



Low Exergy Solar thermal supply for community based energy

Drake Landing as a working example

Ken Church P Eng
CanmetENERGY
Natural Resources Canada`



Credits to:

Drake Landing Solar Community

Natural Resources Canada – Doug Mclenahan

SAIC – Bill Wong

ATCO Gas

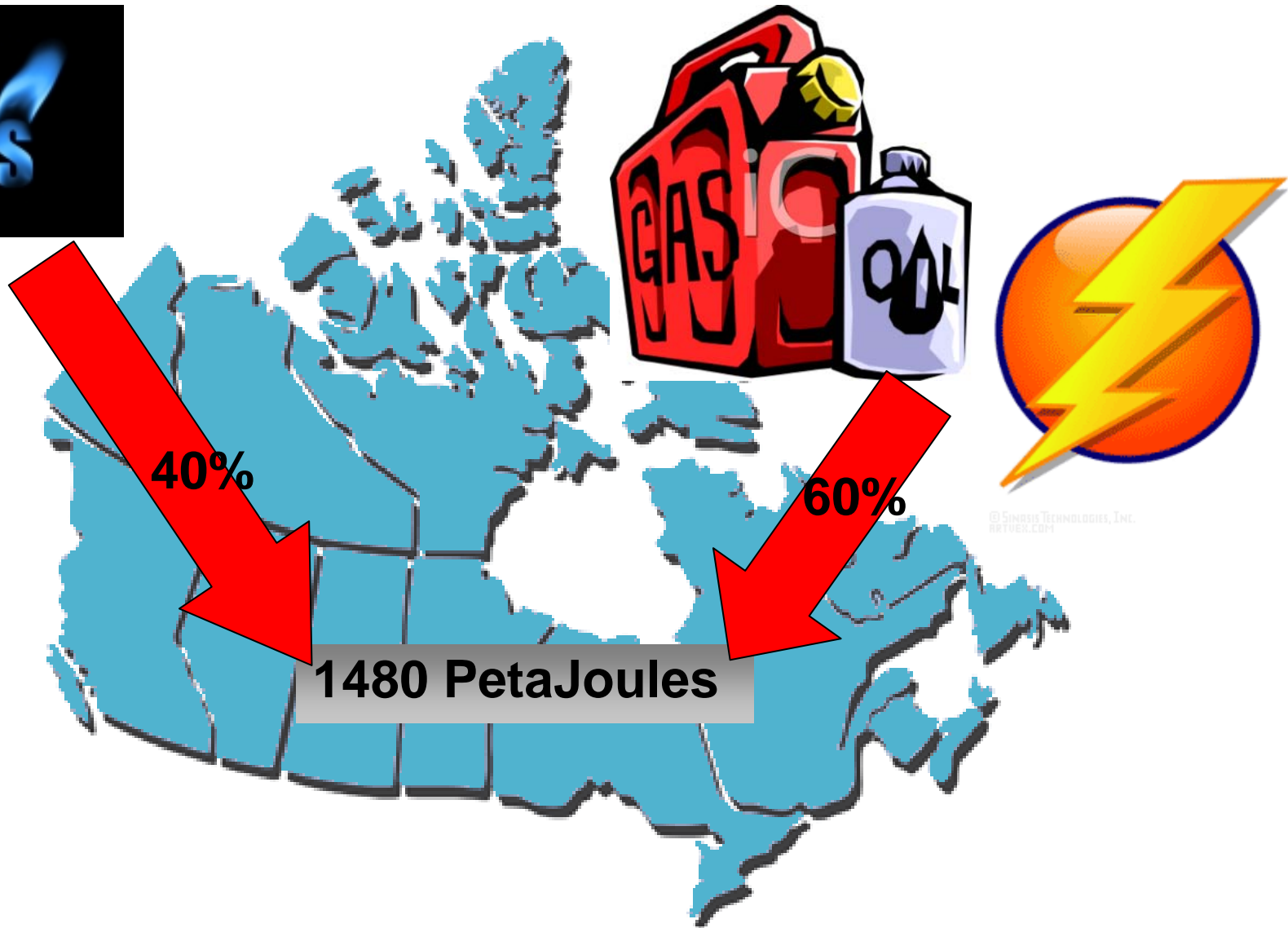
and many others....



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Ressources naturelles
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Canadian Energy Streams

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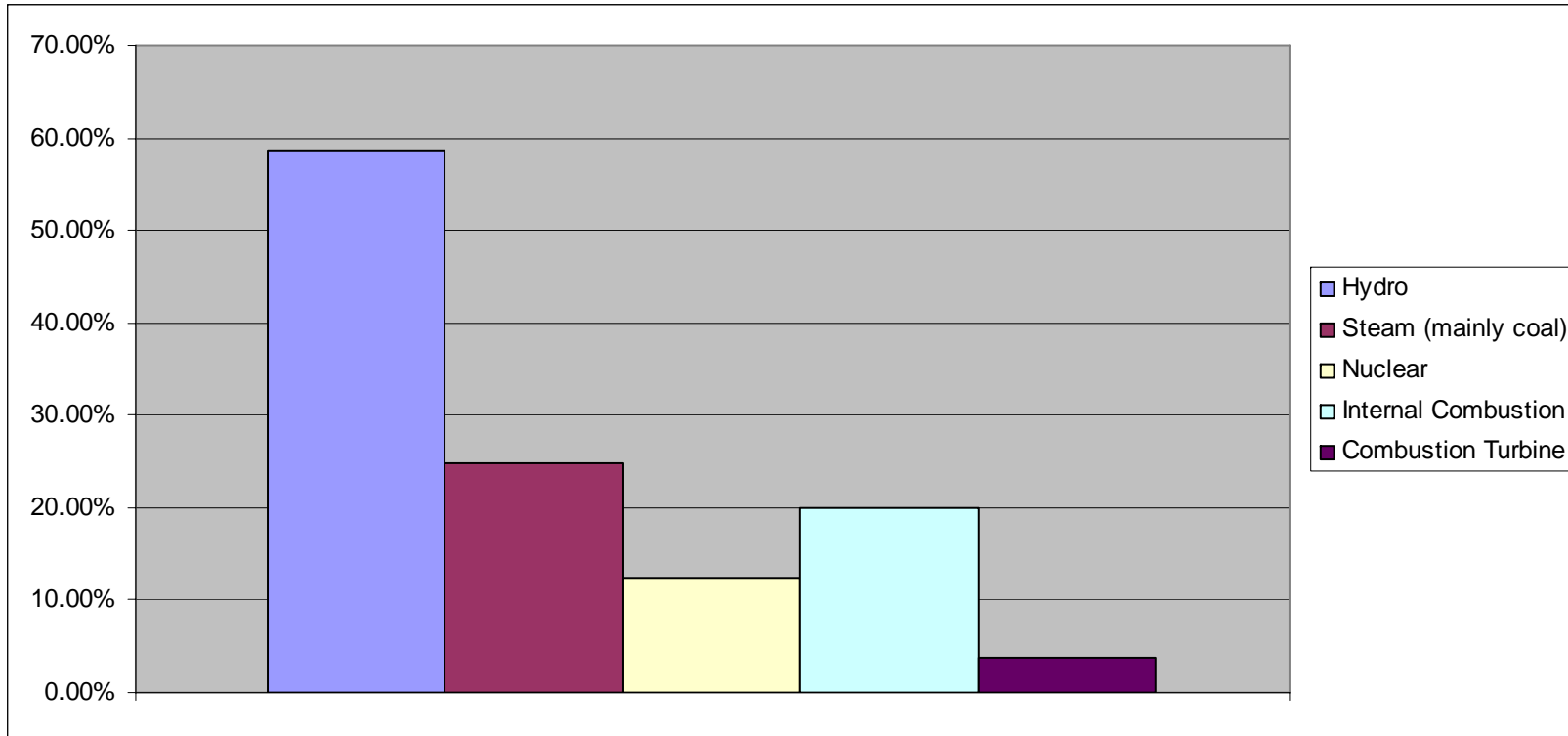


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Canadian Electrical Supply



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Canadian Mentality

We have the resources

Use them

Wisely

But

Don't forget

Resources mean jobs.....

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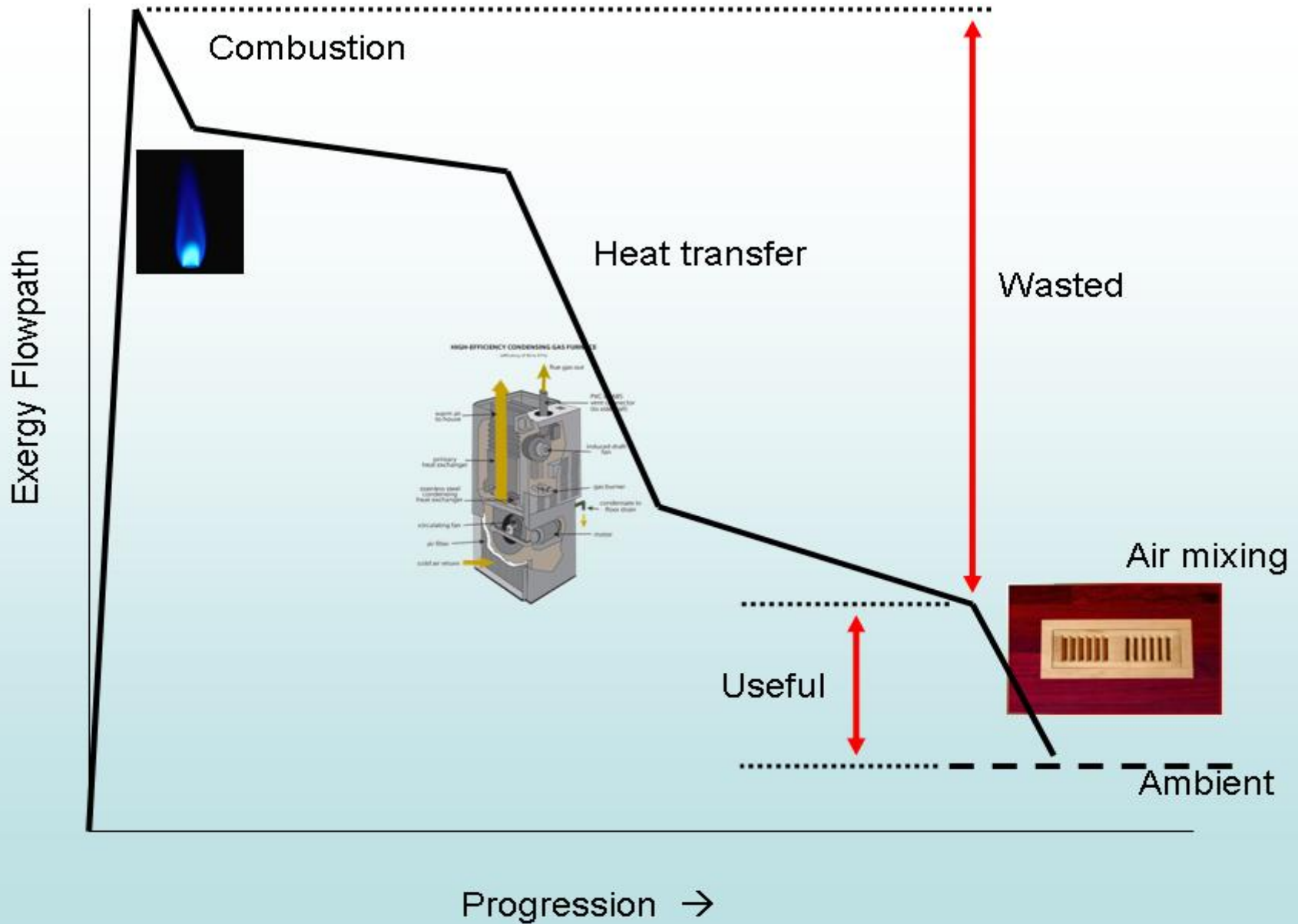
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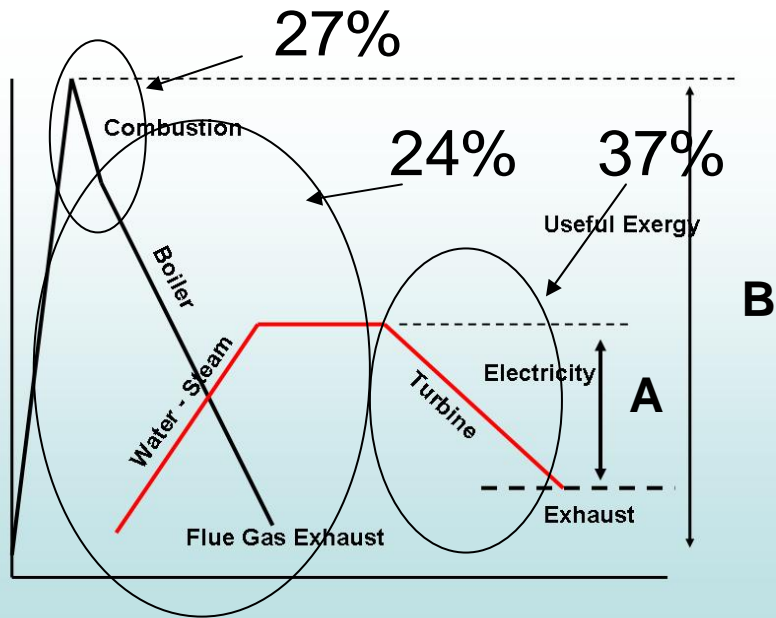
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Typical Exergy Flow





Steam Turbine

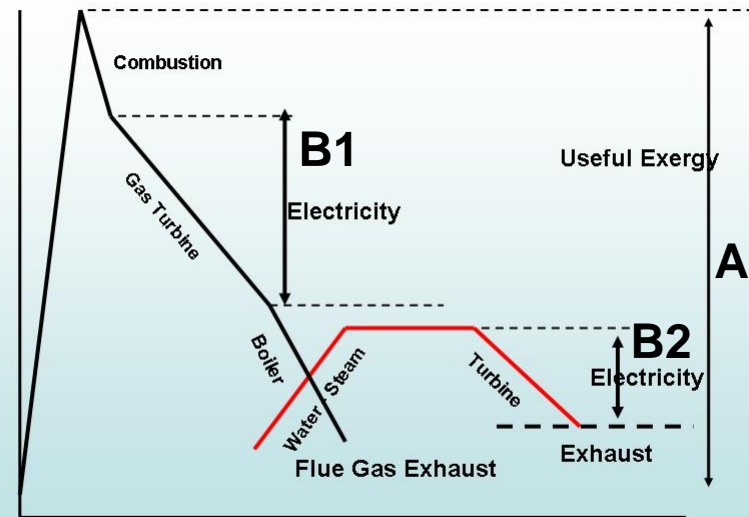
$$\text{Efficiency} = \frac{\sum B}{A}$$

$$= B/A$$

Gas Turbine

$$\text{Efficiency} = \frac{\sum B}{A}$$

$$= (B1+B2)/A$$



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Drake Landing Solar Community

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Okotoks Housing and Panels



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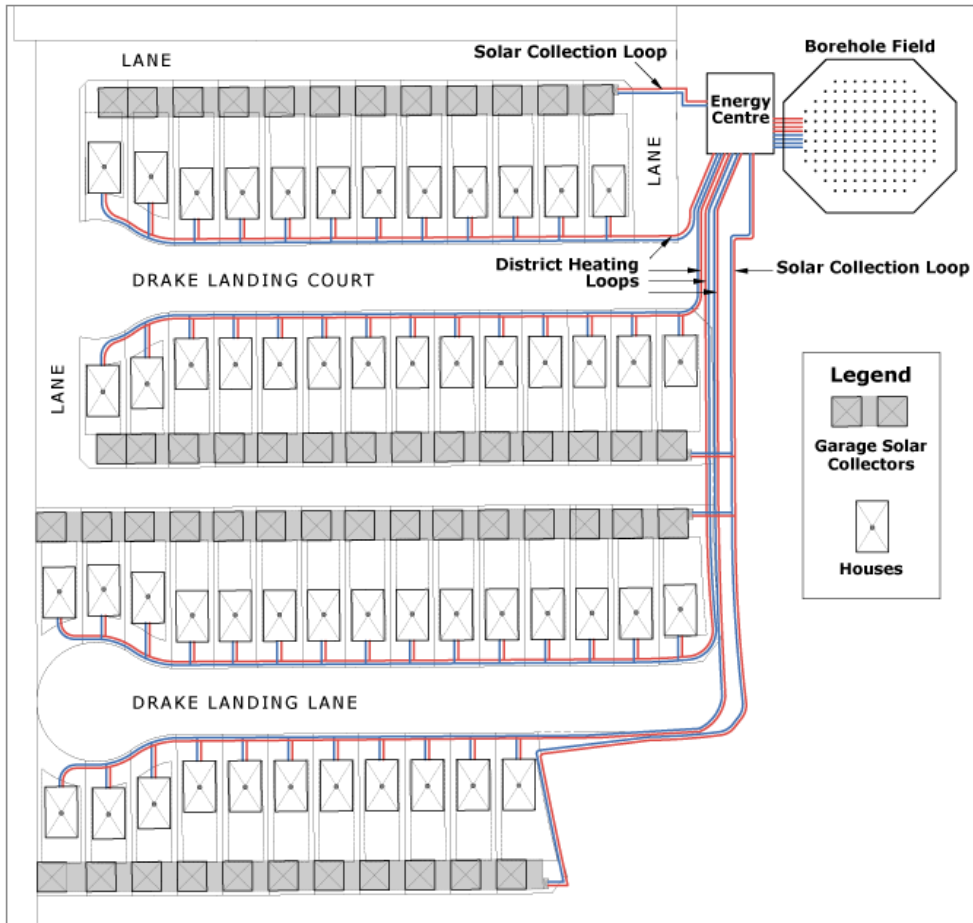
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Collection and Distribution piping

Garage mounted solar collectors



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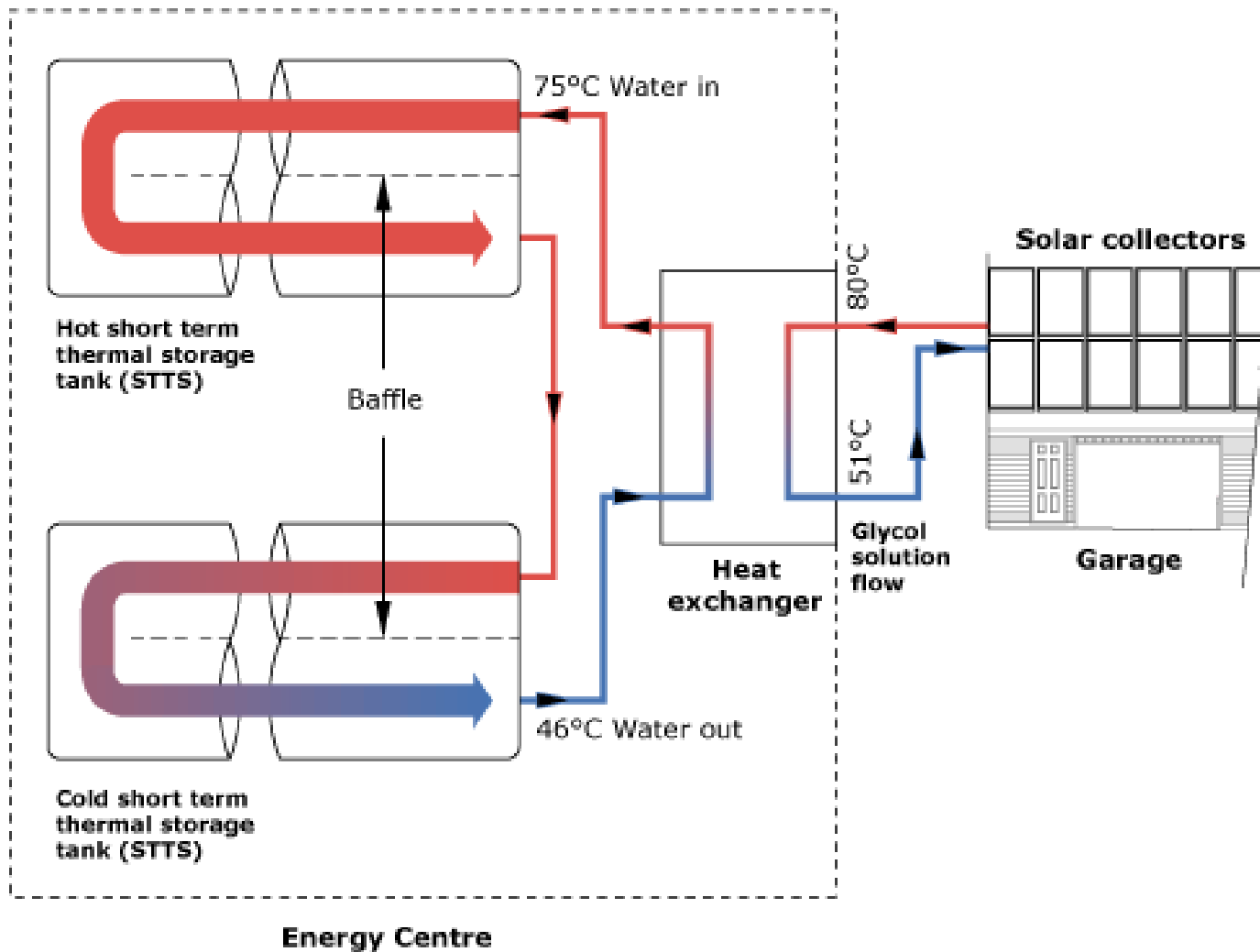
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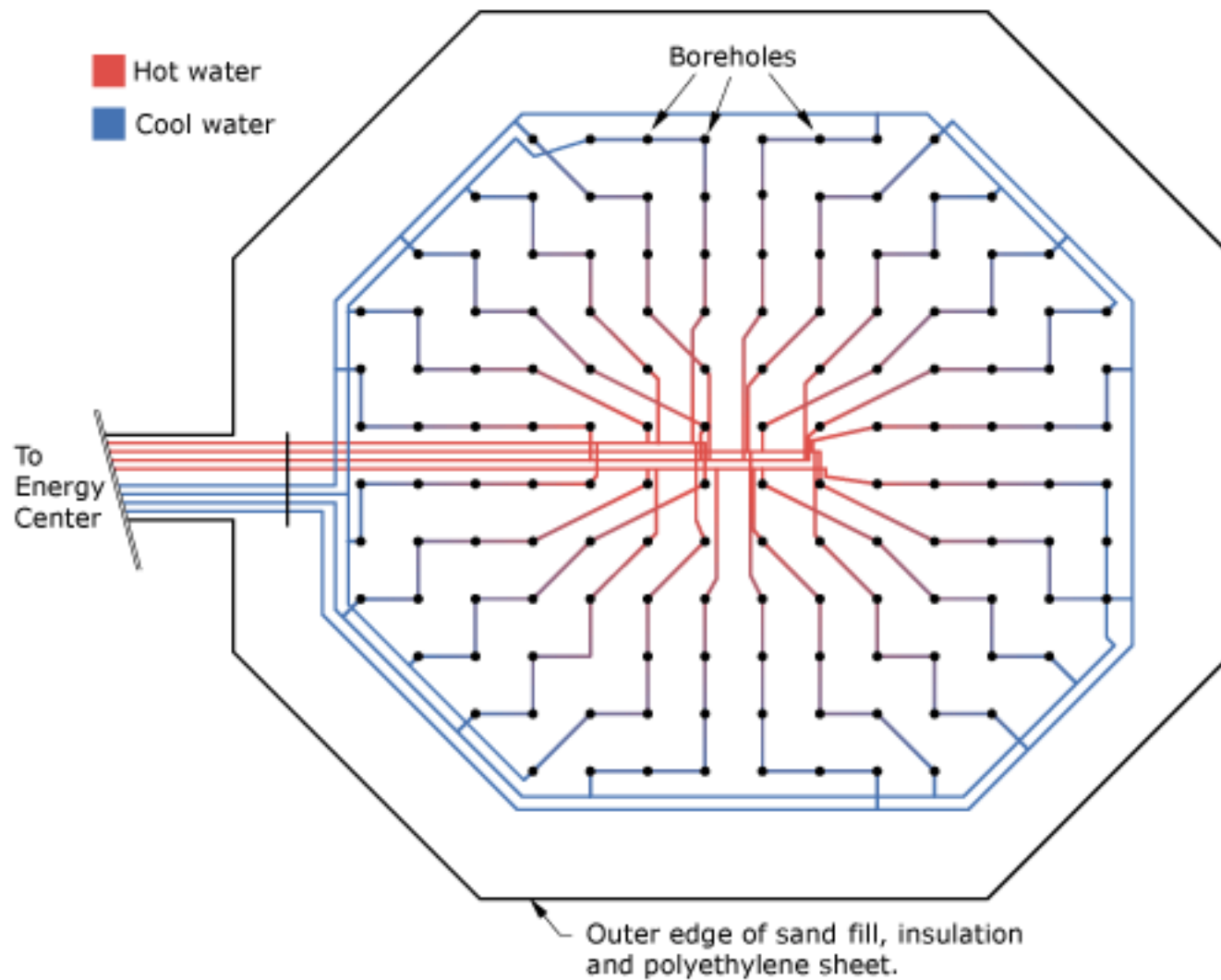
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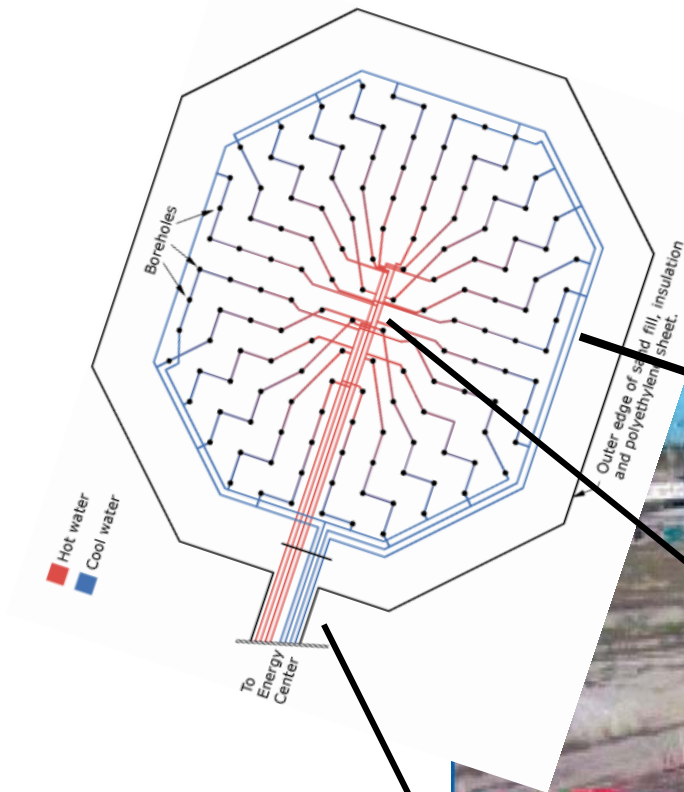


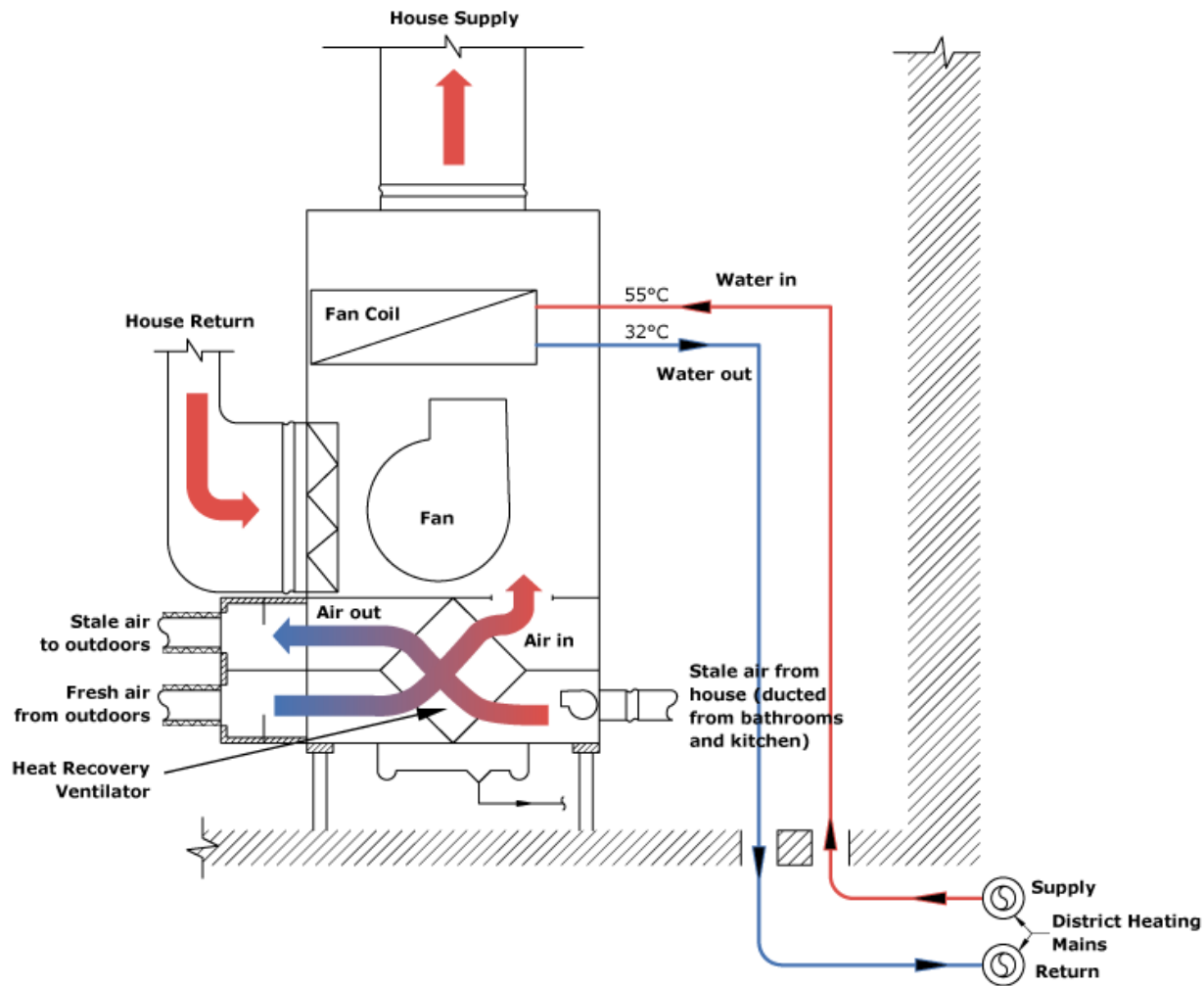
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Borehole Thermal Energy Storage





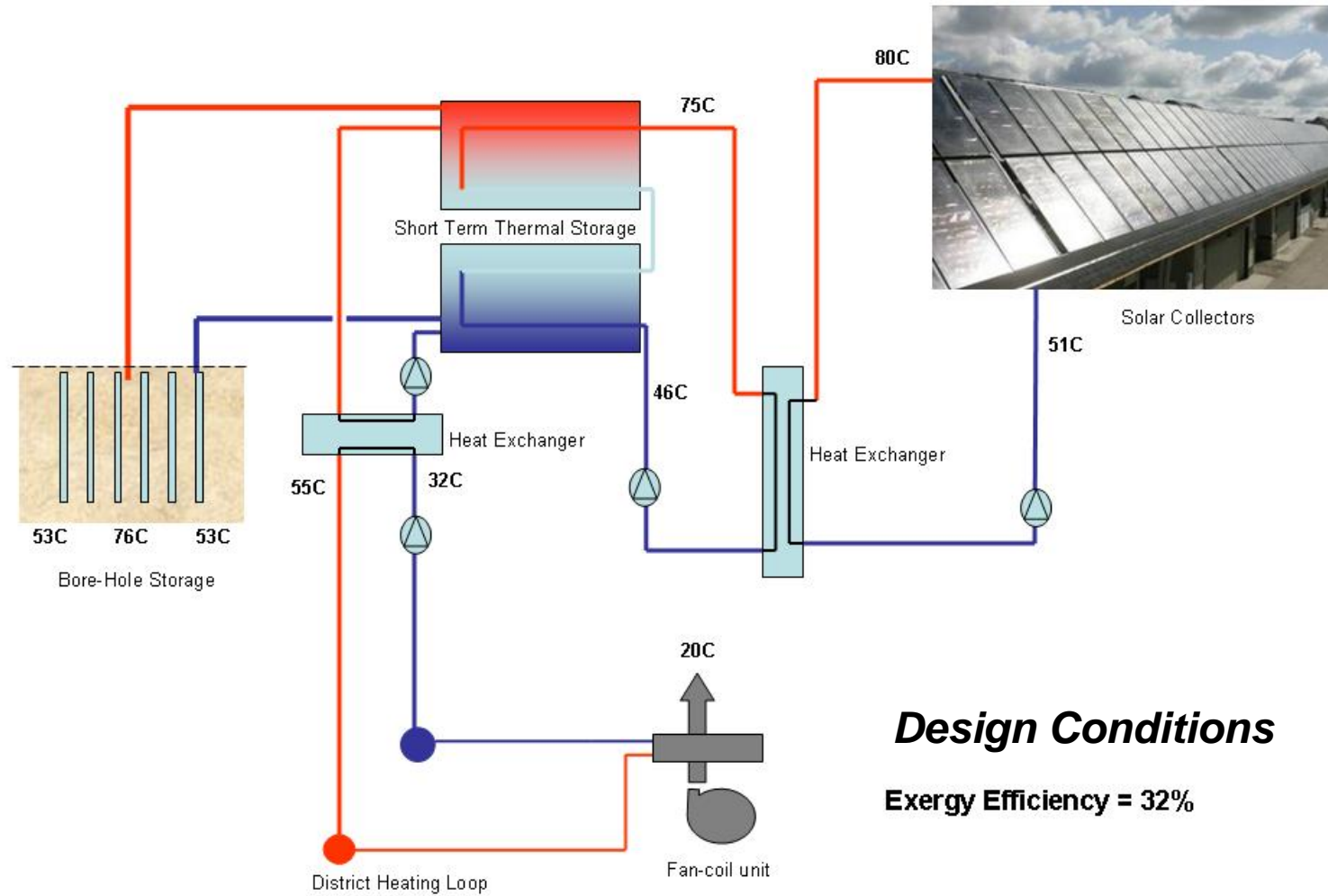
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Design Conditions
Exergy Efficiency = 32%

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Sources of Confusion

- Source Temperature
- Ambient Temperature
- Efficiency

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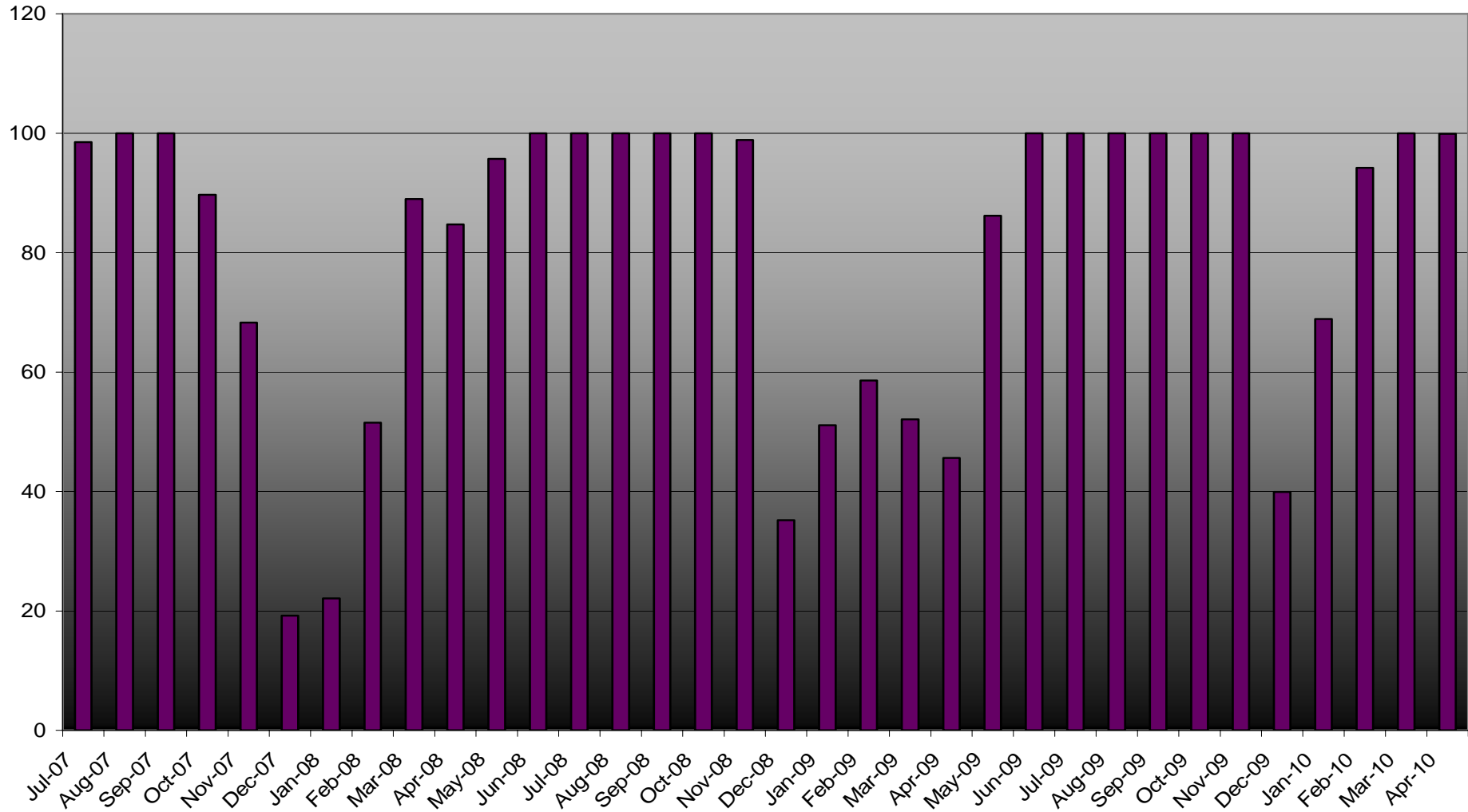


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Solar Fraction (%)



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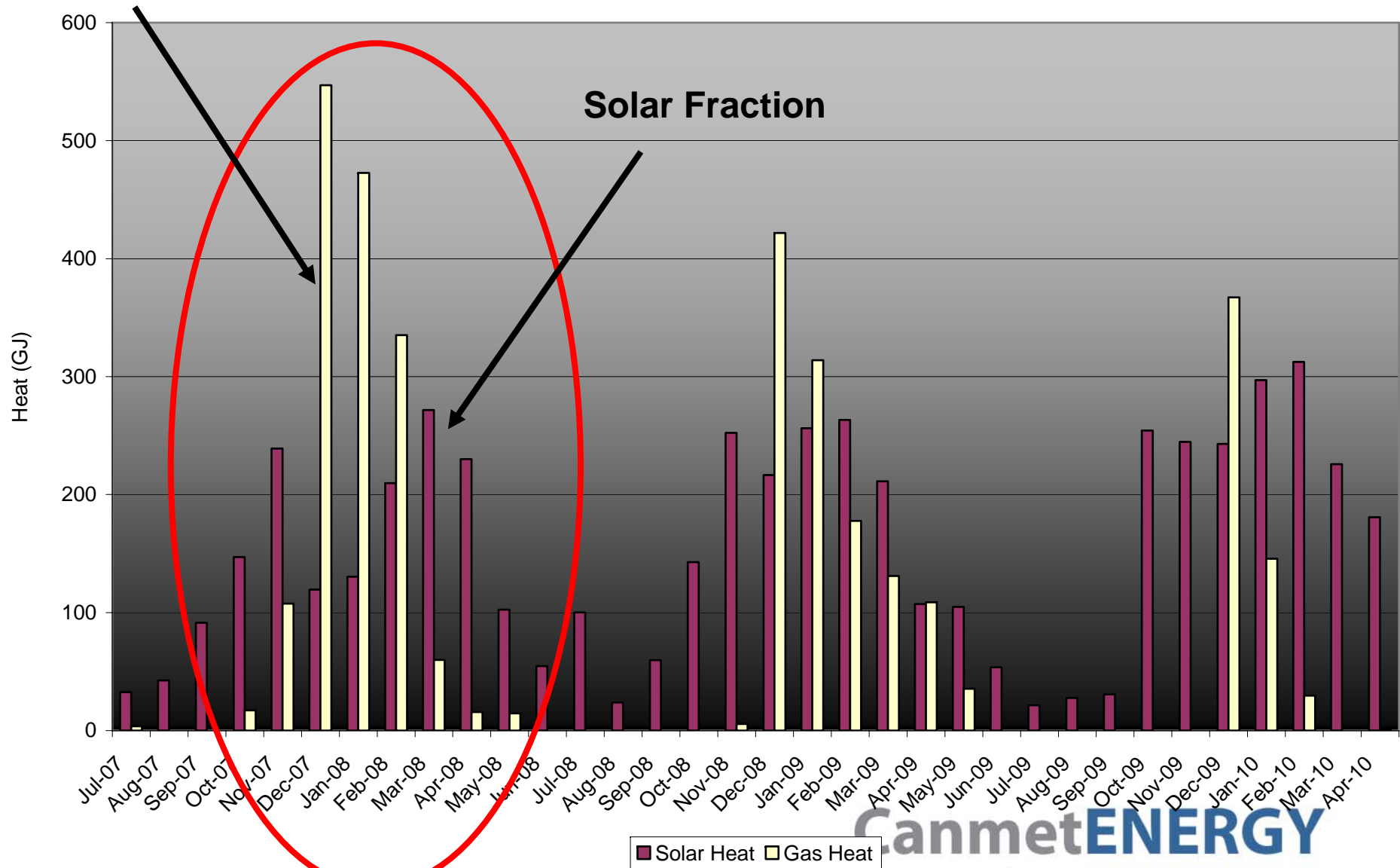
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Solar & Gas Heating

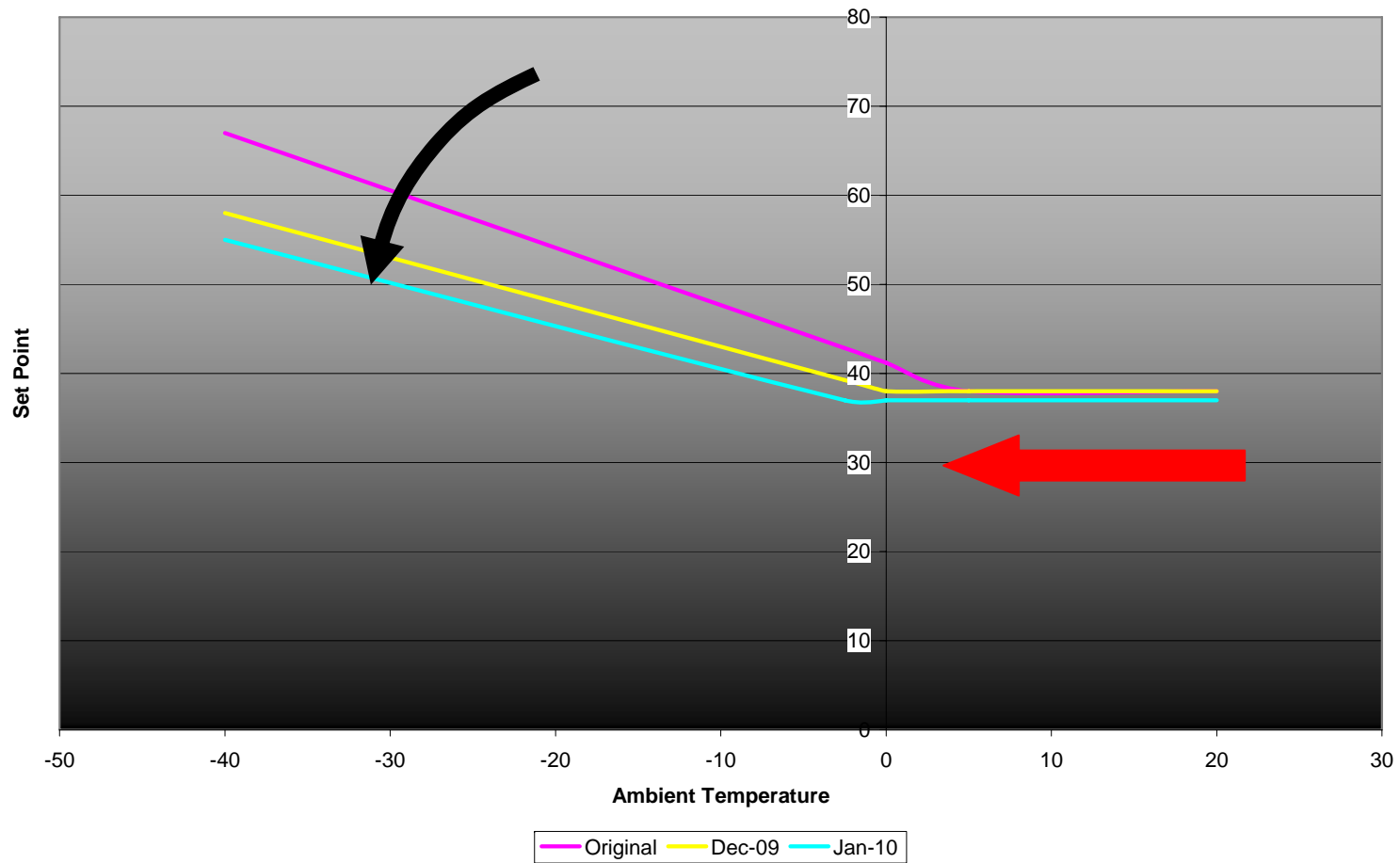
Gas Supplement



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Heating Program Changes



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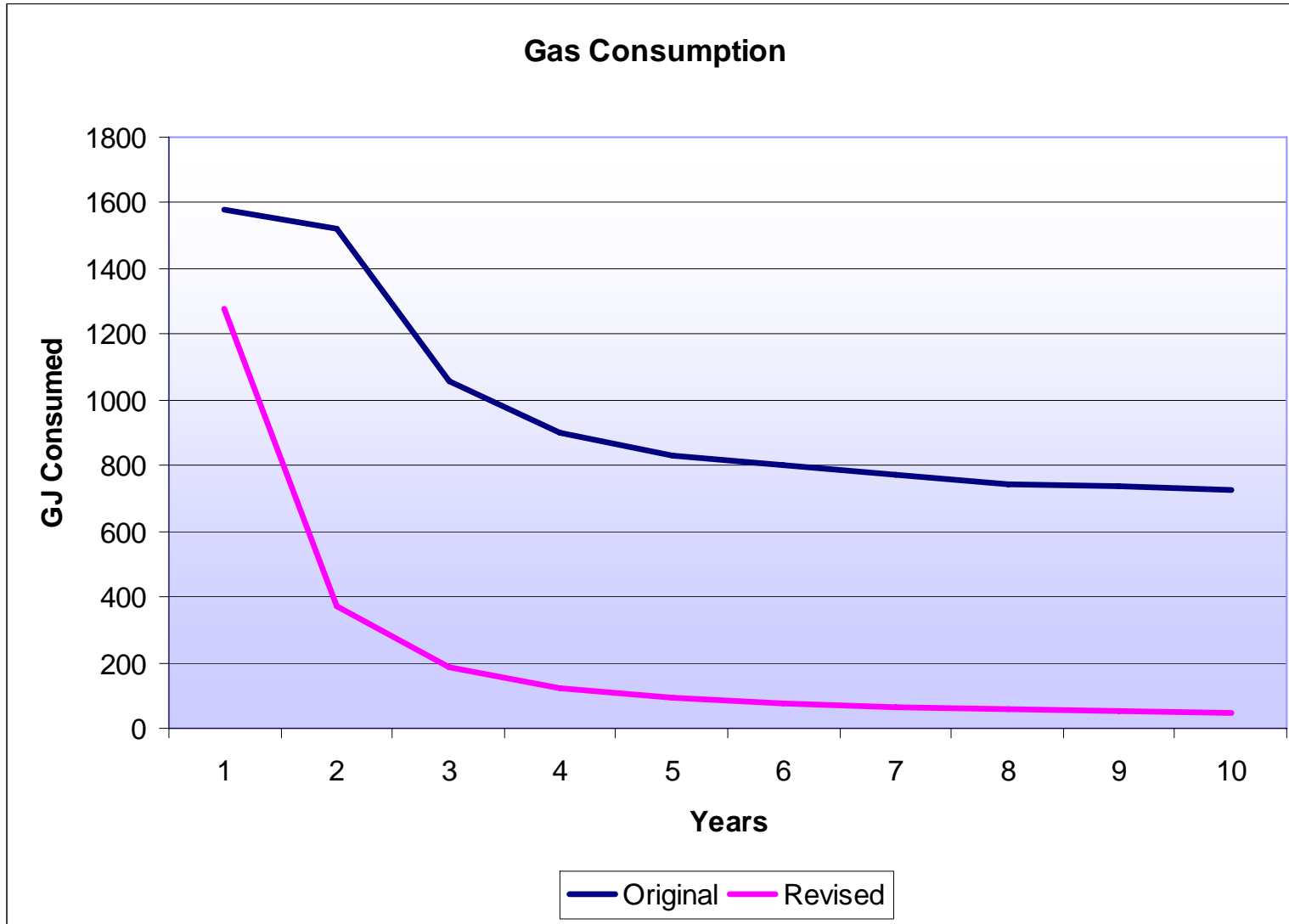
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Net Gas Savings = \$10,668 (€8000) over 10 years

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Conclusions

- 1 Low Exergy or Low Exergy Losses?***
- 2 Parameters of Exergy must be defined***
- 3 Exergy identifies losses not efficiency***
- 4 Exergy can be used to eliminate fossil fuels***
- 5 Implementation of exergy requires reconfiguration of buildings***

<http://www.dlsc.ca/>

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