

Advanced biofuels: what holds them back?

Presenters:

Toshimasa Masuyama, Bioenergy team | Seungwoo Kang, Bioenergy team

TUESDAY, 23 JUNE 2020 • 10:00 – 10:30 CEST

SPEAKERS



Toshimasa Masuyama
IRENA



Seungwoo Kang
IRENA



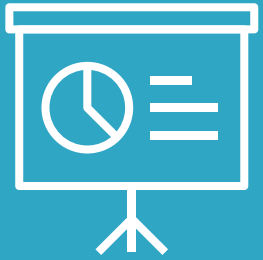
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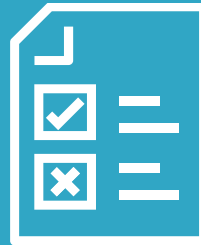
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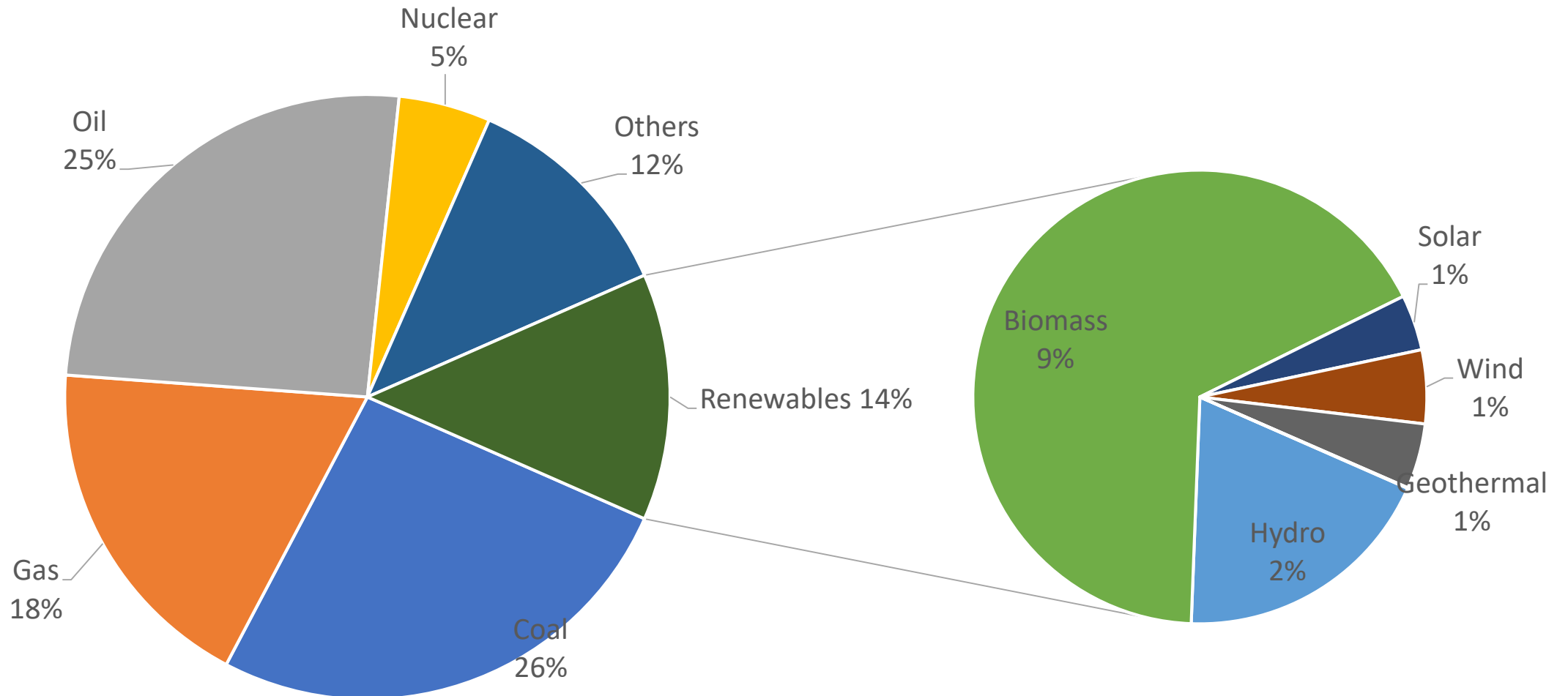
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Advanced biofuels: what holds them back?

Toshimasa Masuyama and Seungwoo Kang
Bioenergy team, IRENA

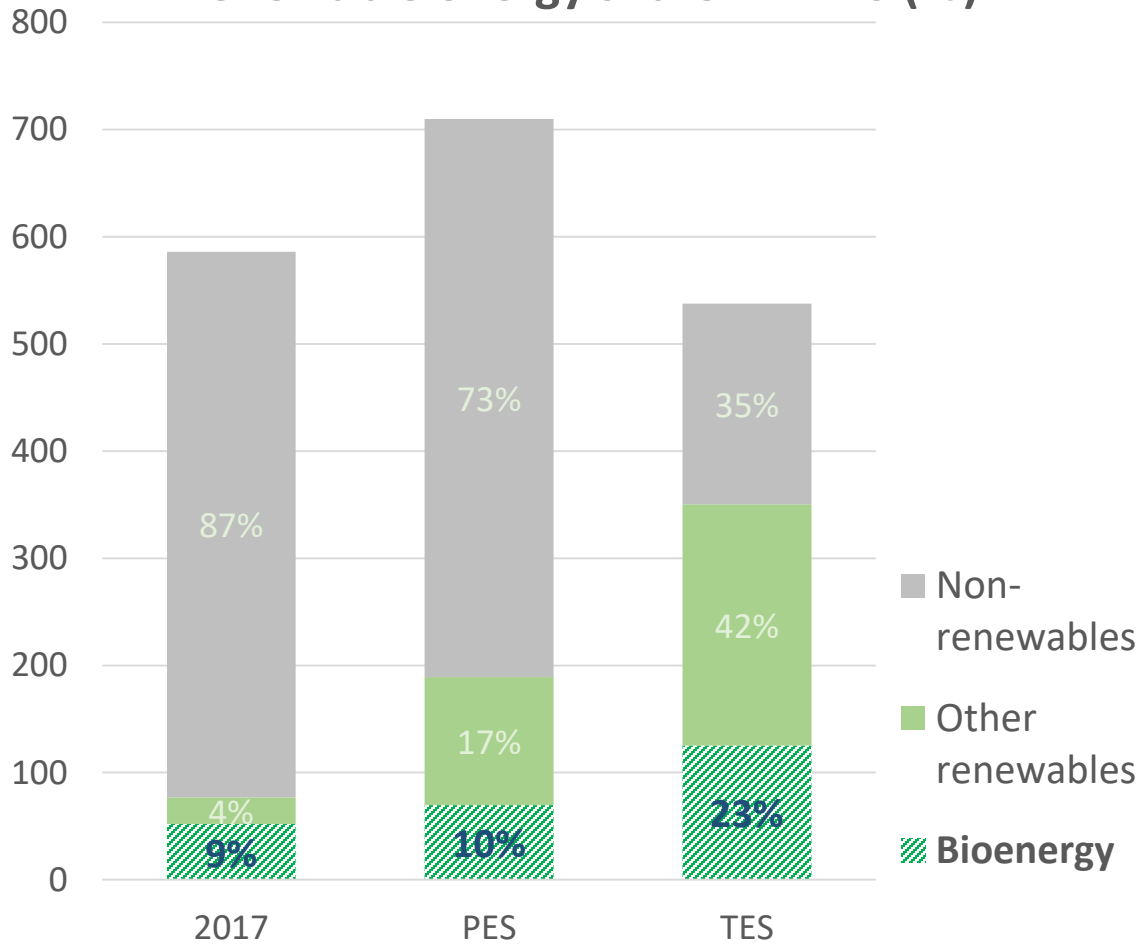
Bioenergy as the single largest source of renewable energy today

Total Primary Energy Supply (%) in 2017



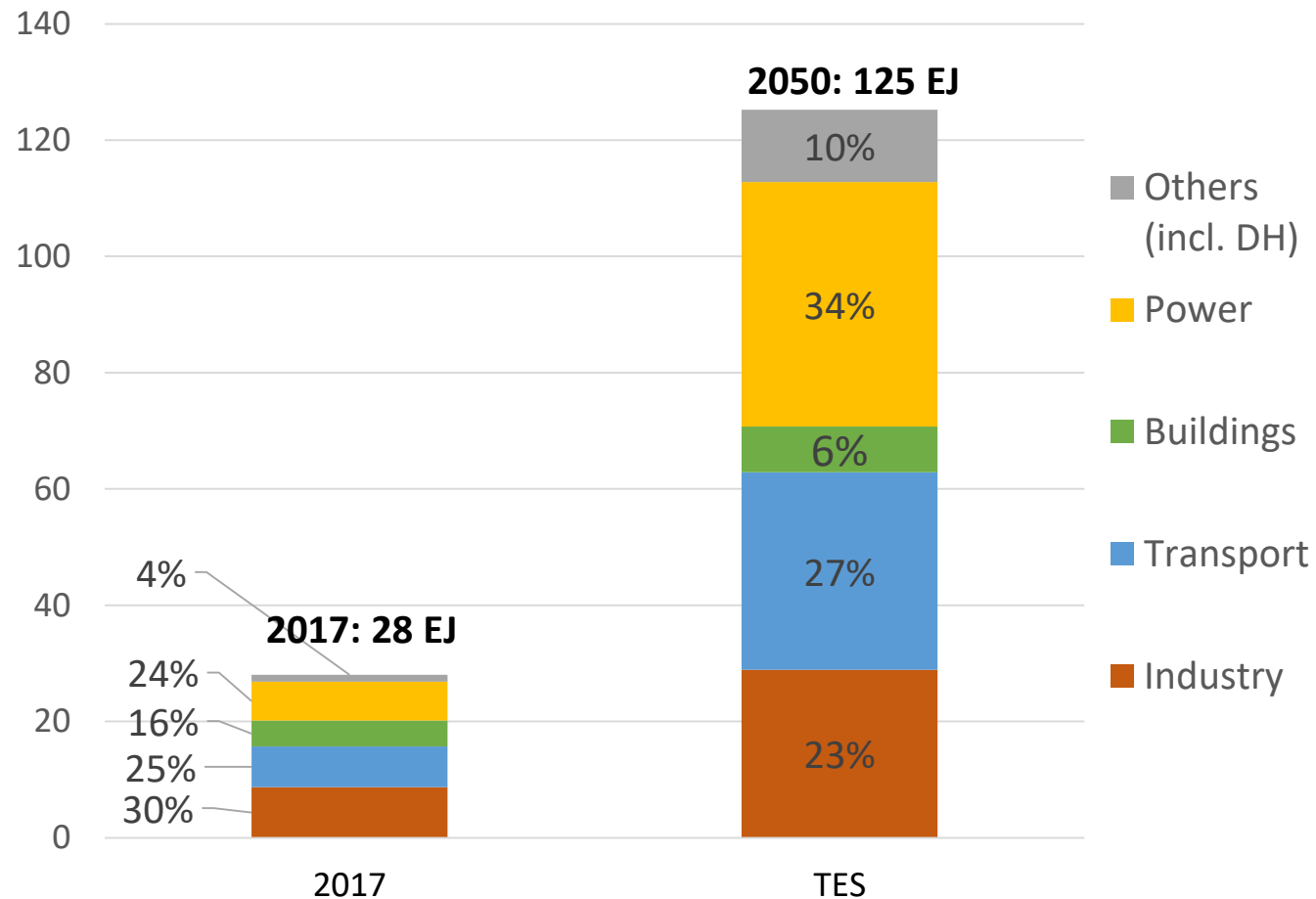
Bioenergy needs to be a core part of the energy transformation

Renewable energy share in TPES (EJ)



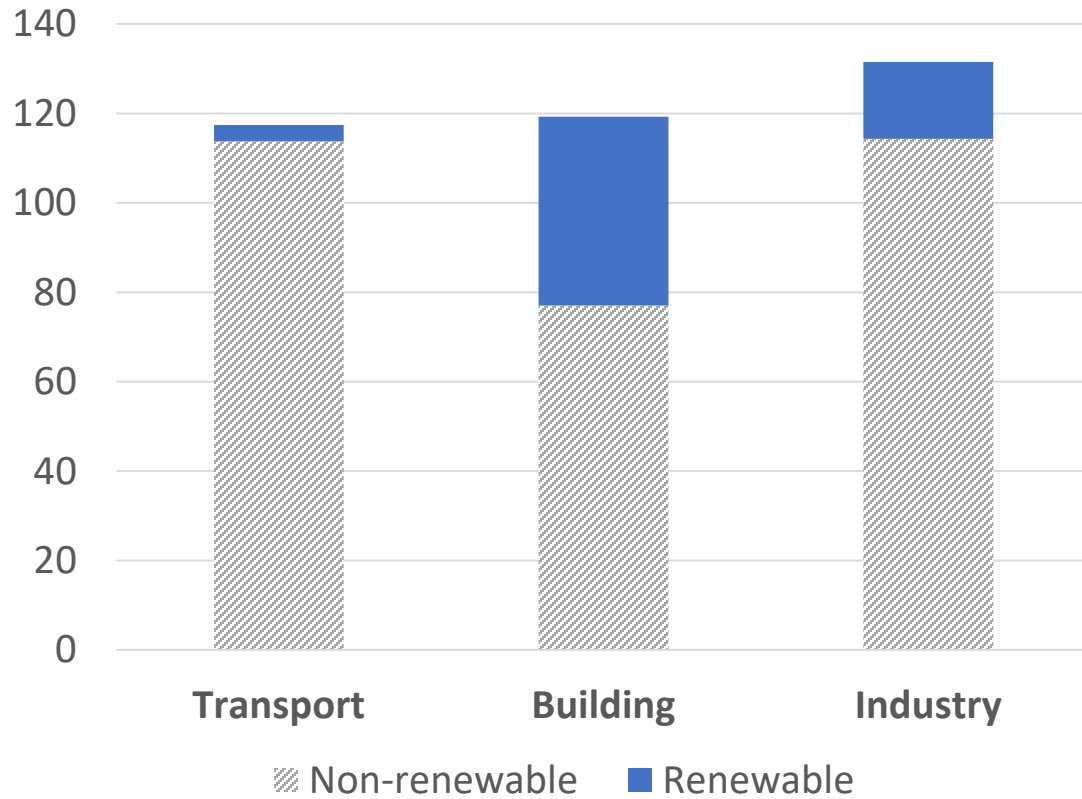
PES: Planned Energy Scenario
TES: Transforming Energy Scenario

Modern bioenergy primary energy demand (EJ)

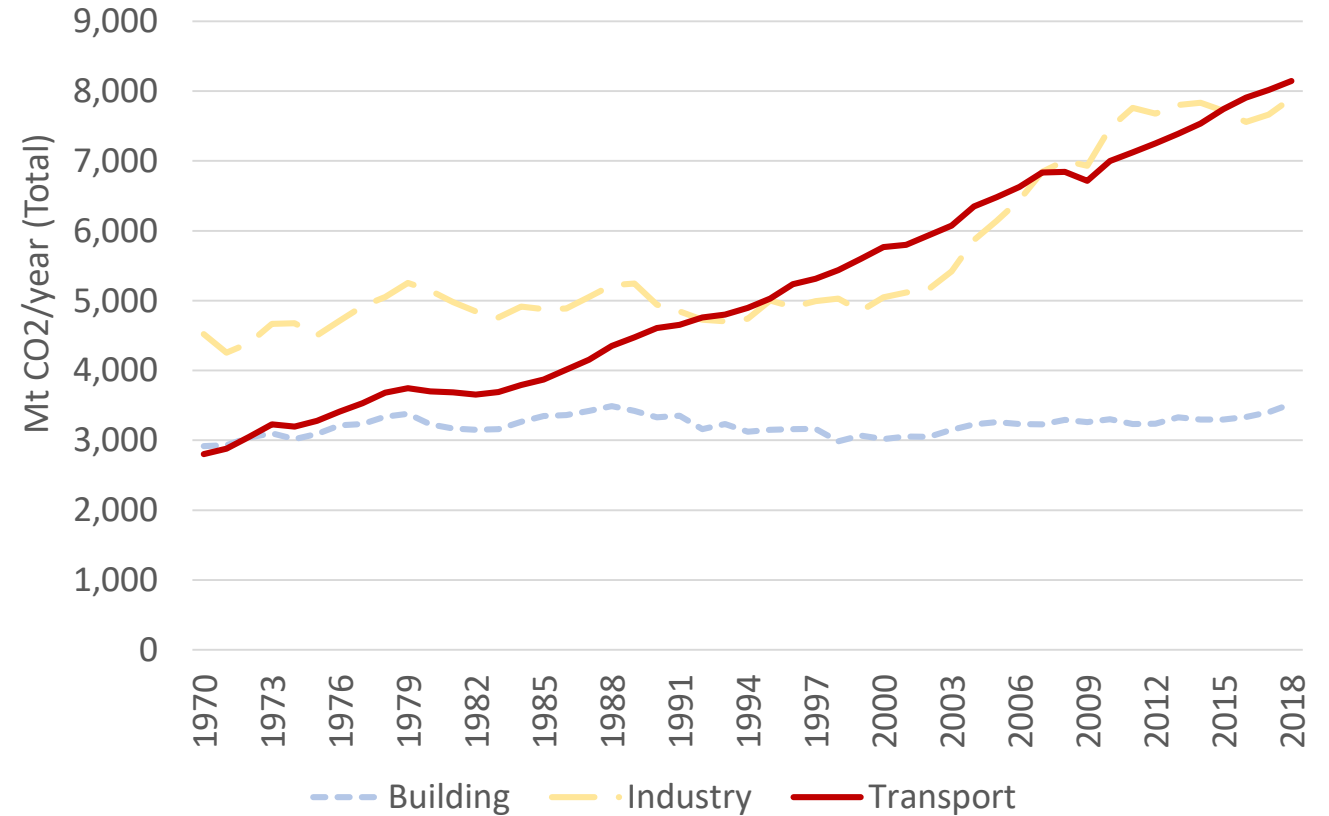


Transport sector: the lowest renewables uptake + growing emissions

Total Final Energy Consumption (EJ) in 2017



Annual CO2 emissions associated with end-use sectors

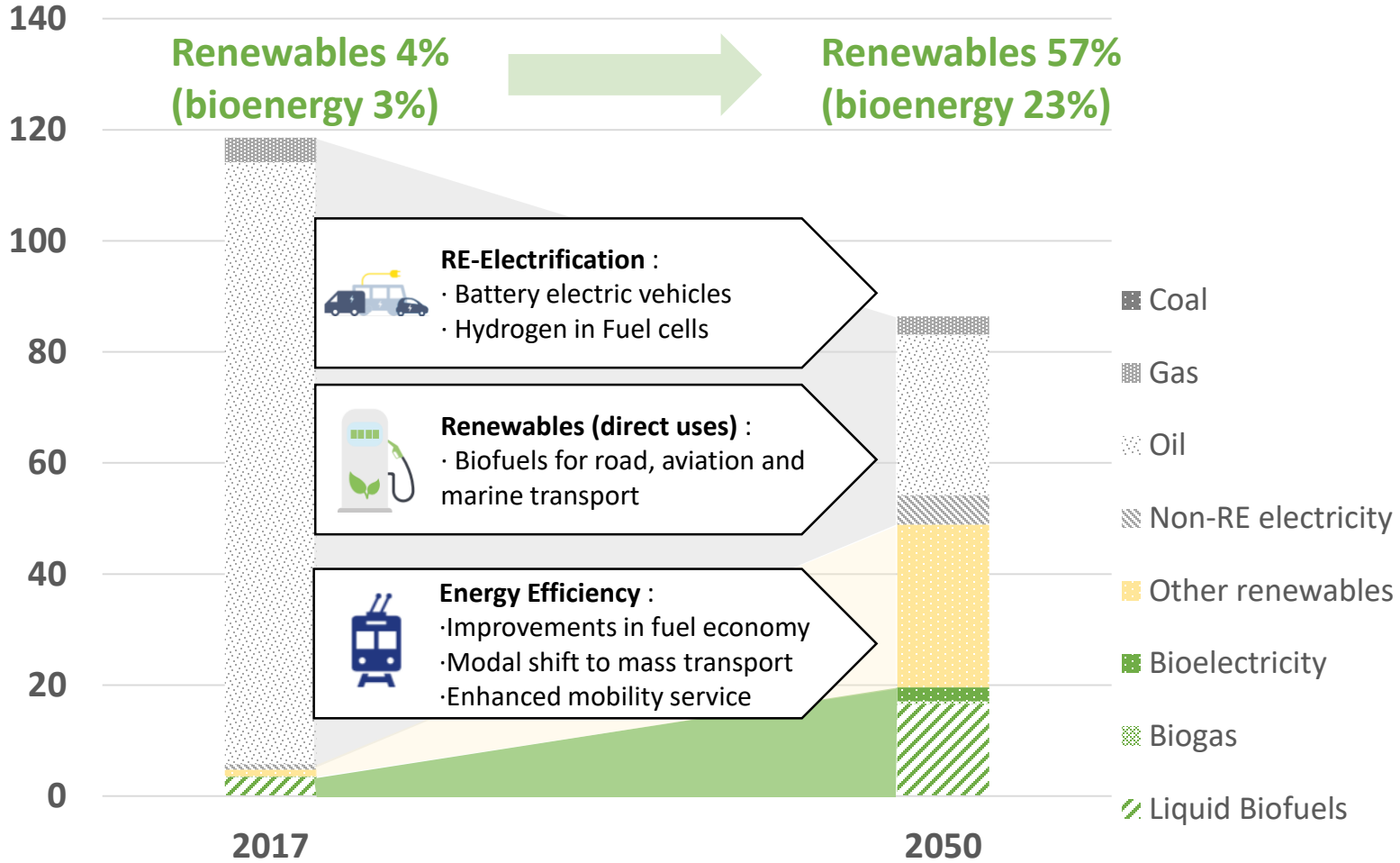


Source: JRC-EDGAR (2018)

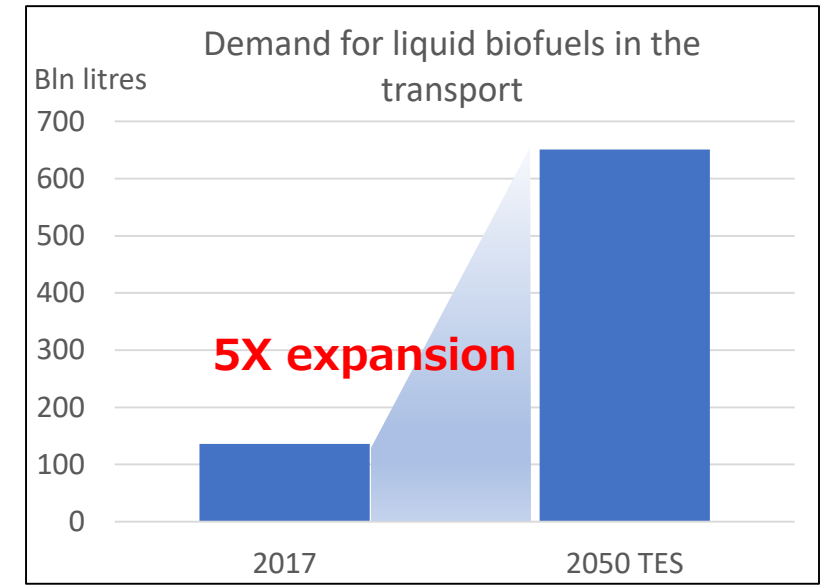
Transport sector decarbonization pathways

Final energy consumption (EJ/yr)

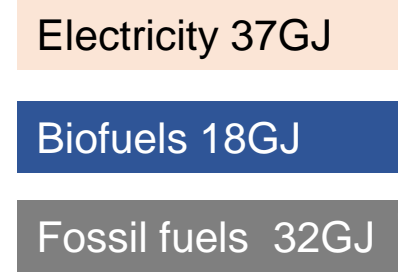
Transport



Transforming Energy Scenario



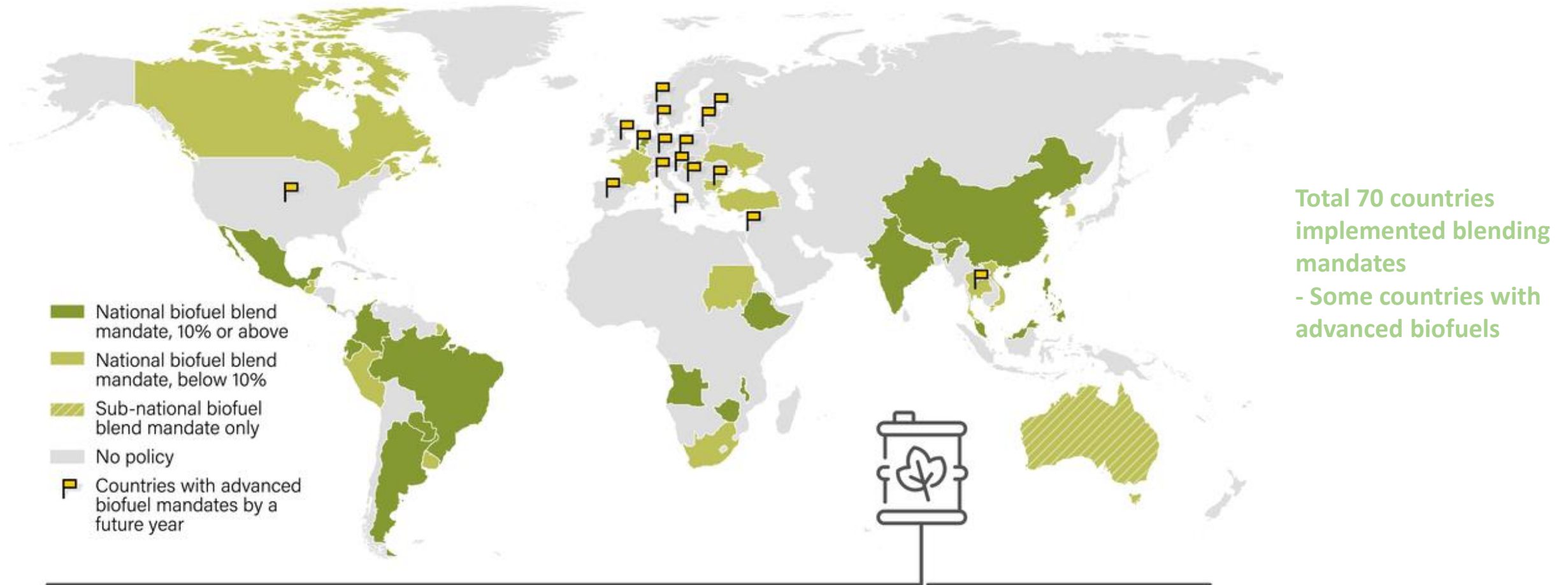
15 bln litres to be installed every year



Blend Wall to be broken

Countries with biofuel obligations for transport, 2019

National and Sub-National Renewable Transport Mandates, as of End-2019

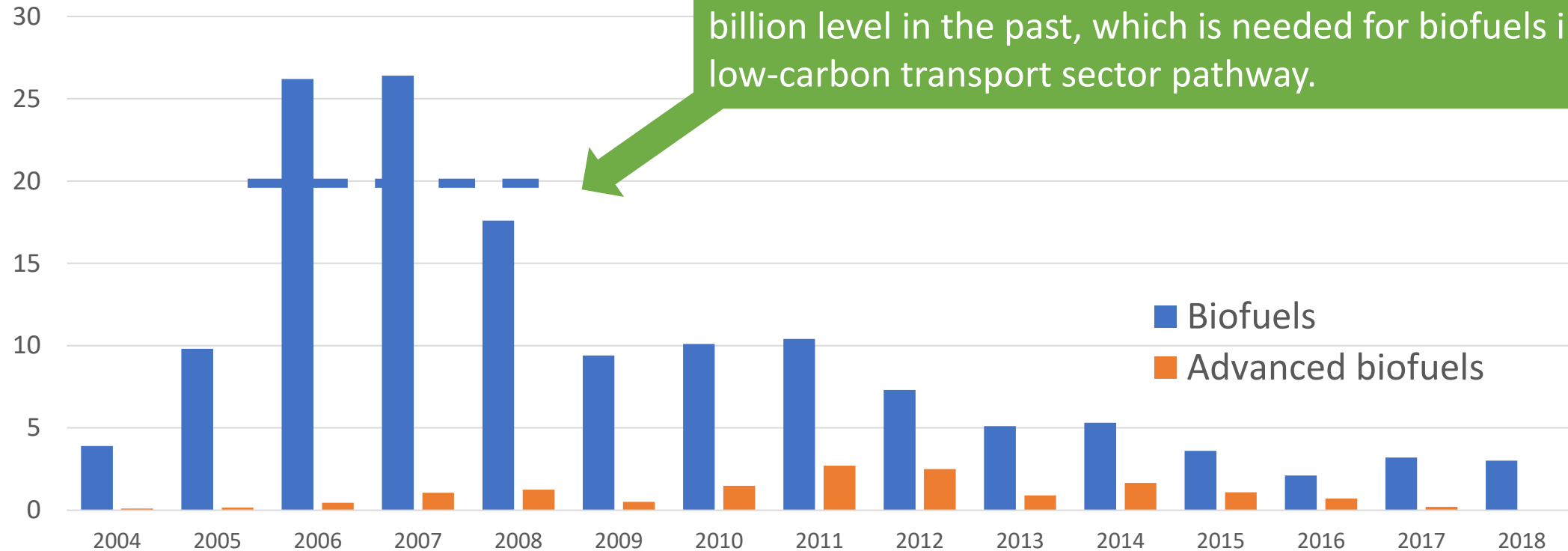


Note: Shading shows countries and states/provinces with mandates for either biodiesel, ethanol or both. At the regional level, the EU has an advanced biofuels target.

Source: REN21 Policy Database.

Global biofuel investments are on a declining trend

Annual Investments in Biofuels (billion \$)

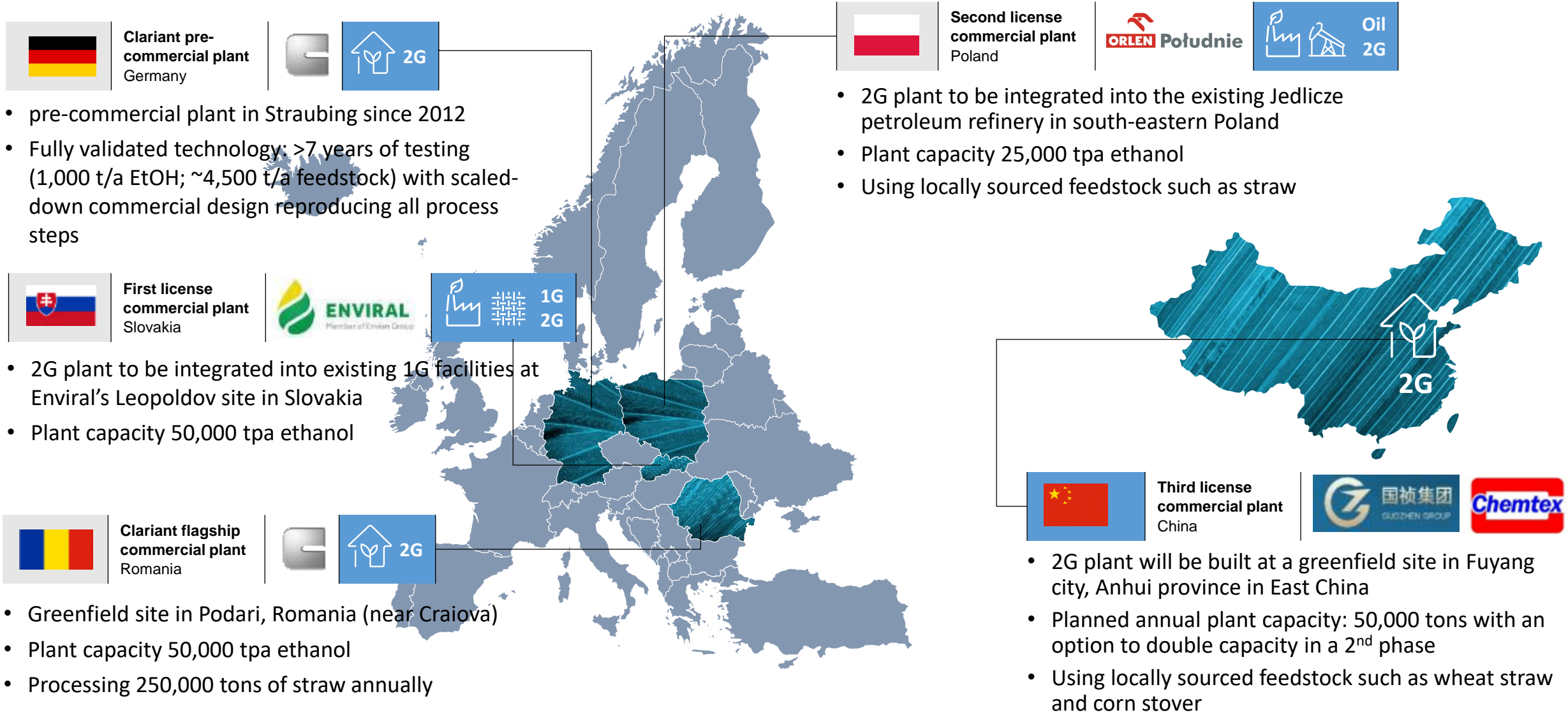


The industry had reached and even exceeded the USD 20 billion level in the past, which is needed for biofuels in the low-carbon transport sector pathway.

Source: BNEF

- To achieve the 5-fold increase goal, more than 100 refineries should be developed annually at an investment cost of USD 20+ billion.

(Pre-) Commercial sunliquid[®] plants in the EU and China



 **Clariant pre-commercial plant**
Germany

- pre-commercial plant in Straubing since 2012
- Fully validated technology: >7 years of testing (1,000 t/a EtOH; ~4,500 t/a feedstock) with scaled-down commercial design reproducing all process steps

 **First license commercial plant**
Slovakia

- 2G plant to be integrated into existing 1G facilities at Enviral's Leopoldov site in Slovakia
- Plant capacity 50,000 tpa ethanol

 **Clariant flagship commercial plant**
Romania

- Greenfield site in Podari, Romania (near Craiova)
- Plant capacity 50,000 tpa ethanol
- Processing 250,000 tons of straw annually

 **Second license commercial plant**
Poland

- 2G plant to be integrated into the existing Jedlicze petroleum refinery in south-eastern Poland
- Plant capacity 25,000 tpa ethanol
- Using locally sourced feedstock such as straw

 **Third license commercial plant**
China

- 2G plant will be built at a greenfield site in Fuyang city, Anhui province in East China
- Planned annual plant capacity: 50,000 tons with an option to double capacity in a 2nd phase
- Using locally sourced feedstock such as wheat straw and corn stover

* The project receives funding from the European Union's Seventh Framework Programme 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)



Advanced Biofuels – what holds them back?

Scope of the study

(Objective)

- ✓ Clarify the factors explaining the stagnating investment activity in advanced biofuels

(Method of analysis)

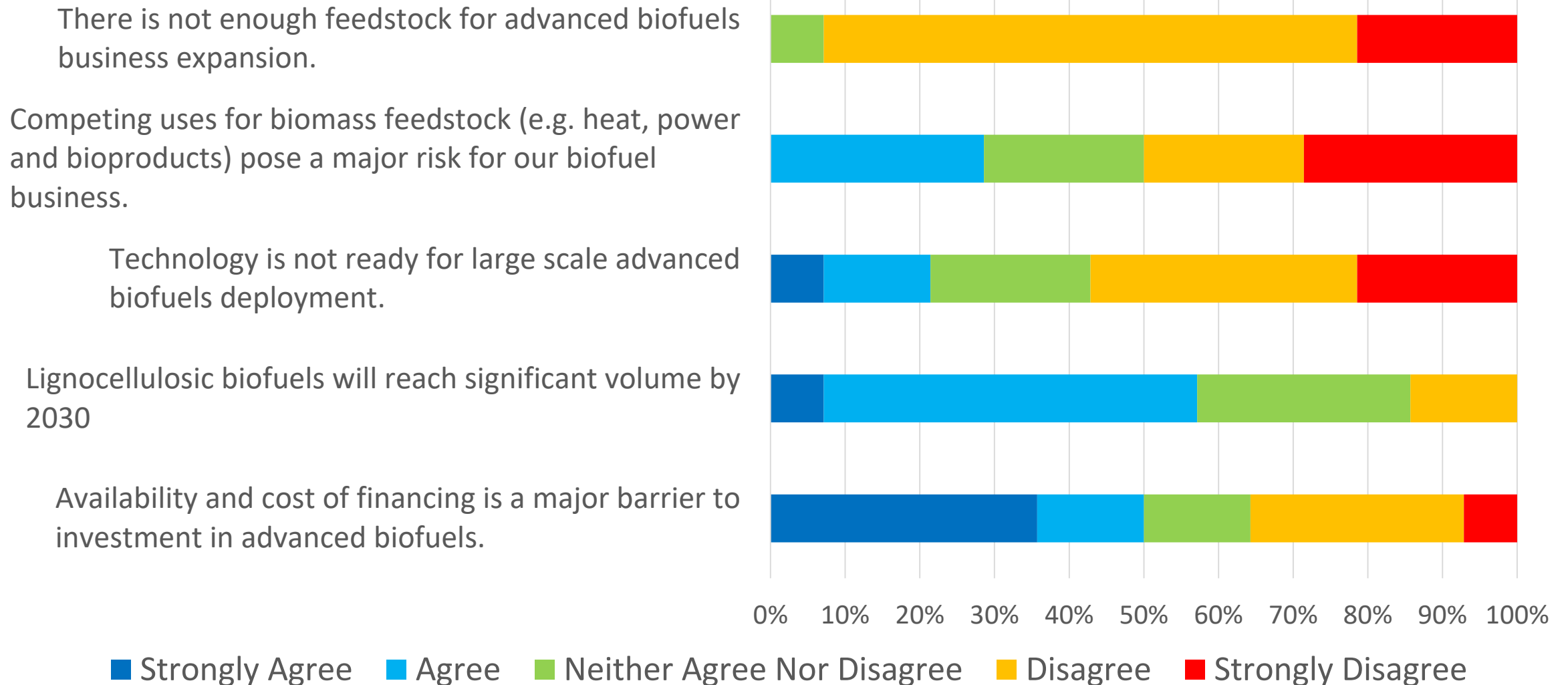
- ✓ A review of past literature + survey by questionnaire with industry executives in companies that have invested in 2G biofuel productions (14 respondents)
- ✓ Statements evaluated on a five-point agreement scale (the Likert Scale) under the five following groups
 - feedstock (8 statements)
 - technology and financing (7 statements)
 - markets through mandates and targets (16 statements)
 - trends in consumer demand (12 statements)
 - environmental and social concerns (11 statements)



Released November 18, 2019

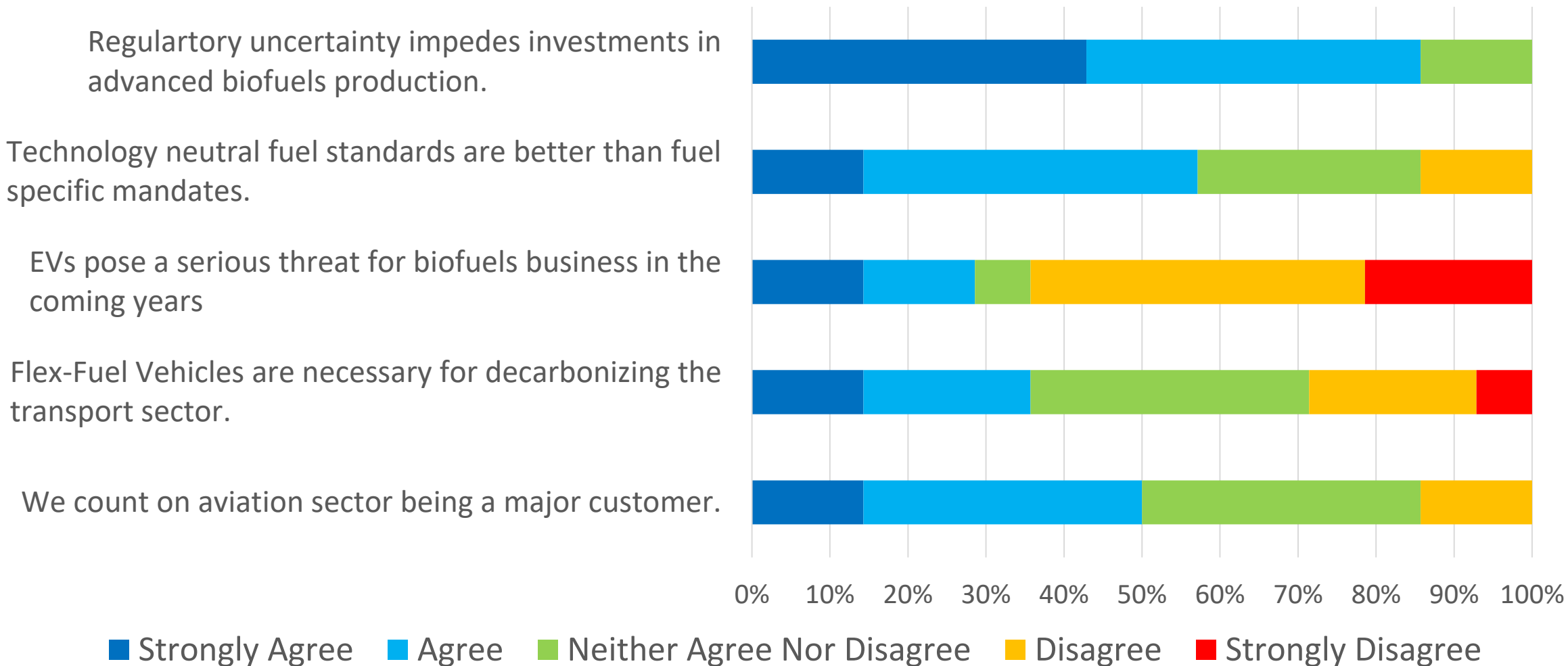
Barriers to investment in advanced biofuels

- feedstock, technology and financing -



Barriers to investment in advanced biofuels

- mandates, targets and demand -



Barriers to investment in advanced biofuels

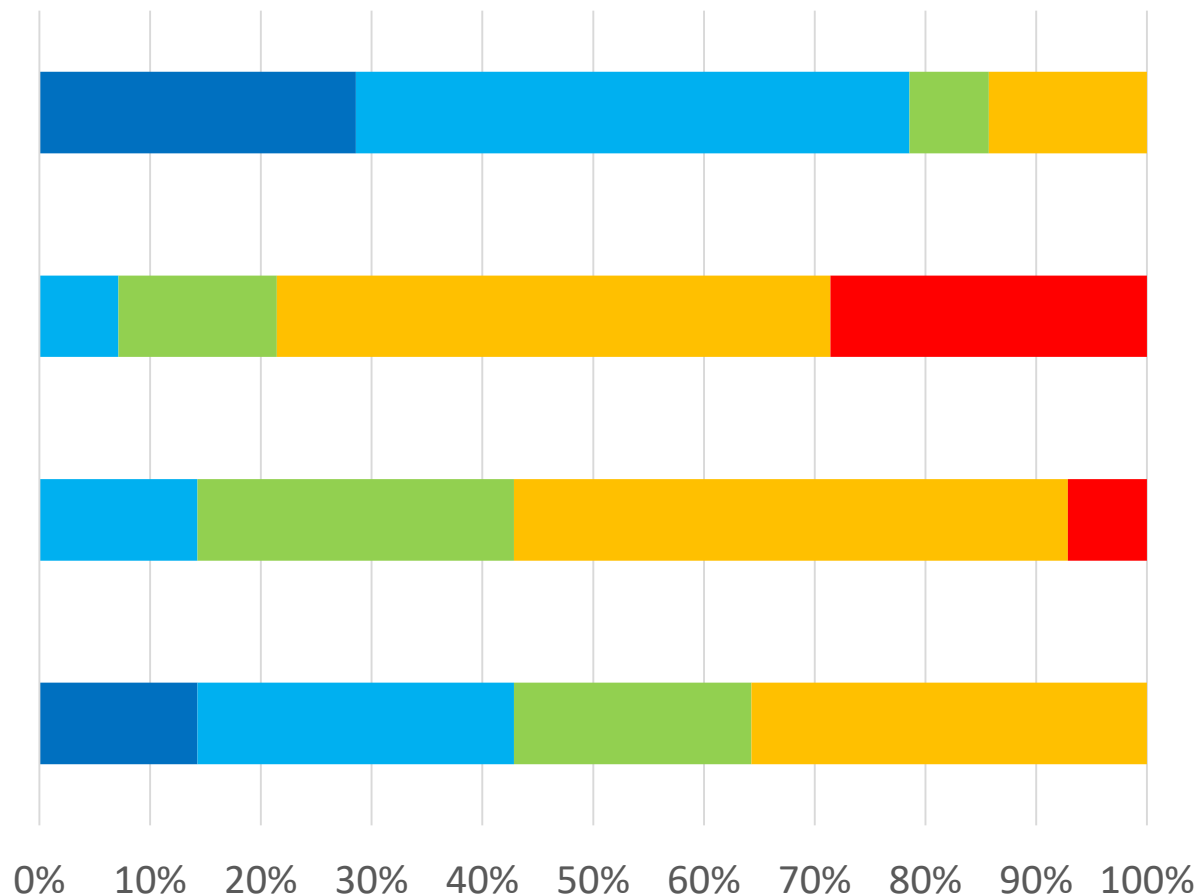
- environmental and social concerns -

There is too much confusion about how life-cycle GHG emissions, LUC and ILUC are estimated.

Methods used for estimating land use change impacts of various biofuels are accurate and reliable.

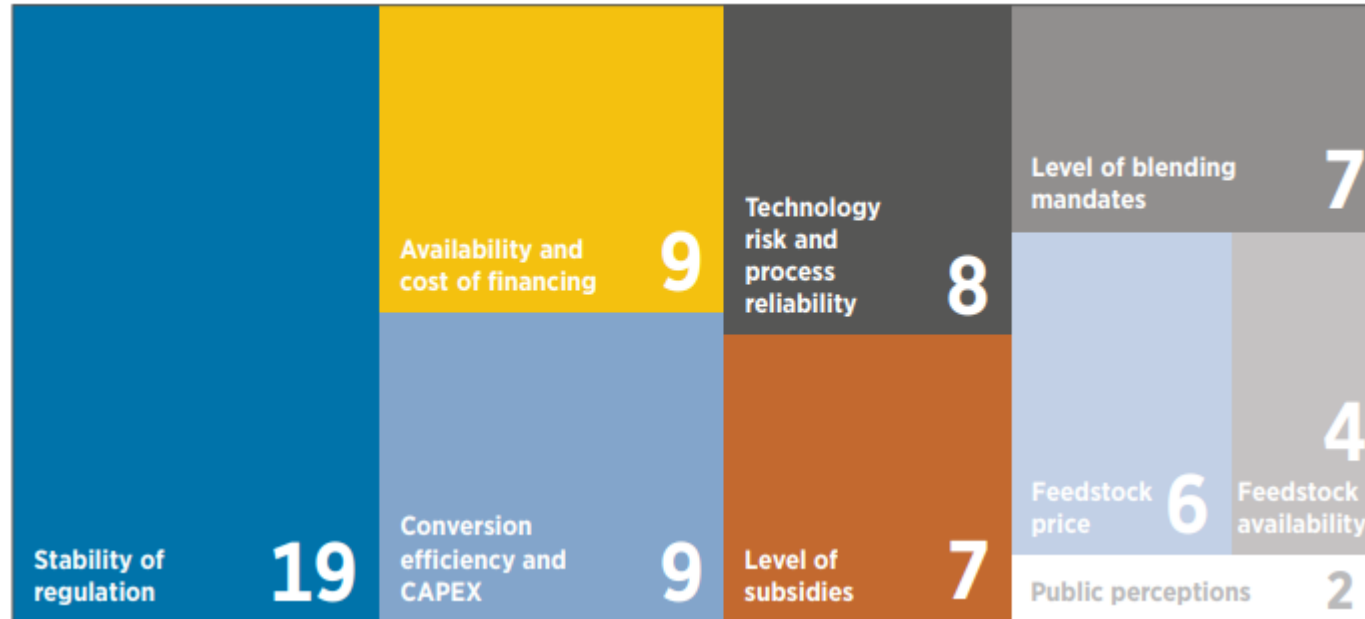
Environmental advocacy groups have helped advanced 2G biofuels.

Investments are hampered by worries that sustainability criteria may become more stringent.



■ Strongly Agree ■ Agree ■ Neither Agree Nor Disagree ■ Disagree ■ Strongly Disagree

What really matters? - *Ranking the barriers*



Area is in relation to perceived importance.

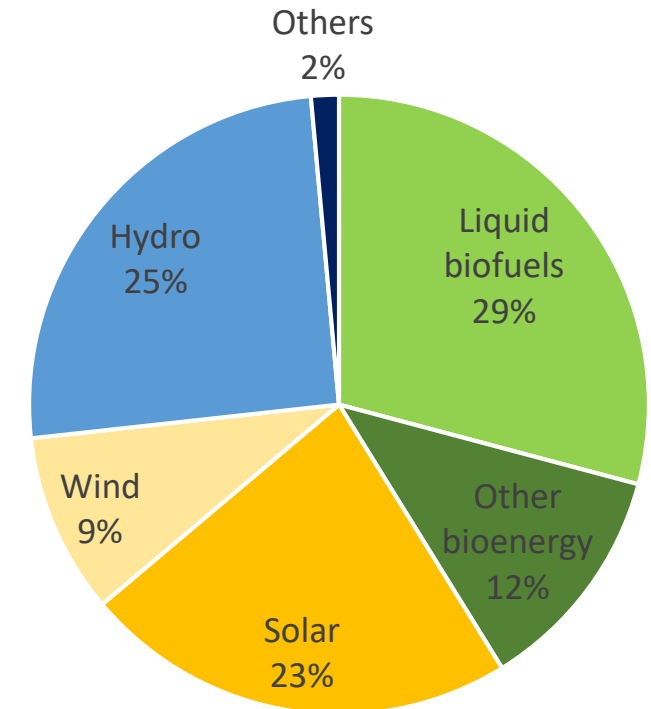
- highest scored barrier = value of 3
- second scored barrier = value of 2
- third scored barrier = value of 1

- *Stability of regulation* is clearly the most important barrier to investments followed by the cost and availability of **financing** and level of **conversion efficiency & capex**.
- The three issues of **policy stability, mandates and subsidies** (46%) are all dependent on regulation and thus subject to societal preferences and political control.
- The second largest "block" relates to **cost competitiveness** of advanced biofuels production, formed jointly by "conversion efficiency & CAPEX" and "feedstock price".

Biofuels under post Covid-19 recovery

- The sharp fall in demand for transport fuels and the drop in oil prices cause dual hardships for biofuels industry
- A number of cases of biofuels plant closure reported
- A few signs of an improvement e.g. Chicago Argo ethanol reaches highest level since early March, June 10
- Regulatory changes with positive signals for the market e.g. French airline bailout plans with environmental conditions, the removal of the ethanol ban in Indonesia
- Policies play a more crucial role in supporting short-term recovery and providing longer term predictability for market expansion
- Biofuels create large volume of employment providing rationale for stimulus packages

Renewable energy employment by technologies (outside China)



IRENA, Renewable Energy and Jobs 2019

- 6.9 million jobs in total
- 11.0 million jobs when China added

Conclusions

- Biofuels can provide readily available solutions for decarbonizing the transport sector complementing the enhanced role of electrification and other urban measures
- Biofuels play a major role in displacing fossil fuels, particularly for long-haul transport (aviation, marine and long-haul road freight)
- Five-fold increase of production capacity of biofuels is needed by 2050 to meet the international climate goals.
- The level of investment required for the five-fold increase is economically feasible.
- Policy uncertainty is found to be the most significant barrier to investment in biofuels.
- Other barriers such as technology, cost-competitiveness, finance, infrastructure, end-use applications (blend limits), sustainability need to be addressed, but solutions are at hand.



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Q & A
10 min

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