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TRENDS, DRIVERS AND Pathways FOR SUSTAINABLE URBAN MOBILITY

Book Chapter

Sustainable Urban Mobility Pathways

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Abstract

Transport plays a key role in delivering on the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda. While providing essential services to society and economy, transport is also an important part of the economy and it is at the core of a number of major sustainability challenges, in particular climate change, air quality, safety, energy security and efficiency in the use of resources. This book identifies the linkages between decarbonisation pathways, policy design, coalition building and institutional frameworks. The analysis shows that there are critical interlinkages between these aspects:

- Decarbonisation of the transport sector is not possible through isolated measures. A broad range of local and national actions are needed to bring the sectors on to low-carbon development path.
- A holistic policy approach is needed to deliver on wider sustainable development objectives. Addressing a broader range of policy objectives can help forming coalitions and consensus among key political and societal actors.
- Consensus oriented institutions are needed to maintain a stable policy environment that enables the long-term transitions towards a low-carbon development path.

Introduction

Transport is a highly complex sector and policy interventions in this sector can have unintended consequences, positive and negative as they rarely only affect one objective, for example air quality measures may affect fuel efficiency negatively or biofuels may have land-use change implications. Linking and packaging policies is therefore vital to generate synergies and co-benefits between measures. This provides a basis for coalitions that can align different veto players. While some analysis on policy integration has been carried out, e.g. Justen et al. 2014; Givoni 2014, the linkages between policy packaging, co-benefits and coalitions can be summarised in three aspects:

Trends, drivers and pathways: What are the key trends and drivers in the transport sector, what is the greenhouse gas emission reduction potential and how can mitigation pathways contribute to sustainable development as lever for broad coalitions?

Potential for co-benefits: What policies are needed to achieve a sustainable, low-carbon pathway for transport, what barriers have to be overcome and how would a integrated policy strategy need to be designed to provide a basis for political coalitions?

Coalitions and institutions: What institutional framework creates sufficient political stability and continuity to foster the take-up of and long-term support for sustainable transport strategies?

Trends, drivers and pathways

Scenarios can play an important role in climate change relevant assessment, they can guide and inform policy decisions and provide indications of potential impacts of actions or the lack thereof (van Vuuren et al. 2012). Policy relevance of scenarios can vary greatly, which heavily depends on the design of the analysis, the assumptions, context and the presentation of the scenarios (Garb, Pulver, and VanDeveer 2008). Moving from abstract scenarios to concrete cases in a specific area can make quantitative research policy relevant and can guide the development and implementation of policy (Elmore 1979). Hence, not only the data and analysis if relevant for the development of decarbonisation scenarios, but also the framing and the presentation considerably affects the policy relevant of scenarios and pathways derived from them (Berkhout, Hertin, and Jordan 2002). This is where the book aims to make a contribution to the current body of literature, by identifying policy drivers in key emerging economies and developing policy relevant scenarios that highlight the different policy options to decarbonise the transport sector and the interactions of them.

The transport sector is currently on track to continue to stay at current levels of greenhouse gas emissions even under very optimistic scenarios (Fulton, Lah, and Cuenot 2013; Harvey 2013). Growth in mobility demand for mobility outpaces efficiency gains. Even when taking into consideration a substantial take-up of more efficient vehicles technology and some modal shifts, transport CO2 emissions in 2050 will still be at 2015 levels of around 7.5 Giga-tonnes of CO_2 (ITF 2017). If, however, there are now changes to current trends, transport sector greenhouse gas emissions are set to double by 2050 (IPCC 2014). Setting the transport sector on a low-carbon development pathway is essential for global climate change mitigation efforts that aim to stabilise global warming at well below 2°C, which is the internationally agreed target under the United Nations Framework Conventions on Climate Change (UNFCCC). To contribute to this target developed countries will have to rapidly decarbonise their transport sector over the coming decades (-80% by 2050) and developing and emerging countries will have to curb growth (+70% by 2050), which will require substantial policy action.

The analysis of policy actions in key industrialised and emerging economies carried out under SOLUTIONS shows that there is a substantial gap between the mitigation action needed and the proposed policy actions by countries (Yang et al. 2017). The analysis shows that urban passenger transport and surface freight transport need to play a major role in decarbonising the sector, both in managing growth in emerging economies and drastically reduce emissions in industrialised economies, even more so when aiming for a 1.5°C stabilisation pathway. Integrated assessments models underestimate the role of modal shifts and changing travel patterns and their role to achieve wider sustainable development objectives along with the ability of a broader policy approach to potentially support coalition building of policy actors that represent these objectives (van Vuuren et al. 2015; Edelenbosch et al. 2017; Roelfsema et al. 2018)

Urban passenger transport plays also a particularly important role in providing access to urban services, economic opportunities and social participation (Bibas, Méjean, and Hamdi-Cherif 2015; Admasu, Balcha, and Getahun 2016; Angel and Blei 2016). Car, but also bus travel is projected to increase rapidly in developing and emerging economies. This reflects the growing travel demand in developing economies, which is a vital component of economic development (Berry et al. 2016; Gschwender, Jara-Díaz, and Bravo 2016; Spyra and Salmhofer 2016).

Several international assessments have analysed the technological potential and effort required to decarbonise the transport sector (IPCC 2014; Dessens, Anandarajah, and Gambhir 2016; Figueroa Meza et al. 2014; Lewis Fulton, Lah, and Cuenot 2013). These analyses show that, moving on to a stabilisation pathway that is consistent with global climate change targets, transport needs to decarbonize substantially over the coming decades and almost entirely in

industrialised countries by the middle of this century (IEA 2016, ITF 2017). Taking this path will unlock direct and indirect benefits that outweigh the costs, with savings of between USD 50 trillion and 100 in trillion in fuel savings, reduced vehicle purchases, needed infrastructure and fuel costs (IEA 2014, 2016). The additional co-benefits and synergies generated by sustainable mobility, such as improved safety and air quality and reduced travel time make an even stronger case for the shift towards low-carbon transport, which is the guiding framework for the scenarios developed for this book. The contribution of countries to the global decarbonisation efforts of the (land-) transport sector is reflected in the scenarios that show travel demand, technology deployment and policy interventions and their effect on different scenarios.

From a climate change perspective vehicle technology and fuel switch options provide the biggest mitigation potential (Suzanna Kahn Ribeiro and Figueroa 2012), but this does not fully reflect a broader sustainable mobility perspective. A broader multimodal approach that manages growth in travel demand and modal split may yield important benefits in air quality, traffic congestion, safety and overall societal mobility may trigger substantially higher socio-economic co-benefits and may also be more cost effective (van Vuuren et al. 2015).

The mitigation potential of a number of transport sector mitigation measures has been well-established, e.g., shift to public and non-motorized transport and efficiency improvements of internal combustion engines (R Sims et al. 2014; Kok, Annema, and van Wee 2011; Wright, L., Fulton 2005; Macchion et al. 2015). However, a more integrated view that combines technology shifts potential in a balanced perspective to the wider sustainable (urban) development approach of low-carbon mobility options still needs further research (Saujot and Lefèvre 2016; F. Creutzig 2016).

Only a few high-level climate change mitigation potential assessments manage to show the relationship between the fuels, and technology elements and the planning, and model shift aspects of a decarbonisation pathways for transport (Sims et al. 2014; Figueroa Meza et al. 2014; Lewis Fulton, Lah, and Cuenot 2013). There are a number of case studies that provide indications on individual costs and benefits of specific measures (Doll and Jansson 2005; Felix Creutzig and He 2009; Pathak and Shukla 2016; Jacoby, H.G., Minten 2009).

The main message from decarbonisation scenarios is that light-duty vehicle (LDV) travel will need to change rapidly in industrialised countries and shift towards more efficient vehicles technologies and more efficient modes of transport. In industrialised economies a reduction of car travel between 4 to 37% combined with average vehicle fuel efficiency (reduction in energy/km) of between 45 to 56% would be required to achieve the desired reduction of 73-80% to be roughly in line with an emission reduction pathway for a 2°C stabilization scenario as suggested by the IPCC (IEA 2012a; Lewis Fulton, Lah, and Cuenot 2013). In developing and emerging countries, light-vehicle travel per capita has still a potential to grow even under a low-carbon development scenario by around 130 to 350 % if accompanied by fuel efficiency and carbon intensity gains of 40 to 50% (IEA 2012a; Lewis Fulton, Lah, and Cuenot 2013).

One vital aspect of the book is the factor policy integration, which is needed to achieve sustainable development goals and global climate change goals. This has been tested in scenarios and pathways specifically developed for this book. The quantitative analysis carried out for this book builds on the International Energy Agency's data and develops sensitivity cases to highlight the role of an integrated policy approach in the transport sector (IEA 2012a, 2012b; Fulton, Cazzola, and Cuenot 2009).

Potential for co-benefits

It is often claimed that transport is one of the hardest sector to decarbonise (Vale 2016; Cai et al. 2015; van Vuuren et al. 2015). This view is challenged by a number of more recent chapters, which show that an integrated policy approach can address create co-benefits with other key policy objectives, such as health, productivity, energy security and safety, which can lead to a maximum of socio-economic benefits (Bollen 2015; Dhar and Shukla 2015; Lah 2015; Schwanitz et al. 2015; Dhar, Pathak, and Shukla 2017). These synergies between policy objectives have the potential to incorporate the positions of relevant veto players, which can help forming coalitions to support policy implementation, which is often neglected in studies on the decarbonisation potential of the sector.

If applied in isolation policy measures are unlikely to achieve goals without generating trade-offs that create a risk of a veto player blocking the implementation process. For example, increased fuel taxes, without the provision of modal alternatives and measures to ensure a supply of efficient vehicles, would impact negatively on mobility and transport affordability (Greene, D.L., Patterson, P.D., Singh, M., Li 2005; Sterner 2007), which would result in relevant veto players blocking this initiative. However, a balanced and integrated policy approach combines measures such as vehicle efficiency standards, fuel tax, differentiated vehicle taxes with the provision of modal choices and compact city design, has the potential of addressing policy objectives that can ensure relevant veto players support the implementation.

Several chapters assess the emission reduction potential of measures but fall short of identifying the relevance of . The potential for synergies and co-benefits generated by an integrated policy approach and the link to potential coalitions among key veto players is considered to be a vital link between policy design and political institutions that is often neglected. Table 1 provides an overview of the required policy interventions and their potential impact and co-benefits, which gives a first indication of the key policy actors involved and with that the potential veto players (Lah 2017a).

Table 1 Summary of sustainable urban mobility actions and potential benefits

Low-carbon urban mobility actions	Emission reduction potential	Co-benefits and synergies	Potential Veto Players
Activity (reduction and management: short distances, compact cities and mixed use)	Potential to reduce energy consumption by 10 to 30%	Reduced travel times; improved air quality, public health, safety and more equitable access	Urban planning department, Mayor, transport department
Structure (shift to more energy efficient modes)	Potential for energy efficiency gains varies greatly, but for example BRT systems can deliver up to 30% reductions at a cost of $1-27 M/km	Reduced urban congestion and more equitable access	Mayor, transport department, public transport authority
Intensity (vehicle fuel efficiency)	Efficiency improvement of 40-60% by 2030 feasible at low or negative costs	Improved energy security, productivity and affordability	Treasury/ Finance Ministry, Transport Ministry (national)
Fuel (switch to electricity, hydrogen, CNG, biofuels and other fuels)	Changing the structure of the energy consumption, but not necessarily overall demand.	Diversification of the fuels used contributes to climate, air quality and/or energy security objectives	Treasury/ Finance Ministry, Transport Ministry (national)

Adapted and expanded from IPCC 2014, Figueroa Meza et al. 2014, Lah 2017

The initial screening of policies serves as starting point for identifying critical stakeholders on the national level. Stakeholders are individuals or groups who are seriously affected by a policy or who have the means to influence the implementation of the objectives of a project (Freeman, 1984). Stakeholders can either be potential supporters and potential opponents. stop your project or critical components of it.

The mapping of stakeholders is a stage for the selection of key partners in the policy development and implementation phase. Before getting into contact with stakeholders it is important to have an understanding of their potential role, their interests, and their influence. This comprises their 'red lines' in terms of objectives, targets, or types of measures (e.g. scepticism against regulation, or increasing taxes). For the preparation of the stakeholder involvement, it is essential to make sure you have a good idea about your objectives, your bargaining position and what you want to reach (minimum outcome): what is your non-negotiable core, what is your negotiation space, etc.

Decision making on urban mobility and infrastructure investments is as complex as cities themselves. Rarely ever will a single measure at the local or national level achieve comprehensive climate change impacts and also generate economic, social and environmental benefits without creating trade-offs. Many policy and planning decisions have synergistic effects, meaning that their impacts are larger if implemented together. It is therefore generally best to implement and evaluate integrated programs rather than individual strategies. For example, by itself improvements of public transport services may only cause minimal reductions in individual motorized travel, and associated benefits such as congestion reductions, consumer savings and reduced pollution emissions. However, the same measure may prove very effective and beneficial if implemented with complementary incentives, such as efficient road and parking pricing, so travellers have an incentive to shift away from individual car travel (Lah, 2015). In fact, the most effective programs tend to include a combination of qualitative improvements to alternative modes (walking, cycling, ridesharing and public transit services), incentives to discourage carbon-intensive modes (e.g. by efficient road, parking and fuel pricing; marketing programs for mobility management and the reduction of commuting trips ; road space reallocation to favour resource-efficient modes), plus integrated transport planning and land use development, which creates more compact, mixed and better connected communities with less need to travel. Hence, a vital benefit of the combination of measures is the ability of integrated packages to deliver synergies and minimise rebound effects.

When pursuing sustainable urban mobility actions it is important to ensure that Veto players are identified early on the policy process as they are political actors who have a distinctive institutional role in the policy process and have the legal power to put a hold to an initiative. Typical veto players are finance ministries and parliaments with legislative prerogatives. This is a substantially different role from stakeholders, who have a vested interested in a particular policy process, but do not have the (legal) power stop it. However, both groups need to be involved in the process to successfully implement a measure. Public participation can help ensuring durability and support beyond political parties. There is a causal relationship between policy objectives, agenda setting, institutional structures and policy outcomes (Tsebelis 2002, Lijphart 1984). The synergies explored in this paper provide a basis for the inclusion of veto players into the policy process, which is vital for the uptake of sustainable mobility policies. The table below aims to apply the veto players' approach to coalition formation to identify the links between policy objectives and policy actors (Table 2). This aims to highlight that politics and the policy environment play an important role in the uptake of policy measures.

Table 2 Mapping of key actors - examples of potential linkages between climate and other sustainable development policy objectives and actors

Climate change mitigation approach and objective	Economic implications and actors	Social implications and actors	Environmental implications and actors
Activity: Avoid vehicle travel by reduced trip distances e.g. by developing more compact, mixed communities and telework.	Reduced congestion: *Local authorities (v)* ↑ More efficient freight distribution: *Businesses and associations* ↑ *Economic development ministry (v)* ↑	Improved access and mobility *Social development ministry* ↑ Accident reductions *Health Ministry* ↑	Reduced land consumption *Local planning authority (v)* →
Stucture: Shift to low-carbon transport modes, such as public transport, walking and cycling	Improved productivity due to reduced urban congestion and travel times across all modes *Local authorities (v)* ↑	Reduced exposure to air pollution Health benefits from shifts to active transport modes *Local authorities (v)* ↑	Ecosystem benefits due to reduced local air pollution. *Local environmental department & national ministry* ↑
Intensity: Improve the efficiency of the vehicle fleet and use	Reduced transport costs for businesses and individuals *Local authorities (v)* and Economic and Social development ministries ↑	Health benefits due to reduced urban air pollution *Health Ministry* ↑	Ecosystem and biodiversity benefits due to reduced urban air pollution *Local authorities (v)* ↑
Fuels: Reduce the carbon content of fuels and energy carriers	Improved energy security *Economic development Ministry* ↑ Reduce trade imbalance for oil-importing countries *Finance Ministry (v)* ↑	A shift to diesel can improve efficiency, but tends to increase air pollution *Health and Environment Ministries (v)* ↓	Potential adverse effects of biofuels on biodiversity and land-use *Environment and agriculture ministries (v)* ↓

The selection is not exhaustive and depends on the policy environment. Key: positive ↑ negative ↓ uncertain → , (v) potential Veto Player

The mapping of key intervention and actors shows that urban passenger transport plays a particularly important role in the generation of co-benefits, e.g. by providing access to urban services, economic opportunities and social participation. The interdependencies of local and national policy provide a case for coordination among different levels of government and multi-level governance.

Coalitions and institutions

Energy and climate change policies for the transport sector generally require a consensus on the need for policy intervention and a strategic, coherent, and stable operating environment. Policy interventions in the transport sector, such as fuel and vehicle taxation, are highly visible and politically sensitive. They require a strong political commitment to appear on the policy agenda and to remain in place as they rely on investments that are only cost-effective over the medium to long-term (IEA 2010a; IPCC 2014a). Developing consensus can be difficult because transport is complex and multifaceted and policy interventions can have unintended consequences (Lijphard 1984; Klenk and Meehan 2015; Häussler et al. 2016). The chapters developed for this part of the book show that linking and packaging policies is vital to generate synergies and co-benefits between measures, including linking GHG reduction goals with

other sustainable development goals, such as increasing energy security, road safety, public health, increasing economic productivity and air pollution, and improving equity and access, but also highlight the linkages to governance issues which goes beyond other recent studies in this areas (e.g. Kanda, Sakao, and Hjelm 2016; Wen et al. 2016). A survey and interviews carried out for this chapter among local and national policy advisors in Europe, Asia, Africa and the Americas shows that the lack of funds, lack of suitable technologies and also public opposition are not considered to be the main barriers for the take-up of sustainable transport measures. The largest barriers for the sustainable transport policy action are insufficient knowledge of the various benefits of sustainable mobility, in particular among political decision makers and institutional barriers that directly affect the implementation process (Figure 1). Knowledge about the potential co-benefits of sustainable transport policy can help aligning different policy actors and institutions.
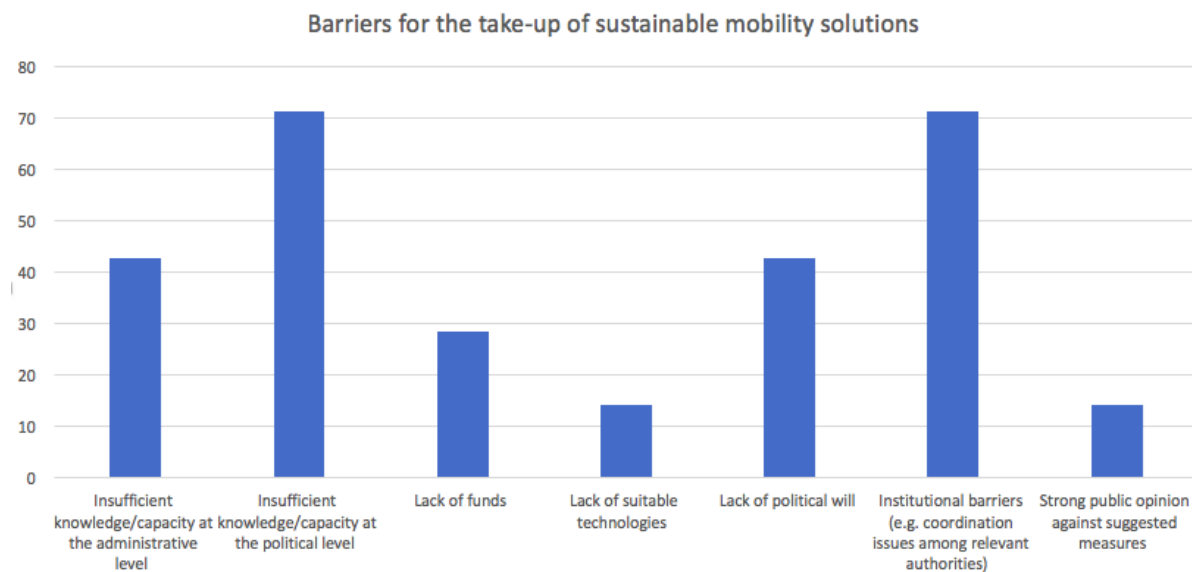

Figure 1 Barriers for sustainable mobility policy implementation (Lah 2017)

An integrated policy approach that creates consensus and coalitions among diverse stakeholders and interests can help to overcome implementation barriers, minimize rebound effects, and motivate people, businesses, and communities (von Stechow et al. 2015). This type of integrated policy approach is especially critical because current GHG reduction measures alone can make important contributions but cannot achieve the levels of reduction needed to shift to a 1.5°C pathway (IPCC 2014).

Decision making on transport policy and infrastructure investments is as complex as the sector itself. Rarely will a single measure achieve comprehensive climate change impacts and also generate economic, social and environmental benefits (Lah 2014; F. Creutzig 2016). Many policy and planning decisions have synergistic effects, meaning that their impacts are larger if implemented together. It is therefore generally best to implement and evaluate integrated programs rather than individual strategies (Hüging, Glensor, and Lah 2014). For example, by itself a public transit improvement may cause minimal reductions in individual motorized travel, and associated benefits such as congestion reductions, consumer savings and reduced pollution emissions. However, the same measure may prove very effective and beneficial if implemented with complementary incentives, such as efficient road and parking pricing, so travellers have an incentive to shift away from individual car travel(Cuenot, Fulton, and Staub 2012; den Boer et al. 2011). In fact, the most effective programs tend to include a combination of qualitative improvements to alternative modes (walking, cycling and public transit services), incentives to discourage carbon-intensive modes (e.g. fuel pricing, vehicle fuel efficiency regulation and taxation), and integrated transport and land use planning, which

creates more compact, mixed and better connected communities with less need to travel (Figueroa Meza et al. 2014; R Sims et al. 2014).

A vital benefit of the combination of measures is the ability of integrated packages to deliver synergies and minimise rebound effects. For example, the introduction of fuel efficiency standards for light duty vehicles may improve the efficiency of the overall fleet, but may also induce additional travel as fuel costs decrease for the individual users (Yang et al. 2017). This effect refers to the tendency for total demand for energy decrease less than expected after efficiency improvements are introduced, due to the resultant decrease in the cost of energy services (Sorrell 2010; Gillingham et al. 2013, Lah 2014). Ignoring or underestimating this effect whilst planning policies may lead to inaccurate forecasts and unrealistic expectations of the outcomes, which, in turn, lead to significant errors in the calculations of policies' payback periods (IPCC 2014). The expected rebound effect is around 0-12% for household appliances such as fridges and washing machines and lighting, while it is up to 20% in industrial processes and 12-32% for road transport (IEA 2013). The higher the potential rebound effect and also the wider the range of possible take-back, the greater the uncertainty of a policy's cost effectiveness and its effect upon energy efficiency (Ruzzenenti and Basosi 2008a).

The current approach to transport policy and infrastructure appraisal that does not take fully into account the wider socio-economic benefits of sustainability mobility (Hüging, Glensor, and Lah 2014). A number of studies emphasize that an integrated approach is vital to reduce transport-sector greenhouse gas emissions cost-effectively (IPCC 2014, Figueroa Meza et al. 2014). While emissions reductions can be achieved through several means, such as modal shift, efficiency gains and reduced transport activity, it is apparent that the combination of measures is a key success factor to maximise synergies and reduce rebound effects. For example, overall travel demand reduction and modal shifts would need to be substantially stronger if not accompanied by efficiency improvements within the vehicle fleet and vice-versa (Figueroa Meza et al. 2014; Lewis Fulton, Lah, and Cuenot 2013).

Policy agenda setting and policy continuity is affected by political consensus, which is a result of political and institutional relationships (Fankhauser, Gennaioli, and Collins 2015; Marquardt 2017). These relationships, including the interactions between different levels of government (e.g. local, state, federal, supra-national) and acknowledgment of scientific consensus on climate change policy, vary greatly between key political and societal actors (Never and Betz 2014). The political environments are the main focus of Part III of the book. They can vary by country and change over time, which affects implementation of sustainable transport and other climate change mitigation measures and results in significant differences between countries' progress reducing GHG emissions from the transport sector. This analysis build on a number of studies examining the influence of the concepts of institutions and actors within the policy process (for example: Haas 1992, 1999; Jahn 1998; Scruggs 1999, 2001; Jänicke 2002; Tsebelis 2002; Neumayer 2003; Bernauer & Koubi, 2009, Jacob and Volkery 2004). The main focus of this analysis is the (potential) support from diverse political and institutional actors, which is considered to be vital for the long-term success of policy and infrastructure decisions.

The policy environment, or context in which decisions are made, is as important as the combination of policy decisions and infrastructure investments that make up a low-carbon transport strategy (Justen et al. 2014). This policy environment includes socio-economic and political aspects of the institutional structures of countries. These structures help build coalitions, but can also increase the risk that a policy package fails because one measure faces strong opposition (Sørensen, Hedgaard, et al. 2014). A core element of success is the involvement at an early stage of potential veto players and the incorporation of their policy objectives in the agenda setting (Tsebelis and Garrett 1996). The analysis also shows that the

policy approach presented in this book provides opportunities for broader coalitions that help to make decarbonisation strategies resilient to political change.

Towards an integrated policy and governance framework for the decarbonisation of the transport sector

Transport plays an important role in total global energy demand, yet the structure of the sector and the decarbonisation pathways for it are vastly different to the electricity sector. Transport is the currently second largest and the fastest growing energy end-use sector and accounts for 28% of total final energy demand (IEA 2012, 2016). The vast majority (94%) of the energy used in transport comes from fossil fuels, responsible for emissions of 6.9 Gt CO2-eq of carbon dioxide (CO2) and other greenhouse gases whose increasing concentration in the atmosphere is a dominant factor in the warming of the climate (IEA 2016). The near complete dependency of transport on energy from fossil fuels poses major challenges for the sector, which are severe in certain regions, particularly those related to air pollution, environmental degradation, energy security, economic efficiency and sustainable development. In addition to this transport is at the heart of many other policy objectives related to road safety, land-use, congestion and access to jobs and opportunities. This book shows that measures to reduce greenhouse gas emissions are available, but that a broader policy approach is required to address all relevant policy objectives. It also shows that policy design and coalition building are closely interlinked.

Energy and climate change policies for the transport sector require a stable political operating environment to enable long-term investment decisions by industry and consumers (Lakshmanan 2011; Fais, Sabio, and Strachan 2016; Spataru et al. 2015). Consensus focused governance and institutional structures may be able to provide such a strategic, coherent and stable operating environment. Policies to reduce energy consumption in the transport sector require a strong political commitment to appear on the policy agenda and to remain in place as they rely on investments that are only cost-effective over the medium to long-term (ITF 2017). Policy interventions in the transport sector, such as fuel and vehicle taxation, are highly visible and politically sensitive. To get a clearer picture of the feasibility of climate policy pathway one can draw on well-established concepts from the political science theory that aim to identify key institutional characteristics that influence policy processes. For example, there are a number of studies examining the influence of the concepts of institutions and actors within the policy process (for example: Haas 1992, 1999; Jahn 1998; Scruggs 1999, 2001; Jänicke 2002; Tsebelis 2002; Neumayer 2003; Bernauer & Koubi, 2009). Most of these studies focus on higher level environmental performance indicators (e.g. Lundquist 1980; Scruggs 1999, 2001; Congleton, 1992; Jahn 1998, Jacob and Volkery 2004). Considering the in complexity of policy making processes it is challenging to draw direct conclusions from institutional settings to climate policy performance. However, several recent studies highlight the relevance of the veto player concept for domestic and international environmental policy (Jahn 2014; Batalla 2012; Schulze 2014; Singh and Dunn 2013; Sotirov and Memmler 2012). Similarly, recent chapters continue to assess the role of corporatist structures in environmental policy (Cairney 2014; Iguchi 2015; Jones 2014; Vink et al. 2015; Weiner 2014; Benoit and Patsias 2014).

The relationship between institutional structures and climate policy performance becomes obvious when assessing the stability (or the lack thereof) of specific policies in different countries. After the 2016 presidential elections, climate change policies in the United States are taking a radical U-turn, which highlights the political volatility that is a key institutional feature of majoritarian democracies that rely almost entirely on the minimal coalition and

partisan support, rather than a broad societal consensus on climate policy that features very prominently in the European Union and its member states. To establish a relationship between institutional structures and capacities, and climate policy impacts, i.e. emission reductions, it is first vital to establish the link between a certain set of policies and their ability to deliver substantial emission reduction impacts. A review of key policy measures in G20 countries focused on improving the efficiency of the light-duty vehicle (LDV) fleet shows that only a combination of vehicle fuel efficiency standards along with vehicle and fuel taxation delivers significant improvements in the efficiency of the vehicles fleet and in-use efficiency gains (Yang et al. 2017). These national policy level measures are a vital backbone of a comprehensive policy package. When correlating these measures with institutional features of consensus democracies a first indication of a positive relationship between the presence of institutions that enable a stable and consensus oriented policy environment and the presence of key national level policy measures can be derived (Lah 2017b). This is then further substantiated by interviews with policy advisors and practitioners (Figure 2) who confirm that the reliance on particular political parties may deliver swift and more ambitious immediate policy action, which may, however, be overturned after elections as for example the announcement by the new US administration to weaken the vehicle fuel efficiency standards and regulations. The risk of political volatility is also reflected in Figure 2, where only 20% of the respondents consider it feasible that political parties can find common ground on sustainable transport issues and that policies are often implemented in an isolated way. However, relevant authorities at the local and national level are considered more prone to cooperate with counterparts on sustainable transport policy.
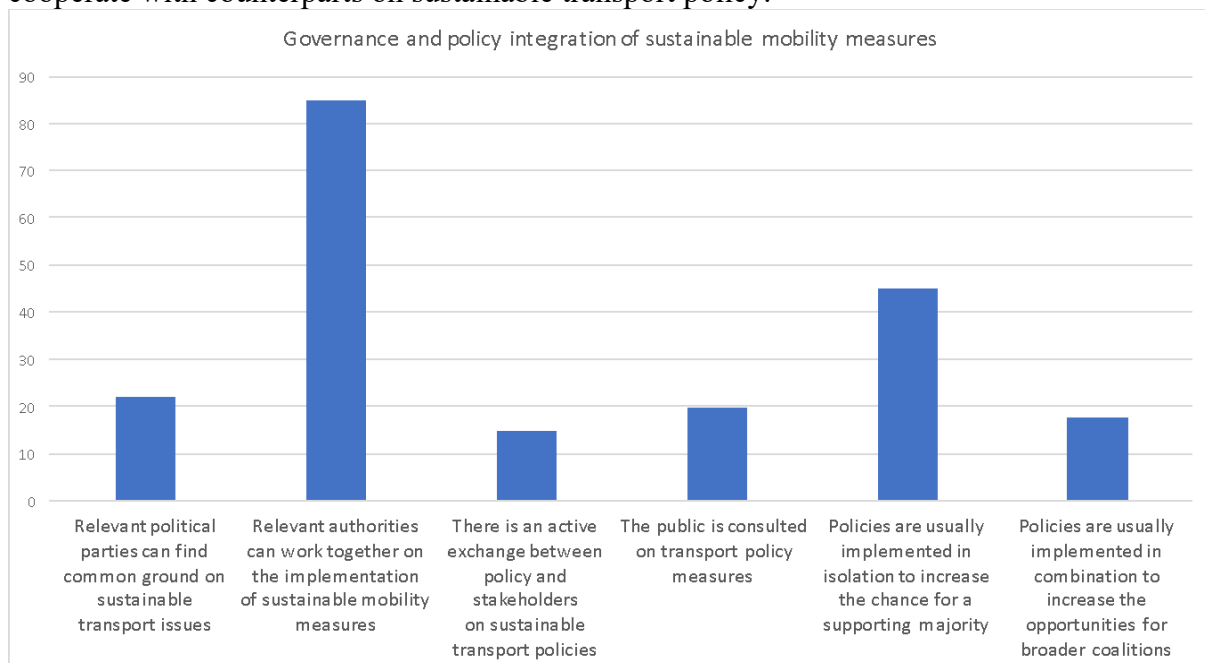

Figure 2 Factors of governance and policy integration affecting the implementation of sustainable mobility measures (Lah 2017)

Institutional structures, policy continuity and implementation are vital aspects to deliver of global climate change goals in line with the Paris Agreement. The decarbonization pathways across sectors are clearly outlined (IPCC 2014) and translated to actions in the transport sector, highlighting the fact that global climate change mitigation targets will not be reached without an appropriate contribution by the transport sector (Fulton et al. 2013, Sims 2014). The climate change mitigation potential of specific measures has been well-established, showing that the technological change to reduce transport sector greenhouse gas emissions is readily available (Figueroa et al. 2014). An integrated policy approach that aims to generate synergies (rather

than trade-offs) between policy objectives can help to maximise socio-economic benefits and can help to form coalitions that endure and are resilient in the face of political volatility (Figure 1).

The analysis presented in the chapters that comprise this book shows clearly that transport is a complex and multifaceted activity and that policy interventions in this sector can have unintended consequences, positive and negative as they rarely only affect one policy objective. For example air quality measures may affect fuel efficiency negatively or biofuels may have land-use change implications. Linking and packaging policies is therefore vital to generate synergies and co-benefits between measures. This can provide a basis for coalitions that can align different veto players' interests. While some analysis on policy integration has been carried out, e.g. Justen et al. 2014; Kelly, May, and Jopson 2008; Givoni 2014, the linkages between policy packaging, co-benefits and coalitions have not been assessed for climate change mitigation strategies in a specific sector yet.

As identified in the chapters developed for this book policy integration is vital to achieve stabilisation pathways that are in line with global climate change mitigation targets and they can also create the basis for coalition building if policy objectives of key stakeholders and veto players are taken into account (Figure 3).
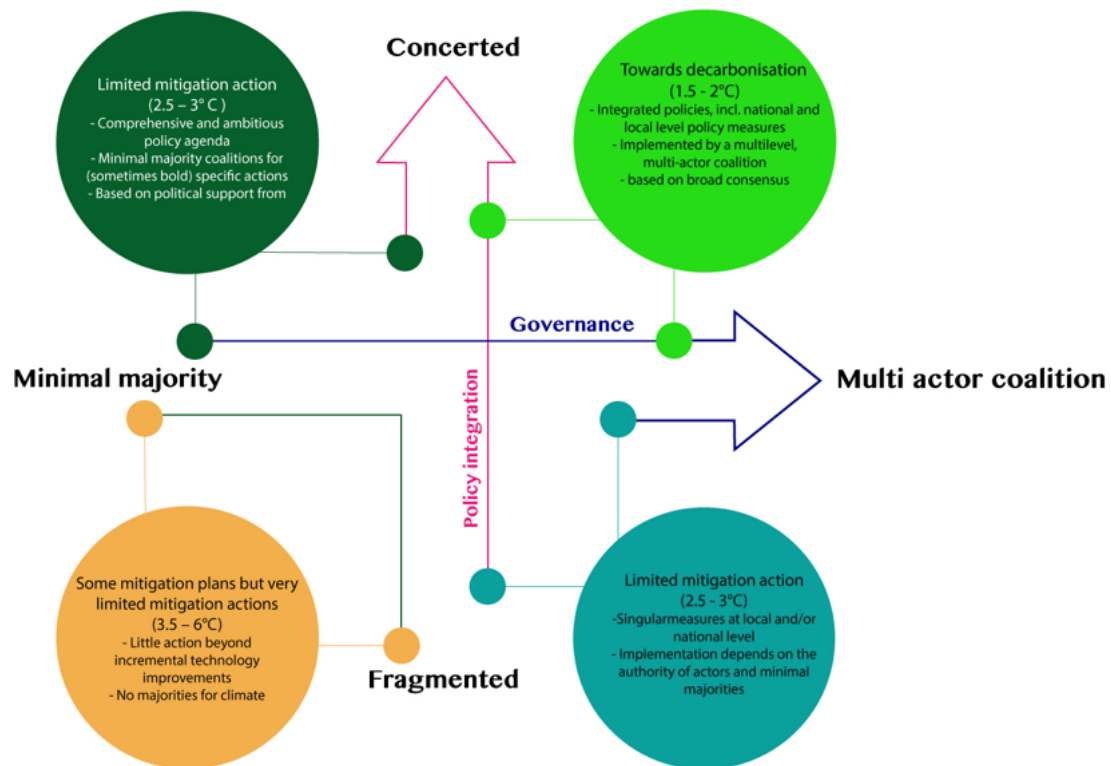

Figure 3 Policy integration and governance framework

This framework helped identifying the main factors that affect the ability and need for policy integration and how this helps or hinders coalition building. The analysis aimed to make a contribution to a better understanding of the institutional context and the role policy integration and political structures play in generating policy outcomes.

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