

# Municipalities can contribute to the strengthening of carbon sinks



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POLICY BRIEF:

# Municipalities can contribute to the strengthening of carbon sinks

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# Introduction

In Europe, the role of carbon sinks<sup>[1]</sup> in mitigating climate change has become an issue in policy making. In the EU the Regulation on land use, land use change and forestry (LULUCF) addresses the role of sinks in mitigating climate change and emissions from land use.<sup>[2]</sup> This policy brief focuses on the opportunities and challenges related to the strengthening of sinks in municipalities.

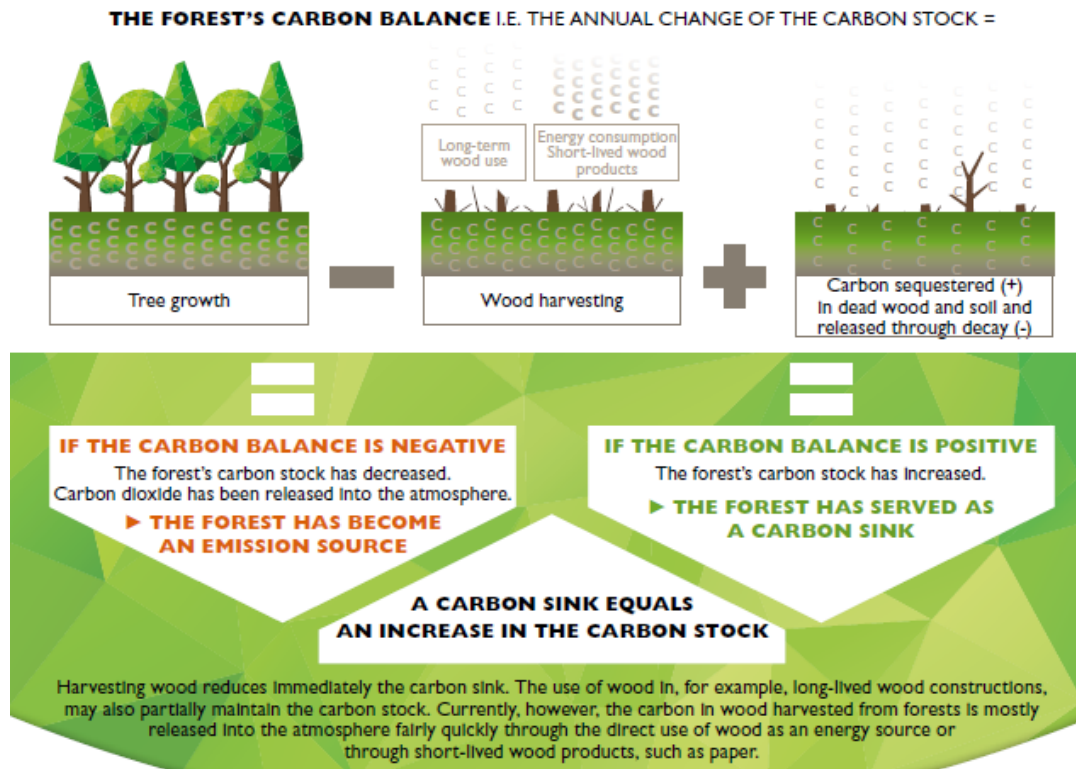
Especially in forested countries such as Finland, Norway and Sweden, the maintenance of forest sinks has turned out to be politically challenging due to expectations in the development of forest-based industries and the hope that wood could replace fossil raw materials and fuels. In addition, the Intergovernmental Panel on Climate Change (IPCC) has stressed that emissions caused by land use and land use change should also be addressed.<sup>[3]</sup>

Policy instruments that would actively stop conversion of forest land to other uses or encourage landowners to maintain and develop carbon sinks or aim at reducing greenhouse gas emissions of land use are still under-developed. Municipalities and regional governments can, however, play an important role and become frontrunners in developing voluntary actions for the preservations of sinks. Municipalities can influence land-use in many ways and raise awareness of the role of sinks in setting up local climate targets and measures.

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1. A carbon sink is a process or mechanism that removes carbon dioxide from the atmosphere. A given carbon pool (such as a forest or a wetland) can be a sink, during a given time interval, if carbon inflow exceeds carbon outflow.
  2. LULUCF [https://climate.ec.europa.eu/eu-action/land-use-sector\\_en](https://climate.ec.europa.eu/eu-action/land-use-sector_en)
  3. [https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC\\_AR6\\_WGIII\\_Chapter\\_07.pdf](https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_07.pdf)

# Municipalities recognise the importance of carbon sinks

At the national level sinks play an important role in the quest for carbon neutrality. The role of sinks in the national carbon neutrality targets and target years varies between the nations. For example, Finland counts all sinks in the accounting for the net zero target, while Sweden only counts the sinks that are additional to the sinks that are required in its country-level target in the European Union. In Norway, carbon emissions and uptake from LULUCF in the reference year 1990 is not included in what is reported under the Paris agreement, but emissions and uptake that is additional will be included when looking at goal achievement in 2030. For Denmark, the national reduction target of 30 pct compared to the emission in 1990 includes all emissions and removals as defined by the IPCC (2006) and that are included in the official reporting under the United Nations Framework Convention on Climate Change (UNFCCC).<sup>[4]</sup>



Infographics: Syke

4. <https://unfccc.int/>

At the municipal level sinks are also important in territorial carbon accounting, but municipalities have very different endowments with respect to the development and maintenance of carbon sinks. There are also uncertainties in what and how to calculate. Nevertheless, several municipalities have stated ambitious net zero targets that make explicit or implicit assumptions on the level of carbon sinks.

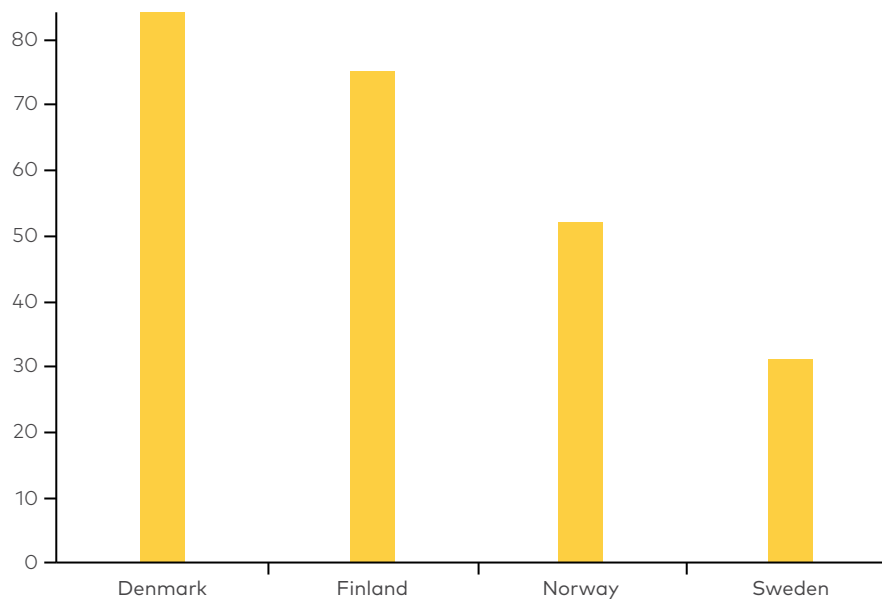
To explore local level work related to sinks, we carried out a survey in 2022 among municipalities in Denmark, Finland, Norway, and Sweden. We received a total number of 247 responses with approximately the same number of responses from the countries (Table 1). The share of the total number of municipalities differs, however, due to differences in municipal structure. For example, in Finland with a total of about 300 municipalities the sample covered mainly the large (> 20 000 inhabitants) municipalities whereas in Denmark that generally has bigger municipalities the sample gave coverage of all municipalities.

**Table 1.** The number of responding municipalities. The aim was to collect a representative sample. Some bias towards larger and more active municipalities was, however, evident in, for example, Finland.

Denmark	44
Finland	67
Norway	67
Sweden	69
<b>Total</b>	<b>247</b>

In addition to the survey, information on the use of sinks in national and local accounting was collected from discussions at workshops with representatives from municipalities in the participating Nordic countries.

The survey on municipal work on sinks carried out in Denmark, Finland, Norway, and Sweden in 2022 showed that many municipalities across the Nordics have taken an active interest in developing and maintaining carbon sinks (Fig. 1). Especially Danish and Finnish municipalities have actively worked with sinks, with 84 and 75% of the responding municipalities reporting activities in relation to carbon sinks, whereas in Sweden activities were more limited with about two-thirds of the Swedish municipalities responding that they are not working with sinks (Fig.1). However, an increasing recognition of sinks was also noted. For example, in Sweden an additional 21% of the responding municipalities foresaw work on sinks within a year.



**Fig. 1.** Share of responding municipalities working with sinks based on survey responses.

# Active municipalities engage in actions of several types to maintain and increase carbon sinks

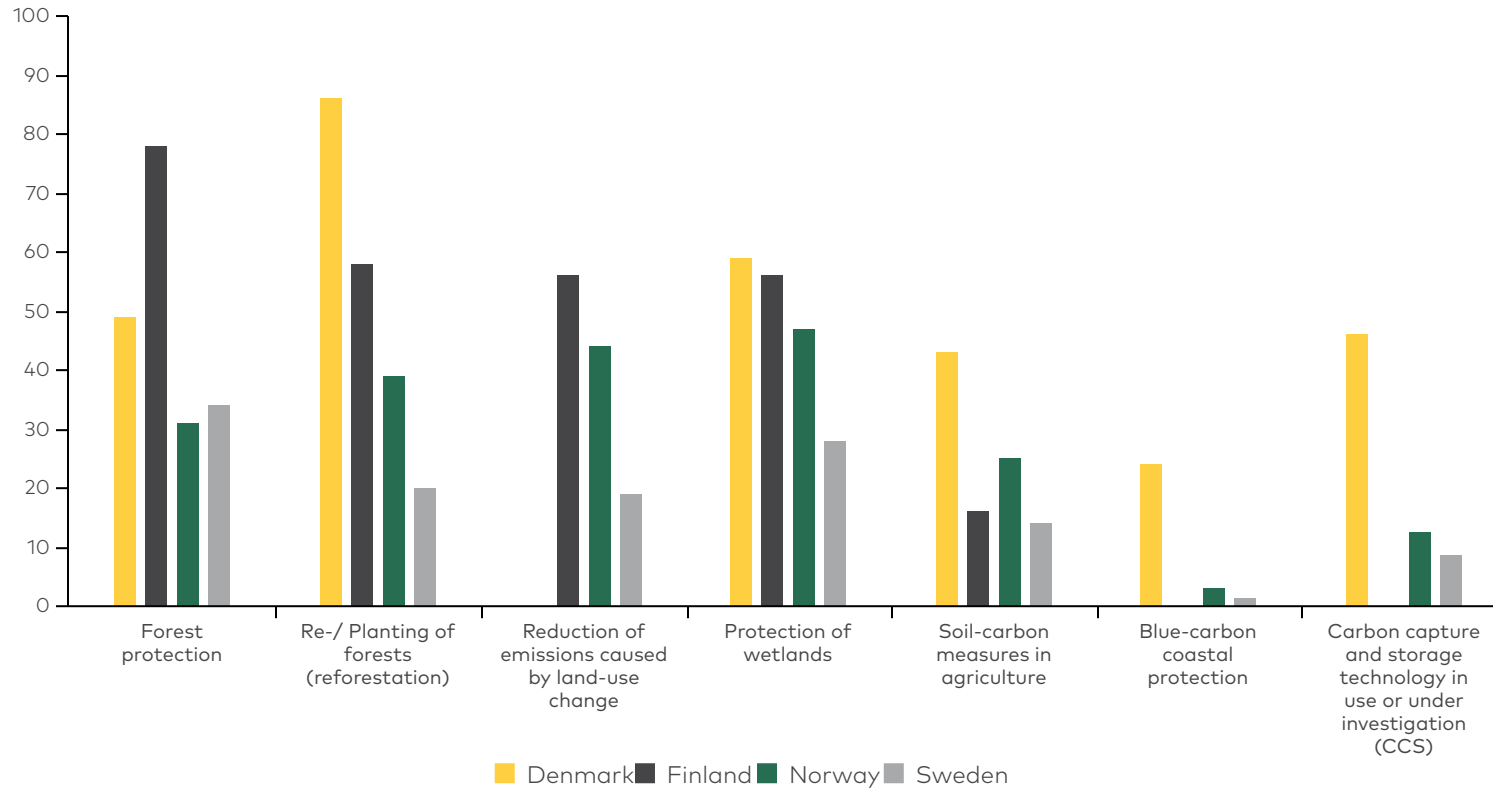
The differences between the Nordic countries with respect to the work on carbon sinks reflect political, geographical, and economic differences. Danish municipalities were overall more active in the work to strengthen the focus on sinks than the responding municipalities in the other countries (Fig. 1) but there is also variation in the favoured activities (Fig. 2). The strong emphasis on reforestation in Denmark is likely to reflect the very limited forested area compared to the other countries. Thus, Denmark initiated a national forest programme 2018 which demands that municipal planning processes devote, on average, minimum 20% of unbuilt areas to raising forests.<sup>[5]</sup> All municipalities are expected to contribute to this. In Norway, the protection of wetlands and the reduction of emissions caused by land use change (this option was not included in the survey distributed in Denmark) were among the top actions. In Sweden forest and wetland protection were noted as the most common actions. In Finland, forest protection, reforestation, reducing land-use change emissions, and protection of wetlands were reported by over half of the survey respondents. In Finland the strong focus on forest protection may arise because many municipalities that own forest protect parts of them as green space. Except for increasing sinks the reduction of emission caused by land-use and land use change are also recognised in Norway and Finland (Fig. 2).

At the time of the survey (spring 2022) Carbon Capture and Storage (CCS) had generated interest among Danish municipalities, in the other countries the interest was low or modest. In the Finnish survey CCS was not offered as a response alternative because there was prior knowledge that no such activities were under consideration in Finnish municipalities.

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5. <https://mst.dk/erhverv/skovbrug/nationalt-skovprogram/>





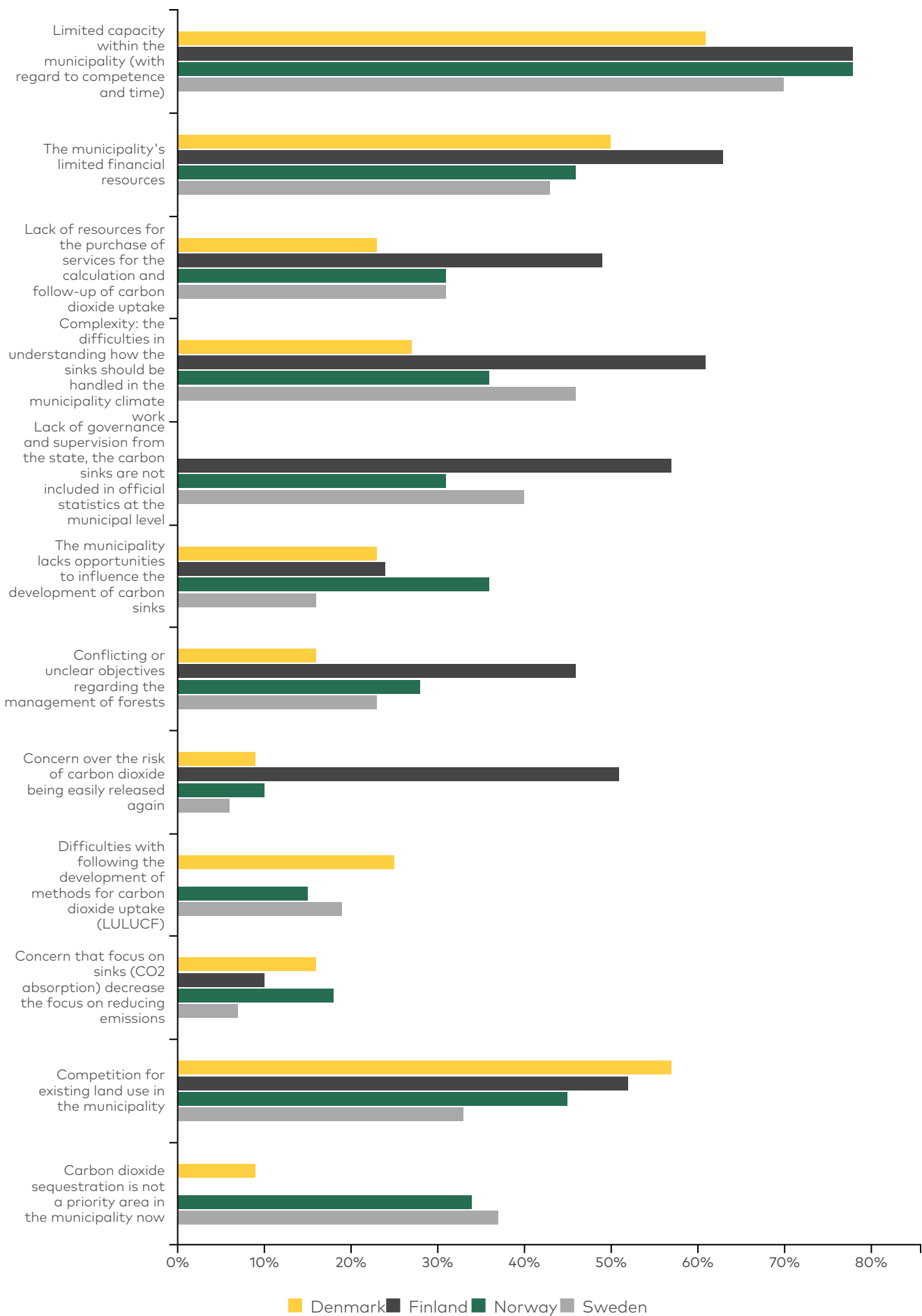
**Fig. 2** The different actions that municipalities have engaged in to strengthen sinks. Note that there were some variations in the options offered to respondents. Thus, activities to "reduce emissions caused by land use change" was not offered as a response option in the Danish survey and CCS was not a response option in the Finnish survey.

# Key challenges in developing sinks at the municipal level

Sinks differ from other mitigation activities because most municipalities have limited 'own' sinks and there are few policy instruments beyond appeals to voluntary action that would directly help to maintain or increase sinks. Land use planning could in theory be used, but until recently the preservation of sinks has not been a criterion in land use planning. Carbon Capture and Storage could, in theory, offer possibilities for direct action by municipalities, but at the time of the survey the technical and economic difficulties were still very large.

Lack of human resources was felt to be the main barrier related to municipal work on sinks and land-use in all the countries (Fig. 3). Lack of financial resources, the complexity and difficulty to include sinks in the climate work of the municipality, and competition with existing land use were also felt strongly in all the countries. In Finland, many of the barriers were experienced by a larger share of the respondents when compared to other countries. This may partly be due to especially forest issues being high on the political agenda, which has revealed numerous challenges in dealing with sinks. Especially the risk that the carbon stored will be lost was raised as a serious concern by Finnish respondents but was only moderately recognised in the other countries. This is likely to reflect the Finnish debate that especially forest sinks may be only temporal. It can be noted too that in about a third of the municipalities in Sweden and Norway it is considered an obstacle that carbon dioxide sequestration is not a priority area in the municipality yet.

**Fig. 3 (next page).** Barriers and limitations recognised by the respondents in the municipalities. All options were not available in all countries. In Finland the option that "Carbon dioxide sequestration is not a priority" and "Difficulties in following methods for carbon dioxide uptake" were not available to the respondents, in Denmark "Lack of governance and supervision from the state, the carbon sinks are not included in official statistics at the municipal level" was not a response option.



# Tackling the challenges and using the information on sinks

The reported obstacles and barriers can be used to identify possible remedies that were also discussed in dedicated workshops organised by the project. Capacities can be strengthened through training and pilot experiments. Such activities have been initiated for example by the Finnish programme on “catching the carbon” funded by the Ministry of Agriculture and Forestry.<sup>[6]</sup> For example, measurements and studies are under way to calculate the potential sinks in municipal green space (see Fig. 4),<sup>[7]</sup> in changing forestry practices or modifying the use of agricultural land. Through increasing awareness, it may be possible to tackle some of the inherently more difficult issues such as the competition for land use (see Fig 3). Competition for land use is an example of a fundamental challenge that is difficult to solve unless the preservation of carbon sinks becomes economically interesting so that for example landowners can weigh the preservation of sinks against other uses of forests and other land areas also in economic terms.

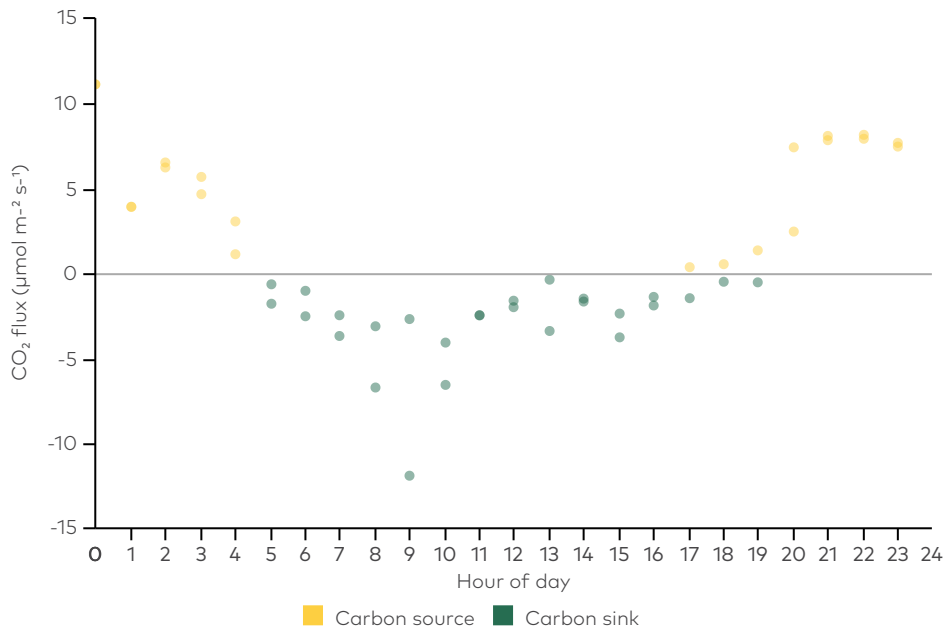
The first step in developing a municipal sink policy is to gather information on the level of sinks. The responses to the survey showed that the respondents identify several general uses for the information. Use of the information for actual negotiations over the preservation of sinks was less recognised, only among Danish municipalities slightly more than half of the municipalities foresaw this use, possibly because of existing subsidies for creating wetlands.<sup>[8]</sup> In the other countries, the percentage was clearly less than 50% (Fig. 5).

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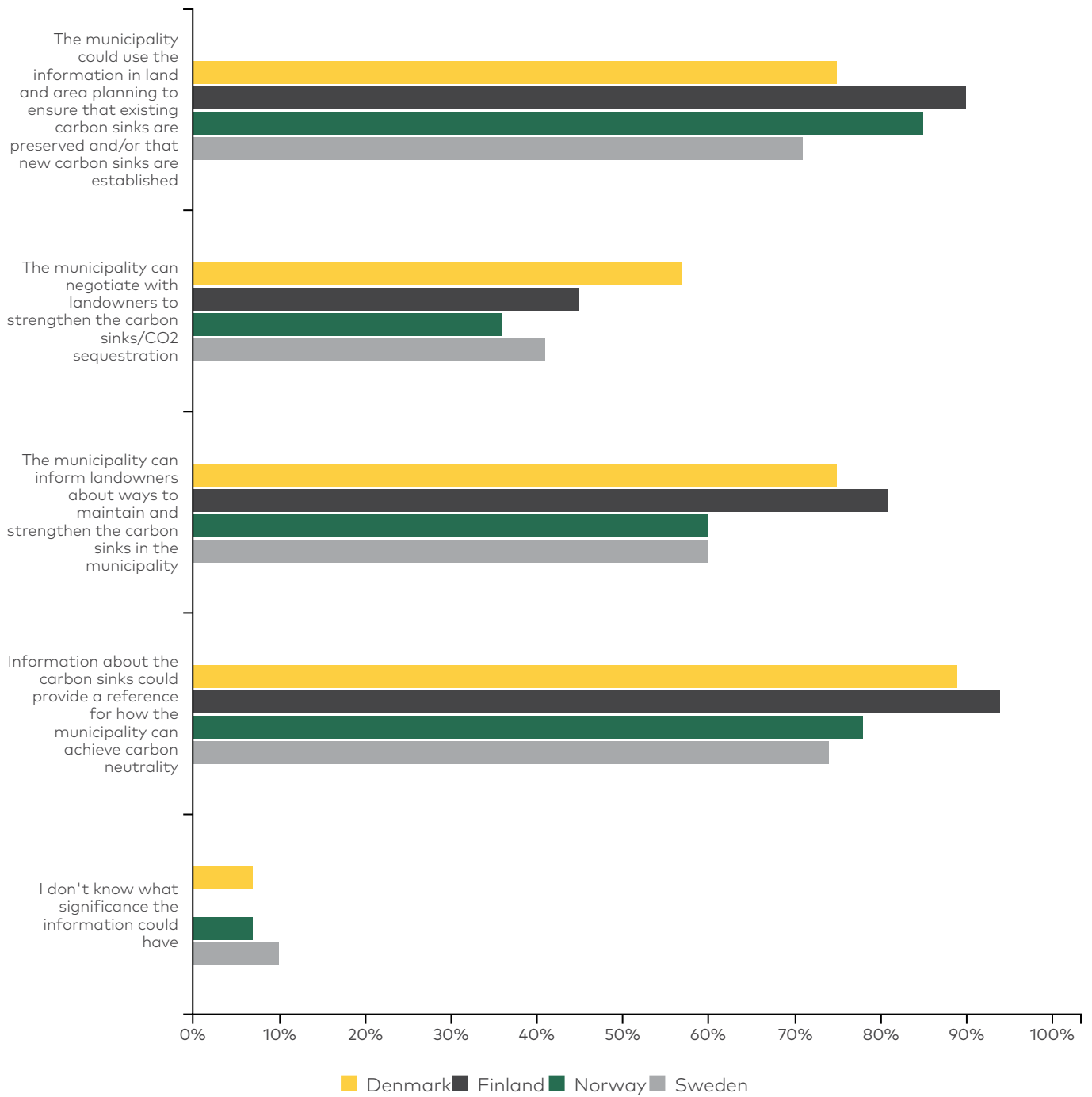
6. <https://mmm.fi/en/climate-plan-for-the-land-use-sector/research-and-innovation-programme>

7. Forthcoming literature review in the project Kuntanielu (“Municipal sinks” -project)  
<https://www.turku.fi/en/kuntanielu>

8. <https://mst.dk/natur-vand/vandmiljoe/tilskud-til-vand-og-klimaprojekter/udtagning-af-lavbundsjoender/>



**Fig. 4.** Illustration of detailed sink estimation based on carbon flux measurements from the Marjaniemi park and garden area in Helsinki. Site specific information on the development of the sink is obtained. During a single summer day (30.6.) the area varies between being a sink (day time) and a carbon source (night time). If the carbon stock increases during the year the area becomes a net sink. Photograph: Anna Lintunen, Kuntanielu project <https://www.turku.fi/en/kuntanielu>



**Fig. 5.** The potential use of information on sinks. "Do not know" was not an option in the Finnish survey.

# Conclusions

Municipalities can act to strengthen sinks and this activity should be considered an important contribution to the general societal transition toward national carbon neutrality.

The challenges that were identified in our Nordic surveys and in the workshops show that it is not effective for municipalities to focus on their own climate neutrality with an aim to verify it according to, for example, gold standards.<sup>[9]</sup> Such an approach would require, among other things, trading with sinks which would be challenging, especially for urban municipalities that have limited sinks relative to their emissions. Many rural municipalities could in theory benefit from surplus sinks, but the use of the sinks by the municipality would be technically and legally challenging.

Municipalities have only partial control over the sinks within their own territories. Even a municipality that has large, forested areas within its border, has limited rights to steer the use of land, for example, through land use planning. Forest harvests that can significantly affect the sinks are not controlled by municipalities. The same is true for, for example, the management of agricultural soils or coastal waters.



Planting microforest for studying possibilities to strengthen local carbon sinks in the CO-CARBON project (<https://cocarbon.fi/en/>) funded by the Finnish Strategic Research Council. Photograph: Anna Pursiainen

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9. <https://www.goldstandard.org/>

Ultimately, the development of sinks and emissions from land use depends strongly on the landowners who have sovereign rights to use their land within the boundaries that land use planning and other regulations allow. Carbon sinks and emissions from land use have until recently not been issues in land use policy and therefore there are limited or no policy instruments that would guide landowners to safeguard carbon sinks and reduce emissions from land use. There are also few policy instruments that would give landowners a possibility to benefit financially from the strengthening of sinks.

Many municipalities experience a lack of expertise and financing in dealing with sinks. This calls for some centrally organised support. Such support can be in the form of openly available data on the level of sinks and support on the interpretation of such information. National information on sinks should in the future therefore be produced at a resolution that gives municipalities information on the state of the sinks within their territories. Currently information on sinks is routinely available for larger areas only. Further development could also include guidance on voluntary carbon (sink) markets.

Despite the barriers and limitations in the work on carbon sinks, municipalities have significant potential and are also interested in enhancing and developing actions that incentivize the safeguarding of sinks within their territories. Finer resolution of the information on sinks would encourage joint work across municipalities and cooperation between municipalities, landowners, and other stakeholders.



# About this publication

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