



bioenergy2020+

Advanced biofuels are just around the corner

Advanced Biofuels Conference

Dina Bacovsky, BIOENERGY 2020+

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COMET

Competence Centers for
Excellent Technologies

Building cellulosic biofuel capacities

Company	Country	Capacity [t/y]	Start-up	Product
Beta Renewables	Crescentino, Piedmont, Italy	40.000	2013	cellulosic ethanol
Fortum	Joensuu, Finland	50.000	2013	pyrolysis oil
Abengoa	Hugoton, Kansas, USA	75.000	2014	cellulosic ethanol
Enerkem	Edmonton, Alberta, Canada	30.000	2014	methanol / ethanol
Goteborg Energi	Gothenburg, Sweden	11.200	2014	SNG
GranBio	Sao Miguel, Alagoas, Brazil	65.000	2014	cellulosic ethanol
POET-DSM	Emmetsburg, Iowa, USA	75.000	2014	cellulosic ethanol
VERBIO Straw	Schwedt, Germany	9.000	2014	biomethane
Raizen Energia	Piracicaba, Sao Paulo, Brazil	30.000	2015	cellulosic ethanol
Du Pont	Nevada, Iowa, USA	83.000	2016	cellulosic ethanol



EU Renewable Energy Directive + Amendment

- By 2020, 10 % target for RES in transport in each Member State
- Minimum GHG reduction for biofuels 35% and 50% from 2017 on; 60% for new installations from 2017
- Biofuels produced from 'food' crops capped at 7%
- Other 3% come from a variety of multiple counted alternatives
- Bench mark for the share of advanced biofuels in the transport sector of 0.5%



NER 300 – a vehicle to demonstration?

- EU funding programme for commercial scale demonstration
- Funds: selling of 300 million ETS allowances
- Award decisions taken in 2012 and 2014
- 39 RES and 1 CCS projects awarded
- 13 projects are bioenergy projects

NER 300 Bio-Projects

Call	Project	Product	Capacity [t/y]	Country	Funding [m €]	Date of entry into operation
first call	Ajos BTL	renewable diesel and naphta	115.000	Finland	89	Postponed to 31.12.2018
	BEST	cellulosic ethanol	40.000	Italy	28	Operational since Oct 2013
	CEG Plant Goswinowice	cellulosic ethanol	47.000	Poland	31	Postponed to 31.12.2016
	UPM Stracel BTL	synfuel	105.000	France	170	Withdrawn
	Woodspirit	methanol	228.000	Netherlands	199	Withdrawn
	Gobigas phase 2	SNG	56.000	Sweden	59	Withdrawn
	Pyrogrot	pyrolysis oil	160.000	Sweden	31	Withdrawn, substituted by Bio 2G
	VERBIO Straw	bio-methane	9.000	Germany	22	Operational since Oct 2014
second call	MET	cellulosic ethanol	51.000	Denmark	39	Postponed to 30.06.2020
	Fast pyrolysis	pyrolysis oil	50.000	Estonia	7	Postponed to 30.06.2020
	TORR	bio-coal	100.000	Estonia	25	Postponed to 31.12.2019
	CHP Biomass pyrolysis	pyrolysis oil	40.000	Latvia	4	Postponed to 30.06.2020
	W2B	cellulosic ethanol	22.000	Spain	29	Postponed to 30.06.2020
	Bio2G	SNG	111.000	Sweden	204	Postponed to 30.06.2020

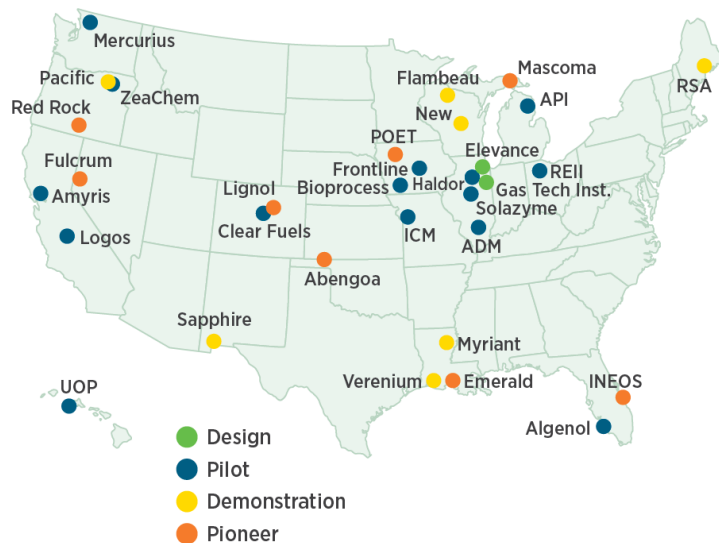
www.ner300.com



USDOE Integrated Biorefinery Program

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

Integrated Biorefinery Project Locations



Funding programme to develop, build, and operate integrated biorefineries at pilot, demonstration, and pioneer scales.

- 30 projects selected for funding
- 6 projects successfully completed to date



Lessons identified in the IBR program

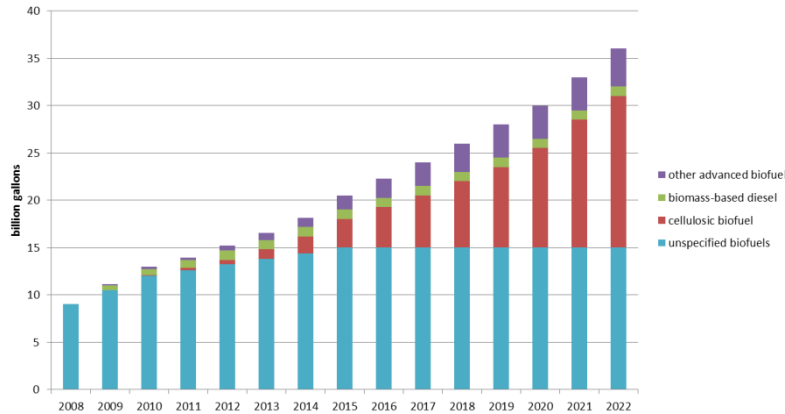
- Proper validation of technology in fully integrated pilot plants required prior to scale up
- Project location weather and climate should be considered
- Equipment in a new function should be treated as new technology
- Properly oversee long lead equipment manufacturers
- Plans against heat or power disruptions needed
- Feeding solid biomass to reactors is challenging
- Overaggressive schedules mask risks
- Well balanced, diverse project team required
- Additional contingency during commissioning required

<https://energy.gov/eere/bioenergy/downloads/integrated-biorefinery-lessons-learned-and-best-practices>

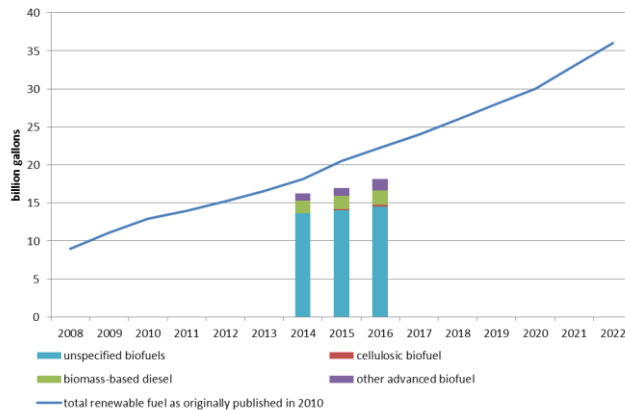


Cellulosic biofuels production in the US

RFS2 volumes as mandated Feb 2010



RFS2 volumes as mandated Nov 2015



2015

RFS2 mandate 123.0 million gallons

installed capacity ~ 45.0 million gallons

volume produced 2.2 million gallons

2016

RFS2 mandate 230.0 million gallons

installed capacity ~75.0 million gallons

volume produced 3.8 million gallons

Production data from <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/2016-renewable-fuel-standard-data>

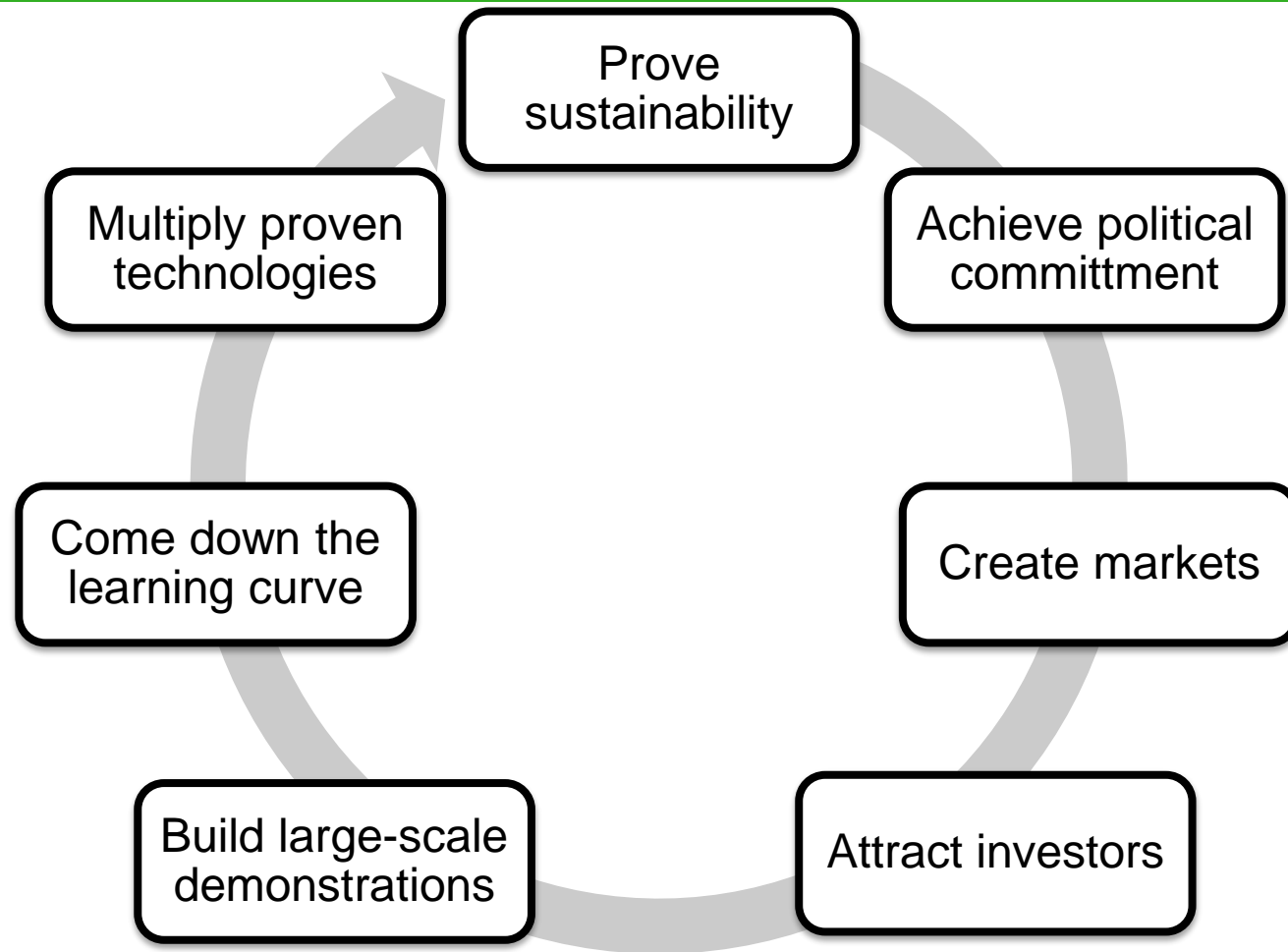


When will one of these build a second facility?

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Sustainability is key





Acknowledgements

Database and report available at:

<http://demoplants.bioenergy2020.eu>

www.task39.org



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Key Messages

- The advanced biofuels industry is developing from pilot to demonstration to commercial scale
- It takes policy to create a market, and a funding programme to enable construction of demonstration and commercial-scale facilities
- The EU RED and NER 300 do not sufficiently support advanced biofuels (but there is hope on RED II)
- The RFS and the IBR program are delivering better, although currently produced volumes are nowhere close commercial volumes
- Our hope is on the first large-scale facilities to build a second one – then large scale production may actually be just around the corner
- Markets and technologies need to be built hand in hand, and for Europe, sustainability is key