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# What is Combined Heat & Power (CHP)?

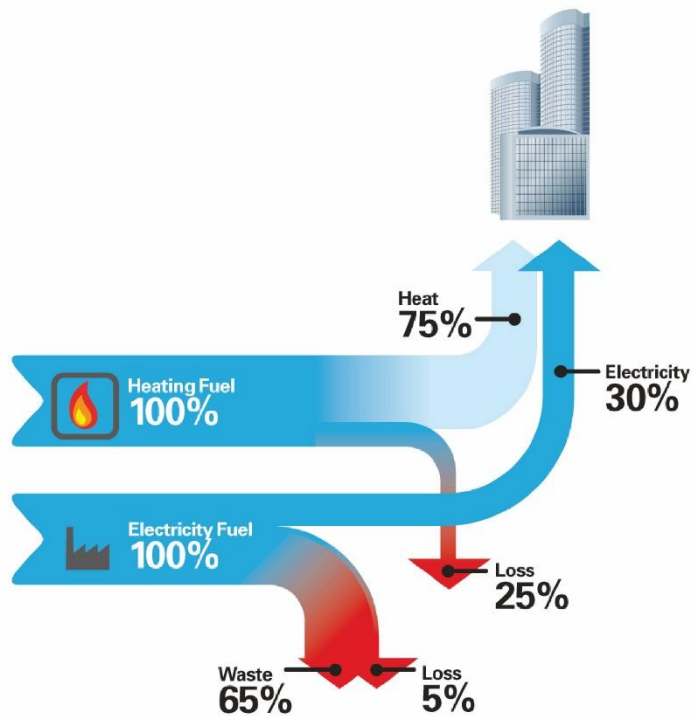
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# Energy Savings

## Conventional Generation vs CHP

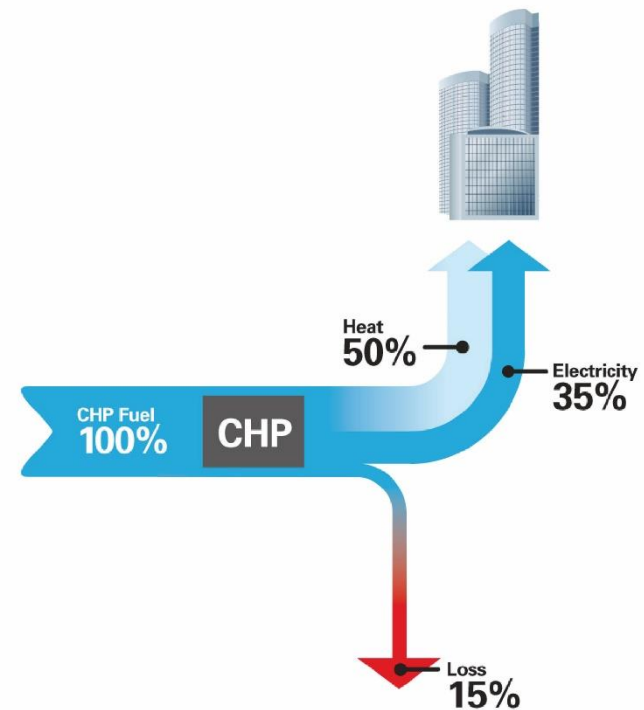
**Conventional  
Generation**

**Total Fuel  
Efficiency  
52.5%**

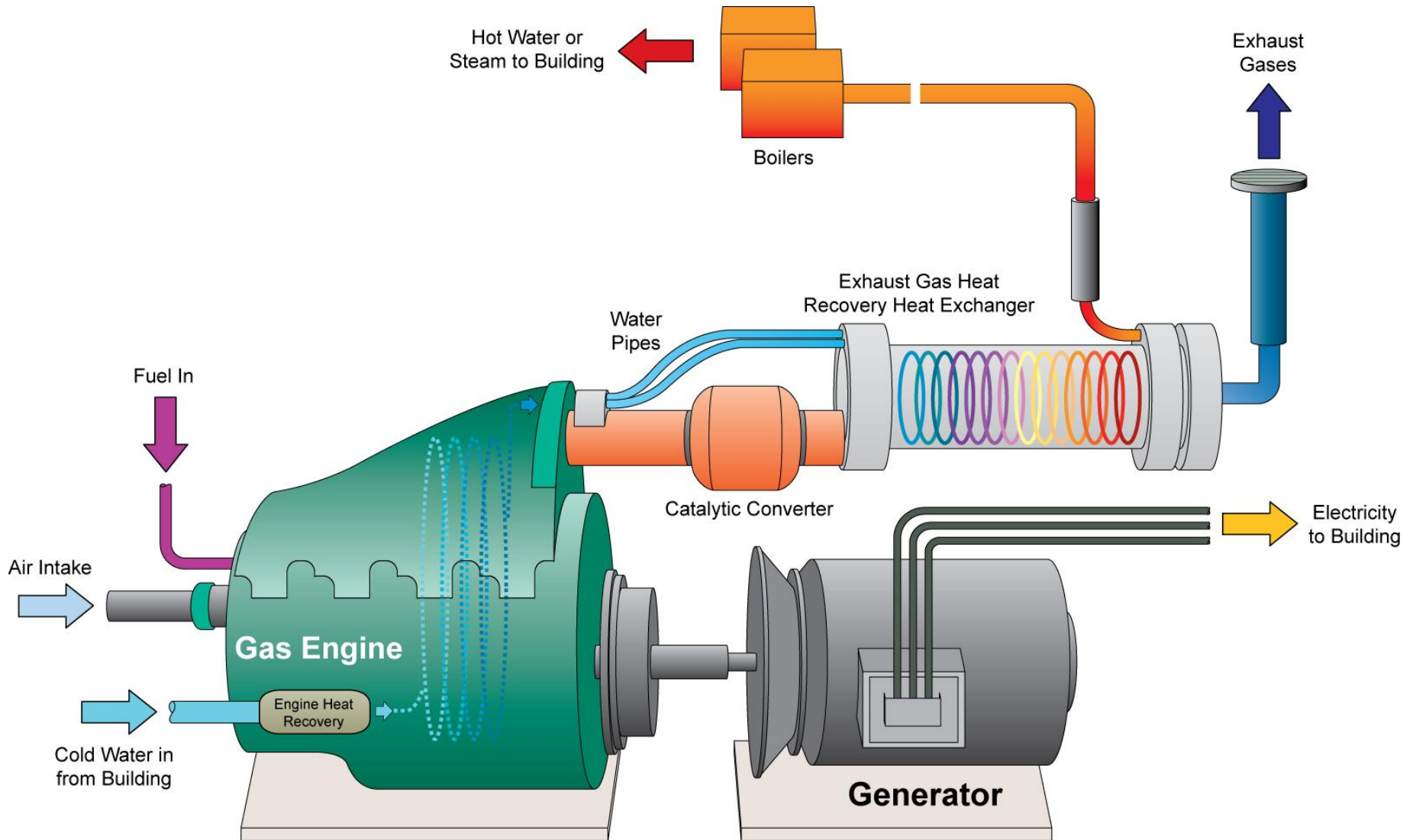


**CHP**

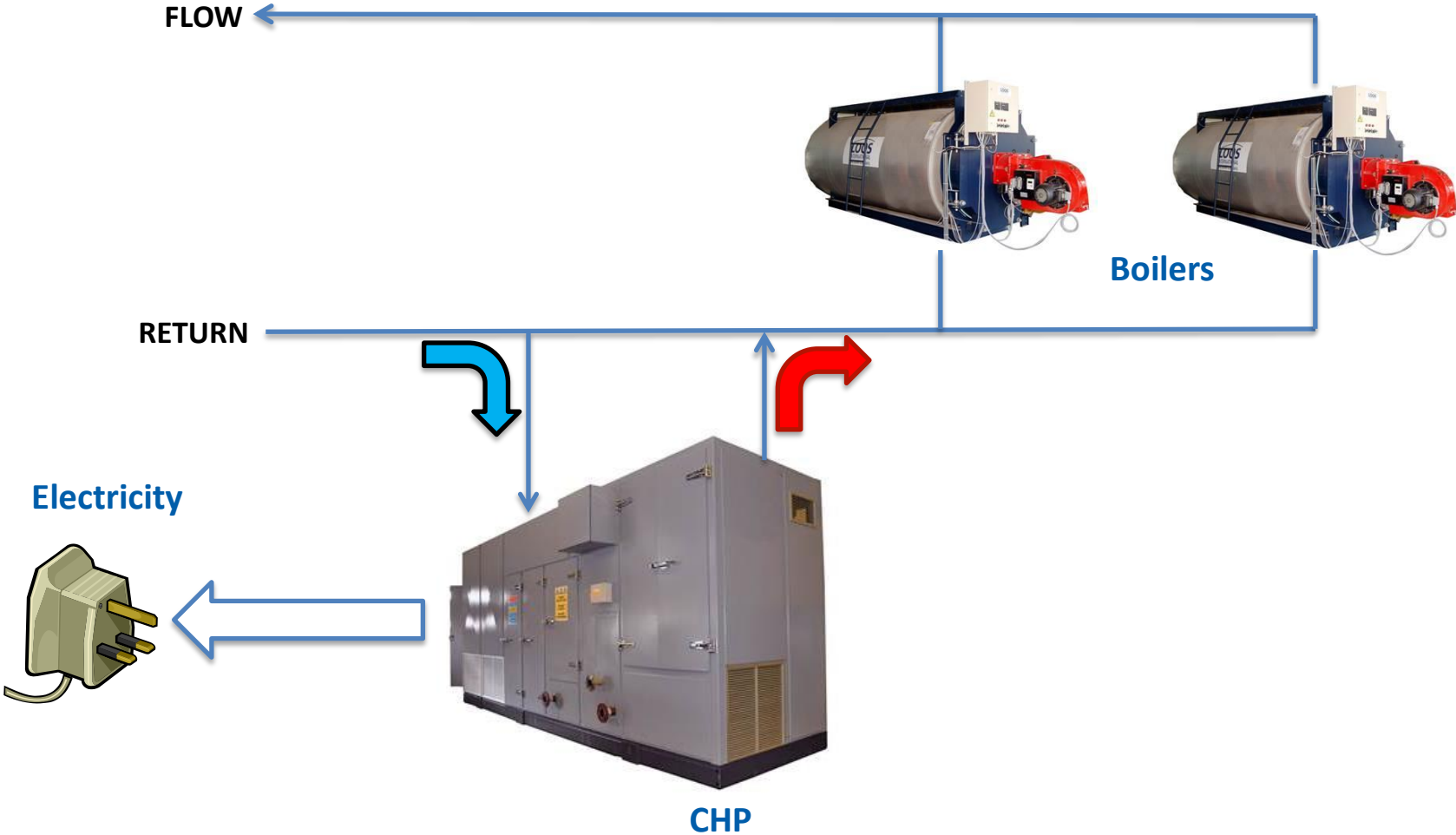
**Total Fuel  
Efficiency  
85%**



# How CHP works



# Simple Boiler Interface



# CHP Key Design Issues

How does your host site work?

- How many hours does the site operate?
- What does the electrical load profile look like?
- How and when is the thermal loading used?

Heat demand is critical

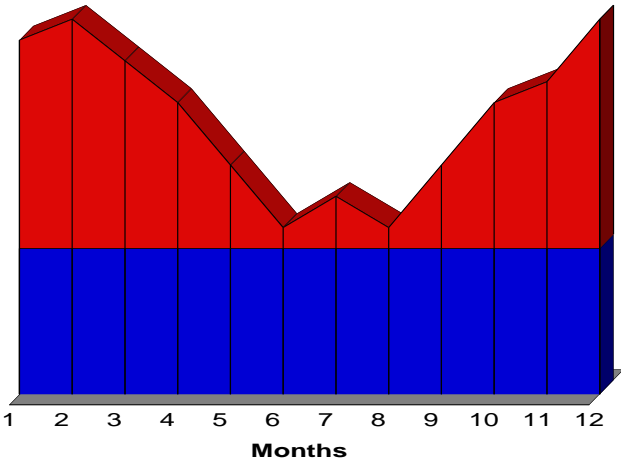
- CHP heat output must be maximised to achieve savings
- CHP sizing is based on heat demand for most sites
- CHP must be able to supply the grade of heat required, eg. steam, medium pressure hot water

Electric loads need to be determined

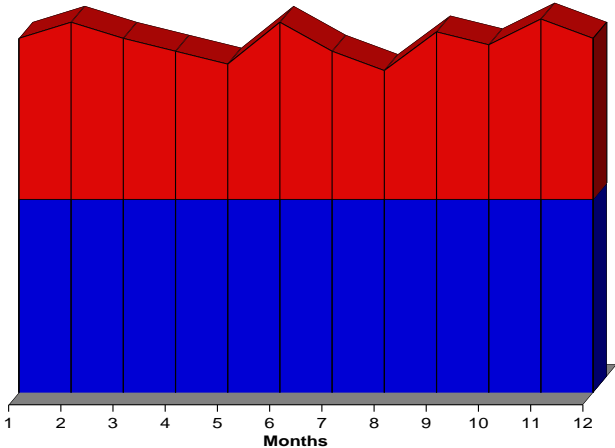
- Best connection interface is at the meter supply point
- Can connect at sub-distribution boards providing there is capacity in the cable

# Demand Profile Requirements

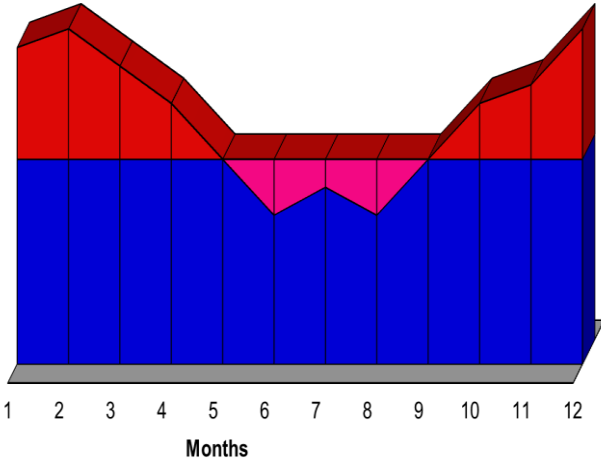
Thermal Profile - Base Load



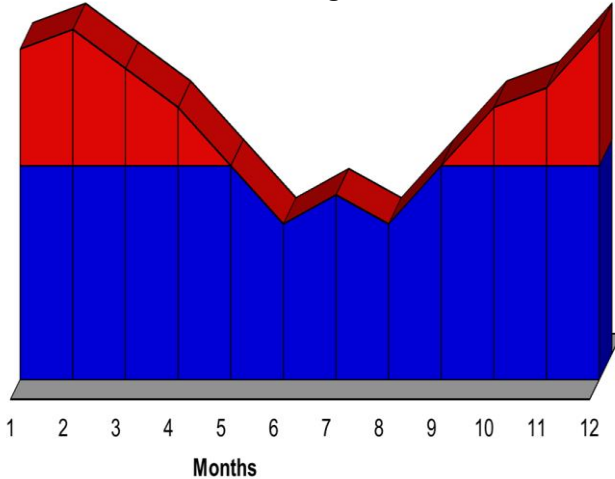
Electrical Profile - Base Load



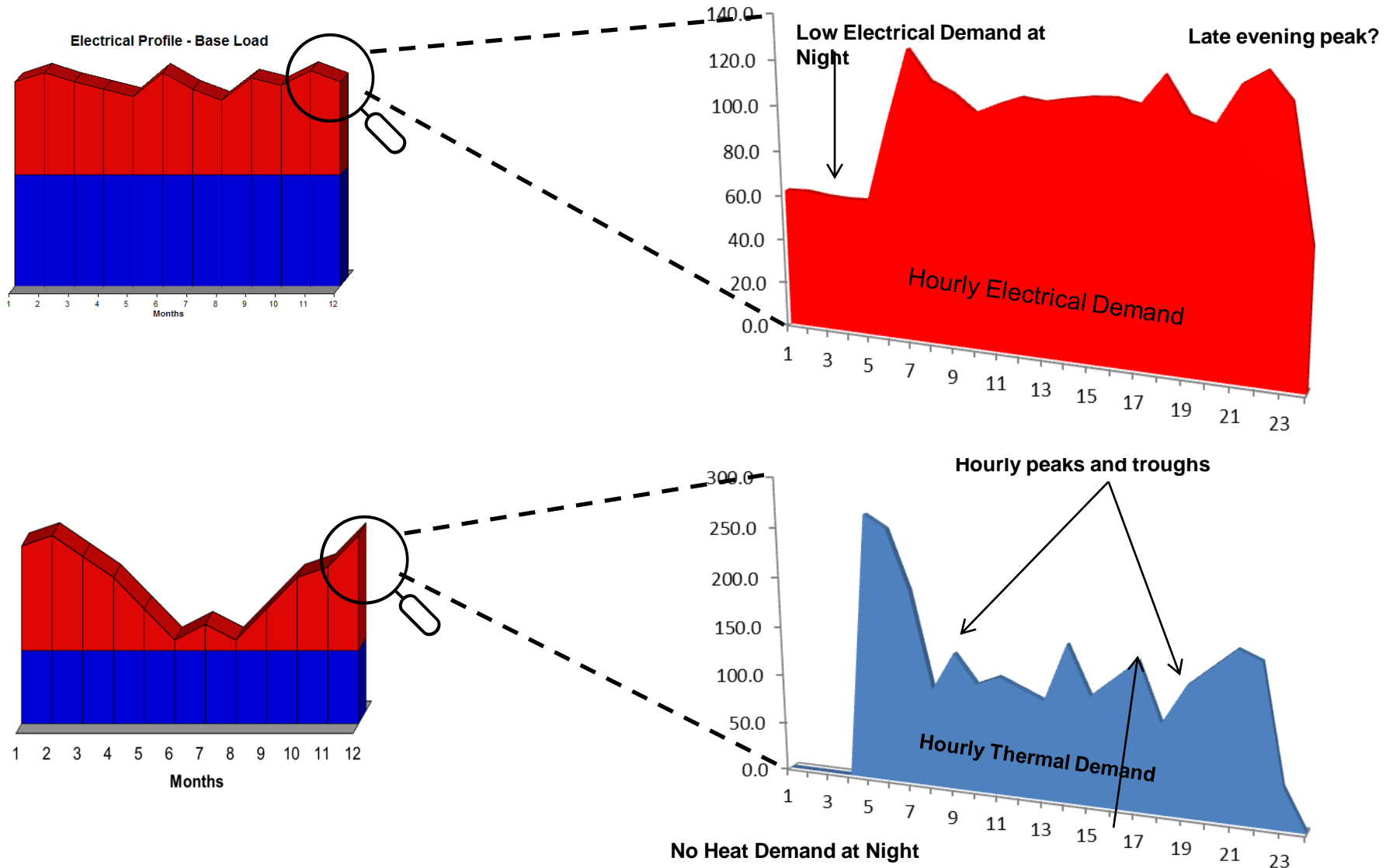
CHP now generates excess heat in summer



CHP "load tracking" in summer



# CHP Sizing – The Devil is in the Detail!



# Other Factors to Consider

- Low cost energy saving measures first
- A detailed feasibility study is essential
- Don't overestimate heat & power demands
- Best sites have year round heat demand
- Usually running 5,000 hrs/yr for economic viability
- CHP should always be the lead 'boiler'
- Gas availability
- Noise issues
- Analyze a range of CHP types and sizes
- Consider all the practical issues carefully
- Assess all the environmental benefits/issues
- Use guidance from CIBSE AM12



# CHP Positioning

PLANT LOCATION (Normally in boiler house)	GENERAL ACCESS FOR SERVICING	AIRBORNE NOISE	VIBRATION ISSUES	FLOOR LOADING	EXHAUST	PLANNING
<b>Ground Floor</b>	Good	Easy to deal with	Easy to deal with	Not an Issue	Careful consideration	No (maybe flue)
<b>Mid Level</b>	Careful consideration	Easy to deal with	Careful consideration	Careful consideration	Average	No (maybe flue)
<b>Roof</b>	Very Careful Consideration	Easy to deal with	Careful consideration	Careful consideration	Short exhaust	Yes
<b>External Location</b>	Good	Careful consideration	Not an Issue	Not an Issue	Careful consideration	Yes

# Summary

There is a lot to think about.....

There are several excellent CHP suppliers out there who will all give you a free feasibility study using sophisticated models which will take all this into account

## CHP Key Design Issues

How does your host site work?

- How many hours does the site operate?
- What does the electrical load profile look like?
- How and when is the thermal loading used?

Heat demand is critical

- CHP heat output must be maximised to achieve savings
- CHP sizing is based on heat demand for most sites
- CHP must be able to supply pressure hot water

Electric loads need to be defined

- Best connection interface is
- Can connect at sub-distribution

## Other Factors to Consider

- Low cost energy saving measures first
- A detailed feasibility study is essential
- Don't overestimate heat & power demands
- Best sites have year round heat demand
- Usually running 5,000 hrs/yr for economic viability
- CHP should always be the lead 'boiler'
- Gas availability
- Noise issues
- Analyze a range of CHP types and sizes
- Consider all the practical issues carefully
- Assess all the environmental benefits/issues

## Unit Positioning

PLANT LOCATION (Normally in boiler house)	GENERAL ACCESS FOR SERVICING	AIRBORNE NOISE	VIBRATION ISSUES	FLOOR LOADING	EXHAUST	PLANNING
Ground Floor	Good	Easy to deal with	Easy to deal with	Not an issue	Careful consideration	No (maybe flue)
Mid Level	Careful consideration	Easy to deal with	Careful consideration	Careful consideration	Average	No (maybe flue)
Roof	Very Careful Consideration	Easy to deal with	Careful consideration	Careful consideration	Short exhaust	Yes
External Location	Good	Careful consideration	Not an issue	Not an issue	Careful consideration	Yes

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# CHP Equipment Options

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# CHP Options - Internal packages

- Fully contained packages <500kWe
- Modular blocks >500kWe
- Least expensive option
- Limited flexibility
- Greater level of site integration
- Lower unit build cost



Image © ENER-G

# CHP Options - External packages

- Contained packages up to 2 MWe or more
- Special acoustic housings
- Good flexibility
- Simpler site integration
- Lower noise options
- Planning issues



Image © ENER-G