

Kütuselemendid hoonete energiavarustuses

Enn Õunpuu
AS Elcogen



Miks kütuselement?

Graduated from the University
of Tartu, Estonia, in 1875

Received his Ph.D. there in 1878
Under the guidance of Carl
Schmidt,

Academic lecturer from 1875 to
1881

**NOBEL PRIZE FOR
CHEMISTRY 1909**



Friedrich Wilhelm Ostwald
1853 - 1932

*“ The fuel cell is a
greater achievement of
civilization than the
steam engine and will
soon banish the
Siemens generator into
the museum.”*

At the 2nd annual meeting of the
Association of German Electrical
Engineers in 1884 (Verband Deutscher
Elektrotechniker)

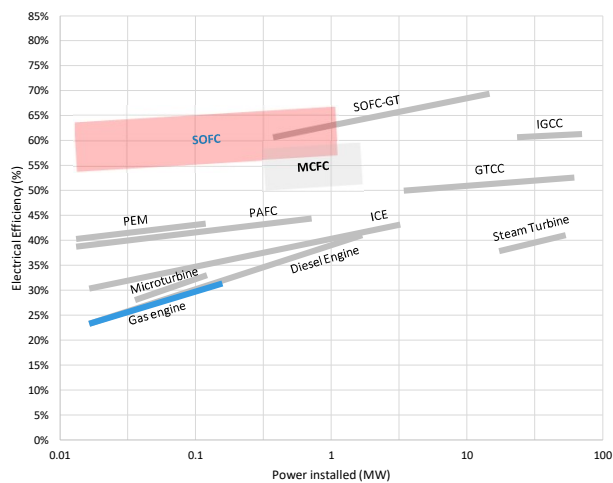
Mis on kütuselement?



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Miks kütuselement?

Kõrgeim efektiivsus laias võimsusvahemikus



Positiivne keskkonnamõju



- On-site power and heat generation
- Premium electrical efficiency
- Modular scalability
- Renewable power with 24/7 availability
- Power security

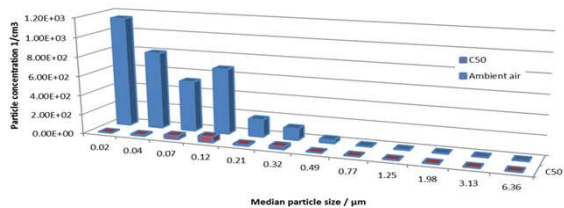
Electric output	60 kW net-AC
Electrical efficiency	60 % (LHV)
Thermal output	27 kW (exhaust cooled to 40°C)
Total efficiency	84 % (LHV) (exhaust cooled to 40°C)
Range of electric output	65 - 33 kW (normal modulation range 100-50%, temporary modulation down to 30%)
Water consumption	None
Exhaust gas flow	200°C, 575 kg/h, dew point 37°C
Fuel envelope, LHV	440-850 kJ/mol biogas 55 % - 100 % mol CH ₄ with CO ₂ as a diluent

CO₂ 330 g/kWh

CO ≤ 0,02 g/kWh

NO_x ≤ 0,05 g/kWh

SO_x ≤ 0,07 g/kWh



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Elektrienergia tootmine – tööstus



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Elektrienergia tootmine – kommertshooned



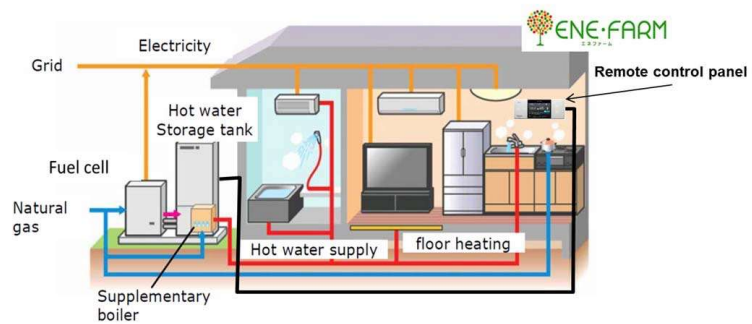
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Elektrienergia tootmine – elukondlikud hooned



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Kütuselemendisüsteemid hoonetes



Üle 300 000 süsteemi paigaldatud



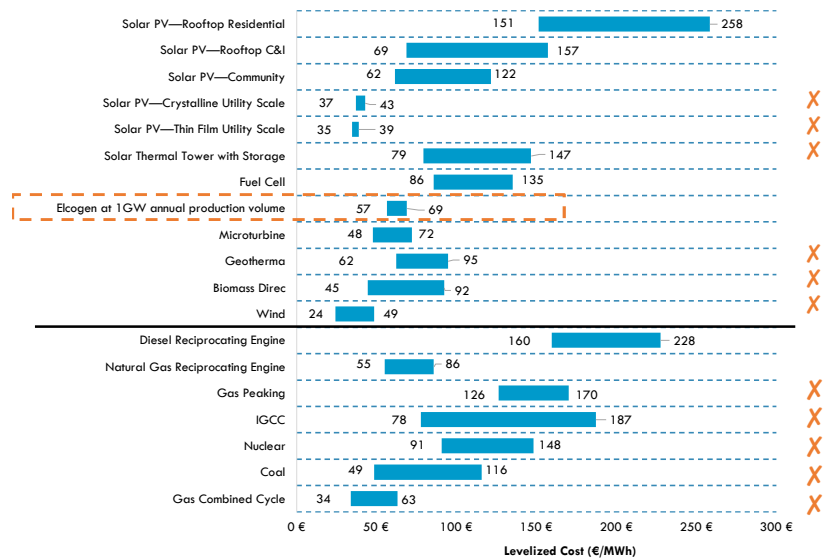
Alla 3 000 süsteemi paigaldatud

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Elektrienergia hind - LCOE

Alternatiivsed tehnoloogiad

Traditsionaalsed tehnoloogiad



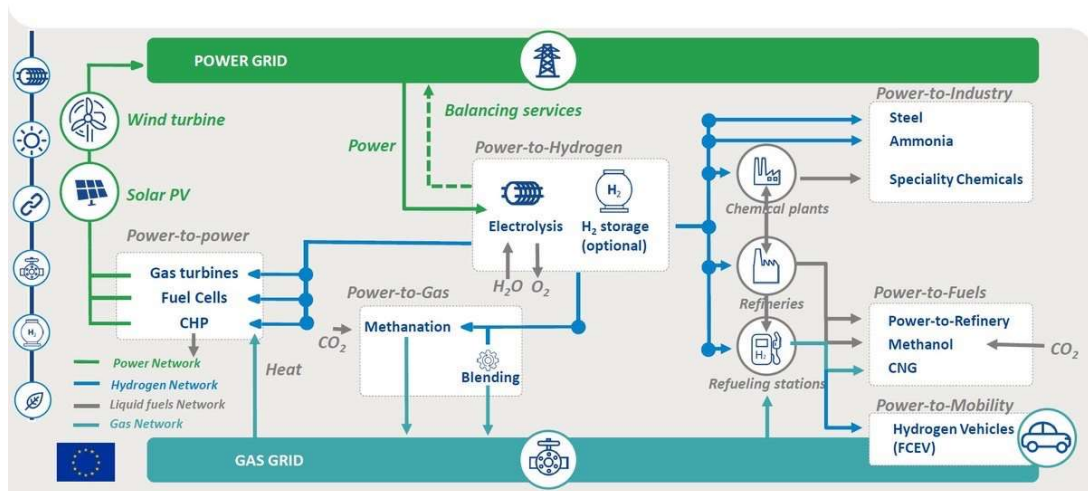
Source: Lazard Version 11.0

X elektrri hinnale lisanduvad võrgutasud

Tulevik

Riding the "P2H & H2X" wave

Greening industry, providing electricity grid services, injection in the NG grid





Täna tähelepanu eest!

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