



COGENERATION OBSERVATORY  
AND DISSEMINATION EUROPE

 Jožef Stefan Institute, Ljubljana, Slovenia  
Energy Efficiency Centre

# Innovative cogeneration – CODE Handbook with best practice examples

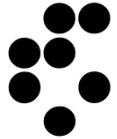
**Stane Merše**

*Jozef Stefan Institute, Energy Efficiency Centre*

*CODE Final Dissemination Workshop*

*25 March 2011, Brussels*



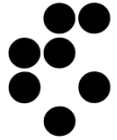


# *Why Best practice ?*

***“The real success of a policy is found in its effects in the real world.”***

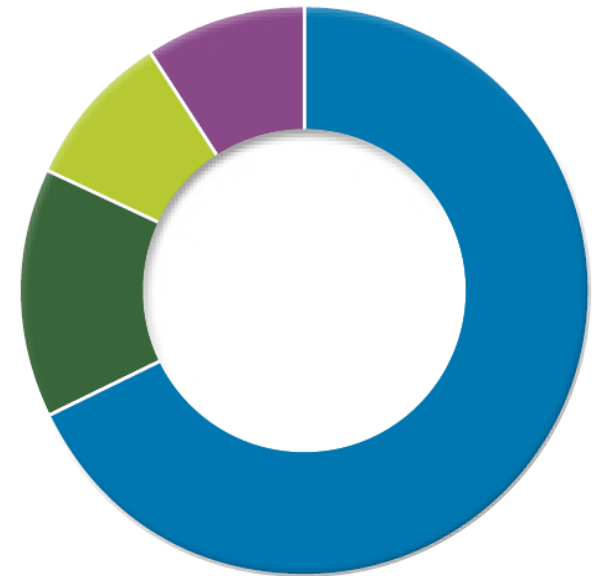
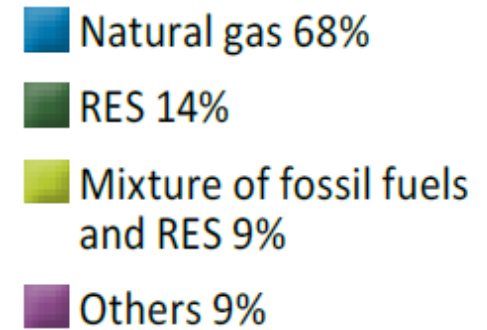
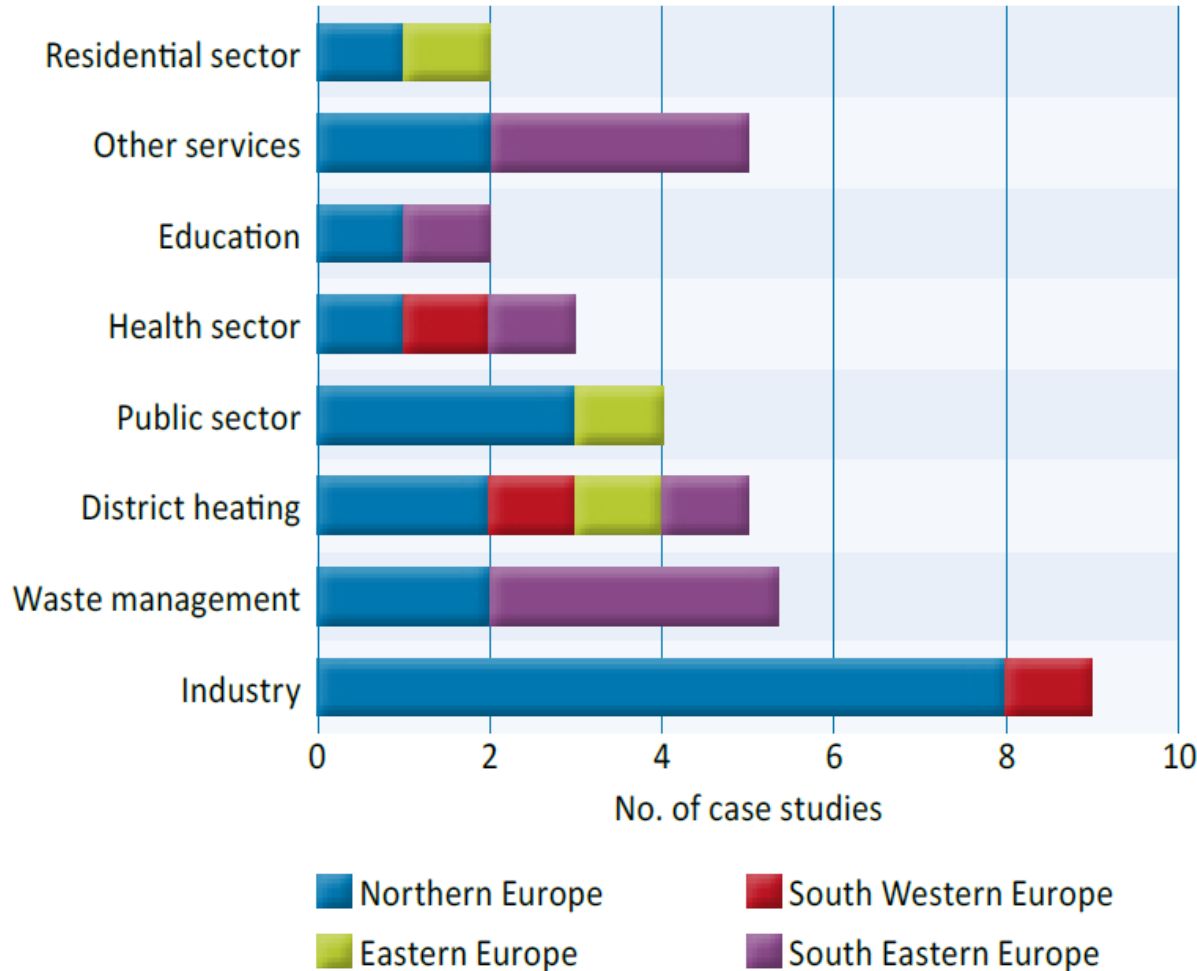
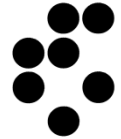
- they provide an **important insight into what drives a successful CHP project.**
- The case studies show the **wonderful diversity of CHP applications**
- allow us to explore **why** in some cases, despite the competitive, economic and communication barriers, **a project will be built,**
- allowing us to better understand **where action** by industry, suppliers, communicators and policymakers **should be prioritised.**
- **Make cogeneration visible & touchable!**

# *Innovative & Best practice criteria*

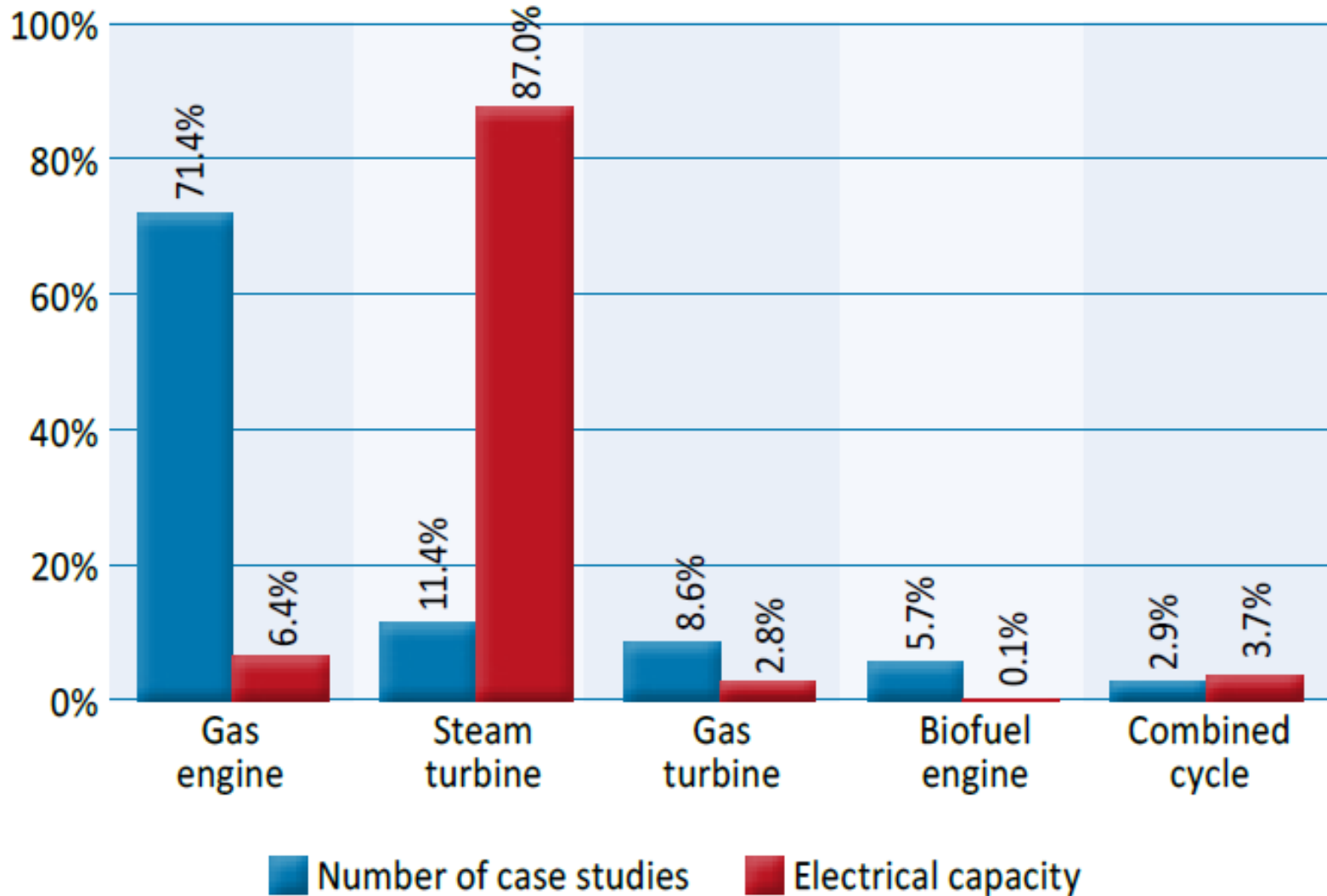
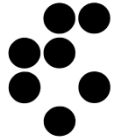


- **Success cases from several aspects:** environmental, energy, technology, economic...
- **New advanced/promising technologies** and approaches in cogeneration
- **A diversity of cogeneration** applications in different EU regions:
- **Different sectors** (industry, district heating, buildings, agriculture etc.)
- **Fuel diversity:** renewable fuels/hybrid solutions
- **High potential/no development**, far from targets

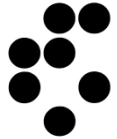
# 35 Collected Case Studies



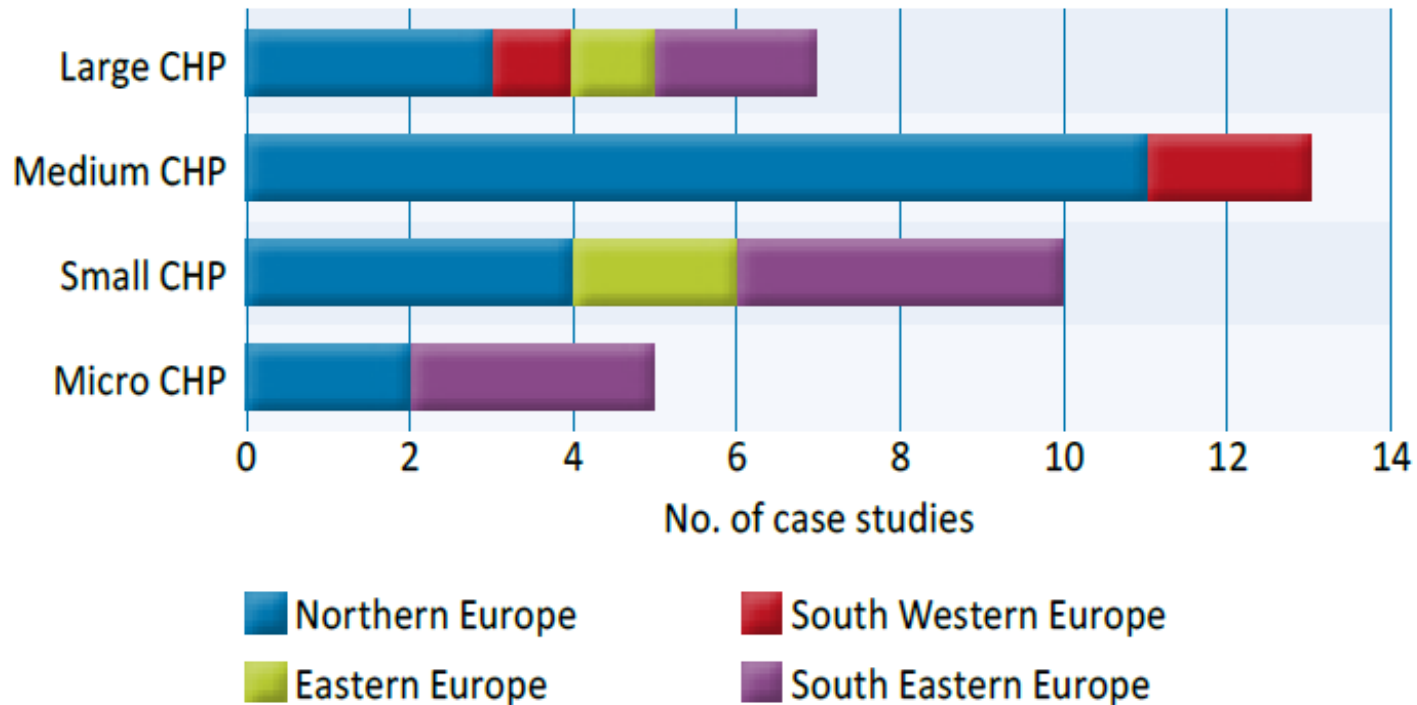
# Shares of technologies: Number of cases & El. Capacity



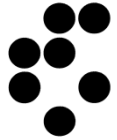
# Size structure



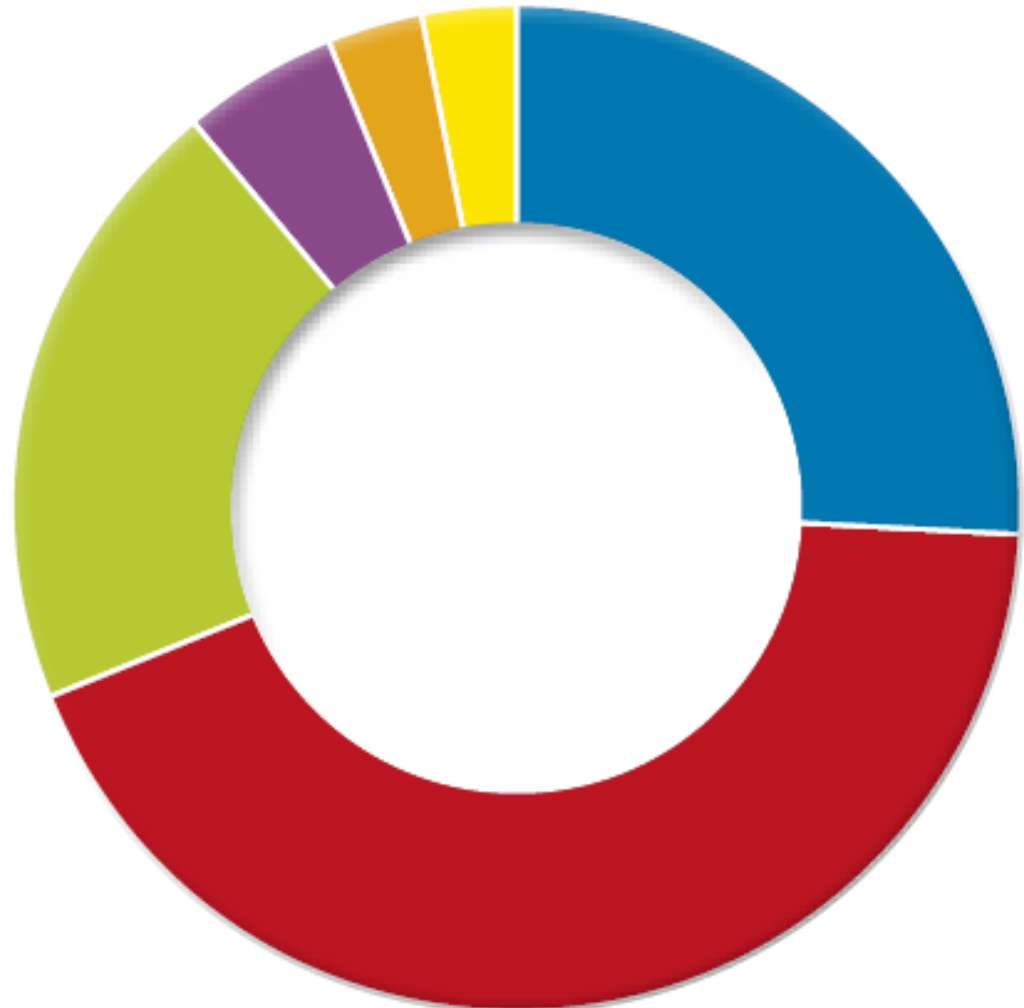
- micro CHP (< 50 kWe);
- small CHP (50 kWe ≤ size < 1 MWe);
- medium CHP (1 MWe ≤ size < 10 MWe) and
- large CHP (≥ 10 MWe).



# *Share of different financial resources used*

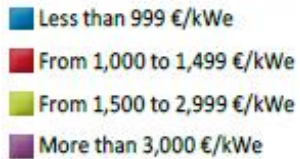


- Own, loans 26%
- Own 43%
- TPF 20%
- Loans 5%
- Loans, TPF 3%
- European funds 3%

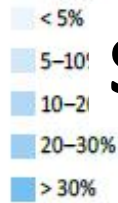


# Specific investment costs of projects

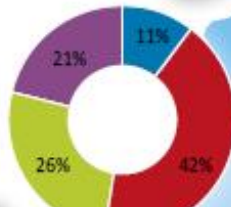
Share of different cost groups



Share of CHP in total electricity generation



NO. OF CASE STUDIES:	20
MICRO CHP	2
SMALL CHP	4
MEDIUM CHP	11
LARGE CHP	3



NO. OF CASE STUDIES:	3
SMALL CHP	2
LARGE CHP	1



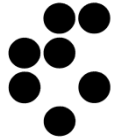
NO. OF CASE STUDIES:	3
MEDIUM CHP	2
LARGE CHP	1



NO. OF CASE STUDIES:	9
MICRO CHP	3
SMALL CHP	4
LARGE CHP	2



# *Sustainable highly efficient use of renewable energy sources*



## Pricewaterhouse Coopers, 7 More London, UK



09/09/2009

Electrical/Heat capacity	800 kW <sub>el</sub> / 830 kW <sub>th</sub>
Technology	Biodiesel engine
Fuel	Biodiesel
Investment	EUR 1.3 million
Financing	Own funds

### **Trigeneration - “double decker” configuration**

*Biodiesel engine coupled with a chiller mounted directly above the engine enclosure .*

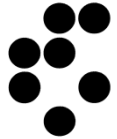
### **Reducing corporate carbon footprint**

*74% less CO<sub>2</sub> emission than that required under the 2006 Part L2 Building Regulations.*

### **First office building in England to achieve the BREEAM “Outstanding” rating.**

*Building Research Establishment Environmental Assessment Method - best practices in sustainable design.*

# Hybrid RES & CHP unit



## Aegean & Egnatia Hotels, Thessaloniki, Greece



Electrical/Heat capacity	40 kW <sub>el</sub> / 86 kW <sub>th</sub>
Technology	Gas engine
Fuel	Natural gas
Investment	EUR 142.700
Financing	Own funds, Investment subsidy

### Hybrid RES & CHP

The micro CHP units co-operate with a solar collectors system for hot water production. Among the first installations in Greece.

**14.000 € annual profit** for hotel

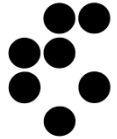
09/09/2009





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# Highly efficient industrial applications



## UPM KYMI RECOVERY ISLAND, Kuusankoski, Finland



09/09/2009

Electrical/Heat capacity	110 MW <sub>el</sub> / 630 t <sub>steam</sub> /h
Technology	Steam turbine
Fuel	Black liquor
Investment	EUR 360 million
Financing	Own funds, loans

### Extremely competitive integrated mill site

producing pulp, energy and fine paper.

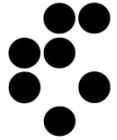
- 90% share of biofuels in total energy production
- 80% of mill's electricity

Substantial emissions improvements: sulphur dioxide, particle and malodorous gas emissions.

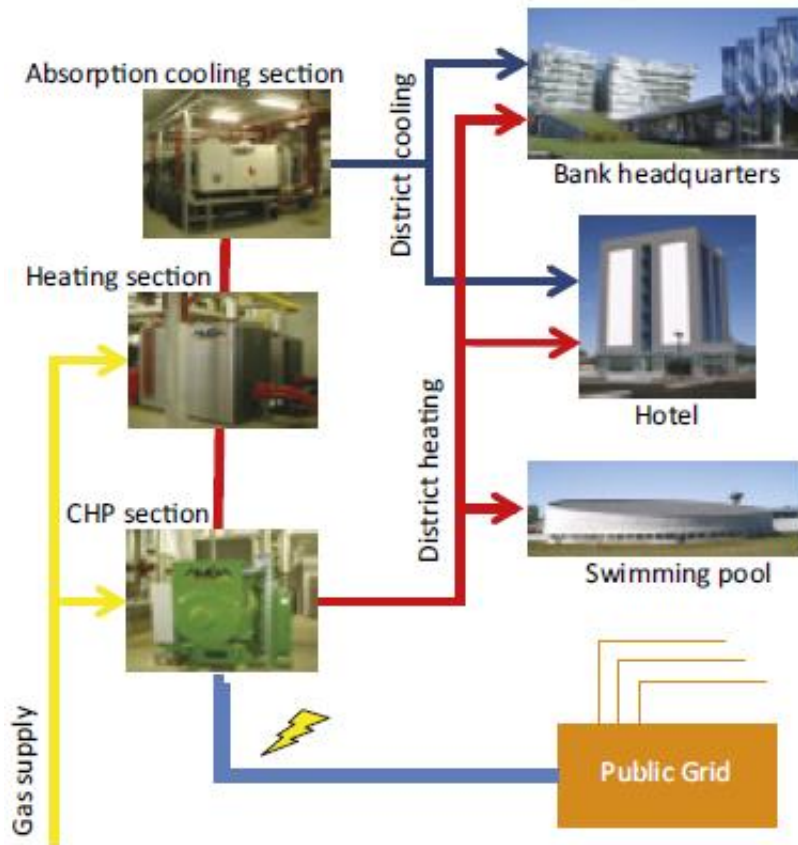
Top-class in energy efficiency terms and the lowest airborne emissions in the industry.

- good opportunity to move **very close to a zero carbon footprint** (papermaking that is carbon dioxide neutral).

# Energy efficiency in buildings and the public sector



## “Hypo Alpe Adria” Trigeneration Plant, Tavagnacco, Italy



Electrical/Heat/Cooling capacity	1.1 MW <sub>el</sub> / 1,3 MW <sub>t</sub> / 0,5 MW <sub>cooling</sub>
Technology	Motor engine
Fuel	Natural gas
Investment	EUR 3.8 million
Financing	Own funds

**Efficient central heating and cooling supply** to residential area with several public and private buildings, including a swimming pool, a hotel, and Italian bank’s headquarters.

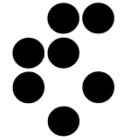
**Unmanned operation**, remote control through the Internet network.

**Quality feasibility study followed by good engineering , management and maintenance of plant** by skilled personnel are key for the success.



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# Other selection criteria for Handbook 20 cases



**Efficient micro&small scale heat supply**  
**De Clare Court, Haverfordwest**



**Replacing old CHP  
with new BAT  
units,  
UIPSA  
Cogeneration  
Plant, Spain**



**Prevention of pollution  
(efficient waste use)**  
**MVR Rugenberger Damm  
Hamburg**



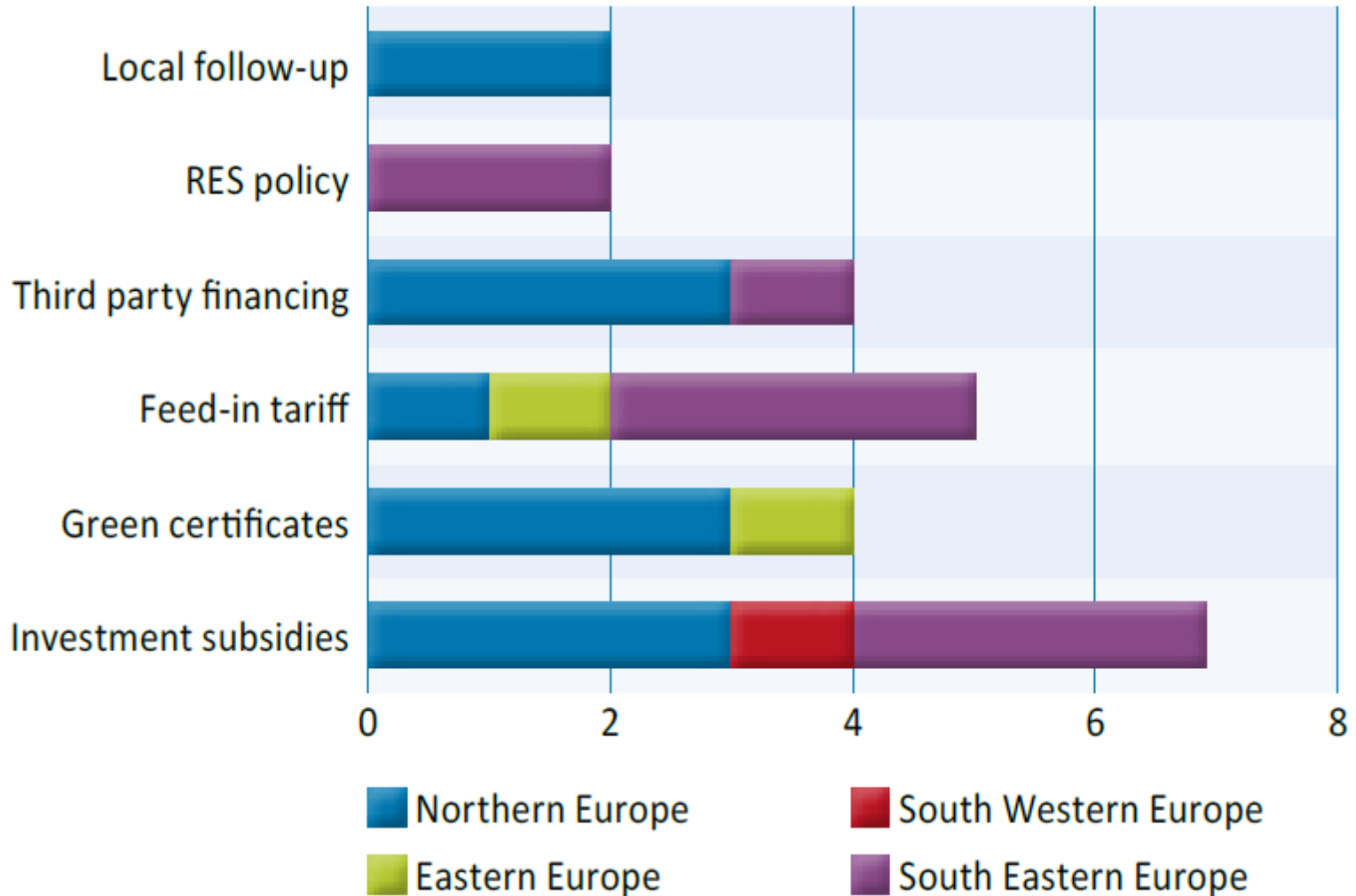
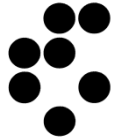
**Improved availability and  
reliability of energy supply**  
**Hospital Central de la  
Defensa 'Gómez Ulla'**



**Efficient agriculture  
solutions, 'Hortipower'**  
**Docent Katholieke  
Hogeschool Kempen**



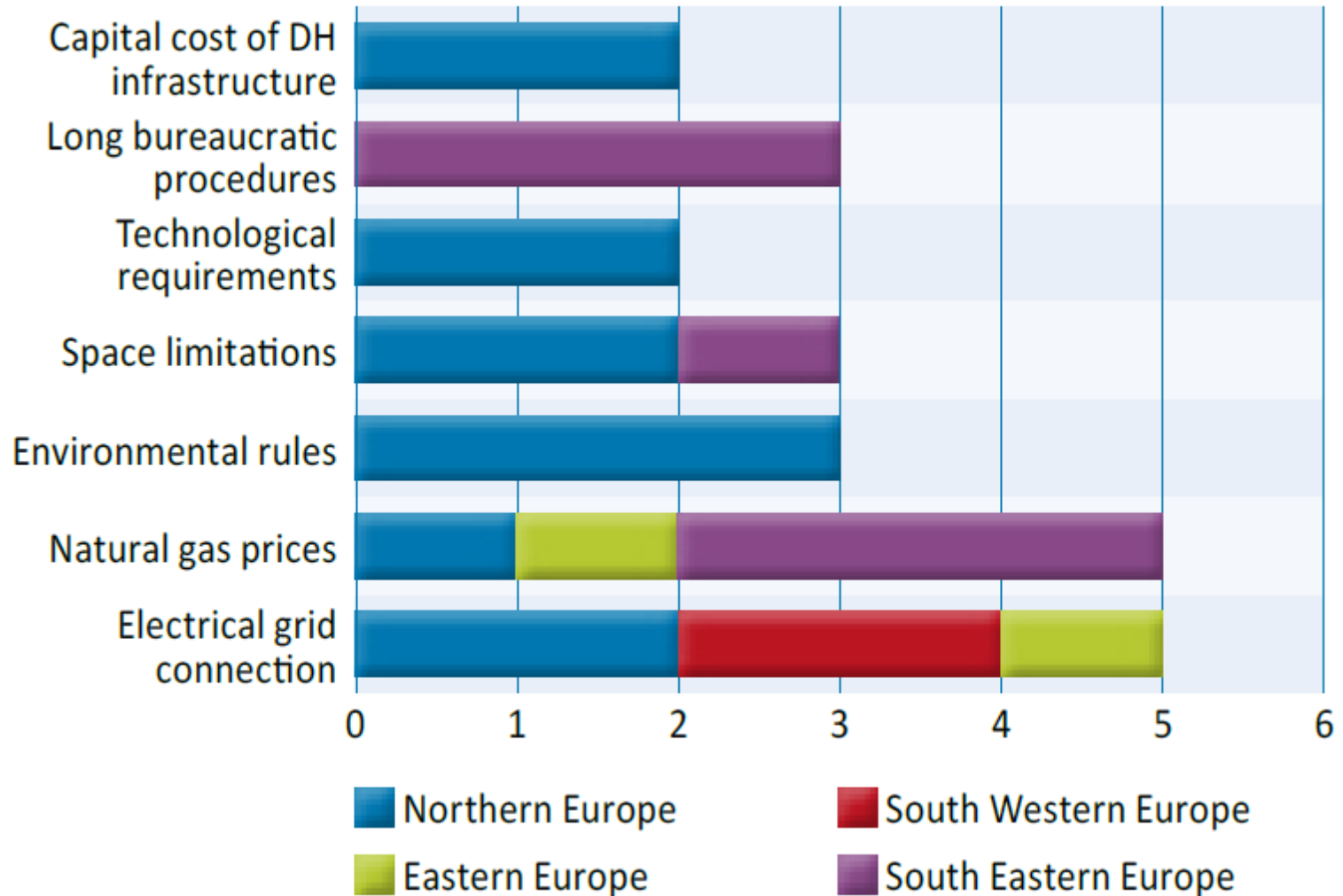
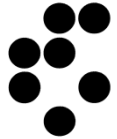
# Overview of the most common success factors





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# Overview of the most common main barriers





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# Chapter on Summary of IRR Calculation

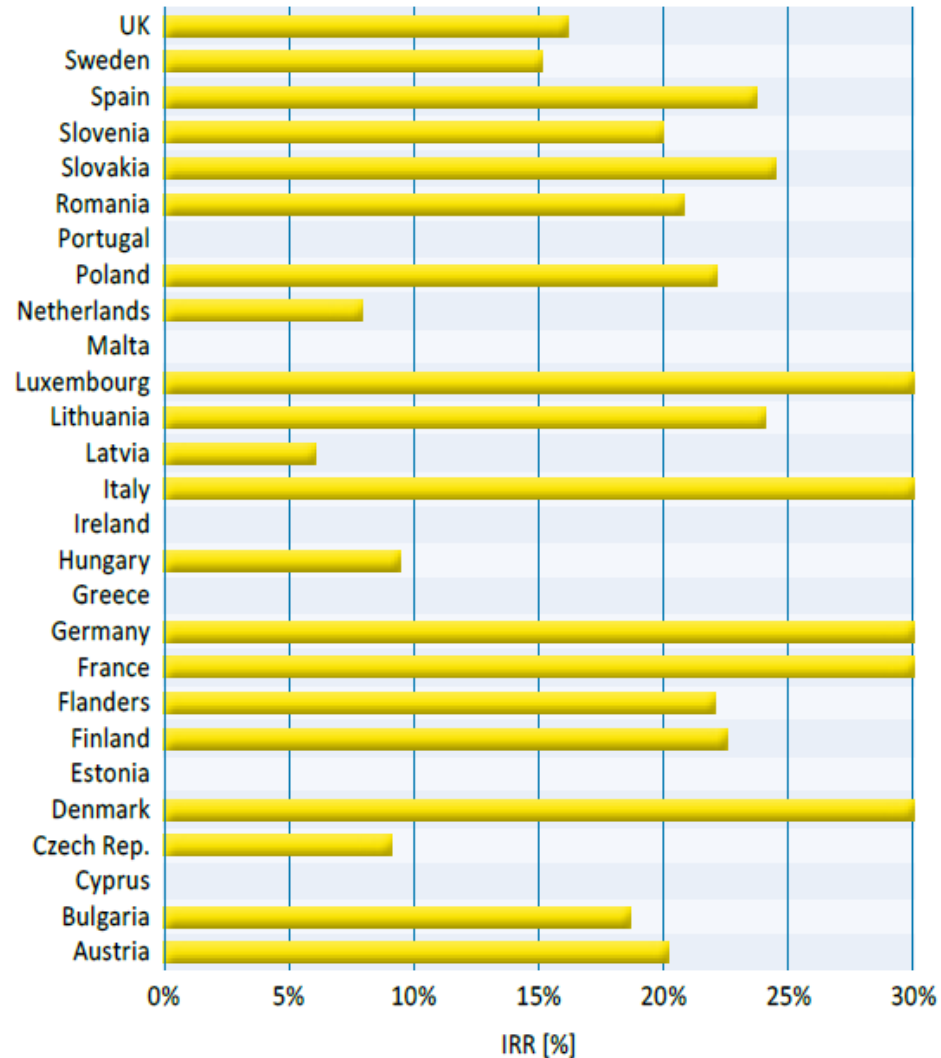
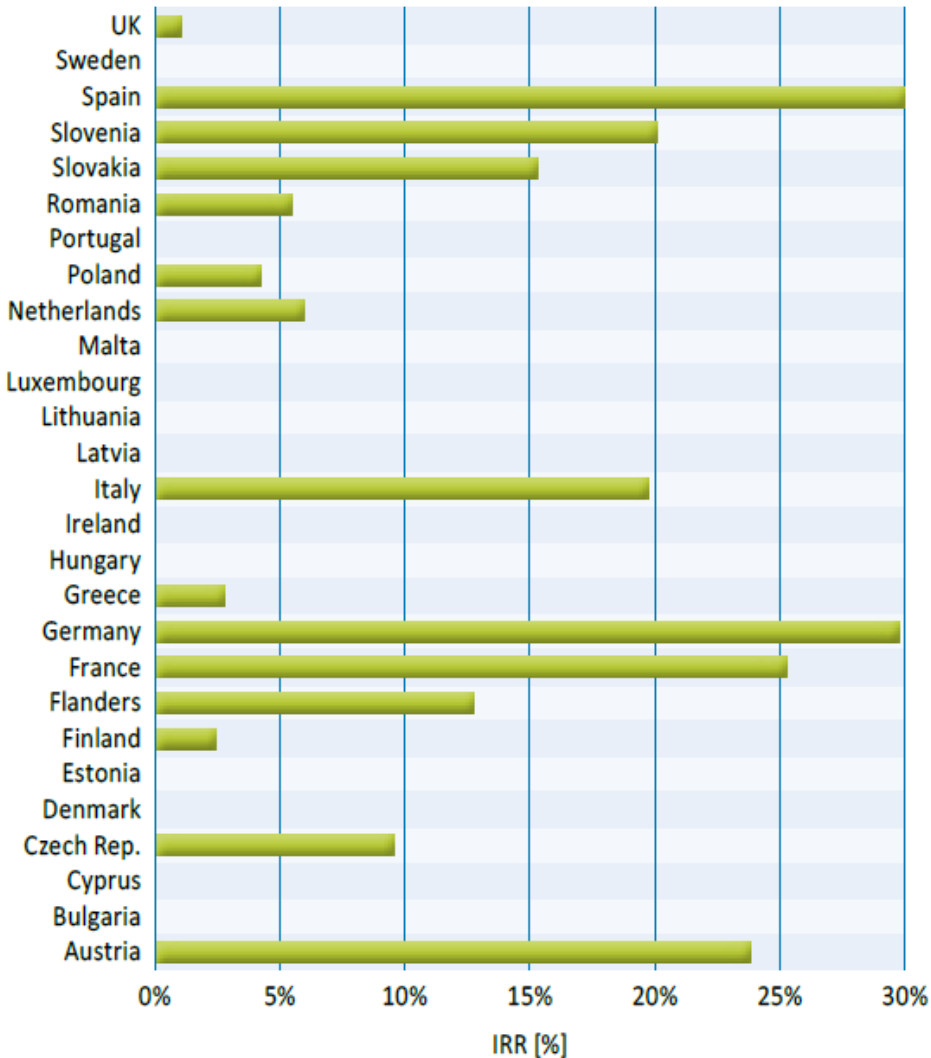
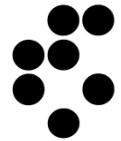
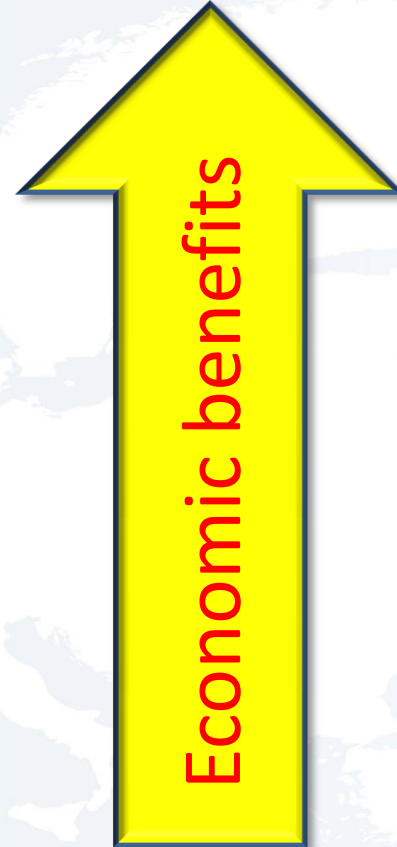


Figure 10: IRR with support for the 50 kW<sub>e</sub> and 1 MWe gas engine project in the EU-27

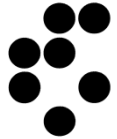
# KEY ROLE OF THE FUTURE COGENERATION





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*Thank you for your  
attention!*



**Thank you to all who  
have contirbuted  
Best practice cases!**

**Hanbook ready and to  
be desiminated in  
next days!**

For more information contact  
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