



bioenergy2020+

Recent developments in bioenergy and biofuels - IEA Bioenergy Highlights

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IEA Bioenergy ExCo Alternate for Austria

Austrian IEA Bioenergy Task 39 Workshop „Biofuels“

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Transport Biofuels in IEA Bioenergy

- IEA Bioenergy: “Value for Money”
 - Founded in 1978,
 - a top class Agreement under the umbrella of the International Energy Agency with 23 member states
 - ... aimed at the deployment of sustainable bioenergy and competitive bioenergy technologies
 - ... with an long-lasting, regularly adapted strategic approach, more and more globally oriented.
- Transport biofuels activities since 1995
 - ... starting with (nowadays) “Conventional Biofuels”,
 - today with 14 countries one of the pillars of the Agreement ,
 - ... strongly focussed on “Advanced Biofuels” and biofuels policies.



Bioenergy Trends

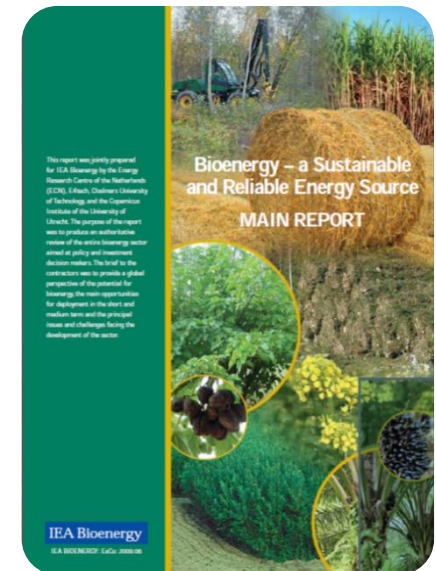
- EU: “Sustainable Bioeconomy”, but managing land use change (direct & indirect) is challenging
- “RIN”s reflect the US bioenergy policy
- “Energy Revolution” in Germany
- IEA-B focussed on “Mobilizing sustainable bioenergy supply chains”
- Sustainable Bioenergy – opportunities for energy, industry and agriculture
 - IRENA: **“BIOENERGY is #ONE!”**
 - FAO: Bioenergy is complex but offers global opportunities
- Advanced Biofuels toward commercialisation
- Emerging biofuels technologies:
 - Biomethane for transport,
 - Aviation biofuels

Policy is the key!



IEA Bioenergy MAIN REPORT 2009: Bioenergy - a Sustainable Energy Source

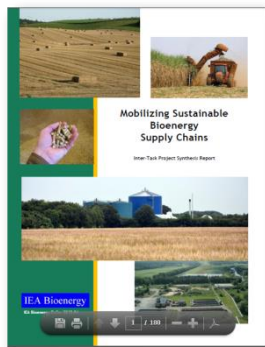
- Bioenergy could contribute 1/4 to 1/3 of global primary energy supply in 2050
- It is the only renewable source that can replace fossil fuels in all energy markets
- Expansion of bioenergy poses challenges
 - Competition for land and for raw material
 - Productivity of food feedstocks needs to be increased
 - Bioenergy must become increasingly competitive



www.ieabioenergy.com/wp-content/uploads/2013/10/MAIN-REPORT-Bioenergy-a-sustainable-and-reliable-energy-source.-A-review-of-status-and-prospects.pdf

Mobilizing sustainable bioenergy supply chains

- IEA-B strategic project involving T37-Biogas, 38-Climate Change, 39-Biofuels, 40-Trade, 42-Biorefining, 43-Feedstocks)
- Prospects for large-scale mobilization of bioenergy resources
- Case studies: boreal+temperate forests, agricultural residues, biogas, lignocellulosic crops, grasslands+pastures in Brazil
- Results



- ✓ Efficient production of biomass can contribute to ambitious targets
- ✓ Social changes along the supply chains needed to mobilize resources and to make the social and economic services possible
- ✓ Strong policy needed, eg mandates, RE portfolios, taxes, CO₂ trading schemes
- ✓ **Success will depend on greater policy support than today**

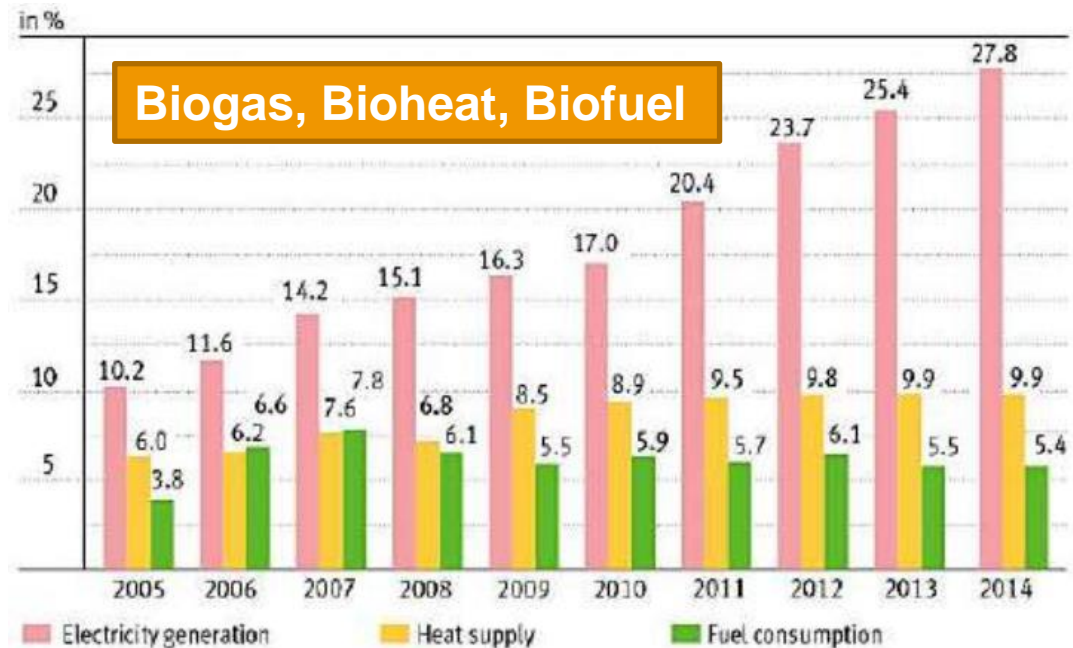


Bioenergy in Germany today

Renewable energy in Germany

	Overall share [%]	RE share [%]
Hydropower	0.5	5
Wind	1.6	14
PV	1.0	9
Solar heat	0.2	2
Geothermal	0.3	3
Bioresidues	1.0	9
Biomass	6.7	59

https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_bioenergy_exco76_berlin_2015_bericht.pdf?m=1469660758





Germany: ambitious 2050 goals

Renewable energy 2020 goals [%]

	2014	2020
Renewable power	28	35
Bioheat	10	14
CHP-power	16	25
Transport fuel ¹⁾	5.1	10-12
¹⁾ 6 % GGE reduction required		

https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_bioenergy_exco76_berlin_2015_bericht.pdf?m=1469660758

Energy scenario 2050

	2014	2050
Consumption [PJ]	12 400	6 950
Fossil [%]	89	49
Biomass [%]	7	28
Other RE [%]	4	23

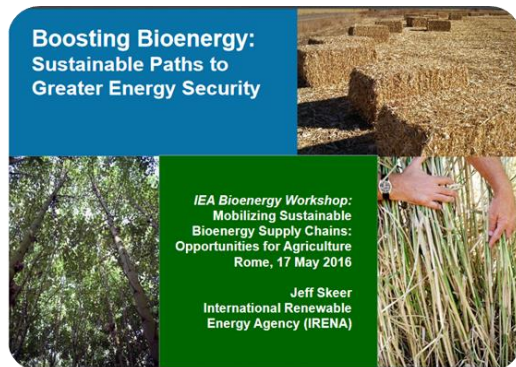


IRENA: „Bioenergy is number ONE“

Global Bioenergy Use in 2030 [EJ]

Industry	28
Power	24
Transport	23
Residential	19
Total	94

https://www.nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_bioenergy_exco76_berlin_2015_berechtigt.pdf

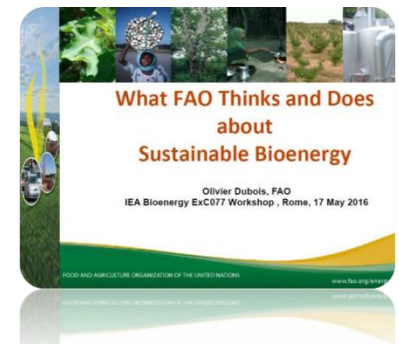


Global Biomass-to-Energy Potential 2050 [EJ]

Agricultural residues	36 – 76
Increased agricultural productivity	47 – 88
Transformed pasture	71 – 83
Reduction of food waste	40 – 83
Increased silvicultural productivity	83 – 141
Overall	287 - 549

FAO: Bioenergy in Developing Countries

- **Sustainable biomass for energy & industry is complex**
- Models and studies not applicable for evaluation!
- Sustainability must be evaluated in the regional context
- Bioenergy from food crops is neither good nor bad
- Manifold reasons for food price development!
- Certification & monitoring systems needed
- Protect the soil when using residues!!!
- Some dedicated energy plants not mature!
- Biomass for energy and industry may increase rural incomes (eg. EtOH in Brazil, palm oil from outgrowers in Indonesia);





Advanced Biofuels toward Commercialisation

- Commercial „lignocellulose to ethanol“ plants (overall capacity 0.5 mio. m³) in the US (2), Brazil (2) and Italy (1) started operation¹⁾

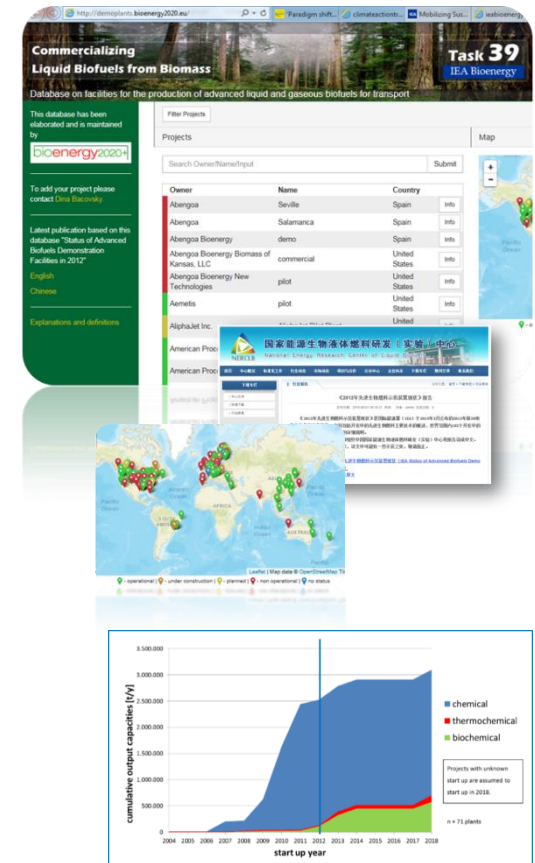
- **Pioneering is challenging**

- Success needs money, efforts, patience, know-how and long term plans

RELIABLE POLICY IS A MUST

- Task 39 data base in the web

<http://demoplants.bioenergy2020.eu/>



¹⁾ https://www.nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_bioenergy_exco76_berlin_2015_bericht.pdf

Emerging technologies

■ Pyrolysis oil production and use¹⁾

■ Plants under operation:

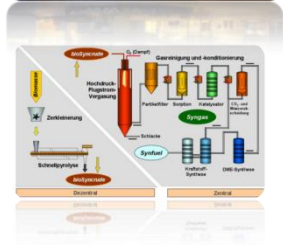
- 25 MW pyrolysis oil plant of FORTUM/ Finland, developed by VALMET; oil for power and heat
- EMPYRO in the Netherlands fast pyrolysis 25 MW plant; oil for heating purpose

■ Process R&D of “biosyncrude” for FT-fuel at KIT/ Germany

- UOP develops „Fluid Catalytic Cracking“ (FCC) process“ for fuel produced from Rapid Thermal Processing (RT) oil

■ Torrefaction²⁾

- Production technologies available
- ISO Standardization under way
- Commercial success limited



1) <http://ieabioenergy2015.org/proceedings/session-vi/>

2) http://ieabioenergy2015.org/fileadmin/veranstaltungen/2015/IEA_Bioenergy_Conference/P01-1_Wild.pdf

Growing interest in Biomethane for Transport

Favourable framework for biomethane, eg in

■ Italy¹⁾

- 1100 CNG filling station
- 900 000 CNG vehicles (more than in the rest of Europe)
- Biomethane could help to reach the 2020 EU 10 % RE transport sector goal

■ UK²⁾

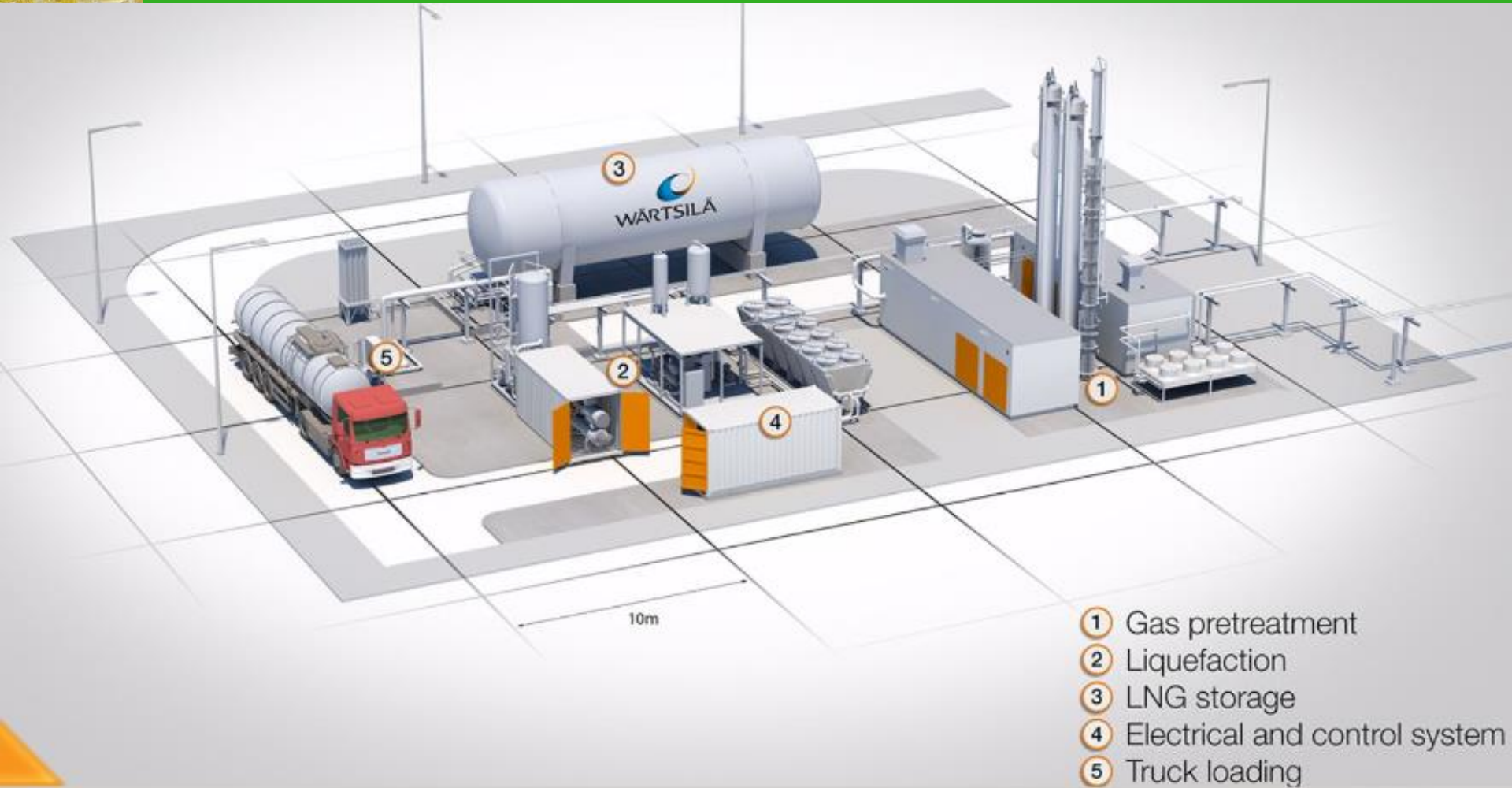
- injection of biomethane in 30 bar gas grids
- CNG filling station for heavy duty vehicles



1) https://nachhaltigwirtschaften.at/resources/iea_pdf/reports/iea_bioenergy_workshop-bericht-exco77.pdf

2) <http://ieabioenergy2015.org/proceedings/session-vii/>

Found in the internet: biogas for buses



- ① Gas pretreatment
- ② Liquefaction
- ③ LNG storage
- ④ Electrical and control system
- ⑤ Truck loading



Michael Paula @mipaula · 12. Sep.

Wärtsilä to deliver Nordic countries' largest #biogas plant to produce #fuel for #buses bioenergy-news.com/display_news/1...



Aviation Biofuels - Results of the IEA Bioenergy Conference 2015 in Berlin

Growing aviation market, „Drop-In Biofuels“ are a must

IATA:

http://ieabioenergy2015.org/fileadmin/veranstaltungen/2015/IEA_Bioenergy_Conference/Po1-4_Roetger_IEA_Bioenergy_271015_IATA_final.pdf

- Sustainable alternative fuels can be a main contributor to aviation's 2050 emissions reduction goals
- Airline-supplier agreements: over 400 000 t/yr
- **Incentives**
 - US: RIN
 - EU: 10 % renewable transport fuel in 2020
 - **Incentives like those for road transport missed**

Sustainable Alternative Fuel Deployment – Status



Boeing: Biofuels are available but insufficient supply and „price premium“ (approved biofuels: FT, HEFA, syntisized paraffin's; alcohol-to-jet; near approval: alcohol-to-jet)



A personal approach

Biomass: stored solar energy, physical present, suitable for energy and industry. The challenge: feedstock supply

1st gen biofuels:

- Have stabilized regional incomes and food prices
- Sustainability & potential worldwide underestimated, lack of appropriate policies
- Insufficient approach to sustainability (policy, science)
- **Austria: agricultural area limits volumes**

Advanced biofuels:

- Lignocellulosic feedstock: more fuel per hectare!
- High investment costs, high risk of first movers
- **Austria: strong in technologies**

**Most important in 2050:
Aviation biofuels**



Read more <http://www.ieabioenergy.com/>

IEA Main Report 2009

www.ieabioenergy.com/wp-content/uploads/2013/10/MAIN-REPORT-Bioenergy-a-sustainable-and-reliable-energy-source.-A-review-of-status-and-prospects.pdf

IEA-B Workshop results:

[Tue 17th May, 2016 WS20: Mobilising sustainable bioenergy supply chains: opportunities for agriculture](#)

[Thu 23rd Oct, 2014 WS19: Bioenergy – Land-use and mitigating iLUC](#)

[Tue 20th May, 2014 WS18: Infrastructure compatible transport fuels](#)

[Thu 1st Dec, 2011 WS15: Environmental Sustainability of Biomass](#)

[Fri 14th May, 2010 WS14: Future Biomass-based Transport Fuels](#)

Conferences

<http://ieabioenergy2015.org/proceedings/>

[Tue 13th Nov, 2012 IEA Bioenergy Conference 2012](#)

Subscribe www.network-biofuels.at/

Mehr auf “Nachhaltig Wirtschaften”

- IEA Bioenergy Task 39 Business Meeting Australien, Bioenergy Australia Conference 2010, Studienreise Neuseeland
- “BBEST Conference Campos do Jordao, BBEST Study Tour, Task Business Meeting Rio de Janeiro”
- „IEA Bioenergy / AMF Joint Workshop Kopenhagen, Dänemark“
- “IEA Bioenergy Study Tour zum “Bio Port” Gent und Workshop „Bioenergy - Land use and mitigating iLUC“
- “IEA Bioenergy Task 39 Business Meeting und 11. Internationaler Fachkongress „Kraftstoffe der Zukunft 2014“
- “IEA Bioenergy ExCo 75 Dublin”
- “IEA Bioenergy ExCo 76, IEA Bioenergy Konferenz 2015, CORE-JetFuel Workshop Berlin”
- "Biobased Future"
- Netzwerk Biotreibstoffe