

The Role of LP Gas in Natural Disasters



The Japanese Tsunami - A WLPGA Case Study

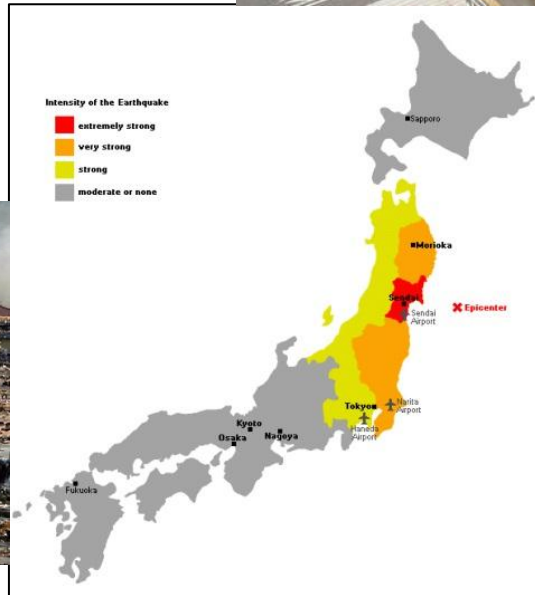
Natural disasters are a tragic reality. Earthquakes, tsunamis, hurricanes, floods strike frequently and often with very little warning causing disruption to power and energy networks. This can directly affect hundreds of thousands of people who are often forced to seek temporary accommodation. These survivors need fuel for warmth and for cooking. The unique benefits of LP Gas mean that it can be transported, stored and used virtually anywhere and this exceptional energy offers swift solutions in times of emergency.

This case study looks at the critical role of LP Gas in one particular and very recent natural disaster – the March 2011 earthquake and tsunami in Japan.

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1. The Events of March 2011

Friday 11 March 2011. 2:46pm. A powerful 9 magnitude earthquake struck the east coast of Japan some 130 km off Miyagi Prefecture in the Pacific Ocean. The earthquake set off a devastating tsunami that sent walls of water washing the coastal area of this north east part of Japan. Waves up to ten meters rushed onto the shore engulfing houses, cars and carrying fishing boats and debris away. Even in Tokyo, far from the epicentre, the earthquake struck hard causing the city's skyscraper's to sway.



2. Immediate Consequences

Despite the fact that Japan is exceptionally well prepared for disaster situations and that cities are constructed with high level construction codes, almost 16,000 people perished and to date over 3,000 people are still missing. Over 270,000 homes were destroyed, roads rendered impassable, public transportation utterly devastated and electricity supply cut off across a widespread area. Even in Tokyo the mobile telephone system floundered.

The principal affected prefectures (Aomori, Iwate, Miyagi, Fukushima, Ibaragi and Chiba) have over four million propane-using homes and approximately 3.6 million 'city gas' households. The city gas (natural gas delivered via a pipeline network) pipelines were significantly damaged by the quake and tsunami.

The refinery and LP Gas import terminal in Miyagi prefecture and the refinery in Chiba were also heavily damaged. The petroleum product terminals and LP Gas terminals on the coastal were also hit.

The disaster affected about 160,000 propane-using households. Many propane cylinders were whisked away and many local LP Gas distributors suffered damage to their filling facilities and consequently the supply chain suffered.

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Note: In Japan **LP Gas importers** import and store at their terminals, distribute mostly by using transporters and sell LP Gas to end users, wholesalers and retailers via their sales networks. **LP Gas distributors** include LP Gas importers, wholesalers and retailers.

3. The Role of LP Gas

LP Gas is an extremely efficiently distributed source of energy in Japan. Typically LP Gas residential users keep two LP Gas cylinders, one full and one spare and retailers switch out the empty cylinder with a fully filled one.

As a reliable, portable energy, unlike grid-based energy services, LP Gas played an important role in the historical disaster relief effort in Japan. The tsunami destroyed everything in the affected area, particularly the north east coast. Even outside of the directly affected area by earthquake, infrastructure was damaged.

Electricity supply was cut off in wide areas and modern city life, so dependent on electricity, was effectively suspended. Transport suffered enormously; train services were cancelled, petrol stations closed and petrol was in seriously short supply.

Supply of LP Gas was affected but recovery was swift. With a plentiful stock of LP Gas at terminals, and despite many LP Gas tank trucks being lost in the tsunami, the industry united to ensure the affected areas had the supplies they needed.



There are stories which tell how LP Gas saved so many lives. Here is a typical story:

Over 100 survivors crossed the snowy mountains to search for shelter. When they reached shelter they found that propane cylinders and cooking propane stoves were available. So, in cooperation with the local parish office, they cooked the meals for themselves and fellow evacuees and the shelter became a widely used meal center. When the cylinders became empty, they replaced them with new ones which were available in the area. This life-saving service was maintained for many days until the evacuees were rescued.

Five critical ways how LP Gas proved itself as a reliable and easily distributed recovery energy source:

- 1** LP Gas distributors in the area brought **the kitchen kits** comprising LP Gas cylinders and cookstoves for meal centres that were rapidly set up in temporary shelters like gymnasiums providing life-saving space for evacuees to gather, cook meals and stay warm.
- 2** LP Gas was used to **generate electricity** by fueling stand-by generators at the shelters to provide lighting and communication services while electricity grid system was disrupted.
- 3** The city gas companies in the area supplied the substitute gas manufactured by a **propane and air mixture** to their customers who lost access to city gas by pipeline. They maintained the portable gas manufacturing facilities using propane as the disaster prevention equipment.
- 4** Stricken refineries had sufficient stock of crude oil, but critically not of petrol as a final product, so petrol stations suffered critically short supply and motorists often had to queue for hours for petrol. **Autogas** drivers, on the other hand, could refuel with no difficulties as LP Gas facilities keep sufficient stock of actual product. Taxis, which in Japan run largely on Autogas, were also available to support for the lack of public transport and even transport relief supplies to shelters.
- 5** Over 52,000 temporary **evacuee housing units** were constructed in the affected region in northern Japan. Approximately 50% of these units were equipped with LP Gas facilities including heating units, cookstoves and hot water facilities. The remainder of the temporary evacuee housing units were secured by the local governments by renting homes in areas still able to use the city gas grid supply.

4. Japanese Government and Industry Reaction

In the light of the March 2011 disaster, LP Gas was proven to be resistant to disaster circumstances. There were three key elements of immediate reaction:

Firstly, a Mutual Assistance Agreement was put in place between Japanese LP Gas importers to lessen the risks for importers caused by shortage of LP Gas supply during an emergency. Under this agreement, LP Gas importers may initiate interaction and discussion with each other to 'borrow' LP Gas under reasonable conditions and take delivery of LP Gas at their agreed terminals. Consequently, LP Gas stock will be kept at each terminal throughout Japan, effectively maintaining a joint, available stock among the Japanese importer community.

Secondly, each local LP Gas Association, whose members are the local retailers, located in the 47 Japanese prefectures (administrative divisions), including the capital Tokyo, entered a cooperation agreement with their local government administration to secure supply.

Thirdly, the Japanese government agreed to release LP Gas from the national stockpile to cover any shortage of LP Gas importation caused by the closure of the LP Gas import terminal which had been blocked by a 91,000GT cargo ship grounded by the power of the tsunami.

LP Gas fully supports emergency and recovery backup activities and systems.

A New initiative by the Japanese Government and the LP Gas Industry

The main lesson learned was that to be more effective during great disasters, regional LP Gas filling plants must be made stronger and communication improved. The Japanese government is now nominating around ten LP Gas filling plants in each prefecture to function as the primary facility to ensure a fully maintained LP Gas supply to the local population. These filling plants will be equipped with stand-by generators and Autogas vehicles with sufficient fuel to transport LP Gas cylinders and satellite communication systems to affected areas. These equipped filling plants will serve to further strengthen the LP Gas supply chain.

The government has also decided to provide four transportable power generation systems which will be transported to the LP Gas import terminals to maintain LP Gas supply even in the case of ruptured electricity supply to the affected terminals.



5. In Conclusion - Why LP Gas Works in Disaster Situations

Centralised energy distribution networks are more prone to failure during natural disasters. **As a decentralised, off-grid energy source, LP Gas is a peerless fuel in times of hardship.** LP Gas can be moved easily to the suffering areas, it effectively and completely supports primary needs of the affected population and fully supports emergency and recovery backup activities and systems:

- Fuelling temporary kitchens and refugee centres with cooking, water boiling and refrigeration appliances.
- Electric power generators.
- Mobile LP Gas-Air systems to replace damaged natural gas networks in vital buildings such as hospitals and schools.
- Heating and power systems (combined heat/power systems mCHP).
- As automotive fuel for Autogas vehicles or dual fuelled Autogas vehicles, LP Gas allows to keep them running when other vehicles are forced to stop due to lack of fuel.

6. Acknowledgements

Mr Makoto Arahata, Overseas Business Manager, Japan LP Gas Association.