

HYDROGEN

Generation • Infrastructure • Transportation



OREGON
DEPARTMENT OF
ENERGY

Oregon Department of **ENERGY**

ODOE RH2 Study

House Committee on Climate,
Energy, and Environment

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February 6, 2023



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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.”

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.

INTERPRETING THE SB 333 DEFINITION OF RENEWABLE HYDROGEN

- Bill defines RH2 as:

“...hydrogen gas derived from energy sources that do not emit greenhouse gases.”

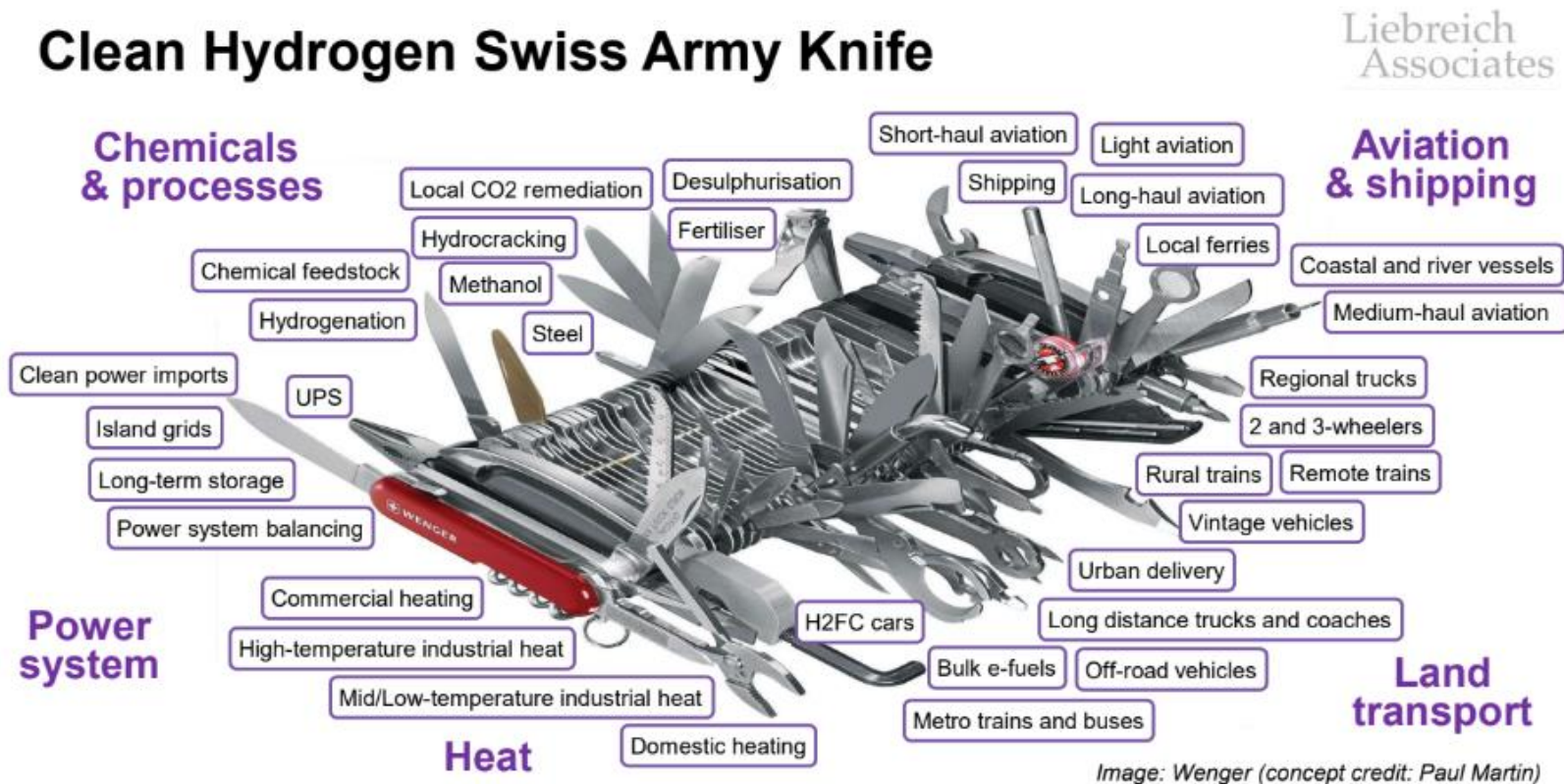
- Interpreting this definition:
 - Does this mean only energy sources that *inherently* do not emit GHGs?
 - Could it include energy sources that emit GHGs but are considered “carbon neutral,” like biomass?
 - Could it include energy sources where GHG emissions associated with hydrogen production are captured and stored?

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



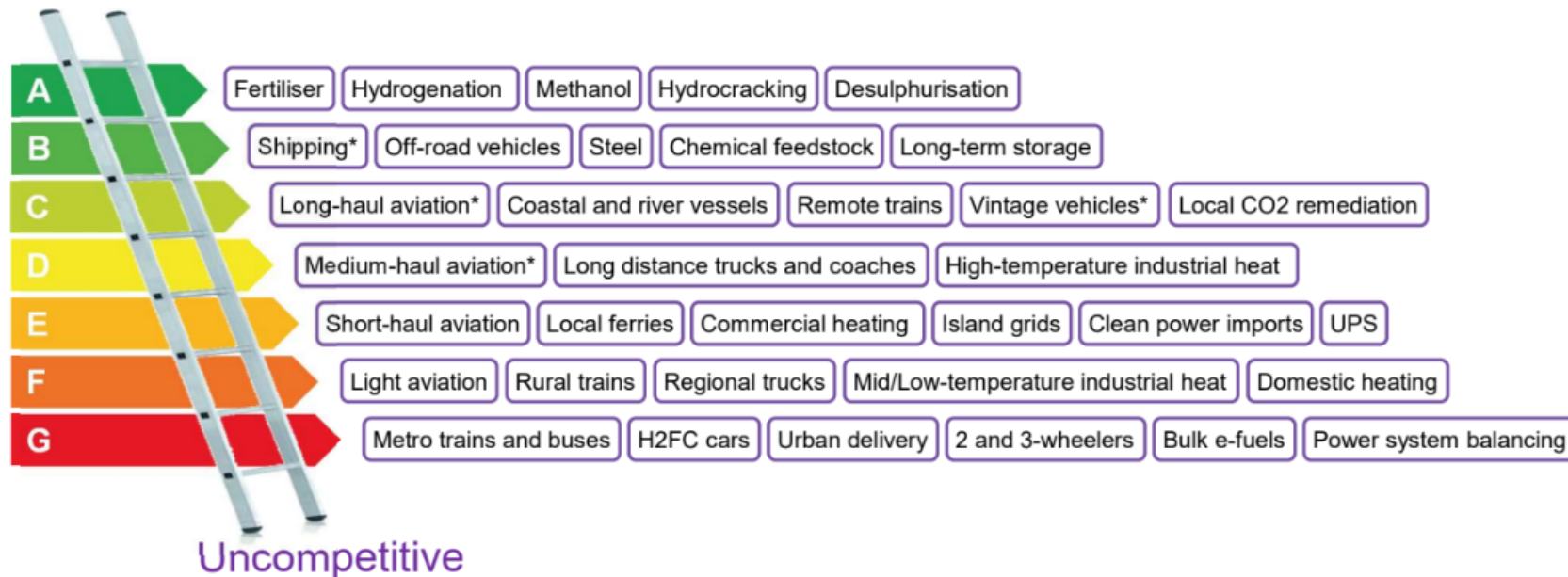
POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

- Where RH2 should be used – merit order of deployment

Clean Hydrogen Ladder

Liebreich
Associates

Unavoidable



* 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)

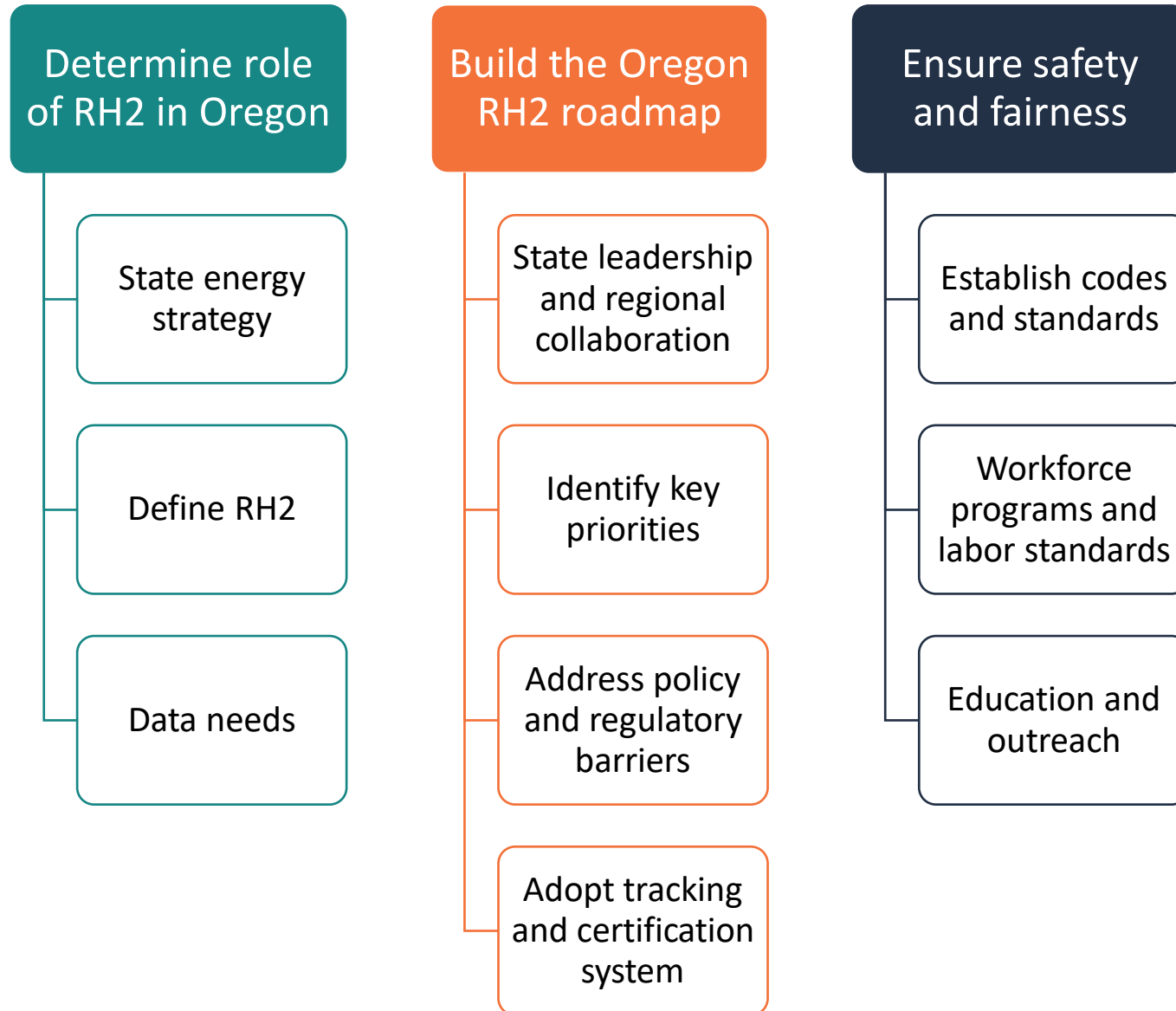
Potential Applications in Oregon

- 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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