Trigeneration and Tertiary Education Carbon Neutrality

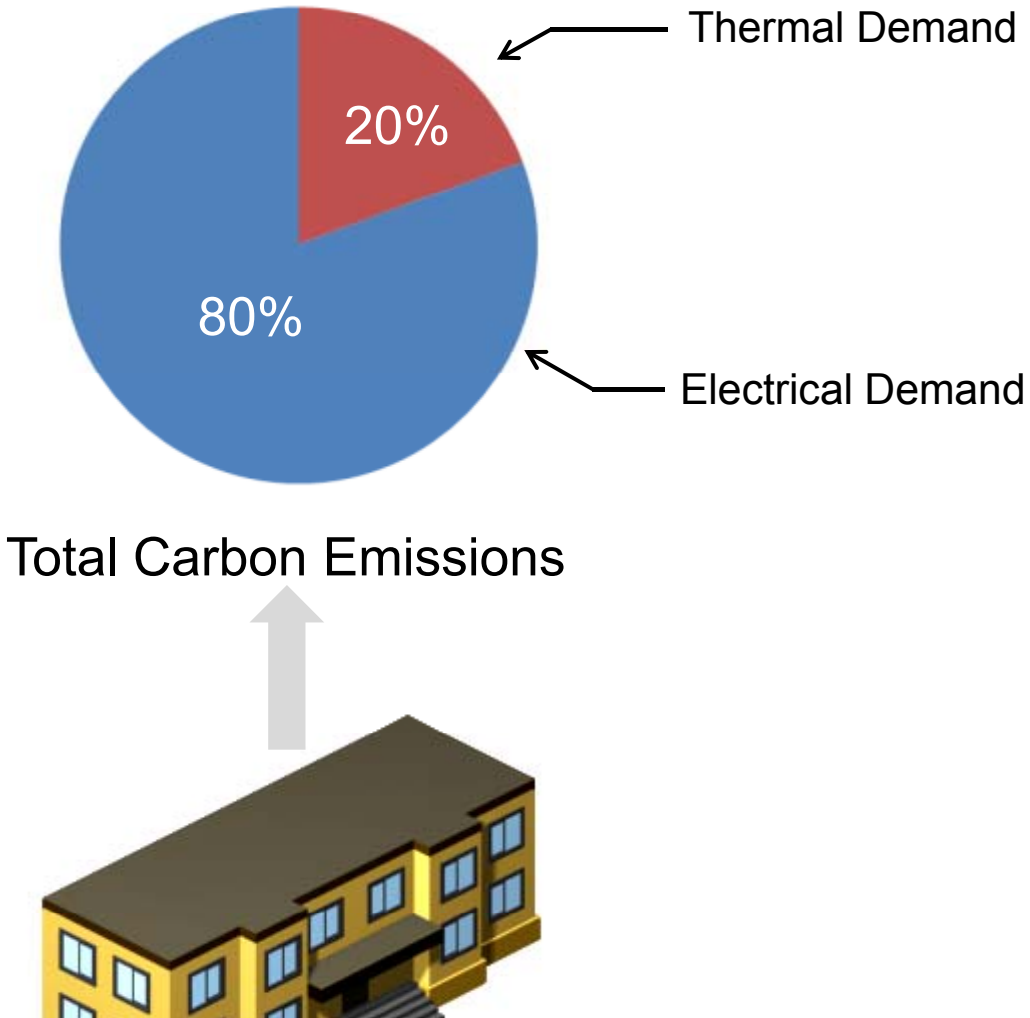
Nick Bamford

15th August, 2011

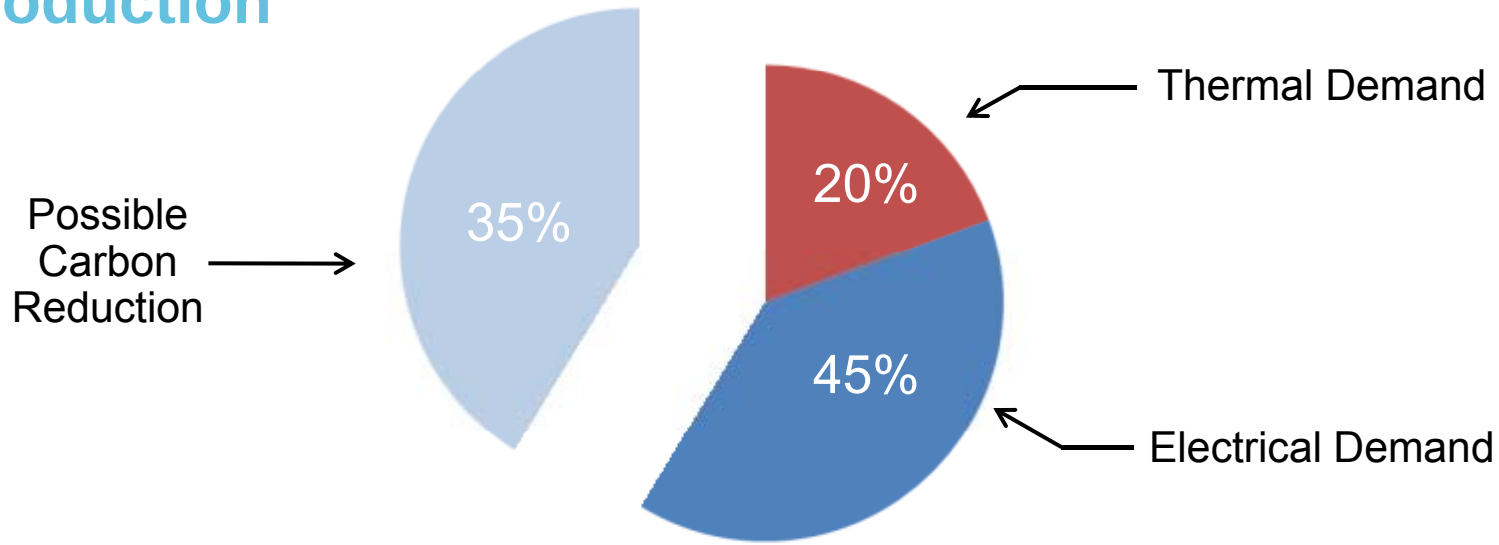
AECOM

troduction

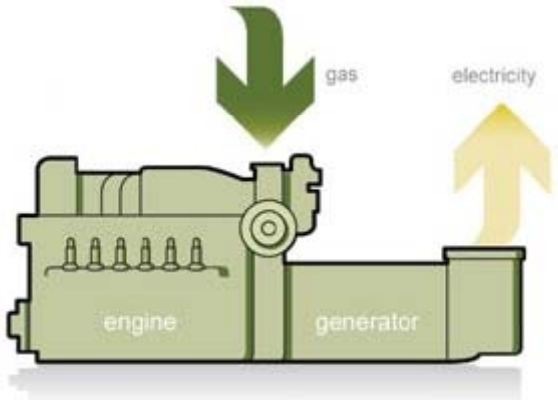
Reducing carbon emissions in universities.


Thermal Demand
20%
80%
Electrical Demand
Total Carbon Emissions

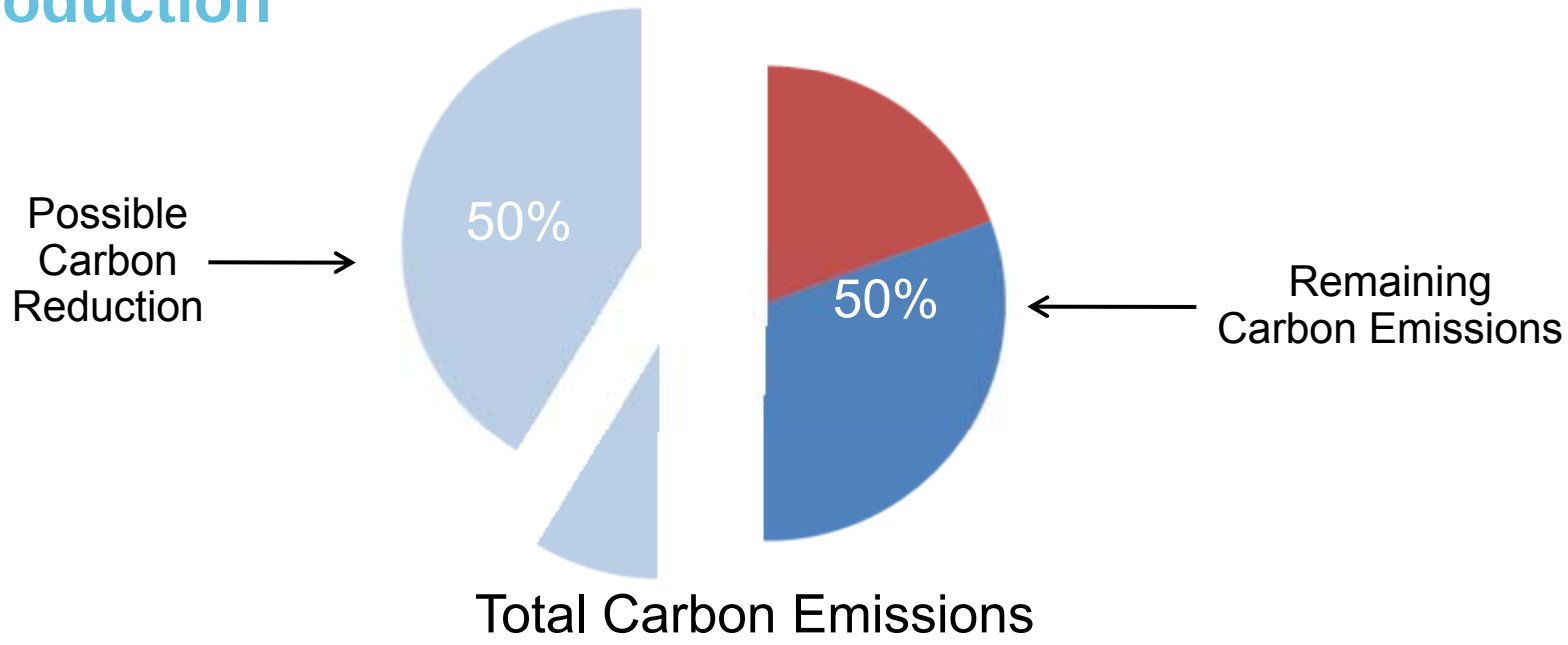
troduction

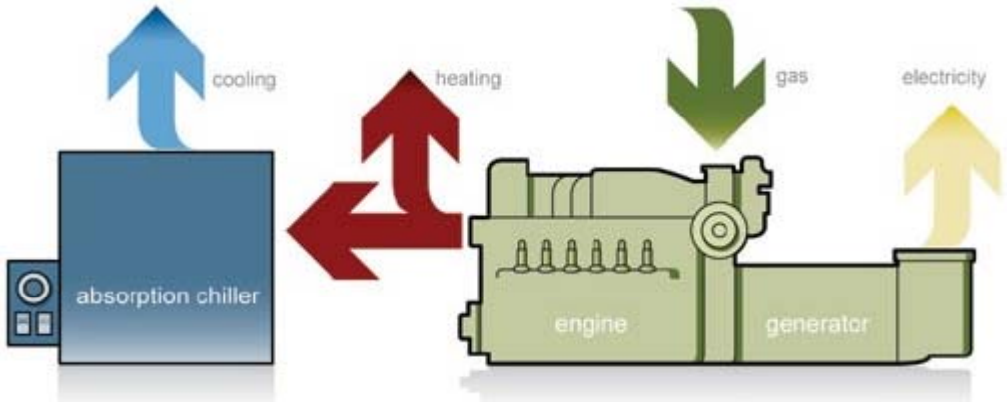


Total Carbon Emissions



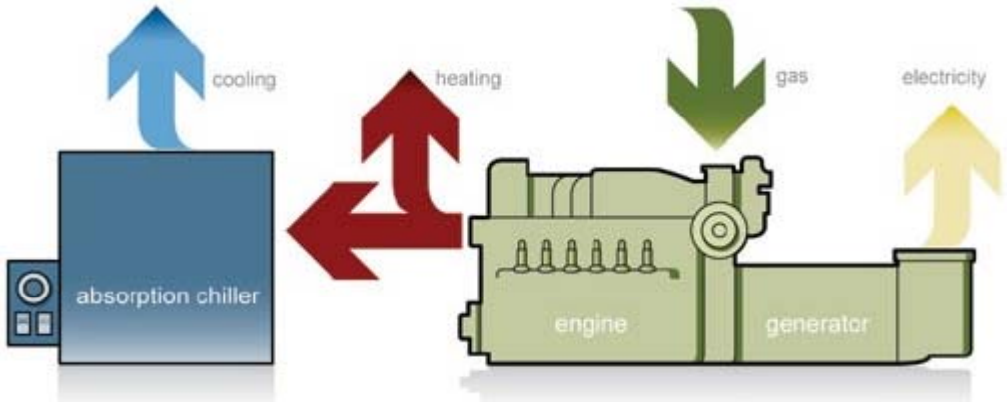
troduction


Possible
Carbon
Reduction
50%
50%
Remaining
Carbon Emissions
Total Carbon Emissions


cooling
heating
gas
electricity
absorption chiller
engine
generator

troduction

Trigeneration is one of the single largest onsite carbon reduction strategies available to tertiary institutions.



troduction

1. Why install Trigeneration
2. Trigeneration Feasibility
3. The Future of Trigeneration

hy Trigeneration?

Security of Supply

hy Trigeneration?

Security of Supply

Utility Cost Reduction

$$\text{Net Present Value} = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}$$

hy Trigeneration?

Security of Supply

Utility Cost Reduction

Carbon Reduction

$$\$/\text{ton}CO_2 = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}$$

hy Trigeneration?

Security of Supply

Utility Cost Reduction

Carbon Reduction

GreenStar

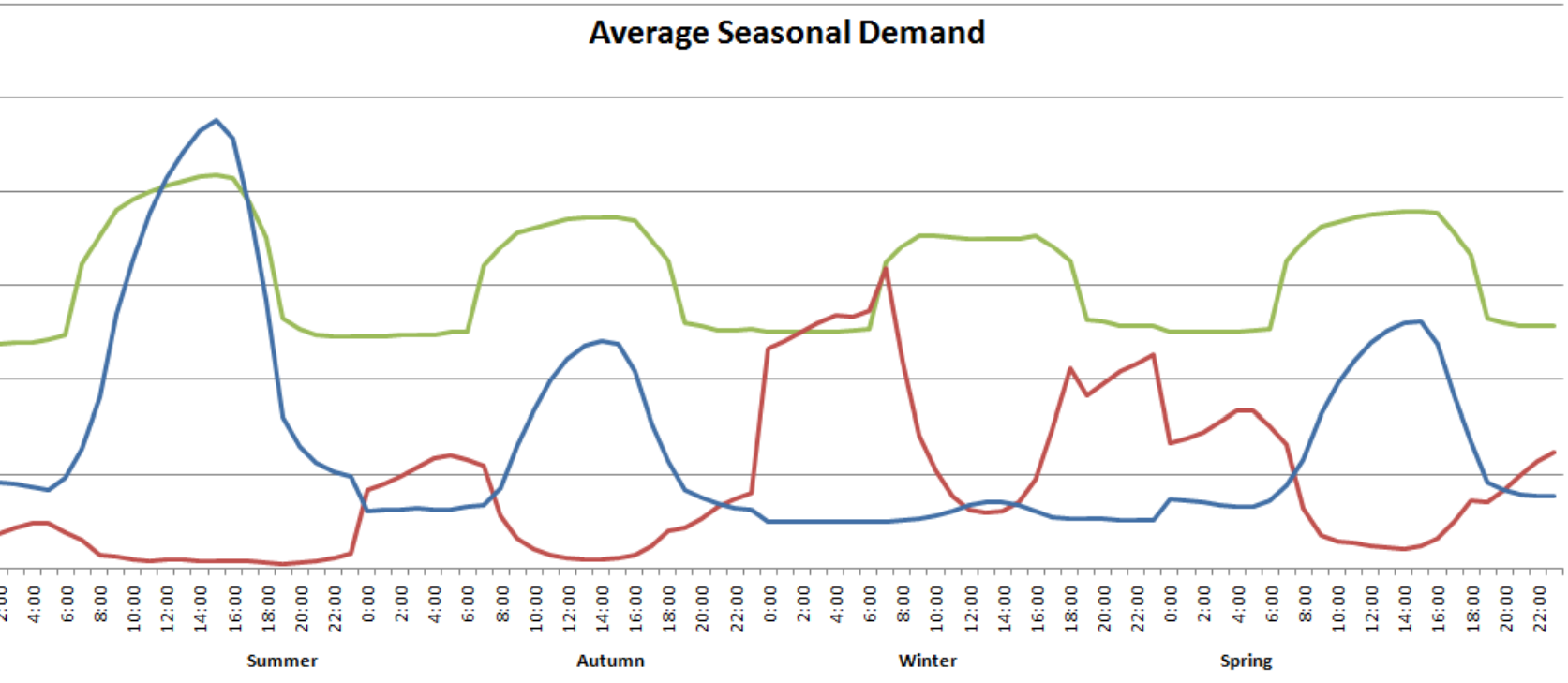
igeneration Feasibility

actors that influence trigeneration feasibility;

igeneration Feasibility

actors that influence trigeneration feasibility;

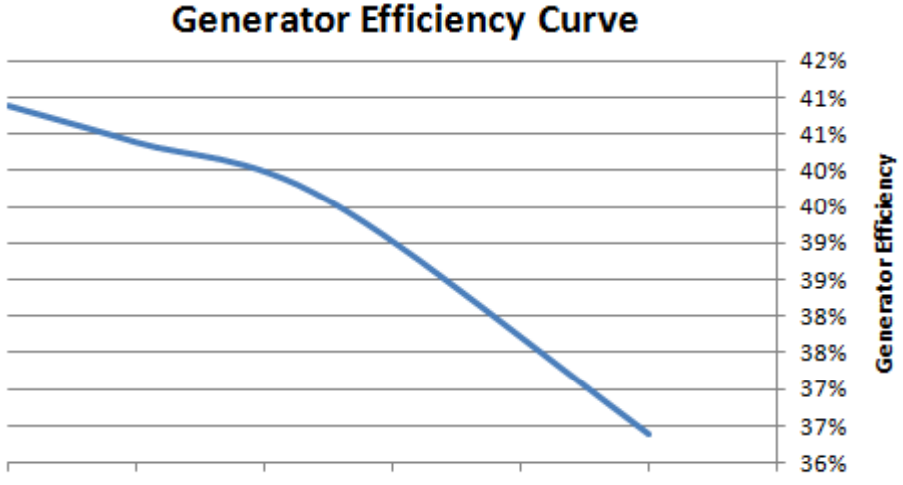
- High utilisation of waste heat



igeneration Feasibility

actors that influence trigeneration feasibility;

- High utilisation of waste heat
- Run trigeneration at peak efficiency



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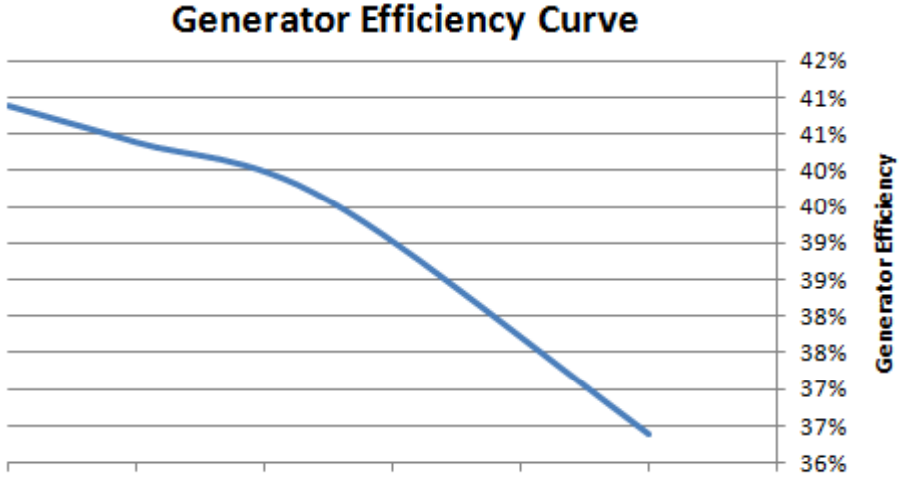
- Run trigeneration at peak efficiency
- Reduce maintenance costs



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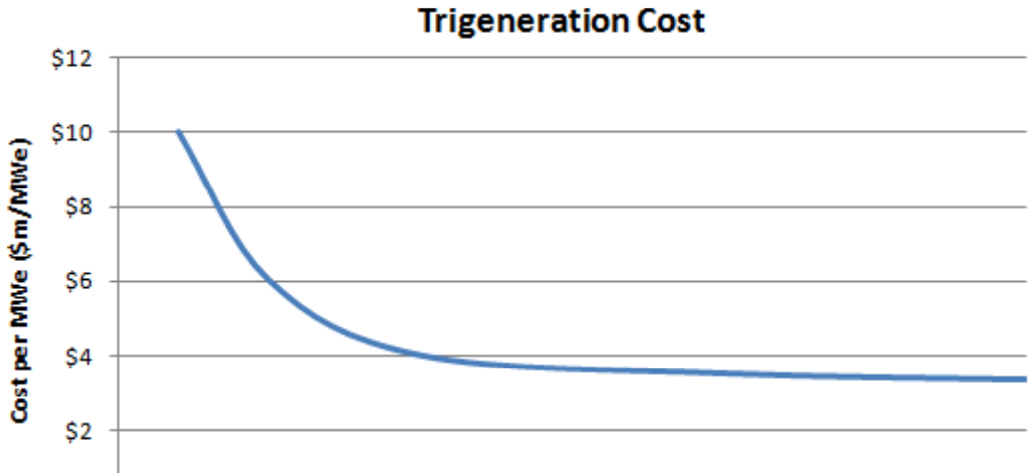
- High utilisation of waste heat
- Run trigeneration at peak efficiency
- Reduce maintenance costs
- Minimise construction costs



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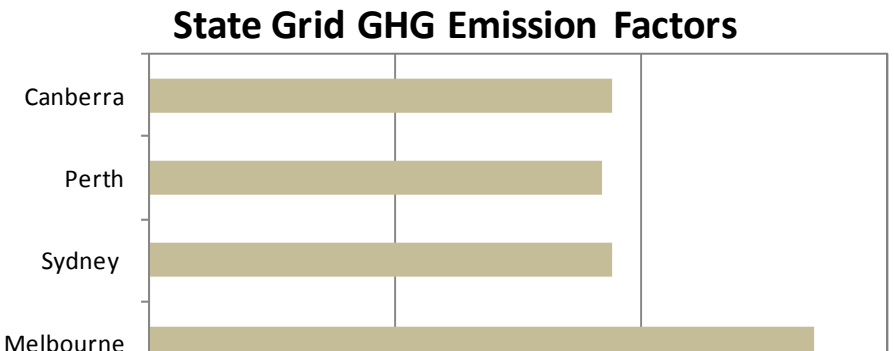
- High utilisation of waste heat
- Run trigeneration at peak efficiency
- Reduce maintenance costs
- Minimise construction costs
- Grid electricity carbon factor



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- Run trigeneration at peak efficiency
- Reduce maintenance costs
- Minimise construction costs
- Grid electricity carbon factor
- Foreseeable utility tariffs
- Real discount rate

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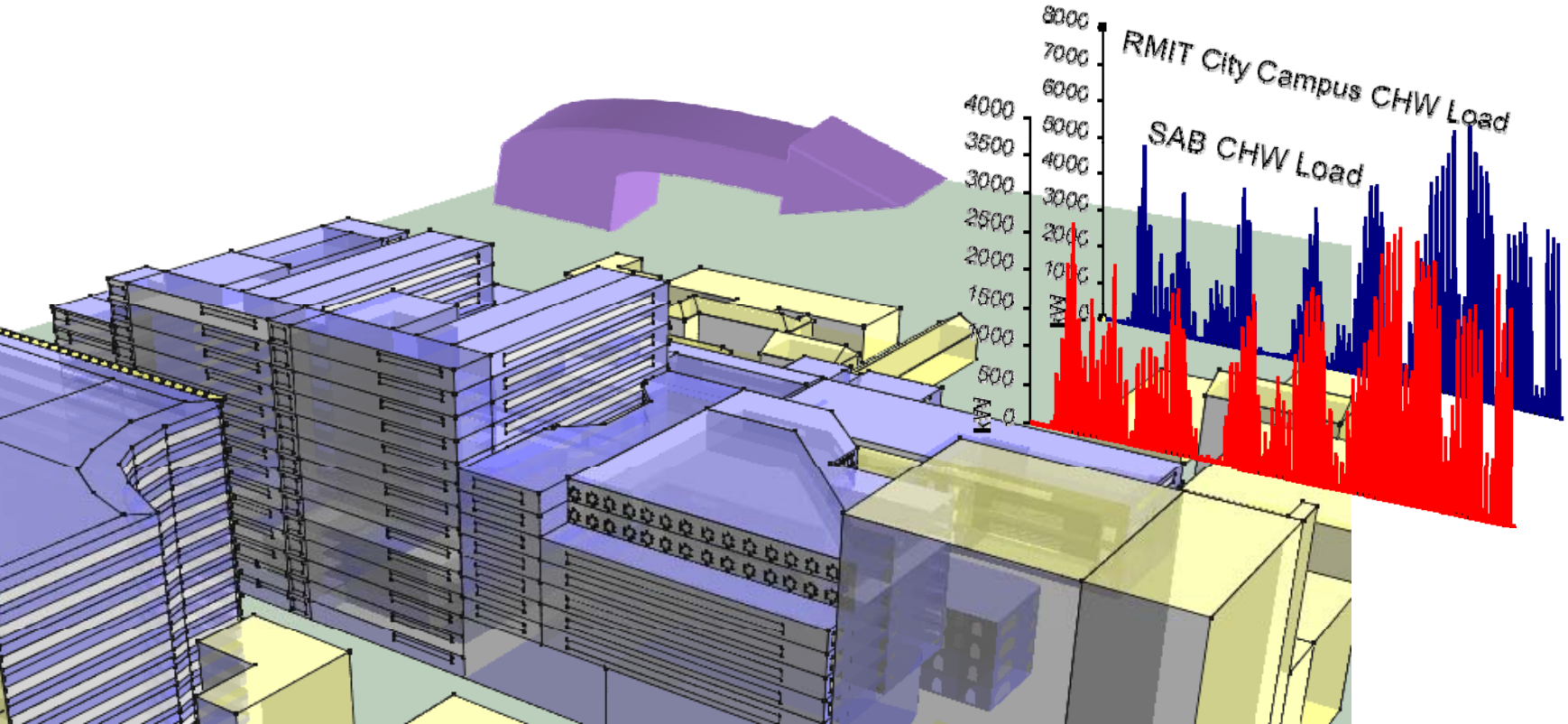
Related to trigeneration capacity

igeneration Feasibility

ptimal trigeneration sizing;

RMIT UNIVERSITY



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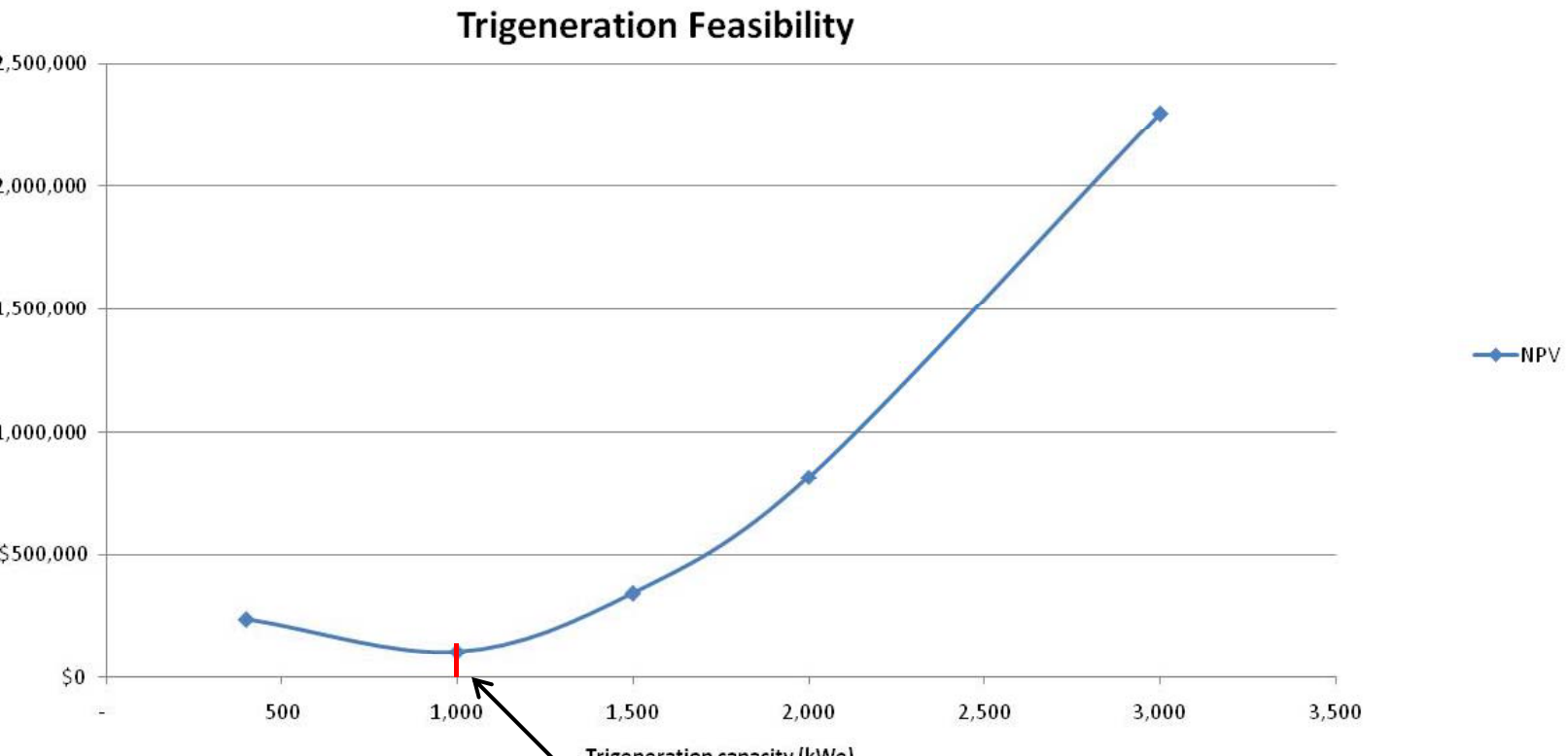

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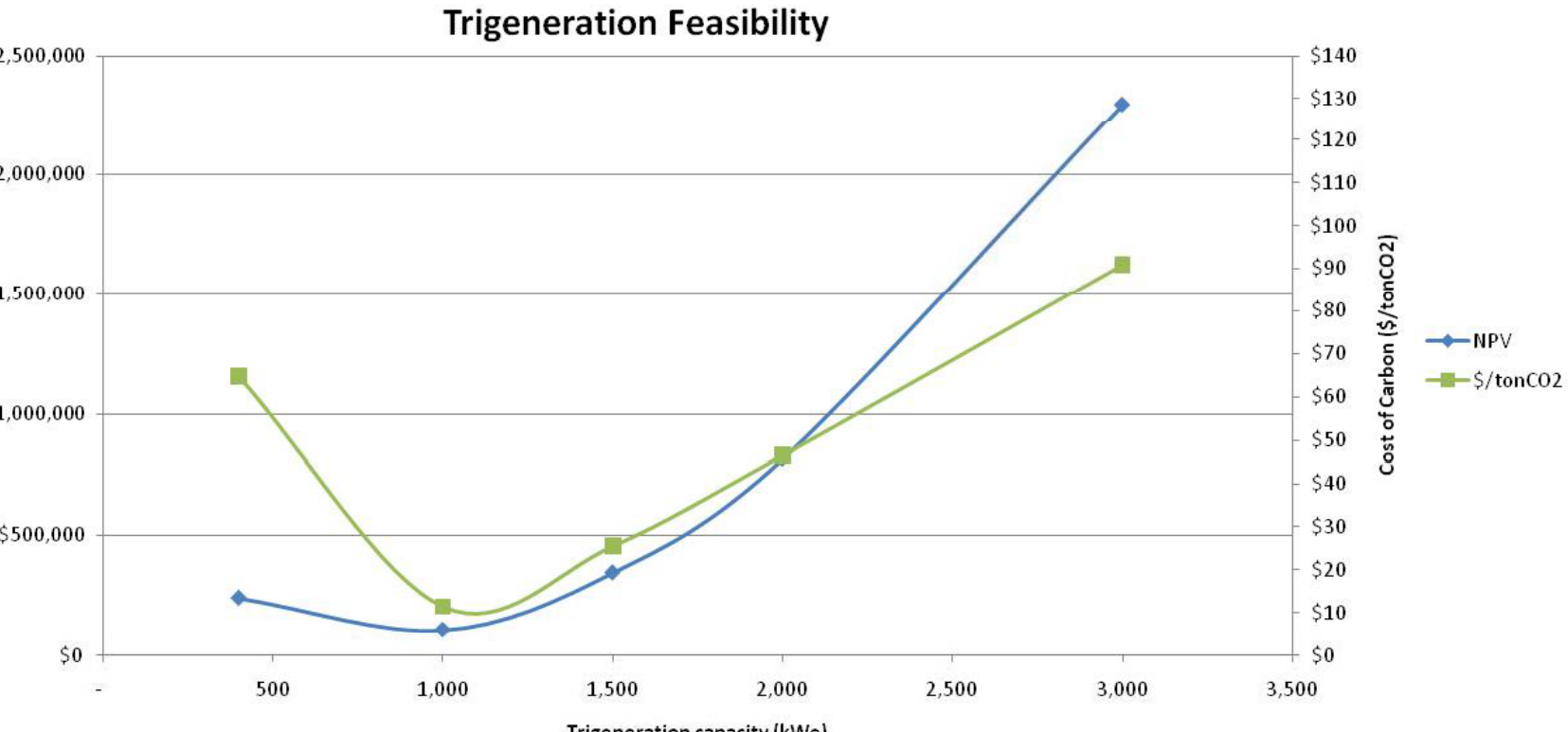

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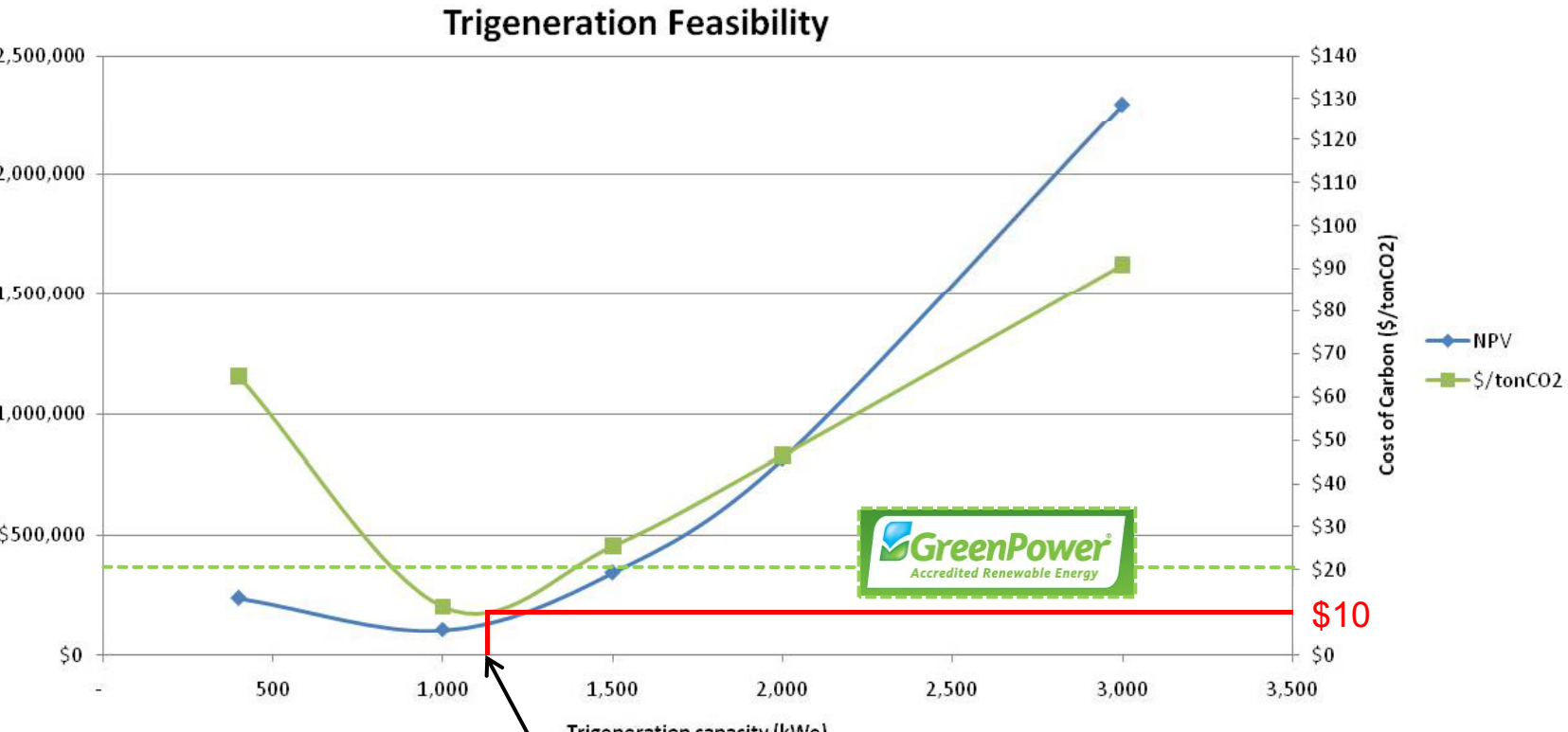
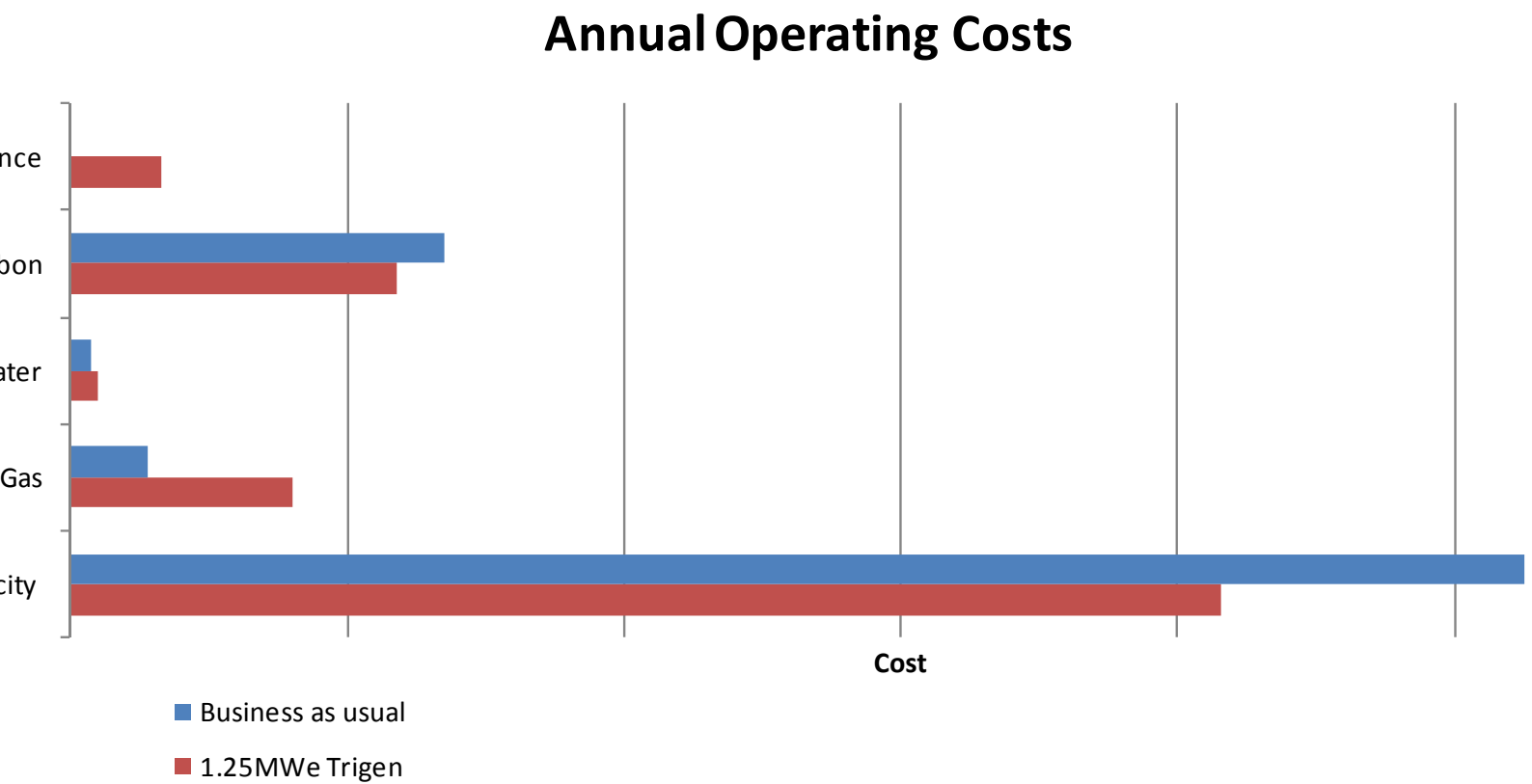


igeneration Feasibility

nnual operating costs;



uture of Trigeneration

actors that influence trigeneration feasibility;

- High utilisation of waste heat
- Run trigeneration at peak efficiency
- Reduce maintenance costs
- Minimise construction costs

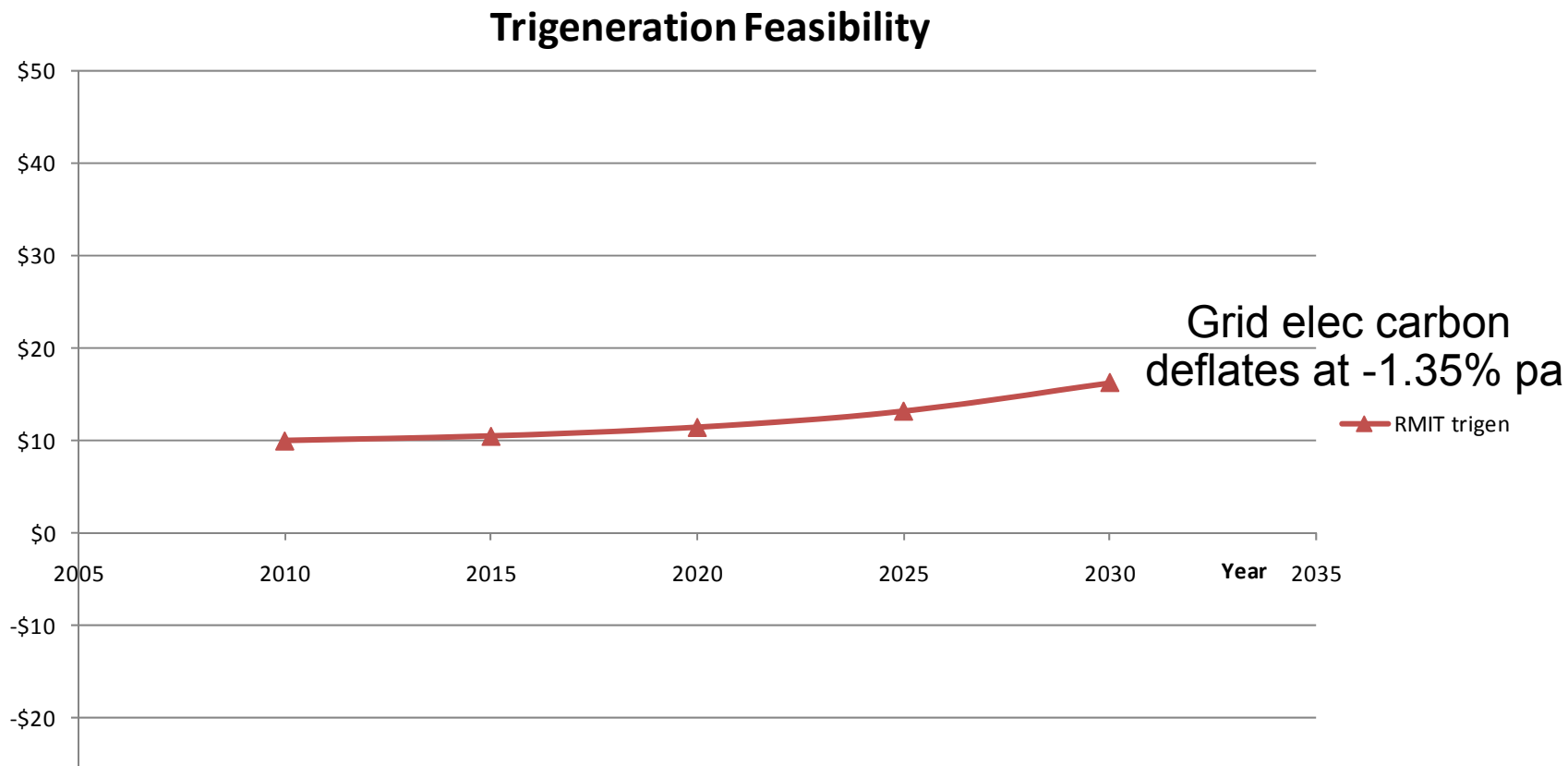
Related to trigeneration capacity

- Foreseeable utility tariffs
- Real discount rate
- Grid electricity carbon factor
- Cost of Carbon
- Construction cost inflation over CPI

Forward project factors to 2030

uture of Trigeneration

rojected Trigeneration Feasibility



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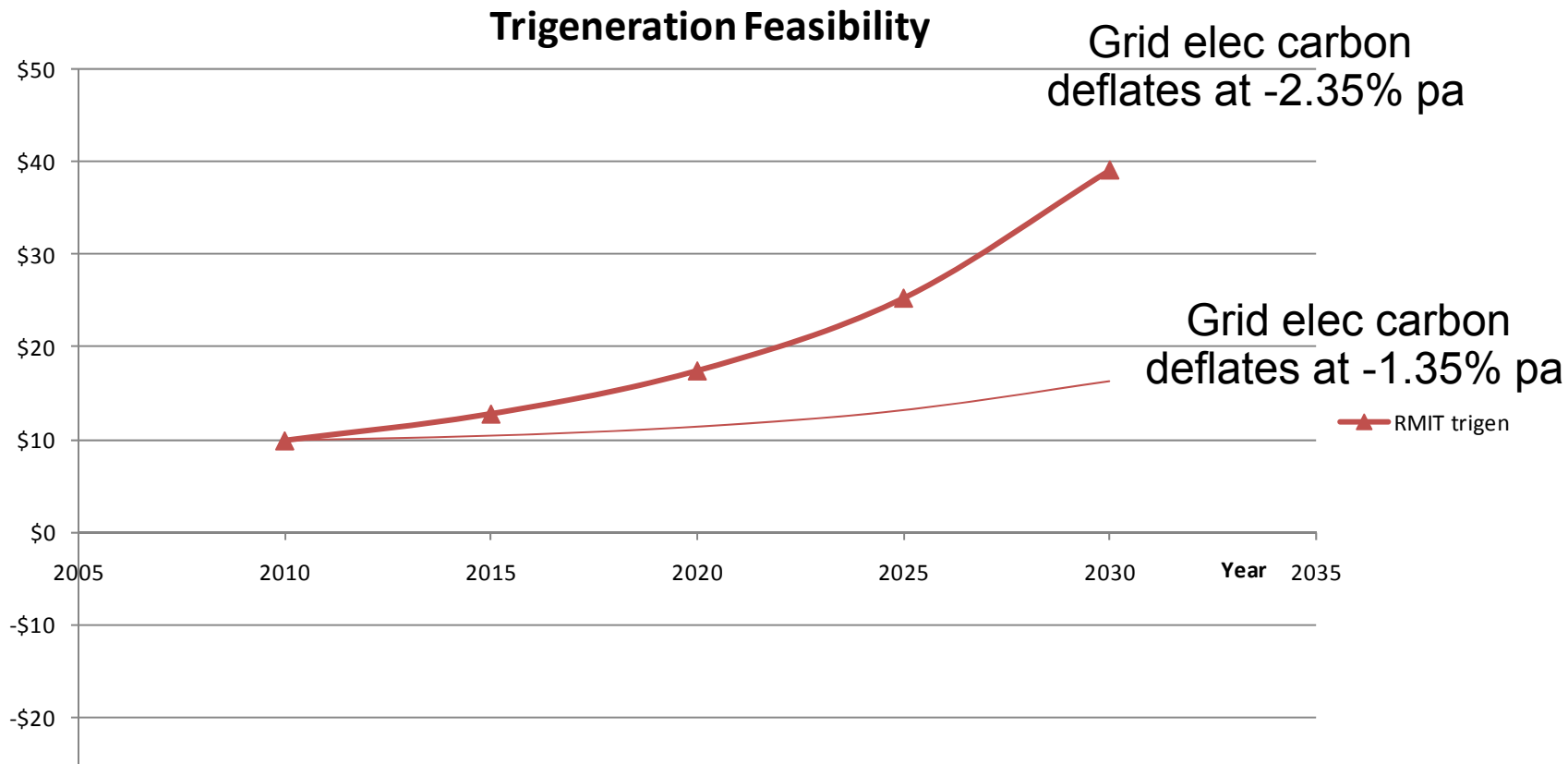

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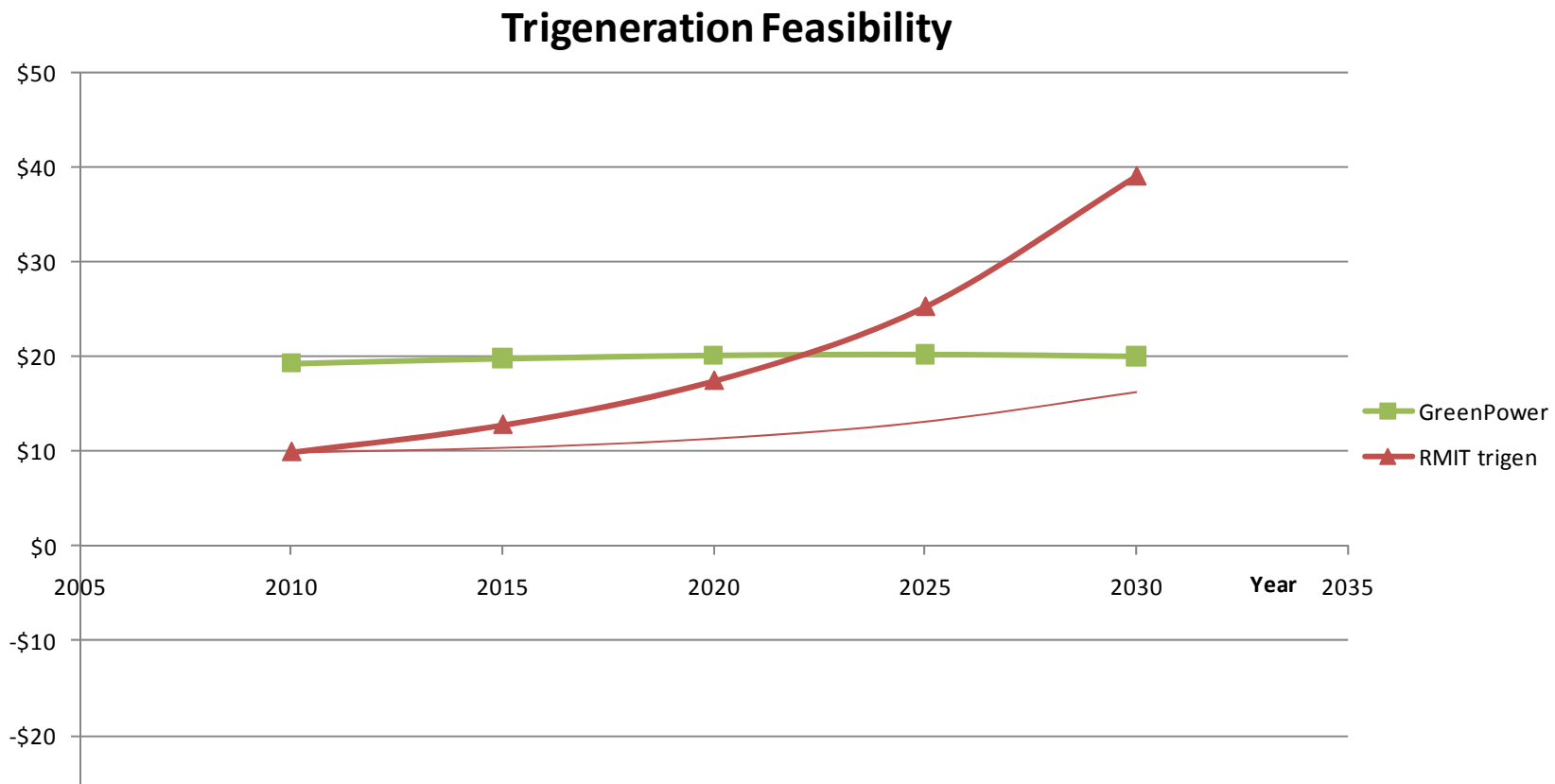

uture of Trigeneration

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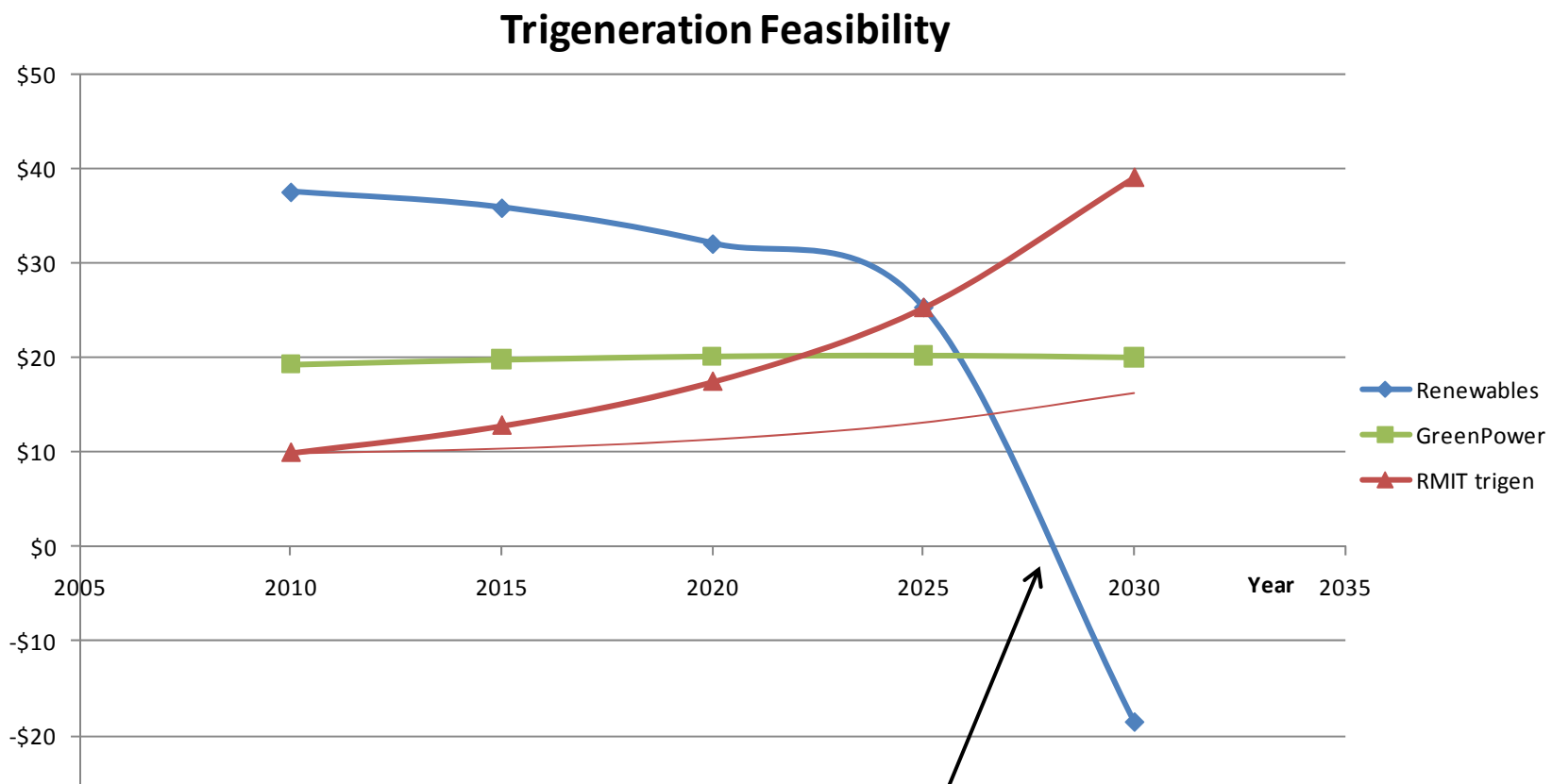

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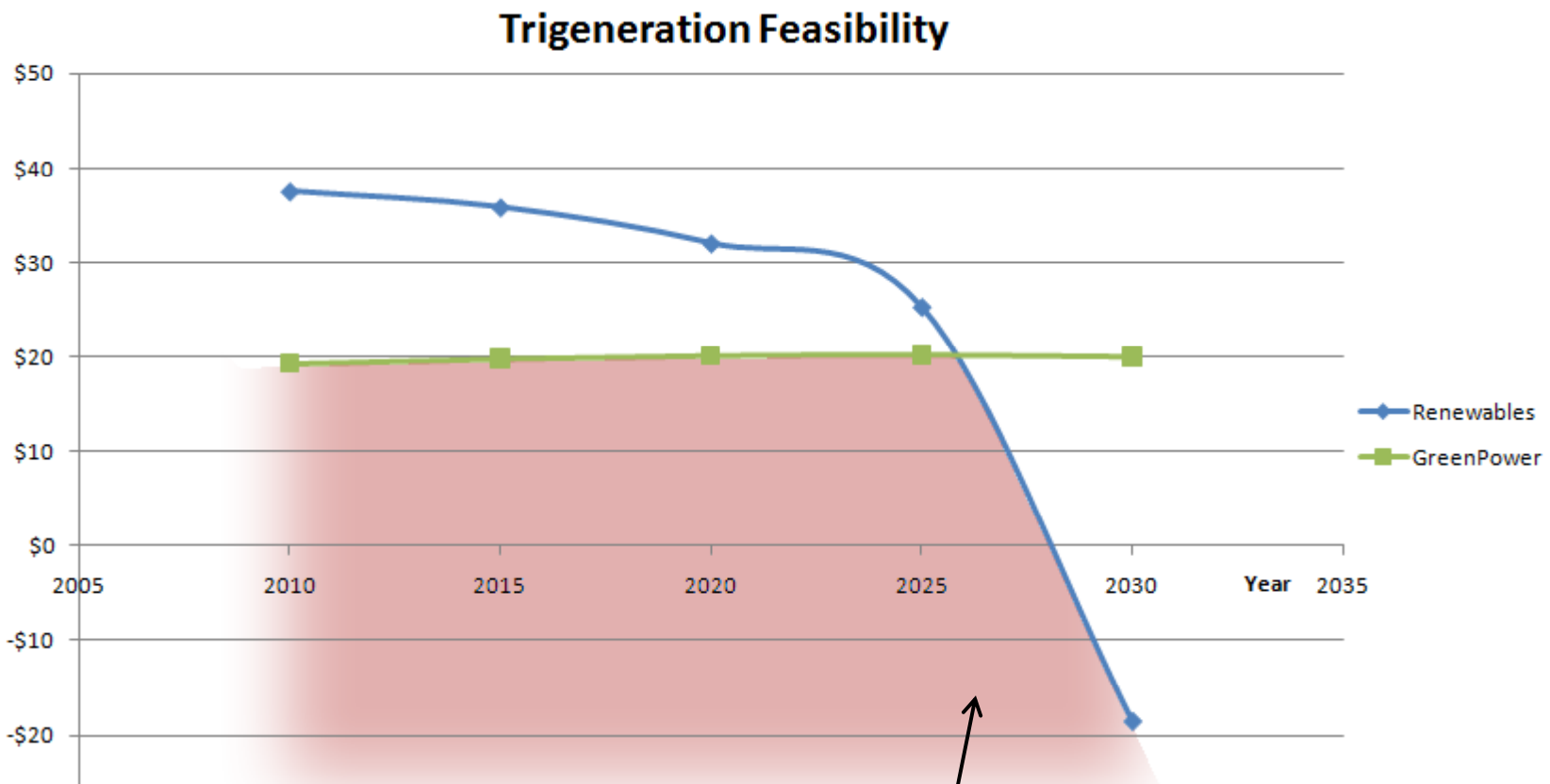

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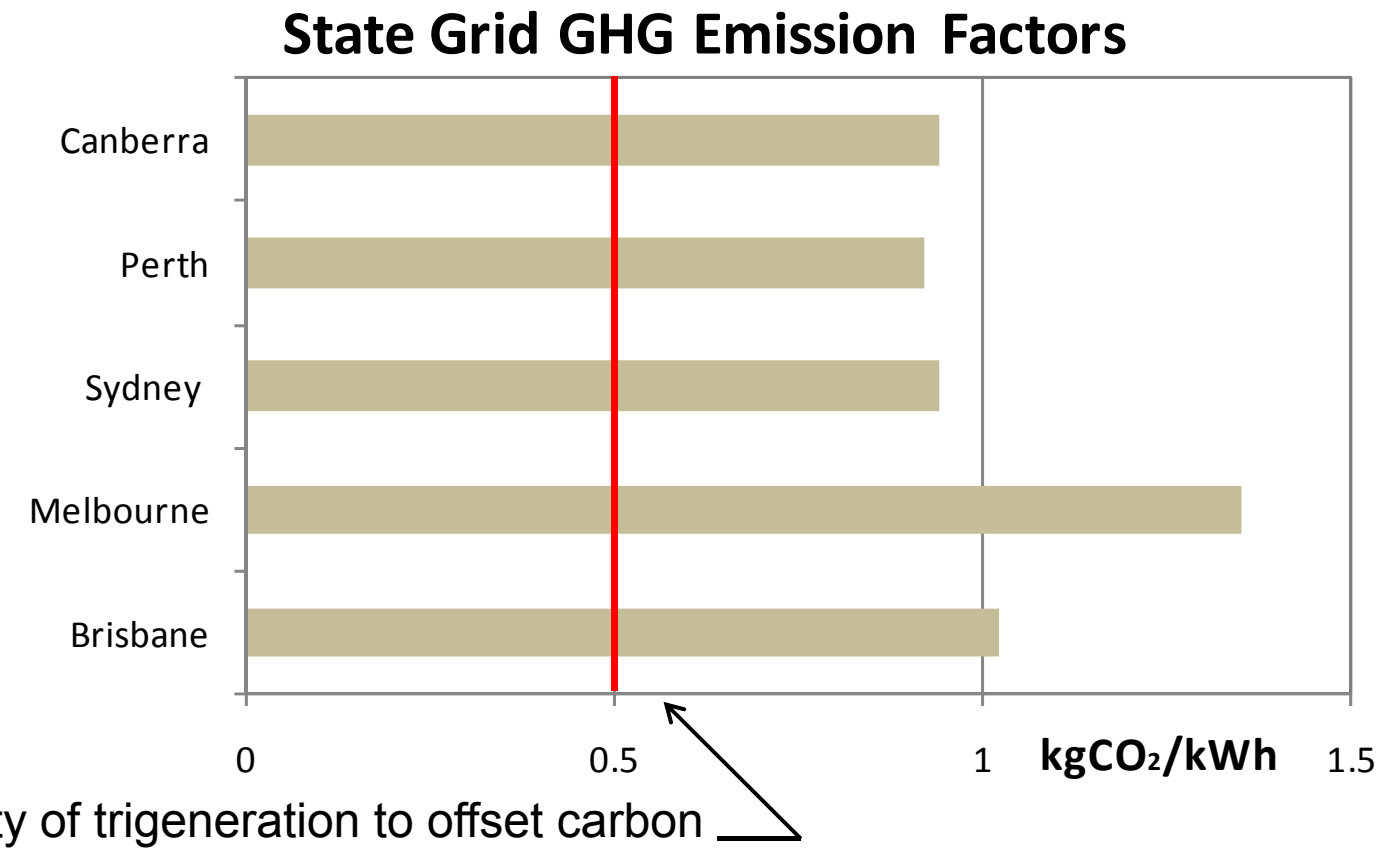
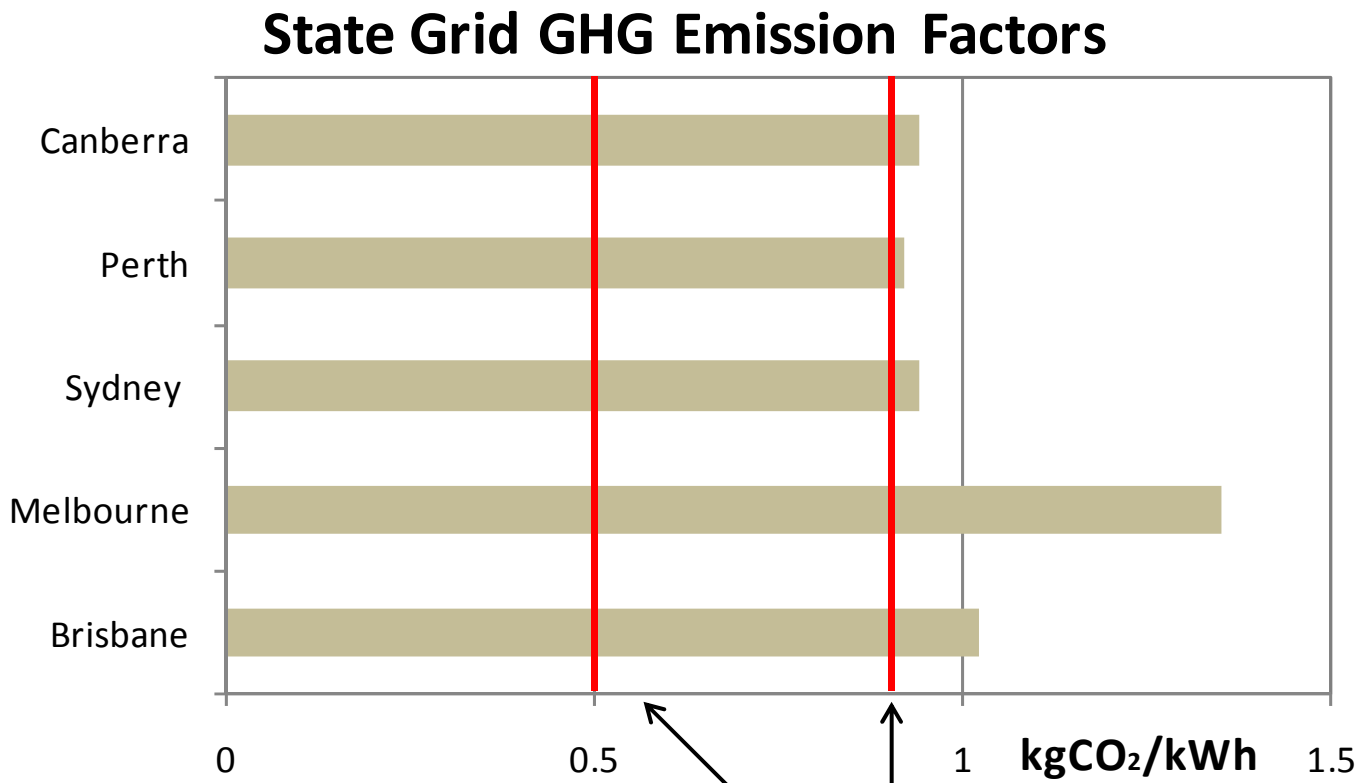


Ability of trigeneration to offset carbon

uture of Trigeneration

rojected Trigeneration Feasibility



Ability of trigeneration to offset carbon

ummary

Trigeneration will continue to be a means for carbon reduction in the near future.

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Large scale wind and solar will compete with trigeneration as a means of carbon reduction from around 2030.

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Feasibility process is key to ensuring cost effective trigeneration.

hank You

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