CO-GENERATION IN JAPAN

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The increase of small household Cogeneration systems in Japan is largely attributed to the availability of very reasonably priced self contained equipment that is being marketed by Gas companies.

In gas cogeneration, city gas is used to power engines, turbines and fuel cells to generate electricity, and the resulting thermal energy used to produce steam and hot water.

Gas cogeneration systems are used for a variety of purposes, including in factories, supplying hot water and steam in hotels and hospitals, heating and air conditioning of buildings, and heated swimming pools.

Gas cogeneration systems reach a total energy efficiency up to 70% ~ 80%. It is also attracting attention as a clean, environmentally friendly gas cogeneration systems that can be tailored to meet specific customer needs.

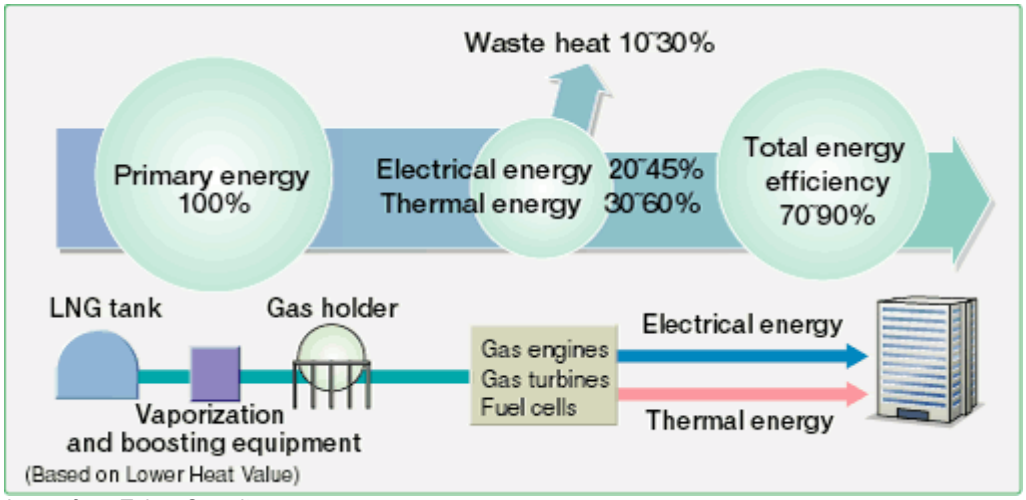

Image from Tokyo Gas site

However all LNG supplied and sold in Japan is imported from overseas sources and regular cost increases seen over the past several years. Exchange rates too have an impact on LNG costs.

Being an imported commodity, the guarantee of supply continuity is not assured and can be adversely impacted on by several external factors.

Shipped LNG supplies can stop during a conflict, calamity, strike or fire. Thus making this a source heavily reliant on external factors.

LNG reserves are said to be under 10 days in Japan but the exact days has never been released for security reasons.

Gas utilities are taking active anti-earthquake measures by introducing earthquake-proof gas facilities and automated gas shut-off systems.

Methods for cutting off gas supplies include shutting down the governor within the target block, shutting off valves installed in medium-pressure conduits, and stopping gas delivery at gas plants or gas tanks.

Some gas providers have set up shutoff systems capable of immediate shutoff by means of block-by-block remote shutoff or automatic seismosensitive shutoff systems.

Seismographs have been installed and used as benchmarks for shutting off gas supplies in times of an earthquake.

Here too Japan is at risk due to the high seismic activity that takes place in Japan at frequent intervals.

Thus having a system is in place by which gas supplies are cut off without delay if the level measured with a seismograph exceeds the given limit is essential.

NEGATIVE ASPECTS of CO-GENERATION

1. Fuel costs are constantly varying globally
2. Japan relies 100% on imported LNG (Australia and Middle East).
3. Exchange rates impact on the cost of LNG
4. Electricity from the grid, on the other hand, would be around 25 to 40% cheaper than co-generated power. *(Further cost studies are recommended if more accurate information is needed).*
5. Tokyo Electric Company (TEPCO) may purchase excess power but at their wholesale purchase price which could be about 30% of the cost incurred in producing the electricity using cogeneration.
6. **Further, generated power is usually 6,600V. While supply lines are 66,000V. Installation of expensive step up transformers will be required.**
7. Noise from the generators could impact on homes nearby. Sound level at the boundary fence must be below 45 dB.
8. Even if heat is recovered using thermal transfer systems, the final exhausts will flow towards the homes with any wind.
9. Obtaining permits from the Fire Marshal and the Local City Engineers for co-generation could be a very difficult exercise.
10. Cost of infrastructure for Co-generation, cost of periodic equipment service and other capital expenditure could be colossal.
11. Regular maintenance of the generators is required.
12. Overhaul is required at approximately 10 years intervals.
13. N+1+1 configuration is a logical configuration as the overhaul period is long.

CO-GENERATION PROJECTS NEAR TOKYO

There have been several high profile Co-generation projects undertaken in the Tokyo area.

Roppongi Hills is a landmark and they initially commenced with 6 x IHI built Generators using LNG piped in by Tokyo Gas. However the cost of electricity to the tenants was around 75% more that comparable supply from TEPCO.

After a few years, Roppongi Hills gradually shut down their generators and switched to TEPCO utility power. One or two generator said to be in operation.

Minato Mirai Yokohama is a large complex of shopping centres, hotels and office buildings. It is about 10 years old.

They commenced with total Co-generation but after a few years faced the same issues as Roppongi Hills.

Today, they have converted most of these generators to Emergency use only and ceased co-generation.

One of their major problems was noticed when the need to overhaul the generators came up and the cost involved was seen as prohibitive.

Other lesser known installations are to be found in Japan. In nearly all cases, there has been a similar trend to cease co-generation and move to power from the utility company.

POWER GENERATION in Japan

In 2010, approximately 33% of all power in Japan was generated using Nuclear power plants. Post March 2011, several nuclear plants have been shut down.

Hydro electric generation is also a significant number and approximately 1/3rd of all power comes from the abundant dams.

Fossil fuel accounts for the balance with LNG the main source of fuel. Coal is also used but is rapidly declining in favour of the cleaner LNG fuel.

LNG is mainly imported from Australia and the Middle East. Some supplies from Russia are also evident but not as prominent as the two primary sources.