Oregon Department of **ENERGY**

ODOE RH2 Study

Senate Committee on Energy and Environment

Rebecca Smith
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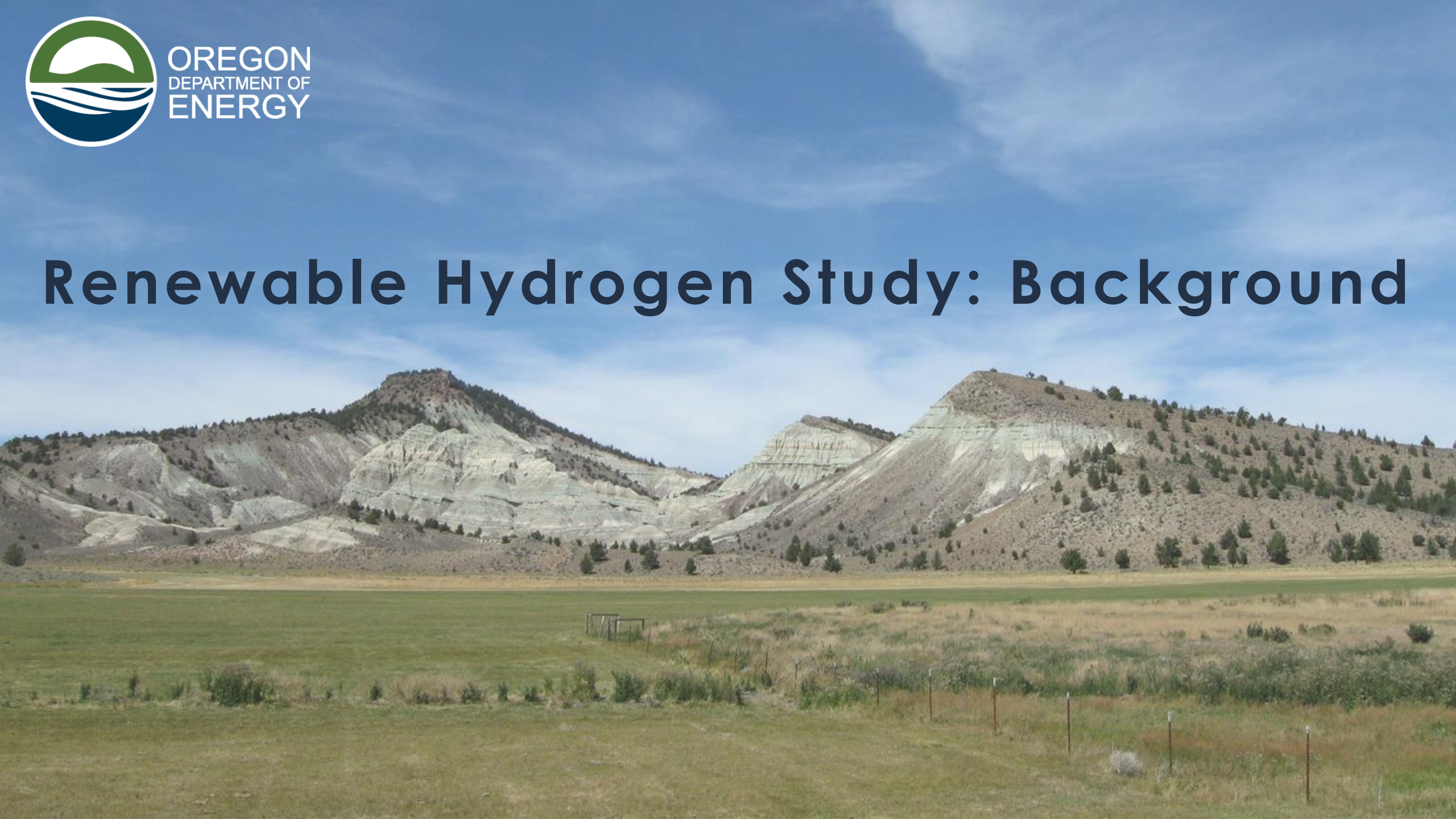
Renewable Hydrogen Study: Background



SB 333 RENEWABLE HYDROGEN STUDY

Study Goal: Provide legislators and stakeholders with a better understanding of the benefits of and barriers to production and consumption of RH2 in Oregon, including trade offs.

For the purposes of the study, **"renewable hydrogen"** means hydrogen gas derived from energy sources that do not emit greenhouse gases.

Study meant to provide "high-level analysis" and draw upon "existing data, studies, or other publicly available information."

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STUDY REQUIREMENTS PER SB 333 (2021)

- Identification of the total H2 volume currently used annually in Oregon.
- Identification of potential applications of RH2 in Oregon by 2030.
- Assessment of potential for coupling renewable electricity generation and RH2 production to increase resiliency or provide flexible loads.
- Discussion of forecasted costs of RH2 and how they might affect adoption of RH2 in Oregon.
- Identification of technological, policy, commercial, and economic barriers to adoption of RH2 in Oregon.

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RH2 Study: Selected Findings

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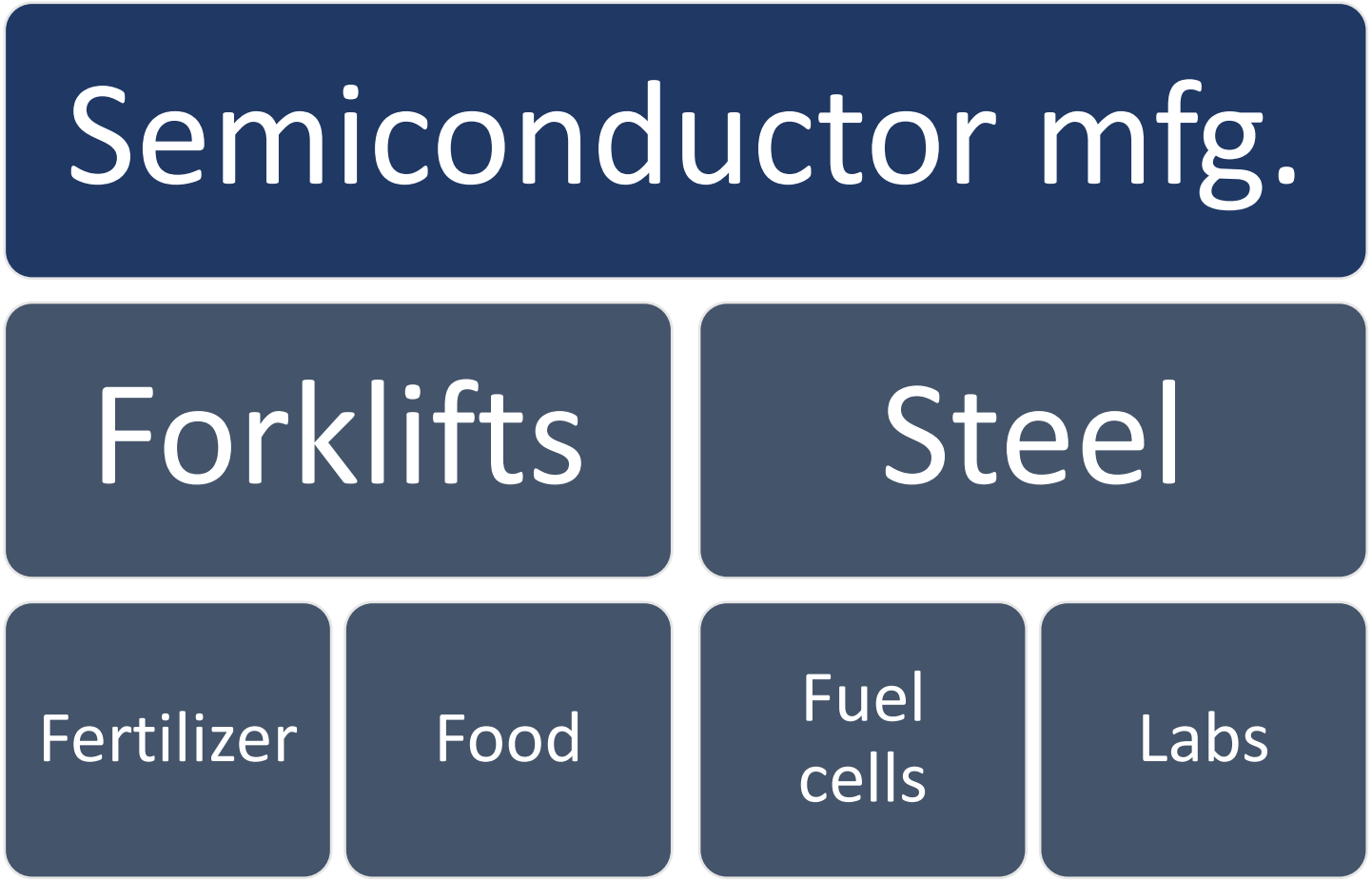
IDENTIFICATION OF THE TOTAL H2 VOLUME CURRENTLY USED ANNUALLY IN OREGON



- Numerous outreach attempts for data gathering
- Challenging to get data – competitive concerns
- Possible methods for estimating H2 use but would need further study

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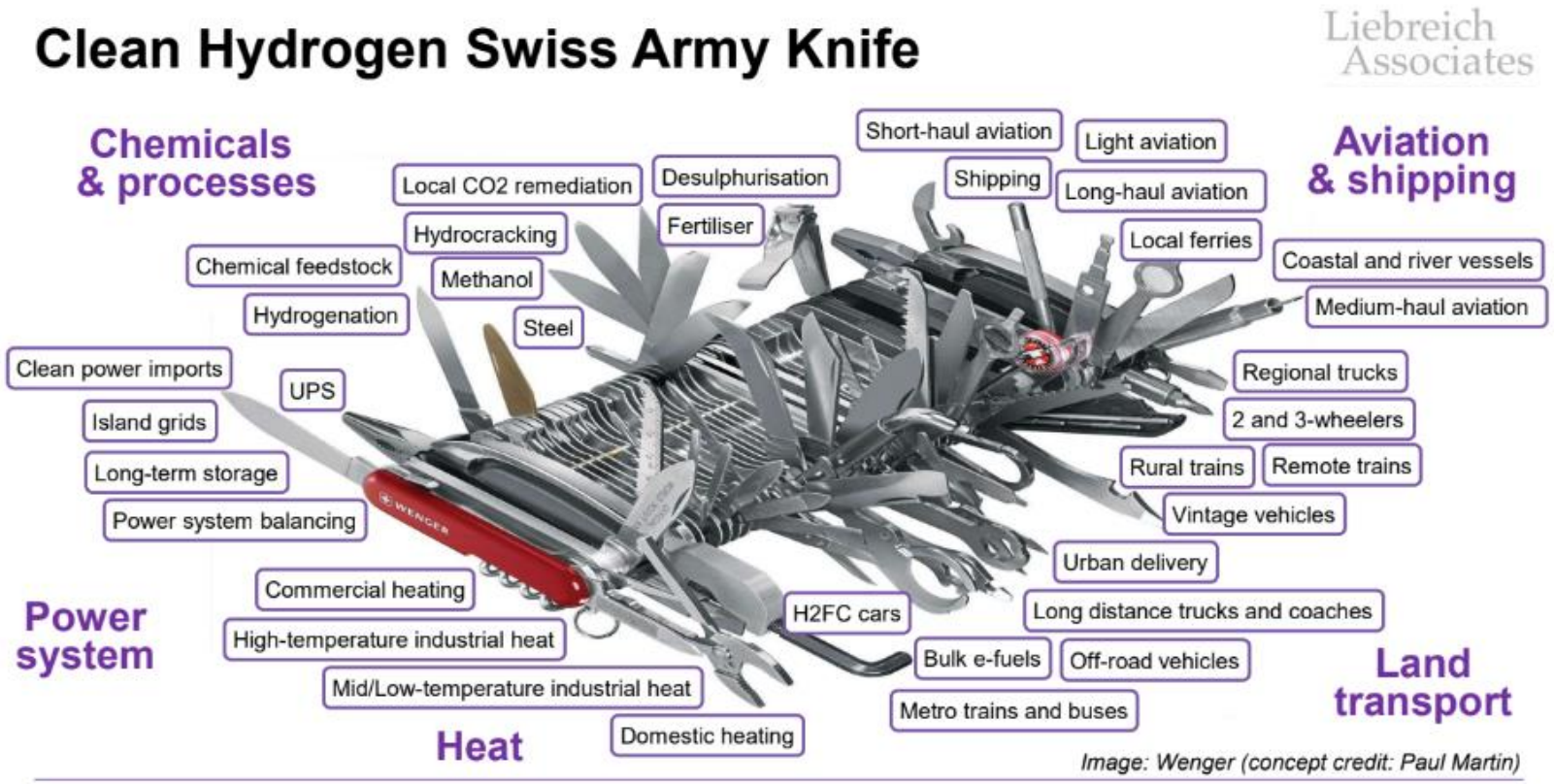
POTENTIAL APPLICATIONS OF RH2 IN OREGON BY 2030

- Where RH2 could be used – feasibility of use
- Where RH2 should be used – merit order of deployment
- Where RH2 might be used – market actors, existing policy

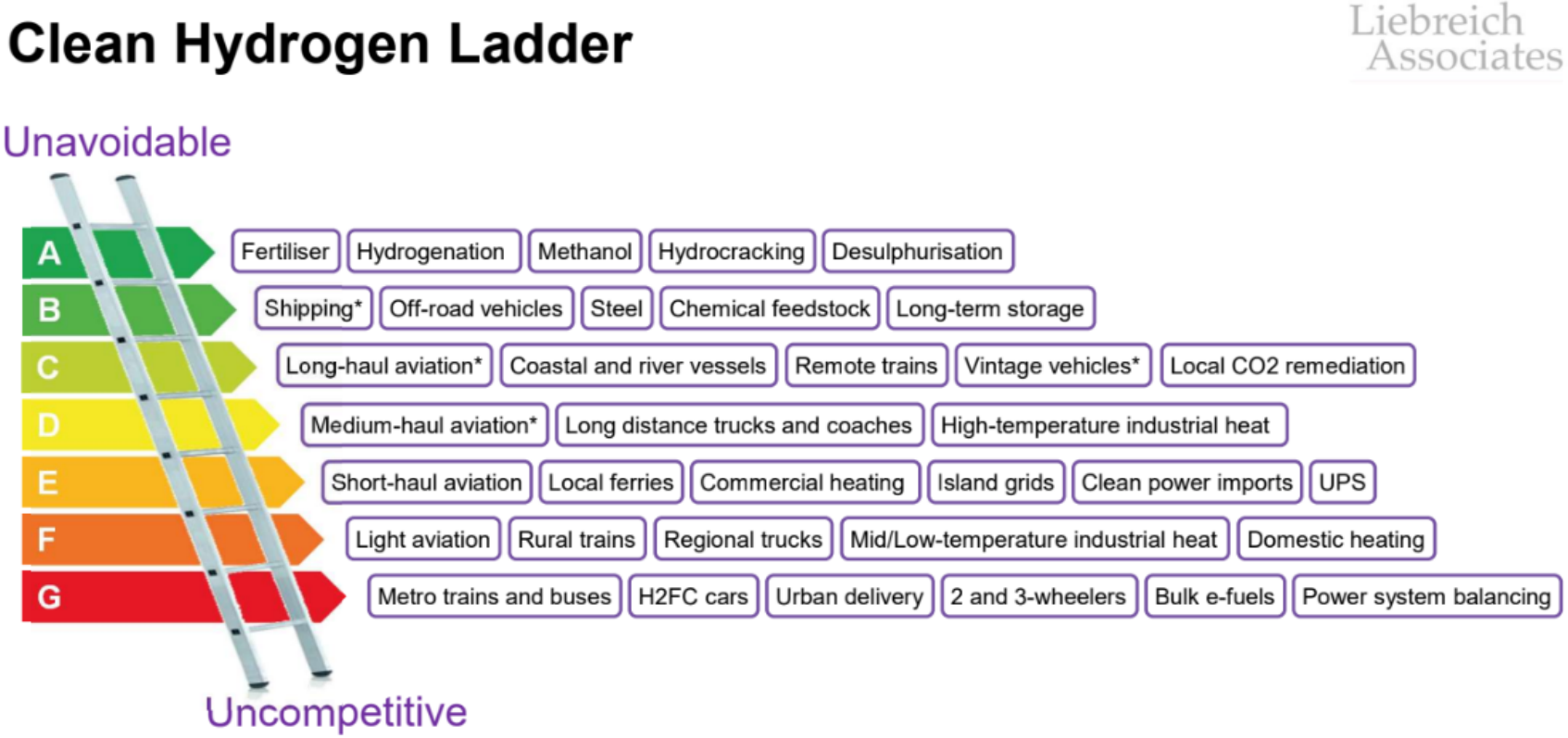
POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

- Where RH2 could be used – feasibility of use



POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

- Where RH2 <u>should</u> be used – merit order of deployment



** Via ammonia or e-fuel rather than H2 gas or liquid*

Source: Liebreich Associates (concept credit: Adrian Hiel/Energy Cities)

POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

- Where RH2 might be used – market actors, existing policy

Market

- Chicken-and-egg problem
- Federal grants
- Tax credits

Policy

- Clean Fuels Program
- Climate Protection Program
- ZEV Rebates
- Alt. Fuels Corridors

POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

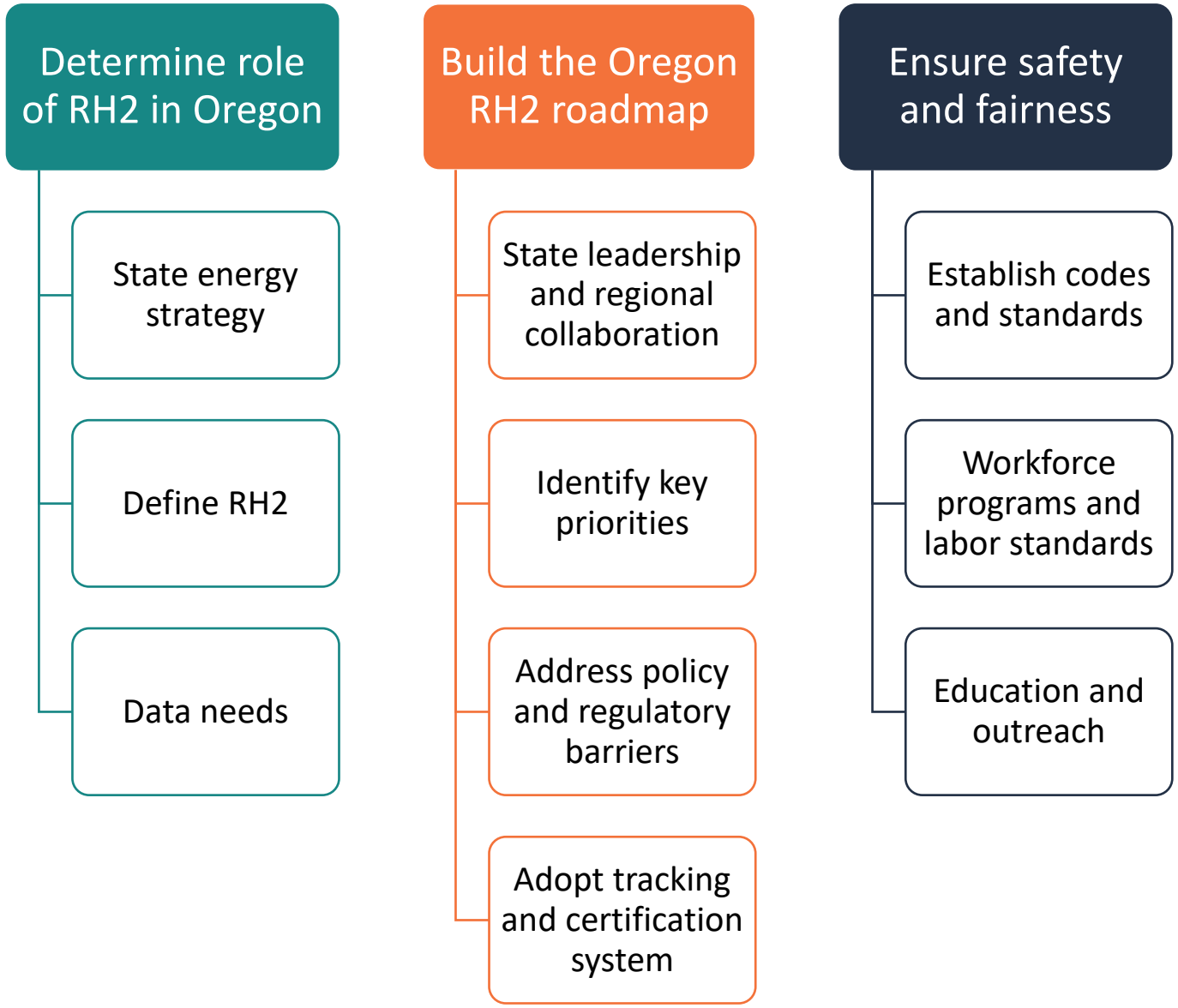
Potential Applications in Oregon

- Substitution of H2 with RH2 where already in use
- Industry w/ high heat demands
- Transportation – LD, MD, HD, offroad
- Chemicals and other energy carriers
- Back-up power replacement for diesel generators
- Long-duration energy storage
- Electricity generation and grid balancing
- Natural gas pipeline blending

DRIVERS

- Properties of H2
- Efficiencies of producing RH2
- Availability of substitutes
- GHG reduction potential
- Enabling policies
- Cost of RH2
- Potential local supply of RH2

RECOMMENDATIONS IF OREGON WISHES TO BUILD RH2 SECTOR



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