

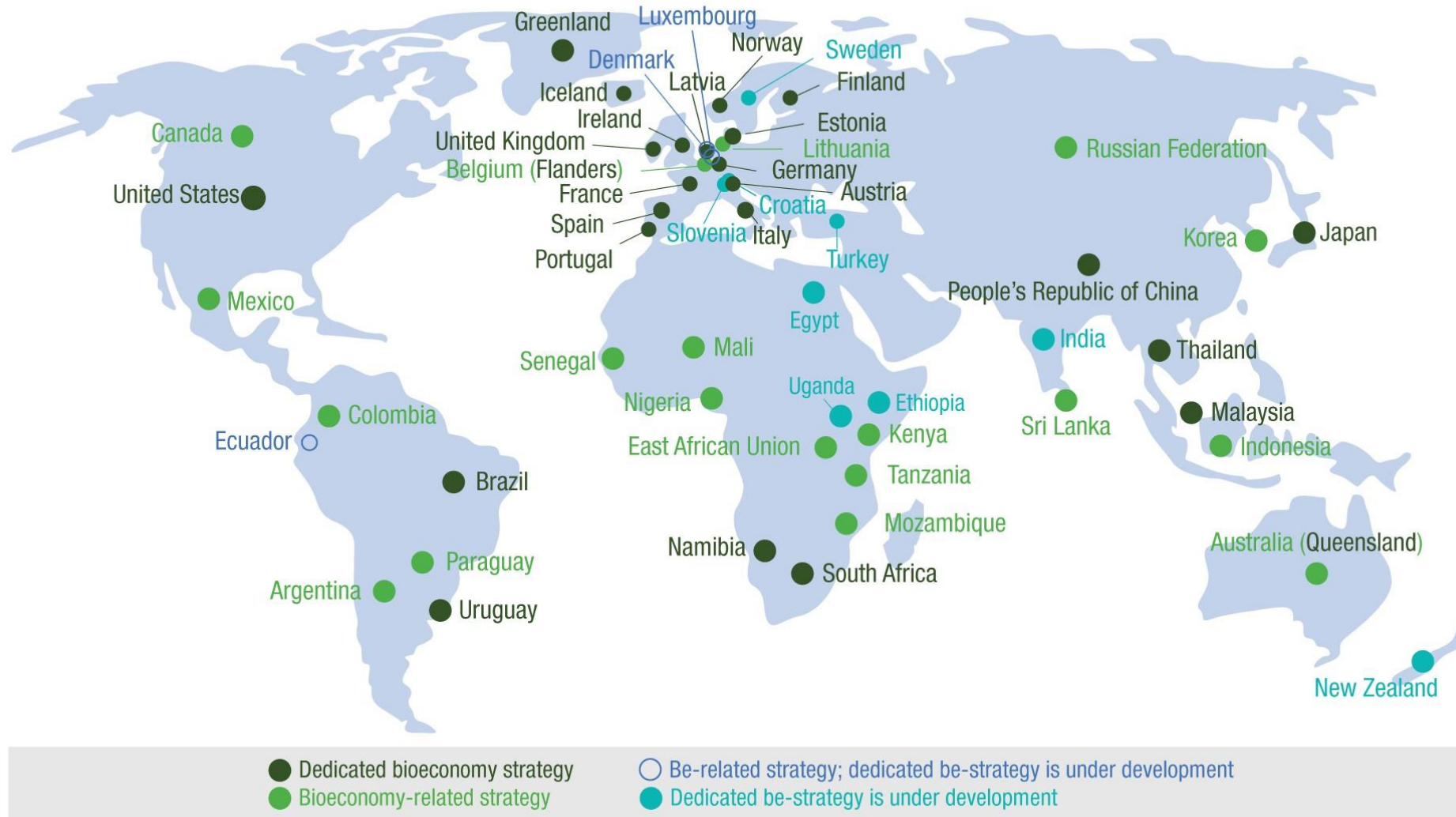


# THE BIOECONOMY WORLDWIDE

Jim Philp, Policy Analyst



# National and regional bioeconomy strategies

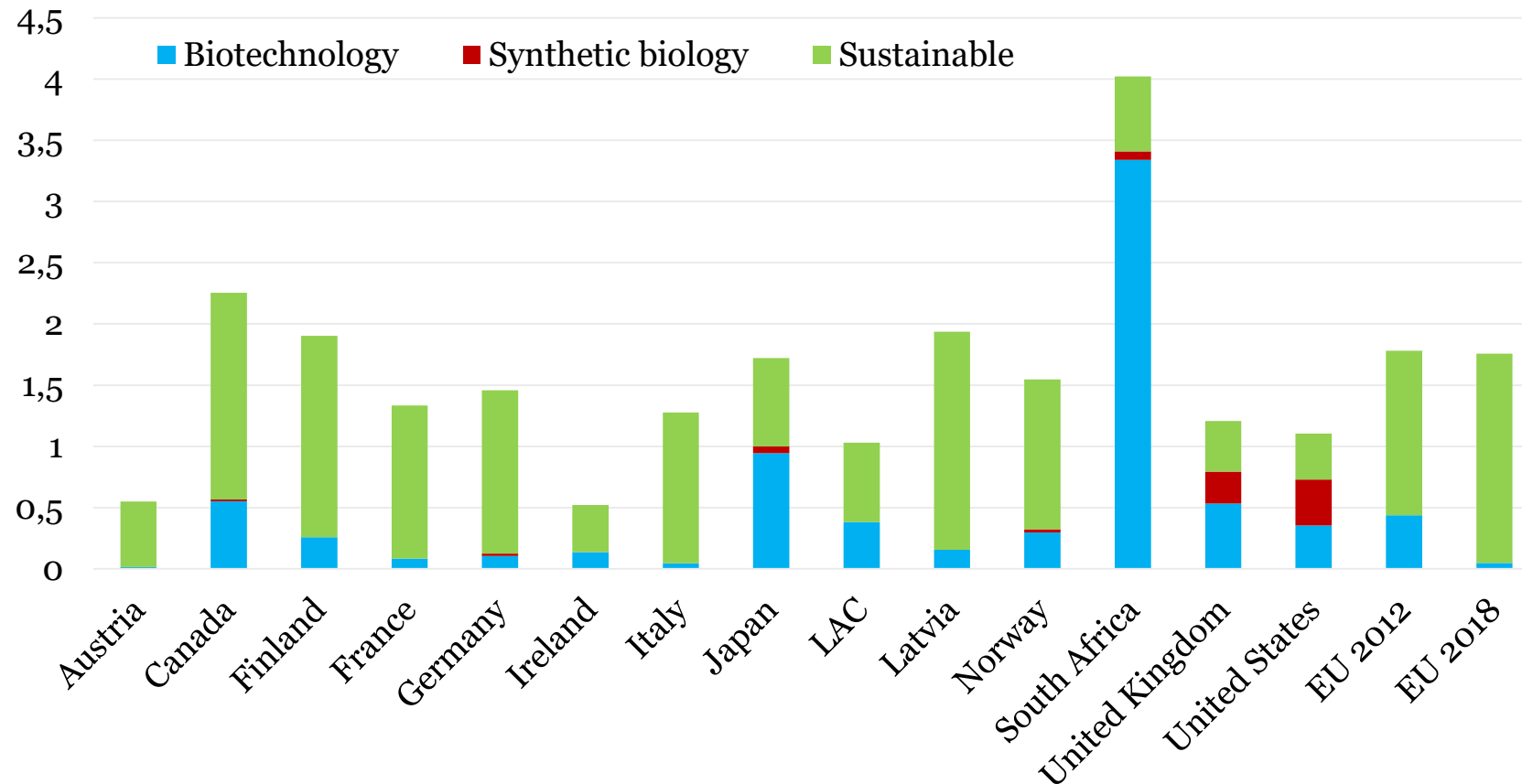




# SIMILARITIES AND DIFFERENCES



# The world view of the bioeconomy has changed since 2009



The figures on the ordinate refer to the **number of occurrences of the word per page of national bioeconomy strategies**, excluding footnotes, endnotes and references.

LAC = Latin America and Caribbean.



# France: as broad as one can imagine



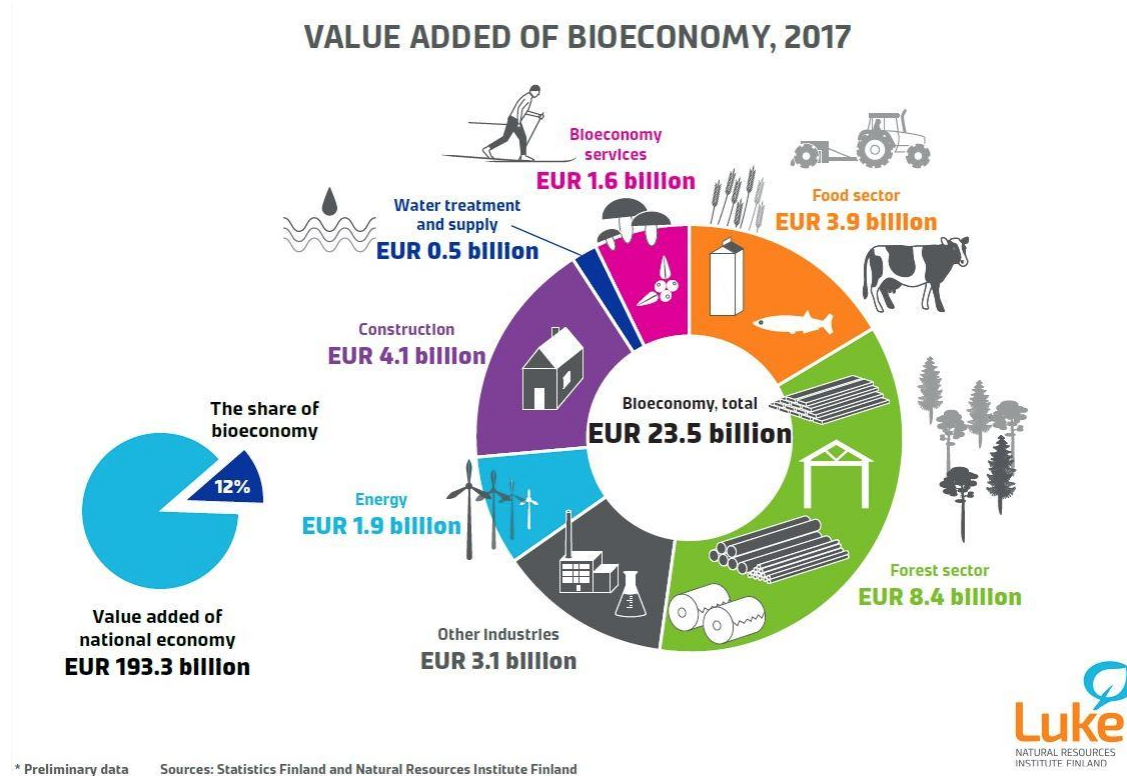
“Bioeconomy must help in the transition from an economy based on fossil resources, to a competitive and sustainable economy based on renewable carbon. With bioeconomy on the rise, sectors such as [agriculture](#), [forestry](#), [aquaculture](#) and [fisheries](#), will position themselves as key players in the transition to a [carbon free economy](#). The development of bioeconomy brings us the opportunity to remember that farmers, foresters and fishermen feed us, but that they can also heat us, dress us, and, finally, provide us with electricity and materials”.







# South Africa, US: have a strong emphasis on human health



Finnish Bioeconomy Strategy (2014), Ministry of Employment and the Economy, [www.biotalous.fi](http://www.biotalous.fi).

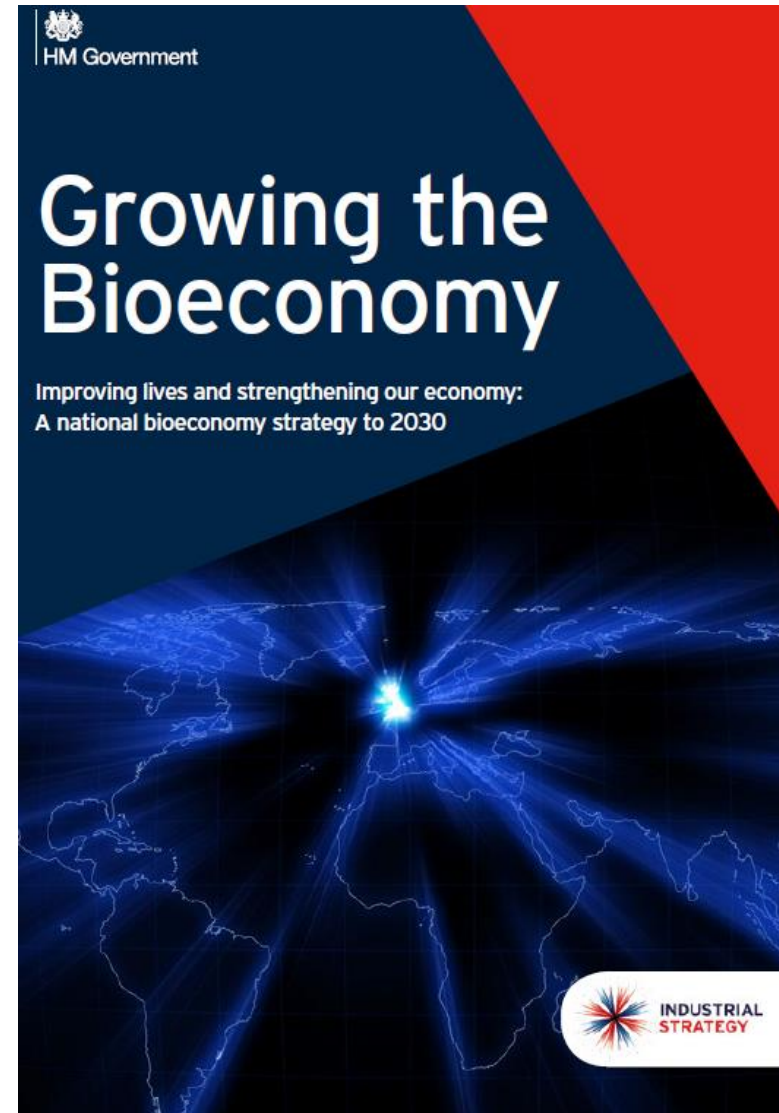


Department of Science and Technology (2013),  
The bio-economy strategy; Department of Science and Technology.  
Pretoria: South Africa.



# UK: bioeconomy strategy is based on biotechnology

- “Our world-leading UK industrial **biotechnology** and **synthetic biology** research, innovation and infrastructure will provide a unique platform for growth which connects businesses and industries in developing and using green, **bio-based technologies** to create a more sustainable future for all.”





# UK: A network of public engineering biology platforms

- Five biofoundries ●
- Six basic research centres ●
- One industrial translation centre ●
- Public investment: ~£350M
- 180 synthetic biology companies
- **x6 leverage of public investment**





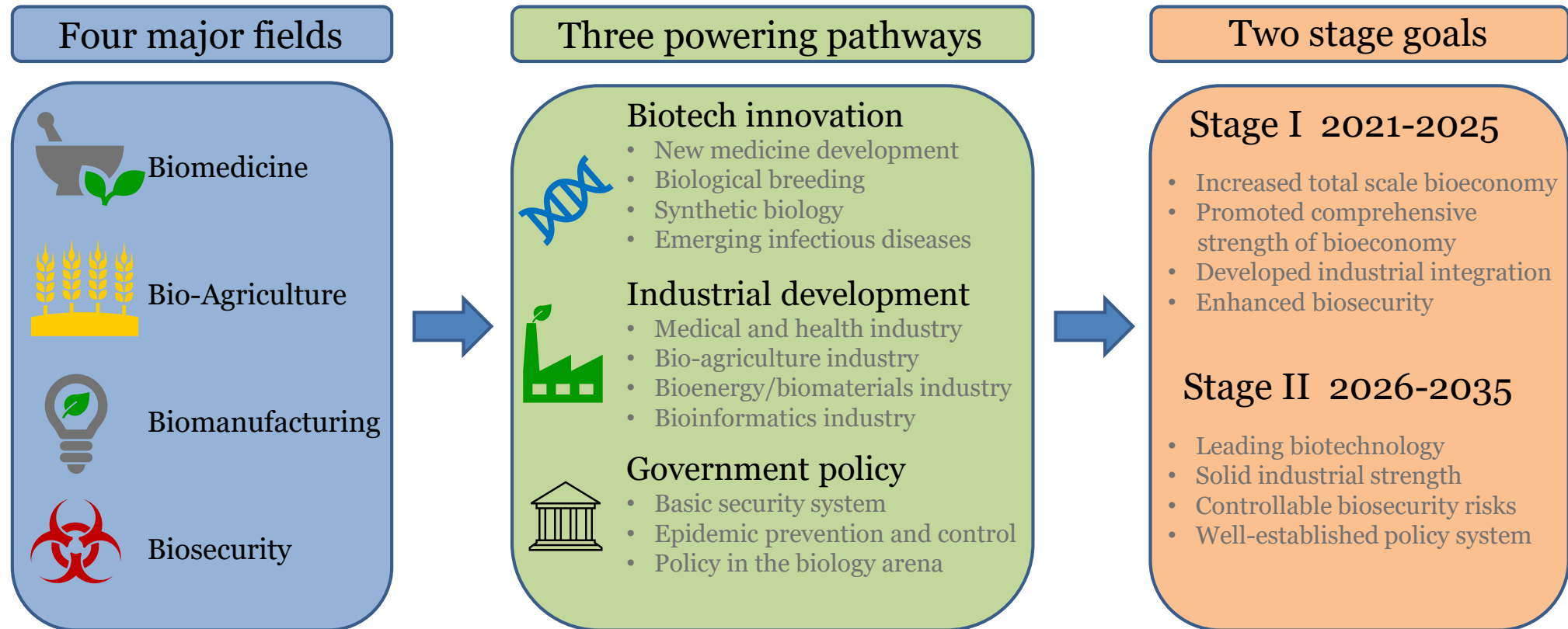


# Public biofoundries are confined to a small number of (elite) facilities





# China's 14<sup>th</sup> Five-year Plan for bioeconomy development





# Stated goals of the US Executive Order on Biomanufacturing

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EXECUTIVE ORDER  
Executive Order on Advancing  
Biotechnology and Biomanufacturing  
Innovation for a Sustainable, Safe, and  
Secure American Bioeconomy

SEPTEMBER 12, 2022 • PRESIDENTIAL ACTIONS

1. Grow domestic biomanufacturing capacity
2. Expand market opportunities for **bio-based products**
3. Drive R&D for **major societal challenges**
4. Improve access to quality federal data
5. Train and support a diverse, skilled **bioeconomy workforce**
6. **Streamline regulations** for products of biotechnology
7. Advance **biosafety and biosecurity** innovation to **reduce risk**
8. Promote standards, establish metrics and develop systems to **grow/assess** the bioeconomy
9. Build a thriving, secure **global** bioeconomy with **partners and allies**



# Similarities between United States and China

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## United States

Grow domestic biomanufacturing capacity

Expand market opportunities for bio-based products

Drive R&D for major societal challenges

Streamline regulations for products of biotechnology

Advance biosafety and biosecurity innovation to reduce risk

Promote standards, establish metrics and develop systems to grow/assess the bioeconomy

Build a thriving, secure global bioeconomy with partners and allies

## China

↔ Solid industrial strength

↔ Increased total scale bioeconomy

↔ Biotechnology innovation

↔ Basic security system, Policy in the biology arena

↔ Controllable biosecurity risks

↔ Increased total scale bioeconomy and other Stage I goals

↔ Ditto Stage I goals



# The Inflation Reduction Act (IRA) 2022



The specific **45Q Tax Credit** enhancements contained in the IRA include:

- Increasing the credit amounts
  - Point source capture and storage from industrial and power facilities - USD 85 per tonne
  - **Carbon capture and utilisation** including enhanced oil recovery - USD 60 per tonne
  - Direct Air Capture
    - Capture and storage of carbon – USD 180 per tonne
    - Capture and utilisation of carbon – USD 130 per tonne

*“A decade ago, we recognized the need to **capture and use** CO<sub>2</sub> to make sellable products, because market forces can be powerful mechanisms to stimulate rapid change. This action by the US government will create incredible **incentives** for the marketplace to accelerate the carbon management market worldwide.”*

Bernard J. David, Chair of the Global CO<sub>2</sub> Initiative Advisory Board, August 2022,  
<https://www.globalco2initiative.org/2022/08/16/ira2022-ccu-incentives/>





## Asia will not be left behind

“Biorefineries present an alternative to fossil-based production, and can generate employment, wealth and the ecosystem needed to make them function. Thailand is establishing a bioeconomy with widespread biorefining as a strategy for future economic growth. There is political will to establish in Thailand, if feasible, small, decentralised biorefineries to which farmers can locally deliver biomass as feedstock, which can then be processed into bio-based products. This would help to relieve rural poverty, which is still a problem in some areas of Thailand despite progress. Developing a biorefinery roadmap will help to assess the feasibility of such an initiative.”

[https://www.oecd-ilibrary.org/science-and-technology/guidance-for-a-biorefining-roadmap-for-thailand\\_60a2b229-en](https://www.oecd-ilibrary.org/science-and-technology/guidance-for-a-biorefining-roadmap-for-thailand_60a2b229-en)

OECD publishing

### GUIDANCE FOR A BIOREFINING ROADMAP FOR THAILAND

OECD SCIENCE, TECHNOLOGY  
AND INDUSTRY  
POLICY PAPERS

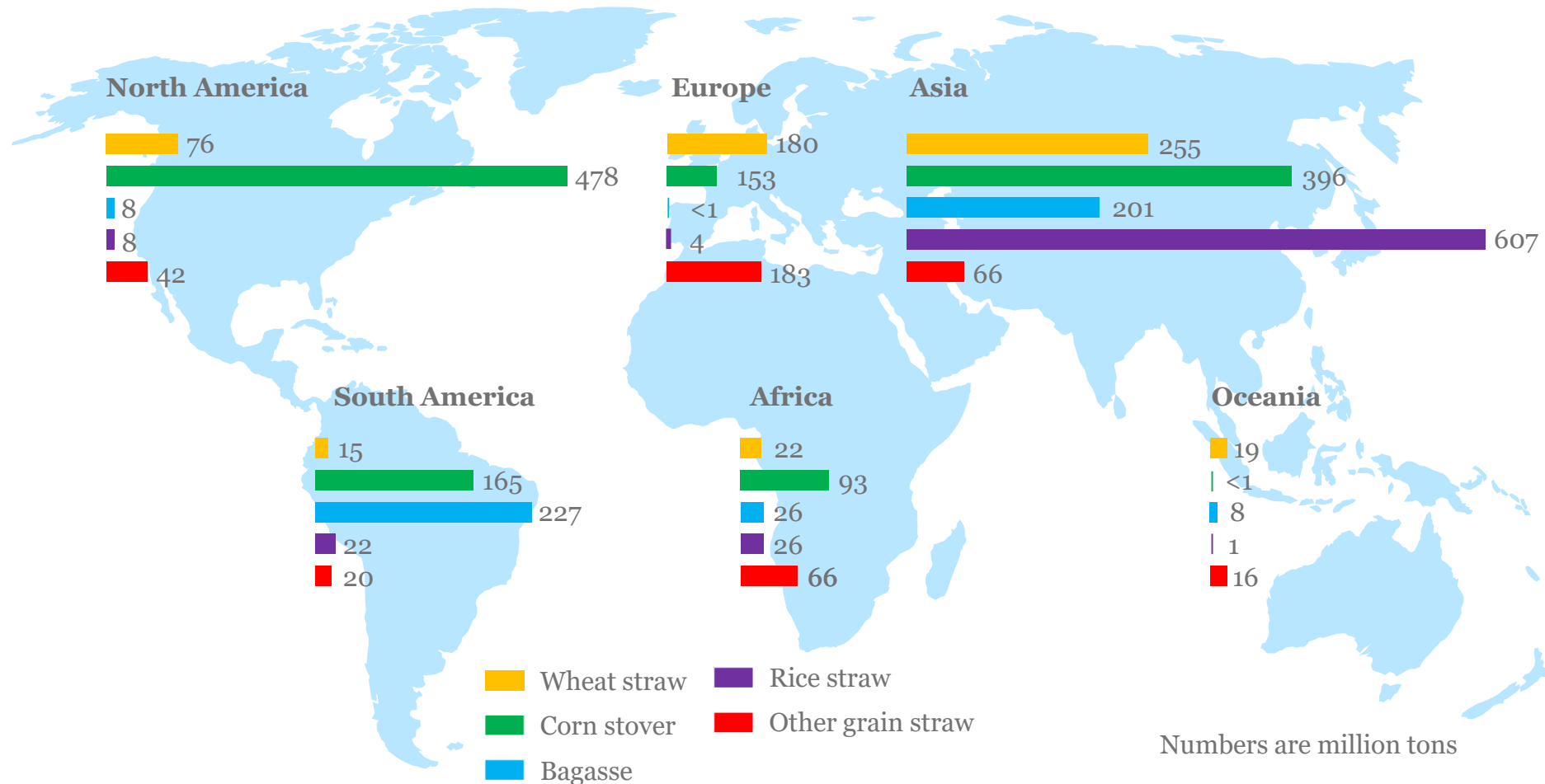
April 2021 No. 110



# FEEDSTOCKS, PRODUCTS, TECHNOLOGIES



# Main sources of (ligno)cellulosic material around the world





# Implementation of the specific CRs

Country	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Belgium	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes
Canada	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Czech Republic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Denmark	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No
Estonia	No	No	Yes	No	No	No	No	Yes	No	Yes
Finland	Yes	Yes	No	Yes	Yes	No	Yes	Yes		Yes
France	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Germany	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hungary	Yes	No	Yes	No	No	No	No	Yes	No	Yes
Israel	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
Italy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Japan	No	No	No	No	No	Yes	No	No	No	No
Korea	No	No	No	No	No	No	No	No	No	No
Latvia	No	No	No	No	No	No	No	No	No	No
Lithuania										
Mexico	No	No	No	No	No	No	No	No	No	No
Namibia	No	No	Yes	Yes	No	No	Yes	Yes	No	Yes
Netherlands	Yes	No	Yes	No	No	No	No	Yes	No	No
New Zealand	No	No	No	No	No	No	No	No	No	No
Norway	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Poland	Yes	Yes	No	No	No	No	No	Yes	No	No
Portugal	No	No	No	No	No	No	No	No	No	No
South Africa	No	No	No	No	No	No	No	No	No	No
Sweden	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
United Kingdom	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes
United States	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes



Recommendation of the Council on  
Assessing the Sustainability of  
Bio-Based Products

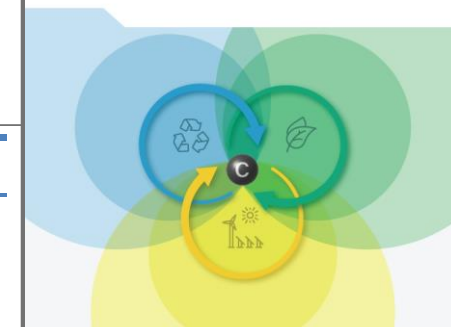
OECD Legal  
Instruments





# Case study summaries: Wide range of technologies...

Country	Case study	Main technology	Convergence?
Austria	Carbon2Product Austria (C2PAT): capturing and using CO <sub>2</sub> from cement production	Nano-enabled catalysis	Chemistry, photovoltaics
Canada	Brock Commons timber-framed high-rise building	Construction	Chemistry, wood technology
	Toundra Greenhouse - Turning waste and emissions into food with the circular bioeconomy	Bioenergy with carbon capture and utilisation (BECCU)	Waste heat capture, digital, water recycling
	Innovation challenges as funding mechanisms to accelerate emerging CCUS technologies	Funding mechanisms for any CCUS technology	Convergence is not specifically targeted but is not excluded
	Solid recovered fuels and CCUS in industry	Waste-to-energy facilities that use SRFs with CCUS technologies e.g. gasification	Waste recycling
Germany	ZeroCarbon FootPrint (ZeroCarbFP): Conversion of carbon-rich waste streams for a sustainable, biological synthesis of valuable substances	Biotechnology, chemistry	Waste recycling
Italy	Compostable bioplastics value chain	Biotechnology, chemistry	Industrial composting
	PlaCE: (Offshore) Platform conversion for eco-sustainable multiple uses	Offshore rig decommissioning, mineral accretion, aquaculture, solar energy	Life-Cycle Cost-Benefit, CCUS, renewable energy e.g. hydrogen production / storage







## Case study summaries...and feedstocks

Japan	Carbon capture and utilisation by Saga City incineration plant	Chemistry	Renewable energy, incineration
	Recycle system development of municipal and industrial waste to useful raw chemicals	Biotechnology	Chemistry, gasification
Korea	Sustainable chemicals and fuels production using nanotechnology in Korea	Nanotechnology	CCU, chemistry
Norway	Production of fish feed by gas fermentation	Biotechnology	Aquaculture, CO <sub>2</sub> capture, water electrolysis for hydrogen production
	Decarbonisation strategies of a ferrosilicon plant	Biotechnology	CCU, CCS, chemistry
United Kingdom	Captured CO <sub>2</sub> for new fertilizers	Chemistry, biochemistry	Agricultural technology
United States	Digital agriculture: soil organic carbon networked measurements technologies	Digital, ICT	Agricultural technology
	Hybrid technologies for recycling waste carbon using gas fermentation and upgrading	Biotechnology	Catalysis, bioenergy



# HOLISTIC BIOECONOMY POLICY



# Bioeconomy policy: Everything is connected

FEEDSTOCK	TECHNOLOGY	INDUSTRIALISATION	MARKET
<b>OBJECTIVES</b>			
Stimulate availability of bio-resources	Strengthen skills and technology base	Trigger investments in new manufacturing	Increased sustainability and value creation
<b>VALUE CHAIN SPECIFIC POLICIES</b>			
Resource regulations and permits	Targeted R&D grant programmes	Public technology scale-up and pilot facilities	Product standards and norms
Transportation and logistics infrastructure	Specific education and training programmes	Financial support for flagship projects	Price subsidies and product tax policies
Feedstock specific trade regulations	Technology cluster and network support	Targeted government investments programmes	Product mandates and bans policies
<b>GENERIC POLICIES</b>			
Biomass sustainability assessment studies	Broad scope R&D grant programmes	Start-up and SME support	Sustainability labels and communication
Governance and regulation efficiency	Tax incentives for applied R&D	Industry-oriented education programmes	Public awareness and acceptance campaigns
Waste management policies	Stimulate international partnerships	Techno-economic feasibility studies	Tax on CO <sub>2</sub> emissions and fossil fuel subsidy reform
International trade agreements	Exchange programmes and apprenticeship	Private investment stimulating policies	Public procurement of bio-based products



# FRAGMENTATION CALLS FOR A GLOBAL FORUM



# The World BioEconomy Forum, <https://wcbef.com/>

The **World BioEconomy Forum**<sup>®</sup> is a platform advocating for the adoption of circular bioeconomy practices to conserve and ensure sustainable use of essential resources and combat climate change. Established **2018**.

The Forum organises all its operations and activities based on the **FOUR-PILLAR Structure**. This structure facilitates a comprehensive assessment of the circular bioeconomy, fostering sector-wide developments. Importantly, it ensures that all key stakeholders in the circular bioeconomy have a platform and a voice in the process.

The Forum conducts season-related programmes, underscoring on the theme relevant to each year. These initiatives include online **Roundtables** and an **Annual Conference**.

Besides public programmes Insider Insight events are arranged for members under the **World Bioeconomy Circle**.

In addition to public programmes, the Forum collaborates with the **World Bioeconomy Circle** to run membership programmes.

The Forum offers **Advisory Services** to support sector developments.

The **Annual Declaration** serves as a consolidated document summarising the significant lessons and insights derived from the activities and experiences of each season within the World BioEconomy Forum.



The Bioeconomy: People,  
Planet, Policies



Corporate Leaders and  
the Financial World




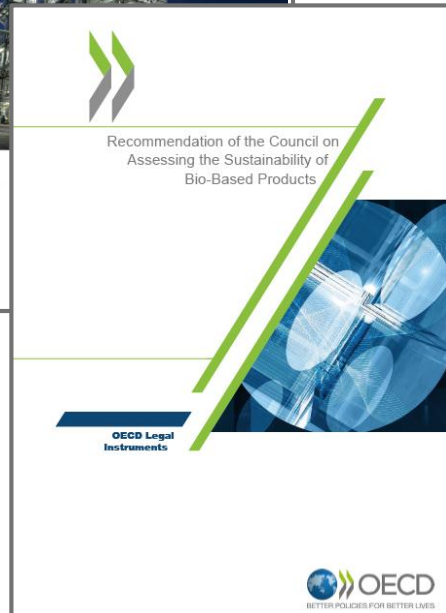
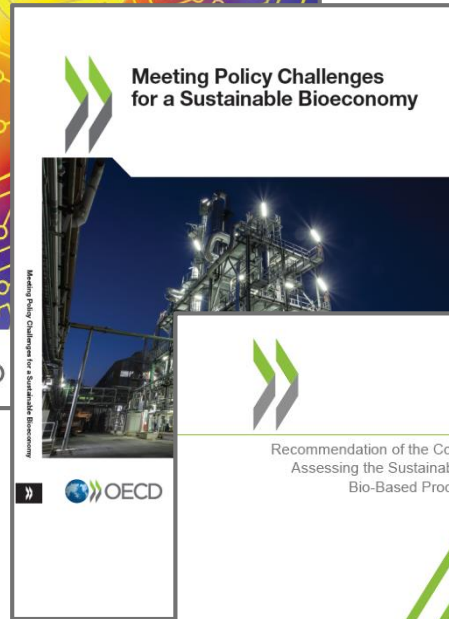
Bioproducts around us



Looking to the Future



 Thank you for your time



New in December

