considers sustainability indicators in more detail and summarises the activity of e-communications regulators (Box 2.10).

Box 2.10. Sustainability indicators for electronic communications networks and services

In June 2022, BEREC released its initial sustainability report (BEREC, 2022^[10]). This report revealed that some regulatory authorities have actively gathered data on the environmental impact of digital services. Nonetheless, the report also identified significant challenges, particularly the scarcity of data and the need for unified methodologies and standards to evaluate the environmental effects of digital technologies.

BEREC's second report on sustainability (BEREC, 2023^[13]) focuses on sustainability indicators for electronic communications networks and services, collating information on current regulatory and non-regulatory initiatives at the European level, considering new data on the actions of regulatory authorities, and the results from stakeholder workshops and industry player questionnaires which indicate support for the development of different indicators.

BEREC takes the first experiences of NRAs on environmental data collection and the contributions of the industrial players and classifies indicators into three preliminary categories:

- Indicators already collected by NRAs and are presented by the surveyed companies as relevant (high or medium), such as energy consumption, carbon emissions, water consumption or e-waste. These indicators are characterised by a higher degree of maturity as they are already collected and relevant methodologies and studies have been published, even if challenges remain, for instance in calculating Scope 3 emissions.
- Indicators not yet collected by NRAs but which benefit from a medium support from the industry.
- Indicators with low support and adoption from the industry. Although, some of these indicators could still be considered relevant for further research in the context of the EU's environmental targets.

Source: (BEREC, 2023^[13]).

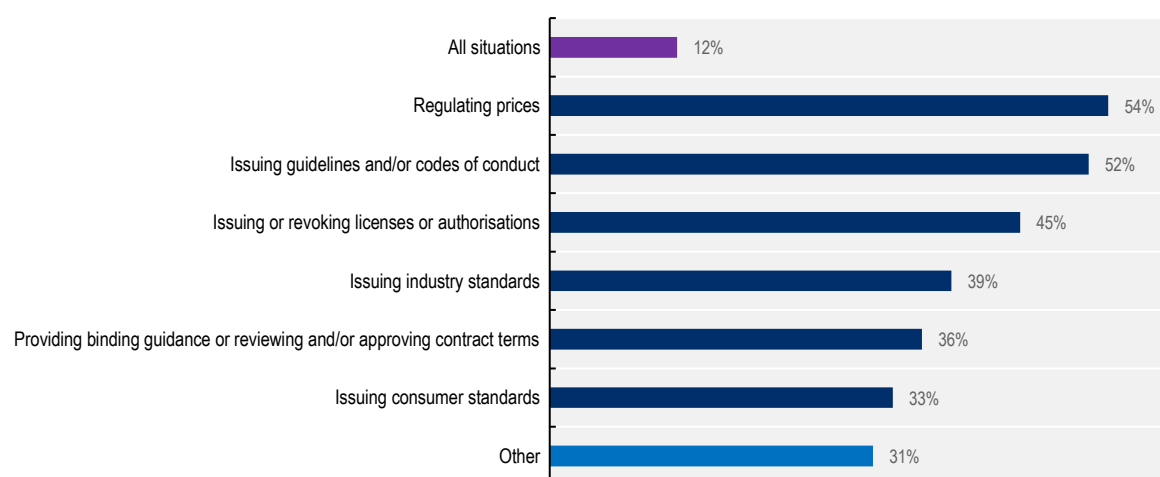
To what extent are economic regulators utilising these tools today?

As demonstrated through the examples and case studies shared above, regulators with the powers to consider environmental sustainability in their decision making are already employing these tools. The qualitative examples illustrate regulators are active in utilising all of the tools discussed, and this is supported by the results of the green governance survey. However, it is important to note that not all regulators hold these powers – around 58% of regulators report they hold the legal power to consider environmental sustainability in regulatory decision making, but 42% lack these powers.

More than half of regulators with the legal powers to consider environmental sustainability report these powers apply in their decisions relating to regulating prices or issuing guidelines and/or codes of conduct. Fifty-four per cent of regulators with the legal powers to consider environmental sustainability state those powers apply when making decisions to regulate prices, and for 52% when issuing guidelines and/or codes of conduct. Close to half (45%) of regulators may consider environmental sustainability when issuing or revoking licenses or authorisations. Between 33% and 39% report having the powers to consider environmental sustainability when issuing industry standards, issuing consumer standards, or providing binding guidance or reviewing and/or approving contract terms (Figure 2.1). Around one-third (31%) of regulators apply powers to consider environmental sustainability in sector-specific scenarios.

Figure 2.1. Proportion of regulatory authorities with the legal power to consider environmental sustainability in regulatory decision making

By decision area



Note: Only regulators who responded they have the legal power to consider environmental sustainability in their decisions are included in this analysis – the relevant sample consists of 106 regulatory authorities.

Whilst most regulators (86%) specified holding powers to consider environmental sustainability in relation to at least one of the defined decision-making situations, some regulators specified only “other” situations, which were mostly related to sector-specific decisions. For example, the energy regulator of Great Britain (Ofgem) considers environmental sustainability in decisions relating to electricity network charging and incentives. In Portugal, the e-communications regulator (ANACOM) considers the environmental sustainability impact of infrastructure planning and access and sharing rules, whilst the air transport regulator (ANAC) noted its role in implementing carbon taxation rather than direct price regulation in the sector. Only 13 regulators (12%) reported that their legal powers applied to all types of decisions (Figure 2.1). On average, regulators consider environmental sustainability in three of the six defined decision areas, and this is consistent across sectors.

The extent to which regulators can use these functions to attain environmental goals will depend on governance arrangements. For example, lacking or unclear legal mandates for many regulators to intervene regarding environmental sustainability may limit potential action beyond information gathering and knowledge building, though even information gathering can be shaped by regulator’s legal powers and perceived remit. Furthermore, economic regulators would not be able to promote environmental goals using the tools mentioned above if doing so would compromise the attainment of their primary objectives

as defined in legislation (WIK-Consult and Ramboll, 2021^[3]). These considerations relating to regulators' mandates, legal powers and the management of trade-offs, alongside other important governance arrangements, are the central topic of the following Chapter 3.

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Notes

¹ A separate OECD publication on the Governance of Sector Regulator indicators and related data is forthcoming, expected to be available in Q4, 2024.

² A separate OECD publication on updated Governance of Sector Regulator indicators and related data is forthcoming, expected to be available in Q4, 2024.

3

Getting governance of regulators right for the green transition

This chapter connects economic regulators' contribution to green transition and the environmental sustainability of the sector(s) they oversee to governance arrangements. The chapter focuses on both internal governance, the arrangements and tools the regulator itself chooses to implement (e.g., the structuring of internal resources, adaptation of existing processes, and capacity-building efforts), and external governance, the arrangements put in place or tools mandated by government or the legislature (e.g., institutional roles and responsibilities, new regulatory objectives, funding procedures, or guidance on impact assessment). Such arrangements and tools affect regulators' potential to positively contribute. Throughout the chapter, OECD normative guidance relating to the governance and performance of regulators is highlighted, and analysis of survey data provides a view of the state of play.

The potential contribution of economic regulators to environmental objectives rests on several important considerations around governance. First and foremost, economic regulators require clarity on their role in relation to meeting environmental goals, including on the objectives that need to be met by the regulator and the sector(s) they oversee. This is ultimately a question for governments or legislators to address, as is the provision of appropriate powers to regulators to enable the fulfilment and achievement of regulatory roles and objectives. Where the remits of regulators may be expanded to include environmental objectives, co-ordination between regulators and other public institutions becomes increasingly important, as does guidance on the prioritisation of different policy objectives or the management of risks and trade-offs between policy objectives.

Regulators may need to adapt their tools and processes to better deliver against environmental objectives and may require further guidance, capacity, and resources to do so. Regulators may be required to engage more, engage differently, or with new stakeholders, in order to understand how to proceed with the delivery of new regulation relating to environmental sustainability. Finally, as noted in Chapter 1, all regulators will be impacted by a period of transition in network sectors. Therefore, economic regulators will need to consider organisational culture and how to manage the risks and opportunities that accompany a changing regulatory environment.

Role clarity

To achieve the desired regulatory outcomes, whether linking to environmental policy objectives or other policy areas, an effective regulator must have clear objectives, with clear and linked functions and powers, and the mechanisms to co-ordinate with other relevant bodies (OECD, 2014^[1]).

Clear objectives

Providing clear objectives for regulators will motivate intervention, whilst setting clear roles and responsibilities within the institutional framework can help avoid misalignment regarding the delivery of those objectives and promote a whole-of-government approach. The *OECD Best Practice Principles on the Governance of Regulators* (OECD, 2014^[1]) recommends the legislation establishing the regulatory framework should be written so that the purpose of the regulator and the objectives of the regulatory framework are clear to the regulator's staff, regulated entities, and citizens (Box 3.1).

Clarity over the respective roles and responsibilities of regulators and government helps ensure accountability. Adequate processes of accountability need to be in place to ensure effective scrutiny of broader functions. It must be clear to regulated entities and the public at large which institutions are responsible for which decisions in order to know whom to hold to account.

Box 3.1. OECD Best Practice Principles on the Governance of Regulators – Role Clarity

The OECD Best Practice Principles on the Governance of Regulators recommends that legislation should clearly state policy objectives and the powers of the authority and that objectives should identify the ends to be achieved or the expected outcome, rather than specifying the means by which they will be achieved.

Without clear objectives the regulator may find it difficult to establish priorities, processes and boundaries for its work. Likewise, external bodies tasked with scrutinising the performance of the regulator require clear objectives to understand how to hold the regulator accountable. Regulated entities have a right to know the reason their activities are being impacted by regulation.

Source: (OECD, 2014^[1]).

However, there is currently no standard approach to what the role of economic regulators should be regarding environmental sustainability, considering regulators' defined objectives. As noted in Chapter 1, based on responses to the green governance survey, 42% of regulators report objectives have been set for the regulator in legislation, whilst 36% do not have any objectives defined. Yet the data also reveals instances where legal or regulatory frameworks may be creating some ambiguity for regulators: 22% of regulators do not have environmental objectives set in their establishing legislation or another piece of legislation yet report that they need to adhere to certain overarching objectives for public institutions relating to the environmental sustainability of the sector.

These overarching objectives may be interpreted to provide sufficient rationale for regulatory intervention. In other cases, lacking or unclear mandates to intervene regarding environmental sustainability may, for many regulators, limit potential action beyond information gathering and knowledge building. Examples discussed above evidence some regulators have been presented with vague definitions of what constitutes environmental sustainability and a broad set of objectives for their sector which require further interpretation and planning (see Chapter 1).

OECD guidance acknowledges that the level of detail and prescription in legislation is a matter of judgement. In some cases, deliberately broad strategic objectives are provided for the sector, following a principles-based approach, to deal with uncertainty and a fast-changing regulatory environment. In other cases, objectives are more granularly defined and regulators have discretion to pick between a range of regulatory and non-regulatory tools. In any case, the objectives and discretion provided to the regulator should still be clearly defined and not encourage or provide opportunities for “mission creep”. Furthermore, compliance should not be treated as an objective in its own right, but rather as a means to an end (OECD, 2014^[1]).

The regulator's own interpretation of its duties, powers, and priorities, and a concern for acting beyond remit, are factors that influence a regulator's chosen path of action. From a regulator's perspective, policymaking and regulatory delivery are connected but not the same, and it is important to maintain a clear distinction for the maintenance of integrity and independence. Legally minded leadership would take a cautious approach when determining the scope of duties and powers, for example in relation to data collection activities, if there is vagueness and associated costs and risks. The regulatory and legal culture in a jurisdiction may influence the scope a regulator has to interpret its duties to include environmental goals.

Furthermore, economic regulators would not be able to promote environmental goals, nor act in accordance with overarching sector targets, using the tools mentioned above (see Chapter 2) if doing so would compromise the attainment of their primary objectives, as defined in legislation.

Appropriate powers and functions

If the mandates of economic regulators expand to encompass environmental goals, regulators must be afforded the appropriate powers to deliver their objectives. The regulatory powers and other functions to be carried out to achieve the regulator's objectives relating to environmental sustainability and the green transition should be clearly specified in the establishing legislation and be appropriate and sufficient to achieving the objectives. The OECD *Best Practice Principles on the Governance of Regulators* (OECD, 2014^[1]) recommends that powers should be sufficient and neither stronger nor weaker than necessary for the regulator to be effective. This applies to regulators' powers to investigate, enforce, and sanction but also gather and use information, for example to monitor the environmental sustainability of the sector. Different levels of regulatory powers will require corresponding accountability mechanisms to ensure the proper functioning of the regulatory regime.

Regardless of whether regulators have had objectives defined, a significant proportion of regulators lack the legal power to consider environmental sustainability in decision making. A total of 78 regulators (42%) reported lacking the legal powers to consider environmental sustainability in regulatory decision making, regardless of the existence of statutory objectives. The survey results suggest this finding is more applicable to the rail transport and e-communications sectors, where 67% and 73% of regulators report lacking powers to consider environmental sustainability in their decisions respectively (Figure 3.2) (see also Box 3.3).

Furthermore, ten per cent of regulators that hold a mandate due to defined objectives in legislation lack the powers to consider environmental sustainability in their decision making (8 out of 78 regulators) (Figure 3.1). Of these 8 regulators, 3 have defined statutory objectives in their establishing legislation and 5 have objectives defined in other legislation. These findings suggest a mismatch between mandates and suitable powers for some regulators.

In reverse, there are also instances where regulators have legal powers to consider environmental sustainability but lack any defined objectives. Thirty-six regulators report having the legal power to consider environmental sustainability in decision making whilst also reporting they have no objectives explicitly defined either in establishing or other legislation. In this scenario, economic regulators are using their discretion to respond to identified societal needs and wider objectives with independent or collaborative action – one example is the case of Portugal’s e-communications regulator, ANACOM (Box 3.2).

Figure 3.1. How many regulators have objectives defined and the powers to consider environmental sustainability?

		Legal powers to consider environmental sustainability in decisions?	
		Yes	No
Defined objectives relating to environmental sustainability in legislation?	Yes	70	8
	No	36	67

Box 3.2. Portugal’s e-communications regulator (ANACOM) considers environmental sustainability in decision-making based on overarching societal needs and objectives

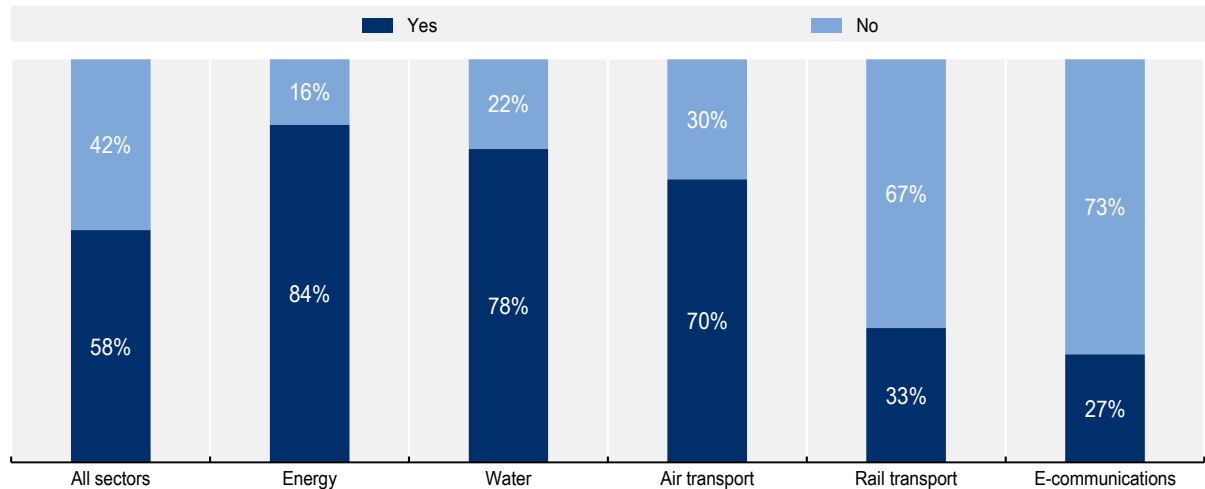
Portugal’s National Communications Authority (ANACOM) has taken steps to consider environmental sustainability in its regulatory decision-making, despite the lack of national legislation with objectives for the regulator related to the environment.

ANACOM has established minimum requirements for infrastructure sharing between operators, encouraged mobile network sharing to meet environmental objectives, and simplified the administrative process to reduce paper usage. ANACOM has also established a forest fire working group to increase the resilience of electronic communication infrastructure and monitored the existence of adaptation plans to climate change by operators.

Additionally, it invites environmental civil society organisations to participate in consultations and is working with the Body of European Regulators for Electronic Communications (BEREC) to develop sector-specific indicators for sustainability.

Source: Information provided by ANACOM, 2023.

Figure 3.2. What proportion of regulators have legal powers to consider environmental sustainability in their decisions?



Note: A total 184 regulatory authorities provided an answer to the survey question, based on their country and sector context.

It is important that powers remain linked to the regulator’s objectives and functions, so that the regulator understands the scope of application of provided powers and is not presented with risks associated with acting beyond the remit provided by legislators (OECD, 2014^[1]). All regulators have decision-making functions, subject to judicial review, which may impact the behaviour of actors within the sector they oversee, and may be provided with complimentary functions, such as the administration of market-based schemes, reward or educational programmes. Functions, powers, and objectives should be aligned and clarified to ensure both that the regulator has the capacity to perform the relevant functions and the most efficient and effective means to achieve objectives are identified and assessed.

Results from the green governance survey, analysed above, provide a view of the state of play in terms of how regulators understand and apply their powers to consider environmental sustainability in decision-making, considering both the nature of the environmental issue and decision area. With regard to environmental issues, regulators’ powers to consider environmental sustainability tend to apply to specific issues rather than across the full array of environmental challenges – more regulators report their powers apply to issues of greenhouse gas reduction (64%), decarbonisation (63%) and water and air pollution (54%) (see Chapter 1: How are economic regulators responding?). However, some regulators noted again the need to interpret how and where powers apply, following vague requirements in legislation to consider “sustainable development” in the delivery of their duties.

With regard to decision areas, more than half of regulators (54%) report powers apply in their decisions relating to regulating prices or issuing guidelines and/or codes of conduct. Close to half (45%) of regulators may consider environmental sustainability when issuing or revoking licenses or authorisations, but fewer report having the powers to consider environmental sustainability when issuing industry standards, issuing consumer standards, or providing binding guidance or reviewing and/or approving contract terms (see

Chapter 2: To what extent are economic regulators utilising these tools today?). It is important to reiterate that, regardless of the existence of statutory objectives and regardless of the environmental issue or decision are in question, not all regulators hold the legal powers to consider environmental sustainability: around 58% of regulators report they hold the legal powers to consider environmental sustainability in regulatory decision making, but 42% lack these powers.

Box 3.3. Complementary findings from the OECD Working Party on Connectivity Services and Infrastructures Policy Questionnaire

Complementary and supplementary findings

The OECD Recommendation on Broadband Connectivity highlights that for the future, the environmental sustainability of communication networks is of paramount importance [[OECD/LEGAL/0322](#)]. In this sense, the Working Party on Connectivity Services and Infrastructures (WPCSI)¹ has placed priority in working on this pressing policy issue. In 2021, the OECD Secretariat surveyed countries on communication policy and regulation for two analytical reports on “Communication Regulators of the Future” (OECD, 2022^[2]) and “Developments in Spectrum Management for Communication Services” (OECD, 2022^[3]). An additional survey was conducted in 2023 to prepare the chapter on Access and Connectivity for the flagship publication Digital Economy Outlook 2024 (OECD, forthcoming). These surveys included a question on areas of mandates of communication regulators. Please note, the sample size and design differs from that of the Green Governance Survey.

Countries were asked whether “Yes”, “No” or “Partially” the communication regulator had a mandate in different areas (e.g. privacy, digital security, AI and IoT, etc.), with one area being: “Issues related to the sustainability of networks or ICTs more general”. In 2021, the Secretariat received answers from 40 countries (i.e. 38 OECD countries, Brazil, and Singapore). Almost half of communication regulators (48%) in the OECD, Brazil, and Singapore reported to have at least partial responsibilities (e.g. through their mandates, collaboration initiatives or lending their knowledge and experience in a whole-of-government approach) on issues related to the environmental sustainability of communication networks. One-fifth reported to have an explicit mandate in this area (OECD, 2022^[2]). The mandate or responsibilities of communication regulators continue to evolve since 2021, including in the area of environmental sustainability (OECD, forthcoming**).

1. The OECD was one of the first organisations working on connectivity through the creation of Digital Policy Committee’s Working Party on Connectivity Services and Infrastructures (WPCSI) in 1988, dedicated to communication policy since the liberalisation of telecommunication markets in OECD countries. Throughout the years, the OECD has been strongly engaged with governments in topics related to [communication policy and regulation](#) to address digital divides, foster [future-proof connectivity](#), provide tailored recommendations in [communication policy regional and country reviews](#), and support the evidence base on broadband measurement ([Broadband Statistics](#)).

Source: OECD (2022^[2]), “Communication regulators of the future” and OECD (forthcoming), Digital Economy Outlook 2024 (Volume 2), Chapter 2 on Access and connectivity.

Governments may choose to change the duties of regulators to explicitly encompass environmental objectives; or they may give the regulator guidance or directions on how to consider or facilitate environmental matters; or they may take action elsewhere to tackle the environmental challenges that economic regulators do not address (Owen, 2006^[4]). Different approaches bring different advantages and disadvantages that each jurisdiction will need to weigh carefully based on policy objectives and context, while paying regard to important considerations such as independence, accountability and the purpose of economic regulators.

Managing competing objectives and functions

Many regulators have had a mix of objectives from the outset. For example, as well as controlling monopoly power and promoting competition, some regulators have a duty to consider the interests of vulnerable consumer groups, such as the elderly or rural populations (Owen, 2006^[4]). Economic regulators therefore have a long experience of balancing different objectives.

Nevertheless, a broadened remit will require regulators to balance multiple objectives and may increase the complexity of the regulator's tasks.

One challenge is the increasing complexity of a regulator's tasks when additional objectives are added to its mandate. This complexity could risk stifling regulatory decision making and limiting the effectiveness of new duties (BEIS, 2022^[5]) (Decker, 2010^[6]). A key rationale for having economic regulators is to ensure predictability and stability in order to encourage long-term investment. Introducing new objectives could introduce uncertainty, both for the regulator in terms of how it is meant to meet several competing objectives concurrently, and for regulated entities.

Whilst there may be positive synergies between regulatory objectives, there will also be situations where reconciling economic, social and environmental objectives will entail managing trade-offs. Achieving environmental objectives in certain cases may run counter to other policy objectives such as promoting competition, cost effectiveness, or protecting consumer welfare. A report commissioned by BEREC (WIK-Consult and Ramboll, 2021^[7]) notes the trade-offs that may arise when sustainability goals are juxtaposed with other objectives that European e-communications regulators must meet under EU¹ and national legislation applying to electronic communications (Box 3.4).

Box 3.4. Potential trade-offs between economic and environmental objectives in e-communications regulation

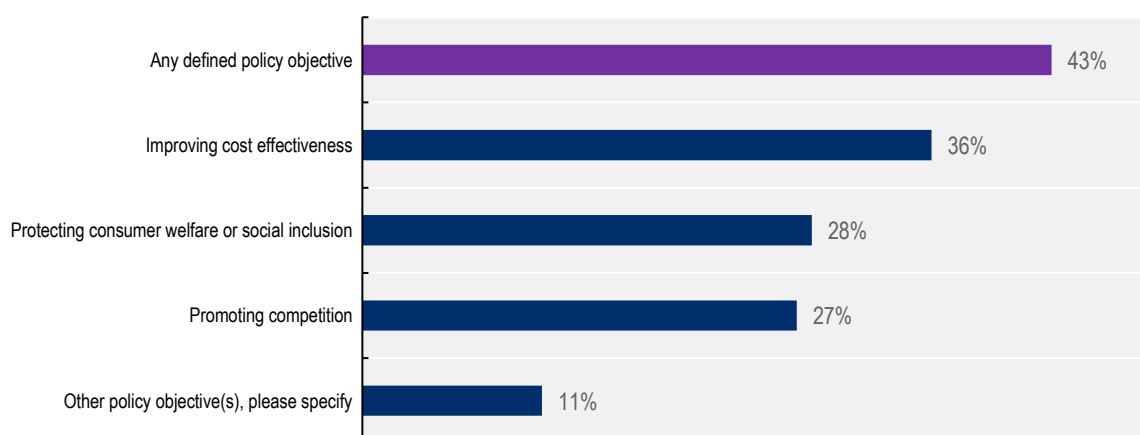
A study commissioned by the Body of European Regulators for Economic Communication (BEREC) highlights cases where pursuing measures that would be beneficial for the environment might run counter to existing rules applying to the European electronic communication sector or require trade-offs to be made against socio-economic objectives. For example:

- Although certain network technologies are known to be more energy efficient, European e-communications regulators are required to promote “Very High Capacity Networks”, which can include less energy-efficient legacy technologies, and to respect the principle of technological neutrality.
- Encouraging or requiring network sharing could limit energy use but could create trade-offs with the objective to promote infrastructure competition and reduce incentives for operators to invest in their own infrastructure to achieve higher coverage and/or quality.
- Strategies to reduce energy consumption might create trade-offs with network coverage and quality.
- There may be trade-offs between environmental objectives and cost. For example, environmental considerations may drive the deployment of more costly technologies, when alternatives might meet the shorter-term needs of consumers.

Source: (WIK-Consult and Ramboll, 2021^[7]).

Amongst economic regulators with the legal powers to consider environmental sustainability, nearly half have encountered or anticipate trade-offs between “green” objectives and other policy objectives. Considering the results of the green governance survey, a significant proportion (43%) of regulators with the legal powers to consider environmental sustainability (46 of 106) state they have encountered or anticipate trade-offs. Based on surveying that asked regulators to consider trade-offs with specified or other policy objectives, improving cost effectiveness is the policy objective most frequently identified as presenting a trade-off with environmental goals (36%), followed by promoting consumer welfare or social inclusion (28%) and promoting competition (27%) (Figure 3.3).

Figure 3.3. What proportion of regulators encounter or anticipate trade-offs between environmental and other policy objectives?



Note: Only regulators who responded they have the legal power to consider environmental sustainability in their decisions are included in this analysis – the relevant sample consists of 106 regulatory authorities.

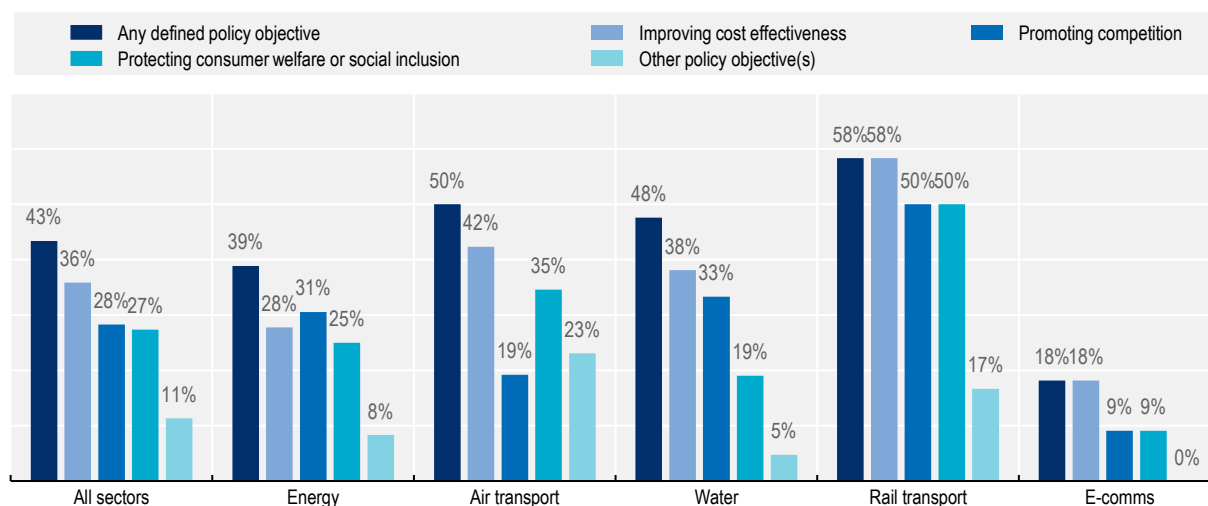
Regulators may face demands to consider a range of issues related to environmental sustainability, presenting even more complex decisions on trade-offs. For example, regulators may not be concerned only with net-zero objectives, but also meeting biodiversity targets, social support measures and so forth. Of the 106 regulators with powers to consider environmental sustainability in decision making, 20 regulators (19%) encounter or anticipate trade-offs between environmental sustainability and all three policy objectives.

Other regulators encounter or anticipate trade-offs between environmental and policy areas beyond those tested by the survey. Twelve regulators specified other policy objectives as potentially conflicting, beyond those listed. A typical trade-off to be managed in the electricity sector between security of supply or grid stability and increased renewables penetration was raised by energy regulators. Air regulators, such as the Swedish Transport Agency (*Transportsyrelsen*), raised a trade-off with safety – safer flight paths or designs for airport approach can deviate from the most sustainable choice, considering emissions and noise pollution.

Trade-offs between policy objectives are most prevalent amongst rail transport regulators, and more likely to be reported by ministerial than independent regulators. Of rail transport regulators with the power to consider environmental sustainability, 58% identify at least one policy objective as a potential trade-off, a higher rate than for regulators in e-communications (18%), energy (39%), water (48%), and air transport (50%). In absolute terms, driven by the fact that energy, air transport, and water regulators are more likely to hold the legal powers to consider environmental sustainability, more regulators from these sector report trade-offs between environmental and other policy objectives overall (Figure 3.4). Likewise, amongst regulators with the legal power to consider environmental sustainability, 50% of ministerial

regulators (14 of 28) identify at least one policy objective as a potential trade-off compared to 41% of independent regulators (32 of 78).

Figure 3.4. What proportion of regulators encounter or anticipate trade-offs between environmental and other policy objectives?



Note: Only regulators who responded they have the legal power to consider environmental sustainability in their decisions are included in this analysis – the relevant sample consists of 106 regulatory authorities.

Clear guidance from the executive or via legislation on priorities and resolving trade-offs should be provided, especially where there is wide scope for discretion. OECD guidance recommends that where trade-offs between objectives are likely to be necessary, there should be a means for the minister to provide an overall direction on priorities, or that legislation should include clear guidance as to how the regulator should resolve trade-offs between objectives (OECD, 2014^[11]). Furthermore, it will be important to have transparency around these issues: the regulator should make explicit any trade-offs between objectives in decision making, and this information should be available to regulated entities in a clear and comprehensible format. Some countries have begun work on frameworks that map sectoral policy objectives and provide support to public institutions on how to manage trade-offs, as is the case in the transport sector in New Zealand (Box 3.5).

Having clear guidance can help mitigate the risk of blurring the boundary between political and technical decision making. Bestowing regulators with a duty for environmental protection could risk blurring the boundary between political and technical decision making, which has important implications for democratic systems. Many environmental decisions are inherently political, as they involve value judgements about equity, distributional issues and the value of nature, in contrast to the “technocratic” decisions that economic regulators are traditionally tasked with (Foster, 1992^[8]). Political questions are typically the remit of policy makers accountable to an electorate, in contrast with the execution of technical decisions made independently of government by regulators.

Governments need to consider whether and to what extent independent agencies should be given responsibility for these kinds of policy or political decisions. (Koop and Lodge, 2020^[9]) raise the question of “how much ‘political space’ independent economic regulators can feasibly and legitimately occupy”, while (Harker and Reader, 2022^[10]) note the criticism that governments have faced “for the imposition of complex, prolix, and contradictory objectives, often requiring regulators to make choices of an essentially political character, leading ‘agencies into high policy by the backdoor’”.

Box 3.5. New Zealand's Transport Outcomes Framework

The Ministry of Transport in New Zealand has taken a proactive step to structure the outcomes the transport system needs to achieve to improve wellbeing and liveability by defining, in 2018, a Transport Outcomes Framework. Transport agencies in the country, including the Civil Aviation Authority, are expected to set out how they will individually and collectively contribute to the outcomes of the framework. The framework aligns and contributes to outcomes across the public sector. Therefore, this requires the transport sector to work with other sectors in a co-ordinated way to achieve broader government outcomes.

The framework includes environmental sustainability as one outcome of five:

- Inclusive access: Enabling all people to participate in society through access to social and economic opportunities, such as work, education, and healthcare.
- Healthy and safe people: Protecting people from transport-related injuries and harmful pollution and making active travel an attractive option.
- Environmental sustainability: Transitioning to net zero carbon emissions and maintaining or improving biodiversity, water quality, and air quality.
- Resilience and security: Minimising and managing the risks from natural and human-made hazards, anticipating and adapting to emerging threats, and recovering effectively from disruptive events.
- Economic prosperity: Supporting economic activity via local, regional, and international connections, with efficient movements of people and products.

The framework encourages decision-makers across the public sector to identify and weigh the potential environmental, social and economic impacts of transport decisions. This is accomplished by considering the five outcomes and utilising 37 possible indicators to measure and report progress. By providing clear options for measurement, the framework helps regulators to understand and decide on trade-offs between different outcomes.

Most recently, the Transport Outcomes Framework has been utilised to guide the decision to invest in Sustainable Aviation Fuels (SAFs) made from renewable or waste materials.

Source: Information gathered by the OECD Secretariat based on information provided by the Civil Aviation Authority, 2023; <https://www.transport.govt.nz/area-of-interest/strategy-and-direction/transport-outcomes-framework/>.

Powers to collect relevant data

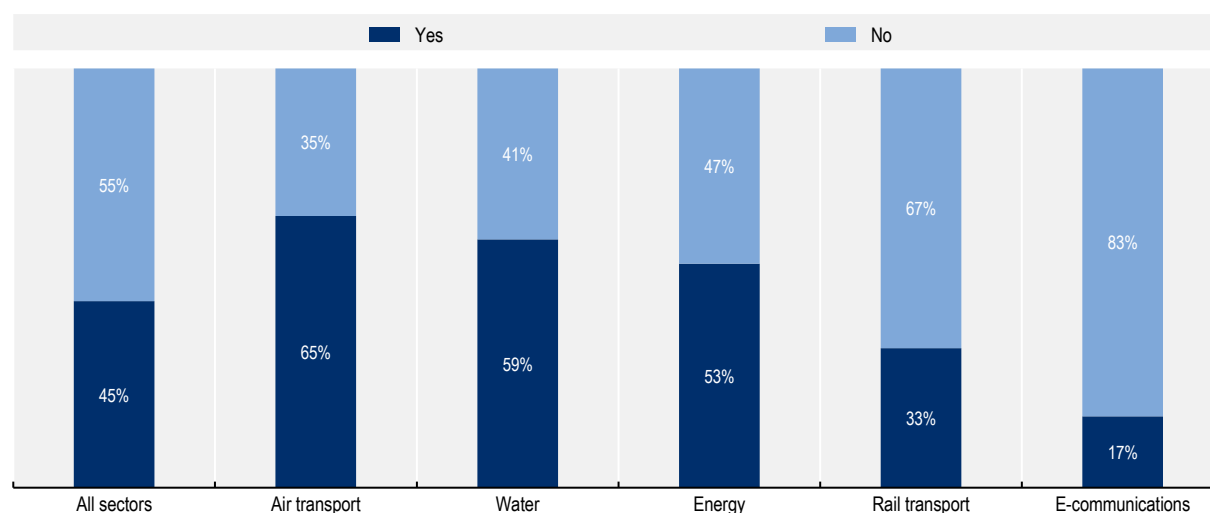
Since a regulator's ability to make accurate assessments and informed regulatory decisions, including on trade-offs, rests on its knowledge and understanding of the regulated sector, consideration should also be given to the regulators' powers to collect and manage data and information. Regulators' detailed knowledge and understanding rests on the data and information that they collect. Data, specifically relevant, timely and good quality data, is therefore a key enabler of evidence-based decision making and efforts to provide transparency. Data is also vital for facilitating continuing evaluation (see regulatory impact assessment), which raises further questions around how to measure impact, what data is required, and how this data should be collected. Economic regulators with objectives relating to environmental sustainability should have access to the relevant data, via exercising powers to collect data from the regulated sector, or through other mechanisms of co-ordination and knowledge sharing.

Surveying shows that more than half of all regulators lack the legal powers to collect data on the environmental sustainability of the sector they oversee. Of the 184 regulators who responded, 45% of regulators stated they have powers to collect relevant data on environmental sustainability in their sector to inform decision making, leaving 55% without such powers. The proportion lacking powers to collect relevant data is higher among independent regulators (60%) than ministerial regulators (41%), and higher for regulators of e-communications (83%) and rail transport (67%) (Figure 3.5).

Moreover, data collection powers are lacking for more than a quarter of regulators who have been set environmental objectives, which could hamper their ability to deliver. Of the regulators with defined objectives related to environmental sustainability, 72% (56 of 78) report they have the powers to collect relevant data, but a significant 28% do not. Five regulators reported they have defined objectives but lack both the powers to consider environmental sustainability in decision making and collect relevant data from the sector they oversee. Seventeen regulators report they have defined objectives, the powers to consider environmental sustainability in decision making, but lack the powers to collect relevant data.

Whilst regulators may report holding the relevant powers to collect data, the extent of those powers and scope of data collected can vary widely between regulators. Many regulators hold powers only to collect data on environmental sustainability when it relates directly to their core regulatory functions, for example Brazil's ANTT requests and monitors the contents of concession contracts in line with its duties for improving environmental sustainability through enforcing certain contract criteria (see Annex A). Other regulators can send specific requests to gather a wider set of information for reports and analysis, for example France's Arcep and Finland's Traficom may request data from the sector to inform regular market studies relating to sustainability. Still others rely on existing regulatory processes (e.g. license application processes) or third parties to gather data, in place of holding any direct powers to collect data themselves. Furthermore, there are situations where regulators have legal powers to collect relevant data, but powers are defined narrowly and focus on specific output metrics (e.g. GHG emissions in energy production), which can leave the regulator without all of the information required to deliver a comprehensive assessment to inform decision-making.

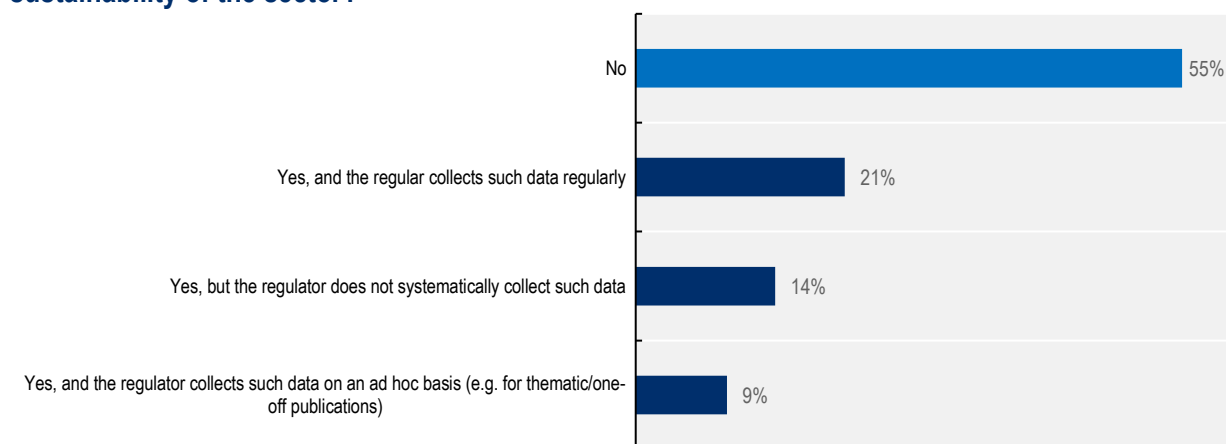
Figure 3.5. What proportion of regulators have the power to collect data on the environmental sustainability of the sector?



Note: "Yes" is a composite of regulators who answered they collect such data regularly, on an ad hoc basis, or do not systematically collect such data but have the powers to do so. A total 184 regulatory authorities provided an answer to the survey question.

Of the regulators with the powers to collect data on environmental sustainability, nearly half do so regularly, but close to one third do not systematically collect such data. Whilst 39 of the 82 regulators (48%) with powers to collect data do so on a regular basis, 17 regulators (21%) only collect data on an *ad hoc* basis, for example for one-off publications, and 26 regulators (32%) report they have no systematic data collection process in place (Figure 3.6). The proportion of regulators collecting data on a regular or *ad hoc* basis is only slightly higher when considering those regulators with both defined objectives and powers to consider environmental sustainability in decision making – 53% of these regulators regularly collect data on environmental sustainability, but then only 16% on an *ad hoc* basis. This means that there are a number of regulators (17) who do not systematically collect data, despite having the powers to do so, as well as the powers to consider environmental sustainability in their decisions and with objectives set in legislation.

Figure 3.6. What proportion of regulatory authorities collect data on the environmental sustainability of the sector?



Note: A total 184 regulatory authorities provided an answer to the survey question.

The extent to which these various considerations around trade-offs and data collection are relevant will depend on the division of responsibilities between the executive and the regulator. OECD guidance considers governments should retain responsibility for key policy decisions, with the regulator assuming the role of implementer or administrator (for example, of schemes to improve environmental outcomes) (OECD, 2014^[11]). Of course, regulators may also have the function of providing advice and insights to government, in which case more extensive powers to collect data may be merited, so as to match functions. For example, regulators may need to calculate the costs of meeting environmental requirements or to clarify potential conflicts between different economic, social, and environmental objectives (Owen, 2006^[4]). In scenarios where regulators have a primary duty to deliver on environmental objectives, the responsibility for managing trade-offs and other questions with an important social or environmental impact (e.g. distributional issues) rather than technical decisions may still fall to the regulator.

Mechanisms for co-ordination

Co-ordination between economic regulators and other public institutions becomes increasingly important in the context of a broadened mandate that encompasses economic, social, and environmental objectives, given the complex interactions between these issues. At a minimum, joined up efforts can be useful to explore and understand how regulation can support environmental objectives (Box 3.6). In some cases, for example in jurisdictions with complex multi-level governance structures, more extensive and close co-ordination may be required (Box 3.7). Given the range of agencies and institutions involved in the environmental policy and regulatory landscape, institutional co-ordination

also allows risks, such as the overlap of mandate, roles and responsibilities, to be identified and addressed. In the UK, long-standing networks, such as the UKRN, have helped to co-ordinate the work of regulators across sectors on particular issues, identifying opportunities for joined-up working but also reducing inefficient overlaps. The UKRN's recent strategic priorities include "evolving regulation to promote sustainable economic recovery and growth, and enabling climate change mitigation and adapting responses that are consumer conscious" (OECD, 2022^[21]). In the UK water sector, the Regulators' Alliance for Progressing Infrastructure Development (RAPID) was set up in 2019 as a partnership between the UK's three water regulators: Ofwat, the Environment Agency and the Drinking Water Inspectorate (DWI). It was established to help accelerate the development of new water resources infrastructure "in the best interests of water users and the environment" and design future regulatory frameworks.²

Box 3.6. CRE's use of committee and council structures to co-ordinate expert input

To help inform its work, in 2017 CRE created a Foresight Committee, which in 2023 became a [Scientific Council](#). CRE's Foresight Committee had been working for several years on enlightening the future of our energy system, with the help of about 200 external experts, including energy operators, academics, consumers' associations and members of Parliament. This independent Committee had helped the French regulator, politicians, and industry players to anticipate changes and adapt their practices to contribute to the energy transition. This structure made it possible to draft reports on issues that, at the time, did not fall directly within the CRE's remit: for example, the impact of clean mobility on the energy mix (2018), the hydrogen vector (2021), biomass and carbon neutrality (2023). The current working group, in its new form, is about to publish a report on carbon capture and storage.

Source: Information provided by CRE, 2024.

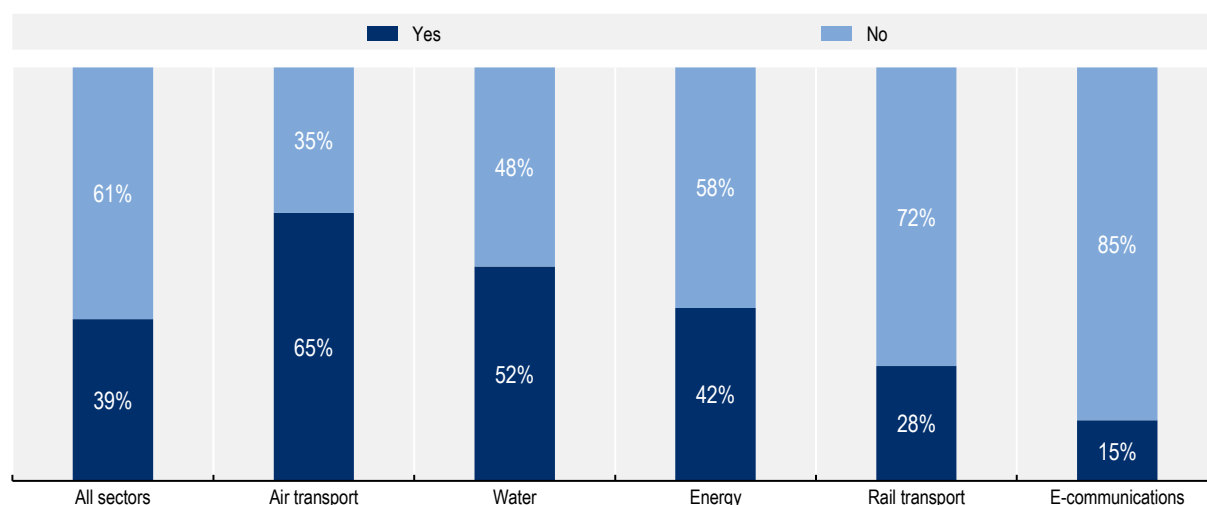
Less than half of regulators surveyed have formalised co-ordination mechanisms in place with other public authorities for issues related to environmental sustainability. Sixty-one per cent of regulators (112 of 184) report there are no formalised co-ordination mechanisms with ministries in charge of environmental policy or authorities in charge of environmental protection, to address issues related to environmental sustainability (Figure 3.7). Ministerial regulators are more likely to report formalised co-ordination mechanisms are in place (61%) than independent regulators (32%).

Air transport regulators are far more likely to respond that co-ordination mechanisms are in place.

A higher proportion of air transport regulators (24 of 37, or 65%) report having formalised co-ordination mechanisms in place with ministries or other authorities, compared to regulators in other sectors, including water (52%), energy (42%), rail (28%) and e-communications (15%) (Figure 3.7).

Formalised co-ordination is more frequent for those regulators tasked with delivering on environmental objectives. Of the 78 regulators with defined objectives to consider environmental sustainability, 63% report formalised co-ordination mechanisms are in place to address issues related to environmental sustainability.

Figure 3.7. Are there any formalised co-ordination mechanisms to address issues related to environmental sustainability between the regulator and other ministries or authorities in charge of environmental policy or protection?



Note: A total 184 regulatory authorities provided an answer to the survey question.

Box 3.7. Colombia's National Environmental Council and National Water Council

In Colombia, the National Environmental Council (*Consejo Nacional Ambiental*, or CNA), created in 1993, is a key co-ordination mechanism and fora concerning the development and implementation of environmental policy. The CNA serves as the highest advisory body to the government on environmental policy matters. In addition to providing advice and recommendations on government policies, plans and programmes, the CNA facilitates co-ordination and collaboration among different government agencies, NGOs and other stakeholders involved in environmental issues. This co-ordination is crucial for effective environmental management and sustainable development. Since the CNA also oversees the implementation of environmental regulation and ensures that various government agencies are complying with laws and standards, it is important that regulatory agencies are included in the governance framework and can interact.

The Ministry of Transport is a permanent member of the council, and though the Civil Aviation Authority is not a permanent member, it is invited to the council when discussions on air transport policy or regulation are underway. The decisions of the National Environmental Council must be taken into account by the regulator.

There is also a National Water Council (*Consejo Nacional de Agua*, also CNA) co-ordinating water resource management, to which the Drinking Water and Basic Sanitation Commission (CRA) may attend as non-permanent member. The CNA shapes policies and regulation related to water conservation, usage and sustainability.

Source: Information gathered by the OECD Secretariat based on information provided by the CAA and CRA, 2023; <https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=297>; <https://www.ins.gov.co/Normatividad/Decretos/DECRETO%200585%20DE%202017.pdf>.

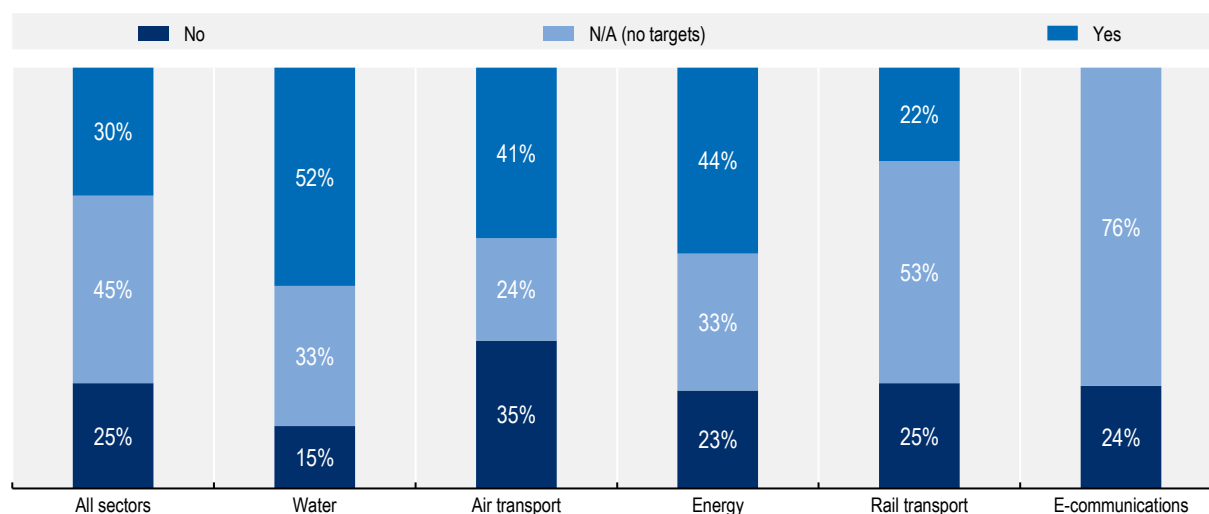
Beyond formal co-ordination mechanisms, overarching targets and objectives can be useful to guide action across government and within sectors, though these measures alone are not sufficient. A number of regulators consider quantitative targets relating to environmental sustainability in their decision making, and as noted above, may need to adhere to overarching objectives set out for public institutions. However, lacking, or unclear mandates to intervene regarding environmental sustainability may, for many regulators, still limit potential action beyond information gathering and knowledge building (see Chapter 3: Clear objectives).

Considering survey responses on the use of sector targets, around one third of regulators report that the sectors they oversee have quantitative targets relating to environmental sustainability that the regulator takes into account in its decision-making. Considering all regulators surveyed, 30% responded there are quantitative targets defined and these are considered in decision-making. The rate is higher for ministerial regulators (43%) than for independent regulators (26%) and higher among regulators of water (52%) and air transport (41%).

Whilst overall more than a half of regulators (55%) oversee sectors where quantitative targets have been defined, a quarter (25%) do not consider these targets in their decision-making (Figure 3.8). This proportion is consistent across sectors and similar for independent and ministerial regulators.

Furthermore, a higher number of regulators report there are quantitative targets defined for their sector than are required to assess impact. Whilst 55% of regulators (102 of 184) report there are targets for the sector defined in legislation relating to environmental sustainability, only 20% (36 of 184) are required to conduct *ex ante* or *ex post* assessment of the impact of their regulatory decisions. Looking at just those regulators that consider targets in decision-making, the proportion is still higher than those required to conduct impact assessment (30% vs. 20%) (Figure 3.8 vs. Figure 3.9).

Figure 3.8. What proportion of regulatory authorities consider quantitative targets relating to environmental sustainability for their sector, defined in legislation, as part of their decision making?



Note: A total 184 regulatory authorities provided an answer to the survey question.

For most regulators however, decision-making is not impacted since no quantitative targets have been set for the sector they oversee. Around 45% do not have quantitative targets relating to environmental sustainability defined for their sector. E-communications (76%) and rail transport (53%)

regulators are most likely to report that no such quantitative targets apply in their sector, but the lack of targets is also significant for many water and energy regulators (33% in both cases).

Regulators with the legal powers to consider environmental sustainability are more likely to take into account quantitative targets in their decision-making. Whereas one third (30%) of all regulators consider quantitative targets relating to environmental sustainability in their decision-making, a higher proportion (46%) of regulators with the legal powers to consider environmental sustainability in decision-making report that these quantitative targets are considered.

Of the 184 regulators surveyed, 15 regulators still consider quantitative targets relating to environmental sustainability in their decision making, despite lacking either relevant defined objectives or powers. Fifteen regulators have quantitative targets defined for their sector which they consider despite lacking relevant objectives relating to environmental sustainability, the powers to consider environmental sustainability in their decision making, or both: there are 5 regulators who lack both objectives and powers but still consider quantitative targets, a further 2 regulators who lack only powers but consider targets, and 8 regulators who lack only defined objectives but considers defined targets.

Adapting regulatory tools and processes

Regulators could take advantage of regulatory management tools to support the delivery of broadened remits relating to environmental sustainability and the green transition. Regulatory impact assessments, *ex post* review of regulations, stakeholder engagement and risk-based regulatory delivery can bring significant value. A more detailed discussion of regulatory management tools can be found in the paper *Better Regulation for the Green Transition* (OECD, 2023^[12]).

Regulatory impact assessment

Regulatory impact assessments (RIA) that encompass cost benefit analyses can help to reveal potential trade-offs and identify solutions with the greatest net benefits for the environment. RIA is a powerful tool for the development of regulation that serves to integrate environmental alongside economic and social concerns. Furthermore, a robust appraisal of different options and their impacts on the environment as part of RIA helps to minimise unintended consequences and therefore the need to change the regulation after implementation. Embedding environmental consideration at early stages of decision making is crucial for the development of new regulation that can positively influence environmental goals – regulators can assess the costs and benefits of different options and consult with relevant stakeholders to identify the option most aligned to environmental goals (balancing other objectives at the same time) (OECD, 2020^[13]).

At the other end of the regulatory policy cycle, *ex post* evaluation can help ensure that regulations stay fit-for-purpose and support environmental goals. Moving away from the traditional “set and forget” approach to regulating, an “adapt and learn” approach will be required to support a more dynamic policy and governance environment as network sectors and society as a whole transition to a more sustainable state. In this context, evaluations will need to assess more than just the marginal impacts anticipated in *ex ante* assessments but consider the indirect and second order impacts for the environment (OECD, 2023^[12]). At the same time, the cumulative effect of regulation for a given network sector (e.g., transport) needs to be considered. The evaluation of individual regulations can be complemented with sector-wide reviews to this effect, which may require collaboration between regulators, and between regulators and the executive, depending on the relative roles, responsibilities, and powers (OECD, 2020^[14]).

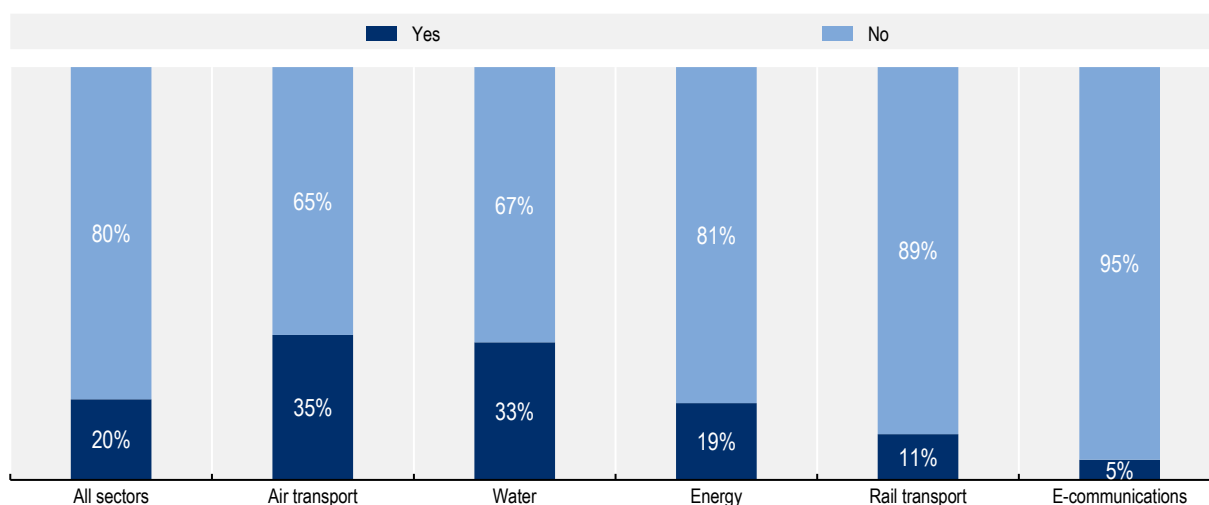
It is important that regulators are aware of the impacts of their regulatory actions and decisions. This helps drive improvements and enhance systems and processes internally. It also demonstrates the effectiveness of the regulator to whom it is accountable and helps to build confidence in the regulatory

system. Where economic regulators begin to regulate in accordance with new mandates associated with environmental sustainability, and with new objectives in mind, there may be a greater need or justification to conduct internal and external reviews. Post-implementation reviews of new regulations can be included alongside a review of the effectiveness and efficiency of any new systems, procedures or processes the regulator may have introduced to deliver on its new mandate.

Evidence from the green governance survey of regulators shows less than a quarter of regulators are required to assess the impact of the regulatory framework or regulatory decisions on environmental outcomes. Whilst 20% (36 of 184) responded they are required to assess impact (*ex ante* or *ex post*) in terms of furthering environmental sustainability, 80% reported they do not have such a requirement (Figure 3.9). It is slightly more likely for ministerial regulators to report a requirement to assess impact (25%) than independent regulators (18%).

The requirement to assess environmental impact is more common for air transport regulators. In most sectors, regulators are not required to assess impact in terms of furthering environmental sustainability. E-communications regulators are the least likely to report requirements of this nature (only 5%) while 35% of air transport regulators (13 of 37) are required to assess impact (Figure 3.9).

Figure 3.9. What proportion of regulatory authorities are required to assess the impact of the regulatory framework or specific regulatory decisions on furthering environmental sustainability?



Note: A total 184 regulatory authorities provided an answer to the survey question.

Stakeholder engagement

Regulators may need to reassess the design of stakeholder engagement processes to support the delivery of broadened remits. Whilst most regulators have established mechanisms for engagement with stakeholders as part of achieving their objectives, and this is good practice, regulators may need to engage with a more diverse range of stakeholder groups if their remit extends to consider environmental goals. For example, there may need to be more explicit efforts to include environmental civil society organisations in engagement processes, or representatives of vulnerable groups that tend to be disproportionately affected by environmental threats.

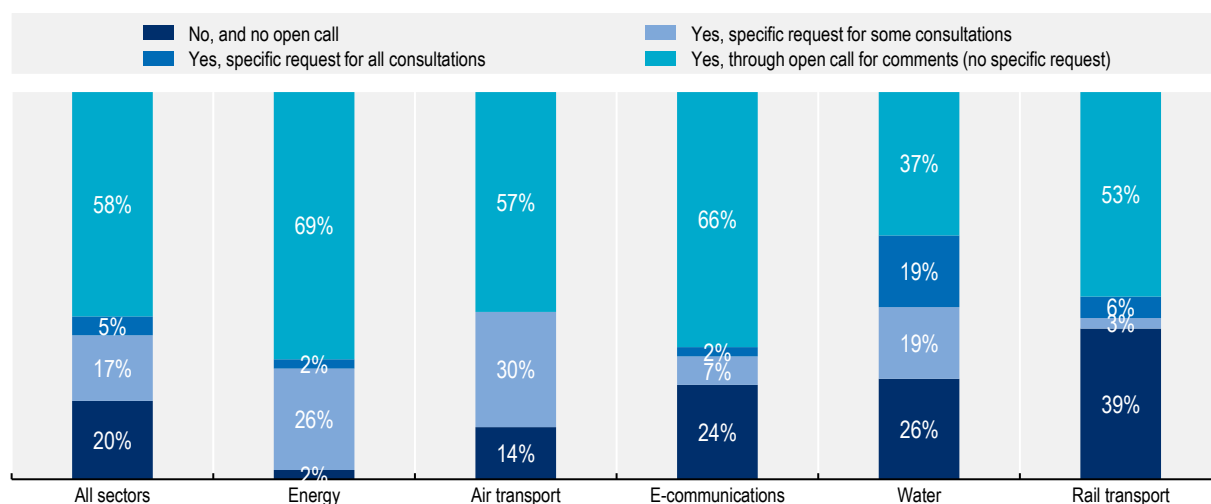
Nearly one quarter of regulators send a specific request to environmental CSOs to invite them to participate in their consultation processes. Overall, 22% of regulators surveyed responded that they invite environmental CSOs to contribute during the consultation process: 17% of regulators do this for

some consultations and 5% of regulators do this for all consultations. It is more likely water (38%) and air transport (30%) regulators report they send a specific request to environmental CSOs, whereas it is least likely that e-communications (9%) or rail transport regulators (9%) do so (Figure 3.10). It is also more likely that ministerial regulators (32%) send a specific request to environmental CSOs than independent regulators (19%). Among regulators with the powers to consider environmental sustainability in decisions and with relevant defined objectives, the proportion inviting input from environmental CSOs specifically is higher (36%).

For most regulators, environmental CSOs do not receive a specific request to participate but are nevertheless able to respond as part of an open call for comments. More than half of regulators (58%) do not make a specific request but launch an open call for comments to all stakeholders, to which environmental CSOs can respond. This proportion is consistent for both ministerial and independent regulators. Furthermore, this situation is the most likely scenario across all sectors, though particularly common in the energy sector – 69% of energy regulators reported environmental CSOs can participate through an open call for comments.

However, there are cases where environmental CSOs have no avenues to provide input into the regulatory decision-making process. For 20% of regulators, due to the lack of any open call for comments or specific requests, environmental CSOs are not invited to participate in consultations and therefore excluded from providing input to inform decision-making. This proportion is even higher in some sectors: 39% of rail transport, 26% of water, and 24% of e-communications regulators provide no avenues for environmental CSOs to input into regulatory decision-making (Figure 3.10).

Figure 3.10. What proportion of regulatory authorities gather input from environmental CSOs through the consultation process to inform decision-making?



Note: A total 183 regulatory authorities provided an answer to the survey question.

Following OECD guidance on the governance of regulators, regulator's engagement practices should be purposeful and structured, the relevant procedures and mechanisms institutionalised and transparent, and engagement should be undertaken regularly (OECD, 2014^[1]). The knowledge of regulated entities, business, citizens and other stakeholders impacted by environmental issues and the regulatory regime assist the regulator to make efficient and effective decisions. Furthermore, good engagement processes help to protect against potential conflicts of interests and the regulator from being seen as captured by special interests.

Foresight and regulatory experimentation

Approaches to managing regulation and the regulatory design process may need to adapt to better support environmental objectives and ensure regulation remains fit-for-purpose. This is especially the case where economic regulators are provided with a broadened mandate and therefore have responsibilities to manage new risks on the horizon. The use of outcome-based regulatory approaches, agile methods, risk management, horizon-scanning, regulatory experimentation, enhanced regulatory delivery functions and other techniques can bring benefits in terms of enhancing regulators' ability to adapt and deliver on environmental goals. As discussed in Chapter 1, economic regulators will face common challenges, emerging risks, and will remain accountable as key state actors, but there are a number of solutions ready to implement to help mitigate these risks and meet the challenge of a changing environment.

For example, innovation can be stimulated through outcome-based regulation, where regulators set envisaged outcomes rather than dictate procedures for how operators should achieve them. Furthermore, regulatory experimentation through regulatory sandboxes, pilot projects and pilot regulations can also be used to harness innovations that will have a beneficial environmental impact (see Chapter 2: Choice of regulatory approach; Box 2.1. Regulatory experimentation in France's energy sector).

Regulators with licensing and/or inspection functions relevant to environmental outcomes could reap the benefits of a risk-based system of regulatory delivery (OECD, 2023^[12]). Risk analysis is of particular importance to environmental regulation, yet the concept of risk is not systematically reflected in the policy making processes of OECD countries – 10 of 36 OECD countries require systematic risk assessment for environmental regulation, according to the OECD Indicators of Regulatory Policy and Governance (OECD, 2021^[15]). For the design of regulatory authority processes, permitting requirements, inspections and enforcement should be proportional to the level of risk associated with a given service, product, or activity.

The OECD Recommendation for Agile Regulatory Governance to Harness Innovation underscores the importance of supporting agile and future-proof regulation by developing institutional capacity and capability for systematic and co-ordinated horizon scanning and scenario analysis, anticipating and monitoring the regulatory implications of high-impact innovations, proactive stakeholder engagement, and continuous learning and adaptation (OECD, 2021^[16]). The French energy regulator's Scientific Council (formerly Foresight Committee) brings together energy industry stakeholders to consider the implications of the energy transition and digital revolutions (Box 3.6). The Colombian regulator, CRC, has established an Innovation and Foresight unit, as well as a Data Analytics Intelligence unit, to meet the evolving challenges in relation to data and innovation.

Beyond purpose-built institutional co-ordination and stakeholder engagement practices, there is also the opportunity to integrate agile and innovative approaches in regulatory tools such as regulatory impact assessment – recent guidance for the European Commission developed by the European Parliamentary Research Service's considers existing practices and ways forward for the use of strategic foresight in impact assessment (EPRS, 2024^[17]).

Capacity and resources

Providing for appropriate resourcing and capability

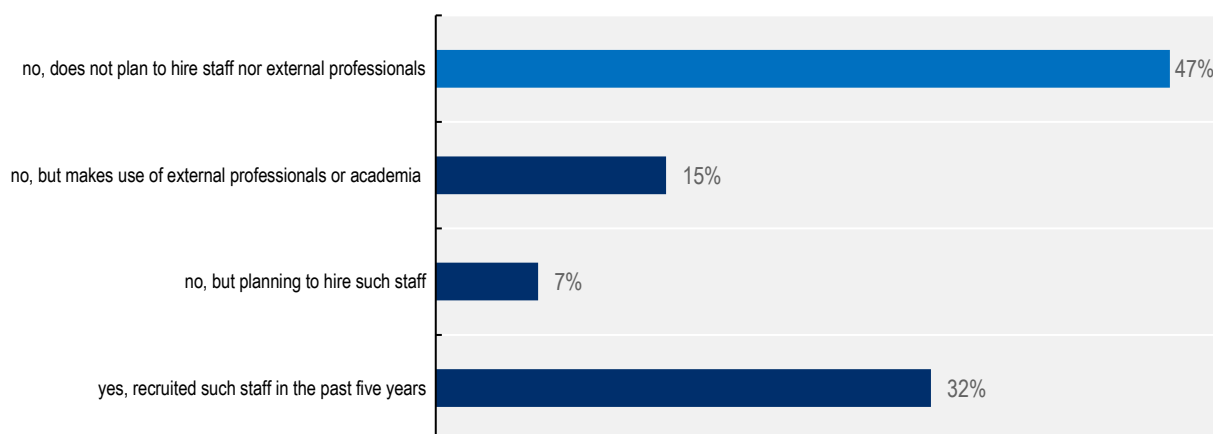
Regulators will need to build sufficient capacity and capabilities to deliver on new or expanded mandates for environmental protection. Close attention will be needed around regulators' staffing and funding arrangements – such as its ability to hire new staff, allow existing staff to build new capacities, re-organise itself internally, or to manage resources autonomously – as these can have an important bearing on its agility to respond to new roles and expectations. The OECD's Principles on the Governance of

Regulators recommend the relevant enabling legislation should identify the skills set and experience relevant to the regulatory functions that need to be represented on the governing body (OECD, 2014^[1]).

As may be expected given the diversity of situations in which regulators find themselves, in terms of their mandate and relevant powers for considering environmental sustainability, regulators are divided between those that are building capacity and capabilities in this area and those that are not.

More than a third of regulators have built internal capacity in environmental sustainability expertise or plan to build capacity in the near future. Around one third (58 of 183, 32%) of regulators have recruited staff with environmental expertise in the past five years. A further 7% are planning to hire such staff for the future (Figure 3.11). As may be expected, the proportion of regulators building or planning to build capacity is higher amongst regulators with defined objectives relating to environmental sustainability (56%), the legal powers to consider environmental sustainability in regulatory decision making (51%), or both (54%).

Figure 3.11. What proportion of regulators have hired or plan to hire staff with expertise relating to the environmental sustainability of the sector, or make use of external expertise?



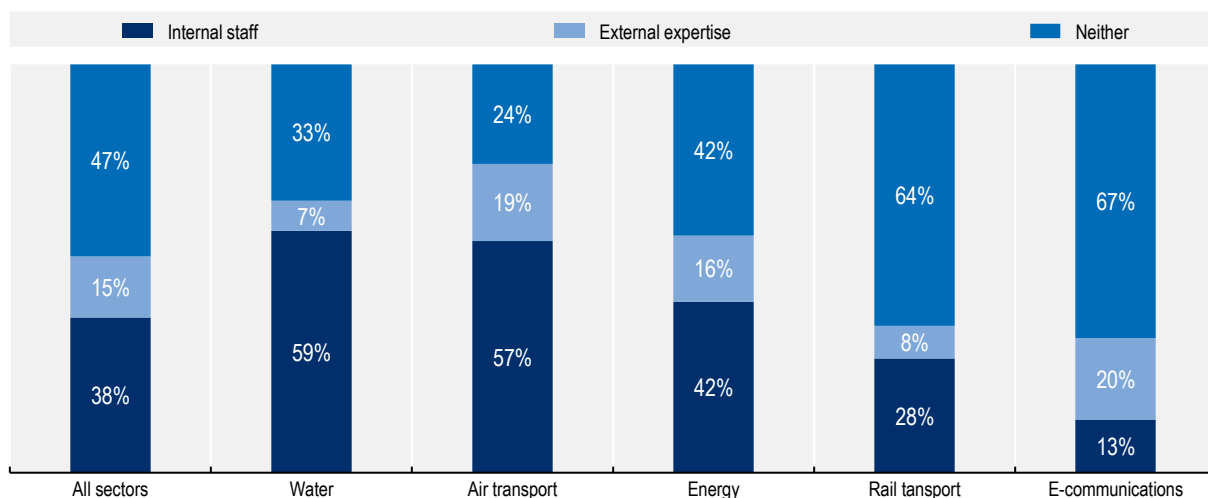
Note: A total 183 regulatory authorities provided an answer to the survey question.

Water and air transport regulators are more likely to report that they have recruited staff with relevant expertise in the past five years or are planning to hire such staff in the future. More than half (21 of 37, or 57%) of air regulators and 59% of water regulators (16 of 27) have hired staff with expertise in the environmental sustainability of the sector in the past five years or plan to do so for the future. In contrast, only 13% of e-communications regulators (5 of 40) and 28% of rail transport regulators (10 of 36) report the same. Only one energy regulator reported plans to hire such staff for the future, but 40% (17 of 43) stated they had already recruited such staff in the past five years (Figure 3.12).

Some regulators have not built internal capacity, instead making use of external expertise. Overall, 15% of regulators reported they make use of external expertise, either professionals or academia, having not hired, or made plans to hire, internal staff. This proportion is slightly higher among regulators with defined objectives related to environmental sustainability (17%), with the legal powers to consider environmental sustainability in decision-making (19%), or both (19%) – for these regulators, who also are more likely to have hired or plan to hire internal staff with expertise, there is still a significant proportion, close to a third, reporting no plans to hire internal or external staff. The use of external expertise rather than internal capacity is slightly below the average among rail transport and water regulators (8% and 7% respectively).

However, a sizeable share of regulators are not building capacity in this area. Close to half (47%) of surveyed regulators have not hired nor plan to hire staff with expertise in areas relating to the environmental sustainability of the sector, nor do they plan to make use of external professionals. The proportion of regulators stating this response is higher amongst independent regulators (52%) than ministerial regulators (32%), and much higher amongst e-communications (68%) and rail transport (64%) regulators than for regulators in other sectors (Figure 3.12).

Figure 3.12. What proportion of regulatory authorities have hired or plan to hire staff with relevant expertise in environmental sustainability, versus the proportion who utilise external expertise?



Note: A total 183 regulatory authorities provided an answer to the survey question.

Regulators with mandates relating to environmental sustainability will need to continually update and enhance the skills, knowledge, and capacity of their staff to keep pace. Changes in the sector, including relevant technological developments, and the possibilities available to all regulators due to digitalisation and the use of big data require the continuous assessment of capacity and capabilities. While the professions of engineers, economists and lawyers remain central, regulators are looking to reinforce their workforces with a range of additional specialist skills and professions. For regulating for the green transition, the capabilities and capacity regulators may require, to develop internally or procure, may relate to the following:

- Expertise in environmental sustainability data measurement and data management
- Expertise in specific environmental issues areas (e.g., biodiversity, pollution, decarbonisation, and so forth)
- Expertise in risk management
- Expertise in IT, digital, and data-based solutions (including AI) to enhance efficiency and provide new data sources for regulatory decision-making.

These skill areas may be targeted as part of a comprehensive future hiring strategy which aims to tackle the requirements associated with evolutions in technology, markets and policy ambitions, which are arising simultaneously. In addition, or as an alternative to hiring, upskilling is a viable approach for meeting the needs of both digitalisation and expanding remits into environmental sustainability. Upskilling will be key to supporting the formation of interdisciplinary teams, an ambition held by German regulator BNetzA, for example.

Regulators, alongside other public sector institutions, can find it especially difficult to hire well-qualified staff in these areas. The OECD's report on *Equipping Agile Regulators* (OECD, 2022^[18]) found that many regulators report difficulties in hiring well-qualified staff, especially IT and data specialists, which can affect their ability to execute regulatory activities. This reality is often a consequence of the hiring terms offered by public sector employers, particularly less competitive salaries, which increased job security is not always to mitigate.

Some skill needs could be met by contracting specialist companies. In the context of the OECD's report *Communication Regulators of the Future*, regulators cited the need to strike a balance between outsourcing and the development of in-house resources, but at the same time, outsourcing arrangements can be used to supplement or build-up in-house skills (OECD, 2022^[21]). In Australia, the ACMA utilises partnership arrangements with the IT sector to supplement capacity and develop long-term capability, both through skill sharing and job rotation opportunities. In Lithuania, the "GovTech Lab" initiatives has allowed the communications regulator to bring in external skills to innovate public sector processes by engaging start-ups and innovative tech companies to develop digital solutions. Such approaches may also play a role in building capacity in expertise relating to the environmental sustainability of the sector.

At the same time, funding levels should be adequate to enable the regulator, operating efficiently, to effectively fulfil the objectives set by government, including obligations relating to environmental sustainability and the green transition. Where those obligations have been introduced as new duties, funding levels should be reviewed to ensure they are fit-for-purpose. Funding processes should remain transparent, efficient, and as simple as possible, and new funding arrangements for new duties should not unduly influence regulatory decisions, the technical decision-making and prioritisation of objectives, or otherwise impact impartiality (OECD, 2014^[11]).

Organisational culture and change

Broadened remits and new objectives for economic regulators relating to environmental sustainability may require new ways of thinking and working. As discussed in Chapter 1, a changing context and role for economic regulators may bring with it organisational challenges, as well as a need to overcome technical or operational barriers to regulatory delivery which necessitate the review, restructuring and development of capacity and capability within the organisation. Efficient and effective delivery will be essential based on the urgency with which governments are seeking action from institutional partners.

Regulators should identify the need for organisational change, diagnose the current state, and take steps to anticipate and understand the potential implications of change. Existing staff within the regulator may be asked to solve problems in new areas, deal with new data, or new processes. The regulator may recruit a substantial volume of new staff, or make changes to its senior management, impacting the nature of the organisation and its identity. These organisational changes need to be properly managed to avoid negative impacts and to enable the organisation to deliver on its new remit effectively and efficiently. Change management strategies that prepare the organisation to adapt and support staff through periods of change appear to be at the heart of cases of successful organisational transformation (OECD, 2020^[19]). When building capacity or managing change, sufficient thought should also be given to the diversity and inclusiveness of the organisation, since increasing these realities holds the promise of increased performance (Nolan-Fletcher, 2019^[20]).

Pressure for change can also come from within the regulator. Some regulators have experienced pressure to address issues such as climate change and take the initiative from its staff. In this case, the regulator needs to understand the risks and opportunities discussed in this chapter before acting, considering changes to governance arrangements, or advocating for change.

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Notes

¹ Notably under the EU Electronic Communications Code (EECC) and the Broadband Cost Reduction Directive (BCRD).

² For more information please see: <https://www.ofwat.gov.uk/regulated-companies/rapid/>.

4

Conclusions

This chapter concludes by considering several ways in which the gathered evidence base may be utilised to provide further insights, as well as options for further research. Specifically, the chapter discusses time-series analysis and other survey developments, options for more in-depth analysis of countries, sectors, and regulatory functions, and the exploration of governance arrangements not fully addressed by the green governance survey data.

This chapter concludes the publication by reflecting on the overarching trends identified in earlier Chapters and consider options to build on the insights presented. Regarding options for development, the chapter discusses opportunities for time-series analysis and other survey developments, options for more in-depth analysis of countries, sectors, and regulatory functions, and the exploration of governance arrangements not fully addressed by the green governance survey data.

The preceding chapters of this publication have covered a lot of ground. Beginning with a discussion of the changing context and role of economic regulators in Chapter 1, the publication has surveyed the numerous ways in which economic regulators may contribute to the green transition of network sectors (Chapter 2) and reviewed governance arrangements and tools for enabling economic regulators to deliver on the objectives and expectations set for them (Chapter 3). Throughout the preceding chapters, quantitative data from recent surveying of 184 regulatory authorities (151 unique institutions accounting for multi-sector regulators) across 42 countries has enabled insights and a view of the state of play to be developed for a range of issues. This data from the green governance survey has been supplemented by further qualitative information, case study data and insights from the academic literature and other sources, such as related OECD publications and normative guidance. Together, the analysis offers a unique evidence base on the role of economic regulators in the green transition.

However, inevitably, not all questions have been answered and there remain some limitations to the data and several avenues for further research. In conclusion, these limitations and potential next steps are discussed, and further resources are provided.

Ways forward

Time-series and other survey developments

The green governance survey was issued for the first time as part of the 2023 edition of the Governance of Sector Regulators (GSR) indicators survey. The GSR indicators survey has been running every 5-years and is now in its third edition. Whilst this publication provides a snapshot of the state of play on issues of green governance, a view over time would be valuable and allow an assessment of change in the context and role of economic regulators in the green transition.

The green governance survey was designed around eight core question areas focused on key governance issues, so as not to burden respondents. However, there a number of other governance issues to investigate, which could be the subject of separate research (see below) or included in future editions of the green governance survey as new questions.

In-depth analysis of countries, sectors, and functions

The quantitative analysis presented in this publication has focused on the state of play on aggregate and provided a comparative view of sectors at the same level. There remains the opportunity to explore country or jurisdiction-level findings in more detail. This opportunity could be met by the design and implementation of country-specific green governance surveying or other bespoke research efforts.

A more in-depth view by sector, considering the driving factors behind existing regulatory governance arrangements and green transition and testing the application of solutions, could also be developed. This in-depth analysis would complement the comparative sectoral view already provided by the quantitative survey data presented in this publication and could clarify recommendations. This opportunity could be met similarly by the design of sector-specific green governance surveying or other bespoke research efforts.

Finally, it would be possible to develop in-depth analysis of regulators' functions, i.e. the tools for green transition identified in Chapter 2, such as tariff setting, or the regulation of network infrastructure planning, looking across sectors and countries to provide comparative analysis and develop recommendations.

The aim of these three strands of research would be to better explain the state of play findings and understand the full scale of different governance challenges, priorities and relevant solutions at the country, sector or function level.

Exploring further aspects of governance

As already noted, the scope of the green governance survey questionnaire was limited to a core set of questions around the governance arrangements of economic regulators. There is opportunity for a more in-depth exploration and consideration of governance principles, relating to both internal and external governance arrangements, not addressed directly by the green governance survey data. For example, governing body structure and its impact on the decision-making processes as it relates to environmental sustainability could be analysed further, as too could aspects of accountability and transparency, and the processes relevant to regulators' activities in this area. Developing an understanding of the different experiences of countries and regulators in these other areas relating to governance may prove useful for the development of new guidance or identification of best practices relating to the governance of regulators, in the context of delivering the green transition and contributing to the environmental sustainability of network sectors.

Furthermore, some aspects covered by the survey questions could be developed and explored further, for example, under capacity and resources, different funding models for duties relating to environmental sustainability and the green transition could be investigated, as well as the use of performance assessment and other management processes to prepare the organisation for change.

At a higher level, future surveys could also be used to provide clarity on the institutional framework of countries regarding green transition and environmental sustainability, to aid the analysis and explanation of survey results. For example, an overview of the role of environmental agencies vis-à-vis economic regulators, gathered systematically as part of surveying, would provide valuable contextual information for the interpretation of results.

Further resources and complementary guidance

Beyond the discussion of internal and external governance arrangements in Chapter 3, there are further principles of good regulation and other necessary elements to support better regulatory outcomes. These elements include well-designed rules and regulations that are efficient and effective, as well as consistent and fair operational processes and practices. There will be a range of practical questions for both governments and regulators to work through in order to adopt a green lens toward regulatory activities (making regulation, operating regulation, reviewing regulation). The OECD's paper *Better Regulation for the Green Transition* picks-up many of these themes in the context of regulating for environmental sustainability (OECD, 2023^[1]).

Complimentary normative guidance issued by the OECD has informed the above discussion on governance arrangements and regulatory policy. Most notably, the OECD's series on Best Practice Principles for Regulatory Policy¹, which includes the 2014 OECD guidance on the governance of regulators (OECD, 2014^[2]). Finally, prior OECD publications on *Shaping the Future of Regulators* (OECD, 2020^[3]), *The Role of Economic Regulators in the Governance of Infrastructure* (OECD, 2017^[4]), and *Communication Regulators of the Future* (OECD, 2022^[5]) have been drawn upon as additional sources of information relating to the role of regulators in the green transition and environmental sustainability.

The data gathered as part of the green governance survey and Governance of Sector Regulators indicators will be made publicly available.²

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Notes

¹ Available at [OECD Best Practice Principles for Regulatory Policy | OECD iLibrary \(oecd-ilibrary.org\)](https://www.oecd-ilibrary.org/governance/best-practice-principles-for-regulatory-policy).

² Please refer to the relevant section of the OECD website (Regulatory Reform) for more information.

Annex A. Case study submissions

The following case study material was submitted to the OECD in response to calls launched during 2023 and 2024. Case studies were requested as part of the development of this publication as well as to inform discussions during meetings of the OECD Network of Economic Regulators.

ANACOM (Portugal – E-communications)

ANACOM has taken into account environmental considerations in specific provisions such as network sharing, and has been mandated in 2015 by the Ministry to pursue the [National Strategy for Adaption to Climate Change in relation to Electronic Communications \(only available in Portuguese\)](#).

The work was co-ordinated by the Environmental Authority (Agência Portuguesa do Ambiente - APA) and was developed by Thematic Areas, Sector Working Groups¹ and the Autonomous Regions of Azores and Madeira.

An intercalary report was produced in 2018 and since then, ANACOM has been monitoring the existence of adaptation plans to climate change by electronic communications operators.

After major wildfires occurred in Portugal in June and October of 2017, ANACOM took the initiative of creating a Forest Fire Working Group, composed of 18 entities to increase resilience of electronic communication infrastructure. This group issued a [report in 2019](#) presenting 27 protection and resilience measures for electronic communications infrastructure, three of which relate to radio, four to underground pathways, twelve to energy or protection, and eight to procedures.

In addition, in 2019, ANACOM issued [Regulation N.º 303/2019](#) on the security and integrity of electronic communications networks and services.

Additionally, although there is no national legislation that includes objectives for the regulator relating to the environmental sustainability of the sector, ANACOM has the legal power to include considerations regarding environmental sustainability in its regulatory decision making and has taken a few initiatives in this regard:

- ANACOM considers that passive and active infrastructure sharing plays an important role in limiting the environmental impact of the ICT sector. Taking into account economic efficiency and environmental considerations, namely “avoiding any inefficient duplication in infrastructures or inconveniences for citizens and economic activities due to the frequent and extensive realisation of soil and subsoil works, with consequent disturbances at traffic and territory planning level, apart from the repercussions of environmental order arising out from it”, in 2004, in a regulatory pioneering decision, ANACOM established the minimum requirements for the implementation by the incumbent operator of a Reference Duct Access Offer (RDAO) of the incumbent operator. Subsequently, in 2010 the RDAO was amended to include also access to poles.
- ANACOM has also encouraged mobile network sharing in part with a view to meeting environmental objectives in the auction rules for spectrum allocations in 2020 and 2011, including provisions to facilitate passive and active sharing, including roaming.

- Furthermore, the transition to 5G will also enable a lower carbon footprint as well as the adoption of fibre to the premises.
- The simplification of the portability administrative process, introduced in the last amendment to the Portability Regulation, allowed for a substantial reduction in paper, a measure with an impact on the ecological footprint recognised on the operators' side.
- Additionally, ANACOM, for some consultation processes, sends a specific request to environmental civil society organisations (CSOs) to invite them to participate in consultations. An inclusive sector specific Working Group was established by the ANACOM for addressing the "National Strategy for Adaption to Climate Change in relation to Electronic Communications". Furthermore, ANACOM invited industry players to respond to a BEREC questionnaire on environmental indicators.

ANACOM has no specific legal power to collect relevant data on the environmental sustainability of the sector (e.g. greenhouse gas emissions, etc.) to inform its regulatory decision making, however ANACOM is actively working with BEREC on the development of sector specific indicators for sustainability.

ANTT (Brazil – Transport)

The actions taken by Brazil's National Land Transport Agency (*Agência Nacional de Transportes Terrestres*, ANTT) to improve sustainability include setting obligations in concession contracts and in regulation, encouraging the adherence of concessionaires to environmental performance indicators (which is voluntary), and a series of internal measures to improve sustainability within the regulator.

ANTT is responsible for:

- granting, inspecting, and managing the contracts of concessionaires of highway and railway infrastructure;
- providing permits and licenses, inspecting, and managing contracts (when a permit has been granted) relating to the interstate and international transportation of passengers, by bus or coach; and
- registering road freight transportation companies, truckers, and trucks; defining and inspecting the minimum rate of road freight transportation in Brazil.

Before granting concessions or prorogations in relation to highways and railways, a social environmental study which assess environmental risks, a Technical, Economic and Environmental Feasibility Study (*Estudo de Viabilidade Técnica, Econômica e Ambiental* – EVTEA), should be completed and approved.

After obtaining a concession relating to highway infrastructure, the concessionaires must present documents to confirm they are taking necessary action to obtain the required environmental licenses. The results are organised in a biannual report where ANTT can monitor the advances the concessionaires made in obtaining the licenses and actions taken to decrease the environmental impact, such as animal rescuing, or mitigation measures adopted to allow the fauna to be less affected by the infrastructure. For railways, ANTT monitors the process of obtaining the licenses through monthly meetings with environmental entities and acts as a mediator.

Since 2017, highway concessionaires are obligated (Portaria SUINF No. 283/2017) to report on their social and educational actions (*Relatórios Sociais e Educacionais* – RSE). The reports are available to the public on ANTT's website.

Brazil adopted goals in line with the Paris Agreement in national legislation (Decree No. 9.073/2017). The contracts concluded after 2020 follow ESG (environmental, social and governance) principles and are aligned with the 17 Sustainable Development Goals – SDGs and with Brazil's commitments to the Paris Agreement. The contracts follow the comply or explain model regarding the SDGs.

Besides the risk assessment included in the EVTEA process, there are complementary obligations related to sustainability included in the highway exploration program, a document attached to the contract. These obligations may involve respecting the International Finance Corporation's (IFC) performance standards, which consider several aspects of sustainability, the insertion of a Zero Carbon Program, and compliance with environmental licensing rules.

The IFC's performance standards relate to the Assessment and Management of Risks and Environmental and Social Impacts; Labor and Working Conditions; Resource Efficiency and Pollution Prevention; Community Health and Safety; Land Acquisition and Involuntary Resettlement; Biodiversity Conservation and Sustainable Management of Living Natural Resources; Indigenous Populations; Cultural Heritage; Gender equality; Stakeholder engagement and dissemination of information. There is a schedule for reaching each of the standards.

The Zero Carbon Program aims to neutralise greenhouse gas (GHG) emissions, calculated in carbon-dioxide equivalent (CO_{2e}), from the concessionaire's operating activities in the Road System. These activities include traffic inspection, winch services and mechanical services, ambulances, incident attendance (firefighting and animal seizure); and the operation of toll plazas, centers of operational control and other administrative buildings managed by the concessionaire. To compensate the emissions the concessionaire may buy carbon credits, reforest areas, plant trees, or adopt a Clean Development Mechanism.

To monitor the Zero Carbon Program and adherence to the IFC's performance standards, ANTT verifies if concessionaires were able to obtain the certifications related to these programs.

Highway concessionaires are also required to implement an Environmental Management System, in line with a national norm (NBR 14.001), within two years from the start of the concession and to have a risk management plan in place, as well as emergency planning for dangerous goods.

New highway concessions include the implementation of "Multi Lane Free Flow" which is expected to mitigate the emission of polluting gases, especially in urban areas. For railways there is special funding available for the "Preservation of Railway Memory".

Both highways and railways include aspects such as the treatment of archaeological sites in their risk allocation matrix. ANTT receives voluntary reports on good environmental practices adopted by the railway concessionaires and publishes these reports on its website.

To influence the behaviour of operators, ANTT uses an indicator of environmental performance (*Índice de Desempenho Ambiental – IDA*) that considers water and effluent use and treatment, solid waste, biodiversity, environmental accidents, governance, culture and community, energy efficiency and emissions. The indicator is currently used for highways and railway concessions. The implementation of the IDA by ANTT is part of the Social environmental and Territorial Agenda of the Ministry of Transport and aims at verifying the qualitative evolution and socio-environmental commitment of the sector. The IDA serves as a parameter to evaluate efficiency and quality of environmental management in transport infrastructure projects, evaluating and stimulating good practices in socio-environmental management. Adherence to the indicator is voluntary. Nevertheless, in 2022, 18 of the total 22 highway concessionaires agreed to be evaluated. For railway concessions, adherence was shown by 11 of 16 concessionaires and sub-concessionaires.

To foster the necessary innovation to reach environmental goals, ANTT created in November 2022 a structure for regulatory experimentation through Resolution 5.999/2022. The first regulatory sandbox experiment is testing the use of Free Flow devices instead of toll plazas, as previously determined in contracts. A second experiment is testing the use of High-Speed Weigh in motion instead of building weigh stations, as determined in the contract.

In order to reduce the environmental impact within the functioning of the regulator, besides allowing the civil servants to work remotely, ANTT is fostering a change in culture, by using a project focused on ethics, integrity, and sustainability to sensitise the civil servants. The project followed the precepts of the Environmental Agenda in Public Administration, developed by the Ministry of the Environment. During the project's implementation, there was a verification of necessary improvements in Inspection Offices infrastructure, air quality, ergonomics and lighting, and a training to inform the civil servants how they could better act to improve aspects such as cleaning and organisation, conscious use of electricity, and sustainable waste disposal.

The project has benefited the environment and improved the quality of life at work of the civil servants. Some results obtained were proper disposal of goods and items that became obsolete after adopting electronical processes, awareness of the correct use of equipment to avoid wasting both paper and electricity, reduction in the acquisition of goods and materials through the reuse and reallocation of idle items, increase in satisfaction of the civil servants and induction of a more proactive behaviour from civil servants in different locations of ANTT towards the central administration of the agency.

ANTT expects to expand its actions related to sustainability. The railway concessionaires' obligations are currently under review, with a view to incorporate similar standards to those for highways. and an indicator like the IDA will be developed for the road freight transportation as part of one project of ANTT's regulatory agenda that aims to improve the regulation of freight transport. The project is expected to end in November 2024.

Arcep (France – E-communications)

Submission I: An evolving mandate – the contribution of Arcep to environmental sustainability

Measuring environmental impact to identify tools for action

The French Government tasked the communication regulator, Arcep (*Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse*), and the agency for ecological transition (*Agence de la transition écologique, ADEME*), to carry out a study quantifying the current and future environmental footprint of digital technologies. The first two volumes of the study were delivered in January 2022 and assessed the current environmental footprint of digital technologies on the environment. In the study the two agencies made a life cycle assessment (LCA) of the environmental footprint generated by one year of digital (uses and goods) in France in 2020 applying a multicriteria, multi-tier and multi-stage methodology. A prospective assessment of the evolution of footprints to 2030 and 2050 was also provided, identifying a number of levers for action to initiate and amplify the development of digital uses that are less carbon- and resource-intensive.

In March 2023, the two agencies delivered the third volume of the study providing a forward-looking assessment of the digital environmental footprint in France up to 2030 and 2050.

The study shows that only a combination of eco-design and sobriety measures can reduce the environmental impact of digital technology and that with no further action to limit the growth of the digital ecosystem's environmental footprint (i.e. the trend-based scenario), its carbon footprint could triple and its energy consumption almost double by 2050.

Arcep began collecting environmental data from the four main telecoms operators in 2020 (the only players for which it had collection powers at that time), which led to the publication of the first edition of the annual survey in April 2022, covering 3 categories of indicators (GHG emissions, network energy consumption and the sale, collection, recycling and reconditioning of mobile phones). In 2021, the data collection was enriched with new indicators on the reconditioning and recycling of Internet boxes and TV set-top boxes,

and led to the publication of the second edition of the annual survey in April 2023, still covering telecoms operators.

Submission II: The role and action undertaken by Arcep in facilitating and promoting environmental sustainability objectives in the electronic communications sector

Arcep's annual survey "Achieving Digital Sustainability"

Since 2020, Arcep has been working on the implementation of an annual publication based on the collection of environmental data from digital players: Arcep's annual survey "Achieving Digital Sustainability".

This survey aims to:

- Improve measurement to better assess environmental issues, inform public authorities and allow the implementation of appropriate measures.
- Provide incentives for economic actors to behave virtuously; and
- Educate consumers about their uses and make tools available to the public.

Arcep's work on measuring the environmental impact of digital technology is based on an iterative and collaborative approach. The annual survey will be progressively enriched with new indicators and new categories of actors as the editions progress.

In March 2020, Arcep began its environmental data collection from the main telecommunication operators which led to the publication of the first edition of the annual survey "Achieving Digital Sustainability" in April 2022 covering 3 categories of indicators:

- Greenhouse Gas (GHG) emissions = 362 000 tons in 2020.
- Network energy consumption:
 - The 4 main operators consumed 3 803 GWh in 2020
 - Mobile networks consume twice more energy than fixed networks.
 - A fiber line consumes 4 times less kWh than a copper line.
- Mobile phones: sales, collection, recycling, refurbishing.
 - Only 13% of the 21.4 million mobile phones sold in France in 2020 are refurbished.
 - Of the 8.1 million mobile phones sold by telecommunication operators, only 2% are refurbished.

Based on Arcep's environmental data collection powers provided by law, an iterative implementation has gradually added new indicators on the reconditioning and refurbishing of internet and set-top boxes, and revised laws in 2021 allow for data collection to extend to new players beyond the four main telecoms operators.

In parallel, the survey has been gradually extended to cover the entire digital ecosystem, with decisions to expand coverage to new players and collect additional indicators decided with the input of stakeholders concerned, and ultimately in stages:

- In December 2021, Arcep's collection powers were extended to cover:
 - Data centers, terminal manufacturers, network equipment manufacturers, operating system suppliers, online public communication service providers
- In September 2022, the decision to extend collection was consulted on with datacentres and device manufacturers. The final decision was adopted at the end of 2022.

- Data collection has started for the year 2021 and 2022 for datacentre operators and device manufacturers and for the year 2022 for telecom operators. This data collection process ran from January 2023 and end of March 2023 and covered:
 - for device manufacturers, their greenhouse gas emissions, the quantity of equipment sold and in circulation and its duration of utilisation and the volumes of rare earths and precious metals used in its manufacture.
 - for data centre operators, their greenhouse gas emissions, their energy and electricity consumption and the volumes and sources of water used.
 - for telecom operators, the Authority is proposing a new protocol for measuring the electricity consumption of internet and set-top boxes.
- The 3rd edition of the annual survey (extended) “Toward a sustainable digital sector” was published in March 2024.

Study assessing the current digital environmental footprint in France and its possible evolutions

As environmental considerations become more and more embedded in the public domain, Arcep and the Agency for the Environment and Energy Management (Ademe) were mandated by the French government to elaborate a study assessing the environmental footprint of the French digital ecosystem which is made of three parts:

- a literature review on existing methodologies and studies on the digital ecosystem’s environmental footprint assessment.
- a life cycle assessment (LCA) of the environmental footprint generated by one year of digital (uses and goods) in France in 2020; and
- a prospective assessment of the possible evolutions of the footprint to the 2030 and 2050 horizons

Applied methodologies in existing studies are very heterogenous. The literature review allows a robust methodological framework compliant with ICT/public standards and including reference tools for assessments to be identified. The life cycle assessment (LCA) of the environmental footprint generated by one year of digital (uses and goods) in France is:

- Multi-criteria, to not only assess the carbon footprint but also other types of environmental impact (a total of 11 environmental indicators).
- Multi-tiered, to segment the digital ecosystem’s environmental impact in three parts (devices, networks, datacentres); and
- Multi-staged, to integrate impacts generated by each step of the life cycle from the manufacturing stage to the end-of-life.

In this context, data collection and measurement are the cornerstone of environmental footprint assessments, since assessment requires data which are hard to access and must sometimes be estimated or extrapolated.

Considering the different indicators of environmental impact analysed, the study highlights those that are best suited for describing the environmental footprint of the digital ecosystem. There is a first group of energy-related indicators (carbon footprint, ionizing radiation and depletion of fossil resources) but the depletion of natural abiotic resources (minerals and metals) also appears to be a relevant indicator.

The study highlights:

- the weights of both the manufacturing phase (for the ecosystem as a whole) and the ‘devices’ part (within the ecosystem) in the impact, which confirms the prominence of digital equipment lifespan expansion measures:

- the manufacturing phase of equipment (devices, servers, boxes, etc.) accounts for 80% of the digital carbon footprint.
- the devices account for 65% to over 90% of the impact depending on the environmental criterion assessed.
- the weight of servers in the impact of data centres (manufacture and use of servers representing just over 50% of the impact of data centres for the four main environmental indicators assessed);
- the weight of the usage phase in the impact generated by networks (more than 50% of the carbon footprint of networks, nearly 90% for the depletion of fossil abiotic resources and ionising radiation);
- that environmental impact of the digital ecosystem must be addressed globally: the predominant weight of devices should not conceal the interdependency between networks, datacentres and devices. Every stakeholder needs to be part of the journey towards digital sustainability.

The prospective analysis uses the developed methodology to inject a trend-based scenario and alternative scenarios to 2030 which combine action levers based on eco-design and sobriety measures. The 2050 horizon sets out declining scenarios: the 4 models of society proposed by ADEME in “Transitions 2050” to reach a French carbon neutral society in 2050, which differ from one to another on the weight they give to digital technologies in the economy.

The analysis indicates that with no further action to limit the growth of the digital ecosystem’s environmental footprint (i.e., the trend-based scenario), its carbon footprint could triple to 2050 (from around 17 to 50 Mt CO₂ eq.).

In parallel, there is also at stakes the issue of metals and minerals consumption and their future degree of availability: the most digital-oriented scenario shows that there could be a report of impact (from carbon emissions to metal and mineral resources consumption)

At the same time, the study shows that alternative trajectories could contain or even curb the trend of a growing digital ecosystem’s environmental footprint by utilising the following levers:

- Stabilising the fleet of devices
- Extending the lifespan of equipment
- Designing eco-friendly devices and digital services
- Heightening awareness of users and promoting more efficient usage and lowered overall consumption.

Progressing on these issues requires collective action, from all stakeholders active across the digital value chain. In both the short- and long-term, there is a need to create and deploy tools to identify, monitor, and encourage the sustainable consumption of digital services and goods as the digital environmental footprint of this economic sector will continue to grow if nothing is done to curb the current trend. Such tools could be built upon recurrent data collection and the use of indicators built on a known and stable methodology.

ARERA (Italy – Multi-sector)

Evolution of the water tariff method: Environmental aspects and climate change

The Italian Regulatory Authority for Energy, Networks and Environment (ARERA) has recently approved the water tariff method for the fourth regulatory period 2024-2029 (MTI-4)² which defines the rules for calculating the costs in tariff for water utilities.

The evolution of the tariff method from the first to the fourth regulatory period was characterised on the one hand by the consolidation of the cost recognition rules, essential to give stability to the sector and encourage investment expenditure, and on the other by the need to promote growing efficiency of management, to enhance interventions for energy and environmental sustainability, and to recognise

interventions to increase the sector's resilience to Climate Change. The evolution of the regulation of the technical quality of the service, complementary to the tariff regulation, followed the same objective.

The strengthening of measures for the energy and environmental sustainability of the integrated water service

The tariff regulation, since the third regulatory period, has introduced provisions oriented towards energy and environmental sustainability, in the wake of the growing legislative activity promoted by the European Commission with regard to the promotion of energy efficiency, waste treatment and reduction of incidence of certain plastic products in the environment.

ARERA has recognised four main axes that identify energy and environmental sustainability objectives, implementing its regulation with the recognition of costs linked to the following measures:

- *energy efficiency* in activities and infrastructures if not attributable to the integrated water service;
- *reduction of the use of plastic* by promoting the consumption of drinking water also through the installation of drinking fountains;
- *recovery of energy* – electrical and thermal – and raw materials through plants or specific treatments integrated into the water infrastructure, as well as diffusion of energy from *renewable sources* to power the integrated water service systems;
- *reuse of treated water* (for agricultural and industrial purposes) with the aim of promoting greater rationalisation of the resource, particularly in contexts characterised by drought phenomena.

Incentive measures for energy and environmental sustainability: reuse of purified wastewater and reduction of electricity purchased

ARERA has introduced new incentive measures for energy and environmental sustainability into the new regulatory framework, and in particular two reward measures have been defined to be attributed to the water utilities that, in 2025 compared to the 2023 data, will have:

- an increase of the percentage of purified volumes that can be earmarked for reuse but were not intended for this purpose, compared to the overall purified volume (incentive for reuse in compliance with the principle of "Water Conservation");
- a reduction of at least 5% in the quantity of electricity purchased (incentive for energy saving and/or self-production of energy).

Since the third regulatory period, ARERA also established the "Fund for the promotion of innovation in the integrated water service" to encourage the reuse of purified wastewater (incentive for reuse in compliance with the principle of "Water Conservation") and the reduction of the quantities of electricity purchased (promoting energy saving and/or self-production of energy). This fund will be used to provide the aforementioned rewards.

Infrastructural integration against climate change

ARERA has based its tariff regulation on the consideration that, among the factors aimed at guaranteeing a necessary ability to adapt to ongoing climate changes, there may be the possibility of expanding the recourse to a management of the rainwater collection and conveyance, which effectively integrates the remaining infrastructure system. The sudden evolution of the climate scenario, with a greater frequency of extreme meteorological events, has indeed suggested assigning a high priority to the infrastructural integration process, so that the works necessary to the management of the potentially riskier effects, can in any case be carried out and maintained according to adequate standards of operation.

From this perspective, among the innovations introduced to the tariff method for water services, ARERA has envisaged that, from 2024, the costs of the activities of collection and removal of rainwater and urban drainage through the management and maintenance of dedicated infrastructures (white sewerage) can be included in the costs of integrated water service (even if they were previously excluded), including the cleaning and maintenance of road drains.

Energy costs and energy efficiency

In the context of the recognition of electricity costs, ARERA has pursued on the one hand the objective of mitigating, in consideration of the volatility of energy markets, the risks of the supply choices made by operators, and on the other that of incentivising energy efficiency through a reduction in consumption and self-production. To this end, the new tariff method provides:

- the recognition of a cost for the purchase of electricity in year (a) equal to that incurred in the previous two years, but for year (a+2), an adjustment is calculated in order to ensure that that cost is not higher than a benchmark (increased by 15%) which takes into account the costs - referring to the same year (a) - relating to a theoretical purchase mix of electricity;
- the strengthening of incentives for the self-production of electricity by water utilities, introducing the possibility of valorising the cost within the component covering energy costs, on the condition that the associated production costs, including those of capital, are not covered by other tariff components;
- an incentive to save the overall amount of energy used for the management of the integrated water service, through a sharing factor based on the energy savings achieved by the operator.

Environmental costs, the protection of aquatic ecosystems and upstream infrastructure

ARERA, in line with European directives, recognises in its tariff method the “*environmental and resource costs*”, in other words the economic valorisation of the reduction and/or alteration of the functions of aquatic ecosystems, namely the missed opportunities (current and future) resulting from a specific use of a scarce resource. In particular, the types of charges specified as “environmental and resource cost” are divided into:

- a cost component referring to environmental costs, which represents the economic valorisation of the reduction and/or alteration of the functions of aquatic ecosystems, such as to damage the functioning of the aquatic ecosystems themselves and/or some uses of the aquatic ecosystems and/or well-being resulting from the non-use of a certain resource;
- a component referring to the costs of the resource, which represents the economic valorisation of the missed opportunities (current and future) imposed, as a consequence of the allocation of a water resource that is scarce in terms of quality and quantity for a specific use, to other potential users of the same water resource.

Furthermore, starting from the fourth regulatory period, it has been specified that the charges (both fixed and variable) relating to large upstream infrastructures can be at least partly considered “resource costs”, being attributable to measures for the security of supply, for the protection and the production of water resources or aimed at containing or mitigating the opportunity cost of the resource.

Finally, in order to promote investment expenditure in large upstream infrastructures which, by their very nature, cannot be exhaustively considered within the scope of the current programming required for the integrated water service management, it has been established that, if their construction is necessary to overcome the critical issues related to climate change and environmental sustainability, they can be financed by shares of specific components of the tariff pertaining to the single utilities involved. In such cases, as part of the planning of each utility's interventions, it is required that the utility provide information

about the entire infrastructure serving territories larger than the single Optimal Territorial Area in which the single utility carries out its activities.

The regulation of technical quality and the new general standard aimed at mitigating critical issues related to Climate Change

The regulation of technical quality, in addition to the tariff regulation, also pursues the objectives of environmental protection and climate change mitigation. The general standards monitored and to which a reward system is associated refer to the following macro-indicators:

- M1 – Water leaks;
- M2 – Service interruptions;
- M3 – Quality of the water supplied;
- M4 – Adequacy of the sewerage system;
- M5 – Sludge disposal in landfill;
- M6 – Quality of purified water.

In order to encourage to carry out works aimed at increasing the resilience of water systems, in addition to the activities already implemented within the “Next Generation EU programme”, ARERA has introduced a new macro-indicator, called “*M0 – Water resilience*”, for monitoring the expected effectiveness of the complex supply system in light of the forecasts regarding the satisfaction of water demand in the managed territory, also including non-civil uses.

As for the other macro-indicators, the value of M0 will determine the class to which the utility belong. This class identifies critical supply situations, which are associated with objectives of annual maintenance or improvement of water availability, to be pursued through the increase of volumes under concession, but also through participation in shares of third-party concessions, or the positive valorisation of reuse or the creation of dual networks.

From a tariff point of view, the costs for adjustments to the technical quality and contractual quality standards are covered by the tariff. The tariff method includes additional charges for the new technical quality objectives, also linked to the introduction of the new macro-indicator.

ART (Italy – Transport)

Transport, the environment and regulation.

Though emissions generated by transport decreased during the pandemic, and are projected to continue decreasing in international aviation and maritime transport, in other transport segments, estimates indicate a rebound. Overall, the sector remains a priority for environmental policy and areas of concern for action to tackle climate change. In Europe, the transport sector accounts for over 20% of total GHG emissions (EEA, 2024^[1]).

By far the largest contributor to emissions is road transport (< 90%), driven primarily by private car use. Considering externalities, in collective land transport, rail has the lowest impact compared to all other modalities (IEA, 2023^[2]).

In Italy, while ecological transition constitutes a key axis of the national *Recovery & Resilience* and 2030 *Energy and Climate* plans, no specific duties or mandates are placed on the transport regulator concerning environmental sustainability.

However, some regulatory tools can be deployed to promote more environmentally sustainable behaviour. ART has provided for regulatory incentives to apply in several areas falling within its remit. To be enacted, these measures must be incorporated in contractual agreements between third parties (awarding authorities/regulated companies). Some examples follow below.

Regulatory tools: Some examples

Regulation of access to infrastructure

In the area of access to infrastructure, particularly with regard to pricing, airport managers, railway infrastructure managers and motorway concessionaires may modulate tariffs according to pollution levels generated by, respectively, aircrafts, trains and road vehicles. Other incentives deal with the possibility to increase annual charges depending on the achievement of environment-related investment targets (airport managers) or the application of quality standards (motorway concessionaires). Reversely, an obligation to reduce annual tariffs applies should the targets established under ART's regulation not be met. Moreover, an extraordinary 1% additional remuneration for the cost of capital may be accorded to airport managers for environment-related investment, subject to strict terms and conditions established in ART's regulation and upon prior consultation of the users (who bear the onus).

Regulation of services

Concerning the regulation of services, incentives apply in different phases of the administrative procedure leading to the award and in the performance of the contract concerning public transport services. Starting with planning, ART's regulation on the design of service supply areas, including transport by rail, bus and waterborne, provides that *"the most sustainable multimodal solution should be preferred."* Additionally, solutions alternative to public financing, such as pollution charges and congestion charges, should be sought to compensate for service contracts. With regard to the tendering phase, for the award of transport services by bus, efficiency KPIs may include environmental standards upon which a pricing/penalty system is applied. In addition, in the case of transport by rail, tariff updates are conditional, among others, upon the efficient use of energy and fuels. Similar provisions are under way in transport by bus.

CNMC (Spain – Multi-sector)

Short summary

This contribution by the Spanish National Markets and Competition Commission³ (CNMC) addresses the topic of the Roundtable on "Competition in the circular economy".

The circular economy in a broad sense has been gaining importance in recent years given the role it plays in achieving the Sustainable Development Goals (SDG) and the opportunities in terms of productivity and employment through innovation and the creation of new markets.

Consistently, the number of entrepreneurial initiatives and regulations in this field have also increased. Given this growing importance, the CNMC has carried out various activities which are covered in this two-part document.

The first part summarises the regulatory and market framework on packaging waste management and the main competition enforcement activities carried out -some of them ongoing- related to the circular economy.

The second part describes the CNMC's advocacy initiatives concerning the circular economy.

Regulation and enforcement actions on packaging waste management sector

The European Packaging Directive, implemented in Spain via Law No.11/1997 of 24 April 1997 on Packaging and Packaging waste which was developed by Royal Decree 782/1998,⁴ requires producers to manage the recycling of the packaging waste associated with the goods that they put on the market.

To comply with such obligations, producers may either establish their own Deposit and Return System or join a Producer Responsibility Organization (PRO). In 1996 Spanish producers, retailers and manufacturers founded ECOEMBALAJES ESPAÑA, S.A. (“ECOEMBES”), a monopolistic non-profit PRO paid for by producers, that organizes and finances the collection, sorting and recycling of packaging waste in Spain.

In Spain, local authorities are directly responsible for managing packaging waste in their territory. Thus, they enter into collaboration agreements with ECOEMBES to establish the infrastructure and develop the separate collection of packaging waste, including all necessary procedures to ensure management and control of the entire recycling process.

Once final consumers deposit their packaging waste in the containers, local authorities collect and transport it to the selection plants that have previously been established by them. In the selection plants the packaging waste is classified into three “fractions”: metals (steel and aluminum), plastics (PET, HDPE, film and plastic mix) and used beverage cartons (brick packaging). Once the packaging has been classified, local authorities sell the waste fractions to ECOEMBES which designates the companies in charge of the recovery/ recycling of the various materials sorted in the plants. Additionally, ECOEMBES regularly awards tenders to recyclers of the packaging waste that has been sorted in the selected plants. However, only those recyclers that haven been certified by ECOEMBES can take part in the tenders.

Provided that ECOEMBES is the only PRO in Spain and that the recyclers need to be previously certified by ECOEMBES to participate in the tenders, ECOEMBES holds a dominant position, a monopoly, on the market of collection and recycling of packaging waste.

ECOEMBES has been previously investigated by the Spanish Competition Authority in two cases concerning a potential abuse of dominant position related to the recycling process, and more specifically, the tenders launched by ECOEMBES to designate the companies responsible for the recovery of the materials.

In October 2023, the Spanish Competition Authority, after carrying out a dawn raid in the headquarters of ECOEMBES, and formally opened infringement proceedings against ECOEMBES. The investigation concerns an abuse of dominant position which may breach Article 2 of the Spanish Competition Act and Article 102 of the Treaty on the Functioning of the European Union (TFEU).

Specifically, the Spanish Competition Authority is investigating a potential competition law infringement related to the lack of transparency in the tenders launched by ECOEMBES to designate the recyclers for the recovery of the materials. The procurement procedure would not guarantee the traceability and integrity of the bids submitted by the recyclers. Additionally, the Spanish Competition Authority is investigating whether ECOEMBES established barriers to entry for the recyclers to participate in the tenders which are not justified on technical, environmental or economic grounds.

In the course of the current investigation, the Spanish Competition Authority adopted (December 2022) interim measures to ensure publicity and transparency in the upcoming tenders of PET and HDPE plastic waste organised.

Article 54 of the Spanish Competition Act establishes that the CNMC’s Council may adopt, ex officio or at the request of any of the parties of the proceeding, interim measures to ensure the effectiveness of the final decision that may be issued once the infringement proceedings have already been opened. According to the mentioned article, interim measures must be motivated, proportional, and time-limited and must

have the sole aim of ensuring the effectiveness of the final decision of the Council stating the potential existence of a competition law infringement.

Following Article 54, the Competition Directorate submitted an interim measures' proposal to the CNMC's Council to guarantee the transparency and publicity of the tenders launched by ECOEMBES.

The Council, after consulting the interested parties in the proceeding, issued a decision adopting the interim measures proposed by the Competition Directorate. These include:

- The participation of a public notary in the tender procedure with the purpose of guaranteeing the transparency, traceability and integrity of the bids submitted by the recyclers;
- A limit on the quantity that can be awarded to a single recycler in tenders for PET and HDPE plastic waste;
- Other measures ensuring the transparency of the tenders such as the publication on ECOEMBES' website of the call for tenders as well as the minutes issued by the public notary containing all the bids submitted for the tender.

In December 2023, Spanish Competition Authority adopted a commitment decision intended to resolve the competition concerns detected during the investigation. Under Spanish Competition Act, a commitment decision imposes the conditions that are offered voluntarily by the alleged offender. The mentioned procedure quickly restores the level of competition through remedies that address the detected concerns and safeguard consumer welfare and the public interest.

This commitment decision includes two categories of commitments: i) Related to tender procedure and ii) Related to the certification process established by ECOEMBES to take part in the tenders.

Commitments related to the tender procedure implement an objective, transparent and non-discriminatory electronic tender process, which will avoid the potential arbitrary intervention of ECOEMBES throughout the tender. The electronic tender is run by an external and independent provider. These type of commitments also involved a reduction of the length of the tender increasing the level of dynamism.

Commitments related to the certification process are based on increasing the number of certification entities that certify the recyclers in order to take part in the tenders. Commitments decision increases the validity duration of the certification and reduce the certification criteria with the aim of reducing the administrative burden of the recyclers. The described commitments pretend to obtain a higher participation of SMEs in the tenders and therefore, an increase in the level of competition in the relevant market.

CNMC's advocacy initiatives concerning the circular economy

The CNMC has been active in the debates concerning the role that competition policy and competition authorities have in the pursuit of sustainability goals, which have accelerated in the past few years.

As part of these conversations, [the CNMC published a position paper](#) in December 2020 in the context of the European Commission's public consultation on how competition policy can contribute to the Green Deal.

CNMC's commitment to sustainability and the promotion of the circular economy is also reflected in its [Activity Plan for 2023](#) as well as in its [Strategic Plan for 2021-2026](#). It is in the context of its aim to help achieve the Sustainable Development Goals, the Advocacy Department is pursuing several projects in "green" sectors, including two ongoing market studies on [electric vehicle charging](#) and [packaging waste management](#).

CNMC's position paper on the Green Deal

In 2020, the European Commission launched a public consultation on the European Green Deals, which aims at making Europe the first climate-neutral continent by 2050 by developing a fair and prosperous society that permits for the implementation of a modern and competitive economy using resources efficiently. The European Commission sought contributions from authorities, associations and operators in three areas: State Aid, prosecution of anti-competitive behaviour and merger control procedures. The CNMC participated in the public consultation by issuing a position document stating its opinion on these matters.

The CNMC's position paper identifies two ways in which competition authorities can help sustainability. On the one hand, competition authorities may address their efforts towards interventions that favour sustainability, by using both enforcement and non-enforcement tools, such as market studies. On the other hand, competition authorities may integrate sustainability considerations into their substantive competition analyses. This must be done carefully.

As a starting point, while there may be more direct ways to promote sustainability, market competition is also a driver for sustainability. Indeed, competition encourages technological innovation and spurs companies to offer more sustainable products and services. Sustainability can be a differentiating factor of competitiveness that benefits consumers, one that competition policy must reinforce.

However, although, in general, competition and sustainability are complementary, sometimes they are not, so a balance that is satisfactory to society must be struck between the two. The necessity and proportionality test is the best way to determine this balance point.

In this regard, the CNMC believes that integrating sustainability considerations into competition analyses must comply with the following principles:

- Provide the necessary predictability to economic operators in terms of how their actions will be assessed under competition rules.
- Maintain the consistency and interpretation of competition rules within the EU and avoid the fragmentation of the internal market.
- Preserve effective competition in the internal market, so that it can be 'fine-tuned' without a radical transformation.

Moreover, a proactive effort for sustainability by competition authorities requires greater specialisation in these areas (professional skills, evaluation methodologies, etc.).

Concerning State aid, it is necessary to conduct a careful assessment of the risks involved in modifying the regulations on State aid. Each country should be allowed to reflect its sustainability concerns without distorting competition in the internal market. The specific proposals made by the CNMC include clarifying the regulations on electricity self-consumption, developing a network of recharging stations to achieve the true deployment of electric vehicles, and immature production technologies, together with reducing incentives for production activities that rely on fossil fuels when it is technically possible to use clean energy. Public procurement can also be an equally effective instrument to curb climate change.

As regards anticompetitive practices, agreements between operators that yield a clear environmental improvement and do not involve restricting parameters that are essential to competition are permitted by competition rules. Those agreements that, in addition to providing a clear environmental benefit, also restrict competition, are acceptable as long as they comply with the requirements of competition regulations (Art.101.3 TFEU and Art. 1.3 of Spain's Anti-Trust Law). However, there is a clear limit that must be respected: sustainability goals can never be an excuse to authorise cartels. The CNMC notes that, in order to stimulate the adoption of co-operation agreements in favour of sustainability targets,

operators should be given greater legal certainty at the EU level on the types of actions they can carry out without breaching rules on competition and on the evaluation of efficiencies.

Finally, the CNMC notes that mergers can, in certain cases, have a negative impact on sustainability by reducing innovation or competition between sustainable operators. Another cause for concern is the so-called “killing acquisitions”, that is, mergers aiming at letting the acquiring company gain control of the acquired company in order to avoid developing or commercialising cleaner technology. By contrast, some business mergers may help advance sustainability objectives. Including sustainability criteria as part of the efficiency analysis would require a review of the evaluation instruments (concepts, tools and profiles).

Market study on packaging waste management

In February 2022, the CNMC announced the launch of a [market study on packaging waste management](#). The market study marks the culmination of the work relating to waste management issues undertaken by the Advocacy Department in the past few years, where it has supported the lawmaker during the drafting stages of new legislation (which transposes European Directives) by issuing several reports on draft regulations.⁵ As a result of this work, the CNMC realised that, even though there was a regulatory reform on its way, there still seemed to exist various obstacles (both structural and regulatory) that hindered competition in the sector and deserved a thorough analysis.

The most obvious of all is that, since the introduction of Extended Producer Responsibility (EPR) in Spain in the late 1990s, only one collective EPR scheme has been created to manage light packaging waste (ECOEMBES) and glass packaging waste (ECOVIDRIO), leading to de facto monopolies, unlike in other waste streams or other countries. During 2022, a significant regulatory reform has been approved that has set into motion a significant transformation of the sector, which places it in a decisive moment to determine the competitive environment in the long term. Furthermore, the CNMC believes that the promotion of competition in the waste management sector has shown to be especially beneficial for sustainability, according to the experience of other countries in terms of waste sorting,⁶ recovery, and recycling rates.⁷

The study began with a public consultation,⁸ in which all stakeholders were invited to respond to a series of questions concerning the packaging waste management sector in Spain, both from the point of view of regulation and the functioning of the markets concerned. The public consultation was a success, with the participation of 49 stakeholders, including public authorities, experts, packaging companies, packaging producers, recycling companies, environmental organisations, individuals, EPR Schemes and others.

The participants in the public consultation highlighted different areas of concern, such as:

- From the packaging companies’ (subject to EPR) point of view, the fact that there is so far only one existing entity to fulfil the obligations given by extended producer responsibility means that they must accept the conditions or practices imposed on them by the monopolist, e.g., concerning green dot fees or governance of the system, among others.
- Several public administrations expressed dissatisfaction with their relationship with at least one of the existing monopolists (ECOEMBES). The administrations depend on the financing of this entity to carry out the management of packaging waste, and many state that this, in addition to their insufficient human resources, gives ECOEMBES more leverage in the negotiations of the financing agreements.
- Recycling companies complain about the homologation system set in place by ECOEMBES, by which they can only participate in material tenders if they pass homologation, even when complying with legal administrative authorisations. In addition, some recyclers have expressed dissatisfaction with the conditions under which material delivery occurs. Finally, they accuse the system of material allocation of lacking transparency, which, in fact, is under investigation by the Enforcement Department of our authority.

The work on the study is still underway, focusing on the legal analysis of the sector in Spain, the situation in other countries, the concept and implementation of extended producer responsibility, which is key in the packaging waste sector, and its implications on competition and the achievement of a circular economy.

Market study on EV charging infrastructure

One of the key challenges to tackle climate change and to reduce the economic dependency on non-renewable resources is decarbonising the transport sector. In order to do so, most authorities have set forth ambitious plans to promote the adoption of electric vehicles (EVs). These include the development of a charging points' network, able to adequately serve this kind of vehicles (the Spanish government, for instance, has established a country goal of 80 000-110 000 public access charging points at the end of 2023, and of 340 000 in 2030).

However, it corresponds to public authorities not only to guarantee certain penetration objectives, but also to ensure that the new market of electric charging services functions properly from a competition perspective. That is why the CNMC has started a market study on EV charging infrastructure. It will incorporate input from a public consultation (to be opened in the next months), and it will focus on competition risks coming from the market structural characteristics, businesses practices, and administrative interventions.

CRE (France – Energy)

CRE's competences: A growing role in implementing the energy transition

As set out in the French Energy Code, the Energy Regulatory Commission contributes to the smooth functioning of the electricity and natural gas markets for the benefit of end consumers and in line with the objectives of the energy policy. CRE's missions can therefore be divided into three areas:

- A mission to regulate the networks, aimed at ensuring the performance of the network operators: cost control, quality of service, access conditions, investments, innovation, construction of the internal market.
- A mission to regulate the markets to allow the opening of the markets and innovation for the benefit of the consumer: setting the tariffs, regulation of nuclear power, capacity mechanism, monitoring of the wholesale and retail markets, consultation on market rules.
- A mission to serve the energy transition: support for renewable energy (examination of calls for tenders), calculation of public service energy charges, electricity mix in the non-interconnected areas. Example [NB: you could use this example somewhere else in the report if you'd like] : as part of its task of processing calls for tenders for new renewable energy capacity, such as solar PV, CRE has developed a tender evaluation methodology that allocates points based on various criteria (including the project's price and environmental impact), with a significant portion of points dedicated to the embodied carbon content of the solar panels and equipment used. This approach incentivises developers to select equipment with lower carbon content and directly impacts the selection of solar panels based on their manufacturing origin due to the differing carbon emissions associated with their production.

In addition, in order to set out a vision and objectives for the actions of its Board and departments for the years 2023 and 2024, CRE published its roadmap in February 2023, with a focus on the ecological transition and carbon neutrality. Its first axis focuses on making grid regulation and energy system transformation a lever for accelerating the ecological transition through:

- Accelerating the transformation of electricity networks: connection and efficient integration of renewable energies, new consumers, storage, electric mobility, etc.

- Determining the medium- and long-term outlook for gas networks and infrastructures and a regulatory framework adapted to the decline in fossil fuels and the development of low-carbon gas and hydrogen.
- Helping to accelerate the development of low-carbon energies by ensuring that they are properly integrated into the energy system and that support measures are effectively implemented.

To inform its work, it is also interesting to note that in 2017 CRE created a Foresight Committee, which in 2023 became a Scientific Council. CRE's Foresight Committee had been working for several years on enlightening the future of our energy system, with the help of about 200 external experts, including energy operators, academics, consumers' associations, and members of Parliament. This independent Committee had helped the French regulator, politicians, and industry players to anticipate changes and adapt their practices to contribute to the energy transition. This structure made it possible to draft reports on issues that, at the time, did not fall directly within the CRE's remit: for example, the impact of clean mobility on the energy mix (2018), the hydrogen vector (2021), biomass and carbon neutrality (2023). The current working group, in its new form, is about to publish a report on carbon capture and storage.

Decarbonisation of the gas sector: The implementation of a favorable framework for the development of biomethane

In France, biomethane production targets (over 11 TWh/y of installed production capacity in 2023) have been met thanks to a favourable framework, which CRE supports and is tasked to implement. To fulfil its potential and play its role in the decarbonisation of the gas sector, the biomethane production needs: to access the network; to access the market; and to be profitable. In that purpose, the legal and regulatory framework consists of 3 main instruments:

- A **"right to injection" principle**, which eases the access of biomethane production plants to the gas network.
- A **regulated feed-in tariffs system** for small to medium-sized installations, which provides economic viability of the sector.
- New schemes for bigger installations that will be soon implemented: tenders and biomethane production certificates.

On the first aspect, CRE has taken action on **connection zoning**: CRE has already validated 345 zonings and around 400 reinforcement works (over EUR 200 million in investments for distribution and around €89 million for backhauls). In the medium term, over 1 200 projects (1 232 to date) could be carried out based on these validated zones, representing over 26.6 TWh.

On the second aspect, biomethane producers have also been benefitting since 2011 from a **feed-in tariff**. End of 2020, the feed-in tariffs have been limited to small installations (< 25GWh). Production subsidies are guaranteed in France for 15 years, span from EUR 73 to EUR 192/MWh depending on the size of the production facility (maximum production capacity) and on the nature of the waste or organic material used; and have increased a lot during the last months because of the inflation and of the cost of electricity.

On the third aspect, **calls for tenders for large-scale facilities** (25 GWh annual production) which currently cannot receive public support will also be implemented. The past summer, CRE took a deliberation on the specifications of those call for tenders. Also, to come, **biomethane production certificates** (extra-budgetary mechanism). Producers who do not receive public support will receive biomethane production certificates (number depending on volumes produced); these certificates will then be sold to gas suppliers with an obligation to purchase a certain volume depending on their level of gas consumption.

Ofwat (United Kingdom – Water)

Governing Green: Role and actions regarding facilitating or promoting environmental sustainability objectives

Who we are

Ofwat is the economic regulator of the water sector in England and Wales and was established in 1989 when the water and sewerage industry was privatised. The companies we regulate are responsible for delivering water and sewerage services to customers. Our functions and duties are laid out in the Water Industry Act 1991.⁹ Our duties include to protect both existing and future consumers' interests and securing the long-term resilience of water companies' services against environmental pressures, population growth and changing consumer behaviour.

We are not the primary environmental regulator, but we see the environment as central to our work. We act in accordance with the UK government and Welsh Government's respective Strategic Policy Statements (SPSs), which include steers related to resilience, biodiversity, net zero and long-term adaptation to climate change.¹⁰

Our approach to regulation aims to facilitate long-term, adaptative, and resilient water, drainage and wastewater services. Ofwat also uses markets to deliver for customers, including in relation to major infrastructure provision and bioresources.

We set out the price, investment and service package that customers receive, through a price review every five years. This is an essential regulatory tool to drive investment and sustainable change in water companies. In addition, we also have a wide range of regulatory tools including markets, licensing and enforcement, assurance, monitoring and campaigns. We operate alongside government departments and water quality and environmental regulators, and co-ordinate and collaborate with our partners.

Ofwat's strategy for the environment

Through our strategy, "Time to act, together", we have committed to ensuring companies meet long-term challenges whilst delivering more for customers, society and the environment.¹¹

We expect water companies to consider the environment an integral part of their business, inseparable from the services they provide. We want the sector to work with stakeholders to restore and improve the ecological status of our water environments and add value to the land they hold and use. We want current and future customers protected from the impacts of extreme weather and pollution.

Our strategy makes clear that we want companies to provide greater public value, delivering for customers, society and the environment. As a result, we set out ambitions for:

- **Climate Change:** We are committed to strengthening the sector's approach to climate change mitigation and adaptation, building on the companies' commitment to achieve net zero emissions by 2030, and preparing for the challenges climate change will bring.
- **Demand management:** We aim to deliver change in how people use water and the wastewater systems to reduce overall demand, working with the Department for Environment, Food and Rural Affairs on measures to reduce personal water use.
- **Nature-based solutions:** We expect companies to make a step change in the use of nature-based solutions including wetlands, sustainable urban drainage systems, and are promoting it through our expenditure assessment which will include environmental and social factors in the next price review for 2025-30.

- **Natural capital:** We are exploring how we can best use natural capital accounting methods to evaluate companies' activities, and how companies can best be incentivised to use them to make decisions.
- **River water quality:** We expect companies to take clear and sustained actions to improve their impact on rivers and reduce harm from storm overflows.

We are working with environmental regulators, UK government and Welsh Government to ensure the next environment programmes (WINEP in England and NEP in Wales) and plans for the water sector (including Drainage and Wastewater Management Plans and Water Resources Management Plans) bring forward the greatest strategic benefits to both customers and the environment.

We are delivering greater environmental and social value with an increased focus on the long term through our regulatory tools, including the price review. As a result, we are exploring incentivising improved outcomes for the environment through performance commitments relating to per capita consumption, leakage, business demand, operational greenhouse gas emissions, pollution incidents, bathing and river water quality and storm overflows.

Focus: Our action on climate change

Our duties enable us to take climate change mitigation and adaptation into account when carrying out our functions.

Climate change mitigation in the water sector is crucial to achieving the UK government and Welsh Government's net zero targets. In our net zero principles paper, we set out our expectations for companies to align with national governments' targets, address both their operational and embedded emissions and prioritise actual reductions in greenhouse gases before the use of offsets.¹²

To achieve this, we introduced standardised annual mandatory reporting of operational and embedded greenhouse gas emissions, respectively in 2022 and 2023. We will incentivise reductions of operational emissions as part of the next price review (2025-30) through new operational greenhouse gas emission performance commitments.

Focus: Water industry national environment programme (WINEP)

The WINEP is the programme of actions water companies in England need to take to meet most of their environmental obligations. The current methodology for the WINEP for England was developed jointly by the Environment Agency, Department for Environment, Food and Rural Affairs and

Ofwat. It will account for approximately GBP 5.2 billion of assets improvements, investigations, monitoring and catchment interventions between 2020 and 2025.¹³

PUC (Latvia – Multi-sector)

Since 9 November 2022, according to the Methodology for Calculating Tariffs for Water Management Services, regulated service providers have the obligation to reduce the costs included in the draft tariff by the unforeseen revenue and the right to increase the costs included in the draft tariff by the unforeseen costs incurred in the previous period. The unforeseen costs and revenue originally consisted of changes in payments if one public water management service provider procured water management services from another public water management service provider, and changes in payments for the purchase of electricity, heating fuel, thermal energy, and gas.

On 28 December 2023, PUC made new amendments to the Methodology by adding the possibility to include in the unforeseen costs the capital costs (depreciation of fixed assets and return on capital) and credit interest payments and repayment of principal sum of the previous period (not longer than two years) related to energy efficiency improvement and energy neutrality promotion measures (Methodology p#17).

Usually, those measures include installation of solar panels, replacement of electrical equipment with more energy-efficient ones and insulation of buildings. Up till the end of 2023 capital costs and credit payments of such measures could be included only in the next draft tariff according to the residual value (as it is now with all the other capital costs). As a result of these latest amendments, service providers can recover the capital costs of the previous period related to the measures that were implemented with the aim to save energy resources and reduce the operational costs. It is also a kind of incentive not to delay the implementation of energy efficiency improvement and energy neutrality promotion projects.

SZTFH (Hungary – Multi-sector)

Europe is facing an energy shortage that is not only affecting citizens, but also spilling over into industries, slowing down and making supply chains more expensive. Harnessing the development potential of clean energy production, including geothermal energy, can help to deliver more efficient, greener and more secure supplies of some public services in the medium term. Nevertheless, this effort also requires the relevant authorities to create a legal environment that encourages investment in green energy.

The Carpathian Basin is a unique geological and hydrological formation, with a crustal thickness of 25-30 km, which is less than one third of the average crustal thickness of the European continent. Because of this absolute proximity, the upwards heat flow from the internal magmatic environment is very strong. Another fortunate local feature could be identified as well: the former Pannonian Sea's remnant seawater has been trapped between rock layers, so not only heat but also the heat-carrying medium (water) is available. On this basis, geothermal energy could become a determining factor in European energy thinking, as the case of Iceland shows that geothermal energy can be successfully integrated into the country's image and identity.

Geothermal energy also contributes to strengthening the pillars of Hungary's energy security. By radically increasing the production of thermal energy in Hungary, approximately 1 to 1.5 billion cubic metres of natural gas per year could be replaced at national level by implementing the following development targets:

- full or partial conversion from natural gas district heating in case of domestic heating, and the development of local thermal water heating systems for municipalities;
- meeting the heating needs of green and brownfield industrial investments; and
- further expansion of agricultural use.

To achieve the objectives mentioned above, the Supervisory Authority for Regulatory Affairs has set a target for 2022 to further deregulate the utilisation of geothermal energy, reducing administrative burdens, while tackling possible bottlenecks when it comes to geothermal project management.

The related one-stop shop system, which came into force on 1 March 2023, aims to create an efficient and fast administration by transferring the previously dispersed responsibilities uniformly to the Mining Authority, which is headed by the Supervisory Authority for Regulatory Affairs. The Mining Authority keeps a public register of geothermal exploration areas, which is essential for the promotion of geothermal projects.

From 1 March 2023, the regulatory environment for domestic geothermal energy has started to be streamlined in the following ways:

- by simplifying and standardising the procedures for geothermal energy exploitation, both in terms of exploration, licensing and regulatory supervision;
- by speeding up the preparation and implementation of geothermal energy projects by reforming the rules and institutions governing geothermal energy exploitation;
- the Supervisory Authority for Regulatory Affairs will explore the development of a range of possible incentive instruments to increase geothermal energy use; and

- by strengthening a data-driven approach, a new complex research programme will be able to serve market and public data needs and will be able to answer questions of preparation, exploration, drilling and technical feasibility for potential investors.

Under the new rules, geothermal energy can only be extracted and used on the basis of a fixed-term contract with the Mining Authority. The contract will be conditional on the existence of an agreement on the use of the geothermal energy extracted. It is also essential that the extracted water is reinjected to the maximum extent it is technically and geologically feasible.

It should be noted that before 1 March 2023, the complexity of the procedure often made it difficult to launch geothermal projects, as the licensing process was complicated and involved several authorities and agencies, which made it difficult to promote sustainable green energy in the country.

References

- EEA (2024), *Transport and mobility*, <https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility#:~:text=Transport%20is%20responsible%20for%20about,noise%20pollution%20and%20habitat%20fragmentation> (accessed in October 2024). [1]
- IEA (2023), *Tracking Clean Energy Progress 2023*, Licence: CC BY 4.0, <https://www.iea.org/reports/tracking-clean-energy-progress-2023>. [2]

Notes

¹ Including: Research and Innovation, international co-operation, communication and dissemination, integrating adaptation into spatial planning and integrating adaptation into water resources management, biodiversity, economy, energy, forests, health, safety of people, transport, communications and coastal areas and sea.

² Resolution 639/2023/R/idr.

³ This contribution has been prepared by the staff of the CNMC and shall not be regarded as the official position of the CNMC unless it refers to CNMC approved documents.

⁴ Please note that the aforementioned Spanish regulation has been recently repealed by Law No. 7/2022 of 8th April on Waste and Soil Contamination for Circular Economy and Royal Decree No.1055/2022 of 27th December on Plastic Containers and Packaging Waste.

⁵ See, for instance, the documents [PRO/CNMC/001/21](#) and [IPN/CNMC/041/21](#) (in Spanish).

⁶ Sektoruntersuchung duale Systeme, Bundeskartellamt, 2012.

⁷ More information available [here](#).

⁸ More information available [here](#) (in Spanish).

⁹ See Ofwat, “[Our duties](#)”.

¹⁰ UK government, [Strategic policy statement for Ofwat](#), February 2022, and Welsh Government, [Written Statement: Strategic Priorities and Objectives Statement for Ofwat \(SPS\)](#), July 2022.

¹¹ Ofwat, [Time to act, together: Ofwat's strategy](#), October 2019.

¹² Ofwat, [Net Zero Principles Position Paper](#), January 2022.

¹³ For more details, see Department for Environment, Food & Rural Affairs, [Water industry national environment programme \(WINEP\) methodology](#), May 2022.

Annex B. Green governance survey structure

Primary questions	Available responses	Secondary questions	Sub-categories	Available responses
Is there a piece of legislation that includes objective(s) for the regulator relating to the environmental sustainability of the sector?	• Yes, statutory objective(s) for the regulator are defined in the regulator's establishing legislation • Yes, objective(s) for the regulator are defined in a piece of legislation other than the establishing legislation • Yes, objective(s) for the regulator are defined both in the regulator's establishing legislation and in another piece of legislation • No, but the regulator needs to adhere to certain overarching objectives for public institutions relating to the environmental sustainability of the sector that have been defined in legislation or the constitution • No, no objectives have been defined			
Regardless of the existence of statutory objective(s), does the regulator have the legal power to include any considerations regarding environmental sustainability in its regulatory decision making?	• Yes • No	If so, for what categories of decision making? (Select any that apply)	• Regulating prices • Issuing or revoking licenses or authorisations • Issuing industry standards • Providing binding guidance or reviewing and/or approving contract terms between regulated actors and/or market actors • Issuing guidelines and/or codes of conduct • Other, please specify	• Yes • No (Plus qualitative free response)
		If so, to which aspect(s) of environmental sustainability do these legal powers relate? (Select any that apply)	• Decarbonisation • Circular economy • Resource management • Greenhouse gas reduction • Biodiversity • Water and air pollution • Waste management • Other, please specify	• Yes • No (Plus qualitative free response)
		If the regulator has the legal power to consider	• Policy objective(s) related to promoting	• Yes • No

Primary questions	Available responses	Secondary questions	Sub-categories	Available responses
		environmental sustainability in the context of its regulatory decision making, are there any policy objectives for which the regulator encountered or anticipates any trade-offs between the respective policy objective and pursuing environmental sustainability objectives? (Select any that apply and elaborate on these trade-offs in the comment column)	competition - Policy objective(s) related to improving cost effectiveness - Policy objective(s) related to protecting consumer welfare or social inclusion - Other policy objective(s), please specify	(Plus qualitative free response)
Does the regulator have the legal power to collect relevant data on the environmental sustainability of the sector (e.g. greenhouse gas emissions, etc.) to inform its regulatory decision making?	- Yes, and the regular collects such data regularly - Yes, and the regulator collects such data on an ad hoc basis (e.g. for thematic/one-off publications) - Yes, but the regulator does not systematically collect such data - No			
Are there any formalised co-ordination mechanisms to address issues related to environmental sustainability between the regulator and ministries in charge of environmental policy or authorities in charge of environmental protection?	- Yes - No			
Does your organisation recruit any staff with expertise in areas related to the environmental sustainability of the sector, in support of the delivery of its functions?	- Yes, the regulator already recruited such staff in the past five years - No, but the regulator is planning to hire such staff for the future - No, the regulator is not planning to hire such staff, but makes use of external professionals or academia on environmental sustainability - No, the regulator does not plan to hire such staff nor makes use of external professionals			
Does the regulator send a specific request to environmental civil society organisations (CSOs) to invite them to participate in consultation processes by the regulator?	- Yes, for all consultation processes, the regulator sends a specific request to environmental CSOs to invite them to participate - Yes, for some consultation processes, the regulator sends a specific request to environmental CSOs to invite them to participate - No specific request is made, but environmental CSOs are able to participate as part of an open call			

Primary questions	Available responses	Secondary questions	Sub-categories	Available responses
	for comments to all stakeholders • No, environmental CSOs are not invited to participate (in case the regulator does not organise an open call for comments)			
If there are quantitative targets for the sector defined in legislation in terms of environmental sustainability, does the regulator consider these quantitative targets as part of its regulatory decision-making process?	• Yes • No • Not applicable (no such quantitative targets)			
Is the regulator required to assess (<i>ex ante</i> or <i>ex post</i>) the impact of the regulatory framework (or specific regulatory decisions issued by the regulator) on furthering environmental sustainability objectives?	• Yes • No			

Annex C. Survey coverage

Countries	Sector	Regulator
Australia (AUS)	Energy	Australian Energy Regulator (AER)
	E-Communications	Australia Communications and Media Authority (ACMA)
	Rail transport	Australia Competition and Consumer Commission (ACCC)
	Air transport	Australia Competition and Consumer Commission (ACCC)
	Water	Australia Competition and Consumer Commission (ACCC)
Austria (AUT)	Energy	Energy Control (E-control)
	E-Communications	Regulatory Authority for Broadcasting and Telecommunications (RTR); Telecommunications Control Commission (TKK)
	Rail transport	Rail Control Commission (Schienen Control)
	Air transport	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (KUEMIT)
Belgium (BEL)	Energy	Commission for Electricity and Gas Regulation (CREG)
	E-Communications	Belgian Institute for Postal Services and Telecommunications (BIPT)
	Rail transport	Regulatory Body for Railway Transport and for Brussels Airport Operations (BRT)
	Air transport	Regulatory Body for Railway Transport and for Brussels Airport Operations (BRT)
	Water	Flanders Regulation Authority (Flanders region only)
Brazil (BRA)	Energy	National Electricity Agency (ANEEL)
	Energy	Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP)
	E-Communications	National Telecommunications Agency (ANATEL)
	Rail transport	National Land Transport Agency (ANTT)
	Air transport	National Civil Aviation Agency (ANAC)
	Water	National Water and Sanitation Agency (ANA)
Bulgaria (BGR)	Energy	The Energy and Water Regulatory Commission (EWRC),
	E-Communications	Communications Regulation Commission (CRC)
	Rail transport	Railway Administration Executive Agency (RAEA),
	Air transport	Directorate General Civil Aviation Administration (CAA)
	Water	The Energy and Water Regulatory Commission (EWRC)
Canada (CAN)	Energy	Canada Energy Regulator (CER)
	E-Communications	Canadian Radio-television and Telecommunications Commission (CRTC)
	Rail transport	Canadian Transport Agency (CTA)
	Air transport	Canadian Transport Agency (CTA)
Chile (CHL)	Energy	National Energy Commission (CNE),
	E-Communications	Undersecretariat of Telecommunications of the Ministry of Transport and Telecommunications (Subtel),
	Rail transport	Ministry of Transports and Telecommunications (MTT)
	Air transport	Civil Aeronautics Board (JAC)
	Water	Superintendence of Sanitary Services (SISS)
Colombia (COL)	Energy	Energy and Gas Regulatory Commission (CREG)
	E-communications	Communications Regulation Commission (CRC)
	Air transport	Civil Aviation Authority (Aerocivil)
	Water	Drinking Water and Basic Sanitation Regulation Commission (CRA)

Countries	Sector	Regulator
Costa Rica (CRI)	Energy	Regulatory Authority of Public Services (ARESEP)
	E-Communications	Superintendency for Telecommunications (SUTEL)
	Rail transport	Regulatory Authority of Public Services (ARESEP)
	Air transport	Regulatory Authority of Public Services (ARESEP)
	Water	Regulatory Authority of Public Services (ARESEP)
Croatia (HRV)	Energy	Croatian Energy Regulatory Agency (HERA)
	E-Communications	Croatian Regulatory Authority for Network Industries (HAKOM)
	Rail transport	Croatian Regulatory Authority for Network Industries (HAKOM)
	Air transport	Croatian Agency for Civil Aviation (CCAA)
	Water	Council for Water Services (VVU)
Cyprus (CYP)	Energy	Cyprus Energy Regulator (CERA)
	E-Communications	Office of the Commissioner for Electronic Communications and Postal Regulation (OCECPR)
Czechia (CZE)	Energy	Energy Regulatory Office (ERU)
	E-Communications	Czech Telecommunications Office (CTU)
	Rail transport	Transport Infrastructure Access Authority (ÚDPI)
	Air transport	Ministry of Transport (MDCR)
	Water	Ministry of Agriculture (eAGRI)
Denmark (DNK)	Energy	Public Utilities Commission (PUC)
	E-Communications	Danish Business Authority (DBA)
	Rail transport	Danish Rail Regulatory Body (DRRB)
	Air transport	Danish Civil Aviation and Railway Authority (DCARA)
	Water	Danish Competition and Consumer Authority (DCCA)
Estonia (EST)	Energy	Estonian Competition Authority (ECA)
	E-communications	Estonian Consumer Protection and Technical Regulatory Authority (ECPTRA)
	Rail transport	Estonian Consumer Protection and Technical Regulatory Authority (ECPTRA)
	Air transport	Estonian Consumer Protection and Technical Regulatory Authority (ECPTRA)
	Water	Estonian Competition Authority (ECA)
Finland (FIN)	Energy	Energy Authority (Energiavirasto)
	E-Communications	Finnish Transport and Communications Agency (Traficom)
	Rail transport	Finnish Rail Regulatory Body (Sääntelyelin)
	Air transport	Finnish Transport and Communications Agency (Traficom)
France (FRA)	Energy	Energy Regulatory Commission (CRE) Transport Regulation Authority (ART)
	E-Communications	Electronic Communications, Postal and Print Media Distribution Regulatory Authority (ARCEP)
	Rail transport	Transport Regulation Authority (ART)
	Air transport	Transport Regulation Authority (ART)
Germany (DEU)	Energy	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (BNetzA)
	E-Communications	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (BNetzA)
	Rail transport	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (BNetzA)
Greece (GRC)	Energy	Regulatory Authority for Energy (RAE)
	E-Communications	Regulatory Authority for Railways (RAS)
	Rail transport	National Telecommunications and Post Commission (EETT)
	Air transport	Hellenic Civil Aviation Authority (HCAA)
	Water	Special Secretariat of Waters under the Ministry of Environment, Energy and Climatic Change (YPEN)
Iceland (ISL)	Energy	National Energy Authority (NKEA)

Countries	Sector	Regulator
Ireland (IRL)	E-communications	Electronic Communications Office of Iceland (ECOI)
	Water	Ministry of Infrastructure
	Energy	Commission for Regulation of Utilities (CRU)
	E-Communications	Commission for Communications Regulation (ComReg)
	Rail transport	Commission for Railway Regulation (CRR)
	Air transport	Commission for Aviation Regulation (CAR)
Israel (ISR)	Water	Commission for Regulation of Utilities (CRU)
	Energy	Electricity Authority and Gas Authority
	E-Communications	Ministry of Communications
	Rail transport	National Public Transport Authority
	Air transport	Civil Aviation Authority
Italy (ITA)	Water	Governmental Authority for Water and Sewage
	Energy	Regulatory Authority for Energy, Networks and Environment (ARERA)
	E-Communications	Communications Regulatory Authority (AGCOM)
	Rail transport	Transport Regulation Authority (ART)
	Air transport	Transport Regulation Authority (ART)
Japan (JPN)	Water	Regulatory Authority for Energy, Networks and Environment (ARERA)
	Energy	Electricity and Gas Market Surveillance Commission (EGC)
	E-Communications	Ministry of Internal Affairs and Communications (MIC)
	Rail transport	Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
	Air transport	Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Korea (KOR)	Energy	Korea Electricity Regulatory Commission (KOREC)
	Air transport	Ministry of Land, Infrastructure and Transport (MOLIT)
	Water	Ministry of Environment (ME)
Latvia (LVA)	Energy	Public Utilities Commission (PUC)
	E-Communications	Public Utilities Commission (PUC)
	Rail transport	State Railway Administration (VDA)
	Air transport	Civil Aviation Agency (CAA)
	Water	Public Utilities Commission (PUC)
Lithuania (LTU)	Energy	National Energy Regulatory Council (NERC)
	E-Communications	Communications Regulatory Authority (RRT)
	Rail transport	Transport Safety Administration (LTSA)
	Air transport	Transport Safety Administration (LTSA)
	Water	National Energy Regulatory Council (NERC)
Luxembourg (LUX)	Energy	Luxembourg Institute of Regulation (ILR)
	E-Communications	Luxembourg Institute of Regulation (ILR)
	Rail transport	Luxembourg Institute of Regulation (ILR)
	Air transport	Luxembourg Institute of Regulation (ILR)
Malta (MLT)	Energy	Regulator for Energy and Water Services (REWS)
	E-Communications	Malta Communications Authority (MCA)
	Air Transport	Civil Aviation Directorate (CAA)
	Water	Regulator for Energy and Water Services (REWS)
Mexico (MEX)	Energy	Energy Commission (CRE)
	E-Communications	Mexico Federal Telecommunications Institute (IFT)
	Air transport	Federal Civil Aviation Agency (AFAC)
	Rail transport	Rail Transport Regulatory Agency (ARTF)
New Zealand (NZL)	Energy	New Zealand Electricity Authority (NZEa)
	E-communications	New Zealand Commerce Commission (ComCom)
	Rail transport	New Zealand Transport Agency (NZTA)
	Air transport	Ministry of Transport

Countries	Sector	Regulator
Norway (NOR)	Energy	Norwegian Energy Regulatory Authority (NVE-RME)
	E-communications	National Communications Authority (NKOM)
	Rail transport	Norwegian Railway Authority (SJT)
	Air transport	Norwegian Civil Aviation Authority (CAA)
Peru (PER)	Energy	Energy and Mining Investment Supervisory Agency (OSINERGMIN)
	E-Communications	Supervisory Body for Private Investment in Telecommunications (OSIPTEL)
	Rail transport	Supervisory Body for Public Transport Infrastructure Investment (OSITRAN)
	Air transport	Supervisory Body for Public Transport Infrastructure Investment (OSITRAN)
	Water	National Superintendency of Sanitation Services (SUNASS)
Poland (POL)	Energy	Energy Regulatory Office (URE)
	E-Communications	Office of Electronic Communications (UKE)
	Rail transport	Office of Rail Transport (UTK)
	Air transport	Civil Aviation Authority (ULC)
	Water	Polish State Waters
Portugal (PRT)	Energy	Energy Services Regulatory Authority (ERSE)
	E-Communications	National Communications Authority (ANACOM)
	Rail transport	Mobility and Transport Authority (AMT)
	Air transport	National Authority of Civil Aviation (ANAC)
	Water	Water and Waste Services Regulation Authority (ERSAR)
Slovak Republic (SVK)	Energy	Regulatory Office for Network Industries (URSO)
	E-Communications	Regulatory Authority for Electronic Communications and Postal Services (RU)
	Rail transport	Transport Authority (NSAT)
	Water	Regulatory Office for Network Industries (URSO)
Slovenia (SVN)	Energy	Energy Agency (AGEN), Agency for Communication Networks and Services (AKOS)
	E-Communications	Agency for Communication Networks and Services (AKOS)
	Rail transport	Agency for Communication Networks and Services (AKOS)
South Africa (ZAF)	Energy	National Energy Regulator of South Africa (NERSA)
	E-Communications	Independent Communications Authority of South Africa (ICASA)
	Air transport	South African Civil Aviation Authority (CAA)
	Water	Department of Water and Sanitation (DWS)
Spain (ESP)	Energy	Spanish National Markets and Competition Commission (CNMC)
	E-Communications	Spanish National Markets and Competition Commission (CNMC)
	Rail transport	Spanish National Markets and Competition Commission (CNMC)
	Air transport	Directorate General of Civil Aviation (DGAC)
Sweden (SWE)	Energy	Energy Markets Inspectorate (Ei)
	E-Communications	Post and Telecom Authority (PTS)
	Rail transport	Swedish Transport Agency (Transportstyrelsen)
	Air transport	Swedish Transport Agency (Transportstyrelsen)
Switzerland (CHE)	Energy	Swiss Federal Electricity Commission (EiCom)
	E-Communications	Federal Communications Commission (ComCom)
	Rail transport	Commission for Rail Transport (RailCom)
	Air transport	Federal Office of Civil Aviation (FOCA)
Türkiye (TUR)	Energy	Energy Market Regulatory Authority (EPDK)
	E-Communications	Information and Communication Technologies Authority (BTK)
	Rail transport	General Directorate of Transport Services Regulation (UHDGM)
	Air transport	Directorate General of Civil Aviation (SHGM)
	Water	Ministry of Agriculture and Forestry
	Energy	Office of Gas and Electricity Markets (Ofgem)

Countries	Sector	Regulator
United Kingdom (GBR)	E-Communications	Office of Communications (Ofcom)
	Rail transport	Office of Rail and Road (ORR)
	Air transport	Civil Aviation Authority (CAA)
	Water	Water Services Regulation Authority (Ofwat)

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Note by Türkiye.

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the “Cyprus” issue.

Note by all the European Union Member States of the OECD and the European Union.

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

The Governance of Regulators

The Role of Economic Regulators in the Green Transition

DRIVING SUSTAINABLE CHANGE IN NETWORK SECTORS

Tackling climate change, addressing other environmental threats, and achieving the green transition all require the profound transformation of network sectors such as water, energy, e-communications, and transport. As leading public bodies in the governance of network sectors, economic regulators can significantly affect environmental outcomes. This publication discusses the role of economic regulators and the tools they can use to contribute to environmental sustainability and the green transition in the sectors they oversee. Survey data and information gathered in collaboration with the OECD Network of Economic Regulators is used to analyse the use of such tools and regulator's governance arrangements, highlighting a number of common challenges and opportunities. The publication includes data relating to regulators' objectives, powers and functions, mechanisms for co-ordination, use of regulatory management tools, and levels of capacity and resources, and integrates OECD guidance related to these topics. As such, this publication will prove valuable to economic regulators, governments and legislators with relevant responsibilities.



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