

Verso una piattaforma italiana per l'idrogeno e le celle a combustibile

**2° WORKSHOP TOSCANO SULL'IDROGENO e TECNOLOGIE COLLEGATE
OPPORTUNITA' e FINANZIAMENTI**

Firenze, 25 Luglio 2014



SOFCpower S.p.A. Solid Oxide Fuel Cell Technology

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SOFCpower SpA

The new generation of energy

**2° Workshop Toscana sull'Idrogeno e
Tecnologie collegate**

25 Jul 201





- SOFCpower: the company
- Units Deployment Projects
- Conclusions

COMPANY

Facts & figures



> 20'000

Cells produced

> 2'000

Stack modules

> 100

**HotBox™
Generators**

2 MW/y

**Prod. capacity
Plant ONE**

July '14 - 60 employers in R&D,
production and adm. staff

www.sofcpower.com






RECENT IMPROVEMENTS (last 12 months)

- ✓ Foreign private investments for >40mio (*public/private investments ratio > 300%*)
- ✓ 20 new jobs
 - SOFCpower employed during crisis period*
- ✓ SOFCpower entered in ene.field project for 1'000 units deployments with the major european manufacturers and utilities
- ✓ Worldwide record for SOFC stack electrical efficiency (74%)
- ✓ New production plant (1200 m2) in BIC center



CLEANTECH FROM TRENTINO: SOFCpower

 SOFCpower is a worldwide leader* in an innovative technology for a new energy world with a significant growth potential**: the distributed generation of clean energy.

** «worldwide leader» means that there're currently less than 5 company in the world with this technology*

***»Significant growth potential» means hundreds of jobs, following the experiences done in the past = we can !*

 SOFCpower signed technical and industrial international agreements

 SOFCpower started product commercialization. Success key = volume increase

PLANT 1

first to scale production line

- 2 MW capacity in single shift (by dec 2014)
- Scalebale production line units
- Supplies field test campaigns and large system development



mCHP

Centralised Generation

- The heat is used for hot water and room heating
- Reduced losses on the grid

Distributed Generation**+ 30%!**

ENGEN™ 2500

**INTEGRATED
mCHP GENERATOR**

Power	2.5 kW
Th. Output	2 kW
Fuel	Natural Gas
Electric Efficiency	50% LHV
Total Efficiency power+heat, usable for cooling	90%
Dimensions w x l x h	0.6 x 0.8 x 1.6 m
Price for orders >10'000 units	4'000 €/kW



Fuel Cell Power Module

**Fuel, Air & Exhaust
management**

**Power Management
System**

SOFC devices: Application by size

SOFCPOWER
SOLID OXIDE FUEL CELLS

Hteramix

EnGen-2500



1 kW

10 kW

100kW-1MW

100 kW



Power, Heating and cooling



Residential



Large buildings



Industrial sites



CCS

CO₂-free
Power plants

FutureGen Powerplant
Coal Gas

Mobile and Vehicles



Atomic and Renewable

Energy Storage





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2011-2013

ene.field[★]
2014-2017

Market

Installations in ene.field (www.enefield.eu)

Real conditions plants:

- ✓ Variable end-user scenarios;
- ✓ More than 7'000 hours continuous operation;
- ✓ Data monitoring;
- ✓ CE field-test approval

❑ 1'000 installations in 12 European countries

Rete Crisalide in Trentino (www.retecrisalide.it)

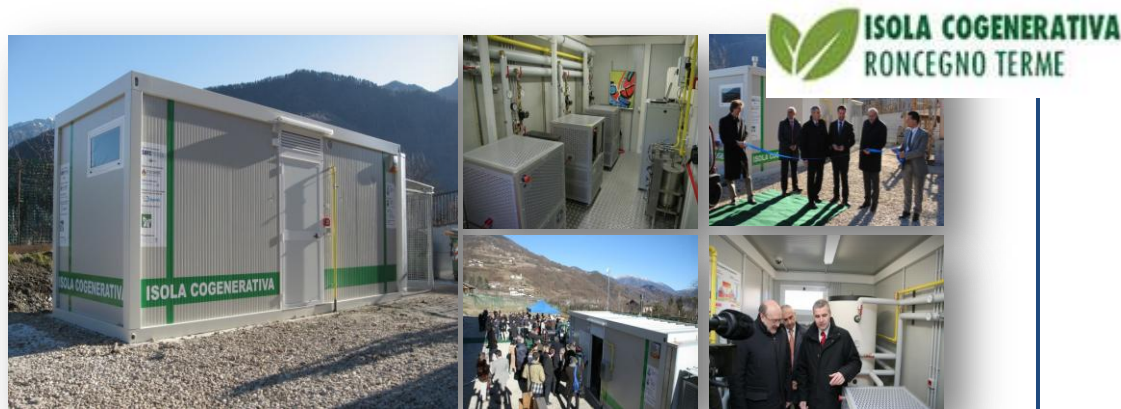
Demonstrative Plant for:

- ✓ Know-how improvement;
- ✓ Finalization of the «lessons learnt»;
- ✓ Demonstrative Installation;

❑ 10 unit installed



✓ Isola Cogenerativa Installation – Roncegno Terme



✓ FriBorgo Project – Borgo Valsugana



Results:

- First Installation of SOFC mCHP for residential application in Italy;
- **Experience on standards / technical connection;**
- Technical educational center at european level

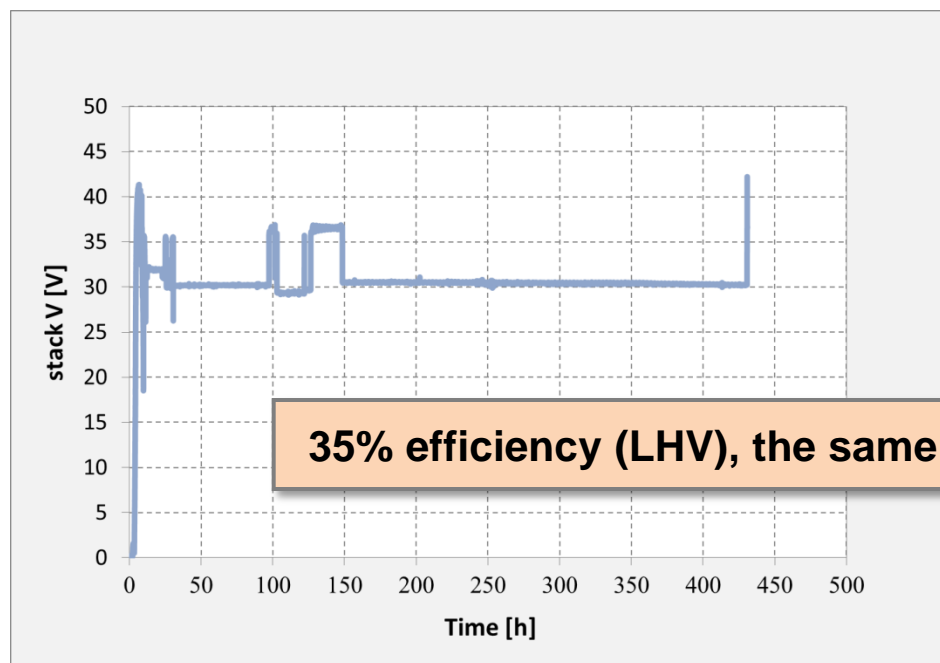


- ✓ Stable operation > 6 months
- ✓ Ave electric efficiency > 30%
- ✓ 15'000 kWh thermal produced
- ✓ 7'600 kWh electric produced
- ✓ 2 ton CO₂ saved



CHP operation with biogas

stable operation demonstrated with biogas
from anaerobic digestion of municipal waste



35% efficiency (LHV), the same as with NG



ene.field★
2014-2017

SOFCpower is going to install 2,5 kW_{el} units in Italy, Slovenia, Switzerland, ...



SOFCpower signed several Associated Field partnerships with important multi-utilities or Esco

MFH and Commercial applications; modular approach from 1 a 6 units up to 15 kW_{el} / 12 kW_{th} for several end user needs

**MFH****Schools, social housing****Hotels, Sport Centers...****2,5 kW****5 kW****10 kW****15 kW**



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INNOVATION – NETWORKING – EXPORT

- ✓ Cleantech product will have an exponential growth over next years,
- ✓ If we'll not be able to export them... **we'll import them!**
- ✓ The micro-cogeneration is a clear example of cleantech with local and «strong» supply chain
- ✓ The keys of current success are: **innovation, creation of a network and international excellence and reputation**

Acknowledgements





Grazie per l'attenzione!

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SOFCPOWER
SOLID OXIDE FUEL CELLS

CREATE NETWORK TO STARTUP A CLEANTECH COMPANY IN A «POST-SUSSIDI» ERA

Innovative and competitive products are daily introduces into the market...
...there's no need of subsidies... If market is «tangible»:



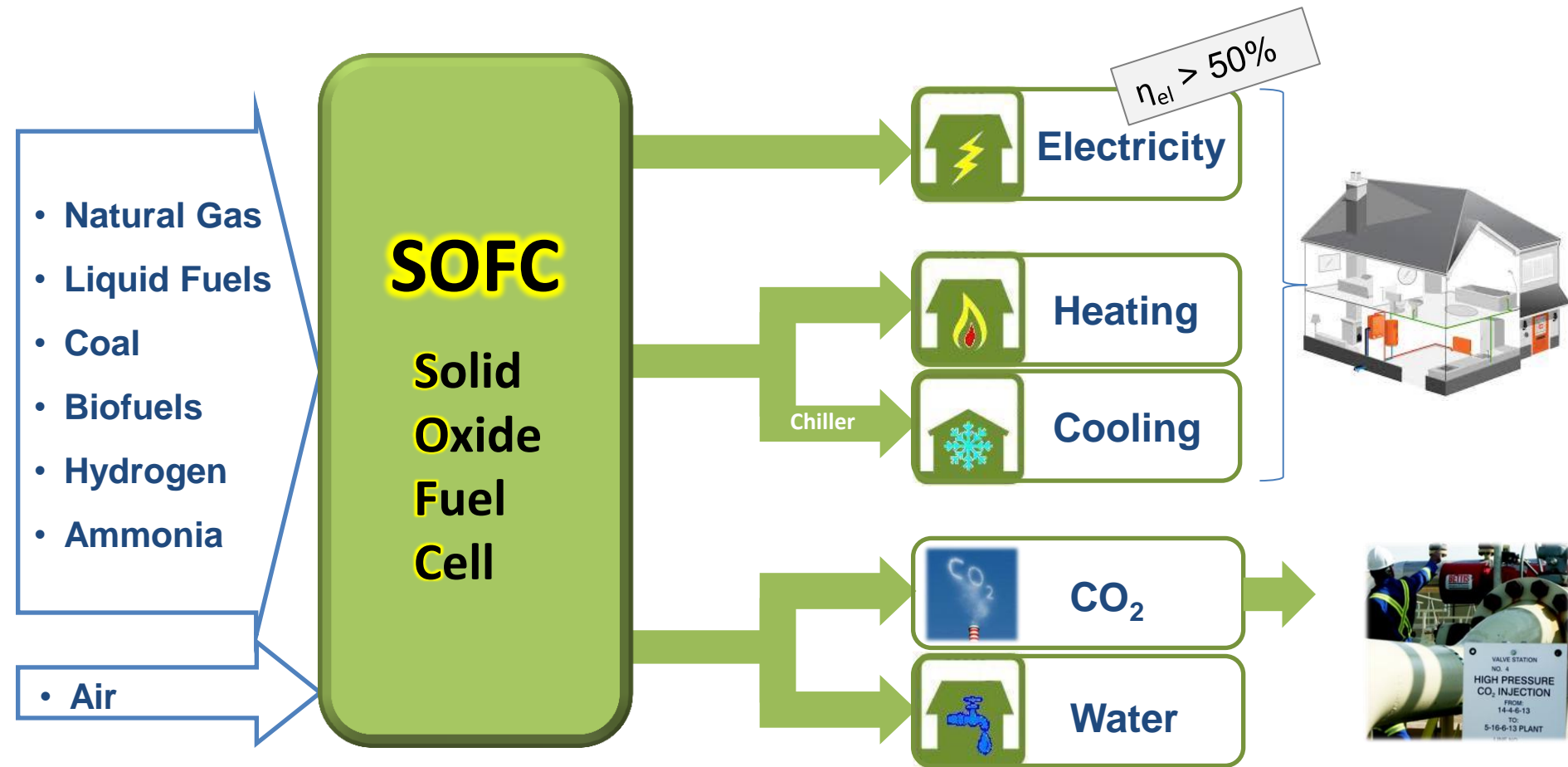
COMPETITIVENESS



«TANGIBLE MARKET» (with volumes)

- ✓ Support focused on development and demonstration in the main markets

- ✓ clear picture of standards and normes
- ✓ Diffusion program
- ✓ Istitutional Support



SOFC generators:
They are REVERSIBLE → Electrolysis

Renewable can be STORED as CHEMICAL ENERGY (FUEL)

- Synthetic Fuels, Hydrocarbons
- Hydrogen

SOEC

Solid
Oxide
Electrolyzer
Cell

Electricity

Heat

CO₂

Water

Pure Oxygen



electric efficiency in methane steam reformat

- ✓ **WORLD RECORD** efficiency in single pass at stack level (DC, LHV): **74%**
- ✓ target efficiency proven in full and part-load operation (> 60%)

