

Distributional impacts of environmental and energy taxes



Nordic Council
of Ministers



Preface

Environmental and energy taxation plays a vital role in the Nordic countries. All taxes have distributional impacts. Governments as well as the general public sometimes worry that these taxes may have a negative impact on low income households, because goods such as energy and transport fuels are necessity goods. There are also concerns that households in rural areas will be hit relatively hard, due to long distances and few alternatives to the use of private cars, and possibly badly insulated houses.

In the transition to a green, low-emission economy, green taxes will probably play a greater role. Any distributional impacts could be magnified. On this background the Nordic Working Group for Environment and Economics (NME) commissioned a report to shed light on the issue. One purpose was to draw together the results from empirical work on distributional consequences of green taxes. Then we wanted to find out whether Nordic governments have guidelines and tools for evaluation of distributional impacts in their work on green taxation, and how they cope with possibly negative impacts. Finally, we wanted the consultant to evaluate the guidelines and practices and put forward recommendations for the future. The focus of the report is on impacts on household disposable income, and not on business and industry profitability, though the latter may of course ultimately also affect household incomes.

The report has been prepared by COWI A/S. The project has included a study of relevant literature and interviews with policymakers in Denmark, Finland, Norway and Sweden. NME members have provided comments on drafts. The authors of the report are responsible for the content as well as the assessments and recommendations, which do not necessarily reflect the views and the positions of the governments in the Nordic countries.

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Contents

Sammenfatning	4
1 Introduction	6
2 Research findings	8
2.1 Methodology	8
2.2 Distribution of costs	9
2.3 Compensatory measures	11
2.4 Distribution of benefits	14
3 National guidelines and practices	16
3.1 Methodology	16
3.2 Denmark	16
3.3 Sweden	21
3.4 Norway	25
3.5 Finland	29
3.6 Greenland	31
4 Distributional impacts and policy implications	32
4.1 Comparative assessment of methodologies and approaches across the Nordic countries	32
4.2 How distributional impacts have affected design of economic instruments in the Nordic countries	34
4.3 Case illustrations (two cases)	36
5 Main findings and recommendations	39
References	42
Appendix A	47
Appendix B	48

Sammenfatning

Den grønne omstilling og målet om et fossilfrit samfund øger behovet for effektive økonomiske styringsmidler, der kan fremme denne udvikling. De nordiske lande har allerede god erfaring med brugen af skatter og afgifter for at opnå miljø-, energi- og klimapolitiske mål. Der kan forventes nye eller omlægning af eksisterende skatter og afgifter i de kommende år for at skabe yderligere incitamenter for grønnere løsninger. Miljø- og energiafgifter beskyldes ofte for at være regressive, dvs. for at påvirke lavindkomstgrupper mest. I en eventuel omstrukturering af afgifts- og skattesystemet er det derfor særligt relevant at begrænse utilsigtede fordelingsmæssige effekter enten i designet af de økonomiske styringsmidler eller ved anden kompensation af de ramte grupper. Denne rapport omfatter udelukkende miljøregulering, medmindre andet er specificeret i teksten.

Rapporten gennemgår eksisterende litteratur om fordelingsvirkninger af skatter og afgifter på miljø- og klimaområdet. Herefter beskrives de nordiske landes vejledninger til, hvordan fordelings effekter skal behandles i forbindelse med politikudviklingen. Dette suppleres med en beskrivelse af de nordiske landes analytiske tilgang til fordelingsmæssige effekter af økonomiske virkemidler på miljø- og klimaområdet. Nationale vejledninger for myndighedernes konsekvensvurderinger af offentlige tiltag på miljø- og klimaområdet er generelt relativt overordnede, hvad angår fordelingsmæssige effekter. De fleste vejledninger indeholder ikke specifikke retningslinjer for den konkrete udførsel af vurderinger af fordelings effekterne af økonomiske virkemidler. Vejledningerne påpeger dog bredt set, at fordelings effekterne bør vurderes, og der er derved plads til fortolkning og fleksibilitet, da den relevante fremgangsmetode vil være forskellig afhængig af den specifikke case. De fordelingsmæssige effekter af den specifikke case er derfor ofte vurderet på baggrund af det tilgængelige datagrundlag, politisk og offentlig opmærksomhed, gruppens størrelse og karakteristika.

Det fremgår af interviews med myndighederne i de nordiske lande, at den nødvendige analysekapacitet til vurdering af effekten på indkomstfordeling af økonomiske styringsmidler er til stede – både ved mindre og mere komplicerede omlægninger. I de nordiske lande er konsekvenserne for indkomstfordeling ved nye økonomiske styringsmidler om nødvendig primært håndteret gennem ændringer i indkomstbeskatningen eller overførelser.

De mest effektive kompensationsmuligheder til håndtering af regressive effekter på indkomstfordelingen er ændringer i skattesatser eller ved direkte overførelser. Tilbageførsel af skatteindtægterne fra f.eks. grønne skatter til husholdningerne kan have en positiv virkning ift. at sikre et mere effektivt afgifts- og skattesystem, samtidig med at det begrænser de regressive effekter. Denne kompensationstilgang gør det dog mere utydeligt, hvordan den enkelte borger bliver kompenseret, og kan være med til at give øget modstand mod grønne afgifter.

Et snævert fokus på indkomstudligning og begrænsede muligheder for identifikation og kompensation af specifikke grupper, der er målrettet ny regulering, kan medføre situationer, der virker uretfærdige i offentlighedens øjne. Dette kan være en af

årsagerne til, at der også foretages en direkte begrænsning af de fordelingsmæssige effekter i designet af de enkelte virkemidler. Dette sker blandt andet ved at lave lettelser eller undtagelser i regulering. I de nordiske lande samlet set er det typisk de økonomiske ministerier, såsom Finansministeriet, der sikrer den overordnede fordelingsmæssige profil med et blik på det samlede skatte- og afgiftstryk i samfundet. De ressortspecifikke ministerier, såsom Miljøministeriet, forholder sig mere kvalitativt til fordelingseffekterne af de pågældende reguleringer og foretager tilpasning af virkemidlets sammensætning, hvis enkelte grupper påvirkes u hensigtsmæssigt ift. de politiske ønsker. Gennemgangen viser, at de nordiske landes tilgange til analyser af fordelingsvirkning på miljø- og klimaområdet er ensartede på tværs af de enkelte lande.

Analysens resultater indikerer, at en større og mere intensiv brug af økonomiske styringsmidler til at kickstarte og understøtte den grønne omstilling vil kræve samarbejde på tværs af styrelser og ministerier.

Hvis brugen af grønne økonomiske styringsmidler skal øges uden negative fordelingseffekter, skal de kompenserende tiltag udvikles som en integreret del af politikudvikling. Dette skyldes særligt, at regulering kan have fordelingsvirkninger på tværs af socioøkonomiske undergrupperinger. Der kan således være et behov for i højere grad at systematisere ressortministeriernes case-analyser og koble dem til de økonomiske ministerens analyser af skatte- og afgiftspolitikens påvirkning på indkomstfordelingen.

1 Introduction

The increasing focus on achieving a better environment, a green transition, and a fossil-free society calls for efficient use of policy instruments to drive the transition. The Nordic countries already have a successful track record of using taxes and other policy instruments to meet environmental, energy and climate targets. To support the transition to a green economy, this application of policy instruments can be expected to increase in the coming years to create more and stronger incentives for implementing greener solutions, which may result in small-scale or large-scale changes to tax systems.

It is important to consider the distributional impacts of a changing/increasing use of economic instruments. Typically, the distribution of financial impacts receives the most attention in the legislative process when evaluating new economic instruments (OECD, 2006), but the distribution of benefits from regulation is also relevant when assessing how the burden of environmental regulation is distributed.

Environmental and energy taxes are often accused of having distributional impacts by being regressive, i.e. having the largest adverse impact on low-income households in the sense that they spend a larger share of their income on paying such taxes. Furthermore, there are suggestions that households in rural areas are affected more than similar households in urban areas as households in rural areas have longer travel distances and fewer alternatives in terms of, e.g., public transport. Furthermore, households in rural areas spend a larger share of their income on energy and heating due to relatively energy-inefficient housing.

This report only covers distributional impacts from the use of economic instrument in relation to environmental regulation unless otherwise stated.

COWI was asked by the Nordic Working Group for Environment and Economy (NME) to carry out an analysis of the current national practices for assessing distributional effects with the aim of providing recommendations for future designs of economic instruments. The contribution from this report is fourfold.

First, it reviews relevant research findings that theoretically or empirically assess distributional impacts of environmental and energy taxes and other economic instruments (Chapter 3). Focus is on findings that are relevant in the context of the Nordic countries. Furthermore, while the focus is on environmental and energy taxes, lessons are also learnt from analysis of other economic instruments such as subsidies or other compensatory measures which can also be applied to help alleviate the impacts on low-income households. Finally, the chapter briefly discusses distributional aspects of the benefits of environmental and energy taxes – e.g., whether low-income households benefit more or less from environmental improvements than high-income households, and whether rural areas benefit more or less than urban areas. This aspect also includes situations where low-income households receive less subsidies to adopt green technologies, e.g., because they cannot afford the investment cost of green technology.

Second, the report examines the national guidelines and practices used for analysing distributional impacts of environmental and energy regulation in the Nordic countries, focusing on the use of economic instruments (Chapter 4). This involves an examination of whether formal guidelines already exist or whether the analyses are carried out by applying ad hoc approaches. Furthermore, it involves an assessment of the coverage of distributional impacts and applied measures to reduce regressive impacts. Focus is on environmental economic instruments such as green taxes that are expected to have the largest impacts on households and shift burdens between different groups of households. It is acknowledged that descriptions of ad hoc practices are rarely publicly available. Hence, much of the evidence used for this analysis is gathered through interviews with public officials in the Nordic countries.

Third, an assessment is made in Chapter 5 of the extent to which distributional impacts have influenced the design of economic instruments in Nordic environmental policy. This has been done by interviewing public officials involved in the design of the economic instruments. As part of this review, two fictional case studies have been developed to highlight relevant types of distributional impacts to consider and possible mitigating actions when designing and implementing economic instruments.

Fourth, Chapter 6 provides recommendations on guidelines and areas of attention for taking distributional impacts into account when designing economic instruments within environmental policies.

This report has been prepared by COWI A/S in a cooperation between COWI offices in Sweden and Denmark. The core team consisted of Troels Hansen (project manager), Emelie von Bahr and Jan Gravers Skygebjerg (COWI). Comments and inputs to the report have been provided by members of the Nordic Working Group for Environment and Economy (NME) as well as an external review by Henrik Scharin (Formas). As part of the preparation of the report, twelve interviews were conducted with policymakers in four countries. The interviews took place from March to May 2020.

2 Research findings

The review of the research findings is presented in four sections. First, the review methodology is explained. Second, the tax incidence is assessed with a focus on the extent to which low-income households or rural areas bear the costs of environmental and energy regulation. Third, it is assessed how compensatory measures can be applied to help alleviate regressive impacts. Fourth, the distribution of benefits from environmental and energy regulation is assessed.

2.1 Methodology

The purpose of this review is to provide insight into the research findings that are most prevalent in the literature on how environmental and energy regulation leads to distributional impacts. In this context, we have focused on the findings that are most relevant for the Nordic countries (see literature list in Appendix B) in terms of the distributional issues that are important to be covered by the national guidelines and practices used in the Nordic countries when analysing distributional impacts of economic instruments in environmental policies (Chapter 4). The review also covers studies looking at countries outside the Nordic region. While these countries may differ from Nordic conditions, care has been taken to cover findings from countries or areas with similar characteristics.

This means, e.g., that there is no emphasis on comparing the impacts on those who live in energy poverty – e.g., comparing households lacking or having limited access to modern energy services – with those who do not experience such limitations (see, e.g., OECD (2017) for a discussion of energy affordability). Rather, focus is on distributional issues of relevance to developed societies such as whether low-income households will experience relatively higher welfare losses than others from increasing environmental and energy taxes, e.g., due to relatively high consumption shares for energy or energy-related consumer products. Similarly, transport affordability is about whether low-income households spend disproportionately high amounts on transport and therefore are likely to be underspending in other essential areas or have fewer alternatives. Focus is also on research findings considering how transport-related taxes differ in impact for rural areas and urban areas.

To ensure that the review covers relevant literature, different search engines have been used, including public libraries, Google and Google Scholar. Search strings have included: distributional impacts, environmental regulation, distributional policies, inequality, tax reforms, green transition, CO₂ taxes as well as other relevant terms. In this context, it may be worth mentioning that the literature search found that more attention was given to assessing the distributional impacts of taxes and fees than to assessing alternative non-economic policy instruments, although it may be the case that policy instruments, such as bans or caps on emissions, can result in distributional impacts of equal or higher importance than green taxes (Fullerton, 2011).

The review of research findings on how environmental and energy taxes leads to distributional impacts is presented in section 3.2. Much of the reviewed literature

also covers findings regarding the distributional impacts of other economic instruments, some of which may also be applied to help alleviate the impacts on low-income households through compensation measures.

Findings regarding compensatory measures and features to be applied when designing and implementing economic instruments in environmental policies are presented in section 3.3. This includes instruments with exemptions for low-income households or instruments that are progressive when considering household income. The measures to mitigate the distributional impacts of the economic instruments can be closely linked to how tax revenue is redistributed, e.g., through a reduction of the income tax.

Similarly, the literature is also reviewed with a focus on whether or how the distribution of the benefits in the form of environmental improvements is included in the assessment (section 3.4). In this respect, the overall benefits will often depend on the environmental targets set for the regulation while the distributional impacts will depend on the specific designs of the economic instrument. Finally, the review focuses on whether low-income households may benefit differently from environmental improvements than those with higher incomes, and whether there are differences between those living in rural and urban areas.

2.2 Distribution of costs

Households are in the majority of the research findings – and in particular when it comes to the empirical findings – distinguished according to current annual household income or expenditures, when analysing the distribution of costs (and benefits) arising from environmental and energy regulation among households. Theoretically, however, it may be more appealing to analyse distributional impacts according to household wealth. Such an analysis can reflect differences in household assets, life-cycle income effects, and other factors. Similarly, changes in household expenditure tend to be smoother than changes in household income and indicate the size of expected life-time income (Kosonen, 2012).

In any case, whether an assessment is conducted based on annual income or wealth will influence the assessment of whether and to what extent a tax or policy is regressive. A regressive tax applied equally across households will take a larger percentage of income from low-income households than from high-income households. In contrast, a progressive tax takes a larger percentage from high-income households. This means that a tax can be regressive even if high-income households pay more than low-income households in absolute terms.

As shown in Table 1, a first and often analysed perception is that of economic instruments within environmental policy being regressive because low-income households pay disproportionately more of the financial costs associated with the economic instrument. For economic instruments within energy, the reason is that low-income households spend a relatively high share of their income on energy or energy-related consumer products. From the theoretical angle, it is a simple notion that energy itself and energy-using household appliances are necessity goods for all household types, but those with higher incomes spend relatively less – see, e.g., (Bento, 2013) and (OECD, 2017).

Furthermore, the use of economic instruments within environmental policy is

regressive to the extent that low-income households are less able to adjust consumption patterns – see, e.g., (Jacobsen, et al., 2001) and (Kosonen, 2012). The better-off households will, e.g., have more means to invest in energy-efficient housing, household appliances or suitable electric transport alternatives. It is, however, evident that accounting for adjustments in consumption can also reduce the regression of the tax. When substitutes are easily available and do not require capital intensive investments, low-income households can have a more elastic response to price increases, reducing the economic impact on the group. This means that low-income households in these cases respond stronger to price changes because they are more willing to make use of less attractive or inconvenient alternatives when other options become too expensive. This has been shown especially for changes in transport costs (ibid.). That said, it is inherently the aim of economic instruments within environmental policy to change behaviour in an environmentally-friendly direction. Hence, a change in consumption patterns is ultimately the target.

Table 1 Distribution of costs of environmental and energy regulation

Research finding	Sources
Household income groups	
Low-income households use a larger share of their income on necessity goods such as energy compared to high-income households – and as so pay a disproportionately higher share of their income on taxes and fees put on such goods.	(Bento, 2013) (OECD, 2017)
Low-income households are less able to change consumption patterns (inelastic demand) as a response to, e.g., higher electricity cost compared to high-income households. The opposite is true for changes in transport costs.	(Jacobsen, et al., 2001)
Low-income households are less likely to be able to change consumption patterns in relation to energy, as they more often rent their houses and have fewer options for improving energy efficiency.	(Roberts, 2010)
Rural vs. urban areas	
Households in rural areas have relatively higher demand for heating, electricity and transport.	(Wier, et al., 2005) and (Jacobsen, et al., 2001)
Households in rural areas live in relatively energy-inefficient dwellings.	(Flues & Thomas, 2015)
Other dimensions	
Transport taxes are found to be less regressive than taxes on heating and electricity and even progressive in the case of value-based car registration tax.	(Kosonen, 2012) and (Jacobsen, et al., 2001)
The regressivity of environmental and energy taxes is not larger than that of other product taxes and duties.	(OECD, 2006) and (Jacobsen, et al., 2001)
The regression tends to be lower when measured as the share of household expenditures rather than disposable income.	(Kosonen, 2012)

Note: See Appendix B for further description of the studies.

With respect to the regional distribution of costs, Table 1 shows that most research findings point to the notion that households in rural areas have relatively high transport needs and, in turn, they pay disproportionately high transport-related environmental and energy taxes – see, e.g., (Wier, et al., 2005). Wier et al. finds that people living in a rural area in Denmark have relatively higher tax payments due to higher demand for energy, heating, and transport. However, taking differences in consumption patterns into consideration, the difference in tax payment is slightly reduced. As a result, the study finds that CO₂ taxes on consumers are more regressive than CO₂ taxes on companies, which are passed on to consumers (ibid.).

The identified studies find energy and heating taxes to be regressive – see, e.g., (Bureau, 2010), (Bento, 2013) and (OECD, 2017). For most countries, however, transport taxes such as CO₂ taxes on fuel, kilometre taxes and CO₂-differentiated vehicle taxes are found to be progressive (OECD, 2017). Whether these transport taxes are regressive or not depends on the quality of public transport. Hence, a well-functioning public transport infrastructure makes cars more a luxury good than a necessity good (OECD, 2017). In most rural areas, alternatives to cars are less available, which in itself can make the impact of taxes on cars more unevenly distributed. Car taxation has, in addition to the environmental motivation, also been justified based on distributional concerns and has historically been designed to be progressive. This is especially the case for value-dependent duties on car registration. Furthermore, it should be observed that taxes related to car purchases and use account for a relatively large share of the environmental tax revenue in the Nordics (Nordic Council of Ministers, 2018).

2.3 Compensatory measures

Whether or not the distribution of the costs of environmental policies is fair needs to be understood in the broader context of government policy with respect to the distribution of wealth via income and/or capital. Such priorities are already reflected in the existing political setup, e.g., via the progressivity of income tax systems and the existence of welfare systems. It can thus be argued that the purpose of economic instruments in environmental policies is to secure environmental benefits rather than pursue aims such as equality. These other aims can typically be reached more efficiently by other more suitable tools. However, to ensure short-term and long-term support for the implementation of economic instruments in environmental policies, it may be necessary to consider the distribution of costs within the context of the environmental policy itself. This can also be the case when the application of existing mechanisms for redistribution is unsuitable to compensate specific socioeconomic groups especially affected by the policy.

In this context of compensatory measures and according to (Wang, et al., 2016) – and also covered in Table 2 – two types of measures to alleviate adverse distributional impacts exist: ex-ante and ex-post measures. Ex-ante measures aim to make the burden smaller for an exposed group by lowering taxes or making exemptions from the planned environmental regulation. Ex-post measures compensate vulnerable groups – e.g., low-income households – by reducing other taxes or by increasing transfer payments. Ex-post measures and ex-ante measures

may be similarly effective in alleviating distributional impacts. However, ex-ante measures may not be as effective in reaching an environmental target as they will limit the incentive to reduce consumption of the taxed good. They can, however, better be targeted specific socio-economic groups, depending on the specific case.

Earmarking revenues from environmental regulations for finance compensatory measures can increase acceptance of the policy (Carattini, 2018). Earmarking makes it clear to the public how the revenues are redistributed, and it can be used to directly compensate affected groups. In the Nordics, however, instead of earmarking tax revenues, revenue is primarily collected for the government's overall budget. Collecting revenues to the overall budget instead of earmarking for certain purposes is motivated by welfare optimizing arguments, since resources can then be used in the most efficient way.

Table 2 shows that the literature mainly finds that tax rebates (OECD, 2006) and measures to increase the progressiveness of income taxes (Bento, 2013) are efficient tools for alleviating distributional impacts. This is especially true because the ex-post compensatory measures limit the risk of reducing the efficiency of the green policy.

According to Kosonen (2012), the use of *additional* tax revenue from increased environmental taxation can have an impact on the final distributional outcome. This relates to the second part of the double dividend argument, which entails that revenues generated from environmental taxes are used to displace or reduce other more distortionary taxes such as taxes on labour and capital. A reduction of personal income tax through green tax revenue recycling by an equal percentage for all household incomes would reduce a distortionary tax, but it would also have a regressive impact. A lump sum transfer distributed equally per household would be progressive, but less efficient because it would not reduce any distortionary taxes. There might thus be a trade-off between effective ways to ensure fair distributional impacts and economic efficiency. A targeted cut in income taxes for low-income households or lump sum transfers to low-income households may be very effective to ensure fair distributional consequences. However, it is not the most economical efficient way to recycle revenue (Kosonen, 2012).

The Nordic countries have low income inequality relative to the OECD average and a high degree of redistribution (OECD, 2019). This allows for existing distributional measures to be amplified to mitigate impacts on inequality, providing flexibility to introduce compensatory measures in areas not directly related to environmental regulation. This can especially be true when revenues from environmental taxes are recycled as part of the general tax revenue. An example of differentiated tax reductions is seen in Denmark, where different income groups get a tax reduction called a *green check*, depending on income¹. A new study measures the loss for the different income groups by removing the green check (Caspersen, 2019). The study estimates that the poorest ten per cent would suffer the most, which indicates that the green check works as a compensation for regressive environmental taxes.

1. The green check is a tax rebate used in Denmark as a compensatory measure. It depends on annual income and number of children in the household. Retirees are paid DKK 875 per year, while people above 18 years are paid DKK 525 per year, and an additional DKK 125 per child. If the income is below DKK 242,400, an additional amount of DKK 280 is paid. Furthermore, the rebate decreases when yearly income exceeds DKK 414,700. The green check was implemented in 2010 as a compensatory measure to "Forårspakke 2.0" where some green taxes were increased. (The Ministry of Taxation, 2019)

Table 2 Compensatory measures

Research finding	Sources
Design of environmental and energy taxes	
Tax rebates according to household income alleviate significant distributional impacts.	(OECD, 2006)
Taxes that are progressive with household income alleviate significant distributional impacts.	(Bento, 2013)
Using green tax revenues to finance lump payments is an effective way to compensate for regressive effects of taxes.	(Kosonen, 2012) (Wang, et al., 2016) (Bento, 2013) (OECD, 2006)
Environmental and energy-related measures	
Subsidies to energy-efficient renovations can increase the opportunities for lower-income households to adjust to higher energy taxes.	(SparEnergi, 2019) (Lindseth, 2015)
Transport subsidies can be used as a compensatory measure for those who get an extra burden from a fuel tax (e.g., mileage allowance, which is a direct compensation, or lowering the price for public transport to substitute cars).	(OECD, 2006)
Commuter subsidies are used as a compensatory measure, where deductions in income taxes for travelling expenses are given.	(Institute for European Environmental Policy, 2013)
Social policy measures	
Other subsidies such as housing allowance can be used as a measure to compensate low-income households.	(OECD, 2006)

The findings regarding environmental and energy-related measures suggest that transport subsidies can be used to mitigate the increased cost burden of a fuel tax for those living in rural areas. In the Nordic countries, Finland, Sweden, Norway and Denmark provide commuter tax deductions to compensate people living in rural areas, as they typically need to commute further to and from work (Institute for European Environmental Policy, 2013). However, the downside of this subsidy is that it gives an incentive to travel over long distances and thus increases CO₂ emissions. The subsidy is primarily designed to ensure workforce mobility: However, it also provides compensation on higher transportation costs due to inter alia environmental taxation.

Other types of compensating subsidies include those for energy-efficiency renovations (SparEnergi, 2019) and (Lindseth, 2015) as well as other transport subsidies (OECD, 2006). For Finland, Norway and Denmark, there are different kinds of support to energy performance contracting (EPC), which seems to be the main driver for installing more efficient-energy sources (Lindseth, 2015). Also, subsidies are given in some countries to energy-efficient renovations.

Finally, as already mentioned, for some countries (e.g., Denmark), the distributional impacts are handled through transfer payments and income taxes, but this is not

directly linked to the environmental tax payments. It is argued to be both more effective at reducing emissions and to be more efficient, as there would be higher administrative costs from handling the distributional impacts through environmental regulation (The Danish Ministry of Taxation, 2019).

2.4 Distribution of benefits

The literature review reveals that most research focus is on assessing the distribution of financial costs from environmental policies, meaning that the distribution of environmental costs (adverse environmental impacts) or environmental benefits from environmental policies are less explored.

The distribution of benefits depends on whether the environmental good is a 'pure' public good or a 'local' public good (OECD, 2006). A 'pure' public good is non-rivalrous and non-excludable, whereas a 'local' public good can be partly rivalrous and partly excludable. For example, a reduction in CO₂ emissions is a 'pure' public good, as CO₂ affects the climate globally. Developing a park in a local area would be classified as a 'local' public good, as it will primarily benefit people living close to the park. Therefore, when introducing a policy regarding a 'pure' public good, the benefits will be shared by all (though not necessarily equally), whereas policy measures regarding "local" public goods may only benefit certain groups (OECD, 2006).

Table 3 Distribution of benefits from environmental and energy regulation

Research finding	Sources
Household income groups	
Low-income households live in the most polluted areas (e.g., closer to polluted areas such as landfills and noisy highways) and thus benefit most from environmental improvements.	(OECD, 2006)
The demand for environmental goods may differ between different income groups due to different demand elasticities.	(OECD, 2006)
Rural vs. urban areas	
Middle-income households in urban areas benefit particularly from fresh air.	(DØRS, 2019)
Other dimensions	
As the average income level increases, it is more likely that environmental quality is valued higher.	(Institute for European Environmental Policy, 2013)

Table 3 shows that the literature, e.g., OECD (2006), indicates that low-income households live in relatively more polluted areas. General environmental improvements can thus potentially benefit these groups the most. It should be noted that relatively more people with a high income live in urban areas, which tend to be more polluted than rural areas. However, lower-income groups tend to live closer to roads or railways, which may cause particulate and noise pollution. For instance, in the same area or region, there is a tendency that the lower the income level, the higher the harmful environmental exposure (DØRS, 2019).

3 National guidelines and practices

This chapter presents the review of national guidelines and practices used for analysing distributional impacts of environmental and energy policies and taking them into account in policymaking. The chapter starts with an explanation of the methodology applied before the findings are reported country-wise

3.1 Methodology

The review of national guidelines and practices is based on evidence of how distributional impacts are handled in practice in each of the countries, gathered via interviews with policymakers in the Nordic countries, and publicly available information. Distributional impacts of environmental policies can furthermore be handled differently in different parts of the central government. To account for this, interviews have been carried out both with sector ministries, such as the ministries of environment, and with economic ministries, such as the ministries of tax or finance. For Finland and Greenland, different approaches have been taken. The findings for Finland are based on interviews with two Finnish government officials, while the findings for Greenland is based on a written reply regarding how the Ministry of Nature and Environment handles distributional impacts in its work.

Hence, our findings are based on a combination of formalised written information and descriptive interview data. The written information is used to provide an overview of the type of requirements to and the guidelines available to assess distributional impacts in the Nordic countries. The interview data is then used to get a more in-depth understanding of how these requirements and guidelines are put into practice when assessing distributional impacts.

3.2 Denmark

The Danish guidelines refer to distributional impacts, but do not specify how the assessment of distributional impacts should be made or what this assessment should cover. Government procedures ensure that the assessments are validated by the Ministry of Finance during the policymaking process. This ministry is also responsible for quantifying the direct distributional impacts on households. During interviews with the Ministry of Finance and the Ministry of Taxation, it was explained that they use a register-based system of microsimulation models called the "*law model*", when applicable, to estimate the first-order distributional impacts of regulation on household disposable income. The distributional impacts of price changes in the energy market are assessed using a specific energy model, and, similarly, changes to car taxation are assessed using a model on car ownership.

A formal model-based assessment of distributional impacts is seldom made in the early stages of the policy development process. The initial assessment of

distributional impacts made by the sector-specific ministries is often in the form of a qualitative description of affected actors. From the interviews, it is evident that distributional impacts on household level, e.g., between different income groups, are rarely part of the initial impact assessment. Only in the case of large packages of policy initiatives is this sometimes considered. The distributional impacts on company level are more frequently considered. This can include impacts on different sectors or on specific companies. In general, attention has primarily been on the distribution of costs from regulation.

Distributional impacts are assessed by the Ministry of Finance when policies are considered after the initial policy development process. This can also be a part of the political negotiations about proposed regulations. The distributional impacts are addressed, depending on the type of economic instrument and the availability of data. The assessment can be qualitative or quantitative. It also serves to challenge the initial assessment of the distributional impacts in cases where regulation has been estimated to have no distributional impact. The assessment is most often based on the distributional impact on households directly coming from the regulation, known as first-order effects. This does not include the impact on consumer or producer behaviour from the tax. In a few special cases, the behavioural changes, known as second-order impacts, are assessed, if these are of special importance. Estimates of second-order effects are more uncertain as they depend on how different income groups adjust the bundle of goods they buy.

3.2.1 National guidelines

In Denmark, there are no specific guidelines dedicated on how or when to measure the distributional impacts of economic environmental instruments. Various national guidelines exist on assessing the economic impact of environmental regulation, theses, however only briefly mention how the distributional impacts of environmental economic instruments should be assessed. The Ministry of Finance has developed a guideline on how to perform cost-benefit analyses in Denmark (Finansministeriet, 2017). The guideline states that it is important to address distributional impacts, especially for tax-financed projects. However, there is no clear guideline on how this specifically should be done or what groups and parameters to consider.

An earlier version of the Ministry of Finance guideline does cover how to assess impacts of new regulation (Finansministeriet, 2005). The guideline covers the general approach to impact assessments of policies. Impacts on the public sector, citizens, private companies and environment are described in more detail. Distributional impacts are mentioned in relation to assessing impacts on gender equality. The guideline, however, does not provide clear recommendations on when and how distributional impacts should be assessed.

A guideline to assess economic impacts for companies from new regulation is also available in Denmark: "*Vejledning i erhvervsøkonomisk konsekvensvurdering*"² (Erhvervs-og vækstministeriet, 2015). However, this guideline only covers economic impacts on private companies and therefore it does not address the issue of distributional impacts on households. Furthermore, the Danish Ministry of Transport has developed a manual on how to carry out cost-benefit

2. Guideline on assessment of business economic consequences

analyses in the transport area (Transportministeriet, 2015). The manual does not directly cover distributional impacts, but states that distributional impacts should be handled in the political decision process.

In the area of energy, Denmark also has a guideline on how to carry out cost-benefit analyses: "*Vejledning i samfundsøkonomiske analyser på energiområdet*"³ (Energistyrelsen, 2018). It does, however, not explicitly state how to address distributional impacts.

The Danish Ministry of Taxation uses the guideline "*Provenu og Metode*"⁴ (The Danish Ministry of Taxation, 2013) in the preparatory work for new legislation. The guideline states that it can be relevant to carry out an economic assessment of the distributional impacts for citizens and provides guidelines on how to do this. The "*law model*" should be used for such assessment. The law model is a system of microsimulations based on information on individuals and families in Denmark. It is primarily used to calculate the impact on income distribution and the impact on general government budgets (Danish Ministry of Finance, 2003) from new legislation. Furthermore, the guideline states that, depending on the kind of legislation that is implemented, there are different ways to present the distributional impacts, e.g., concrete examples, family type examples, stylized examples or representative distributional calculations. Hence, it is evaluated on a case-by-case basis. For large law reforms, the distributional impacts should be presented in more than one way, this could be on income distribution and impacts on specific socio-economic groups, while for minor policies, one way may be sufficient.

For economic analyses in the environmental area, comprehensive guidance from the Ministry of Environment has been developed "*Samfundsøkonomisk vurdering af miljøprojekter*"⁵ (Møller, et al., 2010). The guidance provides theoretical insights and recommendations on analytical approaches, but do not define how analyses should be conducted in the ministry. The purpose of the guideline is, among other things, to detect the changes in net income and net costs of different social groups and institutions. The guideline states that a budgetary economic analysis describing the distribution of the cost and benefits for different groups should be a part of the cost-benefit analysis, as distributional impacts might be a barrier for the implementation of the policy proposal. The guideline covers different types of analyses that can be made to assess distributional impacts. Furthermore, the guideline emphasises that distributional assessments are essential and that that they can be used to develop compensatory measures. The guidance does not however correspond to concert guidelines on how distributional impacts must be analysed in the ministries.

3. Guideline on socio-economic analyses of energy
4. Tax revenue and method
5. Socio-economic evaluation of environmental projects

Table 4 Summary of findings regarding guidelines in Denmark

Denmark	Findings	Comment
Are national guidelines provided?	Yes	With little to no guidance on how to perform an assessment of the distributional impact of green taxation in practice. Procedures ensure that the distributional impacts of economic instruments across agencies are assessed by one single office.
Recommendations in existing guideline(s)		
Coverage (i.e. household income, regional differences, gender)	Relevant groups	Context-dependent. It is not specified when a group is relevant.
Coverage (direct and/or indirect impacts)	Not specified	
Methodology – qualitative, quantitative, specification of models (if any)	Not specified	
Mitigating actions	Not specified	

3.2.2 Methodology for assessing distributional impact

The interviews and guidelines reveal that no specific method is required when assessing distributional impacts. Existing guidelines provide a framework for the process of assessing the implications of proposed policies, ensuring that aspects of importance are considered, such as distributional impacts. In general, a screening is first applied to estimate the scope and importance of the distributional impacts. The screening is based on a consideration of the size of the impact and the groups in society impacted by the regulation. Hence, the screening contains an element of professional judgement.

The assessment of distributional impacts is primarily considered in relation to the introduction of or a change to economic instruments. Examples of analyses of distributional impacts of non-economic instruments were not identified.

The assessments made by the Ministry of Finance are furthermore linked to the financial bill, which means that regulation without a direct link to the financial bill might not be investigated. This could be in terms of command and control regulation, which some respondents mentioned as potentially resulting in greater distributional impacts and could be a future potential area of attention. This type of regulation is, however, not the focus of this study.

3.2.3 Approach to mitigating distributional impacts

The interviews with Danish government officials have not led to the identification of a single approach to mitigating the distributional impacts of environmental economic instruments. On a case-by-case basis, adjustments to the regulation may be applied to mitigate the economic impact on certain groups. Compensatory

measures are most often designed as exceptions in the regulation or as a general redistribution of tax revenue. From the interviews, it seems that mitigating actions implemented in a new or adjusted initiative (e.g., a new economic instrument) are primarily driven by political concerns such as ensuring parliamentary or public support for an initiative, e.g., through ensuring a just and fair distribution of costs and benefits. The economic analyses focus on identifying the most efficient solutions and on describing the distributional impacts. How to balance a potential trade-off between efficiency and distribution is, however, considered to be a political decision.

The respondents emphasised that distributional impacts are generally covered as part of wide economic policies including how wealth should be redistributed in society. A change to an economic policy not closely linked to environmental regulation can thus be used to reverse the regressive distributional impacts of environmental regulation by redistributing governmental revenue to lower-income groups. In the case of large, green reforms, the direct distributional impacts may be analysed and mitigated directly as part of the initiative. The green check is an example of this. The occurrence of environment, energy or transport reforms that are so large that distributional impacts on households are mitigated through direct redistribution are, however, rare and there is no general approach.

3.2.4 Other relevant studies

The below table presents examples of distributional assessments of climate and energy-related policies in Denmark. It illustrates that different methodological approaches are used when assessing distributional impacts, both when it comes to qualitative and quantitative methods, the coverage of the analysis and whether compensatory measures are analysed.

Table 5 Other relevant studies (Denmark)

Denmark	Economic instrument analysed	Qualitative or quantitative method	Analysed groups	Direct and/or indirect effects	Are compensatory measures analysed?
Klinge Jacobsen et al. (2001)	Energy and environmental taxes	Quantitative	Households	Direct and indirect effects	No
DØRS (2017)	Green taxes	Qualitative	Households and companies	Not specified	Yes
Skatteministeriet (2018 a)	Energy taxes	Quantitative	Households and companies	Not relevant	No
Miljøstyrelsen (2008)	Taxes on petrol, electricity, oil products, water and car registration	Quantitative and qualitative	Households	Direct and indirect	No
Birch Sørensen et al (2020)	CO ₂ tax	Quantitative and qualitative	Households and sectors	Direct	Yes
EA energianalyse (2011)	CO ₂ and energy taxes	Qualitative	Households	Not specified	No
Højberre Brauer Schultz (2017)	Electricity tax	Quantitative	Households	Direct and indirect	No

3.3 Sweden

Distributional impacts are addressed in Swedish national guidelines on impact assessments of policy instruments. The guidance is, however, on a general level and it does not provide technical guidance on how to perform assessments of distributional impacts. From interviews, it has been made clear that distributional assessments of environmental policies are not always carried out and that assessments tends to vary significantly in terms of ambition and methodological approach.

The Ministry of Finance carries out distributional impact assessments of larger policy packages, such as using environmental taxes to reduce other taxes. First-order distributional impacts on households are in these assessments estimated using microsimulation models and household consumption data. There are also examples of estimations of second-order distributional impacts, i.e. indirect behavioural effects, estimated using dynamic modelling.

Impact assessments by sector agencies are normally made in earlier stages of the development process. If distributional impact assessments are made at this stage, they are often limited in scope and based on qualitative descriptions.

Furthermore, it is understood that distributional impacts are not always assessed when implementing environmental policies, or that the approach and scope of

assessments are limited. Potential reasons include that distributional impacts are not considered relevant for the policy or because of resource constraints. From interviews, it is also understood that a lack of governmental focus on the issue results in few instructions to the agencies to carry out distributional assessments as part of policy analyses.

In periods, there have been large public and political concerns about distributional impacts of increasing regulations on climate-related emissions. As a result, in 2000, the Swedish Government decided on a strategy of changing the tax burden over the coming decade, including a gradual increase in regulations on greenhouse gas emissions, while gradually decreasing labour costs or income taxes. Following a change of government in 2006, the tax program was lifted in 2007. A more recent tax program is formulated in the budget proposition for 2020. An incineration tax on waste was implemented during 2020, among other environmental regulations. Suggested compensatory measures include a reduction of income tax for individuals living in sparsely populated areas in the northern parts of Sweden.

3.3.1 National guidelines

In Sweden, a legislative framework for distributional assessments of policy instruments is provided. It states that all proposed legislation, including economic instruments, should be preceded by an impact assessment before implementation. It is regulated by the act *Förordning (2007:1244) om konsekvensutredning vid regelgivning*⁶ as of 2007 (SFS, 2007:1244). According to the act, an impact assessment should include a description of who is affected by the policy as well as of the expected costs and other expected consequences for identified groups. The act focuses on analysing consequences for private companies compared to other groups. For example, effects on competition or costs in terms of the administrative burden for companies should be described.

The Swedish Agency for Economic and Regional Growth is responsible for providing guidance on how consequence analyses should be carried out in accordance with the act. Support for methodological guidance is provided by the Swedish National Financial Management Authority. Provided by the former authority is a web-based guideline (Tillväxtverket, 2017). Until recently, the guideline focused on analysing effects for private companies, but it has been developed to include guidance on broader socioeconomic consequences such as distributional impacts on household income and geographical differences (Forsstedt, 2018). What categories to include in the analyse depends on the expected impacts of the policy, but could be based on age, gender, family structure, income or geography. The guideline also recommends analysing both direct and indirect impacts when it is considered relevant for the policy that is analysed. The guidance on how to perform a distributional analysis is on a rather general level. It does not provide guidance on methodology (e.g., quantitative or qualitative), what data or what models to use or other technical support.

Another guideline for carrying out consequence analyses is provided by the Swedish Environmental Protection Agency (SEPA, 2019). With regards to guidance on distributional assessments, it is in essence very similar to Tillväxtverket (2017) when it comes to the level of guidance.

6. Ordinance on impact assessment of regulation

An additional guideline, however, with less methodological guidance is provided by the Swedish National Financial Management Authority (ESV, 2015). There is also a guideline for impact assessments performed within the government offices (Regeringskansliet, 2008). However, it follows the same principles as Tillväxtverket (2017). A brief and general guidance on distributional impacts is also provided by SEPA (2003) as part of an impact assessment guideline.

Table 6 Summary of findings regarding guidelines in Sweden

Sweden	Findings	Comment
Are national guidelines provided?	Yes	
Recommendations in existing guideline(s)		
Coverage (i.e. household income, regional differences, gender)	Relevant groups	Context-dependent
Coverage (direct and/or indirect effects)	Direct and indirect effects	Context-dependent
Methodology – qualitative, quantitative, specification of models (if any)	No specification	
Mitigating actions	No specification	

3.3.2 Methodology for assessing distributional impacts

According to interviews and identified examples (elaborated below), the methodological approaches to assessing distributional impacts vary to a large extent among the agencies carrying out analyses. Since national guidelines do not require any specific methodological approach, methodological variations can be expected. In some agencies, the main approach is to identify distributional impacts with qualitative methods and descriptions. A qualitative and non-exhaustive approach could in part be explained by lack of adequate data, and also by unclear and limited instructions from the government on how to address the issue of distributional impacts when carrying out impact assessments.

On the other hand, there are examples of distributional assessments based on quantitative data and econometric or microsimulation models. For example, analyses performed within the Ministry of Finance (department for distributional analyses) are based on household consumption data and microsimulation models, including analyses of distributional impacts of climate regulation. Other examples are from temporary committees where CO₂ tax increases have been analysed (SOU, 1997:11) and (SOU, 2003:2)). Econometric and microsimulation models were used in these reports to analyse distributional impacts on household income, household composition and household in rural vs. urban areas. Both direct and indirect effects were analysed. A similar approach was used by the National Institute for Economic Research (Konjunkturinstitutet, 2015), where distributional impacts of a CO₂ tax increase were analysed. Direct impacts were analysed based on a microsimulation model, whereas indirect and long-term impacts were analysed using

a general equilibrium model. With regards to coverage, effects on household income groups as well as geographical differences were analysed.

Based on the above description, it is concluded that there is no general approach used to carry out distributional assessments.

3.3.3 Approach to mitigating distributional impacts

With regards to measures to mitigate distributional impacts, there are no general approaches used in Sweden. From interviews, it is understood that compensatory measures are mainly discussed for environmental policies affecting a large share of the population, such as carbon tax on fuels. It is further understood that acceptance of and support for a policy is a determining factor for compensatory measures to be undertaken. With regards to taxes, it is not possible to directly compensate affected groups by earmarking revenues for redistribution. Revenues are instead collected to the Swedish Government's overall budget from which compensatory measures can be made.

The Swedish Government had a general tax changing strategy between 2000 and 2007 when climate regulations got more stringent and when mitigating measures on labour were made. During the first three years, a gradual increase of carbon tax, energy tax and tax on diesel was made along with measures to increase disposable income (Prop., 2003/04:1). Disposable income was increased mainly by raising basic deduction ("grundavdrag" in Swedish), i.e. the non-taxable base of income. The first three years, the program included increased environmental taxation of SEK 8.3 billion in total and disposable income was increased by the same amount. The green tax reform continued during 2004 and 2006 but was lifted in 2007 following a change of government. During 2001-2006, compensatory measures mainly took form as increasing basic deduction, but in 2001, 2004 and 2006, this was supplemented with lowered general payroll taxes (Prop., 2003/04:1) (Prop., 2005/06:1).

Stipulated in the so-called January agreement of 2019 – a political agreement between the governing parties and the Centre Party and the Liberal Party – a green tax reform is planned during the coming years. A waste incineration tax, among other environmental regulations, is implemented in 2020. Compensating measures are not yet decided upon, but suggestions include a reduction of income tax for individuals living in sparsely populated areas in the northern parts of the country (Prop., 2019/20:1).

3.3.4 Other relevant studies

The below table contains a non-exhaustive list of performed distributional assessments of CO₂ and energy-related regulations. They are all examples of assessments using quantitative methods. Some variation is seen with regards to what groups are analysed. Household income is most frequently covered, followed by geographical differences and household composition. A few of them analyse both direct and indirect impacts of the policy whereas we find that almost all assessments include impacts of a regulation (or regulations) aiming to compensate for potential regressive effects.

Table 7 Other relevant studies (Sweden)

Sweden	Economic instrument analysed	Qualitative or quantitative method	Analysed groups	Direct and/or indirect effects	Are compensatory measures analysed?
Konjunktur-institutet (2015)	CO ₂ tax	Quantitative	Household income, and rural vs. urban	Direct and indirect	Yes
Riksrevisionen (2012)	Tax on CO ₂ and energy	Quantitative	House-hold composition, and business sectors	Direct	Yes
Ahola m. fl (2009)	Fuel tax	Quantitative	Household income	Direct	Yes
SIKA (2008)	Fuel tax	Quantitative	Household composition and income, and rural vs. urban	Direct	No
SOU (2003:2)	CO ₂ tax	Quantitative	Household income, and rural vs. urban	Direct and indirect	Yes
SOU (1997:11)	CO ₂ tax	Quantitative	Household composition, and income	Direct and indirect	Yes

3.4 Norway

Distributional impacts of environmental regulations have for a long time been assessed as part of the Norwegian legislative process. The Ministry of Finance has the responsibility for all types of taxation. Green taxes will typically be a part of the tax proposal presented as a part of the annual budget. The responsibility for evaluating the distributional impacts of taxation also lies with the Ministry of Finance. However, when other authorities, such as the Environment Agency, implement regulation, they should also assess both distributional impacts and environmental impacts.

Guidelines are provided to assess the regulations. These guidelines provide a framework for assessing distributional impacts and ensure that they are considered as part of the legislative process. However, the guidelines do not specify how the distributional impacts should be assessed. In some guidelines, emphasis is on highlighting whether specific groups in the society are affected in a particularly negative way.

The general insight of the Norwegian Ministry of Finance is, that the impacts of environmental taxes on household disposable income are relatively evenly distributed. The process of estimating and adjusting the distribution of wealth and income is handled separately from the implementation of a specific environmental tax. Relatively more attention is paid to how private companies are affected by the environmental taxation, as reduced activity or close-down of companies may, in turn, significantly reduce the income and welfare of affected households.

In the cases where changes have a large direct impact on the distribution of disposable income in society, which currently primarily would be related to changes in taxation of energy and motor vehicles, it is the responsibility of the Ministry of

Finance to quantify the distributional impacts, when possible.

3.4.1 National guidelines

As is the case with several of the other Nordic countries, Norway does not have written guidelines on how to assess the distributional impacts when imposing or analysing new policies. However, the government has prepared general guidelines on how to analyse different actions. "*Utrekningsinstruksen*"⁷ (The Norwegian Government, 2016) outlines the requirements for what elements to include in an analysis when evaluating new policies. It explicitly mentions that it should be stated what the positive and negative impacts are and who is affected by it. However, it is neither stated how to measure these in more detail nor if it should be a quantitative or qualitative assessment.

The Norwegian Ministry of Finance has also developed a circular on how to carry out cost-benefit analyses (Finansdepartementet, 2014). In this circular, it is stated that the analyses should contain information about the distributional impacts of an action and that it should be clear if particular groups or geographic areas are affected. The two guidelines form the foundation for the assessments of distributional impacts. The guideline on cost-benefit analysis is supplemented by an internal instruction from the Norwegian Environmental Agency for the analyses that the agency carries out.

The Directorate of Financial Management in Norway has also developed a guideline on how to carry out cost-benefit analyses. In this guideline, it is described what a distributional impact is, and that it should be described as a separate part of the analysis. The ranking of projects is based on the overall net present value, and distributional impacts will therefore not directly affect the ranking. Furthermore, the guideline states that it is necessary to consider whether certain groups (e.g., income groups, private companies, or sectors) should be compensated.

7. *Instructions for Official studies and Reports*

Table 8 Summary of findings regarding guidelines in Norway

Norway	Findings	Comment
Are national guidelines provided?	Yes	Not specifying when or how distributional impact assessments are made
Recommendations in existing guideline(s)		
Coverage (i.e. household income, regional differences, gender)	Does not specify	Context-dependent
Coverage (direct and/or indirect effects)	Direct and indirect effects	Context-dependent
Methodology – qualitative, quantitative, specification of models (if any)	No specification	
Mitigating actions	No specification	Considered on a case or wider economic scale

3.4.2 Methodology for assessing distributional impacts

The Norwegian approaches are based on guidelines, which specify the process of assessing the implications of regulation. The distributional effects of regulation have been comprehensively analysed in previous assessments of the effects of green taxation (Grønn Skattekommisjon, 1996). The distributional effects on income deciles turned out to be of minor importance, and the more recent assessments of the effects of green taxation (Grønn Skattekommisjon, 2015) did not include similar analyses, even though the report states that green taxes could potentially have substantial impacts on the income distribution.

The various guidelines, especially *Instructions for Official studies and Reports* ("Utredningsinstruksen"), provide guidance on an efficient analytical approach (Regjeringen, 2016). Simple and concrete guidelines are provided for the (official) studies that should be performed. As a minimum requirement, six questions should be answered in the analysis. The questions are listed below:

1. What is the problem, and what do we want to achieve?
2. Which measures are relevant?
3. Which fundamental questions are raised by the measures?
4. What are the positive and negative effects of the measures, how permanent are these and who will be affected?
5. Which measure is recommended, and why?
6. What are the prerequisites for successful implementation?

The scope of this analysis should reflect the magnitude of potential consequences. In cases where the effect on disposable income is limited, it would often not be relevant to make a thorough and comprehensive assessment of the distributional impacts.

The sector-specific agencies indicated that the assessment of the distributional impacts of their own regulation is mainly based on stakeholder consultations and a qualitative description of the actors affected by the regulation. New green taxes and substantial changes to existing green taxes are rare, and the approach to

distributional effects is the same as for other tax changes. The Ministry of Finance is responsible for all taxation, including the assessment of economic and distributional impacts. However, the environmental authorities will be consulted for an assessment of environmental effects. The Ministry of Finance assesses the distributional impacts primarily based on register data of household consumption but also other data sources are used such as consumer surveys. The specific method will, though, vary, depending on data availability. The distributional impacts will only be quantified if these are expected to be significant.

3.4.3 Approach to mitigating distributional impacts

The applied mitigating actions are case-dependent. The general approach will be to find the most effective and efficient environmental instrument, both in terms of type and level, and to address household income distribution through other channels.

The mitigating action undertaken by the sector-specific ministries mainly focuses on mitigating impacts on socio economic groups or commercial sectors especially affected by the environmental regulation. This is most often done by making changes or exceptions to the regulation. The mitigating actions to economic instruments, e.g., green taxes, are primarily based on using existing mechanisms of regulating income distribution. Often, there will be an overall assessment of the income distribution impacts of a budget proposal, rather than of each single element, such as the change to a green tax. The mitigating approaches can include transfers or tax changes.

3.4.4 Other relevant studies

Table 9 presents examples of distributional assessments of climate-related and energy-related policies in Norway and the applied methods and scope.

Table 9 Other relevant studies (Norway)

Norway	Economic instrument analysed	Qualitative or quantitative method	Analysed groups	Direct and/or indirect effects	Are compensatory measures analysed?
Grønn skattekommisjon (2015)	Envi-ronmental taxes	Qualitative	Not specified	Not specified	Yes
Grønn skattekommisjon (1996)	CO ₂ taxes	Qualitative and quantitative	Households and industries	Direct and indirect	Yes
Aasness & Røed Larsen (2003)	Trans-portation taxes	Quantitative	Households	Direct and indirect	No

3.5 Finland

The Finnish approach to assessing distributional impacts of environmental policies is similar to that of the other Nordic countries. The distributional impacts are not analysed as part of standard impact assessments of policy instruments, but distributional impact should be considered when relevant. Hence, distributional impacts are rarely analysed, i.e. only when it is considered relevant for a policy or a combination of policies. With regards to guidance on how to assess distributional impacts, there is no detailed technical guidance available. General guidance on when and how to assess distributional impacts is, however, addressed in the guidelines on impact assessments of policy instruments.

From the interviews, it is indicated that there is a large variation with regards to methodological approaches used when distributional impact assessments are performed. The variation concerns the overall method in terms of qualitative or quantitative approaches, but also in terms of coverage, level of detail and precision of the analyses. Variations on available data, expertise and political interest are variables affecting the methodological approach. The issue of distributional impacts of environmental and climate regulations has, however, been an important concern in Finland over the last decades. There has been a general tax changing strategy over the period when increased environmental regulations to some extent have been compensated through increased disposable income for households. For example, redistribution has been made through reduction of individual income tax and by reducing social security payments for employers.

Table 10. Summary of findings regarding guidelines in Finland

Finland	Findings	Comment
Are national guidelines provided?	Yes	With little to no guidance on how to perform the assessment in practice
Recommendations in existing guideline(s)		
Coverage (i.e. household income, regional differences, gender)	Relevant groups	Context-dependent.
Coverage (direct and/or indirect effects)	Not specified	
Methodology – qualitative, quantitative, specification of models (if any)	Not specified	
Mitigating actions	Not specified	

3.5.1 National guidelines

General national guidelines are provided⁸ on how to conduct impact assessments on policy proposals, stating that distributional impacts should be analysed when relevant. There are several specific guidelines available on how to perform cost-benefit analyses. However, the level of guidance on how and when to analyse distributional impacts is general and does not provide detailed technical guidance on methods, models or data to use etc⁹.

3.5.2 Methodology for assessing distributional impacts

Similar to the other Nordic countries, the methodological approaches used when analysing distributional impacts vary to a large extent. In the interviews, it was stated that both qualitative approaches and quantitative methods are used. With regards to quantitative methods, the example methods described are microsimulation models and regression analysis. The scope of the analyses and coverage of aspects to evaluate is context-dependent. However, based on practice and guidelines, household income categories and geographical aspects are evaluated as standard. Policy impact assessments in Finland have had more emphasis on effects on private companies than socioeconomic consequences for individuals and households.

Variations in methodological approaches can be explained by several factors. The availability of adequate data is described as one central factor. There is also the issue of limited economic and time resources, including variations in level of knowledge and capacity to perform analyses. The latter relates to the fact that impact assessments are carried out within different ministries, agencies and research institutes which are described to have different capacity for performing analyses. The policy implementation and decision-making processes are reviewed by several agencies, e.g., the National Audit Office. Ex-post analyses are performed to evaluate the basis on which policy implementations are made. In 2016, the Finnish Council of Regulatory Impact Analysis was founded with the purpose of evaluating the quality of impact assessments for policies (FCRIA, 2019).

3.5.3 Approach to mitigating distributional impacts

During the interviews, it has been stated that Finland has had a general strategy for changing the tax burden over the last two decades. The strategy entails increased climate and energy regulations together with compensatory measures to increase disposable income for households. Different approaches have been used for redistribution: Examples include reduction of individual income taxation and reduction of employer's social security contribution. As an example, social security payment of employers was reduced as a measure to redistribute costs associated with an increased energy tax in 2011 (Tamminen, 2019). The level of ambition on the tax program is acknowledged to have varied during the period somewhat, depending on political governance. There are examples of packages, but also more general and gradual change of taxes over the period.

8. Information on guidelines is based on interviews, and no references on specific guidelines have been collected.

9. Due to language barriers, it has not been possible to evaluate specific guidelines provided in Finland in detail. Information in this chapter is based on interviews.

3.6 Greenland

No interviews with Greenland authorities have been carried out, as it has not been possible to set up an interview with any of the relevant authorities within the interview period. Therefore, this section is quite different from those for the other countries. However, a written response has been provided by the Ministry of Nature and Environment.

The Ministry of Nature and the Environment states that they generally have a strong focus on the financial consequences when new environmental legislation is developed and adopted. Considerations regarding the economic impact on citizens, private companies and government revenue must be included as part of the decision-making basis for new legislation and policies.

The assessments conducted vary in method, but as part of the preparatory work, the economic consequences of the new regulation are always assessed and often actual cost-benefit analyses are prepared (Finansdepartementet, 2015), which examine the effect of the regulation on government, private companies and citizens, including how different groups are affected.

4 Distributional impacts and policy implications

Based on the review of national guidelines and practices in the previous chapter, this chapter looks into whether differences or similarities in methodologies and approaches across the Nordic countries may have any policy implications. Second, we look into whether distributional impacts actually have affected the design of economic instruments in the Nordic countries. Third, the issue is illustrated through two case examples.

4.1 Comparative assessment of methodologies and approaches across the Nordic countries

This section compares methodologies for and approaches to assessing distributional effects across the Nordic countries in order to establish common traits and, if possible, derive recommendations for future work. When comparing the approaches to analysing distributional effects in the Nordics, we find large similarities across the countries. The following conclusions can be drawn:

- Existing national guidelines mainly provide guidance on procedures, but not on the specific methods for assessing distributional impacts.
- The approaches and procedures are, broadly speaking, similar across the Nordics. Distributional impacts of larger tax reforms are as a rule assessed by the Ministry of Finance. Assessments by sector ministries are performed on a case-by-case basis.
- Distributional impacts of some regulations are analysed in much larger detail than others. A determinant for performing comprehensive analyses seems to be if the policy is associated with a strong public opinion and a concern for unfair distributional impacts.
- Methods for assessing the distributional impacts of regulation vary according to data availability, expected size of the distributional impacts and case-specific issues of special interest. Methodological approaches also vary between different authorities performing assessments, which can partly be explained by different competence and focus of the authorities.
- Mitigating actions follow two different approaches: First, changes to proposed regulation to mitigate impacts on special groups, often either through rebates or exemptions. Second, changes to other distributing measures or policies. The first is primarily used to ensure political support and the latter to ensure both acceptance and a politically desirable income distribution.

The guidelines and approaches in the Nordic countries are very similar. Guidelines target the development of policy instruments in the sector ministries and cover a broad range of different regulations, not only economic instruments. This can help explain why guidelines only provide a framework for the analytical process and not specific guidance on how or when distributional assessments should be undertaken. Based on the interviews, three other reasons for different approaches have

emerged:

1. **Data availability** influences the methodological choices: A lack of data can limit the analysis and extensive data collection can be too costly or time-consuming.
2. **Time and resource restrictions** require prioritisation of the scope of the analyses made. The additional use of time must be balanced against the added value of more comprehensive analyses.
3. Methodological variations between different agencies, ministries and other authorities carrying out assessments can to some extent be explained by having **established different practices** as well as differences regarding **access to adequate expertise** within the individual authorities.

The relative importance of the distributional impact in a specific case can depend on who are affected and in which way. There can be a political interest in a special interest group, e.g., house owners or car owners, and impacts on these actors can be of greater importance in the specific case. The respondents especially highlighted cases in which benefits of regulation are widely distributed, whereas costs fall on a few actors only. The primary examples relate to regulation of companies, where few companies carry a large cost of regulation and benefits are widely distributed throughout society.

In general, the respondents from the economic ministries have reported that the distributional impacts of regulation related to environment, energy and transportation in general do not differ from other excise duties on products (e.g., excise duties on alcohol and tobacco) and impacts are analysed in a similar way. The responsibility of making assessments or ensuring that the issue is considered lies with the economic ministries such as the Ministry of Finance or the Ministry of Taxation. These ministries perform distributional assessments for a wide range of regulations, not only for environmental policies. More often, distributional impact assessments consider regulations directly affecting disposable income, e.g., income tax and payroll tax. Worth mentioning in this context is that assessments of distributional effects on the revenue side (e.g., income tax), are more mature in terms of practice, consistency in use of models and, perhaps most importantly, the availability of sufficient and relevant data. Environmental regulations target the expenditure side for households, which are less frequently analysed and are dependent on data with generally limited accuracy. Household consumption data is normally based on survey methods, which has shown to deteriorate over time due to decreasing response rates.

From interviews in all the countries, it is evident that the issue of distributional effects of different regulations is treated with different levels of ambition and scope. For some regulations, the issue is treated at a very general level with qualitative descriptions of expected effects. Other regulations are analysed more comprehensively and in more detail with regards to distributional effects, for which quantitative methods such as microsimulation models, regression analyses and, in rare cases, dynamic models are used. However, comprehensive assessments of distributional effects are performed only by economic ministries with primary attention on direct impact on income distribution. The distributional impacts of other policy instruments than environmental taxes are often the responsibility of the Ministry of Environment or equivalent, which primarily describes distributional impacts qualitatively. This is also the case of regulation of companies, where distributional impacts on households are only indirect. One common factor for the

selected regulations that are analysed more extensively seems to be that the regulations are politically sensitive to a greater extent. Regulations that are associated with a large public opinion with regards to expected distributional effects, or regulations that lack support by parties on the broad political scale, seem to get relatively vast attention when it comes to analysing distributional effects.

The approach in the Nordic countries is well in line with the better regulation guidelines of the EU Commission (European Commission, 2017). According to the guidelines, distributional impacts should be propositionally assessed and considered, but the method is not specified. The distributional impacts are to be considered between different groups of actors and not necessarily between income groups. The guidelines seem to primarily ensure that groups especially impacted by the regulation are identified.

Economic instruments can be expected to become more important in stimulating and steering the green transition, and to make up a larger relative share of the tax revenue. This must be expected to result in a greater emphasis on the wider impacts on the economy, including impacts on the distribution between different income groups and socioeconomic groups. It should be noted that this has not been the prevailing trend the last ten years in the Nordic countries. The number of applied economic instruments has been relatively stable and the shares of environmental taxes in the total tax revenue have even decreased slightly (Nordic Council of Ministers, 2018).

The need for a green transition has also raised the concern that some groups can end up as losers in the transition. As the green transition potentially picks up speed, there will be a growing need to ensure a *just* green transition. The European Green Deal's Just Transition Mechanism is an initiative by the EU Commission to ensure that no one is left behind in the green transition ensuring a financial package of EUR 100 billion to support necessary investments and help workers, regions and sectors that are most affected by the transition to a green economy (European Commission, 2020). Assessments of impacts on certain groups can grow in importance in the future, ensuring that no subgroups in society are left behind. These assessments are currently made on an ad hoc basis based on general guidelines and with a shifting focus.

4.2 How distributional impacts have affected design of economic instruments in the Nordic countries

The purpose of this section is to describe the findings on how distributional impacts have affected the design of economic instruments in the different Nordic countries in order to provide recommendations for future work. This section is primarily based on interviews with different authorities within the Nordics.

Throughout the interviews conducted with policymakers in the Nordic countries, we have attempted to identify changes or modifications to the design of economic instruments specifically taken to mitigate distributional impacts. Modifications specifically due to distributional concerns can, however, be difficult to identify, since the policy development process is interactive and changes to the regulatory design can happen for a range of different reasons along the process. In addition, attention in this rapport is only on initiatives which were implemented. There are, however,

some general findings from the interviews.

In all the countries, the introduction of taxes and subsidies regulating the environment, transport or energy use is the area of competence of the Ministry of Taxation or the Ministry of Finance, with input from the sector-specific ministries. The mitigating actions are therefore also driven by these ministries and in general focused on redistribution based on the general income distribution of the nation. Using environmental tax revenue to reduce other taxes has been a widely used tool as a mitigating action in the Nordics.

In the case of a political wish for mitigating actions directed at specific groups in society, these are developed on a case-by-case basis, depending on the concerns and the case. Examples include commuter subsidies (e.g., in the shape of tax deductions), reduced tax on electricity used for heating, and lower water tax for large water users. Mitigating actions will in general reduce the regulatory burden for specific groups, which might not be possible to single out and target considering the income distribution. This type of mitigating actions, however, reduces the efficiency of the regulation by reducing the price incentives for some groups, leading to a higher than optimum activity of some actors. The interviews reveal that the choice of measures to mitigate the impact on certain groups and which groups to consider is largely driven by the policymakers. They assess the implications of the measures and try to identify satisfactory solutions.

Impacts on the distribution of disposable income tend not to result in changes to the policy design as such. The mitigation measures to reverse distributional impacts on household disposable income when considering an economic instrument, e.g., an environmental tax, are most often not closely linked to the policy. Mitigating actions are most often made using policy tools designed to redistribute disposable income such as changes to the tax on labour or changes to the size or number of transfers. These decisions are based on the overall distribution of disposable income between households. One respondent said that the purpose of environmental regulation should be to ensure a change in behaviour in a more environmentally friendly way and that handling of distributional impacts should not be sought within the same regulation. Mechanisms specifically designed to mitigate regressive effects are more appropriate and can better ensure the desired income distribution in the country.

This also follows the findings in the literature by Bento (2013) and OECD (2006), in which the most efficient forms of redistribution are found to be changes to the tax rate or tax rebates. This underlines that efficient redistribution measures are not closely linked to the actual environmental regulation. When a smaller subset of the population is disproportionately negatively affected by the regulation, traditional redistributing instruments (e.g., reducing labour taxes) can be less suitable as it can be impossible to target the group in question. The literature provides limited guidance on efficient approaches in these cases.

4.3 Case illustrations (two cases)

This section provides two fictional case examples to highlight different aspects influencing the assessment of the distributional impacts, such as how costs and benefits are distributed in the society and the opportunities to change behavior. The cases highlight that approaches to handling distributional impacts differ on a case-by-case basis depending on, e.g., data availability and guidelines provided in a given area, as well as the competences and focus of the ministry performing the specific analysis.

Two cases are evaluated: General tax on CO₂ and introduction of tax on plastic carrier bags.

Case: General tax on CO₂

All the Nordic countries have some version of a CO₂ tax on, e.g., fuels for transportation or energy. However, none of the countries have a universal tax on CO₂ emissions on all CO₂-emitting activities in the country such as agriculture and other non-energy emissions. A CO₂ tax is an instrument which economists argue is of importance in a cost-efficient transition to a less carbon intense economy (Klimarådet, 2020). This case is based on a suggested future general CO₂ tax in addition to current regulation such as the EU ETS.

A general tax on CO₂ and other climate gases like methane and nitrous oxide will have an impact on the disposable income of households directly by, e.g., making products like electricity more expensive, or indirectly by making production of products/services more expensive and hence increasing the price for the products and services. Typically, only the direct distributional impacts are assessed in the Danish analyses of the distributional impacts on disposable income. The tax would increase the cost of energy, meat and transport and affect all sectors in society. An assessment of the expected indirect impacts would therefore also be relevant. This, however, requires assumptions on consumer behaviour in different consumer segments, which creates more uncertainty of the results.

A climate tax would generate a significant tax revenue. Small Great Nation (2020) and Klimarådet (2020) has proposed taxes of 1,250–1,500 DKK/tonne of CO₂, which would generate a revenue of around DKK 50 billion. A tax of this level would have a regressive effect on the income distribution, but the revenue provides opportunities for mitigating the distributional effects. The revenue (after behavioural changes) can be redistributed by a lump sum transfer, or a green check, which is already used in Denmark to compensate for energy regulation. A higher revenue from a green tax can also make it possible to reduce or abandon existing regressive taxes. Small Great Nation has proposed to spend part of the revenue on abandoning the tax on electricity, which is not linked directly to environmental impact and is regressive.

A tax reform of this magnitude will require an elaborate assessment of the distributional impacts, e.g., using economic models to assess ripple effects and impacts on the economy, and at the same time provide different opportunities for mitigating the distributional impacts as shown above. This is especially the case when the tax is part of a larger reform creating opportunities to make changes to different taxes at the same time. Within an income group, the tax reform might

both have winners and losers, who are not identified when only considering the impact on disposable income by income group. Other types of analysis such as stakeholder involvement and examples of case families can help identify groups which have a disproportional share of the cost, and possible methods to potentially reduce the impact. Concerns of carbon leakage – the notion that a carbon tax can move CO₂-intensive production to countries with more relaxed regulation – can make elaborate compensation measures to specific sectors necessary. This can create additional complexity when considering the distribution of cost in society. The concern is linked to regulation of emissions from companies and is not further considered in this report.

Case: Introduction of tax on plastic carrier bags

Sweden introduced an excise tax on plastic bags in May 2020 with the purpose of reducing litter and incentivizing efficient resource use. Taking measures to decrease the use of plastic bags was also done with the purpose of meeting the requirements in the EU Packaging Directive (Directive 94/62/EC) stating that the consumption should not exceed 40 plastic bags per person annually.

The tax is targeted at plastic bags used in retail, food stores and equivalent. The normal tax rate is SEK 3 for thicker carrier bags and SEK 0.30 for smaller and thinner bags normally used for fruits, bread and such. The producers and importers of the plastic bags are liable to pay the tax, but they can choose to transfer the cost to consumers by adding the cost to the price of the bags. According to the impact assessment (Finansdepartementet, 2019) that was performed before the implementation of the tax, the average cost for individuals was estimated to SEK 310 annually. That is, if the consumption of plastic bags stays at the same level as before the implementation of the tax. However, if the target of 40 bags per person a year is reached, the cost would be reduced to SEK 175 on average. In addition, there is a cost for individuals associated with the transition to alternatives to plastic bags such as a tote bag, though this cost is not estimated in the impact assessment.

Taxing plastic bags is an example of an environmental regulation with very broad impacts since it essentially affects all households. Since plastic bags are normally used when buying food and other necessity goods, there are reasons to believe that households of all income levels face essentially the same cost. If this is true, the tax would likely be associated with regressive distributional impacts since low-income households pay a larger share of their disposable income on the tax compared to high-income households.

In the impact assessments carried out, economic effects of the tax on individuals are limited to the estimation of the average cost per person. Even though there are reasons to suspect that the tax is associated with regressive distributional impacts, no effort is made to analyse effects on households with different income levels or other categories that could be relevant. A possible reason for this could be lack of adequate data on plastic bag consumption on household level linked to individual data such as household composition, income level etc. It is also possible that the estimated annual cost of SEK 175–290 on average per person is considered marginal and that a more rigid analysis of distributional effects therefore would be considered excessive. Furthermore, there has not been a very strong public opinion on the issue of regressive effects of the tax, which could also help explain why an analysis in more

detail has not been prioritized. The tax generates an additional revenue for the government, making it possible to reduce other taxes or increase transfers to mitigate the distributional impact of the tax. Without knowledge of the distributional profile of the tax, this can only be done by evaluating the development in the disposable income distribution in the population.

5 Main findings and recommendations

The available guidelines on regulatory impact assessments in the Nordic countries address all forms of policies, including a wide range of policy areas and regulatory instruments. Expected impacts, as well as distributional impacts, vary significantly from policy to policy. In some cases, distributional impacts are not considered relevant whereas it is of large concern in other cases. It is therefore relevant to have different approaches to estimating the distributional impacts of different environmental policies. As a result, it is perhaps not desirable to provide specific methodological guidance on how the distributional impacts are best addressed. However, it is still relevant to provide technical guidance in order to create a better common understanding of and consistency for performing assessments of distributional impacts. This could be done by providing more case-specific guidance and providing examples of best practices for distributional impact assessments for different types of policy areas and regulatory instrument.

From the literature review of research findings in chapter 3, it is shown that the concern for regressive distributional impacts depends on several case-specific factors. For example, regulating necessity goods that are difficult or expensive to substitute, such as electricity for housing, can be expected to result in regressive distributional impacts. For the same reasons, regressive effects are expected in rural areas from fuel taxes. On the other hand, fuel taxes can be expected to be progressive in urban areas where substituting car driving with public transport, as a rule, is easier. This points to the fact that distributional impacts vary significantly from case to case and can hence be difficult to anticipate without performing detailed impact assessment of a planned policy. In order to make well informed decisions before policy implementation, it is important that distributional aspects are analysed with adequate methodology and overall approach.

Mitigating actions are often taken to reduce the distributional impacts of imposed environmental regulation. The sector-specific ministries tend to focus on integrating mitigating elements in the regulation itself as this is the primary compensatory measure available in the toolkit for sector ministries. The economic ministries have the possibility of evaluating the overall distribution of income and dispose of policy tools targeted mitigation of distributional effects in the economy at large, not only the distributional impacts of environmental taxation. The finding indicates that stricter regulations and a more extensive use of economic instruments to trigger and support the green transition will require a greater collaboration between different bodies of government. This will help ensure that concerns of distributional impacts are handled in an efficient way while paying attention to specific groups or areas which might be especially affected or disadvantaged. If the use of green economic instruments is to increase without adverse distributional effects, mitigating actions must be developed as an integrated part of the policy development and consider initiatives in different ministries.

Main findings:

- The Nordic countries have the analytical capacity to assess the impact on income distribution of economic instruments of environmental regulation.
- Alleviating regressive effects on income distribution is most efficiently done using changes to tax rates or transfers.
- Revenue recycling can reduce the regressive impact of an environmental tax. It can, however, be difficult or impossible to recycle tax revenue directly to the specific target groups by the tax. This can be the case when only a subset of the population carries the burden of the regulation, but all in an income group is compensated equally. This might create winners and losers from regulation even if the distribution remains stable between income groups.
- The main purpose of environmental regulation will always be environmental improvements. Negative consequences on income distribution will mostly be handled through other channels, such as changes to income taxes or transfers. When impacts on specific sub-groups of the population is to be mitigated, it is more likely that the design of the environmental regulation is adjusted.
- The distributional impacts of environmental regulation are often considered on a case-by-case basis, depending on, e.g., data availability, type of goods and political awareness. This is especially true for the ministries on environment and climate
- Taxes on energy are often regressive, whereas taxes based on the value of vehicles are found to be progressive in most cases.
- Using tax revenue from green taxation to reduce other taxes has been widely used in the Nordics as a mitigating method. Revenue recycling can have a significant impact in terms of securing efficiency and mitigating regressive effects. This can however be in conflict with aim to use green tax revenue to promote the green transition.

Recommendations:

- Guidelines can be developed to better indicate the types of distributional impacts to consider, e.g., income, gender or geography, and to ensure that each relevant aspect is considered
- Guidelines should include a check list of indicators indicating that distributional impacts should be further assessed. This could include possibilities for substitution to other products/services, or groups that are especially affected such as homeowners or car owners.
- Ensuring procedures which in a consistent way highlight potential impacts of mitigating actions on the effectivity of the regulation. This could further integrate concerns of distributional impacts into the design of the environmental policy initiative.
- To the extent possible, measures reducing the efficiency of the regulation should be avoided. This includes omitting groups from the regulation or providing discounts to certain groups. Measures to mitigate regressive effects should ideally focus on instruments not directly linked to the activity. Only when a suitable, alternative solution cannot be identified should regulatory discounts be provided to certain groups.
- Regulation of environment, energy and transport can be introduced together

with other initiatives to generate a package of policy initiatives with an overall desirable distributional impact, e.g., through tax revenue recycling.

References

- Ahola, H. E. C. o. T. S., 2009. *Är bensinskatten regressiv?*, s.l.: Ekonomisk Debatt, årg 37, nr 2, s 71–77.
- Andersson, J. J., 2019. Carbon Taxes and CO2 Emissions: Sweden as a Case Study. *American Economic Journal: Economic Policy* 2019, 11(4), p. 1–30.
- Bento, A. m., 2013. *Equity impacts of environmental policy*, s.l.: s.n.
- Bureau, B., 2010. *Distributional effects of a carbon tax on car fuels in France*, s.l.: s.n.
- Callan, T. et al., 2008. *The Distributional Implications of a Carbon Tax in Ireland*, s.l.: s.n.
- Carattini, S. C. M. F. S., 2018. *Overcoming public resistance to carbon taxes*, s.l.: WIREs Climate Change.
- Carlbén & Kriström, 2018. *Are Climate Policies in the Nordic Countries Cost-Effective?*, s.l.: s.n.
- Caspersen, S., 2019. *De fattigste rammes hårdest, hvis den grønne check afskaffes*, s.l.: Arbejderbevægelsens Erhvervsråd.
- Danish Ministry of Finance, 2003. *Ministry of Finance*. [Online]
Available at: <https://en.fm.dk/publications/2003/maj/the-law-model-may-2003/>
- DG Environment, 2011. *The role of market-based instruments in achieving a resource efficient economy*, s.l.: European Commission.
- DG Environment, 2017. *Capacity building, programmatic development and communication in the field of environmental taxation and budgetary reform*, s.l.: European Commission .
- DØRS, 2009. *Økonomi og Miljø: Grønne afgifter*, s.l.: s.n.
- DØRS, 2017. *Økonomi og Miljø*.
- DØRS, 2017. *Økonomi og miljø 2017. Grønne afgifter og effektiv miljøregulering*, København: s.n.
- DØRS, 2019. *Økonomi og Miljø*, s.l.: DØRS.
- DØRS, 2019. *Økonomi og Miljø; miljøpåvirkning og fordeling*, s.l.: s.n.
- Ekins, P., Pollitt, H., Barton, J. & Blobel, D., 2011. *The implications for households of environmental tax reform in Europe*, s.l.: Ecological Economics.
- Energianalyse, E., 2011. *Forslag til ny struktur for CO₂- og energiafgifter i Danmark – med fokus på fjernvarme*, s.l.: s.n.
- Energistyrelsen, 2018. *Vejledning i samfundsøkonomiske analyser på energiområdet*, s.l.: s.n.
- Erhvervs-og vækstministeriet, 2015. *Vejledning om erhvervsøkonomiske konsekvensvurderinger*, s.l.: s.n.

ESV, 2015. *Vägledning Tänka efter före – konsekvensutredning vid regelgivning. ESV 2015:19*, s.l.: The Swedish National Financial Management Authority.

European Commission, 2020. *Investing in a Climate-Neutral and Circular Economy - The European Green Deal*, s.l.: s.n.

European Commission, 2017. *Better Regulation Guidelines*, s.l.: s.n.

FCRIA, 2019. *The Finnish Council of Regulatory Impact Analysis, Annual review 2018*, s.l.: Prime Minister's Office.

Finansdepartementet, 2014. *Prinsipper og krav ved utarbeidelse av samfunnsøkonomiske analyser mv*, s.l.: s.n.

Finansdepartementet, 2015. *Vejledning i fremstilling af samfundsøkonomiske konsekvensvurderinger*, s.l.: s.n.

Finansdepartementet, 2019. *Skatt på plastbærkassar*, s.l.: Finansdepartementet, Skatte- og tullavdelningen. Fi2019/02465/S2.

Finansministeriet, 2005. *Vejledning om konsekvensanalyser*, s.l.: s.n.

Finansministeriet, 2017. *Vejledning i samfundsøkonomisk konsekvensvurderinger*, s.l.: s.n.

Fischer, C. & Pizer, W. A., 2016. *Equity versus Efficiency in Energy Regulation*, s.l.: Duke University.

Flues, F. & Thomas, A., 2015. *The distributional effects of energy taxes*, s.l.: OECD.

Forsstedt, S., 2018. *Tänk efter före! En ESO-rapport om samhällsekonomiska konsekvensanalyser*, s.l.: Ministry of Finance.

Fullerton, D., 2011. *Six distributional effects of environmental policy*, s.l.: National Bureau of Economic Research.

Grønn Skattekommisjon, 1996. *Grønne skatter - en politikk for bedre miljø og høy sysselsetting*.

Grønn Skattekommisjon, 2015. *Norges offentlige utredninger: Sett pris på miljøet*.

Halvorsen, B. & Nesbakken, R., 2002. *Distributional Effects of Household Electricity Taxation*, s.l.: Statistics Norway.

Institute for European Environmental Policy, 2013. *Reforming environmental taxes and harmful subsidies: challenges and opportunities*, s.l.: s.n.

Jacobsen, H. K., Bør-Pedersen, K. & Wier, M., 2001. *Fordelingsvirkninger af energi- og miljøafgifter*, s.l.: DTU.

Klimakur 2020, 2010. *Tiltak og virkemidler for at nå norske klimamål mot 2020*, s.l.: s.n.

Klimarådet, 2016. *Afgifter der forandrer*, Danmark: s.n.

Klimarådet, 2020. *kendte veje og nye spor til 70 procents reduktion - Retningslinjer og tiltag for de næste 10 års klimaindsats i Danmark*, s.l.: s.n.

Klinge Jacobsen, H., B.-P. K. & W. M., 2001. *Fordelingsvirkninger af energi- og miljøafgifter. Roskilde: Risø National Laboratory. Denmark. Forskningscenter Risø. Risø-R, Nr. 1297(DA)*.

- Konjunkturinstitutet, 2015. *Miljö, ekonomi och politik*, Stockholm: s.n.
- Kosonen, K., 2012. *Regressivity of environmental taxation: myth or reality?*, s.l.: European Commission.
- Lindseth, L. R., 2015. *EPC in the Nordic Countries*, s.l.: Nordic Council of Ministers.
- McInnes, G., 2017. *Understanding the distributional and household effects of the low carbon transition in G20 countries*, s.l.: OECD.
- Miljøstyrelsen, 2008. Økonomiske styringsmidler i dansk miljøpolitik.
- Milne, J. E. & Andersen, A. S., 2012. *Handbook of Research on Environmental Taxation*, s.l.: s.n.
- Møller, F., Strandmark, L. & Krarup, S., 2010. *Samfundsøkonomisk vurdering af miljøprojekter*, s.l.: The Danish Ministry of Environment.
- Nordic Council of Ministers, 2011. *Virkemidler for å ta hensyn til fordelingseffekter av miljøavgifter og kutt i miljøskadelige subsidier*, s.l.: s.n.
- Nordic Council of Ministers, 2013. *The financial crisis and fiscal consolidation in green budgets*, s.l.: s.n.
- Nordic Council of Ministers, 2014. *Nordic Climate Policy - A case study on Efficient Policy Measures*, Norden: s.n.
- Nordic Council of Ministers, 2018. *The use of economic instruments in Nordic environmental policy 1990–2017*, s.l.: s.n.
- OECD, 2006. *The Distributional Effects of Environment*, s.l.: s.n.
- OECD, 2016. *Distributional impact of structural reforms*, s.l.: s.n.
- OECD, 2017. *Distributional and household effects of low carbon transition in C20 countries*, s.l.: s.n.
- OECD, 2019b. *OECD Economic Surveys Norway*, s.l.: s.n.
- OECD, 2019. *Income redistribution across OECD countries: main findings and policy implications*. [Online].
- Prop., 2003/04:1. *Regeringens proposition 2003/04:1. Budgetproposition för 2004. Förslag till stadsbudget för 2004, finansplan, skattefrågor och tilläggsbudget m.m.*, s.l.: Swedish Ministry of Finance.
- Prop., 2003/04:1. *Regeringens proposition 2003/04:1. Budgetproposition för 2004. Förslag till stadsbudget för 2004, finansplan, skattefrågor och tilläggsbudget m.m.*, s.l.: Swedish Ministry of Finance.
- Prop., 2005/06:1. *Regeringens proposition 2005/06:1. Budgetproposition för 2006. Förslag till statsbudget för 2006, finansplan, skattefrågor och tilläggsbudget*, s.l.: Swedish Ministry of Finance.
- Prop., 2019/20:1. *Regeringens proposition 2019/20:1. Budgetproposition för 2020. Förslag till statens budget för 2020, finansplan och skattefrågor.*, s.l.: Swedish Ministry of Finance.
- Regeringskansliet, 2008. *Riktlinjer för arbetet med konsekvensutredning i Regeringskansliet.*, s.l.: Swedish Government Offices.

- Regjeringen, 2016. *Utredningsinstruksen*, s.l.: Regjeringen Norge.
- Ricardo, 2018. *Sweden Energy and Carbon – Rethinking Decarbonisation Incentives – Policy Case*, s.l.: s.n.
- Riksrevisionen, 2012. *Klimatrelaterade skatter – vem betalar?*, s.l.: Riksrevisionen rapport 2012:1.
- Roberts, T. M., 2010. *Mitigating the Distributional Impacts of Climate Change Policy*, s.l.: s.n.
- Schultz, H. B., 2017. *Økonomiske effekter ved at reducere elafgiften - Udarbejdet for Dansk Energi*, s.l.: s.n.
- SEPA, 2003. *Konsekvensanalys steg för steg*, s.l.: Swedish Environmental Protection Agency.
- SEPA, 2019. *Hanledning i samhällsekonomisk konsekvensanalys*, s.l.: Swedish Environmental Protection Agency.
- SFS, 2007:1244. *Förordning om konsekvensutredning vid regelgivning*, s.l.: Swedish Ministry of Justice.
- SIKA, 2008. *Acceptabla fördelningseffekter av höjd drivmedelsskatt?*, s.l.: Statens institut för kommunikationsanalys. Rapport 2008:11.
- Skattekommisjon, G., 1996. *Grønne skatter – en politikk for bedre miljø og høy sysselsetting*.
- Skatteministeriet, 2018 a. *Afgifts- og tilskudsanalysen på energiområdet*, Danmark: s.n.
- Skatteministeriet, 2018b. *Afgifts- og tilskudsanalysen på energi områder*, København: s.n.
- Small Great Nation - Deloitte and Kraka, 2020. *En klimareform der sikre de magiske 70 procent*, s.l.: s.n.
- SOU, 1997:11. *Skatter, miljø och sysselsättning. Slutbetänkande från Skatteväxlingsutredningen*, s.l.: s.n.
- SOU, 2003:2. *Fördelningseffekter av miljöpolitik, Appendix 11 till Långtidsutredningen 2003*, s.l.: s.n.
- SparEnergi, 2019. *Tilskud og fradrag - Hvilek tilskudsordninger findes der?* [Online] Available at: <https://sparenergi.dk/forbruger/boligen/tilskud-og-fradrag>
- Sørensen, P. B. et al., 2020. *Small Great Nation: En klimareform der leverer de magiske 70 procent*, s.l.: Kraka & Deloitte.
- Tamminen, S. e. a., 2019. *How to implement a larger tax reform in Finland? Potential instruments and impacts*, s.l.: SITRA.
- The Danish Ministry of taxation, 2000. *Rapport om Mulighederne for øget anvendelse af afgiftsregulering på kemikalieområdet, oktober 2000*, s.l.: s.n.
- The Danish Ministry of Taxation, 2013. *Provenu og Metode - Udarbejdelse af provenumæssige konsekvensvurdering i Skatteministeriet*, s.l.: s.n.
- The Danish Ministry of Taxation, 2019. *Anvendelse af afgiftsregulering*, s.l.: s.n.

- The Ministry of Taxation, 2019. *Grøn check - en historisk oversigt*. [Online]
Available at: <https://www.skm.dk/skattetal/satser/skattehistorik/groen-check-en-historisk-oversigt/>
[Accessed 2020].
- The Nordic Council of Ministers, 2018. *Increasing income inequality in the Nordics*, s.l.: s.n.
- The Norwegian Government, 2016. *Utretningsinstruksen*, s.l.: s.n.
- Thoresen, K. O. A. & T. O., 1997. *The Norwegian Tax Reform; Distributional Effects and the High-income Response*, s.l.: s.n.
- Tillväxtverket, 2017. *Handledning för konsekvensutredning*, s.l.: Swedish Agency for Economic and Regional Growth.
- Transportministeriet, 2015. *Manual for samfundsøkonomisk analyse på transportområdet – Anvendt metode og praksis i transportministeriet*, s.l.: s.n.
- Wang, Q. et al., 2016. *Distributional effects of carbon taxation*, s.l.: s.n.
- Wier, M., Birr-Pedersen, K., Jacobsen, H. K. & Klok, J., 2005. *Are CO2 taxes regressive? - Evidence from Danish Experience*, s.l.: s.n.
- Aasness, J. & Røed Larsen, E., 2003. *Distributional Effects of Environmental Taxes on Transportation*, s.l.: s.n.

Appendix A

Stakeholders consulted

Denmark

1. Energy Agency
2. Ministry of Environment and food
3. Ministry of Taxation
4. Ministry of Finance
5. Ministry of Transportation

Norway

1. Ministry of Finance
2. Ministry of Climate and Environment
3. Environment Agency
4. Ministry of Transportation

Sweden

1. Ministry of Finance
2. Ministry of Environment
3. Swedish Environmental Protection Agency
4. National Institute of Economic Research

Finland

1. Ministry of Finance
2. Ministry of Environment

Greenland

1. Ministry of Nature and Environment

Appendix B

Overview of literature on distributional impacts

Table B – 11 Literature on distributional impacts, abstracts

Article	Source	Year	Summary/abstract
Økonomi og Miljø, 2019	Danish Economic Council (DØRS)	2019	This report is produced by the Danish Economic Council. The report focuses on providing recommendations for two main areas; Distribution of environmental impact and Carbon leakage from Danish climate policies. The report finds a relationship between high environmental exposure and individuals with low incomes, the identified relationship is however very weak. Large differences in environmental exposure are found between individuals within the same income groups, indicating that income does not contribute significantly to the explanation of differences in environmental exposure between individuals.
Are Climate Policies in the Nordic Countries Cost-Effective?	Carlén & Kriström	(2018)	This paper argues that Nordic climate policy can become more cost-efficient. The authors develop a general equilibrium framework to analyse the benefits and costs of environmental (and climate) policy. The usual partial equilibrium intuition is quite robust, provided that the policy changes are "small enough". This result simplifies empirical analysis considerably. Significant possibilities for cost reductions are available within current EU policy packages, especially regarding the non-trading sector. There are also some gains to be made from policy coordination and ample within-country opportunities, such as the removal of ineffective subsidies and overlapping regulations. Finally, the significant forest endowment in Finland, Norway and Sweden, may also play a useful role in shaping a more effective climate policy.
Afgifts- og tilskudsanalyse på energiområdet	The Danish Ministry of Taxation	2018	The purpose of this report is to describe the development of the tax and subsidy basis in the area of energy. It is analysed how to create a social optimal system of taxes and quotas while considering the climate and energy policy. The analysis further reflects on who bears the cost of energy regulation, the objectives of the energy policy as well as the historical development in the energy use and the tax proceeds.
Øget indkomstulighed i Norden	NCM	2018	The article provides an overview of inequality developments in the Nordics compared to other OECD countries, starting from the early 1990s. Some of the largest inequality increases have taken place in Sweden, Finland and Denmark, but from very low initial levels. A coherent set of institutions underpin high employment and have likely dampened the inequality-increasing forces from skill-biased technological change and globalization. Demographic trends have increased inequality in the Nordics, but the main mechanisms vary between countries. Redistribution has weakened considerably, mainly driven by weaker insurance transfers to working-age individuals, but these reforms have contributed to including more people in the labor market.
Økonomi og Miljø	Danish Economic Council (DØRS)	2017	The report from the Chairmen of the Danish Economic Council of Environmental Economics has a chapter concerning Green taxes and effective environmental regulation. The chapter describes the principles of how green (environmental) taxes should be designed. Calculations show that great efficiency gains might be achieved by changing the design of the existing green taxes.

Capacity building, programmatic development and communication in the field of environmental taxation and budgetary reform	DG Environment	2017	Environmental taxation efforts have mainly focused in the areas of energy, transport and climate. This study investigated the use of economic instruments to address pollution and natural resource use, in order to contribute to a broader development and application of market-based instruments (MBIs), and in particular environmental taxes, in the field of environmental policy. The objectives of the study were to improve the knowledge base, to stimulate exchanges of experience and best practice amongst civil society stakeholders, and to help organizations to become better prepared to participate in policy-making processes at both the national and EU levels.
Distributional and household effects of low-carbon transition in G20 countries	OECD	2017	This report provides an overview of research into the distributional and household effects of low-carbon transition in the G20 countries and draws lessons from experiences across the G20 addressing and limiting these effects. From this knowledge base as well as the growing experience of G20 countries with carbon-related policies, it is possible to anticipate impacts on lower income households and identify good practice in preventing or managing distributional issues as the transition to a low-carbon economy progresses.
Afgifter der forandrer	Klimarådet	2016	The report focuses on the distributional effects of taxes on transport, and heating to get a more efficient cost-effective green transition. Furthermore, the report analyses if Denmark can reach its set targets of emissions for 2030.
Distributional impact of structural reforms	OECD	2016	In a majority of OECD countries, GDP growth over the past three decades has been associated with growing income disparities. This paper investigates the long-run impact of structural reforms on household incomes across income distribution. Most structural reforms are found to have little impact on income inequality when the latter is assessed through measures that emphasize the middle class. By contrast, a higher number of structural reforms, in particular social protection reforms, are found to have an impact on income inequality and thus may raise trade-offs and synergies between growth equity objectives when inequality is assessed through measures that emphasize relatively more incomes among the poor.
Miljö, ekonomi och politik. Stockholm	Konjunkturinstitutet	2015	The challenge for Swedish climate policy is to reduce greenhouse gas emissions in sectors outside the EU Emissions Trading System (EU ETS). The report analyses socio-economic consequences of an intended target, which means that carbon dioxide emissions will be halved by 2030 compared to the 1990 level, and what distributional effects it can have. Road traffic is the largest source of emissions in Sweden. The focus is therefore on the governance of road transport emissions with a focus on passenger cars. It is discussed which market failures that can justify control in the road transport area. The design of the most important control tools in place to control energy use and carbon dioxide emissions from road transport: the fuel tax which consists of the energy and carbon dioxide tax as well as the EU's carbon dioxide requirements for new cars are analysed. The study also analyses two policy reforms that may be forthcoming: quota obligation for biofuels and bonus malus for new vehicles.
Nordic Climate Policy A Case Study on Efficient Policy Measures	Nordic Council of Ministers	2014	The study includes a quantitative section based on statistics of the development in GHG emissions. This part comprises the whole Nordic region – Norway, Sweden, Finland Denmark and Iceland – to the extent that data is available. The project also entails a descriptive section, presenting policies and cases on GHG reduction initiatives. This part covers primarily Norway, Sweden and Denmark. The purpose of the description is to highlight effective climate policies and to tell the comprehensive story of climate policy in the Nordic countries.

Reforming environmental taxes and harmful subsidies: challenges and opportunities.	Institute for European Environmental Policy	2013	This report has been commissioned by the Nordic Council of Ministers to give an overview on environmental harmful subsidies, subsidy reforms and how to counteract distributional impacts. The report discusses the theoretical principles for an efficient environmental and distribution policy and offers a survey of experiences from policy reforms in different countries.
The financial crisis and fiscal consolidation in green budgets.	Nordic Council of Ministers	2013	Environmental taxes, fees and income from tradable quotas are potential sources of revenue. While most taxes are detrimental to economic efficiency, environmental taxes, fees and tradable quotas will often increase economic efficiency and economic welfare. Revenue is raised to reduce deficits, and efficiency is increased, at the same time. The study argues that environmental taxes and quotas are too low in almost all countries and have too many exemptions compared to the optimal situation. In some countries environmental taxes are negative, that is, environmentally harmful goods and activities are subsidized. The report finds that most of the potential of environmental pricing for reducing public sector deficits in Europe lies with carbon pricing. To argue this case the report examines the optimal emission taxes on the air pollutants SO ₂ , NO _x , PM2.5, NH ₃ and VOC. The estimated marginal environmental costs equal optimal environmental taxes. It is found that revenue from the optimal taxes, imposed on the optimal quantities, amount to EUR 7 billion in 2020 across Europe.
Equity impacts of environmental policy	Antonio M. Bento	2013	This article surveys recent literature on the equity impacts of environmental policy. It focuses on studies that look at the distribution of costs and benefits of alternative environmental policies. The article also examines potentially important trade-offs between efficiency and equity that arise in the context of environmental policy, as well as transition effects. In many of the applications surveyed here, environmental policies can be regressive. Strategies are discussed to reduce this regressively through the use of revenues from certain policy instruments. With regard to the distribution of the benefits of environmental policy, it is concluded that there is a need for more spatially disaggregated studies that simultaneously capture the spatial and socioeconomic impacts of environmental policy.
Handbook of Research on Environmental Taxation.	Milne & Mikael Skou Andersen.	2012	This Handbook describes the research on environmental taxation. The book uses an interdisciplinary perspective where both, economic, law and political science, engineering and public financed is used. Furthermore, a life cycle approach for environmental taxation is used.
The role of market-based instruments in achieving a resource efficient economy.	DG Environment	2011	This study investigated how market-based instruments, can support and drive the move towards resource efficiency. The objective of this study was to identify the market-based instruments being used, particularly those that demonstrate best practice in promoting resource efficiency, and examine how they can be improved, what lessons can be drawn and the recommendations for the future, taking into account the cost, competitiveness and other impacts.
Virkemidler for å ta hensyn til fordelingseffekter av miljøavgifter og kutt i miljøskadelige subsidier	Nordic Council of ministers	2011	This report is describing the basic material for an assessment of Norway's climate policy and the need to change the economic instruments used for regulating the climate impacts. The report is based on the agreement from 2008 in Norway describing the amount of emissions that should be reduced.

The implications for households of environmental tax reform in Europe.	Ekins et. al.	2011	The paper discusses the distributional implications of environmental tax reform (ETR) for households and presents results from modelling the impacts of a major ETR for the European Union. The distributional effects arise from the new environmental taxes, any tax reductions made as part of the ETR, the wider macroeconomic impacts of the ETR, any special provisions in the ETR, and the environmental benefits from the ETR. The paper's literature review makes clear that while the impacts of taxes on the household use of energy is very often regressive, transport taxes tend not to be, although the impacts differ between urban and rural households. Moreover, the net distributional impact is often less regressive, or not at all, once the wider distributional effects are taken in to account. Residual regressive effects can in principle be removed by further adjustments in the tax or benefits system. The modelling results suggest that an ETR in Europe will actually increase real incomes across the EU as a whole, and will not be generally regressive, although the results differ by country and for different socio-economic groups.
Distributional effects of a carbon tax on car fuels in France	Benjamin Bureau	2010	This paper analyses the distributional effects of alternative scenarios of carbon taxes on car fuels using dis-aggregated French panel data from 2003 to 2006. It incorporates household price responsiveness that differs across income groups into a consumer surplus measure of tax burden. Carbon taxation is regressive before revenue recycling. However, benefits from congestion reduction induced by the tax mitigates regressivity. It is also shown that recycling additional revenues from the carbon tax either in equal amounts to each household or according to household size makes poorest households better off.
Tiltak og virkemidler for at nå norske klimamål mot 2020. Klimakur 2020	Klima- og forurensningsdirektoratet	2010	The purpose of this report has been to present various choices that the state authorities have to achieve the goal of national emissions reductions in 2020, and their consequences.
Økonomi og miljø 2009. Grønne afgifter.	DØRS	2009	One of the topics of the report from the Chairmen of the Danish Council of Environmental Economics are on environmental (green) taxes.
The Distributional Implications of a Carbon Tax in Ireland	Callan et al.	2008	The effects of carbon tax and revenue recycling across the income distribution in the Republic of Ireland are studied. In absolute terms, a carbon tax of €20/tCO ₂ would cost the poorest households less than €3/week and the richest households more than €4/week. A carbon tax is regressive. However, if the tax revenue is used to increase social benefits and tax credits, households across the income distribution can be made better off without exhausting the total carbon tax revenue.
The Distributional Effects of Environmental Policy	OECD	2006	The book focus upon distribution impacts associated with both the distribution of environmental quality, and with the distribution of financial effects. Moreover, it looks at such impacts across a broad range of environmental policies.
Are CO₂ taxes regressive? – Evidence from the Danish experience	Wier. Et al.	2005	Denmark today carries one of the heaviest environmental tax burdens in the world, bringing in around 10% of public revenues. While evaluations have shown that the Danish CO ₂ and other environmental taxes work as an effective measure to reduce emissions, a considerable barrier to increased use of these instruments today seems to be a wide spread perception of their socially adverse effects. This article shows that CO ₂ taxes imposed on energy consumption in households, as well as in industry, do tend to be regressive, and therefore have undesirable distributional effect. This holds especially for taxes imposed directly on households.

Distributional Effects of Household Electricity Taxation	Halvorsen, Bente and Nesbakken, Runa	2002	The paper discusses distributional effects across households due to increased electricity taxation in Norway. The study investigates four progressive tax schemes and one proportional. The study finds that the most progressive alternatives have the best distributional properties assuming households cannot change consumption. When allowing household electricity consumption to change as a response to the tax increase, the positive distributional effects of the progressive alternatives are weakened.
Fordelingsvirkninger af energi- og miljøafgifter	Klinge Jacobsen, H; Birr-Pedersen, K. & Wier, M	2001	The distributional effects of Danish taxes related to environmental concerns are examined in relation to household income, socio-economic class, residential location and family status. The results suggest that in Denmark taxes on petrol and registration duties for cars are progressive, whereas most other environmental taxes are regressive, especially the green taxes on water, retail containers and CO ₂ . The study is combining the direct and indirect effect of taxes to investigate the importance of indirect effects on the total distributional effects of the studied taxes.
The distributional effects of energy taxes	Florens, Flues and Alastair, Thomas	2015	The study investigates the distributional effects of energy taxes in 21 OECD countries. The unweighted 21-country average of the proportion of income spent on transport fuel taxes is highest for households in the lowest and in the middle deciles, there is heterogeneity across countries. Some countries have progressive taxes on transport fuels, while others show more proportional effects or to place the highest burden on middle expenditure deciles. Taxes on heating fuels are slightly regressive. Taxes on electricity are more regressive than taxes on heating fuels

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