Role of Hydrogen in Electrifying Transportation in Oregon

Oregon Legislature Transportation Committees
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RHA
RENEWABLE HYDROGEN ALLIANCE

Renewable Hydrogen Alliance

www.RenewableH2.org

- RHA is a trade association whose mission is to:

  Promote using renewable electricity to produce climate-neutral fuels for reducing dependence on fossil fuels.

- Growing and diverse membership:
  - Electric and Gas Utilities (including EWEB, PGE, and NW Natural)
  - Electrolyzer Manufacturers
  - Hydrogen Transportation Supply Chain
  - Project Developers
  - Law Firms
  - Clean Energy Advocacy Organizations

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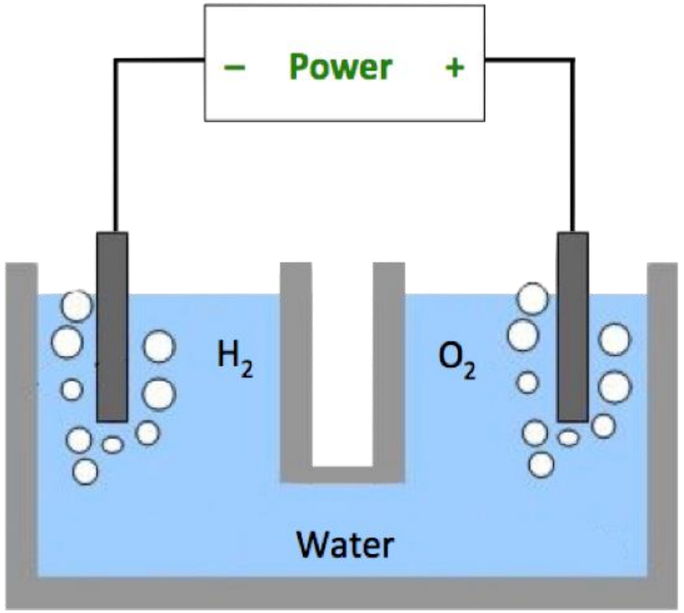
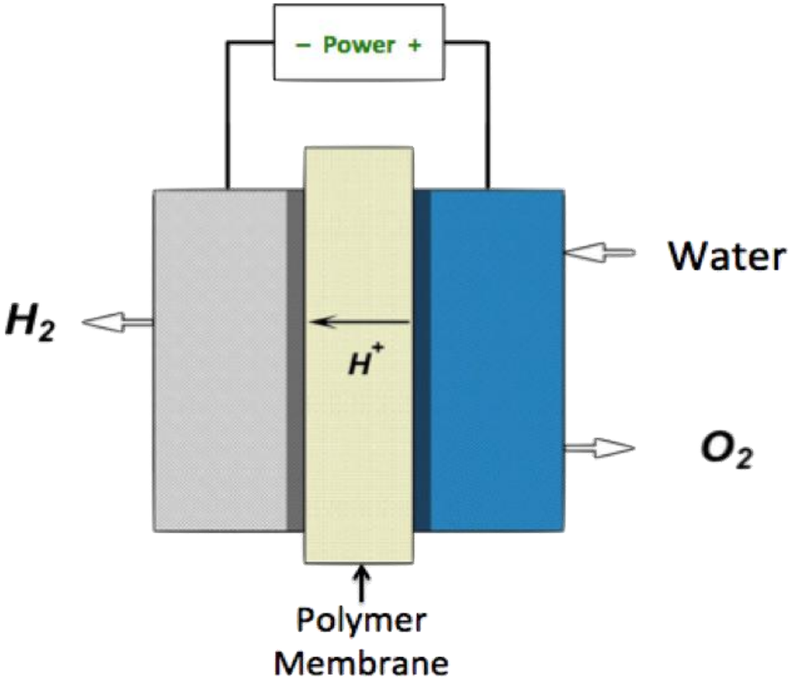
Electrolyzers make hydrogen from electricity

- Electricity + water = hydrogen + oxygen
  - Originally discovered 200 years ago!

Alkaline



Proton Exchange Membrane (PEM)



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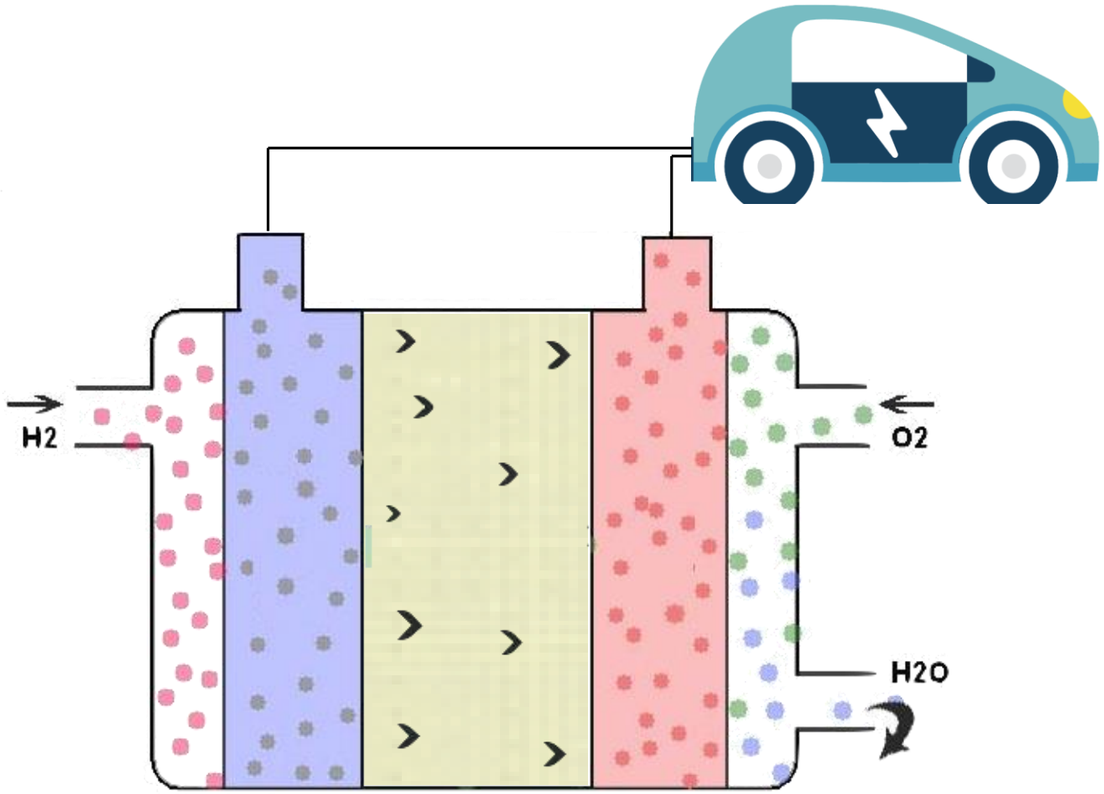
Fuel Cells make electricity from hydrogen

- The process works in reverse:
  - Hydrogen + oxygen = electricity + water
- Hydrogen vehicles ***are*** electric vehicles when the hydrogen is produced from electricity.
  - A hydrogen tank and fuel cell take the place of batteries in what is otherwise an electric vehicle.



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Hydrogen Vehicles in the US Today

- 35,000 hydrogen forklifts in operation.
- 8,800 light duty passenger vehicles.
- ~60 transit buses.
- Three heavy duty trucks by at least two manufacturers are operating.
- San Francisco bought a hydrogen ferry, being built now in Bellingham.
- San Bernardino has ordered the first hydrogen locomotive in the US.
- Zero Avia and others are developing hydrogen aircraft.

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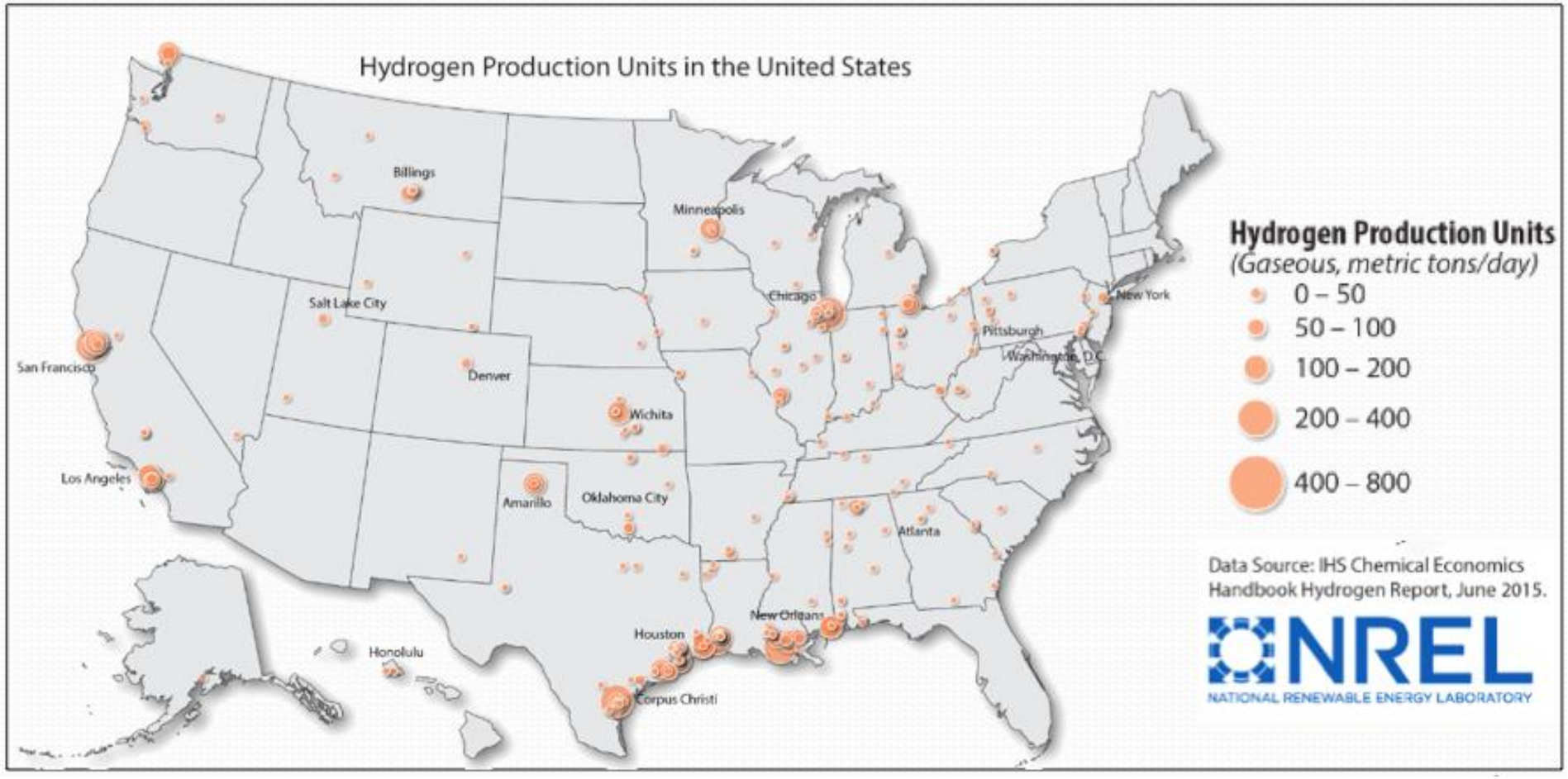
U.S. annual hydrogen production	Largest users in the U.S.			
10 million metric tons	Petroleum Processing	68%	Fertilizer Production	21%



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Key Messages

- Making hydrogen from electricity is key to efficiently using super-abundances of low-cost, zero-carbon renewable power.
- Fuel cell vehicles will be as much a part of transportation electrification as battery vehicles.
  - They are critical to decarbonizing some transportation needs.
- The technology is here today and costs are falling rapidly with economies of scale.

Oregon's commitments to climate and renewable energy make it a fertile place for hydrogen transportation to take root.

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Thank you

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