



# 4<sup>th</sup> SE European CODE Workshop

10<sup>th</sup> – 11<sup>th</sup> of March 2011,  
Thessaloniki, Greece

## SESSION II:

Best case Cogeneration project(s) in Greece

***Dimitris Miras***

*Head of Thermo-electric Power Projects Dpt, ITA Group*

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# The contribution of High Efficiency CHP technology in developing modern agricultural applications in Greece

## Presentation sections:

1. Presentation of “Drama Greenhouses S.A.”, a 10-ha modern glasshouse with a 4,8 MW H-E CHP system for heating and CO<sub>2</sub> enrichment
2. The role of HACHP for the establishment of a new reasonable Feed in Tariff system for the Greek CHP market. The expected effect of the new legislation on the above example project.



## ITA Group CHP projects in operation



16 -> 32 MWe



4,8 -> 8,8 MWe



**100.000 m<sup>2</sup> of glass-covered production area for sweet peppers**

**Gutter height: 5,5 m**





**Budget: 20m€**

**In operation since 2006**





**Annual production: 1.700 – 2.100 tons of pepper for export  
and domestic markets**





**H-E CHP plant**

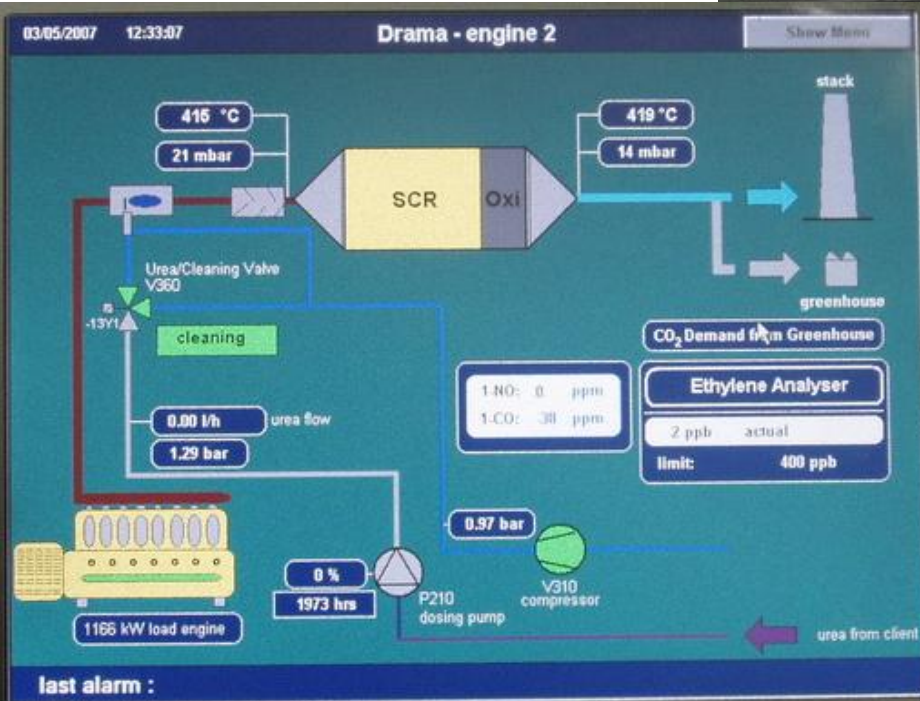
**4.800 kW**

**(3 x 1.600 kW units)**





## Exhaust gas catalyst systems for CO<sub>2</sub> enrichment in the greenhouse area



$\text{NO}_x < 5 \text{ ppm}$





**CO<sub>2</sub> feeding system**

**NG-fired peak boilers 2 x 8 million kcal/h**



## 2.000 m<sup>3</sup> Heat storage tank





## Central computer management with energy efficiency monitoring





## Hygro-fans / Electrically driven roof vents





## Automatic shade and heat saving roof screens





## Hydroponics – Water resources management – IPM





## IPM – Biological pest control – Accreditations

**EUREPGAP**<sup>®</sup>



QS – Ihr Prüfsystem  
für Lebensmittel





## Electrically driven Harvesting systems







## Modern post-harvesting systems for sorting and packing





## Cold stores





## The effect of the CHP technology on the project

### Focus on heating costs for typical greenhouses:

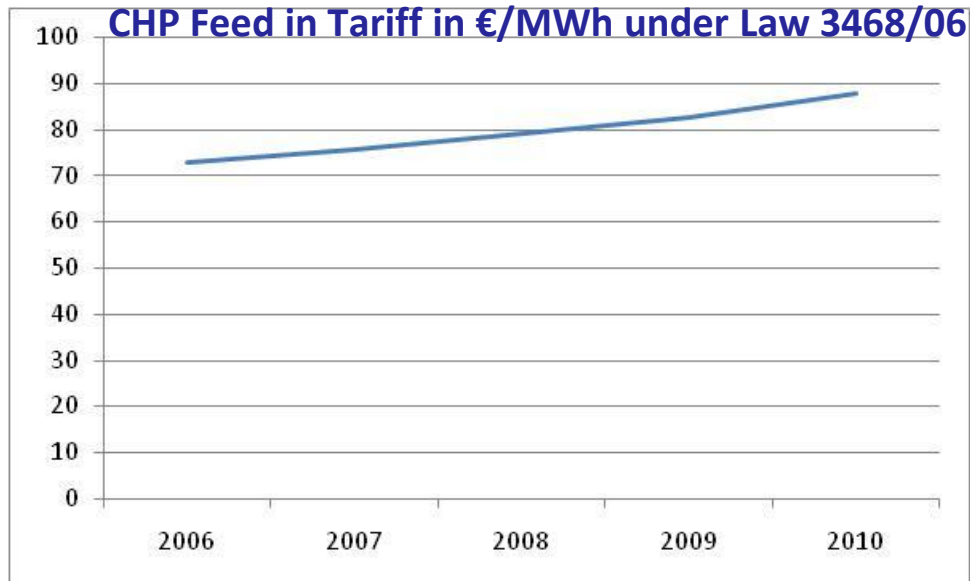
- 15 – 20 €/m<sup>2</sup> with conventional NG boiler system
- Up to 2 million € annual heating cost for 10-ha
- Up to 40% of total production cost
- Impossible to be retrieved from the produce sales

### The application of H-E CHP in greenhouses:

- 2 – 6 €/m<sup>2</sup> annual heating costs
- Down to 5-15% of total production cost

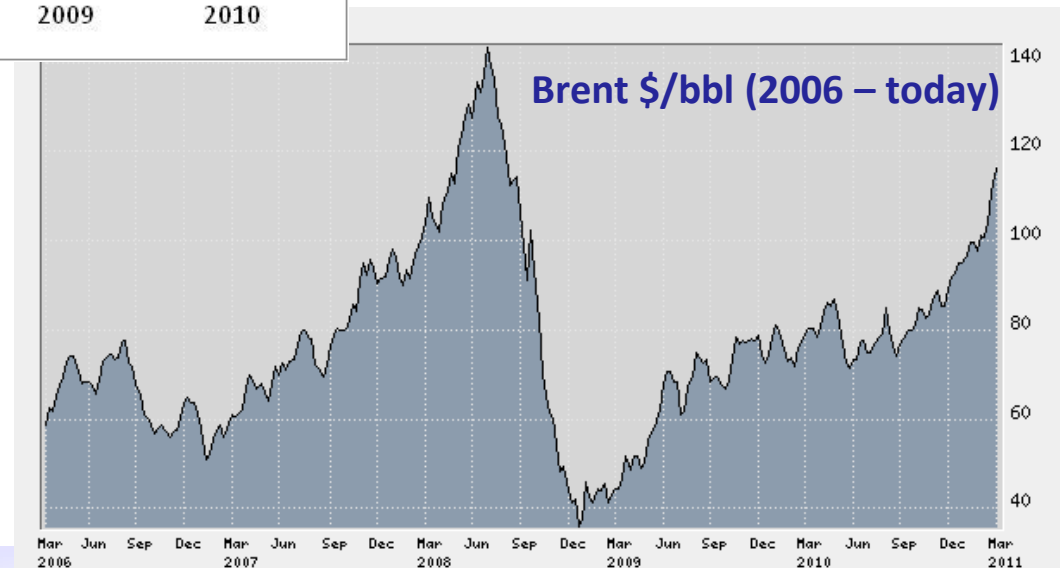


## Results under the previous CHP Feed in Tariff System



**Historical NG prices:  
130 – 250 €/1000Nm<sup>3</sup>  
(1995 – 2005)**

**New era NG prices:  
250 – 550 €/1000Nm<sup>3</sup>  
(2006 – 2011)  
Heating cost > 10 €/m<sup>2</sup>**

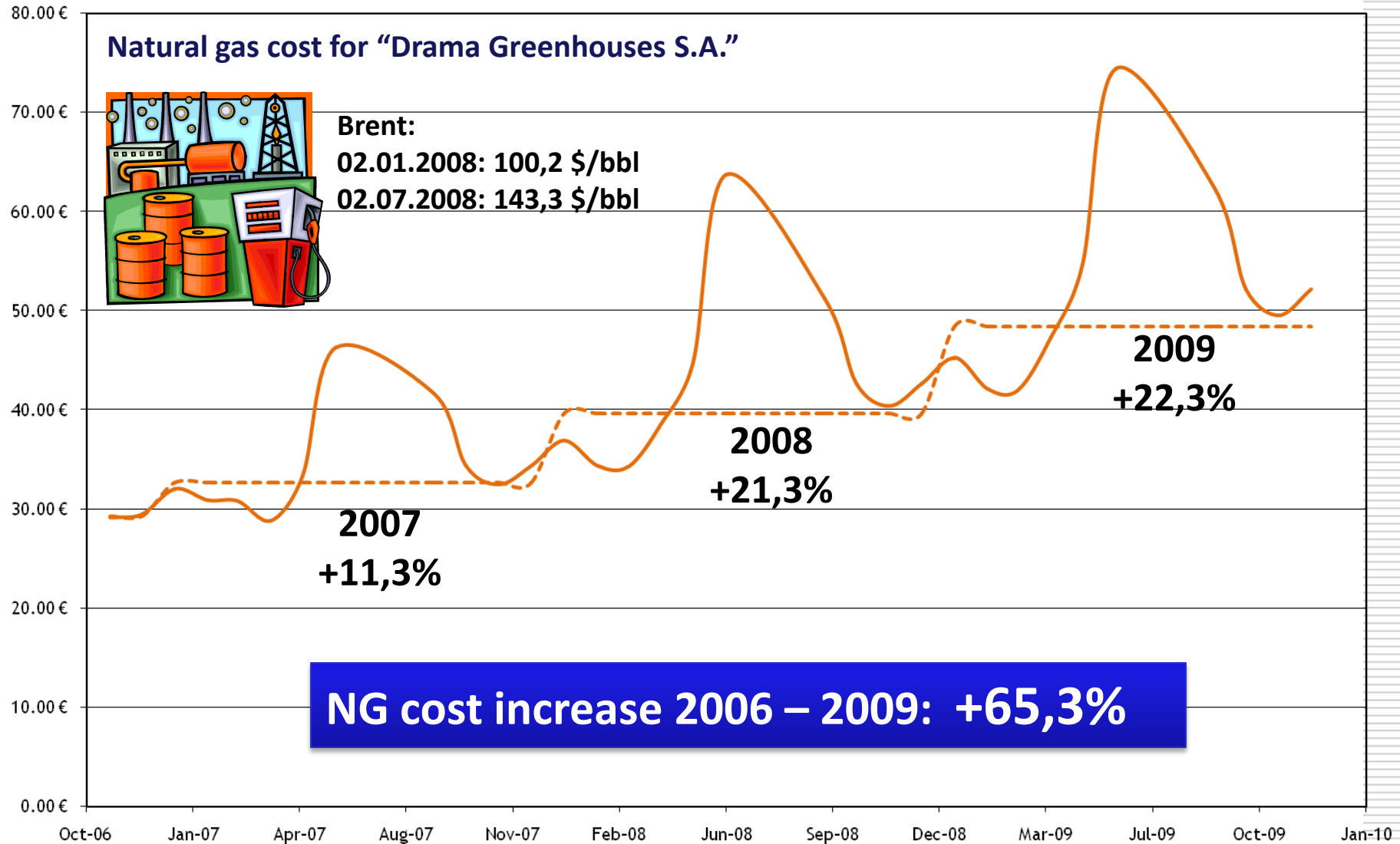




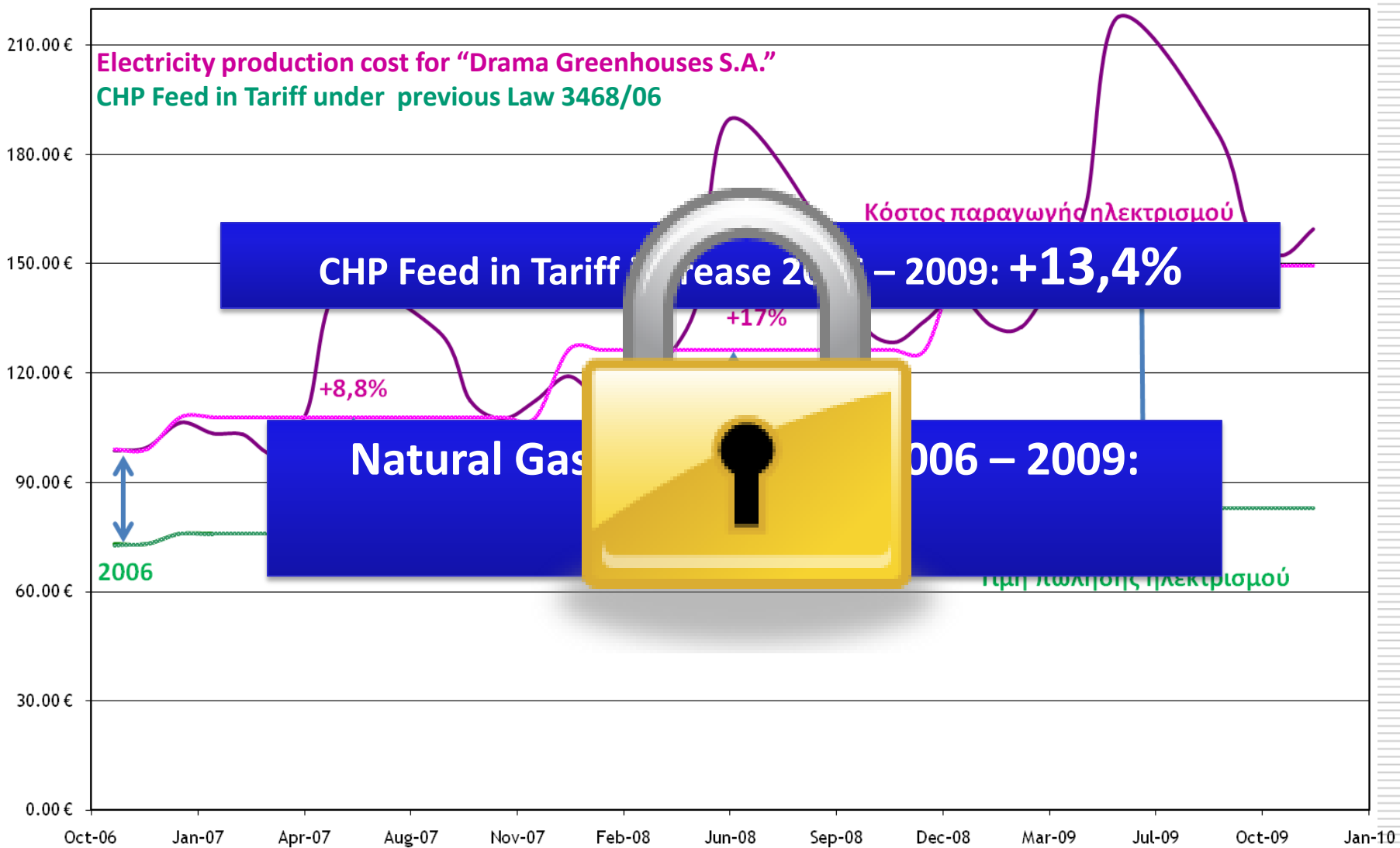
### Natural gas cost for "Drama Greenhouses S.A."



**Brent:**  
02.01.2008: 100,2 \$/bbl  
02.07.2008: 143,3 \$/bbl



**NG cost increase 2006 – 2009: +65,3%**





## The role of HACHP for a new CHP Feed in Tariff System

### Facing the facts:

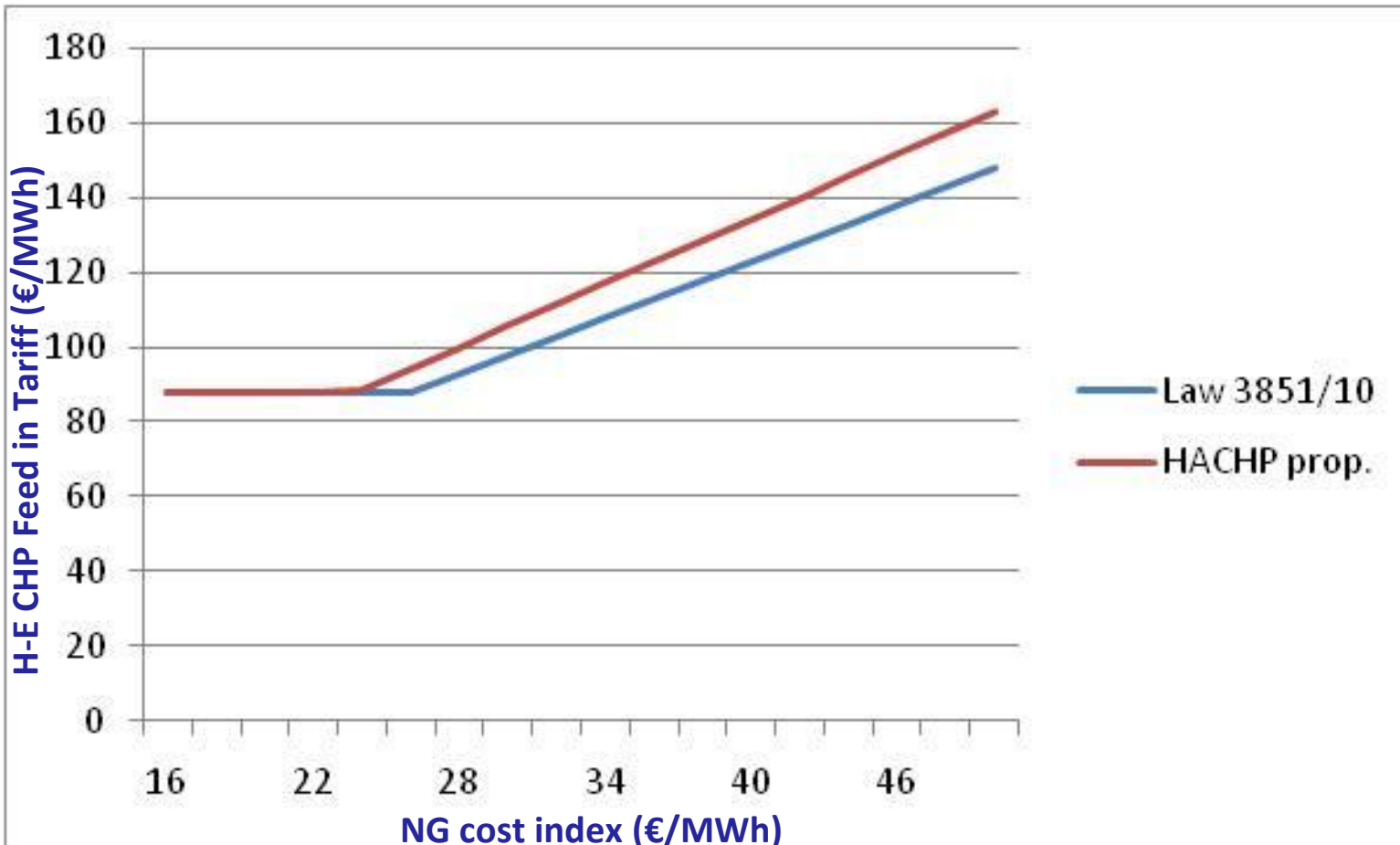
- Existing CHP units shutting down
- High running costs
- Unfair treatment in NG capacity charges
- Zero development in local CHP market
- Inability to reach Energy Conservation targets under “20-20-20” scheme

### HACHP demands:

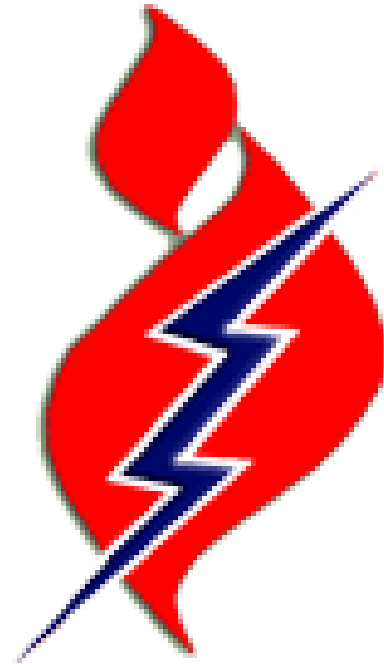
- Reasonable CHP Feed in Tariff
- Reconsideration of NG capacity charges for CHP
- Easier development – permitting for small scale CHP



**New Law 3851/2010 provides link between the H-E CHP Feed in Tariff and a Natural Gas Price Index provided monthly by the State – Owned NG Company DEPA S.A.**







**Thank you for your attention.**