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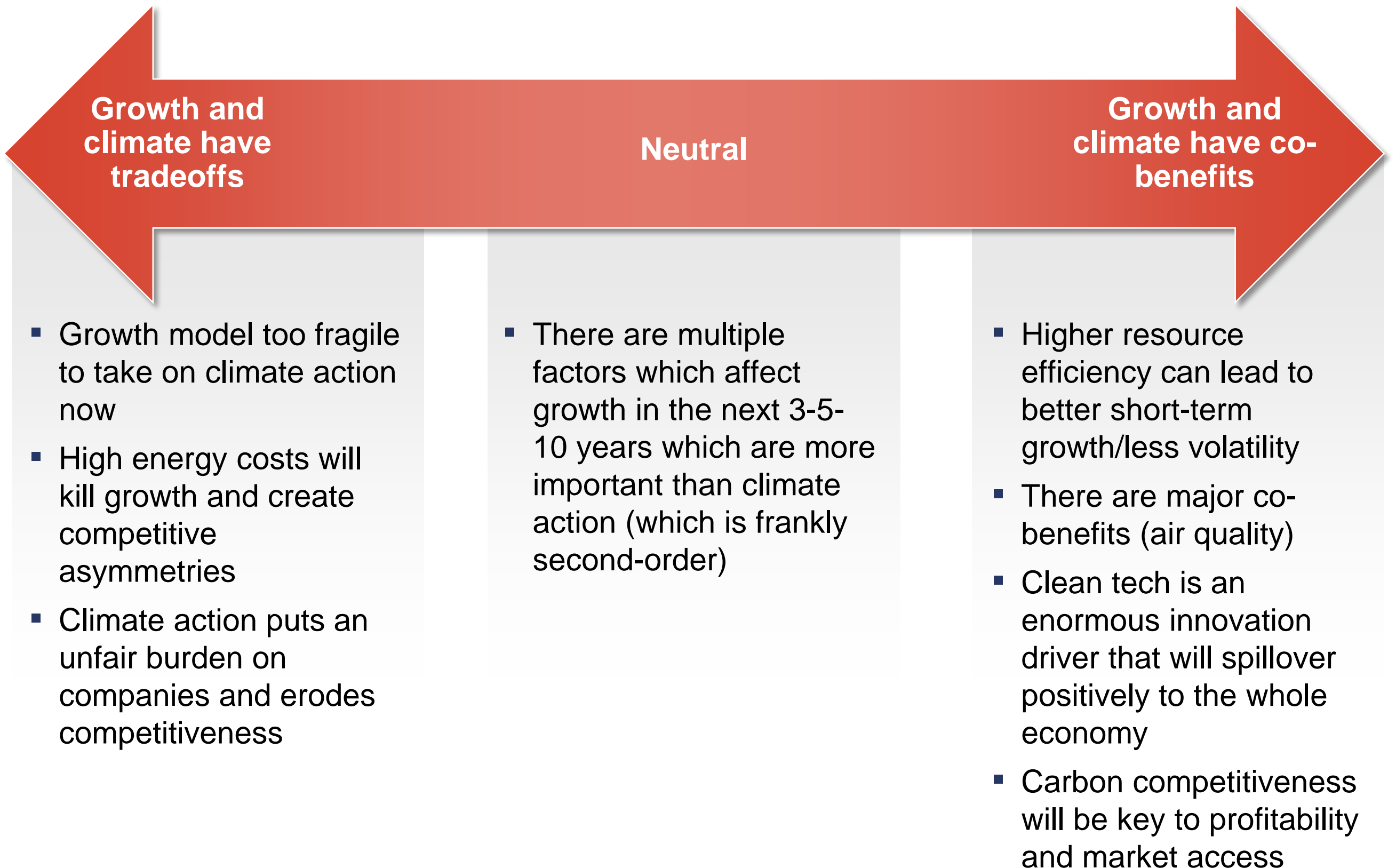
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Oil Sands and Innovation: Creating the Future

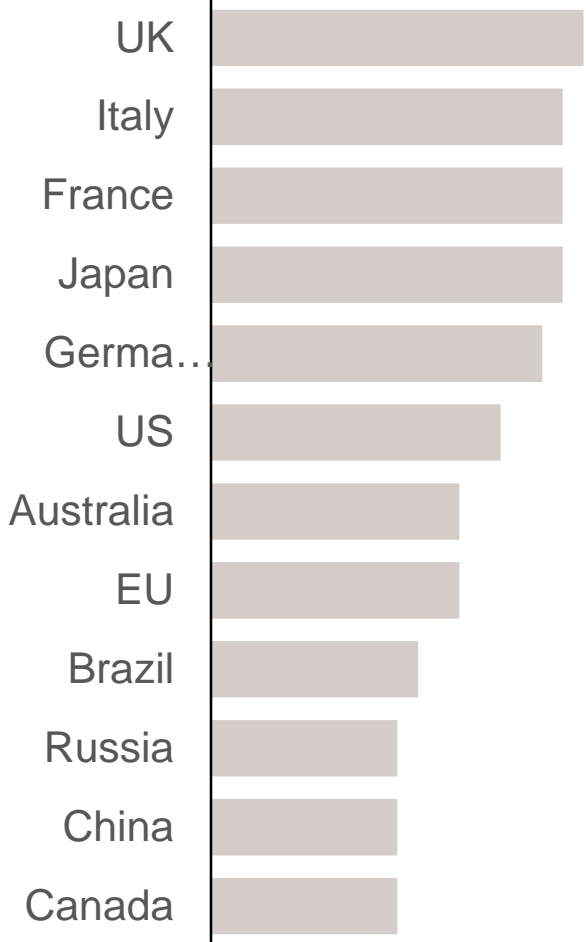
The state of the debate: Innovation, Climate and Competitiveness



Canada is behind on energy efficiency across industry, transportation and buildings

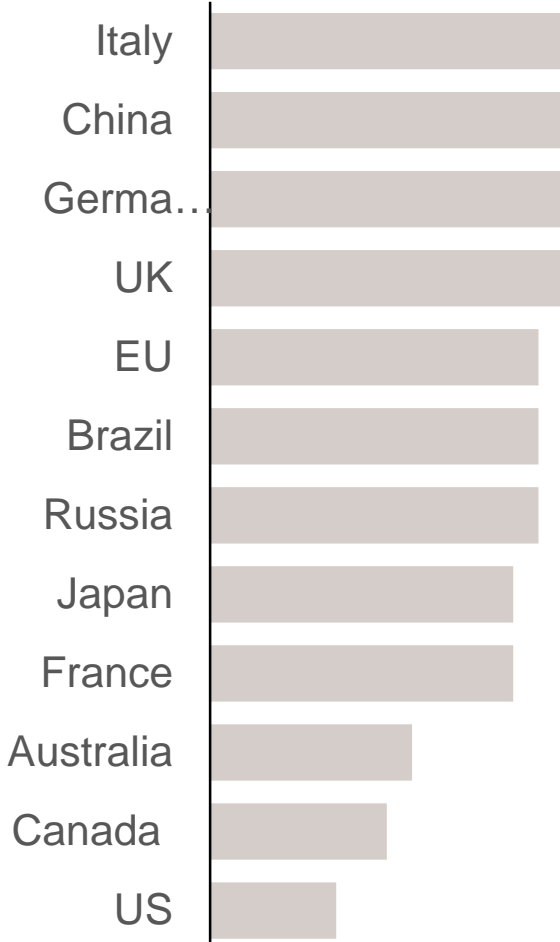
Energy efficiency scores for 2012 by American Council for an Energy-efficient economy

Industry score ranking



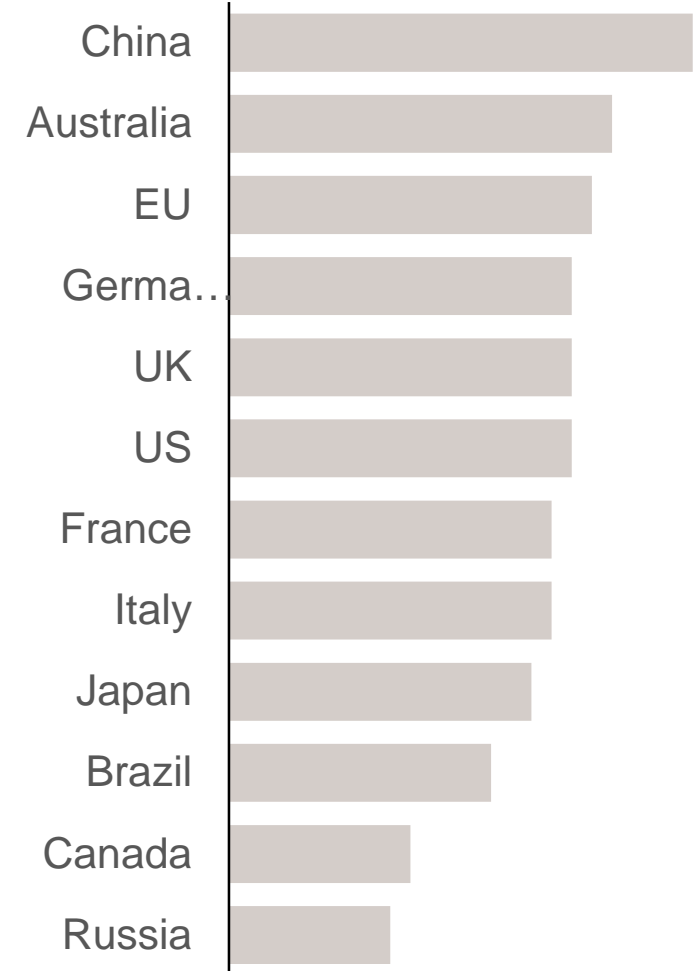
- Score considers factors:
- ✦ Industrial energy intensity
 - ✦ Industrial electricity generated by CHP
 - ✦ Investment in manufacturing R&D
 - ✦ Voluntary agreements
 - ✦ Mandate for plant energy managers
 - ✦ Mandatory energy audits

Transportation score ranking



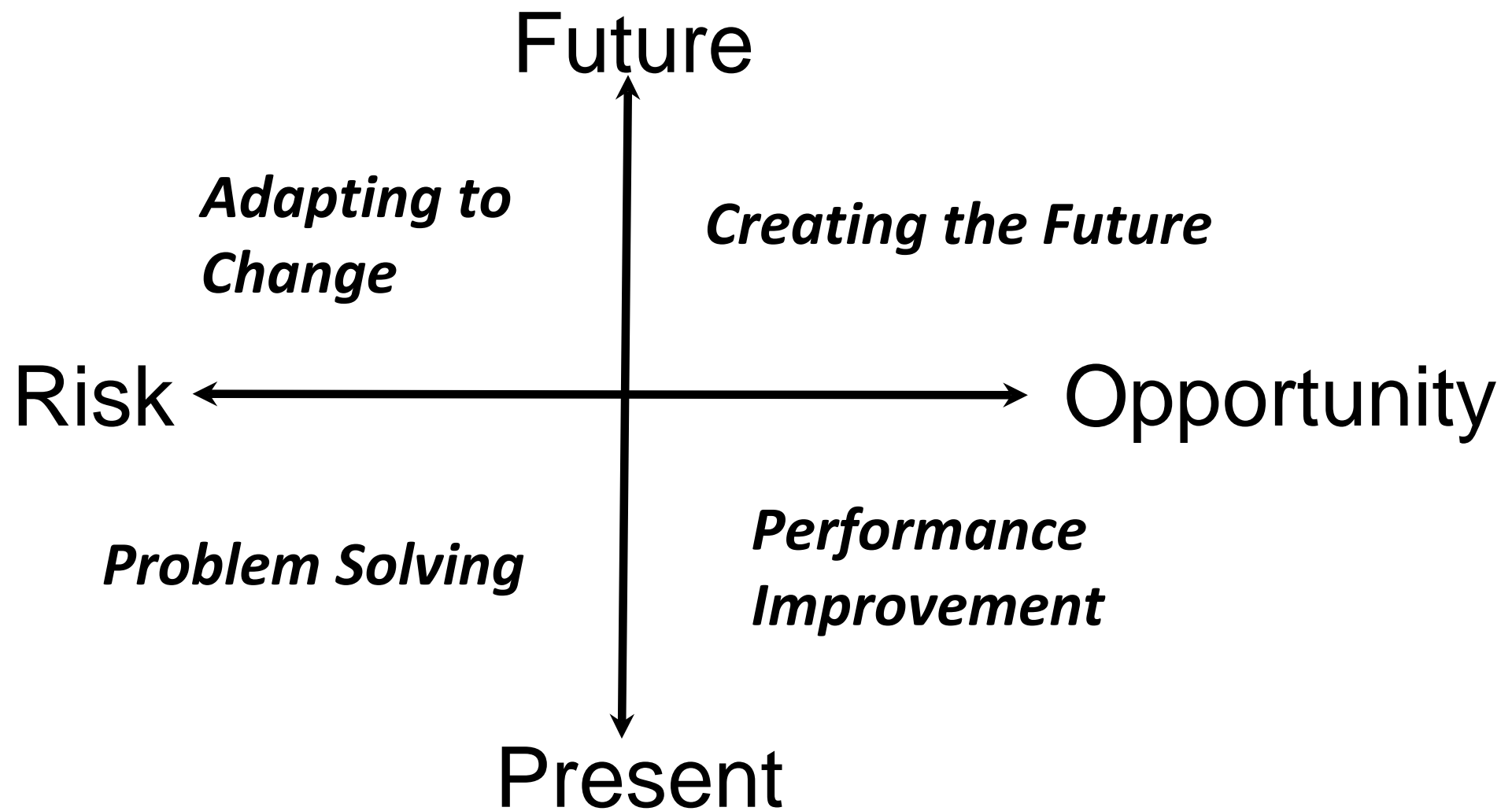
- Score considers factors:
- ✦ Vehicle miles travelled per capita
 - ✦ Passenger vehicle fuel economy
 - ✦ Fuel Economy Standards
 - ✦ Energy intensity of freight transport
 - ✦ Freight transport per dollar of GDP
 - ✦ Use of Public transport
 - ✦ Investment in rail transit

Buildings score ranking



- Score considers factors:
- ✦ Energy use in residential and commercial buildings
 - ✦ Building codes for residential and commercial buildings
 - ✦ Building labelling
 - ✦ Appliance and equipment standards and labelling

Sustainable, Prosperous and Resilient Oil Sands and Alberta



Potential opportunities for Canadian energy-tech companies (including fossil fuel)

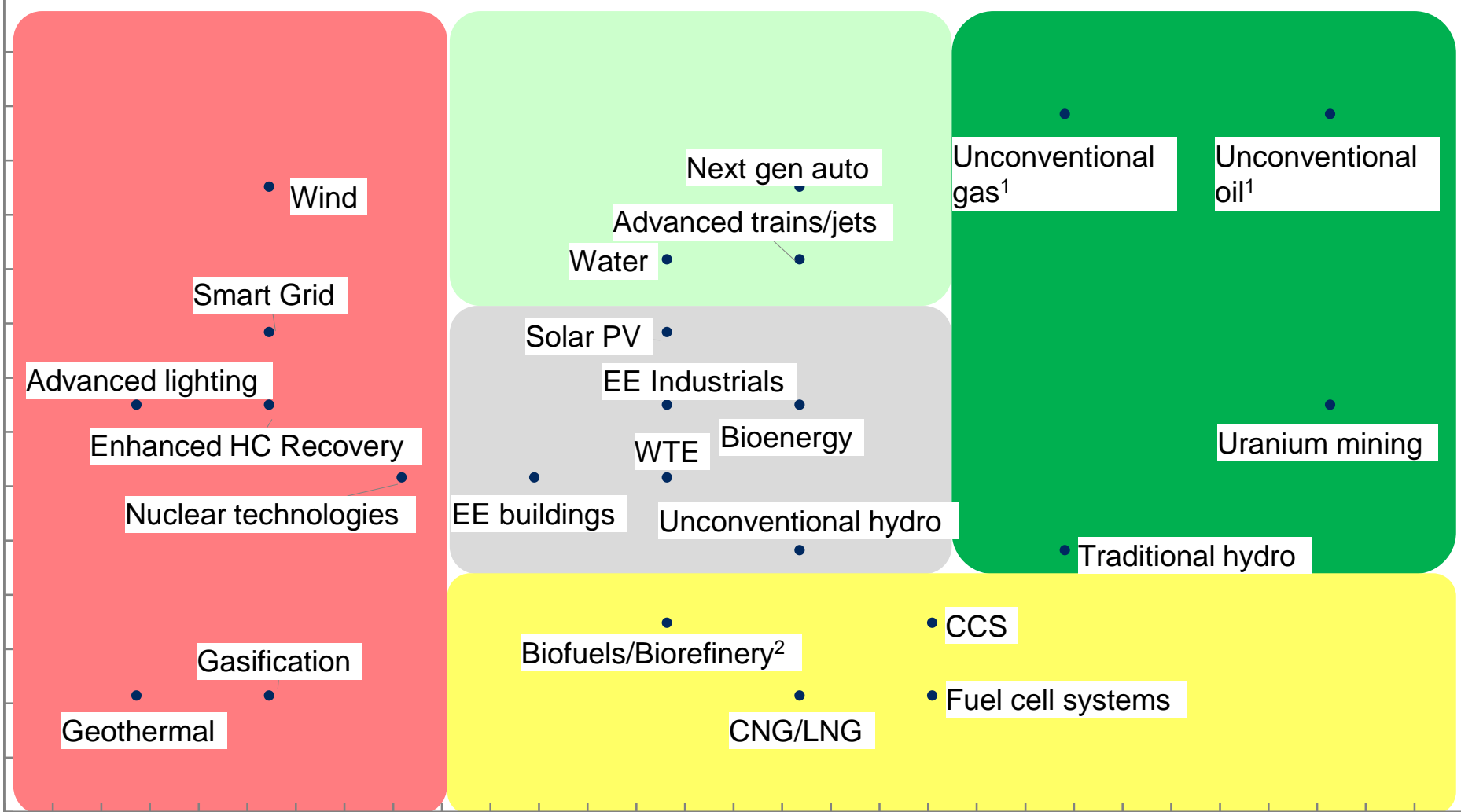
- Large, globally traded market
- Strong projected growth over the next 5-10 years
- Clear path to market for Canadian companies

Highly attractive Markets by 2020

Global market attractiveness

- Mature, highly consolidated markets with limited growth potential
- Small, fragmented, regional markets
- Unclear how Canadian firms can capture value

Unattractive markets by 2020



Other countries have clear sustainable advantage

Canadian competitiveness

Canada is strongly advantaged compared to other countries

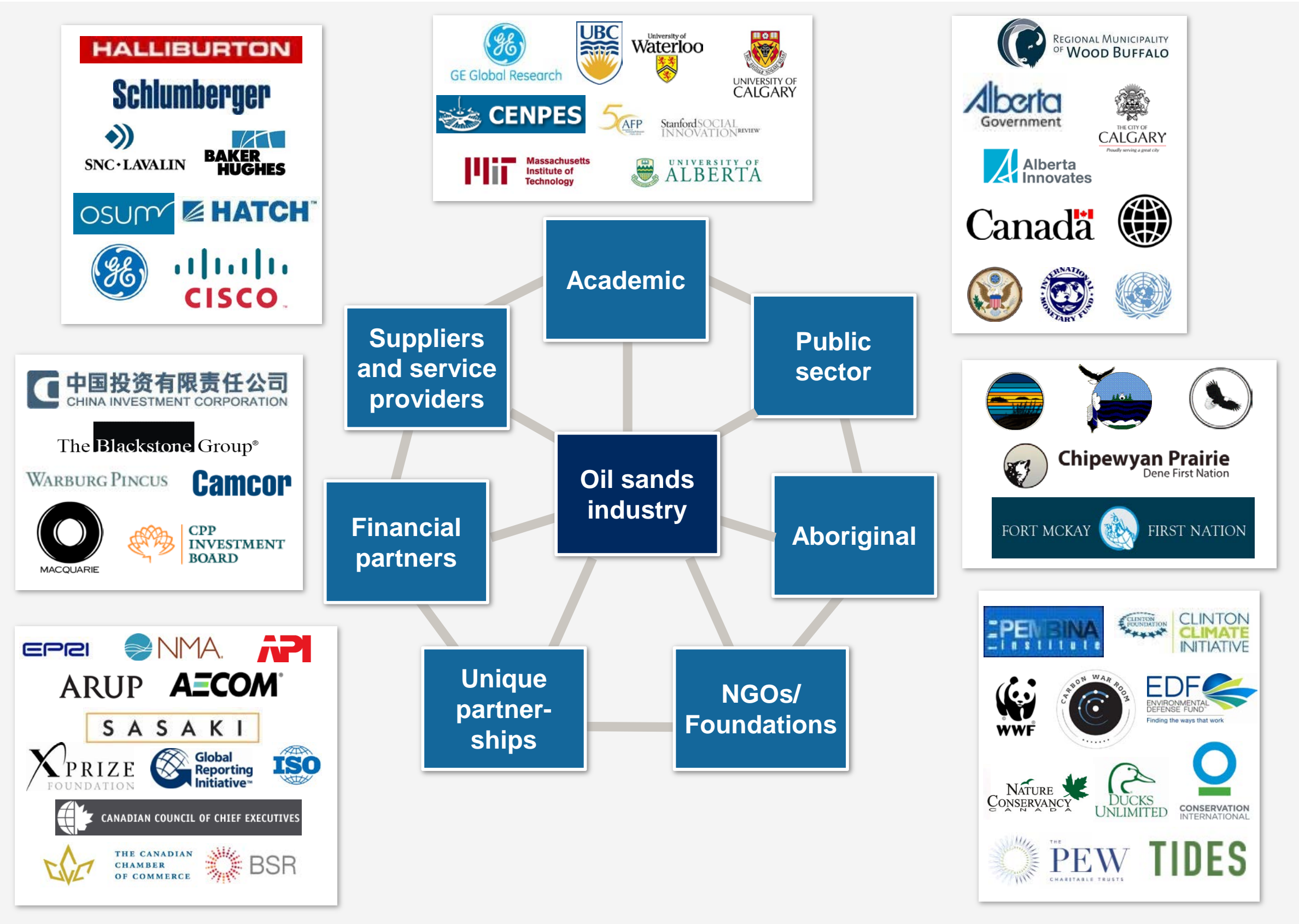
- No compelling Canadian resource or technology advantage
- Market dominated by global companies with little Canadian footprint

- Strong Canadian resource advantage
- Robust Canadian players including global leaders with distinctive technology and market leadership

1 Global capex and sales from Canadian oil or gas only
 2 Global capex and sales from cellulosic biofuels only (includes agriculture waste)

A big idea – an oil sands innovation cluster

ILLUSTRATIVE



Desired Oil Sands and Innovation Challenges:

Purpose: Alberta's Oil Sands resource being competitive and resilient in a carbon constrained and lower growth world

Short to medium term:

- Enhanced Steam Oil Ratio performance improvement at an accelerated pace on existing SAGD projects
- Energy System Design innovations including waste heat recovery and use, new regional energy and water systems, forensic metering
- In the next 10 years develop and commercially deploy Generation 3.0 technology for situ production (50-75% net ghg reduction)

Longer Term (now to 15-20yrs)

- Fuels derived from oil sands are equal or less ghg intensive relative to N Am and global conventional oil alternatives (*net atmospheric benefit or no net increase in atmospheric ghg*)
- Transform our technologies for energy value creation from production to end use (*economic diversification*).

Technology and Innovation: A Future View

- Carbon Competitiveness becomes a key driver of innovation
- Alberta and Canada's Oil Sands have Innovation as a part of their global Brand
- Need to organize for success
- COSIA, PTAC, AIEES, AITF, CCEMC, SDTC, NRCCan, CMCRI, Universities, NSERC, CleanTech sectors
- More collaboration: joint effort to achieve common goals
 - Fewer autonomous Boards....entity interests vs common interests
- Global partnerships (eg global supply chain partners, Cleantech sector, technology firms plus US DOE, Europe)
- Use of global Open Innovation (Carbon X Prize etc)
 - Turn CO₂ from a waste to value added products