the PEMBINA institute Sustainable Energy Solutions

Comments on OPA IPSP Discussion Paper 6: Sustainability

Prepared by Mark S. Winfield, Ph.D, Director, Environmental Governance
December 2006

General comments

The paper generally introduces a more sophisticated discussion of sustainability concepts and makes considerable progress in the identification of sustainability requirements. However, the paper breaks down in terms of translating those general principles and requirements into context specific evaluative criteria for the IPSP. Indeed, the OPA's proposed context-specific evaluative criteria for the IPSP fail to effectively integrate key sustainability requirements as identified in the OPA paper. The requirements of intergenerational equity and intra-generational equity, in particular, are very weakly articulated in the context specific criteria.

More generally, the context specific criteria are poorly defined, and no clear tests or measures are established to assess whether the criteria have been met. Rather the sections dealing with the context specific criteria provide general discussions of issues rather than setting out specific tests/goals that the IPSP will seek to achieve and measures that would permit the assessment of whether the tests had been met.

Specific Comments

Section 2.2.: Sustainability Principles.

- The sustainability requirements (socio-ecological system integrity, livelihood sufficiency and opportunity, Intergenerational equity, intra-generational equity, resource maintenance and efficiency, socio-ecological civility and democratic governance, precaution and adaptation, Immediate and long-term integration) and trade-off criteria (maximum net gains, burden of argument on trade-off proponent, avoidance of significant adverse effects, protection of the future, explicit justification and open process) identified in the paper are appropriate and generally consistent with the current literature on sustainability and decision-making.

However, the actual definitions of these principles and criteria employed in the paper vary significantly from those presented by Gibson in the paper[1] from which they are drawn. In general the modifications soften or narrow the requirements laid out in the original paper.

[1] R.B.Gibson, "Sustainability assessment: basic components of a practical approach," *Impact Asssessment and Project Appraisal,* volume 24, number 3, September 2006, box 1.

The OPA, for example, defines Socio-ecological System Integrity as: "Maintain resiliency of ecosystems and consider linkages between economic, environmental and social impacts," while the original definition was to: "build human-ecological relations to establish and maintain the long term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological well-being depends"

In addition, One of the key thrusts of a sustainability-based approach is integration of objectives, especially through the pursuit of multiple mutually reinforcing benefits, while avoiding significant adverse effects (see the original version of trade-off rule #1). The OPA paper gives little attention to these integration goals.

Section 2.3. Context-Specific Criteria.

- On the basis of the sustainability principles and trade off criteria, the paper identifies six context specific evaluation criteria (feasibility, reliability, cost, flexibility, environmental performance and social acceptance) for the IPSP.

- The discussion of each of these criteria generally fails to articulate specific tests or goals against which the performance of the IPSP will be assessed. Rather the paper merely provides general discussions of these issues in the context of the IPSP.

- A number of the sustainability principles articulated in section 2.2. of the paper are only very weakly represented in the discussion of the context specific criteria. The lack of a strong framework for assessing the plan against the principles of intergenerational and intra-generation equity is particularly noteworthy. There is no discussion of how inter- and intra-generational distributions of risks and costs will be identified and considered in decision-making.

Section 3: Evaluation Criteria – specific comments

Feasibility

- Feasibility is defined in terms of technical and commercial feasibility, infrastructure availability, regulatory requirements, and timing. Specific tests or criteria for these factors are not identified.
- The paper provides no discussion of how different technology choices may affect the options for future generations.

Reliability

- Reliability is set up in the paper as a non-negotiable (i.e. overriding) criteria, which (apparently) trumps all other considerations.
- Reliability is defined as resource adequacy (avoidance of blackouts, reserves) and system security (ability to withstand unexpected events).
- The proposed approach sets up a framework where resource adequacy and security for current consumers trumps all other considerations, including the interests of future generations. This is not an acceptable approach in a sustainability context.

Cost

- The paper generally fails to adopt a polluter pays principle in its approach to cost issues. This is essential to meeting the tests of intergenerational and intra-generational equity set out in section 2.2.

- The discussion of costs assumes LUEC can fully incorporate future costs. In practice, with certain technologies large costs are transferred into the future, with high uncertainty about what these costs will ultimately turn out to be. In the result these costs may not be fully captured in the LUEC.

- The proposed approach to the calculation of LUEC includes the discounting of costs into the future, with the implication that the value of impacts to future generations are reduced relative to those on present consumers. Such an approach cannot be reconciled with the principle of intergenerational equity articulated in section 2.2.

- The paper provides no discussion of how the environmental, social and economic externalities associated with different alternatives will be incorporated into considerations of cost. Costs to consumers are defined exclusively in terms of simple electricity prices. Consideration of externalized costs that may have to be borne by consumers or society as a whole is critical to meeting the principles of both intra-generational and intergenerational equity.

- The discussion of costs assumes that a present value analysis can fully capture long-term costs. Present value calculations are again grounded in part on the discounting of the value of costs imposed on future generations. Present value calculations also fail to fully account for the opportunity costs imposed on future generations resulting from the commitment of resources to managing waste and other problems arising from current consumption. In both of these contexts, a present value calculation approach to the assessment of future costs cannot be reconciled with the principle of intergenerational equity presented in section 2.2.

- The paper proposes to rely on a total resource cost (TRC) to assess the cost-effectiveness of conservation measures. There are a number of problems with this approach from a sustainability perspective
    - The current TRC test fails to consider the potential for avoided externalized environmental costs (i.e. environmental impacts of avoided generation) arising from conservation programs.
    - The proposed approach would assess conservation initiatives on an individual program basis. This approach fails to consider that there has been little activity on electricity conservation in Ontario over the past decade. As a result, considerable infrastructure and capacity development activities may be required for the successful implementation of an overall conservation strategy. It is possible that certain initiatives may not directly result in reductions in demand and energy consumption, and will not be able to meet the TRC, but will be essential to enabling initiatives that will have those types of impacts. Capacity building initiatives may also deliver benefits to future generations in terms on long-term capacity to deliver CDM programs.

Flexibility

- Flexibility is defined as robustness, and ability to adapt to changing circumstances and assumptions.

- References are made to the desirability technological and geographic diversity of supply and CDM resources, but no criteria, tests or indicators of a desired level of technological and geographic diversity are established.

- Reference is made to the overlap between the retirement of old resources and commissioning of new. This implies that the plan should be weighted against resources with higher levels of uncertainty regarding commissioning times to minimize this problem. No reference is made to such considerations as a criteria by which plan components will be assessed.

- The paper provides a discussion of smaller scale, modular facilities as a demand uncertainty risk management strategy vs. benefits of economies of scale of large scale facilities, but simply suggests that a balance be struck between these options. No discussion of criteria or tests to assess the appropriateness of that ‘balance’ is provided.
    - The discussion also fails to consider that smaller scale, modular facilities have additional flexibility advantages. The consequences, for example, of failures of a particular facility or even generating technology for the overall

system are much less severe in a system relying on a wider diversity of generating technologies and facilities.

Environmental Performance

- The discussion of environmental performance is one of the most disappointing aspects of the paper. At a fundamental level, the paper fails to apply the sustainability principles it identifies in section 2.2. in its proposed approach to the assessment of environmental performance. The application of the principle of intergenerational equity, for example, would imply that a heavier weighting be given to environmental impacts or risks that persist over time, as opposed to those that would be experienced by present consumers of electricity. The principles of both intergenerational and intra-generational justice would require that the full range of impacts and risks associated with options be considered on a life cycle basis (i.e. fuel extraction to waste fuel management and facility decommissioning).

- Instead, the criteria for environmental performance retain many of the flaws contained in the analysis presented in the 2005 supply mix advice documents. Some of the more prominent examples include the following:

    - Impacts on water quality are completely excluded from consideration. This is despite the consideration that certain supply options, such as nuclear power, have severe life cycle impacts on surface and water quality. In 2004 Health Canada and Environment Canada concluded effluent from uranium mines and mills in Canada met the definition of “toxic” substances for the purposes of the *Canadian Environmental Protection Act*.
    - The discussion of GHG emissions fails to acknowledge that different levels of GHG emissions are associated with different types of nuclear facilities. Fuel enrichment processes associated with certain types of reactors can be associated with significant GHG emissions. Reliance on lower grade uranium ores as a fuel source can also result in significantly higher GHG emissions, as well as other environmental impacts.
    - Radiation impacts are only considered in relation to atmospheric releases. This fails to consider the impacts radionuclides discharged to surface and groundwater, or to land. These are major exposure pathways for these contaminants.
    - The indicator for wastes proposes to make no distinction between the toxicity/hazard properties of different types of wastes. Wastes are a critical consideration in terms of sustainability, as wastes with persistent toxic, radiological or other hazardous properties imply the transfer of risks and

potential management costs on to future generations. The approach proposed in the paper is obviously unacceptable in this context.
- There is no indicator that attempts to capture impacts on landscapes or ecosystem structure and function. Again such impacts may have significant implications for future generations.
- There is no indicator that attempts to capture impacts on community or occupational health.
- The indicators fail to identify risks associated with non-routine events, such as accidents or security incidents.
- On the whole the indicators seem rather transparently intended to improve the apparent performance of nuclear power relative to other options by excluding or minimizing key areas of impact and risk associated with the technology (e.g. the exclusion of water quality impacts and non-differentiation of toxicity of wastes, both areas where nuclear power produces serious environmental impacts and risks)
- The criteria are generally set up as information items as opposed to tests. The paper does not identify what types of risks or impacts might present severe challenges or be considered unacceptable in a sustainability context.

Social acceptance

- Again the paper provides discussions of issues, as opposed to providing clear definitions and tests/criteria against which the performance of the IPSP can be measured.

  - Openness
    - We note that this criteria cannot be met in the context of the OPA's current interpretation of the Supply Mix Directive. The current interpretation has meant that a full range of potential alternatives to meeting Ontario's future electricity needs is not under discussion. This has significant implications for the public credibility and legitimacy of the IPSP exercise.

  - Conservation culture
    - The paper presents a discussion of conservation culture, but does not present actual criteria by which the IPSP might be assessed (i.e. does the plan advance a 'conservation culture').

  - Livelihood Sufficiency
    - This is defined largely in terms of reliability and sufficiency of electricity supply

        - Does not consider employment impacts of different options and alternatives.
        - Fails to identify potential human resources needs in relation to the plan.

    - Regional development
        - Provides a general discussion of the regional development implications of the plan
        - Are regional development goals being explicitly pursued as part of the plan? If so what are those goals? What is the source of direction to consider these goals?

    - Public health.
        - The discussion of public health provides no explicit discussion of risks and end points/outcomes to be considered in relation to the plan. We note that the City of Toronto Medical Officer of Health has recommended that the overall plan be subject to a health impact assessment. There is no discussion of the treatment of health risks to future generations or to individuals outside of Ontario as would be required by principles of intergenerational and intra-generational justice. Discussions of public health impacts and risks needs to be linked to considerations of environmental impacts and risks, as the two are closely connected.

    - Acceptable land use.
        - This is defined exclusively in terms of the ability to access land for transmission and generation projects. Ecosystem structure and function or landscape impacts are not considered. The impacts of decisions about the location of future transmission and generating capacity on future land uses and development patterns are not considered.

    - Safety
        - There is no identification of potential safety risks to be considered in relation to the plan, no discussion of security issues/risks in relation to the overall plan or its specific elements, or articulation of criteria through which safety and security risks might be assessed.

- Generally needs to set out more appropriate end-points in terms of social/political acceptance – legitimacy and credibility of the result being the key desired outcomes. Criteria might include:

- Acceptance of key assumptions by major stakeholders (i.e. consumers, environmental.

Recommendations

- Retain the proposed sustainability principles and trade-off rules, while revising the definitions to more closely reflect those articulated by Gibson.
- Review the proposed context specific criteria to ensure that they fully reflect the principles and trade-off rules. Particular attention needs to be given to the identification and avoidance of risks, costs, and impacts on individuals and communities beyond the life of the proposed plan (i.e. 20 years) (intergenerational justice), and on individuals and communities who are not consumers of electricity in Ontario (intra-generational justice).
- Environmental and health impacts and risks should be assessed on a life-cycle basis, and consider the full range of impacts (atmospheric, water quality and use, waste generation, and landscape and ecosystem) for all types of pollutants (radiological, conventional and hazardous). Impacts should be considered in the context of both normal operations and accidents or incidents. Provision should be made for the recognition of unique or particularly difficult to manage impacts and risks associated with particular alternatives.
- Strengthen the discussion of the degree to which the IPSP achieves the integration of sustainability objectives.