The Role of Engineers in Policy Advocacy

OSPE Seminar

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OSPE Political Action Network (PAN)
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The Role of Engineers in Policy Advocacy

Outline of Presentation

✧ OSPE’s Role in Public Policy Advocacy
✧ Engineering – The Silent Profession
✧ Why We Need Engineering Input
✧ The Engineer’s Role in Policy Development
✧ The Engineer’s Role in Policy Implementation
✧ Current Policy Challenges
✧ Case Study – Ontario’s Electrical Grid
✧ Q&A period.
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OSPE’s Role in Public Policy Advocacy

✧ OSPE – The Voice of Ontario’s Engineers
✧ OSPE advocates on behalf of engineers’ economic interests.
✧ OSPE does not do detailed engineering, only enough analysis to identify a problem and potential conceptual solutions.
✧ OSPE wants decision makers to seek expert engineering input on complex technical matters before policy is set in stone.
✧ Improvements in environmental protection will only be politically acceptable to the public if we have the economic prosperity to implement the solutions.
✧ Engineers can suggest solutions where the environment, business, the public and government all win!
✧ When that happens engineers win too through greater public recognition of the value of engineers!
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Engineering – The Silent Profession

✧ Some generalizations....
✧ Engineers shy away from politics and policy debates where emotional arguments and self interest are part of the milieu.
✧ In Canada less than 5% of our political leaders are engineers.
✧ Engineers are more comfortable dealing with evidence based, logical processes that focus on improving life for everyone.
✧ Engineers prefer to get things done rather than debate options endlessly.
✧ Engineers typically wait for a political decision and then engage in implementation.
✧ We cannot help our political leaders if we don’t contribute to the policy debates and policy development at the early stages.
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Why We Need Engineering Input

✧ Policies today frequently involve complex engineering systems: energy, transportation, waste treatment, climate change....
✧ Considerable engineering, environmental and economic analysis including simulation is required to assess the impact of various solutions or options.
✧ Environmental and economic impacts cannot be separated politically – unaffordable options are politically unacceptable.
✧ Policies made without the benefit of engineering input typically result in expensive unintended consequences.
✧ There are many ways to achieve environmental goals.
✧ Taking advantage of physical system synergies known to engineers can achieve better environmental performance at lower cost.
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The Engineer’s Role in Policy Development

- Engineers have unique knowledge and skills related to technical systems and their impact on the environment and economy.
- Politicians don’t want to walk into a policy trap – i.e., a well-intentioned policy that turns ugly during implementation.
- Engineering knowledge is invaluable – it facilitates good policy development and minimizes unintended consequences.
- Time is required however to carry out the necessary analysis and in some cases simulation before policy decisions are finalized. A rush to set policy can compromise the process.
- Failure to undertake the analysis beforehand will result in more frequent and costly policy changes after implementation starts.
- Frequent policy changes create market uncertainty and discourage private investment and economic growth.
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The Engineer’s Role in Policy Implementation

- Engineers’ value to society and governments is their ability to find engineering solutions that maximize benefits and minimize unintended consequences.
- Monitoring implementation progress is important to get early warning of unintended consequences.
- Changes to implementation plans and policies should be made before serious negative impacts on the environment or economy occur.
- Engineers need to be mindful of the fact the Professional Engineers Act does not require the engineer’s client, management or government to accept the engineer’s advice.
- Engineers therefore need to learn how to make compelling arguments with supporting evidence in a respectful way.
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Current Policy Challenges

✧ Government is not short of engineering problems to work on:
  ✧ Climate change, including greenhouse gases (GHG’s).
  ✧ Impact of economic development - Ring of Fire, etc.
  ✧ Transportation/transit in urban centers.
  ✧ Air and water quality.
  ✧ Solid waste including containment of nuclear wastes.
  ✧ Emerging areas – eg: nanoparticle containment.

✧ Serious problems mean great opportunities for innovation, exciting professional engineering work and a real contribution to society!
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A Case Study – The Ontario Electrical Grid

The Value of Engineering Input in Policy Development & Implementation
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A Case Study – The Ontario Electrical Grid

Wind Output – Typical Spring Week

Solar Output – Typical Spring Week

Wind and Solar output are NOT aligned with actual customer demand.
Integration cost for intermittent renewables are very high to achieve dependable supply.
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A Case Study – The Ontario Electrical Grid

Ontario Electricity Demand – Daily Min/Max in 2011

- 2011 average annual grid capacity factor was 63%.
- 2011 peak demand was 2.4 x minimum demand.

Solar output is too high in the spring and fall – requires backup after nightfall.
Wind output is too low in the summer – requires backup during peak summer load.
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A Case Study – The Ontario Electrical Grid

✧ Intermittent renewables like wind and solar on their own produce no GHG emissions.
✧ However, intermittent renewables need back up to supply electricity dependably when customers need it.
✧ Ontario has one of the lowest GHG emitting, mixed generation grids in the world due to its heavy reliance on hydroelectric & nuclear generation for about 85% of its energy.
✧ Ontario’s grid in 2015 emitted about 40 kg CO₂ per MWh compared to 400 to 600 for jurisdictions that primarily use fossil generation (USA, EU, China).
✧ If the “backup” to renewables is zero GHG emitting (ie: hydroelectric, nuclear or storage), the GHG emissions drop as you add more intermittent renewables and displace fossil generation.
✧ However, in a clean grid, if you don’t have enough zero GHG emitting backup generation, GHG emissions will rise as you add more intermittent renewables due to the need to use more fossil generation (typically natural gas) for the required backup.
✧ In the absence of cheap storage, increasing renewable capacity, while reducing nuclear capacity as Ontario is planning to do, is NOT a low greenhouse gas emitting strategy!
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A Case Study – The Ontario Electrical Grid

Notes: The above graph appears as Figure 20: Greenhouse Gas Emissions Forecast in the Ministry of Energy 2013 LTEP. Emissions in any one year could be higher, or lower, than the projection depending on the specific operating conditions experienced in the system. Data for 1990 came from the Ministry of Environment and Climate Change report titled Ontario’s Climate Change Update 2014.

If we stay below the 5 Mtonne line we will continue to achieve the 80% carbon reduction goal.

This rise is due to the retirement of Pickering Nuclear. Gas-fired generation will be used for base load.
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A Case Study – The Ontario Electrical Grid

✧ In 2010, 2011 and 2012 OSPE advocated with the government to:
  ✧ Make Ontario’s existing nuclear units more “flexible” so they could be curtailed rather than shut down to help keep CO₂ emissions low.
  ✧ Curtail wind and solar output when that energy could not be utilized and void “paying” neighbouring grids to take our excess electricity.
  ✧ Approve new dispatching rules for nuclear, wind and solar generation to save about $200 M/yr in avoided natural gas fuel cost and reduce CO₂ emissions by 2 million tonnes/yr.
✧ Bruce Power made their reactors more “flexible” in Feb 2013. OPG plans to do the same for Darlington during its refurbishment program.
✧ The new dispatching rules were implemented by the IESO in 2013.
✧ Wind and solar dispatching began in Sep 2013.
✧ Major improvements in the environmental, economic and technical performance of the grid have occurred.
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A Case Study – The Ontario Electrical Grid

✧ During 2011 and 2012 OSPE made 19 recommendations in its “Wind and the Electrical Grid” report – 5 were fully implemented and 8 were partially implemented by the Ministry of Energy.

✧ OSPE is now advocating with the government to:
  ✧ invest in new smart grid R&D including developing lower cost and higher efficiency storage options so that in the longer term more environmentally friendly solutions will be available.
  ✧ Introduce a “Voluntary Smart Grid Electricity Price Plan” to incent consumers to purchase new technologies that will flatten the grid load profile by better utilizing surplus zero-emitting electricity to displace fossil fuels in other sectors.
  ✧ Revise what goes into the electricity price to better align Ontario’s electricity pricing policies with those of our NAFTA trading partners to help make our manufacturers more competitive.
Summary

✧ Policy that affects physical systems requires engineering studies, analysis and often simulation to guide selection of an optimum cost/benefit solution.
✧ Implementation will result in costly unintended consequences when policy is set without the benefit of engineering input.
✧ Politicians don’t want to be blindsided by unintended consequences.
✧ Engineers need to speak up respectfully and contribute their knowledge and experience before public policies are cast in stone.
✧ Environmental goals will not be affordable if engineers do not have a seat at the decision making table.
✧ Ontario could have achieved the same greenhouse gas reductions at a lower electricity price if expert power engineering input had been provided before the Green Energy Act was passed.
✧ High electricity costs relative to our NAFTA trading partners make Ontario industry less competitive and costs the economy jobs including engineering jobs.
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Questions?

Notes:

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