

**Report of May Meeting 2011  
Royal Society  
Southern Highlands Branch**

**Speaker: Robert Hogarth, B.Eng (Hon)  
Geodynamics Ltd**

**Topic: Geothermal Energy – Current Status of  
Development in Australia**

Electricity demand continues to expand worldwide, with consumption projected to grow by nearly 100% by 2020. Electricity generation generally relies on burning fossil fuel which produces carbon dioxide (CO<sub>2</sub>) as one of its waste products. Concern has developed over the last decade about the effects of carbon dioxide on the atmosphere, particularly with respect to global warming. Incentives are now in place in most developed nations to promote the development of clean, renewable energy.

The expansion of the nuclear power industry appears to be socially unacceptable and not without its problems. Solar and wind power cannot replace fossil fuels, although they can augment them. Clearly they are limited in scope, intermittent and unreliable. Research is now pointing to hot fractured rock as having the potential, worldwide, to significantly reduce our dependence on fossil fuels.

Robert Hogarth described the potential of geothermal energy to deliver large-scale, zero emissions, base load power supply to the market. He stated that it is the lowest cost source of renewable energy for base load (24/7) power generation, and that it can be integrated with other technologies such as solar and gas. It has the smallest environmental footprint of all energy types, and it is scalable for on and off-grid projects.

The concept behind Enhanced Geothermal Systems (EGS) geothermal energy is relatively simple. Heat is generated by high heat producing granites by circulating water through enhanced fracture systems within the granite body – in essence, an underground heat exchanger. The extraction of EGS thermal energy relies on existing technologies and engineering processes such as drilling and hydraulic fracture stimulation, techniques established by the oil and gas industry.

Australia has large volumes of identified high heat producing granites within 3 to 5 km from the earth's surface, much of the heat being due to the radioactive isotopes of

potassium, uranium and thorium. Robert Hogarth emphasized that finding buried granites does not require new technology, and that the compressive stress environment leads to the potential for large scale fractures. Australia has the hottest rocks in the world with these stress conditions – the Innamincka granites.

Robert Hogarth described the key technical areas which now require resolution to make such geothermal projects competitive with other power generation methods. These include increasing the water flow rates through the development of multiple reservoirs, better management of overpressure in fractures, increased drilling rates in hard formations, and the reduction of drilling costs.

Once these technical situations are better refined, Australia should find itself with a vast supply of clean, zero emission, base load power. Robert Hogarth concluded that such an achievement would herald a significant contribution to Australia's future energy mix and the green economy.

The audience of 57 asked numerous questions of the speaker at the conclusion of the lecture. Robert Hogarth later commented what a pleasure it had been for him to address such a well-informed and appreciative audience. The vote of thanks was given by Anne Wood.

Anne Wood