Implementation Agendas Report- 2018 Update:

(compare-and-contrast policies used to develop biofuels)

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Implementation Agendas Report

- Compares and contrasts developments in transport biofuels production and use in member countries
- Focuses on biofuel policies and the extent to which these biofuels policies have been effective
- Assesses the measures taken by member countries to develop or stimulate their respective biofuels sectors, including incentives and investment in research, development and commercialization
- Provides an update on the current status of biofuel sustainability assessments and related discussions that factor into policy development

Implementation agenda report

- Main drivers for biofuels policy
- Biofuels policy
  - Biofuels obligations
  - Excise duty reductions
  - Fiscal incentives
  - Investment subsidies
  - Other measures stimulating the implementation of biofuels
- Promotion of advanced biofuels
- Market development and policy effectiveness

Methodology

1. Developed a new questionnaire

2. Sent out the questionnaire to member countries

3. Collected the completed questionnaires from country representatives, complied the information and reviewed/ incorporated recent related publications

4. “Polished” each country’s contribution to try to make them more comparable

5. Shared the draft country sections with each country representatives for their review/feedback

6. Prepared a draft implementation agendas report

Implementation agenda report

- 180-page report comprised of 18 chapters
  - Chapter 1: global biofuels production and use
  - Chapters 2-17: biofuel policies in 15 countries (country chapters)
  - Chapter 18: Compare and contrast biofuel policies

The full report and executive summary are available at “Member Only” section of the Task 39 website.

Production and use of biofuels- 2006-2017

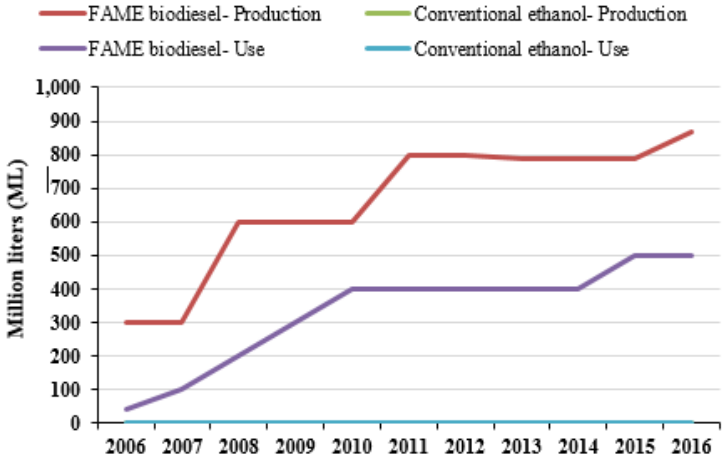


Figure B.9. Biofuels production and use in South Korea (2006-2016)

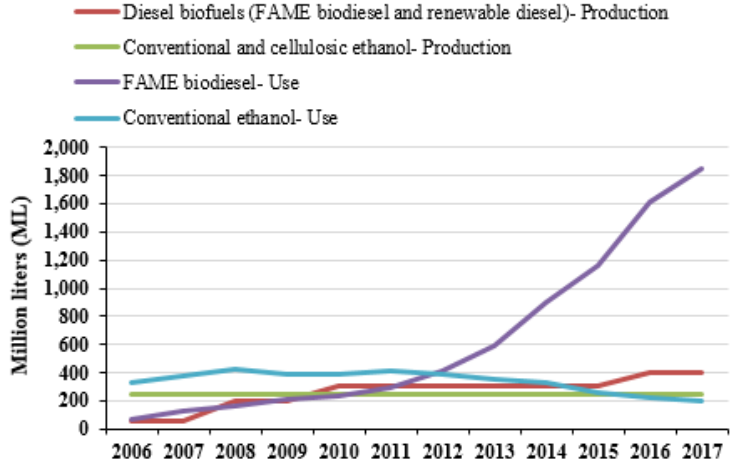


Figure B.10. Biofuels production and use in Sweden (2006-2017)

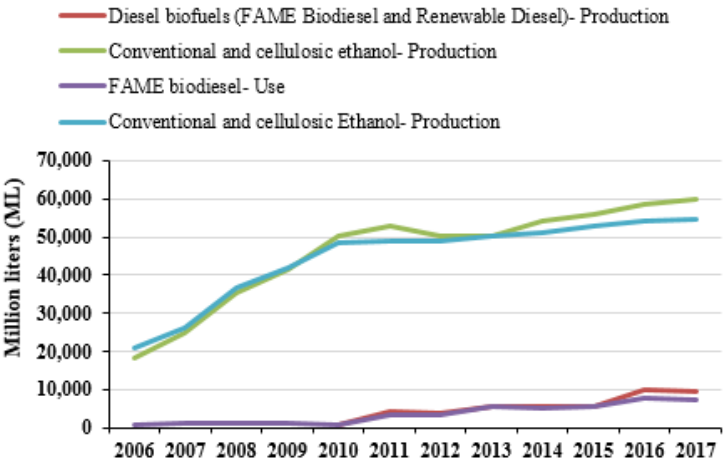


Figure B.11. Biofuels production and use in the US (2006-2017)

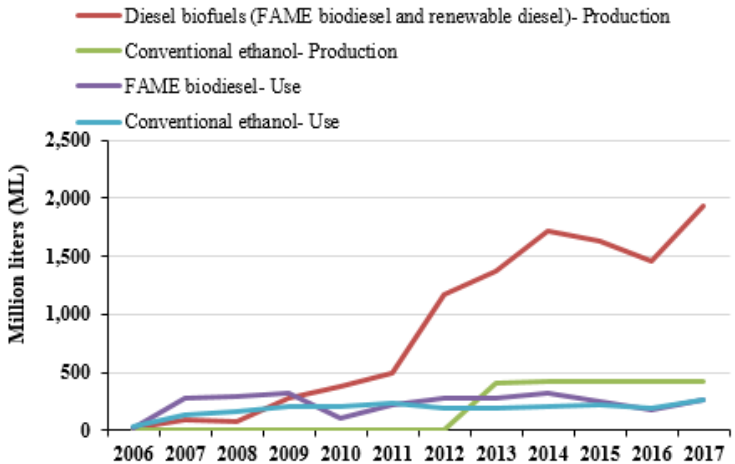


Figure B.7. Biofuels production and use in The Netherlands (2006-2017)

Production and use of biofuels

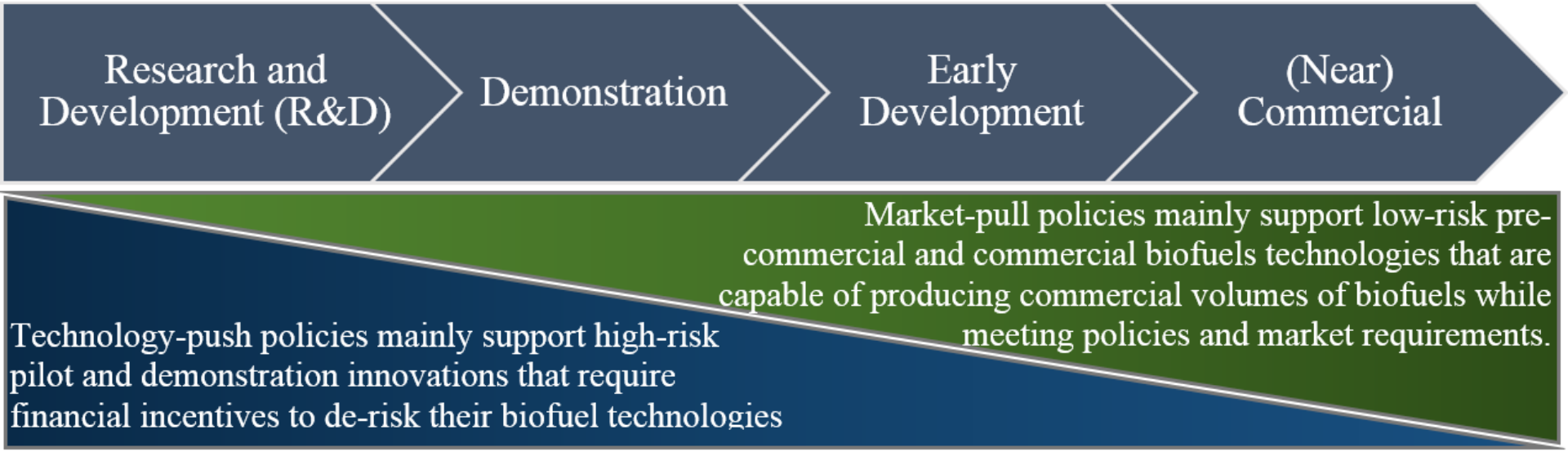
- Biofuels policies in most of the member countries have supported the growth of biofuels markets over the period 2006-2017.

- Not all these growths have been steady over this time period.

- Overall, the average annual production growth over the period 2006-2017 was about 10% with the lowest observed growth of -0.1% in 2011-2012 and the highest observed growth of 34% in 2006-2007.

- The increased maturity in biofuel technologies and markets, especially drop-in biofuels such as HVO/HEFA fuels, inclusion of sustainability requirements in biofuel policies and the emergence of low carbon fuel standards policies that incentivize reductions in the carbon intensity of biofuels rather than blending mandate levels have created more stable biofuels markets in the last four years.

Existing policies and incentives for biofuel production and use



Market-pull policies for biofuel production and use

Country	Biofuels mandates	Fuel excise tax reduction/exemption	Other policy mechanisms
Australia	- No national renewable fuels target - New South Wales: 5% biodiesel and 6% ethanol (volume) - Queensland: 0.5% biodiesel and 4% ethanol (volume)	- Producer grant scheme (fuel excise reduction)	-
Austria	- 6.3% biodiesel, 3.4% ethanol and 5.75% biofuels (energy content) - 0.2% advanced biofuels target by 2022 (energy content)	- Tax concessions for fuels with a biofuel share of at least 4.4% - Pure biofuels exempted from mineral oil tax	-
Brazil	- 27% ethanol and 10% biodiesel (volume) - 100% hydrous ethanol is also marketed in all gas stations in Brazil	- There are tax incentives for biofuel producers, blenders and users including tax incentives for ethanol-flex fuel vehicles, tax incentives for ethanol fuel and federal tax exemptions and incentives for biodiesel production	-
Canada	- Federal use mandates: 5% ethanol and 2% biodiesel (volume) - Five provinces of British Columbia, Alberta, Saskatchewan, Manitoba and Ontario established a blending requirement of 5% to 8.5% for ethanol and 2% to 4% for biodiesel (volume)	-	- British Columbia's Carbon Tax and Low Carbon Fuel Standard - Ontario's auction for carbon allowances - Alberta's carbon levy
Denmark	- 5.75% biofuels (both ethanol and biodiesel) (volume) - 0.9% for advanced biofuels by 2020	- CO_2 excise exemptions for biofuels	-
European Union (EU)	- Cap on food and feed crops of max 1% above 2020 consumption with a maximum of 7% (energy content) - Sub-target for advanced biofuels of 0.2% for 2023, 1.0% for 2025 and 3.5 for 2030 (energy content) - Use of high iLUC crops should gradually decrease to 0% in 2030 unless they are certified to be low-iLUC	-	-
Germany	- GHG reduction of 3.5%/4%/6% in the fuel mix for the entire fuel sector from 2015/2017/2020 onwards	There is no tax relief for FAME biodiesel, HVO/HEFA fuels, vegetable oils and ethanol: - FAME biodiesel, HVO/HEFA fuels and vegetable oils have the same fuel tax as diesel fuel (€ 0.4104/liter) - Ethanol has the same fuel tax as gasoline fuel (€ 0.6545/liter) - The fuel tax for CNG and biomethane is € 0.0139/kWh until 2023	- A carbon tax is indirectly applied via CO_2 tax for passenger cars
Japan	- 500 million liter ethanol mandate (volume) - Introducing 10 million liters (crude oil equivalent) of second generation biofuels (volume)	- No diesel oil delivery tax for B100 - A special tax incentive for the consumption of ethanol - Import of bio-ETBE encouraged through a zero tariff	-

Market-pull policies for biofuel production and use

Country	Biofuels mandates	Fuel excise reduction/exemption	Other policy mechanisms
Netherlands	- 16.4% biofuels (both ethanol and biodiesel, double counting advanced biofuels) (energy content) - 1.0% for advanced biofuels in 2020	-	-
New Zealand	- No mandate on biofuel use or any biofuel volume obligations	- Fuel excise exemption for ethanol (including imported ethanol) - No excise exemption for biodiesel	- Emissions trading scheme
South Africa	- No mandate on biofuel use or any biofuel volume obligations	- Fuel excise exemption for ethanol - Biodiesel manufacturers receive a rebate of 50% on the general fuel levy	-
South Korea	- 2.5% mandate for biodiesel (volume)	-	-
Sweden	- GHG emissions reduction of 2.6% for gasoline and 19.3% for diesel	- The tax exemption has varied from full to reduced tax exemption but from January 2018 all biofuels are fully exempted from tax	-
The United States (US)	- Volume targets for biofuels including conventional corn-based ethanol and advanced, cellulosic and diesel biofuels	-	- California's Low-Carbon Fuel Standard (LCFS) - Biodiesel producer's credit
China	- No official national mandate for ethanol and biodiesel use in the transportation sector - 11 provinces and cities (known as pilot provinces and cities) selected as fuel ethanol pilot zones for mandatory E10 blending (volume) - Small trial program using 2% and 5% biodiesel blends carried out in a few provinces (volume)	- An excise tax exemption for waste oil-based biodiesel production - No excise tax exemption for ethanol	- Fuel ethanol subsidies: halted since 2016 for conventional grain ethanol (1 G); subsidies for 1.5 generation ethanol (from cassava or sweet sorghum) since 2013-2017 but phased out in 2018; cellulosic ethanol production subsidy of $0.07 per liter (600 RMB per ton) - Import tariffs on US-origin ethanol
India	- No official national mandate for ethanol and biodiesel use in the transportation sector - The 20% and 5% blending targets are proposed (volume)	- No excise tax exemption/reductions for ethanol and biodiesel	- Deregulated diesel prices - Allow 100% foreign direct investment in biofuel technologies - Over $30 million USD investment in biofuel R&D and second generation ethanol technology - Biofuel imports are banned but the import of feedstock for production of biodiesel is permitted to the extent necessary

Existing Policies for biofuel production and use

- **Biofuel blending mandates (still the primary policy tool)**
  - Appears to be the most effective in establishing biofuels markets and in shielding biofuels from low oil prices, but not necessarily so useful in expanding/maintaining markets.
  - With the exceptions of New Zealand and South Africa, other member countries have biofuels blending mandates in place.
  - In China and India, there is not yet an official national mandates for ethanol and biodiesel.
  - In addition to blending mandates for conventional biofuels, the US and some EU member states, including Austria, Denmark and Netherlands, have developed/are developing blending mandates for advanced biofuels.

Existing Policies for biofuel production and use

- **Biofuel blending mandates (still the primary policy tool)**
  - Not all blending mandates regulations are the same
  - Not necessarily the best way to meet GHG reduction targets
  - Reasons biofuels mandates have not worked well in some jurisdictions:
    - Lack of secure supply of feedstock (e.g. South Korea)
    - High costs for feedstocks due to competing uses
    - Low crude oil prices (e.g. Australia)
    - Shortage of infrastructure such as fuel pumps to dispense biofuels (e.g. Japan)
    - Food security concerns and sustainability issues (e.g. China)
    - Global trade of biofuels (e.g. Canada)

Existing Policies for biofuel production and use

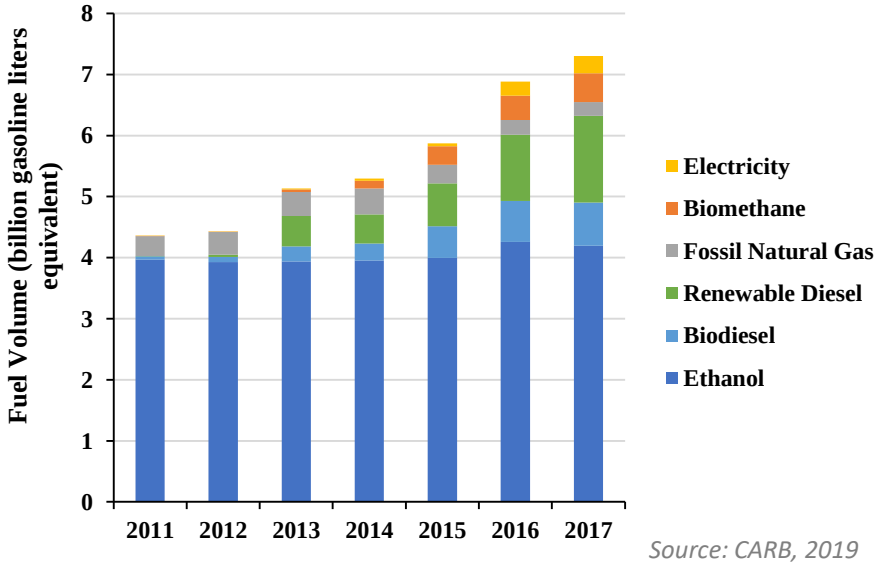
- **Fuel excise reduction/exemption**
  - Currently used by 10 member countries
  - Mainly used to make the production of biofuels economically competitive with fossil fuels in the short and mid-terms
  - Tax incentives have been used successfully to spur biofuel production and reduce biofuel prices at the pump in countries such as Brazil, Germany, and Sweden
  - Without supplementary policies such as biofuel mandates, this policy is not a strong driver to establish biofuels markets (e.g. New Zealand and South Africa)
  - As biofuels production becomes more cost efficient and the price of oil gradually increases, the fuel excise reduction/exemption incentive has been either modified or lifted (e.g. China, South Korea and Australia).

Existing Policies for biofuel production and use

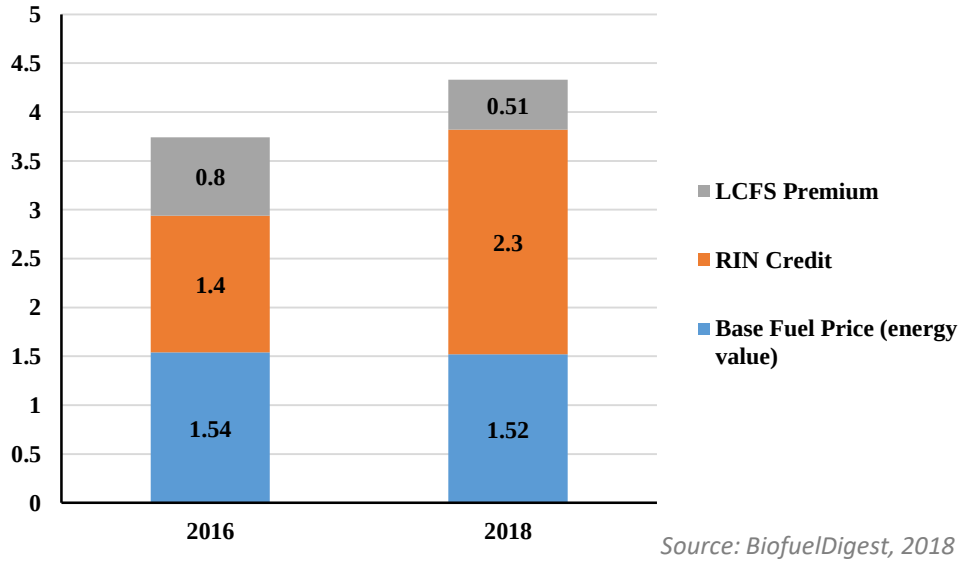
- **Low Carbon Fuel Standard (LCFS)**
  - Proven to be a successful tool to decarbonize the transportation sector by encouraging the reduction of carbon intensity of renewable fuels including biofuels.
  - California and British Columbia are at the forefront of the implementation of this policy.
  - Canada and Brazil are developing national biofuels policies that reward the biofuels based on their carbon intensity.
  - Germany and Sweden have implemented GHG reduction quota obligation for biofuel use in their transportation sectors

Existing Policies for biofuel production and use

- ## Low Carbon Fuel Standard (LCFS)
  - LCFS has spur innovations in the conventional biofuels market to reduce their carbon intensity such as the development of bolt-on and integrated conversion technologies to convert corn kernel fibre into cellulosic ethanol and/or reusing and selling the carbon dioxide (CO_2) produced by ethanol plants as a byproduct
  - In addition to conventional biofuels, it has spurred production and use of low-carbon advanced biofuels and HVO/HEFA biofuels.



Source: CARB, 2019



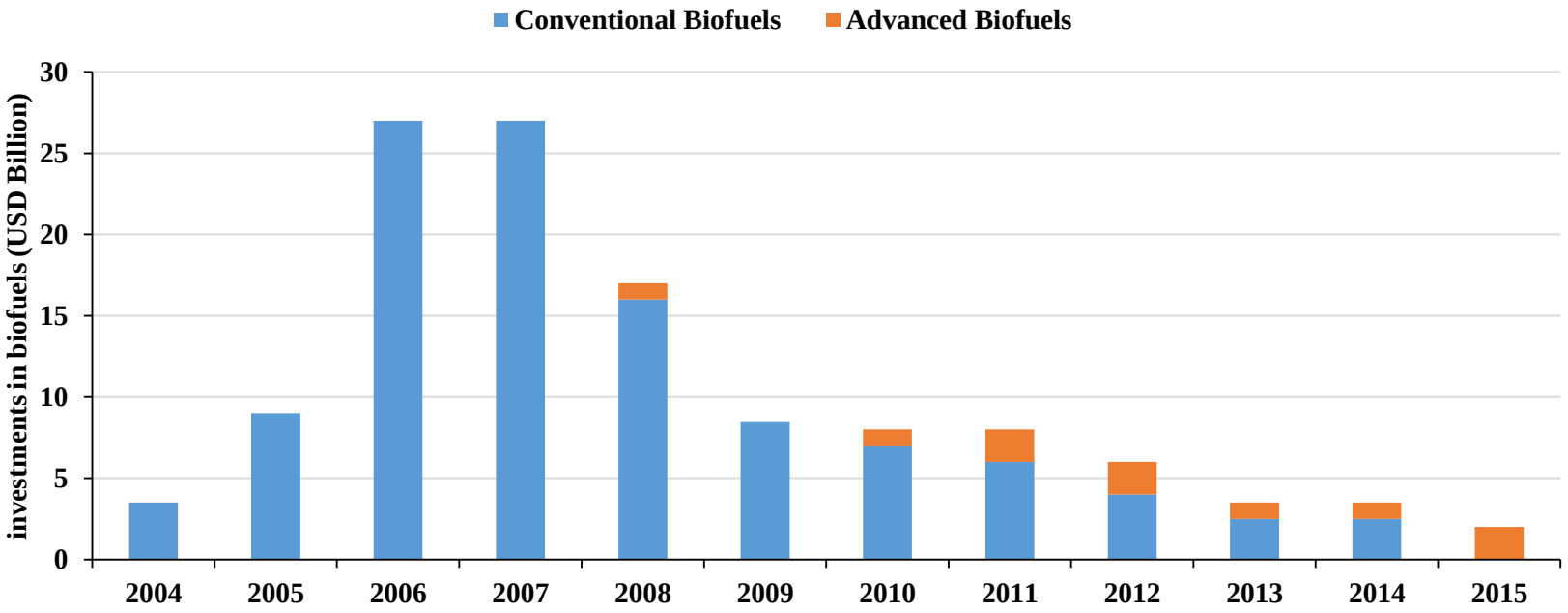
Source: BiofuelDigest, 2018

Financial schemes, investment subsidies and incentives

Member countries have various funding programs to further encourage production and use of biofuels, especially advanced biofuels.

Technology-push incentives	Country
Grants for conversion technology development to increase technology readiness levels and to de-risk the technology and supply chain development.	Australia, Austria, Brazil, Canada, Germany, South Korea, Sweden, US, China, India
Loan guarantees and credit lines to buy down the financial risk of constructing first-of-a-kind larger-scale commercial facilities	US and Brazil
Rebate and tax incentives on bioenergy R&D expenses	Australia
Rebates and bonuses to car buyers for the purchase of certain vehicles such as flex-fuel vehicles (FFVs) and other rebates such as reduced license fees and tax credits	Austria, Brazil, Sweden
Fiscal incentives and subsidies (e.g. reduced property tax, corporate tax, renewable energy depreciation on assists)	Brazil, Japan, China
Financial incentives for feedstock development and logistics	Brazil, USA, China, India
Grants for storage and distribution infrastructure	Canada, The Netherlands, Sweden

Investment in biofuels technologies



Source: IRENA, 2016; Hoefnagels and Junginger, 2018

- Despite the increase in number of biofuels policies and production and use of biofuels globally over the past decade, investments in biofuels has declined substantially in recent years mainly due to low oil prices.

- Annual global investments in biofuels peaked at over $US 27 billion in 2006 and 2007 but have since declined dramatically, decreasing to less than $US 2 billion in 2015.

Existing Policies for biofuel production and use

Policy instrument	Strengths	Limitations
Biofuel blending mandates	- Effective for developing a biofuel market at early stages - Effective in establishing biofuels markets and in shielding biofuels from low oil prices - Greater certainty of increased development - broadly effective to support technologies that are relatively mature, as they create a demand for biofuels, which is typically met with commercial conversion technologies such as conventional ethanol or biodiesel	- Need to balance costs of infrastructure while demand is low in early stages - Need suitable governance to ensure compliance - Not necessarily so useful in expanding /maintaining markets - Not necessarily successful for meeting GHG reduction targets - Limited in their capacity to pull early-stage technologies into the market, since these are often not commercially viable, or are typically more expensive to be produced commercially - struggling to compete against first generation biofuels
Excise duty reductions/exemptions	- Increases the competitiveness of biofuels with fossil fuels, especially at early stages of development, if fossil vs renewable fuels are taxed differently - Can be also considered for the production of biomass such as dedicated biomass crops (e.g. switchgrass, carinata, willow) in order to ensure sufficient feedstocks for production of conventional and advanced biofuels and ultimately achievement of mandates for use - Broadly effective to support technologies that are relatively mature, as they create a demand for biofuels, which is typically met with commercial conversion technologies such as conventional ethanol or biodiesel	- As fuel excise rates vary, this may not be a strong enough driver to foster the biofuels market as an stand-alone policy - Limited in their capacity to pull early-stage technologies into the market, since these are often not commercially viable, or are typically more expensive to be produced commercially - struggling to compete against first generation biofuels
Low carbon fuel standards (LCFS)	- Technology neutral - Favours technologies able to offer the most significant decarbonisation relative to cost - Spurs the development and production of more life cycle efficient advanced biofuels	- Unlikely to simulate demand for higher cost, less-developed technologies with long-term potential - Determining life cycle emissions is complex and time consuming and requiring big data collection

Existing Policies for biofuel production and use

Policy instrument	Strengths	Limitations
Low carbon fuel standards (LCFS)	- Encourages conventional biofuel producers to lower their carbon footprint by transitioning away from fossil fuel-based energy and making better use of their by-products such as CO_2	- Results of life cycle analysis depend on system boundaries, allocation methods and other assumptions and are subject to debate - Need suitable governance to ensure compliance - Need suitable verification process to measure the carbon intensity of biofuels produced from different feedstock-conversion technology pathways
Research and development, demonstration funding and financial de-risking measures, mainly for advanced biofuels	- Necessary to support early market technology development and initial commercial projects with longer-term market potential but high investment risk - Successful in de-risking technology and catalysing private investment for subsequent stages, somewhat sparing public budgets as technologies advance into commercial stages	- Financial risks associated with potential project failures
Sustainability policy	- Propel the production and use of advanced biofuels using non-food crop feedstocks such as municipal solid waste (MSW), used cooking oil, and agricultural and forest residues	- Could constrain further production of conventional biofuels from food crops, even for cases where there is little potential for detrimental indirect land use changes - Could make waste production profitable, which is not in line with overall waste reduction initiatives and polices

Conclusions

- Biofuels policies have and continue to support the growth of biofuels production and use. Not all these growths have been steady in the last decade.

- Because the biofuels industry is extremely sensitive to policy changes, stability may be more important to growth than the actual choice of policy instruments.

- A balanced policy mix of both market-pull and technology-push policies need to be considered to develop and deploy a spectrum of biofuels technologies and markets to decarbonize all transport sectors and meet ambitious GHG reduction goals.

- Biofuel blending mandates is still the primary biofuels policy tool. The success of the LCFS in California and British Columbia has led to several states and nations countries looking to adopt similar programs.

Proposed update of the questionnaire that will be used for the current triennium (2019-2021)

- Mostly use the same format as before?
- In addition, collect information on the global trade of biofuels at the regional level (e.g., Europe, Asia, North and South America, Australasia, Africa) and imposed tariffs/duties on biofuels import/export
- Collect and compile information on the compliance mechanisms used to enforce biofuel policies
- Add additional countries? (such as??)
- Other suggestions??

Next steps

- Send a copy of the revised questionnaire to member countries for their review and feedback- July 2019

- Request completion of the revised questionnaire by September 2019
  - For established members: Share a copy of their respective country chapters, asking for an update of their chapters (e.g. changes in biofuels policies, production and use)
  - For new members: Share a copy of the revised questionnaire, asking for completion and submission

- Collect the completed questionnaires from member countries- October 2019

- Develop the initial draft of the implementation agenda and distribute among member countries for review and comments- December 2019

- Collect comments and feedbacks from member countries on the initial draft- February 2020

- Finalize and publish the implementation agenda- 2019 Update- March 2020