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## A synoptic view of Japan's primary energy sources and fuel cost analysis for power generation

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Japan is one of the leading nations in terms of extent of electrification, that is, nearly half of the primary energy sources consumed in Japan is in the form of electricity. The other half is consumed in the form of feedstock for petrochemical products and fuel for transportation, industrial, commercial and domestic needs. This mix bodes well for a smooth transition to post-fossil fuel sources of energy, as alternative energy sources, with the exception of bioenergy, suffer from the "single-trick pony" syndrome; they can generate electricity but nothing else (hydro, wind, solar, nuclear, geothermal). Thus, the more electrified the national economy, notwithstanding the hurdles of grid connectivity and electricity storage, the lower the structural barriers for the transition to future forms of energy. This is the long-term promise. However, in the short- to medium-term the landscape is more problematic, especially for the case of Japan, an industrial powerhouse, hugely sensitive to cost of power generation for economic competitiveness. This becomes evident when we examine the fuel cost associated with generating a 1000 MW of electricity (useful yardstick in the developed world corresponding to the needs of a population of one million) for a period of one year (useful timespan for energy bill fiscal calculations) based

on Uranium oxide, coal, oil, or natural gas. It becomes quickly evident that unless other costs and risks and societal values are taken into consideration, nuclear is by far the least expensive fuel. Of course, all such fuels are non-renewable, thus over time they become less viable, but in the short- to medium-term the economic rationale favors them hugely, unless supply security becomes a concern (for in the case of Japan virtually all sources originate from foreign lands). For this reason, perhaps, Japan is far-behind other developed nations in terms of its renewable energy contribution to the total mix (barring hydroelectric, where it's amongst leading nations, with the proviso that Japan's massive stock of enriched Uranium and Plutonium at home and in Europe gives to her the sense of indefinite perpetuity). For instance, there is barely enough wind turbines in Japan to generate 1000 MW of continual electricity, not simply nameplate capacity, hence sufficient for only one million people (for a country with 130 million inhabitants), while Japan is particularly well-posed to harvest its offshore wind resources as in Denmark and the UK. The paper and presentation will provide figures obtained from public-domain sources to illustrate this theme and landscape.

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