A VISUAL PRIMER

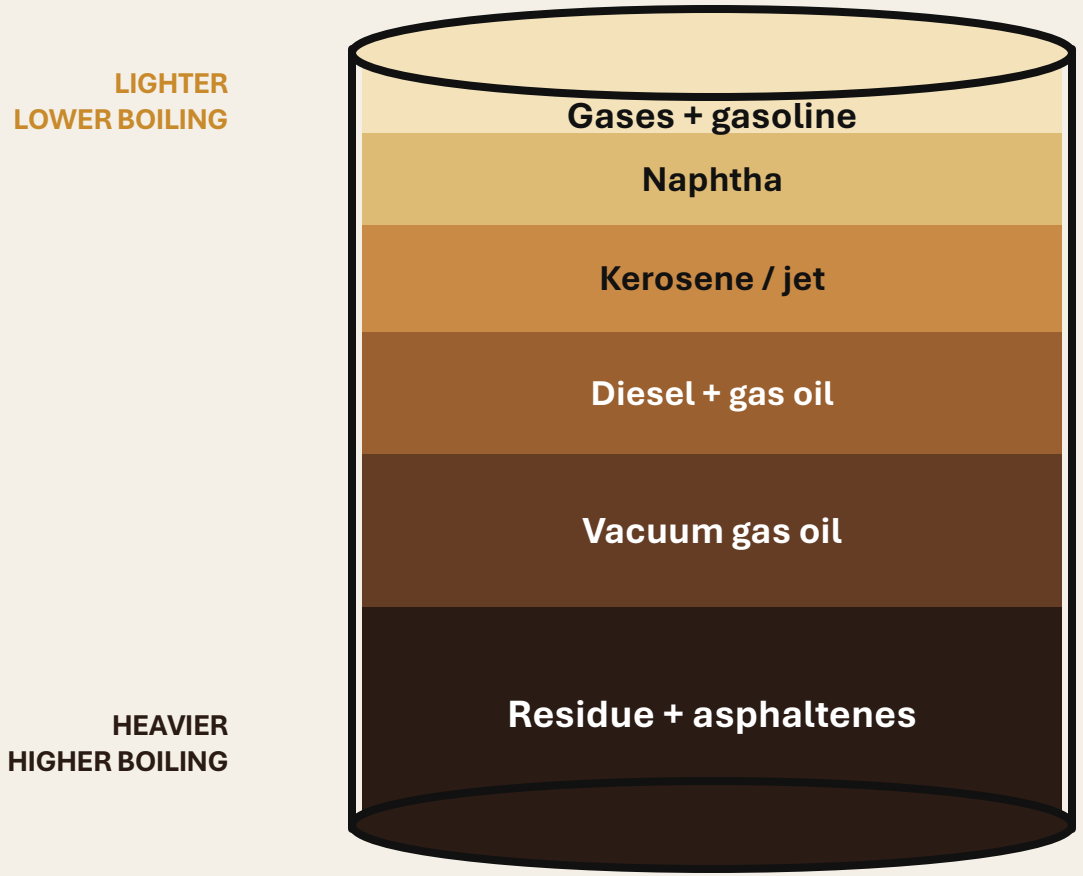
Alberta heavy oil/bitumen basics



extra-heavy · viscous · bottom-heavy

Bitumen is a bottom-heavy barrel

Refining separates crude by boiling range; heavier material remains lower in the barrel.

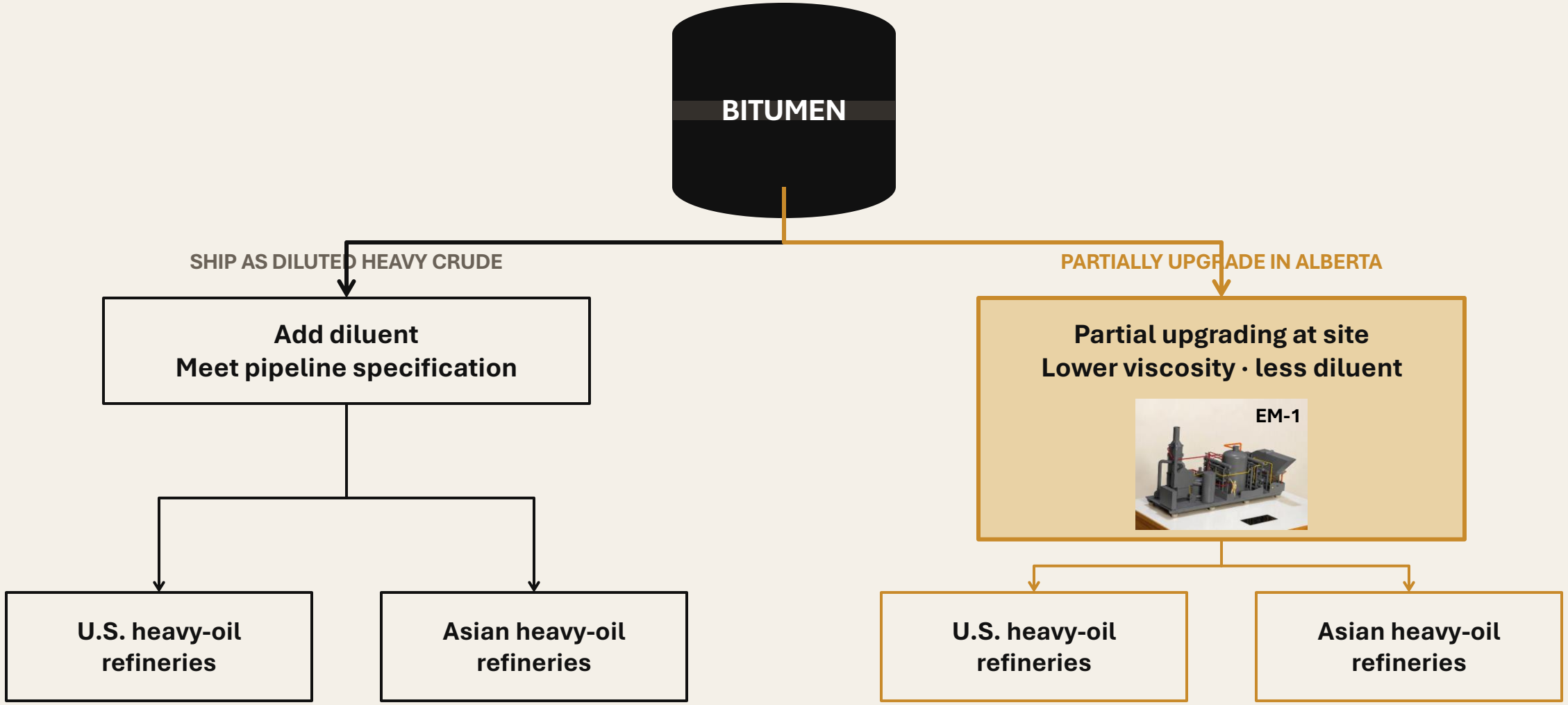


Illustrative boiling-range hierarchy — not a product-yield chart.

Sources: U.S. EIA, Refining crude oil; Alberta Energy Regulator, Oil Sands.

Prepared by: Eadie Technology Inc., Developer of plant EM-1. https://eadie.com

Two routes lead to complex refineries

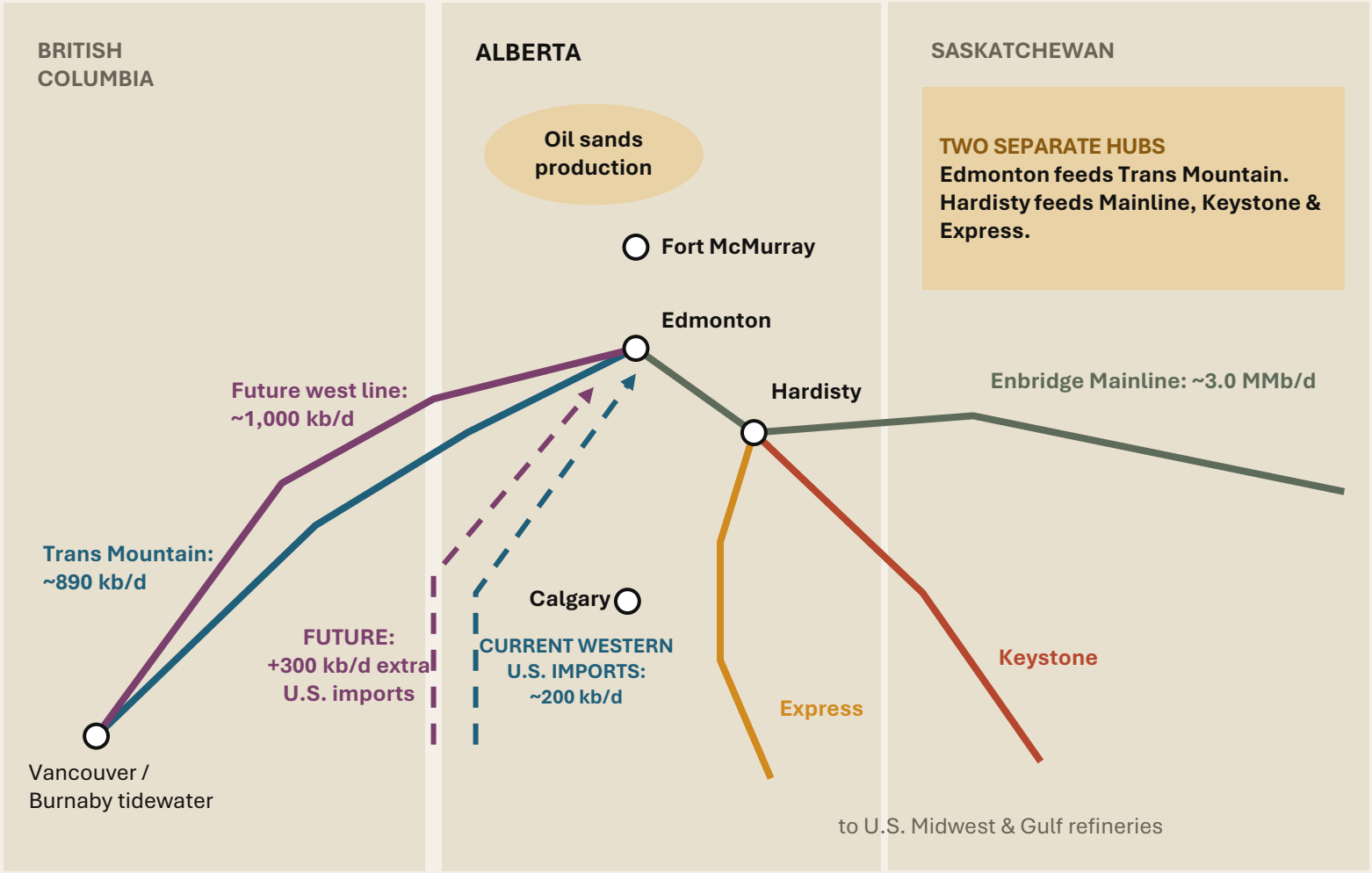


Both routes depend on refineries designed to handle heavy, residue-rich crude.

Sources: Canada Energy Regulator market snapshots (2025); Natural Resources Canada upgrading program.

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Diluent consumes up to 30% of capacity across every export corridor.



CURRENT WORKING ESTIMATE

700 kb/d

500 kb/d produced in Alberta
+ 200 kb/d imported from western U.S.

FUTURE WITH NEW WEST PIPELINE

1,000 kb/d

700 kb/d today + 300 kb/d extra imported from western U.S.

Assumes a new 1,000,000 bbl/d pipeline to Vancouver alongside the existing line.

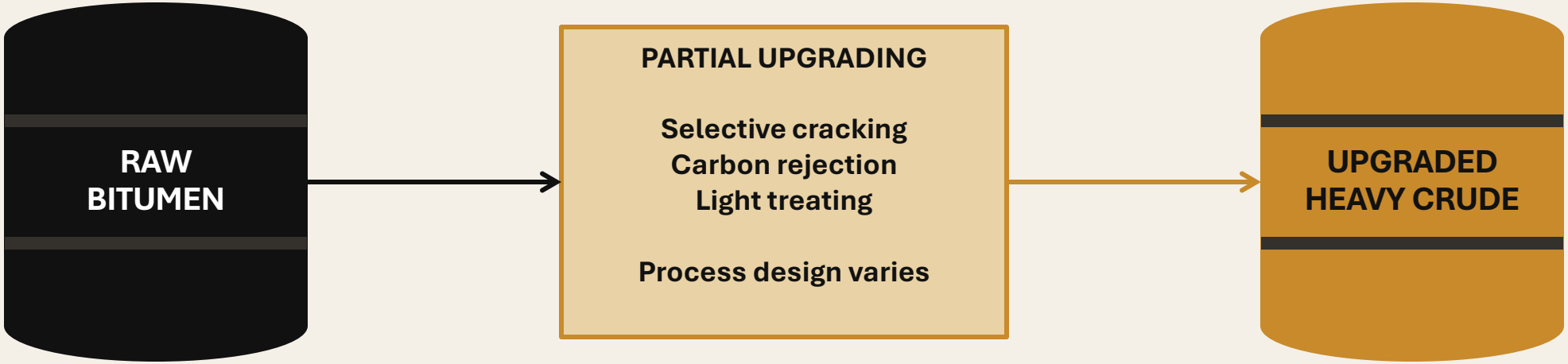
Schematic—not for routing or sizing assets.more

STRATEGIC IMPORTANCE: Importing up to potentially ~500 kb/d of U.S. diluent makes Canada more vulnerable from non-sovereign imports for a critical Alberta & Canadian industry.

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Partial upgrading changes the transport problem

It modifies the heaviest material enough to improve handling — without fully refining the barrel.



LOWER VISCOSITY

Easier to pump and transport

LESS DILUENT

More bitumen in each shipment
Higher value crude
Alberta fabrication jobs
Permanent Alberta service jobs
Lower Emissions

BROADER MARKET FIT

More transport and refinery options

The basic trade-off: upgrade some of the barrel in Alberta, or leave more conversion to the destination refinery.

Sources: Natural Resources Canada, Bitumen upgrading and refining technologies.

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Oil/bitumen are delivered to two hubs, Edmonton & Hardisty.

Light, medium and heavy crudes arrive at each hub from different sources.



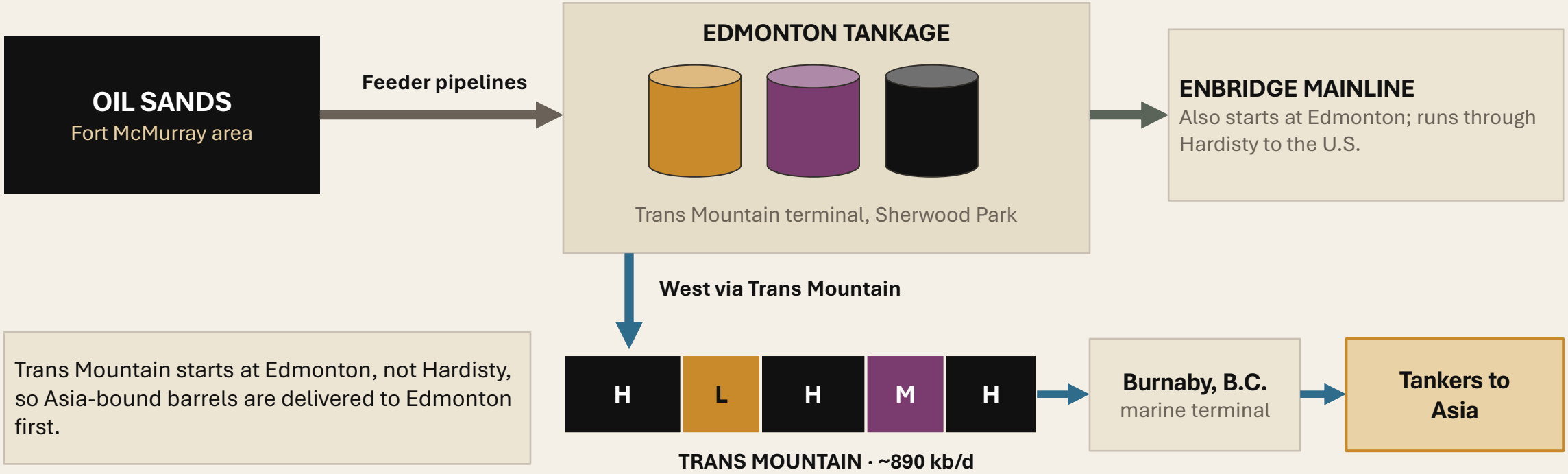
Keeping grades separate at both hubs protects each crude's quality — and its price.

Sources: Husky Midstream, Enbridge and Gibson Energy terminal information; Canada Energy Regulator. Examples illustrative; schematic only.

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Edmonton: a storage and batching hub

Edmonton holds each grade in tankage and ships it in scheduled batches.



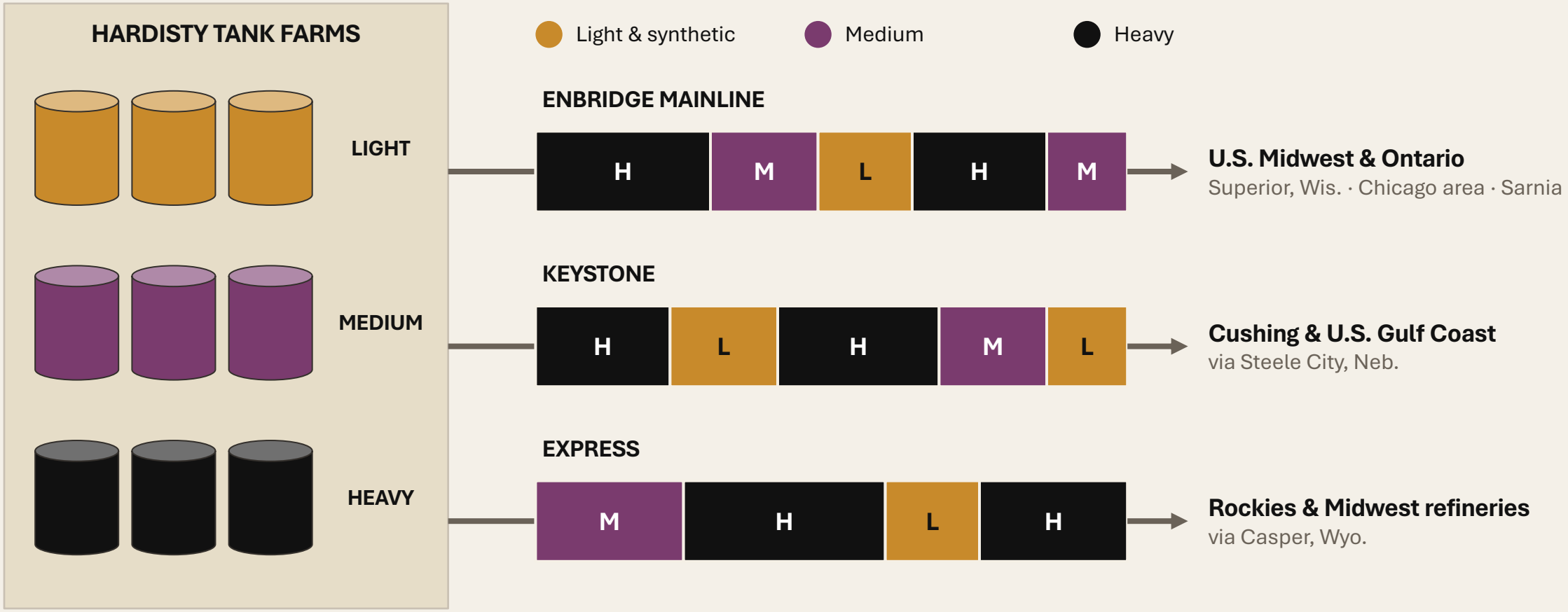
Edmonton collects oil sands barrels, then splits them: west on Trans Mountain, or east on Mainline toward Hardisty and the U.S.

Sources: Trans Mountain pipeline profile; RBN Energy, Edmonton & Hardisty crude storage series; Canada Energy Regulator. Schematic only.

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Hardisty tankage feeds batch-shipped pipelines

Hardisty, the second hub, also stores each grade and releases it in scheduled batches.



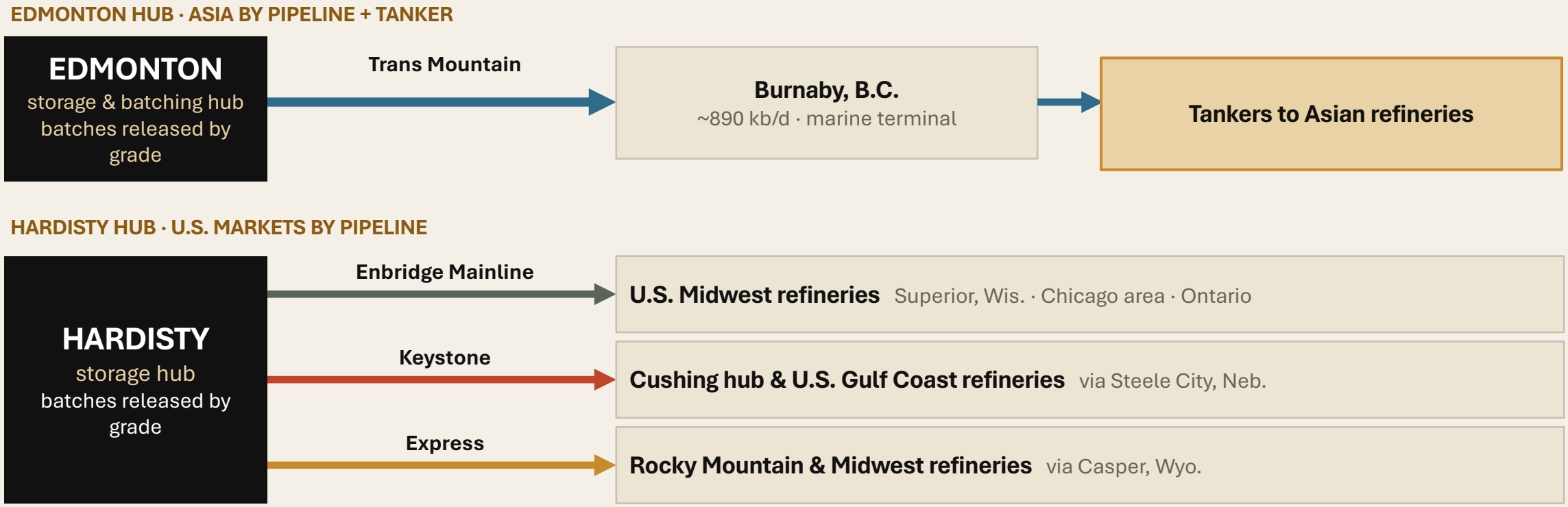
Batch shipping: one grade moves as a slug, the next follows right behind it — only a short interface between batches mixes.

Sources: Enbridge, Gibson Energy and Husky Midstream terminal information; Canada Energy Regulator pipeline profiles. Schematic only.

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Edmonton serves Asia; Hardisty serves the U.S.

Two storage and batching hubs, each serving a different market.



Hardisty tankage does not normally feed Trans Mountain; TMX loads at Edmonton from its own feeder lines.

Two hubs, two outlets: Asia-bound barrels leave through Edmonton; U.S.-bound batches leave Hardisty.

Sources: Enbridge, Gibson Energy and Husky Midstream terminal information; Canada Energy Regulator pipeline profiles. Schematic only.

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Where it lands: U.S. refineries

Refineries reached from Edmonton first, then from Hardisty, by pipeline.



HOW BARRELS GET THERE

Trans Mountain · from Edmonton
Puget Sound refineries (Ferndale, Anacortes) by spur

Enbridge Mainline · Edmonton to Hardisty
Superior, St. Paul, Chicago area; onward to Michigan and Ohio

Keystone · from Hardisty
Cushing hub, Gulf Coast refineries and Wood River

Express · from Hardisty
Billings and Casper, serving Rocky Mountain refineries

LEGEND

- **Heavy-oil capable (coking) refinery**
- **General-crude refinery**
- **Pipeline hub or storage point**

Heavy vs. general grouping is indicative, based on heavy-crude (coking) capacity.

Sources: Enbridge, TC Energy, Trans Mountain and Canada Energy Regulator route information; U.S. refinery coking-capacity data. Schematic only.

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Where it lands: Asian refineries

Edmonton feeds Trans Mountain; tankers load at Westridge, Burnaby, B.C.



WHERE TMX CARGOES WENT

Share of Trans Mountain marine exports, May 2024 to April 2025

United States	51.9%
China	31.9%
Hong Kong	7.1%
Singapore	6.3%
South Korea	1.6%
India	1.2%

Named buyers are those reported in trade press; not a full list.

Sources: Canada Energy Regulator export data (May 2024–Apr 2025); Reuters and S&P Global Platts reports on named buyers; Trans Mountain. Schematic only.

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