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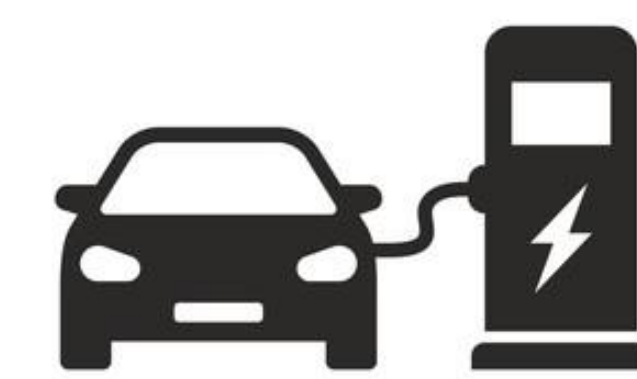
## System setup

- Homemade direct current (DC) micro-grid : interconnect a PV field and consumers.
- **Energy Management System (EMS)** : solar power predictions and storage management.
- Homemade **DC/DC converter** → supply PEM electrolyser with the DC bus.
- Experiments with **green hydrogen (H<sub>2</sub>)** : H<sub>2</sub> production → storage → electricity production.
- **Mobility** development : use our **green hydrogen** to supply electrical vehicles.
- **Methanation** experiments : convert CO<sub>2</sub> sources into methane with our **green H<sub>2</sub>**.

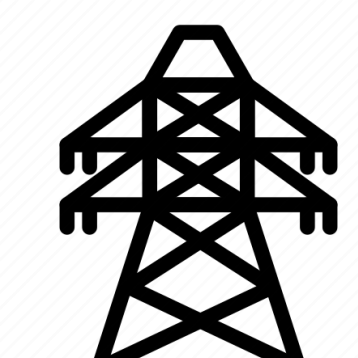
22 kWc photovoltaic



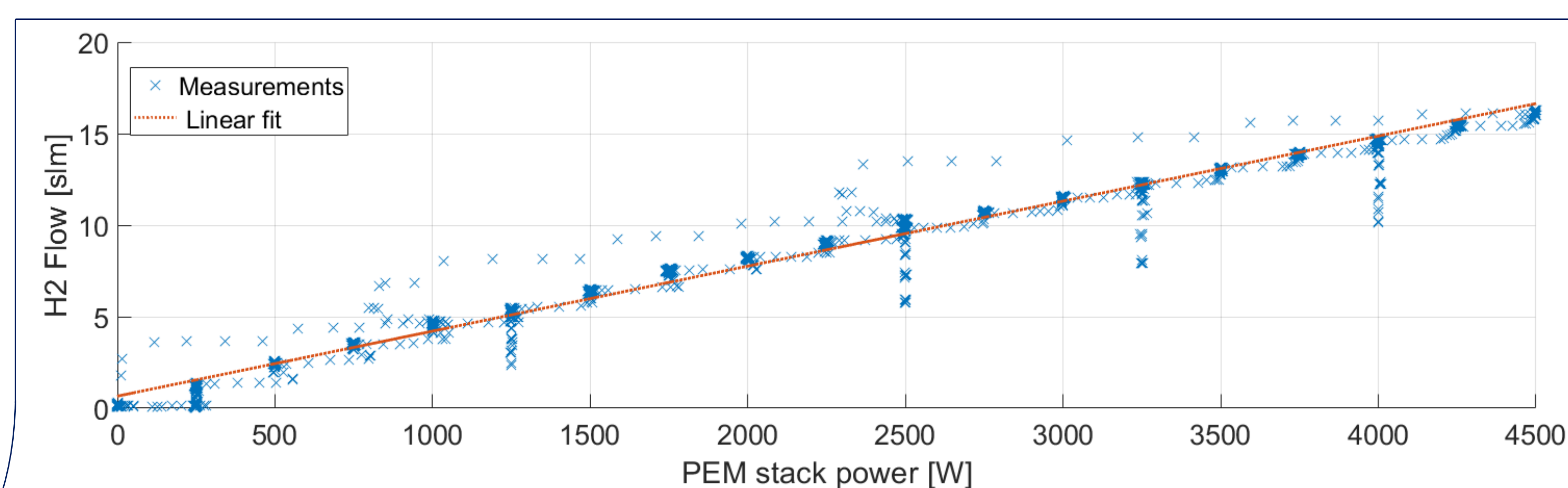
11 kWc cars charging station



Public grid



700 Vdc micro-grid (future 760 Vdc)



5.5 kWc electrolyser

H<sub>2</sub> < 20 slpm

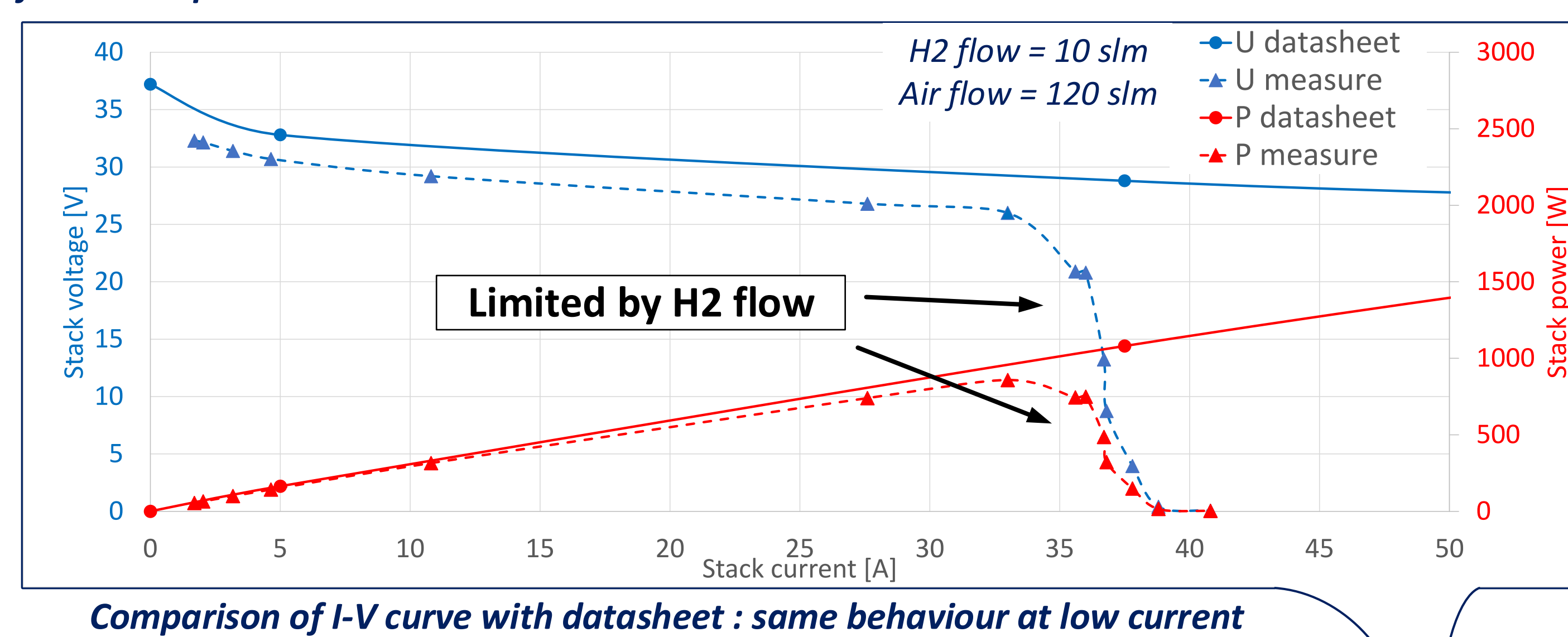
O<sub>2</sub> < 10 slm

Available (not used yet)

H<sub>2</sub> mobility

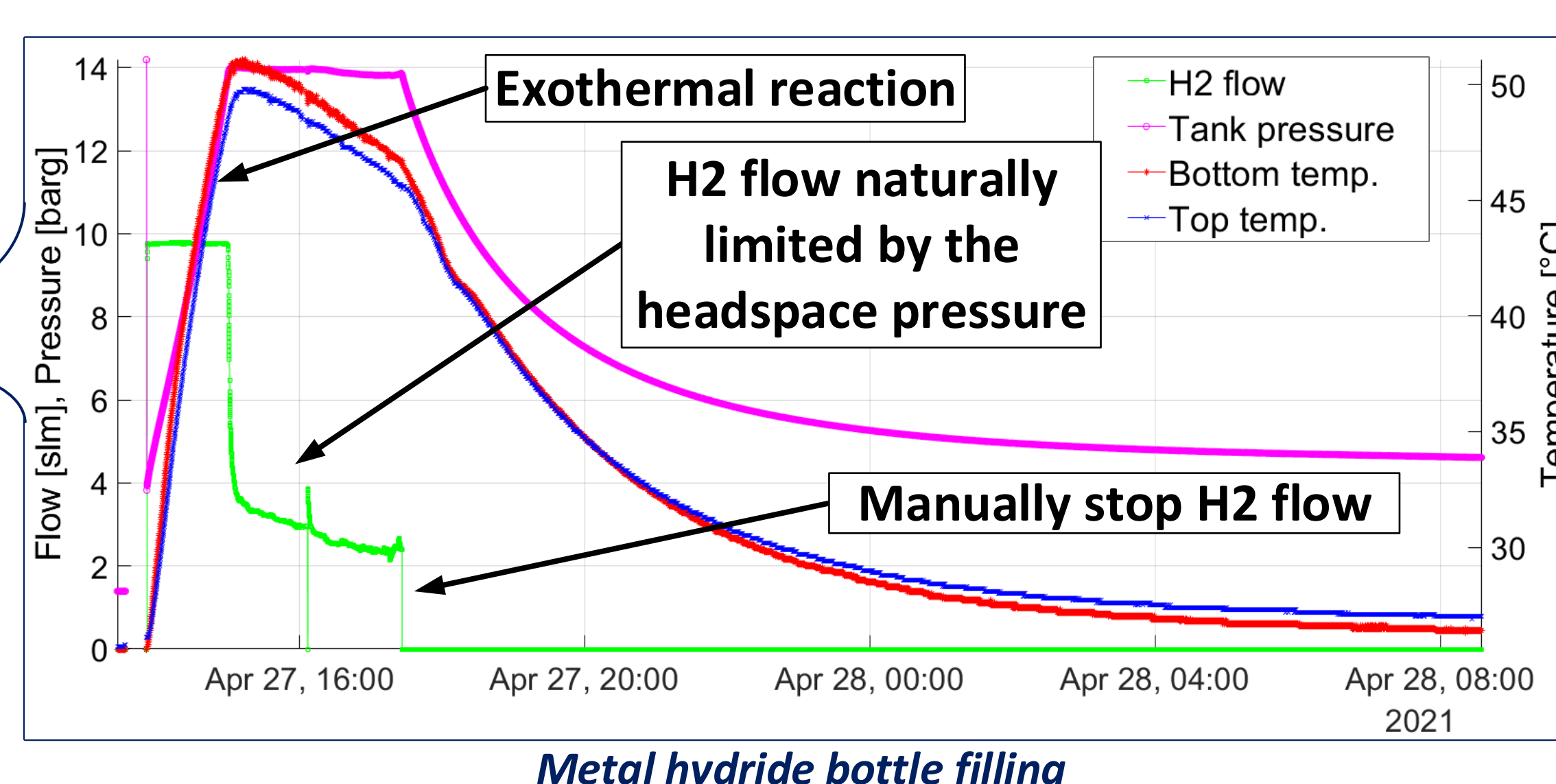


(Poster J. Udry)



Green hydrogen

10L MH bottle ( < 13.5 kWh)



Methanation reactor



Bio-digester 20L

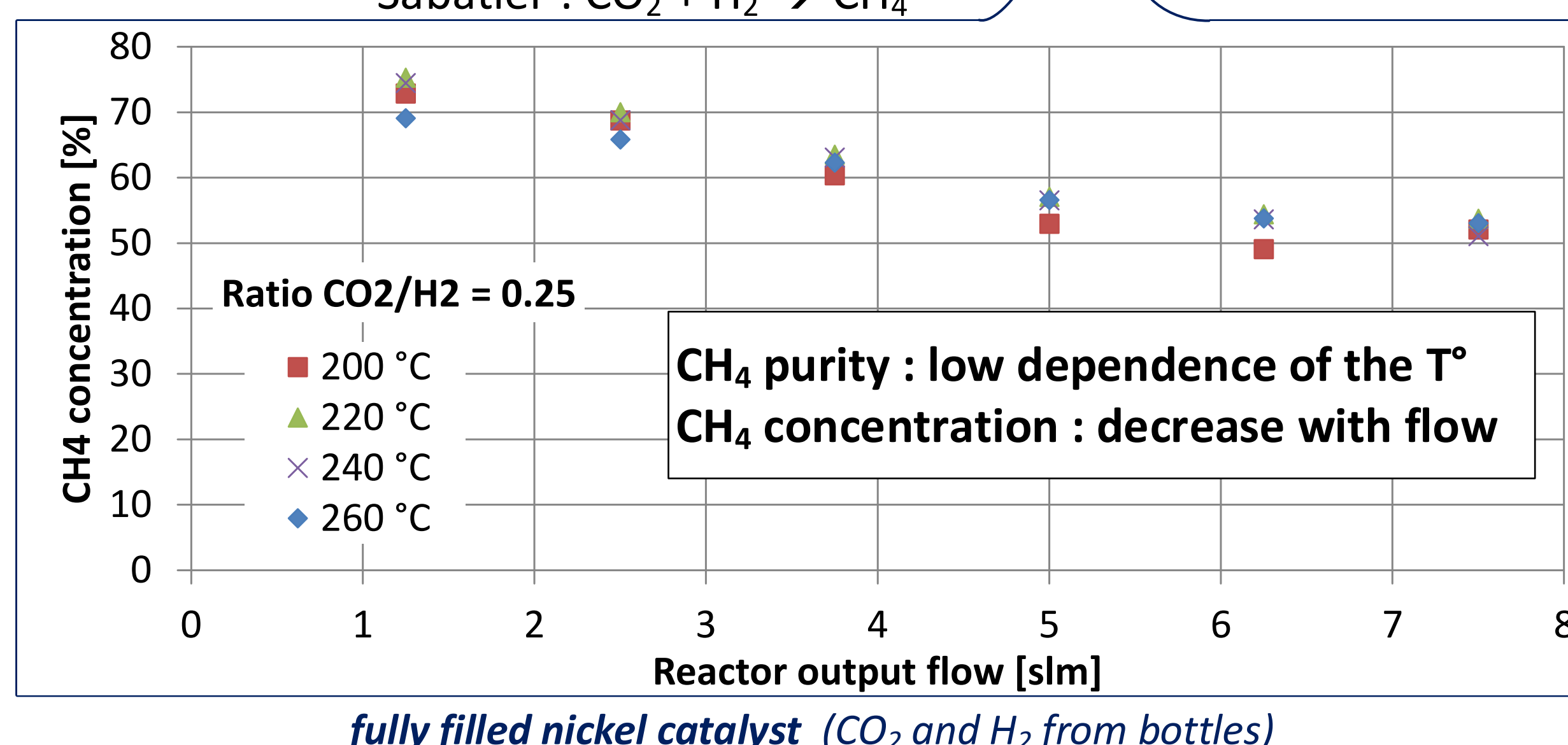
Biogas (CH<sub>4</sub> + CO<sub>2</sub>)

Methane (CH<sub>4</sub>)



Public gas grid

Sabatier : CO<sub>2</sub> + H<sub>2</sub> → CH<sub>4</sub>

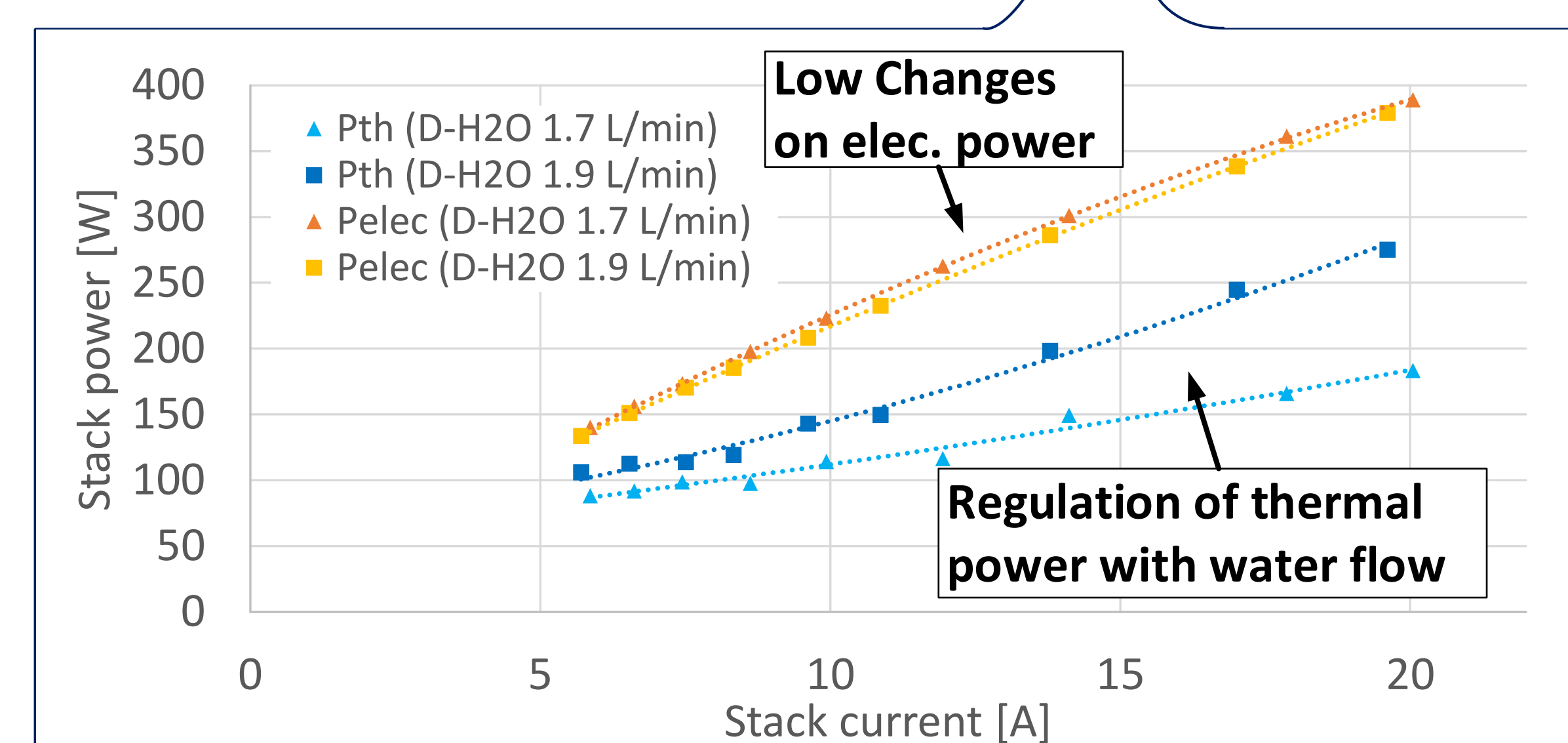


2.4 kWc Fuel Cell

Cogeneration Fuel Cell 2.5 kWc / 2.5 kWh



Heat (~70°C)



## Conclusions

- H<sub>2</sub> equipments are functional : electrolyser, fuel cells, storage, methanation, scooter.
- Fuel cell operation is more delicate than electrolyser operation due to severe regulation constraints.
- Power range designed for 5 kW (electrolyser), sufficient for about 100 kW installed PV power.
- Metal hydride storage is preferable at this power range, compared to high pressure.

## Outlook

- Integrate whole H<sub>2</sub> chain into EMS/micro-grid.
- Implement DC/DC converter for fuel cells.
- Install the bio-digester.
- Test the methanation with biogas.