

# Renewable hydrogen and the Californian Grid

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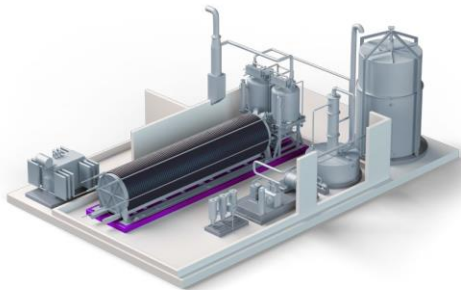


- Pure-play and financially strong hydrogen company listed on the Oslo Stock Exchange (market cap of \$200 million).
- 95 employees in Denmark, Norway and California with world-class experience and skills.
- Contemplated acquisition of Proton OnSite ongoing – will increase American footprint with ~85 employees.
- Offering hydrogen technology and solutions for industrial, energy and transport applications.
- More than 850 hydrogen solutions delivered in 60 countries world wide since 1927.
- World #1 on hydrogen electrolyzers and hydrogen fueling – unrivalled performance and track-record.



## ALKALINE ELECTROLYSERS

Dates back to 1927



## PEM ELECTROLYSERS

Acquisition ongoing



## HYDROGEN FUELING

Acquired in 2015



**“Something is rotten in the state of Denmark”**

*Shakespeare's Hamlet, Act I*

# Case for renewable hydrogen Denmark vs. California



Grid rates	Price
Electricity rate	\$30/MWh
Trans. & Fees	\$20/MWh
Total	\$50/MWh

Achievable hydrogen price

\$7/kg

-43%

Gasoline competitive hydrogen price

\$10/kg



Grid rates	Price
Electricity rate	\$40/MWh
Trans. & Fees	\$20/MWh
Demand Charge	\$30/MWh
Total	\$90/MWh

Achievable hydrogen price

\$10/kg

+43%

Gasoline competitive hydrogen price

\$7/kg



Figures assumes scale and are only indicative

# Incentives for Charging vs. Hydrogen – California



**No renewable requirement**  
BEV rate schedules incentivizes  
charging during night where share  
of fossil electricity is high



**33.3% renewable  
required by law**



**BEV rate schedules**



**None**



**LCFS**  
Not based on renewable content  
Short term – unstable value



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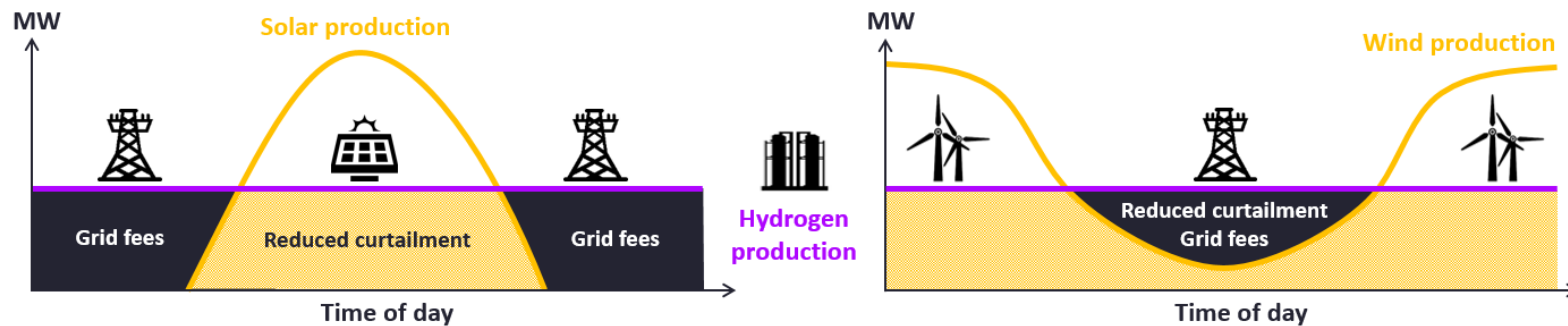


**Investments in charging infrastructure  
Coverage of demand charges**



**None – currently**

- **Create level playing field:**
  - Law mandated renewable content requirement for BEV charging.
  - BEV charging rate schedules should not incentivize charging with fossil power.
  - LCFS value for BEV charging to be based on renewable content.
  - Ensure that VW ZEV Investment Plan includes investments in hydrogen – also in 1<sup>st</sup> cycle.
- **Stabilize value of LCFS for ZEV technologies (BEV+FCEV) + make the LCFS long term similar to PTC (Wind) and ICT (Solar)**
- **Create a Hydrogen Rate Schedule that “values”:**
  - The balancing service provided to the grid by demand-response of the electrolyser.
  - The fact that renewable electricity is directly used for zero emission transportation.



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- **Reduced curtailment of renewables.**
- **Stable renewable production to the grid.**
- **Reduced “duck-curve” ramp challenges.**

**“You can count on the Americans to do the right thing  
– after they’ve tried everything else”**

*Winston Churchill*