WHY NO GAS IN BUILDINGS?

Gas as a fuel in buildings is outmoded, hazardous and unnecessary, and deserves to go the way of the once-ubiquitous gas light. By using renewable power, efficient electrical appliances such as heat pumps and induction cook tops can do the job, possibly at lower cost, and with negligible emissions.

Mains gas is frequently mis-described as an appropriate low-emissions fuel [1,2,3] for use in buildings. However, BZE finds that the use of gas is entirely inconsistent with the goal of achieving a sufficient response to the threat of climate change. As discussed in the BZE Stationary Energy Plan [4], the energy demands of Australian buildings can and should be met entirely with renewable energy, so gas becomes redundant and its use for cooking or heating should be phased out over a ten-year period.

The problems with gas. BZE recommends that the use of mains gas as a fuel in buildings be rapidly phased out because:

- *Low-emission gas is an illusion.* Industry claims of the 'green' merits of gas [1,2,3] are often based on the relative emissions intensity of gas versus coal, at the point of combustion. However, a) emissions from gas combustion are still too high for gas to make a useful contribution to climate change mitigation [5,6], and b) combustion emissions are far from the only emissions associated with gas. Current standard emission factors (kg CO_2e/GJ) for combustion ([7] Tables 1,2) are 51.3 for gas, 88.4 for black coal, and 93.1 for brown coal.

- *Gas emission factors are rising.* Per unit of energy delivered, the emissions associated with gas are increasing as conventional gas reserves are depleted, and unconventional forms of gas like coal-seam gas (CSG) and shale gas are brought into production. Emissions from ageing conventional reserves increase because a) having to actively compress where previously the gas came out under its own pressure, and b) necessary additional processing of the gas stream as progressively lower-quality reserves are tapped and contaminants such as CO_2 are vented to atmosphere [16]. The full picture with CSG emissions is still emerging, but we know that CSG emissions are, at best, comparable with coal [8,9]. BZE is of the view [10,11] that unconventional gas emissions are potentially higher than those from coal. Recent research from Southern Cross University (SCU) [12] and others [13] suggests that current industry assumptions for CSG fugitive emissions (0.12%) are understated by a very large amount. Real rates of leakage are likely to be at least 1% and these published results are consistent with leakage rates of 4% [12].

- *Un-burned gas is much worse than CO_2.* Emissions from the leakage of gas are known as fugitive emissions [14] or migratory emissions [15] and they occur throughout the system of production and distribution of gas. Measurements of the 20-year global warming potential (GWP) value of methane are now reckoned to be 105 times that of CO_2 according to NASA research by Drew Shindell [17,18,19].

- *Gas networks leak.* In the UK, Mitchell and Sweet (1990) [20,21] estimate that in traditional gas networks, a leak of 5.8% would mean that any emission benefit of conventional gas over coal is lost. They estimate that between 5.3% and 10.8% of gas is lost from transmission and distribution pipelines before the point of consumption[22]. Data from Adelaide suggests leakage rates as high as 7.8% [23]. Current official estimates([7] Section 2.4.2.8) from the Australian government put gas leakage factors, depending on state, at around 1.5%. The truth is likely to be somewhere in between these estimates. So even with present-day conventional gas, the net effective emissions are very likely comparable to coal, at best.

- *Environmental and health risks of CSG.* Aside from the emission issues, CSG poses significant risks to the environment. The negative side effects of CSG production are broadly related to water, contamination, waste storage, salts, erosion, air pollution, land clearing, and fire risk [24,25]. These side effects have significant implications to public health, biodiversity and agricultural production [26,27].

- *Gas scarcity and rising costs.* The Australian domestic gas market has been isolated from world parity pricing. This ceases in anticipation of the Gladstone LNG export terminal opening in 2014, exposing Australian consumers to significantly tighter and unstable market conditions. For the consumer this means higher prices and price

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volatility, and reduced security of supply [27,28,29,30,31]. A study by BNEF [32] reports that life-cycle costs of new wind and PV generation is already cheaper than gas for large-scale generation. Under business as usual, there is every possibility that gas supply will be much more highly contested in 20 years time [33].

- *Gas safety concerns.* Gas in and around our buildings is a major hazard [34,35,36] because of toxicity and flammability issues. According to the Gas Regulators Technical Committee “Carbon monoxide is a silent killer and is the major cause of gas related deaths and chronic illnesses throughout the world” [37]. The combustion by-products of gas include nitrous oxides (NO_x), formaldehyde, carbon monoxide (CO), CO_2 and sulphur oxides (SO_x) which can have a direct impact on respiratory and cardiovascular health. Poorly maintained gas heaters can be fatal, as was tragically seen in 2010 when two young boys died [38]. Use of gas for urban co-

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generation poses a risk to local air quality [39].

- *Draughts.* To be safe, indoor combustion of gas, such as gas cooktops and un-flued heaters, requires higher levels of ventilation, which can be at odds with the need to save energy by reducing draughts.

- *Abundant renewable gas is a false promise.* Methane can be synthesised from a wide variety of bio waste streams such as sewage, landfill waste, and agricultural residues [40]. This is sometimes called bio-gas. In special cases it makes sense to generate and use biogas on-site, for example for power generation in piggeries and feed lots. It makes sense to tap landfill gas. However, there is insufficient capacity in Australia [41] to substantially displace current usage of fossil gas with bio-gas. BZE envisages that most of these carbon-rich waste streams will have several higher-value uses such as for industrial processing (see below), for liquid transportation fuels, and carbon sequestration initiatives, discussed in the companion BZE Land Use report.

- *Bio-gas is needed as an industrial feedstock.* Methane and other related petroleum gasses are widely used industrial feedstocks, required for the production of a wide range of chemicals including fertilizers and plastics. If use of methane as a fuel is discontinued, then methane will be available for a much longer time for these higher-value industrial purposes.

- *Redundant infrastructure.* Since electricity can deliver the same service, the gas distribution network can be seen as very expensive redundant infrastructure. Eliminating gas use in buildings would eliminate the expensive maintenance and extensions to the gas network that would happen under business as usual.

Make the switch from gas. The ready availability of affordable electricity from renewables means that choosing to not use gas is now a realistic choice for energy consumers. Consumers switching away from gas are sending a powerful message to the government and industry that investment in new gas infrastructure is a bad idea.

Please send any feedback or suggestions relating to this fact sheet to info@bze.org.au

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