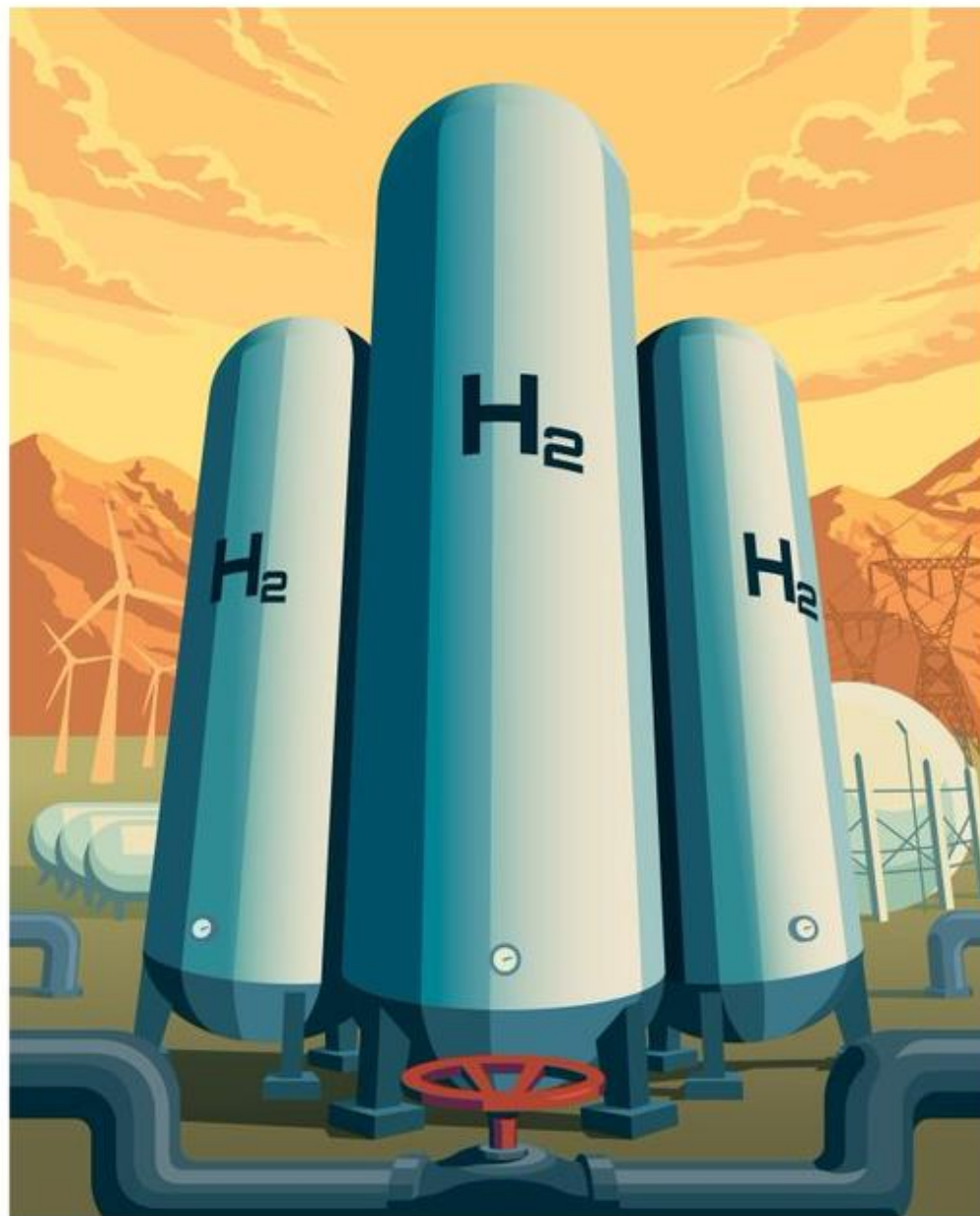


# HYDROGEN

Generation • Infrastructure • Transportation



# Oregon Department of **ENERGY**

## ODOE RH2 Study

House Interim Committee on  
Energy and Natural Resources

Rebecca Smith  
December 8, 2022



OREGON  
DEPARTMENT OF  
ENERGY

# 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)

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- 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.



# RH2 Study: Selected Findings



# IDENTIFICATION OF THE TOTAL H2 VOLUME CURRENTLY USED ANNUALLY IN OREGON

Semiconductor mfg.

Forklifts

Steel

Fertilizer

Food

Fuel  
cells

Labs

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

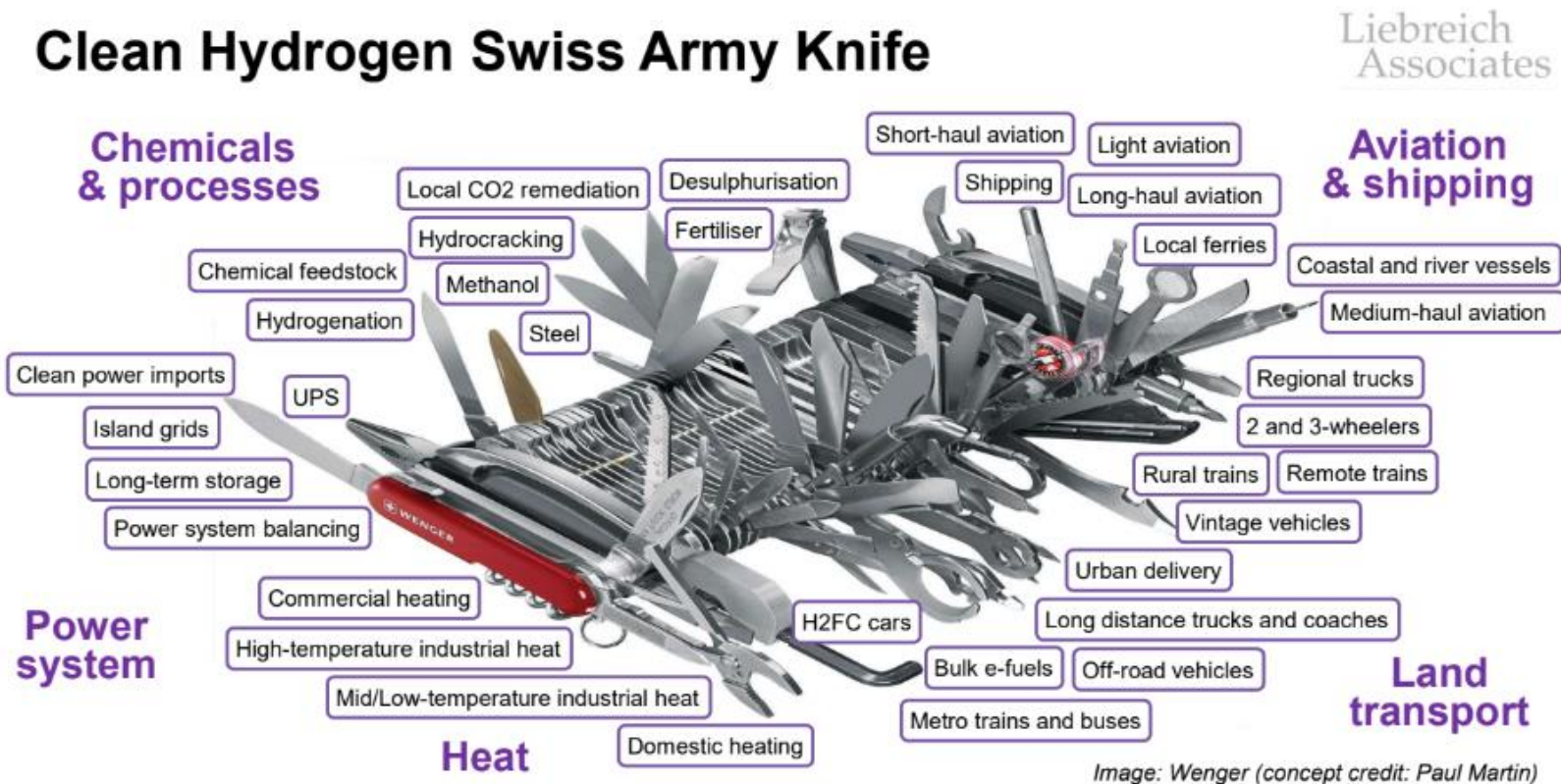
# POTENTIAL APPLICATIONS OF RH2 IN OREGON BY 2030

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- ▶ 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





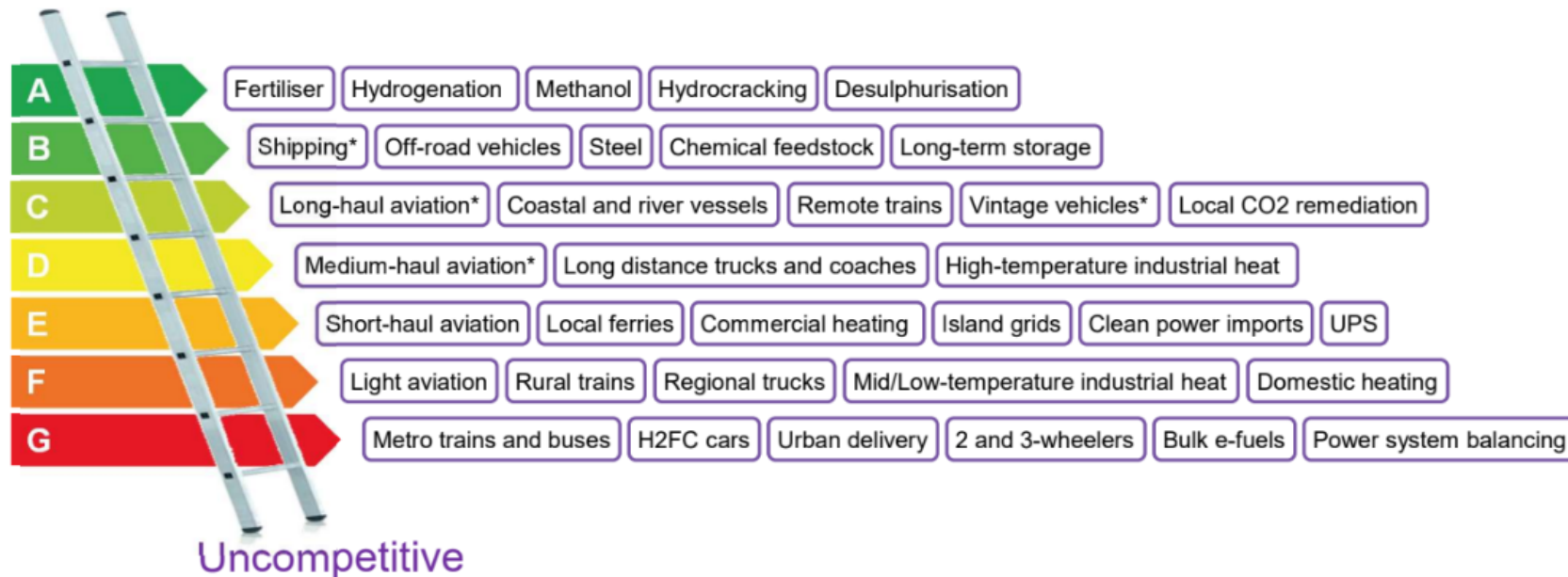
# POTENTIAL APPLICATIONS IN OREGON BY 2030 (cont'd)

## 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)

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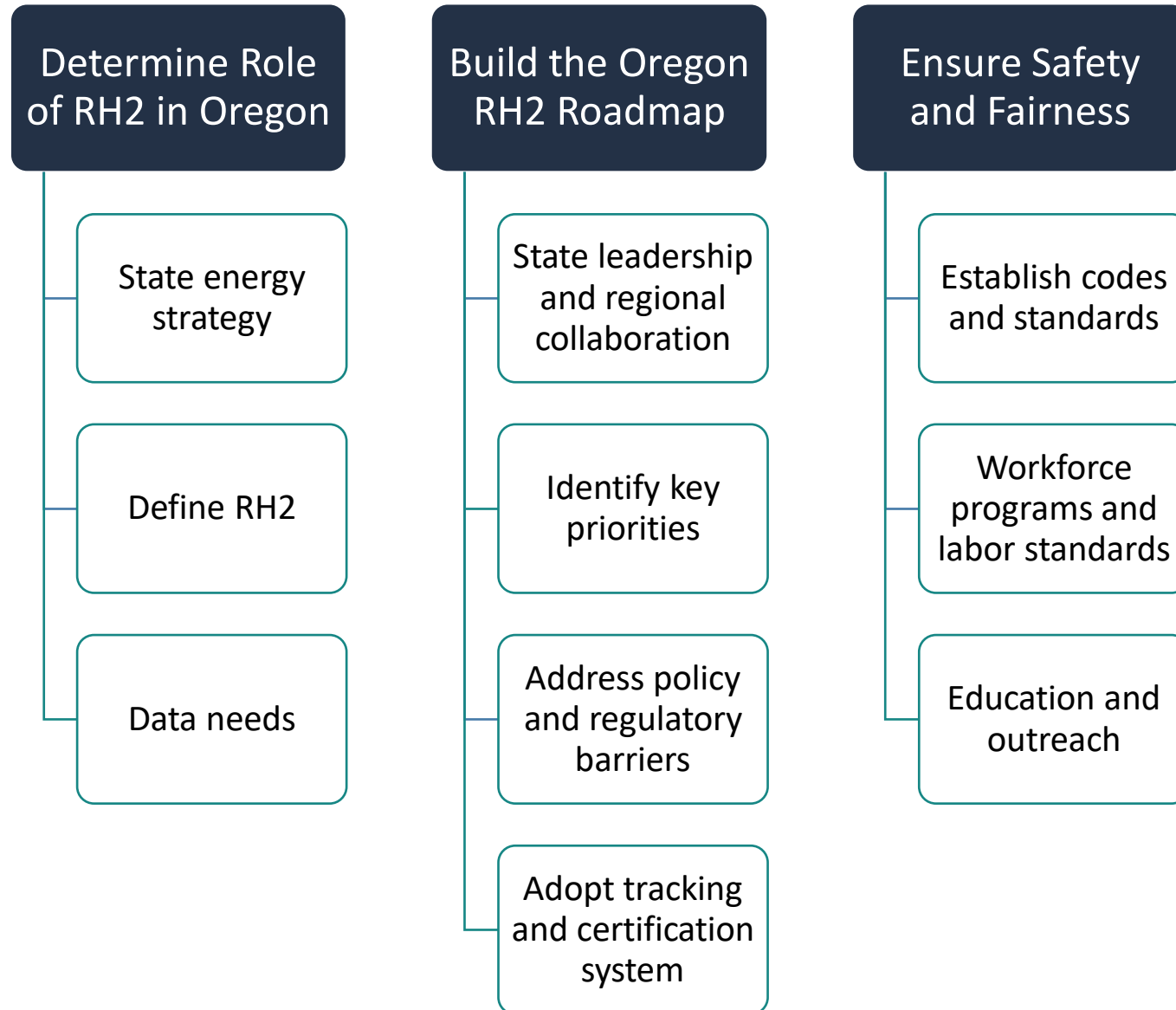
## Potential Applications in Oregon

- Substitution of H<sub>2</sub> with RH<sub>2</sub> 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 H<sub>2</sub>
- Efficiencies of producing RH<sub>2</sub>
- Availability of substitutes
- GHG reduction potential
- Enabling policies
- Cost of RH<sub>2</sub>
- Potential local supply of RH<sub>2</sub>

# RECOMMENDATIONS IF OREGON WISHES TO BUILD RH2 SECTOR





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