Advanced Biofuels Coalition

Driving advanced biofuels from niche to norm

Gloria Gaupmann
13th January 2020

Photo credit: UPM

Immediate action needed in the transport sector

Road transport emissions moving wrong way

Road transport share of total GHG is increasing

Source: EEA

Biofuels demand today and tomorrow

According to the International Energy Agency (IEA), biofuels is an important option to decarbonize transport. The IEA predicts 50/50 renewables vs. fossil & electricity vs. biofuels by 2060 in global transportation.

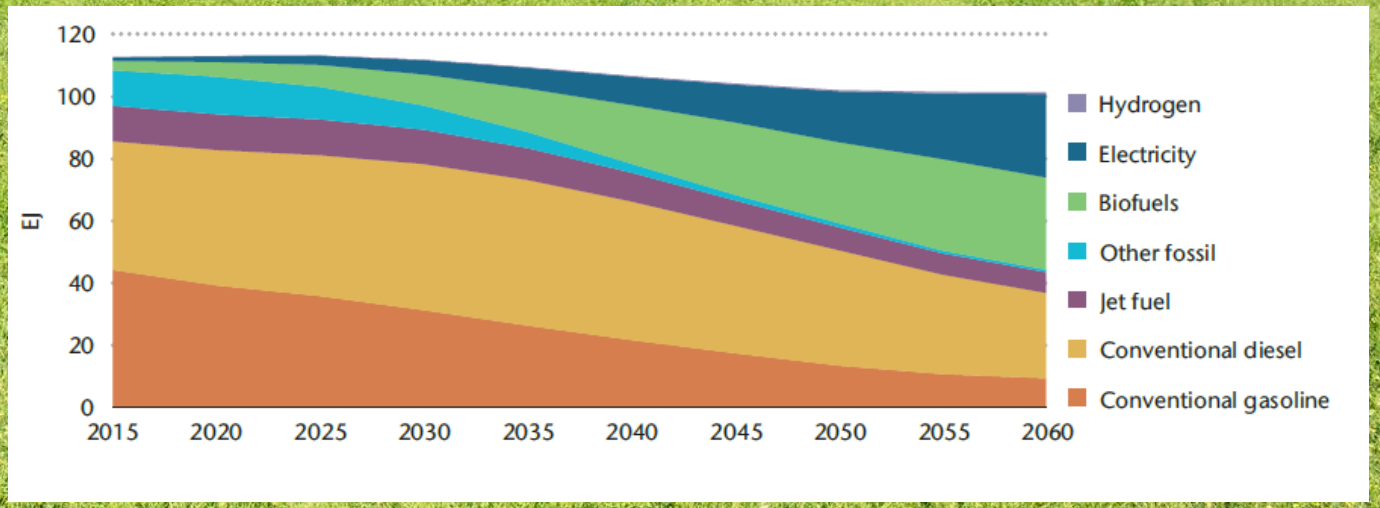
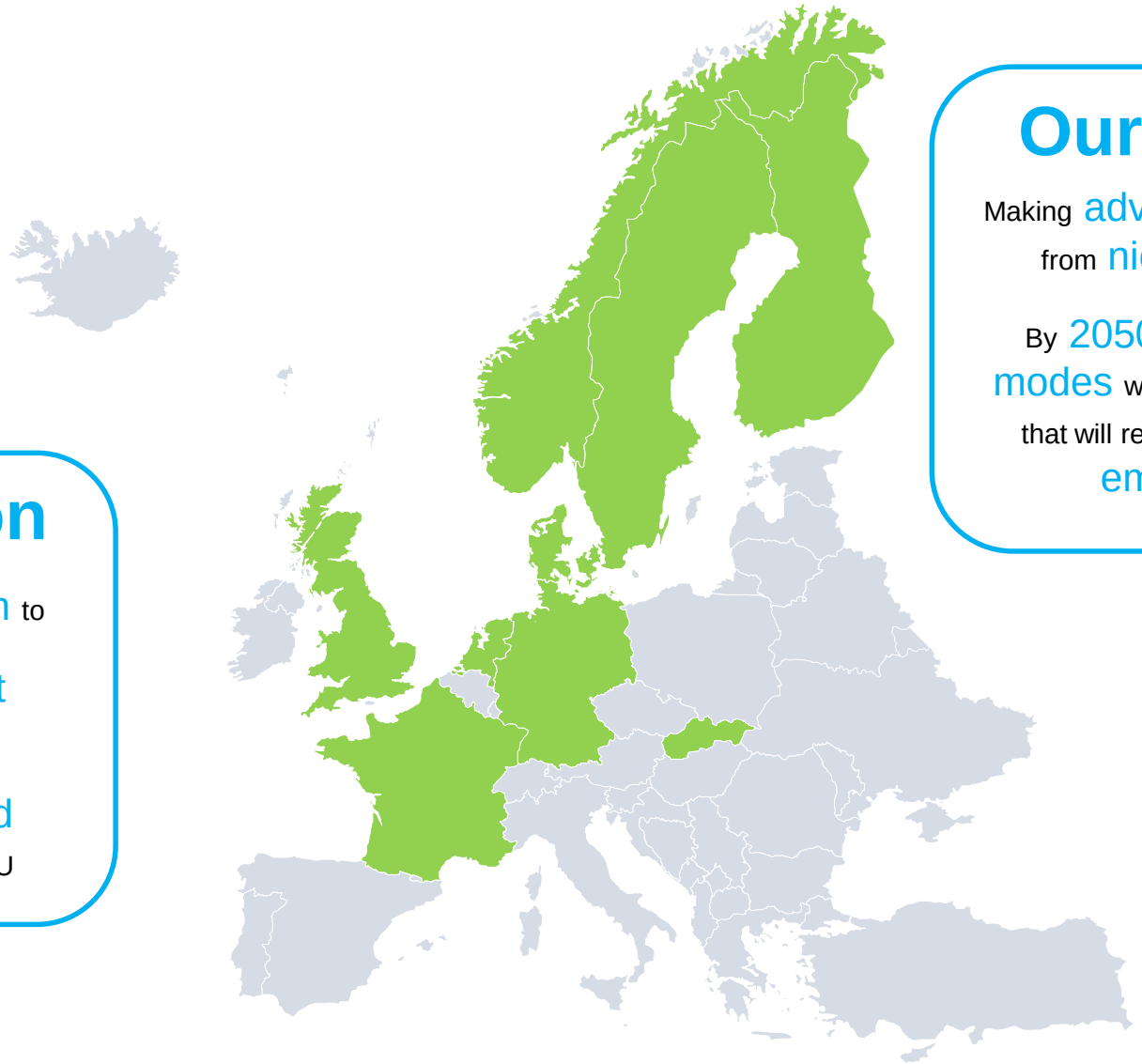


Photo credit: UPM

Advanced Biofuels Coalition -
United to drive advanced biofuels forward in Europe



Our vision

Making advanced biofuels from niche to norm

By 2050 all transport modes will use energy modes that will result in net zero emissions.

Our mission

A strong contribution to meet EU ambition for reducing transport emissions

Promote advanced biofuels use in the EU

Member Companies

CLARIANT

UPM BIOFORE BEYOND FOSSILS

ENVIRAL

TechnipFMC

Enerkem

Ørsted

Sekab

btg biomass technology group

NEOT North European Oil Trade

Global Bioenergies

Advanced Biofuels Coalition in the News[1]

ADVANCED BIOFUELS COALITION LSB

St1 constructs a biorefinery to produce renewable diesel and jet fuel

ST1_RELEASE 18.09.19

Energy company St1 has made an investment decision to construct a new biorefinery at its refinery in Gothenburg in Sweden. The design allows flexibility to process a wide range of feedstocks meeting current and future specifications for renewable fuels to be produced such as HVO diesel, jet fuel and naphtha. The

CLARIANT

Media Release

Clariant and Anhui Guozhen and Chemtex announce license agreement on sunliquid® cellulosic ethanol technology in China

- **Agreement marks first license deal for Clariant's sunliquid® technology in China and its third signed license deal overall**
- **Anhui Guozhen and Chemtex agreed to form a joint venture to realize a full scale commercial plant for the production of cellulosic ethanol in Anhui province with Clariant's sunliquid® technology**
- **Planned annual plant production capacity of 50.000 tons cellulosic ethanol with an option to double capacity will be one of the largest second generation plants in China so far**
- **Intended project will be a major step toward fulfillment of Anhui province ethanol blending mandate**

Muttenz, January 6, 2020 – Clariant, a focused and innovative specialty chemical compan
Anhui Guozhen Group, a Chinese green energy company, and Chemtex Chemical Enginee
multinational engineering company, today signed a license agreement on sunliquid® cellu
ethanol technology.

GLOBAL BIOENERGIES HOME

announced on 6th February 2019

First production of isobutene from wheat straw at demo scale

NEWS RELEASE

Enerkem produces a new clean, renewable alternative solution to diesel fuel for the transportation sector

MONTREAL, Sep. 10, 2018 /CNW/ - Enerkem Inc. (www.enerkemweb.wpengine.com), a world-leading waste-to-biofuels and chemicals producer, announced today that it has successfully produced a clean, renewable bio-dimethyl ether (Bio-DME), a by-product of biomethanol, that could help address global climate change efficiently by replacing the use of diesel fuel in the transportation sector.

Wood-based UPM BioVerno diesel reduces tailpipe emissions announced on 7th March 2019

The construction of the pyrolysis plant of Green Fuel Nordic Oy in Lieksa receives green light announced on 22nd March 2019

Mega-order from Finland for Dutch energy technology

100 million euros to be invested in production of sustainable oil

btg-btl biomass-to-liquid announced on 2nd April 2019

[1]Most recent news from September 2018 – January 2020

Several companies entering EU market for advanced liquid biofuels

Oulu, FIN
Chempolis
Woody & agricultural residues (flexible) operational

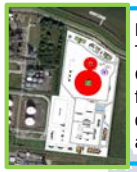
Haapavesi, FIN
NordFuel/ Sebak
Woody biomass to EtOH/ announced

Hamina/ Näripio/ Lappeenranta), FIN
ST1
4x Etanolix plants – biowaste to EtOH/ operational

Kajaani, FIN
ST1
Saw dust to EtOH/ operational

Joensuu, FIN
Fortum
Wood-based material to bio-oil/ operational

Delft, NLD
Technip/ SkyNRG
Cooking oil/ animal fats to kerosene/ diesel/ LPG/ announced



Kastet, SWE
Setra/ Solna/ Preem
Sawdust to bio-oil/ announced

Lieska, FIN
Green Fuel Nordic
Forest-based material to EtOH/ ground break

Jedlice, PL
PKN Poludnie/ PKN Orlen
Agricultural residues to EtOH/ announced

Sarpsborg, NOR
Borregaard
Wood-based material to EtOH/ operational

Lappeenranta, FIN
UPM
Woody biomass to renewable diesel & naphtha/ operational

Hangelo, NLD
btg-btl/ Empyro
Wood residues to pyrolysis oil/ operational

Rotterdam, NLD
Enerkem
W2C/ permitted

Gothenburg, SWE
ST1
Biowaste to EtOH/ operational

Mussalo, FIN
UPM
Solid woody biomass & Brassica carinata to advanced biofuel/ feasibility study

Podari, ROU
Clariant
Agricultural residues to EtOH/ under construction

Pomacle, FRA
Procethol 2G/ Futurol project
Woody & agricultural residues (flexible) / operational

tba, FRA
Global Bioenergies/ Cristal Union
IBN-ONE plant/ isobutene/announced

Leopoldov, SVK
Enviral
Agricultural residues to EtOH/ announced

Tarragona, ESP
Enerkem
/ permitted

Leuna, DE
Global Bioenergies
Plant-based residues to isobutene/ operational

Hallein, AT
AustroCel Hallein
Woody biomass to EtOH/ under construction

Straubing, DE
Clariant
Agricultural residues to EtOH/ operational

Cresentino, ITA
Versalis/ ENI
Agricultural residues to EtOH/ idle

[1]Includes all project status: feasibility studies, permitted, announced, under construction, operational & idle

Advanced biofuels – European project spotlight
Clariant's sunliquid® flagship plant: en route to commercialization

CLARIANT PLANT ROMANIA

Approval to invest in building a 50 kta plant in Romania

HARVESTED 2,7K TONS OF STRAW

UNDERGOING CONSTRUCTION

HARVESTED 20K TONS OF STRAW

2017 — **2018** — **2019** — **2020** — **2021**

GROUNDBREAKING PLANT ROMANIA

12. September 2018

WORKSHOPS WITH FARMERS IN OLTENIA

MANAGEMENT TEAM FORMED

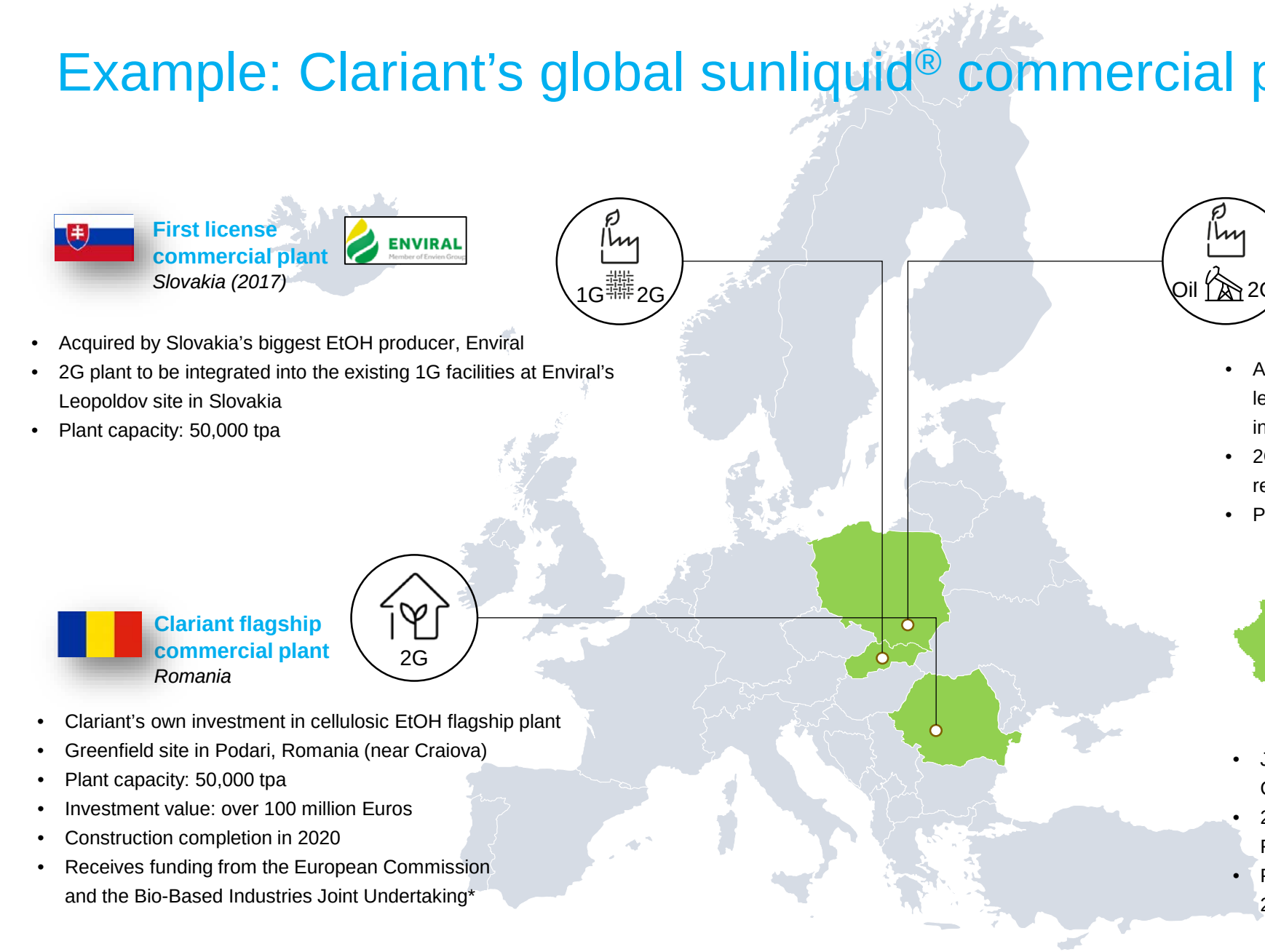
ISCC CERTIFICATION

"TECHNOLOGY PROVIDER OF THE YEAR" PRIZE AWARDED BY DIPLOMAT ROMANIA

EXPECTED CONSTRUCTION COMPLETION

* The project receives funding from the European Union's Seventh Framework Program for research, technological development and demonstration under Grant Agreement no. 322386 (FP7 SUNLIQUID) and from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation program under Grant Agreement no. 709606 (BBI LIGNOFLAG)

Example: Clariant's global sunliquid® commercial plants footprint



First license commercial plant
Slovakia (2017)

- Acquired by Slovakia's biggest EtOH producer, Enviral
- 2G plant to be integrated into the existing 1G facilities at Enviral's Leopoldov site in Slovakia
- Plant capacity: 50,000 tpa

Second license commercial plant
Poland (2019)

- Acquired by ORLEN Południe, a member of ORLEN group, the leading player in the fuels and energy market & largest company in CEE
- 2G plant to be integrated into the existing Jedlicze petroleum refinery in south-eastern Poland
- Plant capacity: 25,000 tpa

Clariant flagship commercial plant
Romania

- Clariant's own investment in cellulosic EtOH flagship plant
- Greenfield site in Podari, Romania (near Craiova)
- Plant capacity: 50,000 tpa
- Investment value: over 100 million Euros
- Construction completion in 2020
- Receives funding from the European Commission and the Bio-Based Industries Joint Undertaking*

Third license commercial plant
China (2020)

- Joint venture formed by Anhui Guozhen Group & Chemtex Chemical Engineering to realize full scale commercial plant
- 2G plant will be executed by the JV at a greenfield site in Fuyang city, Anhui province in East China
- Plant capacity: 50.000 tpa with option to double capacity in a 2nd project phase

* The project receives funding from the European Union's Seventh Framework Program for research, technological development and demonstration under Grant Agreement no. 322386 (FP7 SUNLIQUID) and from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation program under Grant Agreement no. 709606 (BBI LIGNOFLAG)

En route to an advanced biofuels industry in Europe
Actions to be taken

Ambitious & consistent implementation of REDII
Swift and ambitious implementation in the member states is needed

Higher blends
Blending ratio of up to 35% with fossil fuels

Value for sustainability/ GHG savings
Implement a fair excise scheme on fuel in which taxation will be based on CO2 performance & energy content

Financing & funding
Implement & deploy relevant financial instruments

Post 2030
The EU must set ambitious targets for the use of waste-based advanced renewable fuels post 2030 & should not backtrack from the 2030 target.

Photo credit: UPM

Thank you for your attention!

Photo credit: Clariant