

Clean Energy Council Energy Efficiency Seminar

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High Efficiency Point-of-use Generation

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Agenda – Trigeneration overview

- 1. Background**
- 2. Benefits**
- 3. Barriers**
- 4. Opportunities**





Picture – Gavin Coates, Cartoonist

Background

Why Energy Efficiency ?

- Least cost carbon abatement measure
- Good housekeeping – reduce waste and save \$'s

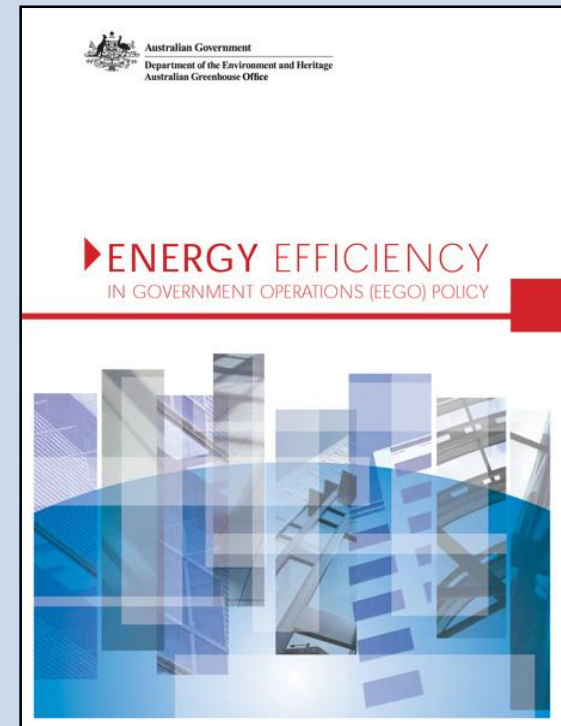
Australian Government Energy Policy:

- National Framework for Energy Efficiency (NFEE)
- Energy Efficiency Opportunities Act (EEO)
- Energy Efficiency in Government Operations (EEGO)
- Carbon Pollution Reduction Scheme (CPRS)

International Energy Agency (IEA):

- Energy Efficiency to deliver **54%** reductions in energy-related CO₂ emissions by 2030

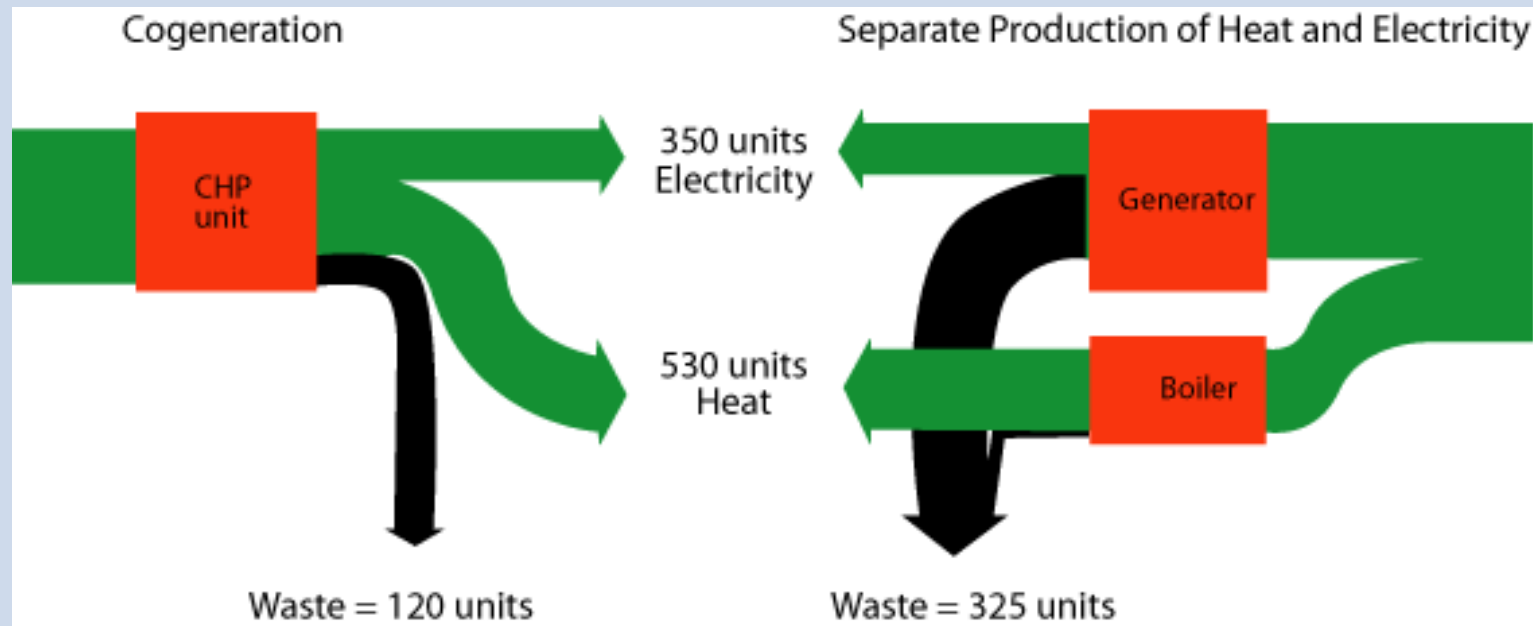
(Source - World Energy Outlook 2008, 450 Policy Scenario)



Cogeneration - description

Cogeneration means the on-site generation of electricity and useful thermal energy

Trigeneration means electricity, heat & cooling

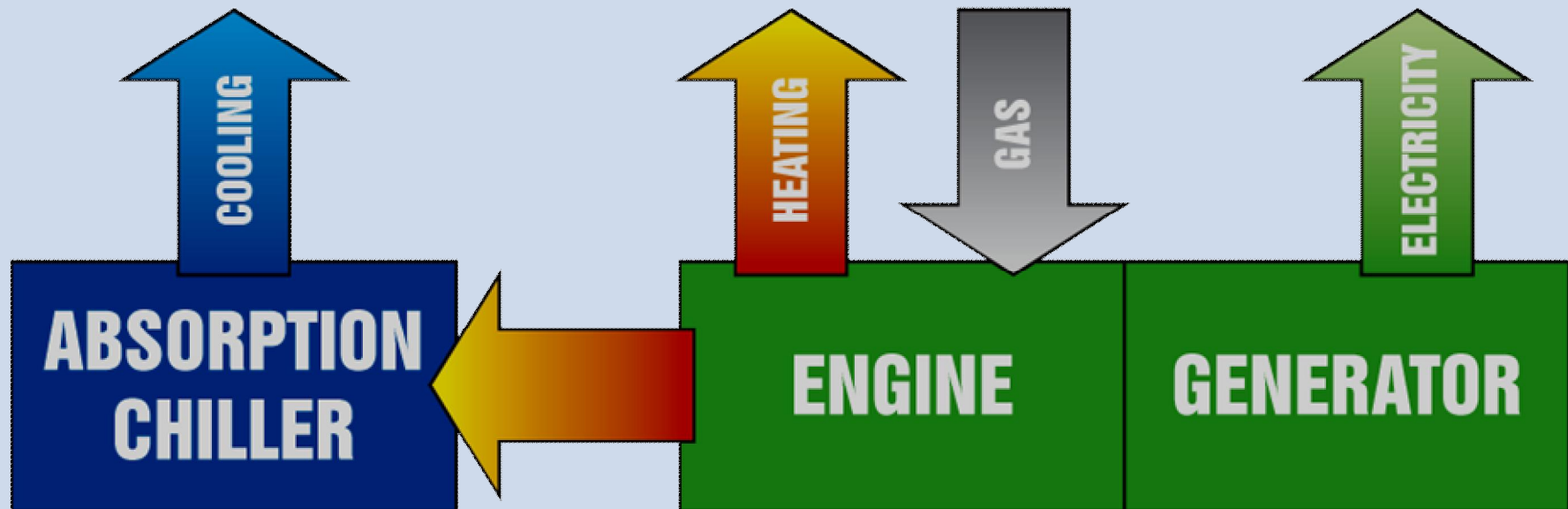


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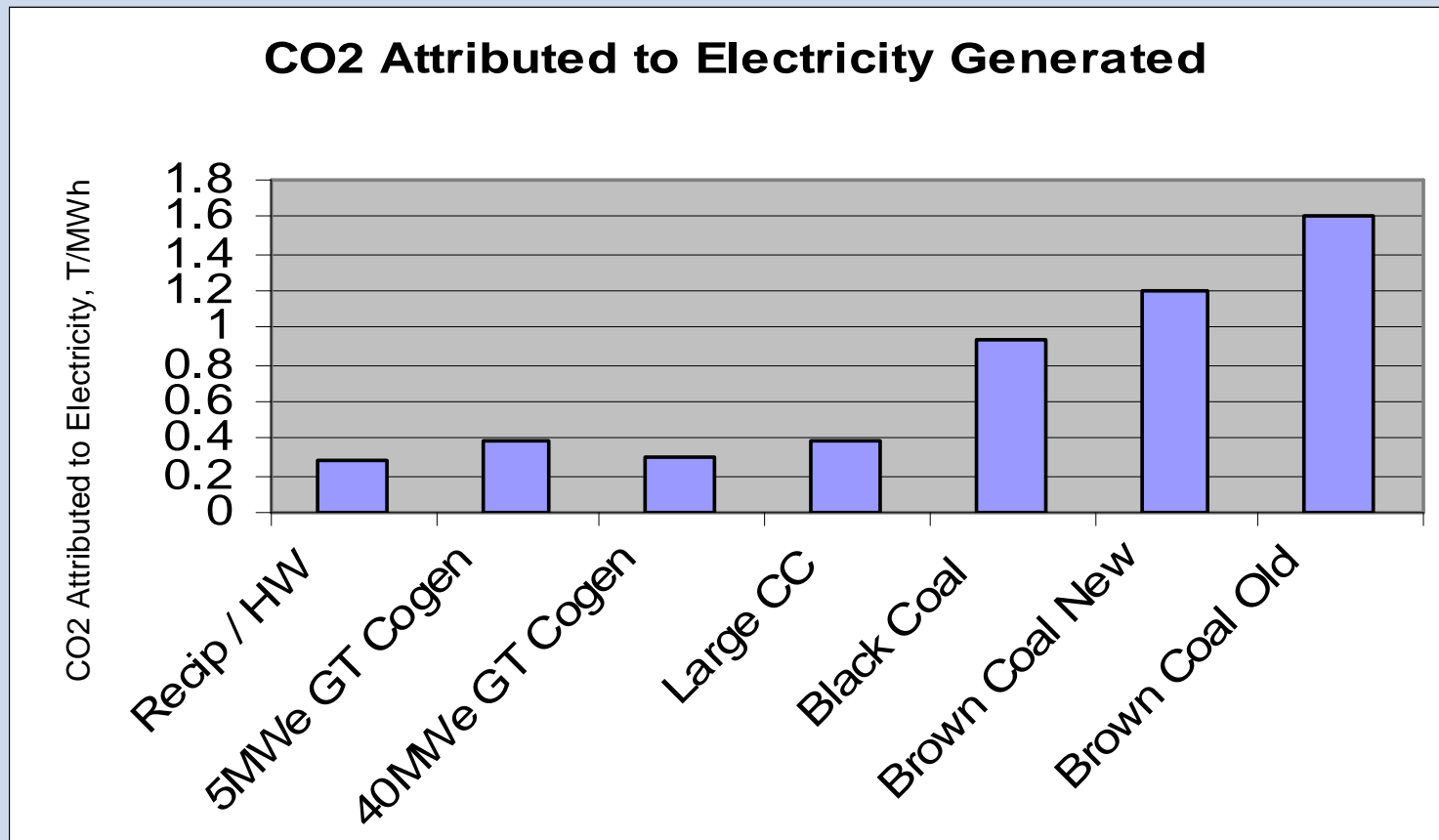
Trigeneration – current technology

Typical configuration:

- 2MW gas engine system capable of producing 2.5 MWr cooling



Trigeneration – carbon benefits



Source – BCSE (CEC) 2005

Trigeneration – benefits summary

Benefits:

- Greenhouse gas emission reductions of around **60%**
- Overall energy efficiency typically **80%** (*compared to 30%*)
- More **affordable** energy costs (*CPRS mitigation*)
- Improved energy **security** and reliability of plant
- Less electrical infrastructure to new sites (*thermal chiller*)
- Reduced daytime **peak** electricity demand
- Building Rating improvement (*NABERS*)
- Network upgrade savings (*plants run during daytime peak hours*)
- Create new **jobs**



Trigeneration – barriers summary

Barriers:

- Network connection rules
- Regulatory issues
- Financial options available
- Split incentives (*landlord / tenant etc*)
- Incumbents have many 'hidden' advantages (low power costs)
- Education - low visibility or awareness of co/trigeneration in Australia (*centralised power is dominant paradigm*)
- Capacity of Energy Services Companies (*ESCO's*)
- Reference work by MCE (*Ministerial Council on Energy*)

<http://www.ret.gov.au/Documents/mce/rdg/improve/default.html>

Trigeneration – opportunities

Incentives:

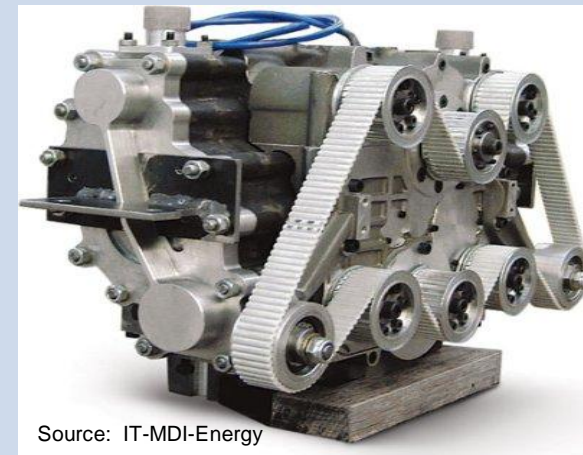
- Make it **easy** to connect local distributed generation (DG) to the grid network
- Mandatory buy-back of exported power (*i.e. \$-for-\$...*)
- Ensure market structure and rules don't create perverse incentives
- Capital **funding** assistance for new high efficiency solutions

Future technologies

New developments:

Infrastructure, improved electrical efficiency, more affordable

- Smart grids:
 - *meters, communications*
- Prime movers:
 - *sterling engine, air engine, fuel cells etc*
- Integrated solutions:
 - *recycled water, storage*
- Hybrid solutions;
 - *solar thermal, organic rankine cycle, hydrogen*



Source: IT-MDI-Energy

Some projects examples

Recent/Planned:

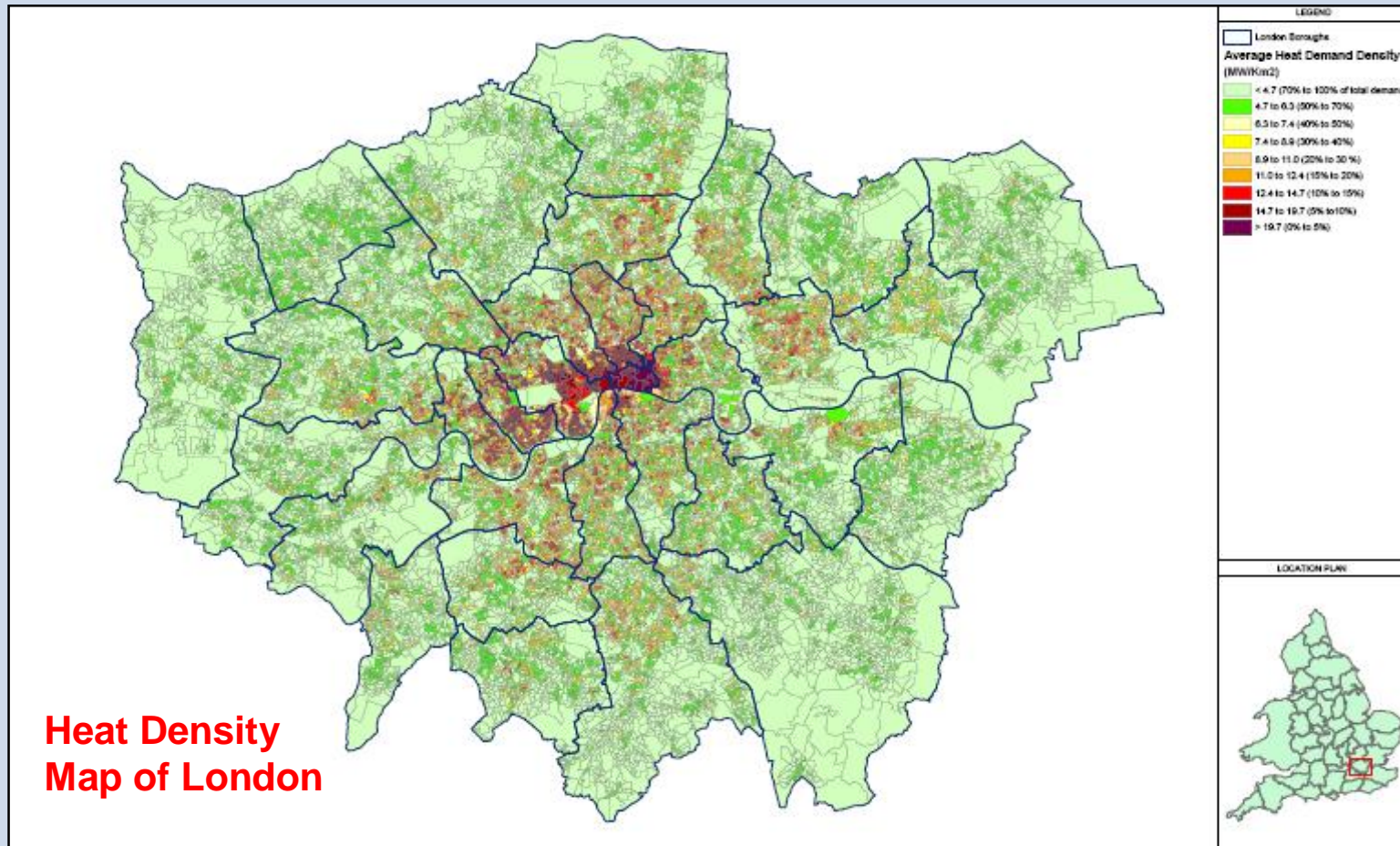
- GPT Charlestown Precinct **2MWe** trigeneration
- Canberra Airport **4MWe** trigeneration
- Sydney Green Transformers **330MWe** embedded generation
- VicUrban Dandenong approx **15MWe** central services hub
- NSW steel plant **250MWe** waste heat cogeneration
- Victoria car manufacturer approx **15MWe** trigeneration



Older installations:

- Crown Casino **6MWe** trigeneration
- St John of God Hospital **1MWe** cogeneration
- Symex **10MWe** gas turbine cogeneration
- Several sugar mills bioenergy cogeneration **20MWe plus**

Overseas experience



Reference: PB's "Powering London into the 21st Century Report" 2008
- decentralised energy scenarios based on cogeneration and renewables

Discussion / Questions

Thank You

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