

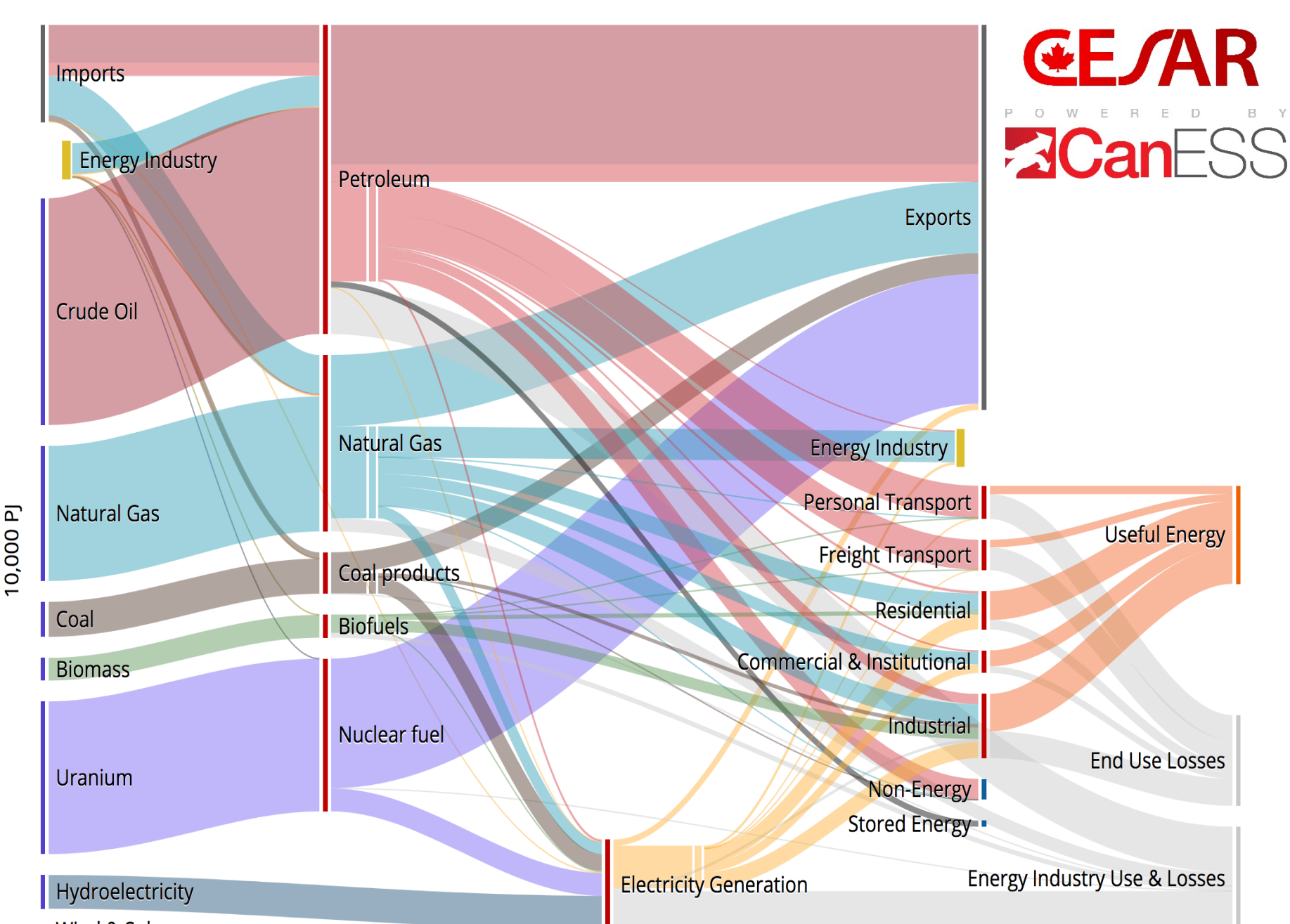
...An inter-disciplinary University of Calgary research initiative that develops & uses technology-based scenario modelling tools to inform policy and investment decisions on pathways to sustainability of Canada's energy systems.

1. BUILD DATA RESOURCES AND VISUALIZATION TOOLS

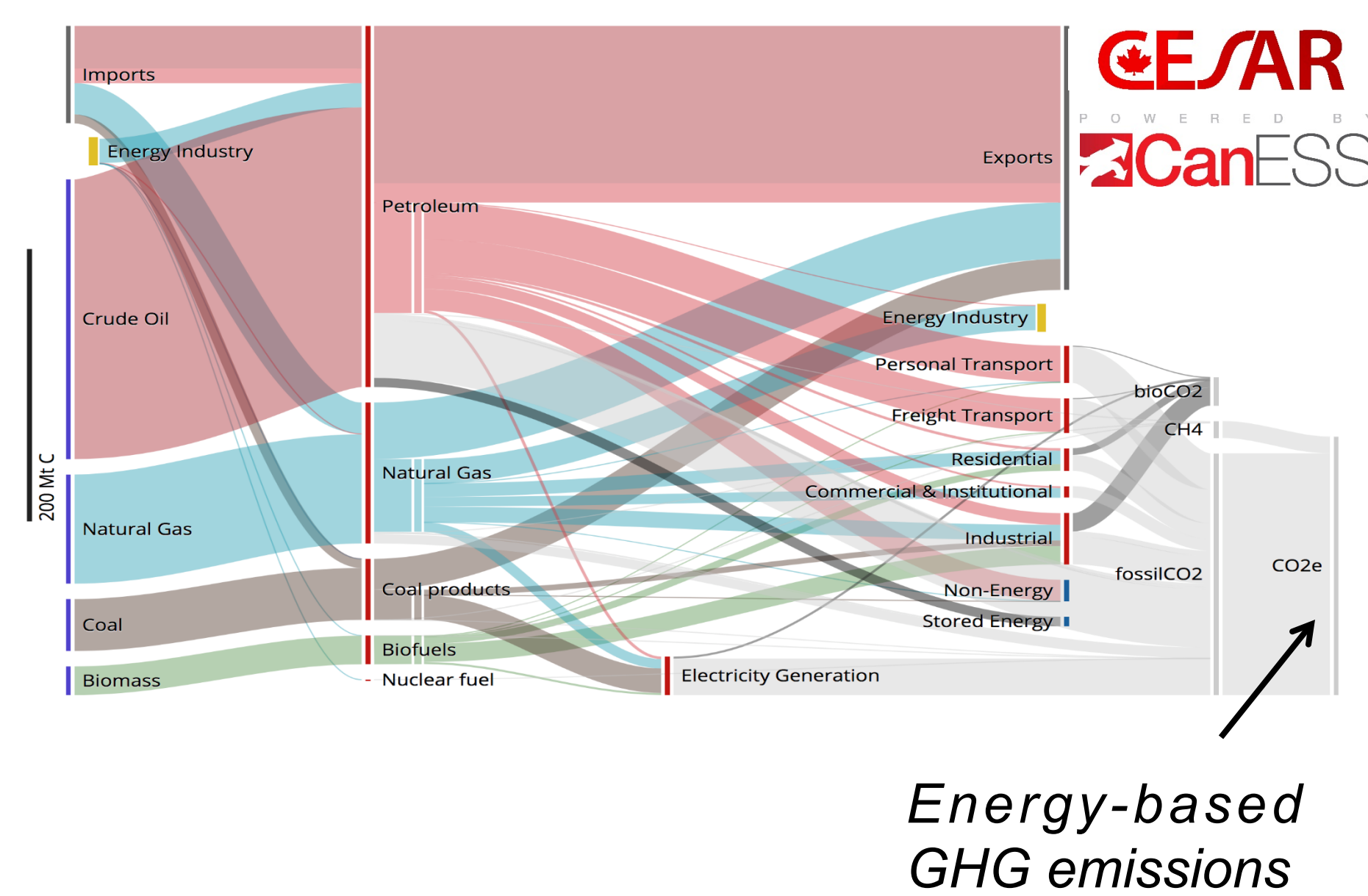
Why?

- To better understand the flows of energy and carbon (a greenhouse gas) that define fuel and electricity production and use in Canada;
- To enhance energy literacy in Canada (free portal at www.cesarnet.ca).

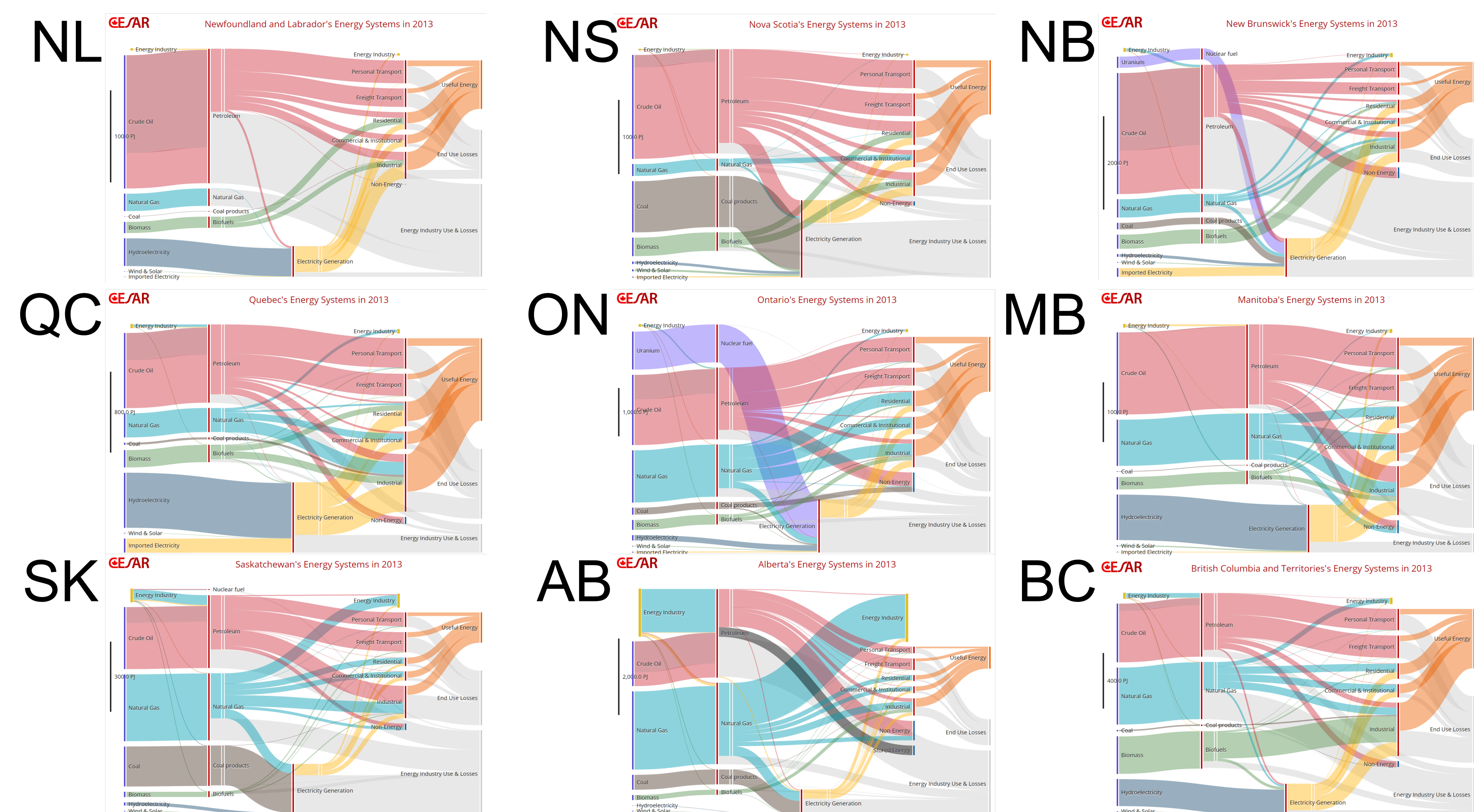
Energy Flows in Canada (2013)



Carbon Flows in Canada (2013)



Note the large interprovincial differences in energy flows:



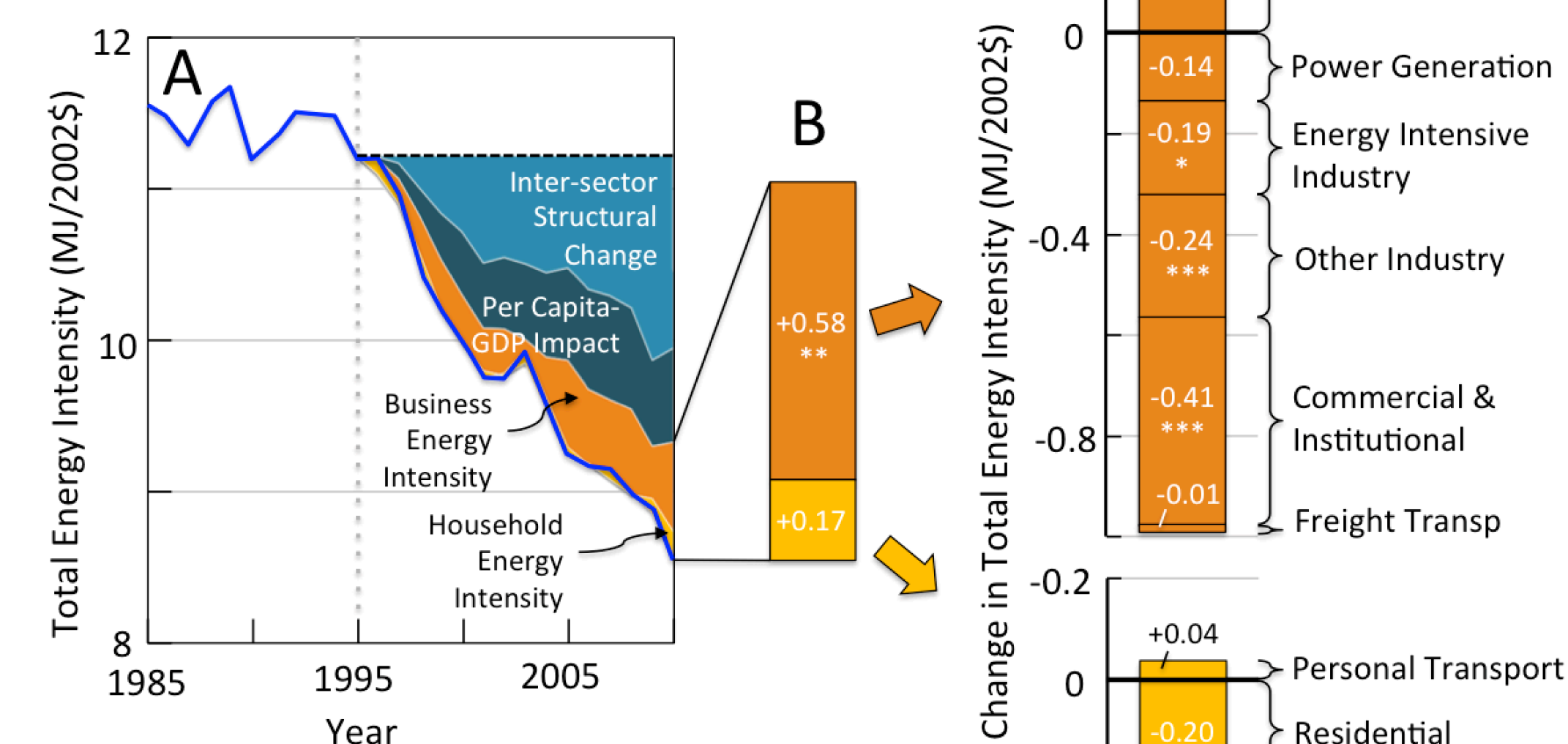
Most of the data for these sankey diagrams is from the Canadian Energy Systems Simulation (CanESS) Model [1].

2. ANALYZE PAST ENERGY SYSTEMS

- To understand trends & forces driving energy systems change;
- To identify areas of inefficiency / opportunity;
- To expand the scope of factors / issues needing consideration in efforts to alter energy systems.

Examples:

1. Understanding energy intensity (MJ/\$GDP) changes in Canada since 1995 [2].



2. The Water - Energy - Climate Nexus [3]



3. Integrating Food and Fibre into the Energy Systems of Canada [4]



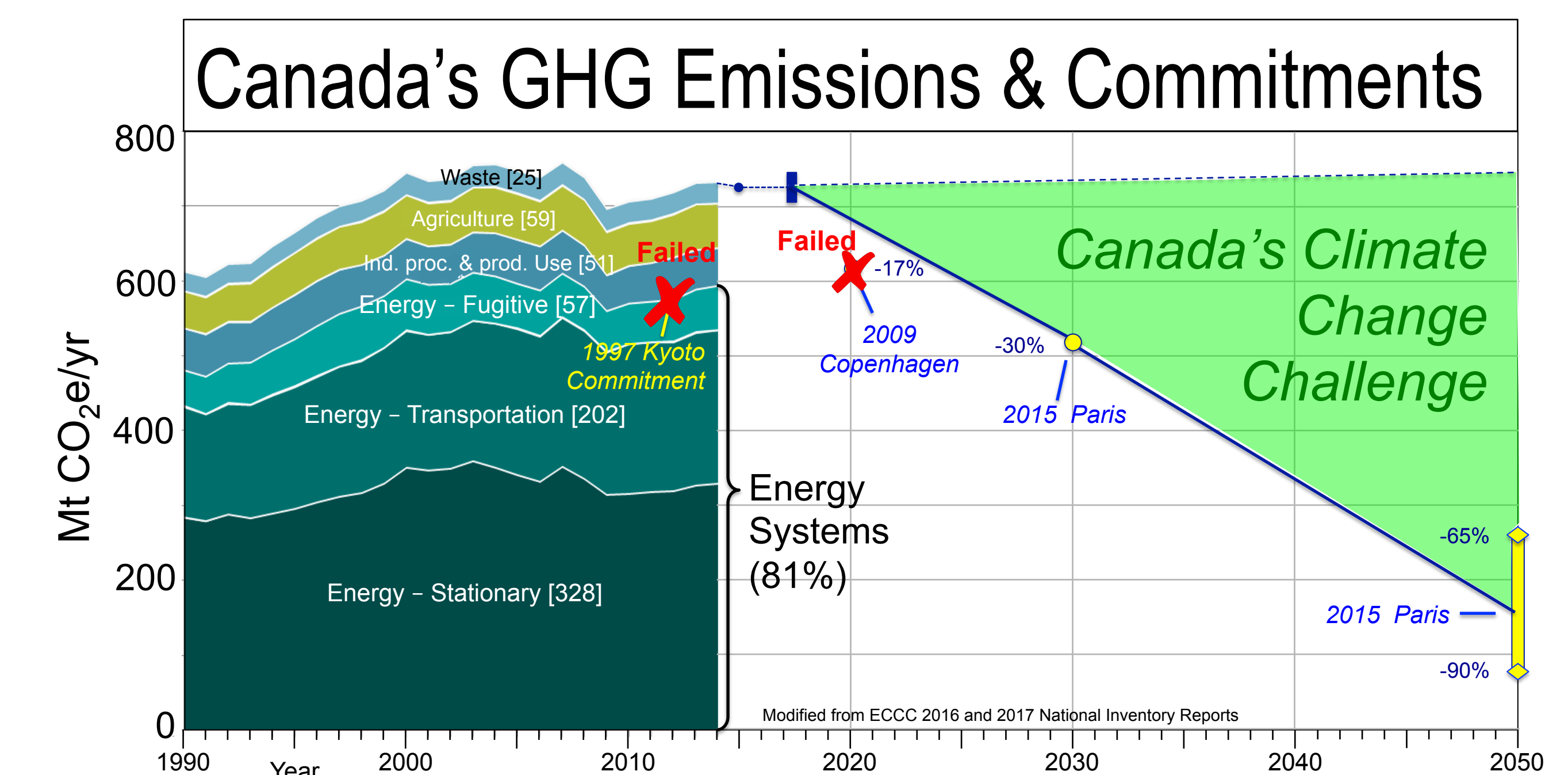
THANKS!

The work of CESAR has been made possible through a generous donation from the Edmonton Community Foundation.



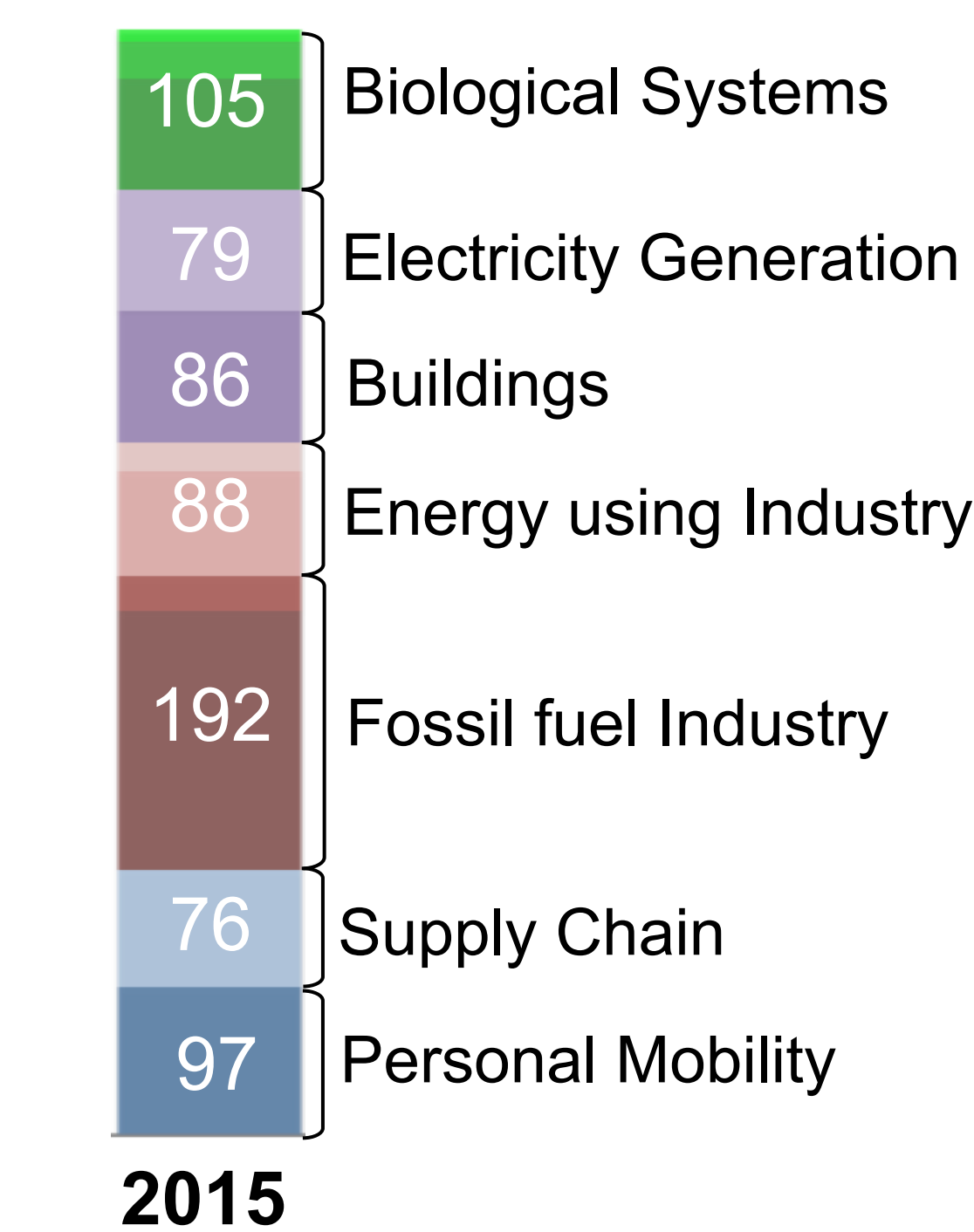
3. MODEL ENERGY FUTURES

- To inform policy and investment decisions regarding credible, compelling sequences of technology, infrastructure and behavioural changes (i.e. **Pathways**) that will allow Canada to meet its climate change commitments.



The CESAR Pathways Project

722 Mt CO₂e/yr



How can these sectors be transformed to meet Canada's climate change challenge?

REFERENCES

- whatIf? Technologies Inc., Ottawa, Ont
- Torrie, R, C Stone and DB Layzell 2016. Understanding Energy Systems Change in Canada. 1. Decomposition of Total Energy Intensity. Energy Economics 56:101-106.
- Goto S and DB Layzell 2013, Water energy climate nexus. MSc thesis
- Kunbi A and DB Layzell PhD Thesis in progress