

Methane Emission Reductions: Driving to Scale

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Sustainability Made Profitable

Cap-Op Energy is a Canadian energy sustainability company whose mission is to make sustainability profitable. Cap-Op provides technological solutions and professional consulting services to innovative clients across the energy spectrum. We enable our clients, their sustainability projects and corporate sustainability programs through monetization of environmental attributes. Cap-Op has experience in all the major environmental credit markets across North America. Our software platforms help our clients multiple effectiveness and scale project yield.



Concept



How to Address?

MEASURE: Research (2013/2014)

- PTAC Alberta Upstream Asset Inventory Study
- Report on Determining Pneumatic Device Emission Factors

PLAN: Policy/Tech Dev (2014-2016)

- Industry-sponsored development of carbon monetization pathway
- Software development
- Clean technology development

DO: Scale-Up (2017-2023)

- Vast field deployment across Western Canada, 10x reductions 2017-2019
- 60%+ of market participating in voluntary methane abatement

Yes, it can work – but we need faster cycle times!

Over 70 Companies participate in Alberta's carbon market

 Agrium

 PENGROWTH

 Air Liquide

 NOVA Chemicals

 ERCO Worldwide

 MEG ENERGY

 ATCO Energy Solutions

 Husky Energy

 Chevron

 PETRO-CANADA

 BONAVISTA ENERGY CORPORATION

 nexen

 ENMAX

 balancingpool

 Capital Power

 LAFARGE CANADA INC.

 ATHABASCA OIL CORPORATION

 cenovus ENERGY

 Imperial Oil

 CP ENERGY

 ConocoPhillips

 TransCanada

 Esso

 TransAlta

 TAQA

 Shell

 Lehigh Hanson HEIDELBERGCEMENT Group

 KEYERA

 EPCOR

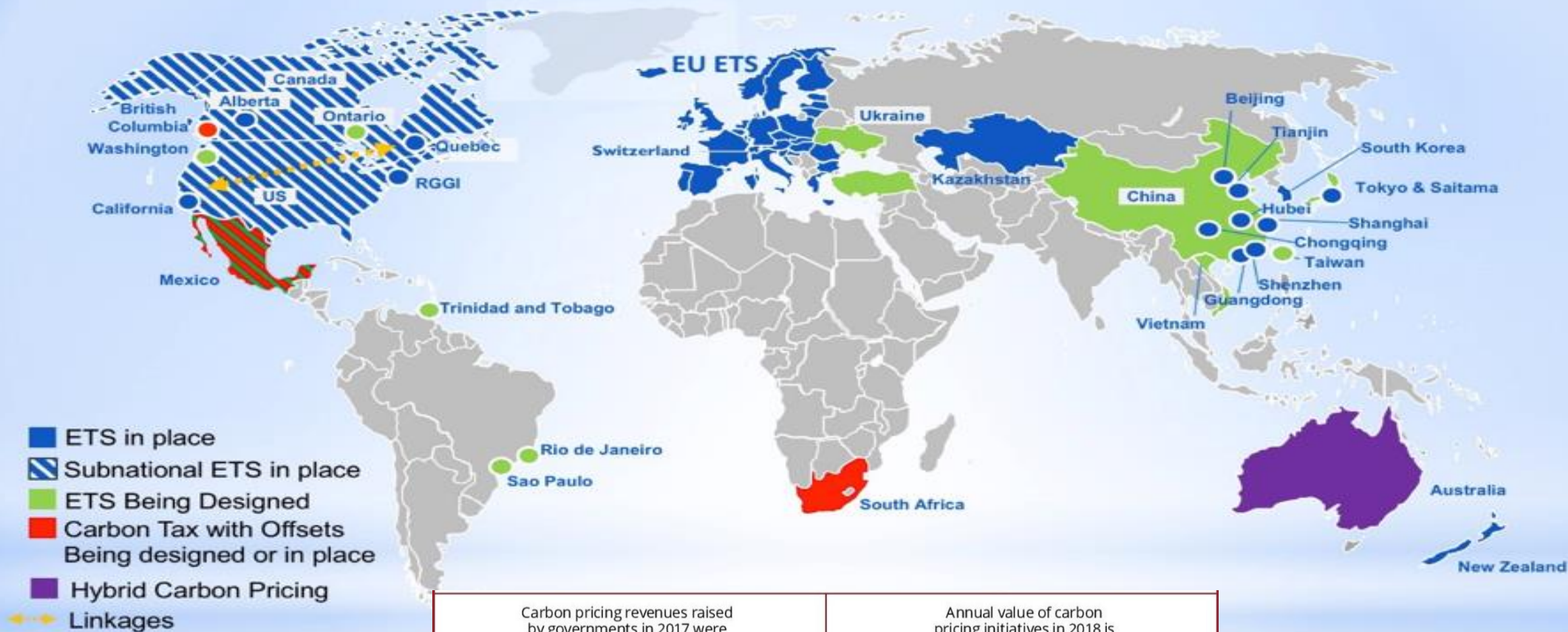
 Orica

 DOW

 MEGlobal
An EQUATE Company

 Canadian Natural

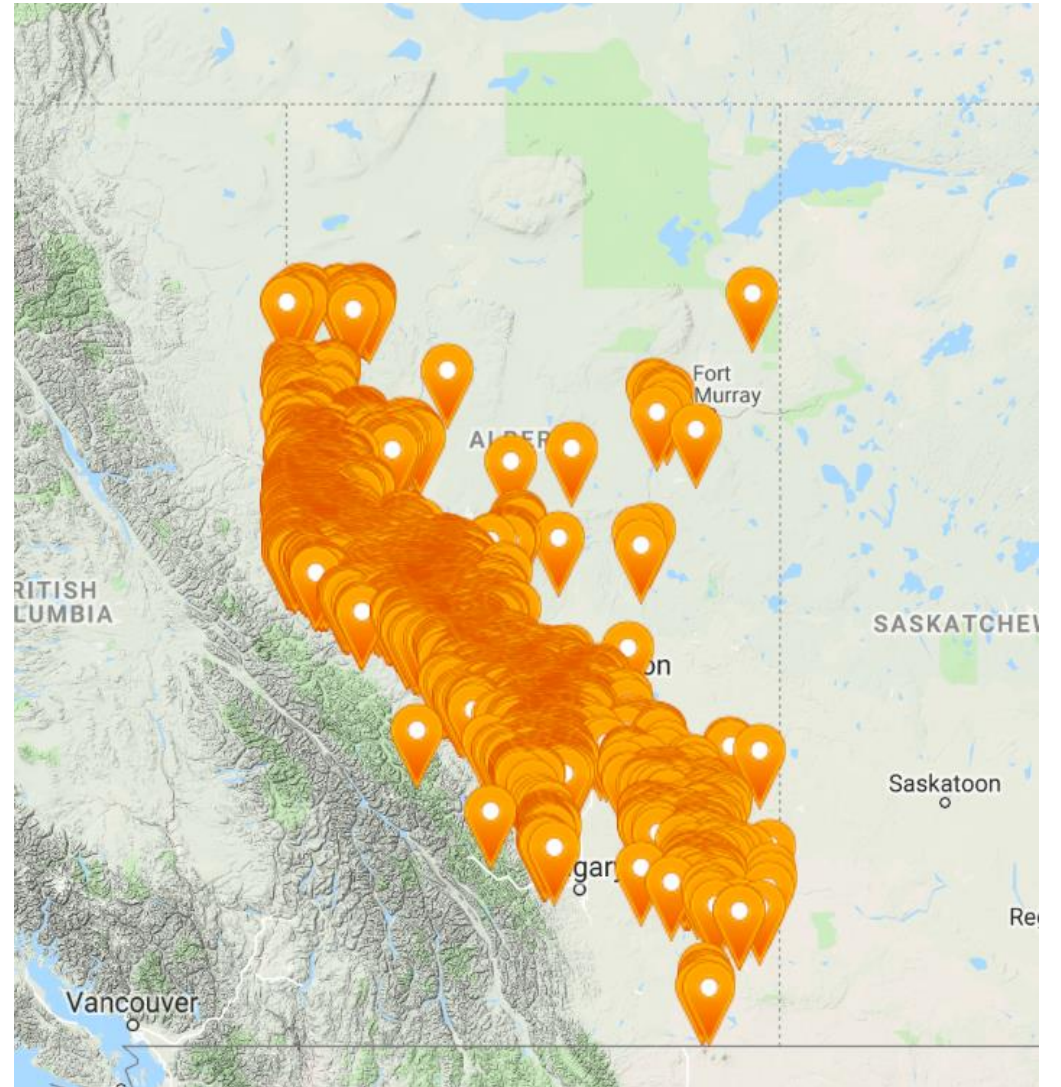
 West Fraser



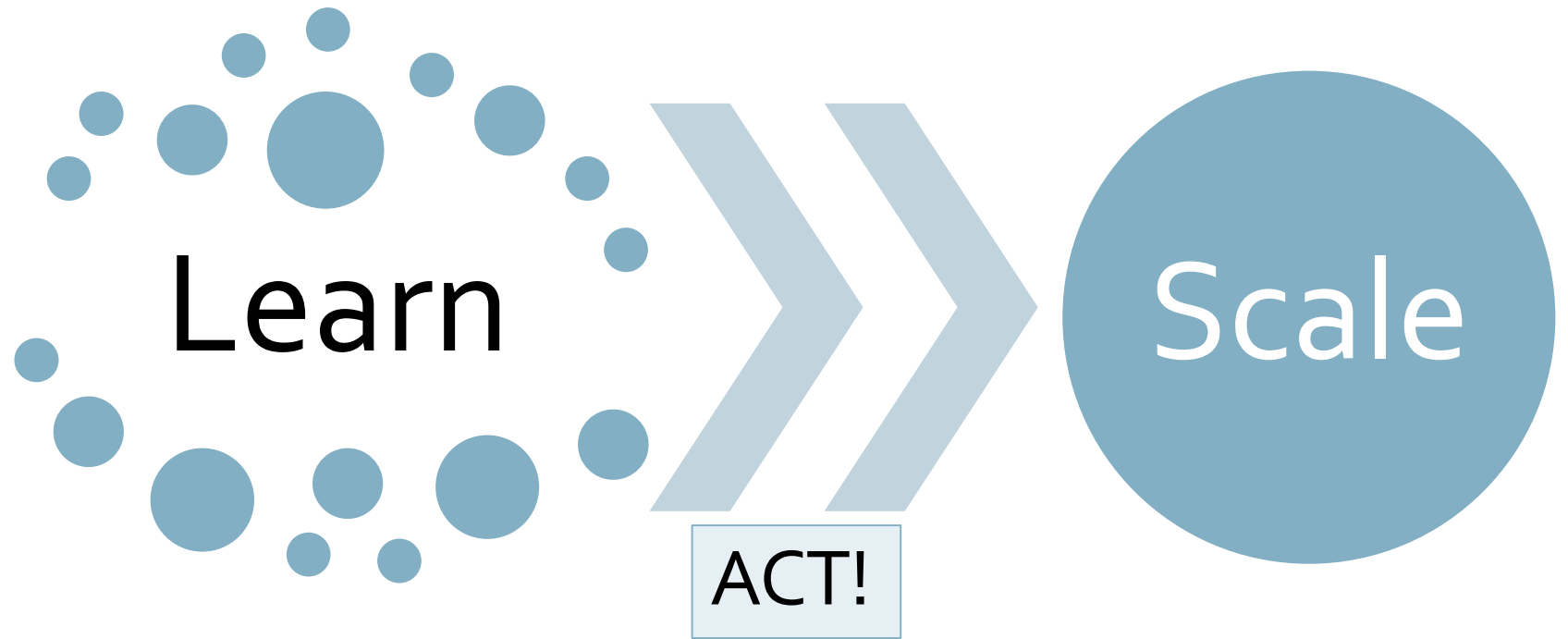
<p>Carbon pricing revenues raised by governments in 2017 were</p> <p>US\$33 billion</p> <p><i>Higher compared to US\$22 billion in 2016</i></p>	<p>Annual value of carbon pricing initiatives in 2018 is</p> <p>US\$82 billion</p> <p><i>Higher than the value of US\$52 billion for 2017</i></p>
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Tackling Pneumatic Methane Emissions at Scale

- 14,000 + facilities surveyed
- 50,000 + inventoried pneumatic equipment
- 20 + producers participating, representing 60%+ of relevant AB facilities
- Reductions approaching 1M t CO₂e/year



New Approach



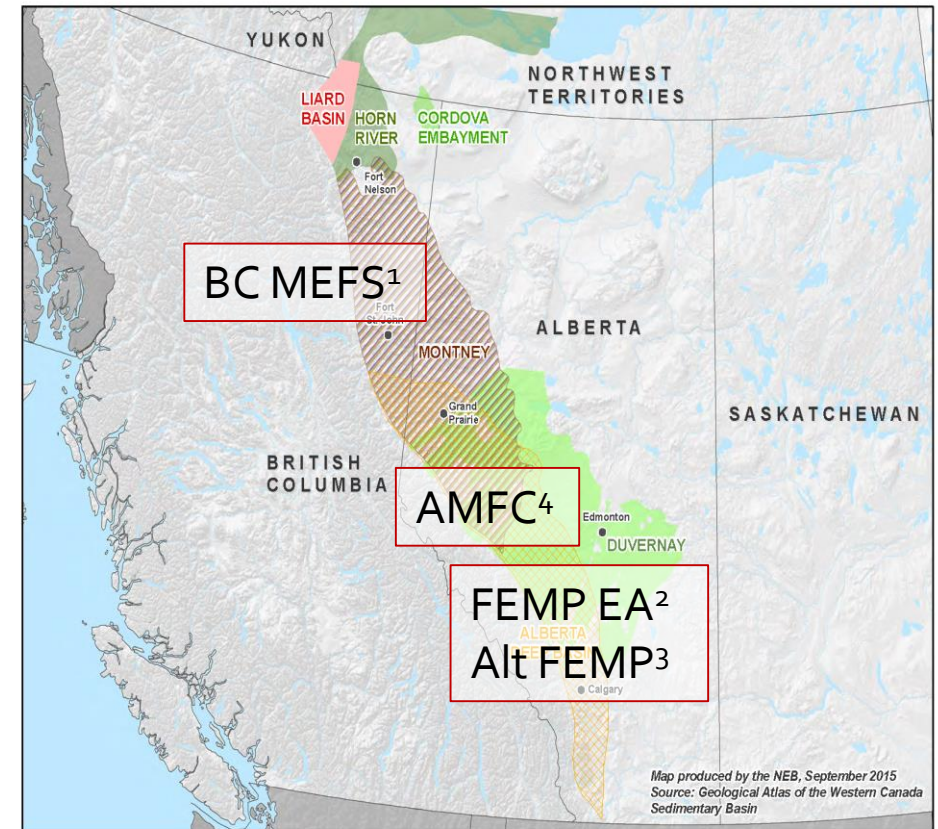
Requires a collaborative approach among industry, regulators, academics, service/tech providers

Methane Research Programs 2018/2019

Who?

- Management Team:
 - Cap-Op Energy
 - DXD Consulting
- Academic Team:
 - Stanford University
 - Harrisburg University
 - University of Calgary
- OGI Field Teams:
 - Davis Safety
 - GreenPath Energy
- Regulators:
 - BCOGC
 - AER
 - AEP
 - ECCC

Where?



- ¹ British Columbia Oil and Gas Equipment and Component Field Survey
² Fugitive Emission Management Program Effectiveness Assessment
³ Alternative Technologies for Fugitive Methane Emissions Management
⁴ Alberta Methane Field Challenge

What Do We Hope to Achieve?

- **Immediate emission reductions during and after programs**
 - Pneumatic reductions likely exceed mega-tonne/year scale in AB
 - >1,500 fugitive surveys conducted to date
 - Vast majority of fugitive results delivered to producers for abatement, repair timelines typically measured in days
- **Sustainable, effective policies**
 - Industry, regulators, and academics sitting at the same table
 - Calibrate regulatory approach by characterization of emission sources, available technologies
 - In near-real-time!
- **Dramatic cost reductions**
 - Targeting 75%+ reduction in fugitive emission management program cost at equivalent effectiveness
 - Net-profitable methane abatement via AB carbon market

How to Drive Scale?



Research Areas

- Detection and Quantification Technologies
- Cost and Efficacy of Control Technologies
- Costs and Efficacy of Proposed Regulations
- Characterization of Emission Sources

Policy Development

- Co-design regulatory approaches with regulators, academics, and industry at same table
- Use existing tools (e.g. carbon market) where possible to align quickly
- Forward-looking regulations balancing prescriptive vs. flexible

Certainty & Support

- Carbon market mechanisms (e.g. carbon-backed financing)
- Gov't Funding Programs (e.g. Energy Efficiency Alberta)
- Royalty credit programs (e.g. BC Clean Infrastructure Royalty Credit Programs)
- Clear, certain regulatory backstop
- Data eco-system to streamline

Thank You

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