

Trigeneration



Tri-generation involves the simultaneous production of electricity, heat and cooling from the one fuel source, greatly reducing greenhouse gas emissions.

What is the problem?

The vast majority of Victoria's electricity supply currently comes from large, centralised brown coal power plants. This form of generation only achieves around 25–40% efficiency. 70% of the energy input is lost either through waste heat produced during the process or from losses in the transmission of electricity over the large distances to the final point of use.

What is Tri-generation?

Tri-generation is an extension of cogeneration, adding cooling to electricity generation and heat production.

Tri-generation involves simultaneous production of heat, cooling and electricity. Fuel is burnt in an engine which drives a generator to produce electricity. The waste heat from the engine is used for space, water or process heating, or can be converted to cold water for cooling through the application of an absorption chiller.

The trigeneration concept can also be used with solar photovoltaic cells. By removing and storing the heat from behind

the PV panels, the heat can be used with an absorption chiller, cooling down the home.

Absorption chillers

An absorption chiller is basically an air conditioner driven by a heat source rather than electricity, utilising excess heat and converting it into cold water or cold air. This is the same process as used in gas camping fridges.

Tri-generation and distributed energy

Tri-generation lends itself to being situated close to where an electricity and heat or cooling demand exists, capturing and using the waste heat. As a result, tri-generation is a form of 'distributed electricity generation', involving many small generation sources distributed within the electricity grid, as opposed to fewer large, centralised power plants.

What are the benefits?

The greatest advantage of tri-generation is the increase in efficiency compared to producing heat, cooling and electricity individually. Additional efficiency is gained from reducing electricity transmission losses.

Tri-generation is specifically beneficial in a variable climate, such as Victoria's, with strong heating demand in winter alternating with high cooling demand in summer.

With tri-generation, electricity supply and demand are linked better, peak load demand can be reduced and security of supply is enhanced due to an increased number of diverse electricity generation alternatives.

For further information

For more information on cogeneration and also distributed generation see MEFLs other fact sheets.