

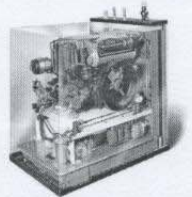


Dachs

BAXI - SENERTEC UK

Dachs mini-CHP
...microgeneration that
really works!

DAVID SHAW
Baxi-SenerTec UK



SenerTec GmbH

BAXI - SENERTEC UK



SenerTec GmbH
Kraft - Wärme - Energiesysteme
Carl - Zeiss - Straße 18
97424 Schweinfurt

- 115 employees
- Dachs mini-CHP
- a BAXI Group company
- market leader mini-CHP in Europe



UK Government Strategy

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UK Energy Policy

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Energy Affordability - energy at the lowest prices possible, consistent with the need for investment.

Energy Security - by 2020 a third of power plants will be closed due to age / improved environmental standards.

Energy Sustainability - it will not be credible to be still building coal-fired power stations in 20 years time and be able to meet carbon reduction targets.

- also, 80% CO₂ reduction by 2050 !



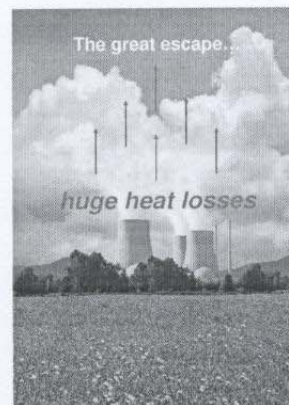
United Kingdom

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'Blackouts will be common in 7 years'

(Steve Holliday, National Grid CEO)

- regular blackouts within seven years if the Government doesn't ensure that more power stations are built.
- acute shortage of generating capacity because a string of ageing nuclear and coal-fired plants were due to be retired from service.
- under a business-as-usual scenario, Britain would lack sufficient generating capacity to meet peak demand around 2015.



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Every year we waste enough energy from power generation to heat most of the buildings in the UK.



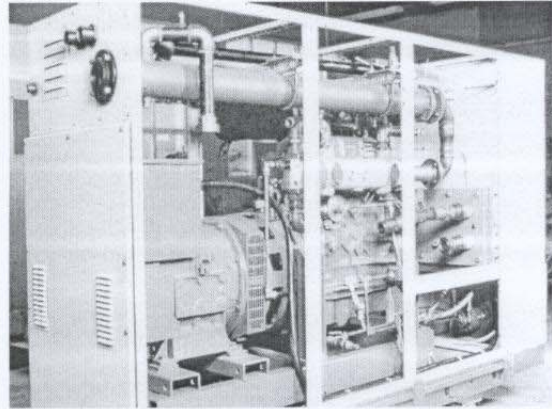
What is CHP?

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Combined Heat and Power

- is the simultaneous production of electricity and heat.
- is a carbon reducing technology.
- is a mature, reliable technology.
- has better payback than all other electricity generators.

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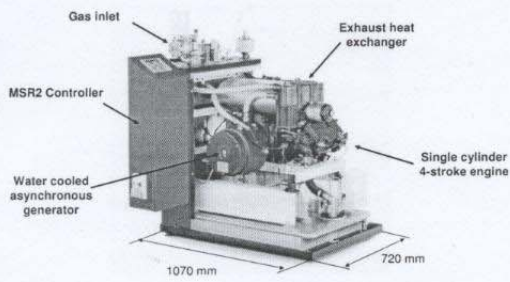


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Main components of mini-CHP

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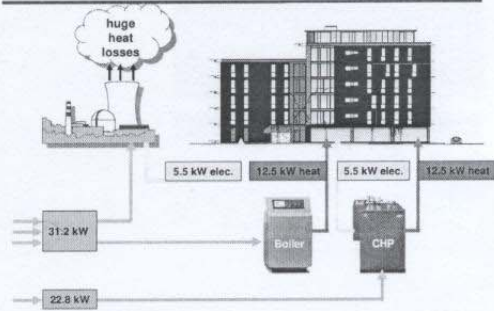


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Carbon saving technology

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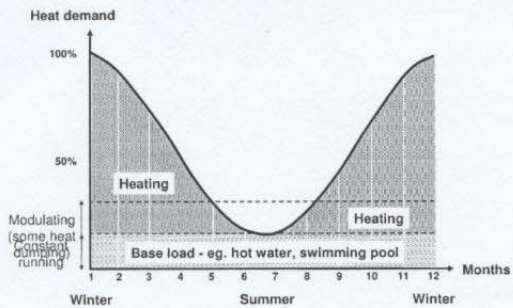
No heat loss with CHP - carbon emissions reduced by up to 30%

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CHP heat output

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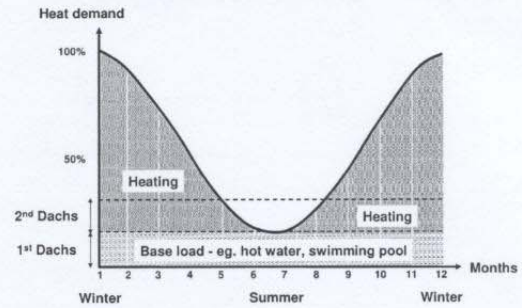


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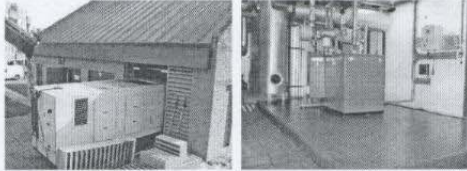


CHP heat output = base load

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Big out....

....small in

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Avoid disappointment!

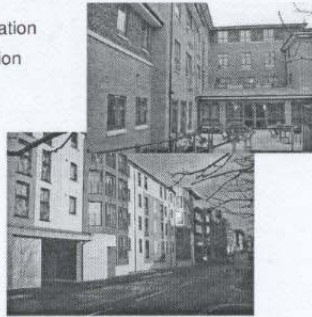
Follow the key rule for successful CHP

...keep it small !

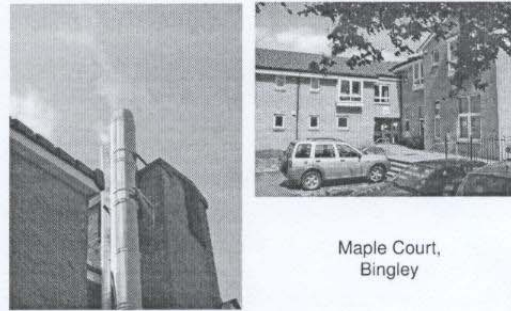
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- sheltered accommodation
- student accommodation
- apartment blocks
- leisure centres
- nursing homes
- hospitals
- schools
- prisons
- hotels

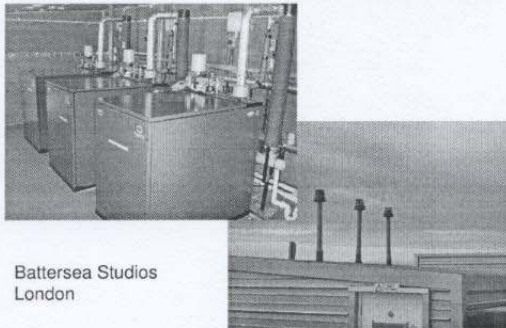


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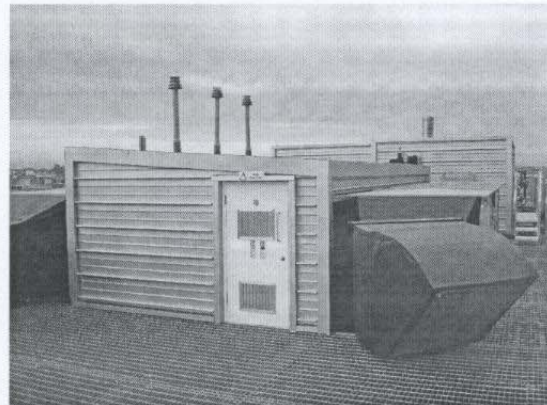
Maple Court,
Bingley

16



Battersea Studios
London

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London Fire Brigade

BAXI - SENERTEC UK



- Results -
- running hours > 6,500 /annum
 - overall efficiency 78% (gross)
 - CO2 reduction 23%
 - cost savings 26%



Wimbledon Fire Station
Dachs SE Condensing



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Private luxury house

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Orchard Meadow, Stamford, Lincs.

New house for Mr & Mrs K. Hicks

(approx. 800 m² incl. 10 bathrooms, swimming pool & jacuzzi)

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National Trust

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Trelissick Gardens
Cornwall

Dachs SE
Condensing
(Calor Gas)

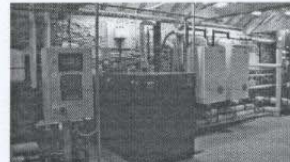


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Trelissick Gardens

BAXI - SENERTEC UK



Chris Curtis
Estate Manager

"...Totally confident
that we have a much
greener solution
much kinder to the
environment..."



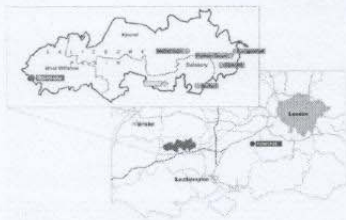
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MOD Aspire Contract

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New accommodation blocks for
British Army - Aldershot/Salisbury
Approx. 40 Dachs supplied.
- more than 100 by 2012.



On-campus
private wire
network

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Drivers

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Big sticks & small carrots !

Big Sticks

- regulations, regulations, regulations.

Small Carrots

- exemption from fuel tax (CCL)
- 100% tax allowance (ECA) in first year
- 5% VAT

But some good news...

Bigger Carrots coming soon!

- Feed-in-Tariffs now in the Energy Bill

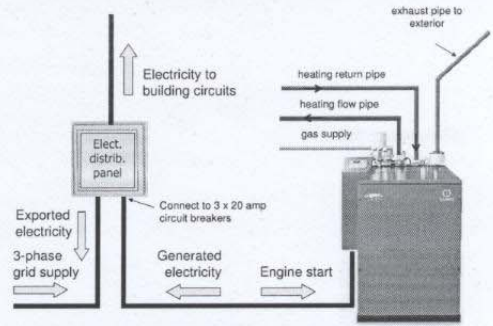
24



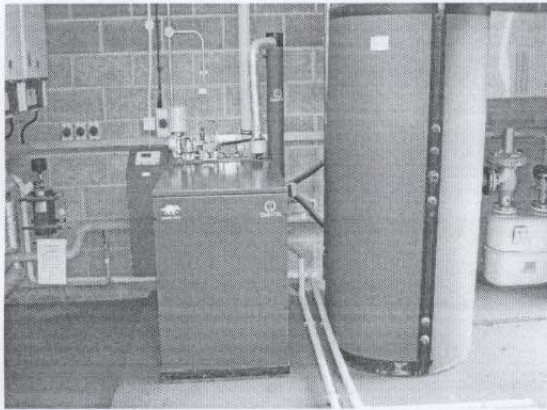
Engineering Recommendation G83/1 provides guidance on the technical requirements for the connection of SSEGs in parallel with public low-voltage distribution networks.

For the purposes of G83, a SSEG is a source of electrical energy rated up to and including 16A per phase, single or multi-phase, 230/400 volts ac.

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What is the value of the energy saved by a Dachs chp unit ?

Dachs gas consumption	2.13	m ³ /h
Energy content of 1 m ³ gas	10.7	kWh/m ³
Dachs gas input	22.791	kWh
Cost of servicing Dachs	0.009	£/kWh
Dachs electricity output	5.5	kWh
Dachs heat output	14.0	kWh
Cost of gas	0.09000	£/kWh
Cost of electricity	0.12000	£/kWh
Boiler efficiency	95	%
Dachs daily operating hours	12	h

Gas cost	£9.08	£/h	Value of electric output	£9.00	£/h
Electricity	£0.66	£/h	Value of heat output	£0.05	£/h
Service cost	£0.11	£/h			
Total operating costs	£9.79	£/h	Total value of energy output	£9.05	£/h
Gas input - value of energy output - operating costs	0.43	per operating hour			
Dachs annual operating hours	0.06	hours per year			
Annual savings	£2,645.01	per year			

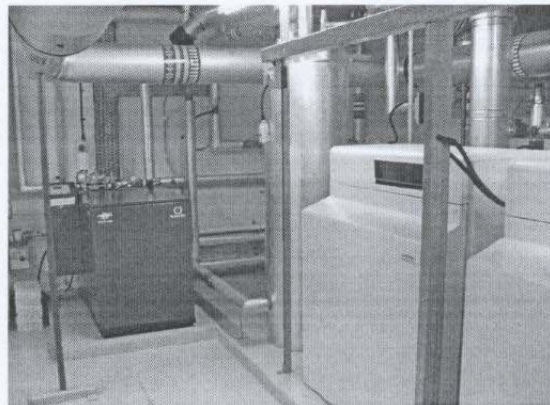
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How much CO₂ is saved by a Dachs chp unit ?

Emission factor for grid electricity	0.43	kg/kWh
Emission factor for natural gas	0.185	kg/kWh
Electricity CO ₂ emissions = emission factor x electrical output	2.37	kg/h
Boiler CO ₂ emissions = emission factor x fuel input	3.48	kg/h
Dachs CO ₂ emissions = emission factor x fuel input	4.22	kg/h
Dachs annual CO ₂ savings	9,940	kg/year

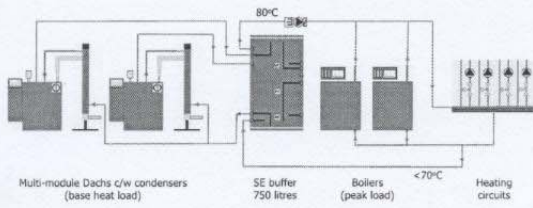
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Typical hydraulic arrangement BAXI-SENERTEC UK



Multi-module Dachs c/w condensers (base heat load)

80°C

SE buffer 750 litres

Boilers (peak load)

<math><70^{\circ}\text{C}</math>

Heating circuits

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Service

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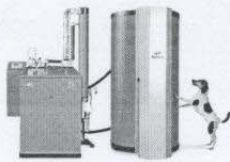


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Dachs

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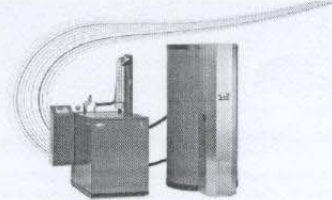


- Total Dachs installed > 20,000
- Total operating hours > 378,400,000
- Total electricity generated kWh > 2,040,000,000
- Total CO2 saving in tonnes > 1,210,000

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DACHS mini-CHP

Carbon saving and money saving microgeneration technology!



Today's CHP technology is already solving tomorrow's problems.
...more than 20,000 Dachs users can't be wrong!

www.baxi-senertec.co.uk



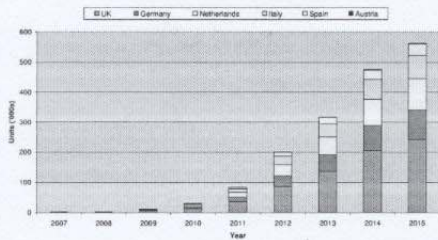
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Micro-CHP Market Trends

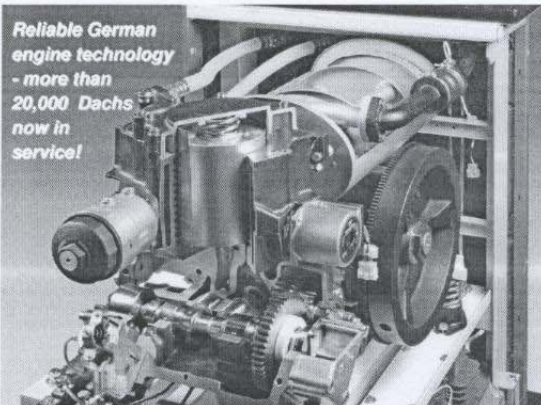
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mCHP installations per annum 2007 to 2015



Source: BSRIA & COGEN reports - mid range (best outcome) analysis UK

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Reliable German engine technology - more than 20,000 Dachs now in service!

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