

Building a sustainable European biofuel industry

4-6 November 2019, Gothenburg

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#biofuels_conf



Welcome!

Building a sustainable European biofuels industry

**BIO4
FUELS**

Supergen
 Bioenergy

 **Swedish
Energy Agency**

THE SWEDISH KNOWLEDGE CENTRE
FOR RENEWABLE TRANSPORTATION FUELS 

Biofuels in Sweden

Ingrid Nohlgren, PhD

Director

f3 Swedish Knowledge Centre for Renewable
Transportation Fuels

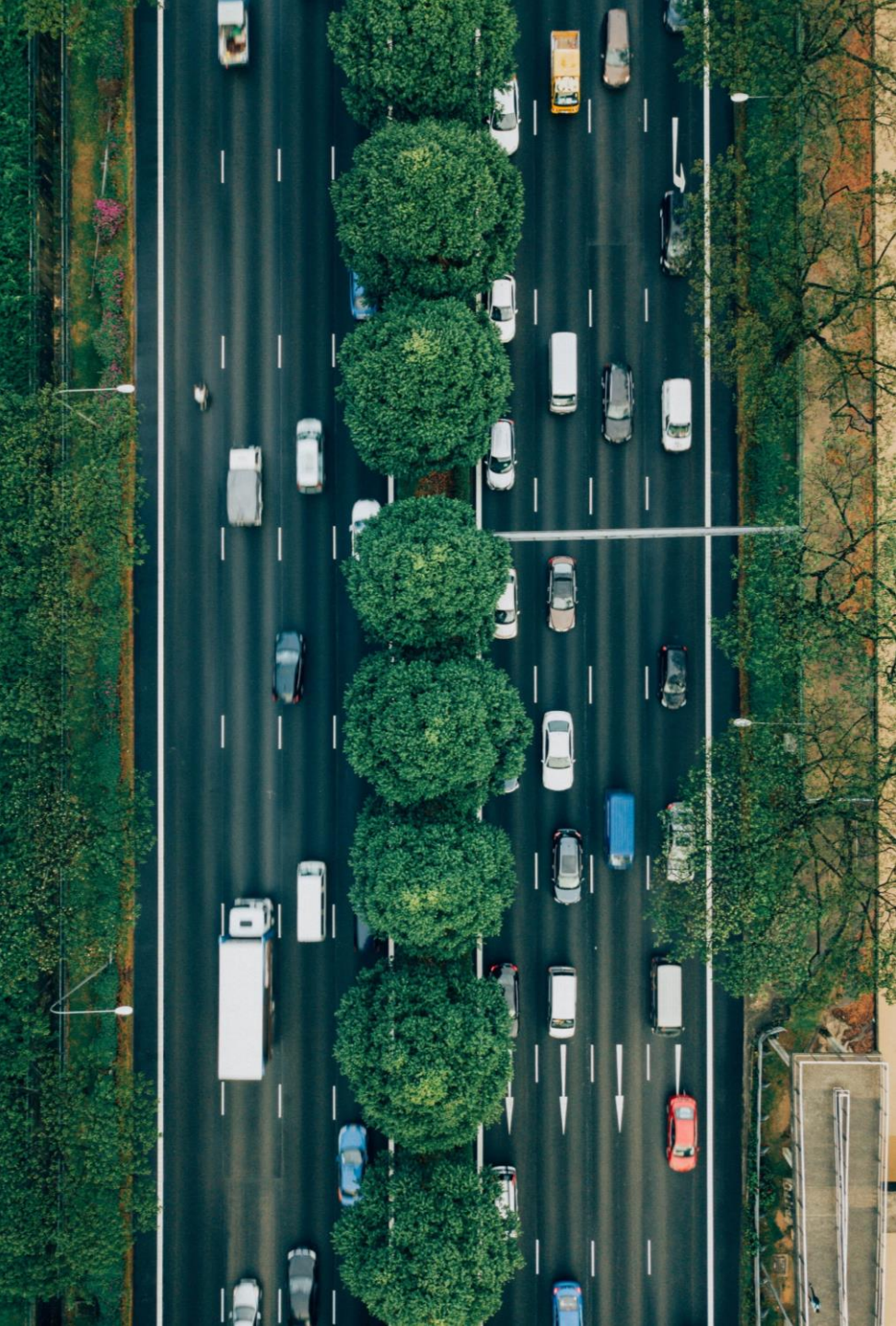
Office Director

Collaborative Research Programme Renewable
Transportation Fuels and Systems

Building a sustainable European
biofuels industry

5-6 November 2019





Renewable Transportation Fuels and Systems

- A collaborative research program between the Swedish Energy Agency and f3
- Second period, 2018-2021
- Aim:
 - The research projects give scientifically based decision support for the development and use of sustainable renewable transportation fuels
 - Enhance system understanding among politicians, agencies and industry.

Renewable Transportation Fuels and Systems



Annual open calls – call is open and closes 19th of Feb 2020.



Open for all actors



Requirements

At least two organisations

At least 25% co-funding



Total funding 33 million SEK



14 ongoing projects



29 projects were carried out last period (2014-2017)

Five research areas

TECHNOLOGICAL, ECONOMICAL STUDIES



Comprehensive technological, economical and/or environmental system studies.

STAKEHOLDER, POLICY AND STRATEGY



Analyses of different policy instruments, barriers for investments, attitudes etc

COMPARATIVE SYSTEM STUDIES



Different production processes and use, e.g. LCA and industrial system analyses.

PROCESS INTEGRATION AND EFFICIENCY



Configuration of efficient production from a system perspective. Integration in existing industry etc.

RESEARCH SYNTHESSES



Status of development for different parts in the value chain and surrounding conditions, such as policy instruments.

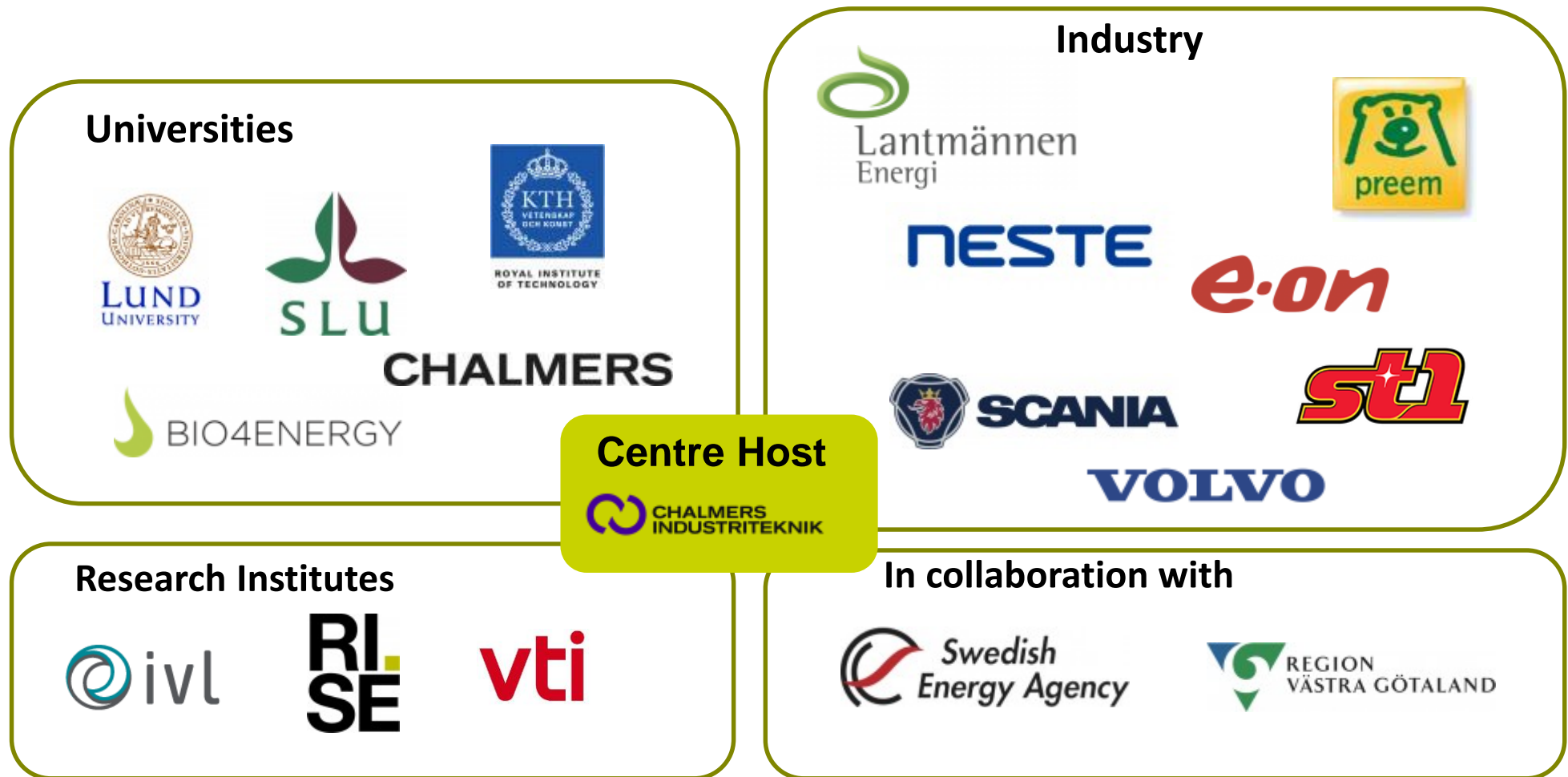
THE SWEDISH KNOWLEDGE CENTRE FOR RENEWABLE TRANSPORTATION FUELS



- f3 is a Swedish knowledge centre where industry, universities, institutes and agencies collaborate for a sustainable transport sector.
- f3 carry out system-oriented and interdisciplinary research in all steps of the biofuel value chain.
- f3 centre partners
 - Finances and carry-out research
 - Disseminates knowledge
 - Engages in advocacy work



f3 – a collaboration and network organisation





Context of Biofuels in Sweden

Climate targets in the transport sector

Sweden 2030: 70% reduction CO₂-emissions

Sweden 2045: fossil free

Electricity generation

40% hydro, 40% nuclear, 11% wind, 9% CHP (bio, waste, industrial)

Energy use in residential and service sector

50% electricity, 32% district heating, 10% biofuels, 8% fossil fuels

Challenge to become renewable in the transport sector and the industrial sector!



Use of Biofuels in Sweden

- 20% reduction of CO₂-emissions since 2010 in the transport sector
- Almost 2,000,000 m³ of biofuels were used in 2018, corresponding to 20% of the energy used in the transport sector
- Biofuels used in Sweden:
 - HVO (drop-in and HVO100)
 - FAME (low blend and B100)
 - Ethanol (low blend and today small amounts of E85)
 - Biogas
- HVO has increased since 2011, and dominates today
- A large amount of the biofuels (or the raw material) used in Sweden, are imported
- Policy instruments directed to **the use of biofuels**, not production




Commercial Production of Biofuels in Sweden

- Total production 7 TWh
 - 16 TWh used biofuels
- **Ethanol** (1.5 TWh), grains, residues from food industry and sugar rich liquor from pulping
- **HVO** (2 TWh), Tall oil and rape seed oil and smaller amounts of animal oil
- **FAME** (1.5 TWh), rape seed oil
- **Biogas** (2 TWh), anaerobic digestion of organic waste and residues



Planned production of Biofuels - EXAMPLES

- **Södra** – Methanol (5,000 ton/y) from stripper gases, 2019
- **RenFuel** – lignin bio oil (25-30,000 ton), catalytic process, Q1 2021 starts the deliveries
- **Preem and Setra** – pyrolysis oil (25,000 ton/y) from saw dust, 2021
- **St1** – renewable fuels (HVO-diesel, jet fuel) (200,000 ton/y), 2022
- **SCA Biorefinery Östrand AB** – Biofuel production from black liquor and solid forest residues

A photograph of a road scene. On the left, a large semi-truck is in motion, blurred horizontally. It is on a dark asphalt road. To the right of the road is a grassy embankment with several birch trees. The sky is blue with some white clouds. A semi-transparent grey box with a thin yellow border is in the upper left corner, containing text.

Thanks!

Ingrid Nohlgren
+ 46 31 772 6352
ingrid.nohlgren@f3centre.se
www.f3centre.se

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BIO4 FUELS

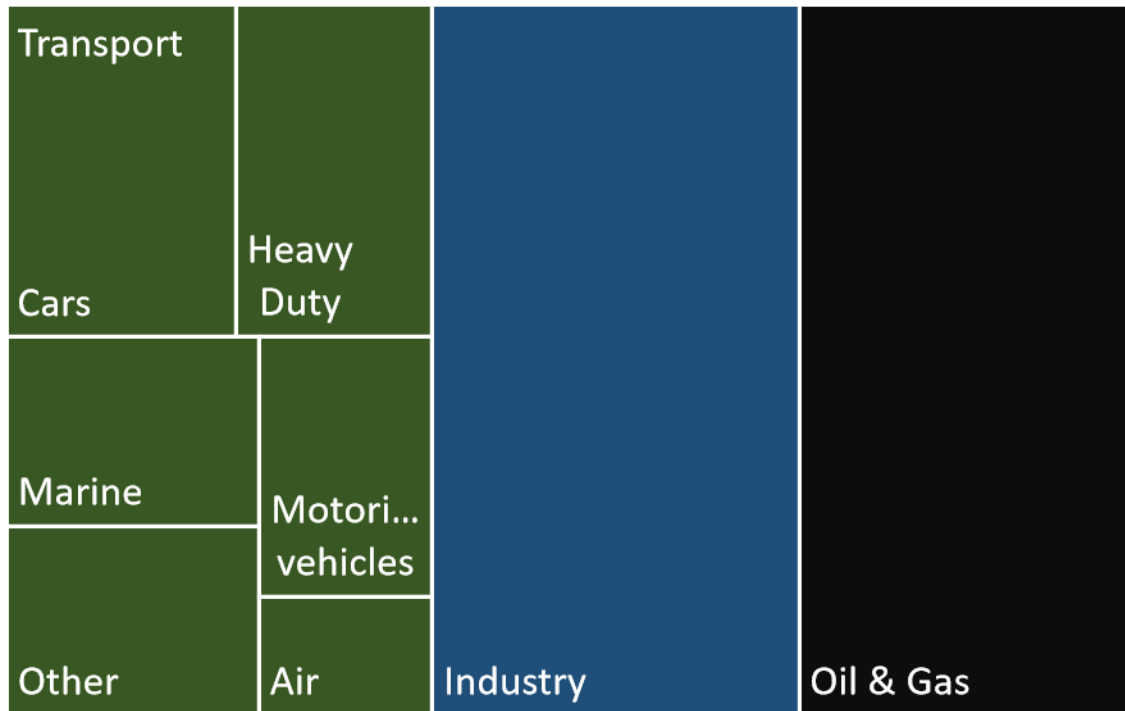
Norwegian Centre for Sustainable Bio-based Fuels and Energy

Duncan Akporiaye, Centre Leader, SINTEF



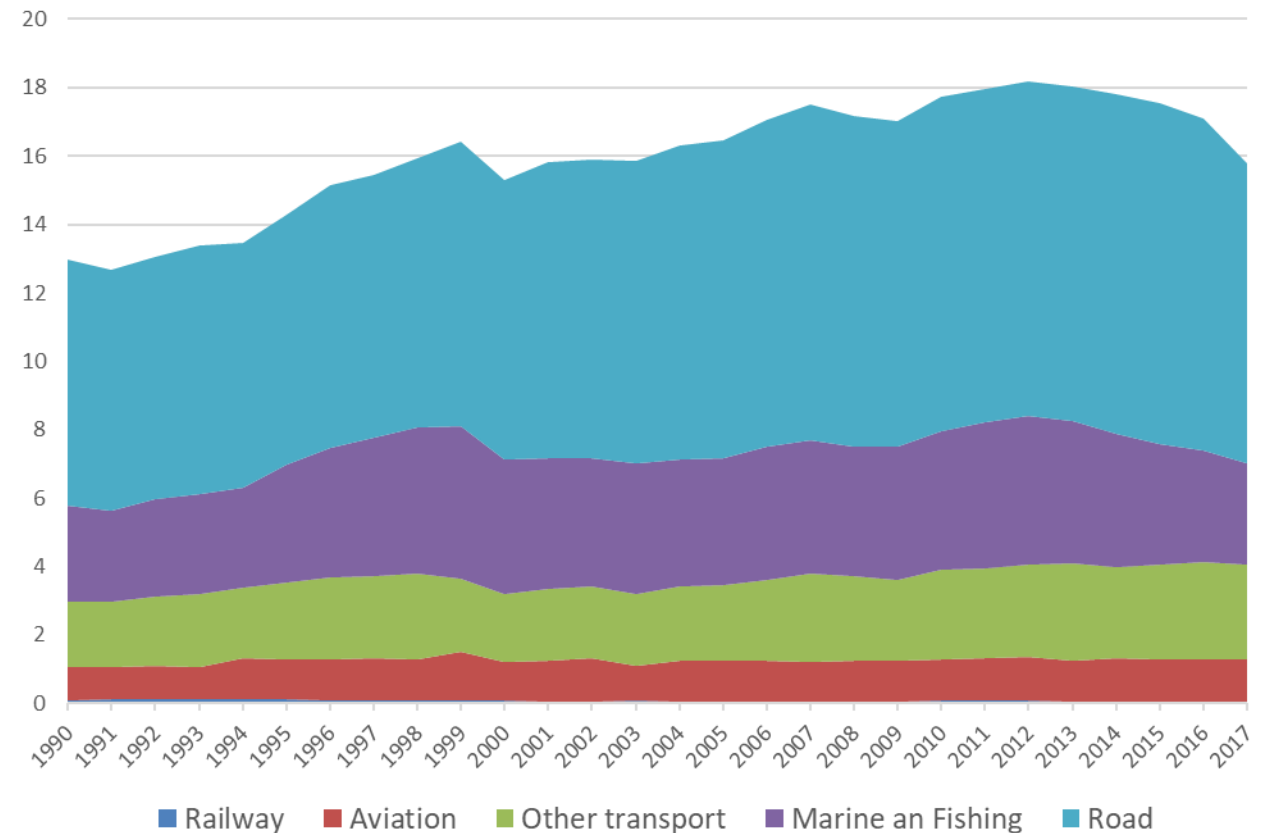
Source of CO₂ emissions in Norway

■ Transport ■ Oil & Gas ■ Industry

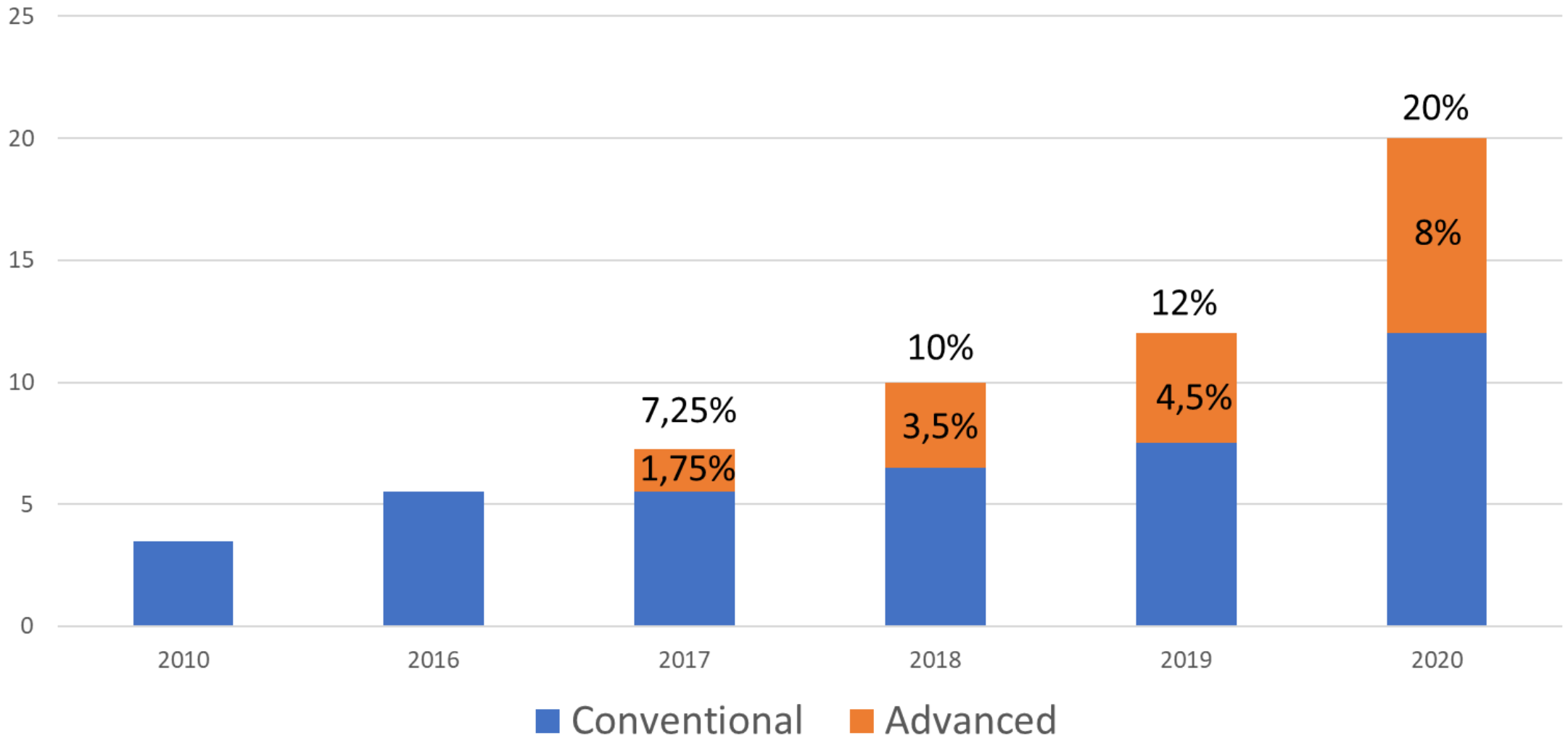


~30%

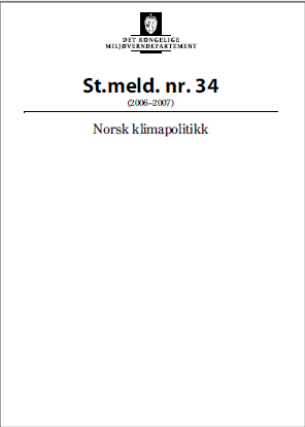
Norway - Emissions from Transport



Targets for blending of Biofuels



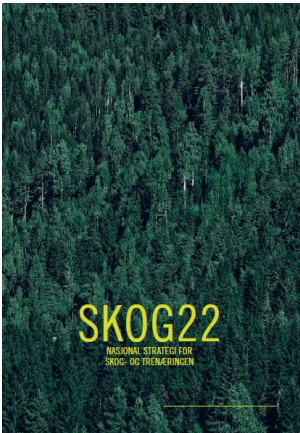
Biofuels Research – National Policies



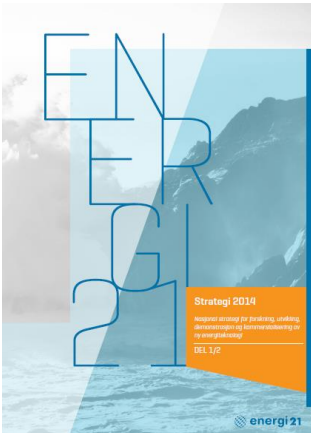
Norwegian Climate Policy



Norwegian Enterprise
Norwegian Energy Resources



National Strategy for Forestry and Wood Industry



National Strategy
For new Energy Technology



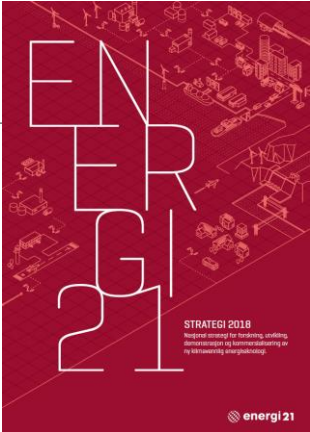
Roadmap
Process Industry



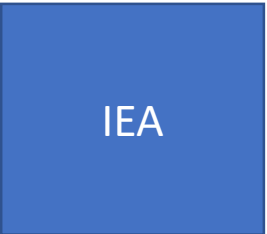
National
Transport Plan



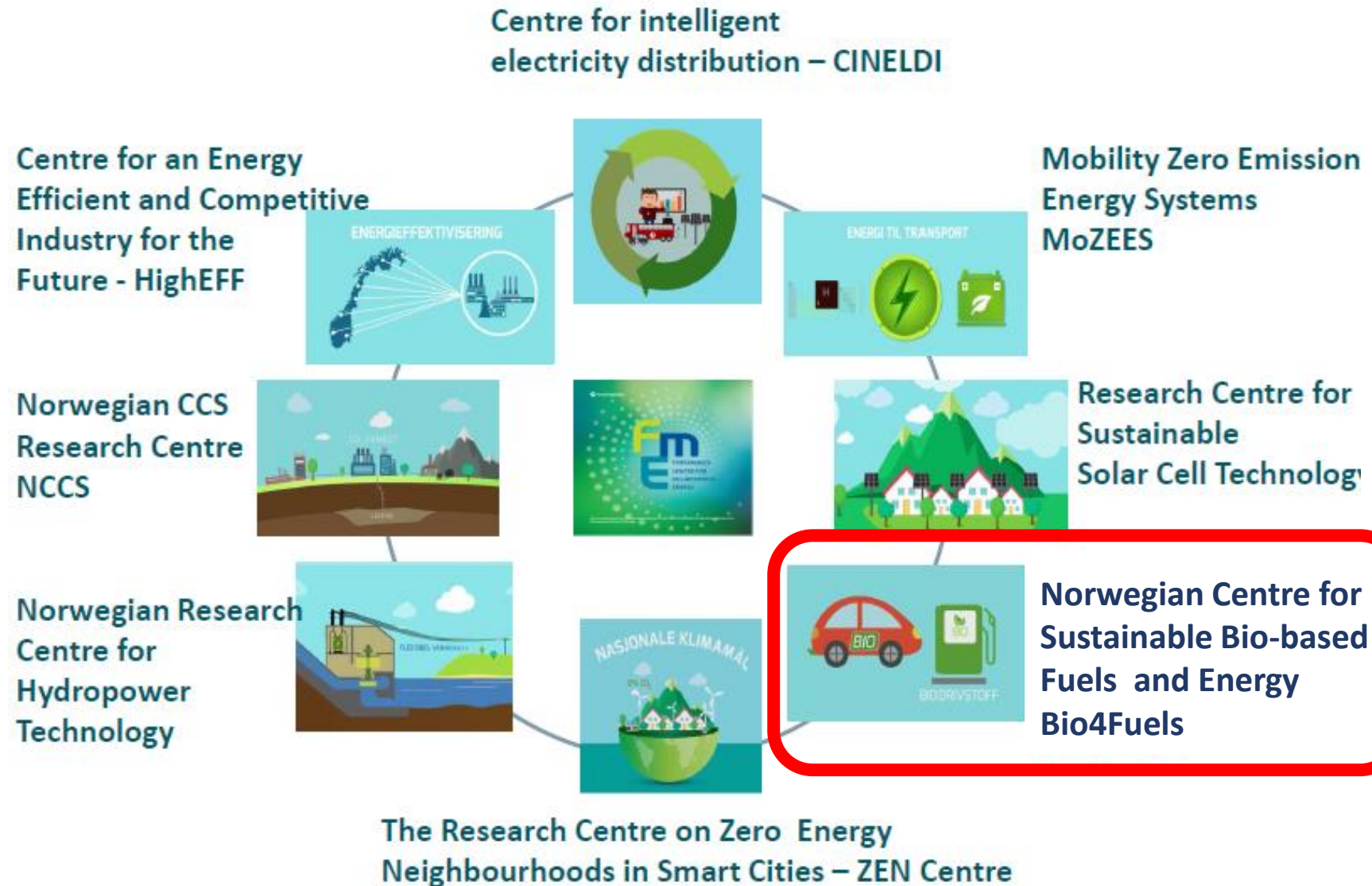
Norwegian Industry
White paper



Energy Research
Strategy



Research Centres for Environmentally Friendly Energy



Nordic Bio-resources

Technologies

- Biochemical
- Thermochemical
- Chemical

Stakeholders

- Resource owners
- R&D institutes
- Industry
- Authorities
- NGOs

Bio-resource ,
Environment, Climate

Primary Biomass
Conversion

Secondary Conversion and
upgrading

Process design and
End Use

SUSTAINABILITY

Markets

Aviation fuel • Heavy Diesel • Biogas • Valorised Side Streams

*Enabling
sustainable
biofuels
production in
Norway*

Bio4Fuels Stakeholders

Bio-resources



Norwegian Technology



International



End Users

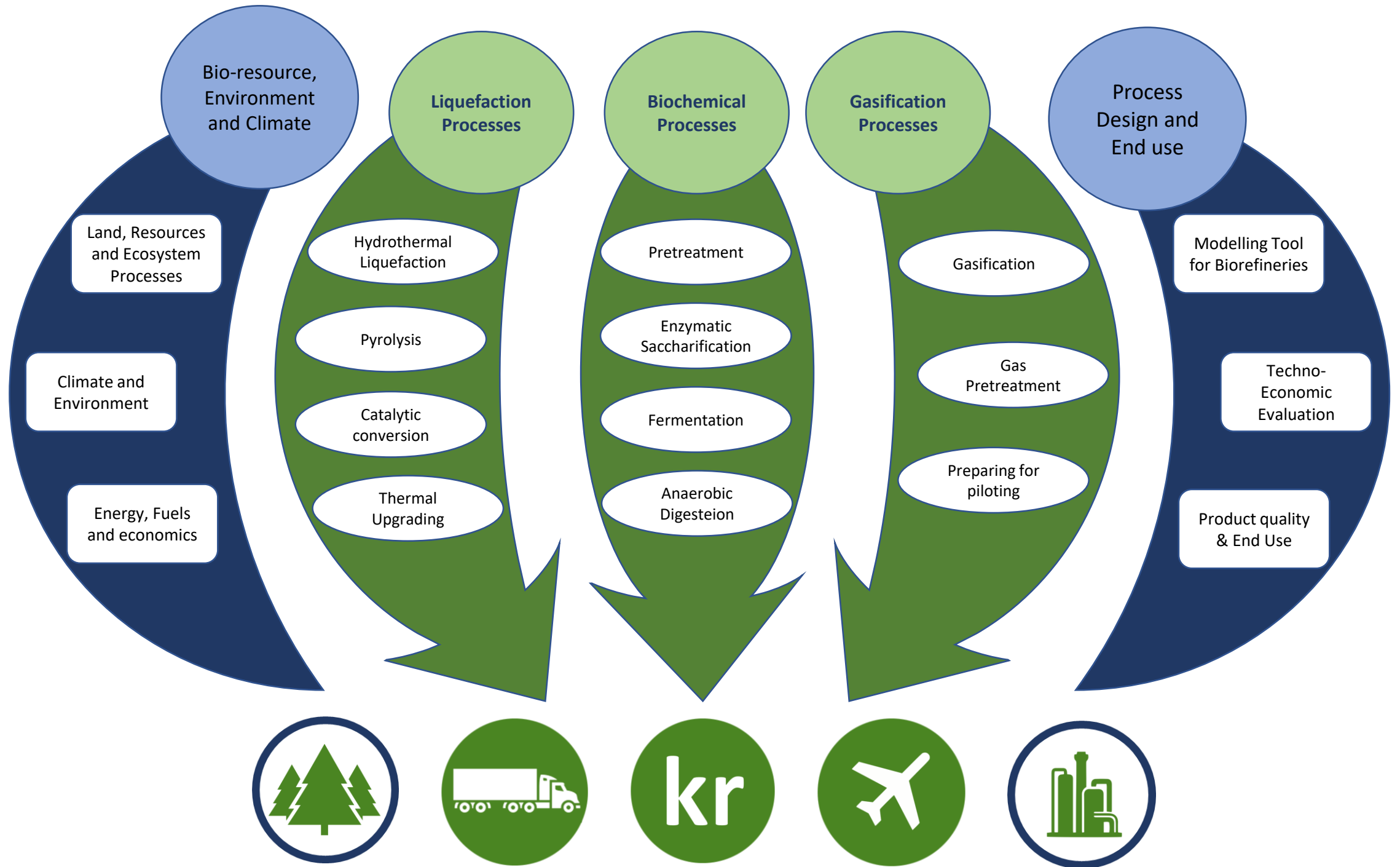


Government and State



Ambitions

- ✓ Establishing a **framework for producing biofuels and added value products** from renewable Norwegian resources, thereby enabling a reduced global CO2 footprint from the energy and transport sector
- Identifying the **most sustainable value chains**, bringing at least **two of them to pilot stage**
- Achieving up to **20% increase of overall product yield and up to 30% reduced processing costs** within the main **value chains** compared to the current state of the art
- Integrating research fields to develop at **least one new conversion technology** and at **least three processes for value added products** in a **biorefinery** setting
- ✓ Strengthen the long term National and international cooperation generating directly a **portfolio of six National and at least one Nordic/EU projects per year**.



ACHIEVEMENTS To



110



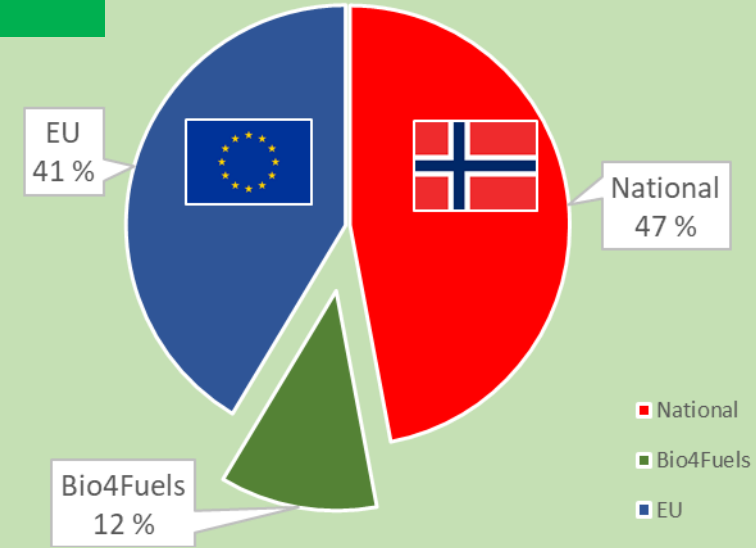
News items



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Leverage through
Associated Projects



Publications



Contact Us!!



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bio4fuels@nmbu.no



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Supergen



Supergen Bioenergy Hub

supergen-bioenergy.net

We work with academia, industry, government and societal stakeholders to develop sustainable bioenergy systems that support the UK's transition to an affordable, resilient, low-carbon energy future.

Vision for UK Bioenergy

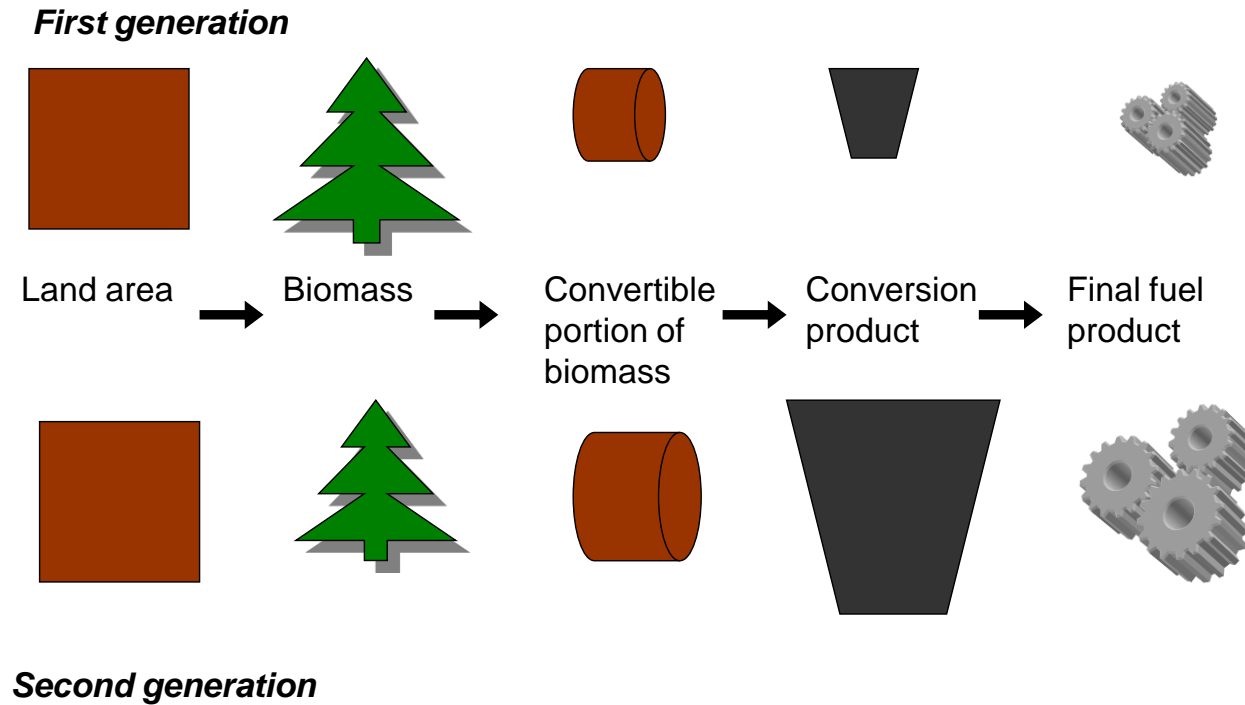
- Up to 45% of UK bioenergy demand¹
- 10% electricity (baseload)
- 50% heat (industrial, district, gas)
- 20% liquid fuels (aviation, shipping, heavy duty/mobile plant)

1. Welfle A., Gilbert P., Thornley P., Securing a bioenergy future without imports, Energy Policy, vol 68, 2014

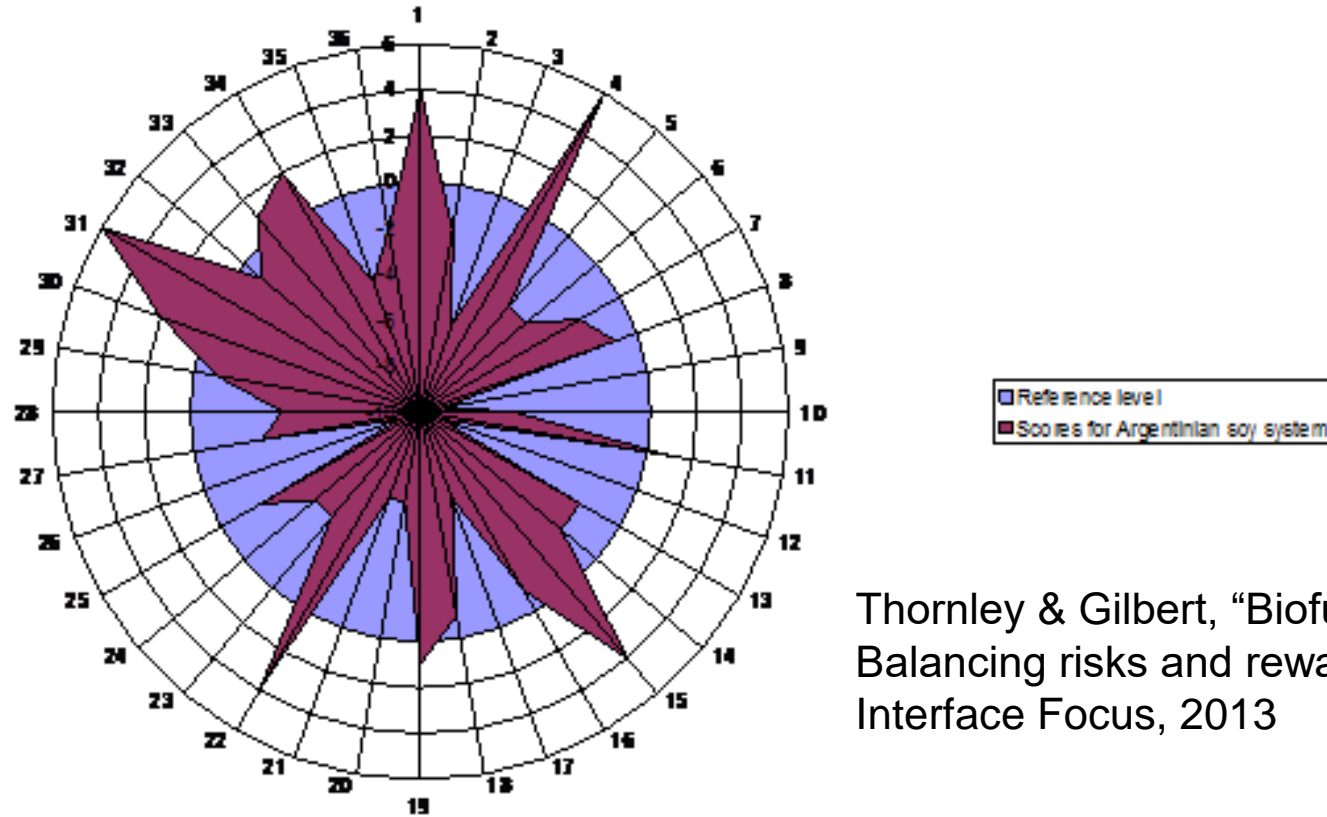
Evolution of UK Bioenergy

- Near term flexible heat and power (diverse feedstocks, pollutants, materials, ecosystem benefits, circular economy, pre-treatment)
- Medium term fungible hydrocarbons (catalysis, pre-treatment, yield increases)
- Long term gaseous vectors (gasification, AD, hydrogen) and negative emissions

Ensuring sustainability (1)



Ensuring sustainability (2)



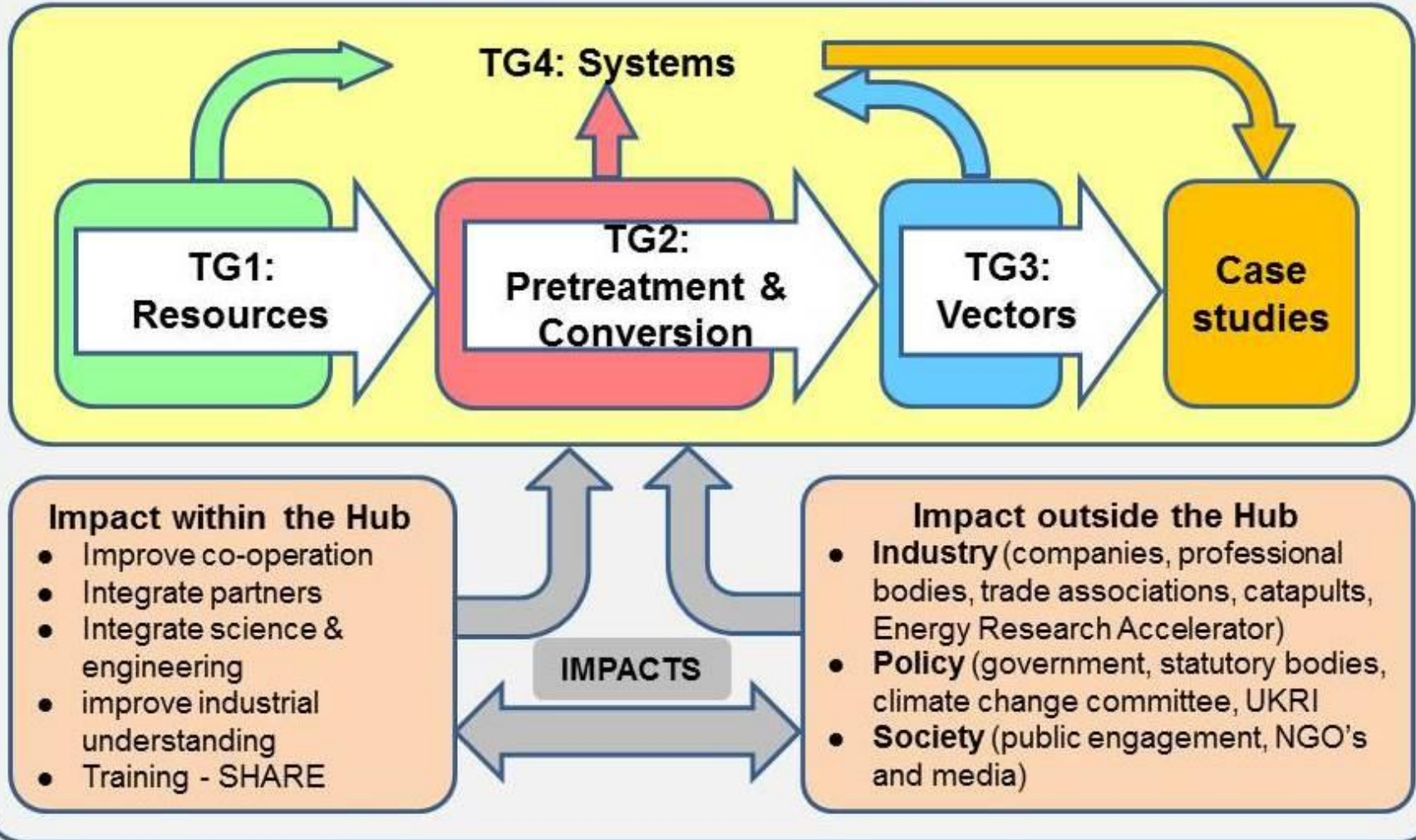
Thornley & Gilbert, "Biofuels: Balancing risks and rewards", Interface Focus, 2013

Thornley & Gilbert, "Biofuels: Balancing risks and rewards", Interface Focus, 2013

UK challenges

- Carbon budget commitments
- Sustainability beyond carbon
- International import base
- Governance framework: risk focused; incentivizes best; recognizes trade-offs and institutional capacity

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Building a sustainable European Biofuel industry

— Some introductory remarks 4-6 December 2019



The scene

- The climate change effect all societies – one way or another.
- 70 % of the global GHG emissions are energy related (in Sweden 75 %).
- Urbanisation is rapid (66 % of the global population lives in cities 2050)
- Electrification and digitalisation is coming
- ... and there are huge **opportunities** for front runners!



Ambitious Energy Policy Targets for Sweden

100 % renewable
electricity 2040

No net emissions of
GHG 2045*

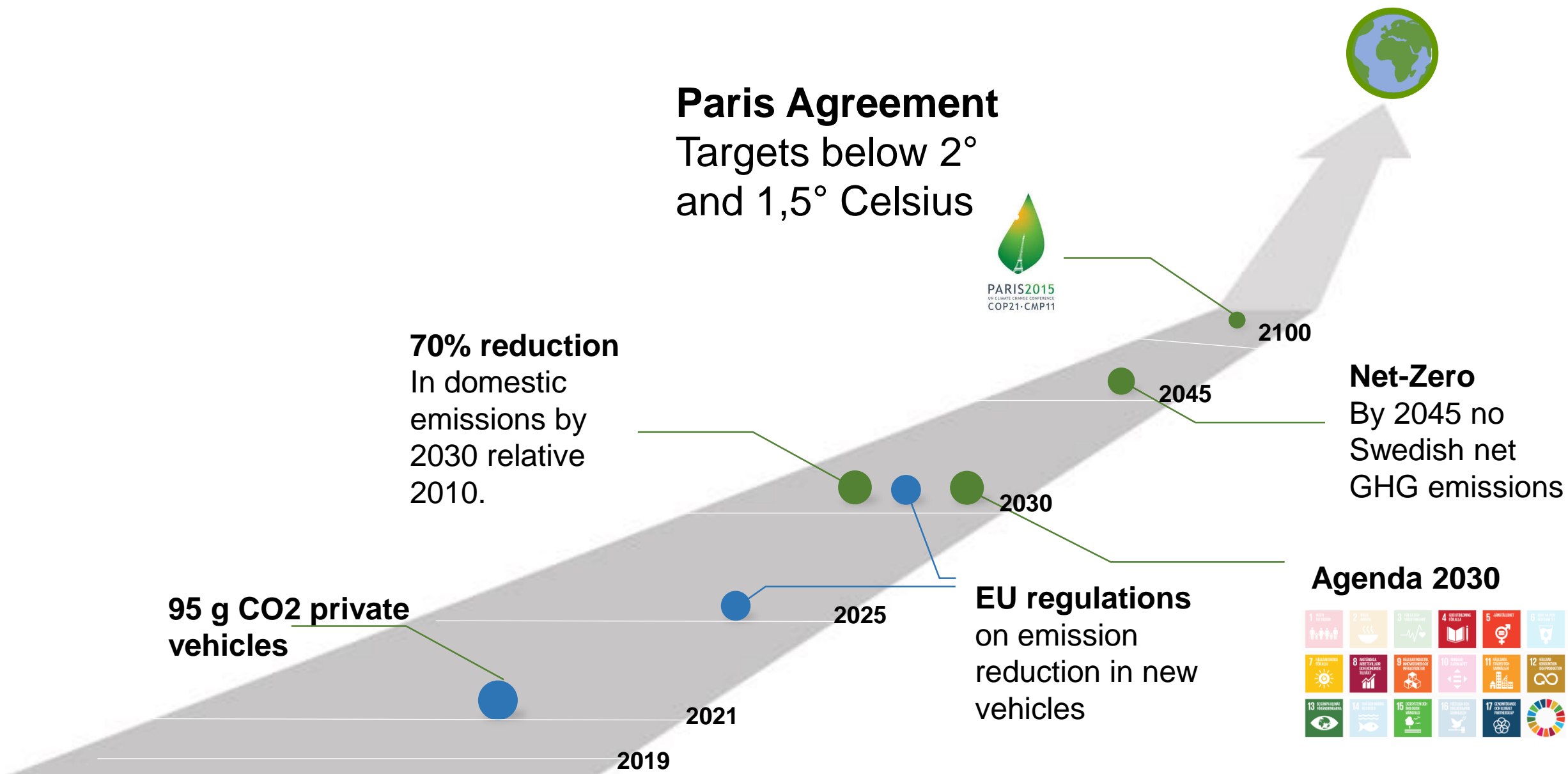
50 % more efficient
energy use 2030
than in 2005



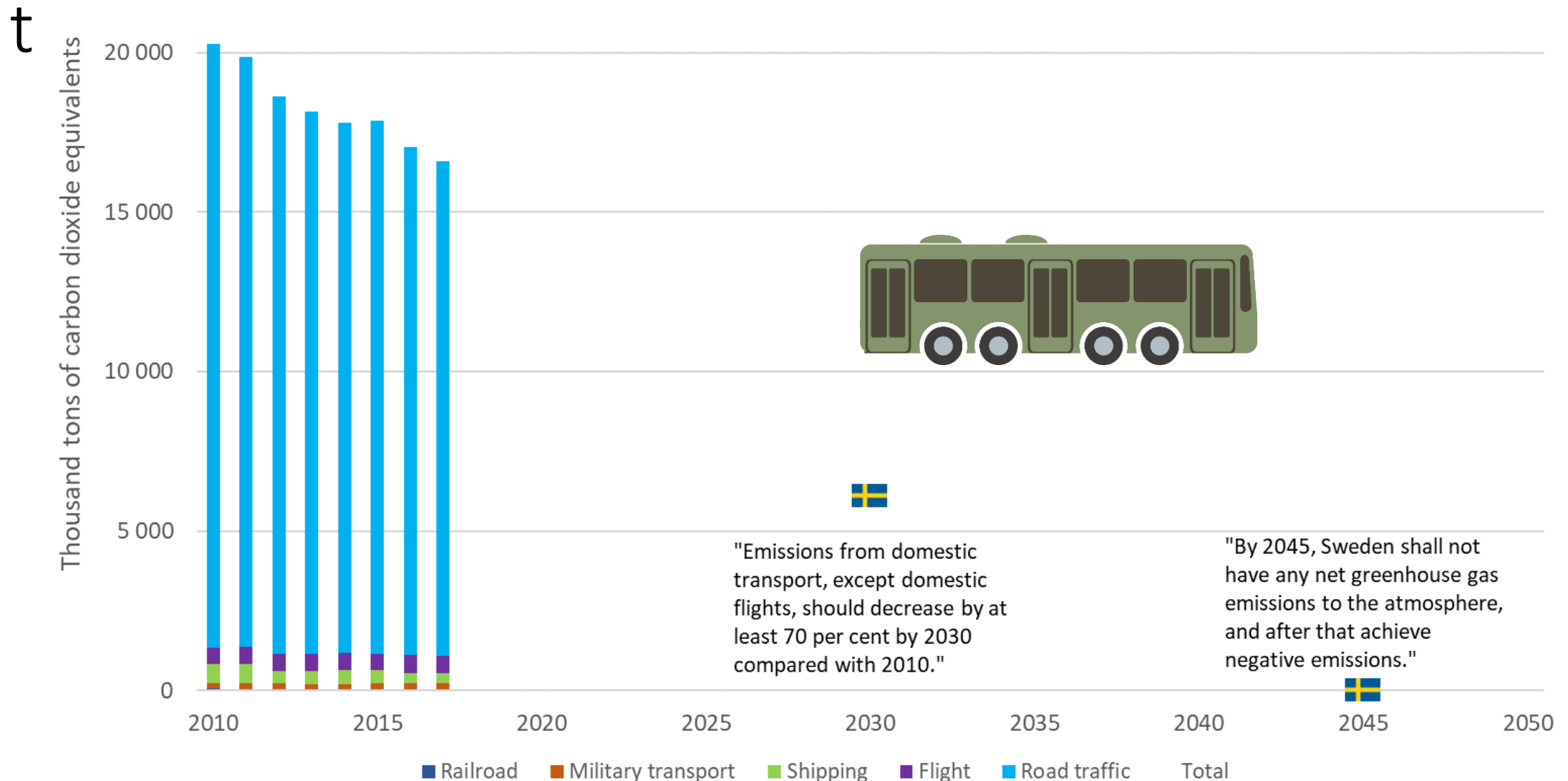
The Fundament

* Reduced GHG emissions by 70 % 2010 – 2030 national transportsystem

The itinerary for the future transportation system

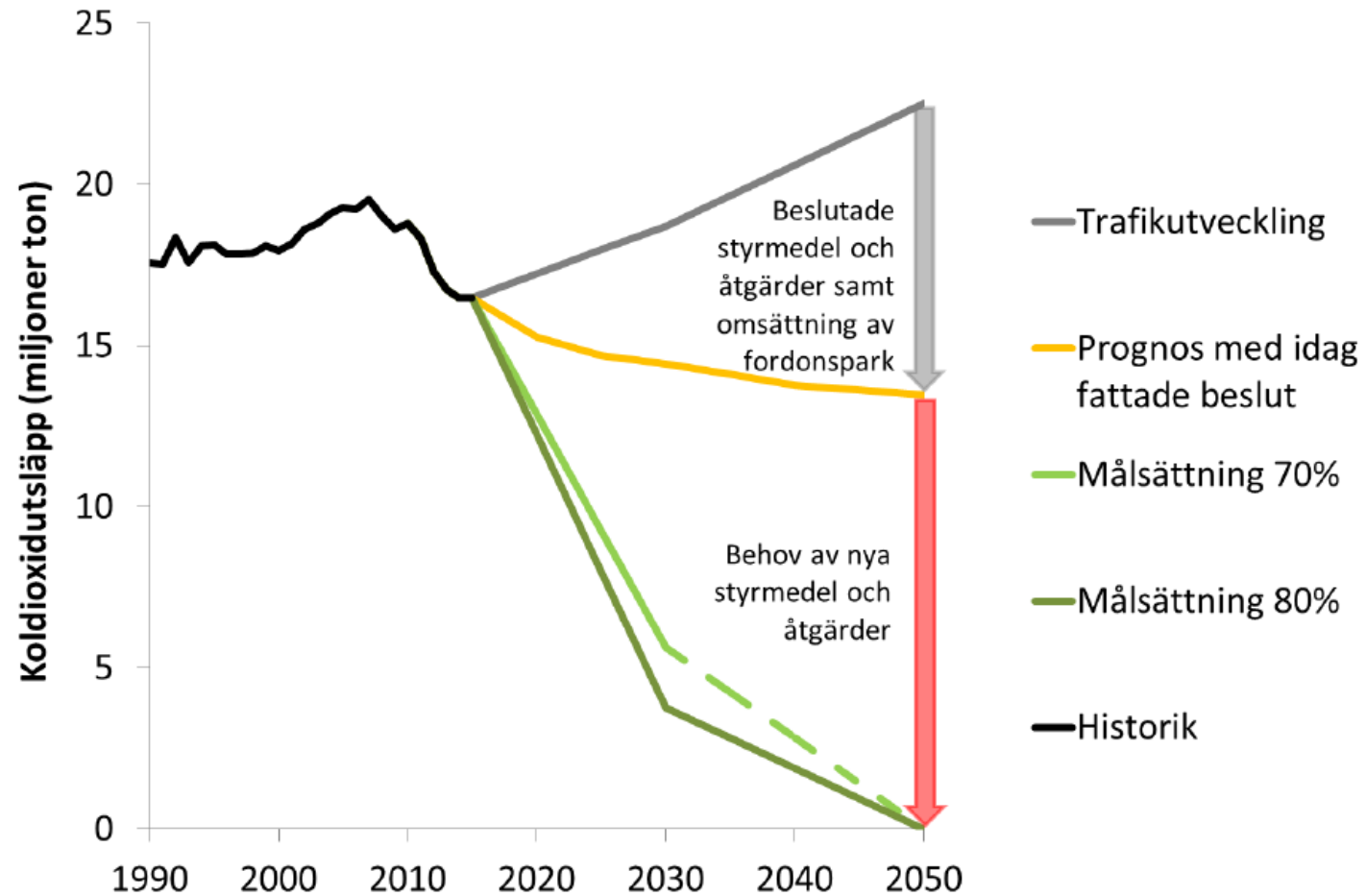


Emissions of green house gases from domestic



Behov av nya åtgärder och styrmedel

Vägfrikens utsläpp

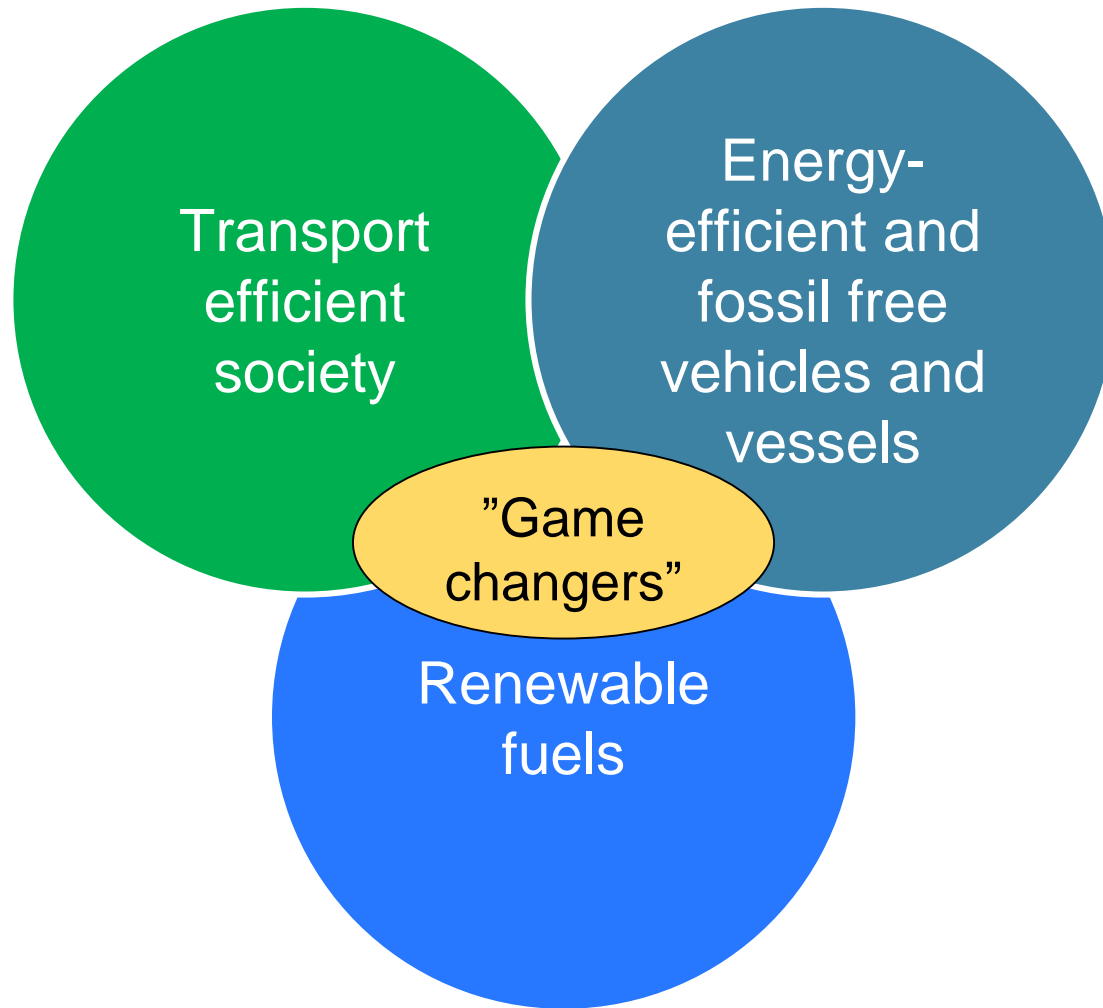


Bild, Nationell plan för transportsystemet 2018-2029, Trafikverket



!Not enough – decisions so far reaches only half way to reducing 70 % by 2030!

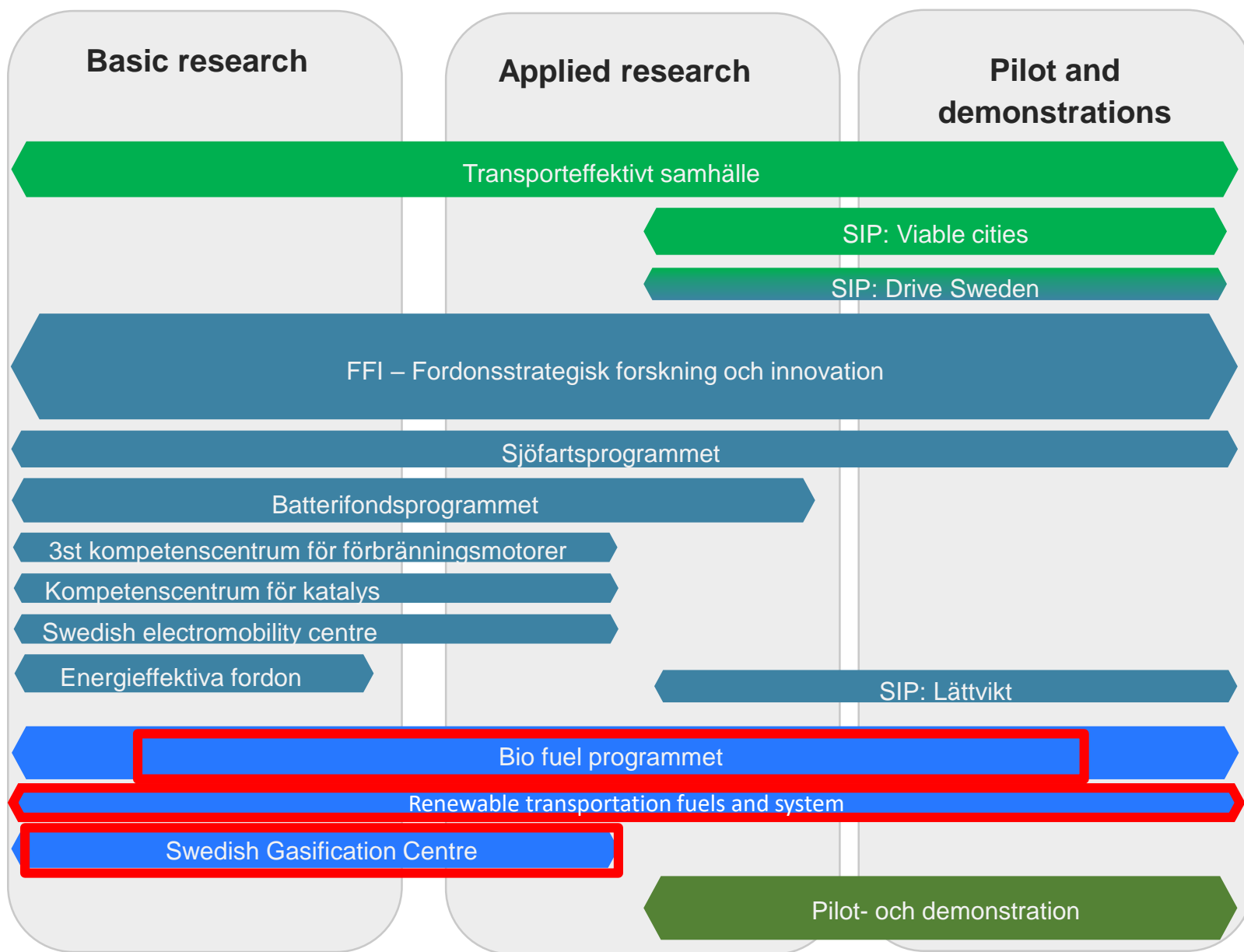
A fossil free transport sector



Our work on transport and biofuel includes...

- SOFT – Strategic plan for a fossil free transport sector
- Research and innovation programmes
- Coordinating infrastructure for biofuels and electrification
- Supervision and overviews of relevant legislation for biofuels
- National implementation of EU-legislation e.g. REDII
- International cooperation e.g. IEA Bioenergy, EU SET-plan
- Statistics





Transport
efficient
society

Energy-
efficient
fossil free
vehicles
and
vessels

Renewable
fuels

Ongoing programmes

Research and innovation – biofuels

The biofuel programme

- Research program annual calls
- Road, aviation and marine fuels
- Development and improvement of production processes
- Funding SEA: 45 MSEK/year

The Swedish gasification center

- To strengthen and coordinate Swedish gasification R&D
- 8 universities, 20 companies and one institute
- Funding SEA: 19,5 MSEK/year



Renewable transportation fuels and systems

- Collaboration program between the Swedish Energy Agency and f3.
- System and policy studies
- Funding SEA: 5,5 MSEK/year

Additional Government assignments

Biofuels for aviation

Liquified biogas

Ethanol for heavy duty transport

Electrification is coming

- Electrification of vehicles and vessels
- Batteries in a life cycle perspective
- Infrastructure for both static and dynamic charging
- Standardization, new market models and changes of mind
- Pollution prevention



In a digital and electric transport system with...

- Artificial Intelligens (AI)
- Automation
- Everything connected (IoT)

...don't forget

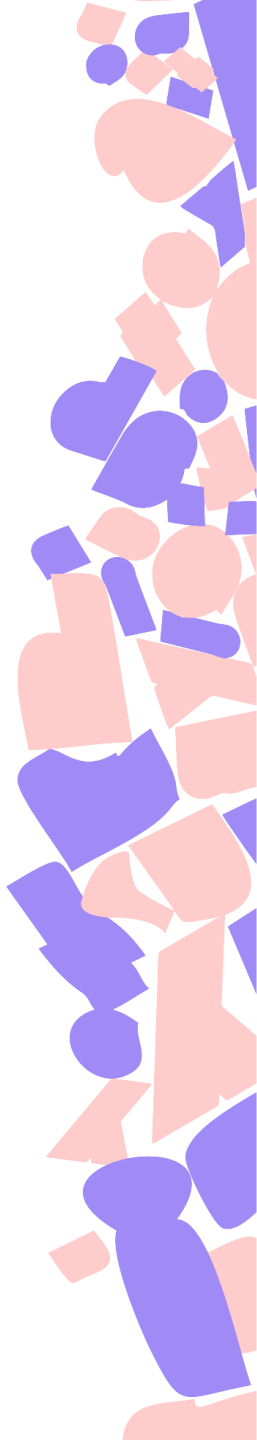
- the vast energy needs for data storage
- Cybersecurity, resilience and robustness



The core Cs

Coming together is a beginning,
staying together is progress and
working together is success
(Henry Ford)

- Courage





Thank you for listening!

Robert Andrén
Director General

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www.energivarlden.se

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