

WestPac LNG. Wrong Direction for BC.

WestPac LNG Corporation is promoting a proposal to import 500 million cubic feet of natural gas per day, (equal to about 20% of BC's own production), from Asia, the Middle East, or Russia, shipped in LNG tankers as Liquefied Natural Gas, to a re-gasification plant at the northern tip of Texada Island, BC. The principal market for the LNG-based natural gas is the US. WestPac also wants to build a large gas-fired electricity plant on Texada as part of the project, initially 600MW, and sell the power to BC Hydro. WestPac's plant could be expanded to 1,200 MW.

The proposed plant would open in 2014. In terms of energy produced, it would be twice the size of Chevron's oil refinery in Burnaby, and be BC's largest emitter of greenhouse gases (GHG) by a factor of 4 times (the plant would increase BC's GHG emissions by 7.6%). LNG tankers 950 ft long or much bigger would be expected to arrive or depart every 5 days on a passage through the Juan de Fuca and Georgia Straits. A 20 Km electricity transmission line would be built down the centre of the most populated part of Texada Island.

NEED BC doesn't need to import natural gas or LNG.

BC uses just 20% of its own natural gas production. BC produced 2.8 billion cubic feet of natural gas per day in 2006, and 40% was exported to the US, and 40% to Alberta. (source: Canadian Association of Petroleum Producers-CAPP).

INVESTMENT Importing LNG threatens the development of BC's renewable energy sources and domestic fuel security.

There is a lot of uncertainty over LNG costs and security of supply (source: CAPP) and sources for LNG are in unstable regions (S.E Asia, the Middle East or Russia).

WestPac hopes to import a substantial 500 million cubic feet per day, which is equal to about 20% of BC's own domestic gas production. LNG is a very capital-intensive business. Once built, the project will have significant sunk costs with depreciation a major non-cash cost. The pressure will be on WestPac to run the plant all the time for cash to cover cash operating costs, selling gas at a loss if necessary. Even if it didn't run, its presence alone would be a deterrent to other power investment. This will be negative for the development of BC's own sustainable energy industry.

EMISSIONS LNG is definitely NOT a "green" sustainable fuel.

The only practical way to ship natural gas is to turn it into a liquid by using energy to cool it to minus 164 degrees Celsius in offshore liquefaction facilities (this reduces its volume by 600 times). The super-cooled LNG is shipped via specially constructed LNG tankers, and converted to a gas at the receiving re-gasification terminal for funnelling into pipelines.

In the process about 11% of the feedstock gas is used in the liquefaction process, 0.15% "boils" off per day in shipping, and 1-2% is consumed as a fuel in the re-gasification process. (source: Deutsche Bank). Assuming a journey of 8,000 nautical miles, the LNG tankers would be 17-20 days in transit, so up to 3% of LNG would "boil off" during shipping. Natural gas is methane, 23x more damaging than CO2 as a greenhouse gas, so a "boil off" of 3% of total deliveries would represent about 300,000 eq tonnes of CO2 evaporating into the atmosphere each year.

GHG GOALS Importing LNG and using it for gas-fired electricity generation would do serious damage to BC’s GHG goals.

When BHP Billiton proposed a project to deliver LNG to the Cabillo Deepwater Port Receiving Terminal offshore Los Angeles in 2006, a consultant group called Climate Mitigation Services was engaged by the Environment Defense Center on behalf of the California Coastal Protection Network, as opponents of the project believed that the applicant’s interpretation of what constitutes greenhouse gas emissions arising from the project was too narrow. BHP Billiton proposed to supply 800 million cubic feet per day (WestPac proposes 500 million per day)) and sourcing the LNG off the coast of Perth, Australia.

LNG supply chains have common characteristics, so it is possible to estimate WestPac’s production chain greenhouse gas emissions by scaling the summary numbers presented by Climate Mitigation Services by 62.5% (500/800)

WestPac LNG. Projected LNG production chain emissions	<u>Million tonnes of CO2 eq</u>		
	Methane	CO2	Total
Offshore liquefaction plant	0.11	1.57	1.68
LNG carrier fleet, Aus-BC	0.03	1.28	1.31
Texada receiving and re-gasification (using gas to heat the LNG)	0.05	0.16	0.22
	<u>0.19</u>	<u>3.01</u>	<u>3.21</u>

Source: Climate Mitigation Services. Emissions Cabillo Deepwater Port: Natural Gas from Australia to California.)

WestPac proposes also a 600 MW gas-fired plant, stating that 0.8lbs of CO2 is emitted per Kwh of generation. So a 600 MW plant would produce 1.8 million tonnes of CO2. (1,200 MW plant, 3.6m tonnes).

Adding the emissions of the LNG production chain and the WestPac’s 600MW gas-fired plant, means that its proposal will increase BC’s GHG emissions by about 7.6% per annum.

WestPac LNG Greenhouse gas emissions (GHG)	
Production chain emissions	3.20 million tonnes
600 MW gas-fired generation	1.80
	<u>5.00</u>
total BC emissions 2005	<u>65.90 million tonnes</u>
% of total BC emissions 2005	<u>7.59%</u>

In scale, in terms of energy produced, the WestPac receiving and re-gasification facility on Texada Island would be twice the size of the Chevron oil refinery in Burnaby. The largest emitter in BC is the natural gas plant owned by Duke Energy Corp in Fort Nelson BC at 1.25 million tonnes of Co2 equivalent. The WestPac plant would be BC’s leading producer of Co2 by a factor of 4 times.

WestPac LNG’s proposal would do serious damage to BC’s greenhouse reduction targets where failure in energy intensive industries, such as mining and manufacturing, would cost BC jobs

LNG TANKERS LNG tanker traffic would disrupt marine, aviation, recreation and commercial activity and discourage tourism.

“Giant” tankers loaded with LNG would be expected to steam through the Strait of Juan de Fuca, past Victoria, the Gulf Islands National Park Reserve, Vancouver and past the Georgia Strait communities onto Texada.

LNG tankers today are 138,000 m3 (cubic meters, or 55,000 tonnes LNG) and these are about the size of a large cruise ship, 950 ft long. However there have been advances in membrane design, which allows for larger ships to be built at lower cost. The average new vessel size is nearer 170,000 cubic

LNG Tankers (continued)

meters (c 70,000 tonnes LNG). The latest orders for the Qatari projects involve ships called the Q-Max with a capacity of some 260,000 cubic meters (or c 105,000 tonnes LNG) (source: Deutsche Bank).

Controlled zones for LNG vessels have been introduced depending on the calculated risk. At the port of Boston the safety and security zone extends 1,000 yards fore and aft and 100 yards each side, and all other traffic movement in the area is restricted, overlying road bridges are closed and flight paths for aircraft approaches adjusted to and from the nearby international airport. Additionally, the US Coast Guard provides, at cost, aerial and marine escort and surveillance throughout the harbour passage and port turnaround period of an LNG carrier at the Everett terminal.

At Cook Inlet, Alaska, the export terminal maintains a 1000 Yard radius zone around its terminal and berthed ships.

The US Coast Guard has enforced a stringent safety zone regime because of the size and handling characteristics of LNG carriers and the hazardous nature of the cargo carried--navigation safety is overlaid with extensive security precautions. The purpose is to prevent access to the LNG vessel throughout its passage through absolute isolation. Such a high security approach to a safety zone for an LNG carrier could include suspension of all traffic in the area during the passage of the LNG vessel to and from the terminal. (source: Richard Cobanli, Transport Canada Marine Safety, Atlantic Region.)

Given the shipping volume in the Juan de Fuca Strait and the Georgia Strait and the narrow channels through the Gulf Islands (of less than 5 km in places) public safety may require the shipping channels to be closed or severely restricted during the passage of an LNG carrier. The consequence of this high level of control would be a negative impact on other shipping including ferry traffic and possibly aviation in the BC region. Further, to be effective, this level of control requires significant and onerous investments in monitoring, patrol and enforcement

Added to the mix is the threat of terrorism. As the passage of LNG tankers would pass Victoria, Vancouver and communities along the Georgia Strait an intentional subversive, malicious or terrorist act on the vessel, would serve the perpetrators cause, as there could possibly be a significant public or economic impact resulting from their actions. Hence governments and the public would demand aggressive enforcement of security zones around the passage of these vessels in BC waters.

We should be aware that development of LNG facilities carries a much higher national security, public safety and environmental risk, and would have a considerable negative influence on our way of life in the populated BC southern coastal region.

It is worth noting that part of the passage in inland waters to Texada would be in US waters through the San Juan Islands. Given the US approach to "homeland" security, one would expect in the US a concentration of a US coastguard force augmented by aircraft. In Canadian waters we may have to depend on US capability, depending on our own military and coastguard capability.

SAFETY Safety and security events of LNG tanker traffic, and at the plant itself, could be life-threatening if things went wrong.

Opponents of LNG facilities like to dramatise the consequences of LNG accidents and they do so because safety is not a theoretical question. In 2004 an LNG facility in Algeria killed 27 and in July of 2004 an explosion in Belgium from a facility cast debris four miles; 15 people were killed, and 120 injured -- many severely burned. It caused a billion dollars damage.

The lesson learned from LNG incidents is that once the hazardous liquefied natural gas is released from confinement, it instantaneously vaporizes and becomes an expanding ignitable vapour cloud of destruction incinerating everything and everyone in its path. LNG inferno temperatures are so extreme that the radiant heat produced causes death and damage even outside the perimeter of the fiery blast.

Proponents of LNG indicate the good safety record of LNG tankers to-date and maintain that their LNG facilities and tankers will operate and deliver LNG safely in all situations. However LNG is a very hazardous cargo and loss of containment would be a life-threatening event. When passage is through busy waterways near large population centres the possible frequency and severity of an event must increase.

There has been no serious incidents involving LNG tankers, however, because of the energy carried by these vessels, an incident has the capability of being of “Chernobyl” significance; meaning that should an incident happen anywhere in the world, movement of these tankers would be highly constrained in the future, and particularly in inland waters. A WestPac plant on Texada would be vulnerable.

HEALTH Emissions from the plant would threaten the health of local populations.

The site of proposed terminal on Texada to the Westview terminal in Powell River is 8.8km.

The re-gasification plant and 600MW gas-fired power facility would emit about 2 million tons of CO2 and nitrous oxides, similar to about 500,000 cars. Also, when natural gas is burned in power generation a fine particulate matter called PM 2.5/TSP is emitted. A 600MW plant would emit more than 25 tons per annum adding to cardiovascular and other health risks. According to Matt Campen of the Lovelace Respiratory Research Institute in New Mexico, “estimates of toxicity based on measurements of particles are likely to dramatically underestimate the net health impact of complex emissions” (London Financial Times. Feb 19, 2008)

VIABILITY. Electricity and gas from LNG is NOT commercially viable

Even if supplies can be assured for the life of the project, prices are uncertain. Prices for long-term LNG contracts are pegged to the price of oil. In December 2007 the price was \$85 for LNG natural gas on an oil-equivalent basis, while the price of natural gas sourced in North America was \$42 (source CAPP). Moreover, transporting LNG long distances is very expensive (source: WestPac).

In addition as a carbon fuel, carbon taxes would be imposed. BC is proposing a modest \$10/tonne CO2, meaning natural gas prices rise by 50c/gigajoule or 5%. The price of European Emission Certificate/tonne was Euro 21.5 in March 2008. Some suggest that a price of Euro 35 (or \$55)/tonne is necessary to influence investment. In any event it is a safe to assume that the price of carbon will increase in the future as the cost of GHG damage becomes more evident. This will prompt new investment away from LNG as a “less than green” fossil fuel.

So going forward, the delivered price of natural gas sourced from LNG and electricity generated from gas-fired generation is going to be uncertain, very expensive, and likely to rise in the future.

Should BC allow a fossil fuel import economy to develop?

BC has plentiful supplies of natural gas and coal and using these fossil fuels will require careful management under BC’s greenhouse gas (GHG) goals. Importing fossil fuels for export and allowing a fossil fuel economy to develop would be nonsense in relation to BC’s GHG goals.

where most of the investment would NOT be in Canada.

To supply 500 million cubic feet per day requires a gas field producing 4 mmtpa (million metric tonnes per annum, or about 4 tcf. --trillion cubic feet). WestPac say an investment of \$2bn? is required for the project, but the vast majority of the investment will be offshore. Typical capital investment for a 5mmtpa project is as follows:

Typical investment: 5 mmtpa LNG supply chain.			
Upstream	Offshore	\$1.00bn	29.20%
Liquifaction	Offshore	\$1.25bn	36.50%
LNG tankers	Offshore	\$0.85bn	24.82%
Re-gasification	in Canada	\$0.325bn	9.49%
		<u>\$3.425bn</u>	<u>100.00%</u>

Source: Wood Mackenzie

