August 2020

Iceland's Strategy on LULUCF

Submitted in accordance with Art. 13(2)(a) of Regulation 2018/841, as adapted by the EEA Joint Committee Decision 269/2019 of 25 October 2019

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Preface

In October 2019, the EEA Joint Committee adopted Decision No 269/2019, which extends the cooperation on climate change, by including greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF) in the EEA Agreement. With the Decision, Iceland and Norway take action to fulfil the target of reducing their greenhouse gas emissions jointly with the European Union and in accordance with the objectives of the Paris Agreement.

According to the Agreement, Iceland will fulfil its greenhouse gas emission reduction commitments for the period 1 January 2021 to 31 December 2030 in accordance with the LULUCF Regulation and the Effort Sharing Regulation. Under the Effort Sharing Regulation, Iceland has committed to reducing 29 percent of emissions in the non-EU ETS—sectors in 2030 compared to 2005. Under the LULUCF Regulation, Iceland shall ensure that emissions do not exceed removals, according to the accounting rules and flexibilities provided.

According to the Decision, it was added to Article 3 paragraph 8(a)(iii) of Protocol 31 to the EEA Agreement that the EFTA States should prepare and submit to the EFTA Surveillance Authority its LULUCF Strategy with a perspective of at least 30 years. The Strategy shall include ongoing or planned specific measures to ensure the conservation or enhancement, as appropriate, of forest sinks and reservoirs.

This Strategy outlines how Iceland aims to fulfil its commitments under the UNFCCC and the Paris Agreement to reduce anthropogenic greenhouse gas emissions and enhance removals by sinks and to promote increased carbon sequestration. The submission is a part of Iceland's fulfilment of the criteria to be entitled to use the managed forest land flexibility given in Article 13 of Regulation 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF Regulation).

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Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
CP	Commitment Period
CRF	Common Reporting Format
EEA	European Economic Area
EFTA	European Free Trade Association
ESR	Effort Sharing Regulation (No 2018/842)
EU	European Union
EU ETS	European Union Emission Trading System
ESA	EFTA Surveillance Authority
GHG	Greenhouse gas
HWP	Harvested wood products
IFS	Icelandic Forest Service
IGLUD	Icelandic Geographical Land Use Database
IPCC	Intergovernmental Panel on Climate Change
JCD	Joint Committee Decision
KP	Kyoto Protocol
LULUCF	Land Use, Land Use Change and Forestry
NCP	National Climate Plan
NFP	National Forestry Plan
NFI	National Forestry Inventory
NIR	National Inventory Report
NPS	National Planning Strategy
NSCP	National Soil Conservation Plan
PaMs	Policies and Measures
SCSI	Soil Conservation Service of Iceland
UNFCCC	United Nation Framework Convention on Climate Change

A. OVERVIEW AND PROCESS FOR DEVELOPING THE STRATEGIES

Iceland's Strategy on Land use, land use change and forestry sector (LULUCF) has been prepared and submitted in accordance with the Decision of the EEA Joint Committee No 269/2019. According to the Decision, it was added to Article 3 paragraph 8(a)(iii) of Protocol 31 to the EEA Agreement that the EFTA States should prepare and submit to the EFTA Surveillance Authority its LULUCF Strategy with a perspective of at least 30 years. The Strategy shall include ongoing or planned specific measures to ensure the conservation or enhancement, as appropriate, of forest sinks and reservoirs.

The Strategy outlines how Iceland aims to fulfil its commitments under the UNFCCC and the Paris Agreement to reduce anthropogenic greenhouse gas emissions and enhance removals by sinks and to promote increased carbon sequestration. The submission is a part of Iceland's fulfilment of the criteria to be entitled to use the managed forest land flexibility given in Article 13 of Regulation 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF Regulation).

The Strategy is developed by the Ministry for the Environment and Natural Resources and is mostly based on Iceland's LULUCF mitigation plan that was published in 2019 as well as the new Climate Action Plan that was announced in June 2020[1]. The measures in the mitigation plan were developed by the Soil Conservation Service of Iceland (SCSI) and the Icelandic Forest Service (IFS), at the request of the Minister for the Environment and Natural Resources.

LULUCF is a cornerstone of Iceland's climate mitigation policy. Historically Iceland has lost most of its woodlands, and the soils are severely degraded due to centuries of soil erosion since human settlement. Government agencies have pursued afforestation and efforts to reclaim soil and vegetation (revegetation) for over a century. Carbon uptake from the atmosphere is seen as an added benefit of such efforts. Iceland has great potential for carbon sequestration in LULUCF, and this fact must be considered in climate policy.

When the Strategy is being prepared, extensive work is being conducted by the Icelandic Government, which will be a base for further development of Iceland's

[1] See press release from announcement of the revised Climate Action Plan (in English), June 23, 2020: https://www.government.is/news/article/2020/06/23/New-Climate-Action-Plan-Iceland-will-fulfil-its-commitments-and-more/

LULUCF strategy. A ten-year National Plan for Soil Conservation (NPSC) and a ten-year National Plan on Forestry (NPF) are under development and will be published at the end of 2020 or the beginning of 2021. Iceland is also working on extensive improvements in measurements and accounting of emissions and carbon sequestration in the LULUCF sector. Improved scientific knowledge and accounting should provide a more accurate estimate of the situation but also help to identify and prioritize measures that curb emissions and stimulate carbon uptake from the atmosphere.

In 2019 Iceland submitted for the first time a report[2] on Policies and Measures (PaMs) and greenhouse gas projections, in line with the bilateral agreement between Iceland and the EU regarding the second commitment period (CP) of the Kyoto Protocol. Emissions and removals were only projected for afforestation since 1990. Projection for the LULUCF sector as a whole will be done for the coming submissions of the PaMs and Projections, in 2021 and subsequently.

A.1 EXECUTIVE SUMMARY

Iceland is committed to reduce its overall greenhouse gas emissions (GHG), in view of holding the increase in the global average temperature well below 2° C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1,5°C above pre-industrial levels, as stated in the Paris Agreement.

In order to limit the temperature increase to 1,5°C, net-zero CO_2 emissions at the global level need to be achieved around 2050 and neutrality for all other greenhouse gases somewhat later in the century. The Icelandic Government aims to make Iceland carbon neutral before 2040.

In October 2019, the EEA Joint Committee adopted Decision No 269/2019, which extends the cooperation on climate change, by including greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF) in the EEA Agreement. Under the LULUCF Regulation, Iceland shall ensure that emissions do not exceed removals, according to the accounting rules and flexibilities provided.

Iceland's climate measures emphasise on reducing emissions and increasing carbon sequestration in land use, by the restoration of woodlands and wetlands, revegetation, and afforestation. These measures were outlined in

[2] Report on Policies, Measures and Projections: Projections of Greenhouse gas emissions in Iceland to 2035, April 2019: https://ust.is/library/Skrar/Atvinnulif/Loftslagsbreytingar/PaMs%20final%20April%202019.pdf

Iceland's LULUCF mitigation plan, published in 2019[3], as well as in the new Climate Action Plan that was published in June 2020[4]. These measures play a role in Iceland meeting the 2030-commitments, but an even an important role in achieving Iceland's goal of carbon neutrality by 2040.

According to Iceland's National Inventory Report (NIR 2020[5]), the LULUCF sector in Iceland is the largest emission category for the entire reporting period 1990 to 2018. In 2018, it accounted for 9,010 kt CO_2-eq. out of 13,867 kt CO_2-eq. Net emission from the LULUCF sector decreased slightly from 9,344 kt CO_2-eq. in 1990 to 9,010 kt CO_2-eq. in 2018. The afforested area in Iceland is increasing every year, and removals in the forest sector have increased from 43 kt CO_2-eq. in 1990 to 386 kt CO_2-eq. in 2018.

Iceland is working on creating emission and carbon sequestration projections for the LULUCF sector. Currently, there are only projections for some sub-sectors or emissions effected by specific measures. Even though Iceland has not produced complete projections for the LULUCF sector, significant measures are being taken to reduce emissions and increasing carbon sequestration in land use. According to historical data and the projections that have been developed, total carbon sequestration was estimated to be 204 kt CO_2-eq. in 2005 and 523 kt CO-eq. in 2018 and the total carbon sequestration estimated to be 1,252 kt-eq. in 2030 and 2,401 kt-CO_2-eq. in 2050.

For Iceland to comply with the 2030 commitments and the new LULUCF Regulation, Iceland is working on extensive improvements in measurements and accounting of emissions and carbon sequestration in the LULUCF sector. Improved scientific knowledge and accounting should provide more accurate estimates and improve the knowledge base for estimating the effect of different policies and measures and thereby provide a better ground for long term projections.

[3] LULUCF Mitigation Plan (Bætt landnýting í þágu loftslagsmála): https://www.stjornarradid.is/lisalib/getfile.aspx?itemid=f8c0433d-9cca-11e9-9443-005056bc4d74

[4] New Climate Action Plan, June 2020: https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/Adgerdaaetlun%20i%20loftslagsmalum%20onnur%20utgafa.pdf

[5] National Inventory Report. Emissions of greenhouse gases in Iceland from 1990 to 2018. https://ust.is/library/Skrar/loft/NIR/NIR%202020.pdf

A.2 Legal and policy context, including where appropriate, indicative milestones for 2040 and 2050

A.2.1 Overarching climate targets and commitments

Iceland is committed to reduce its overall greenhouse gas emissions (GHG), in view of holding the increase in the global average temperature well below 2° C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1,5°C above pre-industrial levels, as stated in the Paris Agreement.

In order to limit the temperature increase to 1,5°C, net-zero CO_2 emissions at the global level need to be achieved around 2050 and neutrality for all other greenhouse gases somewhat later in the century. The Icelandic Government aims to make Iceland carbon neutral before 2040.

Iceland has adopted numerical targets for its emissions under the Kyoto Protocol (KP) since 2008 and has ratified the Doha Amendments to the Kyoto Protocol. Iceland submitted its Nationally Determined Contribution (NDC) under the Paris Agreement in June 2015. According to the NDC, Iceland aims to be part of a joint fulfilment of a -40% emissions target for 2030 (compared to 1990 emissions), with the European Union and its Member States.

In October 2019, the EEA Joint Committee adopted Decision No 269/2019, which extends the cooperation on climate change, by including greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF) in the EEA Agreement. By the Decision, Iceland and Norway take action to fulfil the target of reducing their greenhouse gas emissions jointly with the European Union and in accordance with the objectives of the Paris Agreement.

According to the Agreement, Iceland will fulfil its greenhouse gas emission reduction commitments for the period 1 January 2021 to 31 December 2030 in accordance with the LULUCF Regulation (Regulation (EU) 2018/841) and the Effort Sharing Regulation (ESR- Regulation (EU) 2018/842). Under the ESR, Iceland has committed to reduce 29 percent of emission in the non-EU ETS—sectors in 2030 compared to 2005. Under the LULUCF Regulation, Iceland shall ensure that emissions do not exceed removals, according to the accounting rules and flexibilities provided.

Iceland's mitigation actions seek to reduce GHG emissions and to increase carbon sequestration while ensuring sustainable growth and providing synergies with other environmental goals, such as improving air quality and protecting biodiversity.

Forests, agricultural land, and wetlands play a central role in Iceland's climate policy and efforts to reach carbon neutrality. The land use, land use change and forestry (LULUCF) sector has the potential to provide long-term climate

benefits, and thereby to contribute to the achievement of Iceland's greenhouse gas emissions reduction targets.

Sustainable management practices in the LULUCF sector can contribute to climate change mitigation in several ways, by reducing emissions, and maintaining and enhancing sinks and carbon stocks.

The LULUCF sector has a direct and significant impact on biodiversity and ecosystem services. Therefore, it is an important objective of policies affecting this sector to ensure that there is coherence with Iceland's biodiversity strategy objectives.

A.2.2 Legal frameworks

By the EEA Joint Committee Decision No 269/2019 Iceland will fulfil its respective greenhouse gas emission reduction targets for the period 1 January 2021 to 31 December 2030 in accordance with Regulation 2018/842 on binding annual greenhouse gas emission reduction from 2021 to 2030 (Effort Sharing Regulation) and Regulation 2018/841 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF Regulation).

There is a wide range of measures that are relevant and support the implementation of land use and forest policy and mitigation actions in Iceland. The most relevant, besides Regulations implemented in accordance with the JCD is the new legal framework for forestry and soil conservation as well as the legal framework for land use planning and impact assessment.

The Forestry Act

In May 2019, the Icelandic Parliament passed a new law on Forestry (Act No 33/2019). The Act replaced the old legislation from the year 1955. The Act contains, among other things, the objective to promote carbon sequestration through forestry and that forestry shall contribute to soil protection. According to the Act, a National ten-year Plan on Forestry (National Forestry Plan – NFP) is to be developed every fifth year, in broad consultation between state, stakeholders and regional Governments and shall contain the national policy for forestry, including clear objectives.

The Act contains a new important paragraph that outlines that the Icelandic Forest Service shall prepare and maintain a national registry for all forests and woodlands in the country. The registry shall contain data on locations, area, ownership, species, and carbon stocks.

The Soil Conservation Act

The new Soil Conservation Act (Act No 155/2018) from 2018 replaced legislation from 1965. The Act contains principles and objectives, including the main objective to protect, restore and improve the resources found in vegetation and soil and to ensure sustainable land management. This is vital in the context of

climate change, land use and land use change. Also, the Act states that a National Plan for Soil Conservation (National Soil Conservation Plan - NSCP) shall be prepared, stating the vision and how soil conservation and ecosystem restoration can support society and improve ecosystem services, including carbon sequestration. The development of the NSCP shall include both dialogue and collaboration with stakeholders and relevant institutions and public participation.

To reach the goal of sustainable land management, the Soil Conservation Service of Iceland (SCSI) shall conduct monitoring on the land condition, land use and on the progress of ecosystem restoration work being done. This is also of great importance for the issue of LULUCF since this includes data on carbon stocks and flux.

Legal framework for land use planning and impact assessment

The main legal instrument for other land use categories is the Planning Act from 2010 (Act No 123/2010). Among the purposes of the Act is to promote the rational and efficient use of land and land quality, ensure the protection of the landscape, nature, and cultural value, and prevent environmental damage and over-exploitation, with sustainable development as a goal.

According to the Act, the Minister for the Environment and Natural Resources shall within parliamentary elections present a National twelve-year Planning Strategy. Land use planning is cross-sectoral, which is reflected in that the National Planning Strategy shall integrate public strategies on transport, regional development, nature conservation, energy use and other land use as marine and coastal areas.

Regional plans are the main policy instrument in regional planning, developed by each municipality. The National Forestry Plan (NFP) and the National Soil Conservation Plan (NSCP) shall, according to the Planning Act, be in accordance with applicable regional plans.

The National Planning Strategy (NPS) shall be developed in cooperation with the municipalities, which shall take the Strategy into account in their regional planning. Other relevant organizations, the Association of Icelandic Local Authorities and other interest groups shall be consulted during the development of the National Planning Strategy.

The Environmental Impact Assessment Act (Act No 106/2000) and the Strategic Environmental Assessment Act (Act No 105/2006) apply to both plans, development, and projects, which include land use change. These frameworks, therefore, are of fundamental importance in land use planning.

Another legal instrument for other land use categories is the Farmland Act (No 81/2004) which is important for the land use on farms and has the purpose of laying down rules on the rights and obligations of landowners and promote organized land use in accordance with land benefits, the diverse role of

agriculture and the interest of local authorities and their inhabitants and ensuring a land suitable for agricultural production will be preserved.

A.2.3 Policies and Measures

The preparation of this LULUCF national strategy must be reviewed in the light of the fact that extensive work is ongoing by the Icelandic Government that will be a base for further development of Iceland's LULUCF policies and measures. As stated above, a National Plan for Soil Conservation and a National Plan on Forestry, are under development and will be published by the end of 2020 or in early 2021. Iceland is also working on extensive improvements in measurements and accounting of emissions and carbon sequestration in the LULUCF sector. Improved scientific knowledge and accounting should provide a more accurate estimate of the situation but also help to identify and prioritize policies and measures in the LULUCF sector.

LULUCF is a cornerstone in Iceland's climate mitigation policy and was a key element of Iceland's Climate Action Plan that was published in 2018[6], as well as in the revised Climate Action Plan that was published in June 2020[7]. The LULUCF sector is a key to Iceland's carbon neutrality 2040 goal, and in 2019 the Icelandic Government published a LULUCF mitigation plan outlining specific LULUCF policies and measures to be taken in the period up to 2022.

LULUCF Mitigation Plan

In July 2019, the Icelandic Government published a mitigation plan in the LULUCF sector, outlining concrete measures and funding in accordance with the 2018 Climate Action Plan[8]. The LULUCF Mitigation Plan outlines measures for the period up to 2022 to increase carbon sequestration and to decrease carbon emission from soils and vegetation.

Iceland is using land (ecosystem) restoration, reforestation, and afforestation as mitigation efforts against climate change. These efforts are carried out in collaboration with farmers and other landowners, NGO's and local authorities and include restoring native vegetation in degraded areas, restoring drained wetlands and afforestation to create a woodland resource.

[6] Iceland´s climate Action Plan for 2018-2030, summary published in September 2018: https://www.government.is/library/Files/Icelands%20new%20Climate%20Action%20Plan%20for%202018%202030.pdf

[7] New Climate Action Plan, June 2020: https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/Adgerdaaetlun%20i%20loftslagsmalum%20onnur%20utgafa.pdf

[8] Iceland´s climate Action Plan for 2018-2030, summary published in September 2018: https://www.government.is/library/Files/Icelands%20new%20Climate%20Action%20Plan%20for%202018%202030.pdf

The Icelandic Government has increased these efforts to restore ecosystems to conserve and enhance biological diversity, increase ecosystem resilience against natural disasters and increase the potential of rural societies to use these ecosystems to sustain their livelihoods.

The LULUCF Mitigation Plan is based on the following five main measures:

- Afforestation *Promotion of new forestry for carbon sequestration.* The measure involves promoting forestry in order to increase carbon sequestration from the atmosphere as well as achieving other goals, such as creating a forest resource, at the same time. The main emphasis is on supporting private landowners and NGOs in afforestation projects.
- Land restoration *Strengthening land restoration for carbon sequestration.* The measure aims to strengthen land restoration, where the emphasis is on combatting soil erosion and restoring degraded ecosystems. Here the main emphasis is on supporting farmers and other private landowners and NGOs in restoration and revegetation projects.
- Wetlands *Increased restrictions on wetland drainage and improved monitoring.* The measure aims to prevent drainage of wetlands, trough, among other things, increased monitoring to ensure compliance with the law on the protection of wetlands and enhance the dialogue with local authorities and farmers on the impact of wetland drainage.
- Wetland restoration *Increased restoration efforts.* The measure aims to increase wetlands restoration through advisory and direct support to landowners, as well as improving the mapping of wetlands and classification concerning current land use and greenhouse gas emissions.
- Cooperation with Farmers *increased carbon sequestration* The measure aims to increase collaborative programs and projects with sheep farmers to reduce emissions and increase carbon sequestration in agriculture and land use.

The Minister for the Environment and Natural Resources requested that the Soil Conservation Service of Iceland and the Icelandic Forest Service developed the measures in the LULUCF mitigation plan to reduce emissions and increase carbon sequestration with the following priorities:

- Reduce emissions from land use
- Sufficient data and evaluation of the effect of climate measures
- Research to increase knowledge and sharing of knowledge
- Compliance with international commitments
- Compliance with the Icelandic Government's policy
- Increased cooperation with local authorities, landowners, NGOs, individuals, and the private sector

National Plan for Soil Conservation

Every fifth year a ten-year National Plan for Soil Conservation is to be developed, in accordance with the new Soil Conservation Act. The first Plan is currently under development and should be published in the following months. The Plan shall outline the Icelandic Government's vision and soil conservation policy. The Plan shall state the vision of how soil conservation and ecosystem restoration can support society and improve ecosystem services, including carbon sequestration.

Based on the Plan, The Soil Conservation Service of Iceland shall develop regional plans for Soil Conservation in coordination with the local authorities and other stakeholders. The National Soil Conservation Plan shall be integrated with the National Plan for Forestry.

National Plan for Forestry

In accordance with the new Forestry Act, a ten-year Plan on Forestry is to be developed every fifth year. The first Plan is currently under development and should be published in the following months. The Plan shall outline the Icelandic Government's forestry policy, describe the status and future development of forests in Iceland, as well as numerical targets regarding forestry. The Plan shall outline the following:

- The base for selecting land for afforestation considering nature conservation, cultural heritage, and landscapes,
- Conservation and restoration of native forests and woodlands,
- Forestry to establish a forest resource and reflect on the scope and outlook in terms of utilization,
- Sustainable use of forests,
- The impact of forestry on economic development and settlement,
- People's access to forests for outdoor activities,
- Forestry in the context of biodiversity,
- Forestry in the context of climate change,
- The acquisition of knowledge of forests and forestry and its dissemination,
- Monitoring of conditions and utilization of forests,
- Fire protection and security.

Following up obligations relating to regeneration after harvesting

Requirements for reforestation after felling are strengthened in the new forest Act. The Act prohibits clearcutting without a formal permit from the Icelandic Forestry Service (IFS). Deforestation without permission is also prohibited. Unavoidable deforestation shall be compensated by afforestation. The new forestry Act implements an official logging license system to regulate logging activities in accordance with the main goal of sustainable use of forest resources. The logging licence shall include information on the location and size of the area, what logging system is to be used, the timing of logging and

how the forest regeneration will take place. The forest renewal measures shall commence no later than two years after the logging takes place. The Icelandic Forestry Service and the National Planning Agency hold a register on planned activities that can lead to deforestation. Planned activities that lead to deforestation must be reported by the municipalities and to the IFS before giving a formal permit to conduct deforestation. IFS samples activity data of the affected areas and data about the forest that has been removed.

Sustainable forestry

According to the Forestry Act, the annual logging in Icelandic forests shall not exceed their annual growth. The IFS shall guide forest thinning. Forest management and harvesting shall aim towards sustainability and provide the best economic, social, and environmental benefits to the society without compromising the rights of future generations to fulfil their needs. According to the Act, the Minister for the Environment and Natural Resources shall set the criteria for sustainable forest management in a Regulation.

Carbon storage in harvested wood products (HWP)

Iceland aims to increase forestry with the purpose of wood harvesting. This is in accordance with the objectives of the former and current legal framework. The increase shall be achieved sustainably, supporting the harvesting industry and be consistent and in harmony with other land-use options and industries. This shall be done by:

- Encouraging the use of wood and forest products
- Establish a stable domestic timber supply, with sustainable management of forests
- Increased efficiency in procurement and processing of forest products
- Encourage the development of forest-related tourism

According to the Parliamentary Resolution on Rural Development[9] from 2018, the Parliament approved that forestry will be strengthened as an industry with an emphasis on regional forestry plans and the development in forestry production and processing.

Sustainable land-use

According to the Soil Conservation Act, the Minister for the Environment and Natural Resources shall set a criteria and guidelines for sustainable land-use. The criteria and guidelines for sustainable land-use shall be based on a proposal developed by the Soil Conservation Service of Iceland, in cooperation

[9] Parlimentary Resolution on strategic regional plan for the period 2018-2024: https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/Byggdaaaetlun_2018-2024_ENSKA.pdf

with appropriate institutions, local authorities and other stakeholders. This work is ongoing.

B. CONTENT

B.1 Land use, Land Use Change and Forestry (LULUCF)

B.1.1 Projected emission reductions and enhancement of removals by 2050

Historical trend and overarching numbers

According to Iceland's National Inventory Report (NIR 2020[10]), the LULUCF sector in Iceland is the largest emission category for the entire reporting period 1990 to 2018. In 2018, it accounted for 9,010 kt CO_2-eq. out of 13,867 kt CO_2-eq. Net emission from the LULUCF sector decreased slightly from 9,344 kt CO_2-eq. in 1990 to 9,010 kt CO_2-eq. in 2018.

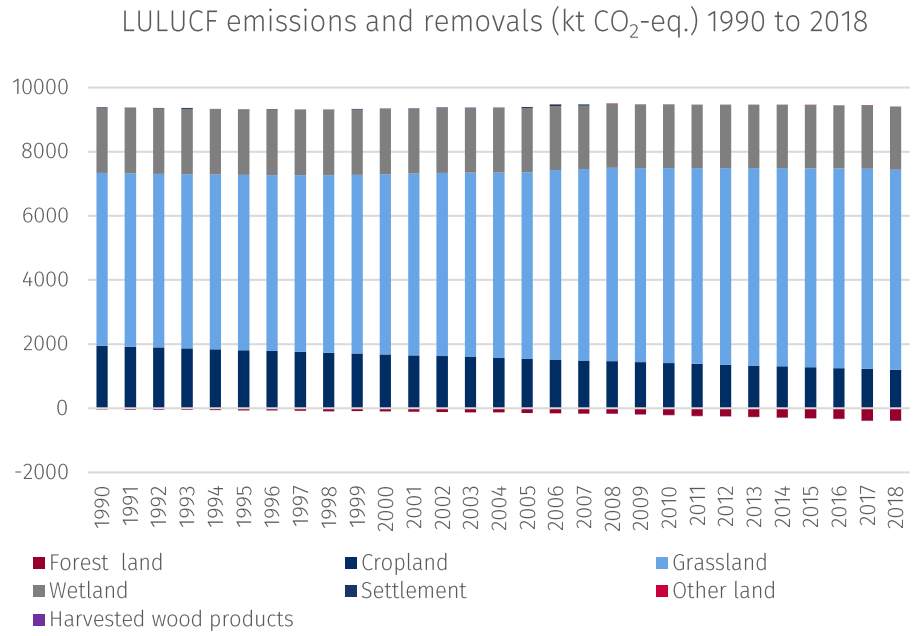

Figure 1 LULUCF emissions and removals (kt CO_2-eq.) by land use category 1990 to 2018.

Most of the emissions from the LULUCF sector are related to the drainage of organic soils, mostly under grassland and croplands or 72% of 2018 LULUCF emissions. Methane emissions for managed wetlands represent 27% of all LULUCF emissions. The afforested areas in Iceland are growing every year, and removals in the forest sector have increased from 43 kt CO_2-eq. in 1990 to 386 kt CO_2-eq. by 2018.

[10] National Inventory Report. Emissions of greenhouse gases in Iceland from 1990 to 2018. https://ust.is/library/Skrar/loft/NIR/NIR%202020.pdf

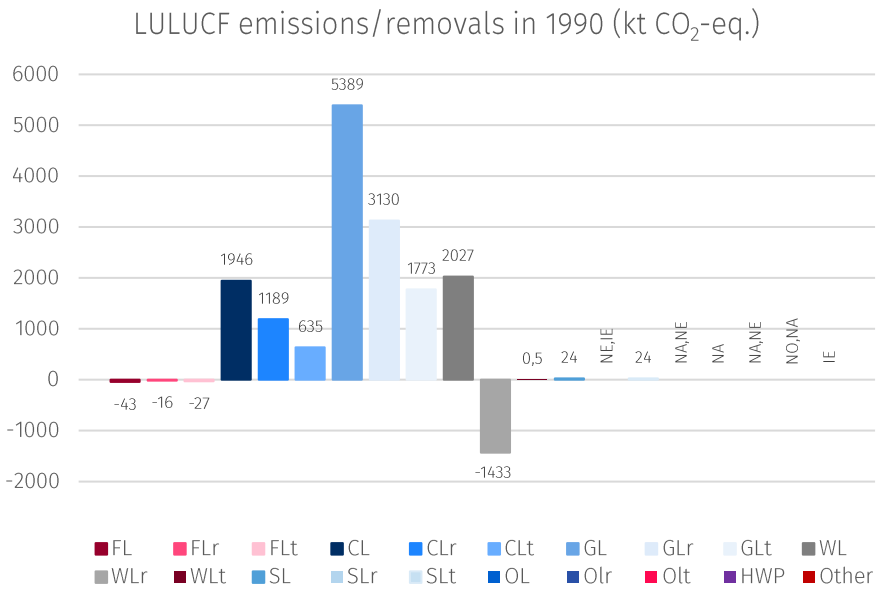

Figure 2 LULUCF emissions and removals (kt CO_2-eq.) by land use category in 1990.

Note: Emissions and removals in tables 4(II) and 4(IV) of the common reporting format (CRF) are allocated to the land use without disaggregation between lands remaining and lands in transition. Therefore, the total emissions and removals from land use (e.g., WL) could differ from the sum of the subcategories land remaining and land in transition (e.g., WLr and WLt).

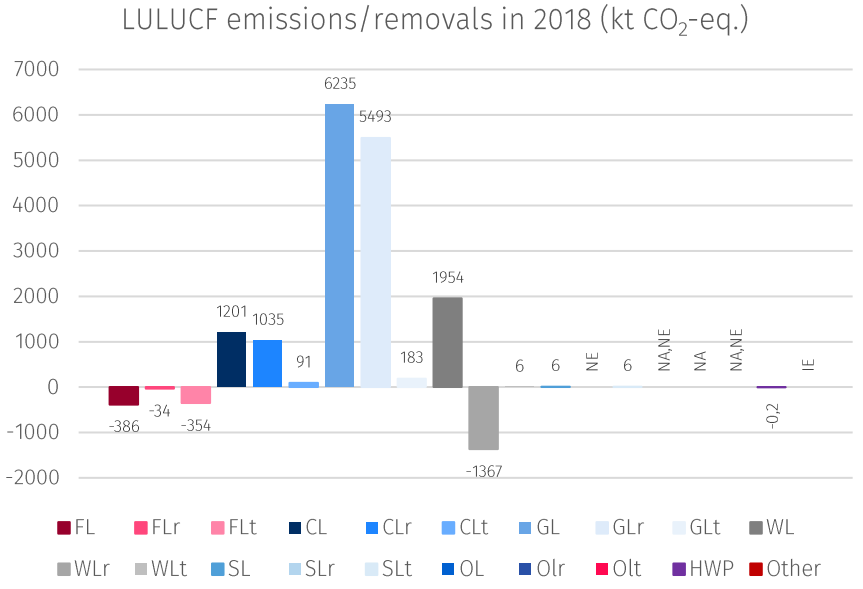

Figure 3 LULUCF emissions and removals (kt CO_2-eq.) by land use category in 2018.

Note: Emissions and removals in tables 4(II) and 4(IV) of the common reporting format (CRF) are allocated to the land use without disaggregation between lands remaining and lands in transition. Therefore, the total emissions and removals from land use (e.g., WL) could differ from the sum of the subcategories land remaining and land in transition (e.g., WLr and WLt).

Approximately 90% of the land area in Iceland is classified as other land or grassland. Other land (52% of the land area) includes lava fields, fell fields, screes, cliffs, glaciers, coastal and geothermal areas, all of which are essentially unmanaged.

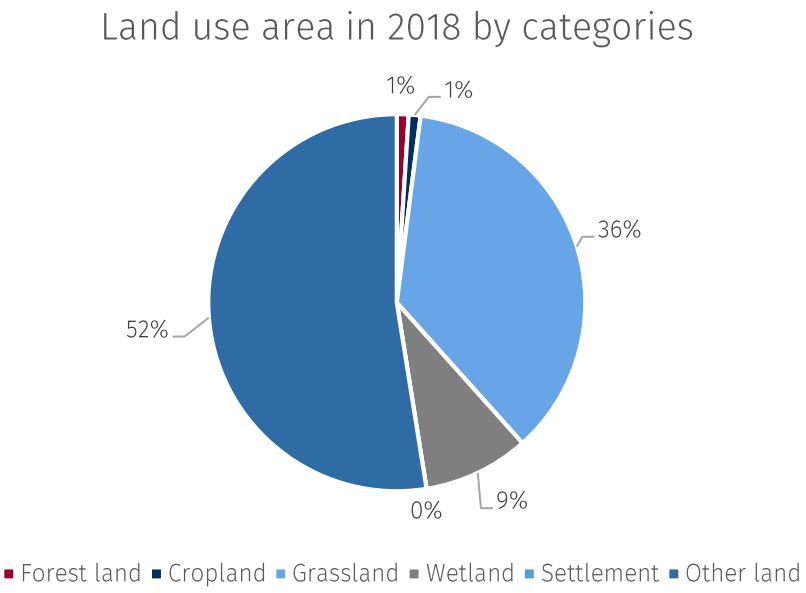

Figure 4 Relative size of land use categories in Iceland in 2018.

Projections for 2030 and 2050

Iceland is working on creating emission and carbon sequestration projections for the LULUCF sector. Currently, there are only projections for some sub-sectors or emissions effected by specific measures. For Iceland to comply with the 2030 commitments and the reporting obligations for the period 2021 to 2030 (including thew LULUCF Regulation), Iceland is working on extensive improvements in measurements and accounting of emissions and carbon sequestration in the LULUCF sector. Improved scientific knowledge and accounting should provide more accurate estimates and improve the knowledge base for estimating the effect of different policies and measures and thereby provide a better ground for long term projections.

In 2019 Iceland submitted for the first time a report[11] on Policies and Measures (PaMs) and Greenhouse Gas Projections, in line with the bilateral agreement between Iceland and the EU regarding the second commitment period (CP) of the Kyoto Protocol. Projection for the LULUCF sector as a whole will be done for the coming submissions of the PaMs and Projections, in 2021 and subsequently.

[11] Report on Policies, Measures and Projections: Projections of Greenhouse gas emissions in Iceland to 2035, April 2019: https://ust.is/library/Skrar/Atvinnulif/Loftslagsbreytingar/PaMs%20final%20April%202019.pdf

The improvements are especially important for assessments of long-term measures within the LULUCF sector. Earlier assessments that have been carried out in relation to the LULUCF Mitigation Plan and Iceland's new Climate Action Plan will complement the upcoming assessment.

As 2021 is just around the corner, the improvements of measurements and accounting will only partly be finalised before the 2021 submission. Iceland aims to finalise most of the planned improvements before the 2023 submission of the PaMs and Projections.

B.1.2 To the extent feasible, expected emissions by sources and by individual GHGs

Below are the descriptions of LULUCF measures that were assessed in relation to the LULUCF Mitigation Plan. The aim is that the measures in the mitigation plan will be implemented over the years 2018 to 2022, even though the effect of the measures on emissions and removals will reach far beyond that. The measures have been estimated for parts of the LULUCF sector, in relation to increased carbon sequestration and reduced emissions. Holistic estimates and projections for total emissions and removals for the LULUCF sector have not been done. This will be done in relation to the coming submissions of the PaMs and Projections, in 2021 and 2023.

Afforestation

Promotion of new forestry for carbon sequestration.

The measure involves promoting forestry in order to increase carbon sequestration from the atmosphere as well as achieving other goals, such as ecosystem restoration, at the same time. Special emphasis will be placed on cultivating new forests in degraded land that potentially emits carbon.

The scope of afforestation projects is predicted to increase from around 1,100 ha/annually in 2018 to 2,300 ha/year 2022. In addition to this, in the year 2020, about half a million native birch plants will be planted on 170 ha of land, as a part of a temporary Covid-19 investment[12] effort by the Icelandic Government. Afforestation is done in cooperation with landowners, NGOs, companies, local authorities, and other stakeholders.

It is estimated that these afforestation measures will result in corresponding carbon sequestration of 34 kt CO_2-eq. in 2022, 134 kt CO_2-eq. in 2030 and 382 kt CO_2-eq. in 2050.

[12] Part of the response to the economic impact of Covid-19 the Government increased funding to several issues in 2020, including climate issues.

Figure 5 shows the significant increase in carbon sequestration that is projected until 2050, based on both earlier and new afforestation measures. The total carbon sequestration is projected to have reached 730 kt CO_2-eq. in 2050 and thereby increased by 250% from 2018.

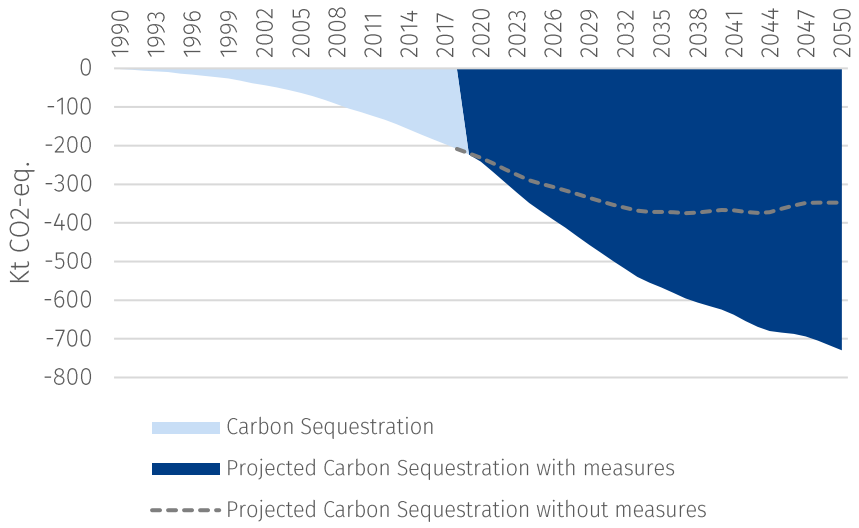

Figure 5 Historical and projected carbon sequestration (kt CO_2-eq.) with and without afforestation measures.

Land restoration

Strengthening land restoration for carbon sequestration.

The measure aims to strengthen land restoration and ecosystem restoration, where the emphasis is on stopping soil erosion and reducing emissions from land. By restoring vegetation cover on barren or poorly vegetated land, soil erosion is stopped, and consequently, so is the loss of carbon, and the functioning of the ecosystem is gradually increased.

The annual scope of land restoration will be doubled between 2018 and 2022, from 6,000 ha in 2018 to around 12,000 ha in 2022. In addition to this, in the year 2020, various land reclamation projects, including land restoration on the edge of the highlands, will be launched as a part of a temporary Covid-19 investment effort by the Icelandic Government. Many farmers and other landowners work on land restoration, as well as NGOs, companies, and local authorities.

It is estimated that these land restoration measures will result in corresponding carbon sequestration of 27 kt CO_2-eq. in 2022, 137 kt CO_2-eq. in 2030 and 410 kt CO_2-eq. in 2050.

Figure 6 shows the significant increase in carbon sequestration that is projected until 2050, based on both earlier and new land restoration measures. The total carbon sequestration is projected to have reached 1,051 kt CO_2-eq. in 2050 and thereby increased by 234% from 2018.

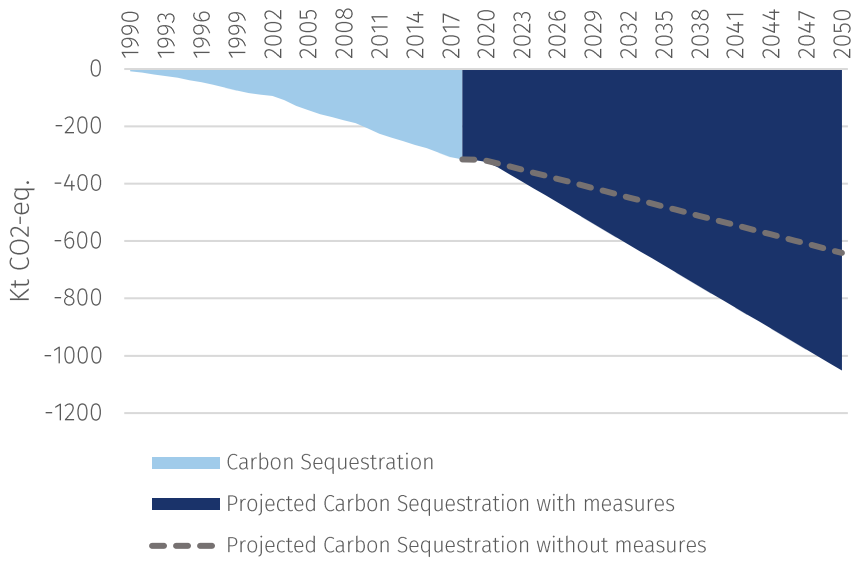

Figure 6 Historical and projected carbon sequestration (kt CO_2-eq.) with and without land restoration measures.

Wetland restoration

Increased wetland restoration efforts.

Measures to increase wetlands restoration, as well as supporting projects which are aimed at mapping and classifying wetlands with respect to current land use and greenhouse gas emissions.

When wetlands are drained, an easier path for oxygen into the soil opens, and carbon and nitrogen compounds are released as greenhouse gases into the atmosphere. It is estimated that during the years 1951-1985, about 29,000 km of ditches were dug in order to drain land for the purpose of improving conditions for agriculture in Iceland.

In Iceland's Climate Action Plan and LULUCF Mitigation Plan, great emphasis is put on wetland restoration. Measures aim to increase the wetland restoration from an average of 45 ha annually in 2016-2018 to about 500 ha in 2022. In addition to this, in the year 2020, 150 ha of wetlands will be restored, as a part of a temporary Covid-19 investment[13] effort by the Icelandic Government.

[13] Part of the response to the economic impact of Covid-19 the Government increased funding to several issues in 2020, including climate issues.

Multiple parties, besides the Government, are supporting and working on wetland restoration in Iceland.

It is estimated that these wetland restoration measures will result in reduced emissions corresponding to 25 kt CO_2-eq. in 2022, 107 kt CO_2-eq. in 2030 and 312 kt CO_2-eq. in 2050.

Wetlands restrictions on drainage

Increased restrictions on wetland drainage and improved monitoring.

The measure aims to prevent the drainage of wetlands, by, among other things, increasing monitoring to ensure compliance with the law on wetland conservation and to improve the implementation of licencing by local authority's for drainage of wetlands.

At the same time, increased emphasis is on restoration of wetlands in Iceland. It is important to prevent further drainage unless there is an urgent need. Cooperation between farmers' associations, local authorities and governmental institutions need to be strengthened in order to protect wetlands in a more comprehensive and effective manner than is currently done.

Measures to increase restrictions on wetland drainage aim to keep emissions from drained land from increasing.

Even though Iceland has not produced complete projections for the LULUCF sector, significant climate measures are being taken to reduce emissions and increase carbon sequestration in land use. These measures play a role in Iceland meeting the 2030-commitments, but an even more important role in achieving Iceland's goal of carbon neutrality by 2040.

As stated above, Iceland is currently working on significant improvements of measurements and accounting of emissions and carbon sequestration in the LULUCF sector as well as working on a National Plan for Soil Conservation and a National Plan on Forestry. The plans, as well as the improved scientific knowledge and accounting, should provide a more accurate estimate of the situation and create a solid ground for producing a holistic projection of emissions and carbon sequestration for the LULUCF sector. This will also help to identify and prioritize measures that curb emissions and stimulate carbon uptake from the atmosphere.

B.1.3 Emission reduction options and options for enhancement of sinks envisaged

Currently, there is ongoing work on extensive updates and improvements of the Icelandic LULUCF estimation of emissions and removals that will lead to better knowledge about how to reduce emissions and enhancement of sinks.

The LULUCF sector is a key sector for Iceland's carbon neutrality 2040 goal. It is the most complex sector in many ways, in terms of measuring emissions and carbon sequestration, distinguishing between natural and human-induced emissions and carbon sequestration, dealing with legacy emissions, measuring benefits of mitigation actions, and securing permanence of carbon stocks. However, it is indisputable that Iceland has huge mitigation potential in the LULUCF sector, as well as considerable co-benefits, so a climate policy ignoring LULUCF would be incomplete and lacking ambition. Iceland aims to halt new emissions from the LULUCF sector, curb legacy emissions (such as emissions from drained wetlands), and increase carbon sequestration by afforestation, revegetation, and other actions.

LULUCF is a cornerstone of Iceland's climate mitigation policy. Historically Iceland has lost most of its woodlands, and the soils are severely degraded due to centuries of soil erosion since human settlement. Government agencies have pursued afforestation and efforts to reclaim soil and vegetation (revegetation) for over a century. Carbon uptake from the atmosphere is seen as an added benefit of such efforts. Iceland has great potential for carbon sequestration in LULUCF, and this fact must be considered in climate policy.

The importance of LULUCF in Iceland's mitigation profile was enhanced by scientists' measurements of significant emissions from drained wetlands in Iceland. Wetlands, especially peatlands, were drained on a large scale in Iceland for a big part of the 20th century, to be used as cropland or grazing land. This draining was supported by government subsidies but came mostly to a halt when the support programme ended shortly before 1990. Despite this, significant emissions continue to occur in most of the drained wetlands. Iceland highlighted the importance of wetlands in discussions resulting in the Doha amendments and submitted a proposal for wetland draining and rewetting as an elective activity, which was taken up in Article 3.4 of the Kyoto Protocol with the Doha Amendments. Iceland's LULUCF efforts include actions to reclaim wetlands and deal with other possible emissions resulting from past activities.

Iceland is currently improving its LULUCF measurement and accounting, in order to ensure that it fulfils the criteria of the LULUCF Regulation. This should ensure more accurate accounting, using methods comparative to other European countries.

B.1.4 To the extent it is relevant for the conservation or enhancement, as appropriate, of forest sinks and reservoirs, adaptation policies and measures

Many of the policies and measures mentioned above are relevant for the conservation and enhancement of forest sinks and reservoirs.

Icelandic authorities have requested and sponsored three expert reports on the effects of climate change in Iceland (see below), including recommendations on adaptation. A comprehensive adaptation plan has, however, not yet been developed for Iceland, and government efforts on adaptation issues are not centralized. Various institutions and companies have worked on adaptation to climate change, in fields such as spatial planning and renewable energy generation. Iceland has considerable experience in the risk management of natural hazards, and many of the risks associated with climate change impacts can be dealt with effectively using existing policy tools and institutions.

Icelandic Climate Law (Act No 72/2012) states that an adaptation plan should be developed following changes made to the law in 2019.

Iceland's third report[14] on climate change was issued in May 2018 by a Scientific Committee on Climate Change. The report highlights the main changes observed in Iceland due to climate change, and a chapter on adaptation is provided at government request.

The Icelandic Climate Council[15] held a conference in 2019 on adaptation in Iceland and published a green paper on adaptation in February 2020. In this report, the concept of adaptation is discussed, and an outline provided on adaptation efforts in selected countries. Current work on adaptation in Iceland is reviewed in the report, as well as the main considerations in developing an adaptation strategy and action plan.

Both reports provide a good starting point in developing a comprehensive national adaptation plan. The issue has been taken up by the Ministry for the Environment and Natural Resources, and work on the adaptation plan is expected to start in the fall of 2020.

The effects of a warming climate after 1990 has been significant in all crops cultivated in Iceland. However, the changes in the climate also have certain negative effects, such as an increased load of parasites on vegetation and increased drought problems in certain situations. The risk of fires associated with increased drought and increased vegetation has increased. With further

[14] Loftslagsbreytingar og áhrif þeirra á Ísland. Skýrsla vísindanefndar um loftslagsbreytingar, 2018. https://www.vedur.is/media/loftslag/Skyrsla-loftslagsbreytingar-2018-Vefur-NY.pdf

[15] Established advisory body to the Government on climate issues. According to the Climate Change Act No 70/2012.

warming of the climate, the cultivation of agricultural species will most likely be more reliable, and new species may be introduced in agriculture, horticulture, and forestry.

For forests and forestry, climate change means both increased risks and new opportunities. To get a better picture of plausible risks and opportunities, it is important to answer questions regarding how afforestation, forest management and wood utilisation can help to mitigate global warming. At the same time, it must be considered how trees and forests and forestry will react to climate change in relation to a genetic adaptation of trees, changes in forest ecosystems and adaptive management.

The Icelandic Forestry Service has the role to provide and disseminate scientific data on the forest and climate context and advise the Government on these issues. In order to meet an increased emphasis on research and audits related to a changing climate and greenhouse gas accounting the Icelandic Forestry Service established a Climate Department in 2019, within the Research Division that is to address climate issues like:

- Gather scientific data and disseminate information on forestry opportunities as climate change mitigation
- Gather and disseminate statistical information on forests for the national greenhouse gas inventory
- To obtain scientific data on the adaptation of forests to climate change.

B.1.5 Aspects related to market demand for forest biomass and impacts on harvest

At the time of human settlement almost 1150 years ago, birch forest and woodland covered 25-40% of Iceland's land area. The relatively tall (up to 15 m) birch forests of sheltered valleys graded to birch and willow scrub toward the coast, on exposed sites and in wetland areas and to willow tundra at high elevations. As in many agrarian societies, the settlers cleared forests and woodlands to create fields and grazing land.

Afforestation by planting started around the mid-20th century. It is difficult to state exactly when net deforestation changed to net afforestation, but it was probably sometime between 1950 and 1980.

Today Iceland is dependent on import of almost all forest products, and harvested wood products are not economically important as a source of wood or fodder, although over 200 tonnes of fireplace logs are produced annually.

Emissions and removals related to harvested wood products (HWP) were estimated for the first time in Iceland's 2017 National Inventory Report (NIR)[16]. The only HWP category reported in Iceland's NIR is sawnwood. Sawnwood is only a small fragment of commercial wood removal. Other HWP is not produced from domestic wood.

Figure 7 and Figure 8 show the annual roundwood production (in m^3 on bark) and sawnwood production (in m^3) 1996 to 2017. It increased dramatically after 2010 as economic markets for domestic wood opened, caused by the economic crash in late 2008.

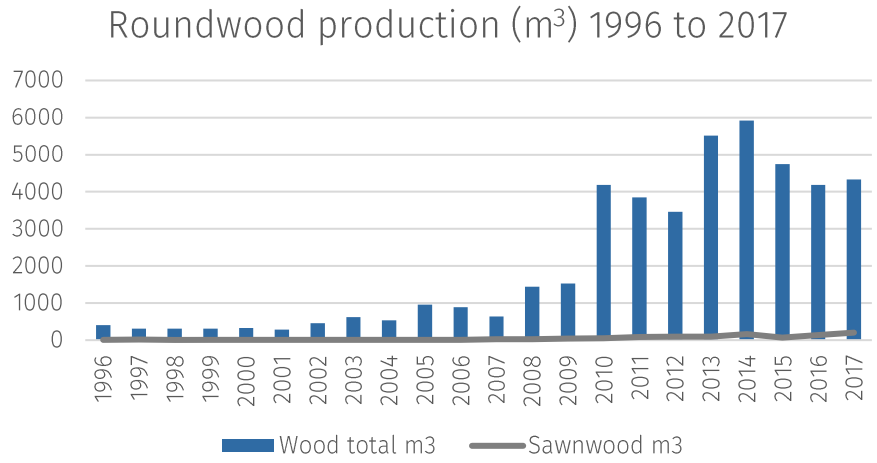

Figure 7 Annual roundwood (m^3 on bark) and sawnwood production (m^3) 1996 to 2017.

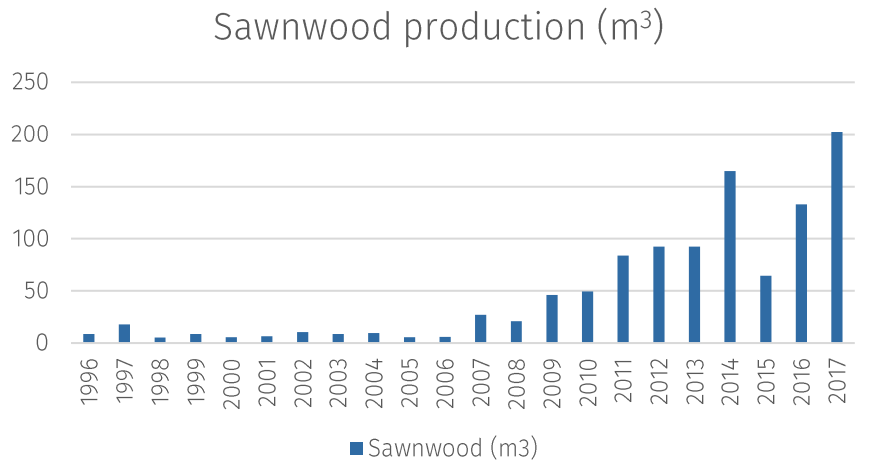

Figure 8 Annual sawnwood production (m^3) 1996 to 2017.

[16] Iceland´s National Inventory Report 2017: https://www.ust.is/library/Skrar/Einstaklingar/Loftgaedi/NIR%20Iceland%202017%20submission_May%20resub.pdf

Iceland aims to increase forestry with the purpose of wood harvesting. This shall be achieved sustainably, supporting the harvesting industry and in harmony with other land use options and industries.

According to the Parliamentary Resolution on Regional Development 2018-2024,[17] the Parliament approved that forestry will be strengthened as an industry with an emphasis on regional forestry plans and the development of the exploitation of forestry products.

In line with Iceland's measures to convert to clean energy in the Climate Action Plan from 2018[18] the Minister of Tourism, Industry and Innovation presented to the Parliament a report[19] on domestic fuel production in April 2019. In the report, there is an overview of domestic fuel production and existing knowledge in the field, as well as the evaluation of possible products for use in Iceland until 2030. In 2020, the Government will further analyse the feasibility of domestic fuel production and possible obstacles that might stand in the way of utilization in accordance with the new Icelandic Climate Action Plan from 2020[20]. Based on this, the Government will lay down a pathway towards renewable fuel in Iceland, i.e., which fuel is most economical to use for which activities, such as heavy transport and ships, and where further research is needed.

B.1.6 As necessary, details on modelling (including assumptions) and/or analysis, indicators etc.

A detailed description of the methodology used to estimate emissions and carbon sequestration in the LULUCF sector can be found in Iceland's National Greenhouse gas Report (NIR[21]). The reporting is based on; land use as recorded in the Icelandic Geographical Land Use Database (IGLUD), activity data and mapping on afforestation and deforestation from the Icelandic Forest Service (IFS), maps of natural birch forest and shrubland from the IFS, activity data and maps on revegetation from the Soil Conservation Service of Iceland (SCSI), time series of Afforestation, Reforestation, Cropland and Grassland categories,

[17] Parlimentary Resolution on strategic regional plan for the period 2018-2024: https://www.stjornarradid.is/library/02-Rit--skyrslur-og-skrar/Byggdaaaetlun_2018-2024_ENSKA.pdf

[18] Iceland´s climate Action Plan for 2018-2030, summary published in September 2018: https://www.government.is/library/Files/Icelands%20new%20Climate%20Action%20Plan%20for%202018%202030.pdf

[19] Skýrsla. Ferðamála- iðnaðar- og nýsköpunarráðherra um innlenda eldsneytisframleiðslu. 149. Löggjafaþing 2018-2019.: https://www.althingi.is/altext/pdf/149/s/2043.pdf

[20] New Climate Action Plan, June 23, 2020: https://www.government.is/news/article/2020/06/23/New-Climate-Action-Plan-Iceland-will-fulfil-its-commitments-and-more/

[21] National Inventory Report. Emissions of greenhouse gases in Iceland from 1990 to 2018. https://ust.is/library/Skrar/loft/NIR/NIR%202020.pdf

including revegetation, drainage and cropland abandonment, and of reservoirs. Data on biomass burning is based on area mapping of the Icelandic Institute of Natural History and biomass estimation for relevant land categories obtained through IGLUD field sampling.

The categorization of land use is according to the 2006 IPCC guidelines[22]. This defines six main land use categories and conversions between them. Emissions and removals of GHG are reported for all managed lands within these categories according to guidelines given in Volume 4: Agriculture, Forestry and Other Land Use of the 2006 Guidelines, named AFOLU Guidelines, and the 2013 Supplement to the 2006 Guidelines: Wetlands[23], named 2013 Wetland Supplement.

All forests, both naturally regenerated and planted, are defined as managed as they are all affected by human activity. For Iceland, a 50-year conversion period has consistently been used for accounting of afforested land to the UNFCCC and duly justified and reviewed based on the IPCCC Guidelines. Iceland will continue to use a 50-year conversion period in accordance with the EEA Joint Committee Decision No 269/2019.

As highlighted before, Iceland is working on extensive improvements of measurements and accounting of emissions and carbon sequestration in the LULUCF sector and thereby restructuring and recalculation as some sources that are incomplete or missing. Improvement of the LULUCF sector in Iceland's reporting is therefore expected in the nearest future.

[22] 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme,. In: Eggleston HS, Buendia L, Miwa K, Ngara T & Tanabe K (eds.) IGES, Japan.

[23] 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol. IPCC, Switzerland, 268 p.