Economic benefits of high temperature ammonia heat pumps (two case stories)

by

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Key Account Manager

Neatpump
LOW CARBON HEATING...NATURALLY

Menu

Project Description

Life Cycle Cost

Capital Cost

Ammonia Heat Pump

VS

R134a Heat Pump

Maintenance Cost

Energy Efficiency

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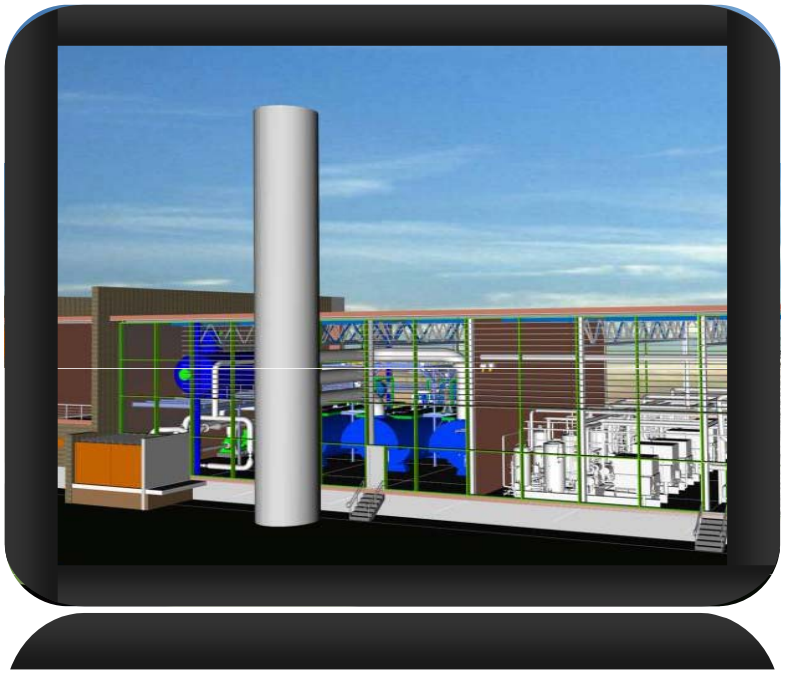
District heating



15 MW, 90°C, District heating

3 x 2 stage 5.0 MW Systems

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$COP_{heating}$ = 3.0

Evaporating temp. 2°C
Sea water 8 to 4°C

Condensing temp. 89°C
District heating water 60 – 90°C

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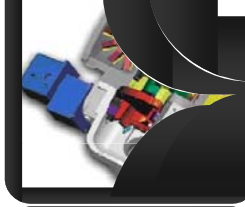
Capital cost (Indexed)

	R134a
Compress	100
Heat excha	150
Refrigeran	3600
Total capit	110

Typical U-Values for gravity fed evaporator [W/m²K]

	Ammonia	R134a
Clean water	2200	1100



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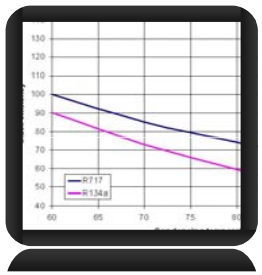
Energy efficiency

	Ammonia	R134a
$COP_{heating}$	3.0	2.6
Energy cost per year	£1,290,000	£1,488,000
Carbon footprint (indirect) [1,000 kg]	11,610	13,400
Carbon footprint (direct) [1,000 kg]	0	1,000
Total Carbon footprint per year [1,000 kg]	11,610	14,200



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Maintenance cost (Indexed)

	Ammonia	R134a
Yearly maintenance	100	250

- 80,000 hours between overhauls
- Equalising forces
- Low wear and tear on components

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Menu

Project Description

Life Cycle Cost

Capital Cost

Ammonia Heat Pump

VS

Gas fired Boiler

Maintenance Cost

Energy Efficiency

Neatpump

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Menu

Process heating and cooling

1.6 MW, 61°C, Process heating

2 x 1 stage 0.8 MW Systems

Chocolate factory

$COP_{heating}$ = 3.39

Evaporating temp. -5°C
Glycol/water 5°C to 0°C

Condensing temp. 60°C
Process heating water 12°C to 60°C

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Capital cost (Indexed)

	Ammonia	Boiler
Total capital cost comparison	**120**	**100**

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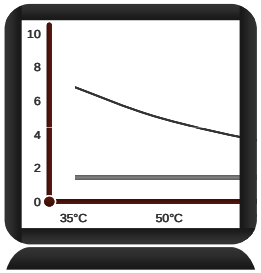
Energy efficiency

	Ammonia	Boiler
$COP_{heating}$	3.39	0.6
Energy cost per year	£170,000	£400,000
Carbon footprint (indirect) [1,000 kg]	1,530	2,880
Carbon footprint (direct) [1,000 kg]	0	0
Total Carbon footprint per year [1,000 kg]	1,530	2,880



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Menu

Maintenance cost (Indexed)

	Ammonia	Boiler
Yearly maintenance	250	100

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Life cycle cost

Based on 25 years life of equipment

	NPV Cost	Carbon Footprint [1,000 kg]
Ammonia heat pump	£15,033,000	290,000
Ammonia heat pump (cooling + heating)	£6,440,000	125,000
R134 heat pump	£17,350,000	335,000
Gas boiler	£31,300,000	480,000

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Conclusion

Deployment of ammonia heat pumps
HOW?

- Reverse Western society's disposable culture
- Low Carbon footprint investments
- Long term investments
- Longer warranties: 3 years, 5 years or lifetime
- Cheaper, robust and future proof
- Priceless benefit of installation like desalination

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