The Role of Engineers in Policy Advocacy

Joint OSPE – PEO Chapter Presentation

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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.
- We all need to focus on solutions where the environment, business, the public and government all win! If that happens then engineers win too through greater economic prosperity!
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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 development.
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Why We Need Engineering Input

✧ Policies today frequently involve complex engineering systems – energy, transportation, waste treatment, etc.
✧ Considerable engineering and environmental analysis and often 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 – ie: 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.
- Plan changes or recommended policy changes should be made before negative impacts on the environment or economy become serious.
- Engineers need to be mindful of the fact the P. Eng. 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 facts.
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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 area – 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 100% backup after nightfall.
Wind output is too low in the summer – requires nearly 100% backup during peak summer load.
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 grid in the world due to its heavy reliance on hydroelectric & nuclear generation.

Ontario emits about 80 kg CO$_2$ 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 if you don't have enough zero GHG emitting backup generation, GHG emissions will rise as you add more intermittent renewables due the use more fossil generation for the required backup.

In the absence of cheap storage, increasing renewables while reducing nuclear generation is NOT a low greenhouse gas emitting strategy!
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A Case Study – The Ontario Electrical Grid

✧ In 2011 and 2012 OSPE advocated with the government to:
  ✧ Make Ontario’s existing nuclear fleet more “flexible” so they could be dispatched to provide zero GHG backup for wind & solar to keep greenhouse gas emissions low.
  ✧ Dispatch off wind and solar when that energy could not be utilized and void “paying” neighbouring grids to take our excess electricity.
  ✧ New dispatching rules for nuclear, wind and solar generation would save at least $200 M/yr in avoided natural gas fuel cost and would lower CO2 emissions by 2 M tons/yr.

✧ Bruce Power made their reactors more “flexible” in Feb 2013. OPG plans to do so during its Darlington refurbishment project.

✧ Wind and solar dispatching began in Sep 2013.

✧ The new dispatching rules implemented by the IESO in 2013 made a significant improvement in the environmental, economic and technical performance of the grid.
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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 implemented, 8 were partially implemented by the Ministry of Energy.

- OSPE is now advocating with the government to:
  - Invest in new smart grid technology R&D including storage options so that in the longer term more environmentally friendly solutions will be available. However, you can’t roll out new solutions in a major way until the R&D has lowered the costs to an affordable level.
  - Introduce a “Voluntary Smart Grid Electricity Price Plan” to incent consumers to purchase new technologies that will flatten the grid load profile and better utilize grid assets. This lowers the overall cost to produce electricity.
  - Redefine what goes into the electricity price to fix current policies that are at odds with NAFTA partner practices and make our manufacturers less competitive by driving up their electricity costs.
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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 much lower electricity costs if expert power engineering input had been provided before the Green Energy Act was passed.
✧ High electricity costs relative to our NAFTA partners make Ontario industry less competitive and costs the economy jobs including engineering jobs.
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Questions?

Notes:

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