In short about

July 2025

VärmlandsMetanol AB

(publ.) founded in 2001

The planned bioMethanol plant, with Hagfors in the background, strategically located in the forest rich county of Värmland

Photo: Lars Nilsson Photomontage: Structor, Örebro

Methanol from Wood Residues - an excellent multipurpose fossil free chemical!

An Urgent, Sustainable Industrial Project

VärmlandsMetanol in Hagfors, Sweden, intends to build and operate the **world's first commercial biomass-to-methanol plant**.
VärmlandsMetanol will gasify forest residues to syngas that will be converted to

BioMethanol – a Sustainable
– Motor Fuel
– Fuel for Electric Cars with Fuel Cells
– Marine Fuel
– Turbine Fuel
– Key Component of Hundreds of Chemicals

Planned annual production **130 000 m^3** fuel grade methanol.

Forest residues — a sustainable "Swedish oil-well" that won't run dry

www.varmlandsmetanol.se
VärmlandsMetanol AB, Postbox 61, SE-683 22 Hagfors, Sweden

History

VärmlandsMetanol AB was founded in 2001 by Dr. Björn O. Gillberg and the Miljöcentrum Foundation. The initial purpose was to build and operate a pilot plant (20 MWth) producing methanol, district heating and electricity from forest biomass using gasification technology. The objective was to demonstrate the great potential of gasification technology and to create a research and development centre for large-scale bioMethanol production.

Based on research and two pre-feasibility studies the company decided in 2006 to build a full-scale commercial plant of 111 MWth that would have a production capacity of 130 000 m^3/ year fuel grade methanol.

In 2007 VärmlandsMetanol became a public stock company. It is today owned by the Miljöcentrum Foundation, the Municipality of Hagfors, the Swedish Federation of Farmers, TRB (an umbrella organization for the 12 largest haulage contractors in Sweden), 1 800 private persons and 60 small companies.

Thyssenkrupp Uhde, was in 2010 selected as technology supplier. In 2012, it was time for an investment decision, based on the fact that the methanol produced would be mixed with gasoline at a low level. The calculations showed a good return. But then the Swedish government suddenly introduced a carbondioxide and energy tax on all low-level biofuel blendings based on volume and not on energy content. The result was twice as high an energy and carbondioxide tax on biomethanol compared to fossil gasoline.

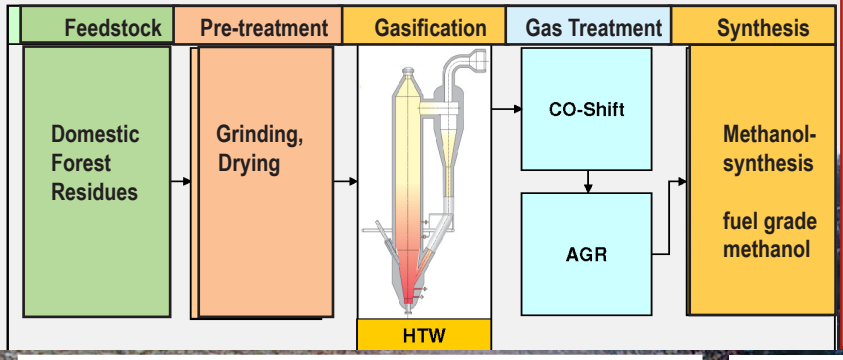
The project was then put on hold until further notice, while the conditions for alternative markets were investigated. The conclusion was, that that market existed within international shipping.

The project has now been updated and an offtake agreement has been signed with an international shipping company. A cooperation agreement has been signed with Siemens Energy AB. A permit application has June 23, 2025 been submitted to the Swedish Environmental Court. More about that below.

The business plan is to produce and sell bioMethanol as a sustainable multipurpose chemical to be used as motor fuel, marine fuel, turbine fuel and a key component of hundreds of chemicals.

A primary business objective is to develop a "turnkey" concept with interested parties and build additional plants in Sweden and also export the concept to other forest rich countries.

Integrated Process Chain for the Production of Bio-Metanol



Facts about the plant

- Required capital – € 400 million
- Raised 50/50 private placements and bank loans
- Three years of construction
- Input 1 100 tonnes forest residues /day (35 trucks /day)
- Output 375 000 litres of methanol /day (12 trucks /day)
- About 700 jobs during three years of construction
- About 50 permanent jobs at the plant
- About 50 permanent external jobs

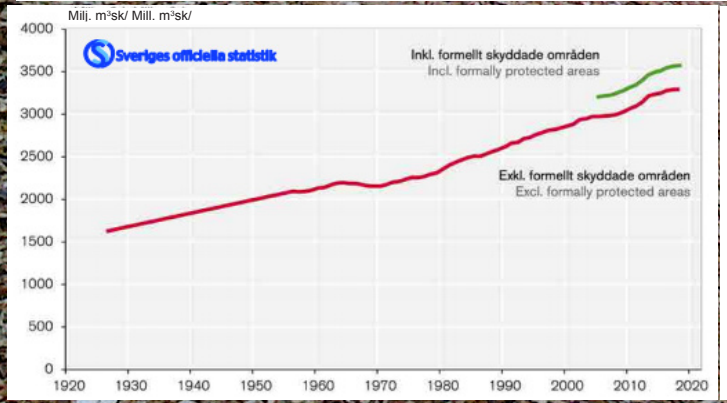
The process is "fed" with forest biomass in the form of logging residues, branches and tops, that has been secured through agreements with private forest owners and the Church of Sweden. Within 150 km of the plant, there is enough logging residues to cover the needs of six plants. The forest residues is chipped, dried and processed to wood pellets. The wood pellets are converted to raw gas in the gasifyer. In the next step the raw gas is purified and adjusted to the correct relation carbon monoxide/hydrogen used for the synthesis of fuel grade bioMethanol. The gasification takes place at high temperature, high pressure and reduced oxygen feeding. The integrated process generates waste heat that is used for drying the feedstock and district heating. The only by-products are wood ash and slightly polluted waste water.

The mineral rich wood ash will be pelletised and returned to forest land where it belongs. The slightly polluted waste water can/will be treated in the local sewage treatment plant.

The gasification technology can be used for production of methanol, ethanol or gasoline from wood. The highest energy efficiency at the lowest cost is achieved producing methanol. About fifty plants of VärmlandsMetanols size will cover Swedens future need of motorfuels. In addition without interfearing with the needs of the conventional forest industry.

In conclusion, the project realizes the principle of managing natural resources. The production is part of the photosynthesis cycle. The forest residues have been created from sunlight, water and carbon dioxide from the atmosphere. This residues are converted through the gasification process and subsequent steps into biomethanol, which when burned in an engine is converted into carbon dioxide and water. The carbon dioxide that is released into the atmosphere through the production and use of biomethanol is of the same type and extent, that would otherwise be released into the atmosphere, if forest residues were left in the forest to rot after logging.

Standing volume in Sweden since the 1920´s, 5-year averages



Total growing stock 1926-2018

Sources: Statistics Sweden, Official Statistics

Supply of Forest Biomass – Värmland

	Million m^3 fub	TWh
Standing volume	198	398
Annual increment	8.2	16.5
Annual felling*	5.2	10.5
Annual consumption VärmlandsMetanol	0.4	0.88

**GROT (forest residue) not included (available GROT = 5.8 TWh/year)*

Sources: Swedish National Forest Inventory
Potential för skogsbränsle i Värmland (Projekt SWX-Energi)

What is Methanol?

- The simplest form of alcohols, wood alcohol, (CH_3OH)
- An exellent high octane (105 octane) motor fuel
- Low blends in gasoline will increase engine efficiency and reduce fuel consumption
- Ranks as one of the top 4 globally used chemicals
- So far mainly produced from fossile natural gas
- Also produced through gasification of coal at approximately 100 plants globally (including China)
- Can also be produced through gasification of wood
- Used by the German army to keep their vehicles running during World War II
- Used in Sweden during the 1940's as a low-blend in gasoline
- Introduced as a motor fuel by the Swedish company Nynäs in the 1980's as M15 (produced from fossile natural gas)
- An important motor fuel in China

Is Methanol dangerous?

- No, only if you drink it. (Gasoline is also unhealthy to drink).
- No, contrary to gasoline and diesel it is not mutagenic or carcinogenic and degrades rapidly in soil and water.
- Burning methanol is extinguished with regular water.

Market for bioMethanol?

- **The renewable energy directive** 2018/2001/EU stipulates that 14 % of all motor fuels in the EU shall be renewable by 2030. This EU Directive is **an important market driver** as it, based on default values for greenhouse gas savings, defines the phasing out of the 1st generation agro-based ethanol, and **prescribes the use of advanced biofuels** such as bioMethanol. Contribution of biofuels produced from food crops is capped at 7 %.
- **Another important driving force** is the EU's Green Deal, Regulation (EU) 2021/1119 of the European Parliament and of the Council, which establishes that the Union shall be climate neutral by 2050, including a target of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.
- **BioMethanol used as low-blend** (up to 25 %) requires no adaptation of gasoline engines or infrastructure, moreover flexi-fuel cars (E85) run equally well on M85.
- **BioMethanol is an excellent fuel for the electric cars** of tomorrow, powered by direct methanol fuel cells (DMFC).
- **BioMethanol is an emerging Marine Fuel**. Several of the world's major shipping companies have decided to switch to biomethanol within ten years. There are already several ships on the world's oceans that are powered by fossil methanol made from natural gas. This reduces emissions of sulfur, nitrogen oxide and particles by 99%, 60% and 95% respectively. In addition, carbon dioxide emissions are reduced by about 15% because fossil methanol burns more efficiently than marine diesel.
  Currently, the world's shipping companies have ordered about 350 methanol-powered ships. A condition for this development has been a marine methanol standard. In 2020, Björn Gillberg was appointed chairman of a Task Force within the International Standardization Commission (ISO) with the task of developing a marine methanol standard. It was adopted in November 2024.
  Add to this, the world's shipping companies within the framework of the International Maritime Organization have committed to reducing greenhouse gas emissions by 20% by 2030 and by 70% by 2040 compared to emissions in 2008.

The goal is zero emissions by 2050.

- **There is a growing demand for a power balancing** of an electric grid supplied by wind and solar power.
- **Gas turbines** fed with bioMethanol will play a significant role for balancing power to become fossil free.
- **Fossile methanol is a basic building block for hundreds of chemical products**. Growing consumer demand will force the chemical industry to widen its feedstock base, particularly by broader use of bio-based, renewable raw materials such as bioMethanol.

Do we have the feedstock?

- Yes, in Sweden we have about 23 million hectares of forest land. Annual increment has exceeded gross felling with 20-30 % since the 1920's. Currently the annual increment, not harvested, is 30 million forest cubic meters (m^3f). VärmlandsMetanol will not compete with sawmills and pulp industry regarding the supply of sustainable feedstock.
- Supply of sustainable forest residues have been secured through agreements with leading producers of forest feedstock.

Project execution – status

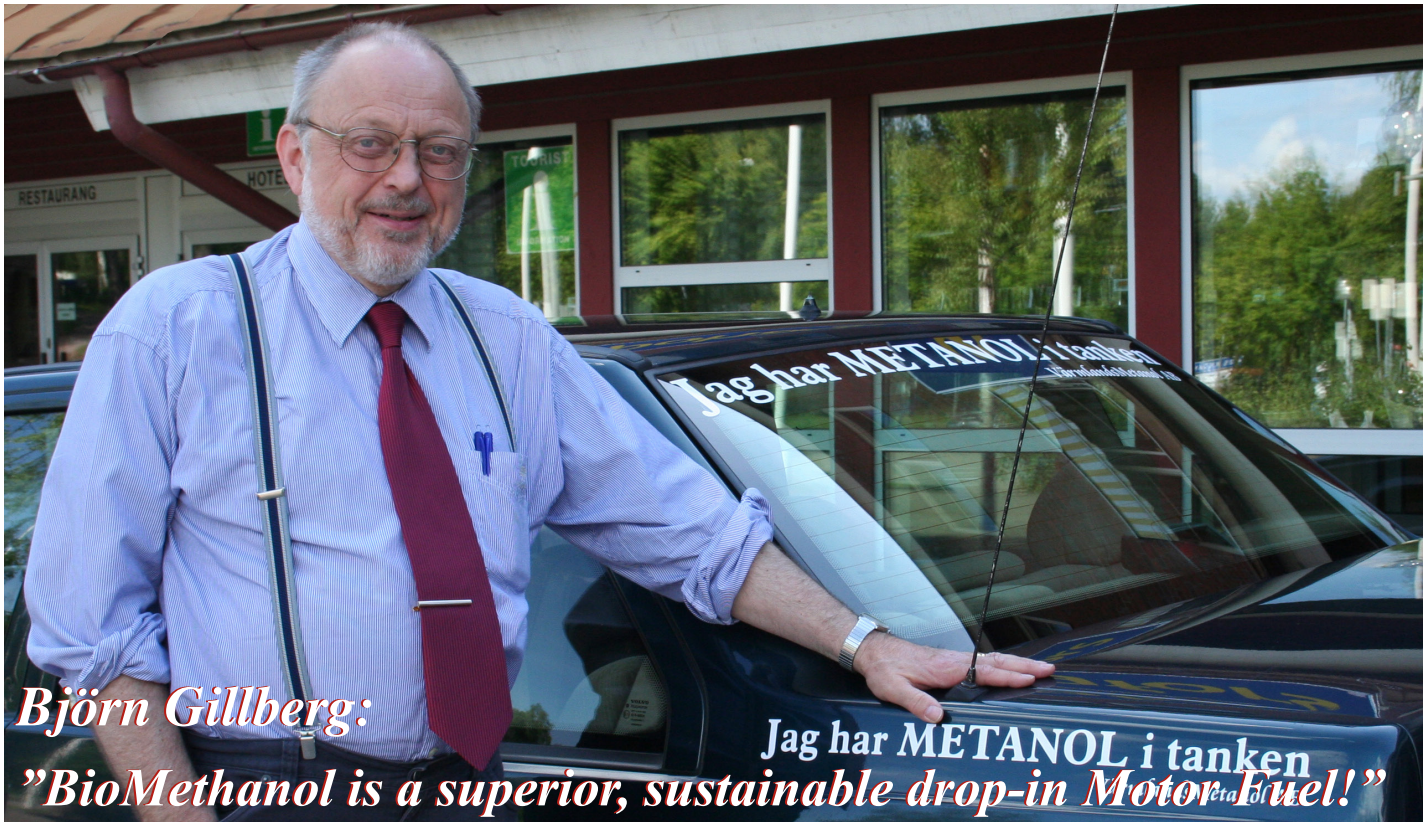
- An industrial site (20 ha) has been acquired for the plant.
- An office building (150 work places) has been acquired.
- A detailed development plan for the site has been approved by the Municipality of Hagfors.
- Supply of feedstock/forest residue has been secured.
- An Environmental Impact Assessment (EIA) and a Risk Assessment have been completed.
- Offtake agreement signed with an interational shipping company.
- The plant can, according to the project execution plan, be ready for startup 36 months after the investment decision.
- A permit application submitted to the Environmental Court in june 2025. Building permit expected within six months.

In progress

- Finish the legal procedure for obtaining the industrial environmental permit from the Environmental Court.
- Securing capital.

Strategy

- The lead time for this kind of project is approximately ten years of which seven years have been carried through in the Hagfors project.
- VärmlandsMetanol is committed to apply the wealth of existing engineering work, the blueprint, for fast track project realization of biomethanol plants world wide.



- ✓ Gasoline cars run excellent on low blends of methanol without any modification
- ✓ Ethanol cars run equally well on methanol
- ✓ Methanol is an excellent fuel for electric cars of tomorrow, powered by fuelcells
- ✓ Perfect as marine fuel
- ✓ Perfect as turbine fuel
- ✓ Perfect raw material for the chemical industry to reduce their carbon footprints
- ✓ BioMethanol is a profitable investment which does not compromise with our childrens future

VärmlandsMetanol – Board of Directors

Chairman:
Wollmar Hintze, Ph.D in Chemical Engineering at The Lund Institute of Technology. Senior advisor at different large companies in Sweden on environmental issues relating to process technology. Former Environmental Director at various infrastructure projects, e.g. the Öresund Link Project between Sweden and Denmark.

Member and CEO:
Björn O Gillberg, Ph.D at Uppsala Univ. and Ph.D h.c at Lund Univ. He is the founder of VärmlandsMetanol and former Environmental Controller at the Öresund Link Project. A long-time committed front figure and advocate of environmental law and technology. He has been an advisor to European governments and corporations.

Other members:
Sture Sonebrink, co-founder of VärmlandsMetanol, entrepreneur and owner of one of the largest private forest holdings in Sweden. He has a long experience and great knowledge of forestry.

Gunnar Westlind, a Construction Engineer, working many years within the steel industry as Project Manager, currently in a leading Swedish consultancy firm. His long experience includes expert advice for the plant development and feasibility studies at VärmlandsMetanol.

Auditor: ***Stefan Lidén,*** PriceWaterhouseCooper, Karlstad.

BioMethanol right in time!

The time is more than ripe for bioMethanol. In a Swedish context a large-scale investment in gasification technology for the production of biofuels from forest biomass is a feasible, cost- and energy efficient way to reach EU´s Green Deal targets.

The choice of methanol produced through gasification of cellulosic biomass, as a substitute for gasoline and marine diesel, is from a process and technological perspective, self-evident.

Sweden has a significant and increasing surplus of forest biomass. In addition, methanol used as a drop in fuel in gasoline does not require new infrastructure, which paves the way for a cost efficient, immediate and major reduction of CO_2 emissions from the existing and future automobile fleet.

VärmlandsMetanol's industrial partners, are global actors, who have the competence and the financial "muscles" needed to guarantee a successful implementation of the project.

Björn O. Gillberg, CEO

www.varmlandsmetanol.se
VärmlandsMetanol AB, Postbox 61, SE-683 22 Hagfors, Sweden
VärmlandsMetanol AB is a public company - shareholders are registered by Euroclear