

Canadian CO₂ Capture & Storage Technology Needs & Initiatives

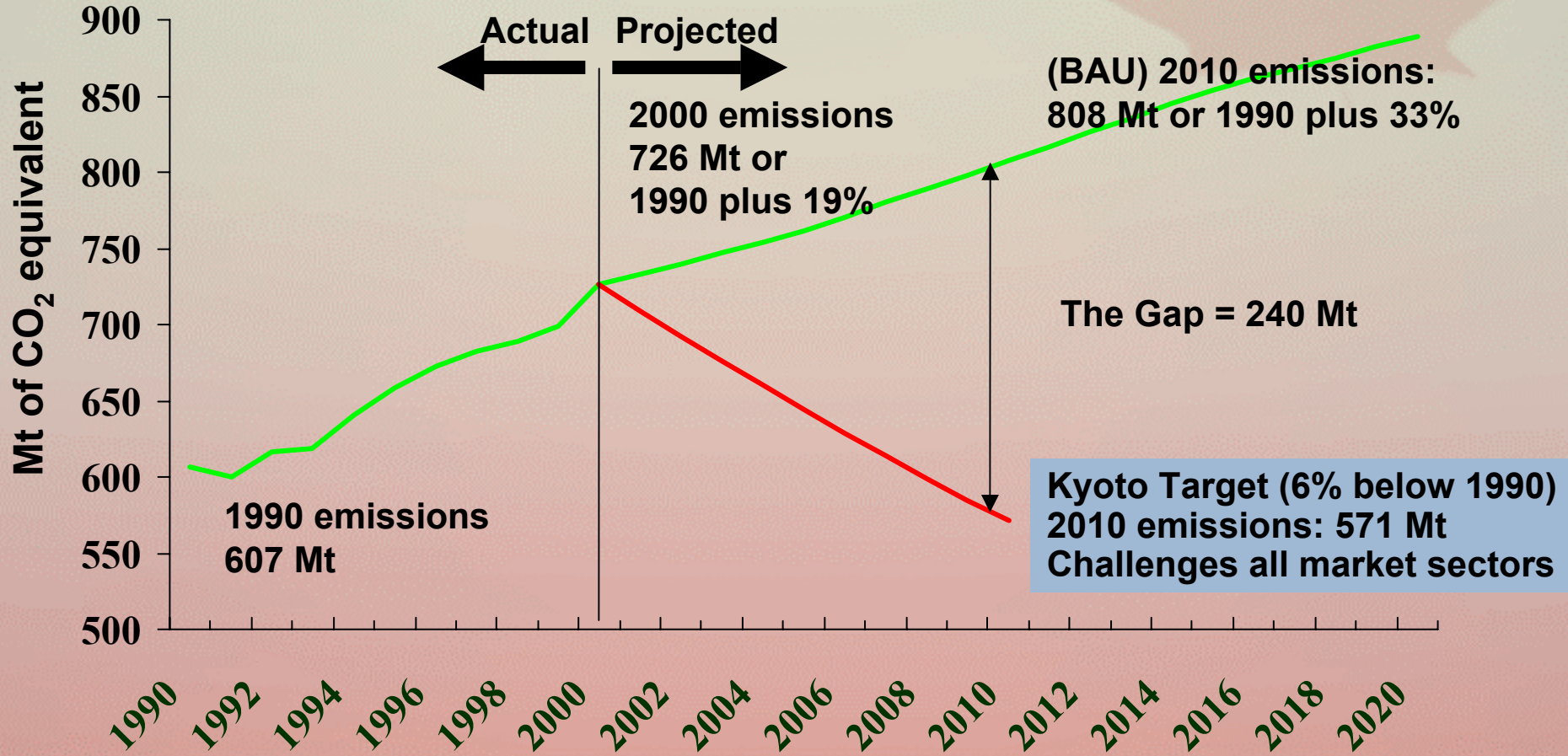
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and
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...“Addressing national and global challenges in a sustainable development context”...

The Canadian Context

- Canadian energy policy is framed within the context of **Sustainable Development**
- Sustainable Development – Pursuit of a balanced portfolio of **Environmental, Economic** and **Social** goals
- For energy, Sustainable Development aims to:
 - ❖ Reduce energy use, intensity (and carbon content), emissions
- A major driver is Climate Change which for fossil fuels includes **Management, Storage** or **Use** of carbon emissions
- **CO₂ Capture and Storage** is the natural evolution of leading Canadian initiatives in acid gas injection and enhanced oil recovery in place since the 1980's

Canada's Kyoto challenge



Drivers, Issues and Needs for CO₂ C&S

- Kyoto Protocol ratified
- Market price for carbon
- Regulation, more demanding standards
- Market 'opportunities' – EOR, ECBM and AGI

Issues and Needs

- CO₂ capture costs, efficiency, improved technologies & systems
- Effectiveness of storage in geological media
- Storage capacity & project economics, monitoring measurement and verification
- Safety and integrity of sub-surface storage and longer term issues affecting 'fixation' and 'leakage'
- Regulatory mechanism, royalty structures & ownership

Components of Current Canadian Strategy

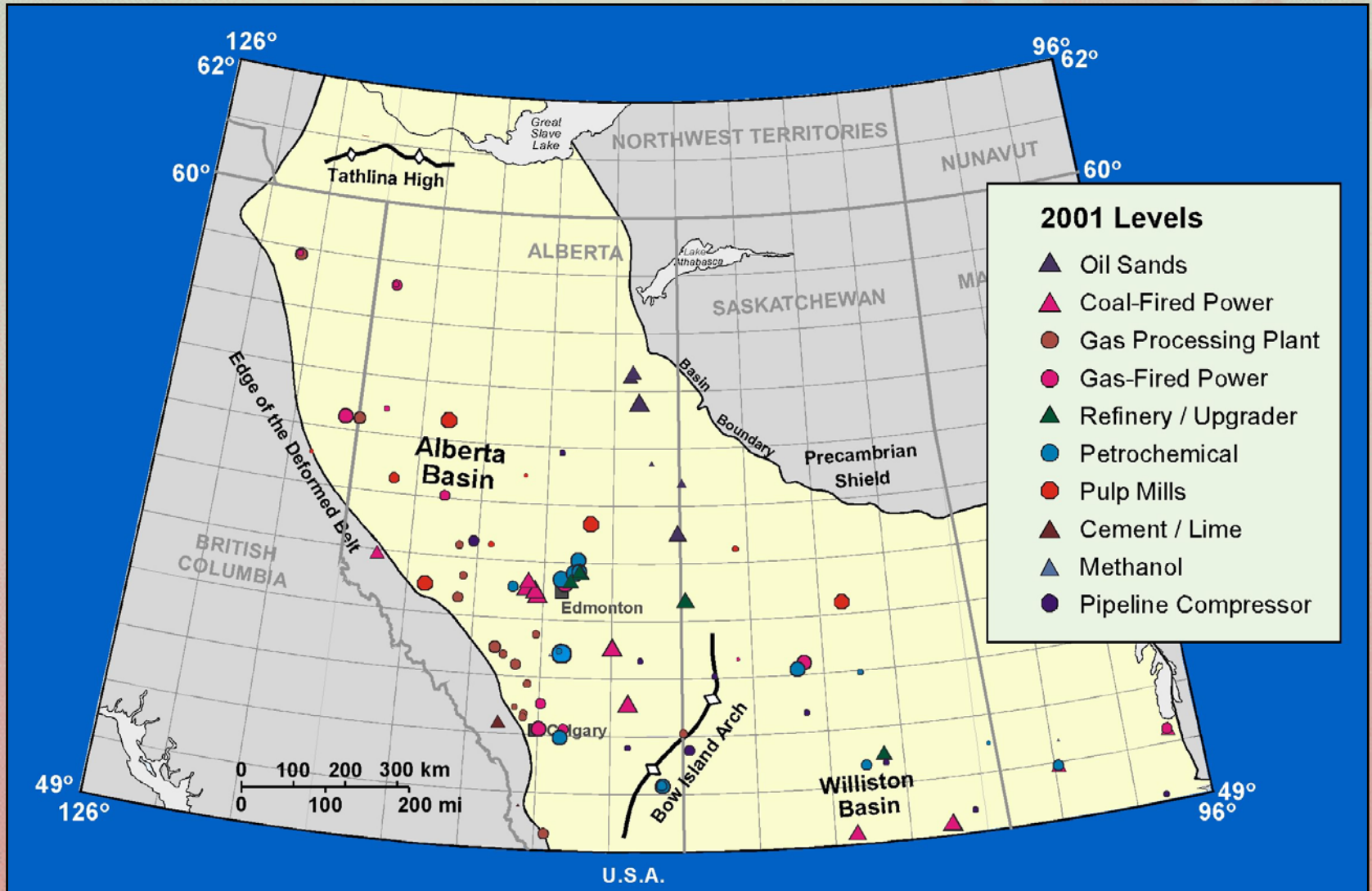
Sources – Purity of CO₂ supply, cost and location

- High purity and low cost – H₂, ammonia and fertilizer plants, natural gas processing; tonnage 8Mt/y CO₂
- Low purity and high cost – Power and industrial plants; tonnage 67 Mt/y CO₂
- Above in proximity of sinks in western Canadian sedimentary basin (WCSB)

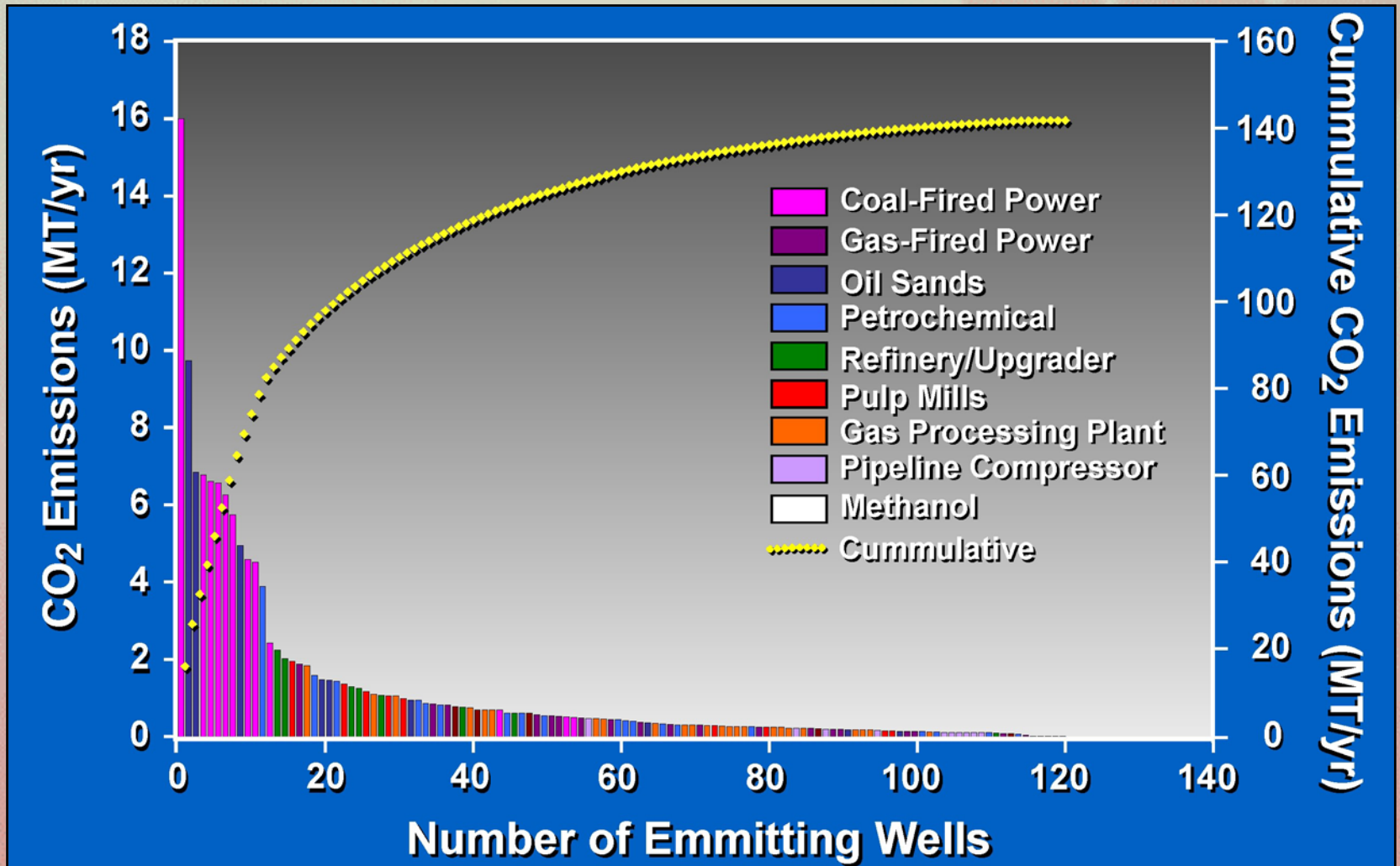
Sinks – Storage and use (WCSB)

- Revenue generating use – EOR and ECBM; ultimate storage ~1-10 Gt CO₂
- Meeting current regulatory requirement – acid gas injection; tonnage ~ 1 Mt/y CO₂
- Storage in other geologic media - depleted oil & gas, saline aquifers; tonnage ~10-100(?) Gt CO₂

AGS/EUB - Inventory of CO₂ Sources in WCSB

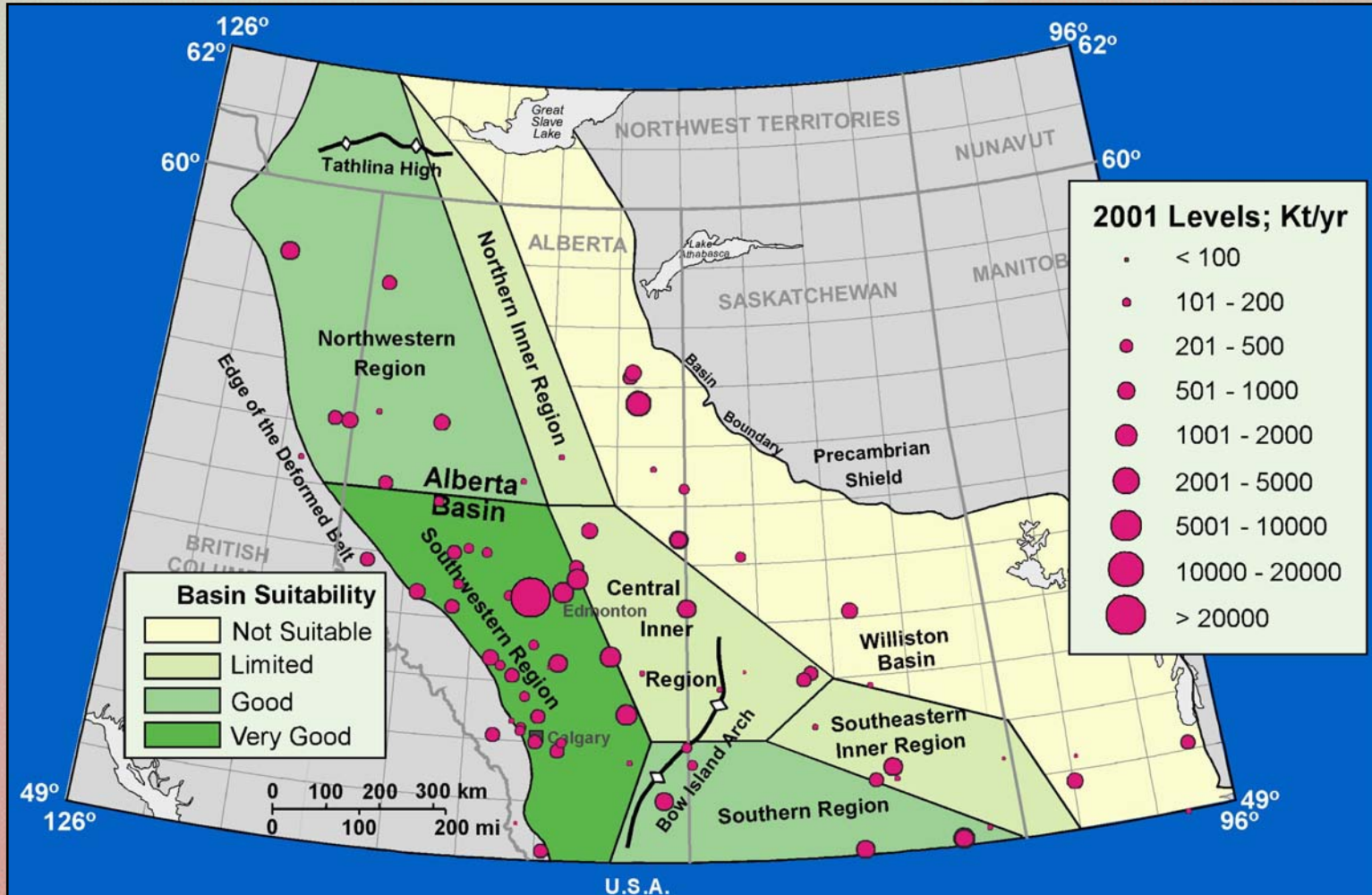


AGS/EUB - Inventory of CO₂ Sources in WCSB (2)

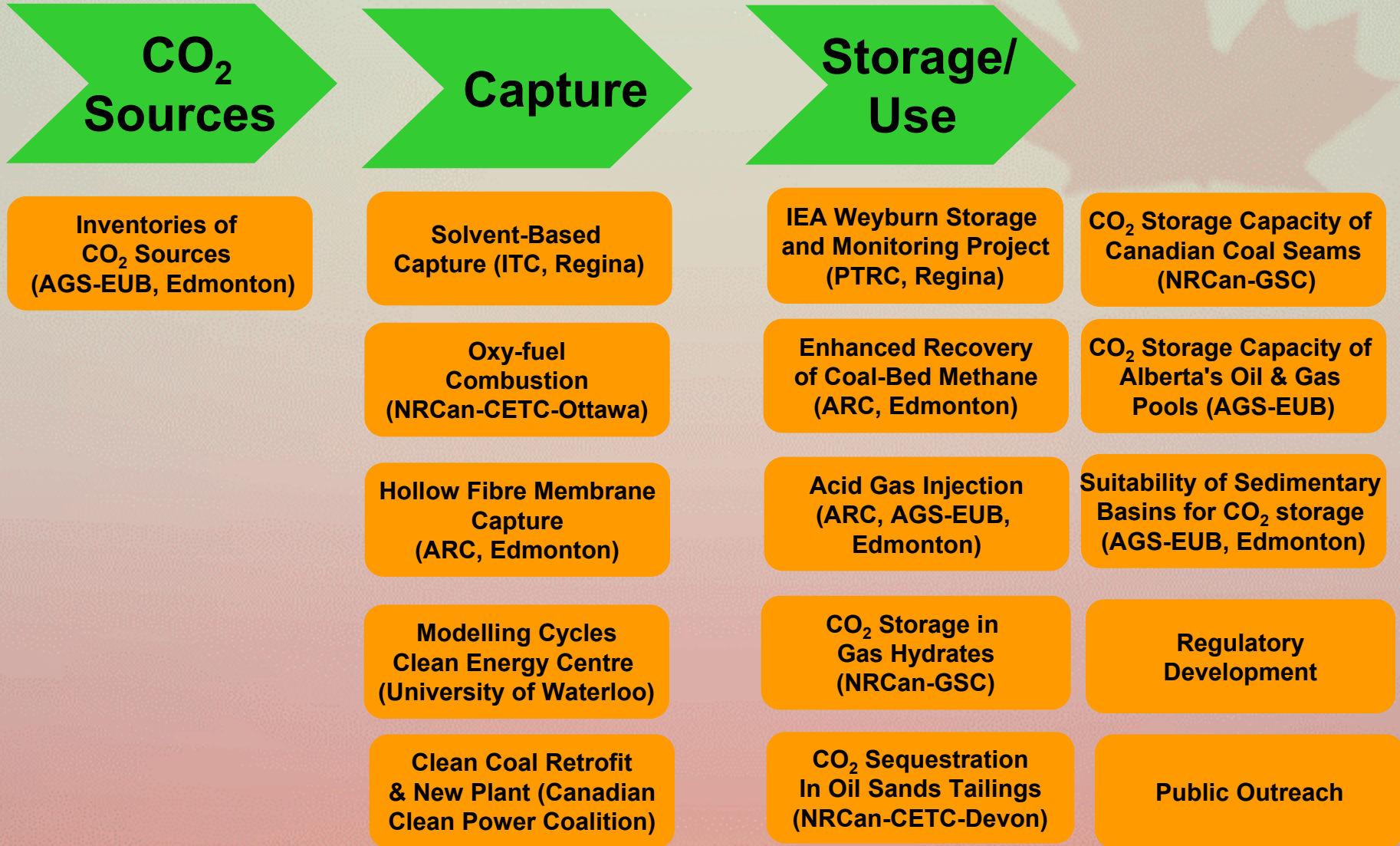


2001 Levels

WCSB Suitability for CO₂ Storage



Current Canadian Projects on Capture & Storage



Closing Remarks

- **CO₂ capture and storage technologies - an integral component of Canada's climate change response options and part of a sustainable development strategy**
- **Breaks link between emission of CO₂ from fossil fuel use and permits the continuing use of the existing energy infrastructure**
- **Canadian industry has taken the lead in many technology projects with strong support from provincial and federal governments, academia – approximately \$40M for R&D projects, plus \$42M at Weyburn, over 5 years**
- **Many R, D and D challenges remain to be addressed before CO₂ Capture and Storage technologies become adopted on a wider scale – improved CO₂ capture technologies, advanced energy cycles, lower penalties and costs; transportation infrastructure; geological fixation, risks of leakage, MMV and improved ECBM productivity to name a few**
- **There is a compelling need for a wider energy infrastructure based, integrated approach to carbon management**
- **Close cooperation both nationally and globally is vital for success – several Canadian projects are being carried out as international collaborations and have engaged the active support of the USDOE and other governments and industry**