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WEBINAR SERIES

Transforming transport with renewable based solutions

Presenters:

- Dr Paul Durrant, End-use Sectors & Bioenergy, IRENA
- Carlos Ruiz, End-use Sectors, IRENA

TUESDAY, 17 NOVEMBER 2020 • 15:00-15:30 CEST

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SPEAKER

Dr Paul Durrant
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Recent work on end-use sectors

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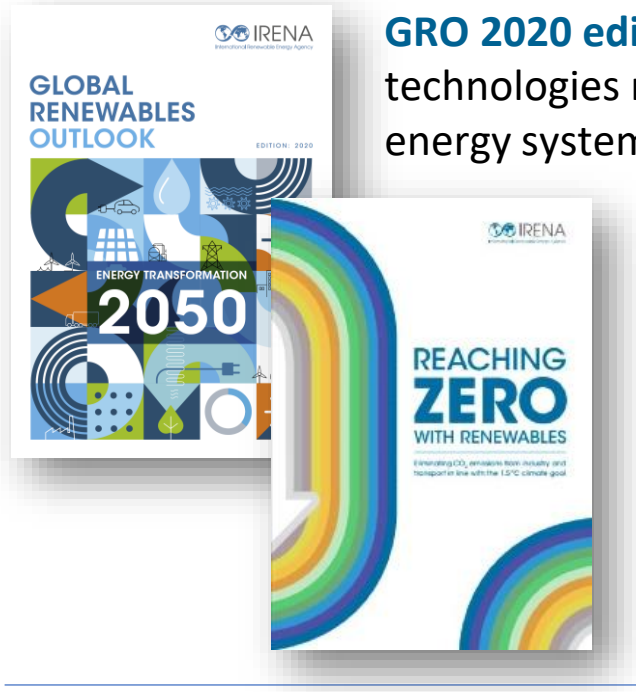

GRO 2020 edition outlines the investments and technologies needed to decarbonise the entire energy system in line with the Paris Agreement.

Reaching Zero with Renewables focuses on how industry and transport could achieve zero emissions by 2060 and assesses the use of renewables and related technologies.

Collaborative Framework on Green Hydrogen

The umbrella for IRENA hydrogen engagement

- IRENA has established a **Collaborative Framework on Green Hydrogen** in June 2020, **to foster dialogue between governments and private sector**
- 65 countries, Hydrogen Council and IPHE participation. ***Co-facilitated by EC.***

IRENA VIRTUAL EDITION
INNOVATION WEEK 2020

4 days | 8 sessions | 23 panels | 101 speakers from 35 countries | 1 600+ audience from around 1 250 companies and organisations and 137 countries

Focus: **Innovative solutions for the energy-end-use sectors of transport & industry.** Showcased emerging **renewables based solutions** from around the world

Collaborating with private sector, associations and other partners

EPRI ELECTRIC POWER RESEARCH INSTITUTE · Hydrogen Council · GBEP Global Bioenergy Partnership · International Transport Forum · MISSION POSSIBLE PLATFORM · SDG7 YOUTH CONSTITUENCY YOUTH IN SUSTAINABLE ENERGY · Initiate!

Summaries and recordings at http://innovationweek.irena.org

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Global Renewables Outlook outlines options to cut energy-related CO_2 emissions to 2050

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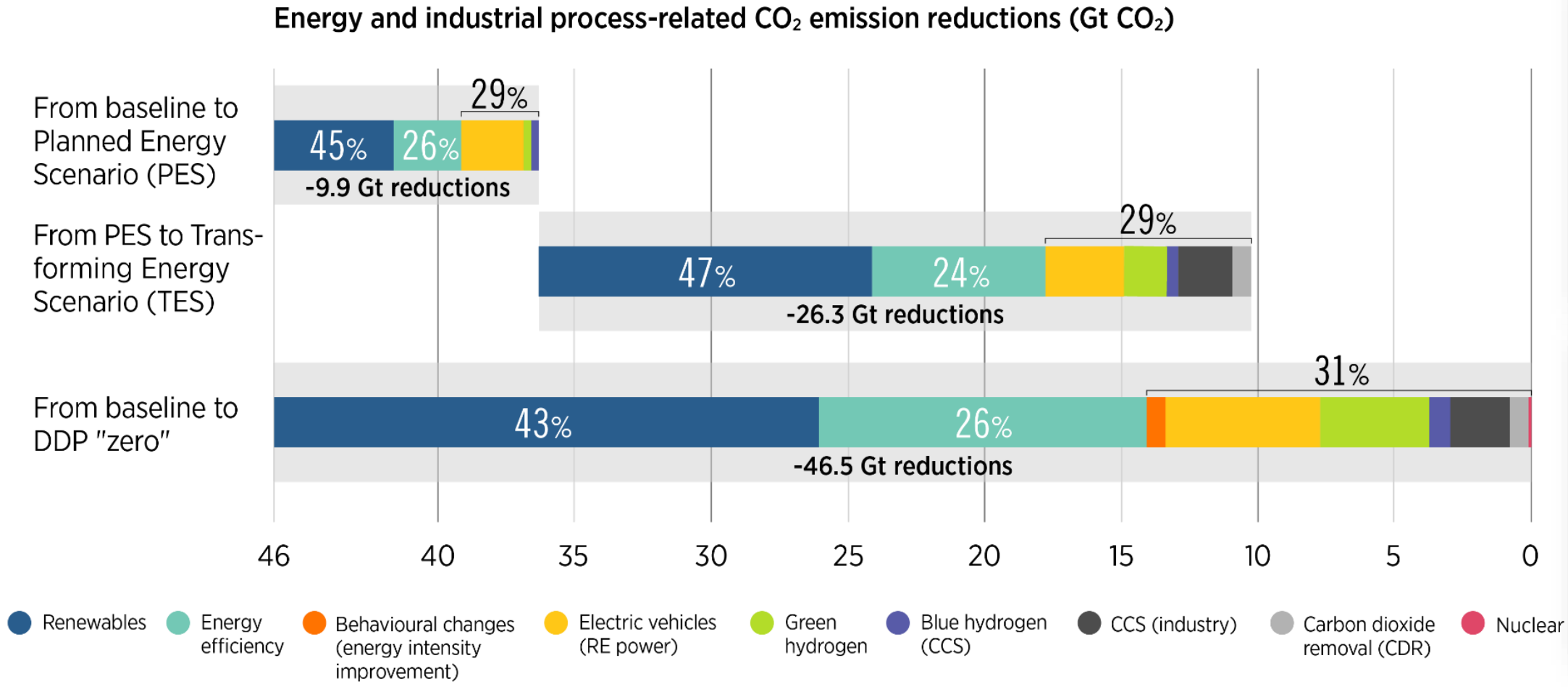

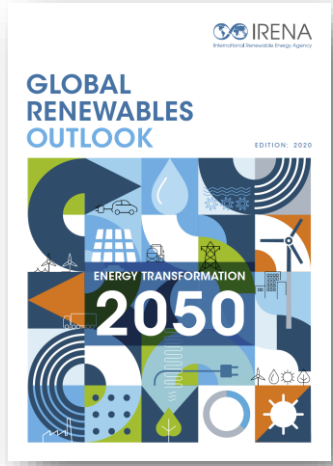

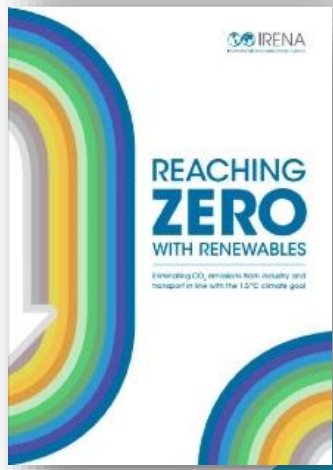

Annual energy-related CO_2 emissions would need to decline by at least 70% below today's level by 2050. End-use electrification, green hydrogen and synthetic fuels will play a crucial role to reach zero emissions.

Industry & Transport – Shares of Energy & Process Emissions

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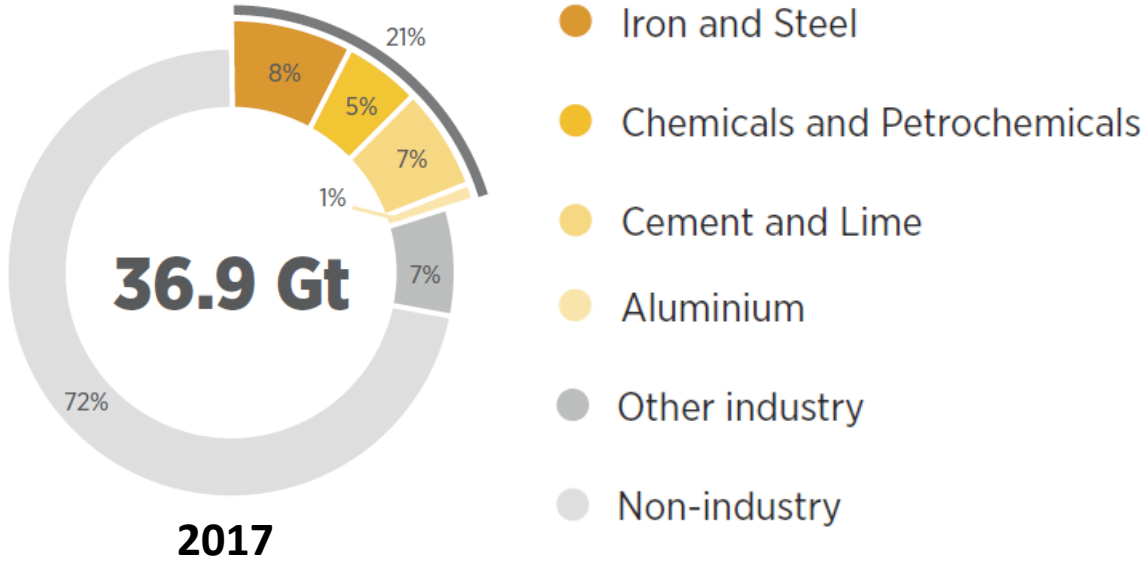
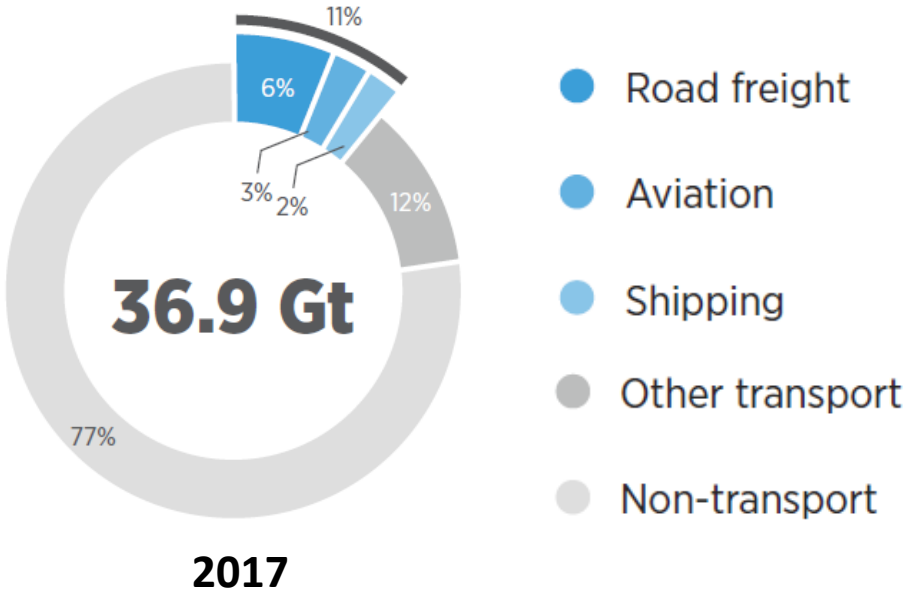
Industry



Annual emissions in Industry increase by 1 GT/yr from 2017 to 2050 PES

Emissions of 11.4 GT/yr remain in 2050

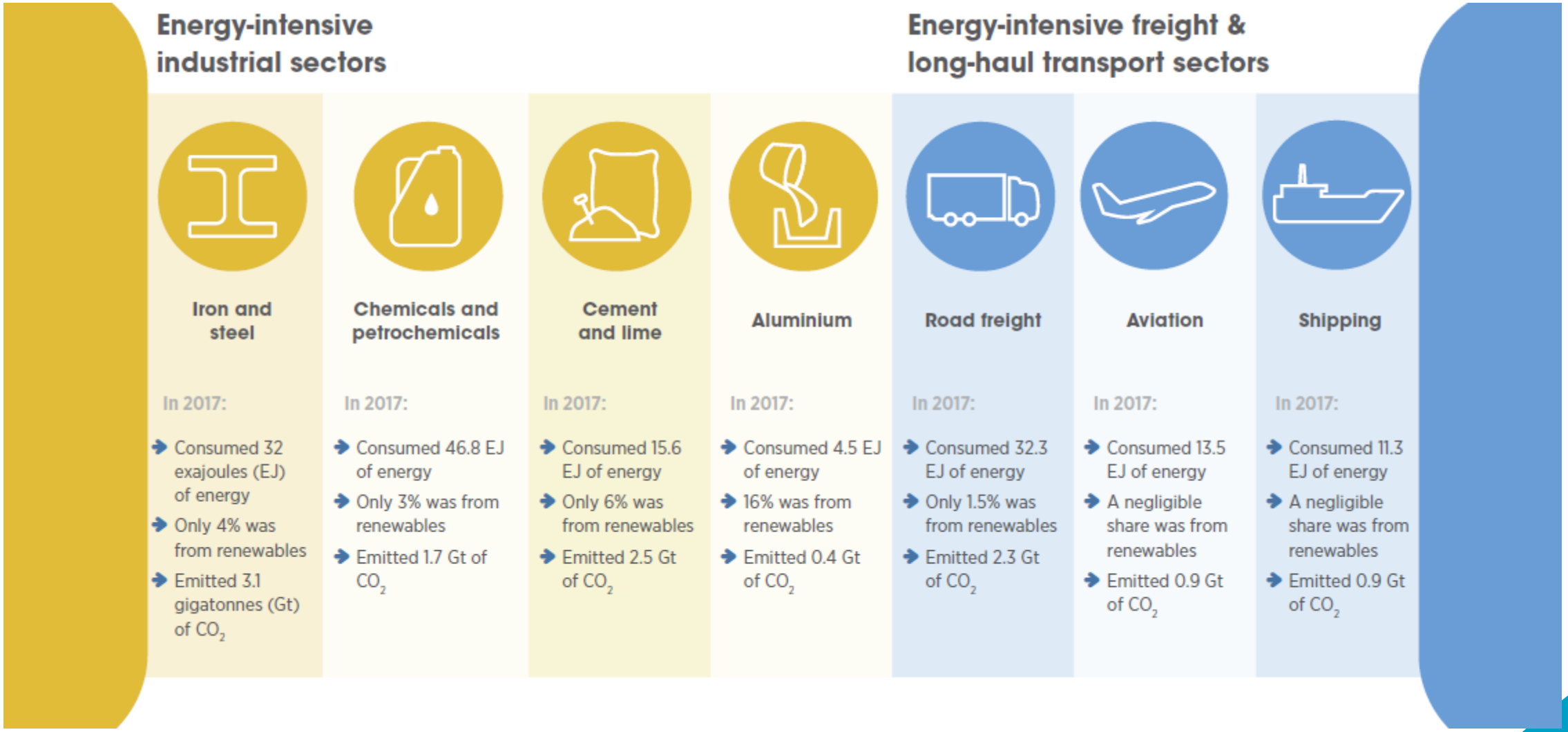
Transport



Annual emissions in Transport increase by 0.1 GT/yr from 2017 to 2050 PES

Emissions of 8.6 GT/yr remain in 2050

Seven challenging sectors



These seven will account for **38% of energy and process emissions and 43% of final energy use by 2050** unless major policy changes are pursued.

5 Measures for Reaching Zero

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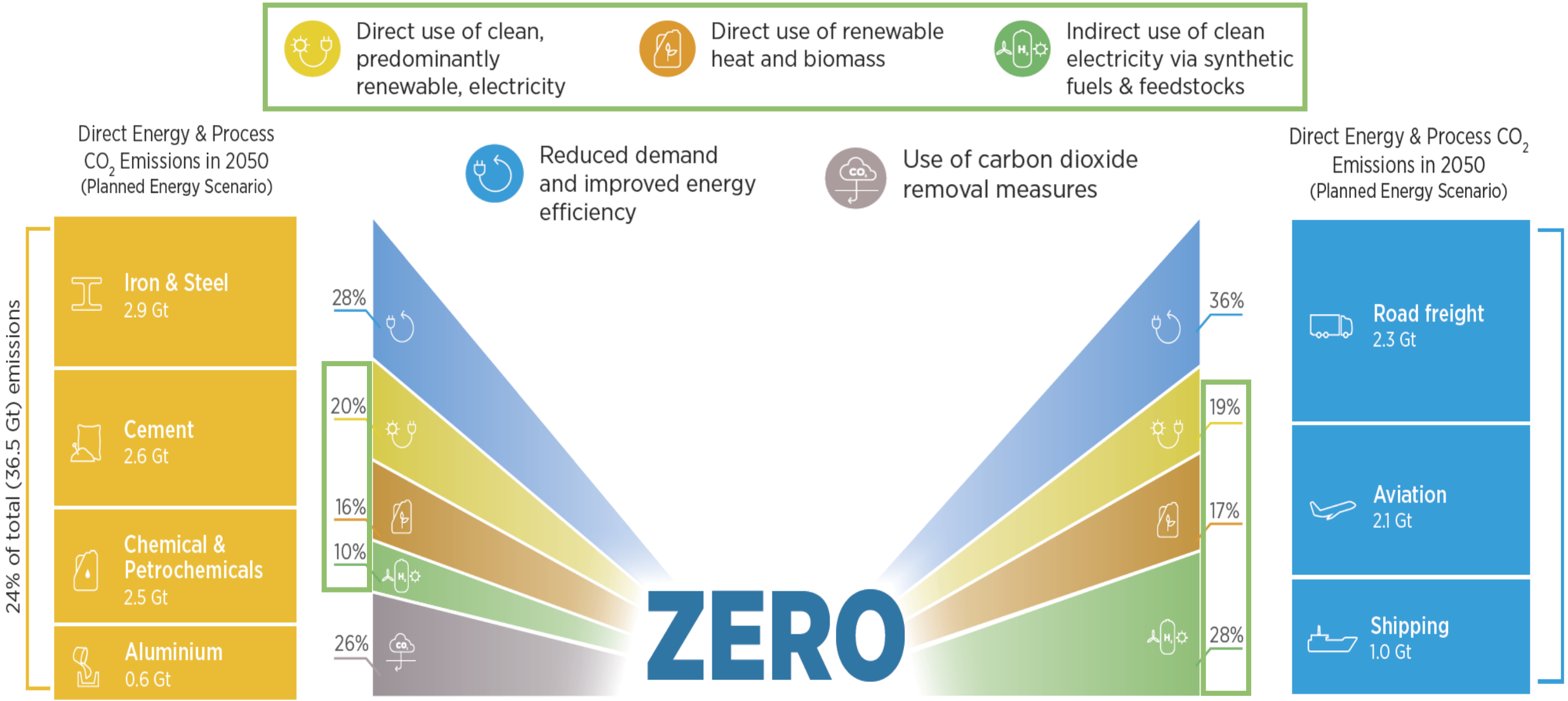
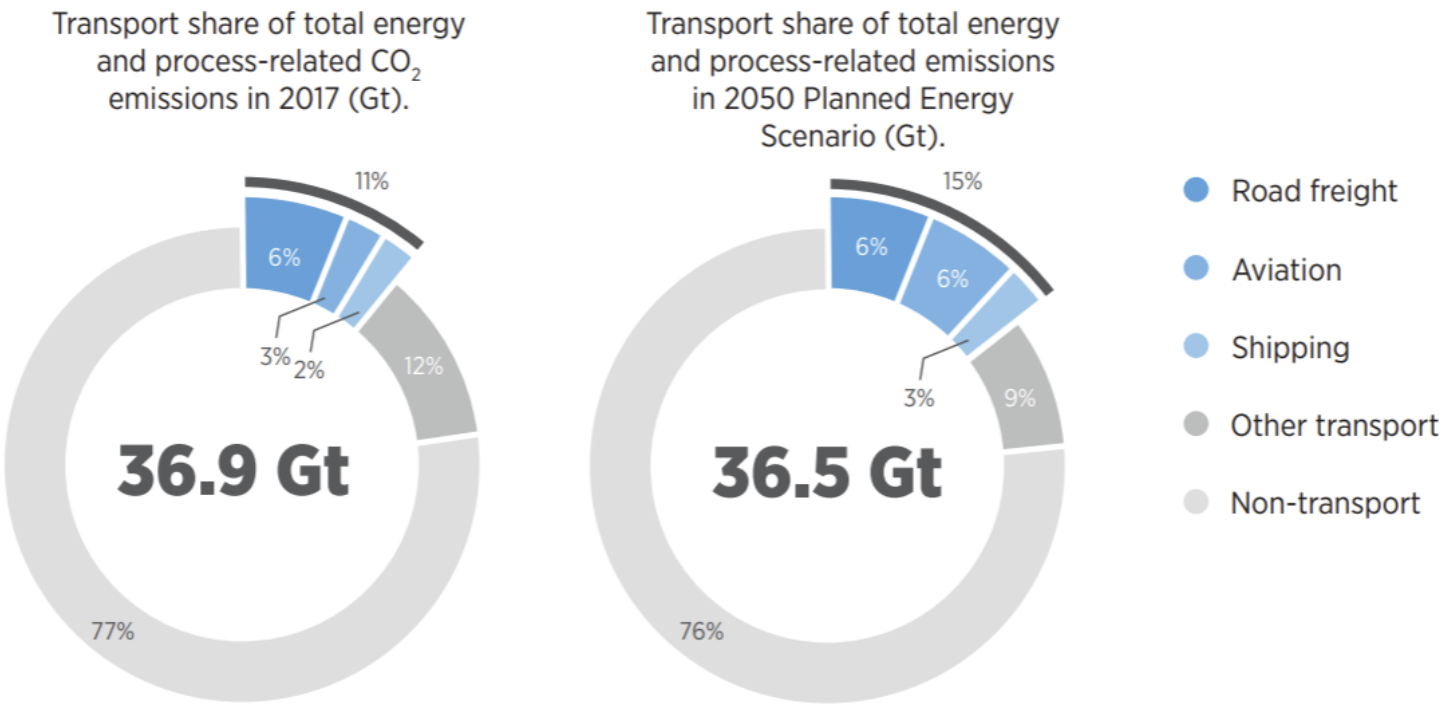


Transport sector – Current situation globally

- Around **30% of total final energy consumption**
- Around **25% of energy-related carbon emissions** (8.5 Gt of CO_2 annual emissions)



Decarbonising road freight transport with renewables

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Road freight

Road freight transport accounted for 27% of all transport-related emissions or over 6% of global CO_2 emissions in 2017.

3 options compatible with reaching zero emissions

ZERO

Battery electric vehicles

- Use electric motors powered by a battery pack, charged with renewable electricity.

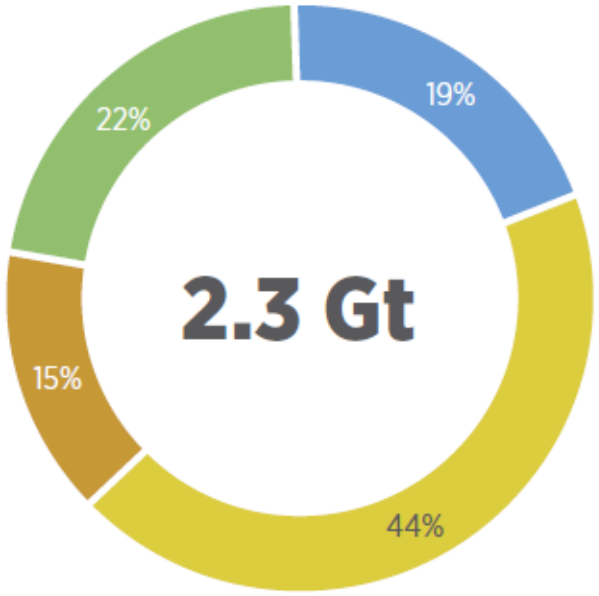
Fuel cell electric vehicles

- Use electricity produced by fuel cells powered by compressed (green) hydrogen.

Advanced biofuels

- Use biomass-based fuel substitutes, such as biodiesels and renewable diesels.

Estimated role of key CO_2 emission reduction measures to reduce road freight Planned Energy Scenario emissions to zero.



Reduced demand and improved energy efficiency

Direct use of clean, predominantly renewable, electricity

Direct use of renewable heat and biomass

Indirect use of clean electricity via synthetic fuels & feedstocks

Road freight
Electric, hydrogen or biofuels

In Europe more than **50% of freight is transported less than 500 kilometres**. This is a distance that can be bridged with batteries today without recharging. Yet most electric delivery vans that are in operation today have shorter ranges.

- For example Deutsche Post DHL Group operates the largest battery electric vehicle fleet in Germany, composed of a fleet of **11 600 vehicles**.
- Electric trucks can benefit from battery advancements for electric cars
  - Battery energy density may double next ten years, potential to quadruple while cost per kWh halve

DHL electric fleet test in Bonn

Key takeaways from IRENA's joint Pentalateral EV truck webinar

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- At this nascent stage of development, road freight transport companies are hesitant to invest in a specific technology until they are confident that it will emerge as the clear winner.
- When compared to hydrogen fuel cell trucks, battery e-trucks are twice as efficient.
- Besides economic benefits for truck operators, this reduces pressure on renewable electricity supply needed to produce green hydrogen.

Pathway	Range (km/100 kWh)	Cost (EUR cents/km)	Efficiency (well-to-wheel)
Battery e-truck	48	20	62%
Hydrogen fuel cell truck	24	55	29%
Power-to-gas CNG-truck	17	70	20%

- Depot charging will dominate, need to consider smart charging strategies

Potential policy measures:

- Establishment of zero-emission zones for delivery vehicles;
- New zero-emissions truck sales requirements (specific targets tailored to specific categories of truck, based on size and weight);
- Incentives for upfront costs;
- Infrastructure investments to match vehicle incentives;
- Reduced road tolls for E-trucks;
- Increased road weight limits for e-trucks to account for battery weight (2 t extra is currently being discussed at the EU level).

Decarbonising shipping with renewables

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Shipping

Shipping accounted for 10% of all transport emissions, or 2.3% of global CO_2 emissions in 2017.

2 options compatible with reaching zero emissions

ZERO

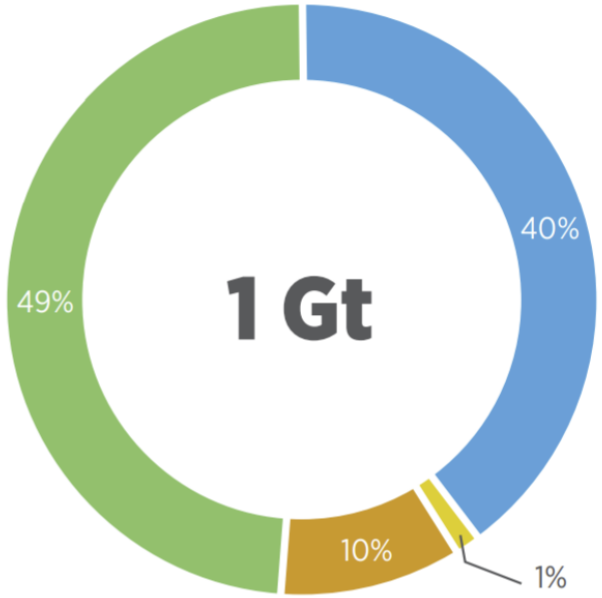
Advanced biofuels

- Use biomass-based fuels such as biodiesel, renewable diesel, bio-methanol, bio-fuel oil and liquefied biogas.

E-fuels

- Use green hydrogen or synthetic fuels such as green methanol, ammonia and methane.

Estimated role of key CO_2 emission reduction measures to reduce shipping Planned Energy Scenario emissions to zero.



- Reduced demand and improved energy efficiency
- Direct use of clean, predominantly renewable, electricity
- Direct use of renewable heat and biomass
- Indirect use of clean electricity via synthetic fuels & feedstocks

Decarbonising aviation with renewables

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Aviation

Aviation accounted for 11% of all transport emissions, or 2.5% of global CO_2 emissions in 2017.

3 options compatible with reaching zero emissions

ZERO

Biojet fuel

- Use fuels produced from sustainably sourced biomass.

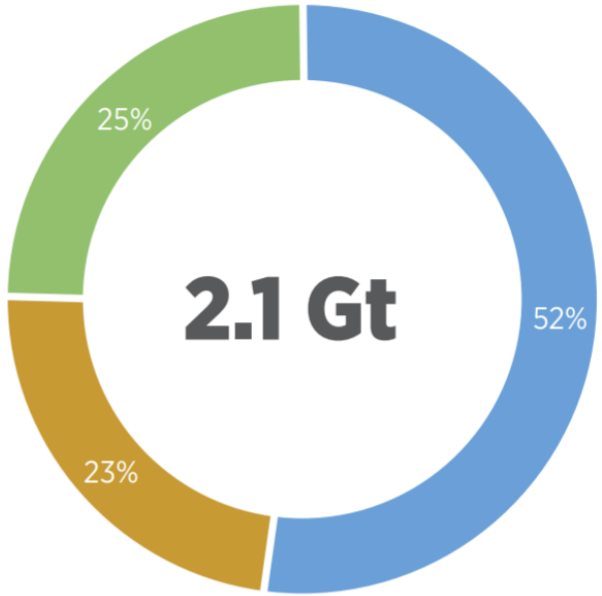
E-fuels

- Use synthetic fuels produced from cleanly sourced CO_2 and green hydrogen.

Battery-powered aircraft

- Use propulsion systems powered by batteries charged with renewable electricity.

Estimated role of key CO_2 emission reduction measures to reduce aviation Planned Energy Scenario emissions to zero.



- Reduced demand and improved energy efficiency
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Biofuels for aviation

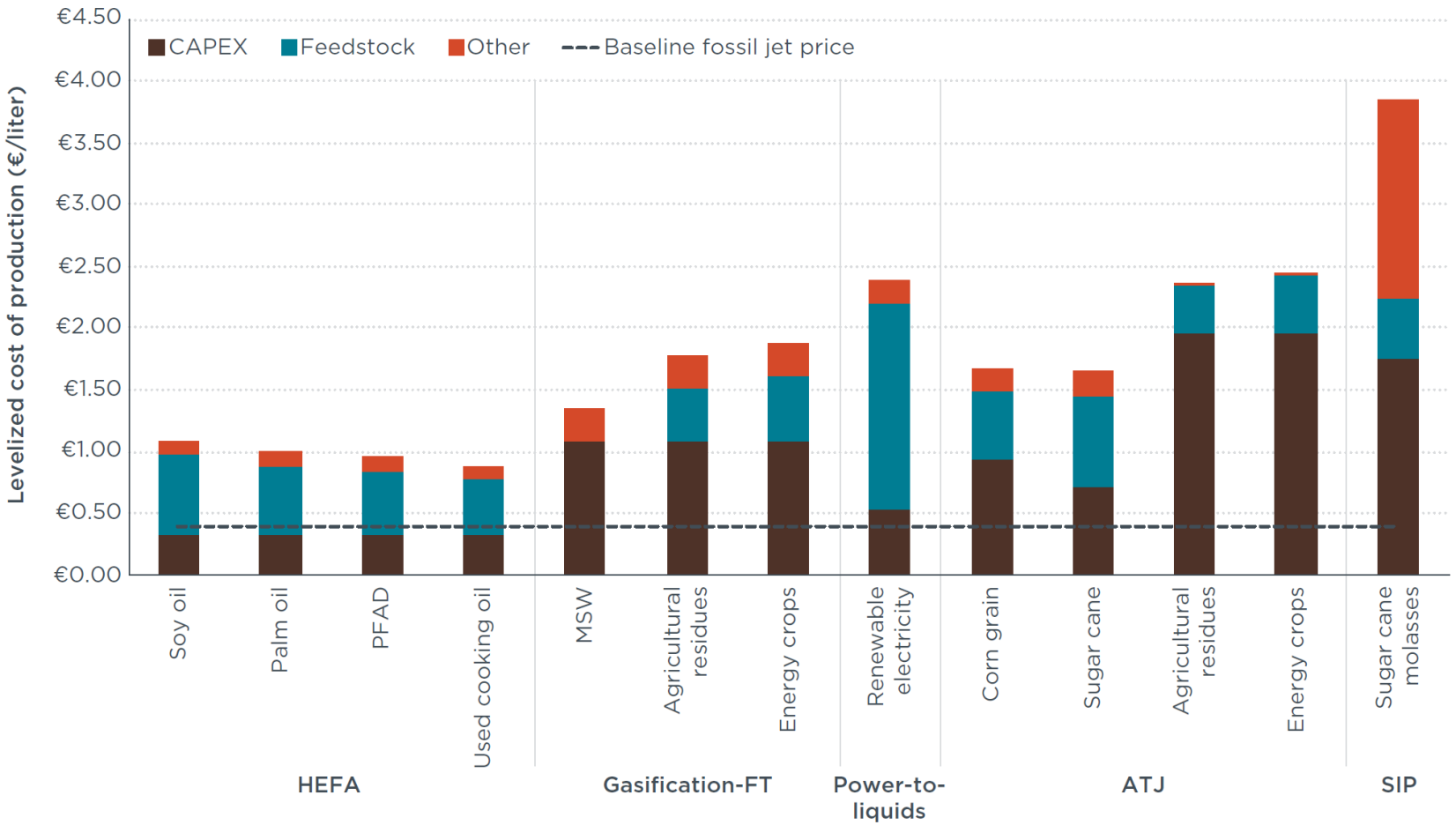

Figure 1. Comparison of levelized costs of production for alternative jet fuel across different fuel conversion pathways and different feedstocks (graph from the ICCT report on Cost of Supporting Alternative Jet Fuels in Europe (A. N. Pavlenko, Searle, and Christensen 2019)

Biojet /Sustainable Aviation Fuels likely to play a major role – how major will depend on sustainable feedstocks and cost reduction.

Oilseed crops on restored land (upgrade biodiesel)

- Europe (rapeseed), China, Americas
- FORBIO project – set aside land in EU

Wood residues (thermochemical routes)

- Uncollected logging residue in Scandinavia
- Unrealised forestry potential in SE Europe

Sugar/Energy cane (1G+2G ethanol plus conversion)

- Brazil, Southern Africa, Caribbean
- Economies from shared 1G/2G process steps
- Future potential enhanced by high-yield energy cane

Ten priorities for action (current global efforts are patchy)

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Co-develop strategies & plans		Address enabling conditions		Enhance business models	
Pursue a renewables-based with an end goal of zero emissions.	Develop a shared vision and strategy and co-develop practical roadmaps.	Build confidence and knowledge among decision makers.	Plan and deploy enabling infrastructure early on.	Foster early demand for green products and services.	Develop tailored approaches to ensure access to finance.
• Requires linked sectoral strategies at the local, national and international levels • Plans built on the five technology pillars.	• Must be supported by all key actors • So co-develop with broad engagement nationally and internationally to build consensus. • International and inter-governmental bodies can assist.	• Decision makers need to better understand the risks. • Many more demonstration and lighthouse projects are needed. • Those who can must lead, showing what is possible.	• New approaches will require substantial new infrastructure. • Investment needs to come ahead of the demand. • Requires carefully co-ordinated planning & targeted incentives.	• Creating early sources of demand for green fuels, materials, products and services will help scale of production and reduce costs. • Use public procurement, corporate sourcing, regulated minimum percent requirements, etc.	• Sectors have specific needs i.e., high CAPEX, long payback periods, etc. • So tailored financial instruments along the whole innovation cycle are needed. • Co-operation between public and private financial institutions can help.

Work international			Support further innovation
Collaborate across borders.	Think globally, utilise national strengths.	Establish pathways for evolving regulation & international standards.	Support RD&D and systemic innovation.
• A global challenge, and the solutions needed are complex and expensive. • Countries working alone will not be able to explore all options in the necessary depth. • Countries can share the burden.	• Relocating industrial production to access low-cost renewable energy could reduce costs and create new trade opportunities. • Countries with large or expanding production should be supported in getting on the right (zero-carbon-compatible) track early on.	• Regulations and standards are both enablers and barriers for change • Requires careful planning to ensure that they shift at the same pace as the technological changes.	• Large gaps in capability and large cost differences still remain. • Increased investment in RD&D is needed across a range of technologies to reduce costs, improve performance and broaden applicability. • Innovation support needs to be systemic.

Delving deeper – some of IRENA's upcoming analysis

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Re Reaching Zero - Coming shortly - Technical Briefs on:

- Electrolyser Cost Reduction report
- Biojet fuels report
- Renewable Methanol report
- Deeper dives into the scale of the challenge on Steel and Chemicals
- Policy briefs on Hydrogen & Bioenergy

Re Reaching Zero - Coming up in 2021:

- Regional perspectives: deeper dives into some specific regions / countries
- Closer look at cost and cost reduction drivers
- Closer look at key enabling conditions, infrastructure standards, global trade.
- 2021's Global Renewables Outlook – 1.5-degree /net-zero pathway
- Innovation landscape for electricity use in end-use sectors.

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Q & A
10 min

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NEXT WEBINARS

- **TUESDAY, 24 November 2020 • 10:00 – 10:30 CET**
  "Socio-economic benefits of renewables: Job creation"
  For more information and to register: https://irena.org/events/2020/Aug/IRENA-SEDA-Joint-Webinar

- **TUESDAY, 1 December 2020 • 15:00 – 15:30 CET**
  "Scenarios for the Energy Transition: Global experience and best practices"
  For more information and to register: https://irena.org/events/2020/Jun/IRENA-Insights

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