

A Long-Term Transformation Pathways Initiative (LTTPI) for the G20

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Challenge

To achieve the Sustainable Development Goals (SDGs) and implement the Paris Climate Agreement, G20 countries will need to undertake profound transformations of their energy systems, food production, industry, cities, and ocean management: The world will use more energy, but energy-related greenhouse gas emissions must fall to zero by 2070 at the latest to stay within 2°C above pre-industrial temperatures. Countries need to transform food systems to provide nutritious food to a growing population, reduce obesity, halt the loss of forests and biodiversity, and achieve net-zero greenhouse gas emissions. Cities must become far more energy efficient to reduce pollution and enhance productivity, and industrial production must expand within natural resource constraints. Unless oceans and coastal ecosystems are managed sustainably they will lose their capacity to support livelihoods and perform essential Earth regulating functions.

Each of these transformations is long-term in nature and will require profound changes to countries' infrastructure and economic systems. New technologies must be developed and large volumes of public and private capital must be mobilized. Countries will need to coordinate their action to reduce the costs of each transformation.

Clearly, the market will play an essential role in driving the transformations, but sound macroeconomic policies will not be sufficient to achieve the quantified benchmarks that every country needs to reach by mid-century. A central question for the G20 therefore is how it can mobilize greater action and coordination across its members in undertaking the transformations of energy, agriculture, cities, industry, and ocean management.

Proposal

Avoiding costly policy dead ends

Most G20 countries do not have rigorous and sufficiently ambitious strategies for addressing these challenges. To the extent strategies exist, they are too short term. For example, the average life time of a new power plant can be over 40 years (new transport infrastructure lasts even longer), so even the best-intentioned 10- to 15-year climate strategies will invariably lead to three types of "dead ends".

A first dead end results from a focus on technologies that reduce emissions in the short term but are incompatible with full decarbonization by mid-century. For example, the climate strategies of the United States and many other countries project a shift from using coal for power generation to natural gas and focus on making vehicle engines more efficient. Both will reduce greenhouse gas emissions, but neither can lead to net zero emissions by the middle of the century. Emission levels would plateau after 2030 and make it impossible to stay below 2°C. If one takes a longer-term view then automotive engineers should focus on transitioning to zero-emission technologies, such as electric or hydrogen-powered engines. Coal must be replaced by renewables and other zero-carbon technologies.

A second dead end is the failure to adopt a systems approach. For example, to decarbonize transport, the sector must develop integrated investment strategies with the power sector since decarbonization requires direct electrification through electric vehicles or indirect electrification through power-to-gas technologies. Yet, ministries and departments responsible for energy and transport rarely talk to each other and certainly do not coordinate long-term investments and policies around decarbonization. Short-term strategies will not encourage such discussions since modest objectives can be achieved through uncoordinated action in each sector.

The third type of dead ends is the least tangible, but the most important for G20 countries' long-term ability to reach zero net emissions at an acceptable cost. The technology roadmaps prepared by the International Energy Agency show that much faster technological progress is necessary to stay within 2°C. Yet on average, OECD countries only invest 4 percent of their public R&D budgets in energy, including the development and diffusion of low-carbon technologies, such as electric vehicles, renewables, carbon capture and storage, low-carbon industrial processes, and energy storage. This corresponds to a mere 0.01 to 0.1 percent of countries' GDP. Since it can take decades for R&D to translate into commercial technologies G20 countries must ramp up investment now.

Long-term pathways as a method for problem solving

To avoid costly dead ends and to ensure that long-term benchmarks can be achieved, countries need to undertake long-term “back-castings” towards clean energy, sustainable agriculture, clean and productive cities, sustainable industry, and safely managed oceans. As one example, research teams from almost all G20 countries have come together under the Deep Decarbonization Pathways Project (DDPP) launched by the Sustainable Development Solutions Network (SDSN) and IDDRI to develop pathways towards decarbonizing energy systems. Building on the lessons from the DDPP, countries have committed in the Paris Climate Agreement to prepare “low-emission development strategies” through to 2050 that are mindful of the objective to keep the rise in average temperatures to well below 2°C (Art. 4.19). This commitment to prepare long-term strategies can help tackle three sets of G20 priorities.

First, transparent low-emission development strategies provide a framework for engaging all key stakeholders – governments (national and subnational), business (e.g. power utilities, infrastructure companies, car manufacturers, finance and insurance companies), civil society, and the scientific community around the practical questions of low-emission development and implications for macroeconomic policies. The process of developing pathways allows all stakeholders an opportunity to review, pose questions, and suggests improvements that may lower the cost, improve the feasibility, and increase the buy-in of moving towards zero net emissions in the country. This is indeed how California has succeeded in building broad societal support for its commitment to reduce greenhouse gas emissions by over 80 percent by 2050.

Second, they ensure transparency, build trust, and promote joint problem-solving among G20 countries. In the case of energy and land use, low-emission development strategies invite every country to ask how to get to zero net emissions, which provides a transparent, long-term benchmark for assessing the adequacy of a country's climate strategies. The absence of a transparent low-emission development strategy in a country demonstrates plainly to everyone that this country is not yet serious about achieving the long-term emission-reduction objective of the UNFCCC. As the world learns how to undertake low-emission development, national pathways can be compared and updated – providing a continuous and fair ratchet mechanism for coordinated G20 action on long-term transformations. This transparency will help build trust among countries that the transformations towards sustainable development have begun.

Third, long-term strategies place the focus on technology development and set out the major business innovation challenges. A central finding of research by the T20 is that the pace of development and diffusion of low-emission technologies must pick up significantly if the world is to stay within the 2°C limit. Long-term strategies will provide transparent technology benchmarks – such as minimum penetration rates of zero-tailpipe emission light-duty vehicles and the carbon intensity of electricity from newly constructed power plants – that must be met over time to respect the world's carbon budget for 2°C. In this way they set out time-bound innovation challenges that industry,

governments, and science can mobilize around.

A T20-SDSN Long-Term Transformation Pathways Initiative (LTTPI)

Most governments lack the ability and capacity to prepare long-term pathways for the transformations of energy systems, food systems and land use, ocean and coastal management, urban management, and the circular economy. The G20 should therefore task the think tanks convened under the T20 and their own leading universities in collaboration with the UN Sustainable Development Solutions Network (SDSN) to investigate the feasibility of such long-term transformations and consider their economic, financial, social, and technological implications. Under this Long-term Transformation Pathways Initiative (LTTPI), participating research institutions will collaborate to compare and improve assumptions on technologies and cost curves, modelling tools, and findings, which will be made available continuously to each new G20 presidency. They will engage universities across the G20 and reach out to business networks, such as the B20 and the World Business Council for Sustainable Development to mobilize business know how and discuss emerging findings.

The LTTPI will build on two existing G20 networks of national research institutions, establish one more during 2017, and build others over the coming years:

1. The Deep Decarbonization Pathways Network focused on pathways towards net-zero energy systems was founded in 2013 by the SDSN and the Institute for Sustainable Development and International Relations (IDDRI).
2. The FABLE (Food, Agriculture, Biodiversity, Land-use, and Energy) Initiative was recently launched by IIASA and the SDSN to prepare integrated global and national pathways towards resilient food systems, sustainable diets, forest and biodiversity conservation, and sustainable water use.
3. Over the next twelve months a G20 research network on oceans and coastal ecosystems network will be established to consider the challenges of long-term coastal and ecosystem management.

To complement the LTTPI, additional research networks on urban management and sustainable industry will be established by the T20, the SDSN, and other global research networks in the coming years.

The LTTPI will be open to research institutions and universities from all G20 countries who wish to contribute to non-official technical analyses for consideration by governments. The T20 and SDSN will issue annual reports on the implications from the LTTPI for G20 work streams, including the G20 Finance Track and working groups on sustainability, development, trade and investment, green finance, and agriculture.

Existing Initiatives & Analysis