

ShortCuts

FROM SKOGFORSK. NO 2 | 2014 | RESEARCH FOR TOMORROW'S FORESTRY

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SKOGFORSK'S
INCOMING CEO

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TIMBER RIG SAVES
SEK 80 000 A YEAR

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MORE ACCURATE
MEASUREMENT

MARIA NORDSTRÖM

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A WIN-WIN SITUATION

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Charlotte Bengtsson takes over the position of CEO on 1 January 2015.

MEET SKOGFORSK'S NEW CEO

Charlotte Bengtsson has been appointed new CEO of Skogforsk. Currently head of department at SP Wood Technology, she has broad experience of management and research in forestry and the built environment.

"I'm very proud and pleased to be given this opportunity to lead Skogforsk. The forestry industry and Skogforsk are playing an important role in the transition to a bio-based society, and I'm really looking forward to leading the organisation in a direction that will take full advantage of the new opportunities that we know lie ahead," says Charlotte Bengtsson.

She will be taking over at a time when Swedish forestry is facing major challenges, but where there are also great opportunities. Productivity improvements have stagnated, the expected climate change is making new demands, and forestry must satisfy ever-increasing social values. Skogforsk has an important function in contributing new knowledge, services and products that will enable Swedish forestry to adapt to the new conditions.

"The interdisciplinary approach, my contact network, my expertise, and my experience in the sector are what I will be bringing to Skogforsk," she says.

Charlotte Bengtsson takes over the position of CEO on 1 January 2015.

NEW INTEREST IN ALDER

In the wake of ash dieback, alder is attracting a lot of interest as an interesting alternative to the ash on nutrient-rich, damp ground. It is relatively insensitive to damage by wild animals, and the wood is in demand. Furthermore, new results make it possible to genetically improve the reproductive material.

"The alder grows well," says Lars-Göran Stener, plant breeder at Skogforsk. "It can produce up to 9 m³ fub/ha a year during a 35-year rotation period. It is less susceptible to damage by wild animals than most other deciduous trees in Sweden, and also improves the soil through its ability to bind nitrogen from the air."

Today, alder wood is primarily used in the furniture industry, but packaging, energy wood and pulp wood are other areas of use. There may also be market potential for alder as a replacement for rare tropical woods.

But there is even greater

growth potential in the alder family. Skogforsk is now testing hybrid alders, a cross between the North American red alder and the Swedish alder. The hybrid combines the good growth of the red alder with the high quality and hardiness of the Swedish alder.

"In our tests, the hybrid alder has, on average, grown much better than the alder, but its stem quality and survival rates are not as good," says Lars-Göran Stener. "But there are examples of cross-bred families with up to 40 percent greater diameter growth than average for the tes-



PHOTO: LARS RYTTER, SKOGFORSK

Genetically improved alder can replace the diseased ash on better soils.

ted hybrid alders, and they also have acceptable survival rates and stem quality."

Skogforsk has also started a project to genetically improve grey alder, which could be an alternative tree species for energy production. It is well-adapted to the climate and grows considerably better than willow and poplar on typical forest soils.

CONTACT: Lars-Göran Stener
Tel: +46 (0)418-471303
lars-goran.stener@skogforsk.se
READ MORE: skogforsk.se/kunskap



PHOTO: SVERKER JOHANSSON/BITZER

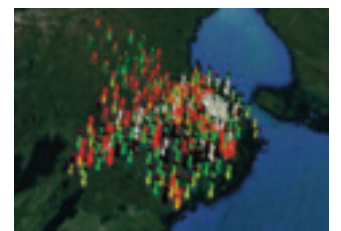
EXCHANGING FUEL VOLUMES IMPROVES EFFICIENCY OF CHIP TRANSPORTS

In Mälardalen, efficiency of chip transport could be improved by approximately 12-15 percent if the hauliers were to collaborate on transport and exchange biofuel volumes with each other.

This is shown in a Skogforsk study involving 42 heating plants and 4 500 landings. The project only examined the potential in straightforward exchange, which reduces the transport distances for both parties. The results correspond with previous analyses of exchanges of

roundwood between different hauliers, where average transport distance could be reduced by approximately 18 percent.

Optimisation solutions that examine the total flow in a region do not favour small transport customers with smaller volumes and fewer transports. As the gains from improving efficiency are so substantial, this can be managed for example by profit sharing between the companies.



Shall we swap? Transport collaboration on 4 500 landings in these areas reduced costs by 12-15 percent.

CONTACT: Petrus Jönsson
Tel: +46 (0)18-188573
petrus.jonsson@skogforsk.se

GENETIC MANAGEMENT OF DECIDUOUS TREES PROVIDES NEW OPTIONS

Normally, genetic adaptation involves the most suitable trees being retained to form the next generation of stands. But there are many indications that climate change will be faster than the deciduous trees' natural ability to adapt to the new conditions.

“This is because it takes a long time for a tree to develop from a small plant to a mature tree. In addition, the seeds are not spread sufficiently far for the tree to extend its range at the same rate as climate change,” says Lars-Göran Stener, researcher at Skogforsk.

In order to secure climate adaptation, Skogforsk has developed a strategy for managing the genetic resources of deciduous trees, and actively adapt forthcoming generations of deciduous trees to a different climate.

The method involves

gathering seeds from a large number of Swedish deciduous trees in their current geographical range and growing them. The new plants are then planted in gene resource stands, which contain great genetic variation and are managed in such a way to quickly develop new trees that are adapted to a future climate.

“For coniferous trees, this strategy is already integrated in the routine tree plant breeding that Skogforsk carries out on behalf of the forestry sector. But now it's important that Sweden agrees on a long-term strategy that also applies to deciduous

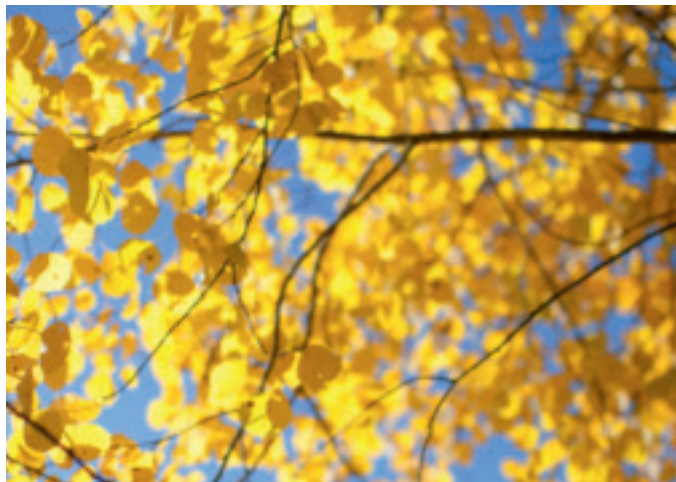


PHOTO: SVERKER JOHANSSON/BITZER

Swedish deciduous trees will be adapted to climate change.

trees, so that various measures have the best effect and that we increase options for future forestry,” Lars-Göran Stener.

The report “Förvaltning av lövträdens genurs” (“Management of the genetic resource of

deciduous trees”) is available in Swedish at skogforsk.se/kunskap.

CONTACT: Lars-Göran Stener
lars-goran.stener@skogforsk.se

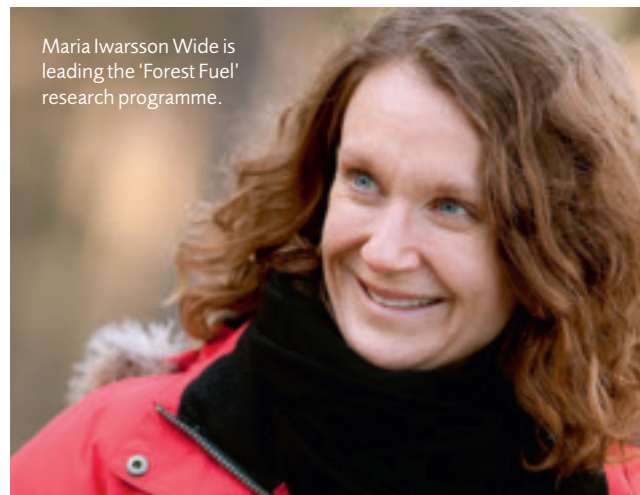


Here they are. Profitable volumes of forest fuel are located using laser scanning.

LOCATE PROFITABLE FOREST FUEL

Remote sensing will enable the forestry sector to more easily locate sites for profitable energy wood extraction in young stands of small trees and along roads, and show their exact location.

“Because the machine costs are



Maria Iwarsson Wide is leading the 'Forest Fuel' research programme.

PHOTO: SVEN TEGELMO, SKOGFORSK

high, and felling small trees is expensive, the method can be used to direct logging operations to areas that are probably profitable,” says Mia Iwarsson Wide of Skogforsk. Together with the Swedish University of

Agricultural Sciences, Skogforsk has studied the possibility of using data from the Lantmäteriet national laser scanning model, NNH, in combination with a spreadsheet tool to identify potentially profitable areas.

Large quantities of biofuel in young forests

Young forests are a great potential source of bioenergy. Sweden has large areas of very dense young forests with small-dimension trees that need thinning, but only some of the wood can be extracted as pulp wood. Calculations show that the potential harvest of forest fuel in thinning of small-dimension trees with technical and economic restrictions lies between 5 and 7 TWh per year.

Small trees on roadsides are also a relatively unutilised resource for forest fuel. In Sweden today, there are approximately 213 000 km of forest roads, i.e. roads without state funding, and the energy potential along these roads is estimated to be approximately 2 TWh per year.

CONTACT: Mia Iwarsson Wide
Tel: +46 (0)18-188599,
mia.iwarssonwide@skogforsk.se
READ MORE: skogforsk.se/kunskap

Harvester technology for measuring length and diameter of logs is largely the same as that used in the 1980s. Although the system for quality assurance has made measurements more reliable, there is still great potential for improvement.

Text: MATS HANNERZ & SVERKER JOHANSSON | Photo: SVERKER JOHANSSON

3 STEPS TO MORE ACCURATE MEASUREMENT

1 MEASUREMENT

For the past year, Skogforsk has been monitoring a number of quality-assured harvesters in southern Sweden, from which data has been regularly collected with the help of VMF Syd, the Timber Measurement Association of Southern Sweden. Within the harvester group, there is of course a range in the measurement results, but it can be seen that the absolute best maintain a very high level of accurate measurement over time. By learning from the best, the aim is to help the entire harvester fleet.

“The aim is to find out how, for example, machine settings and the operator’s technique affect the harvester measurement. But so far we’ve not been able to find any simple associations,” says Maria Nordström.

“This is probably because there are so many different factors that affect measurement, such as the appearance of the forest, the condition of the measuring equipment, the ability of the operator to follow the stem with the harvester head, machine settings and climate factors. But for individual harvesters, we have been able to identify probable causes of errors in measurement. Right now, we’re working on correcting the identified faults

and monitoring how the measurement is improved.”

Measuring a log can seem to be a simple process, but it is not. The operator must be meticulous and consistent. The calliper measurement is often not carried out correctly, or the diameter may be measured over knot bulges, yet the calliper measurement is the basis for following up the machine’s measurement and for collecting data for calibration. This requires training and greater understanding of the importance of good measurement. The key persons are the auditors in the quality assurance system, who meet and train many harvester operators.



Together with Heurgren Film AB, Skogforsk has produced the instruction film ‘Håll måttet!’ to improve diameter measurement. You can order it from skogforsk.se.

2 OPERATOR SUPPORT

Here, the harvester computer will soon show the current state of the measurement, and give a warning in the event of any anomaly. The software will be able to differentiate between mechanical faults and a need for calibration, and make it easier to see the associations between machine settings and measurement results.

“We hope to be able to identify which key figures serve as indicators of how the system is measuring. There’s a lot of very interesting data that the machine’s control system already logs, and this can be used in combination with manual control measurements. Closer collaboration with manufacturers of machines and measurement systems is now important in order to implement the results in practical application. Whenever we’ve met and discussed these issues, there’s been a lot of interest,” Maria Nordström is pleased to report.

3 ATTITUDE

“At the end of the day, good measurement is a matter of attitudes in companies and individuals. And more knowledge and understanding increases interest. Not until then will there be real chances to succeed,” says Maria Nordström.



Skogforsk’s Maria Nordström is working on developing harvester measurement and quality assurance.

“

At the end of the day, good measurement is a matter of attitudes in companies and individuals.

COACHING & CONTROL

During the visit, Jonas Hemmingsson audits the measurement in Magnus Forsberg's harvester. Jonas measures the sample logs that Magnus has put to one side. Magnus also measures the same logs. This is done to ensure that he is measuring the logs accurately. The calliper can easily be out by a millimetre or so, and so Jonas checks against a template.

“A calliper shouldn't be sold without a template,” he says.

Calliper measurement must improve

It is also about measuring in the right way. Using a calliper to measure diameter is an art, and it is important not to measure across knot bulges. Machine operators sometimes measure systematically incorrectly, so that the harvester receives a signal to reset the measurement equipment, even though it is measuring perfectly. A couple of years ago, Skogforsk carried out a survey of common problems in calibration of the harvester's measurement system. This identified errors in calliper measurement as a major and common problem in forestry.

No problems

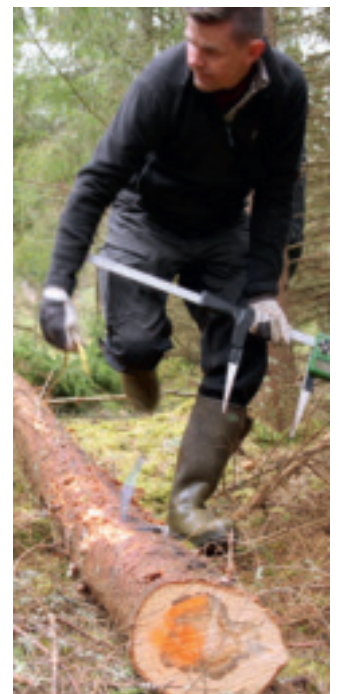
Magnus's measurements are excellent, and Jonas can record an approved field test. When the measurements are compared with those of the harvester, 90 percent of the logs are shown to lie within the length specification of +/- 2 cm, and 70 percent within the diameter specification of +/- 4 mm. Approved with merit.

“Your measurements of length are really good,” compliments Jonas Hemmingsson.

During the audit visit, he also has a dialogue with the contractor. And if anything is wrong in the measurement equipment, it can be corrected directly in the machine.

Feedback every other week

Twice a month, Jonas also sends feedback to Magnus about the data sent from his harvester to SDC. The continual follow-up is the basis for detecting deviations and for adjusting the system if necessary. In a joint review of the past months' data, both Jonas and Magnus observe that there was a slight dip in the number of approved logs in February, even though the level was still acceptable. Rapid temperature changes during the late winter were probably the cause.



DEVELOPMENT WITH GREAT POTENTIAL FOR PROFIT

The project, Quality-assured Harvester Measurement, started in 2002. Skogforsk has been the hub, and has collaborated with the forestry sector, machine manufacturers, SDC (forestry IT companies) and VMF (Timber Measurement Association) to develop the system. An evaluation now shows that the initiative has great potential for generating profit.

Text & photo MATS HANNERZ

In brief, harvesters that undergo control measurement reduce the proportion of logs with delivery errors from eight percent to 4-5.5 percent. The proportion of logs that must be shortened (cut because they are not the correct length) is also reduced.

The potential profit after pre-sawing was then estimated at SEK 120 million for the 31 mil-

lion cubic metres of timber reported in 2011. If we examine how much Skogforsk benefits the forestry sector, it can be observed that the annual profit is of the same order as Skogforsk's annual budget.

Calculated over a five-year period, 2010-2014, with gradual introduction of quality assurance of the

harvesters (see table), the current value of the potential profit after deduction for R&D and running costs is estimated to be SEK 657 million.

The running costs (SEK 0.71/m³sub) comprise internal checks, audit costs, training and system management. The overall R&D investment for the project (research and implementation) was estimated to be SEK 11 million (calculated on current value), of which Skogforsk's share was approximately SEK 1 million.

The investment calculation indicates an internal rate of return

of 98 percent and a payback period of four weeks!

Most harvesters report internal checks to SDC, but so far only 25 percent of the timber volume is produced by quality-assured harvesters. Much of the potential, perhaps SEK 0.5 billion over a five-year period, is still waiting to be realised.

CONTACT: Lars Wilhelmsson, Skogforsk
Tel: +46 (0)18-18 85 00
lars.wilhelmsson@skogforsk.se
READ MORE: Skogforss Redogörelse no. 1/2012.

In the next edition of VISION, we will be describing other profitable research initiatives.



Implementation of quality-assured harvester measurement			
Year	No. of quality-assured harvesters	No. of reporting harvesters	Total
2010	60	940	1 000
2011	120	880	1 000
2012	240	860	1 000
2013	480	720	1 200
2014	700	500	1 200

Profit by harvester category, 2011			
Harvester category	Volume million m ³ sub	Profit SEK/m ³ sub	Total profit SEK million
Certified/quality-assured harvesters	5	5.5	29.6
Reporting harvesters	26	3.4	90.4
Total	31		119.9

The forecast on which the calculation was based. However, to date, only 220 harvesters have been quality assured – not 700 – so implementation is slower than expected.

MORE ATTRACTIVE BUSINESS PARTNER

ATA Timber's main product is wood for construction. It is a bulk market where, under the prevailing construction standards, a couple of lengths are most in demand in the 22-26 cm saw class. And the dimensions must be accurate.

"It's vitally important for customers that measurements are correct, so our quality assurance

makes us a more attractive business partner," says Roger Tagesson, CEO and Sales Manager of ATA Timber. "Our deliveries are more precise and it also often leads to the customers buying other products from us."

Can the improved delivery quality affect the price?

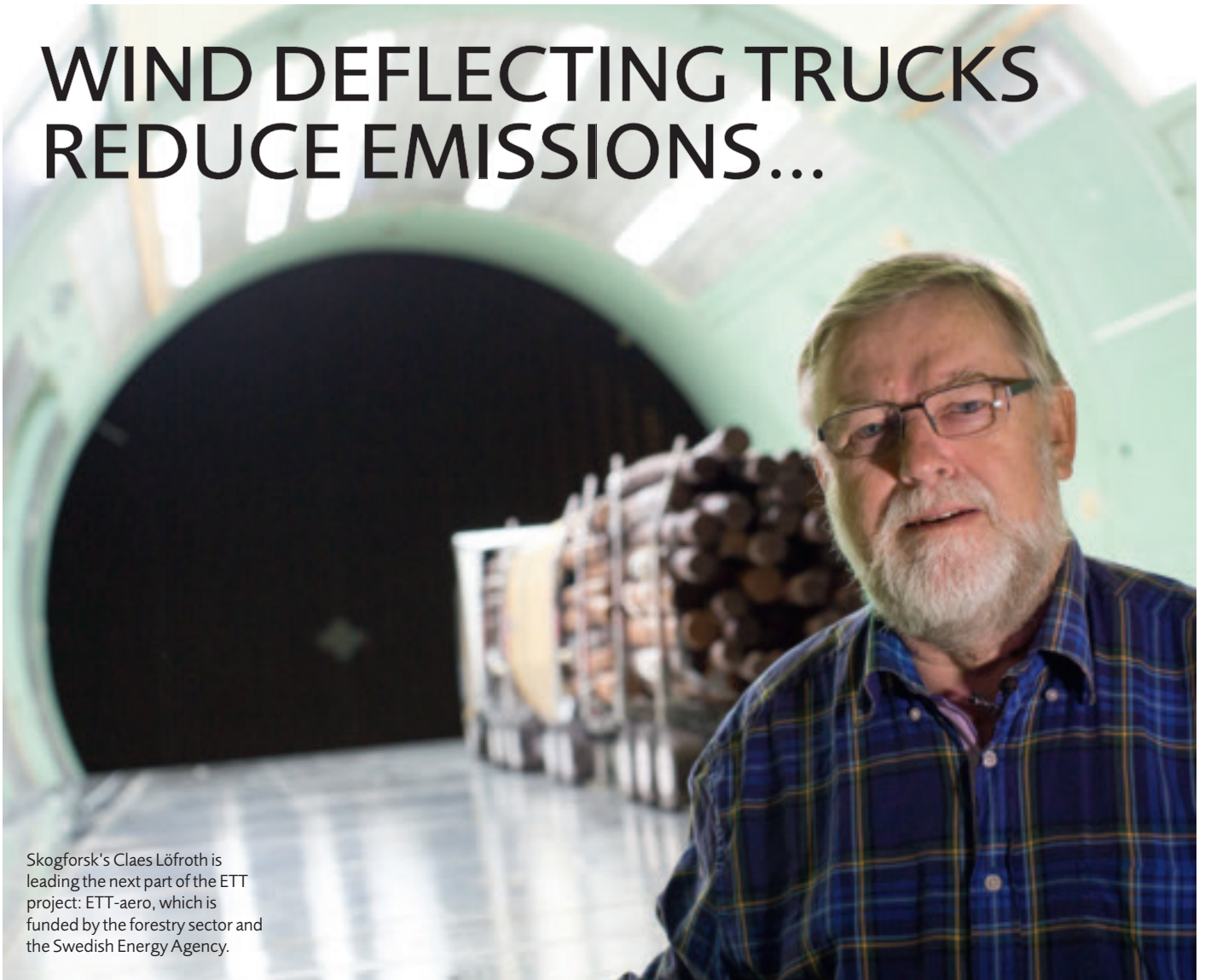
"No, not really. We have to stick

to two prices: purchase price and selling price. If we were one of few players on the market, we would be able to set special prices for such good quality, but in a market where so many players compete by lowering prices and offering large volumes, the quality aspect is more about continuing to be an attractive supplier."



"Gives satisfied customers and sales of other products." Roger Tagesson at ATA is dependent on quality-assured harvesters.

WIND DEFLECTING TRUCKS REDUCE EMISSIONS...



Skogforsk's Claes Löfroth is leading the next part of the ETT project: ETT-aero, which is funded by the forestry sector and the Swedish Energy Agency.

...AND SAVES THE HAULIER SEK 80 000/YEAR

In the future, angular rigs will disappear from our roads. Fuel consumption drops considerably when the entire truck is given an aerodynamic shape. This has been shown in a wind tunnel study carried out by Skogforsk and Linköping University.

Text & photo: SVERKER JOHANSSON

"This is a pioneer study in which we discovered wind eddies between cab and load, between truck and trailer, between stacks, and behind the vehicle," explains Claes Löfroth, transport researcher at Skogforsk.

"We then tested various types of wind-deflecting shields on the

vehicles, both on timber trucks and chip trucks. The results are very promising – we think fuel consumption can be reduced by at least 7-8 percent."

Does this also apply when a vehicle is driven unloaded?

"Yes, but this requires a special

solution – stakes that can be lowered. When the stakes are folded down, just as much fuel is saved when the truck is driven unloaded."

What do the figures show?

"We've calculated with an investment cost of approximately SEK 200 000 for an extended spoiler on the cab and shields between the stacks, and assume a weight increase of approximately 200 kg that reduces the payload. Despite this, the haulier will save SEK 80 000 a year through lower fuel costs."

Good for the entire sector

As in the ETT project, where

Skogforsk together with the Swedish Transport Administration showed that introducing larger trucks of 74–90 tonnes can reduce emissions by between 10 and 20 percent, it is not just the forestry sector that is affected – it applies to the entire transport sector.

Aerodynamically-shaped trucks have tremendous potential to further reduce emissions from heavy traffic in Sweden, which every year transports 280 million tonnes of goods and emits approximately 4.3 million tonnes of CO₂.

B



The wind flows through the timber load and forms eddies that slow the vehicle. The vehicle model is standing on a scale in the tunnel, where wind resistance is measured.



A prototype for the future. With this equipment, fuel consumption is reduced by 7-8 percent.

► Aerodynamic shape on aircraft, ships, trains and cars has been standard for a long time. In the US, for example, vehicles are often equipped with ‘ducktails’, a wind-deflecting rear spoiler. The market requires this.

“But it doesn’t apply to heavy lorries here in Europe,” says Johan Mårtensson of Sjölander & Thyselius, which owns the wind tunnel outside Bromma and has extensive experience of aerodynamics in, particularly, the air sector.

“Fuel has been too cheap. And it’s also a matter of conservatism; by tradition, truck manufacturers have left everything behind the cab to the body builders. And most of them don’t know about this yet.”

Expects greater demand

“Nevertheless, the potential appears to be great – perhaps particularly when it comes to trucks, which have large engines and may be driven 400 000 km a year. But as environmental requirements become more stringent and fuel prices increase, so the market will be demanding new solutions. I think, for example, that haulier interest will grow quickly when they see these figures.”

Practical tests

After the wind tunnel experiments, practical tests will be carried out together with hauliers, body builders and the truck manufacturer Scania. Claes Löf-roth explains more:

“In combination with the ETT rigs, this has fantastic potential, and is a cherry ripe for picking.”

“We have access to several hauliers that have volunteered to assist with the tests. They strongly believe in this smarter shape for trucks, preferably in combination with the higher gross weights of 74-90 tonnes. Skilled body builders – Maskin & Truck in Eksjö who work with chip trucks, the trailer manufacturer Parator and, of course, Exte, who make bunks and stakes – are also involved in the

project and form an exciting technology cluster.”

So you think implementation will be quite rapid?

“Yes, in the ETT project, the sector has shown it is working hard for change. So I’m hoping for the same interest in these solutions. In combination with the ETT rigs, this has fantastic potential, and is a cherry ripe for picking.”



SKOGFORSK

UPPSALA (Head Office) Uppsala Science Park, SE-751 83 Uppsala, Sweden Phone: +46 18 188500

EKEBO Ekebo 2250, SE-268 90 Svalöv, Sweden Phone: +46 418 471300

UMEÅ P.O. Box 3, SE-918 21 Sävar, Sweden. Phone: +46 90 2033350 www.skogforsk.se

RESEARCH PROGRAMMES

FOREST OPERATIONS & PRODUCTS
Rolf Björheden
rolf.bjorheden@skogforsk.se
ph. +46 18 188509

OPERATIONAL PLANNING & LOGISTICS
Gert Andersson
gert.andersson@skogforsk.se
ph. +46 18 188567

FOREST ENERGY
Mia Iwarsson-Wide
maria.iwarssonwide@skogforsk.se
ph. +46 18 188599

SILVICULTURE & ENVIRONMENT
Isabelle Bergkvist
isabelle.bergkvist@skogforsk.se
ph. +46 18 188595

TREE IMPROVEMENT NORTH
Bengt Andersson
bengt.andersson@skogforsk.se
ph. +46 90 203 3358

TREE IMPROVEMENT SOUTH
Bo Karlsson
bo.karlsson@skogforsk.se
ph. +46 418 471305