



IEA Bioenergy

Technology Collaboration Programme



Country report Sweden

IEA Task 33 - Gasification of biomass and waste

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Technology Collaboration Programme

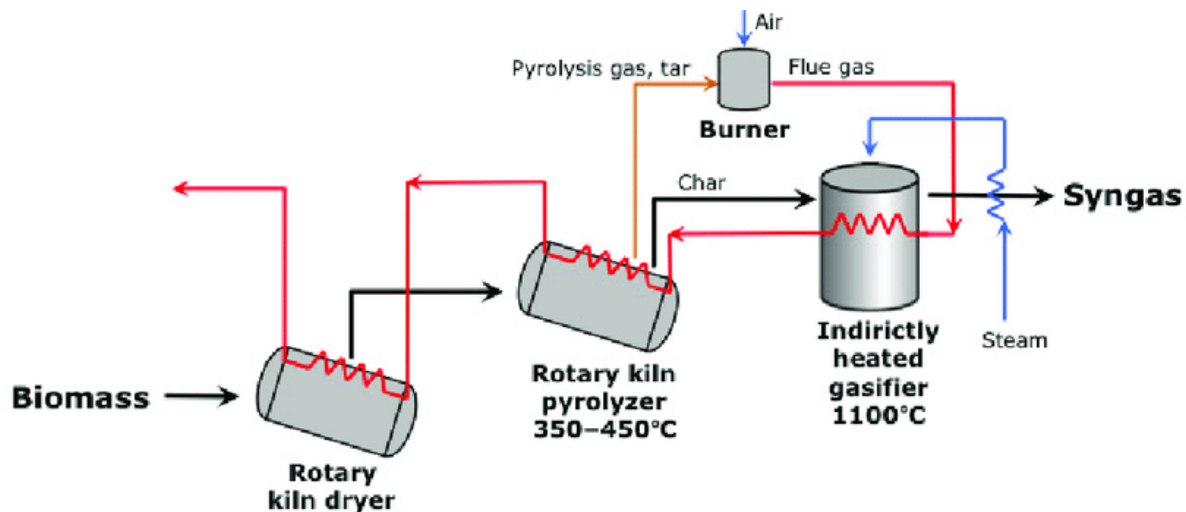
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Commercial gasification projects - current status

Cortus 6 MW WoodRoll® gasifier at the Höganäs steel plant



- Problems with particle build-up in the pyrolysis gas pipes
- Finely ground char particles form deposits in the pipes which complicates the combustion process
- Installation of a cyclone has reduced the amount of finely ground char, but further reduction is necessary



Picture from and more info at <http://cortus.se>

Cortus WoodRoll® in Mariposa (US)

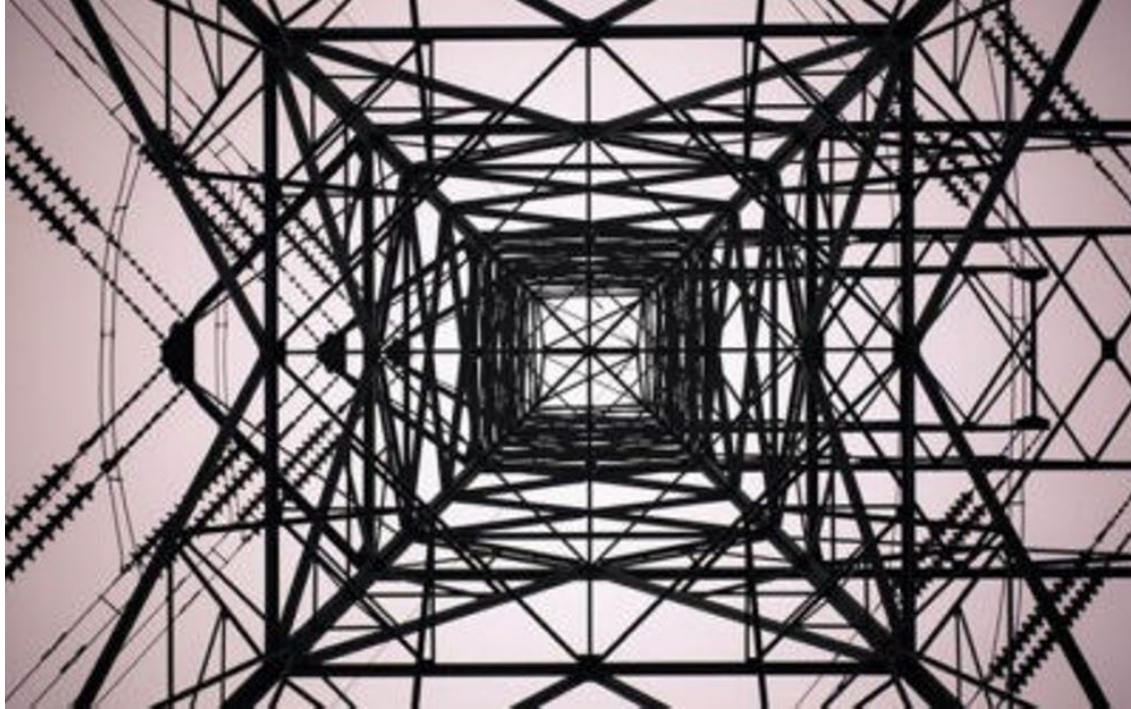


Photo from <http://cortus.se>

- Biomass-to-electricity project in Mariposa
- Pacific Gas & Electric (PG&E) has approved Cortus and the Mariposa-project for delivery of 2,7 MW electricity.
- Cortus can now participate in forthcoming auctions within the BioMAT-program

More info at <http://cortus.se>

* Bioenergy Feed-in Tariff Program, https://www.cpuc.ca.gov/SB_1122

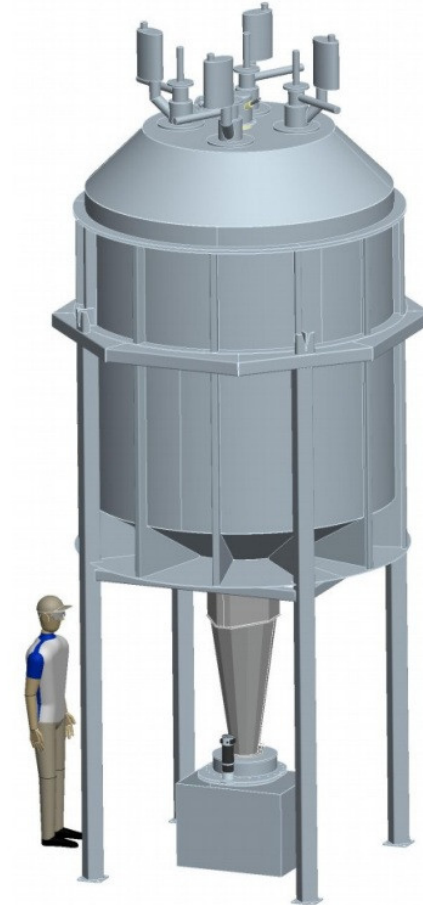
Cortus WoodRoll® & ENGIE (Fr)

- Collaboration project (WoodHy) initiated 2019 on biomass-to-hydrogen project in Bordeaux, France
- An order from **Engie Cofely** worth 135 000 € to carry out an **Advanced Feasibility Study** of a plant for hydrogen and CO₂ production

More info at <http://cortus.se>

**Woodroll
Gasifier**

 **CORTUS**



MEVA CHP-plant in Hortlax



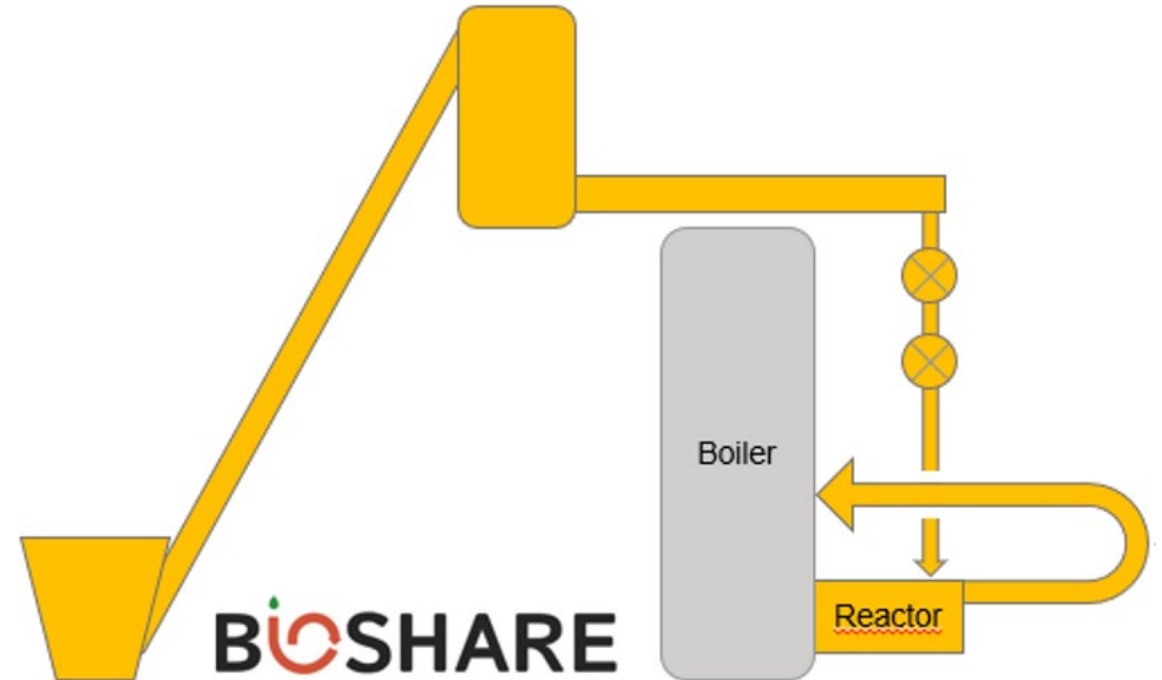
- Entrained flow cyclone gasifier emanated from research at Luleå University of Technology
- Energy outputs 1.2 MW_{el} and 2.4 MW_{th}
- Small fraction fuels (sawdust, wood fibers and agricultural residues)
- Applications: CHP, fossil process gas replacements and industrial drying processes
- **Joint project with Andritz-Enviroburners - A complete gas burner test facility to enable complete engineering of industrial burner installations for process heat generation**

More information at <http://mevaenergy.com>

Commercial initiatives under development

Thermochemical co-production in a CHP plant

- The company BioShare has recently been granted funding ($\approx 1,7$ M€, 2020-2024) to demonstrate integrated gasification and pyrolysis at a CHP-plant
- The reactor will be operated during three heating seasons to assess performance and gas quality with different feedstocks
- Also test different downstream units in pilot scale in separate projects with customers and other stakeholders.



The Gobigas plant in Gothenburg



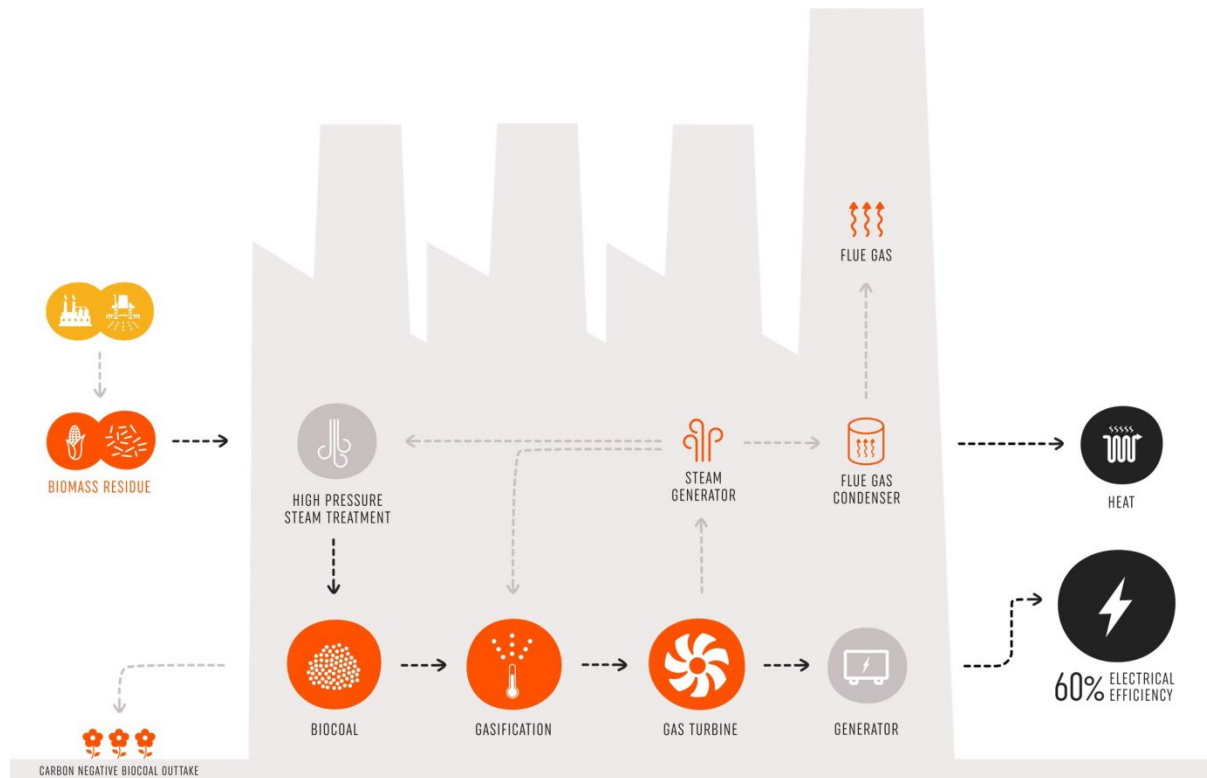
- Plant still moth-balled and for sale
- Ongoing contract negotiations
- Covid-19 situation delays the process

LTU Green Fuels plant

- Plant still in moth-ball
- New regional funding secured for three years to keep the plant from being dismantled and to find new projects



Phoenix Biopower



- The Biomass-fired TopCycle (BTC) - high-pressure steam treatment and entrained flow gasification
- Gas turbine for power generation
- Aiming at electrical efficiency of up to 60 %
- Funding for a pre-study on a pilot plant together with Tekniska Verken in Linköping

More information at <http://phoenixbiopower.com/>

Research activities

Ongoing Swedish gasification-related R&D programs

- Swedish Gasification Centre (SFC): 2011-2021, budget 54 M€
- Swedish Knowledge Centre for Renewable Transportation Fuels (f³): New phase 2018-2021, budget 3.3 M€
- Swedish Energy Agency's biofuel program: On-going 2017-21. Both thermal and biochemical conversion, budget 18 M€

Swedish Gasification Centre (SFC)



- Strengthen and coordinate Swedish gasification R&D and foster a new generation of gasification competence in Swedish academy and industry
- Serve as a national network for knowledge transfer and problem solving within the field of gasification
- In total, 19 companies, 8 universities and one research institute
- 25-30 senior researchers and 30-35 PhD students
- Produced >35 PhDs and >400 journal and conference publications (2012-2019)
- www.sfc-sweden.se



Participating universities, institutes and authorities



CHALMERS



GÖTEBORGS UNIVERSITET



LUNDS
UNIVERSITET
Lunds Tekniska Högskola



**RI
SE**



Participating companies



Swedish Gasification Centre (SFC)



- Current program ends April 2021 (hopefully prolonged until December 2021)
- Planning for a new research program with broadened scope and increased industrial relevance
- New focus areas;
 - Gasification in paper- and pulp industries
 - Gasification in petrochemical industries
 - Gasification in steel industries

Policy issues influencing gasification technologies

- The **reduction obligation for transport fuels** forces fuel distributors to blend in renewable fuels into fossil diesel and gasoline to reach pre-determined CO₂-reduction levels or pay fairly large fines (4,2% CO₂-reduction for gasoline, and 21% for diesel in 2020)
- Sweden has become a **very large importer of HVO**, which is, in the long term hardly sustainable. SFC has published a position paper in the matter, see www.sfc-sweden.se
- The reduction obligation is good, but in the current form, it **fails to promote domestically produced biofuels**

Policy issues influencing gasification technologies

- In the Budget Bill for 2021, the Government has proposed gradually increasing reduction quotas for 2021-2030 (28% CO₂-reduction for gasoline, and 66% for diesel in 2030)
- The government will also introduce a reduction obligation for aviation fuels
- The proposal from the biogas market investigation to give a premium to biogas/biomethane only produced via anaerobic digestion, does not seem to be realized
- The Government has now commissioned the Swedish Energy Agency to investigate the need for additional policy instruments to promote domestic production of biofuels with new technologies

Thanks!

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