

Smart Regulation to drive Clean Innovation

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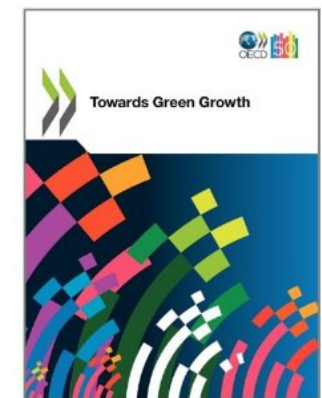
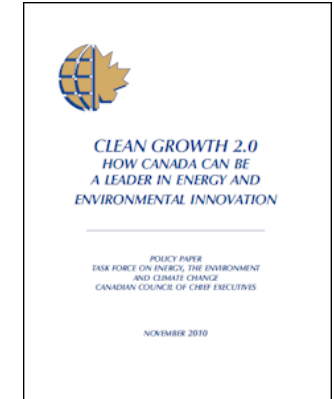
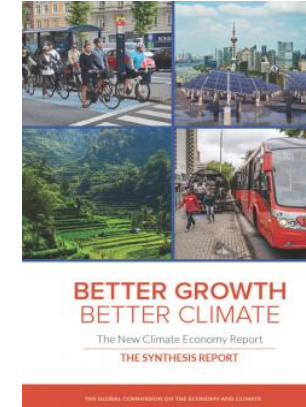
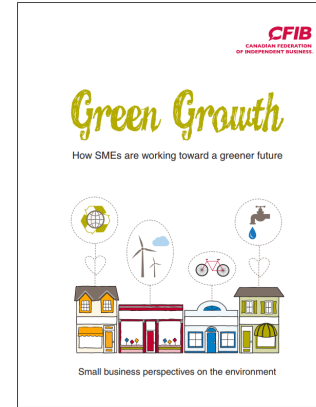
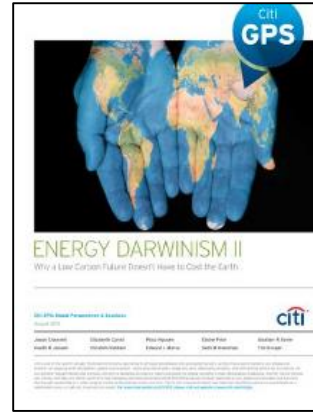
**Smart Prosperity
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institute.smartprosperity.ca

Moving to a global economy that is:

- (net) Zero carbon
- Low polluting
- Eco-innovative, and
- Resource efficient

➤ Across *all* sectors



- **C\$2.5T**: Estimated global cleantech market by 2022 (Analytica)
- **US\$23T**: Global low carbon investment opportunity to 2030 (World Bank)
- **C\$3.6T**: Global opportunity in resource innovation and energy efficiency by 2030 (McKinsey)



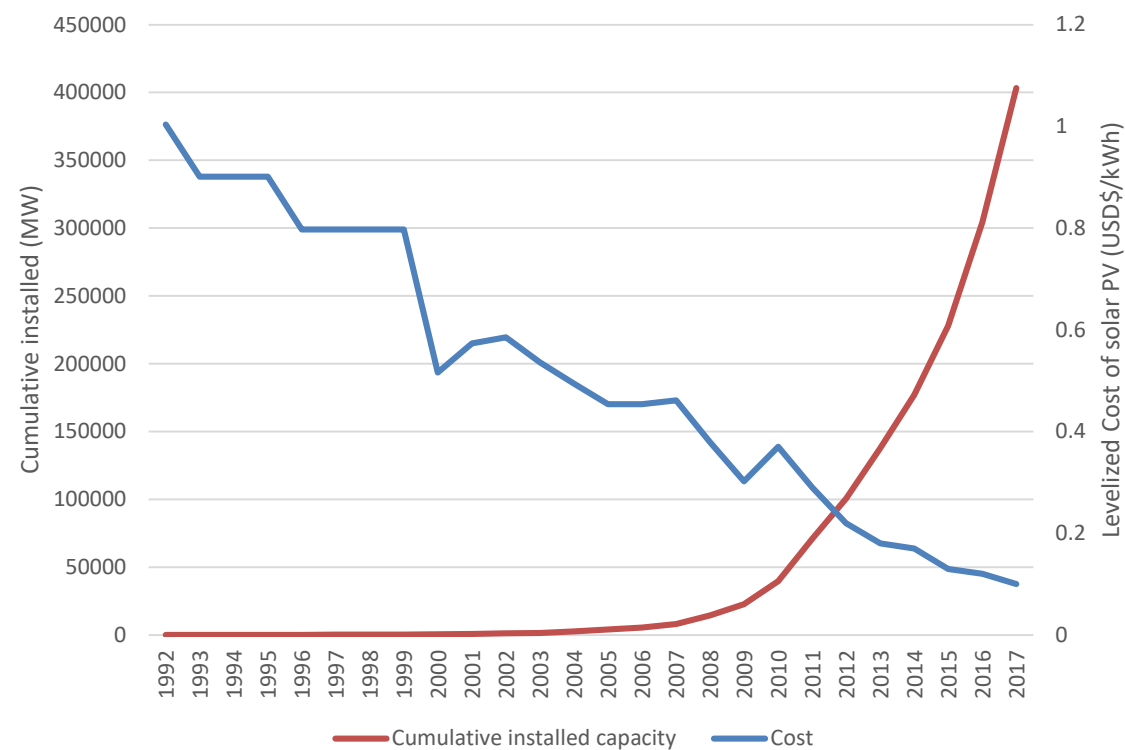
Opportunity for all parts of Canada's economy

- Mining: Canada has 14 of 19 minerals needed for solar panels. And world's 1st all-electric mine
- Concrete: CarbonCure injecting CO₂ into concrete
- Aluminum: Alcoa, Rio Tinto, and Apple building world's first carbon-free aluminum plant, in Canada
- Enerkem: Waste to fuel leader (\$125M investment, partner with China)
- Carbon capture: Canada is one of the world leaders in CCS technology
- And more: biofuels, energy storage, precision ag., engineering, buses, 'north'

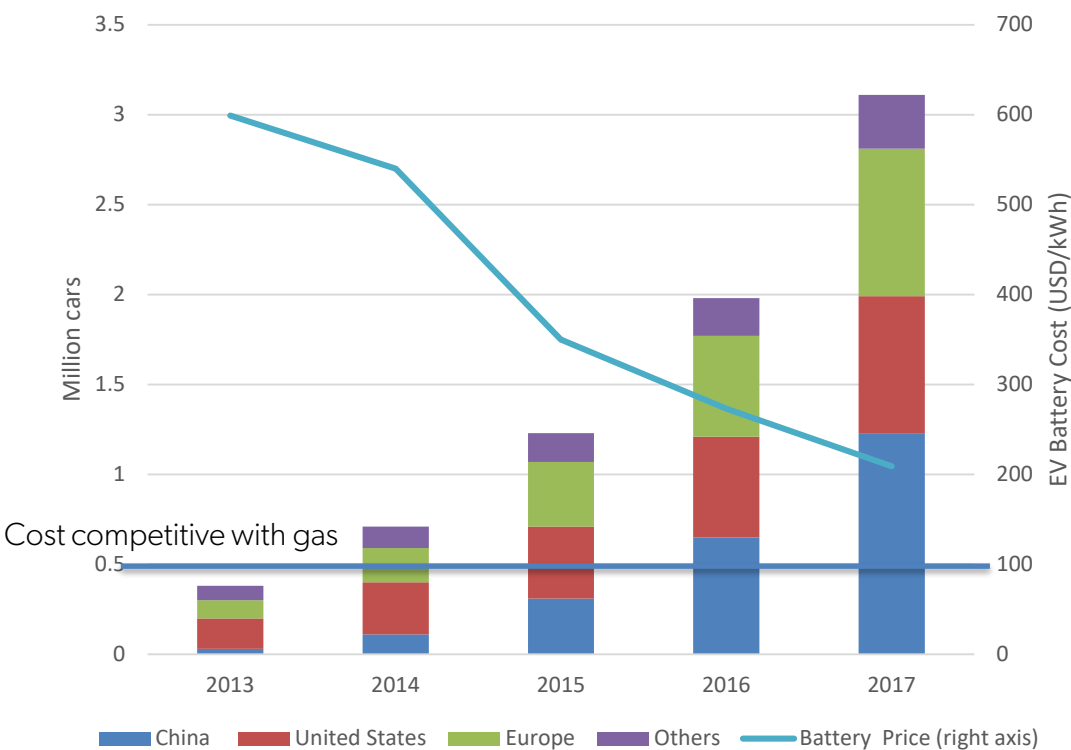


Driven by *Innovation* = Falling Costs, Growing Markets

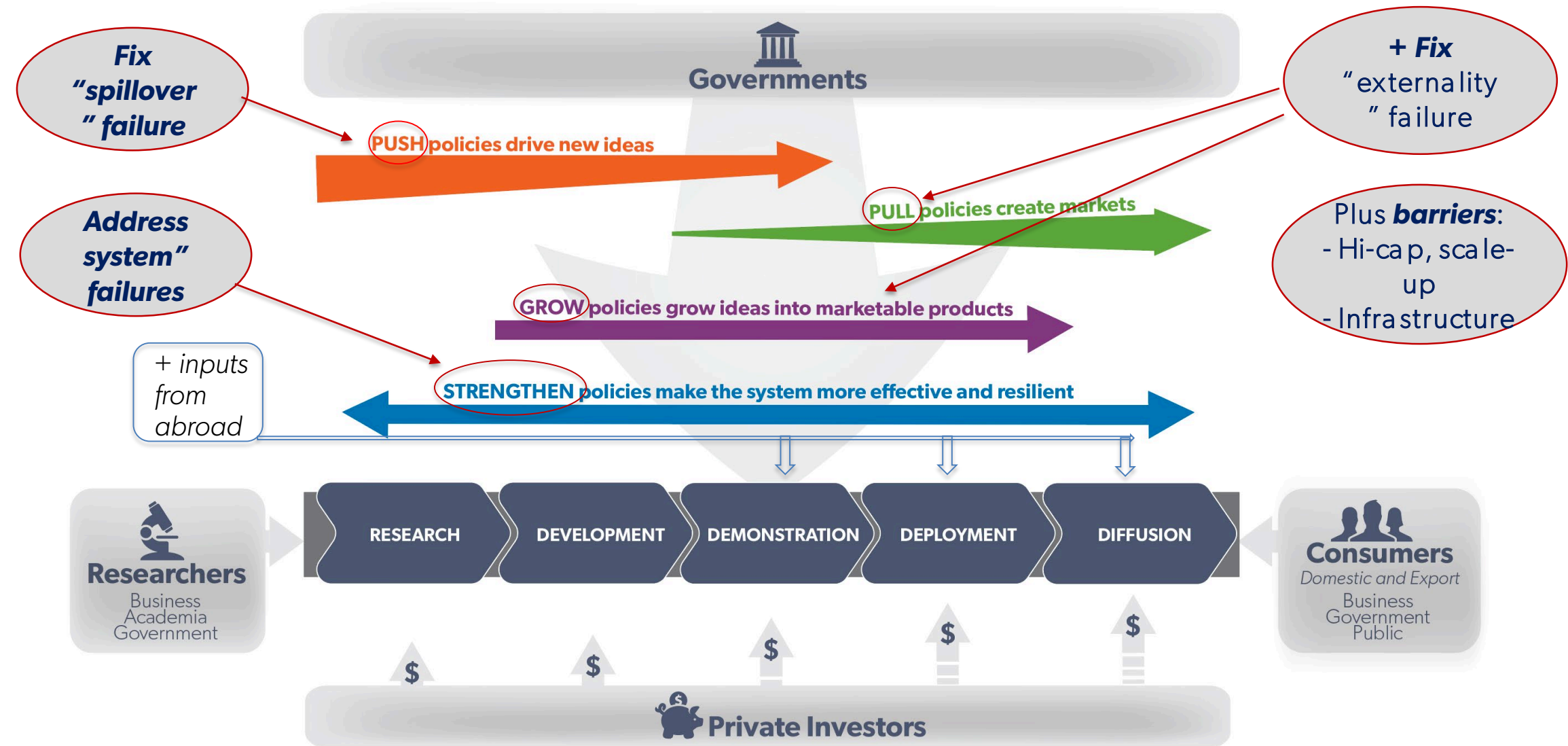
Solar Power Installation and Costs



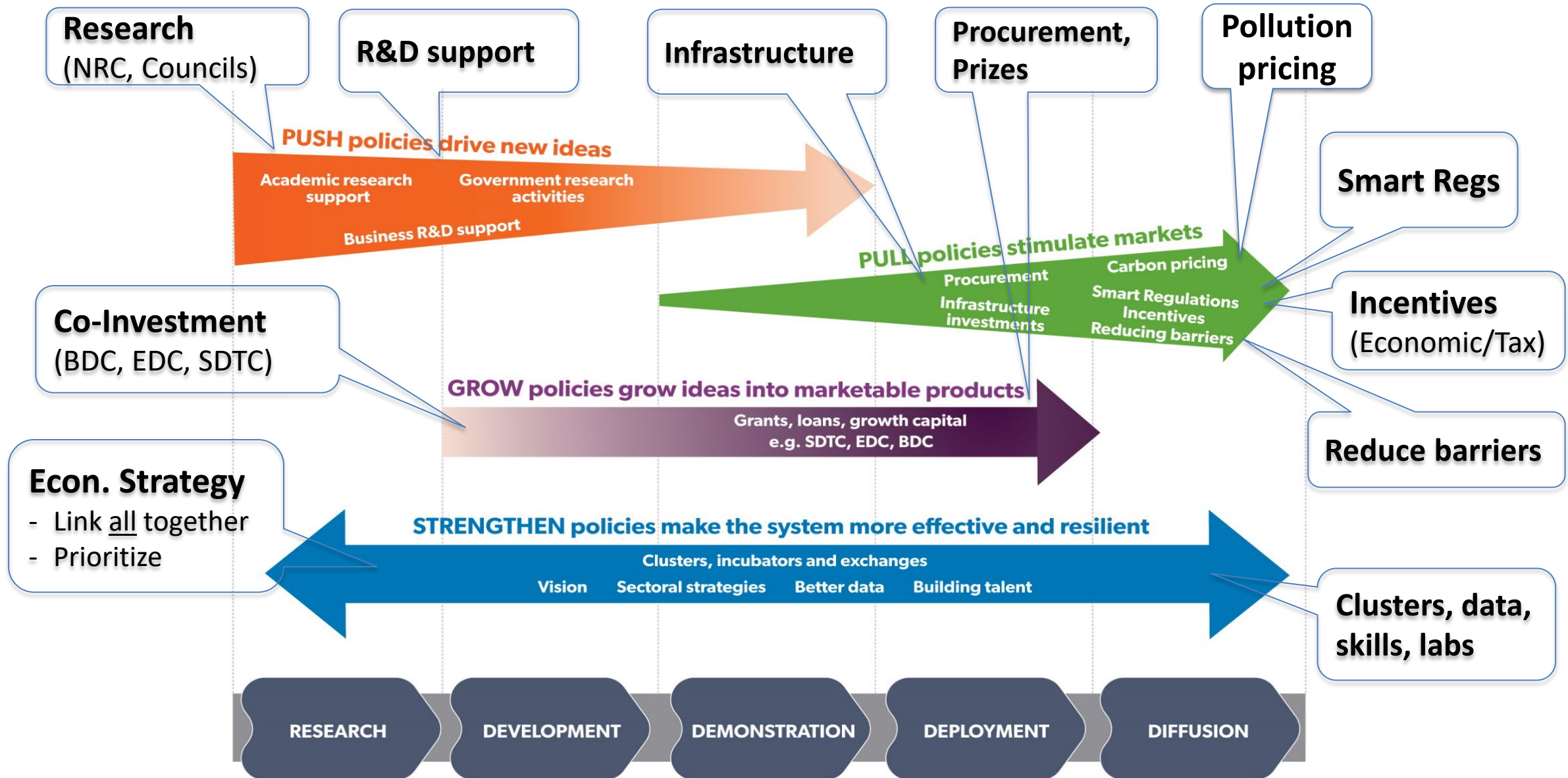
Electric Vehicle Sales and Battery Prices



The Clean Innovation system & barriers (*simplified)



Gov't Roles to Support Clean Innovation



Federal Economic Strategy Tables (2018)

- *Boosting innovation is vital to the competitiveness of traditional sectors (resources, manufacturing) and clean tech*

Key Recommendations to Accelerate Innovation:

1. Agile, world-class **regulation**
2. Tax incentives for clean growth
3. Other
 - Innovation *networks* (lighthouses)
 - Public finance
 - Infrastructure, procurement
 - Skills, Brand

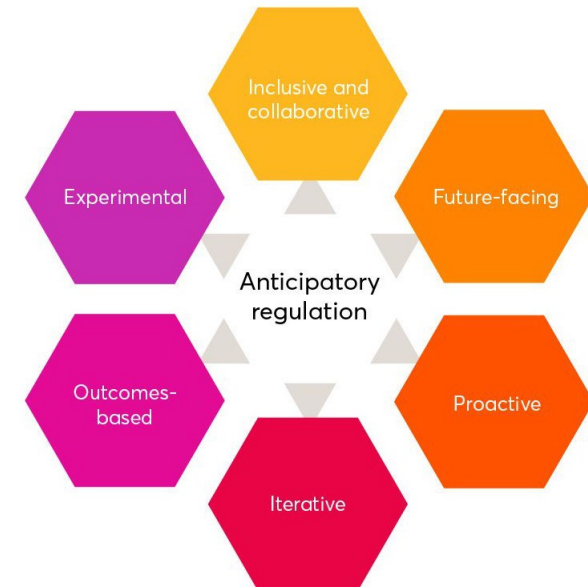


Regulation for Competitiveness & Innovation

- Regulatory reform is vital for economic and environmental reasons:
 - Canada is 14th on WEF Global Competitiveness Index (2018)
 - but 38th on burden of government regulation component
 - 22nd on World Bank Ease of Doing Business Index (2019)
 - Also, 22nd on *Environmental Performance* (of 36 OECD countries)
- Window of opportunity: FES 2018/Budget 2019 announced
 - External Advisory Committee on Regulatory Competitiveness
 - Regulatory Reviews – now doing clean tech
 - Centre for Regulatory Innovation – ‘sandboxes’

The Evolution of Regulation

1. Protect the public (health, environment, etc)
↓
2. Do so at minimal cost, delay
↓
3. Support innovation (Porter Hypothesis)
↓
4. Support competitiveness
↓
5. Enable economic transition ('anticipatory')



Towards an Agile Regulatory Regime

Two sides of the same coin:

- Instrument Design:
 - **Agile regulations** are “outcomes-driven, stringent, flexible, timely and predictable; align with global best practices” (RFEST)
- Institutional Design:
 - **Agile regulators** are informed, nimble, forward-facing, co-learning institutions. They are empowered to experiment with new policies and approaches, to reward risk-taking and spur innovation for public purposes



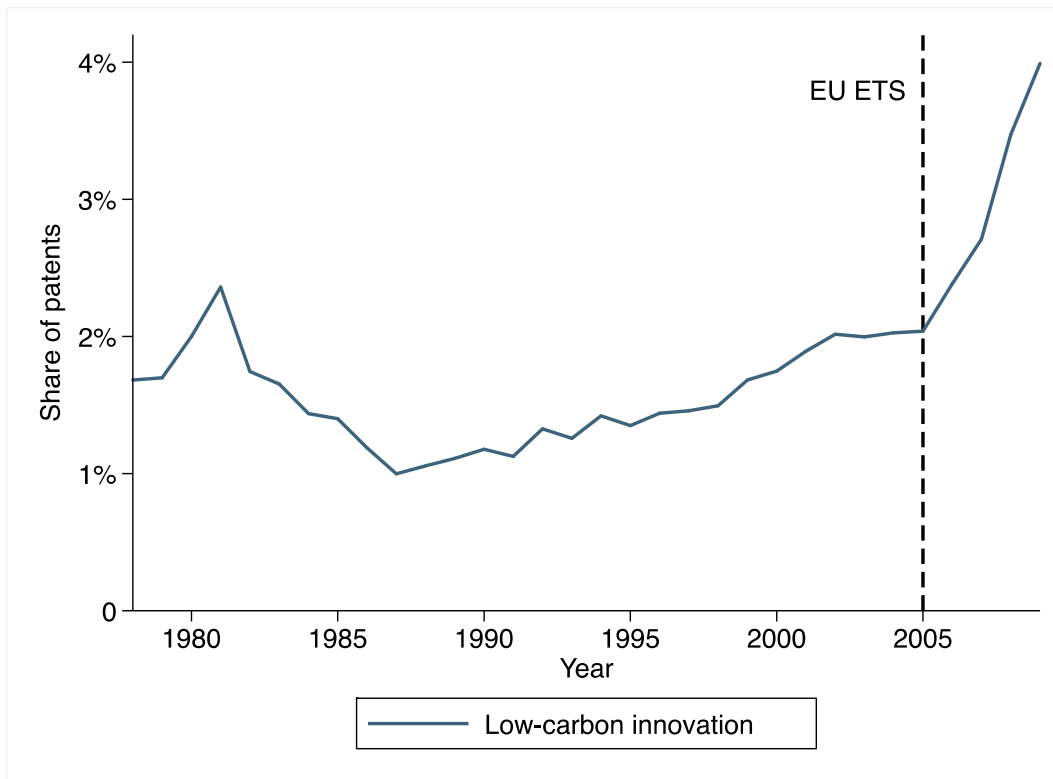
1. Designing Agile Regulations for Innovation

- **Stringent**
 - Bold ambition (mission) spurs and directs innovation
 - e.g: water (Ontario), vehicles (California)
 - But can be politically / economically hard – manage the adjustment
- **Flexible**
 - Outcome / performance-based, pricing / market-based
 - e.g: carbon pricing, CAFÉ stds (averaging), offsetting (Fisheries)
- **Predictable** (dynamic)
 - Critical to drive longer-term investment (10+ yrs)
 - Hard for governments; but can get *improved* (not total) predictability
 - E.g: central bank, carbon pricing (default 10 yr schedule, 5 yr review, criteria)



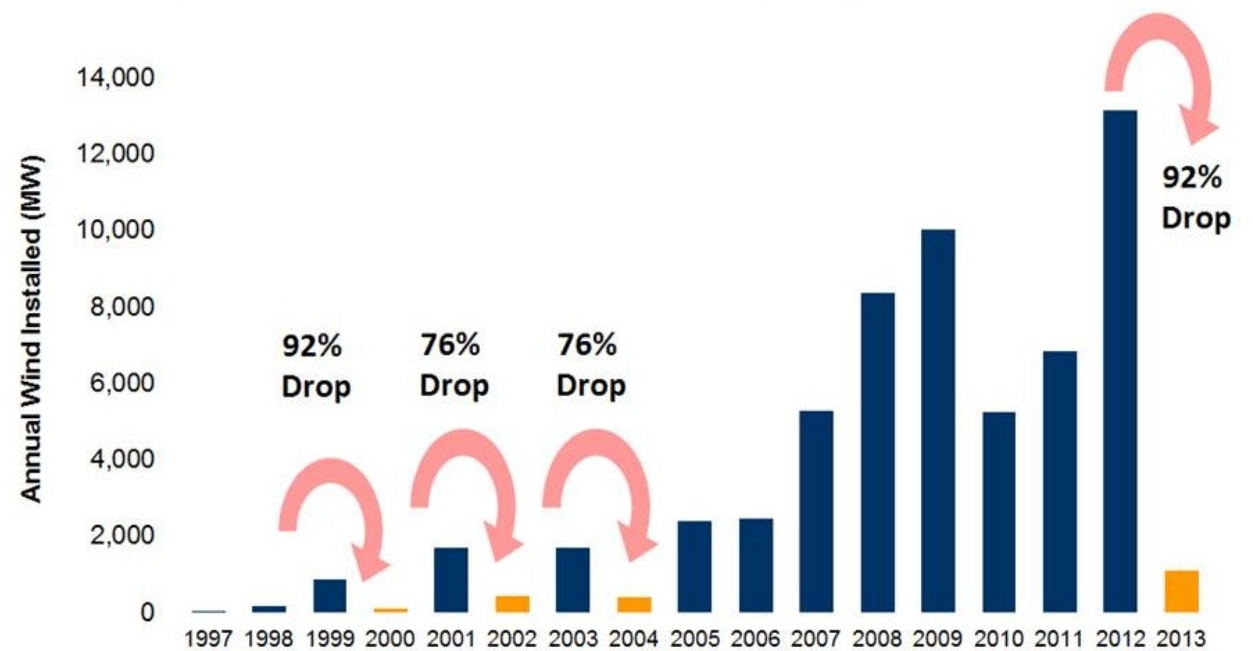
Stringent, flexible, predictable policy drives Innovation

Share of low-carbon patents in Europe



Calel & Dechezleprêtre 2014

Historic Impact of Production Tax Credit (PTC) Expiration on Annual Wind Capacity Installation



American Wind Association, 2015



2. Agile Regulators

- **Informed**
 - Can generate the information to push the frontier of innovation (in-house expertise, and co-discovery with innovators)
- **Empowered**
 - Have the tools, mandate, (autonomy?) to spur experimentation via risks & rewards
- **Nimble**
 - Respond and adjust to incoming information (costs, impacts, tech. innovation)
 - Create spaces for experimentation and innovation
- **Co-learning**
 - Culture of curiosity, risk-taking, problem-solving with industry, innovators & others
- **Anticipatory**
 - Future-facing, proactive, iterative, inclusive, (mission focused?)



3. Regulatory Sandboxes

- What are they and why needed?
 - Overcome reg. barriers to clean innovation (a “patch”)
 - Test innovative technologies, services, models (de-risk)
 - Co-learn (regulator & innovator) -> then apply to regulatory regime
- Clean tech (usually) more complex than Fin. tech:
 - Many different sectors, regulators; env. risk differs case-by-case
 - Learn from others’ experience
- When is sandbox most needed?
 - Innovation office can address most problems
 - Criteria? e.g. genuine barrier, big opportunity, risk-reward balance
- Challenges: public buy-in (risk), resource-intensive, co-learning & uptake, etc

