

Green bonds

POST-ISSUANCE REPORT



2019


SVEASKOG

Preface

In September 2017, Sveaskog issued a new bond for a total of SEK 1 billion under a new green framework. Underlying this framework are the “Green Bond Principles” the aim of which is to promote investment in projects that deliver environmental sustainability. Sveaskog’s framework has been reviewed by Det Norske Veritas – GL. In 2018 Sveaskog did not issue any new bond under the framework, but in April 2019 it was time again and a total of SEK 1.1 billion was issued. There was considerable interest and the bond was placed with 19 investors in Sweden, Norway, Denmark and Finland.

Limiting global warming is one of the greatest challenges of our time. In this context the growing forest and the use of wood play a significant role in combating climate change. As Sweden’s largest forest owner, with 14% of the country’s productive forest land, Sveaskog conducts sustainable forest management in order to increase forest growth which creates more wood raw material that can replace fossil-based material as well as increasing the uptake of carbon dioxide from the atmosphere.

With its natural raw material, forest management and wood raw material play a key role in development towards a sustainable, bio-based society.



Climate benefits of the growing forest



The significance of climate change and how we should handle it are issues that are growing in importance both in Sweden and internationally and are affecting attitudes to forest management and the forest as a raw material. The global climate agreement COP21 agreed by countries in Paris in December 2015 describes forest management as a success factor for preventing the Earth's temperature rising by more than two degrees and preferably remaining under 1.5 degrees. IPCC also stresses the importance of sustainable forest management in efforts to prevent climate change (IPCC, 2019). Activities that are highlighted as important for the forestry sector are replanting, reforestation of deforested areas and increased use of sustainably produced bioenergy which is completely in line with the Swedish forestry model.

The climate benefit of the forest has three components:

- 1) the annual change in carbon storage in tree biomass and soil,
- 2) the substitution effect that arises when forest products replace fossil-based material, and

- 3) storage changes in forest products, i.e. the annual change in carbon storage in society when wood raw material is used for various products such as sawn timber, board and paper.

Annual changes in carbon storage on forest land

Sweden's forests are growing and take up more carbon dioxide than they release. The forest is therefore a carbon sink. Since the beginning of the twentieth century the volume of timber in the Swedish forests has doubled at the same time as extraction of wood raw material has also doubled. This is partly due to Sweden legislating early on mandatory reforestation and partly through continued improvements in silviculture resulting in increased growth. Today Sveaskog's regeneration felling is about 70% of annual growth which means that carbon storage in Sveaskog's forests increases all the time. By focusing on long-term sustainable forest management, the carbon storage in Sveaskog's forests can continue to increase for many years to come at the same time as the company delivers climate-smart products and energy.

Substitution effect

By looking at the entire chain from forest to industry and consumption it is possible to calculate the emissions avoided with a harvested cubic metre of wood raw material. This gives a measure of how effectively a harvested cubic metre contributes to mitigating climate change. For Sweden as a whole, earlier calculations have shown that the average value of this effect is around 500 kg of carbon dioxide emissions avoided per harvested cubic metre (Lundmark et al, 2014). Other studies, meanwhile, show that the substitution effect is probably higher. Improvements in energy efficiency in industry, increased use of renewable vehicle fuel and product development are factors that contribute to increased substitution benefit. Studies in countries including Finland, Austria and Switzerland which have similar forestry sectors to Sweden, show substitution levels that vary between 500 and 1,000 kg of carbon dioxide emission avoided.

Storage changes in forest products in society

When wood raw material is used in different products, the carbon store in the forest moves out into society. Approximately one half of the volume of biomass harvested in the forest goes to the pulp industry and half to sawmills.

Half the sawlogs become something other than solid wood products. Chips go to the pulp industry and sawdust and bark become biofuel. In a similar way about one half of the raw material that goes to the pulp industry becomes something other than paper-pulp, for example bioenergy for the production of electricity and heat and also bio vehicle fuel, chemicals and textiles, see Figure 1. Taken together this means that almost 60% of the biomass harvested in the forest is used for sawn material, board, paper and pulp, while the remainder becomes bioenergy.

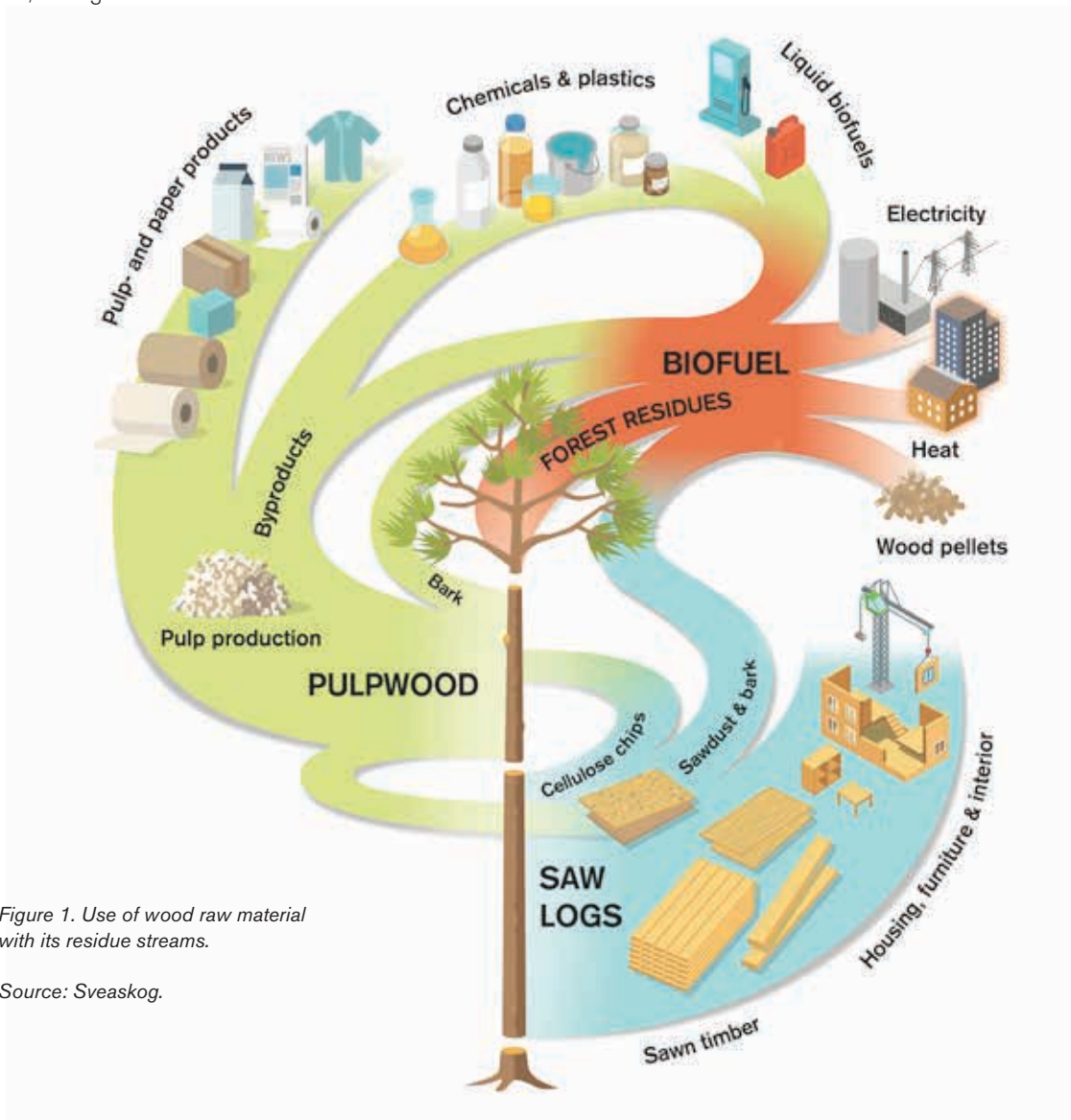


Figure 1. Use of wood raw material with its residue streams.

Source: Sveaskog.

Sveaskog's green bond of SEK 1.1 billion issued in April 2019 has been used to finance sustainable forest management and development projects which aim to increase the climate benefit of the forest and wood raw materials', reduce energy consumption or the use of fossil resources.

Projects to which the bond was allocated are reported on the following pages





Sustainable forest management

Sustainable forest management increased growth and therefore also carbon-dioxide sequestration. Sveaskog's current investments in sustainable forest management according to the Swedish forest management model are split across the following projects:

Silviculture

Planting

For each tree felled on Sveaskog's lands, three new are planted to ensure regeneration. Well-executed regeneration is the first important step to ensure the quality and value of the new forest. With the new seedlings in the ground, the build-up of carbon dioxide in the forest starts again. Sveaskog plants 40 million new seedlings annually.

Cleaning

Cleaning manages the development of the stand so that the best trees with the highest quality are given space for optimum development. The aim of cleaning is to optimise growth of the trees that remain by removing competitive trees. Cleaning also opens up the forest and makes it more attractive for outdoor activities after some years. Cleaning is normally carried out once or twice before the stand reaches 30 years.

Thinning

Thinning further improves the quality of the remaining trees. The aim of thinning is to optimise the timber component, i.e. that part of the timber which will be used later for long-lived products such as sawn timber. Trees harvested at thinning

are used mainly as pulpwood, but also for sawlogs and bioenergy.

Sveaskog's total investment in silviculture in the period March 2018 to March 2019 amounted to SEK 550,006 thousand of which SEK 478,931 thousand was financed through the green bond.

Main environmental benefit: Increased carbon dioxide sequestration.

Fertilisation

Fertilisation is an efficient way of increasing growth and therefore also carbon dioxide sequestration. Normally a stand is fertilised 10–15 years before felling and the increased growth is estimated at 10–20 m³ per hectare, which corresponds to increased carbon dioxide sequestration of between 10 and 20 tonnes CO₂ per hectare. During 2018 Sveaskog fertilised a total of 3,195 hectares.

Sveaskog's total investment in fertilisation during the reporting period amounted to SEK 11,861 thousand of which SEK 10,293 thousand was financed through the green bond.

Main environmental benefit: Increased carbon dioxide sequestration.

Regeneration felling

All forests bind carbon dioxide but a tree's growth slows with age and thus its ability to bind additional carbon dioxide. The managed forest therefore contributes the most carbon benefit over time since the high growth persists. If the substitution benefit which arises from all the products from wood raw material which replace fossil energy and energy-demanding building materials is taken into account, then the climate benefit of the managed forest is enormous.

Each year Sveaskog carries out thinning and regeneration felling on about 40,000 hectares or 1% of our land. In total Sveaskog harvested 7,664,000 m³ of wood raw materials from its own forests in 2018 which corresponds to a climate benefit of 3.8–5.4 million tonnes CO₂ equivalent in avoided fossil emissions¹.

Sveaskog works actively to avoid negative environmental impact when felling and has an environmental target that 99% of all felling shall take place without any serious impact on natural or cultural values. All silvicultural activities are carried out with consideration for the environment in the form of edge zones by watercourses, leaving valuable trees and tree groups and sensitive habitats. On average 10% is left out of environmental consideration when felling.

Sveaskog's total investment in regeneration felling in 2019 amounted to SEK 492,151 thousand of which SEK 428,551 thousand was financed through the green bond.

Main environmental benefit: Substitution benefit.

¹ Substitution benefit is calculated from a scientific study where the Swedish wood raw material is assessed to have a substitution effect of between 0.5 and 0.7 tonnes CO₂ equivalent per harvested cubic metre (Lundmark, T. et al, 2014). However, Sveaskog has chosen not to include substitution benefit in its reporting of climate benefit resulting from investments from green bonds.

Nature conservation

An important part of sustainable forest management is nature conservation. Sveaskog has developed its own strategy for how it carries out nature conservation work. We work with several tools at different scales – from consideration for nature when felling to setting aside nature conservation forests and large contiguous landscapes that we call ecoparks. Sveaskog works both with retaining high conservation values and with strengthening and recreating natural values. The latter are done using silvicultural methods that actively promote nature conservation.

Sveaskog has already made its largest investment in nature conservation by setting aside 10% of productive forest land below the montane forest region as nature conservation forests and in addition has established 37 ecoparks. A total of 28% of Sveaskog's forest land is not used for timber production. In 2018 we carried out, among other things, deciduous forest restoration, re-creation of wetlands and removal of fish run obstacles in waterways with the aim of strengthening and recreating conservation values. During 2018 Sveaskog carried out what was probably Sweden's largest ever conservation burning in the Ejheden Ecopark in Rättvik municipality where a total of 260 hectares was burnt. Forest fires are important for a lot of fire-dependant insects, plants and fungi. Further, there are several other species – plants, insects, birds and animals – that benefit from the open and leafy woodland which is created after a fire.

Sveaskog's total investment in nature conservation during the reporting period amounted to SEK 8,239 thousand of which SEK 7,174 thousand was financed through the green bond.

Main environmental benefit: Strengthened conservation values.



Many plants, insects, birds and animals benefit from the open and leafy woodland which is created after a fire.



Research and development

In its development projects, Sveaskog collaborates with other players including universities, forestry, the transport sector and the vehicle fuel sector. Projects are usually multi-year and Sveaskog's investments in the projects during the reporting period are summarised below.

Somatic embryogenesis

Somatic embryogenesis (SE) is a method for vegetative propagation of the best plant material that results from breeding. This means being at the leading edge of plant breeding and thus providing the market with the absolutely best forest cultivating material far sooner than through traditional mass propagation. It also means that an unlimited number of new embryos can be created from a single seed. Sveaskog has participated in the development of SE plants for a number of years and the aim now is to automate the

propagation process. Raising these microplants is considerably more environmentally efficient compared with traditional plant breeding since a greenhouse can hold up to six times as many plants, which saves energy.

Sveaskog's total costs incurred during the reporting period amounted to SEK 701,000.

Main environmental benefit: Reduced energy consumption.

Effekt 20

Effekt 20 is a comprehensive inventory programme in six of Sveaskog's 37 ecoparks. In collaboration with researchers from Lund University and the Swedish University of Agricultural Sciences the project will evaluate how completed nature conservation efforts have affected the occurrence of wood-living beetles and woodland birds in the ecoparks. By comparing the ecoparks with a reference area over time, the programme aims to evaluate the effects of nature conservation efforts on the landscape.

Sveaskog's total costs incurred during the reporting period amounted to SEK 283,000.

Main environmental benefit: Increased knowledge of effective nature conservation efforts.

Sector-leading consideration inventory

Sveaskog's target is that 99% of silvicultural activities when felling shall be carried out without any major environmental impact. The target is assessed through annual inventories by the Swedish Forest Agency. What is checked is how well environmental consideration is applied when felling, such as edge zones by lakes and waterways, that areas with ecological qualities are not felled, and consideration for cultural environments. The evaluation then becomes the basis for continued development of good environmental consideration. Over the past two years, Sveaskog has succeeded in carrying out 98% of all silvicultural activities without major environmental impact.

Sveaskog's total costs incurred during the reporting period amounted to SEK 1,595,000.

Main environmental benefit: Increased knowledge of effective environmental consideration in forestry.



Tall diesel is a renewable vehicle fuel based on tall oil which can replace fossil fuel.

Vehicle biofuel from lignin in black liquor

In collaboration with a consortium of researchers, entrepreneurs and a vehicle fuel producer Sveaskog is conducting a project which aims to develop a technology to extract lignin from pulp mills' black liquor and convert this to raw material for vehicle biofuel. The project has been running since 2014 and has moved from laboratory experiment to a pilot plant where the

technology and product are verified as meeting the demands of a commercial operation.

Sveaskog's total costs incurred during the reporting period amounted to SEK 3,180,000.

Main environmental benefit: Reduced use of fossil vehicle fuels.

Competitive production of wood fibre-based composites

Together with a consortium of players from across the entire value chain, from forest owners via pulp mills to end users, Sveaskog is conducting a project which aims to produce feedstock for the manufacture of biocomposites in a pulp and paper mill. The aim is to achieve a more competitive value chain for biocomposites which will enable fossil raw materials to be

replace with renewable raw materials in a range of products.

Sveaskog's total costs incurred during the reporting period amounted to SEK 390,000.

Main environmental benefit: Reduced use of fossil raw materials.

EFFORTE

EFFORTE (Efficient forestry by precision planning and management for sustainable environment and cost-competitive bio-based industry) is a European collaborative project between forest companies and research organisations which aims to test new technologies and knowhow for improved sustainability in forest management. The project will develop efficient and gentle procedures for mechanised

silviculture as well as planning procedures for efficient, gentle and customised harvesting of the forest.

Sveaskog's total costs incurred during the reporting period amounted to SEK 310,000.

Main environmental benefit: Reduced climate emissions and lower environmental impact.

Bigger and longer vehicles

Forestry is transport intensive and Sveaskog is therefore participating in projects to enable larger and longer transports, partly to reduce transport costs and partly to reduce fuel consumption and the consequent carbon dioxide emissions. One such project is the ST project for lorries with a greater load capacity so that the gross weight can go up to 74 tonnes compared with the traditional 60–64-tonnes lorries. An ETT vehicle can increase capacity further to 90 tonnes. Evaluation of three such vehicles is underway in Sveaskog's operations. Studies show that fuel

consumption and thus carbon dioxide emissions are reduced by 8–14% compared with regular lorries. Reduced fuel consumption of that order corresponds to an annual reduction for Sveaskog in carbon dioxide emissions of 6,000 to 10,000 tonnes.

Sveaskog's total costs incurred during the reporting period amounted to SEK 523,000.

Main environmental benefit: Reduced use of fossil vehicle fuels.

Flowcut

In collaboration with researchers, forest companies and entrepreneurs Sveaskog is conducting the Flowcut project which aims to develop a technology which will make it profitable to use the biomass from felling thin trees. The goal is to achieve profitable thinning in dense, overlooked stands and a successful project will mean that we can use some of the biomass that is often cut down and left in the forest.

This will increase the availability of biofuel which can be used to replace fossil resources.

Sveaskog's total costs incurred during the reporting period amounted to SEK 618,000.

Main environmental benefit: Reduced use of fossil resources.

Cognitive forestry

Sveaskog encourages the development of digital technology in forestry. In the Cognitive forestry project the company has started a collaboration with the IT company Sogeti which uses artificial intelligence, satellite images and advanced algorithms to produce detailed maps of the forest holdings which simplify both planning and silvicultural activities. The technology can be used, among other things, for early identification of spruce bark beetle infestation which

mitigates forest damage attacks and improves the use of raw material when insect attacks are discovered earlier which means that smaller volumes are classified as firewood.

Sveaskog's total costs incurred during the reporting period amounted to SEK 400,000.

Main environmental benefit: Lower environmental impact and improved raw material utilisation.

The Flowcut project aims to develop technology that will make it profitable to use the biomass from felling thin trees in overlooked stands.





Acquisition of forest land

Sveaskog is Sweden's largest forest owner with some 4 million hectares of forest land (2018). All our forest land is certified according to the Swedish forest certification FSC®. In this way we contribute to promoting sustainable forest management worldwide. FSC is a voluntary international system and is the only forest certification that has broad global support from the environmental movement. FSC-certified forest management provides an economic return but also takes into account environmental values and social conditions. Biodiversity, ecologically valuable environments and cultural heritage are protected. Employees are offered contracted and safe employment terms. The Sami and the general public are given the opportunity for insight and influence. When carrying out silvicultural activities, special consideration is given to Sami cultural sites, reindeer-herding areas or important recreational areas.

Sveaskog continuously acquires forest land which is always FSC certified. In this way sustainable management of the forest and forest land is ensured. The acquired forest land is also covered by Sveaskog's environmental targets which means that our voluntary set-asides are increased by an amount corresponding to 20% of the acquired productive forest land. With green bonds we can both finance new forest land acquisition and also refinance the loans for previous acquisitions. During 2018 Sveaskog acquired a total of 1,584 hectares of forest land at a cost of SEK 167 million.

Sveaskog's total investment for acquisition of forest land during the reporting period amounted to SEK 167 million of which SEK 167 million was financed through the green bond.

Main environmental benefit: Ensuring sustainable forest management.

Summary of Sveaskog's green projects

Market Area North

Project name	Project category according to framework	Total investment (SEK)	Total costs incurred (SEK) allocated to the green bond at 31 March 2019	Share of the project financed by the green bond (%) at 31 March 2019	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	239,290,521	208,367,738	87	Carbon dioxide sequestration of 3,874,000 tonnes
Fertilising	Environmentally sustainable forestry	2,550,000	2,220,471	87	
Regeneration felling	Environmentally sustainable forestry	235,141,242	204,754,657	87	
Nature conservation	Environmentally sustainable forestry	3,170,643	2,760,911	87	

Market Area South

Project name	Project category according to framework	Total investment (SEK)	Total costs incurred (SEK) allocated to the green bond at 31 March 2019	Share of the project financed by the green bond (%) at 31 March 2019	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	310,716,436	270,563,499	87	Carbon dioxide sequestration of 1,531,000 tonnes
Fertilising	Environmentally sustainable forestry	9,270,903	8,072,853	87	
Regeneration felling	Environmentally sustainable forestry	257,009,367	223,796,831	87	
Nature conservation	Environmentally sustainable forestry	5,067,957	4,413,040	87	

Whole of Sveaskog

Project name	Project category according to framework	Total investment (SEK)	Total costs incurred (SEK) allocated to the green bond at 31 March 2019	Share of the project financed by the green bond (%) at 31 March 2019	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	550,006,957	478,931,237	87	Carbon dioxide sequestration of 5,405,000 tonnes
Fertilising	Environmentally sustainable forestry	11,820,903	10,293,324	87	
Regeneration-felling	Environmentally sustainable forestry	492,150,609	428,551,488	87	
Nature conservation	Environmentally sustainable forestry	8,238,600	7,173,951	87	

Research and development

Project name	Project category according to framework	Total costs incurred (SEK) allocated to the green bond at 31 March 2019	Most significant measurable environmental impact as a result of financing
Somatic embryogenesis	Research and development	701,000	Reduced energy consumption
Effekt 20	Research and development	283,000	Increased knowledge of effective nature conservation efforts
Sector-leading consideration inventory	Research and development	1,595,000	Increased knowledge of effective environmental consideration in forestry
Vehicle biofuel from lignin in black liquor	Research and development	3,180,000	Reduced use of fossil vehicle fuels
Competitive production of wood-fibre based composites	Research and development	390,000	Reduced use of fossil raw materials
EFFORTE	Research and development	310,000	Reduced climate impact and improved environmental consideration
Bigger and longer vehicles	Research and development	523,000	Reduced use of fossil vehicle fuels
Flowcut	Research and development	618,000	Increased availability of biofuels that can replace fossil raw materials
Cognitive forestry	Research and development	400,000	Reduced environmental impact in forestry and improved raw material utilisation

Acquisition of property

Project name	Project category according to framework	Total investment (SEK)	Total costs incurred (SEK) allocated to the green bond at 31 March 2019	Share of the project financed by the green bond (%) at 31 March 2019	Most significant measurable environmental impact as a result of financing
MA South	Acquisition of forest land	167,050,000	167,050,000	100	FSC® certification of 1,584 hectares of forest land

This report was approved at a meeting of Sveaskog's Green Bond Committee

Stockholm, 30 March 2020

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Appendix 1 – Calculation of climate benefits

The carbon balance in the forest is determined by several different processes.

In green plants photosynthesis takes up carbon dioxide from the atmosphere and converts it into carbohydrates. Some of the absorbed carbon dioxide is released again by the respiration needed for metabolic activity in trees and other plants. While the trees are growing, some carbon is allocated to the ground via the roots and when needles and cones fall. Dead organic material is gradually broken down by different organisms which leads to carbon dioxide being emitted back to the atmosphere.

In the managed forest there is a further factor which is significant for the carbon balance, harvesting the trees.

This means that some of the growth is extracted in the form of wood raw material which is then used for consumption by society. Assuming that forest products are replaced by others that have fossil origins or are based on cement, a substitution benefit achieved by the harvested biomass can be calculated.

In reporting climate benefits contributed by Sveaskog's forests and forest management, only climate benefits as net growth are taken into account. Since Sveaskog only felled 63% of annual growth, the carbon stored in the standing timber increased. Carbon storage in the ground or the substitution benefit have not been included which means in total an underestimate of the climate benefits of the forest and wood raw material.

The following formula has been used to calculate the amount of carbon sequestered in Sveaskog's forests during the year:

$$\text{Total carbon sequestration (tonnes)} = \text{Change in timber stocks (m}^3\text{fo)} \times \text{BEF} \times \text{CF}$$

where,

Net growth = Change in standing timber stocks (m³fo)

BEF = Biomass Expansion Factor, conversion factor to determine the total oven-dry biomass

CF = Carbon Fraction, the amount of carbon in oven-dry wood

Table 1. Parameters used to calculate carbon content

Tree species	CF	
	CF (tonnes C tonnes oven-dry mass ⁻¹)	BEF
Pine	0.51	0.7
Spruce	0.51	0.8
Source	(IPCC 2006)	(Lehtonen, et al. 2004)

The following formula has been used to convert the amount of carbon sequestered to the amount of carbon dioxide sequestered:

$$\text{Total carbon dioxide sequestered (tonnes)} = \frac{\text{Carbon sequestered (tonnes)} \times \text{CO}_2 \text{ molecular weight}}{\text{C molecular weight}}$$

In 2018 net growth on Sveaskog's entire land holdings was 4.4 million m³fo which corresponds to carbon dioxide sequestration of 6.2 million tonnes. The bond has financed 87% of the growth-improving activities reported

as green projects within the framework of environmentally sustainable forestry. Therefore 87% of the total climate benefit of net growth is reported as a result of the financing.

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