HotMEA temadag

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Ser energy

The Power of Simplicity

Serenergy in short…

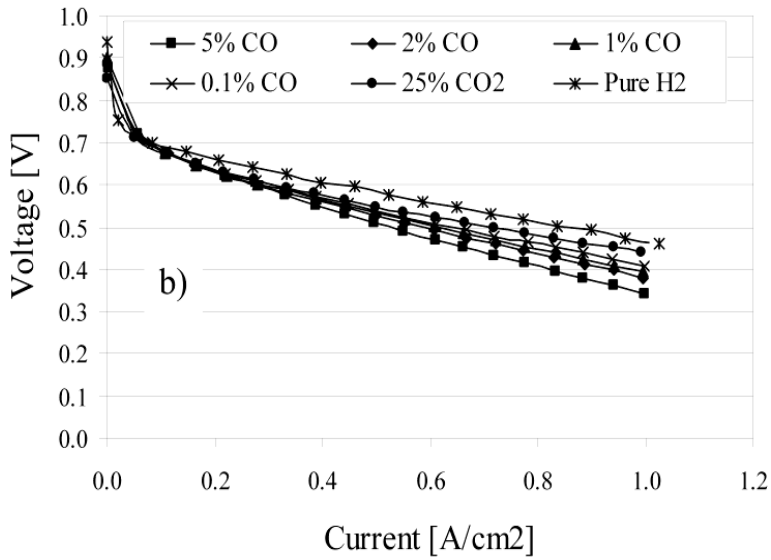
- Established June 2006 by Mads Bang (CTO, PhD) and Anders Korsgaard (CEO, PhD)
- Located in Hobro, Denmark
- 15 employees
- Privately owned

Business focus

- In top three (WW) in terms of HTPEM fuel cell manufacturing volume
- Currently focus on marketing integrated methanol fuel cell based battery chargers
- The technology presents world class cost and efficiency potential

The competitive edge of HT-PEM

- High operational temperature (120-180° Celsius) gives you the benefit of:
  - High CO & sulfur tolerance. Makes the design of reformer systems plausible
  - Cooling at high temperatures
  - No humidification & no water management
  - Low pressure system



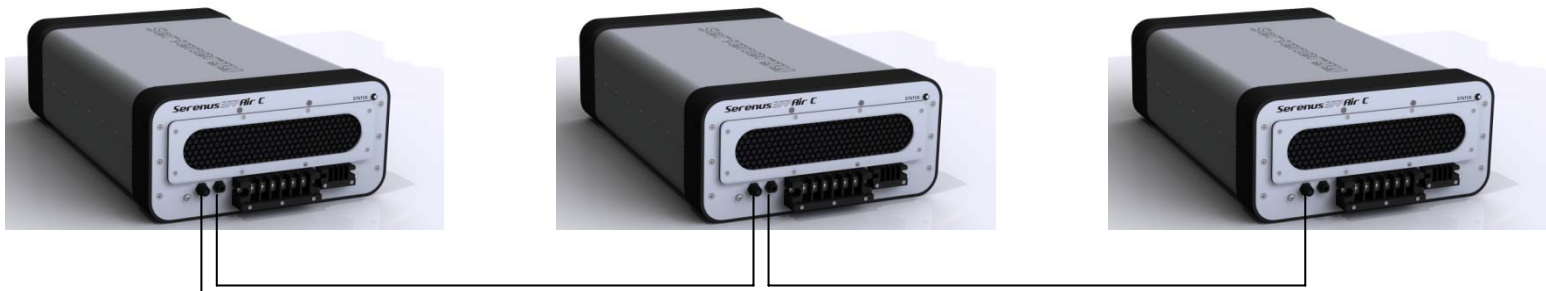
Products - Fuel cell module

- Simple air cooled technology
- 15-200VDC output
- Compatible with all fuels
  (with use of reformer)
- Up to 57% system efficiency
- Comes with software & support
- All included: blowers, air shut-off
  valves, filters etc.
- Compact
  (complete system: 150W/L kg, 150 W/kg)

Serenus 166 Air C

Serenus 390 Air C

Extreme modularity and flexibility



CAN BUS controller

You may hook as many units up via the CAN BUS interface as needed for the application. Units can be electrically coupled in series or parallel!

Methanol – The CURE

- Methanol is:
  - **C**heap (250 Euros/ton)
  - **U**nlimited (Naturalgas & renewables)
  - **R**enewable (Black liquer, Sweden)
  - **E**nergy efficient (Efficient to produce and use)

Annual methanol production is 45 Billion Liters compared to annual consumption of gasoline 1250 Billion Litres

Methanol

- Whenever humanity has been forced to be creative regarding fuel supply, methanol is the answer
  - Germany during 2nd WW
  - South Africa during Apartheid
  - California due to smog
  - China due to lack of oil

Methanol reformer based systems

- Low purchasing cost due to simple and cheap FC & reformer technology
- Low fuel cost due to relatively high efficiency ~30%. Can be above 50% for bigger systems. Heat-utilization.
- Low service and maintenance costs. Very few moving parts.
- High efficiency, low CO2 emissions, no local emissions (NOx, PM, SOx etc.), low vibrations, low noise

350 W battery charger

- Industrial power generation
- 24V battery charger
- Integration of HTPEM and methanol reformer
- Peak Efficiency ~ 40 - 45%
- Efficiency at peak power ~ 30%

20 and 1000 L tanks

W	L/hr	Runtime 20 L	Runtime 1000 L
350	0.45	44 hrs +	90 hrs +

Vehicle range extender

- 3000W generator
- F.eks. Range extenders in battery electric cars
- MEOH reformer in integration with 1xAIR 390
- Next version is funded by EUDP

Power gliders and UAV's

- Project with DLR and Lange Aviation.
- H2 Fuelled Power glider
- Peak 20 kW during take off. Pure fuel cell power

http://www.youtube.com/watch?v=6KW0ySzNzsQ

Thank you for your time