



IEA Bioenergy Conference 2015

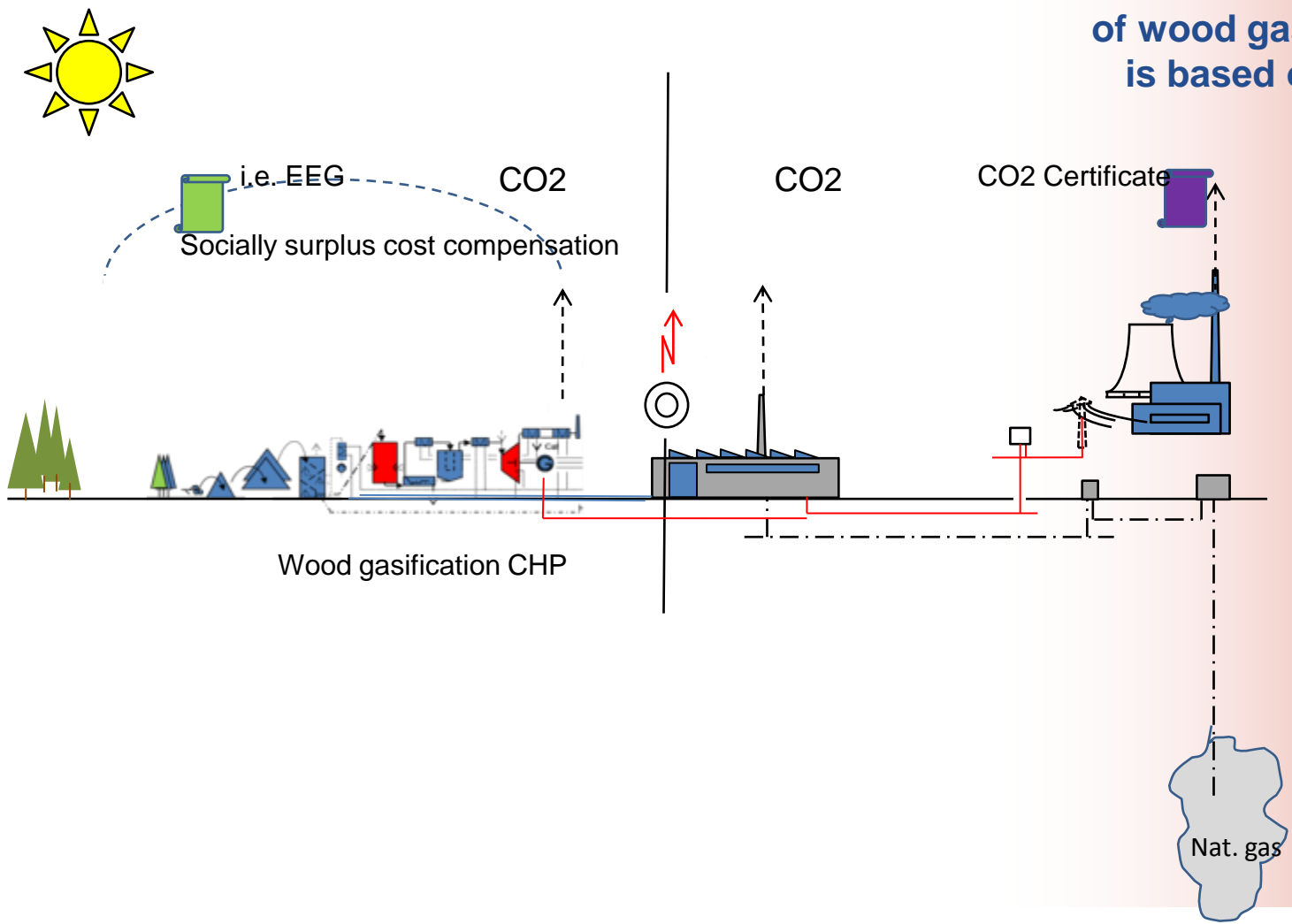
Berlin, 27.10.2015

Latest developments in German biomass gasification processes for Power&Heat

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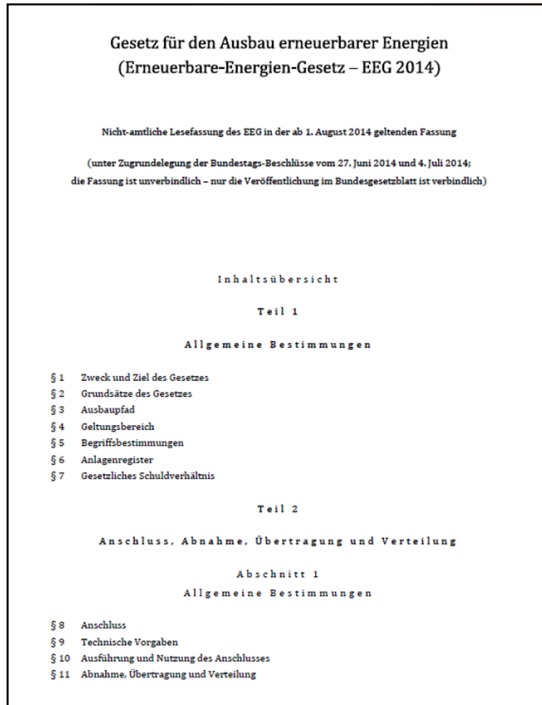
Wood gasification CHP plants as part of the energy system



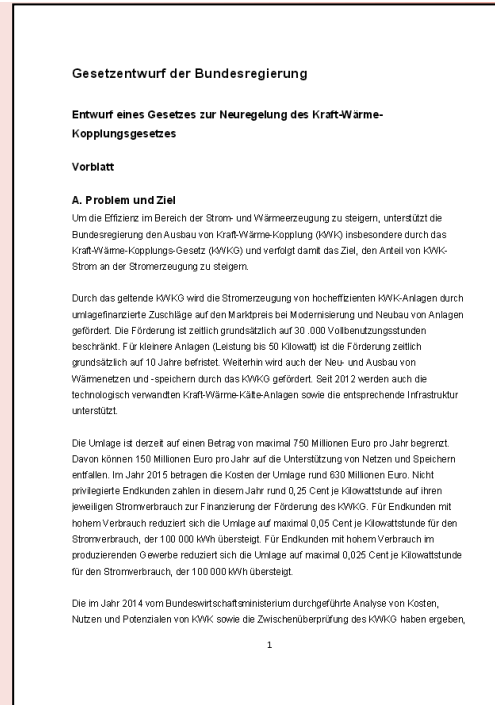
The key for application of wood gasification processes is based on its main features:

- they need heat, and supply heat.
- Therefore their preferred site is a heat customer, who uses the opportunity to substitute electricity and heat demand which is charged by final customer's prices.

3 documents expressing political convictions changed the world of wood gasification in Germany only recently



Feed-In law (EEG) 2014

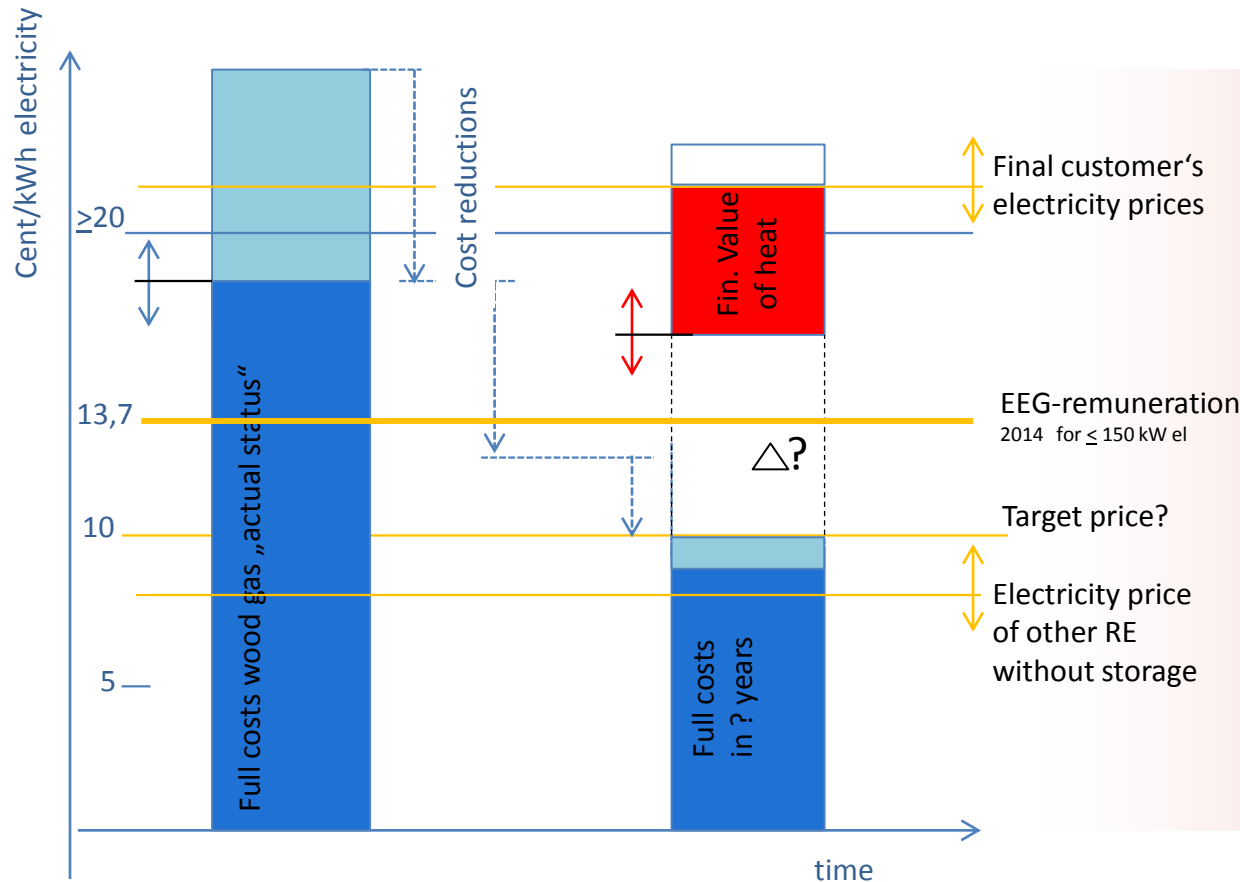


Amendment of German CHP-law



Main features of a new German energy law

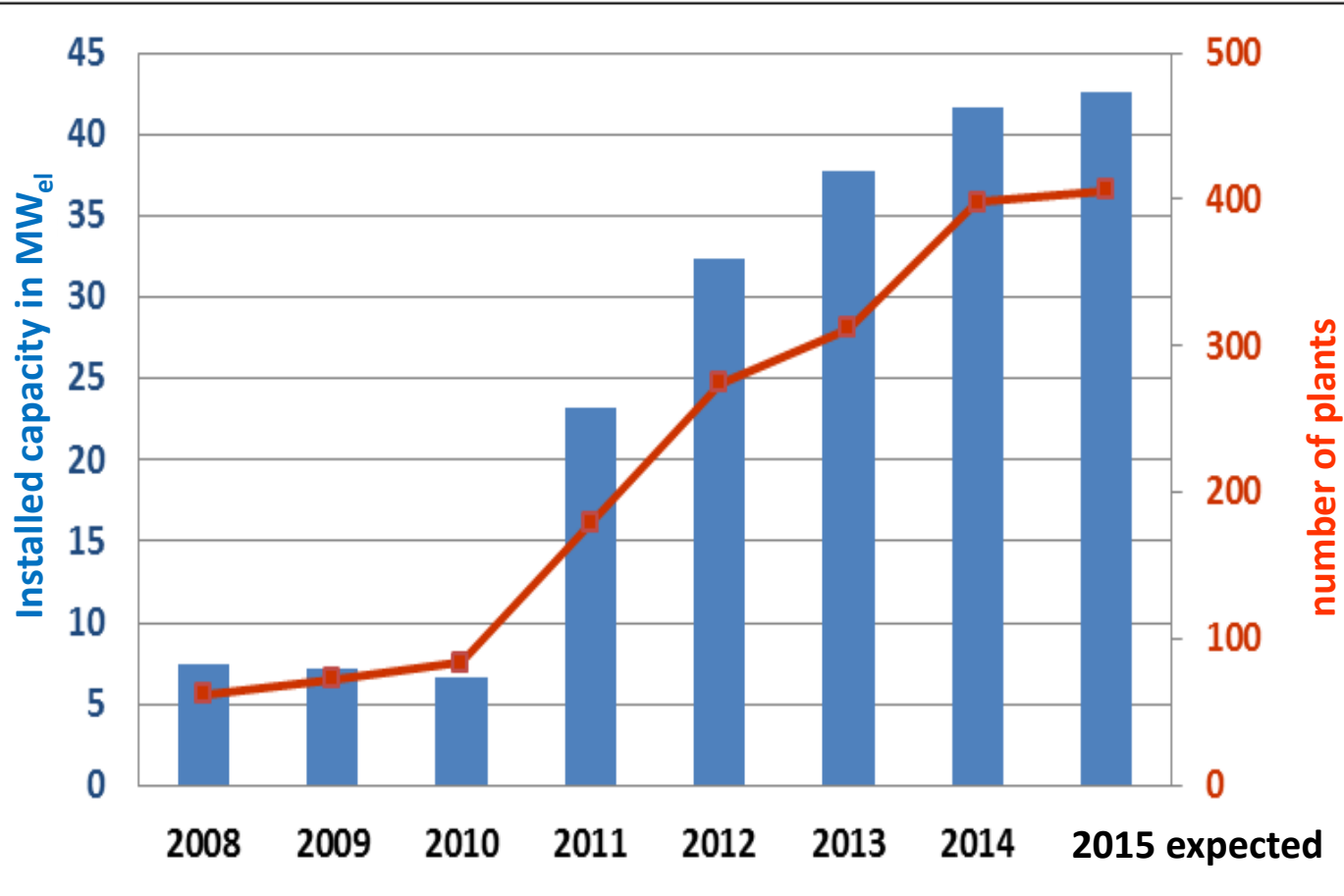
An economic display of changed framework conditions



Rapid cost reductions based on process engineering or production engineering are actually not at hand.

This way applications remain dependent on frame work conditions and (tailored) adaptations to the specific site constraints.

Changed frame work conditions show ...

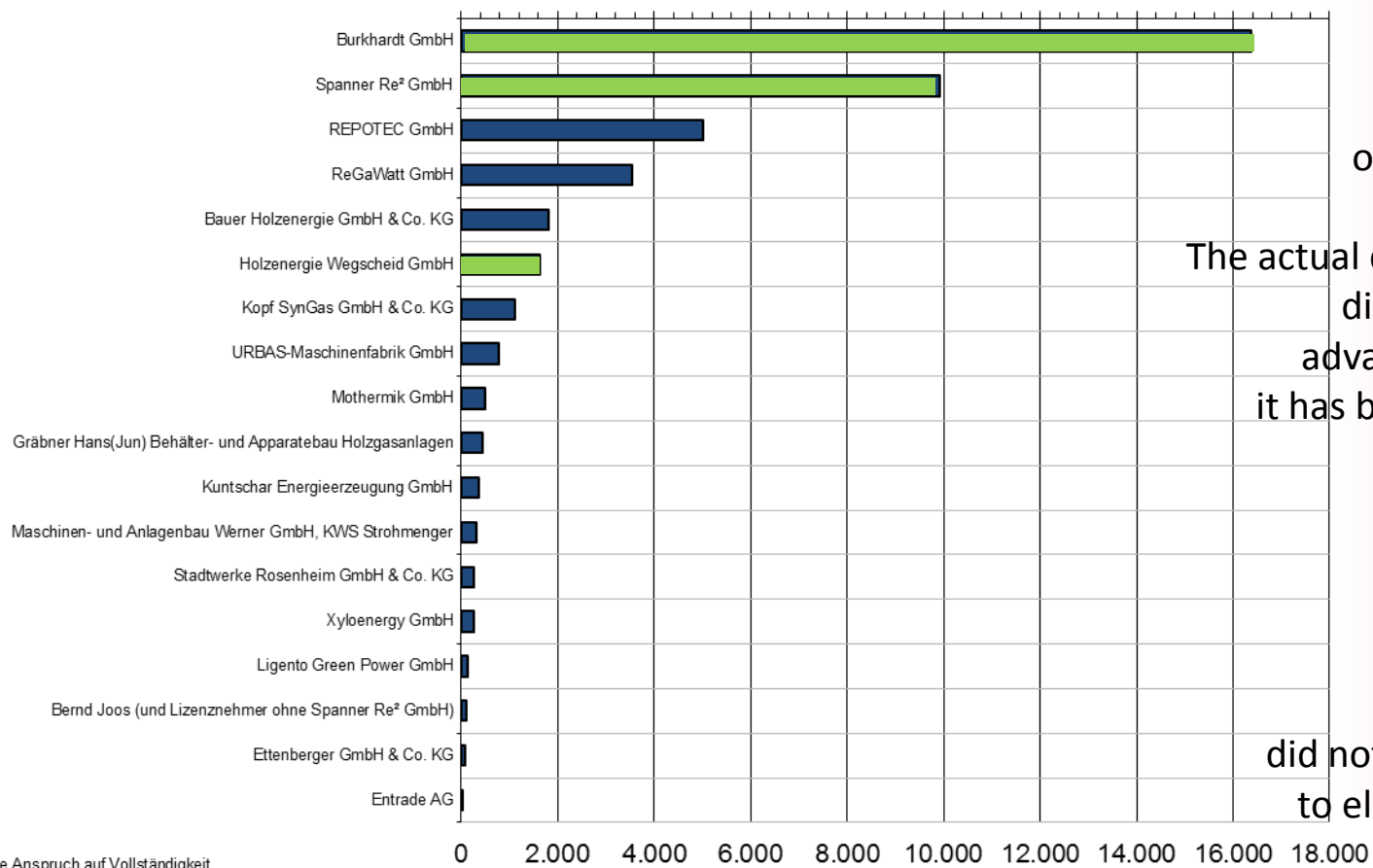


.... **stagnation**, which can be seen trough the development line in Germany after 1.8.2014.

On the basis of EEG 2014 up to now **no new plants** have been handed over to German customers. App. 20 plants started operation only on other conditions.

Expressed differently.....

total electric power installed from CHP units based on biomass gasification in Germany as kW



3 suppliers dominate the number of plants in operation

The actual development of EEG did not terminate the advancement totally but it has blocked further steps of first installations or first commercial follow-ups.

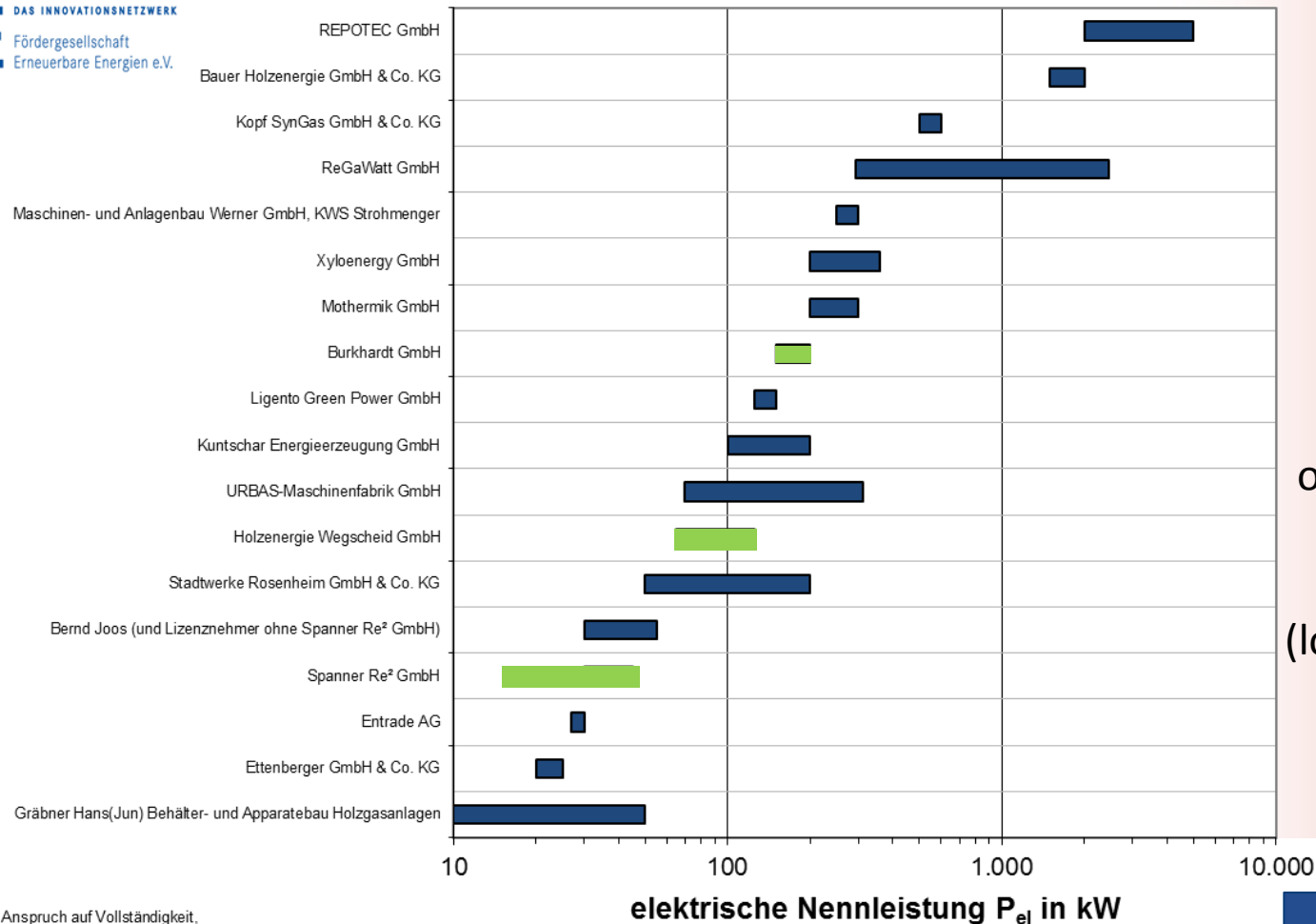
Gasification plants for organic residues did not start to contribute to electricity production yet.

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More than 5 plants on customer's sites
At least one prototype with more than 5,000 running hours

status 31.12. 2014

Spread of suppliers in Germany which characterizes the operation of wood gasification CHP plants



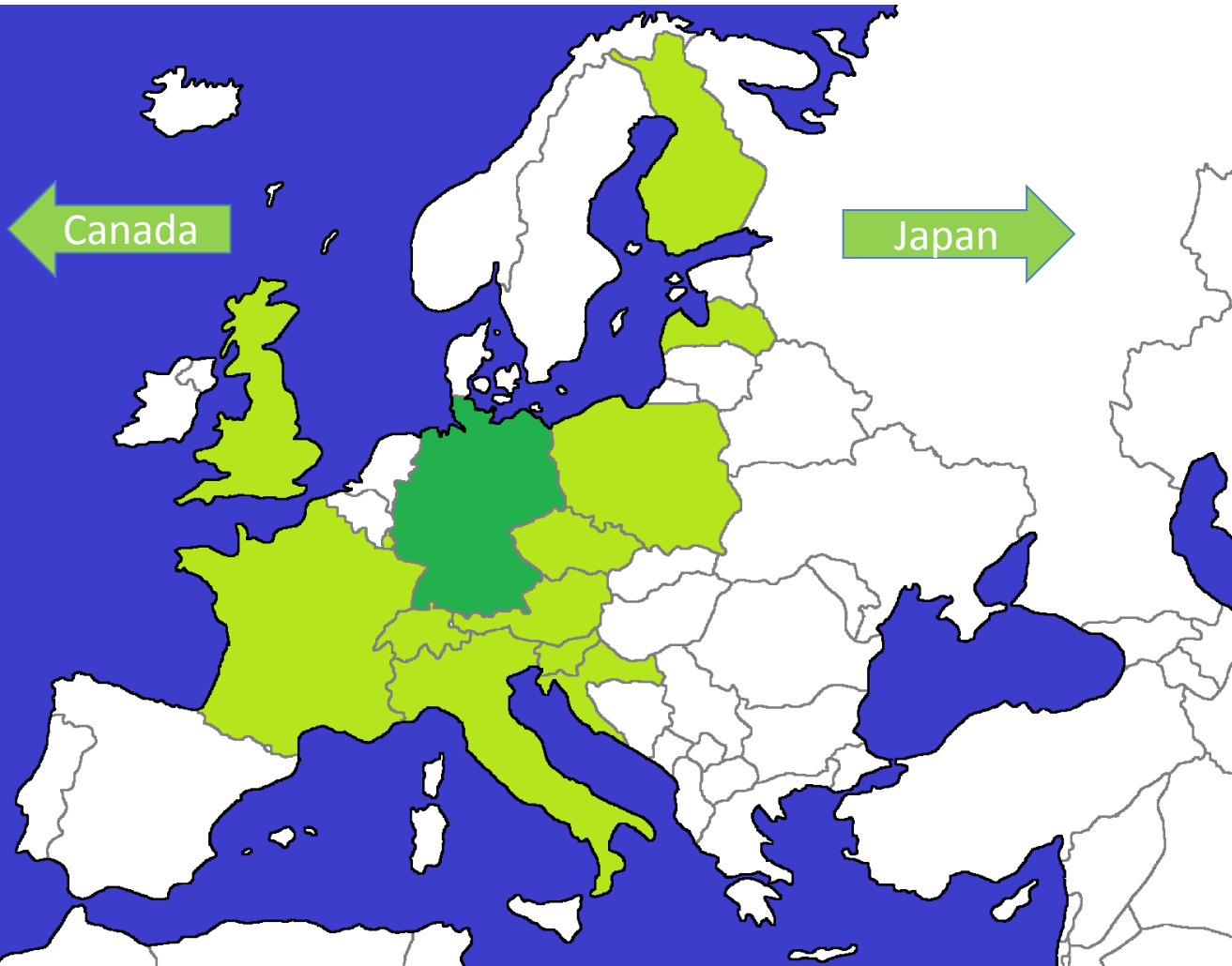
A growth of spec. applications may be noticed especially in the (lower) power range, being suitable for own electricity production.

status 31.12. 2014

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■ More than 5 plants on customer's sites
■ At least one prototype with more than 5.000 running hours

First reactions of manufacturers: Export, Export, Export,



Three German producers so far have exported app. 300 plants out of a total of app. **650 plants.**

Side reaction: competition.....has been kindled, among each other and with other countries



Source: producer

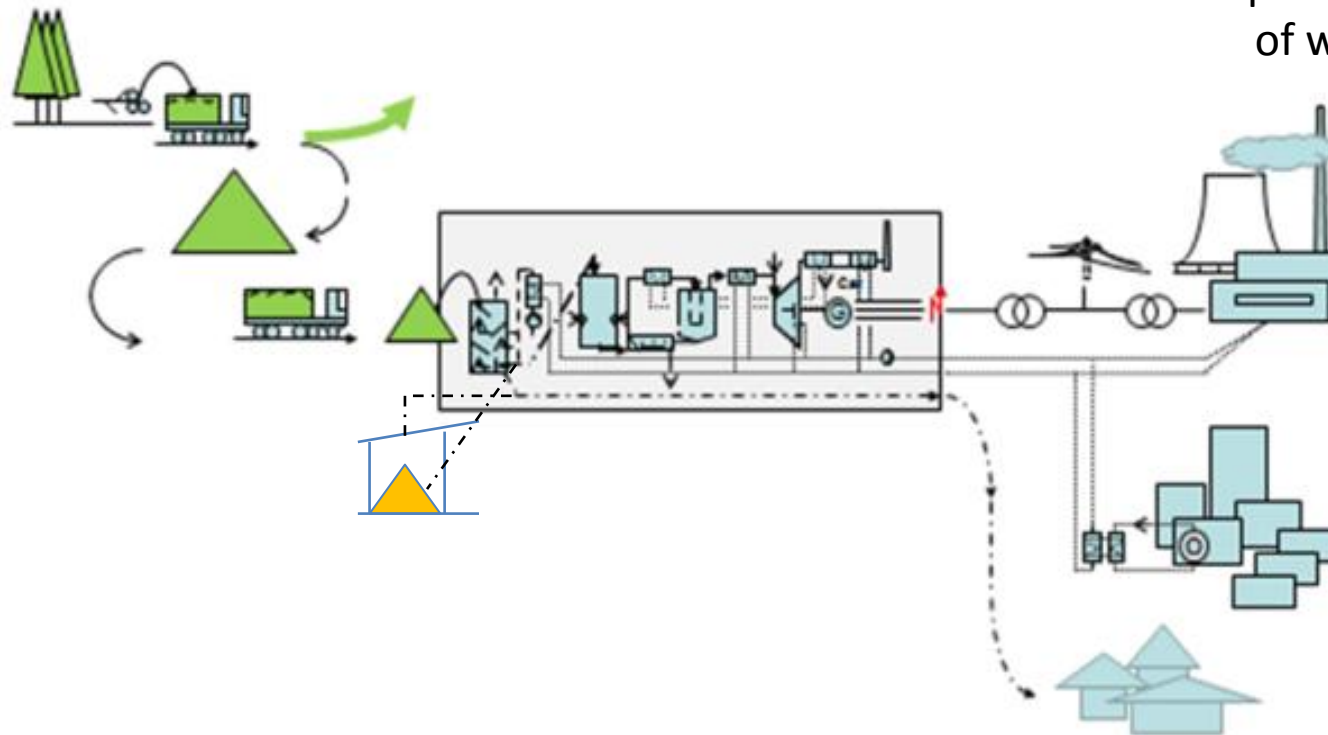
The Finish manufacturer Volter Ltd, Offers complete solid bed wood gasification plants at an electric power of 40 kWel supporting 100 kW heated water and 20 kW hot air Based on wood chips (water content <18% and particle size 30-50 mm.



Source: producer

Austrian manufacturers supply well proved plants as well. As one example SynCraft Engineering GmbH should be mentioned, which offers a technology based on a floating bed transforming complex wood mixtures (water content<15% and size 30-50 mm) to an electric power of 180-324 kWel and thermal capacity of 350-625 kWth.

It is crucial that the technology brings even more to bear its own specific advantages



The most important works comprising the further development of wood gasification technology are related to their fit into its strategic triangle: use of wood, sales of heat, sales of electricity.

Technology development now pushes for higher availability and solutions of works earlier neglected.

Example for increase in reliability and efficiency



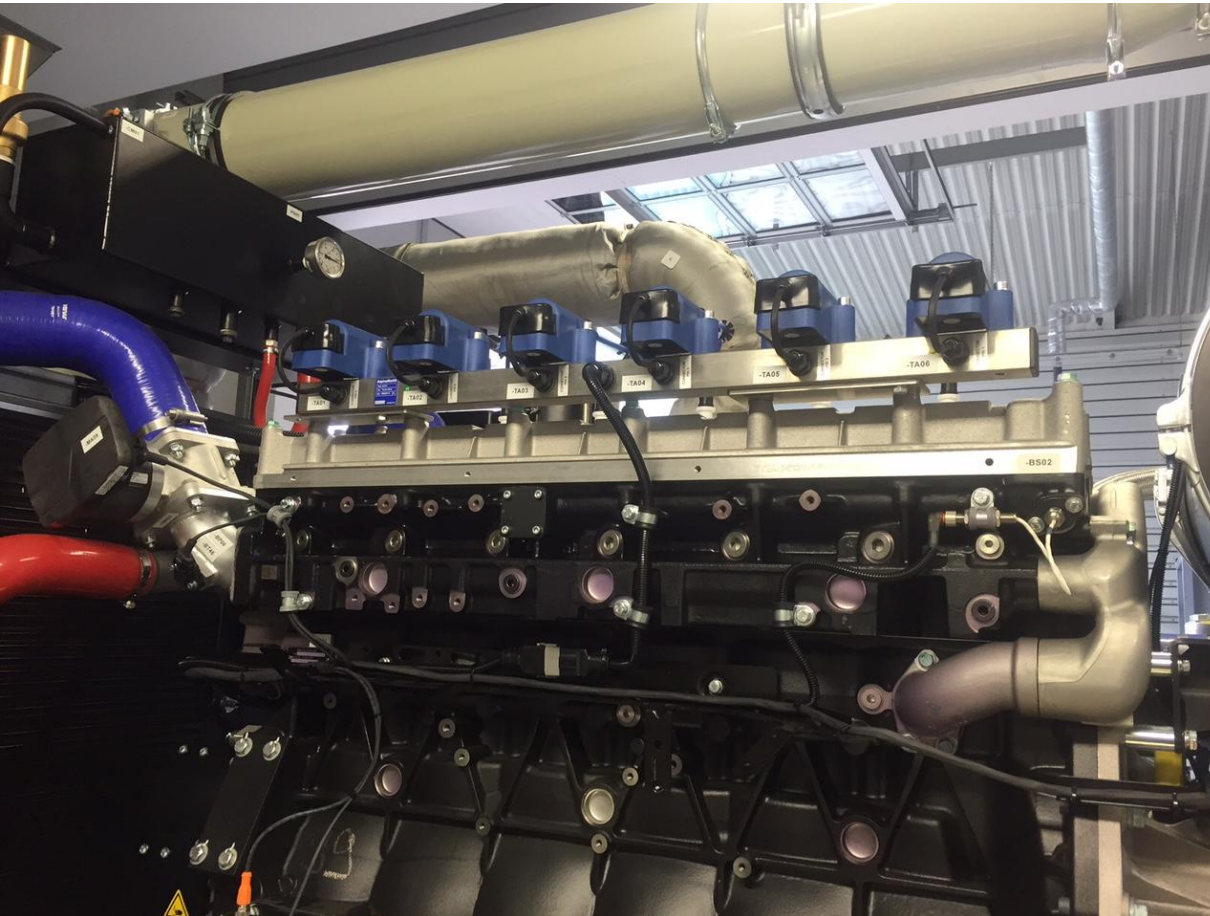
Technical data:
electric power
165 and 180 kW
thermal power
260 and 270 kW
consumption of pellets
110 kg/h
plant efficiency
el. **30%**

Source: producer

Updraft co-current gas production combined with fluidized bed,
and wood gas -CHP, no available together with shown Otto-engine = ECO 165 HG

Status III/2015: 138 plants on customer's sites, out of that 45 abroad

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Example for adaptation according to customers demand for on site power production and full use of heat



Spanner *Re2*

Technical data:
electric power
now:
from 9 to 45 kW,
thermal capacity
from 25 to 108 kW
Consumption
of wood chips
from 10 to 45 kg/h
plant efficiency
el. 23-25%

Source: producer

Gasification unit using down draft co-current flow and dry gas cleaning
New development of displayed 9 kW-plant is based on know-how from 400 plants

Status III/2015: 475 plants on customer's sites, out of that 232 abroad.

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Example for building up a product spectrum.....



holz energie
wegscheid

Technical data:
electric power
65, 125, 140 kW

thermal capacities
110, 230, 260 kW

Gasification unit based on down draft solid bed reactor co-current flow and hot gas cleaning

Source: producer

Status III/2015: 42 Modules on customer's sites, out of that 22 abroad

Example for a shift to more complicated fuels



Biomass-
Kombi-Power-System®

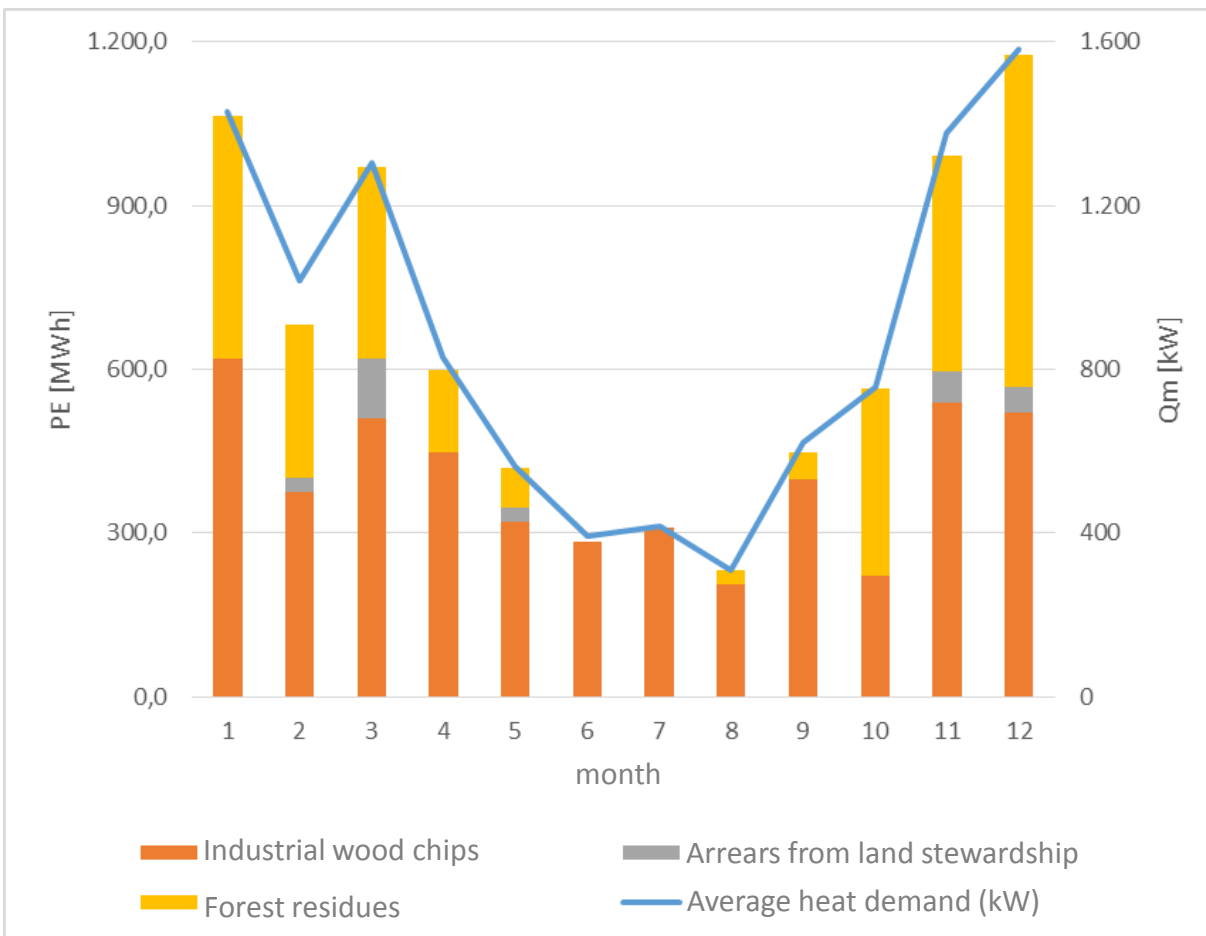
technical data:
electric power
2.450 kW
Thermal capacity
4.300 kW
electric efficiency
30 %

Source: producer

Gasification based on down draft solid bed counter-current flow added by a combustion chamber and optional electricity production alternatives (hot gas turbine) under construction:
Counter current gasification, flue gas cleaning and gas motors

Status III/2015: gasification units 4x on customers sites, gas exploitation site specific

Example for the opportunity to establish CHP units on the occasion of heating plants improvement



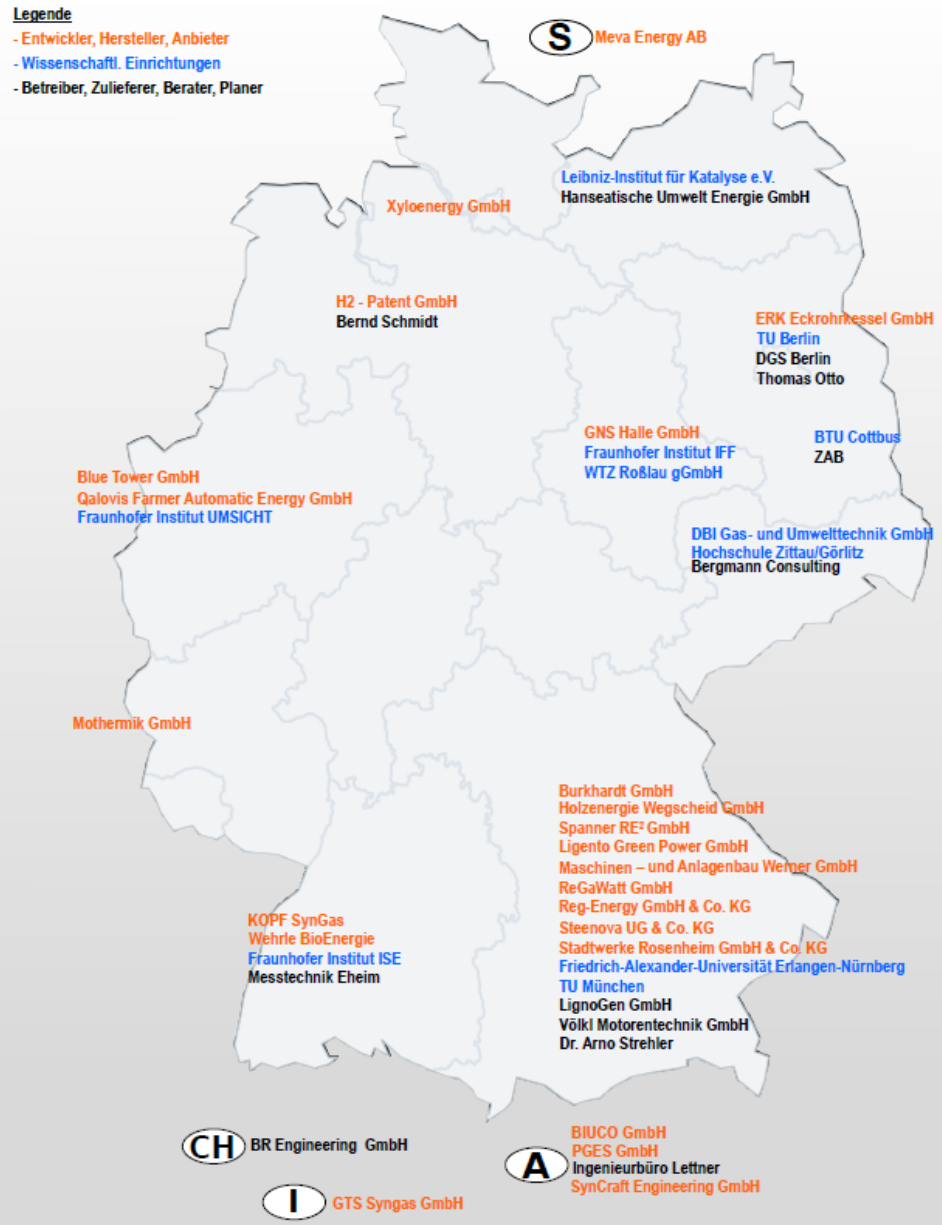
No chance without calculation,
Without calculation, no chance!

A necessity: exploitation or shipment of solid residues has to be mastered correctly



A „black chapter“
Is being
transformed
to a grey one.

recollection
to
potassium
as recyclable
should be
considered



German Working group on gasification of biomass run by FEE e.V. needs to be adapted as well.

It keeps contact to those engaged in amending and developing obligations and acts on energy and related fields like air cleaning.

It follows new electricity market design developments and the new tender processes (EEG16).

It is engaged in more efficient Cooperation on R&D.

Simply, we are there... when gasification of biomass is on the agenda.



Please check carefully repeatedly the conditions for CHP units based on gases generated from biomass/wood.
Please check repeatedly offers and references and talk to users, visit sites with running plants.
Please calculate repeatedly, first on micro economic basis than on macro (=regional) economic basis

Thanks to all who supported the preparation of this presentation.

Thank you for your attention!

More Information on:

Society for the promotion of Renewable Energies e.V.

info@fee-ev.de

www.fee-ev.de



Hope to see you again

December 2nd, 2015
8. International Appliers Conference Biomass Gasification
Innsbruck , Austria

A common event of „IEA Task 33“ (part of IEA Bionenergy), Management Center Innsbruck (MCI) and FEE e.V.

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