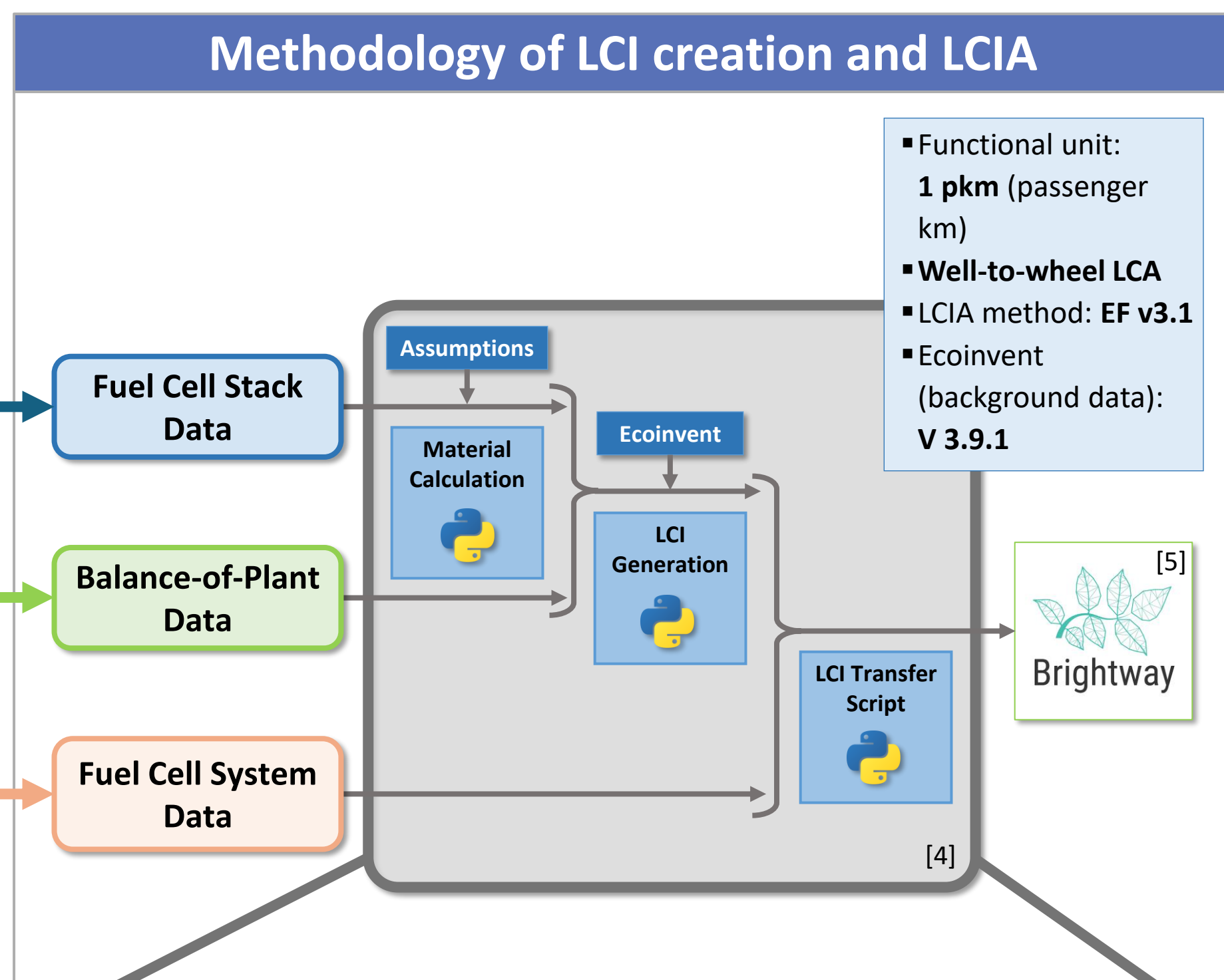
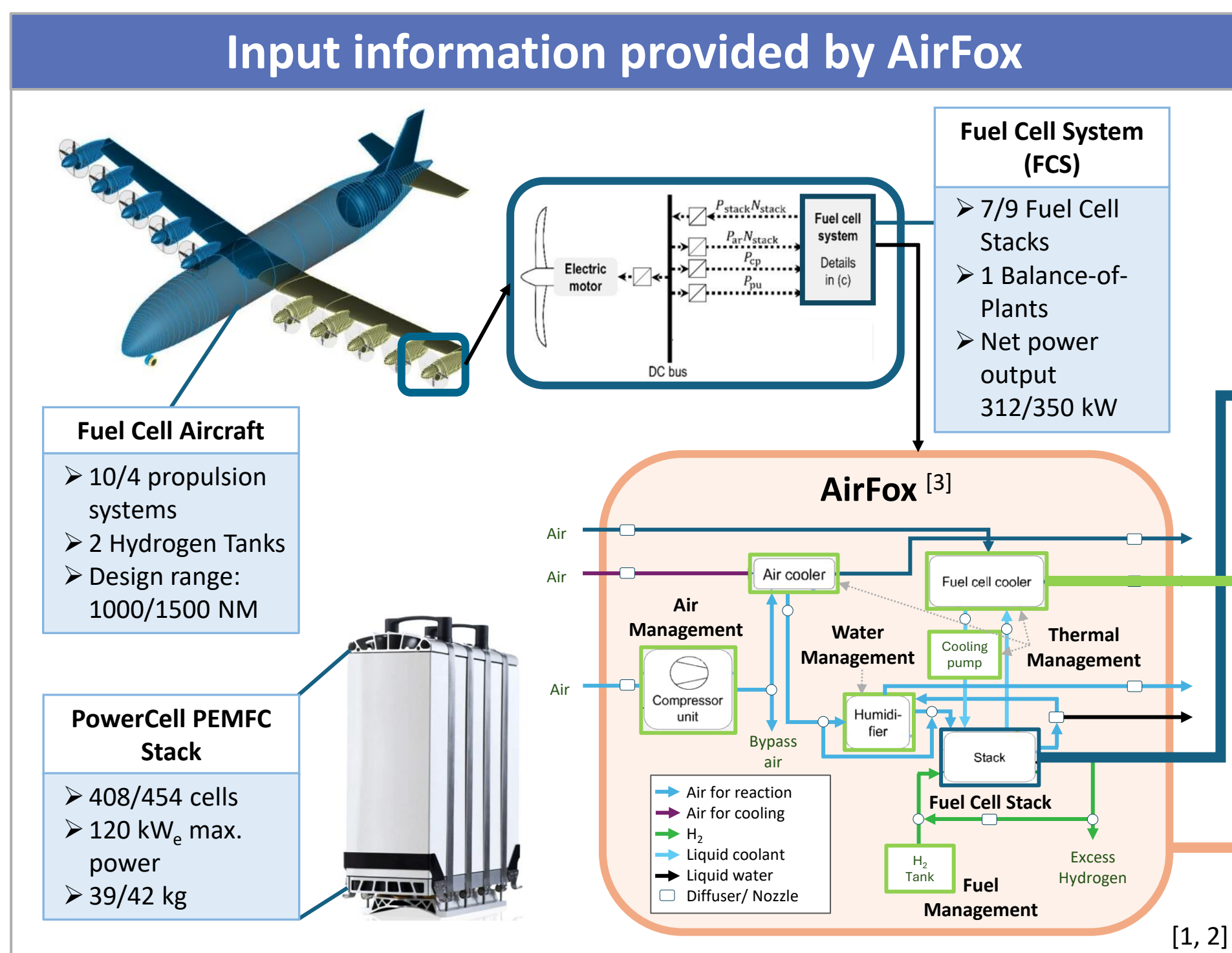


Fuel Cell Systems (FCS) for different aircraft concepts: Life cycle assessment

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Main properties of case studies

	FCS70	APU250
Propulsion	FCS	H ₂ comb. + FCS APU (Auxiliary Power Unit)
Passenger	70	250
Flight distance [NM]	1000	1500
Hydrogen [kg/pkm]	0.0050	0.0038

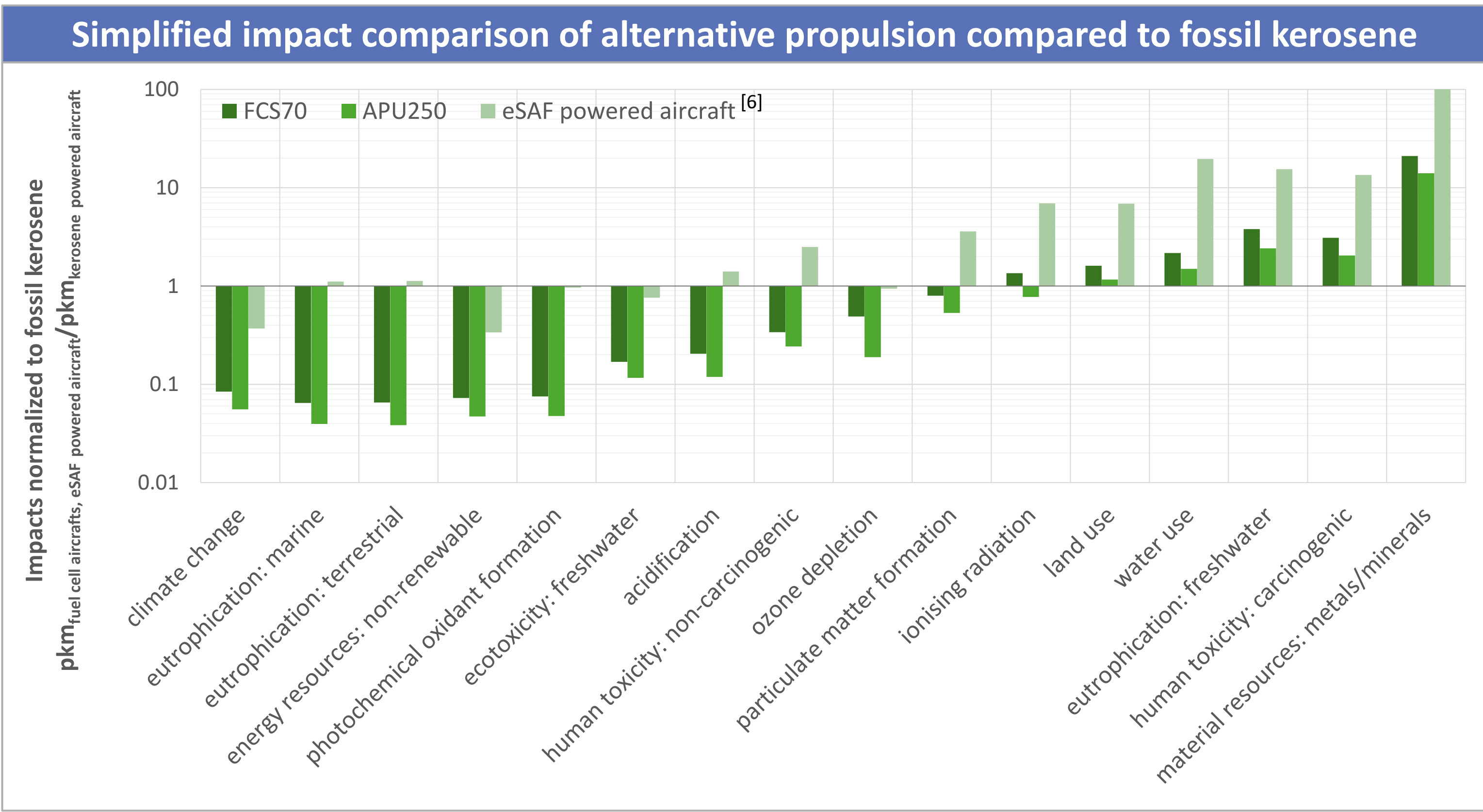
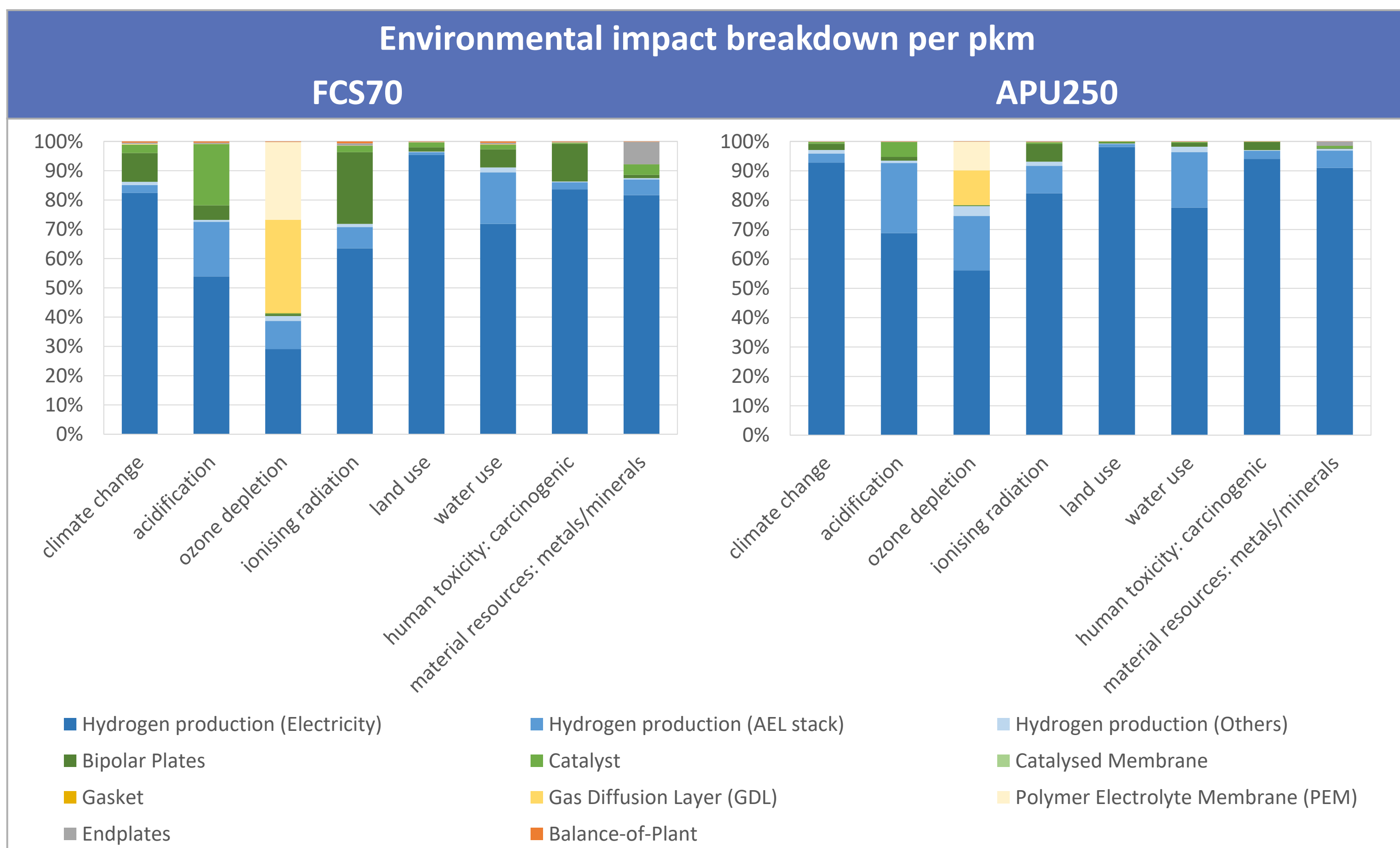
Python Tool

Flexible & adaptable python tool for AirFox-LCI coupling

- Flexible, parametrizable datasets
- Easy input modifications for component weight calculations
- Automates life cycle inventory generation
- Promotes data reuse across applications
- Accommodates various aircraft sizes and missions

Impact Contribution

- Hydrogen dominant contributor in both FCS70 and APU250
- Lower contribution of fuel cell parts in APU250 case
- Biggest contributor from FCS are catalyst and bipolar plates
- Tetrafluoroethylene (TFE) in GDL and PEM contribute significantly to ozone depletion



Fossil kerosene comparison

- Lower impact of APU250 due to lower hydrogen consumption per pkm
- Lower impact of FCS70 and APU250 compared to eSAF aircraft mostly because of lower electricity consumption during fuel production

[1] Schröder *et al.* (2024), Optimal design of proton exchange membrane fuel cell systems for regional aircraft

[2] P Stack Datasheet, p-stack-v-221.pdf (powercellgroup.com)

[3] DLR Fuel Cell System Design Tool (AirFox) (<https://www.dlr.de/de/tt/forschung-transfer/forschungsinfrastruktur/modellierungswerkzeuge/airfox/airfox>)

[4] Evon *et al.* (2025), Life Cycle Assessment of Hydrogen-powered Fuel Cell System for Regional Aviation - Methodology Development and Preliminary Results, under review.

[5] Mutel (2017), Brightway: An open source framework for Life Cycle Assessment

[6] Rojas-Michaga *et al.* (2023), Sustainable aviation fuel (SAF) production through power-to-liquid (PtL): A combined techno-economic and life cycle assessment

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