

Future Amercentrale

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Bio Park Amer
Bio Based Economy



RWE



POWERING.RELIABLE.FUTURE

How we think. What we do. What we are working on.

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Amercentrale, Geertruidenberg



Future Amercentrale?

Beyond wood



Beyond coal



Beyond co-firing



Future for the Amercentrale? Yes! A biomass future

RWE's Amer 9 and Eemshaven

- RWE secured subsidies in the two 2016 SDE+ rounds to co-fire 80pc biomass at its Amer 9 unit for eight years*.
- So far, RWE confirmed it will move ahead with co-firing plans at Amer 9. RWE will co-fire over 50pc biomass at Amer 9 this year and move to 80pc by 2020, it said. Amer 9 previously co-fired under the old subsidy scheme.
- Amer 9 will use about 1.1mn t/yr of wood pellets to co-fire 50pc and 1.8mn t/yr to co-fire 80pc, assuming energy efficiency of 39pc, Argus estimates.
- RWE also secured subsidies in the autumn 2016 SDE+ round to co-fire 15pc at its Eemshaven coal-fired plant, but is yet to give a timeline on when co-firing will begin. One unit co-firing 15pc would require around 380,000 t/yr, assuming 46pc efficiency, Argus estimates.

**all biomass co-firing subsidies are for eight years*

<http://www.woodpelletservices.com/documents/Argus%20update%20on%20The%20Netherlands%20co-firing.pdf>

Amer power plant, Geertruidenberg

- > 625 MWe, 350 MWth district heating
- > Large scale biomass co firing subsidies granted to reduce CO2 footprint
- > 50% coal replaced by 2018
- > 80% of current coal use can be replaced by 2020

Eemshaven power plant

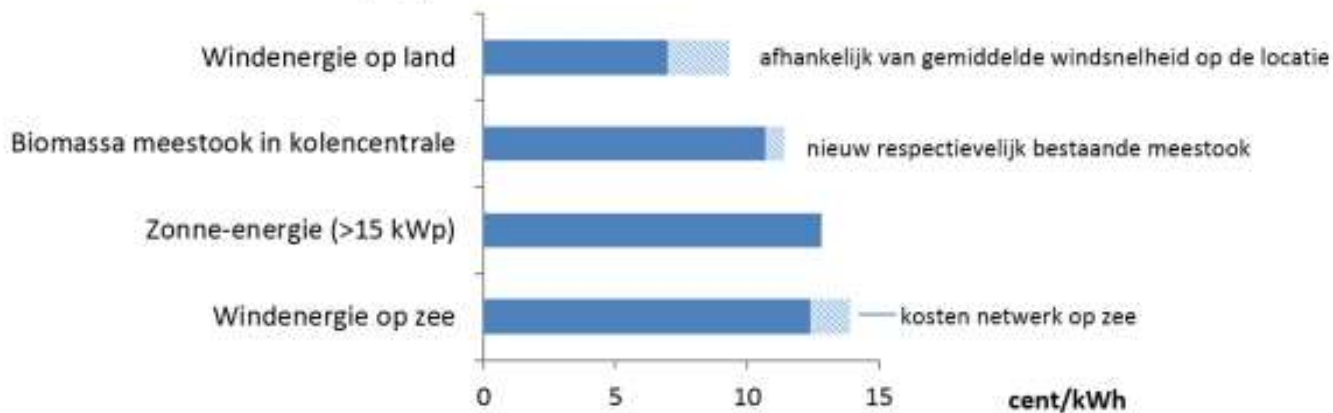
- > Subsidies granted for replacement of 15% of coal by biomass

Why biomass?



Sustainable biomass for energy is affordable

Kostprijs duurzame elektriciteit in Nederland



Bron: ECN eindadvies basisbedragen SDE+ 2016; Voor wind op zee: ministerie van economische zaken: maximum tenderbedrag 'Borssele' 12,4 c/kWh en kosten TenneT netwerk op zee 1,5 ct/kWh



Future Amercentrale

Amercentrale is the location in NL where sustainable energy is created

Amercentrale makes the transition to sustainable energy possible

Bio park Amer facilitates bio based economy initiatives

Sparkling new energy, knowledge development and innovation

International strategic location, “altijd dichtbij”, attractive habitat



Facilitating bio based economy

Bio Park Amer enables

- > Developments in the bio based economy
- > Utilities / biomass logistics

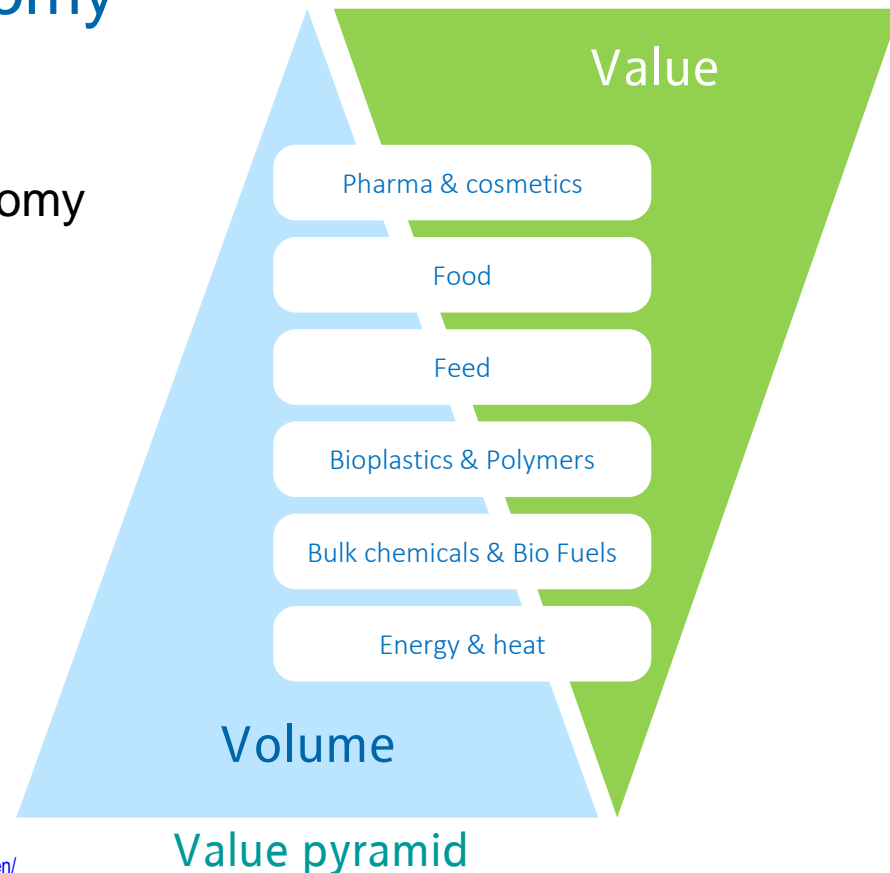
Drivers for RWE

- > Local biomass
- > Cascading biomass use
- > Adding value to biomass

Focus of Bio Park Amer

- > Biomass conversion activities
- > Installation realisation
- > Piloting, demo facilities

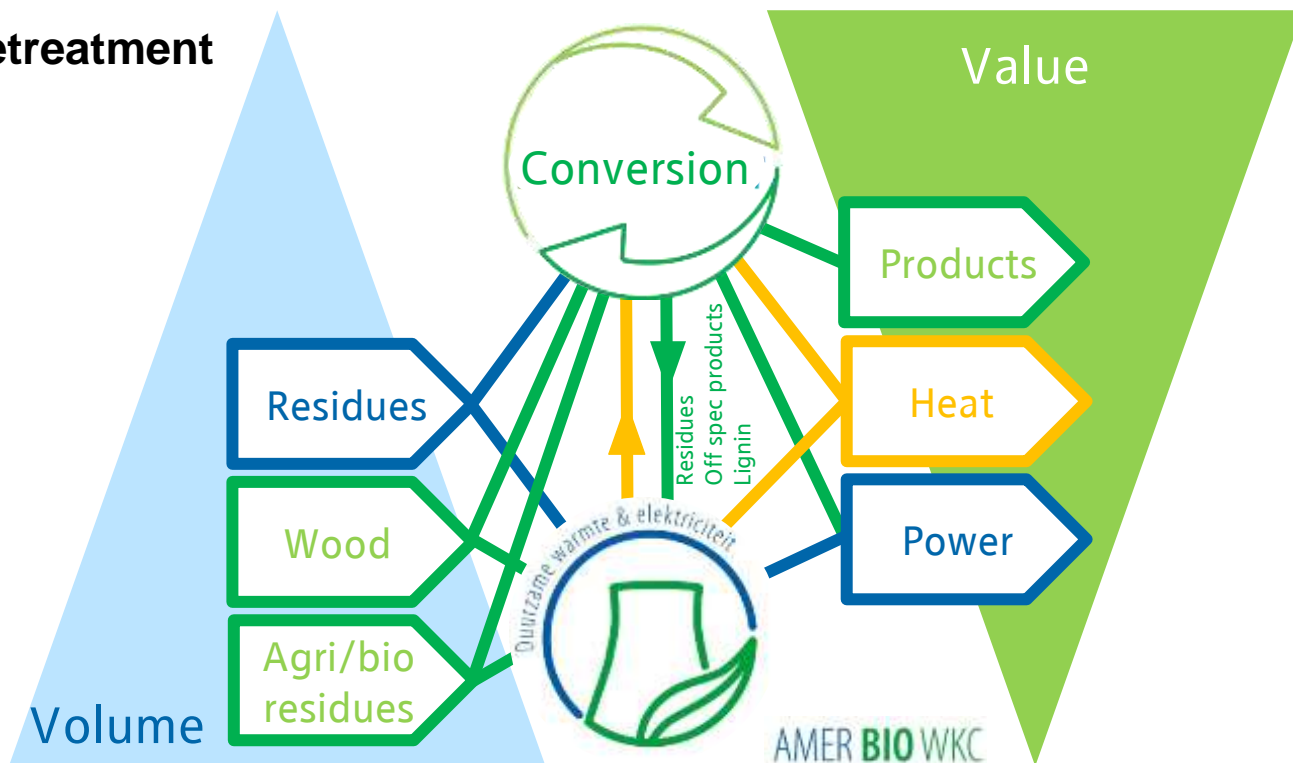
<http://www.agro-chemie.nl/artikelen/biopark-amer-amercentrale-gaat-ontwikkelingen-biobased-ondersteunen/>



Bio Park Amer

Conversion and pretreatment

- > Torrefaction
- > Torwash
- > Drying
- > Size reduction
- > Pelletizing
- > Sorting
- > Upgrading
- > Steam explosion
- > Hydrolysis
- > Fermentation



<https://direct.argusmedia.com/newsandanalysis/article/1356024?keywords=bio%20park> RWE plans Dutch biopark

Advantages of Bio Park Amer

We have over 15 yrs of biomass experience

- > Safety
- > Ship unloading
- > Truck unloading
- > Storage
- > Transport

So volumes of and different types of biomass do not make us nervous!



Bio Park Amer advantages

We are experienced with large facilities

- > Steam boilers
- > Gasification
- > Truck unloading facilities
- > Ship unloading
- > Biomass storage
- > Transportation
- > Safety

So,

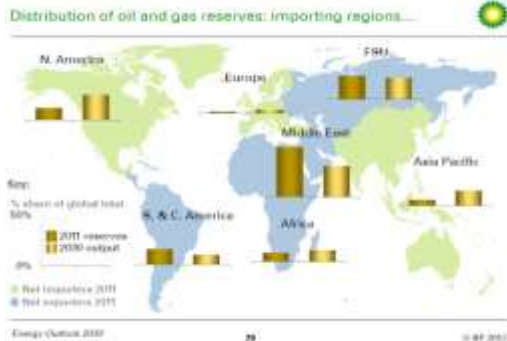
industrial installations do not scare us!

We love them!



Create alliances with bio based economy: biorefinery

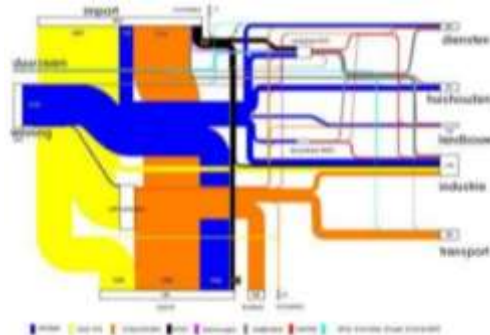
North western EU



Security of supply Demand for CO₂ reduction

- > ARRA heavily depends on fossil feedstock
- > Europe heavily depends in imports
- > Low CO₂ society requires CO₂ neutral chemicals

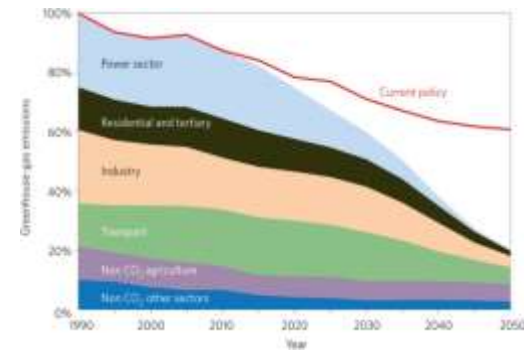
Netherlands



Geographical position Petrochemical industry

- > Key importing country of fossil fuels
- > Key exporting country of intermediates + end products
- > Large petrochemical industry

Biomass

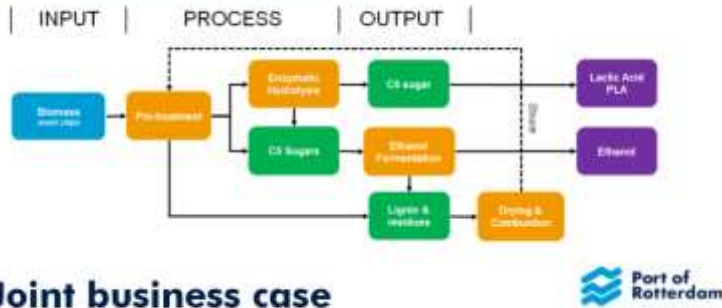


New value chain Bio energy to bio chemistry

- > Energy agreement: some certainty up to 2028
- > What will happen after 2028?
- > RWE is asset backed trading company

Example of alliance with bio refinery initiative

The Bio-refinery concept



Joint business case

Corbion, Uniper, RWE and the Port Authority have developed a joint business case that looks very promising. The port of Rotterdam enjoys a steady intake of biomass. The development of a biorefinery would allow local partners to take even more effective advantage of this influx. The biomass can be used instead of fossil base materials for the production of biochemicals and plastics, as well as generate

From wood to bioplastics

Chemically breaking down (refining) wood feedstock rather than burning it directly yields a number of interesting components: lignin and sugars. Project Director Marc Lankveld of Corbion: "That is why Corbion has joined this initiative. We can use the sugars created in this process for the production of bioplastics." The lignin can be used to generate heat and energy and, in the longer term, chemicals and fuels. Lankveld: "This allows us to create even more value."

<https://www.portofrotterdam.com/en/news-and-press-releases/joining-forces-for-a-biorefinery-in-rotterdam>

Corbion

> 2018 75 kTpa PLA bioplastics plant

PoR

> 2025 Rdam X00 kton p y wood

RWE Generation NL

> Could deliver feedstock

> Could take off residue

> Could valorise lignin

Thank you for your attention



Beyond coal



Beyond wood



Beyond co-firing

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