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ENERGY MADE SAFE FOR PEOPLE AND THE PLANET

Power stations are remote, imposing and essential to everyday life. These massive installations touch everyone in a modern economy, but most people will never visit the source of their daily joule. Explosive fuels are transformed into a steady stream of energy that safely powers everyone's lives. This transubstantiation demands huge investment spread across decades of a power plant's lifespan. CK Infrastructure companies conduct a global mass of energy service from Hong Kong and the UK to Canada and Australia. In Hong Kong, HK Electric has a mix of coal and natural gas generation units that provide electricity to the homes and businesses of Hong Kong and Lamma Islands. Its power supply reliability rating has been maintained at higher than 99.999% since 1997 – a record that surpasses many top cities in the world. Canadian Power's plants light up three provinces with gas and steam turbines. These cathedrals of energy arise and serve through design that provides energy safely while protecting the people, wildlife and the broader environment.





SAFETY FIRST

HK Electric has inputs for both coal and natural gas at their plant, which is located on an island away from the bulk of the 1.3 million residents and daytime workers on Hong Kong Island. But the safety of the 525 staff, 600 contractor workers and up to 6,300 residents of Lamma Island, home to HK Electric's power plant, is of paramount concern.

While HK Electric now has two fuel sources flowing to two types of turbine, the cleaner of the two is clearly ascendant. The newer element is liquefied natural gas (LNG). Natural gas now makes up about 50% of the fuel mix. Designers had to meet the extra challenge of building in new capacity for a wholly different system for LNG. Given the risk of a problem with one fuel source spreading to the other, the materials in the facility are kept 1.5km apart.

Across the Pacific and over the Canadian Rockies, Canadian Power operates solely gas-fuelled facilities. In addition to technological sensors, Canadian Power enhances safety by using a powerful biological tool – the sense of smell of their staff and customers. Most people don't realise that the rotten egg smell associated with natural gas isn't normal – an odoriferous agent, mercaptan, is added. Making leaks detectable by smell increases the chance of detection by people working at the plant, in industry or using gas at home. HK Electric's plant uses different safeguards suitable for electricity generation to avoid the off-putting smell.



Within the plants in both Hong Kong and Canada, a wide array of sensors are constantly monitoring the systems for malfunctions and potential hazards. The gas turbines themselves have redundant fail-safes so that if they run too fast, either an automatic computer-driven shutdown will occur or a mechanical fail-safe will kick in. Power source flows are halted, doors shut and pressure relief valves vent safe materials (such as steam) to avoid pressure build-ups. For Canadian Power, they also monitor the The safety of the 525 staff, 600 contractor workers and up to 6,300 residents of Lamma Island, home to HK Electric's power plant, is of paramount concern.

Most people don't realise that the rotten egg smell associated with natural gas isn't normal – it has to be added. safe distribution of steam and gas to select customers in an array of settings as diverse as hospitals and power plants. Plants in Hong Kong and Canada have operated without major incident for decades.

ALL EARTH'S CREATURES, GREAT AND SMALL

HK Electric's specially sourced, comparatively clean coal served Hong Kong well as it grew to become a thriving metropolis. But now, coal's days are numbered. It is planned to be completely phased out by 2035 at the latest.

LNG can't be stored on site, so is constantly flowing in via a 92km-long subsea pipeline that stretches from an LNG terminal in Guangdong Dapeng. The design of the pipeline is impressive. It's sunk into the seabed 3m deep. Armour rocks are placed on the seabed above the pipeline (no ordinary rocks will do). Teams of experts descended on special quarries in China to carefully select and test the stone that would defend the pipeline from container ship anchors and other hazards. The pipeline could only be designed and installed after considering the impact on marine traffic, the environmental impact and fisheries resources. The habitat of Hong Kong's rare and famous "pink" dolphins falls at the western end of the pipeline, while the waters nearer to the plant are home to rare finless porpoises. Construction could only take place about six months of the year to avoid disrupting the marine mammals' reproductive and offspringrearing behaviours.

Power delivery is through overland pipelines and gas turbines that enable the delivery of electricity, gas and steam to Canadian Power's customers. While their inland plants don't have to look out for dolphins, they do have protective measures that serve not only to prevent dust intake but also to protect birds by ensuring that they don't get sucked into the turbines.

The use of water as a safety measure to cool the gas turbines in Canada can also be used to enhance the environment. The Sheerness cooling pond in Hanna, Alberta contains the run-off from the cooling procedure and provides a source of water for residents, irrigation for farmers, habitat for wildlife and recreational facilities for campers and boaters.

Power plants are massive investments that are depended on to provide safe, steady electricity and a return on capital that makes reinvestment possible. Careful design ensures that this happens safely for people, and the protection of the planet must be incorporated from original buildout and then as part of the continuous upgrades that bring new technologies into play. CK Infrastructure power plants are delivering a future where energy becomes safer and greener in every iteration.



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