

Canadian Energy Research Institute

Examining the Expansion Potential of the Petrochemical Industry in Canada

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January 2016

Canadian Energy Research Institute

Founded in 1975, the Canadian Energy Research Institute (CERI) is an independent, not-for-profit research institute specializing in the analysis of energy economics and related environmental policy issues in the energy production, transportation, and consumption sectors.

Our mission is to provide **relevant, independent, and objective economic research** of energy and environmental issues to benefit business, government, academia and the public.

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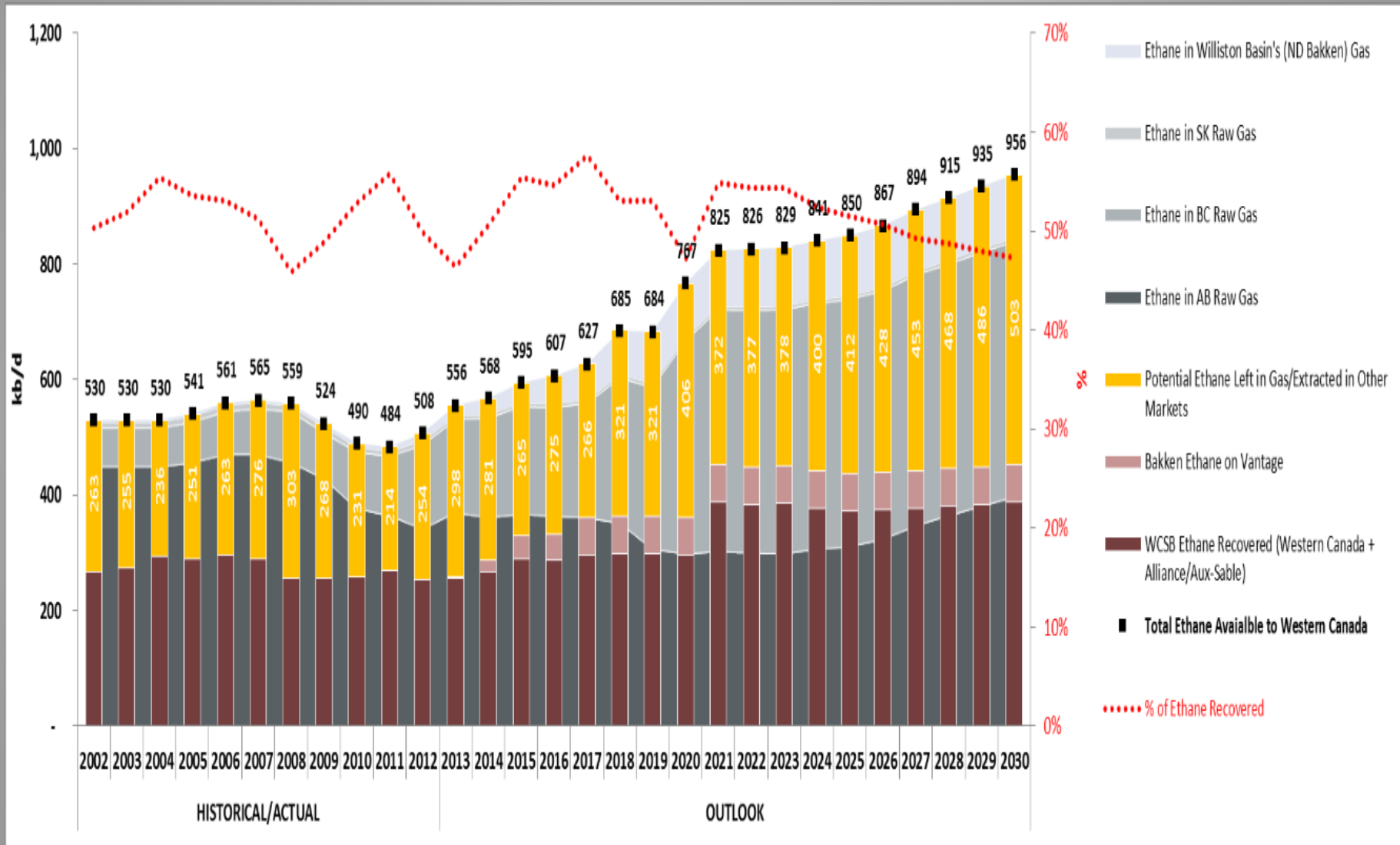
Market Dynamics

- Majority of petrochemical production is based on ethylene cracking and derivatives from ethane.
- Almost 80% of ethylene cracking capacity is located in Alberta. Feedstock of 255 Kb/d of NGLs, the rest is located in Ontario. Total capacity is 5200 Kt/yr of ethylene.
- Total average annual production is 4800 kt/yr which leaves some surplus capacity for ethylene. Capacity utilization is around 95%.
- New Joffre polyethylene plant should take much of the excess ethylene capacity.
- Market in Western Canada is balanced between ethylene production and derivative plants.
- Growth in polyethylene production may test the limits of demand, especially in North America.

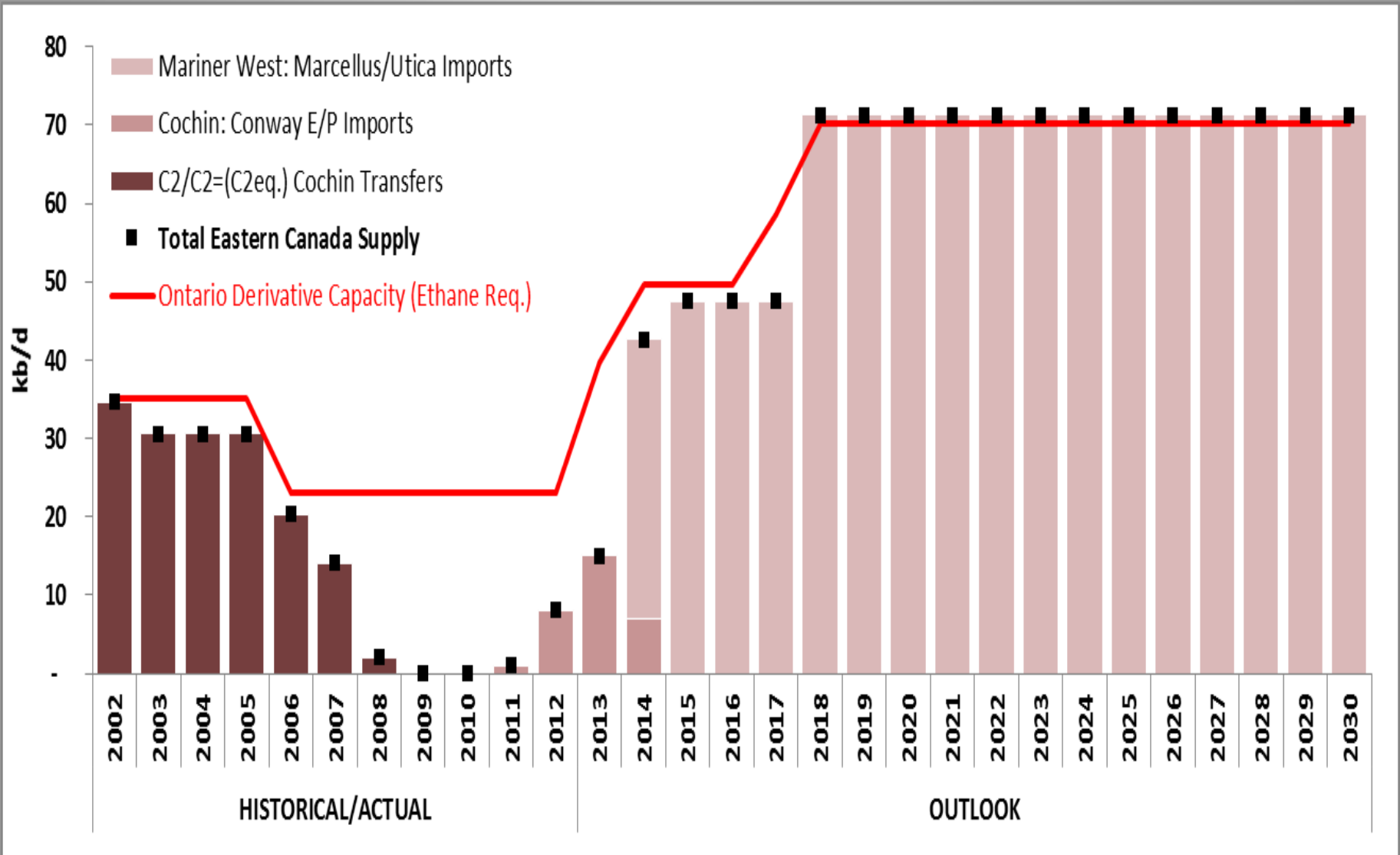
Feedstocks

- Natural Gas: Future demand for natural gas will change from a 50:50 split between export volumes and domestic use to a 60:40 split because of declining exports and increasing domestic demand. There is a concern of a continued decline in export demand due to higher production in the U.S.
- Ethane: Total supply of ethane available to Western Canada is projected to rise to 956 Kb/d per day by 2030 with the greatest projected growth in BC as a result of LNG projects. Ethane could also be extracted from gas streaming, new straddle plants or LNG ethane extraction.
- Propane: Canada currently exports all its surplus propane to the United States. Exports to the US are forecasted to decline. However, imports from the US are forecasted to increase from 2017 to 2030.
- Butane: Supply volumes are forecasted to increase steadily through 2030.

Ethane Supply Forecast: Western Canada



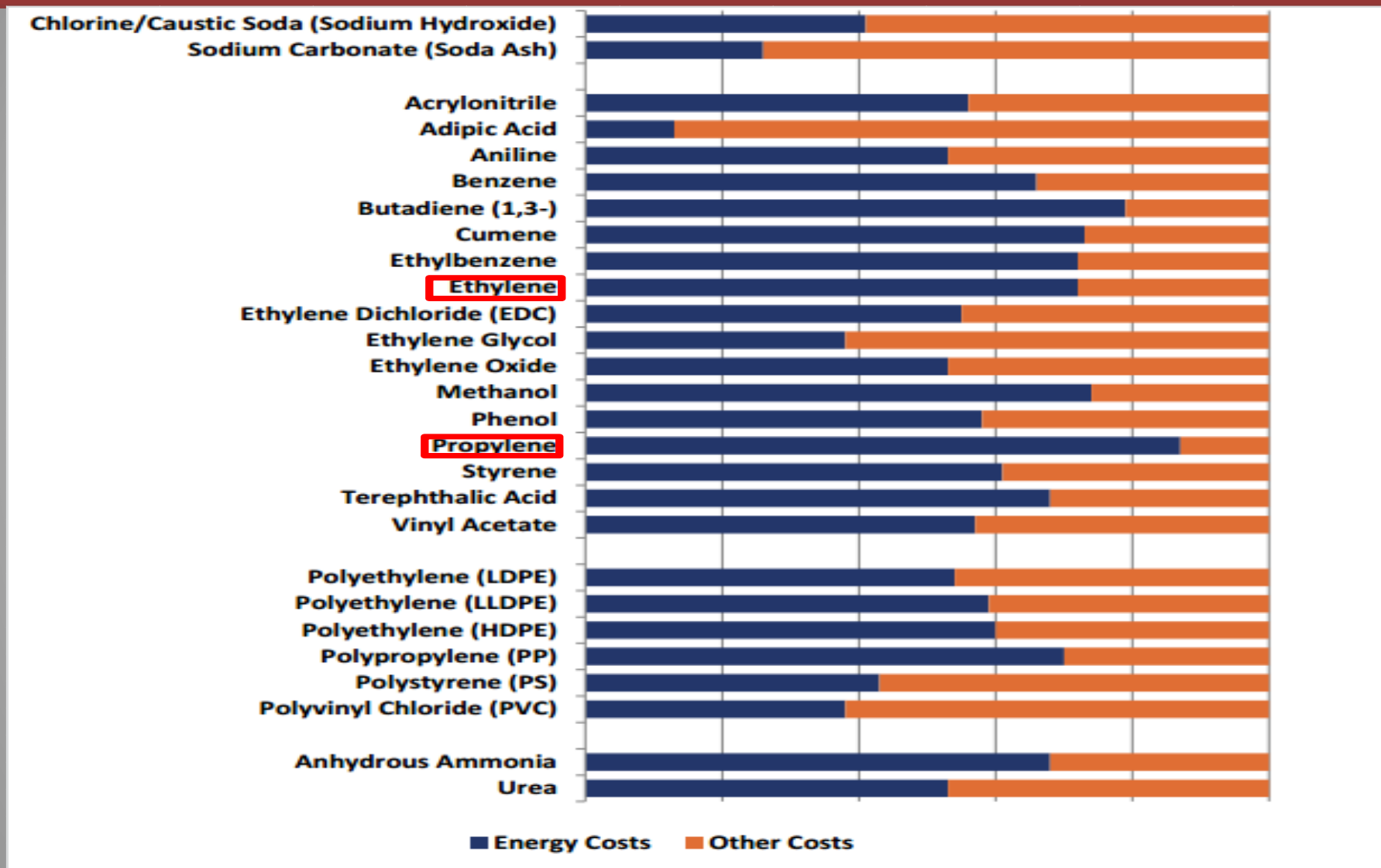
Ethane Supply Forecast: Eastern Canada



International Petrochemical Clusters Comparison

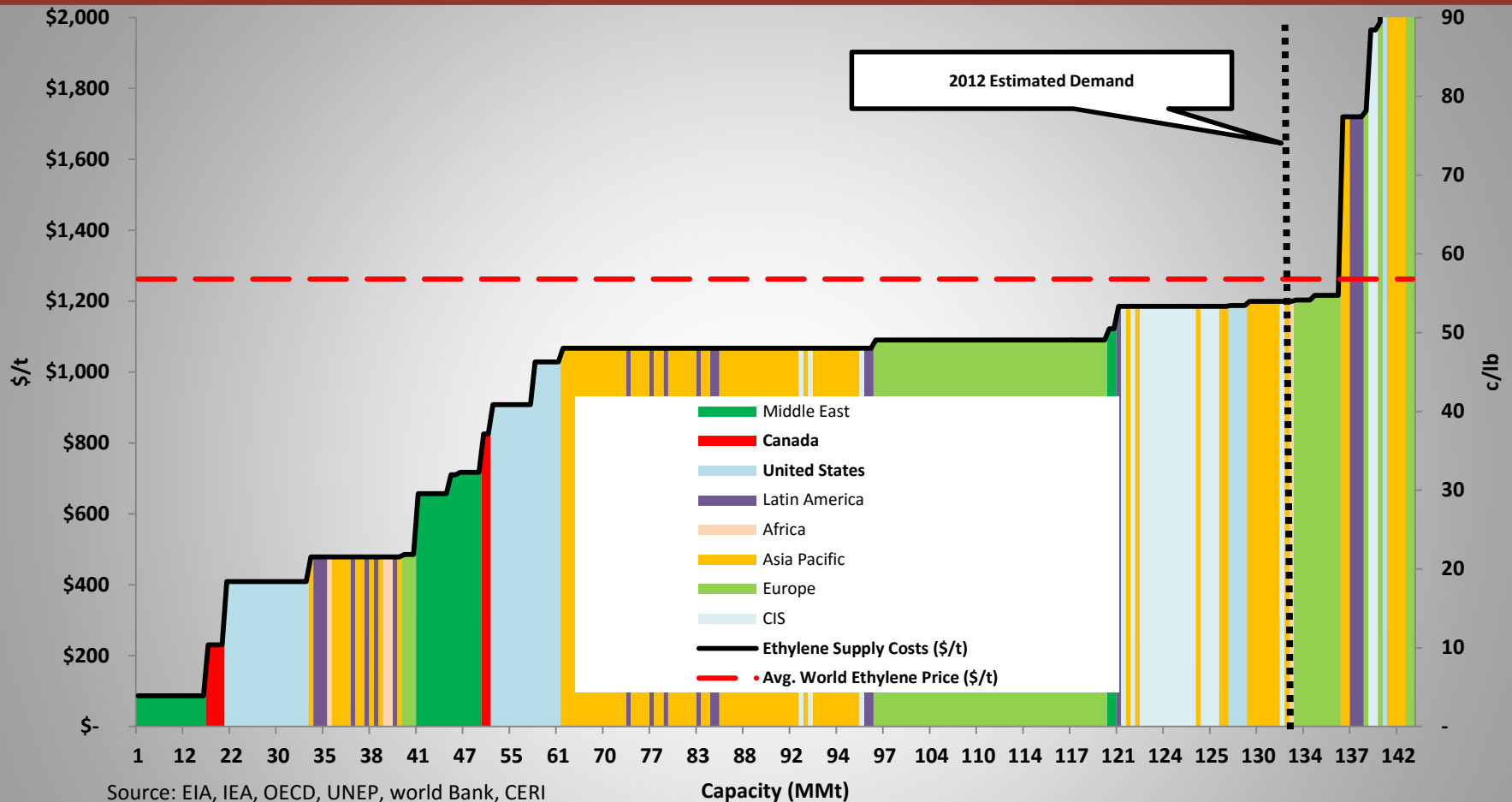
- Three case studies- Saudi Arabia, Japan/Korea, and the US Gulf Coast are detailed. By drawing on regions with certain differentiating characteristics, Canadian petrochemical clusters may be able to gain some useful insights.
- The Middle East has the greatest cost advantage due to incentives making their feedstocks artificially low.
- Canada and the US are the next most competitive regions, followed by Latin America and some parts of the Asia Pacific region. U.S. State Governments are active in attracting Petrochemical investment.
- Canada is cost competitive with other regions globally. The main reason is the access to cheap feedstock. North American petrochemical production is dominated by NGL feedstocks. Other regions (e.g. Japan/Korea) source their feedstock from crude oil and naphtha.

Feedstock & Energy Cost share of total cost



Source: American Chemistry Council

Global Cost Comparison



- Cost assessment based on \$90/bbl oil. Oil based production costs are approximately ½ relative to this chart
- Detailed competitive cost assessment update due out this year

Summary Observations

- Canada is still a cost competitive region for global production of petrochemicals
- Success factors for Canada
 - Continued access to low cost NGLs – partially dependent on LNG plants on the west coast
 - A return to a significant price spread between Natural Gas and Oil
 - Access to markets (via rail or pipeline)
 - Coordination between the Canadian clusters ???
- There is sufficient ethane to supply an additional two or three world class ethylene cracking facilities in Western Canada
- Eastern Canadian access to the Marcellus and Utica gas fields provides ready access to feedstocks in the Great Lakes region

Thank you!

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