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# Executive Summary

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Natural gas liquids (NGLs) are an important component of our energy system and have many uses. Ethane is a feedstock for the petrochemical industry to produce ethylene via steam cracking. Propane is also used as a feedstock for the petrochemical industry and is used for space heating and cooking in the residential and commercial sectors. Butanes (iso-butane and normal butane) have various petrochemical applications and are used in oil refineries to produce refined petroleum products such as gasoline. Butanes are also employed as a blending component, or diluent, to decrease the viscosity of heavy oil and bitumen to ease transport through pipelines. Most of the pentanes plus produced are used as a diluent for this purpose.

Without question, NGLs affect a broad range of industries across the economy – locally, regionally, and globally. The relationships across all these energy commodities are complex and intricate, and the outlook for increasing availability of NGLs in Canada points to the existence of various opportunities to expand domestic industries and to diversify and reach new markets. These opportunities will be met with challenges related to required investments in infrastructure, particularly in a low energy price environment. However, understanding those unique opportunities and challenges are the first step to effectively deal with future uncertainty.

The Canadian Energy Research Institute (CERI) conducted qualitative and quantitative analysis to understand how different market factors could foster or constrain Western Canadian NGLs market development. An in-depth analysis of the Western Canadian NGLs market strengths, weaknesses, opportunities, and threats (SWOT), at the industry level, as well as for each commodity was conducted. A large contributing part of the study were interviews with businesses, governments, regulatory agencies and associations which shared their views regarding the further development of the market.

Some of the recurring themes that originated from the interviews include:

1. **Need for reduction of costs:** costs related to power, plant processing fees, transportation, and getting products into pipelines must be reduced.
2. **Demand growth for Western Canadian NGLs (local and International):** for all products: ethane, propane, butane, and pentanes plus.
3. **NGLs exports:** expectations that NGLs exports will grow based on the international demand growth for NGLs and increasing export terminal capacities growth.
4. **Infrastructure development:** is generally considered to be limited and insufficient. A desire for more egress options was expressed by many interview participants.
5. **Market access and transparency:** improvement of the regulatory and pricing frameworks in the market, particularly regarding price transparency.
6. **The role of government and regulatory impacts:** All levels of government have a role to play to incentivize Western Canadian NGLs market growth through a variety of fiscal and policy-related programs.

Incorporating the interview results, together with an external and internal analysis of the sector produced several market development scenarios. The full description and pathways of these scenarios are listed in Chapter 5. When building the scenarios, numerous factors are considered.

Natural resource abundance, government incentivization, as well as favourable market demand-supply balances, supports a scenario where a potential pathway for market development is identified. Furthermore, regulatory, fiscal, and environmental policies can impact competitiveness for Western Canadian NGLs and should be considered as tools to manage the functioning of the market. Pathways should consider how to resolve dichotomies between regulatory and fiscal policy mechanisms (for example, the Environmental Act and municipality taxes) in order to preserve the synergy between different levels of government (Cowley, 2018)

Competitive prices of Western Canadian NGLs are important considerations supporting the challenge of Western Canada increasing market share of Asian demand. This growing demand can be addressed through increases in infrastructure development. Addressing the market concerns that are related to Edmonton price transparency and liquidity would be essential for encouraging higher levels of participation in the market. In the same vein, higher levels of participation in the market could signal to potential investors that the Western Canadian NGLs market is “open for business.” Proponents interviewed by CERI and expert feedback showed an interest in improving online data disclosures. These considerations can help increase the interest in long-term sales and purchase agreements for NGLs.

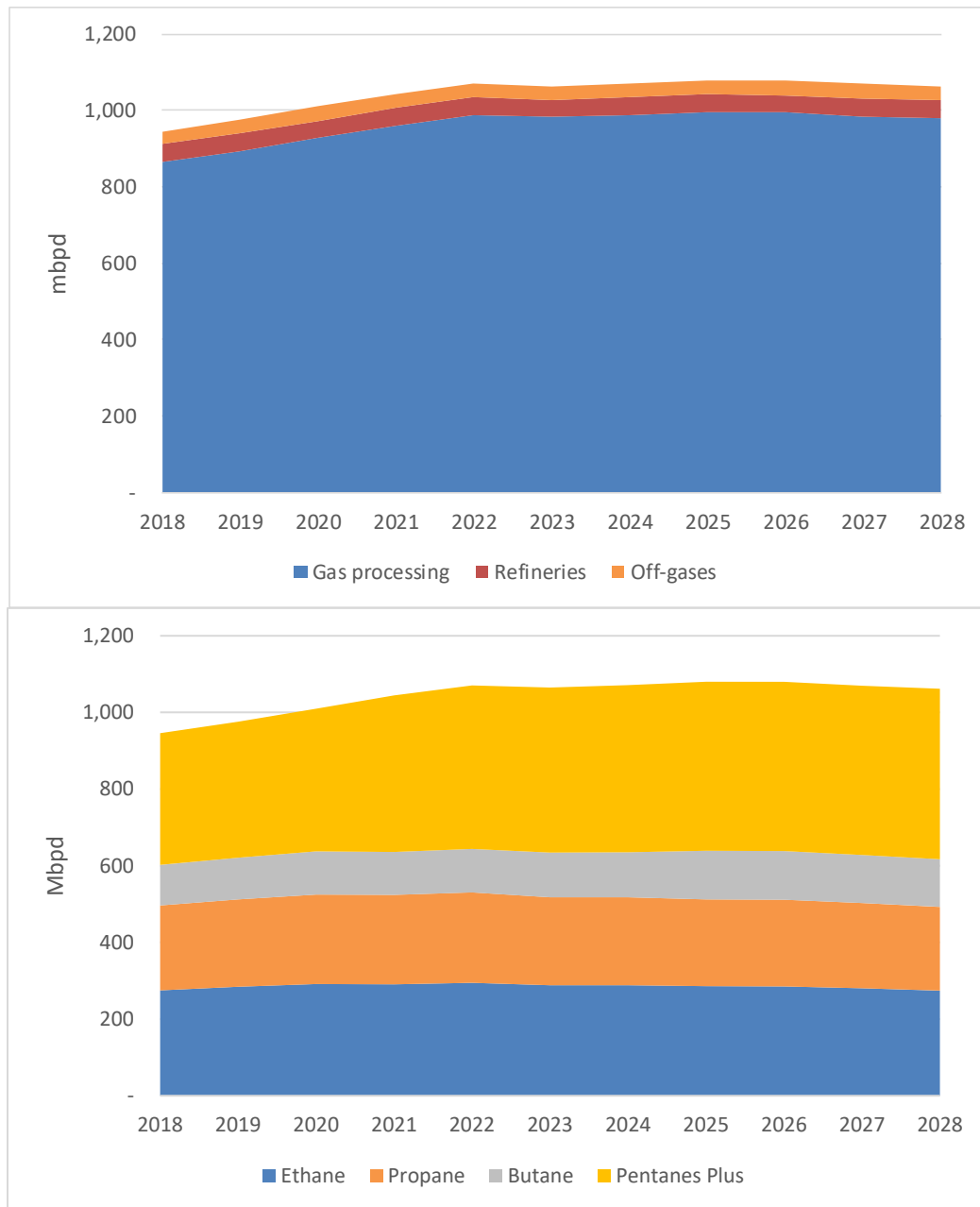
Finally, collaboration between governments, governments and Indigenous organizations, governments with industry and industry associations are essential in the efficiency of review processes. Mutual benefit agreements can be a tool for improving process efficiencies. They can also identify issues and promote early resolution amongst the parties. This can improve the responsiveness of the sector to take advantage of market opportunities.

The growth rate of NGL production in the next 11 years will slow down from 52% (prior eight years’ period growth) to 12%. Total NGL volume from all sources is expected to increase from 946 thousand barrels per day (Mbpd) to 1,062 Mbpd.

With refinery and upgrader off-gas production expected to be stable, NGL growth is expected to come only from gas processing units and primarily from pentanes plus and condensate. Ethane production is expected to be flat; butane production will increase by 17%, while pentanes plus will boost its output by 39%. The outlook for propane is based on current recovery rates.

The producers’ pursuit of liquids, especially pentanes plus for oil sands /bitumen blending, will drive growth. However, the largest constraint is the ability to market natural gas in the same or growing volumes as the Canadian market is set for a decline in natural gas production because of diminishing US requirements for imports.

**Figure E.1: Western Canadian NGLs Production Outlook by Type and Commodity**



Western Canada’s demand for ethane has been higher than its supply. In Alberta, the petrochemical industry is the major consumer of ethane recovered from natural gas, which is the major source of ethane (more than 84% of ethane comes from natural gas). For the next 11 years (2018-2028), CERI expects total ethane production in the Western Canadian Sedimentary Basin (WCSB) to be between 275-295 Mbbpd; ethane from off-gases will account for 19-22 Mbbpd in the production slate. The supply and demand for Western Canada are shown in Figure E.1.

Over the forecast period, CERI expects total propane production to be between 218-235 Mbbpd; propane from off-gases will account for 10 Mbbpd in the production slate and 7.2 Mbbpd from

refineries. Market projections based on the current recovery rates of propane from natural gas indicate that the amount of propane available for export will decrease from 90 Mbpd to 20 Mbpd. These volumes are insufficient to satisfy two new export facilities after 2023.

However, if all propane was recovered from the natural gas stream, the amount of propane available for export would be 113 to 191 Mbpd for the forecast period. With existing and approximately 93 Mbpd of new processing infrastructure which is available by 2020, it is likely that recovery rates can be increased substantially.

Western Canada's supply of isobutane and normal butane was enough to satisfy market demand as of late. Butane production grew from approximately 80 Mbpd in 2012 to 123 Mbpd in 2017. Imports have been between 5 and 7 Mbpd, while exports have grown from 7 to 17 Mbpd from 2012 to 2017.

For the next 11 years (2018-2028), CERI expects total butane production to be between 118-136 Mbpd; butane from off-gases will account for 10 Mbpd in the production slate, while production from refineries will be 4-5 Mbpd. CERI's NGLs interview participants believe that butane imports will increase and would likely continue if the oil sands diluent demand is sustained. Producers, despite targeting liquids-rich formations, are opting to leave butane as part of a natural gas liquids mix for removal from Alberta.

Over the forecast period, CERI predicts the total production of pentanes plus to increase over 35% from 343 Mbpd in 2018 to 445 Mbpd in 2028. This is due to increasing demand as natural gas producers continue to target condensate, specifically in liquids-rich formations such as the Montney, Upper Mannville, and the Duvernay. In addition, producers have also implemented field recovery of condensate, which lowers the costs associated with recovery since there are no plant processing fees.

Demand for pentanes plus is expected to grow from 585 Mbpd in 2018 to 752 Mbpd in 2025, and then start increasing at a faster pace reaching 916 Mbpd in 2028.