2022 Strategic Foresight Report: twinning the green and digital transitions in the new geopolitical context

Brussels, 29 June 2022

The Commission has today adopted the 2022 Strategic Foresight Report – “Twinning the green and digital transitions in the new geopolitical context”. As we prepare to accelerate both transitions, the report identifies ten key areas of action with the objective of maximising synergies and consistency between our climate and digital ambitions. By doing so, the EU will strengthen its cross-sector resilience and open strategic autonomy, and be better prepared to face new global challenges between now and 2050.

Maroš Šefčovič, Vice-President for interinstitutional Relations and Foresight said: “To reach climate neutrality by 2050, we need to unleash the power of digitalisation. At the same time, sustainability must be at the heart of the digital transformation. That is why this Strategic Foresight Report takes a deeper look at how to best align our twin objectives, especially as they take on a significant security dimension due to the current geopolitical shifts. For instance, from 2040, recycling could be a major source of metals and minerals, inevitable for new technologies, if Europe fixes its shortcomings in the area of raw materials. Understanding this interplay between the twin transitions, while striving for open strategic autonomy, is the right way forward.”

The green and digital transitions are at the top of the Commission’s political agenda set out by President von der Leyen in 2019. In light of Russia's aggression against Ukraine, Europe is accelerating its embrace of climate and digital global leadership, with eyes firmly on key challenges, from energy and food, to defence and cutting-edge technologies. From this perspective, the 2022 Strategic Foresight Report puts forward a future-oriented and holistic analysis of the interactions between the twin transitions, taking into account the role of new and emerging technologies as well as key geopolitical, social, economic and regulatory factors shaping their twinning – i.e. their capacity to reinforce each other.

Technologies essential for the twinning towards 2050

On one hand, digital technologies help the EU achieve climate neutrality, reduce pollution and restore biodiversity. On the other hand, their widespread use is increasing energy consumption, while also leading to more electronic waste and bigger environmental footprint.

Energy, transport, industry, construction, and agriculture – the five biggest greenhouse gas emitters in the EU – are key for a successful twinning of the green and digital transitions. Technologies will play a key role in reducing these sector's carbon footprint. By 2030, most reductions in CO₂ emissions will come from technologies available today. However, achieving climate neutrality and circularity by 2050 will be enabled by new technologies currently at the experimental, demonstration or prototype phase.

For example:

- In the energy sector, novel sensors, satellite data and blockchain could help strengthen the EU's energy security, by improving the forecasting of energy production and demand, by preventing weather-related disruptions or by facilitating cross-border exchanges.
- In the transport sector, a new generation of batteries or digital technologies, like artificial intelligence and internet of things will enable major shifts towards sustainability and multimodal mobility across different modes of transport, even short-distance aviation.
- Across industrial sectors, digital twins – a virtual counterpart of a physical object or process, using real-time data and machine learning, – could help improve design, production and maintenance.
- In the construction sector, building information modelling could improve energy and water efficiency, affecting design choices and use of buildings.
- Finally, in the agriculture sector, quantum computing, in combination with bioinformatics, can enhance understanding of the biological and chemical processes needed to reduce pesticides
and fertilisers.

**Geopolitical, social, economic and regulatory factors affecting the twinning**

The current geopolitical instability confirms the need to not only accelerate the twin transitions but to also reduce our strategic dependencies. In the short-term, this will continue affecting energy and food prices, with the significant social fallout. In the medium- and long-term, for instance, **sustainable access to raw materials** critical for the twin transitions will remain of paramount importance, adding pressure to move to shorter and less vulnerable supply chains and to friend-shoring wherever possible.

The twinning will also require **hinging the EU’s economic model on wellbeing**, sustainability and circularity. The EU's position in shaping global standards will play an important part, while social fairness and the skills agenda will be amongst the conditions for success, alongside the mobilisation of **public and private investment**. It is expected that almost €650 billion will be needed in additional future-proof investment annually until 2030.

**Ten key areas of action**

The report identifies areas where a policy response is needed to maximise opportunities and minimise potential risks stemming from the twinning:

1. Strengthening **resilience and open strategic autonomy** in sectors critical for the twin transitions via, for instance, the work of the EU Observatory of Critical Technologies, or the Common Agricultural Policy in ensuring food security.
2. Stepping up **green and digital diplomacy**, by leveraging the EU's regulatory and standardisation power, while promoting EU values and fostering partnerships.
4. Strengthening **economic and social cohesion**, by for instance, reinforcing social protection and the welfare state, with regional development strategies and investment also playing an important role.
5. Adapting **education and training systems** to match a rapidly transforming technological and socio-economic reality as well as supporting labour mobility across sectors.
6. Mobilising **additional future-proof investment** into new technologies and infrastructures – and particularly into R&I and synergies between human capital and tech –with cross-country projects key to pooling EU, national and private resources.
7. Developing **monitoring frameworks** for measuring wellbeing beyond GDP and assessing the enabling effects of digitalisation and its overall carbon, energy and environmental footprint.
8. Ensuring a **future-proof regulatory framework for the Single Market**, conducive to sustainable business models and consumer patterns, for instance, by constantly reducing administrative burdens, updating our state aid policy toolbox or by applying artificial intelligence to support policymaking and citizens' engagement.
9. Stepping up a **global approach to standard-setting** and benefitting from the EU's first mover advantage in competitive sustainability, centred around a 'reduce, repair, reuse and recycle' principle.
10. Promoting robust **cybersecurity and secure data sharing framework** to ensure, among other things, that critical entities can prevent, resists and recover from disruptions, and ultimately, to build trust in technologies linked to the twin transitions.

**Next steps**

The Commission will continue to advance its Strategic Foresight Agenda, while informing the Commission Work Programme initiatives for next year.

On 17-18 November 2022, the Commission will co-organise the annual European Strategy and Political Analysis System (ESPADS) conference to discuss the conclusions of the 2022 Strategic Foresight Report and prepare the ground for the 2023 edition.

**Background**

Strategic foresight supports the Commission on its forward-looking and ambitious path towards achieving **President von der Leyen’s** six headline ambitions. As of 2020, based on full foresight cycles, annual Strategic Foresight Reports are prepared to inform the Commission's priorities defined in the annual State of the Union address, the Commission Work Programme and multi-annual
This year’s report builds on the 2020 and 2021 Strategic Foresight Reports, which focused on resilience as a new compass for EU policymaking and on the EU’s open strategic autonomy, respectively.

The analysis presented in the 2022 Strategic Foresight Report was based on an expert-led, cross-sectoral foresight exercise conducted by the Joint Research Centre, complemented by broad consultations with Member States, and other EU institutions in the framework of the European Strategy and Policy Analysis System (ESPAS), as well as with citizens through a call for evidence published on Have Your Say. The results of the foresight exercise are presented in the Joint Research Centre’s Science for Policy report: ‘Towards a green and digital future. Key requirements for successful twin transitions in the European Union’.

For more information

[2022 Strategic Foresight Report: Twinning the green and digital transitions in the new geopolitical context](link)

[2022 Strategic Foresight Report webpage](link)

[Questions and answers on the 2022 Strategic Foresight Report](link)

[Website on strategic foresight](link)

[JRC Science for Policy report: Towards a green and digital future. Key requirements for successful twin transitions in the European Union](link)

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[Read-out of the weekly meeting of the von der Leyen Commission by Maroš Šefcovic, Vice-President of the European Commission, on the 2022 Strategic Foresight Report](link)