



THE EVOLUTION OF COGENERATION PLANTS IN THE CERAMICS INDUSTRY

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” PRESENTATION OVERVIEW

1. The evolution of the regulatory framework
2. A case study on the replacement of a cogeneration plant
3. The pros and cons of technological solutions
 - ✓ existing plant overhaul
 - ✓ gas turbines
 - ✓ internal combustion engines
 - ✓ heat recovery

” THE EVOLUTION OF THE REGULATORY FRAMEWORK

INTEGRATED TEXT ON PRODUCTION AND CONSUMPTION
SIMPLE SYSTEMS → Resolution 578/13/R/eel

OTHER PRODUCTION AND CONSUMPTION SYSTEMS (ASSPC)

→ **SESEU** → *(Existing Systems Equivalent to Efficient Systems for Users) EXISTING plants in 2013*

→ **SEU** → *(Efficient Systems for Users) HIGH EFFICIENCY new plants*

→ **ASAP and ASE** 100% system charges

5% system charges

BLANK CERTIFICATES
CAR type

SYSTEM CHARGES AND BLANK CERTIFICATES

➤ 2015 → 60€/MWh

e.g./ 6MW GAS TURBINE x 8,000h year = **48,000 MWh/year**

✓ ASAP system = 2.9M€/year → not sustainable

100% system charges

✓ SEU/SESEU system (new or existing **High Efficiency Cogeneration**)

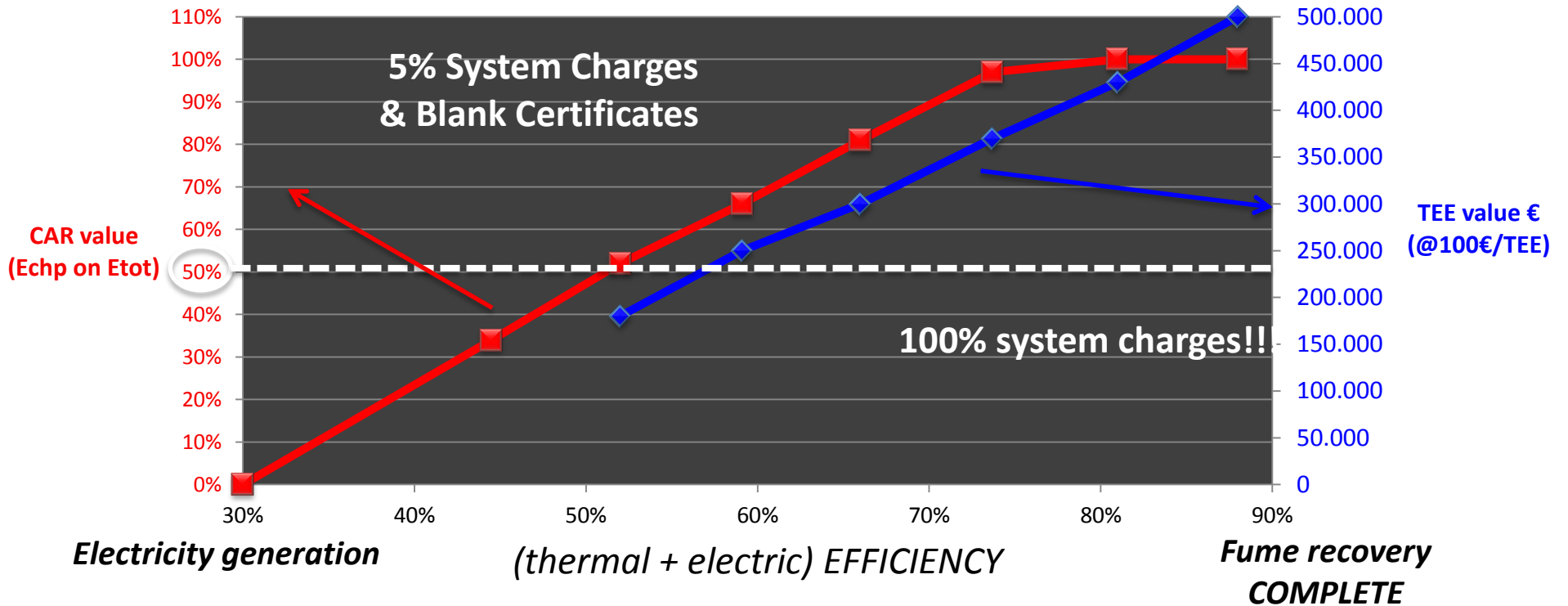
5% system charges

e.g./145,000€

✓ SEU System (**New High Efficiency**)

BLANK CERTIFICATES
CAR type II

” THE EVOLUTION OF THE REGULATORY FRAMEWORK

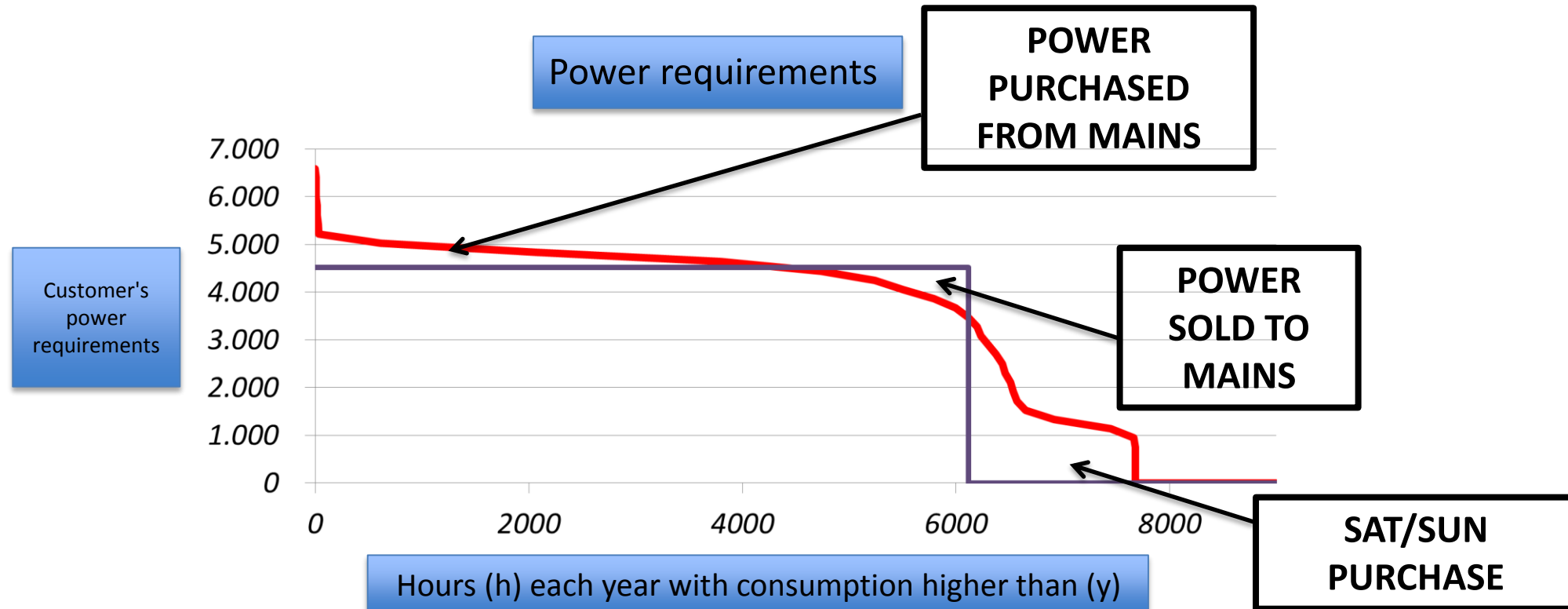


Note
6MW @8,000h/year

BLANK CERTIFICATES
CAR type II

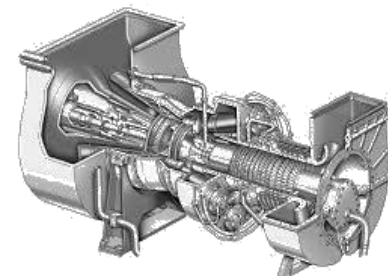
200,000€ → 500,000€

” CASE STUDY/ Replacement of existing plant



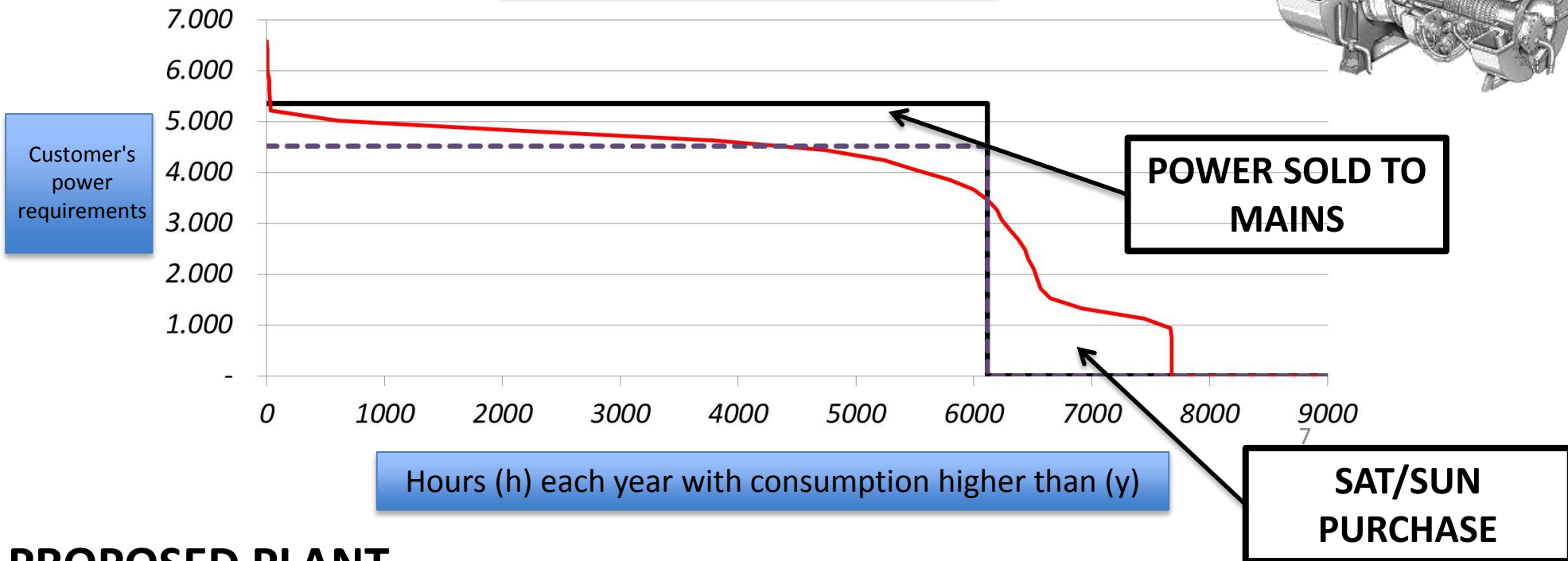
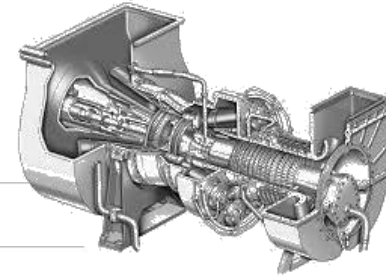
CURRENT PLANT

- ✓ Turbine **electrical 4.5MW** $\eta_{el} = 27\%$
- ✓ Heat recovery **88% FUMES** *year average*



CASE STUDY/ Replacement of existing plant

Customer's power requirements
Production hours



PROPOSED PLANT

- ✓ Turbine **electrical 5.1 MW** $\eta_{el} = 30\%$
- ✓ Heat recovery **95% FUMES** *year average (Higher fume temperature)*

» CASE STUDY/ Year energy balance

	CURRENT 4.5MWe	FUTURE 5.1MWe
NATURAL GAS	10.5M Smc	11.3M Smc
ELECTRIC POWER PRODUCED	27.6 GWh	32.7 GWh
ELECTRIC POWER SOLD	1.5 GWh	5.3 GWh
ELECTRIC POWER PURCHASED	9.3 GWh	8.0 GWh
THERMAL ENERGY RECOVERED	70.5 GWh	72 GWh
FUME RECOVERY	88%	>95%
EFFICIENCY	>95%	>97%
Echp/Etot share	-	100%

» CASE STUDY/ Year financial balance

	CURRENT 4.5MWe	FUTURE 5.1MWe
NATURAL GAS	-3,150 k€	-3,390 k€
ELECTRIC POWER OWN USE	3,900 k€	4,110 k€
ELECTRIC POWER SOLD	80 k€	265 k€
THERMAL ENERGY RECOVERED	2,450 k€	2,500 k€
CHARGES, EXCISE DUTIES	-200 k€	-230 k€
BLANK CERTIFICATES	-	500 k€
SAVING COMPARED WITH MAINS	3.1 M€	3.8 M€
EXTRA-SAVING compared with 2015	+700 k€	

” REVAMPING / Financial considerations

➤ INVESTMENT vs REVAMPING

NEW PLANT

→ 4M€

EXISTING PLANT OVERHAUL

→ 1M€

TOT = 3M€ → <5 years'
pay-back

Despite minimum size increase

➤ NEW CONSUMPTION PROFILE compared with first dimensioning (pre-2000)

E.g./ Increase +1 MWe → currently purchased off mains: 5GWh, equal to 750,000€
therefore saving can increase to over 1M€

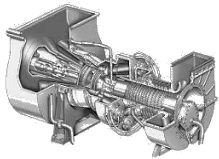

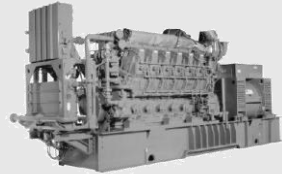

E.g./ Reduction -1 MWe → - optimisation of *heat recovery*
- *use at full capacity* with greater efficiency

➤ MANAGEMENT OPTIMISATION with software logic

✓ Electrical/thermal tracking

✓ CAR qualification required → Blank Certificates

” INTEGRATED TECHNOLOGY SOLUTIONS

	PROS	CONS
<p>Existing plant OVERHAUL</p>	<ul style="list-style-type: none"> Limited investment 	<ul style="list-style-type: none"> Low efficiency Reliability?
<p>NEW TURBINE</p> 	<ul style="list-style-type: none"> Sizing optimisation Access to Blank Certificates Good return on investment 	<ul style="list-style-type: none"> Higher investment Systematic management required (CAR/SEU) 
<p>NEW ENGINE</p> 	<ul style="list-style-type: none"> Increased flexibility E.g./ useful for Efficiency rates Access to Blank Certificates Lower investment, same size 	<ul style="list-style-type: none"> 90°C hot water recycling e.g./process fluids pre-heating
<p>HEAT RECOVERY OVENS</p> 	<ul style="list-style-type: none"> Lower investment Repayment guaranteed even just by natural gas saving 	<ul style="list-style-type: none"> Difficult access to Blank Certificates

” WHY CEFLA

- **PRELIMINARY TECHNICAL/ECONOMIC STUDY** *FREE OF CHARGE*
 - ✓ COGENERATION PLANT ASSESSMENT particularly during the existing plant overhaul phase
 - ✓ Saving from **increasing, reducing and MAINTAINING** the plant size

- **GENERAL CONTRACTOR POSITION**
 - ✓ Knowledge of available technologies on the market
 - ✓ **Integrated approach** (engine + recovery?)

- **GLOBAL TECHNOLOGICAL SERVICE**

- **Over 30 YEARS' EXPERIENCE IN THE CERAMIC and COGENERATION INDUSTRIES**