Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

Austria's 2030 Mobility Master Plan

The new climate action framework for the transport sector:
sustainable – resilient – digital

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Vienna, 2021

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Vision for 2040

It is January 2040, and we have reached our target. The way we live and do business will allow future generations to have a good life in an intact environment without having to depend on coal, oil, natural gas or nuclear power. Austria's transition to a sustainable, climate-neutral, safe, resilient, gender-equal, social and economically viable mobility system by 2040 was a success. We met people's needs for a better quality of life, more climate-consciousness and greater focus on "thinking and acting local". Important services in the mobility system are made available to people and companies but their impact on the climate is limited. International connectivity was maintained and challenges were overcome together – and in line with EU targets.

Doing business locally, developing settlement based around needs, and strengthening city and town centres mean that people generally only need to travel short distances, which can be covered conveniently on foot or by bicycle or in combination with public transport. Limited city space has been reallocated. Better bus and train service and new, flexible mobility options give people a choice of sustainable means of transport in urban and rural areas. Cars – when people do have to use their own or a shared one – run on electricity generated from water, the sun or wind.

Goods and products are made to last and are transported by rail or waterway whenever possible. Road transport is climate-neutral, renewable and energy-saving. Business travellers take the bus or train or travel together by electric car; or, video conferences replace business trips altogether. Attractive and convenient night train service, fast rail links on high-speed routes and intermodal transport have been expanded so that air travel is increasingly replaced by other modes of public transport. And flying is possible without petroleum.

New ideas have strengthened Austrian companies' innovative capacity and have had a lasting impact on the economy. We continuously improve our mobility system and are constantly learning from our past experience for the benefit of the future. We tap into the opportunities of digitalisation for sustainable mobility services. Moreover, we are open to new ideas and alternative pathways to solutions and make room for all things new.

The 2030 Mobility Master Plan laid the foundation for this transformation. Let's set out on this path together to become climate-neutral by 2040!

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1 The 2030 Mobility Master Plan: a milestone on our pathway to meeting Paris targets

Realigning the mobility sector to meet the requirements of the Paris Climate Agreement

Mobility satisfies basic human needs, and goods transport plays a key role in economic progress. At the same time, tackling the climate crisis in the transport sector is especially challenging. We need clear frameworks and dedicated implementation programmes to reverse the trend in carbon emissions. The 2030 Mobility Master Plan therefore identifies ways to avoid, shift and improve traffic and transport and significantly increase the share of eco-mobility in total transport – foot and bicycle traffic, public modes of transport, and shared mobility.

Much has changed since the last strategic planning document for the transport sector, the Austrian Transport Master Plan for 2012, was published. Mainstream society has become more aware of the climate crisis. Even more advancements in digitalisation have been made. The pandemic immediately turned our lives upside down, with no timeline for returning to a pre-COVID normal. Yet our priorities now remain the same as they were back then: Transport must be social, safe, environmentally friendly and efficient.

The federal government's target of becoming climate-neutral by 2040, which is consistent with the science, meets the requirements of the Paris Agreement. However, all stakeholders at the European level and in Austria must act in concert if we are to meet this aim. The European Commission's European Green Deal is an opportunity to make this happen. The EU's ambitious climate targets for 2030 and beyond will provide massive support for Austria's mobility transition.

1.1 Starting with the target: the backcasting approach to the 2030 Mobility Master Plan

Achieving a climate-neutral transport sector by 2040 is the project of the century. The vision for 2040 outlines our ideal future, which serves as the basis for backcasting: planning by starting with our target and working our way back. When we were designing the 2030 Mobility Master Plan, it quickly became clear that we needed a way to connect our vision for 2040 with today's reality. Extrapolating based on past and current trends alone would not be enough to meet the objective of this project of the century: to become climate-neutral by 2040. The necessity of decarbonising the transport sector by 2040 has made it clear that we need more than just forecasts of how transport will develop. We need clear solutions that will ensure that we meet this target.

The starting point for the 2030 Mobility Master Plan is therefore a backcasting model, which is based on a sensible combination of avoiding traffic, shifting traffic and improving the efficiency of each mode of transport. It is backed by a marked increase in the energy-efficiency of the entire transport system within the available carbon budget. We used studies (such as the Transition 2040 project of the Environment Agency Austria, which was commissioned by the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology), expert assessments and plausibility analyses, for example, to specify traffic and transport services, capacity utilisation, final energy consumption and modal split boundaries for the development of transport demand.

We adjusted the three variables of avoiding, shifting and improving to decide on a plausible state for a carbon-free transport system, which we could use as a basis for developing clear measures. The figures provided are intended as indicators of the scope and direction of changes. We identified two crucial limiting factors in the system:

- Rail infrastructure and potential to shift traffic: Infrastructure projects have a long lead time, and the construction capacity that is available each year limits both the speed of implementation and the total volume of projects. There are also environmental limitations, such as land consumption, with equally ambitious targets, such as limiting new impervious surfaces to 2.5 hectares per day. Moreover, there are limitations to the extent that the urban spatial structure can be modified. The ability to shift between modes is likewise not limitless. For example, modal shifts would be difficult in the case of complex sequences of mobility activities in passenger and freight transport.
- Availability of renewable energy: The availability of renewable energy sources will be a key factor in achieving a climate-neutral transport sector. Yet Austria's sustainable and carbon-free production of primary energy is limited (see Section 4.2). The amount of energy that will be available in 2040 is equivalent to roughly one-third of the energy currently consumed by land transport. Despite considerable improvements to efficiency, major efforts are needed to expand renewable sources, in particular between 2030 and 2040. That means that changes are needed in all areas of the transport system: infrastructure, modes of transport, the urban spatial structure, our behaviours and our attitudes.

Yet despite these limitations, shifting more traffic to environmentally friendly modes is still possible and necessary. In addition to a number of transport-related arguments – such as low space requirements in densely populated areas combined with high capacity, travel comfort and convenience, short travel time on long routes, and avoidance of congestion and accidents – energy efficiency is one of the most crucial reasons why we need high-performance public modes of transport. Although road transport will become largely electrified, electrified rail will continue to be one of the most energy-efficient forms of transport, both for passengers and freight.

By nature, the energy efficiency of each mode depends greatly on usage conditions and above all, capacity utilisation. Even so, rail passenger transport on average only needs a little more than half (55 per cent) of the energy per passenger that a battery electric car needs. The difference is even greater with freight transport. One tonne transported by rail requires on average less than one-third of the energy used by a maximum-efficiency electric lorry powered by electricity from overhead lines[1]. This

1 Specific energy-efficiency analysis by SCHIG, based on different usage conditions and capacity utilisation

shows that it still makes sense to shift traffic to rail and public transport and that it is important that we continue to do so.

Backcasting result (1)

We need to reverse the trend away from current growth in passenger and freight transport. Freight transport growth must be decoupled from economic growth. Continuing the historical rates of increase in the volume of traffic and transport cannot be reconciled with climate-neutrality in 2040.

One assumption of our model is that passenger and freight transport both have low potential for growth. If the volume for passenger mobility increases only slightly – with the volume of transport per head declining as the population increases – this would enable moderate growth in freight transport. This requires growth in freight transport to be decoupled from economic growth ("thinking local" and fostering a circular economy), with a trend reversal driven by implementing cost transparency and changing the urban spatial structure, behaviours and digitalisation.

Figure 1 Growth in passenger and freight transport, in per cent

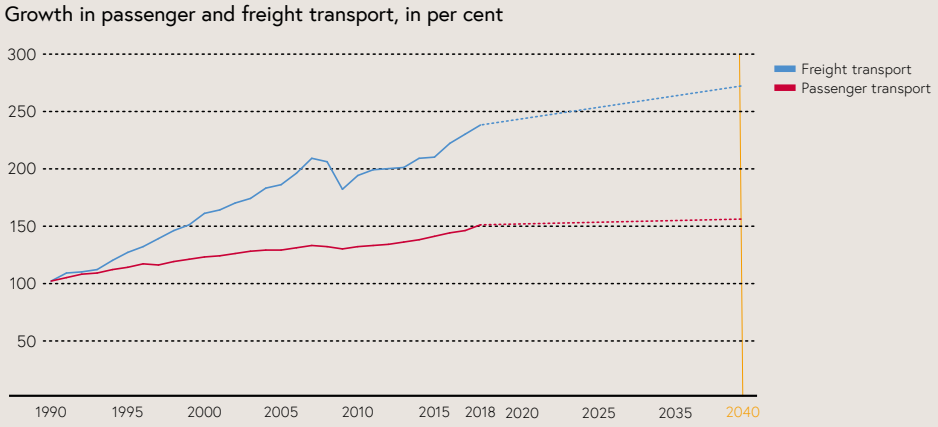


Figure 1 shows that the volume of traffic can increase somewhat in a balanced scenario for passenger and freight transport.

Backcasting result (2)

We must continue to prioritise shifting traffic to rail and public transport and must leverage existing potential to shift traffic. Additional capacity and better-quality services in both passenger and freight transport will enable more traffic to be shifted. We can expect rail services to improve in the coming years as a result of various innovative measures (digitalisation, automation and digital automatic coupling).

New technology and mobility services in passenger transport have great potential to shift traffic from cars to a new form of multimodality with modified mobility behaviour. Active mobility is also not used anywhere near its full potential. Moreover, we need to continue to push for the expansion of all public transport and reverse the trend in private motorised transport.

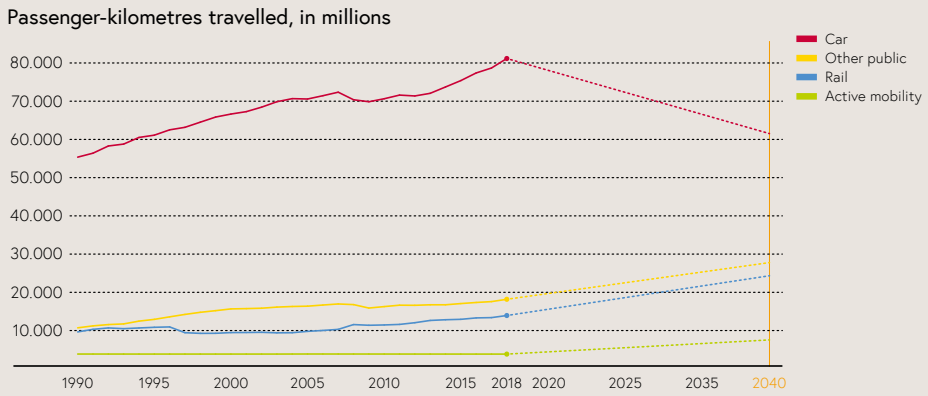


Figure 2 Growth in passenger transport

Figure 2 shows that the volume of car transport for personal mobility must decrease considerably. Together, the remaining eco-mobility modes would be able to close this gap, with the volume of passenger transport increasing slightly. The shift in the share of each of the modes in passenger transport is shown in detail in Table 1.

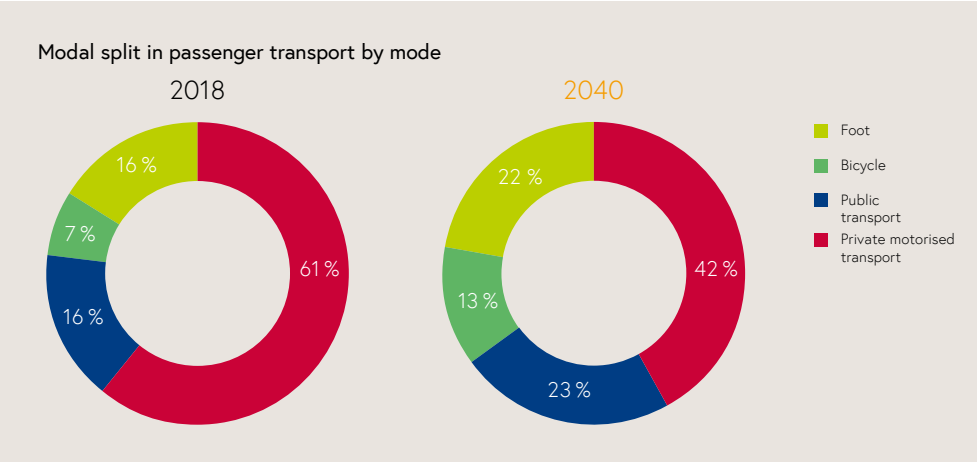
Table 1 Modal split in passenger transport by passenger-kilometres travelled, in per cent

	2018	2040
Private motorised transport	70 %	54 %
Public transport	27 %	40 %
Active mobility	3 %	6 %

Table 2 Modal split in passenger transport by routes, in per cent

	2018	2040
Private motorised transport	61 %	42 %
Public transport	16 %	23 %
Active mobility	23 %	35 %
Thereof bicycle	7 %	13 %
Thereof foot	16 %	22 %

Figure 3 Modal split in passenger transport by mode



In freight transport, it is difficult to shift from road to rail or waterway on short to moderate distances (or only in specific market segments). We expect railbased transport (such as petroleum transport) to decline as a result of the structural transformation of industry and conversion to a sustainable energy system. However, rolling road can also be used efficiently on short distances and is also suitable for small businesses without a change in logistics and without additional investments as a usable alternative to road freight transport. Additional measures to shift traffic on long-distance routes to rail and waterways are possible and needed.

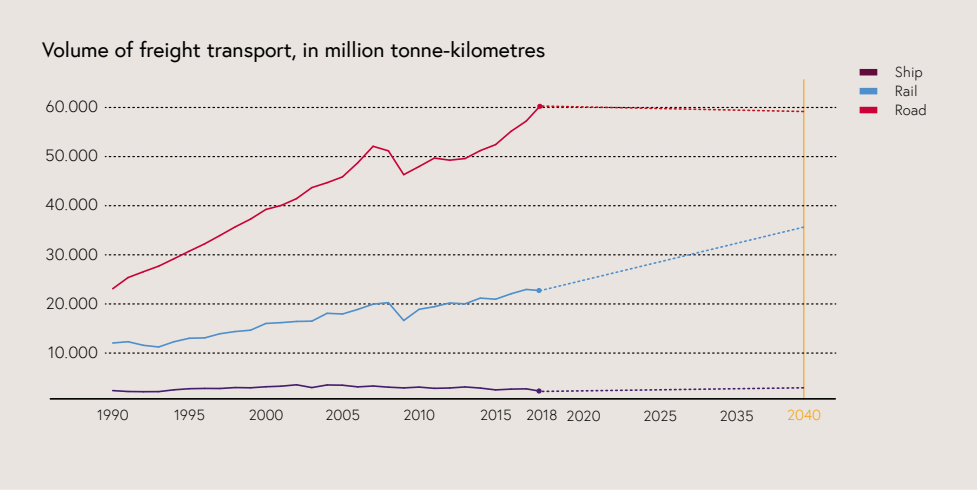


Figure 4 Growth in freight transport

Figure 4 shows a nearly constant volume of freight transport for road and disproportionately high growth for rail. It also shows an increase on waterways. The shift in the share of each of the modes in freight transport is shown in detail in Table 3. In the case of freight transport in particular, it makes a considerable difference whether measures are implemented only in Austria or throughout the EU. The figure assumes measures will be implemented EU-wide.

Table 3 Modal split in freight transport by tonne-kilometres

	2018	2040/2040 EU-ambition
Road	67 %	63 % - 57 %
Rail	31 %	34 % - 40 %
Waterway	2 %	3 %

Rail freight's percentage of the total volume of freight transport is crucial. The higher the volume, the more cargo can be transported (or the more cargo transports are possible) with the same amount of energy. We also have to factor in that cross-border transport accounts for 80 per cent of the volume of transport in Austria. That means that Austria is limited in its ability to make rail freight more attractive. Isolated efforts by Austria alone will enable only a minor increase in rail's share of the modal split. Greatly increasing rail's share of the modal split, for instance to the 40 per cent target set out in the Transport Master Plan for 2012, can happen only if concerted action is taken Europe-wide: by making urgently needed improvements to the efficiency of international rail freight transport and by introducing comprehensive cost transparency for all modes. Even if the volume of freight transport increases at a greater rate overall, the rail system must make sure that it can maintain a 40 per cent share of the modal split. For this to happen, capacity in the rail system needs to be expanded to accommodate this higher volume of transport.

Backcasting result (3)

Technology needs to achieve maximum efficiency, as the amount of renewable energy available is limited. The necessary zero-emission infrastructure must be available in time, and a clear roadmap is needed.

Efficiency also needs to increase within the modes, including rail and waterway transport, and in the entire multimodal transport chain if we are to achieve a sustainable carbon-free transport system. That includes the choice of drive technology, optimal infrastructure, technical advancement and higher capacity utilisation.

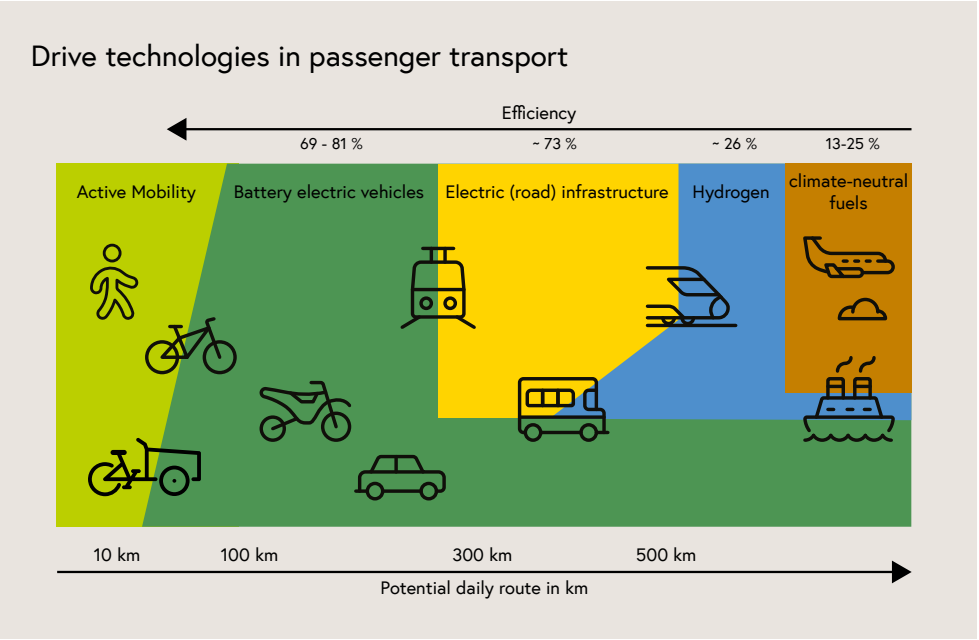


Figure 5 The role of the different drive technologies and their efficiency in passenger transport; source: Environment Agency Austria, 2020; Path2ZeroCarbonTrans; projekte.ffg.at/projekt/3282946

Figure 5 shows that active mobility is the most efficient mode of transport for people when they need to travel short distances. In terms of cars, battery electric systems are the most efficient technology today. In addition to battery electric vehicles, hydrogen is also used to power buses and vehicles on non-electrified rail. Electric road systems – infrastructure for charging systems in the network of major roads and motorways – are especially efficient for long-distance coaches. In barge transport, renewable synthetic fuels are also an option in addition to battery and hydrogen power. These renewable liquid fuels are currently considered the most likely option for climate-neutral aviation, provided the extent of air traffic can be stabilised or reduced in the near term to limit non-carbon emissions, which also have a major impact on the environment.

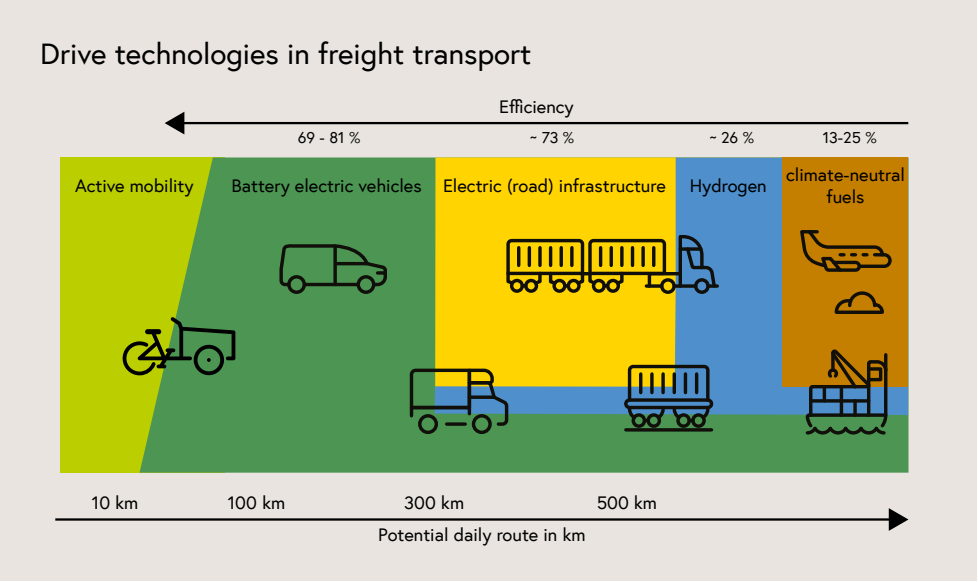


Figure 6 The role of the different drive technologies and their efficiency in freight transport

Figure 6 shows that battery electric vehicles can largely handle freight transport on distances up to roughly 300 kilometres per day. Hydrogen will also play a role for heavy goods vehicles and longer ranges. In terms of transit, with the exception of especially efficient freight transport on electrified rail, there are a number of activities moving toward implementing electric road systems in Europe. Of the zero-emission technologies, overhead lines seem to be the most promising technological option. The best technologies for cargo vessels and aircraft are the same as for passenger transport. With the exception of a few niches where battery and hydrogen can be used, renewable and climate-neutral fuels are the most likely.

Backcasting summary

The 2030 Mobility Master Plan creates the necessary planning certainty for all players to set out on the path toward climate neutrality in 2040 in time. In the interest of this planning certainty, all future projects and investments must be reviewed to ensure they are in line with the Paris Agreement and must be developed and implemented in concert.

1.2 Objectives of the 2030 Mobility Master Plan

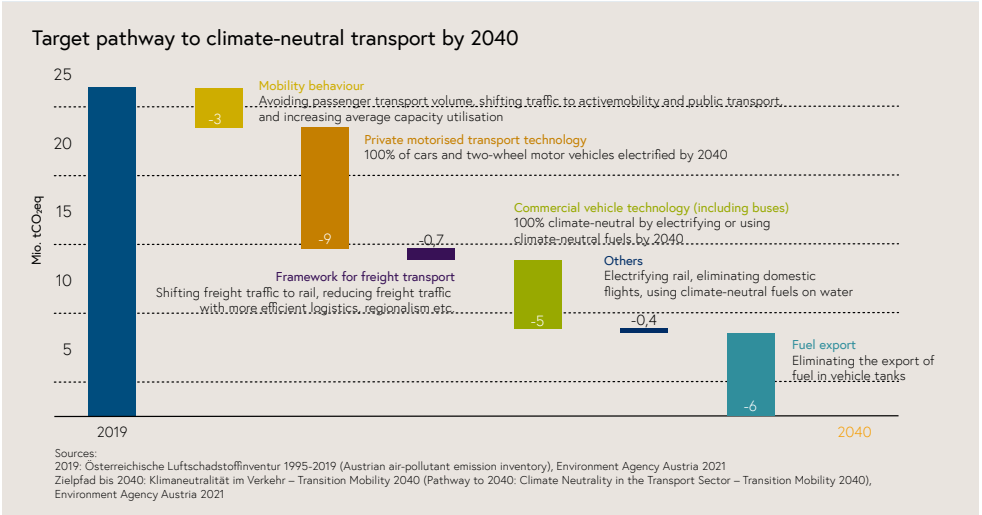
The nationwide climate target for transport is a binding directive for action, and strategic planning for all modes of transport must be guided by it. Carbon emissions from transport must be reduced from around 24 million tCO_2eq (2019 levels)[2] to close to zero tCO_2eq by 2040 in order for Austria to achieve climate neutrality.[3]

If emissions are reduced linearly, we will need a target that is more ambitious than the current sector target of 15.7 million tCO_2eq by 2030, which is set by the #mission2030 climate and energy strategy. This adjusted reduction pathway is laid out in the new climate protection law in conjunction with the higher target of the European Green Deal.[4]

We will succeed in attaining a climate-neutral transport sector with a "traffic transition" (avoiding and shifting traffic) and an "energy transition" in transport (making improvements by phasing out fossil fuels and transitioning to 100 per cent renewable energy in the transport sector). Together, these two transitions make up the "mobility transition" that is needed to achieve our target mobility system by 2040.

In passenger transport, we will reach the target by increasing the expansion of publicly accessible transport for all settlement areas compared with current plans, greatly expanding and rededicating traffic space for bicycle and foot traffic, and making the ambitious switch to zero-emission vehicle technologies..

Figure 8 Target pathway to climate-neutral transport by 2040



2 Environment Agency Austria; THG-Bilanz 2019 (Greenhouse Gas Footprint for 2019); umweltbundesamt.at/news210119 (only in German)

3 The greenhouse gas footprint for non-ETS emissions are not recorded for international aviation or off-road vehicles (tractors, construction machinery, etc.) in the transport sector. Nevertheless, these areas are discussed in the 2030 Mobility Master Plan and are geared toward the aim of becoming climate-neutral by 2040.

4 Pending the target pathway per the Climate Protection Act (Klimaschutzgesetz)

In freight transport, we will reach the target by increasing cost transparency for the different modes (to enable road and rail to truly be compared, for example), which would in turn increase efficiency in transport chains, and by strengthening the focus on regionalism. In addition, measures to combat "tank tourism" are included. Taxes on petroleum products in Austria are consistently lower than rates in neighbouring countries, resulting in a relevant share of fuel, for the most part diesel, sold in Austria being consumed outside the country (fuel being exported in tanks). The result is that specific national measures do not have an impact[5]. The coming decade will be crucial for the switch to climate-neutral technology in freight transport, as the related infrastructure decisions will need to be made by 2030, with decisions for transit routes needing to be made in consultation with our European partners. Rail freight transport as well as inland waterway transport have clear advantages in terms of energy efficiency even as road transport decarbonises. They need to be made more attractive and reliable for the market to embrace these advantages.

1.3 The contribution of research, innovation and digitalisation

Research, innovation and digitalisation help to mobilise and consolidate new forces for the process of change that is needed. Austrian companies are increasing their innovative capacity for a climate-neutral mobility sector. New options for taking action are becoming available to decision-makers at the provincial, city and municipal level. Citizens are being mobilised and empowered to actively help shape the transformation. All of this makes research, innovation and digitalisation essential cornerstones for the mobility transition's success. Research, innovation and digitalisation will be discussed separately in the main Avoiding, Shifting and Improving sections.

Promoting research, technology and innovation (RTI) will result in new solutions for reaching climate-neutrality by 2040. Thanks to its diversity, RTI will open up new pathways to solutions for environmentally friendly and affordable mobility in cities and rural areas. Moreover, it will create space for new, unconventional and radical ideas, approaches and solutions. RTI will provide the foundation, tools and expertise to better implement mobility-related strategies and measures based on actual impact and in consideration of potential secondary effects in the overall system. Procurement that is focused on innovation will make it possible for new mobility solutions to be implemented in the public sector and make an impact.

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5 Carbon equivalents (CO2eq) are used as the metric for transport based on refuelling volume in Austria. Austria's climate target for the transport sector is derived from this metric – in other words, it is a higher level that can we can do something about immediately. A separate objective for adjusting for this effect is therefore needed.

Digitalisation will lay the groundwork for our concept of the mobility system and its flows, and for this reason it is a key component of environmentally friendly and forward-looking mobility. Digitalisation comprises multimodal, connected, cooperative and automated mobility; software, hardware and data management; digital infrastructures; and digital connection of sectors and areas of life.

One of the results of digitalisation is that data can be generated and made available for planning and decision-making in policy-making, planning, the economy and research through better information and management in terms of transport use, mobility behaviour and new mobility services. Digitalisation and automation need to bring rail in particular into the 21st century.

Beyond that, the basis for making decisions needs to be established in line with objectives, which would improve the ability to take action based on evidence. Clearly specifying data requirements to address specific targets will be crucial, and this should be the basis for data-driven governance.

The sector needs to do a better job of putting the findings and information learned from RTI initiatives and projects to use in practice. For that to happen, there needs to be a clear link to the effectiveness of measures that are adopted, and a framework needs to be created to ensure that learning and experimenting happens quickly and that results can be scaled and adapted to regional requirements..

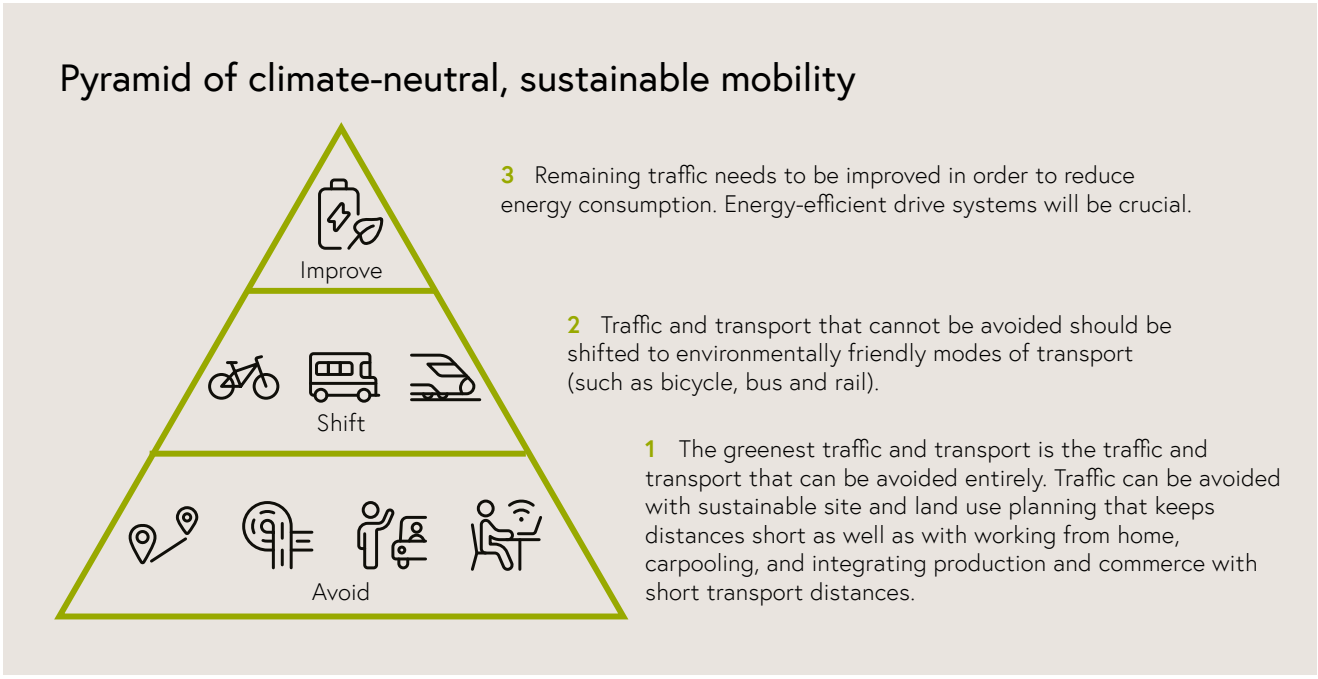


Figure 9 Pyramid of climate-neutral, sustainable mobility

Guiding principles of climate-neutral, sustainable mobility: sufficiency – consistency – efficiency

The principle of sufficiency addresses necessary changes in behaviour (mobility demand) for the purposes of avoiding traffic. The strategy of consistency promotes the use of renewable energy in the transport system. The principle of efficiency means achieving the same target with less energy, space, transport capacity, and other resources and by integrating production and commerce at the regional level to enable short transport distances.

The first principle is part of avoiding traffic, while the other two principles address technological measures (mobility services, vehicles and infrastructure) that would help shift and improve traffic and transport. The greatest possible impact can be achieved and secondary effects in the overall system, such as rebound effects, can be minimised only if these three strategies are implemented together (avoiding, shifting and improving).

2
Avoiding without sacrificing!

Transitioning to less traffic, more regionalism and better quality of life

2.1 Targets

Over the last two decades, the volume of transport in the form of passenger-kilometres required to cover mobility needs has increased by more than 30 per cent, while the volume of freight transport has increased by over 70 per cent. To maintain similar levels in the next 20 years, we will need to pursue the following targets.

Passenger transport

- The volume of passenger transport must be kept nearly constant. Due to population growth, this would mean a slight reduction in the volume of transport per person per day from 35.4 kilometres currently to roughly 33.2 kilometres.

Freight transport

- Economic growth must be decoupled from the volume of freight transport. With the economy expected to grow 40 per cent by 2040, the aim is for the volume of freight transport to increase only moderately, by no more than 10 per cent.

2.2 Passenger transport

Mobility is highly influenced by the urban spatial structure. The distribution of places where people spend time and the transport infrastructure determine the distances people have to travel and their choice of transport mode, which determines the volume of transport needed to cover distances travelled (by motorised modes of transport). By the same token, mobility needs also affect the urban spatial structure. Modern, resource-saving land-use planning will transform structures over the long term, reducing transport demand. Experience has shown that structural transformations take a very long time. That's why climate-friendly land-use planning and transport regulations that create urban settlement structures that avoid transport are so important now to prevent urban sprawl from continuing to constrain mobility, which would limit our future ability to avoid transport and shift transport to active mobility and public transport.

There is more urban sprawl in Austria than in other countries, which is also proof that the existing legal situation with government and regulatory expertise in land-use planning is not an appropriate tool. That is why we would welcome giving the federal government the right to participate so that we could make a coordinated and targeted impact on settlement development. Land-use planning can be supplemented with fiscal control measures by the federal government, such as charges for developing areas not connected to the public transport network, or by tying federal contributions to infrastructure projects that meet land-use objectives, such as those set out in the Austrian Spatial Development Concept (ÖROK) for 2030.

Federal policy is therefore backing a new climate partnership with the provinces, cities and municipalities. These regional administrative units will participate financially

in measures, such as investments in rail service with a primarily regional benefit, active mobility, park & ride options and noise control. In future, the federal government can link support to specific suitability criteria. One example of this could be land-use and mobility management to use a province's or municipality's mechanisms to help meet climate targets. Or the federal government could tie mobility funding for provincial or municipal projects to a climate partnership.

Regions, cities and municipalities have the ability to use sustainable provincial, regional, city and transport planning to create an important framework for environmentally responsible mobility that avoids transport by doing the following activities, among others:

- Creating "cities" with short travel distances ("15 minute cities")
- Reallocating public space
- Making town centres and public space more attractive
- Using forward-looking forms of traffic calming (such as superblocks)
- Managing parking region-wide
- Banning or restricting entry to certain areas or implementing entry requirements
- Implementing measures to adapt to climate change (such as more green spaces, removing impervious surfaces, shaded pavements and arcades)
- Replacing monomodal requirements to create parking spaces by implementing multimodal climate-friendly mobility management
- Consistently implementing sustainable urban mobility and logistics plans (SUMP/SULP)

Measures to avoid motorised transport will lead to more active mobility and shorter distances and reduce the pressure to use cars. The needs of pedestrians and cyclists must be integrated into land-use, development and settlement planning by the provinces, cities and municipalities. Virtual mobility and digitalisation can also be used to limit travel.

Working from home has the potential to reduce commuter traffic

We learned from the COVID-19 pandemic that more work can be done from home than we used to think was possible, thanks to digitalisation. Working from home instead of at traditional workplaces has the potential to reduce emissions from passenger transport and be part of a sustainable transport transition because of the commutes saved. But not all professions allow working from home. We need socially acceptable solutions for employees and high-performance digital infrastructure for nationwide implementation.

With current work processes and structures, roughly one-fourth of all employed people in Austria could theoretically work from home. If 40 per cent of these employed people actually worked from home, we could save some 300,000 tCO2eq a year in the near term, with additional potential as working environments become increasingly digitalised and automated. This is equivalent to approximately 1.4 per cent of greenhouse gas emissions caused by traffic.

Avoiding commutes or shifting the time of day when people commute to work would reduce traffic peaks and enable optimised capacity utilisation of transport services. The capacity that is gained would then need to be reorganised, and undesirable secondary effects (such as rebound effects relating to urban sprawl and mobility for leisure purposes) would need to be avoided to prevent more traffic at other times.[6] Distances travelled to take care of daily necessities combined with commutes need to be taken into account.

In addition, we will need to scrutinise routines and habits in transport behaviour to a greater extent than before if mobility is to be climate-neutral. There is major potential in efficiently using video conferencing, which can replace business travel to a large extent (in particular air travel).

2.3 Freight transport

By 2040, freight transport will be climate-neutral, sustainable and crisis-proof as one of the main pillars of a modern, specialised and inclusive domestic economy. This will ensure a high quality of life and quality of supply for people. Successful economies need an attractive logistics location and help fulfil climate and environmental policy objectives. Freight mobility will rely on renewable energy, and for the last mile of city logistics in particular, on muscle power in addition to electrified drive systems. Zero-emission (electrified) vehicles are already used in construction logistics and are poised to become mainstream. Coordinated measures on European and national level (such as emissions pricing) and a focus on European value chains and efficient goods exchange within Europe have shifted flows of goods to the regions, reducing transport distances. Legislators must communicate legal frameworks and visions for roles, responsibilities and freight transport's share of total mobility transport early on and transparently. Innovative production concepts (3D printing, bionic manufacturing, etc.), smaller and standardised volume goods, more durable products, and a well established repair and recycling economy will reduce the volume of transport overall. Due to its advantages in terms of energy efficiency, rail freight transport must continue to play an important role – and must play an even greater role in the future – to enable moderate overall growth in freight transport. For this to happen, attractive and easy-to-plan services need to be created, including for international rail freight transport. Continued expansion of the infrastructure and extensive European collaboration will make this possible.

6 Environment Agency Austria; mipra; 2020; PoviMob; projekte.ffg.at/projekt/3300239

2.4 Research, innovation and digitalisation

Promoting traffic-reducing and digital approaches to solutions for climate protection in the transport sector.

Research and innovation

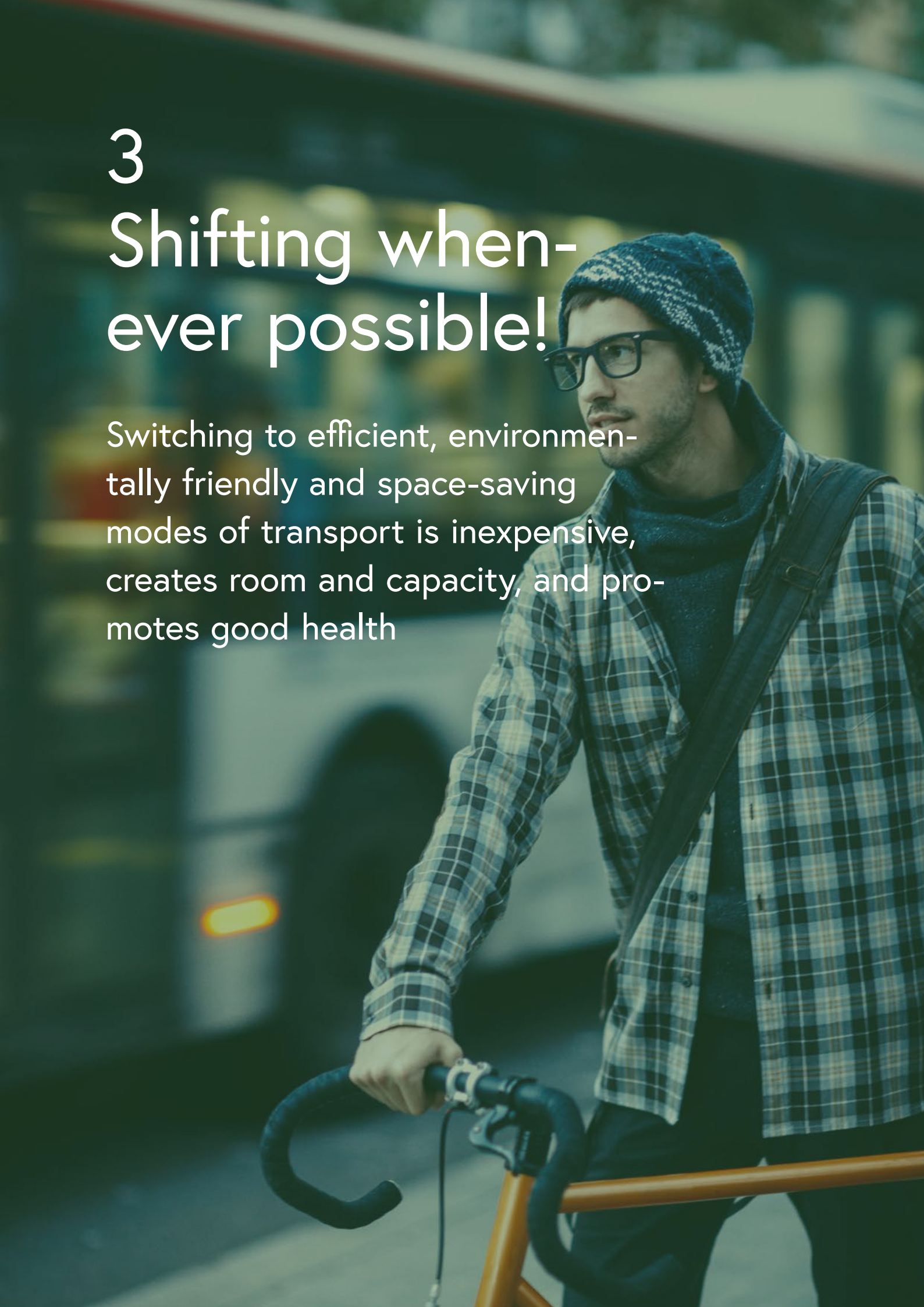
Research and innovation to avoid travel and reduce the volume of traffic and transport must focus on developing foundations, technologies, tools and concepts. Solutions must account for climate protection, social responsibility, public services and the economic future of locations. The supply of products and services for daily necessities, production and distribution opportunities, participation in economic cultural life, and inclusion must also be accounted for:

- Traffic-reducing urban spatial structures to secure quality of life and location quality
- Mechanisms and practices to reduce the volume of traffic and transport (sufficient mobility and consumption patterns)
- Acceptance and use of the full new potential of virtual mobility

Digitalisation

Digitalisation helps to avoid travel by decoupling economic growth from the volume of traffic and transport because organisation and management of passenger and freight transport are energy efficient, and because substitute technologies are used. It promotes sector integration with data and services that are connected in smart ways, making it a driver of social and technological change:

- Providing high-performance digital infrastructure empowers people, companies and public administration to promote measures to avoid traffic and transport.
- Digital technologies are part of extensive digital and social approaches to solutions to identify and counteract undesirable effects, while still complying with data protection requirements.
- Digitalisation aims to improve accessibility to climate-friendly mobility for all users and at a lower overall cost.



3 Shifting whenever possible!

Switching to efficient, environmentally friendly and space-saving modes of transport is inexpensive, creates room and capacity, and promotes good health

3.1 Targets

All potential needs to be leveraged to shift traffic to energy-efficient eco-mobility, such as electrified rail and active mobility. We will pursue the following targets by improving infrastructure, improving the quality of services offered and creating the right frameworks:

Passenger transport

- The share of the volume of transport accounted for by eco-mobility must increase by around half, from 30 per cent to 47 per cent.
- Currently some 60 per cent of distances are travelled by car. This ratio essentially needs to be reversed, and 60 per cent of distances need to be travelled using eco-mobility.
- Cycling's share of distances travelled must double to 13 per cent by 2030.
- Private motorised transport's share needs to drop to 42 per cent, with shared mobility and micro-mobility expanded on a large scale.

Freight transport

- Rail's share of the modal split must be increased to 40 per cent (equivalent to some 35 billion tonne-kilometres) with the right European collaboration.
- Austria alone can achieve only a moderate increase (34 per cent).

3.2 Passenger transport

The availability of renewable energy and raw materials for energy storage means that climate-neutral passenger transport is limited and must therefore be made more efficient. Mobility using public transport, vehicle sharing systems and taxis is more efficient and saves more resources. This publicly accessible transport must therefore be bolstered with extensive microtransit and new types of carsharing systems in a way that creates a nationwide mobility system that is publicly accessible in the sense of affordable, safe and accessible to people with disabilities (mobility guarantee) in urban, suburban and rural areas. This would make comprehensive mobility available without the need to own a car or with the addition of an inexpensive and energy-efficient electric vehicle adapted to needs.

Strategic planning across modes

Shifting has to start with infrastructure planning. The aim is to strengthen energy-efficient modes by shifting resources and space away from private motorised transport to active mobility and public transport. The much lower volume of road transport – the percentage of road transport must be reduced by nearly one-fourth by 2040 according to our backcast – will make room for fast bicycle lanes and lanes for public transport. In

addition, we need to transform parking spaces into pavements and public places where people can spend time.

Moreover, projects to build and expand major roads and motorways to increase capacity and the creation of additional garage capacity need to be made consistent with climate criteria. The focus must be on publicly accessible transport services and supplying renewable energy to the transport system. Reducing speeds would cut energy consumption, with the desired secondary effects of making traffic safer and reducing noise emissions.

The federal government's strategic plans for federal infrastructure (rail network and ASFINAG network), which are coordinated with each other, will enable us to reach these aims and achieve the best possible multimodality. Austria's traffic forecast for 2040 (VPÖ 2040) builds on the considerations we used in our backcast to develop a climate-neutral scenario as the foundation for plans for road and rail. Electrification strategies, for road as well as rail, are a crucial planning topic.

Planning needs to span not only modes but also regional administrative units. Municipalities and provinces have access to essential infrastructure planning factors for climate-neutral mobility – for example, the infrastructure for active mobility but also integration of public transport hubs into local and regional networks. This will require new partnerships.

Public transport

The federal government's transport policy aims to strengthen public transport with clear objectives for transport services, infrastructure and fare systems.

Traffic services offered

The success factors for using public transport, in addition to the convenience factor, are primarily short total travel times thanks to easy access to the public transport system, high service frequency, optimised connections and speed. The federal government and provinces must work together to use contracts for transport service to expand transport services in connection with the expansion of infrastructure.

Better cross-border collaboration on planning, organisation and financing must make it possible to introduce new and convenient night and long-distance trains. In the medium and long term, integrated planning of infrastructure and closely coordinated and connected transport services must happen at the European level as well. Attractive night and high-speed rail connections will make many European flights unnecessary.

In the short term, service needs to be more frequent, operating hours need to be extended and routing needs to be optimised using the existing infrastructure and public transport fleet. More space on roads for bus lanes or separate tram tracks will prevent private transport from disrupting public transport. New express bus lines will supplement rail transport and help relieve some of the pressure on it.

In addition, the range of flexible, unscheduled mobility solutions, such as on-demand transport and convenient hire systems for bicycles and electric vehicles, must

be greatly increased where they are needed. The federal government must assume its responsibility in this area and ensure that the operator-friendly and user-friendly legal and organisational framework is in place to help these flexible services quickly achieve a breakthrough. The combination of publicly accessible modes of transport will result in a nationwide mobility guarantee: a wide range of journey options throughout Austria at attractive prices and with a limited time investment.

Infrastructure

A well developed infrastructure serves as the basis of our transport network. Compared with other countries in Europe, Austria has an especially dense, high-performance and modern rail network, which is the backbone of public transport. The rail network needs to be expanded, focusing on the following areas, to make it possible for us to make the improvements in services we are aiming for.

Regular interval timetable and travel times: shortening travel times by incorporating Austria's rail network into Europe's high-speed network and expanding non-road-based local transport (S-Bahn commuter rail, metro and regional rail) and improving the regular integrated timetable (examples include expanding the routes in the TEN-T network and selected acceleration measures to reach hubs in the regular interval timetable).

Measures to increase capacity: enabling more frequent connections and longer trains based on expected demand, especially in metropolitan areas and long-distance transport, and improving the compatibility of local, regional, long-distance and freight transport (examples include expanding routes to two tracks, or in selected areas multiple tracks, increasing capacity at rail nodes and additional interchange stations, and freight train passing loops in compliance with TEN-T standards).

Fare system

The connection between annual fixed costs and the cost of an individual journey on different modes is an important factor for users. The federal government's transport policy therefore aims to enable an integrated range of public transport services to be offered at an attractive base price. In the future, fixed costs for mobility should consist primarily of the annual public transport pass at a competitive price. Introduction of the Climate Ticket will provide an attractive and affordable option for making public transport easily accessible throughout Austria.

Shared mobility

Not all regions can easily be covered with traditional public transport services. To create a range of efficient publicly accessible mobility services, traditional public transport, microtransit and sharing services for cars, bicycles, cargo bikes, scooters and ride sharing need integrated planning and funding. An Austria-wide shared mobility strategy is being developed for these flexible transport services. The strategy is based on collaboration among the federal government, provinces, regions, and municipalities and regular dialogues with public and private providers and other relevant stakeholders.

Evidence-based planning by ascertaining regional needs with municipalities and regions and using planning tools such as quality categories for public transport will help ensure optimal design of mobility services. Experimentation clauses and allowing flexibility for experimentation will provide secure legal and funding frameworks and will make it possible to try out new ideas and solutions. This will allow innovative new mobility services (such as vehicles, forms of organisation, drive concepts and traffic patterns) to be tested and improved in a real environment.

Most of all, providers of new mobility services (in particular microtransit and carsharing services operated in the public interest) need legal certainty. Defining services in legislation (in particular carsharing) and introducing a consistent nationwide identification system will make it possible to make parking spaces available (in public places) for new services. Basic quality standards need to be specified at the federal level and used as criteria for integrating services into information and fare systems. This would ensure that new services are compatible with existing objectives (such as decarbonisation).

Integrating new services into routing and ticketing will make it possible to use a single ticket with multiple transport providers – from microtransit to long-distance rail transport. New services first need to be included in the traditional service system and fare system of transport operators and transport associations as well as in existing and future sales platforms.

Mobility data lays the foundation for digitalising services. Different mobility services currently use different systems. Data format specifications, mandatory provision of data and open interfaces are needed so that new services can be integrated into the technology. Integration of new services can be managed using a public mobility data management system. Data collected on a regular basis, including KPIs that are agreed throughout Europe, will make it possible to illustrate developments and evaluate measures.

Multimodal mobility nodes will act as hubs in cities, suburbs and rural areas. They will offer better transfer quality, better passenger information systems, parking spaces for sharing services and other new mobility services (such as electric taxis and microtransit), charging options for electric vehicles and collection terminals for online orders. Existing park & ride spaces and adjacent areas would lend themselves to this purpose if they had the right commuting area, visibility and scalability.

Station-based sharing services should be matched as best as possible to the needs of the area (such as residential, work, tourism, or shopping and other necessities). Successful concepts should be rolled out in cities and metropolitan areas Austria-wide, and a strategy to develop rural mobility nodes should be developed.

Places of residence, as an origin and destination, are important nodes for mobility. Building codes and parking regulations in many places mandate the creation of many parking spaces for cars. The money builders have to invest in this parking should go toward sustainable forms of mobility instead. For that to happen, the existing legal framework and new business models in residential construction need to change. Flexible re-use concepts for empty garages and parking spaces for existing buildings should be

promoted with changes to building codes and Austria's Residential Property Ownership Act (Wohnungseigentumsgesetz).

Providing support for ridesharing (raising the compensation permitted and integrating ridesharing into information systems) is an especially important tool in working environments to increase capacity utilisation.

Active mobility

Active mobility is the most energy-efficient, climate-friendly, resource-saving, healthy and safe way to get around, making it the most sustainable form of mobility there is. Increasing the share of active mobility – the goal is to more than double the share of active mobility by 2040 – will make the overall transport system safer. Active mobility has minimum space requirements, is socially inclusive and stimulates the economy.

Mobility surveys currently in use systematically underestimate the share of active mobility because they only include walking and cycling on their own, not when combined with other modes. Distances to, from or between modes that are covered on foot or bicycle are counted towards car or public transport instead of counted as walking or cycling. Surveys therefore need to be reformed to include legs separately so that they more realistically reflect cycling and walking habits.

Active forms of mobility are how people get to public transport and are the mode of choice for short distances in cities and municipalities. Walking and cycling give you more flexibility and often get you to your destination more quickly than driving. Some 40 per cent of car journeys are less than five kilometres long, making them within bicycling distance; some seven per cent of journeys are shorter than one kilometre, making them within walking distance. Electric bikes expand this radius and have the potential to shift traffic up to distances of 10 kilometres, or 61 per cent of car journeys.

Austria needs a nationwide campaign for active mobility. Current initiatives in Austria's walking and cycling master plans need to be expanded, and successful support programmes and initiatives, such as klimaaktiv mobil, need to be continued. A broad-scale investment campaign at the federal, provincial and municipal levels will serve as a coordinated mechanism for promoting the expansion of cycling and walking infrastructure throughout Austria and for encouraging active mobility.

At the federal level efforts to facilitate urban and regional bicycle infrastructure and fast bicycle links, promotion of walking and promotion of mobility management for active mobility are being kept at high levels as part of klimaaktiv mobil. The investment needed in cycling between now and 2030 will be calculated with the provinces based on an Austria-wide target network for the cycling infrastructure. Legal frameworks, such as traffic regulations (Straßenverkehrsordnung, "StVO") and requirements for traffic organisation, planning and infrastructure will be redesigned to be cyclist and pedestrian-friendly. Reorganising public space to the benefit of active mobility with extensive traffic calming; speed limit reductions down to 30 kilometres per hour in towns and cities; expansion of car-free zones, living streets and pedestrian zones; and attractive cycling

and walking networks will make residential areas and communities more attractive and will strengthen local amenities.

Public transport and microtransit need to be easily reached by bicycle or on foot. Bicycle hire systems and options for bringing bicycles on board (where possible) will be expanded. Continuing to promote electric bikes and electric cargo bikes will create additional potential for public transport. Wide-scale awareness-raising efforts will teach people about the advantages of active mobility and motivate them to cycle and walk. Training and further education will create new professions and jobs in teaching cycling and bicycle technology as well as local and regional officials responsible for cycling and walking-related matters.

In addition, measures are needed to give active mobility the same opportunities as other modes. Measures include internalising external costs according to the polluter-pays principle, cutting back subsidies that are harmful to the environment, reallocating public space and matching travel speeds, particularly in urban areas. In addition to the benefits to the climate, the health benefits of active mobility, as a contributing factor to health promotion, need to be accounted for to a greater extent by funding and infrastructure programmes, land use and the health sector. Hardwiring the promotion of active mobility in land-use, traffic and urban planning is essential, in particular in the design and allocation of public space, and by using the planning principle of short distances and mixed use.

Active mobility will require the federal government to partner with provinces, cities and municipalities; with the health-care sector, climate and environmental policy-makers, land-use and settlement planners; and with companies and members of civil society, such as NGOs and associations.

Mobility in the tourism and leisure industry

People are increasingly choosing to holiday in Austria or nearby countries, and there is a growing trend toward regionalism and environmentally friendly travel[7]. This means that more sustainable mobility services are being used even when people are on holiday. This behaviour must be encouraged in the interest of sustainable tourism.

Austria needs to further increase bicycle tourism by expanding its bicycle infrastructure and creating attractive options for taking bicycles on transport and for hiring bicycles and electric bicycles. We need to broaden the focus of public transport on commuters and pupils to a full-fledged, nationwide and year-round mobility system for tourism, excursions and leisure.

We will create attractive, climate-friendly mobility services for the first and last mile and mobility at destinations and in the regions that are available to guests and locals alike. Tourist offers that include mobility services and are tied together using methods

7 The 2030 Mobility Master Plan was written during a pandemic. The deliberate restriction of personal mobility associated with the pandemic affects the tourism and leisure industry in particular.

such as indirect funding models (tourism levies, surcharges on overnight stays or tourist cards) will make sustainable mobility solutions more visible to guests and locals.

Another aim is to make sure that holiday and excursion destinations and sights can be reached easily by train, by bus, using flexible mobility services and by bicycle and on foot. These offerings must be included in national and regional tourism advertising, advertising by individual businesses and organisers, and timetable and transport information systems.

The goal is to implement tourism mobility management for all tourism businesses and holiday regions in Austria.

3.3 Freight transport

Rail freight transport and waterways are core components of a sustainable Austrian and European freight transport system due to their inherent advantages: mass transport capacity, environmental sustainability, safety, energy efficiency and resilience. In addition to punctuality, reliability and planning capacity, the speed of rail freight needs to continue to increase, primarily in international rail freight transport. Coupled with economic and energy efficiency, we want rail and inland navigation to become primary components of climate-neutral supply chains by 2040.

Solutions include single wagonload transport, which in Austria is handled primarily using sidings, unaccompanied combined transport, accompanied transport as rolling road, roll-on roll-off, block train transport (traditional point-to-point connections) and inland navigation by individual operators or transport associations. New forms of organising transport with small-scale transshipment options and transport containers are needed for the first and last mile at the regional and urban level.

We also need better frameworks for cost efficiency, logistics chains and volume flexibility in terms of cargo volume, punctuality, adherence to delivery dates and reliability. Shifting traffic to waterways needs reliable and internationally harmonised infrastructure development (such as Good Navigation Status).

Digitalising modes of transport and their interfaces should make transport capacity and multimodal supply chains more efficient. Technologies will be developed that will be consistent nationwide and internationally to facilitate access to, handling in and use of the rail and waterway systems (booking and use platforms).

Concepts for urban freight transport tailored to the regions need to be developed and implemented together with the participation of the parties responsible in the areas of loading and receiving, logistics, transport and municipalities. Clear legal frameworks will enable regional administrative units to manage urban freight transport. Clear legal frameworks are also needed for instruments such as entry restrictions so that regional and local road freight transport can be carried out entirely using zero-emission vehicles, which can load and unload cargo in the optimally located areas and microhubs they need without disruption.

However, if we are to maximise efficiency in rail freight transport, we need supranational and Europe-wide efforts. We need a joint European railway area instead of national regulations only. Digitalisation and automation of rail freight transport at the European level will also be crucial so that rail freight transport is able to take on its future role in a climate-neutral transport system.

The 2030 Mobility Master Plan will be fleshed out for freight transport by the government's master plan for freight transport. This master plan will create the strategic framework for developing and designing rail freight transport in the coming years based on the main cornerstones of the 2030 Mobility Master Plan.

3.4 Research, innovation and digitalisation

Creating new momentum for shifting to energy-efficient modes with innovative and digital solutions.

Research and innovation

Research and innovation to shift passenger and freight transport to energy-efficient and resource-efficient modes or to post-fossil and active forms of mobility will focus on developing foundations, technologies, tools and concepts. New solutions will enable integrated, accessible and affordable mobility services with end-to-end mobility chains and a variety of mobility options for urban and rural areas without requiring people to be dependent on their own car. Innovative logistics concepts will facilitate climate-neutral forms of freight transport and help create climate-neutral logistics chains:

- Improving the attractiveness of energy-efficient and resource-efficient mobility and transport alternatives as well as creating integrated mobility services for different contexts (living, working, tourism, etc.)
- Increasing infrastructure and vehicle capacity
- Managing demand for people and freight

Digitalisation

Digitalisation is not about digitalisation for its own sake or about only improving efficiency and performance and increasing services. Ultimately, the aim is also for digitalisation to help reduce resource consumption and greenhouse gas emissions. Connecting data and services will lay the foundation for shifting freight transport to resource-saving modes across modes and operators and will make it possible to evaluate and prove the carbon-reducing impact of measures that are introduced:

- Providing non-discriminatory access to precise, standardised and reliable data for all mobility and transport services according to set criteria

- Providing analysis tools for evidence-based management and shifting of traffic flows, monitoring impact using environmental indicators, and creating transparency for citizens surrounding measures and interrelationships
- Involving active mobility and new mobility services in Austria-wide information services and integrating customer-friendly booking and payment services
- Translating potential that has already been identified and small-scale multimodal solutions into scalable and transformable concepts

4 Improving the system and making it efficient!

The transition to renewable energy in the transport sector is an essential component of reaching climate-neutrality by 2040

4.1 Targets

Existing vehicles need to be retrofitted with zero-emission drive systems in time for us to achieve climate neutrality in 2040. This will mean the following new zero-emission registration targets for road transport:

Passenger transport: road

- 100 per cent of all new car and two-wheel registrations will be zero-emission beginning no later than 2030. If CO_2 emission standards can consistently be tightened even further at the European level, this could happen sooner.
- 100 per cent of all new bus registrations will be zero-emission in 2032.

Freight transport: road

- 100 per cent of all new light commercial vehicle registrations will be zero-emission no later than 2030. If CO_2 emission standards can consistently be tightened even further at the European level, this could happen sooner.
- 100 per cent of all new heavy goods vehicle registrations (vehicles under 18 tonnes) will be zero-emission in 2030.
- 100 per cent of all new heavy goods vehicle registrations (vehicles over 18 tonnes) will be zero-emission in 2035.

The vehicle rampup and nationwide expansion of the infrastructure will happen simultaneously. This means that the necessary infrastructure for zero-emission operation of all types of vehicles must be put in place, in stages, by no later than 2035.

Rail, waterway and air transport

Our aim for rail, waterway and air transport is also to become climate-neutral by 2040. Rail transport will accomplish this primarily with electrified lines. Climate-neutral fuels from renewable sources will be used in waterway navigation and air transport, in other words, the areas where zero-emission technologies cannot currently cover all uses:

- 100 per cent of rail transport will be climate-neutral by 2040, with most decarbonisation completed by 2035.
- 100 per cent of inland waterway vessels will be climate-neutral by 2040.
- 100 per cent of aircraft will be climate-neutral by 2040.

4.2 100 per cent of renewable energy sources from Austria on balance

The third component of the 2030 Mobility Master Plan aims for future transport to be climate-neutral and operated with the most efficient technology available. This focus will make it possible to show the full life cycle assessment of renewable energy sources from Austria needed for transport.

The 2030 Mobility Master Plan provides the framework for this undertaking, which will be fleshed out in detail in a strategy on the use of renewable energy sources in mobility.

The Path2ZeroCarbonTrans[8] project described and calculated a pathway to achieving climate neutrality in Austria's transport sector by 2040. The calculated primary energy of 135 petajoules for 2040 will result in final energy of around 109 petajoules per year (for land transport, including inland waterway navigation and off-road transport) based on the technologies used. This translates to an additional need for the electricity sector to expand from the current level of around 30 terawatt-hours for the period to 2040 (87 per cent of which will be used for direct electrification, while nearly 13 per cent will be used to produce renewable hydrogen). With the right regulatory efforts and investment, Austria can produce this amount of renewable energy by 2040. For this to happen, we need highly ambitious plans to expand renewable energy in Austria, in particular between 2030 and 2040.

From the present-day perspective, this ambitious target can be reached only if jet fuel used in Austria for aviation comes from sources in addition to the renewable energy produced in Austria. It takes more renewable energy to produce electricity-based synthetic fuels because of their high transformation loss and low efficiency. From where we stand, the aviation sector will continue to rely on international exports. Continuing to use fossil fuels is not an option if we are to become climate neutral by 2040.

That is why this energy strategy does not rely primarily on importing fuel from renewable sources. These imports are associated with a number of uncertainties, such as technological and economic issues that could greatly limit the availability of the volume required and, in particular, political risks. We therefore need clear infrastructure decisions to be made soon about measures for direct electrification wherever technically possible in order for the transport sector to become climate-neutral in 20 years. To ensure a robust strategy and to minimise risk and uncertainty, we cannot rely primarily on imports in the 2030 Mobility Master Plan. Moreover, producing our own energy in Austria has considerable potential to increase employment and value added.[9]

In some cases, we need to continue traffic-reducing measures beyond 2030 to achieve the full potential (such as reforms of land-use planning). Although as much traffic as

8 Environment Agency Austria; 2020; Path2ZeroCarbonTrans; projekte.ffg.at/projekt/3282946

9 Wuppertal Institute; 2020; Assessment of the Advantages and Disadvantages of Hydrogen Imports Compared to Domestic Production; https://wupperinst.org/en/p/wi/p/s/pd/932

possible will be shifted to more efficient modes, such as active mobility, public transport, rail and waterways, road will continue to make up a large volume of transport for passenger as well as freight transport. We need to choose the most efficient drive system available for each purpose to be able to cover this volume of transport with 100 per cent renewable energy from Austria[10].

Continuing to use the existing (fossil) infrastructure would be at the expense of the system's overall efficiency. We therefore need to promote sector integration with the most efficient processes and technologies to reduce energy imports and prevent an outflow of value added. Focusing on energy-efficient use of renewables in each sector where energy is consumed will play a major role in our ability to be climate-neutral by 2040.

4.3 Passenger transport by land

Direct electrification of cars, buses and rail is the most efficient form of decarbonisation.

Electrification of cars

To meet Paris climate targets and achieve climate-neutrality by 2040 new registrations must be limited to zero-emission commercial cars (class M1), motorcycles (class L vehicles) and light commercial vehicles (class N1) no later than 2030. If we set ambitious new CO_2 emission standards for vehicle manufacturers, a sooner date is realistic. Reaching these targets for new registrations is the only way to ensure that nearly all vehicles in these classes will be climate-neutral by 2040. The federal government will implement this target in public procurement as early as 2022. New registrations for taxis, hired cars and carsharing vehicles will be allowed only for zero-emission vehicles beginning in 2025, and carsharing parking in public spaces will be available only for zero-emission vehicles beginning in 2027.

These ambitious targets will require a package of additional measures. Examples of taxation measures include "greening" the special treatment of company cars and standard fuel consumption tax (already done) and carbon pricing beginning in 2022.

These fiscal measures could be supplemented with funding mechanisms for the procurement of vehicles for private individuals and companies. European fleet targets for cars and light commercial vehicles specified for vehicle manufacturers will increase the supply and availability of practical, zero-emission models.

Increasing the number of electric vehicles in use goes hand in hand with expanding the public and private charging infrastructure. Targets for expansion and measures will be fleshed out in more detail in the immediate action programme for renewable energy in mobility by the end of 2021. Obstacles in housing law will be eliminated to facilitate building of private charging infrastructure in multi-family residential construction

10 Excluding aviation

("right to plug"), while support will continue for the expansion of the public charging infrastructure. From where we stand, technologies other than battery electric vehicles (BEVs) will not play a significant role in the car segment by 2030, which will also be reflected in the way frameworks are designed.

Electrification of buses

In addition to greatly expanding public transport, we also need to make sure that existing and new public road transport is zero-emission. The specifications of the Clean Vehicles Directive (CVD) provide support by setting ambitious targets for procuring clean vehicles between now and 2030. To meet Paris climate targets and achieve climate-neutrality by 2040 new registrations of buses must be limited to zero-emission buses (class M2 and M3) by 2032.

In addition to battery electric buses, hydrogen fuel cell buses will be used so that lines that are difficult to electrify can also be operated with zero emissions. Funding mechanisms to reduce the added cost of electrifying bus fleets and a gradual phase-out of diesel will be needed in order to implement the Clean Vehicles Directive.

Electric road systems, batteries and hydrogen will make public transport's dependence on fossil fuels – on the road and on the rails – a thing of the past.

Electrification of rail transport

Some 90 per cent of the volume of transport in ÖBB's rail network is electric. BMK and ÖBB aim to decarbonise rail transport on the ÖBB to the greatest extent possible by 2035. To do so, a mix of track-side and vehicle-side solutions is planned (such as vehicles with alternative drive technologies). On the track side, lines roughly 500 kilometres long will be electrified by 2030. Eighty-five per cent of the ÖBB network will then be electrified. Priority will be given to routes that make the most sense to electrify and where electrification is the most cost-effective. High-priority routes include routes in the Trans-European Transport Network (TEN-T), routes that already have dense passenger connections, routes that are crucial for freight transport, and routes that have an important function as diversion routes – for the purpose of creating system resilience in the rail network.

Additional routes to be electrified will then be added in the coming years. The reason is that the results of ongoing and planned pilot projects on vehicles with alternative drive technologies (such as Cityjet Eco and hydrogen fuel cell locomotives) will be taken into account. A similar approach should be used for routes outside the ÖBB network (private railways within the meaning of the law on private railways).

4.4 Land freight transport

To meet Paris climate targets and achieve climate-neutrality by 2040 new registrations must be limited to zero-emission commercial vehicles (class N2 and N3) by 2030 for vehicles under 18 tonnes and by 2035 for vehicles 18 tonnes and greater.

Battery electric drive systems are the most efficient technology on the market in terms of energy and cost (purchase and operation) for road freight transport up to 300 kilometres a day. Although hydrogen fuel cell vehicles have a lower overall system efficiency, they are better for special requirements, such as covering long ranges with heavy loads and short refuelling times, which makes them good for supplementing long-distance and heavy goods traffic in particular. Our aim is also for long-distance transport, which poses more of a technological challenge, to be climate-neutral by 2040. The technologies that are available – battery electric vehicles, hydrogen fuel cell vehicles and hybrid systems in combination with electric road systems – are currently still in development. Coordination and a market rampup at the European level as well as timely infrastructure decisions regarding electric road systems in Austria are crucial. Seamless zero-emission operation of vehicles for freight transport must be possible throughout Austria no later than 2035.

The framework for implementing large battery electric and hydrogen fuel cell fleet projects must therefore be put in place by 2030. Establishment and expansion of the infrastructure is being systematically planned and implemented based on needs. The capacity utilisation needed for economically efficient operations requires joint project development for vehicle fleets, charging and fuelling infrastructure, delivery concepts and/or options for producing renewable power and hydrogen or for storing it locally.

Rail freight transport will be 100 per cent climate-neutral. This also includes interface areas: greater digitalisation (cloud, blockchain, etc.), retrofitting rolling stock and the necessary infrastructure expansion. The aim is to reduce noise from rail freight transport (wheel/rail contact, wagon equipment and braking) with a coordinated European procedure and incentives to innovate to such an extent that available train path capacity at night can efficiently be used for rail freight.

4.5 Inland waterway transport: passengers and freight

Inland vessels and their motors have a long service life, which means that switching technologies on a large scale requires longer transition periods. There are currently different approaches for zero-emission vessels, but the use of new technologies must be carefully coordinated, as vessels will be used in cross-border transport.

Renewable fuels could be used in the near term provided they are available in the volume needed and are economically feasible. Electric drive systems are appropriate primarily for small vessels and short distances. Replaceable battery containers are an option for longer distances but they require the right supply infrastructure on land.

Expansion of this infrastructure is being planned for idle vessels and potentially also for charging battery systems. In addition, the power supply on land for inland waterway transport, as a measure for reducing carbon emissions, also needs to be expanded.

Hydrogen applications are in the pilot phase. Eventually, liquefied biogas or synthetic methane, provided methane could be prevented from entering the atmosphere (methane slip), could be used. Decisions about technology need to be made based on international research and development projects. Until then, a blending mandate will help reduce carbon emissions in the short term. The mandate will be rolled out with a package of measures consisting of legislative specifications, infrastructure development and incentives. Austria will campaign for fair taxation of marine diesel to steer developments in the right direction.

4.6 Air transport: people and freight

Economic measures will play a key role on our pathway to climate-neutral air transport. Greater cost transparency, in particular surrounding the cost to the environment, needs to be included in ticket pricing. Austria is campaigning for fair taxation of jet fuel at the European and global level. Revision of the European emissions trading system for European flights will help reduce the free allocation of certificates and phase them out between now by 2030. Moreover, we would welcome earmarking revenues from the emissions trading system for promoting green innovations in aviation.
Multiple measures are needed to make air transport that cannot be avoided or shifted climate-neutral by 2040. Some of the key components are technological developments in renewable synthetic fuels and innovative drive systems based on hydrogen and battery power. Government funding for the development of synthetic fuels and regulatory incentives will also provide support. A blending mandate is needed in order to achieve climate-neutrality. Efficient, environmentally friendly and scalable fuel alternatives that meet international criteria for approval must be available in the volume needed and at a reasonable cost before they can be successfully introduced.

In addition, non-CO2 effects, which manifest at high altitudes and have a negative impact on the climate, also need to be taken into account. To achieve full climate-neutrality, these non-CO2 effects need to be offset with sinks. Additional research is needed due to the complexity of these effects.

The continued efforts to implement the Single European Sky, which will further expand a coordinated European airspace, can also be expected to greatly reduce emissions with shorter routes. As with efficiency gains from fuel-saving technologies, rebound effects from cost savings also need to be avoided. At the international level, Austria's aviation sector will participate in the Carbon Offsetting Reduction Scheme for International Aviation (CORSIA) of the International Civil Aviation Organization (ICAO) beginning in 2021, which aims to make the global growth that is forecasted for aviation climate-neutral. Austrian and EU climate policy objectives go farther.

4.7 Climate-neutral fuels will supplement power from the water, wind and sun

In addition to using zero-emission technologies, such as battery electric mobility and hydrogen fuel cells, the use of synthetic renewable fuels for areas that are difficult to electrify is another option for decarbonising the transport sector, in particular aviation and inland waterway navigation. The technologies already exist but are not yet available on a large scale. The step toward synthetic renewable fuels produced using 100 per cent renewable power should therefore be viewed long-term, taking into account the energy efficiency of the overall system and the resulting costs.

Traditional and comparatively less expensive biofuels and increasingly advanced biofuels are currently used almost exclusively in road transport due to the objective set by the EU Directive on the promotion of renewable energy. In the future, these fuels could increasingly be used in other areas, such as the off-road sector, agriculture, shipping and to a certain extent aviation. It should be noted, however, that biomass cannot be used more efficiently in other sectors and must be sufficiently available.

4.8 The role of automated mobility for climate neutrality

Cooperative, connected and automated mobility for passenger and freight transport has significant potential to reduce the negative effects of transport on the climate and environment. If we are to achieve this potential, we need transparent, comprehensive and targeted management and steering by the public sector and we need Austria to take a strong position in the international sphere. Only then can we pave the way toward optimising traffic flows, avoiding empty runs and saving energy with optimal transport sizes and toward more efficient capacity utilisation, sustainable use of infrastructure, climate-neutral first and last-mile solutions, multimodal approaches and safer transport.

Tying in to climate-neutral drive forms and networking and cooperation among each of the different systems and with the infrastructure are crucial if we are to achieve targets. We must look at the big picture while focusing on the system for automated mobility to play a significant role in climate neutrality.

4.9 Research, innovation and digitalisation

Preparing for maximum efficiency and full climate neutrality with innovation and digitalisation.

Research and innovation

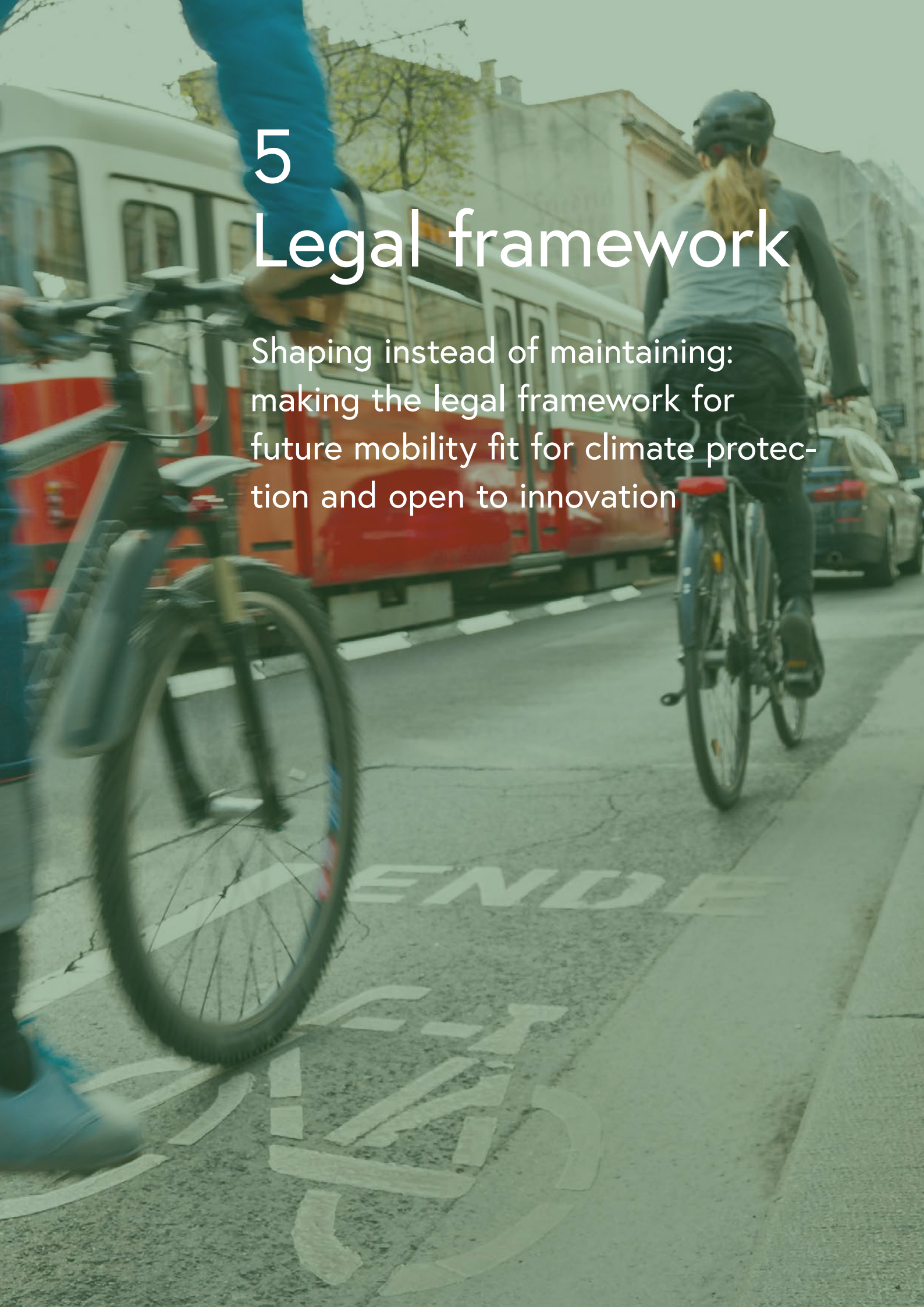
Research and innovation will focus on developing the foundations, technologies, tools and concepts to increase energy and resource efficiency per unit of volume of traffic or transport. Research also provides approaches to improved implementation of technologies with a high level of maturity and significant contribution to climate neutrality and enables improvements in emissions, pollution, noise reduction, transport safety and so on to be made to vehicles and the necessary infrastructure.

- Technologies and concepts for climate-neutral vehicles, including aircraft
- Innovations in resource-efficient and environmentally friendly components for the transport infrastructure
- Optimisations to process for managing freight and passenger mobility

Digitalisation

Connecting mobility data with physical, digital and organisational infrastructure will enable sustainable and flexible management of mobility needs while saving resources. Integrating automated services and information for fleet management will make organisation of the transport system as a whole more efficient and will help users accept and use zero-emission technologies.

- Specifying frameworks and models for cooperation for an integrated mobility system and advancing solutions that have been harmonised throughout Austria and Europe
- Using the digital infrastructure to share information effectively, for example about energy management and transport demand
- Specifying requirements and implementation steps for making legal provisions available digitally and creating management options for prioritising energy-efficient modes (such as consistent priority for public transport at junctions, access restrictions and low-emission zones)



5 Legal framework

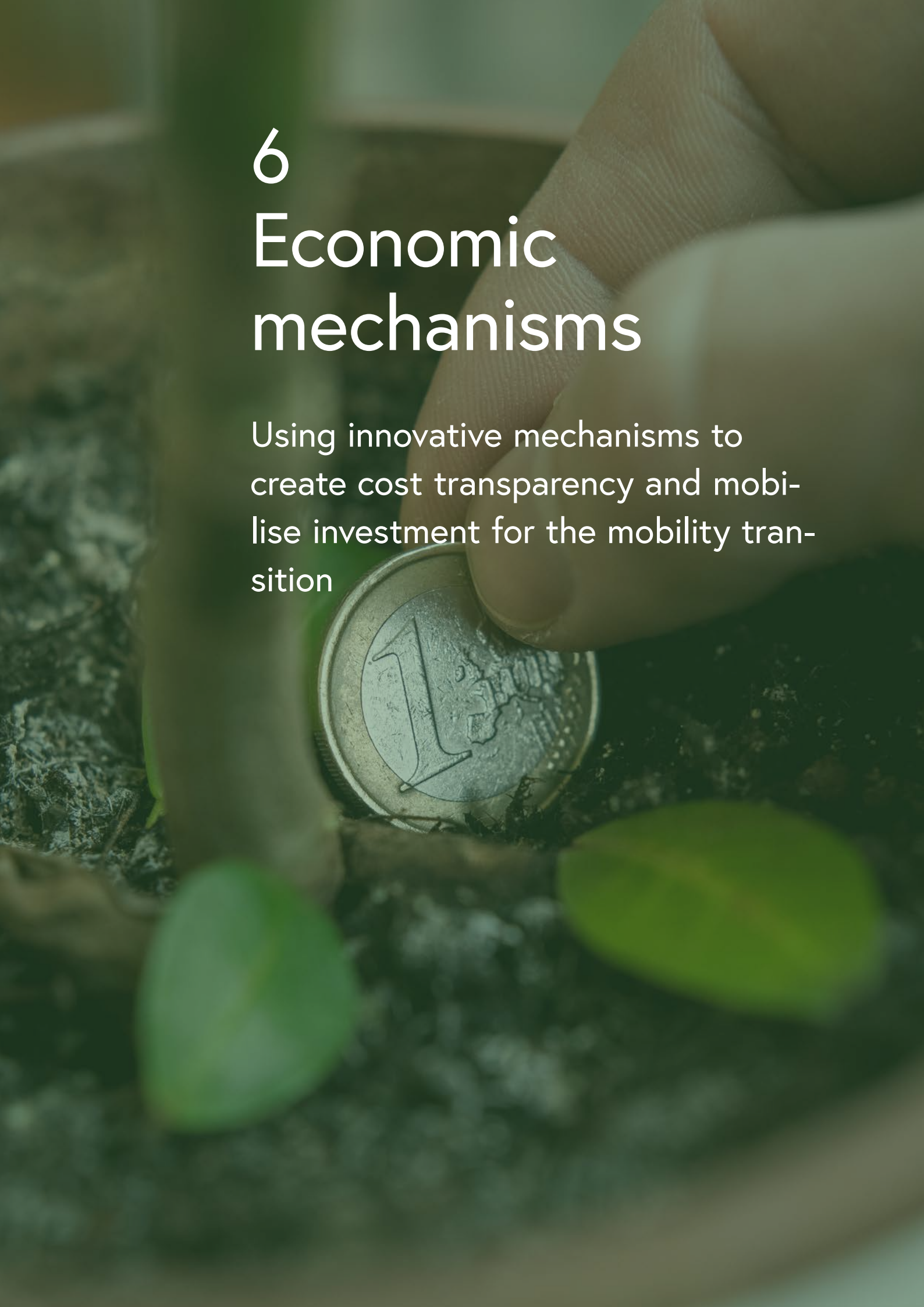
Shaping instead of maintaining: making the legal framework for future mobility fit for climate protection and open to innovation

Realigning the way legal frameworks are created and giving them an innovation focus will be crucial in implementing this ambitious 2030 Mobility Master Plan. In order for us to reach the bar that has been set, mobility legislation is being drafted that is geared toward the future challenges of the mobility transition. This legislation will hardwire innovation and climate protection in transport law. The first step will be to review existing legislation for the road, rail, air and water transport sectors for their compatibility with the requirements of climate-neutrality by 2040 and the targets of the 2030 Mobility Master Plan. The aim will then be to realign these legal standards to create a framework for effective measures. The core components of these efforts are:

- Implementing a climate check for existing legislation for the mobility sector
- Creating room for experimentation to enable innovations, coordinated closely with nationwide activities in this area
- Implementing the transport protocol of the Alpine Convention

External experts will also be brought in to implement a sweeping reform of mobility law. Draft legislation is being prepared with the support of a steering committee within the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, which will provide the legal tools to achieve the targets and measures of the 2030 Mobility Master Plan.

Moreover, a number of additional legal improvements will be implemented on an ongoing basis, such as revising the road traffic code to be friendlier to pedestrians and cyclists.



6 Economic mechanisms

Using innovative mechanisms to create cost transparency and mobilise investment for the mobility transition

In addition to regulatory and funding policies, economic instruments are important to creating incentives for climate-friendly technologies and sustainable mobility. In doing so, environmentally friendly behavior is to be promoted step by step and cost truth is to be established, which also takes the corresponding environmental costs into account.

A well balanced policy mix is needed to significantly reduce carbon emissions in the transport sector and achieve climate neutrality by 2040. Failing to meet climate targets wouldn't just have environmental and social consequences; it would have economic consequences as well. Austrian society already has to cover some EUR 2 billion per year in costs related to damage from weather and climate change[11]. A further significant increase in climate-related societal costs is expected for the future, especially if the global climate targets are not achieved. Austria has also committed to reducing its emissions as part of its international obligations. If it does not meet these obligations, it will need to purchase additional emissions allowances at a future, unknown cost.

6.1 Pricing carbon emissions as a key economic tool

One of the most established economic instruments is the introduction of additional CO_2 pricing. This can take place both through tax measures and through the introduction of emissions trading. The European Green Deal and toughening of the EU's climate targets for 2030 have also led to a discussion about the integration of additional sectors into Europe's emissions trading system. The transport sector will play a key role as the largest sector not included in the European emissions trading system (with the exception of European aviation). Regardless of which mechanism for pricing carbon emissions is chosen (taxation or trading), it is evident that an effective price for carbon will be needed to achieve the necessary reductions in transport.

The European Investment Bank recently increased its reference costs for evaluating projects to EUR 250 per tonne CO_2[12]. As of today an European trading system could begin to have an impact on transport from 2026 onwards. The establishment of economic instruments for CO_2 pricing on a national level will also have an impact on climate policy in Austria in the coming years.

In addition to the step-by-step, plannable implementation, an essential component of CO_2 pricing is the redistribution of revenues. This benefits households in particular, but also companies, and takes into account the social effects of CO_2 pricing and the creation of positive incentives to switch to climate-friendly alternatives.In the near and medium term, it would therefore be beneficial to use the additional revenues from CO_2

11 COIN; 2020; Klimapolitik in Österreich: Innovationschance Coronakrise und die Kosten des Nicht-Handelns (Climate policy in Austria: the corona crisis as an innovation opportunity and the cost of doing nothing; only available in German); klimafonds.gv.at/wp-content/uploads/sites/6/COIN_2020.pd

12 EIB Group; 2020; Climate Bank Roadmap 2021-2025; eib.org/de/publications/the-eib-group-climate-bank-roadmap.htm

pricing to fund compensation measures in addition to investing in climate protection. Measures such as lump reimbursements, tax relief, reductions in social insurance contributions and subsidies, and state aid could be used to redistribute additional tax revenues.

6.2 Green Finance Agenda: investing in the future

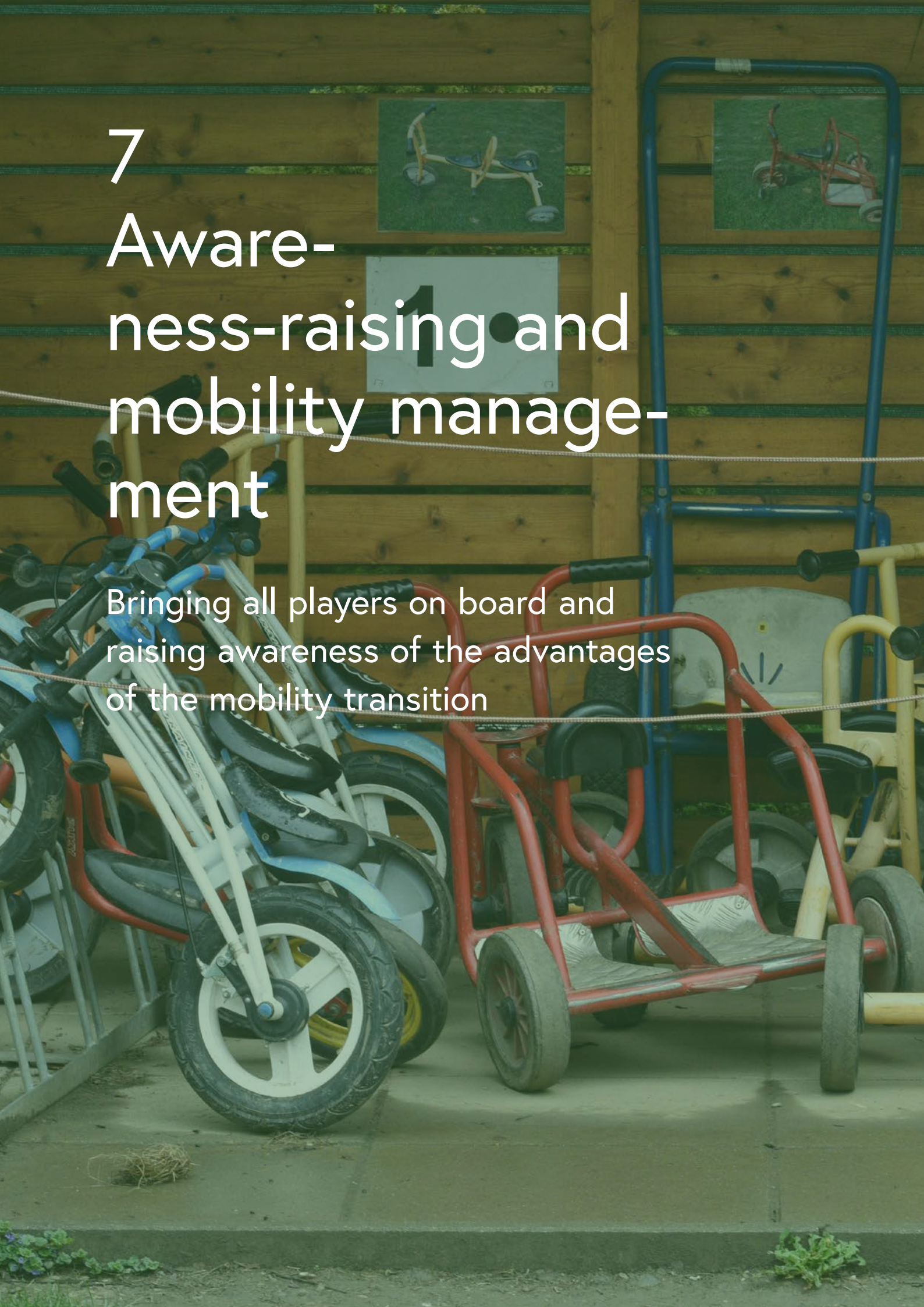
Implementing climate-friendly mobility in Austria will involve a need for significant investment, which must include private as well as public funding.

Austria's Green Finance Agenda outlines the pathway to climate-friendly and economically sustainable finance. It identifies a strategic mix of measures and areas for action that will enable innovative financing instruments for climate-friendly investment to be scaled up – including for mobility and together with Austria's financial sector.

Supply and demand for financing instruments that are declared to be sustainable has increased. Existing sustainable financing instruments need to be supported, and new innovative instruments need to be promoted. One example is green leasing, which is used primarily in electromobility; the green label facilitates inclusion in a framework for green bonds for refinancing. In 2019, 20 per cent of green bonds issued around the world were used for the transport sector (compared with 10 per cent in Austria)[13].

Other measures include green crowdfunding as an alternative to traditional bank financing, green finance programmes, and the Austrian Green Investment Hub for private investment in projects and pilot projects, including in green transport. EU taxonomy will need to play a key role. It will create a system for classifying environmentally sustainable business activities that is consistent throughout Europe. This would make it possible to identify environmentally friendly and climate-friendly investments using clear criteria backed by science.

13 Climate Bonds Initiative; 2020; Green Bonds Global State of the Market 2019; climatebonds.net/resources/reports/green-bonds-global-state-market-2019 and Climate Bonds Initiative; 2020; Green Bond Market Briefing – Austria; climatebonds.net/resources/reports



7 Aware-ness-raising and mobility manage-ment

Bringing all players on board and raising awareness of the advantages of the mobility transition

Knowledge needs to be transferred and shared among the private, public and scientific sectors so that they can promote the development of new mobility services together. Communication of monitoring results that is tailored to the target audience, early mobility education to bring about lasting changes to mobility behaviour, and promotion of new mobility services when advising and training stakeholders (from municipalities to companies) are important actions that can be taken. Existing networks (such as the Austrian Association of Cities and Towns, the Austrian Association of Municipalities, civil society initiatives, and the Austrian Association for Public and Social Economy) need to be involved in these actions.

The mobility transition calls for integrated approaches in order to bundle measures, create synergism, prevent counterproductive effects and help players change their behaviour. The 2030 Mobility Master Plan therefore takes the mobility needs of transport players into account using mobility management and awareness-raising – in parallel with infrastructure measures, alternative drive technologies, digitalisation and automation.

Mobility management combines measures from different areas and motivates players to take action, promotes climate-friendly mobility behaviour, and creates awareness for clean technologies and new mobility services. As an interdisciplinary tool for improving mobility in the private and business environment, mobility management plays a major role in the transformation toward sustainable mobility and decarbonised transport in cities and regions. The aim is to have a better selection of environmentally friendly forms of mobility, both for commuter and leisure traffic.

Raising awareness for modes of transport, mobility behaviour and consumption habits as well as exercise and health can contribute greatly to increased use of public transport, active mobility and general acceptance of the mobility transition.

Better frameworks for mobility management at the company, public, municipal, tourism and school levels will create a seamless mobility chain with options for the first and last mile. They will offer incentive systems for climate-friendly mobility, which should encourage the introduction of sustainable mobility management. In addition, the klimaaktiv mobil programme provides implementation support with advising, funding, awareness-raising, training and certification. Players that are responsible for an especially high volume of traffic will be motivated to create mobility management plans.

Digitalisation is playing a major role in the mobility transition, and at the same time, the transport sector connects increasingly digitalised living environments. If we are to use the full potential of digitalisation, first and foremost we need to increase confidence in new technologies with target audience-specific measures and include user behaviour in our examination of the mobility transition. Moreover, the federal government's, provinces' and municipalities' awareness and use of digital tools need to be increased and contact points for connecting knowledge about and the impact of digitalisation in the mobility sector need to be initiated.

8 Climate protection for social value added

Diverse benefits to society from the transition to sustainable, environmentally friendly mobility

8.1 Access to mobility

A climate-neutral transport system will make life better for everyone. All people – men and women, young and old, and people with physical or mental challenges – will have the same access to mobility regardless of their circumstances or where they live.

Until now, people's access to mobility outside of metropolitan areas in particular has depended largely on whether they have a vehicle, especially a car, and are able and licensed to drive. That has restricted participation in society not only for low-income groups but also for those who cannot drive due to their age or health. As a further consequence of a lack of independent and autonomous mobility, caregivers, who tend to be women, have to invest a lot of time in providing transport and running errands.

Groups who have so far been at a disadvantage because of reduced mobility will be the main beneficiaries of the focus of the 2030 Mobility Master Plan on publicly accessible transport, accessible mobility services and sharing systems – based on the principle of guaranteed mobility without a driver's license or owning a car.

Land-use, transport and infrastructure planning will take gender-related aspects into account. Better lighting and facilities for infrastructure (stops, rest areas, underpasses, etc.) and pavement networks will increase subjective safety and largely remove barriers that restrict mobility. The quality of the transport system will improve as a result of a higher stop density, better-equipped means of transport, better timetable offerings even during off-peak times, and a more closely meshed public transport network. Flexible, affordable fares will increase mobility opportunities and account for a variety of mobility needs.

8.2 Traffic safety

The Austrian Road Safety Programme 2011-2020 referred to a clear aim of no more fatalities on Austria's roads and set interim targets that also serve as guides in the federal government's traffic safety strategy for the next decade. The aim is to cut the number of fatalities and serious injuries in half by 2030. Austria's efforts at the national level to improve road safety are in line with other European strategies, which call for no more fatalities or serious injuries from traffic accidents on Europe's roads by 2050.

The focus over the next 10 years will shift more toward increasing active, safe and climate-friendly mobility, which will help groups that are at particular risk in road traffic, such as pedestrians and cyclists, to get around safely.

We need to establish and strengthen a culture of road safety that is based on watching out for one another.

The federal government's Austrian Road Safety Programme 2021-2030, which was developed using a comprehensive basic analysis in close collaboration with stakeholders in Austria's road safety sector, should be accompanied by topic-specific action plans with specific timelines so that we can continue to successfully handle current mobility

and technology developments, which are rapidly changing, and influence current threats in road traffic with as much flexibility as possible.

8.3 Contribution to environmental objectives

Environmental objectives will benefit primarily from measures to avoid motorised transport. Positive contributions will also be made in terms of shifting, for example by shifting traffic to active mobility. Shifting motor vehicle traffic to public transport and traffic from freight transport from the road to rail will also reduce pollution emissions. In terms of improving, the switch from combustion engines to electromobility will play a crucial role. Nevertheless, a number of environmental problems in the transport sector will not be solved simply by a switch in technology used for road transport.

Air pollution control and noise reduction

By reducing air pollution caused by combustion, the objectives of the 2030 Mobility Master Plan are playing an important role in meeting national and international standards for nitrogen oxide and particulate matter emissions. Electric vehicles generate lower pollution emissions (in particular nitrogen oxide and particulate matter) than conventional vehicles because there is no engine to produce them. However, these vehicles do still generate particulate matter from tire and brake abrasion and by stirring up dust on roads.

At lower speeds, electric vehicles have a clear advantage over conventional vehicles in terms of noise emissions. Driving noise is comparable at speeds above 30 kilometres per hour, however. Shifting more traffic from the road to rail and waterways would also reduce noise emissions because it would reduce the number of vehicles on the road. Traffic noise can be reduced primarily by monitoring existing speed restrictions and by introducing measures to reduce speed limits.

Resource requirements and emissions over the life cycle

Conversion to electric drive systems reduces carbon emissions and resource requirements over the entire service life compared to conventional technologies. This prevents the often devastating effects of petroleum extraction and transport, for example. Nevertheless, electric vehicles do use natural resources.

Battery production for electric vehicles depends on metal and metalloid raw materials and rare earth oxides, which often have negative environmental and social impacts when they break down. Solutions that make good environmental and economic sense also need to be found for reusing and recycling the future high volume of rechargeable batteries. Austria is campaigning for ambitious environmental targets in this context as part of legal regulations at the EU level (in particular the EU Battery Directive). The focus of the 2030 Mobility Master Plan on publicly accessible transport, sharing systems and electric road systems will play a major role in reducing resource requirements.

When looking at emissions over the entire life cycle of vehicle, vehicle production and energy production need to be taken into account in addition to operation of the vehicle. In Austria, Environment Agency Austria does this on a regular basis using life cycle assessments. They have shown that electric vehicles have clear advantages over conventionally operated petrol and diesel vehicles in terms of greenhouse gas emissions, cumulative energy demand and nitrogen oxide emissions, which means that electric vehicles can make an important contribution to reducing carbon emissions in the transport sector. In order to have an impact on the environment, however, electricity and hydrogen used to power vehicles must come entirely from renewable energy sources.

Impervious surfaces and land use

The land used by the transport system is an important environmental indicator given the limited space for development and sensitive Alpine regions in Austria. The overall economic and cross-sector target of nine square-kilometres of land use in 2030 will also require us to rethink mobility. Modes of transport will need to be connected based on their environmental strengths and with targeted mobility management, and land use will need to be reduced by shifting to active mobility and public modes. Land-use planning needs to prevent mobility constraints, such as long commutes and distances to shopping opportunities without a link to the bicycle infrastructure or public transport. Moreover, tax incentives for transport need to be eliminated if they are counterproductive in terms of climate and environmental protection.

Biodiversity

Heavy land use is one of the main reasons why biodiversity is lost. Natural habitats are often cut off by transport infrastructure, destroying them forever. Entire ecosystems are sensitive to anthropogenic interference. This development can be counteracted by avoiding cutting off natural habitats, adjusting routing to the landscape when infrastructure is built, and promoting especially space-saving means of transport and getting around, such as walking cycling and using public transport.

8.4 Health

The transport system of the future outlined in the 2030 Mobility Master Plan will play a crucial role in Austria's ability to reach its health targets and exercise recommendations. There are numerous benefits to regular walking and cycling. They reduce the risk of developing type 2 diabetes and cardiovascular disease, prevent obesity and improve mental health. Due to these and other effects, every euro invested in active mobility generates EUR 3.20 in benefits to the economy.

In contrast, forms of mobility that use fossil fuels have a significant impact on climate change and serious climate-induced health consequences for people. Health inequity is worsened by climate-related changes. We need to address these negative

effects on health not least by adapting our health-care system. More active mobility as a result of individual and state actions through greater cooperation between the mobility and health-care sectors will benefit people's health and the climate.

Walking and cycling have been demonstrated to have a high economic benefit and could be increased with partial reimbursements to people who use active forms of mobility. This would further increase the share of distances covered using active forms of mobility and have ecological advantages as well. Since January 1, 2021, for example, those who travel to work by company bike have also been entitled to the commuter allowance.

8.5 Value added and labour market potential

The mobility transition will bring about structural shifts in current value chains. As zero-emission technologies like electromobility become more widespread, Austria's highly developed supplier landscape for automotive production will face new challenges. Electromobility's value added potential in Austria is disproportionately high compared with combustion energy technology, in part because Austria has many companies in the control and power electronics sector.[14] It is important take advantage of this potential, however, and initiate compensatory countermeasures so that Austria can maintain its position as an important technology location. Moreover, new value added potential will be fostered as part of service-oriented business models and digitalisation, both in the international and regional context.

Infrastructure investment in public transport and active mobility in particular have considerable potential to add value. Austria has a five per cent share of the global market for rail vehicles, for example. Many new jobs will be created not only as a result of infrastructure being built (in the short term); jobs will also be needed for operations.

The structural change will ensure that Austria remains a safe place to do business over the long term. We also need to widen our digital activities with the Internet of Things, artificial intelligence, data science, communications technologies and a training campaign for professionals in electric vehicles, infrastructure development and sustainable logistics.

RTI in the mobility sector will also be important in adding value and securing Austria's position. The resulting products, services and concepts – but also new approaches to actions, political measures, norms and standards, for example – will make a key contribution to environmentally, socially and economically sustainable development everywhere that mobility will make an impact.

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14 Frauenhofer; 2020; E-MAPP 2; Qualification and Training needs; klimafonds.gv.at/wp-content/uploads/sites/6/2020_E-MAPP2_-FhA_TU_SMP_v2.3.pdf

The 2030 Mobility Master Plan in the context of SDGs

The 2030 Agenda, with its 17 sustainable development goals (SDGs) was adopted by the 193 Member States of the United Nations in 2015. The SDGs provide guidelines for sustainable development at the economic, environmental and social level and are based on the principle of involving the whole world. Austria also committed internally to implementing these targets.

The 2030 Mobility Master Plan will make an important contribution toward filling current gaps in achieving targets relevant to mobility. The overall objective is to combat climate change and its impacts (SDG 13). Reducing air pollution in the transport sector will also ensure healthy lives for all, at any age (SDG 3). Sustainable infrastructure will be built and innovation will be fostered (SDG 9). The measures of the 2030 Mobility Master Plan will also help make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11).

The 2030 Mobility Master Plan is intended to achieve precisely those targets set out for the mobility sector in the SDGs. It means a paradigm shift away from what has been done until now – determining only after the fact whether measures in the transport sector are affected by SDGs.

9 Austria as a strong voice and pioneer in Europe

As a pioneer with ambitious targets, Austria is supporting the mobility transition at the European and international level by forming alliances and participating in international organisations and initiatives.

Austria supports taking advantage of the economic opportunities of environmentally friendly mobility, advancing innovative technologies and mobility management at the same time, lowering transport emissions and health risks, and promoting healthy, active mobility throughout Europe.

For a smooth transition to a transport system that does not depend on coal, oil or natural gas, the right decisions need to be made in time, especially at the European level, when it comes to cross-border transport or fundamental issues of EU responsibility and when consistent, standardised solutions are needed. The Sustainable and Smart Mobility Strategy presented by the European Commission in December 2020 identifies a few important interim targets. It also includes an action plan with 82 initiatives, which will guide activities at the European level in the coming years.

Austria is stepping up its active dialogue with like-minded EU Member States to create the framework at the European level that is needed in order for the mobility transition to succeed. The following issues are a crucial part of this framework:

- Austria is fully committed at the European level to further tightening CO_2 emission standards and ambitious development of the incentive for manufacturers to bring zero-emission vehicles to the market to enable full electrification of new cars by the deadlines set and in compliance with EU law. This includes CO_2 emission standards for new heavy goods vehicles and expansion of targets to other vehicle categories, in particular buses. In the medium and long term, carbon fleet targets should evolve so that manufacturers can continuously improve the energy consumption of zero-emission vehicles.
- Austria is also in favour of specifications that would create an appropriate framework for the price signals that are needed in road transport. In this context, Austria supports ending financing and subsidies for fossil fuel infrastructure and fossil energy.
- Establishing new night and long-distance train service as an alternative to aviation will require appropriate train paths to be awarded. In addition to technical interoperability, it will also require the EU to overcome the often inconsistent and country-focused approaches in the different Member States. The much needed major expansion of rolling stock for night trains can be initiated effectively at the European level. In the long term, joint infrastructure and transport service planning is needed, following the principle of the integral regular interval timetable.
- Austria sees itself as an active partner of the European Commission on the path to efficient European rail freight transport and a single European railway area, and is in favour of attractive services for cross-border rail freight transport, for example along the EU's rail freight corridors.
- Austria champions transparent and fair prices for public charging infrastructure and establishment of climate-neutral energy infrastructure along the road and waterway network that is consistent Europe-wide. The full benefit of an electrified network of major roads will be felt in passenger and freight transport if a

consistent system is used across all borders. Fragmentation similar to rail's power and train protection systems must be avoided at all costs.

- Austria advocates for real improvement to the employment and social conditions of drivers in international road freight – and thus for effective measures to combat social and wage dumping – and for an effective increase in fair competition and elimination of unjustified competitive advantages in the transport business, which continue to put rail at a disadvantage even though it is an environmentally friendly mode.
- Austria is in favour of the introduction of a EU-wide jet fuel tax. In addition, the working and social conditions in aviation should be improved. Creating consistent social standards for employees in aviation should enable fair market conditions. Moreover, Austria is in favour of stronger intermodal transport throughout Europe. Connecting individual modes allows for more efficient routes. Better connecting rail and air transport would shift some of the traffic off of the roads.
- The European Commission has set out clear steps toward achieving climate neutrality in its climate-neutral and smart cities (CNSC) Horizon Europe mission. The mission calls for 100 pioneering cities in Europe to be climate-neutral by 2030. Mobility will play a key role in achieving this target. Austria is using this initiative as momentum and a catalyst for achieving climate targets in the urban context and has already successfully established the first preparatory steps.

Austria and other ambitious EU Member States are sharing their experience with their national climate protection programmes and communicating a few flagship projects and part of an ongoing dialogue. Austria is taking on approaches that have been successful in other countries whenever possible. These include both government initiatives as well as programmes for encouraging, activating and supporting climate-friendly mobility on a broad scale (such as klimaaktiv mobil).

As a signatory of the Convention on the Protection of the Alps (Alpine Convention), Austria pledged to implement the transport protocols of the convention and is committed to transport solutions in the interests of an integrated policy on the protection and sustainable development of the Alpine region. The Alpine Climate Board, a body which was set up within the Alpine Convention in 2016 and is chaired by Austria, set targets as part of the Alpine Climate Target System 2050 for the transport sector, among other sectors, and developed specific steps to implementation to make the Alpine region climate-neutral and climate-resilient by 2050.

Specifically, it set targets for the decarbonisation of freight transport and integrated solutions for public transport. The present 2030 Mobility Master Plan also aims to help meet these targets.

At the international level, Austria supports relevant activities, such as the UNECE WHO Transport, Health and Environment Pan-European Programme (THE PEP), a partnership of transport, health and environment ministries from 56 countries.

10 Governance and monitoring

A governance system and monitoring strategy are needed in order to ensure the effectiveness of the 2030 Mobility Master Plan. These systems must be established gradually.

Achievement of the targets set out in the 2030 Mobility Master Plan will be evaluated using a number of base indicators in addition to the primary carbon emissions target. The Environment Agency Austria publishes a nowcasting report on Austrian greenhouse gas emissions in July of every year. The base indicators of the 2030 Mobility Master Plan will be evaluated at the same time.

Expanded indicators will be developed in the coming years and the necessary data basis and tools will be created for timely process control as a transparent way of illustrating implementation of the 2030 Mobility Master Plan, its impact and underlying causes. This should map out the overall systemic impacts for all sustainability dimensions (for the purposes of SDGs), including undesirable secondary effects and rebound effects.

A council of third-party experts (the National Forum for Climate-Neutral Mobility – see Section 11) will oversee the process to ensure the greatest possible transparency and objectivity. In addition, the governance processes for the 2030 Mobility Master Plan will be reconciled with other mobility-related strategies (such as the R&I Mobility Strategy for 2040).

The implementation process for the 2030 Mobility Master Plan will begin immediately. Immediate action programmes and specific measures are being prepared for all disciplines, and subject-matter strategies are being developed or refined. For example, the 1-2-3 Climate Ticket will be implemented throughout Austria by the end of 2021, and an immediate action programme for renewable energy in mobility is being presented for electric mobility.

11 New dialogue and cooperation formats

Building broad alliances and working on implementing the 2030 Mobility Master Plan together

Climate-neutral mobility in a decarbonised transport sector will require an extensive transformation process, which will take the next two decades. This major effort will succeed only as a joint undertaking involving enormous effort from all levels of government, business and society. This is even more true for the transport sector than for other sectors of the economy, such as the energy and industry sector. After all, a comprehensive climate-protection strategy for transport means changing the daily routines of millions of people and business processes that have become ingrained over decades. The success of this task, which will require the buy-in of and will affect society as a whole, depends on the acceptance and willingness of everyone to change: parliaments, governments, companies and every single person living in Austria. People cannot be ordered to accept change or be talked into it. Acceptance must be developed through enlightened, rational discourse involving all of society. Discourse will create support, but discourse also needs a clear framework.

11.1 National Forum for Climate-Neutral Mobility

The National Forum for Climate-Neutral Mobility (Nationales Forum Klimaneutrale Mobilität, "NFKM") is being established as the basis for a discourse with society as a whole. It will help shape and oversee the development pathways and framework for the necessary transformation process in the transport sector. The NFKM will consist of some 25 members representing key social players in government (federal, provincial and municipal), business, science and civil society in the transport sector. The members of the NFKM will be appointed by the minister responsible for the transport sector, who will provide support for its work in the transport sector. It will meet at least once a year.

The NFKM will evaluate the implementation progress of the 2030 Mobility Master Plan using a system of indicators and will make joint recommendations for improving the Master Plan at the measure and mechanism level. This will happen in particular if sector targets are not met or are not likely to be met in the foreseeable future. The NFKM will not have to agree unanimously on recommendations. Quite the opposite. Given the diversity of the institutions represented on the NFKM, we can expect different assessments and evaluations. But the wider the consensus is among members of the NFKM, the greater the impact that recommended actions could have. In addition, the NFKM will evaluate the progress of implementation initiatives and will suggest new high-priority projects for successful implementation of the 2030 Mobility Master Plan.

The NFKM administrative office will be located within the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology. The Environment Agency Austria will ensure that the necessary scientific support is provided.

11.2 Austrian Automotive Transformation Platform

For quite some time now we have known that decarbonisation and digitalisation of the transport sector will require a serious structural transformation in the automotive industry and automotive supply industry. At the same time, there will be a tremendous need for skilled workers in electrical engineering to create the necessary electrification infrastructure. The aim is to use the opportunities made possible by this structural change for climate protection and to add jobs and create value. Likewise, the aim is also to accompany the structural transformation with market economy and employment policy measures in areas where few workers may be needed in the future, such as in the development and manufacturing of powertrains for vehicles with combustion engines. We want to save as many jobs as possible in the automotive industry and upstream and downstream industries.

In light of this, the Austrian Automotive Transformation Platform (AATP) is being established. The core of the AATP will be made up of experts from the automotive and mobility sector, electrical engineering, unions, science and civil society. The members will contribute their technical expertise on the opportunities and challenges of the structural transformation and the associated climate policy requirements that future transport must meet, potential future development of the technological transformation, and areas for action to secure Austria's competitive position as a vehicle supply location.

The experts will develop recommended actions to actively support the structural change in the mobility business, which could include the following areas, for example:

- Locating or tapping into additional value-adding parts of the mobility or automotive sector that will be important in the future in Austria (such as electric vehicle batteries, connectivity and automation components and software)
- Creating and facilitating access to financing for research, development and production conversion at companies involved in the structural transformation or at start-ups
- Accompanying the structural transformation with employment and structural policy by supporting measures in training, further education and advanced training and measures in location policy

The AATP will prepare a report once a year on the status of the transformation and recommendations for action developed based on it. The report will be discussed at a public conference.