Powering Major Energy Projects: Roundtable Backgrounder

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How Canada can engineer a massive energy build-out

Canada faces rising energy demand from data centres, increased electrification, and significant industrial growth and advanced manufacturing. China, the United States and others are accelerating massive energy investments and build outs. Canada wants to fast-track major projects to fuel the next generation of technologies and infrastructure. These projects will succeed—or stall—on two factors: people and knowledge.

While market forces and the policy environment are key factors shaping investment, the energy build out required in Canada will demand unprecedented coordination between industry, government, educational institutions, First Nations, Inuit, and Indigenous peoples. This applies across conventional and emerging energy projects, such as SMRs, LNG, new pipelines, critical mineral development, decarbonization and the clean energy transition, transmission upgrades, batteries and storage, and energy security.

Session Goal: Enable post-secondary institutions, industry, government, and communities across Canada to build the workforce and capacity to deliver many ambitious large-scale energy projects by 2035.

Why Now?

- Global energy investment will reach US$3.3T this year, with US$1.5T for electrification; North America will invest US$690B this year.
- Canada is scaling nuclear and grid capacity: consider Ontario alone with 4 SMRs planned at Darlington (2029-2036), Bruce Power expansion of 4,800 MW, and Ontario procuring 739 MW of storage to offset data centre demand.
- LNG investment is increasing, led by the U.S., Qatar, and Canada, while clean energy deployment slows globally.
- Canada's biggest provinces recognize they need to double electricity supply by 2050.
- China drives one third of global energy investment, split between grid and storage, renewable power and fossil fuels – Canada must secure critical minerals and affordable electricity to stay competitive.
- Canada's new Major Projects Office aims to fast-track energy corridors, LNG, and clean energy, but outcomes depend on execution and talent availability.
- Canada's net-zero policies (coal phase-out by 2030, clean electricity regulations, net-zero grid by 2035) demand rapid scaling of technology and talent.

SWOT Snapshot: The Canadian Energy Context

Strengths

- World-class PSE hubs advancing SMRs, energy systems modelling, and clean tech
- Strong energy companies
- Strong nuclear engineering programs at Ontario Tech, UofT, McGill
- Established energy research infrastructure
- Federal commitment to net-zero grid by 2035 (although may be changing to 2050)

Weaknesses

- Talent shortages in hydrogen, large-scale battery storage, and SMRs
- Few educational programs specifically for critical minerals in Canada
- Limited industry-PSE collaboration pathways
- Skills gap in emerging energy technologies
- Insufficient apprenticeship programs for energy trades
- Regional disparities in energy training capacity
- Long project approval timelines
- Low capacity for mineral processing and refinement

Opportunities

- Building with First Nations, Indigenous, and Inuit communities from the ground up including equity stakes in major projects
- US$690B North American energy investment this year
- Growing demand from data centres creating market pull
- Targeted certificate programs for emerging energy fields
- Applied research partnerships to de-risk industrial adoption
- Testing emerging technologies through PSE institutions
- Energy hubs integrating workforce, training, and research
- Canada First policy supporting local procurement
- Co-investment into research between government, industry, and university (like Australia Trailblazer University Projects)

Threats

- Tariffs and geopolitical tensions limiting critical mineral trade
- China accounts for 1/3 of global energy investment and 70% control of the global mining of REEs
- Rising data centre load straining grid capacity
- US Inflation Reduction Act drawing investment south
- Global competition for energy talent. Playing catch up: Australia's Trailblazer Universities Program committed $660 million in university-industry recycling and clean energy research and commercialization hubs.
- Rate of clean energy deployment is shifting due to US government pivot and cost of living concerns
- Competing priorities in energy and renewables

Strategic Focus: People and Ideas, Now to 2035

Let's reflect on where we are now and systems we must build to lead globally by 2035.

Energy talent competitiveness will depend on our ability to produce, attract, and retain the right volume and mix of talent. **We likely need structural reforms which could include:**

- Creating specialized degree programs for critical minerals, green hydrogen, and large-scale battery storage
- Scaling nuclear engineering programs to support major SMR build outs across Canada
- Developing targeted certificate programs and apprenticeships for solar PV, carbon management, and electrification needs (EVs, charging, heat pumps, etc.)
- Establishing work-integrated learning specifically for major energy projects
- Building clear pathways from college diplomas to university energy engineering programs

Making choices on energy innovation is essential, because we don't have the capacity to win on everything. We'll have to prioritize. **We could for example:**

- Train students in transdisciplinary programs spanning energy policy, law, and business
- Create testing facilities at PSE institutions for emerging energy technologies such as carbon capture, methane and derivative forms such as hydrogen, and more
- Establish commercialization pathways linking research with industrial deployment
- Build regional energy hubs that integrate workforce development with federal priorities
- Develop IP retention strategies for clean energy innovations

Key Questions for Discussion

This session is not about consensus. It's about surfacing high-impact opportunities for action. **Areas of discussion could focus on four critical areas, for example:**

- **Regional Training Hubs:** How can we establish national energy training hubs that align PSE capacity with the 9-12% growth in energy engineering roles expected by 2035?
- **Applied Research Models:** What models would best accelerate industrial adoption, de-risk projects, and test emerging energy technologies at scale?
- **Innovation Centres:** Should Canada develop 5 regional Energy Innovation Centres in PSE linking energy research, critical minerals, and grid integration with commercial pathways? What would ensure their success?
- **Metrics & Accountability:** What clear accountability metrics should we establish for 2025-2030? Consider:
  - Training 10,000 new energy workers
  - Achieving 50% reduction in technology deployment timelines through PSE partnerships
  - Supporting $200B in energy project investments
  - Proactively meeting workforce needs for all Major Projects Office projects

The core challenge remains: how do we ensure Canada captures value from US$690B in North American energy investment when China controls vast swathes of critical minerals and rare earths, and the US often offers stronger incentives and massive capital pools?