Keystone XL Pipeline Project versus Sustainable Energy – U.S. and World

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Attention: U.S. Department of State

Keystone XL EIS Project
P.O. Box 96503–98500
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Public Comments

Dear Members of the U.S. Department of State:

I appreciate the opportunity to provide comments related to the proposed Keystone XL pipeline project. I have reviewed the Draft Environmental Impact Statement and the Supplemental Draft Environmental Impact Statement for the project, and shall provide a few general comments.

Sincerely,

Matthew McCarville

Introduction

The U.S. Department of State has requested public comment on the Supplemental Draft Environmental Impact Statement (EIS) for the proposed Keystone XL pipeline.

TransCanada Keystone Pipeline, L.P. (Keystone) proposes to construct and operate a crude oil pipeline and related facilities to transport Western Canadian Sedimentary Basin (WCSB) crude oil from an oil supply hub near Hardisty, Alberta, Canada to destinations in the south central United States, including a new tank farm in Cushing, Oklahoma and delivery points in Nederland (near Port Arthur) and Moore Junction (in Harris County), Texas (click here for a map of the project). In total, the proposed Keystone XL Project would consist of approximately 1,711 miles of new, 36-inch-diameter pipeline, with approximately 327 miles of pipeline in Canada and approximately 1,384 miles in the United States. The proposed Project would cross the international border between Saskatchewan, Canada, and the United States near Morgan, Montana. The proposed Project initially would have a nominal transport capacity of 700,000 barrels per day (bpd) of crude oil. Because this proposed project will cross into the United States from Canada, a Presidential Permit issued by the U.S. Department of State is required for the project to proceed. This subjects the Keystone XL Project to the National Environmental Policy Act (NEPA), which requires disclosure of potential environmental impacts (beneficial and adverse) and the consideration of possible alternatives.

I shall focus on the possible alternatives which are neither to meet the needs of the refiners nor the purpose of the proposed project. Specifically, I shall suggest a possible alternative which does not require any crude oil for energy in the U.S. or global marketplace.

I understand that Dr. James E. Hansen will be providing public comments, in which case I shall ask that the U.S. Department of State consider his comments as generally reflective of my own concerns with respect to climate impacts, etc. [1].

I also request that Members of the U.S. Department of State or any other relevant decision-makers in this process do carefully read through and consider the information which is contained in the links provided in the bibliography section. This information is crucial as it reflects a body of information that supports my assertions, etc.

These comments are offered on the basis on my expertise; I am not representing the position of my employer nor any organizations with which I am affiliated.

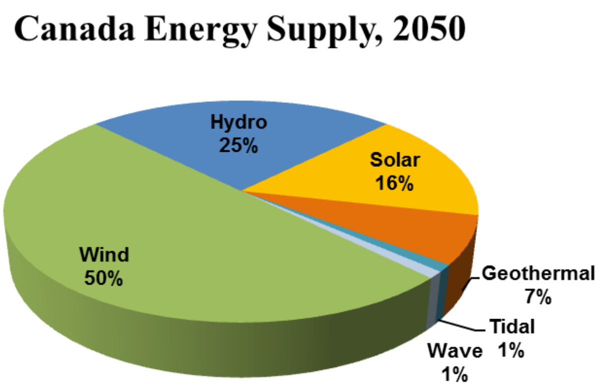
A review of solutions to global warming, air pollution, and energy security

Jacobson (2008) reviewed and ranked “major proposed energy-related solutions to global warming, air pollution mortality, and energy security while considering other impacts of the proposed solutions, such as on water supply, land use, wildlife, resource availability, thermal pollution, water chemical pollution, nuclear proliferation, and undernutrition” (p.148) [2]. Jacobson asserts the “use of wind, CSP, geothermal, tidal, PV, wave, and hydro to provide electricity for battery electric vehicles (BEVs) and hydrogen fuel cell vehicles (HFCVs) and, by extension, electricity for the residential, industrial, and commercial sectors, will result in the most benefit among the options considered. The combination of these technologies should be advanced as a solution to global warming, air pollution, and energy security. Coal-CCS and nuclear offer less benefit thus represent an opportunity cost loss, and the biofuel options provide no certain benefit and the greatest negative impacts.” (p.148) [3].

A path to sustainable energy in Canada

On March 2nd, 2011, I testified to the Parliament of Canada Senate Committee on Energy, the Environment and Natural Resources with a plan to power Canada with 100% renewables by 2050. I motivated this asking what's the problem? Why care? Why act quickly; not in 100 years?

Aside from 2.5-3 million air pollution deaths a year, hidden medical and insurance costs, etc., temperatures are rising. In Atlantic Canada from September to December in 2010, 89 new temperature records were set; 3 new lows and 86 new highs. In the 2000's arctic sea ice decreased 15% and we had 9 of the 10 hottest years in recorded history. As sea ice disappears it's more difficult for it to recover. Once gone, the climate can warm even more rapidly. So this is important as we can't rely on solutions that might become available. We have huge populations to support, we have infrastructure and want to be sustainable for a while, so we must rely on the best technologies existing today to solve this.



I estimate that approximately 55,000 5 megawatt (MW) wind turbines, 500 300 MW concentrated solar plants, 500 300 MW solar PV power plants, 3 million 3 kilowatt (kW) rooftop PV or small wind systems, 150 100 MW geothermal power plants, 5000 0.75 MW wave devices, 5000 1 MW tidal turbines, 10 new 1300 MW hydroelectric power plants and 70,000 MW of existing hydroelectric power plant capacity, can power Canada with electricity and electrolytic hydrogen for all purposes within 40 years at costs similar to today.

Vehicles, ships and trains would be powered by electricity and hydrogen fuel cells. Aircraft would run on liquid hydrogen. If Canada converts all personal vehicles to battery electric vehicles powered by wind, towers on the ground require less than 0.2 km^2 – twice the area of Parliament Hill. Land for turbine spacing can still be used for agriculture.

Wind power is the greenest energy supply option and it’s about twice as powerful in the coldest month compared to the warmest. Space heating is 63% of end-use energy in Canada’s residential sector. So homes would be warmed with excess winter winds using electric thermal storage heaters – no need for coal, oil, natural gas, nuclear or biofuels – and water would be preheated by the sun.

Aside from cryogenic hydrogen for aircraft, which you have to combust, along with some high temperature processes that would replace steel production, there would be no need for any combustion except in very remote circumstances. In sum, this path to sustainable energy in Canada achieves about 90% reductions in GHGs from energy use by 2050. Barriers to the plan are primarily social and political, not technological or economic.

I request Members of the U.S. Department of State to view the Committee Proceedings along with my Briefing Notes to SCEENR to see the details of this testimony [4,5]. I also request Members to view a more recent and detailed paper entitled, “A path to sustainable energy in Atlantic Canada by 2050” which has been submitted to the the CIGRÉ Canada Conference on Power Systems [6].

A path to sustainable energy – U.S. and World

Jacobson et al. (2011) shows the U.S. and world can technically and economically convert energy systems to 100% renewable energy by using electricity and electrolytic hydrogen for all purposes. Part one of the study examined technologies, energy resources, quantities and areas of infrastructure, and materials [7]. Part two examined reliability, system and transmission costs, and policies [8]. Hart et al (2011) uses stochastic models and Monte Carlo approaches to simulate generator portfolios for reliability of power systems with high amounts of variable renewable energies [9]. Jacobson et al. (2011) illustrates that if the projected energy demand for the U.S. in 2030 is converted to electric power, then reduced due to the inherent electricity and hydrogen conservation measures in the system, the resultant average U.S. power demand is approximately 1.78 terawatts (TW) [10].

Several studies show it is possible for wind electricity to supply at least 50% of power demand [11,12]. If 50% of U.S. energy in 2030 is supplied with wind turbines, the average power output from the turbines would need to be approximately 890 gigawatts (GW). Let's assume that half of installed wind capacity is onshore and half is offshore, with capacity factors onshore of 36% and 40% offshore [13,14]. Thus, approximately 470,000 5 megawatt (MW) turbines (or 2.35 TW installed wind capacity) would be needed to meet 50% of all U.S. energy needs in 2030.

Kempton (2009) provided testimony before the U.S. Senate Committee on Environment and Public Works regarding large-scale carbon free power [15]. Based on his assessment, current wind turbine factories running five days and three shifts can produce 350 turbines per year. If the U.S. wanted to build 470,000 turbines within 15 years, it would require about 90 factories. In addition, the U.S. would need 90 factories for blades and 90 for towers. This would be like 90 large automobile manufacturing factories, each employing perhaps 500 people with a 4x multiplier for indirect jobs among suppliers. This represents a potential of 225,000 jobs. Regardless of whether manufacturing is local, the economic impact of a large-scale deployment of wind farms, ie. - in terms of employment from construction, operation and maintenance, etc. is still significant [16].

Conclusion

There is no need to develop the Keystone XL Pipeline Project as evidence shows it is possible to switch to alternatives in sufficient quantities at reasonable costs using existing technologies. Furthermore, it is necessary to choose only the best technologies to have a reasonable chance of limiting global warming to 2 degrees Celsius since preindustrial time.

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