

Sveaskog's green bonds



Foto reprintad with permission.
©2017 Nasdaq, Inc. All rights reserved.

Contents

1. Preface	1
2. Climate benefits of the growing forest	2
3. Sustainable forest management	3
4. Research and development	5
5. Acquisition of forest land	8
6. Summary of our green projects	9
Appendix – Calculation of climate benefits	12

Preface

In September 2017 Sveaskog issued a new bond under a new green framework. The framework is aligned with the “Green Bond Principles” the aim of which is to promote investment in projects which deliver environmental sustainability. The framework clarifies what the borrowed capital shall be used for, what positive environmental effects are expected and how feedback will be provided.

Norwegian DNV GL has audited Sveaskog's green framework and evaluated Sveaskog's forest production, certification and nature conservation programmes.

The bond has a term of five years. It is issued under the company's MTN programme and consists of two tranches. One tranche comprises SEK 550 million with floating-rate interest at an annual rate of 3-month STIBOR + 0.67% and the other tranche comprises SEK 450 million at an annual rate of 1.10%.

Climate benefits of the growing forest

The global climate agreement COP21 reached by the international community in December 2015 describes forest management as a success factor for preventing the Earth's temperature from increasing by more than two degrees. The forest provides climate benefit in three equally important ways:

- standing timber as a carbon sink,
- carbon dioxide sequestration in the growing forest,
- the substitution effect achieved when fossil resources are replaced by wood raw material.

The forest as a carbon sink has its limitations. There is only room for a certain number of trees in the forest and over time the forest stops growing and carbon dioxide sequestration slows down or stops. On the other hand, active and sustainable forest management means that the forest can be used continuously to bind carbon dioxide and wood raw material can replace fossil resources.

The growing forest takes up carbon dioxide from the atmosphere through photosynthesis where carbon dioxide is converted into carbohydrates that are stored in the tree and in the soil. Therefore most carbon dioxide sequestration takes place in young and middle-aged forests when growth is at its greatest, while growth slows as the forest ages. Through active silvicultural measures carried out at the right time Sveaskog has ensured high growth and thus high carbon dioxide sequestration.

Sveaskog's green bond for one billion kronor

which was issued in September 2017 has financed sustainable forestry and development projects which aim to increase the climate benefit of the forest and wood raw material, reduce energy consumption or use of fossil resources. Status reports are provided on the following pages for the projects to which the bond has been allocated.





Sustainable forest management

Sustainable forest management leads to increased growth and therefore also more carbon dioxide sequestration. In the managed forest there is another factor affecting the carbon balance – harvesting trees. Extracting part of the net growth as wood raw material that can subsequently be used to replace other fossil raw materials creates a substitution effect, i.e. by using wood raw material we avoid fossil carbon dioxide emissions. Sveaskog's current investments in sustainable forest management consist of the following projects:

SILVICULTURE

Planting

For each tree felled on Sveaskog's land, three new ones 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 plants in the ground, carbon dioxide starts to build up again in the forest stand. Sveaskog plants about 40 million new seedlings annually.

Cleaning

Cleaning controls a stand's development so that the best trunks with the highest value are given space for optimal growth. The aim of cleaning is to optimise growth of the trunks that are left standing by removing competing trees, but cleaning also makes the forest more open and therefore more attractive for outdoor activities after a few years. Cleaning is normally carried out once or twice before the stand has reached the age of 30.

Thinning

Thinning further improves the quality of the remaining trees. The aim of thinning is to optimise the proportion of timber, i.e. that part of the wood which can be used later for long-life products such as sawn wood products. Tree trunks harvested during thinning are mainly used as pulpwood but also as sawlogs and for bioenergy.

Sveaskog's total investment in silviculture

in 2017 was SEK 627,284,000 of which SEK 484,954,000 is financed through the Green Bond.

Main environmental benefit: Increased carbon dioxide sequestration.

FERTILISING

Fertilising is an efficient way of increasing growth and thus also carbon dioxide sequestration. Usually a forest stand is fertilised 10–15 years before felling and the increase in growth is estimated at between 10–20 m³ per hectare, which corresponds to an increase in carbon dioxide sequestration of between 10–20 tonnes CO₂ per hectare. In 2017 Sveaskog fertilised a total of 3,009 hectares.

Sveaskog's total investment in fertilising in 2017 was SEK 11,632,000 of which SEK 9,067,000 is financed through the Green Bond.

Main environmental benefit: Increased carbon dioxide sequestration.

REGENERATION FELLING

All forests bind carbon dioxide but with age a tree's growth slows down and thus also its ability to sequester additional carbon dioxide. The managed forest therefore contributes the greatest climate benefit in the long term since the high growth rate is retained. If the substitution benefit which arises for all the products from wood raw material which replace fossil energy and energy-intensive building materials is also taken into account, the climate benefit of the managed forest is enormous.

Every year Sveaskog carries out thinning and regeneration felling on about 40,000 hectares or approximately 1% of our land. During the year Sveaskog harvested a total of 7,860,000 m³ of wood raw material which corresponds to a climate benefit of 4–5 million tonnes CO₂ equivalent in avoided fossil emissions¹.

Sveaskog works actively to avoid negative

¹ Substitution benefit is calculated on the basis of a scientific study where Swedish wood raw material is assessed to have a substitution effect of between 0.5–0.7 tonnes CO₂ equivalent per harvested m³ (Lundmark, T. et al, 2014).

environmental impact when felling and has an environmental goal that 99% of all felling shall be done without any serious impact on conservation or cultural values. All forestry activities take into account consideration for nature which includes edge zones along waterways, retention of high conservation value trees/tree groups and sensitive biotopes. On average 10% of a felled area is left as consideration for nature.

Sveaskog's total investment in regeneration felling in 2017 was SEK 477,524,000 of which SEK 377,220,000 is financed through the Green Bond.

Main environmental benefit: Substitution benefit.

NATURE CONSERVATION

A key part of sustainable forest management is nature conservation work. Sveaskog has developed its own strategy for the design of nature conservation work. We work with several tools at different scales – everything from nature consideration

when felling to set-asides of high conservation value forests and large contiguous landscapes that we call ecoparks. Sveaskog works with both protecting high conservation values and strengthening and recreating conservation values. We do the latter using active nature-conserving silviculture.

Sveaskog has already made its biggest investment in nature conservation by excluding 20% of the area of productive forest land from commercial forestry. During the year measures carried out included controlled conservation burning, restoration of broad-leaved forests and the removal of obstacles to migration in watercourses with the aim of strengthening and recreating conservation values.

Sveaskog's total investment in nature conservation in 2017 was SEK 7,244,000 of which SEK 5,646,000 is financed through the Green Bond.

Main environmental benefit: Strengthened conservation values.



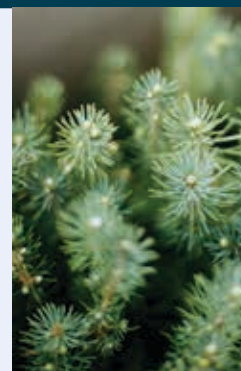
Research and development

Shutterstock by Paolo Toscani

In its development projects, Sveaskog collaborates with other players from universities, forestry, the transport sector, the vehicle fuel sector, etc. Projects are usually multi-year. The total project budget includes all co-financiers' investments while the amount in parentheses relates to Sveaskog's investment in the project.

Somatic embryogenesis

Somatic embryogenesis (SE) is a method for vegetative propagation of the best plant material that comes from breeding. This means being able to be right in the front line of breeding and thus supply the market with the absolutely best forest seedling material far sooner than with traditional mass propagation. It also means that an unlimited number of new embryos can be raised from a single seed. Sveaskog has been involved in the development of SE plants for a number of years and the aim now is to automate the propagation process. Forcing using microplant technology is significantly more environmentally efficient compared with traditional plant breeding since a greenhouse can hold up to six times as many plants, which saves energy.



Total project budget: SEK 16 million (4)*
Sveaskog's total costs in 2017 amounted to SEK 251,000.
Main environmental benefit: Reduced energy consumption.

Higher raw material yield

In collaboration with Stenvalls Trä, Sveaskog is running a project which aims to raise the value of the wood raw material and the sawn wood products. The project is investigating the possibilities of using X-ray equipment in timber sorting and the saw intake to identify the right grades for different products. The more wood raw material that can be turned into sawn wood products, the greater the climate benefit from the wood raw material since sawn wood products have the longest lifetime in society.



Total project budget: SEK 12 million (3)*
Sveaskog's total costs in 2017 amounted to SEK 1,000,000.
Main environmental benefit: Increased climate benefit in the value chain.

* Relates to Sveaskog's share of the total project budget.

Bio vehicle fuel from lignin in black liquor

Sveaskog is running in collaboration with a consortium of researchers, contractors and a vehicle fuel manufacturer, a project aimed at developing technology to extract lignin from pulp mills' black liquor and convert this to raw material for bio vehicle fuel. The project has been running since 2014 and progressed from a laboratory trial to a pilot plant to verify that the technology and product meet the demands of commercial operations. The project is expected to be completed in 2018.

Total project budget: SEK 30 million (7.5)*
Sveaskog's total costs in 2017 amounted to SEK 1,000,000.
Main environmental benefit: Reduced use of fossil vehicle fuels.



Competitive production of wood-fibre based composites

Together with a consortium of players from the entire value chain, from forest owners via pulp mills to end users, Sveaskog is running a project aimed at producing the feedstock for manufacturing biocomposites in a pulp and paper mill. The goal is to achieve a more competitive value chain for biocomposites which permits fossil raw material to be replaced by renewable raw material in a number of products.

Total project budget: SEK 7 million (0.78)*
Sveaskog's total costs in 2017 amounted to SEK 390,000.
Main environmental benefit: Reduced use of fossil raw materials.

SeedPad

SeedPad is potentially a new regeneration method for seeding where a pine seed is placed under a thin hydroponic pad which also contains fertiliser. The method has been developed together with Arevo and Sveaskog has been running field trials in recent years. The trials show good plant growth and survival rate. The hope is that the method can be cost-effective compared with planting pine seedlings and that it will be possible to mechanise placement in conjunction with soil scarification. Regeneration seeding is significantly more energy efficient than planting since seedlings must be initially forced in a greenhouse.

Total project budget for field trials: SEK 2.5 million (2.5)*
Sveaskog's total costs in 2017 amounted to SEK 417,000.
Main environmental benefit: Reduced energy consumption.



* Relates to Sveaskog's share of the total project budget.

Bigger and longer vehicles

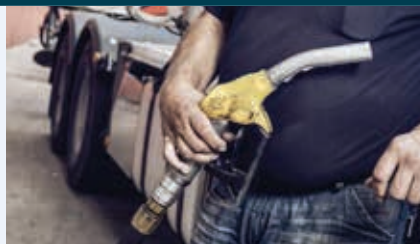
Forestry is transport-intensive. Sveaskog therefore participates in projects to enable larger and longer vehicles, partly to reduce transport costs, partly to reduce fuel consumption and thus carbon dioxide emissions. One such project is the ST project (Bigger Piles) for HGVs with a greater load capacity so that the gross weight can be up to 74 tonnes compared with the traditional 60–64-tonne vehicles. An ETT vehicle (One More Pile) can increase the gross weight to 90 tonnes. Evaluation is under way in Sveaskog's operations of three such vehicles. Studies show that the reduction in fuel consumption and thus also carbon dioxide emissions is between 8–14% compared with conventional HGVs. A reduction in fuel consumption of that order corresponds to an annual reduction of carbon dioxide emissions of 6,000–10,000 tonnes for Sveaskog.



Total project budget for trial vehicles: SEK 3 million (3)*
 Sveaskog's total costs in 2017 amounted to SEK 377,000.
 Main environmental benefit: Reduced use of fossil vehicle fuels.

Bio4Gasification

Sveaskog cooperates with the Swedish Gasification Centre (SFC) in the project Bio4Gasification which aims to extract bio vehicle fuel directly from wood raw material. SFC is a research centre where nine academic stakeholders cooperate with industry in a number of projects. This project runs for four years and Sveaskog's annual contribution is SEK 200,000. A successful project will provide possibilities for a significant reduction of fossil CO₂ emissions through replacement of fossil vehicle fuel.



Total project budget: SEK 31.6 million (0.8)*
 Sveaskog's total costs in 2017 amounted to SEK 200,000.
 Main environmental benefit: Reduced use of fossil vehicle fuels.

Flowcut

Sveaskog is running together with researchers, forest companies and contractors the Flowcut project which aims to develop technology which will make it profitable to make use of biomass from the felling of small-dimension trees. The goal is profitable thinning in dense neglected stands and a successful project will mean that we can make use of part of the biomass that is otherwise cleared and left in the forest. This increases the availability of biofuel that can be used to replace fossil resources.



Total project budget: SEK 2.25 million (0.3)*
 Sveaskog's total costs in 2017 amounted to SEK 100,000.
 Main environmental benefit: Reduced use of fossil resources.

* Relates to Sveaskog's share of the total project budget.



Acquisition of forest land

Shutterstock by Poyker

Sveaskog is Sweden's largest forest owner with over 4 million hectares of forest land (2017). All our forest land is certified according to the Swedish forest certification FSC®. In this way we contribute to the promotion of sustainable forestry worldwide. FSC is a voluntary international system and is the only forest certification that enjoys the broad support of the environmental movement worldwide. FSC certified forest management provides economic returns but also takes into account conservation values and social conditions. Biodiversity, environments with high ecological values and cultural remains are protected. Employees are offered contractual and safe working conditions. The Sami and general public are given the possibility of insight and influence. Special consideration is taken with forest management activities that affect Sami cultural sites, reindeer herding areas or important recreation areas.

Sveaskog continually acquires new forest land which is then always FSC certified. In this way sustainable cultivation of the forest and forest land is assured. The acquired forest land is also included in Sveaskog's environmental goal 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 acquisitions and refinance loans for previous acquisitions. During 2017 Sveaskog acquired a total of 2,063 hectares for the sum of SEK 118 million.

Sveaskog's total costs for acquisition of forest land in 2017 amounted to SEK 118 million of which SEK 118 million was financed through the green bond.

Main environmental benefit: Assuring sustainable forest management.

Summary of Sveaskog's green projects

Presentation of our green projects. Allocation of proceeds from the green bond has been checked by Sveaskog's Green Bond Committee and is reported in the Annual Report.

Market Area North

Project name	Project category according to framework	Total investment (SEK thousands)	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	261,215	203,635	78%	Carbon dioxide sequestration of 3,456,000 tonnes and a substitution benefit of 1,234,000 tonnes in fossil carbon dioxide emissions avoided
Fertilising	Environmentally sustainable forestry	2,670	2,081	78%	
Regeneration felling	Environmentally sustainable forestry	225,052	175,443	78%	
Nature conservation	Environmentally sustainable forestry	3,220	2,510	78%	

Market Area Central

Project name	Project category according to framework	Total investment (SEK thousands)	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	236,111	184,064	78%	Carbon dioxide sequestration of 556,000,000 tonnes and a substitution benefit of 1,271,000 tonnes in fossil carbon dioxide emissions avoided
Fertilising	Environmentally sustainable forestry	6,306	4,916	78%	
Regeneration felling	Environmentally sustainable forestry	179,302	139,778	78%	
Nature conservation	Environmentally sustainable forestry	1,797	1,401	78%	

Market Area South

Project name	Project category according to framework	Total investment (SEK thousands)	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	129,959	101,311	78%	Carbon dioxide sequestration of 521,000 tonnes and a substitution benefit of 558,000 tonnes in fossil carbon dioxide emissions avoided
Fertilising	Environmentally sustainable forestry	2,656	2,071	78%	
Regeneration felling	Environmentally sustainable forestry	73,170	57,041	78%	
Nature conservation	Environmentally sustainable forestry	2,227	1,736	78%	

Whole of Sveaskog

Project name	Project category according to framework	Total investment (SEK thousands)	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
Silviculture	Environmentally sustainable forestry	627,284	489,010	78%	Carbon dioxide sequestration of 4,533,000 tonnes and a substitution benefit of 3,064,000 tonnes in fossil carbon dioxide emissions avoided
Fertilising	Environmentally sustainable forestry	11,632	9,068	78%	
Regeneration felling	Environmentally sustainable forestry	477,524	372,262	78%	
Nature conservation	Environmentally sustainable forestry	7,244	5,647	78%	

Research and development

Project name	Project category according to framework	Total investment (SEK thousands)/of which Sveaskog's share	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
Somatic embryogenesis	Research and development	16,000/4,000	2,251	14%	Reduced energy consumption
Higher raw material yield	Research and development	12,000/3,000	1,000	8%	Increased climate benefit in the value chain
Bio vehicle fuel from lignin in black liquor	Research and development	30,000/7,500	1,000	3%	Reduced use of fossil vehicle fuels
Competitive production of wood-fibre based composites	Research and development	7,000/780	390	6%	Reduced use of fossil raw materials
SeedPad	Research and development	2,500/2,500	417	17%	Reduced energy consumption
Bigger and longer vehicles	Research and development	3,000/3,000	377	6%	Reduced use of fossil vehicle fuels
Bio4Gasification	Research and development	31,600/800	200	1%	Reduced use of fossil vehicle fuels
Flowcut	Research and development	2,250/300	100	4%	Reduced use of fossil raw materials

Acquisition of property

Project name	Project category according to framework	Total investment (SEK thousands)	Total costs incurred (SEK thousands) allocated to the green bond at 31 December 2017	Share of the project financed by the green bond (%) at 31 December 2017	Most significant measurable environmental impact as a result of financing
MA North	Acquisition of forest land	1,025	1,025	100%	FSC® certification of 108 hectares of forest land
MA Central	Acquisition of forest land	52,876	52,876	100%	FSC® certification of 1,164 hectares of forest land
MA South	Acquisition of forest land	64,377	64,377	100%	FSC® certification of 791 hectares of forest land

TOTAL

SEK 1,000,000 thousand

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

Stockholm, 8 March 2018

Per Matses
Chairman

Anders Jakobsson

Olof Johansson

Anders Nilsson

Tommy Nilsson

Jessica Nordin

Lena Sammeli-Johansson

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, trees that are too old to maintain a high net increase in biomass are felled and there is less accumulation of dead wood since the forest is cleaned and thinned. Active silvicultural measures give high growth and thus carbon storage and climate benefits are also high. 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, allows a substitution benefit achieved by the harvested biomass to be calculated. Through the use of forest products the carbon sink is moved from the forest into society which is also a climate benefit. It is therefore difficult to calculate the climate benefits from changes in inventory of forest products. To do this requires data on which products are made and their life span.

In reporting climate benefits from Sveaskog's forests and forest management, only climate benefits such as increase in timber stocks and substitution benefits are taken into account. Since Sveaskog only felled 65% of annual growth, the carbon stored in the standing timber increased. Carbon storage in the ground or wood products has 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:

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

Calculations of substitution benefit are based on various scientific studies. Taking Sweden as a whole, previous calculations have shown that an average value for the substitution effect is around 500 kg in avoided carbon dioxide emissions per harvested cubic metre. It is this figure which is used in calculating the substitution benefit of timber extraction from Sveaskog's lands. The figure is based on a study of the Swedish forest sector using data from 1990–2005 (Lundmark, et al. 2014). Considering the forest sector and forest industry have become considerably more energy efficient and that the application of raw material has partly changed (among other things a lot of raw material is supplied to the bio vehicle fuel industry

nowadays), the substitution effect is probably underestimated.

In 2017 the timber stocks on Sveaskog's entire land holdings increased by 4.1 million m³fo which corresponds to carbon dioxide emissions of 5.8 million tonnes. At the same time timber extraction was 7.9 million m³fo which provided a substitution benefit of 4 million tonnes in avoided fossil carbon dioxide emissions. The bond has financed 78% of the forest management activities reported as green projects within the framework of environmentally sustainable forestry. Therefore 78% of carbon dioxide sequestration as well as substitution effects is reported as a result of the financing.

SVEASKOG AB

Company registration number 556558-0031

Head office

SE-105 22 Stockholm

Tel +46 771 787 000

Visitors: Torsgatan 4, Stockholm

e-mail info@sveaskog.se

www.sveaskog.se



facebook.com/sveaskog



twitter.com/sveaskog



vimeo.com/sveaskog



youtube.com, search word "sveaskog"