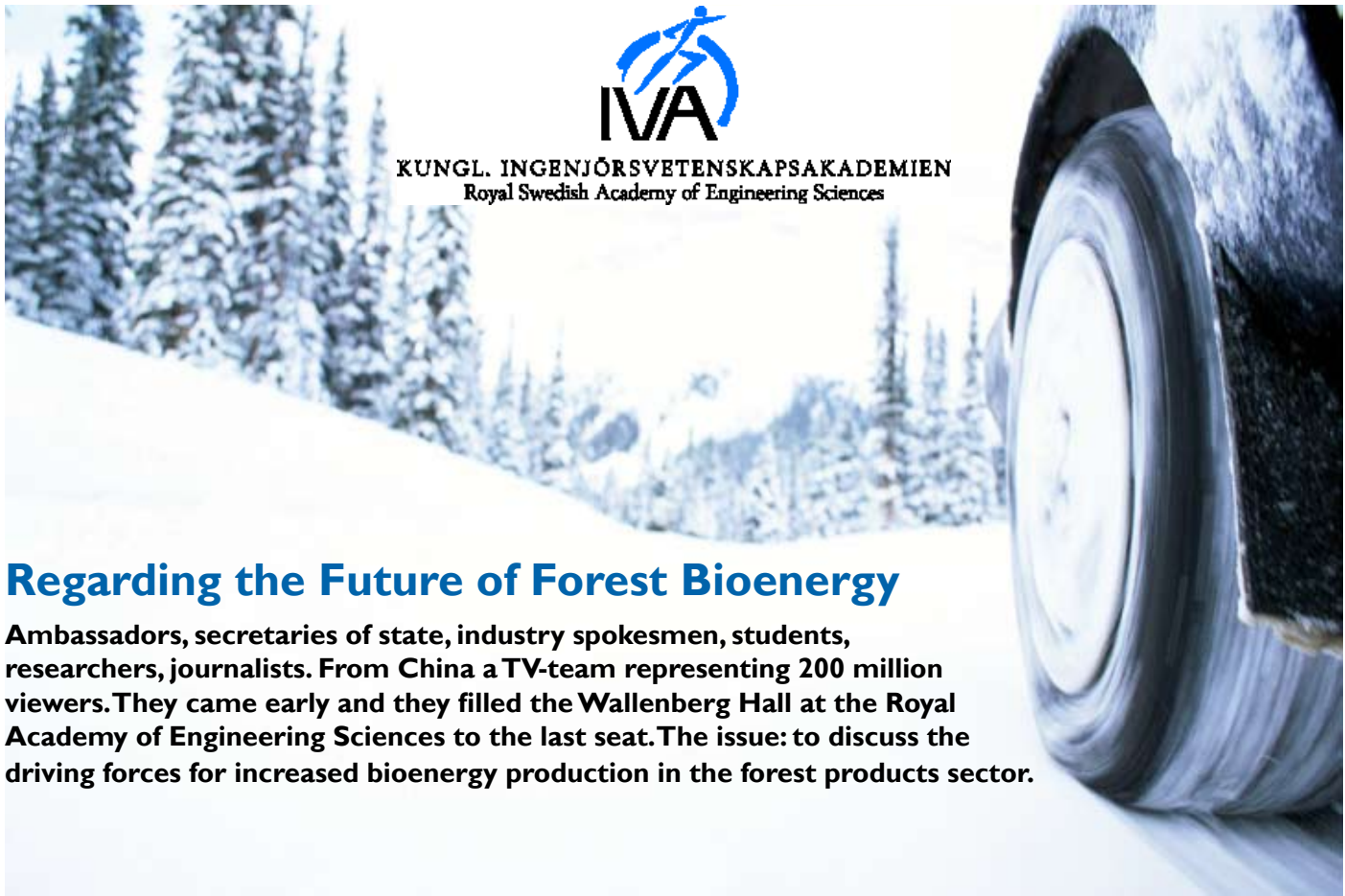




KUNGL. INGENJÖRSVETENSKAPSAKADEMIEN  
Royal Swedish Academy of Engineering Sciences



## Regarding the Future of Forest Bioenergy

**Ambassadors, secretaries of state, industry spokesmen, students, researchers, journalists. From China a TV-team representing 200 million viewers. They came early and they filled the Wallenberg Hall at the Royal Academy of Engineering Sciences to the last seat. The issue: to discuss the driving forces for increased bioenergy production in the forest products sector.**

**The president of the academy, professor Lena Treschow Torell, welcomed everybody to a symposium that was put together to give a global view of the bioenergy potential from technical, economical and political perspectives. And to the discussion on the potential need for structural changes and development of the Swedish forest industry to meet the energy sector's requirements.**

**Opening speaker Michael Wood, the US Stockholm Ambassador** since last summer, told the audience that he and President Bush decided, already in July, that the new Ambassador's main focus would be on strengthening the cooperation between Sweden and US concerning alternative energy technologies.

– I didn't know then, that the tipping point would be

reached so quickly; with the issue of global warming becoming as important as it did this fall, he said.

### **Bush and Wood fund Swedish forest R&D**

However, he and the President had agreed that Sweden has a unique advantage, with a lot of know-how, advanced research and development, infrastructure, high international ranking, a government that sets the standards right. And a high level of concern among its' citizens for the worlds number one problem in the world.

– I visited Göteborg and saw the biogas production from the water treatment plant. Where methane is produced that gives the town electricity. This shows that cooperation makes sense.



Michael M. Wood, The US Ambassador in Stockholm, discussing environmental questions with Ola Alterå, the Swedish State Secretary to the Minister for Enterprise and Energy.



Lena Treschow Torell, the president of the Royal Swedish Academy of Engineering Sciences, IVA, presented the academy in an interview by a Chinese TV-team.

– To us that made Sweden to a logical partner. I travel the country to experience and learn as much as I can. Last month I went to Örnsköldsvik and learned about the problems they have with the greasy lignines in the production of ethanol from wood chips. This has to be solved so I called Washington and now the Department of Energy will supply with research funds.

The Swedish Minister for Enterprise and Energy, Maud Olofsson and the Ambassador both participated in the press conference given at the site in Örnsköldsvik. It's said that she claimed there, not to have written but at least to have inspired President Bush's latest State of the Union Speech.

– I was disappointed of the outcome of that speech. The president created a \$70 million market, just by setting new goals for the nation. He wants to reduce the use of gasoline by 20 percent in ten years. This made many people surprised. Even the US gets it on global warming.

– I and the country I represent want to be your partners, contribute with capital resources and science collaboration and exchange. And I want my office to be the where all the connections take place, said Michael Wood, the Ambassador of the United States in Stockholm.

<http://stockholm.usembassy.gov/newsflash/pr22sep06.html>  
<http://stockholm.usembassy.gov/Environment/index.html>

### Heavy competition from Brazil

Sweden may well be in the forefront when it comes to environmental technologies and R&D on alternative energy. And from a European perspective we are in good shape when it comes to using renewables. **Sven Kullander, the Chairman of the Energy Committee of the Royal Academy of Sciences, KVA**, said that the target for share of renewables by 2010 in EU is 12 percent. And Sweden already has a share of 27 percent, where biomass stands for 17 percent and hydro for 10 percent. Corresponding numbers for EU-25



*Sven Kullander, the Chairman of the Energy Committee of the Royal Academy of Sciences, KVA, pointing out our energy consumption now and in the future.*

are 4 percent biomass and 1.5 percent hydro.

He also mentions the breakthrough made by researchers at Umeå Science Plant Center. Professor Ove Nilsson and his group in 2005 found the florigen, the gene that controls blooming. This research has made it possible to manipulate certain tree plants to bloom when they are only a month old as compared to when they are 15 years old.

But when it comes to production of biomass and products based on biomass, the competition from Brazil is huge.



*In the long run, Christer Sjödin, energy consultant, believes in electrical power to run cars and gas to produce electricity to the industry.*

– In 313 factories we produced 16 billion litres of bio ethanol 2006, 2.5 billions were exported. We have 89 new plants under construction. We produce about 7,000 litre ethanol per hectare from sugar canes, 3,600 litres from corn. And now we are able to produce ethanol from both bagasse and other residual biomass products. And yet we have an area of 90 million square kilometres still available for agriculture, says **Donato Aranda, a professor at Green Tech Laboratory, Federal University, Rio de Janeiro.**

Brazil has a long history of producing green fuel. The Ethanol Program started already in 1975, after the first oil crisis. E-20 was mandatory in 1993, at 33,000 gas stations – in Sweden E85 will be compulsory in 2009. And last year four out of five vehicles sold in Brazil had flex fuel engines.

When it comes to biodiesel, Donato Aranda says that Brazil offers low federal taxes for social projects and poor regions. There are already 10 biodiesel plants up and working, producing 500,000 tons per year. More than 100



*- In Brazil there are already 10 biodiesel plants, producing 500 000 tons per year, said Donato Aranda, professor at Green Tech Laboratory, Federal Univ. Rio de Janeiro.*

new plants are projected. B2 will become mandatory next year, B5 in 2010, and already some transportation companies are using B30. And already there are 2,000 gas stations providing B2.

The Brazilian biodiesel is made of soy beans, jatropha, palm oil, easy to handle and with relatively high energy content. The production costs are low and the customer's prize is about \$0.6.



IVAs international symposium regarding the Future of forest Bioenergy treated a hot subject. Almost 200 participants filled the Wallenberg Hall, from morning to late afternoon.

### ”The 20-percent vision is very optimistic”

For Sweden, several studies show that the production cost will be at least \$0.9, according to **Nippe Hylander, director at ÅF-Process AB, a large Swedish consultancy firm.** When comparing the possible alternatives for producing fuel from wood he concludes that they are all possible from a technical perspective. But he underlines that still a lot of development remains for all of them.

– The vision of the former Swedish Prime Minister Göran Persson and his oil commission, where 20 percent of all the transportation fuel comes from wood is very optimistic, says Nippe Hylander.

**Director Christer Sjölin, energy consultant and IVA-member agrees.**

– The climate changes makes bio fuels to an alternative. But the prize must decide how and where the raw material should be used. One must be aware that there is a risk that taxes gives the wrong result for society in the long run, he says.

He discusses the ethanol plant in Örn-sköldsvik, North central Sweden, the gas plant i Piteå, in the North, managing to produce electricity as well as biofuels from black liquor, and the plant in Värnamo, South of Sweden where the plans are to produce gas for fuel. He concludes that sugar canes are the most efficient



- The strategy for Södra has been to reduce our oil dependency, says **Leif Brodén, CEO Södra.**



- Bioenergy will not solve the problems of cost for electricity, said **Sverker Martin-Löf, chairman for the global consumer paper and wood products company, SCA.**

raw material for making ethanol, to a cost of only a couple of Swedish crowns, a third of what it cost to produce biodiesel from wood.

– Domestic production of ethanol is more than twice as expensive as importing it from developing countries. And also, it adds substantially to the competition on raw materials and drives prize increments in Europe, says Christer Sjölin. In the long run he believes in electrical power to run cars and gas to produce electricity to the industry.

On the other hand, Södra – a forestry group owned by its 35,000 members – already today gets 20 percent of its earnings from bioenergy; among the products are residues from forest fellings, thinnings, woodchips, bark and fuelwood, processed fuel in the form of pellets and briquettes and peat.

– We count on that number to be 40 percent in five years and that we are more than self sustained on energy. The strategy for Södra has been to reduce our oil dependency, says **CEO Leif Brodén.**

**More nuclear and hydro power necessary**

**Sverker Martin-Löf, chairman for the global consumer paper and wood products company SCA,** and one of Europes largest suppliers of biofuels through the Norrbränslen company, is worried by the increasing demand of wooden raw material.

He considers new bio heat- and powerplants as a threat to the pulp and paper industry, he is worried about the competition on raw materials, and furthermore by the overall energy situation for the traditional electricity consuming trade of industry.

– We have a potential for bioenergy in Sweden, but initially it can hurt the assets, the supply of industrial wood, he says.

– We count on a shortage corresponding to 1300 Giga watt hours during 2008. Bioenergy will not solve the problems of cost for electricity, we need powerful changes of policy; long term contracts on electricity until we're allowed to invest in nuclear and hydropower, says Sverker Martin-Löf, SCA.

### Optimized utilization gives potential

According to **Jan Fryk, CEO of Skogforsk, the Forestry Research Institute of Sweden**, the supply of raw materials doesn't have to be a problem on long term. He shows that Sweden has potential to increase growth, for example by using unexploited land, by using fertilizers and through better seed orchards. But most efficient on a short term is to better utilize the existing assets.

– Tops and branches could contribute with 8 Terawatt hours per year, roots, small trees and stumps with 12, he says.

His calculations show a potential for a 20 percent increase of biomass to use for energy purposes.



*Jan Fryk, CEO, Skogforsk, the forestry Research Institute of Sweden, showed that Sweden has potential to increase growth, by using unexploited land, using fertilizers and through better seed orchards.*

### EU to build research platform

Presently the European Commission is setting up a biofuels technology platform, and the target for the first year is to finalize a strategic research agenda for biofuels. Involved in the work is researchers, the forest industry, the food industry, the vehicle industry oil companies, research institutes, universities and biofuels associations.

Volvo is involved and **Anders Röj, Fuels Coordinator of Volvo Technology**, discussed the future of biofuels and

how to evaluate the alternatives we have for future fuels. The alternatives have to be evaluated on the basis of sustainable availability, on well-to-wheel efficiency and emissions, regulated and unregulated and carbon dioxide included. Energy density, economy and infra structure are important aspects as well as safety and health when it comes to handling the fuel. Other view points to consider are those of political environment and customer perceptions.

Anders Röj discussed a joint study by the European Commission's Joint Research Centre, the European Council for Automotive R&D and CONCAWE showed that ethanol for example often emit more CO<sub>2</sub> than one might expect. He concluded that by 2030, up to a quarter of all road transport fuel used within the European Union is replaced by biofuels. According to him, producing methanol or DME out of black liquor is to make good



*- Energy density, economy and infra structure are important aspects as well as safety and health when it comes to handling the fuel, says Anders Röj, Fuels Coordinator of Volvo Technology.*

use of low grade biomass.

### Petrol and diesel still going strong

**Carl Georgsson, CEO**, asked himself how **Svenska Shell** can meet the growing demand for secure energy in an environmentally and socially responsible way.

He mentioned four energy policy drivers that will help meet the energy challenge; energy security, economic development, environmental impact and ease of implementation. He anticipates that petrol and diesel will



*Petrol and diesel will be the principle transport fuels for the foreseeable future but they will become cleaner, said Carl Georgsson, CEO, Svenska Shell.*

be the principle transport fuels for the foreseeable future but that they will become cleaner.

According to Carl Georgsson synthetic fuels and biofuels will become increasingly important, but mainly as blends with fossil fuels. And on a longer term he considers hydrogen has the potential to be a viable fuel option on a longer term. So Shell is investing in R&D and bio-technology companies to commercialise second generation biofuels, like IOGEN that produces Cellulose Ethanol from Straw and CHOREN taking biomass to liquids from woodchips.

### **“Policy makers should guarantee stability”**

– The traditional forest industry will continue to play an important role in the Swedish economy also in the future. But we will be forced to use the materials even smarter than today. To me this is primarily a question of economy, about willingness to pay. Our task as politicians is to offer stable long term environment so that the industry dare to

invest, said **Ola Alterå (c)**, the **Swedish State Secretary to the Minister of Enterprise and Energy.**

– To create a sustainable energy society is one of the most important and challenging issues for the European Union ever. To success we need

to act together, within Europe, over the Atlantic, globally, he said.

– The Swedish Government support the European Commissions will to take global leadership on these issues, and the ambitious target of a 30 percent reduction of greenhouse gas emissions. Since their starting points are so different from each other, it will be necessary for the member states to form their own national strategies. And Sweden has a leading position when it comes to the use of renewables; 28 percent of our primary energy source, and where bioenergy stands for the largest part.

– We believe that energy and carbon dioxide taxation will in part help in reaching the goals. But we also believe in the role of innovative actors, market based innovations, economic incentives and the need of a functioning European electricity market.

– For us it is important to establish long term conditions so that there will be room for industrial investments in a predictable and foreseeable environment for those companies.

Ola Alterå also said that he believes an intense discussion is the basis of democracy. He said that the initiatives taken by the Swedish Minister for Enterprise and Energy, Maud Olofsson, to bring together actors that used to stand far away from each other, has established a common understanding for the main future direction.

– I think it has in part resolved the Swedish national trauma on the being of the Swedish nuclear energy future. This left us more clear-sighted and able to see possibilities instead of getting stuck in old discussions. That’s necessary. Otherwise others will take the lead.

Commenting on the future he stated that he believes it possible for Sweden to phase out the use of fossil fuels in heating and cooling completely till 2015, through green certificates and bio-based combined heat and power production.

When it comes to power generation he foresees a considerable volume increase in wind power.

He considers transportation as interesting, and thinks of bioenergy as a crucial part of the energy mix. Where the second generation of biofuels has much higher efficiency and there is hope for further development.



*- The forest industry will perform an important part of Sweden’s economy in the future. Prize regulations and competition on raw materials is a challenge. But we have the know-how and all the possibilities for a sustainable future if we utilize the material in even more advanced ways, said Ola Alterå, the Swedish State Secretary to the Minister of Enterprise and Energy.*

– We hope we’ll be able to give the right incentives to develop a technology that is in a phase where it’s necessary to find more intelligent ways to cooperate – from research to market.

– The forest industry will perform an important part of Sweden’s economy in the future. The development should continue. Prize regulations and competition on raw materials is a challenge. But we have the know-how and all the possibilities for a sustainable future if we utilize the material in even more advanced ways, developing the range of technical solutions needed to reach a flexible output.

**By Erika Ingvald**  
**Photos: Torbjörn Zadig**



Three wise men, all members of IVA, discussing the future of the forest. From the left Björn Hägglund, IVA's Executive Committee, Sverker Martin-Löf, chairman of the global consumer paper and wood products company, SCA, and Bo Berggren, the foundation Stora Kopparberget.

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Further information can be obtained from:  
Project Manager Teresa Jonek, IVA, tel: +46-8-791 29 74, fax: +46-8-611 56 23  
or e-mail: [teresa.jonek@iva.se](mailto:teresa.jonek@iva.se)

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