

EB-2007-0707

OPA Integrated Power System Plan (IPSP)

The data in this comment is drawn from *OPA Exhibit G*, entitled “PLAN ROBUSTNESS”. The primary points to be made are:

- (1) The OPA plan is not robust. It is based on an assumption that is highly improbable, and it fails to consider supply and demand scenarios that are much more probable.**
- (2) The OPA plan is extremely risky. As it stands the primary energy sources will be nuclear and natural gas, both of which are subject to unpredictable loss of supply, and the plan breaks down completely in the event that the demand has been underestimated, putting Ontario's economy and environment at risk.**
- (3) The OPA plan is inconsistent with the intent of all levels of Canadian government (and the international community) to deal with Climate Change.**
- (4) The OPA plan is excessively expensive for the taxpayers and consumers of Ontario. It perpetuates the dependence on the existing energy regime at the expense of alternatives that would be less expensive and more sustainable.**

Robustness

The basic OPA assumption is that there will be no new demands for electricity in the period 2008-2027. The total demand will increase with population growth but their assumption is that efficiency improvements will reduce the per capita demand so the net increase in demand for electricity will be very modest. Although the OPA analysis considers eight different scenarios, six of them assume the same capacity requirement for 2027 (40,076 MW) and the other two are only slightly different at 45,413 MW.

The primary energy demand sectors in Ontario are buildings, transportation and industry. All three of these sectors are in the early stages of undergoing major transformations in their energy sources. For buildings the change will be involuntary. We will run out of domestic natural gas during the subject period so the OPA should have considered the potential impact of that fundamental change in a consumption sector that is even larger than the electricity supply sector. It is not self evident that LNG will substitute for the natural gas. Ground heat storage (that needs electricity to function) would be a better choice, or we might even a switch to electrically heated buildings that rely on improved building design. Considering the immense size of this application and the immediacy of the changes that will be needed the omission of an analysis of its impact represents a major flaw in the plan.

The transportation sector is in the same boat (please excuse the choice of words). The US government has just passed revisions to its Energy Act that will require that vehicle manufacturers meet a 35 mpg average for the cars they make. Since the Canadian car industry is a part of the North American industry the US regulations will automatically apply here as well. The most likely outcome will be a new generation of electric and hybrid vehicles (cars, buses and trains) that may run primarily on electricity rather than gasoline. The consequence would be a huge increase in the demand for electricity. Since cars have a short lifetime this transformation could occur relatively quickly, well within the period of interest. The failure of the OPA plan to deal with this potential scenario has two consequences – the OPA plan itself is not robust if it excludes cases that have a substantial probability – and the failure of the OPA and OEB to consider how the electricity might be provided would be a

major deterrent to the adoption of GHG measures that are urgently needed in the transportation sector.

The federal government is currently in the process of developing and enacting regulations that will drastically reduce the production of greenhouse gases by the industrial sector. Most such changes are likely to rely on increased use of electricity by industry. Note moreover that the federal regulations will apply to the electricity supply industry itself. The OPA plan calls for an increase in the use of natural gas (& oil) from 4,570 MW to 11,501 MW (Case 2), a huge increase that obviously puts the OPA plan in direct conflict with the federal objectives. Therefore it may not (and certainly should not) even be possible to implement the OPA IPSP plan.

Each of these three demands has the potential to more than double the consumption of electricity. The transformations are currently underway. The underlying pivotal change for each has already happened, and they all require prompt attention. However, their impact on consumption is still in its early stage and the eventual magnitude of the resultant demands cannot be determined from simple trend projections. Throughout the OPA review process many of us tried to persuade the OPA to examine these factors, which we think would be a normal management practice considering their importance in developing a plan that can deal with the likely future events. However, the OPA declined, arguing that they will deal with such contingencies when the trend statistics became available, a position that is reiterated in Section 2 and elsewhere in Exhibit G. That raises the question of whether the OPA submission is a plan at all, or is it just a short term projection of the status quo?

The plan does not even provide a credible projection. A rational starting point would be to look at the growth in demand over the past 20 years and project that growth for the coming 20 years. Such a projection would predict a much larger demand by 2027 than the OPA has proposed. Instead, the OPA appears to have cherry-picked the trend for only the past couple of years and projected that into the future. The recent trend does show a levelling of the demand, primarily as a consequence of recent efficiency gains. Such initial gains are comparatively easy to achieve simply by replacing old facilities with newer and more efficient ones. However, those initial improvements will not permanently alter the slope of the demand curve. To do that it would be necessary to constantly implement yet more efficiencies, but that becomes progressively more difficult.

Risk

The “Renewables” category in the OPA plan is primarily composed of hydro power, which is a relatively stable and reliable source of energy, but it has very little potential for growth. The other primary sources of energy in the OPA plan are nuclear power and natural gas.

Nuclear The use of nuclear power was originally justified on the grounds that it would be extremely cheap, and later on the grounds that it provided the only viable alternative to fossil fuels. Neither assumption has proved to be correct. It is a very expensive source of energy with respect to both its capital cost and its long term operating costs. Quite apart from the risks of the dangerous process itself it imposes an economic risk because nuclear power will probably not be competitive. Renewable energy sources can provide energy that is less expensive, more reliable, quicker to bring on line, more sustainable in the long term, and less wasteful because it can utilize distributed generation. Nuclear power is subject to a significant danger that the whole industry will collapse if there is another major accident anywhere in the world. It is likely to encounter continuing commissioning delays and failures to meet design objectives similar to those that have plagued the Canadian program from its outset.

Natural gas We should not be wasting the rapidly dwindling domestic reserves of natural gas on applications like space heating. That job can be much more economically handled by storing heat in the ground, a technology that can be almost universally applied to both new buildings and retrofits. It provides an alternative that is clean and permanently sustainable. However, that alternative requires forward planning to ensure that the electric power that will be needed for the heat pumps will be available. The OPA plan fails to make provision for this, or even to provide an estimate of the potential demand.

Once the domestic supplies of natural gas have been exhausted we will become dependent on imported LNG. That is a high risk alternative that will be subject to the risk of supply interruptions from the supplier countries and their pipelines, potential shipping problems, vulnerability to acts of terrorism, and to regassification challenges. Such risks are unnecessary.

Coal The OPA plan nominally calls for the use of coal to be phased out but any delay in constructing the nuclear power stations or any demand in excess of the OPA's demand projections will confound that intent. Since both contingencies are highly probable the most likely outcome is that the use of coal for power generation will in practice increase sharply, with consequent negative impacts on the environment.

Climate Change

All levels of government in Canada have undertaken to reduce the production of greenhouse gases and air pollution. They have all set targets and there is a rapidly growing body of legislation and regulations to control these factors. Since the OEB is charged with the responsibility of ensuring that energy plans are formulated in the public interest it should require that applicants like the OPA must provide detailed schedules for the resultant production of GHG, an analysis showing how the proposed plans will be better than the alternatives, and a review showing how the plan conforms to the targets, laws and regulations of all levels of government. The OPA plan is particularly important in this respect because it directly or indirectly impacts on nearly all of the major sources of GHG's.

As it stands the IPSP plan calls for a large increase in the use of fossil fuels, primarily in the form of natural gas, from a capacity of 4,570 MW to 11,501 MW (Case 2). That is diametrically opposed to all governments' intents to drastically reduce the use of fossil fuels in that same period. This should by itself provide sufficient reason to reject the OPA plan altogether.

The OPA plan proposes to phase out the use of coal for power generation, but none of the other energy sources considered by the OPA has the capacity to provide the required amount of energy in the event that demand exceeds the planned supply (which is a probable outcome), or if the nuclear program is delayed (which is also highly likely). The reliability of the supply of LNG is an additional concern. The OPA plan is very inflexible because it rejects the use of renewable energy (other than hydro) for primary electricity and heat production. If anything goes wrong on either the supply side or the demand side then Ontario would have to return to the use of coal, probably on a much larger scale than it does at present.

The reliance on nuclear power for baseload power greatly exacerbates this problem. Renewable energy sources cannot provide the peak power required for the winter, summer and diurnal peaks. Nuclear stations operate at a fixed output, so the use of nuclear power automatically means that fossil fuels must be used to meet those peak loads, since fossil fuels can be stored and employed as needed. If there

were no nuclear plants then renewable energy sources would be able to meet the province's needs throughout the year, using their complementary outputs plus hydro and thermal energy storage to match supply and demand. It should be noted that seasonal heat storage in the ground has a much greater potential energy capacity (and occupies much less space) than all of Ontario's nuclear power stations. That capacity is not determined by supply or cost considerations but rather by the potential uses of low grade heat, which are very substantial.

Cost

The objectives of the OEB in its responsibility to regulate the electricity industry, and to provide advice to the Ontario government, are (from the OEB web site):

To protect the interests of consumers with respect to prices and the adequacy, reliability and quality of electricity service.

To promote economic efficiency and cost effectiveness in the generation, transmission, distribution, sale and demand management of electricity and to facilitate the maintenance of a financially viable electricity industry.

It is therefore very surprising to see so little evidence regarding the costs of the plan proposed by the OPA, especially considering that those costs will amount to many tens of billions of dollars. The Board should not approve or even consider such a plan if it lacks a schedule of capital, operating, maintenance, replacement (and hidden) costs associated with its components. In view of the long history of cost overruns, delays and system failures for nuclear power stations the costing plan should assess the uncertainty in the cost estimates for such components. This will also be needed for comparing the costs to those of emerging energy technologies such as renewable energy, sequestration, etc.

Beyond 2027

As it stands the OPA plan calls for a continuation of the status quo, with a growing centralized power system employing the existing mix of nuclear, fossil fuel and hydro sources. The significant changes are not in the central power system itself but rather are shifted to the shoulders of the consumers, who will be expected to reduce their consumption to accommodate the needs of the power industry. It assumes that Ontario will continue its reliance on fossil fuels for the non-baseload portion of its power generation, and more importantly we will continue to use fossil fuels for heating our homes, operating our vehicles and for industrial applications. The result will be a continuation of the upward spiral in GHG and cost.

There is an alternative. A decentralized system in which local power suppliers generate most of their own electricity could provide district heating to utilize the heat that is presently being wasted. Those local suppliers would need to generate additional power to meet the needs of industry as it reduces its dependence on fossil fuels. Cities could also provide charging points for cars, buses and trains that would enable them to run primarily on electricity rather than gas or diesel fuel, but this means yet more power generation (i.e. the plug-in hybrid car concept would be extended to cover vehicles in general). Homes and other buildings could utilize stored heat for heating, and stored cold for cooling, in addition to the heat from the co-generators. In such an alternative world the use of fossil fuels would be largely phased out for the three major consumption sectors – buildings, transportation and industry – and would also be greatly reduced for the power industry itself. We would no longer be totally reliant on an expensive power grid that depends on 100% reliability and that itself wastes power.

To make such an alternative work we will need to ensure that supply and demand are balanced at all times. To some degree that can be achieved by using renewable energy sources in a complementary way. For example, solar power provides power during the day, when consumption peaks, and hydro power provides storage that can accommodate cloudy or windless days. We can utilize seasonal ground storage of heat to meet the thermal energy needs on an as-required basis, and of course cogeneration provides additional heat in the winter. The summer power demand peak will be greatly reduced if we shift away from electrically driven air conditioners to heat/cold storage systems. Solar, wind, hydro and ground storage systems together are capable of supplying all of the energy that we need, including the demand increases implied by the sectoral switches away from fossil fuels. Fossil fuels will continue to be used, but for the minor role of providing continuity of supply at times when the renewable sources are deficient. Eventually even that role will be phased out by the development of energy storage systems.

The OPA plan obstructs the development of such an alternative energy regime. If the Ontario Energy Board approves the IPSP plan then it will be committing the province to a long term spiral of GHG production, rising costs, and rising risks of power outages that will damage both our environment and our prosperity.

Ron Tolmie

129 Salter Crescent

Kanata, ON K2K 1Y9

(613) 271-9543

tolmie129@rogers.com

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