
Chapter 3

Summary

3.1 Introduction

Efficient and sustainable utilisation of the world's resources is a prerequisite for ensuring sound environmental and economic development. Degradation of nature may therefore have major economic implications. If natural capital is depleted, services provided by nature, such as pollination, clean air and water, as well as contributions to stable temperatures, will be impaired.

The main environmental challenges internationally are anthropogenic climate change, biodiversity loss, inadequate access to freshwater, human impact on the nitrogen and phosphorus cycle, as well as health effects of pollution. Norway participates in various international fora to reduce these problems. In Norway, many of the local and regional environmental problems have been reduced in recent years. The utilisation of most renewable resources is at a sustainable level, and local emissions from major point sources is limited. Environmentally harmful activity is nonetheless a problem in a number of locations, although the damage is often restricted to smaller areas. Physical interventions, fragmentation of nature and reduction of available land areas affect nature and the environment locally, and may drive away species. Norway is also affected by global environmental challenges, such as the dispersion of environmental contaminants, biodiversity loss and anthropogenic climate change.

The main purpose of the Green Tax Commission's work is to examine whether and how one can achieve lower greenhouse gas emissions, a better environment, as well as favourable economic development by way of climate- and environment-motivated taxes, combined with reductions in other taxes. This requires an assessment of the scope and level of existing environmental taxes, as well as of whether precisely targeted environmental taxes can be introduced in new areas. The Commission has also examined whether subsidies and tax expenditures that are harmful to the environment should be scaled back.

An environmental tax implies that the polluter pays a price for the damage inflicted on the environment, and hence is in conformity with the «polluter pays» principle. Environmental taxes provide financial incentives for curtailing environmentally harmful activity. A higher price will reduce the demand for environmentally harmful products, which will serve to scale back the production of such products. A tax on environmentally harmful inputs implies that enterprises choose to use such inputs less intensively in their production. Moreover, environmental taxes will stimulate the development of new technology (including cleaning technology) by creating demand and a market for environmental technology.

Environmental taxes ensures that emissions are reduced at the lowest possible cost to society. Cost effectiveness considerations suggest that activities causing the same environmental damage should be subject to the same tax, irrespective of sector or activity. Emission reductions will in such case be implemented to the lowest possible costs to society. A correctly designed environmental tax should be set at the same level as the marginal environmental damage. For some environmental problems, Norway has concluded international agreements stipulating explicit emission reduction requirements. Environmental taxes should in such cases be put at a sufficiently high level to ensure compliance with the international obligations. Examples of such agreements are the Kyoto Protocol on greenhouse gas emissions and the Gothenburg Protocol on long-range air pollution. Starting out from explicit emission targets when setting the level of environmental taxes may also be appropriate in situations where environmental damage is very severe if emissions exceed specific threshold values.

Environmental tax is one of several environmental policy tools. Other tools are emission allowances, direct regulations, voluntary agreements, subsidies or grants for more environmentally friendly alternatives and technological development, as well as information. A successful environmental policy cannot be based exclusively on environmental taxes, but the Commission believes that it should be feasible to use environmental taxes to a greater extent than at present. In comparison with alternative policy tools, taxes have attractive characteristics, such as cost effectiveness (the most environment per Norwegian krone spent) and the generation of tax revenues. Emission allowances that are auctioned off have much the same characteristics as environmental taxes.

The main reason for using environmental taxes is to bring about environmental improvements. In addition, environmental taxes will enable a so-called green tax shift, by raising revenues that may be used to reduce other taxes that inflict a deadweight loss on society. Examples of taxes one may want to reduce are employers' social security contributions, personal income tax and corporate tax. Since these taxes give rise to deadweight loss, a green tax shift may deliver other gains in addition to the environmental gains.

This summary chapter provides an overview of the Commission's assessments and recommendations. The summary is structured around key environmental challenges. Section 3.2 discusses the climate challenge and the pricing of greenhouse gas emissions. Section 3.3 addresses other environmentally harmful emissions. Key themes are vehicle taxes and tax on various emissions from commercial activities. In Section 3.4, the Commission discusses biodiversity and the potential introduction of an ecosystem services tax. The development of new technologies will play a key role in resolving environmental problems, and the Commission discusses the structuring of economic policy measures for the promotion of environmental technology development in Section 3.5. Section 3.6 summarises the financial and administrative implications of the Commission's proposals. Chapter 12 provides an integrated overview of the Commission's recommendations.

3.2 The climate challenge

The climate challenge is global and needs to be resolved globally. The United Nations Framework Convention on Climate Change (UNFCCC) is the key framework for such international effort. The main objective of the Framework Convention is to stabilise the concentration of greenhouse gases at a level that is sufficiently low to prevent a dangerous anthropogenic global climate impact. In line with this, the parties to the Framework Convention have agreed to limit the increase in global mean temperature to below 2 °C relative to the pre-industrial level. According to the UN Intergovernmental Panel on Climate Change (IPCC), global emissions will need to be reduced by 40 – 70 percent by 2050, relative to 2010 levels, and net emissions will need to be nil or negative towards the end of the century in order for the two-degree objective to be realised. Norwegian greenhouse gas emissions account for about one thousandth of overall global emissions.

Thus far, countries have not reached agreement on sufficient emission reductions. Only about 10 percent of global emissions are subject to binding emission reduction obligations (the Kyoto Protocol), and few countries use economic or other measures to curtail emissions. All major international analyses of the climate challenge show that establishing a price on greenhouse gas emissions will be of absolutely decisive importance for reducing emissions sufficiently to realise the two-degree target. The purpose of the UN Climate Change Conference in Paris in November-December 2015 is to come to an agreement on greenhouse gas emission reductions that encompasses all countries.

Although the climate challenge can only be resolved through international collaboration, each country bears responsibility for curtailing emissions. In Norway, more than 80 percent of greenhouse gas emissions are priced via taxes or participation in the EU emissions trading system (EU ETS). The average price of Norwegian greenhouse gas emissions is about NOK 250 per tonne of CO₂, which is considerably higher than the EU ETS emission allowance price (close to NOK 80) and the average price of UN-approved projects (like CDM) based on the Norwegian purchase strategy (about NOK 30). There is considerable variation in the price of greenhouse gas emissions between sectors and between emission sources. Agriculture is neither in the EU emissions trading system, nor subject to tax on emissions of methane and nitrous oxide. The CO₂ tax on mineral oil is close to NOK 340 and the tax on HFC and PFC is in excess of NOK 350 per tonne of CO₂ equivalents. Petrol and auto diesel are subject to a CO₂ tax of NOK 410 per tonne of CO₂ equivalents. The price of greenhouse gas emissions is the highest in oil and gas extraction and in domestic aviation within the EU ETS. Both sectors are subject to both CO₂ tax and the EU ETS, and the aggregate price of greenhouse gas emissions is about NOK 500 and 480, respectively, per tonne of CO₂ equivalents. Few, but some enterprises are exempted from CO₂ tax or taxed at a reduced rate.

New emission commitment for Norway for 2030 – towards joint fulfilment with the EU

Norway has submitted to the UN a conditional commitment for Norway to contribute to reducing emissions by no less than 40 percent in 2030, relative to 1990. Norway intends to fulfil the commitment jointly with the EU, which aims to reduce emissions by 40 percent within the EU, without use of international emission allowances. The EU target for 2030 is in conformity with an emission reduction of 80 – 95 percent by 2050, which is compatible with the two-degree objective. The EU emission target for 2030 is to be realised by reducing emissions within the EU ETS by 43 percent and by reducing emissions not included in the EU ETS by 30 percent, both relative to the 2005 level.

Reduction of emissions within the EU ETS shall be achieved through gradual tightening of the number of emission allowances issued annually.

Reduction of emissions in the non-EU ETS sectors is to be allocated as national targets for each member state, and may range from 0 to 40 percent. Furthermore, the flexibility within the non-EU ETS sector will be significantly enhanced. There will be more opportunity for one member state to fund emission reductions in the non-EU ETS sectors in other member states. Moreover, a limited one off arrangement to purchase EU ETS emission allowances in order to account for emissions in the non-EU ETS sector will be put in place.

The Green Tax Commission operates on the assumption that Norway will conclude an agreement with the EU on joint fulfilment of the climate target for 2030. Such an agreement will be guiding for the price of Norwegian greenhouse gas emissions. For greenhouse gas emissions within the EU ETS, the price will be determined in the market, which also encompasses enterprises in Norway. The emissions price in the non-EU ETS sector will be determined by the level of Norway's national target, access to flexible mechanisms and the price of these, as well as the costs of reducing emissions in Norway. It is difficult to estimate what the price of Norwegian greenhouse gas emissions will be, as there is considerable uncertainty associated with Norway's climate target for the non-EU ETS sector and the scope for using EU internal flexible mechanisms. To what extent carbon pricing systems are introduced outside the EU will also have impact on the price of Norwegian greenhouse gas emissions. If a larger part of global emissions are subject to carbon pricing, the development of climate-friendly technology will be swifter. This will contribute to lowering the prices of greenhouse gas emissions.

The Green Tax Commission starts out by defining fundamental guidelines for determining carbon prices based on cost-effective compliance with our international commitments.

Fundamental guidelines for carbon pricing

Norwegian emissions covered by the EU ETS are faced with the EU ETS emission allowance price. At present, parts of EU ETS-emissions (petroleum activities and parts of domestic aviation) are subject to CO₂ tax in addition to this. Such tax provides a further emission reduction incentive in these sectors. This will reduce demand for emission allowances, thus lowering the emission allowance price and freeing up emission allowances for use elsewhere within the EU ETS in Norway or in other countries. Overall emissions in the EU ETS remains unchanged. In principle, the Green Tax Commission is of the view that emissions covered by the EU ETS should not be subjected to CO₂ tax in addition to the emission allowance price, as this will not contribute to a reduction in global emissions as long as the total number of emission allowances issued remains fixed over time. It is possible that a lower emission allowance price may make it easier to bring about reductions in the emission allowance volume in the longer run, but a low price may also weaken the legitimacy of the emissions trading system and the incentives for developing climate technology. The low emission allowance price in recent years gives cause for expecting a future increase, which may, when taken in isolation, be an argument for imposing a temporary CO₂ tax on emissions within the EU ETS.

Greenhouse gas emissions not included in the EU ETS need to be priced via a tax on emissions (CO₂ tax). Cost effectiveness considerations suggest that the CO₂ tax should be the same for all emission sources in the non-EU ETS sectors. The flexibility internally within the EU will, at the margin, contribute to determining the level of the CO₂ tax on emissions in the non-EU ETS sectors. If a high degree of flexibility is introduced in the non-EU ETS sectors, the price of purchasing such emission reductions will represent the opportunity cost of Norwegian emission reductions in the non-EU ETS sectors. The CO₂ tax on emis-

sions in the non-EU ETS sectors should therefore be equal to the price of such emission reductions. If there is a low degree of flexibility, Norway will in practice get a domestic target for emissions in the non-EU ETS sectors. The CO₂ tax on emissions in the non-EU ETS sectors should in such case be put at the level required to meet such target (marginal abatement cost).

A new carbon pricing system in Norway

The fundamental guidelines outlined above will result in considerable changes relative to the current marginal costs of greenhouse gas emissions. The most important change is that the price of greenhouse gas emissions becomes the same for all sectors covered by the EU ETS and for all sectors not included in the EU ETS. This serves to reduce the costs of curbing greenhouse gas emissions.

The price of greenhouse gas emissions within the EU ETS will be determined by the emission allowance price. There is reason to expect an increase in the emission allowance price, given the reduction in the number of emission allowances proposed by the EU. The Green Tax Commission recommends that the special CO₂ taxes on petroleum activities and domestic aviation be reduced in line with the increase in the emission allowance price, such as to bring about an equalisation of greenhouse gas emission prices internally within the EU ETS.

A larger portion of the greenhouse gas emissions in the non-EU ETS sectors should be priced. This implies that the reduced rates of CO₂ tax are increased and that exemptions from such tax are abolished. Specifically, it means that the CO₂ tax rate on mineral oil for fishing in coastal waters shall be increased and that the greenhouse industry, waste incineration, domestic shipping and offshore vessels shall no longer be exempted from the tax.

The fundamental guidelines imply that the CO₂ tax on emissions not included in the EU ETS should be set such as to meet the Norwegian emission target for the non-EU ETS sector. Whether it is the price of EU internal flexible mechanisms or the cost of emission reductions in Norway that will be binding remains uncertain, and will depend among others on whether there is a sufficient market for EU internal mechanisms. Access to such mechanisms is subject to considerable uncertainty. Current greenhouse gas taxes in Norway on emissions in the non-EU ETS sectors are already high and on a par with estimates of prices in 2020 that are consistent with long-term realisation of the two-degree target. However, the taxes are unlikely to be high relative to what can reasonably be expected to be required to realise Norway's emission target for the non-EU ETS sector. The Green Tax Commission recommends a new, general CO₂ tax on emissions in the non-EU ETS sectors, which will upon its introduction be at the same level as the current CO₂ tax on petrol and auto diesel (NOK 420 per tonne of CO₂ equivalents).

After 2020, the tax level will have to develop in line with the price on EU internal flexible mechanisms, or alternatively the level necessary to realise a domestic target for non-EU ETS emissions. The EU target of a 30 percent reduction in emissions in the non-EU ETS sector, may, towards 2030, result in a CO₂ tax that is significantly higher than the current CO₂ tax on petrol and auto diesel.

Agriculture

Greenhouse gas emissions from agriculture account for 8.5 percent of Norway's overall greenhouse gas emissions. Such emissions primarily originate from livestock farming and meat production (methane from flatus and farmyard manure), the release of CO₂ upon the cultivation of bogs and nitrous oxide from nitrogenous fertiliser. Neither is agriculture included in the emissions trading system, nor are emissions of methane and nitrous oxide subject to a tax on greenhouse gas emissions. In principle, the Green Tax Commission believes that all greenhouse gas emissions from agriculture should be subject to a tax. However, this is complicated by a number of practical problems.

With regard to emissions from livestock farming and meat production, it is in practice impossible to measure actual emissions of methane from individual animals and tax these. A less targeted alternative would be to levy a tax on red meat (beef, mutton/lamb and goat meat), which have high greenhouse gas emissions per calorie. Climate considerations would merit, if taken in isolation, the introduction of a tax on red meat. However, a number of agricultural subsidy schemes have been introduced to take into account agricultural and regional policy objectives. At present, production grants are much higher for red meat than for white meat, both per kilogram and per calorie. The Green Tax Commission deems it appropriate,

against this background, to reduce production grants for red meat. Both the lowering of production grants and the levying of a consumption tax will serve to reduce the domestic production of red meat, but may have different effects on consumption and imports. Calculations commissioned by the Commission on the agricultural partial equilibrium model Jordmod indicate that differences between lower production grants and a consumption tax are minor. How much the grants should be reduced must, inter alia, be considered in the context of regional policy considerations, as well as the positive contributions made by grazing livestock to biodiversity and the preservation of cultivated landscapes. Lower production grants would mean that transfers to agriculture are reduced. Overall agricultural support is discussed in more detail in the general discussion as to how higher revenues resulting from the Commission's recommendations shall be allocated.

Furthermore, the Commission recommends the introduction of a tax on nitrogen in mineral fertilisers (synthetic fertilisers) and a tax on greenhouse gas emissions from bog interventions (which will also encompass other land-use changes). The tax rate will in both cases be the same as under the general CO₂ tax on emissions not included in the EU ETS (NOK 420 per tonne of CO₂ equivalents).

Subsidy schemes with a negative climate impact

The Commission has examined subsidy schemes with a negative climate impact, and proposes to downscale or abolish a number of such schemes. These are primarily schemes that subsidise transport, thereby contributing to greenhouse gas emissions. The Commission recommends that passenger transport services be subjected to full value added tax, that grants to domestic aviation be reduced, that the agreement for the procurement of services on the coastal route Bergen-Kirkenes (Hurtigruten) be terminated and replaced by targeted procurement of transport services, that the tax allowance for daily commuting travel between home and work be abolished, that the tax-exempted rate on the use of own car for business travel be reduced and that the right to duty-free imports of alcohol and tobacco be abolished. The Commission acknowledges that some of these schemes are motivated by other societal considerations (for example regional policy objectives), but is of the view that such considerations could be better attended to by other means. The proposed tightening of subsidy schemes will also serve to reduce other environmentally harmful emissions discussed in Section 3.3.

Renewable energy

High ambitions for greenhouse gas emission reductions and joint fulfilment of target with the EU without using international flexible mechanisms, suggest that greenhouse gas emission prices will increase in coming years. A higher price on greenhouse gas emissions means that the cost of using fossil energy will increase, and that various forms of renewable energy will become more competitive. Higher carbon prices on greenhouse gas emissions, and hence higher energy prices, means that renewable energy production may be expanded even without state aid.

The electricity certificate scheme is a subsidy scheme for renewable power generation funded through a mark-up on electricity bills. The scheme is shared between Norway and Sweden, and is intended to establish a total of 26.4 TWh of new renewable power generation between 2012 and 2020. The electricity certificate scheme is not an efficient climate policy tool in the short run. Expanded generation of electricity from renewable sources in Norway will largely replace generation of electricity from fossil sources in the EU. Since the EU ETS emission allowance volume is fixed for this period, there will be no reduction in overall greenhouse gas emissions. The development of new renewable energy will also come with an environmental costs as it requires interventions in nature.

The Commission recommends that the electricity certificate scheme not be extended beyond the period for which it has been approved.

Other factors of relevance to carbon pricing

Norwegian policy will not only influence Norwegian emissions, but also emissions abroad (beyond the use of flexible mechanisms) that are not included in the Norwegian emission accounts or Norway's international commitments. Lower production grants to red meat may, for example, result in higher imports and

thus higher greenhouse gas emissions abroad (so-called carbon leakage). Reduced petroleum production in Norway may (unless other petroleum-producing countries expand their production correspondingly) reduce global petroleum consumption, and hence global greenhouse gas emissions. It is a legitimate question whether such factors should be taken into consideration in formulating climate policy, for example through the introduction of a consumption tax on red meat (which also applies to imports), instead of reducing production grants, or a tax on Norwegian petroleum production to reduce global petroleum consumption. Emission reductions abroad may also be achieved by utilising international flexible mechanisms, or by financing emission reductions from deforestation in developing countries. The Green Tax Commission is of the view that effects of Norwegian policy on emissions abroad need to be considered from the perspective of whether these are efficient means of reducing global greenhouse gas emissions. However, it can be challenging to estimate the effects on global emissions. Another important factor is which political signals are conveyed by Norwegian climate policy, and how these may affect Norway's role in climate negotiations. It falls outside the Commission's mandate to make specific recommendations in such regard.

Certain emissions from Norwegian territory are not encompassed by the Norwegian emission accounts and Norway's international commitments. These include, inter alia, CO₂ emissions from aviation between Norway and destinations outside the EEA, and emissions of black carbon. Although measures to reduce such emissions will not contribute to compliance with our international obligations, they will contribute to reducing global greenhouse gas emissions. The Commission believes that all greenhouse gas emissions from Norwegian territory should in principle be priced. The Commission recommends that it be examined whether flights between Norway and destinations outside the EEA (flights within the EEA are encompassed by the EU ETS) should be subjected to a climate-motivated seat or passenger tax, and that a black carbon element be added to the CO₂ tax on mineral oil. The tax level will in both cases have to be considered in more detail. Implications in terms of the number of unnecessary intermediate stops must form part of the assessment as far as flights outside the EEA are concerned.

A climate-motivated seat or passenger tax for flights between Norway and destinations outside the EEA is a second-best solution. The Commission recommends that efforts be pursued with a view to amending international shipping and aviation regulations such as to ensure that greenhouse gas emissions from international shipping and aviation are priced.

Taxes on petroleum activities and coal mining in Svalbard

Norway levies high taxes on petroleum activities and high taxes on fuels. This is in contrast with many other petroleum-producing countries, which have low taxes or subsidise fuels. Legislative Proposition No. 1 (2015 – 2016) to the Storting, Taxes and tariffs 2016, provides an overview of tax sanctions and tax expenditure. For petroleum activities, it is specified for 2015 that CO₂ tax on the continental shelf represents a tax sanction of NOK 5.2 billion gross and that high investment-based allowances represent a tax expenditure of NOK 17.9 billion.

In principle, the Commission believes that tax expenditure and tax sanctions associated with petroleum activities should be abolished to prevent economically unprofitable investments from being implemented and to ensure that the negative environmental impact of petroleum extraction on the Norwegian continental shelf is no larger than necessary.

In principle, the Commission believes that all greenhouse gas emissions in Svalbard, including emissions from mining operations and coal power plants, should be priced to provide incentives for reducing emissions. The same applies to local pollution (coal dust emissions). However, Svalbard is outside the tax area and it can be complex to establish separate taxes on environmentally harmful emissions. The imposition of emission-reduction measures should be considered as a second-best policy. Coal mining in Svalbard should not be subsidised, and the conflicting objectives motivated by environmental considerations and strategic/political considerations, respectively, should be highlighted when Norway's Svalbard policy is examined. It should also be considered whether other industries, such as tourism and research, have now become so important to Svalbard society that the mining operations can be discontinued without any detrimental implications in terms of strategic/political objectives.

3.3 Other environmentally harmful emissions

In addition to global warming, human activity has other negative environmental implications at the local, regional or global level. A number of urban areas are, for example, faced with local air pollution challenges. These can affect human health. The challenges are related, in particular, to local emissions, for example from road traffic, but are also caused by long-range air pollution from other countries. The main regional problem is acidification of water and soil. Acidification is related, in particular, to long-range emissions. Excessive fertilisation is related, in particular, to local emissions from agriculture and aquaculture.

Environmental contaminants are strictly regulated, and emissions of prioritised environmental contaminants have been reduced significantly over the last 15 years. Long decomposition times and continued inflow from both national and international sources mean that concentrations of environmental contaminants will nonetheless remain higher than recommended for a long time to come.

Most of the refuse in Norway is collected. However, some refuse remains in nature through littering. Littering is a source of pollution and may be detrimental to animals and humans. Many types of refuse have long decomposition times. Marine littering in general, and microplastics in particular, is a growing problem and refuse is easily spotted along the coast of Norway.

Noise is deemed to be a public health problem. It can, inter alia, cause sleeping problems and stress. Noise has also been found to have potentially negative effects on onshore and offshore fauna. Noise in nature areas has a negative impact on both nature experiences and the quality of life.

Taxes on other environmentally harmful emissions than greenhouse gases will be discussed in the following. Vehicle and fuel taxes are addressed in Section 3.3.1 and other environmental taxes in Section 3.3.2.

3.3.1 Vehicle and fuel taxes

Road traffic serves important functions in modern society and contributes to the smooth transport of goods between manufacturers and markets, and of employees between their homes and workplaces. Road traffic results in closer integration of different geographic markets, which stimulates competition and economic growth. Recreational and leisure activities often depend on car or bus transport. However, road traffic also has negative implications in the form of, for example, CO₂ emissions, local air pollution, accidents, congestion and noise. This is a key rationale behind vehicle and fuel taxes.

Current vehicle taxes are related to the purchase (motor vehicle registration tax), ownership (annual motor vehicle tax and annual weight-based tax) and use of cars (road usage tax and CO₂ tax). The rationale behind usage taxes is that road traffic generates environmentally harmful emissions and other external costs, whilst taxes relating to purchase and ownership (non-usage-based taxes) are predominantly fiscally motivated. Non-usage-based taxes are partly differentiated on the basis of the environmental characteristics of vehicles. Zero-emission cars (electric cars and hydrogen cars) are exempted from value added tax and motor vehicle registration tax, and subject to a reduced annual motor vehicle tax rate.

The taxation of road traffic has implications for both global and local environment. The Commission's carbon pricing system implies that fuels used in road traffic are subjected to the general CO₂ tax applicable to emissions not included in the EU ETS. The structuring of the other vehicle and fuel taxes is discussed in the following. As the vehicle taxes feature an element of differentiation based on CO₂ emissions, this discussion must to some extent be considered in the context of greenhouse gas emission pricing.

The road usage tax

The Commission operates on the premise that usage-based vehicle taxes should be at a level matching the marginal external costs of road traffic. The Institute of Transport Economics (TØI) has recently prepared updated calculations of costs associated with local air pollution, accidents, noise, congestion, road wear and tear, as well as winter operations. NO_x emission figures are based on independent test findings that register considerably higher emissions than indicated by the certificate of conformity, especially in congested traffic. Such calculations do not include greenhouse gas emissions (which are addressed via the CO₂ tax), and may thus serve as a basis for determining the level of the road usage tax intended to cover other external costs than greenhouse gas emissions. TØI finds that marginal external costs are considerably higher

than the current level of road usage tax, especially in major urban areas and during rush hours, which suggests that the road usage tax may be increased substantially. The Commission has in its impact assessments assumed that usage-based taxes may be increased by NOK 12 – 17 billion. This takes into account that road tolls already imply some degree of pricing of external costs. Although road tolls are not motivated by the pricing of external costs, these may nonetheless have traffic management implications.

The road usage tax is currently collected by way of taxes on petrol and diesel. The current composition of the vehicle population means that the road usage tax encompasses more than 90 percent of all vehicles. However, it is a problem that the road usage tax is not differentiated on the basis of where and when the road usage takes place. Marginal external costs are, for example, higher in major urban areas than in sparsely populated areas, and are higher during periods of dense traffic than during periods of sparse traffic. Moreover, it is likely that future developments will result in a major portion of the car population being comprised of zero-emission cars (for example electric cars and hydrogen cars) or other ultra-low emission cars. If disregarding emissions of greenhouse gases, NO_x and particles, the external costs (congestion, accidents, road wear and tear, whirling of particles, etc.) of using such cars will be about the same as of using petrol and diesel cars. However, it is difficult to levy road usage tax on electricity for use in such vehicles. These circumstances suggest that it is necessary to price the external costs differently than at present.

The Commission has considered an alternative in which the current road usage tax on fuels is replaced by GNSS-based road pricing. This is a satellite-based system in which all vehicles are equipped with a transponder transmitting information on where the vehicle is located at any given time. Such systems have been introduced for heavy vehicles in several European countries. The Commission is envisaging a fairly rough classification based on geographic zones (for example major urban areas, other urban areas and sparsely populated areas) and the time of day (for example during and outside rush hours). This is partly because empirical knowledge concerning variations in damage costs is limited, and partly because a highly fine-meshed system would be difficult to keep track of for motorists. The tax can be based on the number of kilometres driven, as well as where and when the road usage takes place. Besides, the taxes per kilometre need to be differentiated by vehicle type (for example passenger car, lorry, bus) and fuel type (for example petrol, diesel, electricity) in line with estimated marginal external costs. From an economic perspective, GNSS-based road pricing would be the most precise method of pricing external costs, also for zero- and low-emission cars. GNSS-based road pricing involves disadvantages in relation to data protection and tax collection. It would for a certain period of time be necessary to retain fairly detailed information in order to facilitate verification as to whether the tax has been correctly calculated. GNSS-based road pricing would also result in a significant increase in the number of tax payers, and hence in increased administrative costs.

Another alternative is to introduce GNSS-based road pricing only for heavy vehicles (including foreign vehicles) and a separate system for light vehicles. The tax system for light vehicles will comprise three components: (i) accident tax; (ii) environment and congestion pricing; and (iii) a new road usage tax on fuels.

Accident costs represent, on average, more than half of marginal external costs (excluding greenhouse gas emissions) and vary little between geographical areas. An accident tax will encompass all light vehicles (including zero- and low-emission cars) and may be levied as a fixed amount per kilometre agreed in the insurance agreement. A restructuring of the annual motor vehicle tax as a tax on traffic insurance is already in the pipeline, and the collection of a new accident tax can be coordinated with this. In order for the accident tax to work as intended, there may be a need for the number of kilometres agreed in insurance agreements to be classified into somewhat smaller intervals than at present.

Environment and congestion pricing in major urban areas can reflect that the marginal external costs of road traffic are higher in major urban areas and that these vary with the time of day within major urban areas. An environment and congestion pricing system can be based on the current toll rings in major urban areas, and will capture external costs associated with congestion and high local emissions (NO_x and suspended dust). However, there may be a need for a more fine-meshed network of toll charging points in existing toll rings and the establishment of toll rings in additional urban areas. In order to capture variations in emission costs, the environment and congestion pricing should be differentiated by type of fuel (for

example diesel, petrol, electricity) and other vehicle characteristics. Such differentiation requires additional vehicle details to be registered in the AutoPASS scheme.

The remaining external costs relating to road wear and tear, winter operations and noise, as well as local air pollution outside densely populated areas, can be priced through a tax on fuels, like at present. The level of the new road usage tax on fuels would be set such as to reflect the energy contents of the various fuel types. This would imply that the amount of tax is about the same per kilometre driven. The new road usage tax would be expanded to encompass all fuel types, including biofuels and gas.

When compared to GNSS-based road pricing, this would result in a tax system with less precise pricing of marginal external costs, but the model does not suffer from the same disadvantages relating to data protection and tax collection. The Commission believes that such a tax model for light vehicles, in combination with GNSS-based road pricing for heavy vehicles, can be a permanent arrangement for pricing of the marginal external costs of road traffic.

Certain aspects of the accident tax model should be examined in further detail. Firstly, such model will result in the rate of the new road usage tax on fuels being lower than the current rate, which may cause petrol and diesel prices to be lower than at present. This may make it more attractive for foreign motorists to purchase fuel in Norway, which would be registered in the Norwegian greenhouse gas emission accounts. The level of the new road usage tax should be considered from this perspective. Another objection is that the accident tax adds to the complexity of the system for motorists. An alternative to the accident tax might be to retain the accident component of the road usage tax, whilst at the same time introducing a separate mileage tax for zero- and low-emission vehicles. The Commission is of the view that the accident tax is more appropriate than such a solution because it can be coordinated with the collection of annual motor vehicle tax, thus implying that it can encompass all light vehicles (not only zero- and low-emission cars). Administrative costs are likely to be lower than for a system with a mileage tax for zero- and low-emission vehicles.

It is primarily in major urban areas that local air pollution from road traffic is an important problem. Several heavily urbanised municipalities wish to enact direct regulations, such as prohibitions against the use of diesel cars on certain days or bans on driving into the town or city centre. The desire for direct regulations may reflect the limited scope permitted under current toll ring arrangements (adopted pursuant to the Road Act) for differentiating rates. Rates can only be differentiated on the basis of time if the measures in the road toll package are motivated by heavy rush hour traffic. Road pricing or congestion pricing (adopted pursuant to the Road Traffic Act) allow more flexibility in terms of differentiation based on the time of day and environmental considerations. The Commission recommends that the regulatory framework be adapted to facilitate the use of environment and congestion pricing in major urban areas. Environment and congestion pricing will in many cases be more appropriate traffic management tools than direct regulations, such as for example prohibitions for certain vehicle types. Some car owners may have a willingness to pay for car use on the relevant days that exceeds the emission costs inflicted on society by such car use. Consequently, environment and congestion pricing will result in more socially optimal behaviour than would a prohibition.

Motor vehicle registration tax and annual motor vehicle tax

Non-usage-based taxes are predominantly fiscally motivated. For Norway, a high motor vehicle registration tax may also imply lower import prices. Non-usage-based taxes are partly differentiated on the basis of the environmental characteristics of vehicles. As discussed above, the Commission proposes that the level of usage-based taxes be modified to better reflect environmental damage and other external costs than at present. It is relevant to discuss, against that background, both the level of non-usage-based taxes and the extent to which these shall continue to be differentiated on the basis of environmental characteristics. It may be argued that higher usage-based taxes should be counterbalanced by lower non-usage-based taxes in order to limit the overall tax level associated with keeping a car. The Commission has chosen to address this issue as part of the general discussion of how to use the higher revenues from environmental taxes.

Road traffic causes environmental problems and other external costs associated with car use. This suggests that environmental taxes should be levied on car use, and that it is not necessary to differentiate non-usage-based taxes on the basis of the environmental characteristics of vehicles. There are nonetheless

some environmental arguments that may be invoked in favour of environmental differentiation of non-usage-based taxes. It may, for example, be that purchasers of cars do not attach sufficient weight to future fuel expenses when purchasing a new car (present bias). Zero-emission cars are exempted from motor vehicle registration tax under the current system, thus implying that the CO₂ component does not affect overall taxes for such cars. Under the Commission's recommendation that zero-emission cars should be subject to motor vehicle registration tax (see below), the CO₂ component will also be of relevance to such cars. This implies that network externalities associated with the adoption of new technology will be a further argument in favour of the CO₂ component. The Commission recommends that a certain environmental differentiation of motor vehicle registration tax be retained. It is proposed, as a measure to reduce present bias, that retailers of new vehicles be required to specify the estimated fuel costs of vehicles.

At present, the motor vehicle registration tax is calculated on the basis of the weight, engine power, as well as CO₂ and NO_x emissions, of vehicles. The financial gain from choosing a car with low CO₂ emissions is high. The incentive under the motor vehicle registration tax for choosing cars with low CO₂ emissions is currently estimated at NOK 3,000–12,000 per tonne of CO₂ over the lifespan of the car. For most cars, the amount is about NOK 3,000 per tonne. The CO₂ component of the motor vehicle registration tax has contributed to a considerable reduction in average CO₂ emissions from new passenger cars. However, a substantial portion of the reduction in average CO₂ emissions is caused by a higher market share for diesel cars, which has contributed to increasing NO_x emissions, and thereby local air pollution.

The CO₂ component of the motor vehicle registration tax contributes to making the overall carbon price for road transport much higher than in other sectors. This gives cause to ask whether the climate policy is structured in a cost-effective manner. The Commission considers the emissions trading system and the CO₂ tax to be the primary means of achieving a cost-effective climate policy across sectors.

It is difficult to establish, on an economic basis, the appropriate level of differentiation, but the Commission is of the view that the CO₂ component of motor vehicle registration tax should be smaller than at present. However, arguments relating to present bias and network externalities suggest that CO₂ differentiation should remain significant.

The Commission has in its impact assessments examined the effects of reducing the CO₂ component to about NOK 1,500 per tonne of CO₂ over the lifespan of the car. Besides, it is proposed to abolish the progressive element of the CO₂ component, such as to make incentives for purchasing lower-emission cars the same for all vehicles.

Present bias may justify differentiation of the motor vehicle registration tax on the basis of NO_x emissions, in the same manner as for the CO₂ component. The NO_x component may also be justified on the basis that it can be difficult to structure the road usage tax in an optimal manner. The NO_x component should be considered in light of the CO₂ component, such as to prevent any undesirable distortions between petrol and diesel cars.

The motor vehicle registration tax for vans, taxis and minibuses is calculated as a percentage of the tax on passenger cars. The Commission recommends that such vehicles be subjected to the full CO₂ and NO_x component of the motor vehicle registration tax, whilst at the same time modifying the weight and engine power components in such a manner that the tax burden on enterprises is not increased. Campervans should be subjected to the full CO₂ and NO_x components.

There is an environmental component to the annual motor vehicle tax inasmuch as diesel cars without a factory-fitted particulate filter are subjected to a higher rate of tax than other vehicles. The Commission considers this a viable arrangement until the introduction of GNSS-based road pricing, or environment and congestion pricing in major urban areas that reflects the environmental characteristics of vehicles.

Zero-emission cars

The Commission takes the view that taxes on the purchase, ownership and use of zero-emission cars should in principle be considered in the same manner as taxes on the purchase, ownership and use of conventional cars. This suggests, firstly, that the level of usage-based taxes on zero-emission cars should also reflect marginal external costs. Marginal external costs will be lower for zero-emission cars than for petrol and diesel cars. This is principally because these are not emitting greenhouse gases, but also because they are causing less local air pollution. The other external costs relating to congestion, accidents, as

well as road wear and tear, etc., will be the same for zero-emission cars as for corresponding petrol and diesel cars. The road usage tax proposal of the Commission involves zero-emission cars being subjected to a tax covering marginal external costs, either through the introduction of GNSS-based road pricing or through a combination of environment and congestion pricing and accident tax. The Commission further recommends that zero-emission cars be subjected to motor vehicle registration tax and annual motor vehicle tax in the same manner as other cars, and also recommends the abolition of the exemption from value added tax and the discount under the company car scheme for electric cars.

The preferential tax treatment of zero-emission cars is largely motivated by the need for taking network externalities into account. Such need has declined in line with increases in the market share of electric cars, and the Commission believes that the preferential treatment of electric cars can now be scaled back. Network externalities will still apply to hydrogen cars. Zero-emission cars will remain subject to substantially lower taxes than corresponding petrol and diesel cars. This is the result of the environmental differentiation of motor vehicle registration tax and annual motor vehicle tax, and also of zero-emission cars not being subject to CO₂ tax. In addition, they cause less local air pollution, which will result in lower rates of environment and congestion pricing or GNSS-based road pricing.

The Commission's recommendations still imply a favourable tax treatment of zero-emission cars. Such favourable treatment will to a greater extent than at present reflect the environmental gains from zero-emission cars, as compared to petrol and diesel cars. Further grants for the purchase of zero-emission cars may be given in the form of a temporary subsidy on the expenditure side of the budget. The system will become more transparent by gathering grants for zero-emission cars together in one place. A subsidy scheme for zero-emission cars should be structured as a fixed amount per car, to be phased out gradually in accordance with an announced reduction and abolition plan. The amount of such grant may, at the time of its introduction, be based on the value of the exemption from value added tax for an ordinary electric car. In determining the amount of such grants it should also be considered whether other measures (such as for example grants for charging and filling stations) are more effective in terms of stimulating the sale of zero-emission cars.

Plug-in hybrid cars

Marginal external costs will for plug-in hybrid cars depend on the extent to which the car runs on electricity and the extent to which it runs on petrol/diesel. This poses challenges in relation to the motor vehicle registration tax. Significantly lower motor vehicle registration tax for plug-in hybrid cars than for corresponding petrol and diesel cars might make it profitable to purchase plug-in hybrid cars with the intention of primarily running these on petrol or diesel. This strengthens the argument that environmental taxes should principally be levied on car use.

Plug-in hybrid cars also present some problems with regard to the pricing of external costs associated with local air pollution in major urban areas. Local air pollution will depend, especially for plug-in diesel hybrid cars, on whether the car runs on diesel or electricity. It can be difficult to capture this through GNSS-based road pricing, or through environment and congestion pricing. Stricter emission requirements may reduce this problem.

Vehicles, etc., not encompassed by vehicle and fuel taxes

Motorised equipment, pleasure boats, jet skis, etc., may have environmental and health effects in the form of air and water pollution, noise, accidents, etc., that are not priced via vehicle and fuel taxes. Present bias may also in this context justify an environmentally differentiated tax at the time of purchase. The Commission is of the view that the potential introduction of an environmentally differentiated tax upon the purchase of motorised equipment not currently subject to any corresponding tax should be examined in further detail. One may, for example, start out by considering an environmentally differentiated tax on pleasure boat engines, along with environmental differentiation of the motor vehicle registration tax on snowmobiles.

3.3.2 Other environmental taxes

Tax on emissions subject to emission licences

Emission permits under the Pollution Act (licences) for individual enterprises are an important policy tool for the regulation of emissions to air and water from manufacturing industry. Close to 4,000 enterprises and municipal facilities hold emission permits from the Norwegian Environment Agency, county governors or local authorities. Although emissions from manufacturing industry have been reduced considerably over the last few decades, manufacturing industry emissions still account for a significant portion of overall Norwegian emissions, and such emissions can be high within a specific geographical area.

The Commission recommends that the scope for supplementing the licencing system by a tax on permitted emissions (stipulated in the emission permit) and any excess emissions be examined in further detail. This may have a number of positive effects. Firstly, it will give enterprises an incentive to reduce emissions and apply for less extensive emission permits. Secondly, it will give enterprises an incentive to prevent emissions from being higher than permitted. Thirdly, such a tax can improve the functioning of the licencing system. A licence is granted if the social benefits of a measure are deemed to outweigh its disadvantages. Enterprises may therefore find it in their interest to exaggerate the costs of limiting or cleaning up emissions, in order to avoid strict emission requirements. This problem will be reduced if they are required to pay a tax on their emissions. If emissions are subject to tax, enterprises should be allowed flexibility with regard to how their emission targets are to be met.

Such a tax system would primarily be of relevance to emissions that are not subject to tax at present. Potential candidates are environmental contaminants, suspended dust, nitrogen and possibly noise.

Taxes on NO_x and SO₂ emissions

The NO_x tax shall contribute to cost-effective reductions in NO_x emissions and to Norway meeting its emission commitment under the Gothenburg Protocol. The sulphur tax on mineral oil shall contribute to reductions in sulphur dioxide (SO₂) emissions. Joint characteristics of these two taxes are that not all emissions fall within their scope, and that there is considerable geographic variation in the marginal damage costs of the emissions these are intended to price.

Road traffic emissions fall outside the scope of the NO_x tax and the sulphur tax on mineral oil, but are instead priced via the road usage tax on fuels. Furthermore, parts of manufacturing industry have concluded agreements with government authorities on emission reductions in return for being exempted from tax. The NO_x agreement covers most of manufacturing industry, and involves the payment of membership dues to an NO_x fund, which fund finances emission reductions. The NO_x agreement has resulted in emission reductions and less resistance to environmental requirements in manufacturing industry. However, there is reason to believe that the social costs of such emission reductions have been higher than is necessary. This has to do with membership dues being higher for the petroleum sector than for other sectors, and with the measures supported by the fund not necessarily being the cheapest ones. A corresponding agreement has been concluded between manufacturing industry and central government with regard to process emissions of SO₂ (emissions from coal and coke, as well as emissions from refineries).

The Commission is of the opinion that tax is, in principle, a better means of achieving cost-effective emission reductions than are agreements with an entitlement to tax exemption. Such agreements imply that the membership dues paid by manufacturing industry are used to fund emission-reduction measures. In a tax regime, manufacturing industry would both pay environmental tax on its emissions and fund measures to reduce such emissions. The Commission recommends that the use of environmental agreements, including the agreements on NO_x and SO₂, be evaluated prior to the conclusion of any new agreements. Such evaluation should attach weight to cost-effective emission reductions and the «polluter pays» principle.

There is considerable geographic variation in marginal damage costs for both NO_x and SO₂. Marginal damage costs for NO_x are estimated at NOK 320 per kg in major urban areas, NOK 85 per kg in other urban areas and NOK 20 per kg outside densely populated areas. The current tax level for SO₂ emissions is on a par with estimates for marginal external costs outside densely populated areas. However, the said

estimates are based on data from the late 1990s and must be considered uncertain. The Commission therefore recommends that updated studies of the harmful effects of NO_x and SO₂ be conducted.

The Commission will in any event recommend that the introduction of a geographical differentiation of the taxes on NO_x and SO₂ be considered, for example on emissions from ships in port and stationary emission sources. Geographical differentiation may cause enterprises to take environmental costs into account in their localisation decisions. Geographical differentiation of emissions from stationary emission sources may be implemented by way of areas characterised by particularly high marginal damage costs being subject to a surtax in connection with the licencing process, cf. the discussion of a tax on emissions that are subject to emission licences. A tax on emissions of NO_x from ships in port could be differentiated by engine characteristics and the time spent in port. Such a tax will, inter alia, provide incentives to use onshore power supply.

Waste oil

Subventions are currently made for the depositing of waste oil at approved collection facilities. A high proportion of waste oil is collected, thus indicating that the arrangement functions as intended. Waste oil is exempted from CO₂ tax, sulphur tax and base tax on mineral oil, reportedly because a tax may reduce the quantity of waste oil collected. CO₂ and sulphur taxes are intended to price external costs of emissions. As with other mineral products, the incineration of waste oil generates emissions. The Commission is therefore of the view that the exemption from CO₂ tax, sulphur tax and base tax on mineral oil should be abolished. This will contribute to cost-effective emission reductions, whilst at the same time providing incentives for the re-refining of waste oil.

Abolition of the tax exemption may reduce the willingness of collection facilities to pay for waste oil. The Commission has considered further measures to ensure that the collection of waste oil remains adequate. In the short run, the Commission believes that it would be most appropriate to increase the subventions made for the depositing of waste oil at approved collection facilities. In the longer run, one may consider measures to stimulate re-refining of waste oil or the introduction of a product liability arrangement.

Excessive fertilisation and eutrophication

Emissions of nitrogen, phosphorus and ammonia may cause excessive fertilisation and thus eutrophication of watercourses and coastal waters. The main emission sources are the use of fertiliser in agriculture and aquaculture. Farmyard manure and mineral fertiliser are used to increase agricultural harvests, but an excess of nutrient salts (nitrogen and phosphorus) may cause excessive fertilisation and eutrophication. Farmyard manure is also an important emission source for ammonia. Aquaculture accounts for the predominant part of phosphorus emissions, primarily to the north of the Stad peninsula.

Until 2000, a tax was levied on nitrogen and phosphorus in synthetic fertilisers. The tax was abolished as part of the agricultural settlement. It was intended that targets for reduction of nutrient runoff would be met by other policy means, but there has been no reduction in nitrogen emissions from agriculture in recent years. The Commission recommends the introduction of a tax on nitrogen and phosphorus in mineral fertiliser to price the external costs associated with excessive fertilisation and eutrophication. This would be in addition to the climate tax on nitrogen in mineral fertiliser. In principle, there also ought to be a tax on nitrogen in farmyard manure, but such a tax is difficult to levy in practice.

The Commission has considered a tax on fish feeds in order to reduce phosphorus and nitrogen emissions. However, as yet no damage has been demonstrated in the form of excessive fertilisation in the areas in which aquaculture is located. Hence, the Commission recommends that no tax on fish feeds be introduced at the present time. If the environmental problems associated with emissions from aquaculture turn out to have been underestimated, the introduction of a tax should be reconsidered. The same applies to other environmental challenges in relation to aquaculture, such as for example escaped farmed salmon and emissions of delousing agents. The Commission recommends that external costs of aquaculture be assessed in more detail and that new taxes in the field be considered in view of such assessment.

Aircraft noise

Noise is primarily a local environmental problem, with the transport sector as its main source.

Aircraft noise is principally a problem at and around airports. The noise problem varies with the time of day, the type of aircraft, the population density in the vicinity of the airport, as well as flight approach patterns. The Commission recommends that a system of noise taxes at Norwegian airports be examined in further detail.

Miscellaneous

The Commission has considered a number of taxes on environmentally harmful emissions in addition to those discussed above, but without proposing changes to existing taxes or new taxes. The reasons are either that such taxes work as intended, the absence of good estimates of the environmental damage, a need for further examination or that said taxes are fiscally motivated.

The taxes on trichloroethene (TRI) and tetrachloroethene (PER) have contributed to a substantial reduction in the use of these chemicals, which are hazardous to health and environmentally harmful, and the use of PER has almost been phased out. The taxes work as intended, and the Commission recommends that these be maintained at the same level as at present.

In some cases, the environmental cost estimates are uncertain and/or outdated. The Commission recommends, in particular, that estimates of the harmful effects of sulphur dioxide (SO₂), pesticides and littering be updated. Until updated analyses are available, it is recommended that the sulphur tax, the environmental tax on beverage packaging and the tax on pesticides be maintained at the same level as at present. New taxes to counter littering are not proposed.

In Sweden, a report on taxes on chemicals has recently been published. It proposes, inter alia, a tax on PVC that applies to floor, wall and ceiling coverings that contain PVC. The Commission holds this to be an interesting proposal and recommends that a corresponding tax be considered in Norway.

Historically, the electricity tax, the base tax on mineral oil and the base tax on disposable packaging for beverages have partly been environmentally motivated and partly been fiscally motivated. The Commission is of the view that these taxes currently rest on a weak environmental foundation and considers them to be fiscal taxes, in line with the official Norwegian report on differentiated electricity consumption tax for households (NOU 2004: 8 Differensiert elavgift for husholdninger – Norwegian only). Consequently, the Commission has not examined these taxes in further detail.

3.4 Biodiversity loss

The UN has concluded that the main challenge for sustainable development, apart from the climate problem, is biodiversity loss. Loss of natural diversity can be a problem locally, regionally and globally. Natural diversity is regulated via various international agreements and obligations.

Land-use changes as the result of, for example, the construction of primary homes, holiday homes and roads are currently a threat against natural diversity in Norway. Land-use changes result in natural habitats being lost, fragmented, destroyed or modified. The absence of natural diversity pricing means that many of the goods and services produced by ecosystems are perceived to be free or cheap to use, although the value of such resources may be very high. This provides an incentive for excessive consumption. The general state of Norwegian ecosystems is nonetheless fairly good.

The use of nature is primarily regulated via zoning plans and/or licencing processes pursuant to the Energy Act, the Watercourse Regulation Act, the Minerals Act, etc. The licencing process involves, inter alia, requirements for examining the environmental implications of the various projects. A licence is granted if the benefits from an initiative are held to outweigh the disadvantages. The authorities may also require abatement measures to reduce the damage from the initiative, for example requirements for habitat improvements or changes to the routing of power lines.

An ecosystem services tax is a tax on the use of nature areas. The official Norwegian report on green taxes and policies for a better environment and high employment (NOU 1996:9 Grønne skatter – en politikk for bedre miljø og høy sysselsetting – Norwegian only) proposed the examination of the scope for

introducing an ecosystem services tax as a potential means of confronting developers with the full economic costs of interventions in nature. The proposal has not been followed up, but was reiterated by the Ecosystem Services Committee ([official Norwegian report NOU 2013: 10](#) – complete text in Norwegian only), which noted that the methods for economic valuation of land areas have evolved in recent years, and «that an arrangement involving a – potentially earmarked – ecosystem services tax should be considered».

The Commission starts out from the premise that all use of natural resources and ecosystem services should carry a price tag. Such price should reflect the economic costs of loss of, for example, biodiversity. This suggests that an ecosystem services tax should be introduced on all interventions in nature that reduce the value of ecosystem services and biodiversity. An ecosystem services tax will make developers internalise environmental costs to a greater extent, and can in addition serve to improve the functioning of the licencing process. The licence applicant (developer) may have an incentive to exaggerate the private financial gains to increase the likelihood of obtaining a licence. An ecosystem services tax may serve to correct such market failure.

The main challenge in designing an ecosystem services tax is that economic costs vary considerably across periods, locations and types of damage to nature, and that knowledge of damage costs is limited. An ideal ecosystem services tax would reflect this, but would result in a complex and opaque tax system. The Commission recommends the development of a system based on rules of thumb, with a small number of tax categories depending on type of intervention and localisation. The tax would be determined as part of the licencing process. One possibility for the valuation of environmental damage would be to refer to the land-use indicator INON (areas without major infrastructure development in Norway). INON areas are defined as areas located one kilometre or more (as the crow flies) away from heavy technical interventions. The classification of interventions and nature types in INON might serve as a basis for a valuation using rules of thumb. The valuation should also take into account loss of recreational value as the result of interventions in nature, which loss may be considerably higher for land areas close to major population centres than for INON type areas.

The ecosystem services tax should be considered in the context of the Commission's proposal for CO₂ tax on bog interventions and major land-use changes. This proposal may be considered a first step towards the development of a general ecosystem services tax that also takes other negative environmental impacts into account.

The Commission also recommends, in order to limit loss of biodiversity, that the subsidies for the construction of logging roads and steep-terrain logging be abolished.

3.5 Development and dissemination of environmental technology

Technological development can make key contributions to resolving environmental challenges. Technological changes may serve to reduce the environmental impact by scaling back the use of environmentally degrading inputs, developing new production processes or products with less environmental impact and developing cleaning technology.

Technological development is caused by innovation and may be described as a movement through various phases. A distinction is commonly made between the research phase, the refinement phase and the dissemination phase. The private financial gain from innovation is estimated to be less than the economic gain, for both environmental technology and other technology. However, the market imperfection may be more pronounced for environmental technology than for other technology, especially during the research phase and the dissemination phase. Productivity in the development of environmental technology may be relatively low during the research phase, because the knowledge base in the field is so restricted, and it can be challenging for environmentally friendly alternatives to gain a market foothold during the dissemination phase. This suggests that policy measures to promote the development of environmental technology should in some cases be administered in larger doses than for other technology.

The Commission considers predictable environmental taxes or other forms of pricing of polluting emissions to be making an important contribution to technological development in the environmental field. Environmental taxes make it more profitable to develop more environmentally friendly technology. During the dissemination phase, environmental taxes contribute to the adoption of new technology, thus also

increasing the profitability of the research phase and the refinement phase. Direct regulations, such as emission or technology requirements, also provide incentives for the development of environmental technologies, and may be effective where the use of taxes is not viable. Non-economic measures, such as information campaigns, should also be considered, in order to contribute to price signals being registered and to new technologies being disseminated in markets.

Grants for the development of environmental technologies in particular, especially during the research phase, are necessary to correct for positive knowledge externalities. If there is major uncertainty associated with future environmental policy, this may also serve as an argument for higher grants. The Commission is of the view that a combination of environmental taxes and grants for technological development will in most cases be the most appropriate use of policy measures to promote the development and use of environmental technology. Grants for technological development will, as a main rule, not be sufficient to ensure that environmentally friendly technology is entered into use. Environmental taxes are necessary to make it profitable for enterprises and households to put such technology to use. The Commission is not in a position to make specific recommendations as to how such grants and other innovation policy should be structured.

If environmental technology cannot, for various reasons, be adequately supported through innovation policy measures, one might consider setting taxes on environmental externalities at a level in excess of marginal environmental damage. Challenges during the dissemination phase for new environmental technologies (for example CO₂ capture and storage) may also serve as an argument for setting a tax rate in excess of the environmental damage if (temporary) direct grants are difficult to implement. One thereby compensates for the network externality represented by the fact that every time someone purchases a product with a negative environmental impact, the probability increases that others will purchase the same product in future. However, it is difficult to determine how much higher the tax rate should be.

Norway is a small country that is entirely dependent on the environmental technology developed internationally. Norwegian authorities can pave the way for Norwegian enterprises and individuals to be as prepared as possible for putting such technology to use (absorption). The Commission emphasises that Norway cannot bring about a global technology shift that results in lower emissions on its own, but Norway should promote global collaboration on R&D within low-emission technologies.

Tax allowances for energy efficiency investments and favourable depreciation rates for inputs or installations that are held to be more environmentally friendly (for example windmills) are proposed in certain contexts. Tax allowances and reduced depreciation rates will stimulate the type of investment that receives more favourable tax treatment than others. In practice, special tax allowances and lower depreciation rates will have to be limited to specifically defined measures and investments. Environmental taxes will, on the other hand, deliver economic gains for all measures and investments that contribute to a better environment, including measures and investments that had not been contemplated at the time of determining the tax allowances and depreciation rates. Consequently, the Commission will not recommend the introduction of special depreciation rules to promote the use of environmentally friendly technology or tax allowances for energy efficiency investments in private households. Present bias may result in energy efficiency investments in households being too low. This can be countered through information concerning future financial savings associated with such investments.

3.6 Financial and administrative implications

The Commission recommends higher and new climate and environmental taxes and reduction or abolition of subsidy schemes and tax expenditure with a negative environmental impact. The proposals will contribute to environmental improvements because households and enterprises to a greater extent will factor environmental costs into their decisions. An increase in usage-based vehicle taxes with a larger element of environment and congestion pricing will deliver both health and environmental gains because of reduced local air pollution, especially in urban areas. Geographical differentiation of taxes on emissions from manufacturing industry and ships in port will also give health gains and a reduction in damage to buildings and acidification of soil and water in affected areas. Introduction of ecosystem services tax will in the longer

run, inter alia, preserve unspoilt nature areas, and thereby biodiversity. The new carbon pricing system implies that Norway will meet its international obligations in a cost-effective manner.

Increasing environmental taxes and scaling back subsidy schemes and tax expenditure will, in addition to the environmental gains, generate revenues that can be allocated to reducing other taxes. Since taxes normally impose a deadweight loss on society, a green tax shift may deliver gains beyond the environmental gains. The gains from a green tax shift will be large if the revenues are used to reduce taxes that involve high economic costs.

The Tax Committee ([official Norwegian report NOU 2014:13](#) – complete text in Norwegian only) proposed a restructuring of the tax system, with less of a focus on corporate tax and personal income taxes involving relatively high economic costs, and more of a focus on consumption taxes and property tax involving relatively low economic costs. Such a restructuring of direct taxes is in line with international recommendations for a more efficient tax system. The Commission will recommend, based on the assessments of the Tax Committee, that parts of the revenues from increasing environmental taxes and scaling back subsidy schemes be used to reduce corporate tax and personal income taxes. In addition, one may consider reducing other taxes that give rise to undesirable biases.

The overall revenue effect of the Commission's recommendations is estimated at NOK 25 – 30 billion in 2016. The main contributions are increases in usage-based vehicle taxes (NOK 12 – 17 billion) and reductions in subsidies and tax expenditure (NOK 12 billion). The increase in climate-motivated taxes on emissions not included in the EU ETS is estimated at about NOK 800 million. The tax expenditure estimates do not take behavioural changes into account, thus implying a certain overestimation of the revenue effect. It is estimated, on an uncertain basis, that domestic greenhouse gas emissions will be reduced by 1 – 2 million tonnes of CO₂ equivalents. However, the estimates do not take into account potential new taxes such as ecosystem services tax, replacement of the NO_x and SO₂ agreements with a NO_x and SO₂ tax, geographically differentiated rates on NO_x and SO₂ emissions, and a tax on flights outside the EEA, which may generate tax revenues in the longer run. In the longer run, environment and congestion pricing in urban areas may also reduce the need for new road developments.

The potential for a green tax shift can be illustrated by calculating how much corporate tax and personal income taxes can be reduced. Less than half of the revenue increase would be sufficient to fund the proposal in the white paper on tax reform for restructuring and growth ([Meld. St. 4 \(2015 – 2016\)](#) – complete text in Norwegian only) for the corporate tax rate to be reduced from 27 to 22 percent. The remainder of these revenues could fund a 1 – 1.5 percentage-point reduction in the proposed bracketed tax.

There has been much discussion in economic literature as to whether a green tax shift could generate so-called double gains. By double gains is meant that the gain to society will be positive also when disregarding the environmental gains. The scope for realising double gains depends on the extent to which the tax system is optimally structured to begin with. If there is considerable variation in marginal deadweight loss between different taxes, it will be possible to realise double gains. The Commission's proposal for a reduction in taxes with a large marginal deadweight loss suggests that a green tax shift may promote growth in the Norwegian economy.

The employment effect of the Commission's recommendations is likely to be minor. Its effect on the tax wedge in the labour market (the difference between labour productivity and the purchasing power of gross wages) is of key importance in this regard. On the one hand, higher environmental taxes will serve to increase prices, expand the tax wedge and reduce employment. On the other hand, lower personal income taxes will serve to reduce the tax wedge and increase employment. Moreover, lower corporate tax may increase business investment and the demand for labour.

The positive effects of the Commission's recommendations in the form of environmental improvements and general tax reductions will be spread across many, and thus be less visible, whilst the negative effects will be more concentrated on those affected by increased environmental taxes or reduced subsidies. Agriculture will be affected both by reduced subsidies (primarily by reduced production grants for red meat) and by increased taxes on synthetic fertiliser. This may conflict with agricultural and regional policy objectives. An increase in usage-based vehicle taxes will increase the overall tax burden on motorists if non-usage-based taxes are maintained at the same level as at present. The negative implications for agriculture may be countered by expanding other subsidy schemes that promote agricultural and regional

policy objectives in a more climate-friendly manner, whilst the negative implications of a higher tax level for motorists may be countered through lower non-usage-based taxes or improved public transport, especially in major urban areas. Such compensating measures would imply that the revenue effect of the Commission's proposal is reduced by up to NOK 14 – 19 billion, and may reduce the positive effects of a green tax shift.

The Commission believes that tax is, in principle, a better policy tool than voluntary agreements. If the voluntary agreements on NO_x and SO₂ are not continued, the result will be higher costs for domestic shipping and fisheries, as well as for manufacturing industry. The other recommendations of the Commission are of limited importance to manufacturing industry. As far as greenhouse gas emissions are concerned, manufacturing industry will continue to be faced with the emission allowance price under the EU emissions trading system. In addition, manufacturing enterprises with high point-source emissions will be affected by potential geographical differentiation of the taxes on NO_x and SO₂.

Existing enterprises will need to adapt to the new regulatory framework, to innovate, and to create more climate-friendly and environmentally friendly production processes and products. On the other hand, higher environmental taxes will create new opportunities for enterprises that produce and develop cleaning technology or more environmentally friendly alternatives to existing products.