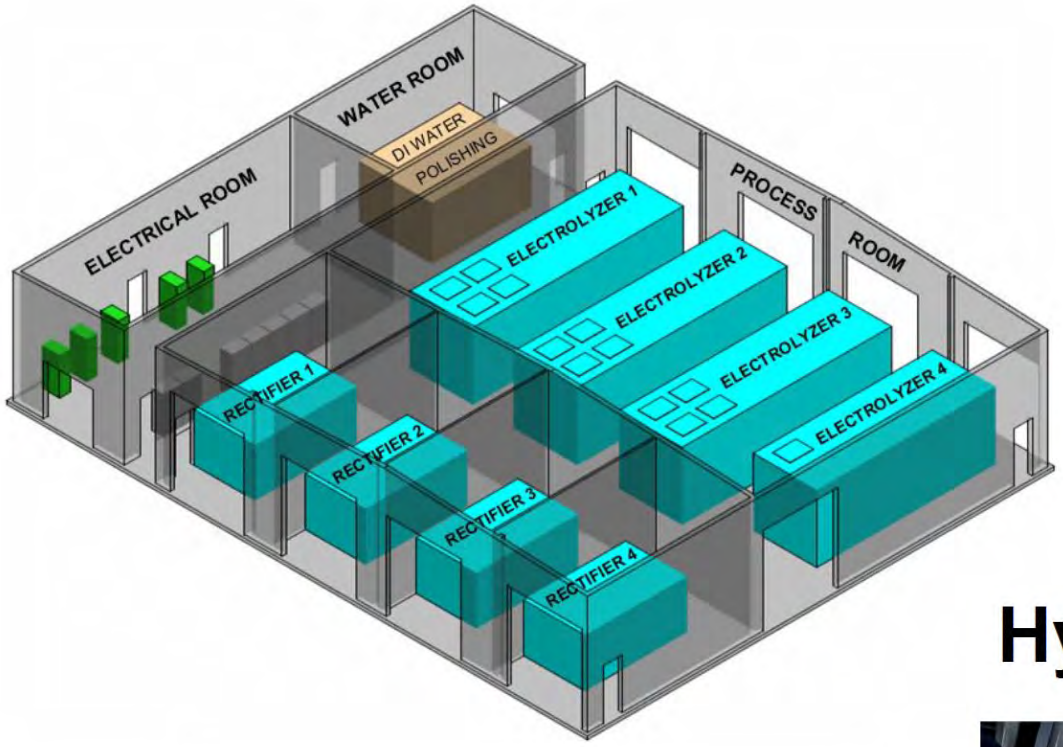
Douglas PUD Hydro to H2

Renewable Hydrogen Pilot Project

- 5MW electrolyzer (PEM)
- Producing 2-tons of hydrogen per day
- Hydrogen sold wholesale for industrial and transportation uses
- Facility is expandable to meet demand
- Long-term storage is a future goal

Equipment Overview



HyLYZER®-1000

Facility is expandable to meet demand

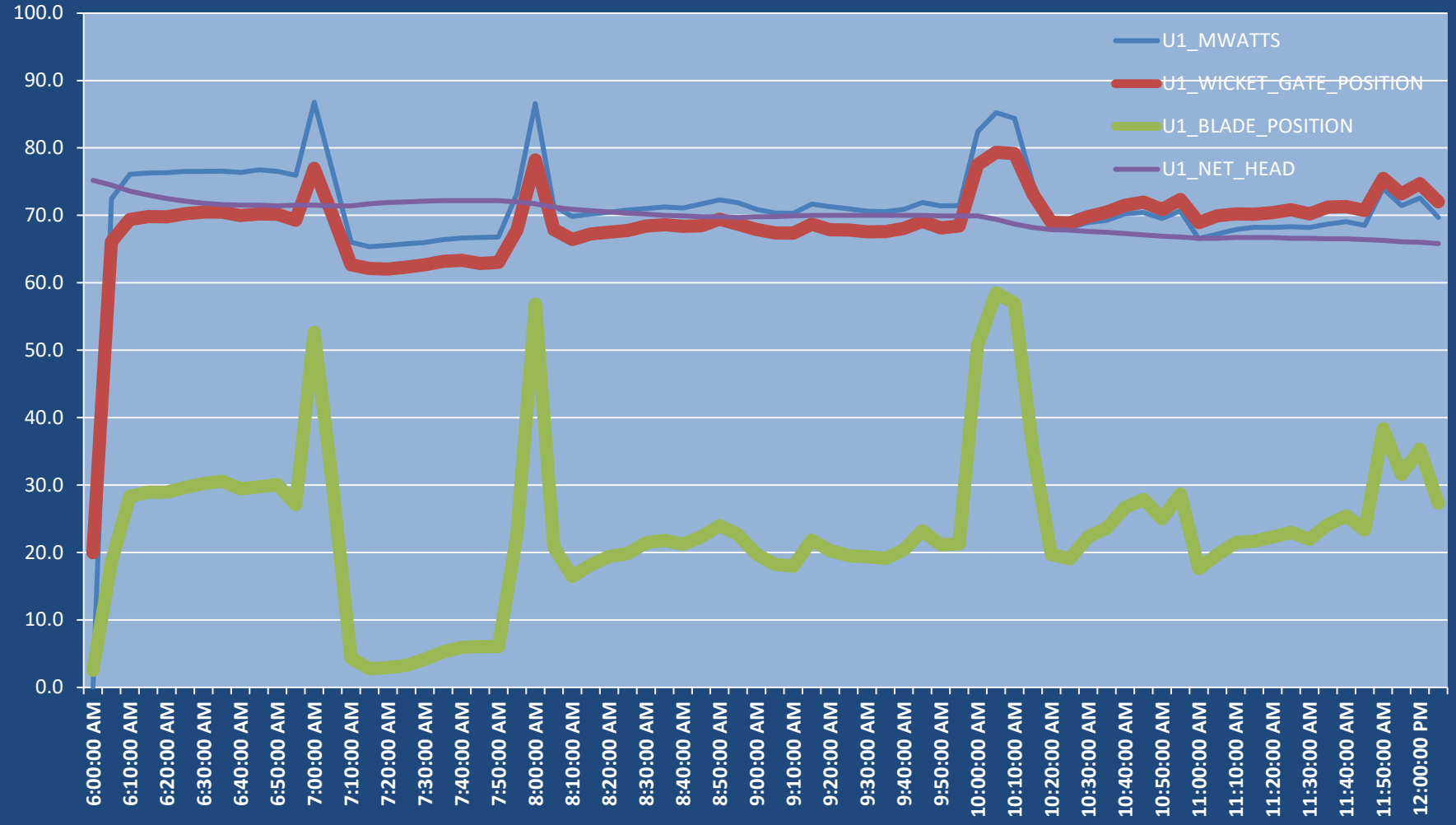
Why Renewable Hydrogen?

- Passed laws granting PUD's authority to produce hydrogen in 2019
- Helps solve intermittent renewable problems - Hydro, Wind and Solar – predictable fuel
- Input Cost is 70 to 80% Electricity
- Grid Services
  - Reserves
  - Frequency Regulation
  - Load Following

Solving Hydro Production Problems

- **Efficiencies created by hydrogen production**
  - Mechanical wear-and-tear caused by starts and stops, 4 second adjustments to grid demand
  - Seasonal and variable fuel supply
  - Demand response – grid balancing reserves (15 MW)

Units ramping up and down in 24 hours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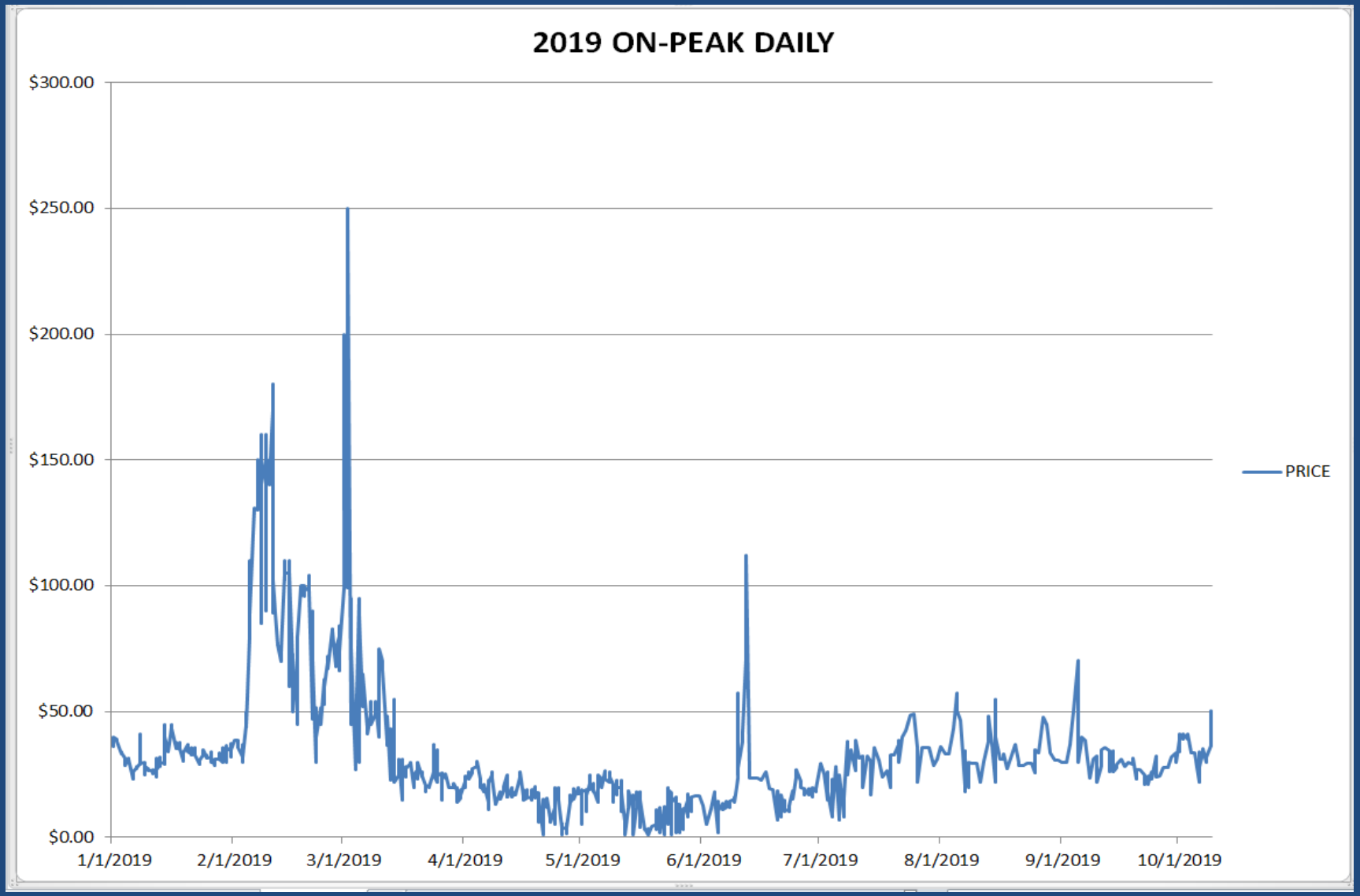
Wholesale Market



Hydrogen Fueled Transportation

Transportation Fueling Infrastructure

- Electric (Lithium-ion) vs. Hydrogen