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2021 ICAO Pre-stocktaking webinar #2 Hydrogen, getting to zero carbon flights

The Role of Hydrogen in the Energy Transition

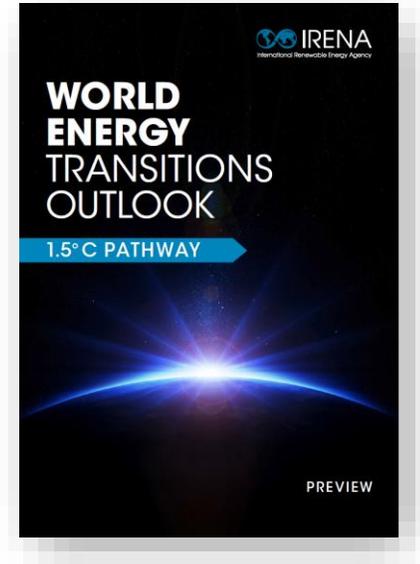
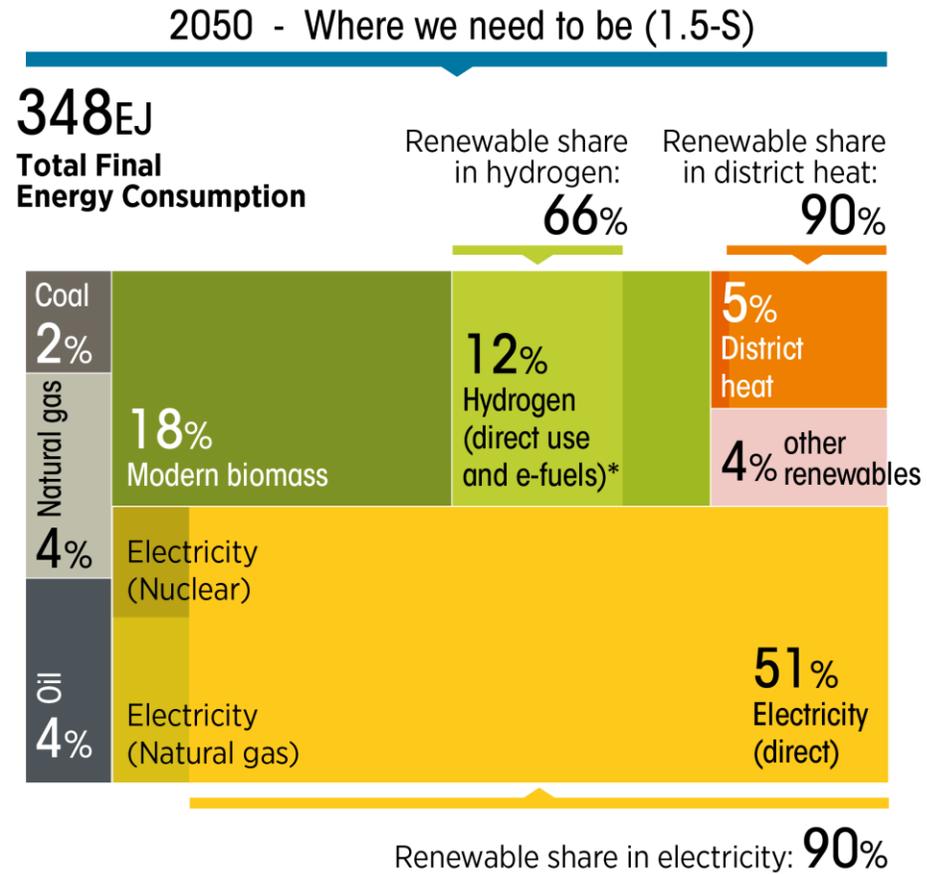
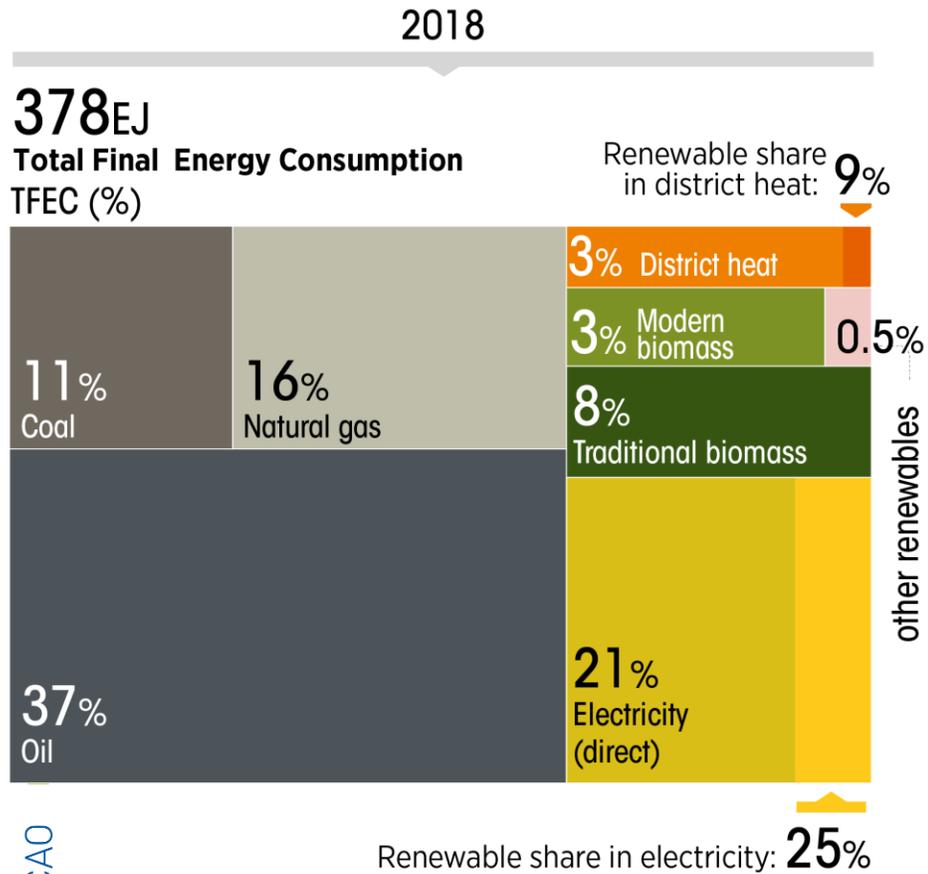
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15 April 2021

World Energy Transitions Outlook (WETO) 2021



Electricity becomes the main energy carrier in 2050 but nearly half energy use cannot be electrified

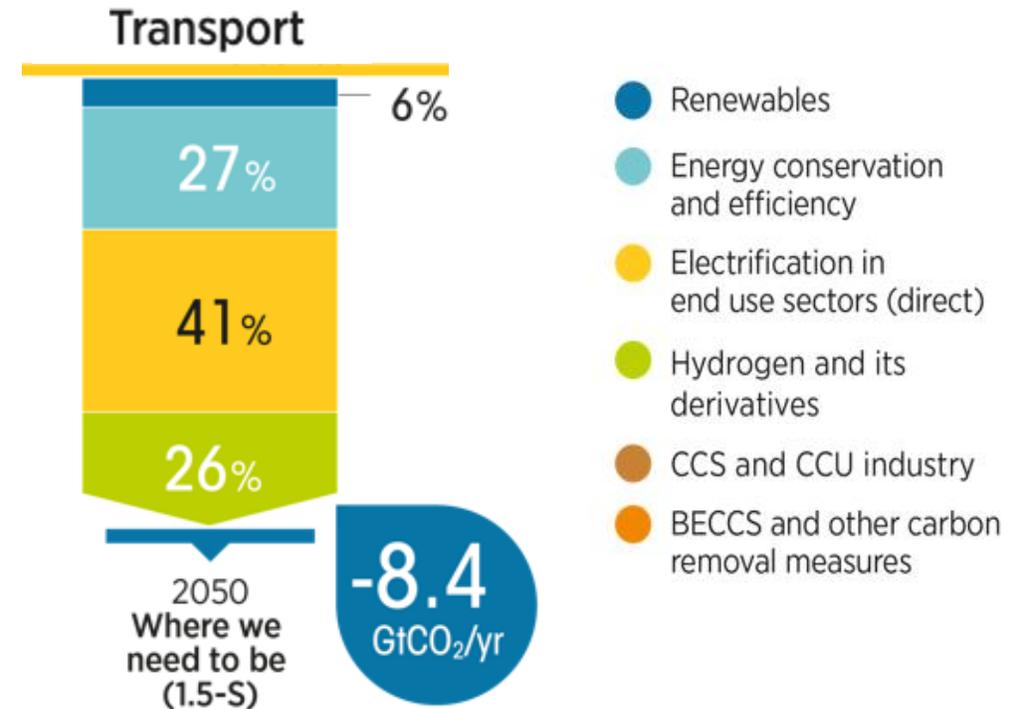
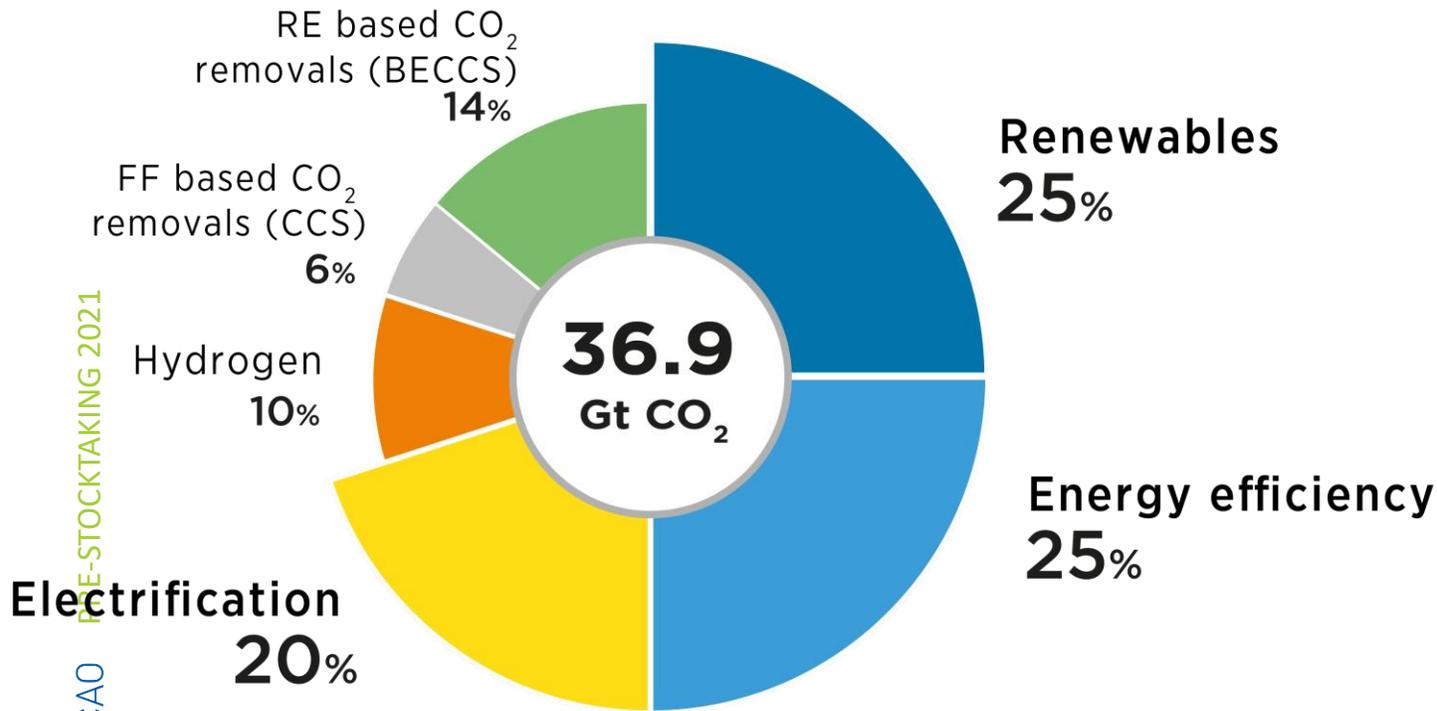
Hydrogen has a role in reducing emissions from HTDS of aviation, heavy transport and heavy industry

2/3 hydrogen will be “green hydrogen” made from splitting water using renewable electricity

WETO: CO2 abatement options for transportation

Six components of the energy transition strategy

67% CO2 reductions in transport come from electrification and hydrogen



- Renewables
- Energy conservation and efficiency
- Electrification in end use sectors (direct)
- Hydrogen and its derivatives
- CCS and CCU industry
- BECCS and other carbon removal measures

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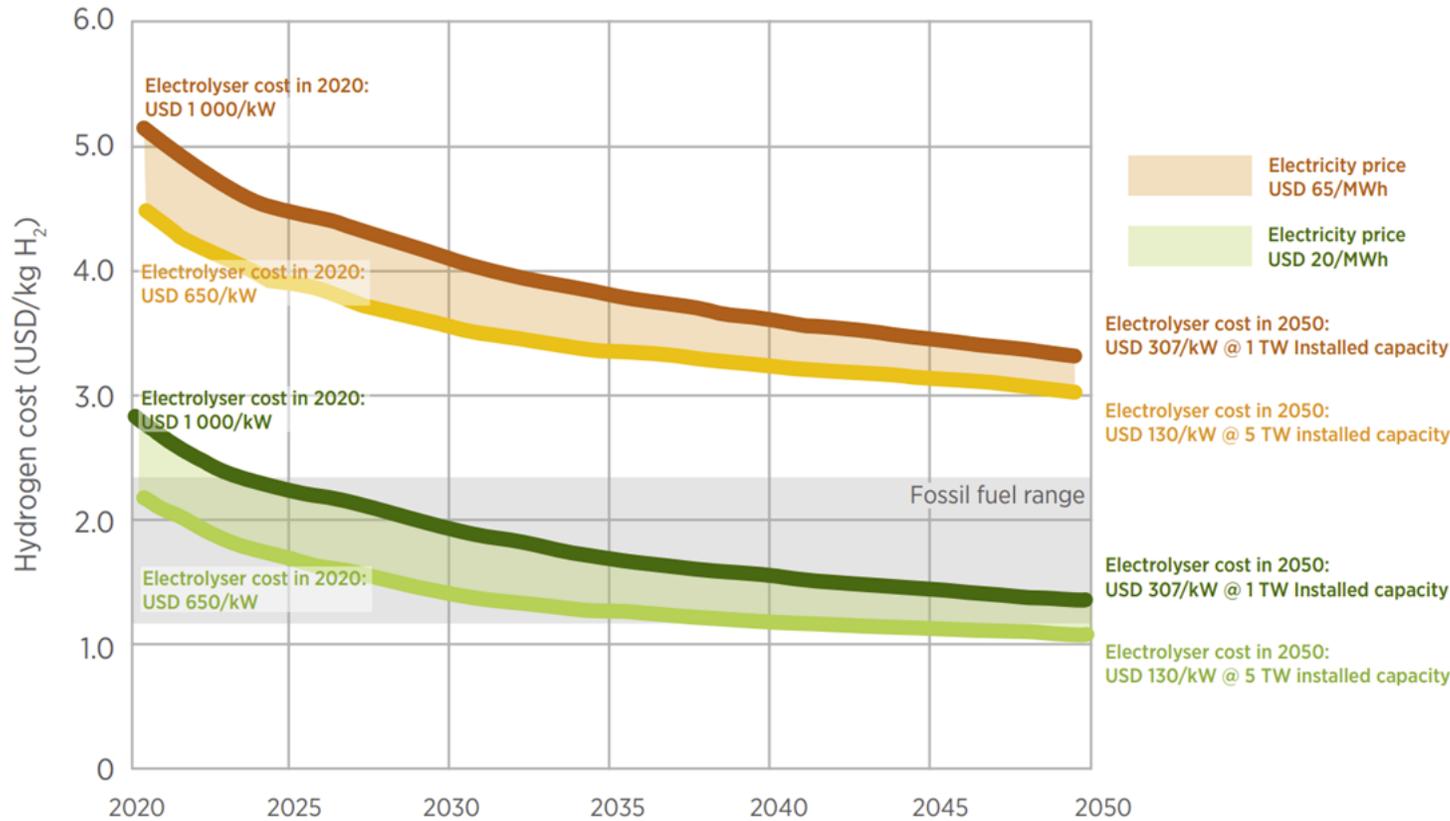


Aviation is currently 11% of all transport emissions

Deep emission cuts needed by 2050, close to zero without offsets

Green hydrogen will be scaled up and cost-competitive by 2030 (USD1.5/kg H₂)

Green hydrogen cost reduction will facilitate ramp up



Main strategies for cost reduction

- Innovation
- Scale up manufacturing
- Scale up modules
- Learning-by-doing



Source: IRENA (2020)



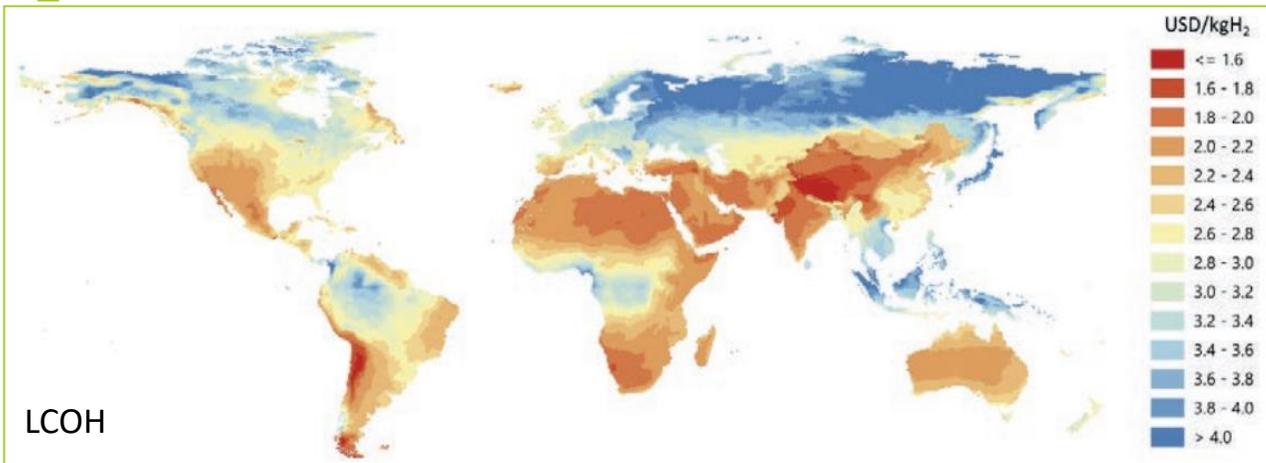
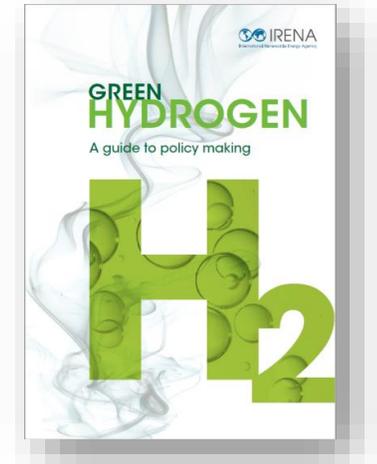
Electrolysers can become 40% cheaper short-term and up to 80% longer term

Green hydrogen production cost reductions can pass \$1.5/kg H₂ by 2030

Key assumptions for electrolyser: Electricity price USD 20/MWh. Efficiency at nominal capacity: 65% in 2020 and 76% in 2050, Electrolyser investment cost (2020): USD 650-1000/kW (USD 130-307/kW as a result of 1-5 TW of capacity deployed by 2050).

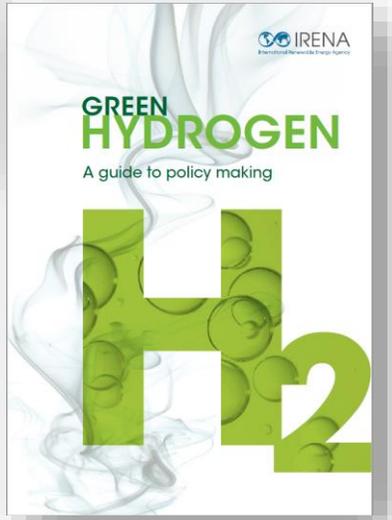
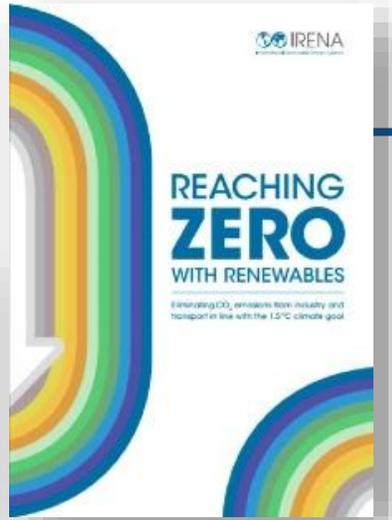
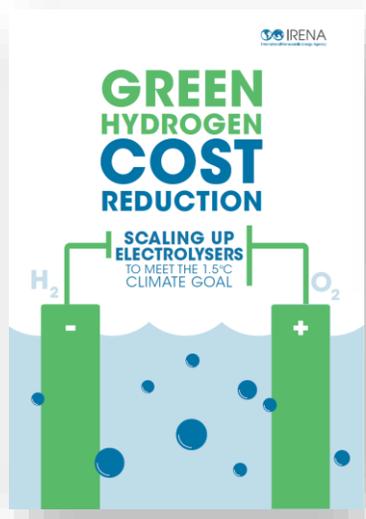
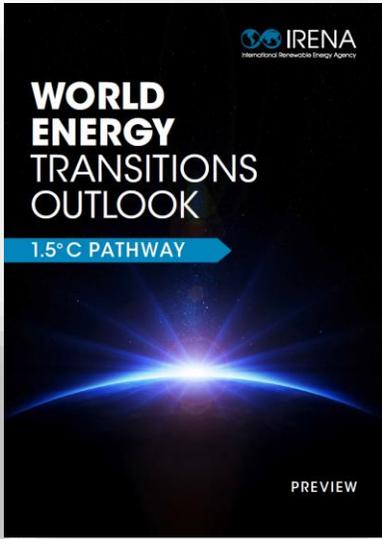
Hydrogen and aviation emission reductions - needs

1. National and regional emission reduction strategies including hydrogen
2. Shared zero-emission vision for aviation and associated policy priorities
3. Understanding of realistic potential role of hydrogen for aviation
4. Cross-sectoral synergies for green hydrogen and synfuels production
5. Green hydrogen technology development, scale-up and cost reduction
6. International certification system to track carbon footprint of fuels





International Renewable Energy Agency



Thank you for your attention

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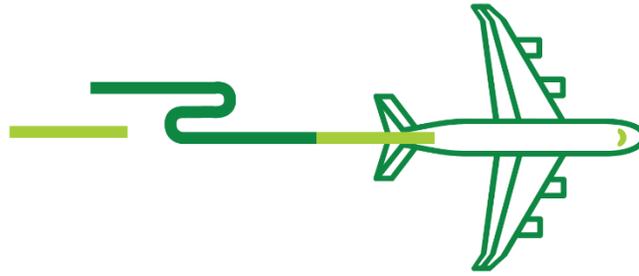
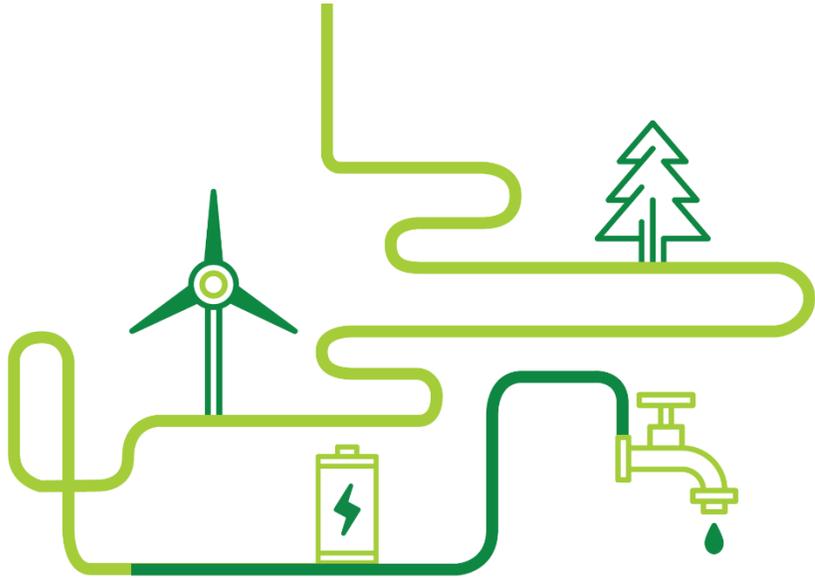


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AVIATION CO₂ REDUCTIONS



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