



bioenergy2020+

Production of advanced biofuels

Dina Bacovsky, Bioenergy 2020+

Vienna, 29.9.2016

COMET

Competence Centers for
Excellent Technologies

Database and interactive map

Commercializing Liquid Biofuels from Biomass

Task 39
IEA Bioenergy

<http://demoplants.bioenergy2020.eu>

Database on facilities for the production of advanced liquid and gaseous biofuels for transport

This database has been elaborated and is maintained by **bioenergy2020+**

To add your project please contact **Dina Bacovsky**

Latest publication based on this database "Status of Advanced Biofuels Demonstration Facilities in 2012"

English
Chinese

Explanations and definitions

Filter Projects

Projects

Search Owner/Name/Input Submit

Owner	Name	Country	
Aarhus University	Center for Biorefining Technologies	Denmark	Info
Abengoa	Seville	Spain	Info
Abengoa	Salamanca	Spain	Info
Abengoa Bioenergy	demo	Spain	Info
Abengoa Bioenergy Biomass of Kansas, LLC	commercial	United States	Info
Abengoa Bioenergy New Technologies	pilot	United States	Info
Aemelis	pilot	United States	Info
AlphaJet Inc.	AlphaJet Pilot Plant	United States	Info
American Process	Alpena Biorefinery	United States	Info
American Process	Thomaston GP3+ Biorefinery	United States	Info
Amyris, Inc.	Amyris Biomin	Brazil	Info
Amyris, Inc.	Amyris Tate & Lyle	United States	Info
Amyris, Inc.	Amyris Pilot & Demonstration Plant	Brazil	Info
Amyris, Inc.	Amyris Sao Martinho	Brazil	Info
Amyris, Inc.	Amyris Paraiso	Brazil	Info
Amyris, Inc.	Amyris USA	United States	Info
Anhui BBKA Biochemical	BBKA	China	Info
Aquatic Energy		United States	Info

Map

Legend: operational | under construction | planned | non operational | no status

Cellulosic ethanol facilities

Company	Country	Capacity [t/y]	Start-up
Du Pont	Nevada, Iowa, USA	83.000	2016
(Abengoa)	Hugoton, Kansas, USA	75.000	2014)
POET-DSM Advanced Biofuels	Emmetsburg, Iowa, USA	75.000	2014
GranBio	Sao Miguel, Alagoas, Brazil	65.000	2014
Longlive Biotechnology	Yucheng, Shandong, China	60.000	2012
Beta Renewables	Crescentino, Piedmont, Italy	40.000	2013
Cane Technology Center (CTC)	Piracicaba, Sao Paulo, Brazil	40.000	2012
Raizen Energia	Piracicaba, Sao Paulo, Brazil	30.000	2015
Henan Tianguan Group	Zhenping, Henan, China	30.000	2011
Borregaard Industries AS	Sarpsborg, Norway	15.800	1938

Facilities for gasification and pyrolysis

Company	Country	Capacity [t/y]	Start-up year
Fortum pyrolysis oil for use in CHP	Joensuu, Finland	50.000	2013
Enerkem methanol / ethanol from MSW	Edmonton, Alberta, Canada	30.000	2014
Goteborg Energi SNG from forest residues	Gothenburg, Sweden	11.200	2014

Plans announced or facilities under construction with a range of thermochemical technologies by:

BioMCN, Sundrop Biofuels, Akwawit, Gulf Coast Energy, Virent, Clearfuels, Solena, Clearfuels, CORE Biofuel, Fulcrum, Cool Planet, Vanerco (Enerkem & Greenfield Ethanol), Enerkem Mississippi Biofuels, ORG



POET Project Liberty

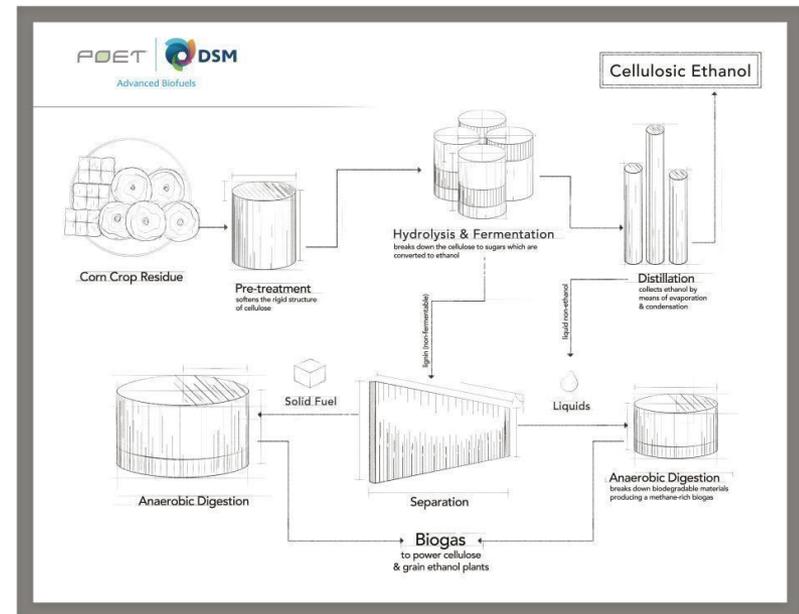
Commercial facility in Emmetsburg, Iowa, USA

Fermentation of agricultural residues (corn stover) fermentation to ethanol, integrated into conventional corn ethanol facility

Capacity 500 000 t/y ethanol, of which 75 000 t/y cellulosic ethanol;

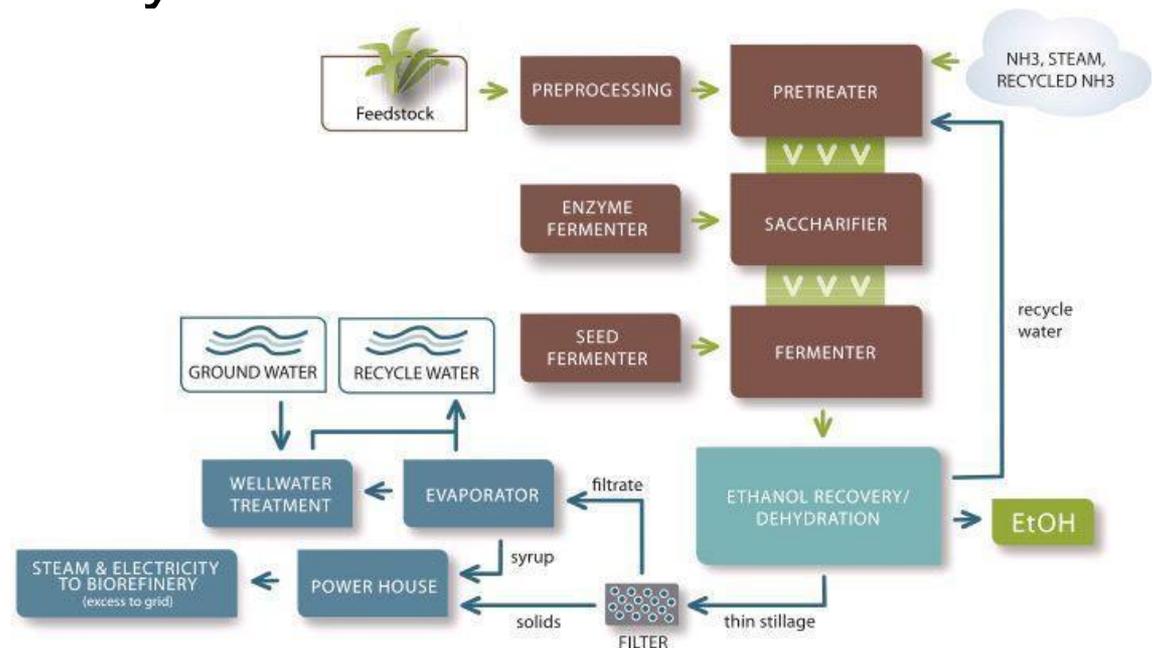
Started up in 2014

Total investment 250 mio USD



DuPont

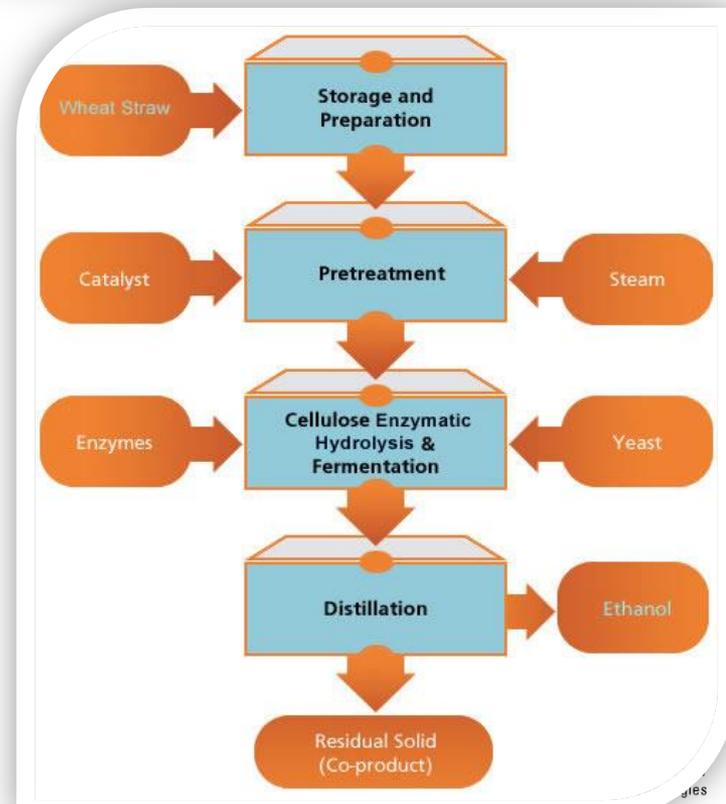
- Commercial facility in Nevada, Iowa, USA
- Fermentation of corn stover to ethanol
- Capacity 83.000 t/y
- Started up in 2016





Abengoa

- Facilities:
 - Pilot: York, USA; 75 t/y; since 2007
 - Demo: Babilafuente, Spain; 4.000 t/y; since 2010
 - Commercial: Hugoton, USA; 75.000 t/a; started up in 2014
Funding was 76 mio USD
- Fermentation of corn stover, wheat straw and switch grass to ethanol
 - Steam explosion
 - Enzymatic hydrolysis
 - C5 and C6 Co-Fermentation
 - Heat and power provided from biomass





Beta Renewables

- Commercial facility in Crescentino, Italy, capacity 40.000 t/y ethanol from fermentation of wheat straw, rice straw, arundo donax, poplar, started up in 2013
- Technology is also realized in the GranBio project in Brazil with a capacity of 65.000 t/y ethanol production





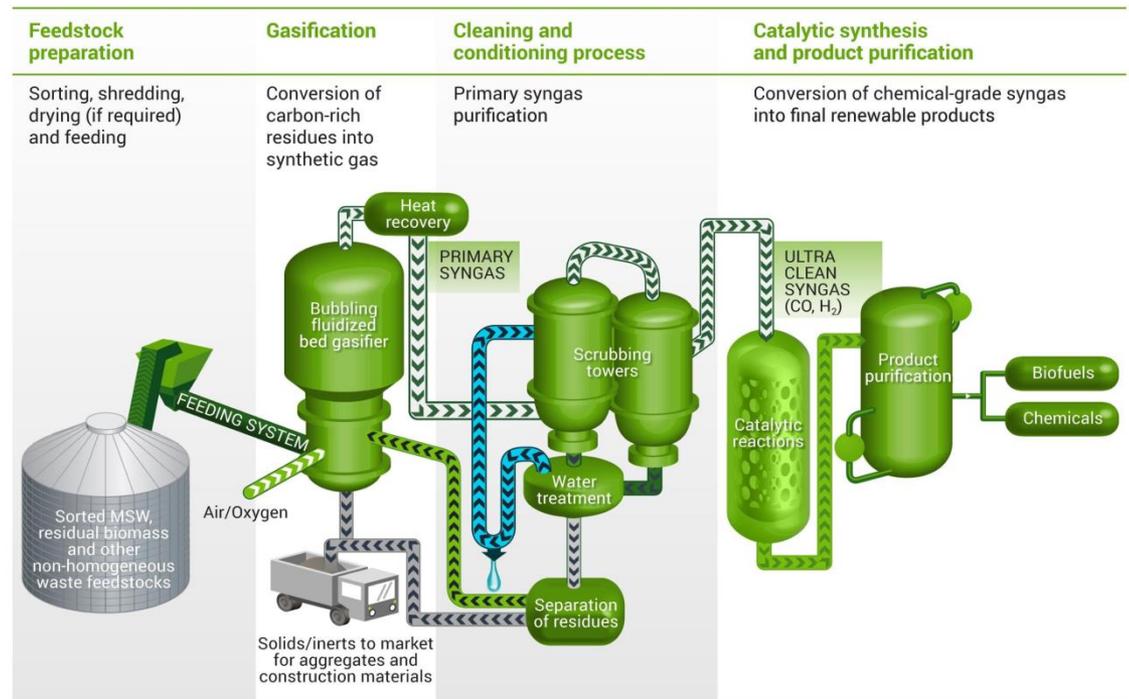
GoBiGas

- Gothenburg, Sweden
 - Phase 1: 11.200 t/y (20 MW), started up in 2014
 - Phase 2: 80-100 MW - cancelled
- Gasification of wood chips, methanation to produce biomethane, used for heat and electricity production
- Gasification technology developed in Austria (Repotec, Güssing)



Enerkem

- Commercial facility in Edmonton, Canada
- Gasification of organic residues and waste streams with subsequent catalytic synthesis to produce methanol and/or ethanol
- Capacity 30.000 t/y
- Started up in 2014

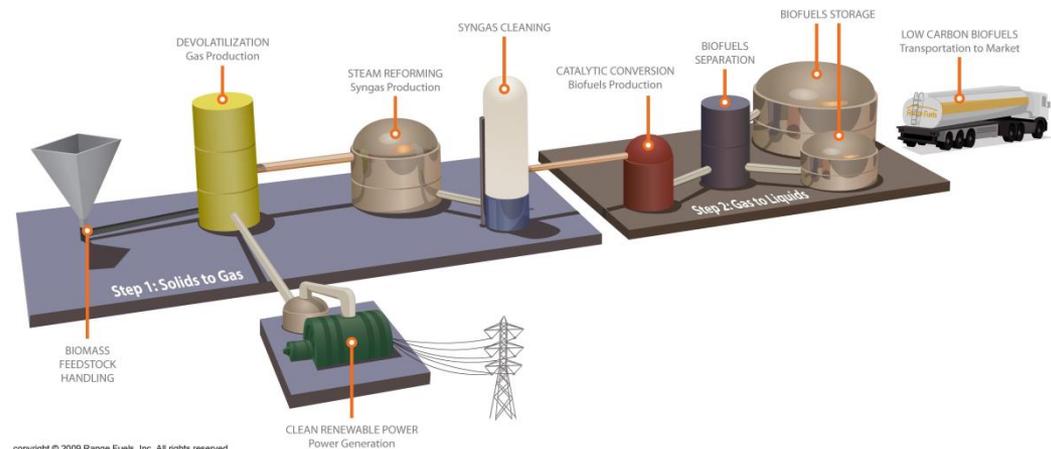
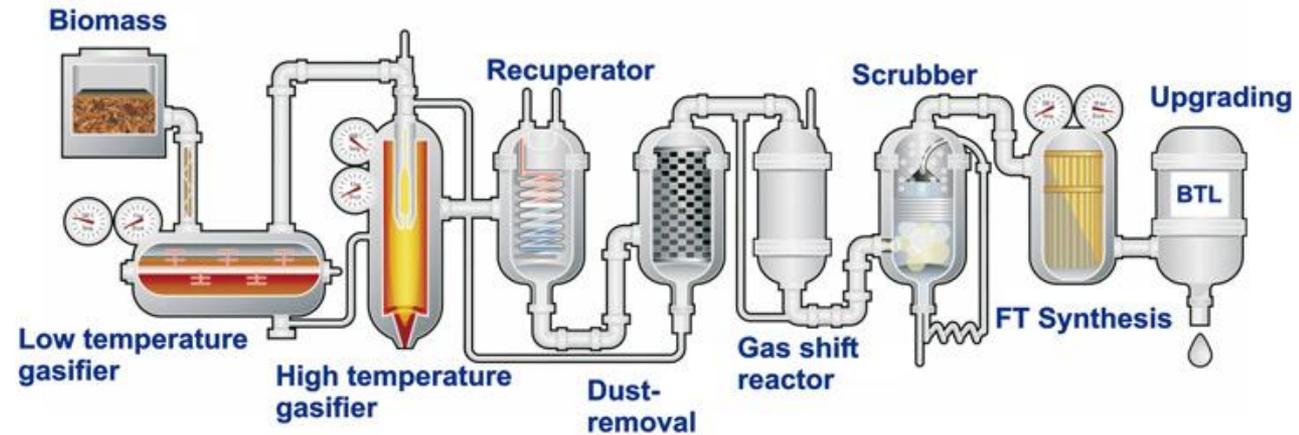


* Municipal solid waste



What happened to...?

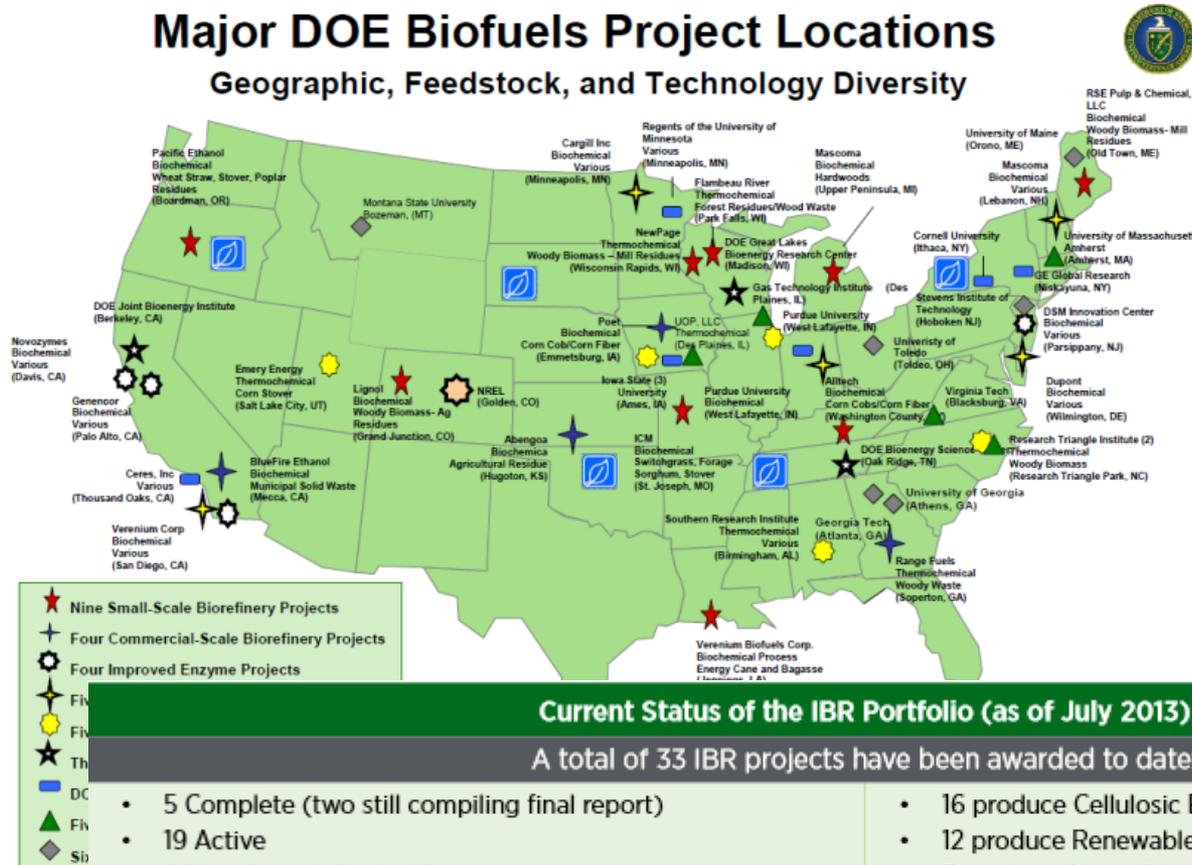
- Choren
- Range Fuels
- KiOR
- RenTech
- Lignol
- Pacific Ethanol
- New page
- Flambeau River
- Gevo
- Coskata
- ...



USDOE Integrated Biorefinery Program

<http://www.energy.gov/eere/bioenergy/integrated-biorefineries>

Major DOE Biofuels Project Locations Geographic, Feedstock, and Technology Diversity



- 5 Complete (two still compiling final report)
- 19 Active
- 4 New Awards Under Negotiation
- 5 Mutually Terminated

- 16 produce Cellulosic Ethanol
- 12 produce Renewable Hydrocarbons
- 3 produce Algae Oil
- 2 produce Bioproducts

NER 300 Projects first call announcements Dec 2012

Project	Company	Country	Funding [m €]	Status
BEST	Beta Renewables	Italy	28	
CEG Plant Goswinowice	SEKAB	Poland	31	
VERBIO Straw	VERBIO	Germany	22	
Ajos BTL	Vapo Oy	Finland	89	
UPM Stracel BTL UPM		France	170	
Woodspirit	BioMCN	Netherlands	199	
Gobigas phase 2	Goteborg Energi	Sweden	59	
Pyrogrot	BillerudKorsnäs	Sweden	31	

NER 300 Projects first call announcements Dec 2012

Project	Company	Country	Funding [m €]	Status
BEST	Beta Renewables	Italy	28	operational since Oct 2013
CEG Plant Goswinowice	SEKAB	Poland	31	Investment decision pending
VERBIO Straw	VERBIO	Germany	22	Operational since Oct 2014
Ajos BTL	Vapo Oy	Finland	89	freezed in Feb 2014
UPM Stracel BTL	UPM	France	170	investment decision pending
Woodspirit	BioMCN	Netherlands	199	investment decision pending
Gobigas phase 2	Goteborg Energi	Sweden	59	cancelled in 2016
Pyrogrot	BillerudKorsnäs	Sweden	31	cancelled in Dec 2013



Biofuels Policy Drivers

- Energy supply security
- Rural income
- GHG emission reduction



Biofuels Policy Drivers

- Energy supply security
 - low fossil oil prices reduce concerns over supply security and make biofuels even less competitive
- Rural income
 - food versus fuel debate: high prices for agricultural products drive food prices
- GHG emission reduction
 - sustainability debate: if not done right, biofuels may produce more GHG emissions than fossil fuels



EU Policy

- Biofuels Directive (2003):
 - 5,75% biofuels by 2010
- RED (2009):
 - 10% of transport fuels from RES by 2020
 - Sustainability criteria, incl. min. GHG reduction of 35% / 50% from 2017 on
- RED Amendment (2015):
 - Cap of 7% for conventional biofuels
 - Suggested 0,5% target for advanced biofuels
- Climate and Energy Policy Framework 2020-2030 (2014)
 - No transport specific post 2020 targets



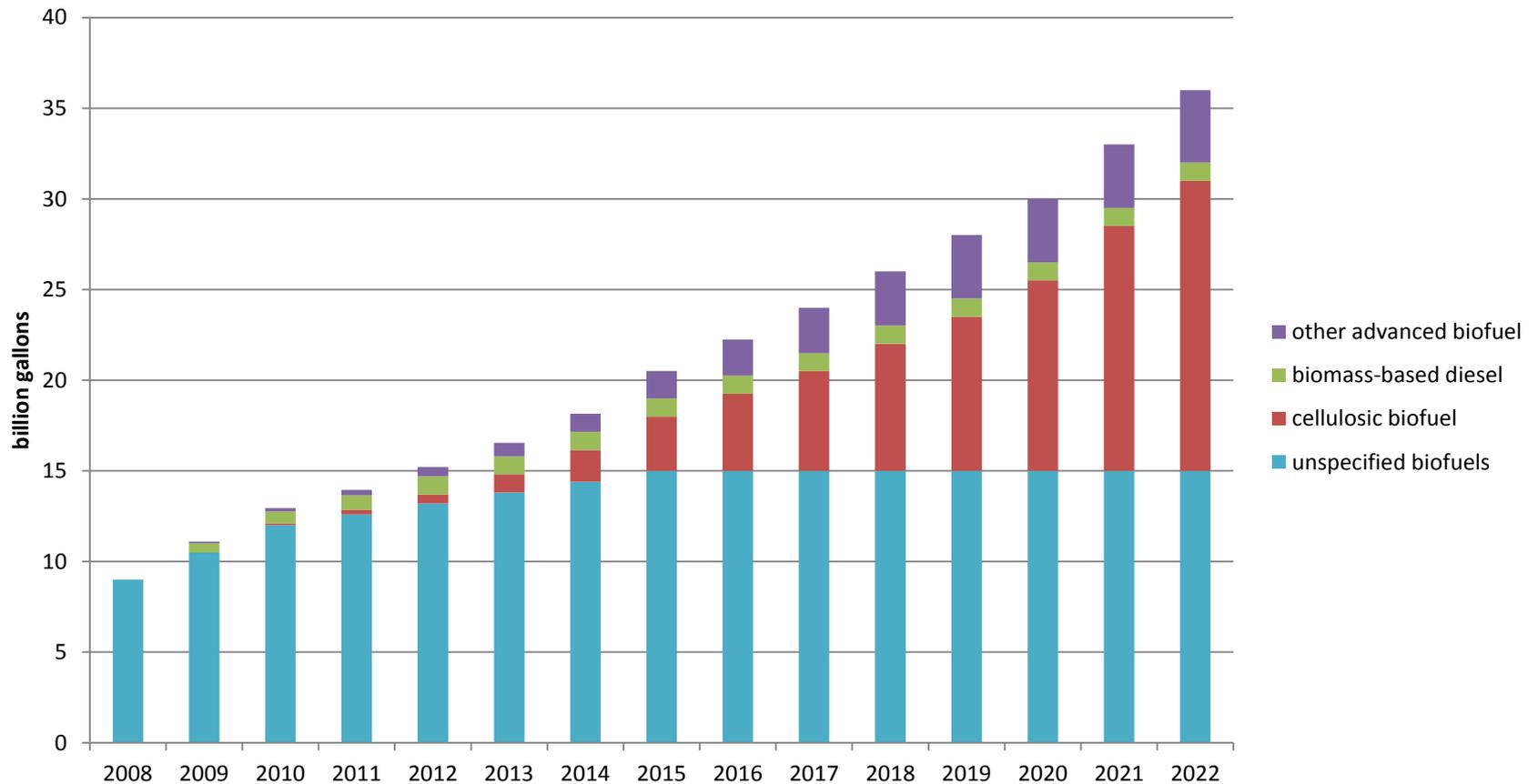
US Biofuels Policy

- Renewable Fuel Standard mandates volumes to be sold
- Increasing from 13 billion gallons in 2010 to 36 billion gallons in 2022
- Minimum GHG emission reduction is 20%
50% for advanced fuels
60% for cellulosic fuels
- But:
 - Development of cellulosic fuels lagging behind schedule
 - Mandated volumes waived every year



USA: RFS2 mandated volumes

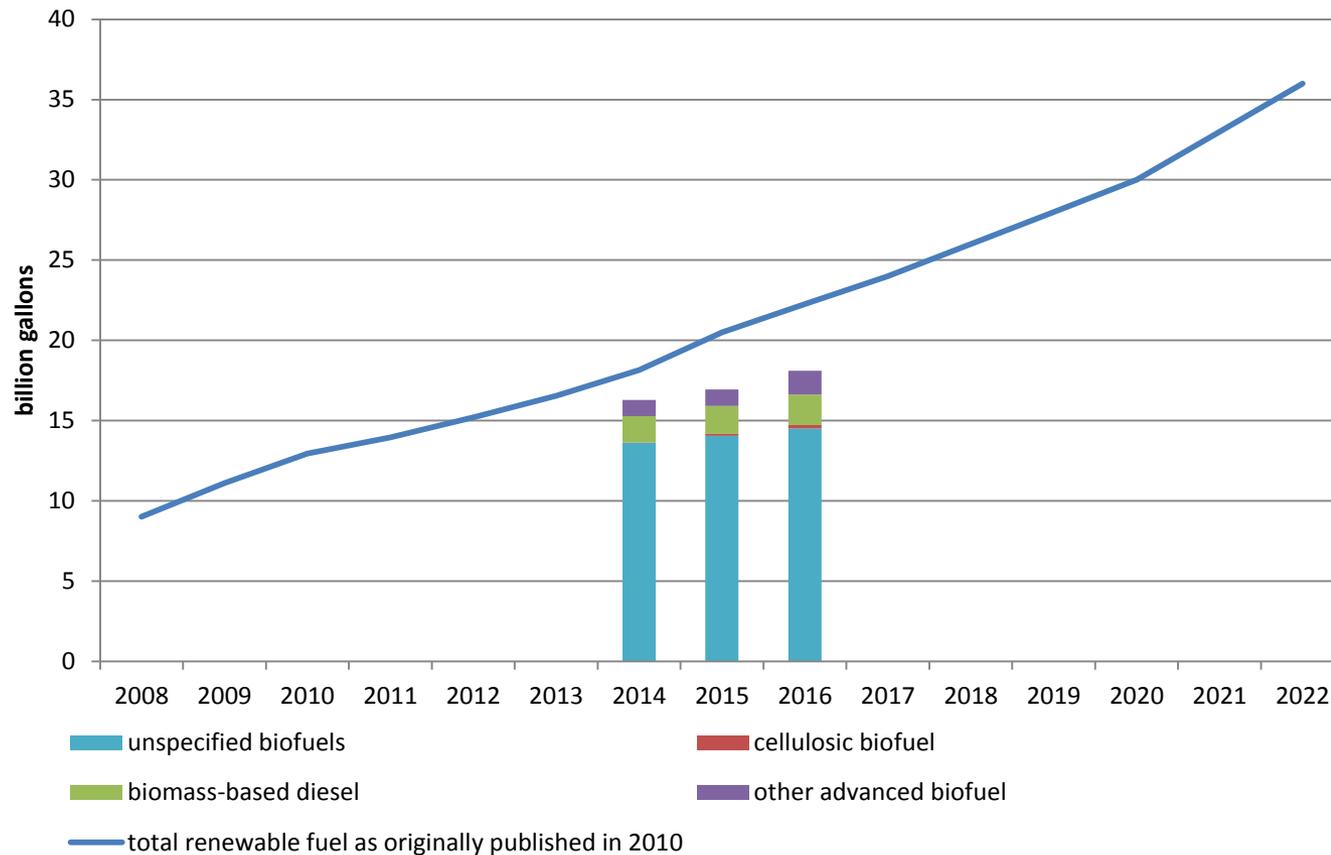
RFS2 volumes as mandated Feb 2010





USA: RFS2 revised mandated volumes

RFS2 volumes as mandated Nov 2015





Political Support in EU and USA has decreased

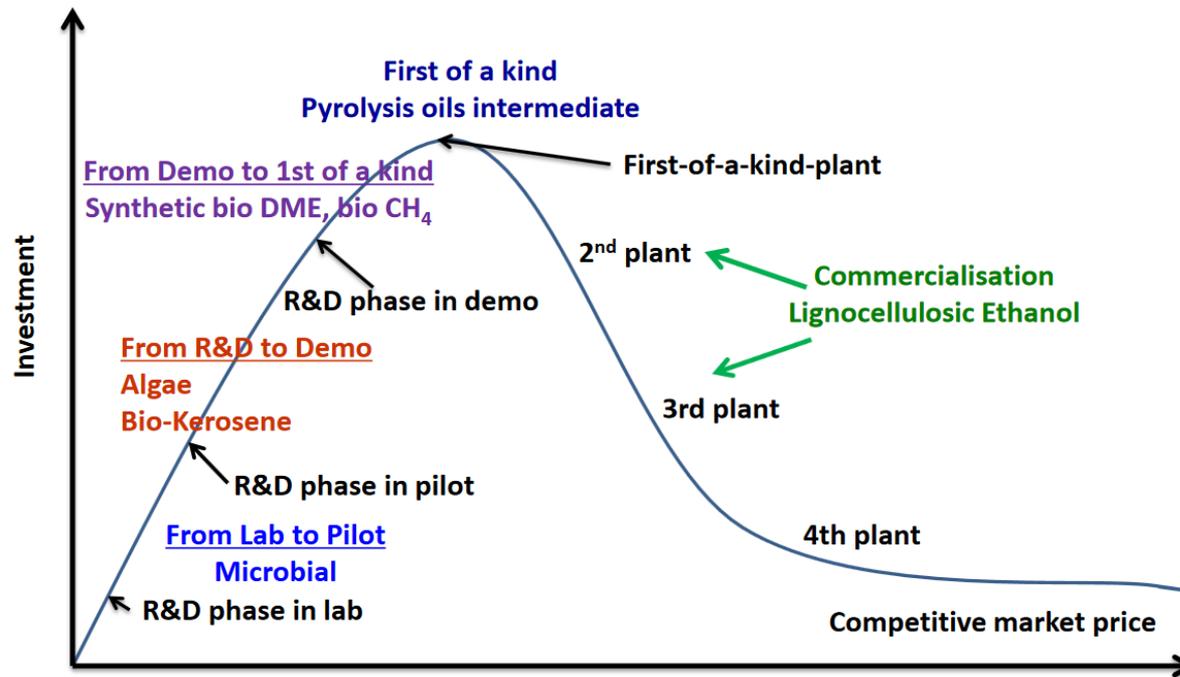
- ...consequently
 - plans for advanced biofuel production sites move to Brazil and China
 - targeted products move from biofuels to biochemicals

- As to get advanced biofuels down the learning curve a stable policy environment up to 2030 is needed as to guarantee a market for biofuels and trigger the necessary investments.



Advanced biofuels learning curve

Technology Valley of death: Positioning of FP7 supported technologies



http://www.biofuelstp.eu/spm7/Panel_Maniasis.pdf



Thanks for your attention!

Dina Bacovsky

+43-7416-52238-35

dina.bacovsky@bioenergy2020.eu

www.bioenergy2020.eu