

## REDEVELOP: Training the next generation of science and engineering leaders and policy makers to change public perception of Canada's energy sector

*Celia Kennedy and David Eaton*  
*Department of Geoscience, University of Calgary*

### Summary

The economic downturn in the energy sector, particularly in Alberta, reminds us of the dynamic world we live in, that change is the only constant. As we straddle the transition from conventional to unconventional to renewables, energy-sector innovation takes hold, employers reconsider their workforce and universities adapt to evolving education demands. While texting, tweeting and swiping replace the art of conversation, students endeavor to build communication skills as they prepare to enter the workforce. With social media and fake news on the rise, the general public struggles to discern fact from fiction, resulting in biased public perception of important issues associated with the intersection of science and policy; of environment and economics. This talk reports on the REDEVELOP program; training graduate students to work across disciplines, distance and culture, led by the University of Calgary in partnership with the Universities of Alberta, Toronto, Waterloo and Western Ontario, and NSERC (CREATE).

### Theory / Method / Workflow

REDEVELOP is a catalyst for change, and there are five fundamental reasons for its timely success.

1. **Increasing energy demands.** With a 40% increase in population between 1970 - 2020, Canada is facing unprecedented challenges in supplying cost-effective sustainable energy to meet growing demands.
2. **Abundant unconventional resources.** Technological developments in recent decades have unlocked vast energy resources in the form of hydrocarbons contained in low-permeability rock formations.
3. **Energy transition is imminent.** These unconventional resources, responsibly developed, are the key to Canada's transition to a low-carbon energy future, environmental sustainability and socio-economic stability.
4. **Interdisciplinary approach is needed.** Future leaders within industry, government and Indigenous communities will rely on technical knowledge that crosscuts western disciplines in the natural sciences and traditional knowledge for informed decision-making.
5. **Training complements education.** Graduate students work to develop depth of knowledge in a specific science or research area to establish expertise, but soft skills training is needed to apply that expertise.

Training is delivered to graduate students from Geoscience, Engineering and Public Policy through *The REDEVELOP Challenge*. Multi-university, interdisciplinary teams are each tasked with finding solutions to a scientific question/problem impacting Canada's energy sector. Each team elects a project manager, conducts weekly meetings and engages with subject matter experts from industry, government and Indigenous communities to develop a technical research question (and path to a solution), a policy angle and Indigenous perspectives.

At the end of the 5-month training session, teams communicate their findings at the annual REDEVELOP conference with: a scientific poster, a policy paper, a 90s video for a general audience, and a 15-min presentation to a technical audience, followed by a 30-min Q&A in *Dragon's Den* format. Workshops in communication, project management, Indigenous relations, industrial-organizational psychology and a range of technical skills occur at various stages of training.

REDEVELOP works based on cause-and-effect. Energy problems are in the headlines of traditional and social media daily. While students may be motivated to research the cause of the problem and the people affected by it, what really drives this program is their desire to develop a solution; a positive effect. In 2020, there is a team working on an evaluation system to repurpose orphan wells, and a team doing an LNG environmental (cost) – economic (benefit) analysis. There's also a team investigating the evolution of well cement seals and fugitive gas emissions, and another developing a solution to the bitumen transportation bottleneck. In 2019, the winning team used ground motion in the Traffic Light System to estimate damage caused by induced seismic events.

## **Results, Observations, Conclusions**

Now in our third year, REDEVELOP has trained 60 graduate students or HQPs (highly qualified professionals) (Figure 1). The program also hosts a summer internship program for Indigenous undergraduate students to explore field and lab skills training MSc options. The value of REDEVELOP training is evident in our student tracking. More than 15 of our HQPs have completed internships with: CSUR, Chevron, Encana, Suncor, Teck Resources, AER, TransCanada, Petronas Canada, Tourmaline Oil, CleanTech Geomechanics, Peto MacCallum Consulting Engineers, Black & Veatch, and Alberta Culture, Multiculturalism and Status of Women. More than 10 of our HQPs have graduated from their academic degree programs and are employed in Canada and abroad, as: a Seismologist at AGS, Policy Analyst at The Fraser Institute, Energy Trader at TransAlta, Policy Analyst at Canada West Foundation, Stewardship Advisor at Encana, Program Manager at Terra Logix Solutions, Development Geophysicist and Data Scientist at Chevron, Processing Geophysicist at CGG, Data Analyst at the Canada China Business Council, Regulatory Analyst at CP Rail, and an Analyst/Consultant in Indigenous Services at MNP.

## **Novel/Additive Information**

Training is both collaborative and competitive. A cohesive, interdisciplinary team of professionals distributed across the country is an achievement in collaboration, involving self-awareness, humility, tolerance and appreciation of others. A high-functioning team with these

attributes and the capacity to meet deadlines with quality outputs in a competitive arena is an asset to any employer.

A foundational understanding of Indigenous history in Canada, the Truth and Reconciliation Calls to Action, and the importance of relationship-building in Indigenous culture are core components integrated into REDEVELOP training. Students engage with Indigenous elders and experts to exchange ideas and discuss the differences between western and traditional approaches to problem-solving.



**Figure 1.** REDEVELOP students enter the workforce with a graduate degree in Geoscience, Engineering or Public Policy, coupled with training that prepares them for Canada’s changing energy sector.

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