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An Integrated Approach to Energy in BC

Synergy is the term used to describe a situation where different entities work together to realize a whole that is greater that the sum of its parts. Today, British Columbia has a compelling opportunity to achieve synergy with our energy resources—"energy synergy". Our northeastern "Energy Corridor" has extraordinary energy resources, notably hydro, wind, and natural gas, all of which should be integrated to make our province a clean energy powerhouse.

The GM Shrum Generating Station (GMS) currently has a capacity of 2730 MW. On average, however, it runs at just over 50% capacity because the amount of water that flows into Williston Lake is insufficient to allow BC Hydro to direct more water through GMS turbines while maintaining the reservoir at an acceptably high level. What's more, given our changing climate and consequent reduced snow packs and receding glaciers, in the future less water may flow into this vast reservoir, causing GMS output to fall even further below its potential. Almost all electricity generated in BC is from hydro, which, in light of climate change and the potential for reduced run-off, makes us vulnerable. We need to diversify—to introduce more wind power into the system and combine it with hydro to achieve energy synergy.

Although renewable energy has been a major theme in BC in recent years, wind projects have drawn far less attention than run-of-river projects, even though the former have overwhelmingly more power potential in our province than the latter, and with modest environmental impacts. Few people are fully apprised of BC's wind power resource base. Several leading international wind power analysts are, however, and they have confirmed what many BC wind developers know—that northeastern BC has a vast array of textbook-perfect wind farm sites, stretching from south of Tumbler Ridge to the Yukon border. Several of these sites are close to the Bennett Dam, Williston

Lake, GMS, and existing transmission infrastructure, and if they were built-out to full capacity, wind-generated electricity could replace hydro-generated electricity for significant periods of time. This is where hydro and wind work synergistically. When the wind blows BC Hydro would be able to conserve water in Williston Lake instead of directing it through GMS turbines—and to use this water to increase GMS output when winds are light. On top of this, because wind would allow BC Hydro to retain much more water in the reservoir, it could build a new generating station larger than GMS on the opposite side of the Bennett Dam from GMS, more than doubling the power generation potential of the Bennett Dam/Lake Williston complex. The use of wind to generate electricity—and store vast amounts of energy in the form of water that can be directed through turbines on short notice—would allow Williston Lake to become, in effect, the largest battery in North America, a superb firming mechanism for intermittent wind.

BC's energy synergy opportunity is not limited to our two best renewables—hydro and wind. Natural gas is also part of the equation. With the recent discovery of the Horn River Basin and Montney shale natural gas fields, the province's natural gas reserves are now also world-class. And although natural gas is a fossil fuel that generates greenhouse gases both during its processing and consumption, the new fields will almost certainly be developed, making legislated greenhouse gas reduction targets even more challenging to meet. By integrating our energy resources, however, we arrive at a solution.

The largest individual sources of greenhouse gas emissions in BC are the natural gas processing plants near Chetwynd and Fort Nelson. Tapping into the Horn River Basin and Montney fields will result in new plants with similarly problematic emissions. Fortunately, CO2 can be readily captured from such plants with existing technology and used as a feedstock for an emerging fuel called dimethyl ether (DME or Blue Fuel), an alternative fuel for transportation (diesel substitute), home heating and cooking (propane blendstock and substitute), power generation (natural gas substitute), and plastics production (oil substitute). Using CO2 to make DME/Blue Fuel constitutes "active sequestration", counterpoint to "passive sequestration"—storing CO2 in geological formations, an approach that is prohibitively expensive and experimental. The other key DME /Blue Fuel feedstock is hydrogen, which, through electrolysis conducted with electricity generated by hydro and wind, can be produced in the vicinity of the natural gas processing plants. By using CO2 and re-

newable energy to produce DME/Blue Fuel, BC would become one of the few sources in the world of carbon-neutral DME/Blue Fuel, a fuel that will readily find markets both domestically and abroad.

Apart from being ultra-clean burning and non-toxic, DME/Blue Fuel is an excellent energy carrier, the ideal medium for transmitting energy via rail, pipeline or ship and without the need to upgrade heavily burdened electricity grids. To put this in context, a single 80,000 tonne ship loaded with DME/Blue Fuel could carry from Prince Rupert to Los Angeles the equivalent amount of energy that a 500 kV line could transmit between these cities. DME/Blue Fuel truly is, in essence, “liquid electricity”.

Now is a time for visionary thinking and bold action. Given the convergence of hydro, wind, and natural gas in northeastern BC, we are in an enviable position to build a new economy that will give rise to a wealth of green business opportunities and jobs—and make our province a leading low-carbon society that will inspire others and attract investment from around the world.