

PLANNING FOR 2050

Key messages

Climate planning for 2050 has become a core strand of debate in the European Union (EU). Most recently, focus has shifted to a potential revision of the EU's long-term climate objectives within the context of a new 2050 strategy, which is to be submitted to the United Nations under the Paris Agreement by 2020. In parallel, all EU Member States must develop national strategies of their own, albeit with little central guidance and no overarching structure in place for collaboration. To provide support to these national processes, the Climate Recon 2050 project has created a platform for dialogue among experts from government and science. The goal of the platform is to identify common challenges and good practices to support effective national 2050 planning through mutual learning.

Key insights gained from the project include:

- **A wealth of experience:** Nearly half of the EU Member States have already developed national long-term climate strategies (LTCS) within the past decade. With the Paris Agreement and its objectives serving as an impulse, some countries have begun to review existing strategies for an update in 2020 and have started to plan towards net zero greenhouse gas (GHG) emissions by 2050 or earlier. Good practices exist for many procedural elements, including governance frameworks and stakeholder involvement.
- **Great diversity:** The existing strategies differ in many respects, including content, degree of detail on specific measures, political ownership and legal form. This diversity reduces comparability and also indicates that some strategies do not deliver on the essential elements needed to manage the net zero transformation. Accordingly, such strategies cannot provide a clear direction for near-term policies. The lack of a common guidance framework and low comparability are obstacles to effective strategy development. Without losing sight of country-specific circumstances, a higher level of strategic alignment is needed and could take the form of a common fact base, regarding *inter alia* technological assumptions and options.
- **Common challenges:** similar issues arise across the EU both in policy-making and on a technical level. These include connections between the EU and national levels as well as coherence between near- and long-term policy-making—i.e., between the 2030 National Energy and Climate Plans (NECP) and 2050 LTCSs—to avoid carbon-intensive lock-ins economic and social disruption.

A process for assessing the LTCSs after their submission in 2020 has been enshrined in EU legislation (and is to be implemented the European Commission), but details on the timing, format and outcome are unknown. Despite a lack of information on the foreseen evaluation, this process presents a considerable opportunity to improve the 2050 plans.

- The 2020 evaluation process should become a **vehicle for dialogue** about planning experiences as well as an exercise to **identify the most effective options** for coordinated EU-level or regional action by, e.g., facilitating the **aligning of assumptions** on the availability and cost of transformation options.
- In addition, capacity bottlenecks and the lack of dedicated national expertise are a further hindrance to strong 2050 strategies. **Dedicated support** should be organised at the EU level.

NOTE: this briefing was produced by the project team and does not represent the views of the participants in the Climate Recon 2050 dialogue activities.

Context

Long-term climate strategies (LTCS) are an essential tool for transforming the world's economies to net-zero emissions, as required by the Paris Agreement's (PA) long-term objectives, and tackling the climate crisis. Article 4.19 of the PA requests that all parties formulate and communicate "long-term low greenhouse gas emission development strategies". At the EU level, this commitment has been enshrined in law via Article 15 of the "Regulation on the Governance of the Energy Union and Climate Action" (EU/2018/1999). The Governance Regulation, adopted in December 2018, obliges all Member States to prepare long-term climate strategies with a perspective of at least 30 years by January 1st 2020. The strategies should contribute to achieving net-zero emissions in the EU "as early as possible," eventually reaching net-negative emissions. The strategies are to cover plans for emission reductions in a number of individual sectors and include links to other national long-term objectives and, "to the extent feasible", expected socio-economic effects.

Apart from vague descriptions of required content and a (voluntary) template, found in an Annex to the Governance Regulation, there has been little central guidance on strategy development. Indeed, Member States have pursued long-term climate planning largely in separate national fora. With the publication of the draft EU 2050 strategy in late November 2018, another reference point for national 2050 plans was established. However, the relationship between the EU strategy and the national LTCSs is still to be determined.

In this context, the Climate Recon 2050 project was established to provide a forum for the exchange of experience among national experts from governments and research institutes involved in "planning for 2050". This briefing summarises the key challenges and insights gained from an analysis conducted on the dialogue up until May 2019 for the broader policy community.

State of play – and key issues for policy-makers

Diversity on essential elements

The existing strategies differ widely in terms of their ambition, scope, design, underlying stakeholder engagement, political ownership and legal form. An analysis performed by the European Environment Agency (EEA) concludes that the diversity among the existing strategies presents a problem for robust climate action in the EU. More specifically, many national strategies "fail to systematically address important elements" including "key policies and measures to achieve the strategy's objectives, political commitments, information on financing aspects, impact assessment, cost and benefit analysis, and details on progress monitoring"¹.

Status quo: Whether it is creating an analytical basis or organising an initial stakeholder consultation, all EU Member States have undertaken some action to inform their long-term climate planning. As of May 2019, 12 out of the 28 Member States have officially published LTCSs with a 2050 perspective and an additional 4 have prepared draft strategies (see Figure on page 3).

Targets and scope: Among the published strategies, the upper range of the targets is a GHG emissions reduction of between 80 and 95 percent below 1990 levels by 2050 (e.g. in Denmark, Finland, Germany and the Netherlands). However, some countries have already announced new, more ambitious targets (e.g., France and Portugal both aim to reach net zero emissions by 2050) and are currently reviewing their strategies to include these revamped goals. Some other countries have

¹ EEA (2018) Overview of Low-Carbon Development Strategies in European Countries, Eionet Report — ETC/ACM 2018/12. Available from: https://acm.eionet.europa.eu/reports/EIONET_Rep_ETCACM_2018_12_LowCarbonNatlDevStrategies [Accessed 14 March 2019]

already announced their long-term climate targets but have not yet produced a strategy, which would show how they plan to reach it (e.g., Sweden, which has included a net-zero by 2045 goal in its climate law). Most strategies have broad sectoral coverage, incorporating decarbonization pathways, goals and milestones for sectors such as energy, industry, buildings, transport, waste, agriculture and land use change. However, Greece’s existing strategy, for example, published as early as 2012, only covers the energy sector.

Legal form: The existing strategies come in different formats and reside in diverse legal contexts. In some countries, the strategies have been published as a requirement under an extant national law (e.g., France, Ireland, United Kingdom) or the strategy itself is a legally binding document, published as a legal act (e.g., Finland). In others, the strategies have been officially adopted by a government or parliament resolution (e.g., Czech Republic, Estonia, Germany, and Lithuania). In several cases, the strategies take the form of a report from a ministry, government or environment agency and have no legal power (e.g., Greece, Netherlands, Portugal). Moreover, the formal ownership of the strategies varies: most strategies are prepared by ministries responsible for climate and environmental affairs, but in Italy, Finland and the United Kingdom, for example, the development of the strategies lies within the competence of ministries dealing primarily with economic affairs.

FIGURE: Overview of existing long-term strategies in EU Member States

| | Member State | Long-term strategy status | Year | Reduction target ¹ | Legal form |
|------------|----------------|----------------------------------|------|-------------------------------|---|
| Pre-Paris | Denmark | Published (2011–16) ² | 2011 | 80–95% | Governmental policy plan |
| | Netherlands | Published (2011–16) ² | 2011 | 80–95% | Government report |
| | Greece | Published (2012) | 2012 | 60–70% (2005) | Ministry report |
| | Lithuania | Adopted (2012) | 2012 | 80% | Parliament resolution |
| | Portugal | Published (2012), under review | 2012 | 50–60% | Environment Agency report; 2030 goals as Government Decree |
| | Cyprus | <i>Draft published (2014)</i> | 2014 | 80% | |
| | Finland | Adopted (2014) | 2014 | 80–95% | Parliamentary Committee Report & Climate Change Act |
| Post-Paris | France | Adopted (2015), under review | 2015 | 75% | Published as a requirement of an existing law |
| | Germany | Adopted (2016) | 2016 | 80–95% | Government resolution |
| | Croatia | <i>Draft published (2017)</i> | 2017 | | |
| | Czech Republic | Adopted (2017) | 2017 | 80% | Government resolution |
| | Estonia | Adopted (2017) | 2017 | 80% | Parliament resolution |
| | Ireland | Published (2017) | 2017 | 80% | Published as a requirement of an existing law |
| | Malta | <i>Vision published (2017)</i> | | no target | |
| | United Kingdom | Reviewed (2017) | 2017 | 80% ³ | Published as a requirement of an existing law |
| | Latvia | <i>Draft published (2018)</i> | 2018 | 80% | <i>Final document to be adopted by the Cabinet of Ministers</i> |

Insights from governmental practices

The following conclusions are distilled from the experiences gained in EU Member States so far, as captured through the activities of the Climate Recon 2050 project.

Rationale for creating long-term strategies: LTCSs are unlike most other government strategies because they include a longer time-frame and encompass an unusually broad spectrum of policy areas by covering almost all economic activities. National strategies and their underlying technical models are helpful to governments as they provide a clear trajectory to inform near- and mid-term policy planning and translate the international obligations into the national context. A comprehensive LTCS serves as an actionable plan and creates an atmosphere of policy certainty and coherence for decades to come. These functions can be supported by governance frameworks to manage implementation (e.g., delegation of responsibilities across government agencies) or enshrined in a national framework law, as several Member States have done. A clear, forward-looking vision of a low-carbon economy signals the speed and direction of the transformation to investors and will help avoid infrastructural lock-ins and path dependencies.

The importance of an inclusive process: Inherent to the development of an LTCS are opportunities to raise public awareness and facilitate in-country dialogue about climate change and mitigation approaches. In the face of broad transformational changes to the world's economies and societies, national strategy development has the ability to communicate the importance of climate planning, forge consensus and create a transformative vision, simultaneously outlining the costs and opportunities of a low-carbon transition. This process can also reveal conflicts between different national interests, which can then be mediated by turning the 2050 planning process into a platform to negotiate solutions. Such proactive engagement with the foreseen impacts of transformational change can also help ensure a just transition for those working in sectors particularly affected. Involving stakeholders and the public has been a feature of most long-term strategy processes to date. However, the scale of and approach to public engagement have differed significantly from country to country. It is uncertain to what extent public engagement will be a priority for those countries that currently do not have a strategy, and considering the 2020 deadline, countries only starting to prepare their strategies in 2019 will have little time to invest in broader outreach and may need to make up for it at a later stage.

Opportunities for more collaboration between Member States: As indicated above, the lack of a common structure or detailed guidance to facilitate collaboration between Member States in the process of strategy preparation has resulted in a wide diversity of approaches. This is a particularly important gap to fill; as countries create transformative new pathways for their societies and economies, the developments in each Member State will have cross-border impacts. Coordinated EU-level and regional initiatives could help reveal areas in which common approaches and joint EU action are most effective and desirable. Enhanced coordination could furthermore unlock additional options, provide access to resources and reduce costs, especially given the multitude of existing interdependencies between the EU Member States. The desire for greater integration among Member States is clearly expressed by national 2050 planners.

EU and national level integration: National planners also express the need for better integration between EU- and national-level processes. To date, the EU 2050 strategy and the national processes are largely disconnected, and their likely interaction is a concern for national policy-makers as it produces uncertainty. For this reason and others, regional and national integration holds the promise of more effective 2050 policy. The preparation of the EU-level long-term strategy was a window of opportunity, and it can still be taken advantage of. An EU-level perspective can point to options that would otherwise not be considered in national strategies, which tend to account only for national resources and circumstances.

Integrating mid-and long-term policy and planning: Article 15.6 of the Governance Regulation underscores the need for policy coherence in the medium and long term by requiring Member States' 2030 national energy and climate plans (NECPs) to be consistent with a corresponding national LTCS. Such "2050 compatibility" is essential: near-term policies that help deliver the 2030 targets may be inconsistent with reaching deeper reductions because they lock-in infrastructure that prevents further decarbonisation in certain sectors. In practice, lead responsibilities for the NECPs and LTCS are often split, for example, between environment ministries (for LTCS) and economy or energy ministries (for NECPs), which presents an obstacle to coherent planning. To date, many Member States, especially countries that lack a long-term strategy, have focused their efforts on preparing draft NECPs, in effect prioritising 2030 over 2050, and reducing consistency.

Challenges in developing technical 2050 analyses

Planning for 2050 requires technical inputs about the options available for transformational change and their implications for society and the economy. The decarbonization scenarios used as input for policymakers are built on assumptions about future technological developments and evaluations of economic potentials. The Climate Recon 2050 project established a dedicated Technical Dialogue to allow for an exchange among technical experts from government and academia. These interactions led to the identification of a number of key challenges.

Communicating technical results as narratives: A key challenge when it comes to using models as input to the 2050 strategy development process lies in the perception of the results and what they mean for policy-making. Interpretation of the models is influenced by how results are communicated and the context in which they have been arrived at. Modelling policies can be difficult due to significant limitations in the way real world parameters can be estimated by mathematical formulas. Thus, the outcomes of these models are not predictions about the future but educated assessments of the likely impacts of policy and technology changes. Three specific lessons on the use and communication of model results are highlighted below:

- ⇒ **Modelling for insights—not for numbers.** (Richard Hamming) Simulations and models help us understand complex systems—however, they are not perfectly accurate representations of the world and should therefore be interpreted with care. In the discussion and interpretation of model results, one should seek to distil a general understanding and general conclusions instead of focusing on specific numbers.
- ⇒ **All models are wrong, but some are useful.** (George Box) All models are clear simplifications and approximations of reality. Accordingly, model results come with uncertainty. Quite often, the modeller is aware of those uncertainties, but the audience may not be. Qualifying model results with confidence intervals, error bars or sensitivity analyses helps to demonstrate these uncertainties. Focusing on the more robust findings and dismissing less valid conclusions is good practice when using models as input for policy-making.
- ⇒ **Predictions are difficult—in particular about the future.** (Niels Bohr) Many important factors in modelling future energy systems are highly uncertain and unpredictable. However, one should validate the model results as much as possible using existing historical data. This helps improve the model and sheds light on its range of applicability. Importantly, many simulations are not predictions at all but tools to help us understand complicated systems and inform decision-making.

Packaging insights into narratives about the future is one way to provide context and put individual model results into perspective.

The implications of aiming for “net zero”: The goal to achieve net zero emissions and negative emissions thereafter inspired by the Paris Agreement poses further questions for analysis. The gap between a 75% or 80% reduction and achieving net-zero is not easily bridged by additional measures. Reaching net-zero emissions requires more than simply replacing the fossil energy system with a renewable one. Emissions from all sectors as well as the potential for increasing natural sinks or developing artificial ones must be modelled, and potential interdependencies have to be taken into account. Not only are technological solutions needed, but analyses must also consider issues, such as urban planning, land use, circular economy and lifestyle or behavioural changes. Even with strong and effective mitigation policies it is impossible to avoid all anthropogenic emissions. For instance, in the agricultural sector there will always remain substantial emissions from biological-chemical processes. These remaining emissions have to be compensated by negative emissions, i.e., the extraction of CO₂ from the atmosphere. There are various technological options—e.g., bioenergy with carbon capture and storage (BECCS), carbon sinks in forests (afforestation) and direct air capture (DAC). Still, the potential shortcomings and sustainability concerns of these technologies are currently under discussion, and public acceptance remains uncertain.

Distributional Impacts: Successful implementation of necessary policies requires social acceptance, which, in turn, is dependent on the distributional impacts that climate action may have on different types of economic actors, sectors and geographies. Thus, a comprehensive LTCS needs to cover not only the impacts of transition but also the distribution of costs and benefits. Such an assessment should support the identification of suitable approaches to minimise the negative consequences that could translate into increased social inequalities. Furthermore, it must clearly differentiate between largely unavoidable structural economic shifts (e.g., sectoral restructuring) and distributional impacts, which are driven by policy design (e.g., specific rules of subsidy schemes). However, the modelling tools used to support LTCS development focus on technological pathways and their macroeconomic impacts, providing little information on the distribution of costs and benefits of the transition and their dependence on policy design. In recent years, though, an increasing number of projects and initiatives have tried to map actual and necessary financial flows towards a low-carbon economy. Combined with results from the techno-economic modelling of decarbonisation pathways, these can be used to quantify necessary additional shifts in financial flows required to reach climate targets. Such an in-depth assessment of the investment gaps to be addressed by climate policies (both directly, e.g., through subsidies, and indirectly, e.g., through introduction of standards to redirect private investment to low-carbon solutions) allows for distributional impacts to be modelled. Thus, linking the assessment of investment needs and distributional impacts may ensure better alignment between technical modelling work and specific domestic policy challenges.

Sufficiency: The current overshoot of planetary boundaries calls for a broad response beyond the development of green technologies. Sufficiency emerges as the term that encompasses such efforts to rethink and redesign collective and individual practices to fulfil people’s aspirations for better lives within those boundaries. It touches upon issues such as human needs, social equity, economic development, urban structures, social norms, consumption habits, and the need to reflect on them in policies to support the necessary transition. While specific sufficiency options such as reducing air travel, lowering speed limits or reducing meat consumption trigger emotional reactions, the approach in its entirety has not been considered by policymakers to date. In order to be better integrated in policy-making, sufficiency needs to be made more visible in decision-making tools, including policy scenarios. The majority of existing national scenarios does not address sufficiency potentials, although sufficiency items are occasionally included. Developing sufficiency in scenarios, from the modelling stage to refined sectorial analysis and building consistent transition narratives, is still facing methodological challenges. Currently, discussions have emerged on how to overcome these

issues, including recommendations to increase the quality and credibility of sufficiency potential quantifications, and to reflect on the benefits of sufficiency.

Connecting modelling at EU and Member State levels: There are clear differences between the EU and Member State levels in terms of which models are applied and the assumptions and input data used. In contrast to the EU approach, some of the models used by Member States are very detailed. It is therefore not surprising that the Member State scenarios often differ significantly from the scenarios developed at the EU level, especially for smaller countries. In general, a common fact base is missing. Moving forward, greater transparency in the models at the EU level and enhanced exchange between Member States will be the primary challenges in developing more harmonised mitigation strategies.

Conclusions and outlook: alignment and integration

The variety of approaches to 2050 planning at the national level reflects the different national circumstances and the lack of ex-ante guidance on the planning process and requirements for what the strategies should contain—on which the Governance Regulation provides very little detail. The apparent diversity is thus a function of 28 parallel national processes searching for answers to a question they all have in common: How can the transition to a low-carbon economy be realised? While these individual planning processes have generated a wealth of experience and, by extension, many insights and lessons, there is currently no formal process for future alignment between them. This gap should be filled at the very latest by 2020, the year by which all Member States should have produced a national 2050 strategy.

The current state of 2050 planning in the EU suggests that there is need for integration and alignment across three main dimensions:

- a. **Country-to-country alignment:** A common fact base could create better strategies in all countries, without losing sight of country-specific circumstances. Common assumptions and data sets should be incorporated into future analyses carried out for the EU 2050 strategy in order to provide a more complete picture.
- b. **EU and national level integration:** National strategies are by definition limited in the options they have available, and closer regional or EU cooperation could unlock additional approaches for emissions reductions and reduce investment needs.
- c. **2030 and 2050 consistency:** Ongoing policy-making processes for the 2030 targets may render transformational change harder and more costly if they are not fully informed by the 2050 targets and the information contained in the 2050 strategies.

The Governance Regulation tasks the European Commission with assessing the extent to which the national long-term strategies are adequate to achieve the targets set at the EU level and identifying the gap between declared and required emissions reductions (Article 15.9). This process is not specified to a high level of detail, but it could become a vehicle for dialogue, mutual learning and alignment among countries and across the European Union. All strategies should then be updated, as foreseen in the Governance Regulation for 2025—or earlier. In addition, dedicated support could be made available to those Member States that lack national expertise on key aspects of the 2050 transition.

This process could also consider how to improve consistency between 2030 policies and 2050 strategies. At the time of writing, the European Commission is preparing recommendations to Member States on their draft NECPs, which should include a “2050 compatibility” check. Once those plans and the LTCSs are final, a follow-up process starting in 2020 may have to more forcibly align the 2030 and 2050 dimensions between the two planning documents (possibly as input to a mandatory review of the NECPs in 2023).

CLIMATE RECON 2050

Project publications

All project publications are available at climatedialogue.eu/publications

Briefing Notes:

- **2050 Climate Strategies in EU Countries: State of Play.** Iwaszuk, E., Duwe, M. (2018) - <https://tinyurl.com/2050strategiesEU>
- **Articulating national climate governance in line with the EU Governance Regulation,** Voss-Stemping, J. (2019), <https://tinyurl.com/2050EUGovernance>
- **The role and state of the art of independent expert institutions on climate,** Vallejo, L., Rüdinger, A. (2019) <https://tinyurl.com/2050Institutions>

Technical Notes:

- **Low-emission mobility & transport,** Blanck, R., Gnann, T., Plötz, P. (2018) - <https://tinyurl.com/2050Transport>
- **Transparency of Modelling,** Wiese, F. (2018) - <https://tinyurl.com/2050Transparency>
- **Modelling at EU and MS level,** Duscha, V., Lehmann, S., (2018) - <https://tinyurl.com/2050EUMS>
- **Developing policy-relevant narratives underlying long-term climate strategies,** Voss-Stemping, J. (2018) - <https://tinyurl.com/2050Narratives>
- **Modelling net zero emissions,** Emele, L., Marignac, Y., Petrovic, S., (2019) - <https://tinyurl.com/2050NetZero>
- **Distributional impacts of long-term climate policies,** Wetmańska, Z., Marszał, K., Śniegocki, A., (2019) - <https://tinyurl.com/2050JustTransition>
- **Energy sufficiency as part of climate action,** Marignac, Y. (2019) - <https://tinyurl.com/2050Sufficiency>

Overview:

- **One page overview: National Long-Term Climate Strategies in the EU28** - <https://tinyurl.com/LTSMatrix>

About the project

The Climate Recon 2050 project facilitates intra-EU exchange and fosters the creation of know-how and networks essential to developing effective and ambitious 2050 strategies. Representatives from more than half of all EU Member States as well as the European Commission and the EEA took part in meetings of Climate Recon 2050's Policy-Maker Platform – a dialogue forum for governmental representatives. The Technical Dialogue – and exchange forum for technical experts and modellers supporting the development of long-term strategies, brought together representatives of nearly twenty research institutes from across Europe. The project's events are accompanied by a series of publications on the current state of strategy development and key issues in long-term, climate related economic modelling.

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