

# *Bringing Energy Home: Understanding Alternative Energy Economic Development Opportunities*

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# *US-Canada face similar issues in energy, economy and environment*

- Canada is the largest supplier of fuel to the US – oil, natural gas, coal, uranium, and electricity
- Both depend on hydroelectric power and both have world class renewable resources
- Canada is on a fast track to reduce carbon emissions 20% by 2020 and US is proposing aggressive reductions
- Challenges include:
  - Unpredictable energy prices/volatility
  - Navigating energy security and environmental stewardship, including water and land use, clean coal and clean oil
  - Building and sustaining infrastructure (pipelines, transmission, electricity supply)
- Our economies cannot grow without reliable energy supply



- Canada exports about 2.5M million barrels of oil per day to the U.S, the largest supplier to the US (2007) and exports to the US are rising
- Canada has about 179B barrels of proven oil reserves, largest next to Saudia Arabia; 95% is from oil sands
- Canada provides about 82% of natural gas imports to the U.S., representing 16% of consumption
- Pacific Northwest relies predominately on hydro-electric power, and Canada (2/3) and the U.S. supply each other through an integrated grid
- Canada supplies about 1/3 of uranium provided for US domestic fuel market
- Trade in energy totals about \$100B annually

## *US and Canada are on a path to a Clean Energy Future*

- Three decades of international cooperation, including a nuclear 123 agreement, Gen IV Intl Forum
- *Clean Energy Dialogue* launched this year and focuses on:
  - High return joint R&D on existing and new projects (e.g., biofuels, engines)
  - Deploying clean energy technologies, e.g., building on carbon sequestration project between ND and Saskatchewan (Weyburn Project)
  - Building more efficient electricity grid based on clean, renewable energy



*How will the Clean Energy Dialogue Evolve – will it recognize shared interests in nuclear energy, will a North American cap and trade emerge?*

## *All sources will be needed, including nuclear energy and alternative fuels*

- High value jobs and benefits to local economies
- Investment
- Reduced energy costs for consumers
- Reduced energy price volatility
- Trade
- Climate change mitigation



*Is there an opportunity for nuclear energy to contribute beyond electricity.*

# *Nuclear energy – Necessary for a Sustainable Future*

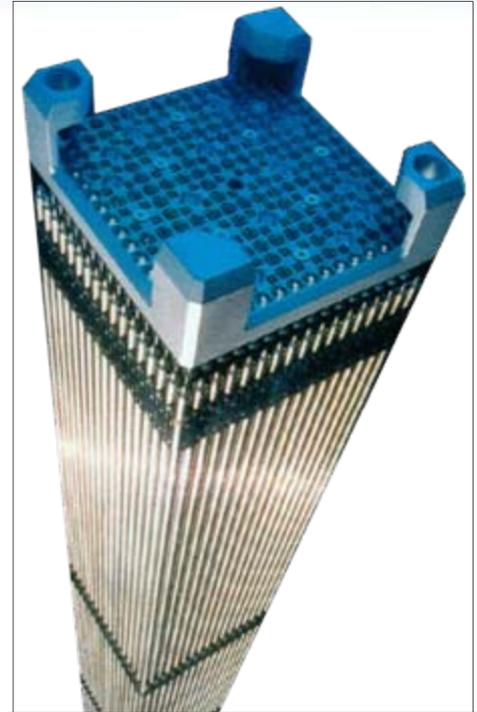
- Canada, US, and other countries depend on nuclear energy for electricity supply
  - Nuclear and hydro - the only carbon-neutral base load electricity, low fuel and production costs
  - High value jobs, paying about 36% more than other jobs in region; significant contribution to tax base, average \$430M annual economic impact in local communities
- Nuclear energy could be used to supplement or supplant fossil fuels and speed renewable deployment
  - Providing high temperature process heat , hydrogen/oxygen to refineries and chemical plants
  - Producing energy carriers such as hydrogen for petroleum upgrade and coal conversion for transportation fuels and feedstock



*The challenge is how to integrate energy sources to maximize benefits and mitigate to balance energy security and sustainable development.*

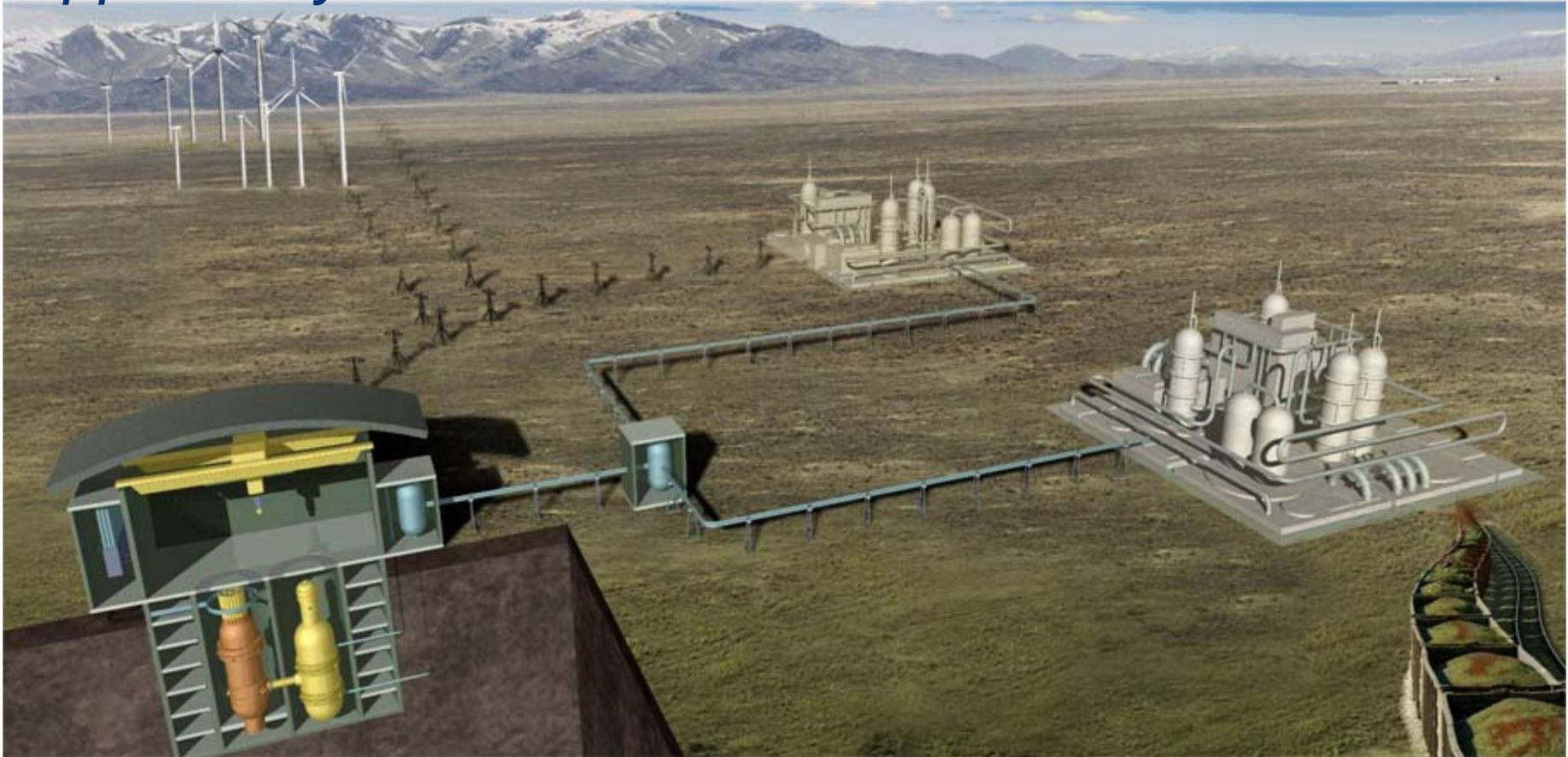
## *Are there unique issues that must be managed?*

- As with any energy source, there are issues:
  - Regulatory and financial risk
  - Societal and political support
- The most significant issue that continues to face nuclear energy is what to do with the used fuel
  - Nuclear energy is the only energy source that accounts for life cycle costs of waste
  - Resource or a waste? Open versus closed fuel cycle?
  - Safe, cost effective to store for decades



*An adaptive, phased approach to nuclear waste disposition may be needed.*

## *Hybrid energy systems – An alternative energy opportunity*



***Result...drive down carbon footprint—build on existing energy distribution and alternative fuels systems—energy where you need it / when you need it—get more renewables to the consumer, faster.***