



| ICAO

STOCKTAKING 2021



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SMARTENERGY

e-kerosene for Europe, an innovative project approach

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Synthetic Fuels for Aviation - ICAO

6th May 2021

Virtual climate summit last week increases the pace for decarbonization world-wide – quotas for aviation in the make



EU leaders and Parliament's negotiators on Wednesday reached an agreement to set into law the bloc's objectives to be carbon-neutral by 2050 and to reduce its greenhouse gas emissions by at least **55 per cent**



Biden commits to cutting U.S. emissions in half by 2030 as part of Paris climate pact

The president announced the pledge during remarks at the White House's virtual climate summit Thursday.



Radical new climate change commitments will set the UK on course to cut carbon emissions by 78% by 2035, the UK government has announced.



Politics

Trudeau pledges to slash greenhouse gas emissions by at least 40% by 2030



Canada will 'blow past' its previous target of a 30 per cent reduction from 2005 levels by 2030, PM says



Environment

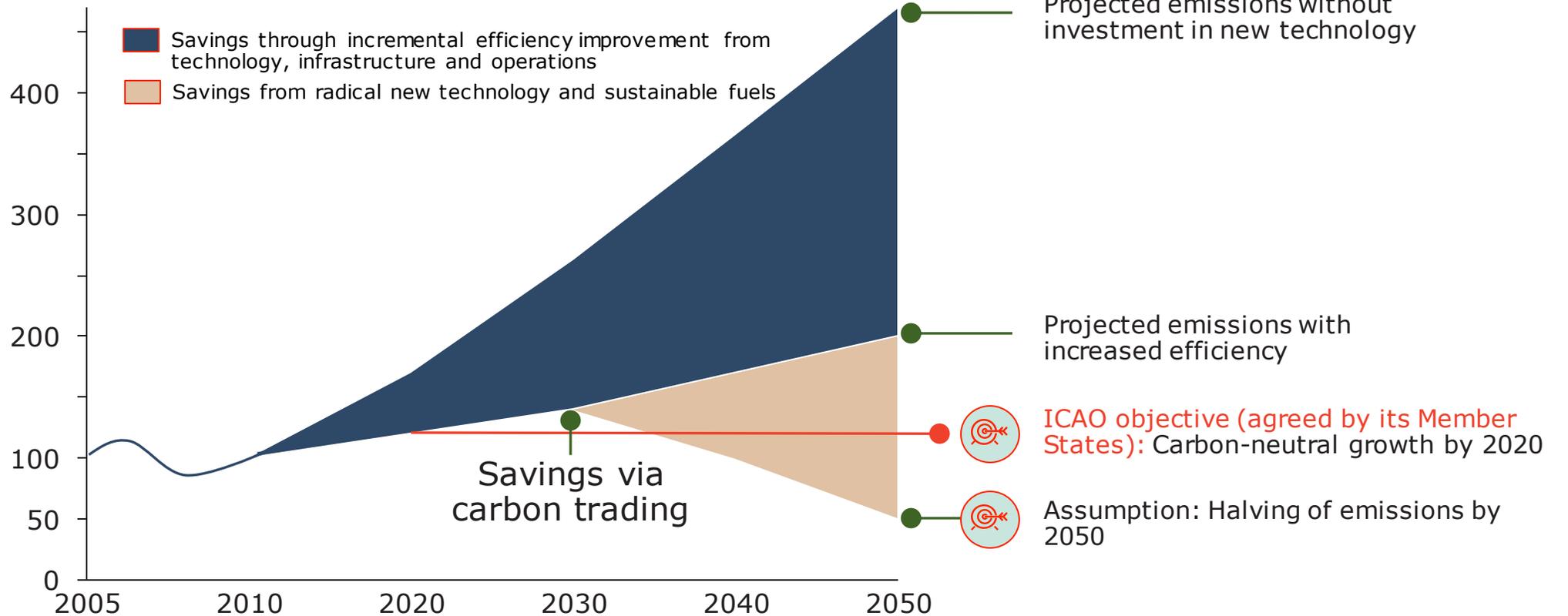
Japan vows deeper emission cuts as Biden holds climate summit

Sustainable Aviation Fuels (SAF) will be the key to reach the ambitious climate goals of the aviation sector defined by IATA

Aviation sector emission reductions roadmap by IATA

Simplified illustration

CO₂-Index (2005=100)



Source: IATA, ICAO



Special momentum in aviation sector – National governments pushing for EU-wide PtL quota, GER moving ahead with e-kerosene

Policy momentum for e-fuels in aviation

Recent policy initiatives by EU member states

Joint declaration on SAF (Feb 2021): Key statements

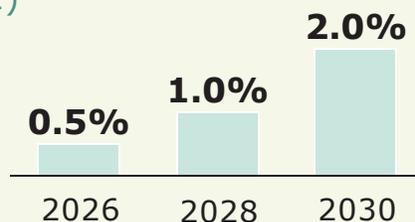


- > The potential of synthetic aviation fuels, in addition to advanced sustainable biofuels is clear
- > The challenge is to provide for a clear long-term perspective, so as to contribute to a scalable SAF marketplace
- > A European blending mandate for SAF can achieve this

Denmark France Luxembourg Spain
 Finland Germany Netherlands Sweden

German PtL blending quota for aviation (Jan 2021)

- > **German draft law** for RED II implementation foresees specific **e-kerosene blending quota in aviation**¹⁾
- > This would create a **mass-scale e-fuel market** –with very limited production capacity



Expected EU policy developments



Q1 2021: ReFuelEU Aviation – Regulation – Commission’s proposal

- > Initiative aims to boost the supply and demand for SAF
- > Policy measures, including mandatory minimum share of SAF, under review

Jun 2021: Legislative revision results

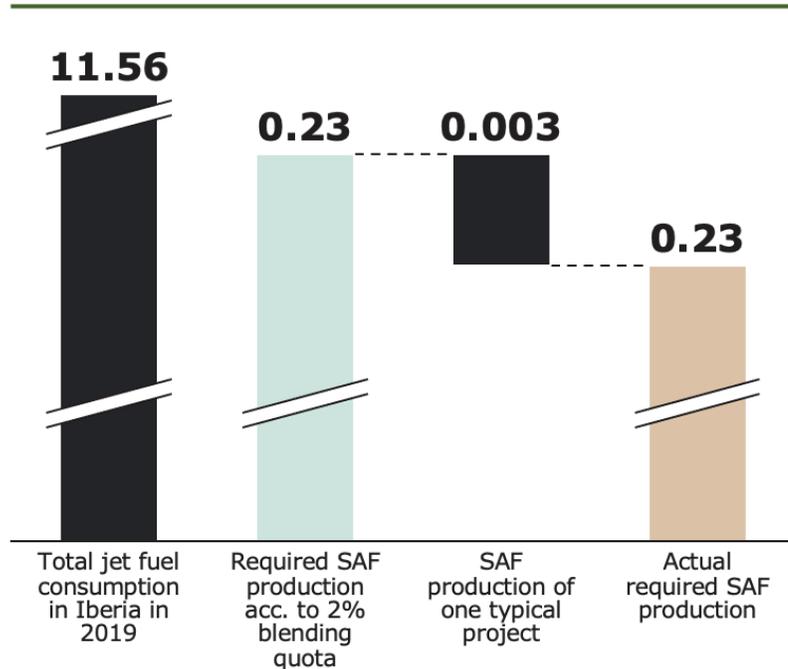
- > Align current legislations with higher Green Deal targets
- > Covering RED II, ETS, etc.

1) As foreseen in draft law for RED II implementation in Germany approved by the federal cabinet; parliamentary approval pending

Source: European Commission; German Federal Government, Government of Luxembourg

Example Iberia: Blending quota translates into a substantial volume which needs corresponding projects to feed the refineries

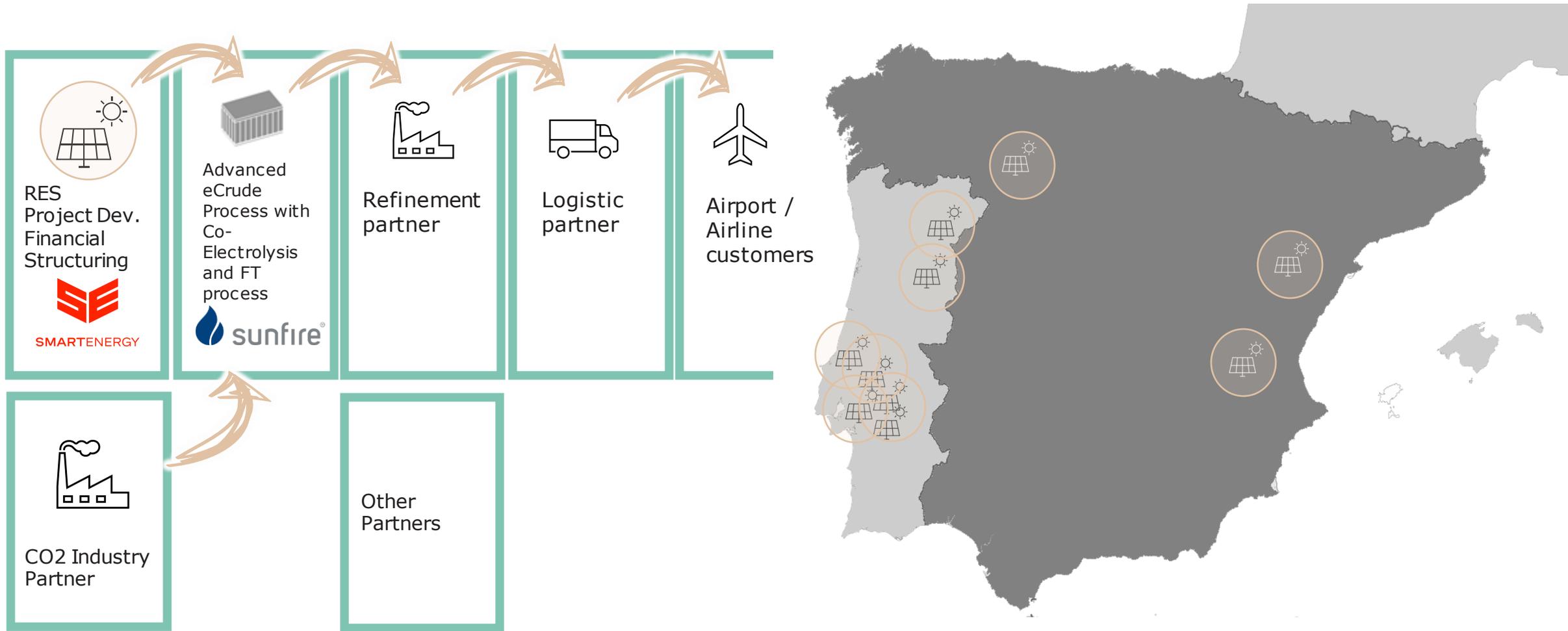
2% blending quota target [bn liters p.a.]



- > 2% quota: approx. 0,23 bn liters p.a.
- > On typical project produces approx. 0,003 bn liters, almost 80 such projects required

- > Assumption: up to 20% of total refining capacity can be used for the synthetic crude processing with existing technology
- > In Iberia, 20% of the total refining capacity amount to approx. 22 bn liters p.a.
- > Sufficient refining capacity available for SAF
- > Corresponding projects need to be developed to feed the refineries with eCrude

Smartenergy and Sunfire have teamed up to develop e-kerosene in Iberia – further project partners under discussion



Smartenergy and Sunfire combine in-depth renewables expertise and cutting-edge H₂ technology capabilities as integrated offering

Key capabilities at a glance



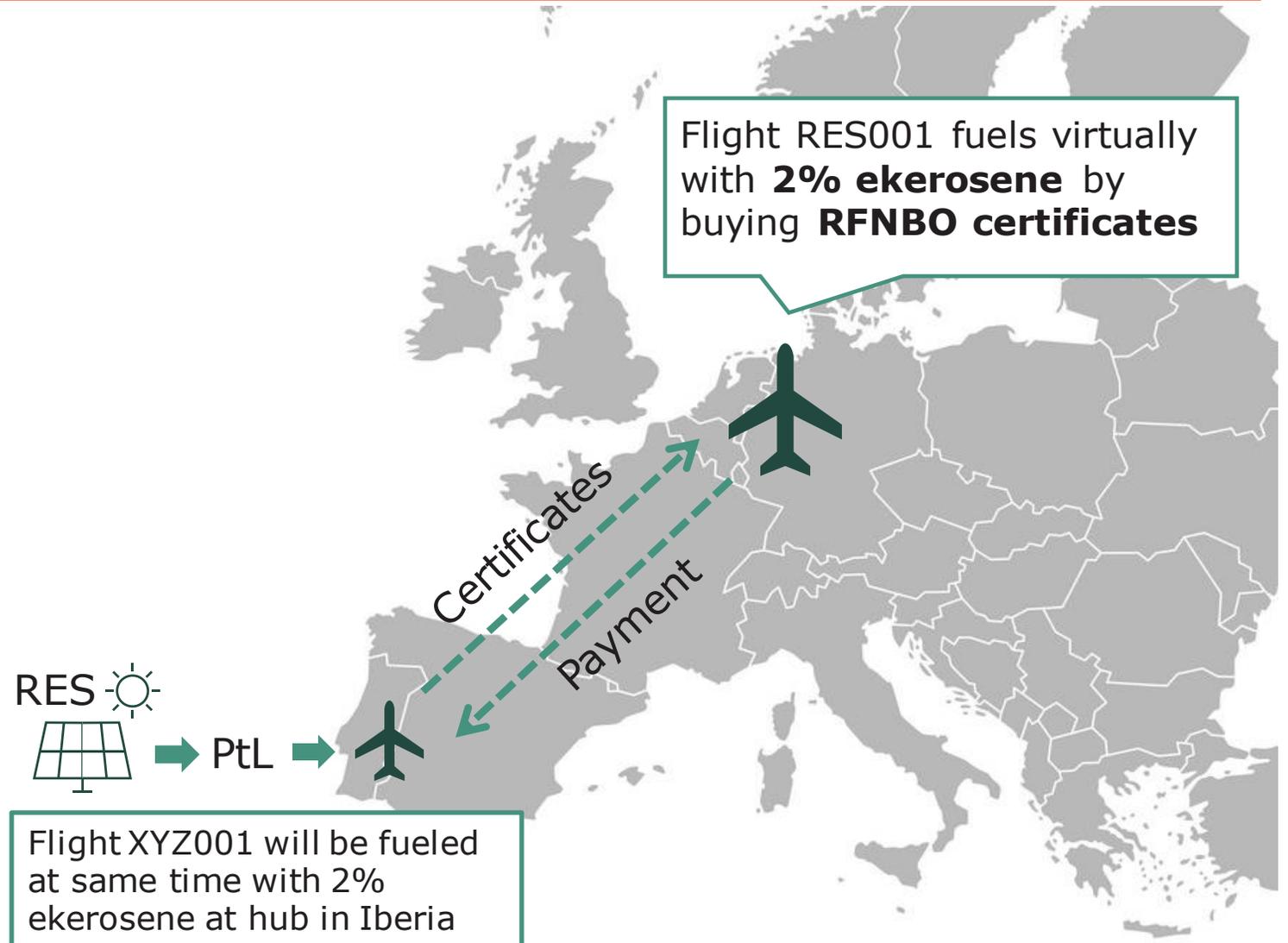
- ✓ Large-scale renewable electricity generation project development and asset management experience
- ✓ More than 360 MW solar & wind plants sold in Iberia since 2017
- ✓ Renewables project pipeline (PV and onshore wind) of > 1 GW in Portugal, further pipeline in Spain, Italy and Germany
- ✓ Local regulatory and permitting expertise in Iberia
- ✓ Driving various high-profile green H₂ projects across Iberia



- ✓ Proprietary technology and engineering expertise
- ✓ SOEC-based co-electrolysis for e-crude production
- ✓ Pressurized alkaline water electrolysis for H₂ production
- ✓ Own development arm for industrial scale e-fuel plants – subsidiary Norsk e-Fuel as leading example
- ✓ Longstanding track-record of development and operation of SOEC and Alkali H₂ production facilities

Project shall make available eKerosene at any participating airport virtually through a corresponding innovative trading system

- > Make eKerosene available at designated hubs with favorable conditions
- > As emissions are equal and are distributed in the atmosphere across borders, it is not essential who loads the real eKerosene
- > By innovative trading system any flight can load virtually eKerosene while another flight really loads the fuel.
- > More cost competitive eFuel without otherwise required infrastructure and logistics





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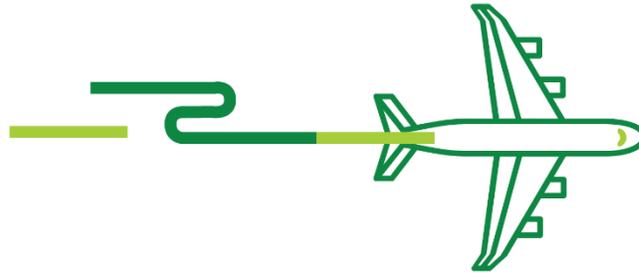
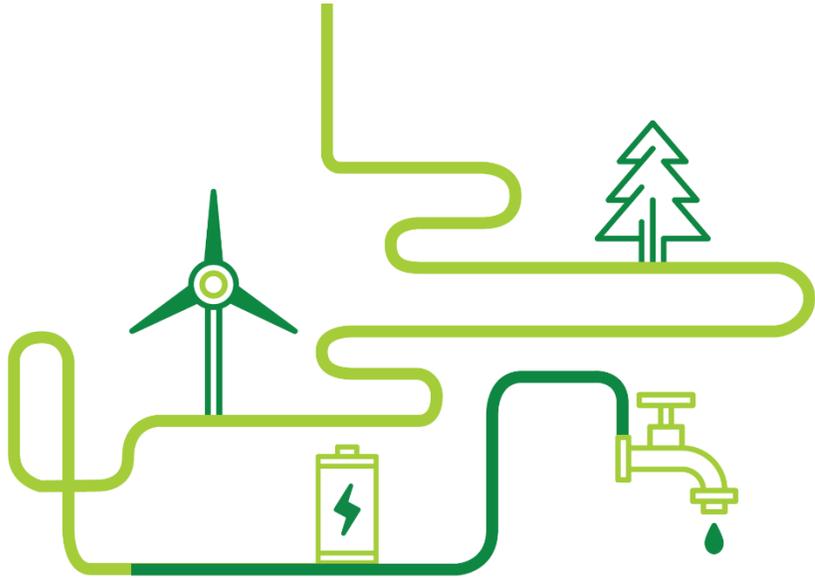
Thank you!

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