

# Planning for change in the transport sector

## Knowledge status and needs in planning a low-emission society under uncertainty

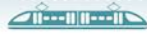
TØI Report 2086/2025 • Author: Daniel Ruben Pinchasik • Oslo 2025 • 42 pages

*The transition to a low-emission society and other major societal challenges have triggered a need for new planning methods, both within transport and society at large. Rather than planning incrementally, based on historical trends and adopted policy, one should plan for a desired future and transformative change. This requires foresight methods that cover how the future should look, and possible pathways there. New planning methods should enable larger changes, ensure that a low-emission society is achieved by 2050, account for nature and land-use objectives, and ensure efficient use of scarce resources – all under increasing uncertainty. Two such planning methods are backcasting and extended scenario methodology. These can be combined with ‘accessibility’ or ‘sufficiency’ perspectives and the Avoid-Shift-Improve framework (ASI). This report synthesizes current knowledge and knowledge and methodological needs, and intuitively presents ‘new’ planning perspectives: what must be in place, how should we plan, how not to plan, and how can and should ‘new’ methods and perspectives be used in practice?*

Society is facing major changes and increasing uncertainty, both with regard to the transition to a low-emission society and as a result of other major societal challenges. In recent years, it has become increasingly clear that today’s analysis and decision processes suffer from weaknesses and that ‘business-as-usual’ will not result in a low-emission society in 2050 which simultaneously meets key nature preservation and land-use objectives and uses scarce resources efficiently (e.g. energy, biomass, capital, minerals, metals, other natural resources, and high-skilled labour). In this light, there is a need for further development of methods, analytical tools and decision-making support for long-term planning. Such planning should enable more structural and transformative transitions and organizational changes.

This report aims to synthesize current knowledge, knowledge needs, and needs for further methodological development and to make ‘new’ planning perspectives more accessible: *what must be in place, how should we plan, how not, and how can and should ‘new’ methods and planning perspectives be used in practice?*

Given the need for societal transitions and improved long-term planning, the OECD/ITF, UN’s Intergovernmental Panel on Climate Change (IPCC), and Norway’s Climate Change Committee (NCCC), among others, have published a wide range of principles, recommendations, guidelines and nuances. Although the current report focuses on *transport* planning, many of these



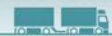
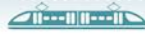
apply to societal planning more generally. A central premise is that planning should be based on goals that represent the future society desires, instead of where historical trends and adopted policy will lead us. This is referred to as ‘decide-and-provide’ or ‘design the future’ approaches that are driven by visions, rather than today’s ‘predict and provide’, which is more reactive and based on trend extrapolation and projection (e.g. of transport demand).

Planning for a ‘desired future’ requires strategic long-term visions and supporting methods. Such methods should yield more holistic planning across transport modes and other societal sectors, integrate long-term goals into all planning, and be put in place within the next few years. *This requires foresight methods covering two central questions: ‘how should the future look?’, and ‘what can pathways to such a future look like?* For example, whilst reaching a low-emission society by 2050 could be an obvious goal, many such futures can be imagined, with anything from low to high consumption of resources. Because pathways to desirable futures can also take different forms with wholly different emissions profiles, the NCCC further recommends the use of 5-year carbon budgets, of which the first two budgets should be more binding.

Both within transport and other sectors, it may be necessary to reduce or curb growth in activity levels. There is a need for approaches that prioritize measures that ‘avoid’ emissions and reduce activities that generate emissions, over measures that ‘shift’ or ‘improve’ (the ASI framework). Within transport, reduced demand is also central to results of socio-economic analyses and investment choices. Reduced transport demand further has implications for the level of resources required (e.g. energy) and for resources available to other sectors. Better knowledge is needed on the drivers of transport demand, both to allow for better targeting this demand and to gain better insights into links between transport and spatial planning, so that the latter can be used more strategically. This may entail a need for developing knowledge and perspectives related to concepts such as ‘accessibility’ and ‘sufficiency’, which some countries have started to use in planning. Better insights into demand and activity levels are also necessary to be able to define which (small) emissions may remain in 2050, and to be able to include changes in trends and transport demand in general. Similarly, there is a need for insights into ‘inevitable’ transport that, in future, will be necessary for society’s energy transition, climate adaptation, carbon capture and storage, etc. These future demands must be captured in planning systems, but cannot be derived from historical data or trends, and are difficult to predict.

In general, there is a need for socio-economic assessments that better take into account other qualities of transport than time use. Assessments should also assess, address and aim to avoid path-dependency, and better include climate and nature considerations. Here, improved methodology for valuing and quantifying land-use, and for comparisons between modes of transport, is required. Emissions should not only be highlighted better in analysis and decision-making processes, but actively be included as constraints. The same applies to total energy and resource demand, which should also be reported *across sectors*. It should become clear what different sectors of the economy are expected to contribute with, and tools should be developed for evaluating progress along the way.

For transport, planning should take place *across* transport modes, so that developments of the transport system are in line with a low-emission society. The transition to a low-emission society and challenges along the way imply a need to re-assess which infrastructure should be prioritized from a societal perspective. This includes both the different infrastructure needs society may have, and the implications that infrastructure projects have on society’s ability to meet increasingly strict climate targets and needs with regard to climate adaptation, technology transition and resource scarcity. All choices should be compatible with a low-emission society.



With the above as starting point, there is a need for tools to define concrete future visions and alternative pathways to achieve these. In this context, there are different but related foresight methods that can contribute to a greater understanding of factors that affect developments, and how to achieve change. In recent years, particularly ‘backcasting’ and extended scenario methodology have been highlighted as promising approaches going forward.

Backcasting involves defining one or more desired futures and working backwards in time to identify possible pathways to these futures (see Figure S.1). A characteristic that distinguishes backcasting from many other foresight methods is its explicitly normative nature: backcasting emphasizes futures that are desirable, rather than futures that are most likely. Backcasting can be used as valuable decision-support tool, e.g. to illustrate political possibilities for achieving goals, to illustrate alternative pathways, and to provide insights into critical choices, timing of choices, and their sequence. Backcasting methodology can be particularly suitable when there is a need for transformative change, time horizons are long enough to allow radical changes, goals lie relatively far ahead in the future, business-as-usual and incremental measures are insufficient to achieve desired changes, problems are complex or persistent, externalities play a significant role, and when planning is carried out under high uncertainty. Backcasting is also compatible with different types of tools and methods, both qualitative and quantitative. Because backcasting is normative, it can be argued that using backcasting can be a strategy to reduce uncertainty.

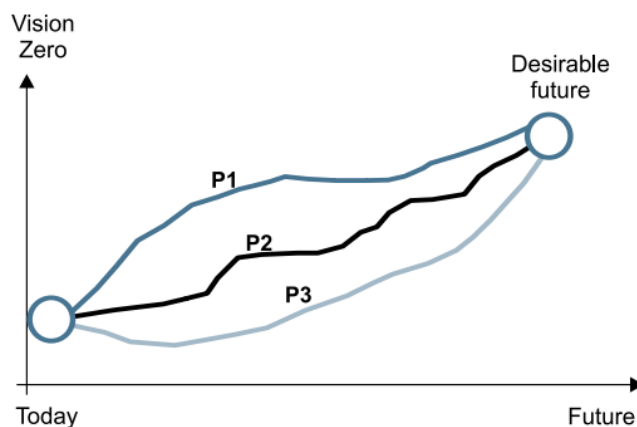


Figure S.1. Illustration of a backcasting approach. Source: Whitelegg et al. (2010).

Scenario methodology, in turn, can be useful for exploring different futures under uncertainty. A range of methods and techniques exist, each with its own strengths and nuances. In practice, the number of scenarios and level of detail will often have to be limited based on assessments of internal consistency, plausibility, overlap, representativity, etc. Narratives are a much-used approach, often combined with numbers, and with scenario families that employ extremes or large contrasts (e.g. the so-called Shared Socio-Economic Pathways used in climate research). Backcasting and scenario methodology, can, but don't necessarily have to be tightly linked. The current report provides detailed descriptions and ‘recipes’ for using these methods in practice.

In recent years, some few countries have slowly started to integrate concepts related to the ASI framework, ‘accessibility’, ‘sufficiency’, backcasting and scenario methodology, into their transport and societal planning. Similarly, a few countries have started to somewhat put climate and environmental objectives in the driver’s seat for transport planning. This can particularly be noted for Wales and Austria. Even though interest for ‘new’ perspectives and methods is increasing, most countries are still at an early stage, with discussions remaining and at a relatively general level. By synthesizing and presenting new perspectives, methods, ‘recipes’ and considerations, we hope that this report makes future planning methods more accessible and intuitive.