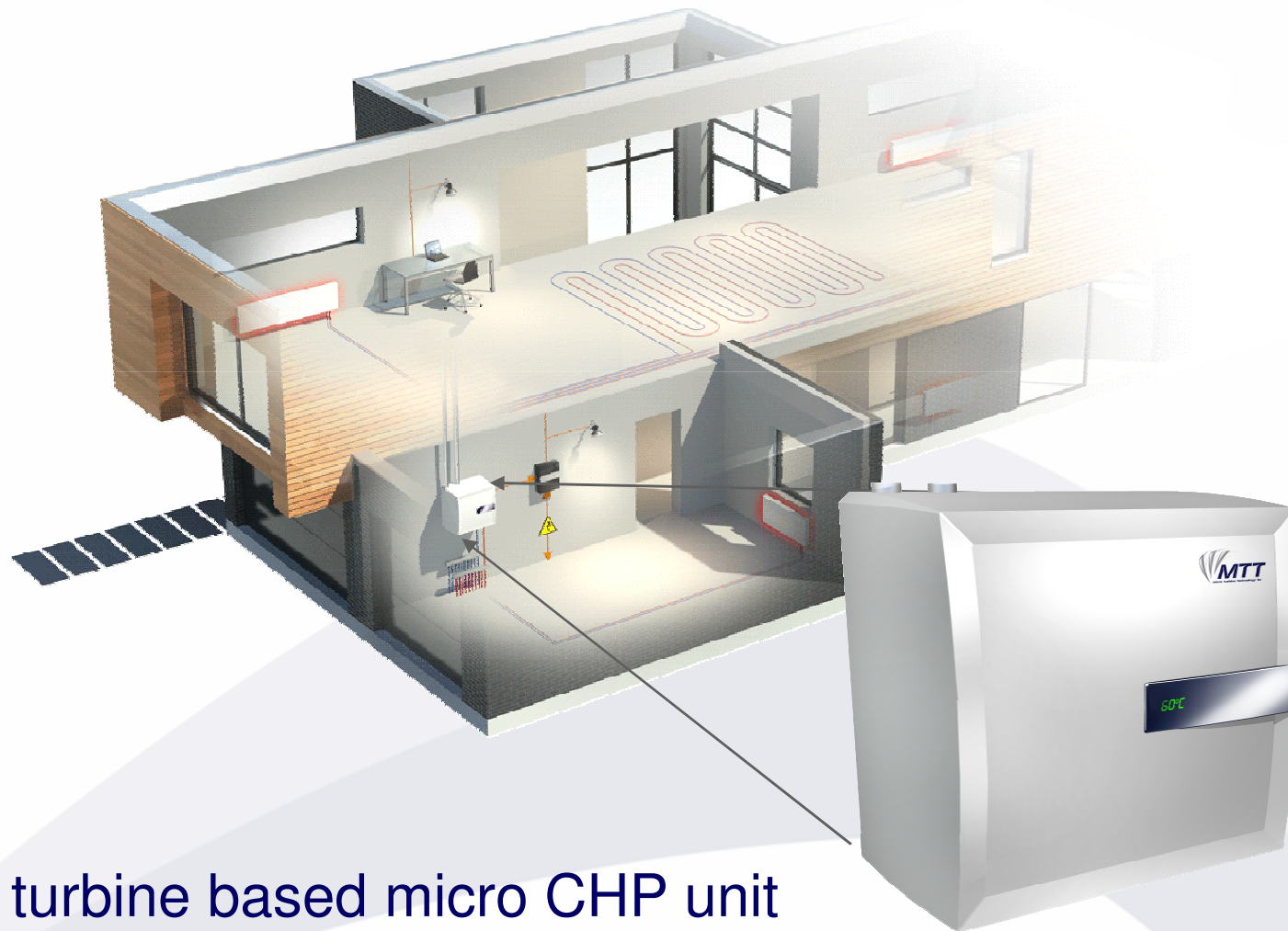


## MTT 3 kWe micro CHP system



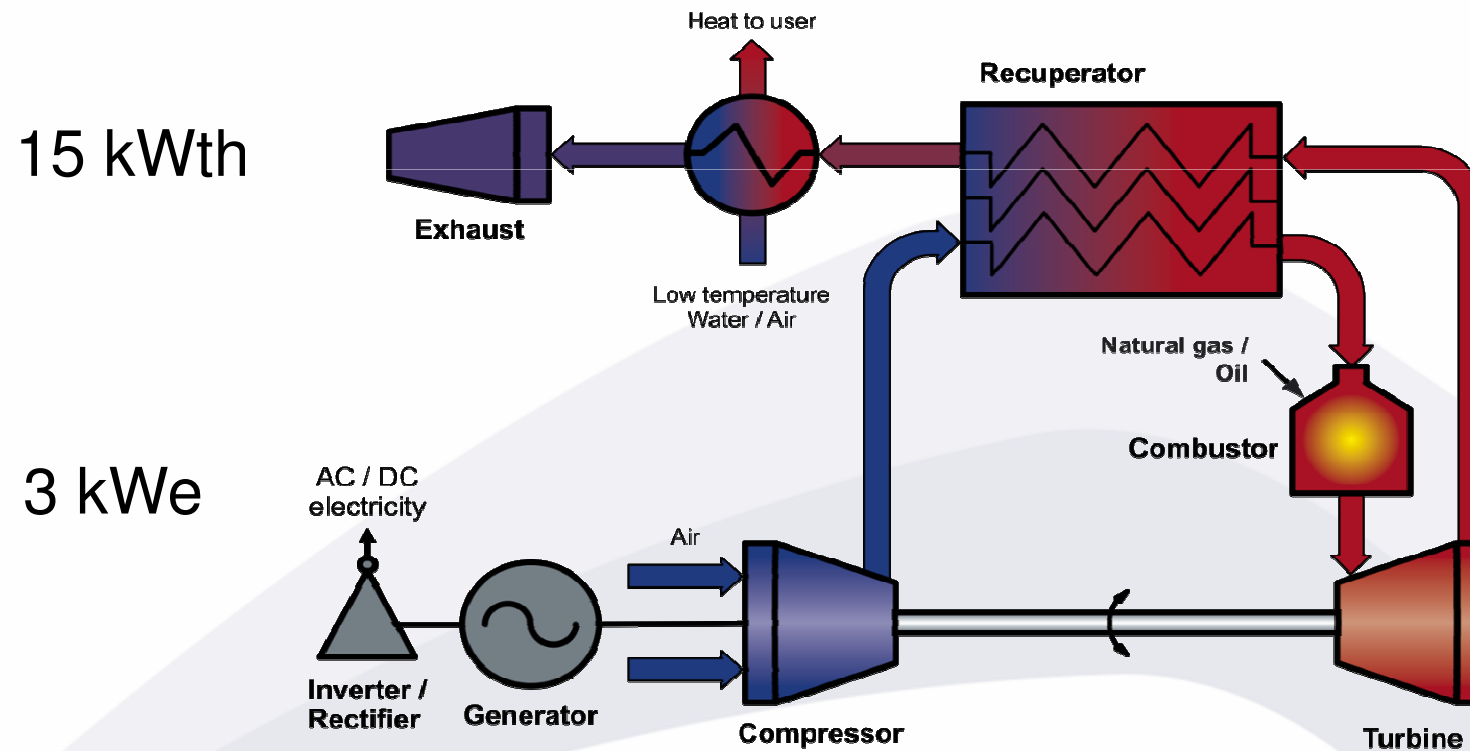
Gas turbine based micro CHP unit

## MTT 3 kWe micro CHP system



MTT's 3 kWe CHP system is based on the use of COTS automotive turbocharger components which result in:

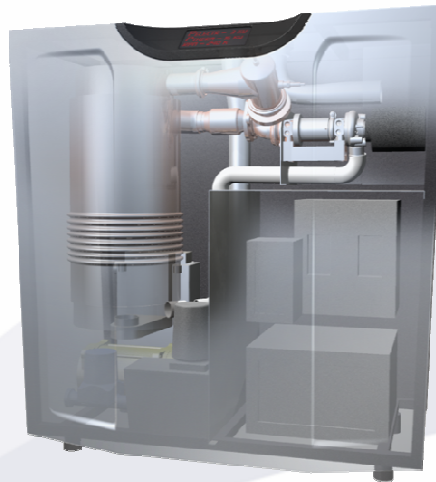
- high performance and efficiency
- short pay back time for the end user



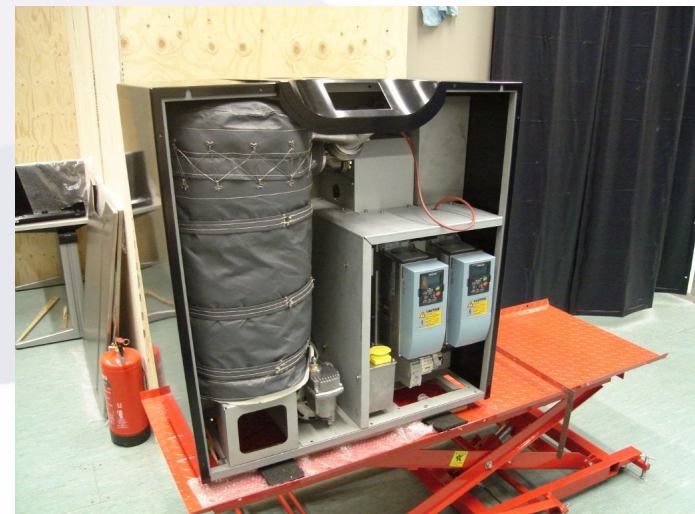
# MTT 3 kWe micro CHP system



- Fast to market → COTS components (where possible)
- Pay back time between 2 and 4 years
- Aiming at early adapters CHP users
  - 3 kWe, 15 kWth, able to modulate
  - Power - heat ratio ~22%
- Most cost effective micro CHP product



3kWe micro CHP demonstrator ~April 2010



## Micro CHP: Business drivers

**Main business drivers for Micro CHP systems are:**

- ***From the consumers / SME perspective:***
  - Substantial lower energy bills (up to 20-25%)
  - Environmental friendly
- ***From the perspective of boiler manufacturers:***
  - Compliance with international laws on emissions reduction
  - New products: the condensing boiler is at the end of the product-life cycle
- ***From the perspective of energy companies (utilities):***
  - Reduced needs for high investments in new power plants
  - New business models, green image, emission reductions
- ***From governmental (national / EU) perspective:***
  - CO<sub>2</sub> and NO<sub>x</sub> emissions reduction, substantial energy savings
  - New economic activities and impulses

**Micro CHP is a hot topic for all stakeholders**

## European micro CHP market for 3 kWe

Applications	NL	GE	UK	Σ EU
<b>Total number of Households</b>	<b>7.155.000</b>	<b>39.189.000</b>	<b>25.932.000</b>	<b>194.625.000</b>
Large houses (4% of households)	286.200	1.567.560	1.037.280	7.785.000
Manufacturing	45.600	196.754	151.433	2.309.523
Retail, wholesale, repair	164.590	474.067	381.030	6.335.602
Hotels, restaurants & bars	36.650	179.782	131.794	1.681.935
Business activities, offices	158.650	620.186	644.318	5.663.581
Agriculture (feedstock & crops)	76.400	370.480	299.830	14.478.600
Unknown: schools, healthcare	-	-	-	-
<b>Σ market potential (based on 1 unit / location)</b>	<b>768.090</b>	<b>3.408.829</b>	<b>2.645.685 *</b>	<b>38.254.241</b>

- **Market potential 3 kWe micro CHP system:**
  - NL-GE-UK market potential: 6.650.000 units
  - Europe (EU) currently estimated at larger then 10 million units, or >€ 50 billion !!
  - Europe will gradually increase to a potential of >30 million units.
  - Other significant markets are USA, Russia, Japan, Korea ...
- **Additional market potential:**
  - Cascade arrangements, block heating etc

Source: CBS and Eurostat

- \* Baxi claims UK market potential for 3-5 kWe micro CHP system to be around 5.000.000 units

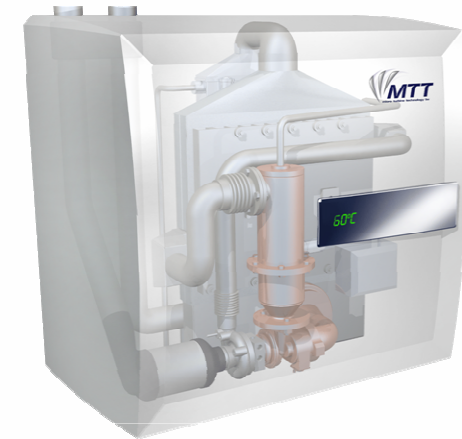


# MTT micro CHP end user advantage



## Parameters for MTT 3 kWe CHP system :

- Power (natural gas) input: 18 kW
- Electrical efficiency : 16,5%
- Electrical power: 3,0 kW
- Annual operating hours: 2.000 – 6.000 hrs.
- End user price: € 5.500,- (ex VAT)



## Assumptions:

- System is driven by heat demand (switch on / off by temperature control);
- Additional maintenance cost compared to conventional heaters: € 0,01 / kWh<sup>1</sup>
- Business case based on replacement of condensing boiler of equal heat power (price estimated at € 2.550,- ex VAT installed);
- Energy prices depending on annual consumption<sup>2</sup>
- Cost price and end user price calculation

**Business case model and results validated by KEMA (October 2009).**

1. Source: Austrian Energy Agency  
2. Source: Essent / NRE Jan. 2008



# MTT Pay back times in Europe



Calculation based on 2000 running hours / year and local energy prices, excluding the investment subsidies.

## The Netherlands

- 2 - 4 years

## Germany

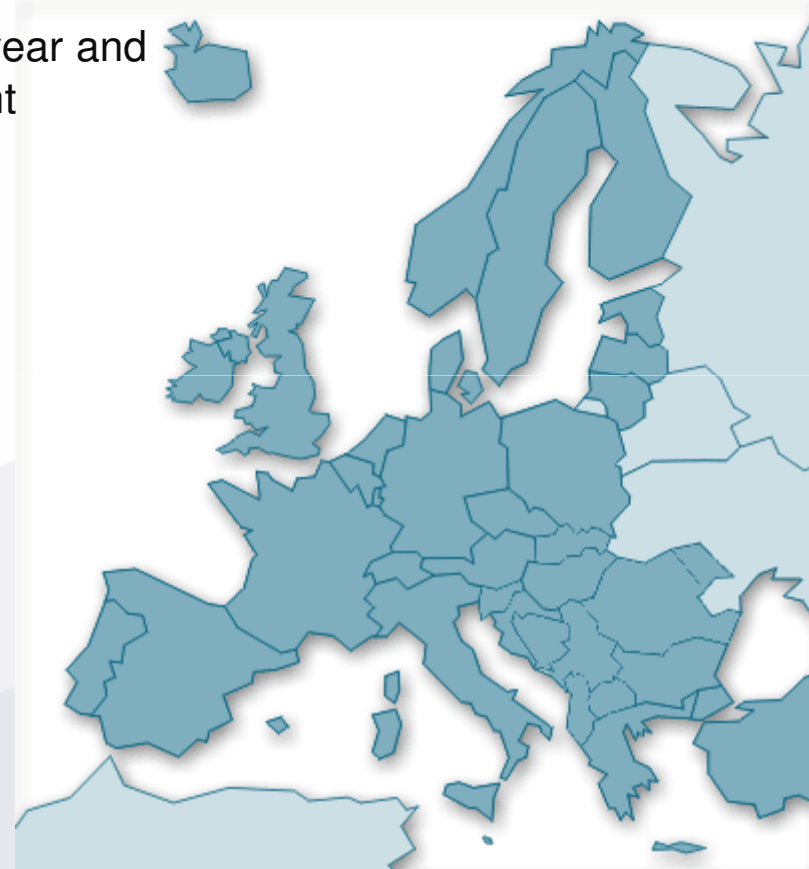
- 2.5 - 3 years

## France

- 3.5 - 4 years

## United Kingdom (2kW version)

- 3 - 4.5 years



# Overview of MTT and risk sharing partners



## KNOWLEGE PARTNERS



### Micro Turbine Technology bv:

- Formed in 2003, located in Eindhoven, the Netherlands
- 14 FTE (academic level), growing to 16 - 18 FTE in 2010  
Including partners:  $\pm$  35 engineers on development programs
- Strong partnerships (*participate at risk sharing bases*)
- Independent assessment by KEMA (October 2009) shows that MTT's technical & business objectives are feasible

## INDUSTRIAL PARTNERS

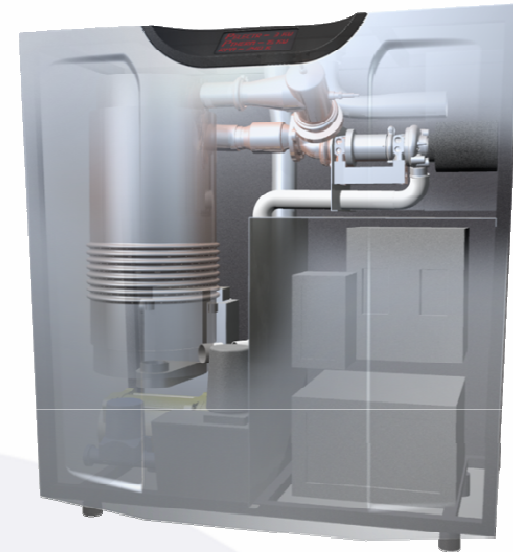




# Business proposal



- **Purchase of field trial units:**
  - Setting up a field trial
- **Exclusivity agreement:**
  - For specific geographical market
  - For specific fuel type
  - For agreed period / first series
  - Min Euro 100 / unit, series >10.000
- **Technology purchase / licensing:**
  - Use of MTT technology in other applications
  - Marketing of MTT micro CHP technology outside Europe
- **Development / engineering contract**





## Contact details

---

Willy Ahout,  
**CEO**

- Mobile: +31 6 2245 3479
- Email: [willy@mtt-eu.com](mailto:willy@mtt-eu.com)

Mateusz Kurkowski,  
**Business Development**

+31 6 2456 6430  
[mateusz@mtt-eu.com](mailto:mateusz@mtt-eu.com)

### **Micro Turbine Technology BV (MTT)**

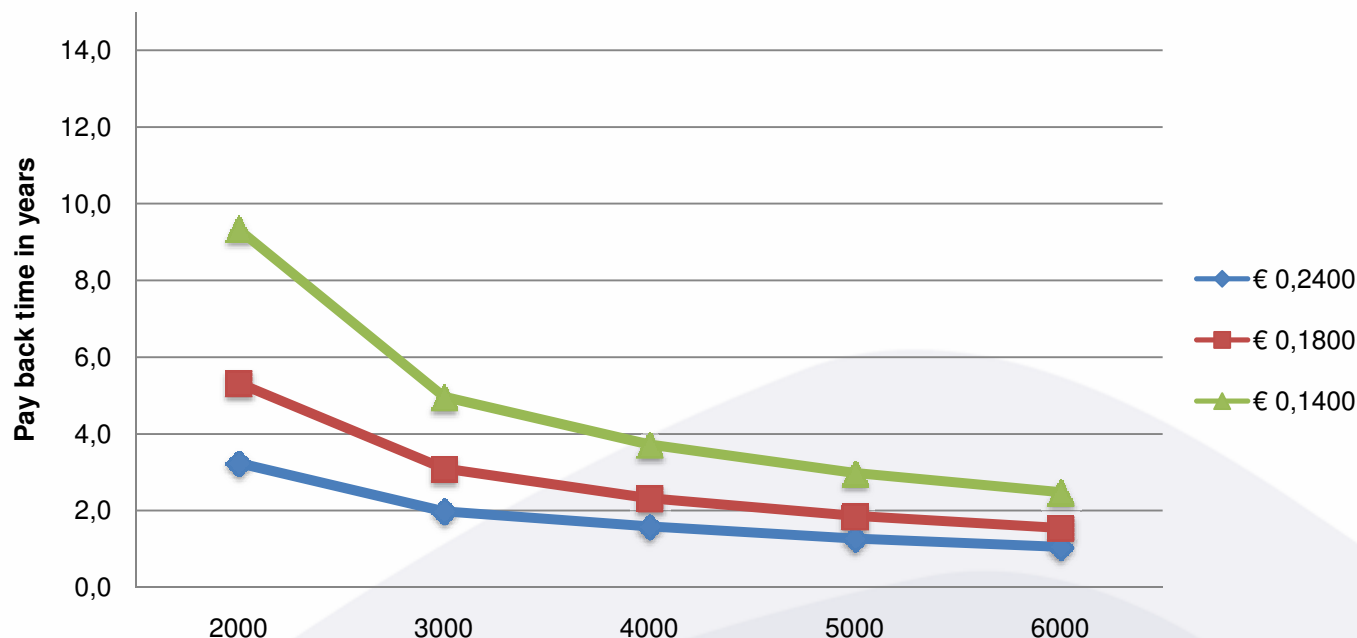
De Rondon 1  
5612 AP Eindhoven  
The Netherlands

Web: [www.mtt-eu.com](http://www.mtt-eu.com)  
Phone: +31 (0)88 688 0000

# Pay back time in the Netherlands



## MTT in the Netherlands excl. investement subsidy



### Notes:

1. No subsidies calculated for (currently Euro 4.000,- / system).
2. NL law allows balancing up to 5.000 kWh / year for decentralized electricity (net kWh exported to the grid).

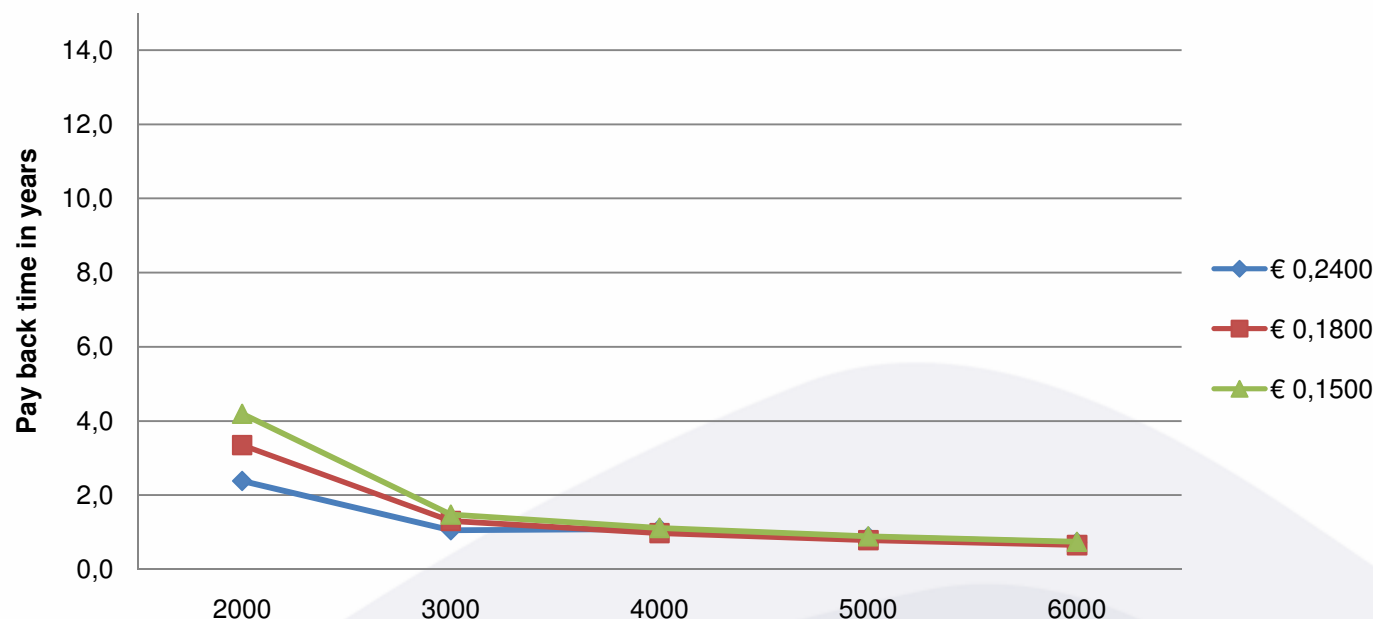
### Market potential ± 650.000 units.

Price NG in NL = Euro 0,5477 / m3 (Euro 0,5286 for > 5.000 m3)

# Pay back time in Germany



## MTT in Germany excl. investement subsidy



### Notes:

1. Calculations based on energy prices in Germany in 2009 (electricity & natural gas).
2. German investment premiums for a 3 kWe micro CHP system go up to Euro 4.950,- (not calculated)..
3. Germany also offers bonus Euro 0,05/kWh for electricity produced by CHP (for 10 years, installed before 2017).
4. Additional tax exemption bonus for micro CHP: Euro 100 – 300 per year (not calculated).

### Market potential ± 3.400.000 units.

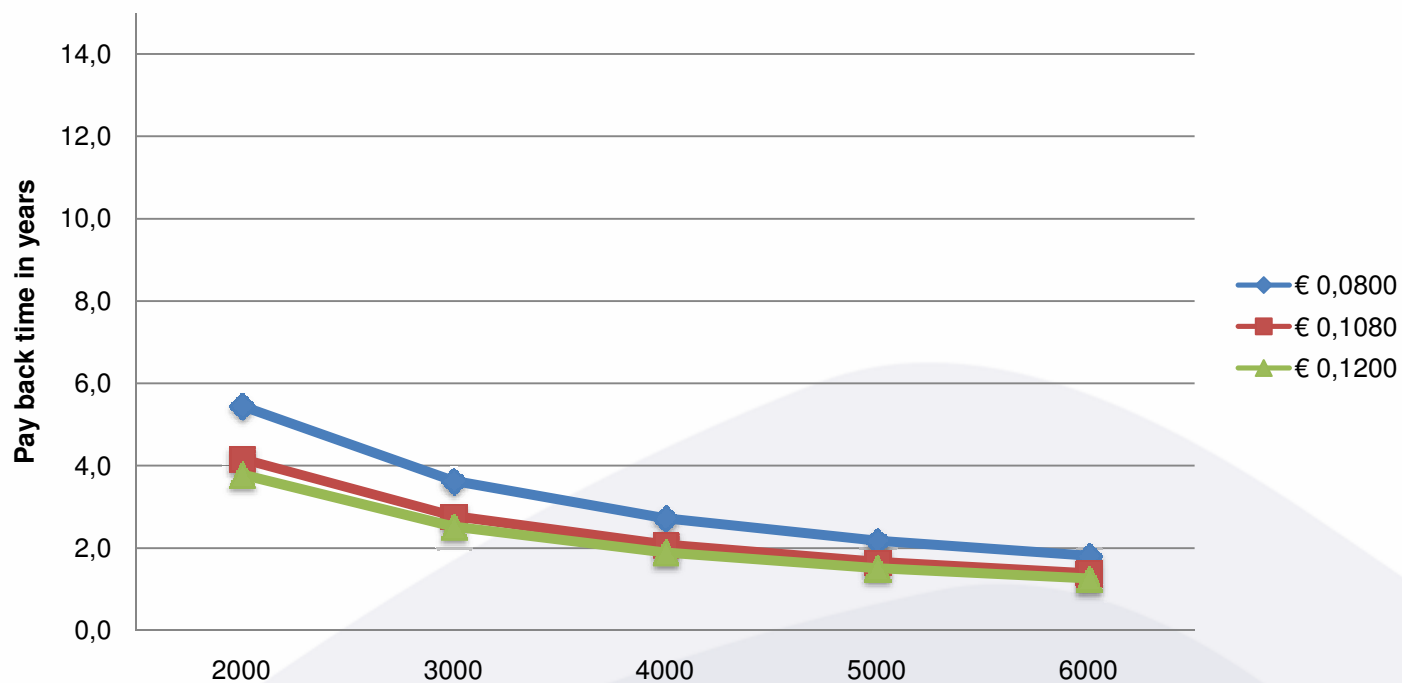
Price NG in GE = Euro 0,5180 / m<sup>3</sup>

Source: Invest in Germany, December 2008, confirmed by Delta Energy Consult

# Pay back time in France



## MTT in France incl. feed in tariff



### Notes:

1. Investment subsidies have not been calculated.
2. Feed in tariff calculated is €0.08 per kWh

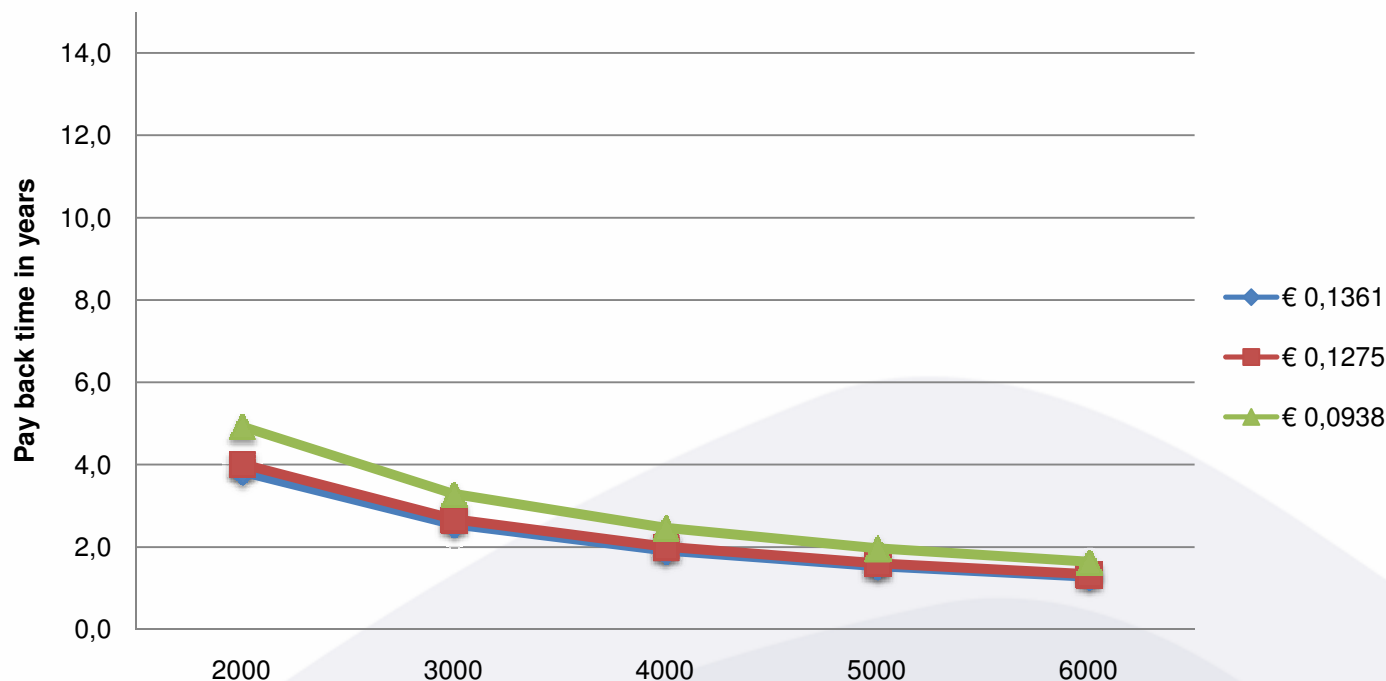
**Market potential ± 2.500.000 units.**

Price NG in France is Euro 0,4201 / m3

# Pay back time in the United Kingdom



## MTT 2 kWe in the UK, incl. feed in tariff



### Notes:

1. Investment subsidies have not been calculated.
2. FIT applies to first 30.000 units: 10 pence (electricity generated) plus 3 pence (if exported to grid), only the generation tariff has been calculated.
3. Maximum power to apply for FIT is 2kWe → MTT system has to be scaled down

**Market potential ± 2.600.000 units.**

Price NG in UK is Euro 0,3110 / m3

Source: Delta Energy Consult