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How much does the world need Canadian oil and gas?

Oil sands and LNG in a carbon-constrained world

Andrew Leach, Professor of Economics and Law

IPE Workshop, March 13, 2023

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The world needs oil

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> (...) most economists expect that we're going to continue to be growing the use of oil and gas at least over the next one to two decades.

Alex Pourbaix, Cenovus CEO, *The Current*, Monday March 6, 2023

> We're still going to need combustion engines. We're going to still need oil for the next 10 to 15 years because all of the sudden, they're not all going to go away.

President Joe Biden, March 9, 2023

> There is a global demand for Canadian oil and natural gas, and this country will be producing both for years to come. (...) [F]orcing an artificial cut in production of Canadian oil and gas, when global demand exists, is not the way to (reduce Canada's emissions). The void would be filled by OPEC, Moscow and others. It would leave us poorer and weaker, and would benefit neither us nor our allies.

Globe and Mail Editorial Board, October 17, 2022

... and gas

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> Do we want to contribute to international security and global emissions reductions by further developing our gas reserves? Or does the world's 5th-largest producer and 6th-largest exporter of natural gas prefer to keep its energy battalions off the field?

Edward Greenspon, Kim Henderson, Dave Nikolejsin, Globe and Mail, Monday March 6, 2023

> Oil and gas is going to remain a part of our energy mix for years to come. We know that even the boldest projections for clean energy deployment suggest that in the middle of the century we are going to be using abated fossil fuels."

Jennifer Granholm, US Secretary of Energy, at CERA week (via Javier Blas), March 8, 2023

> "When I'm prime minister, I will repeal C-69, the anti-energy law. I'll clear the way for our mines, our resources and our natural gas export terminals. We will liquefy natural gas in Canada. We will ship it to Asia to shut down dirty coal fired plants and replace them with clean Canadian gas."

Conservative Leader Pierre Poilievre, February 15, 2023

The world needs oil

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Each of these statements contain common elements:

- the world will continue to use oil and gas into the foreseeable future;
- technological change might be fast, but adoption is slow;
- acknowledging climate change but not the impact of climate policies on energy markets;
- a sense we should prefer domestic production to production in other locations.

But, each is often *heard* to be saying something subtly different

- the world will continue to use *more* oil and/or gas year-over-year;
- technological change won't disrupt the demand and/or the price of oil or gas;
- [insert Canadian energy source here] has lower emissions per unit than plausible alternatives;
- the market will be willing to pay a premium for Canadian oil (or gas).

Each set of bullets suggests a different future for Canadian oil and gas

Canadian oil's comparative challenge(s) and advantage(s)

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Relative to other sources of global oil, new Canadian oil (oil sands) barrels:

- are relatively emissions-intensive
- produce mostly heavy, *sour* crude which trades at a discount
- are located *far*, both geographically and infrastructure-wise, from growing markets
- have long investment cycles with high up-front costs

But, existing oil (and oil sands) production is very low cost:

- some *in situ* oil sands projects have operating costs below $10 per barrel
- royalty and tax regimes provide substantial risk hedging
- current carbon pricing regimes largely preserve industry competitiveness
- Canadian and Albertan governments appear poised to offer substantial support for CCUS projects

Canadian LNG's comparative challenge(s) and advantage(s)

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Relative to other sources of global LNG, new Canadian LNG:

- has multiple mountain ranges between it and the coast;
- must compete with facilities anywhere in North America;
- has plant locations in relatively remote, small communities;
- faces stringent domestic (BC and Ottawa) regulations.

But, Canadian LNG does have some potential advantages too:

- shorter route to Asia;
- domestic, potentially stranded gas;
- lower temperature delta required due to northern locations;
- access to clean hydroelectricity.

How much oil does the world use? And where does it use oil?

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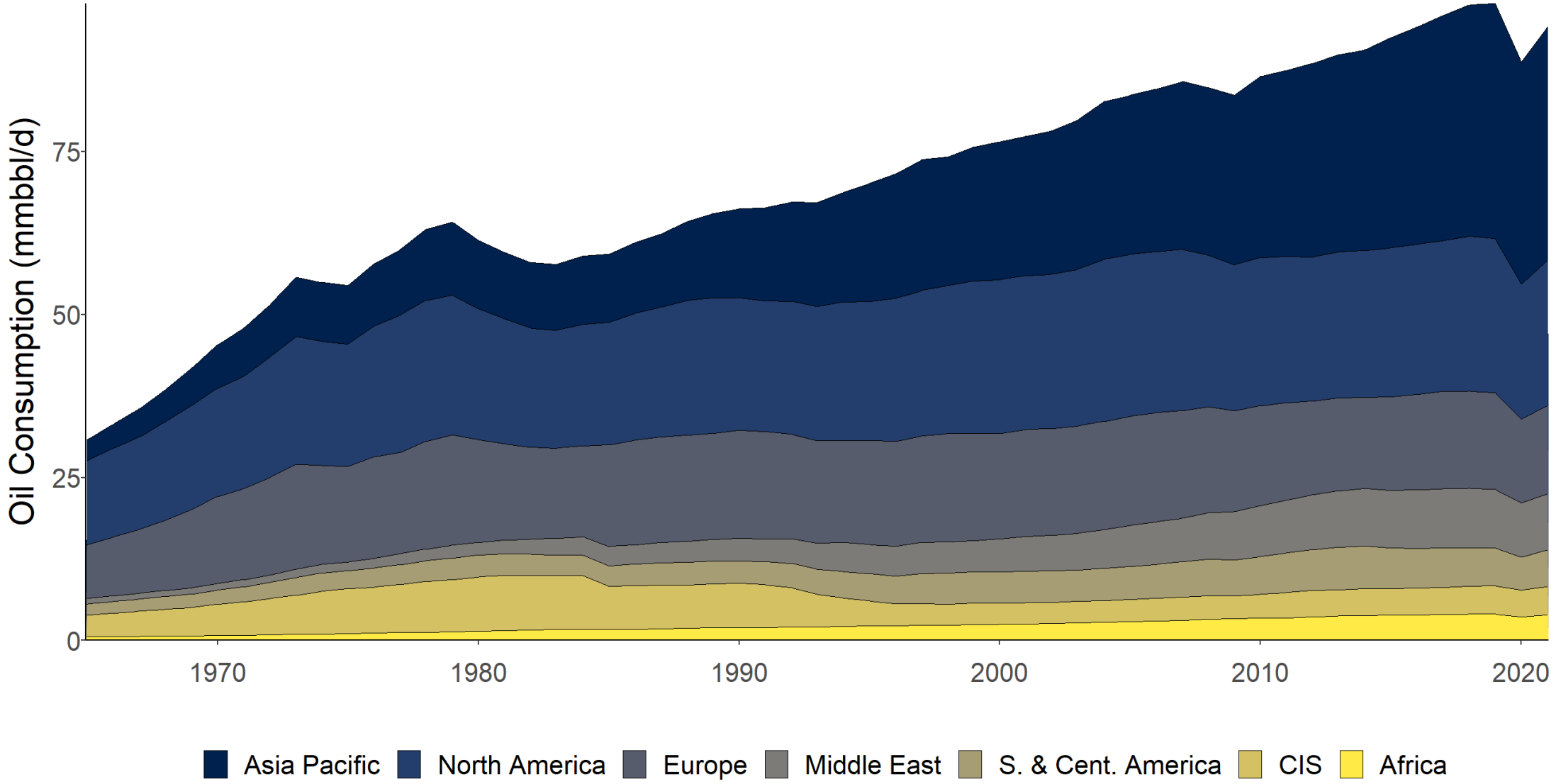

Source: BP Statistical Review of World Energy

North American Oil Use

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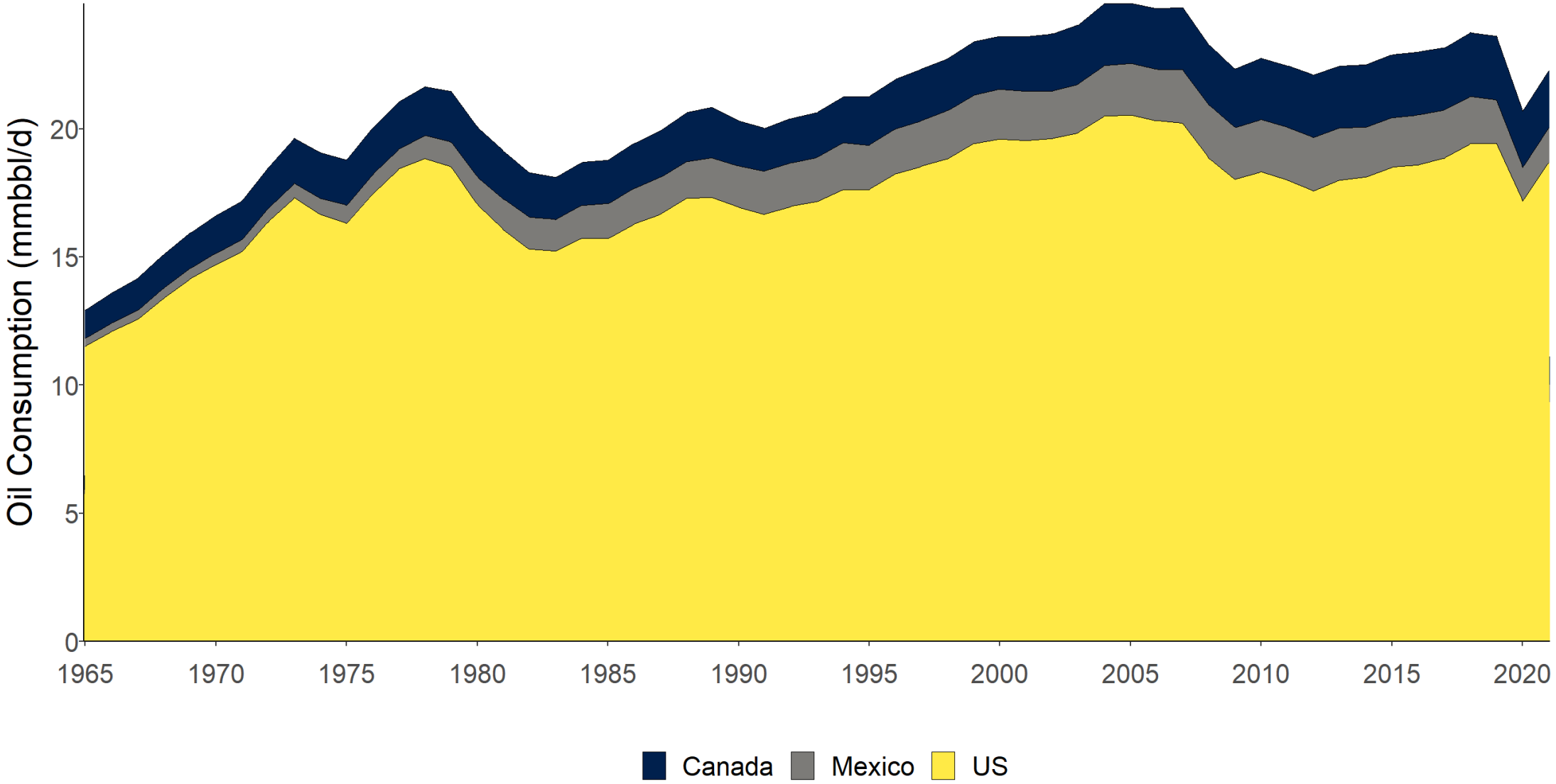

Source: BP Statistical Review of World Energy

The world will keep using oil...but how much oil?

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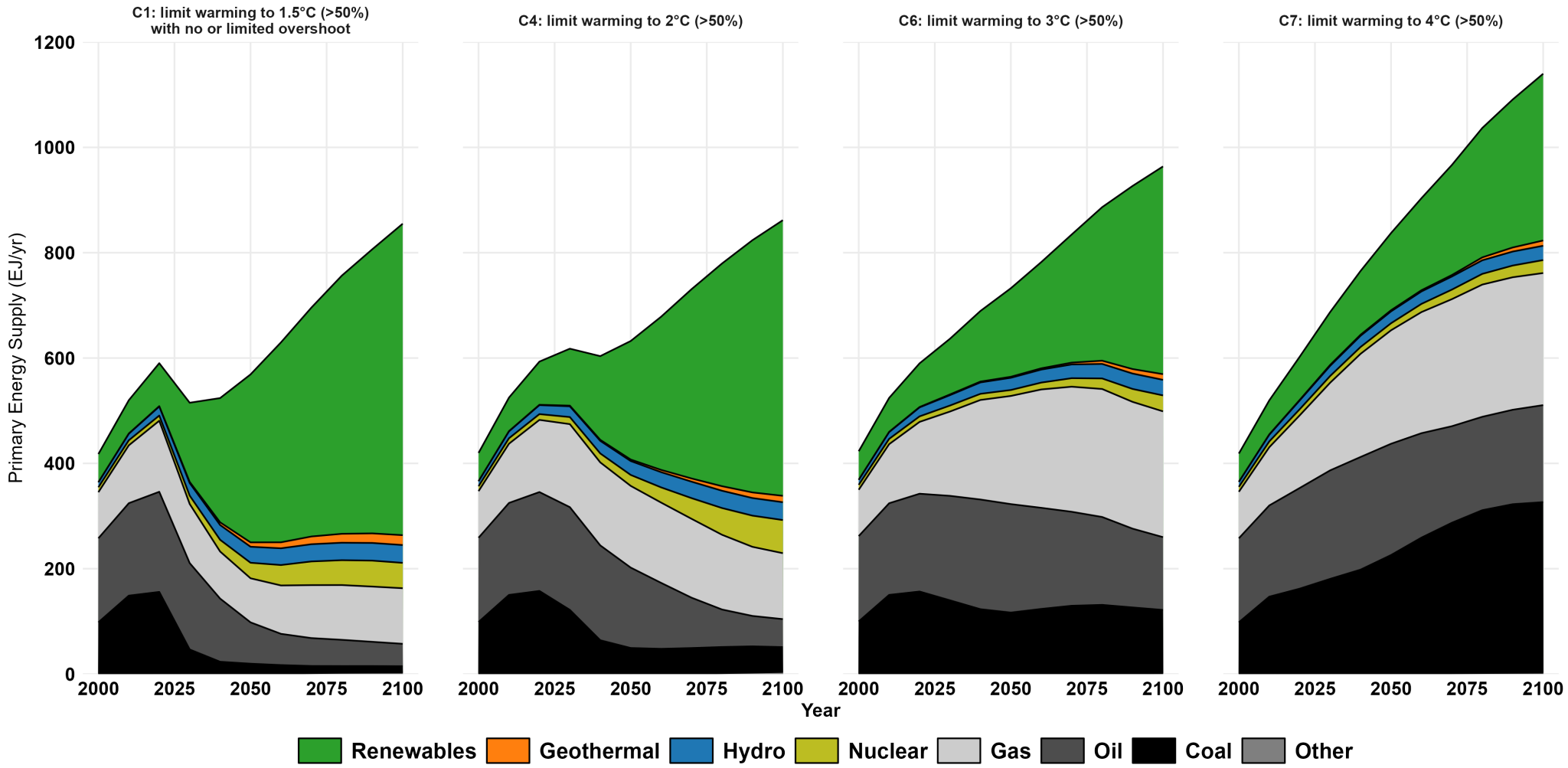

IIASA AR6 Database

The world will keep using oil...but how much oil?

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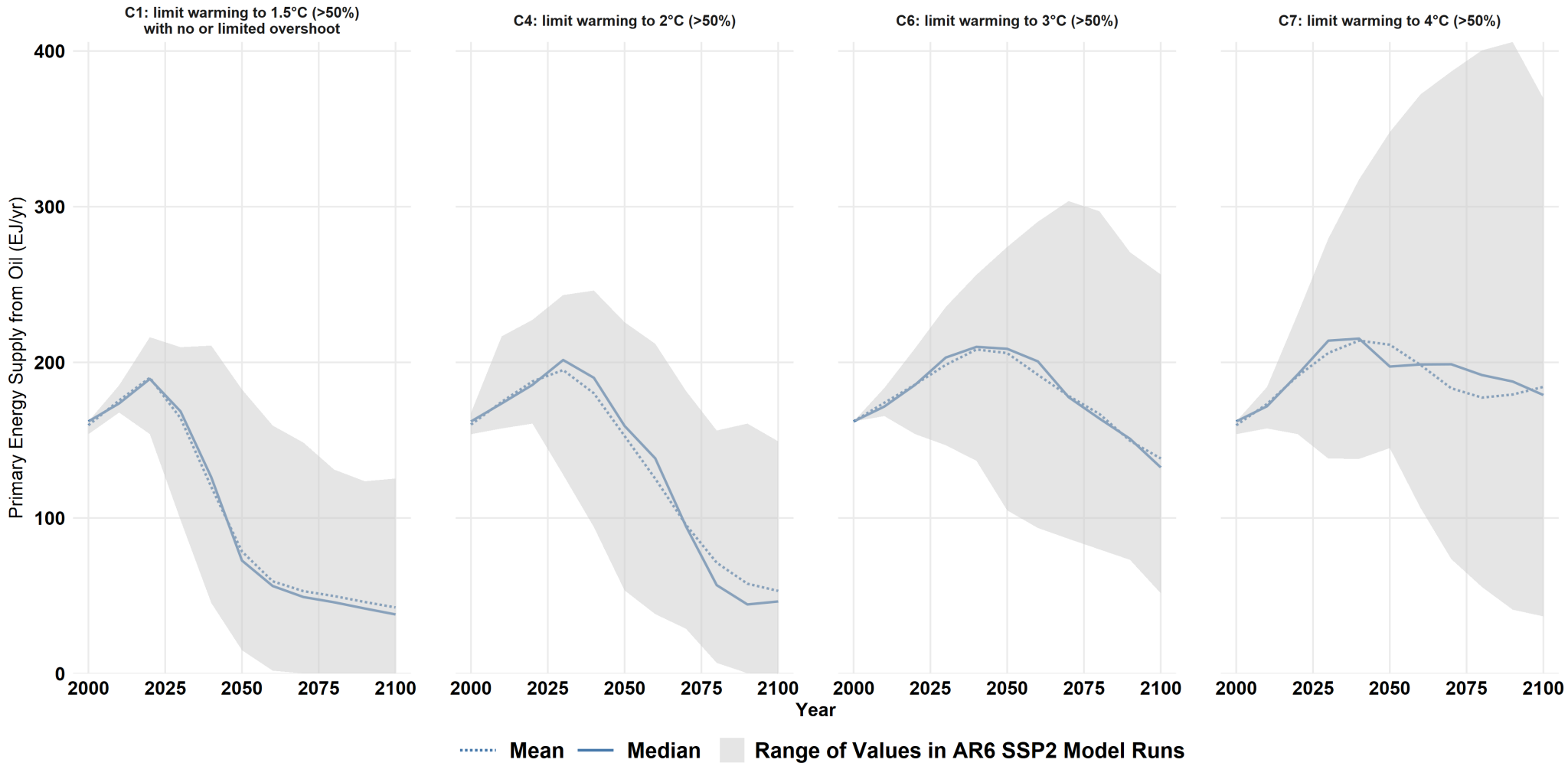

IIASA AR6 Database

The world will keep using oil...but how much oil?

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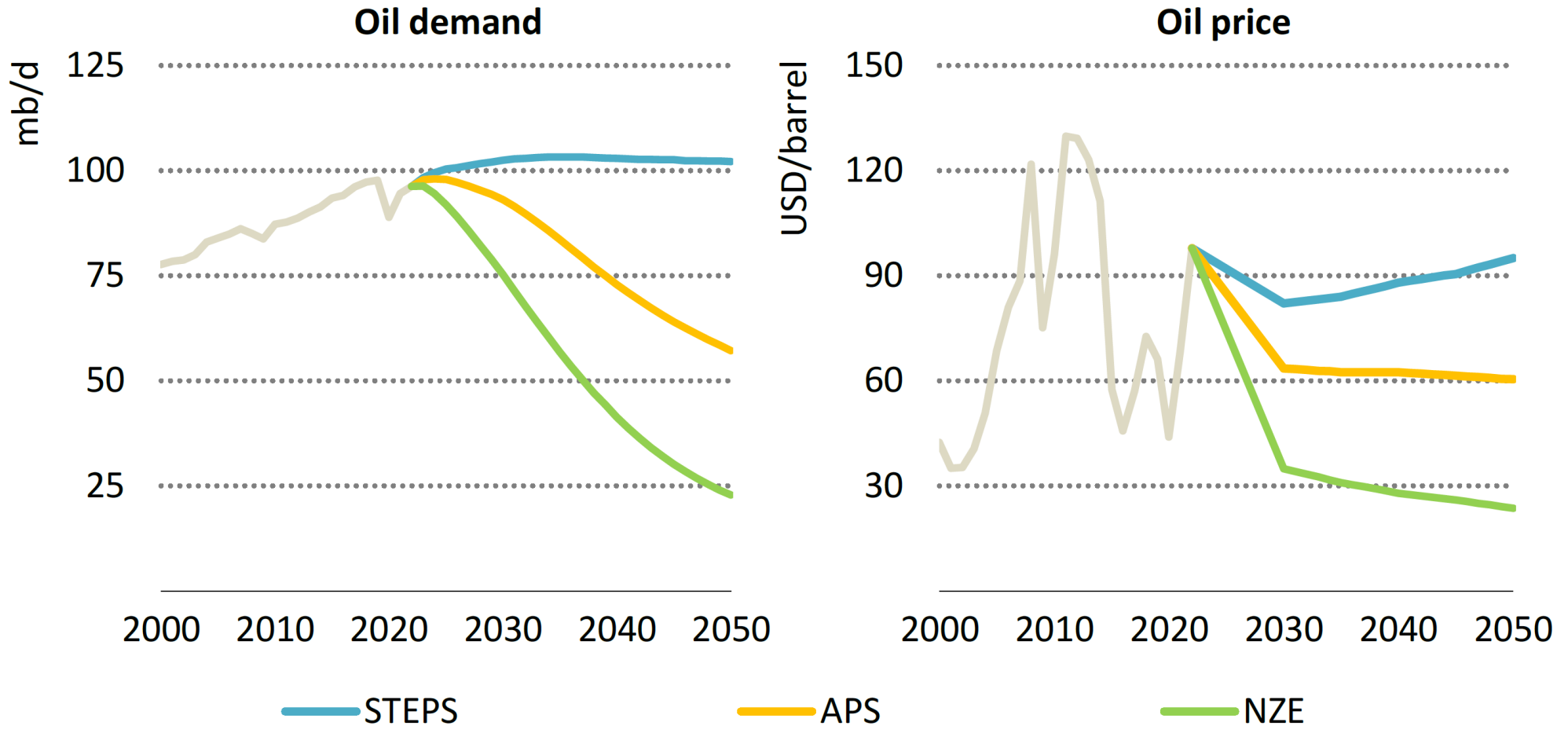
Figure 7.1 ▷ **Global oil demand and crude oil price by scenario**



IEA World Energy Outlook 2022

The world will keep using oil...but how much oil?

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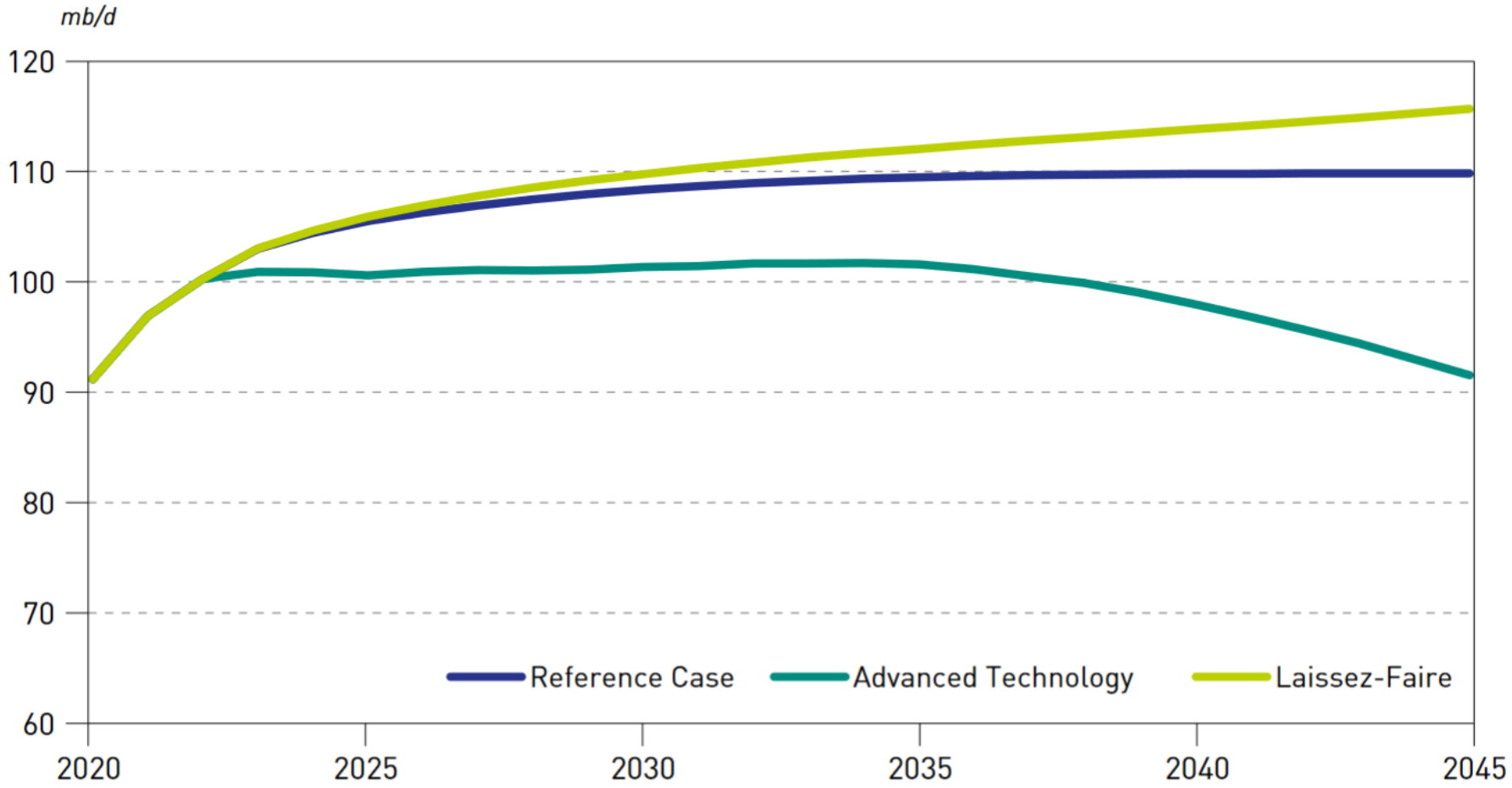

Source: OPEC.

OPEC World Oil Outlook 2022

The world will keep using oil...but how much oil?

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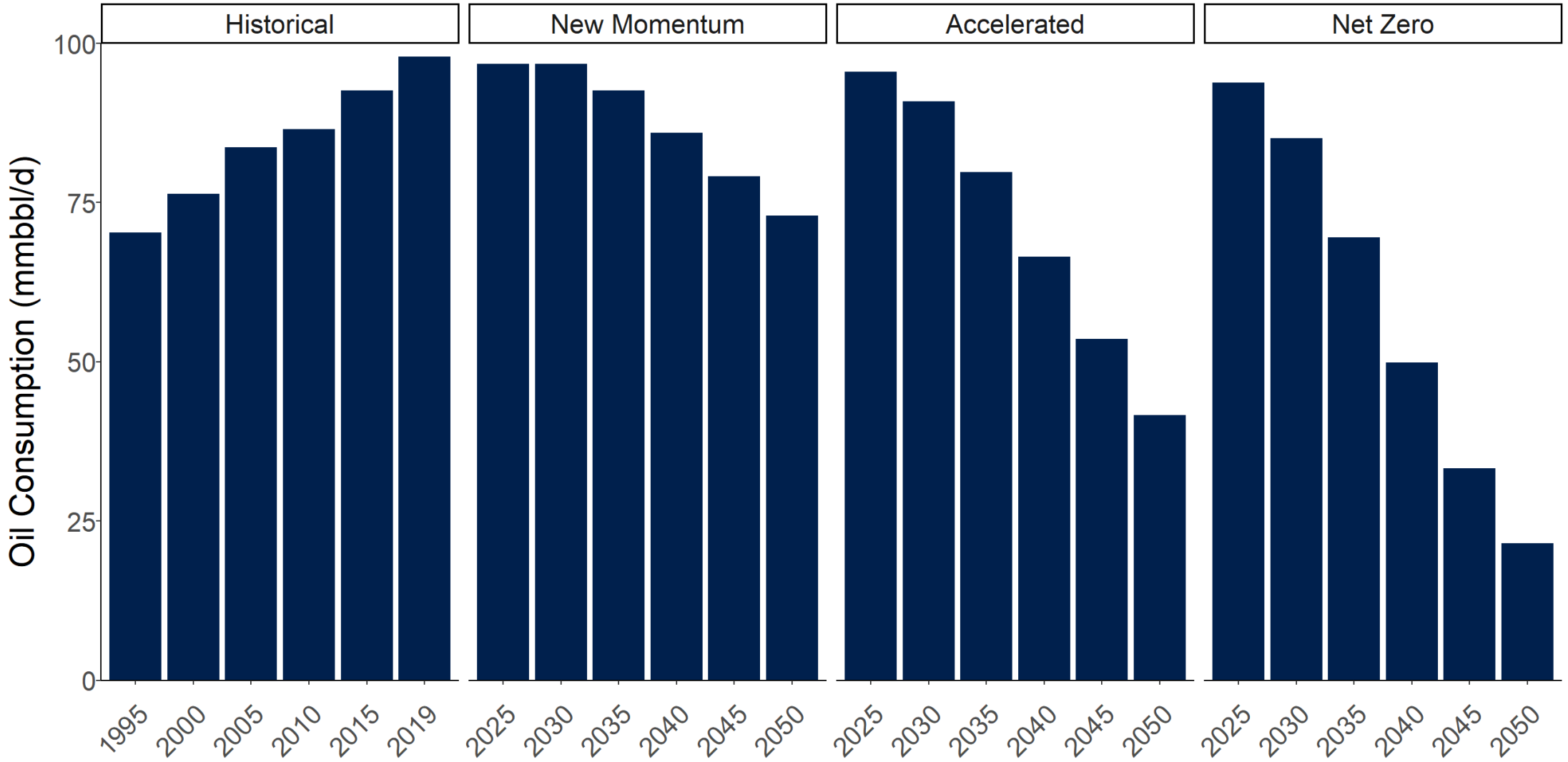

Source: BP Energy Outlook, 2023

The world will keep using oil...but where?

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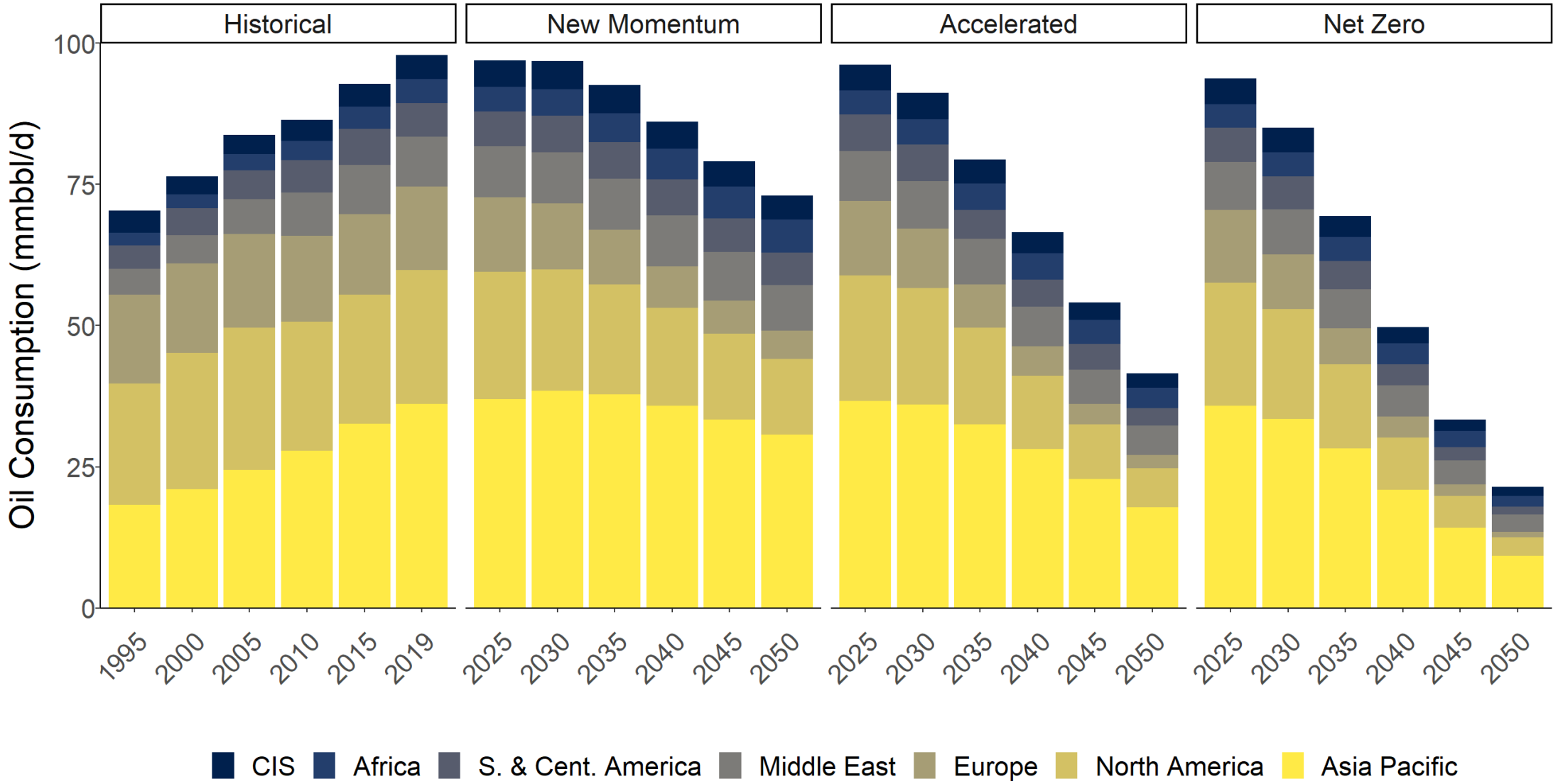

Source: BP Energy Outlook, 2023

How does the world use oil? Mostly to move people and freight

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- it's a common soundbite to remind people that oil is used for more than just transportation fuels
- products like electronics, household goods, etc. use oil
- you're meant to imagine that this is a large share of global oil demand.
- Petrochemicals are not a major source of oil demand. About 1/5th of oil demand today goes into chemicals.

Source: CAPP What is oil used for?

Transportation demand drops with action on climate change

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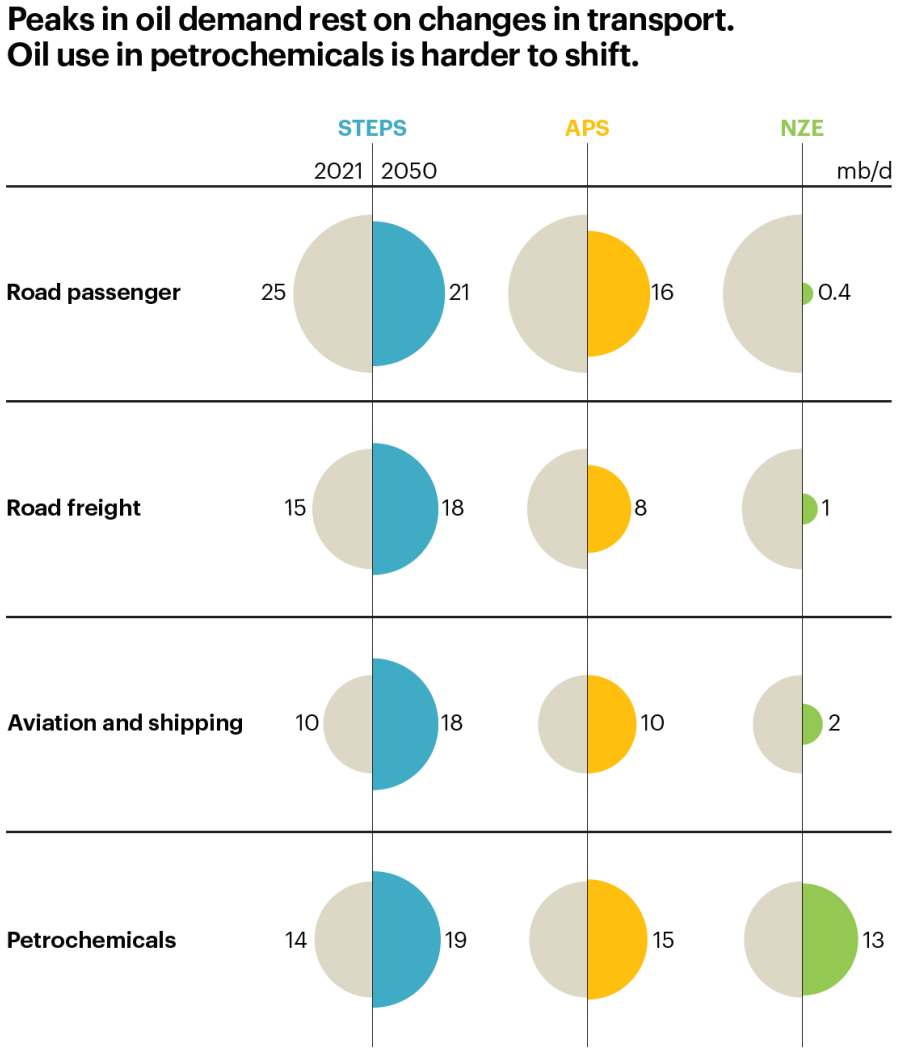
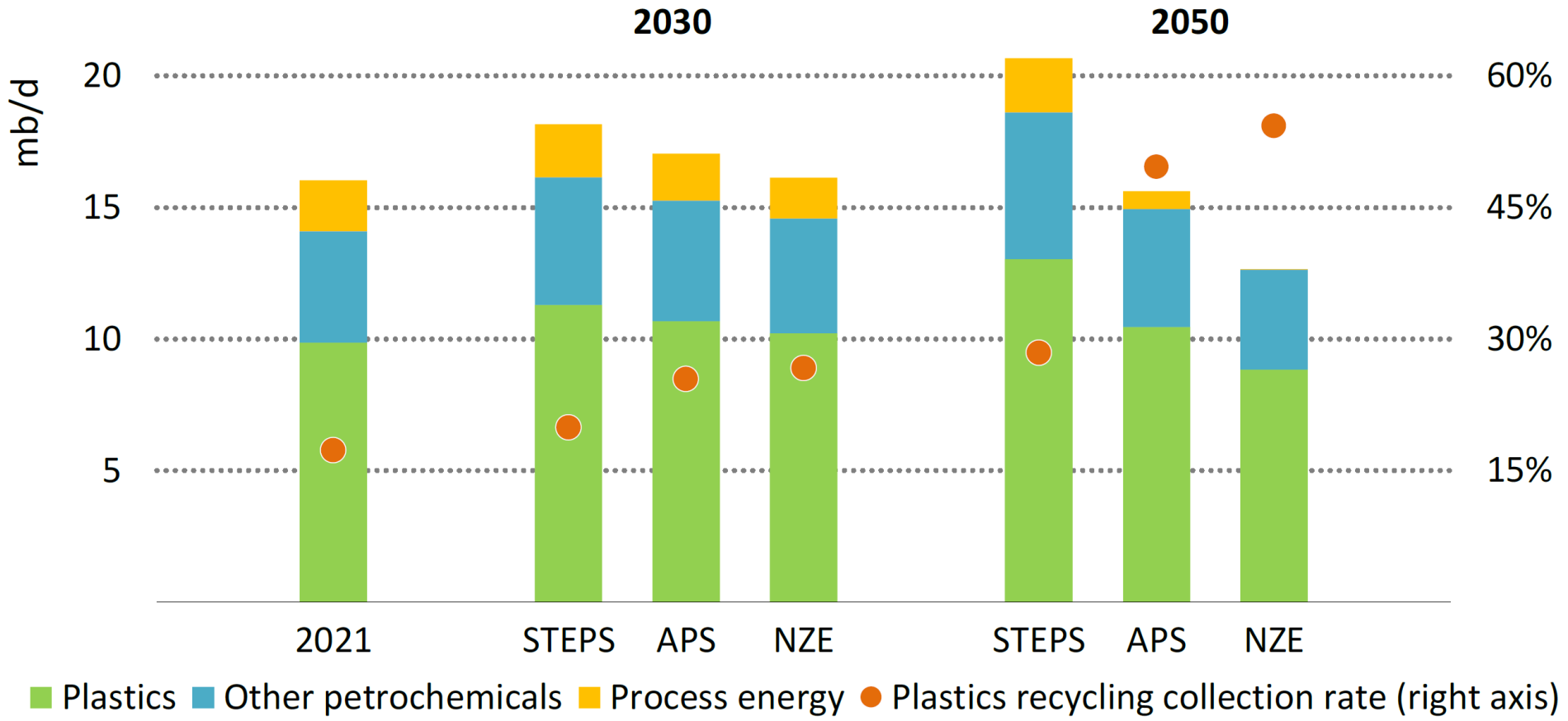
- global action on climate change drives reduction in passenger and freight use of oil
- fastest declines are in passenger vehicles
- petrochemical uses of oil are more resilient to action on climate change



A climate-constrained world will still use oil for plastics...but less of it

Figure 7.11 ▷ Oil use in the chemical sector by scenario



IEA World Energy Outlook 2022

The US will always need our oil, right?

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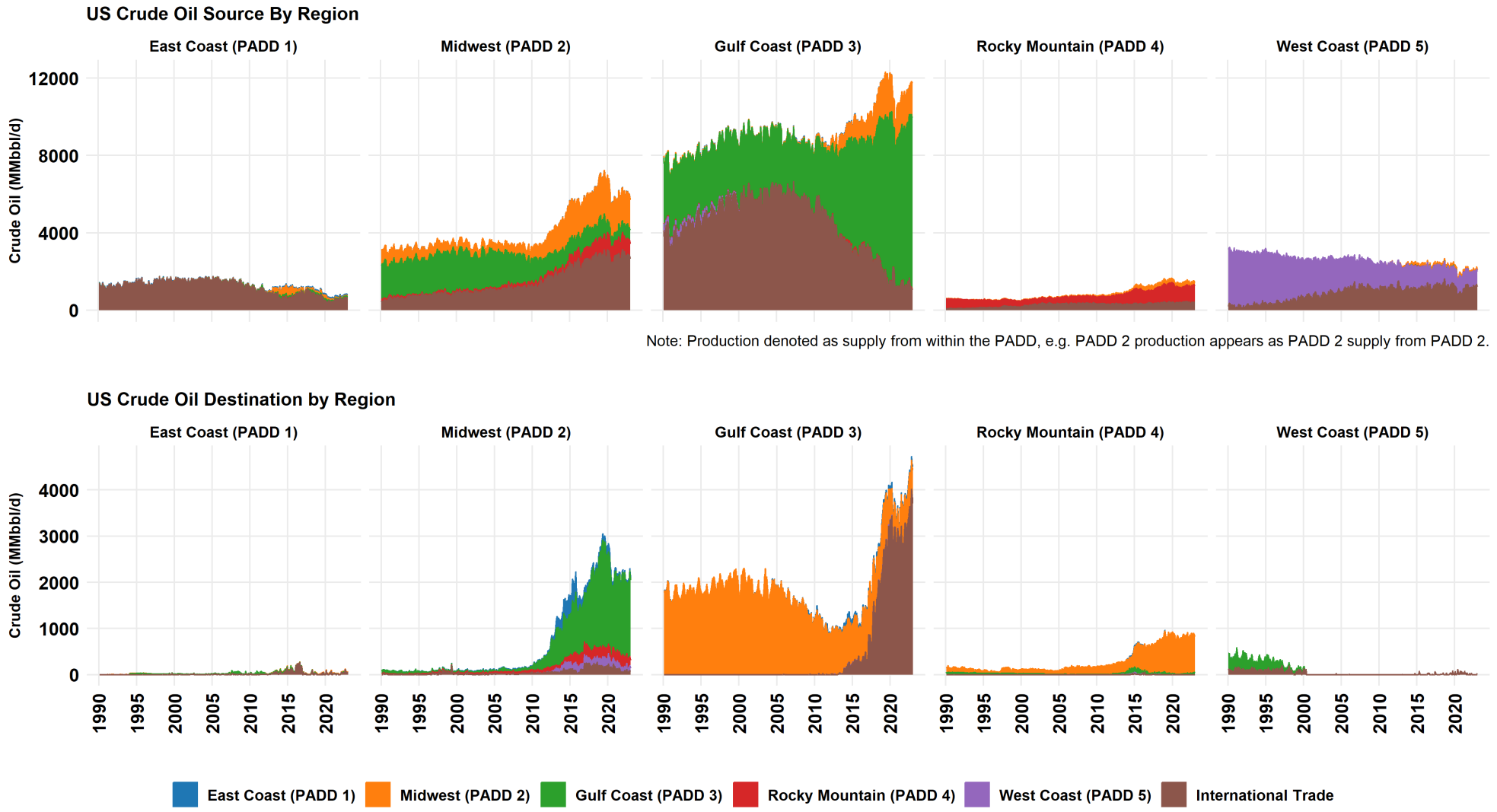

Source: Data via EIA, graph by Andrew Leach

The US will always need our oil, right?

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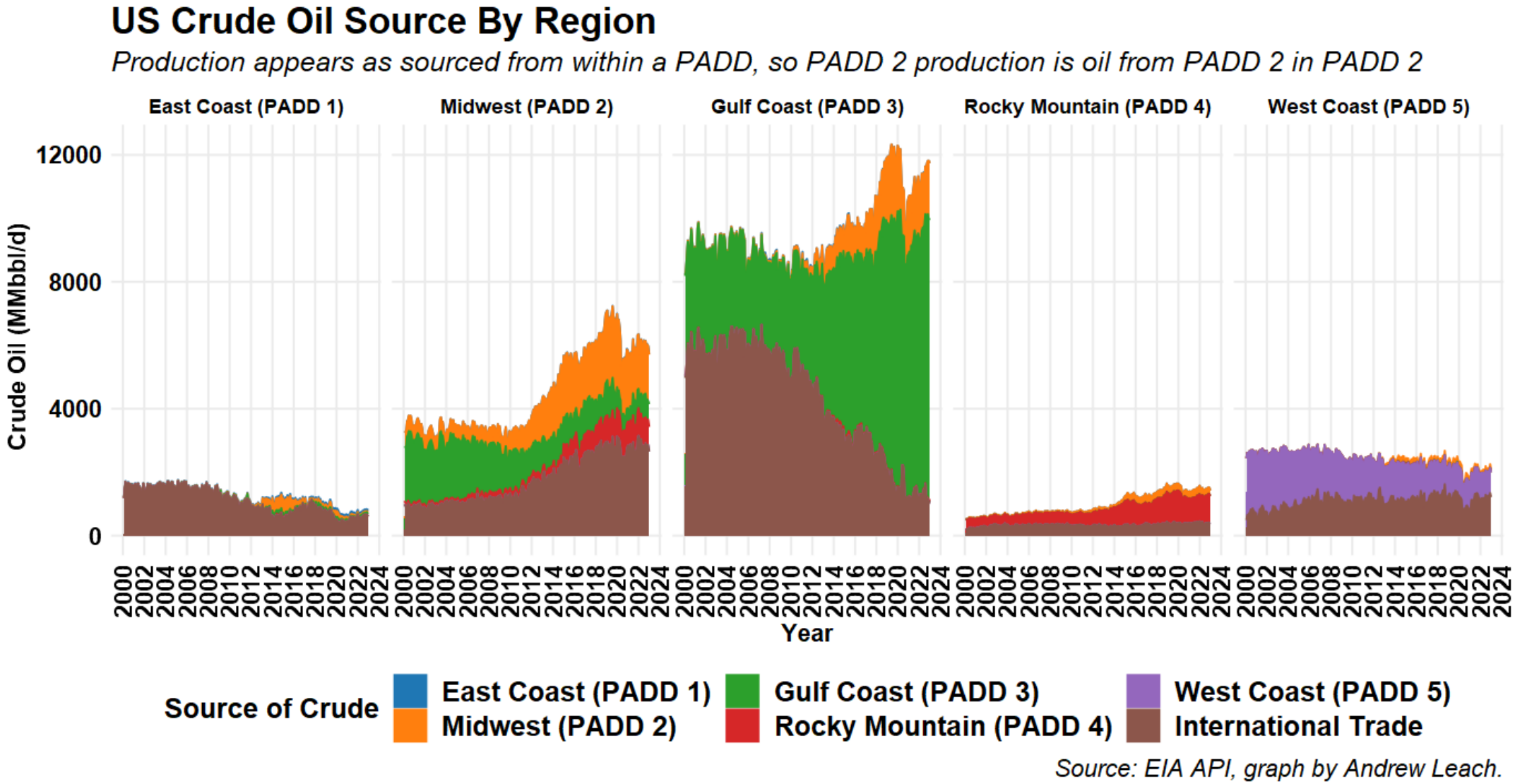

Source: EIA API, graph by Andrew Leach.

The US will always need our oil, right?

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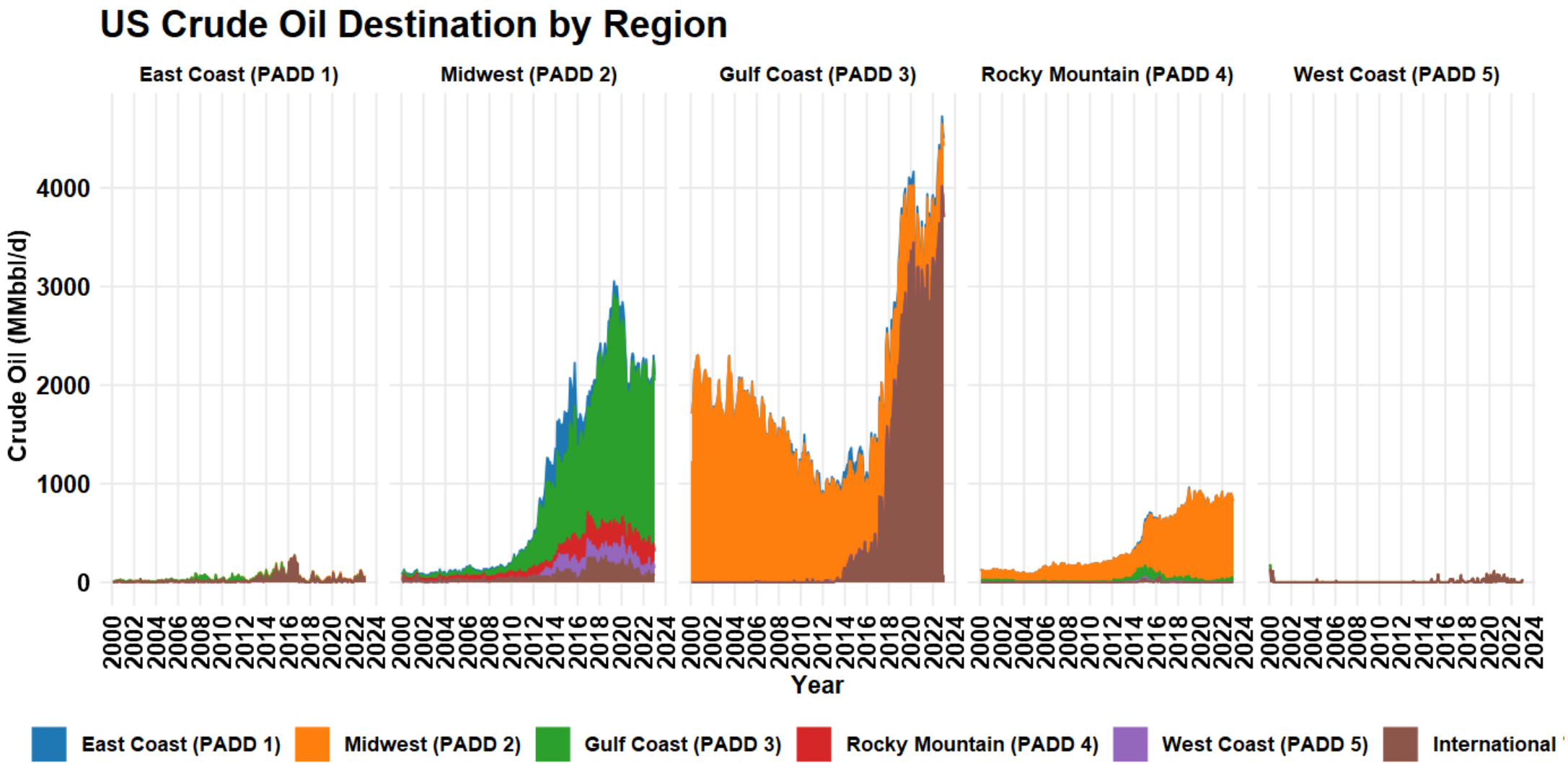

Source: EIA API, graph by Andrew Leach.

The US will always need our oil, right?

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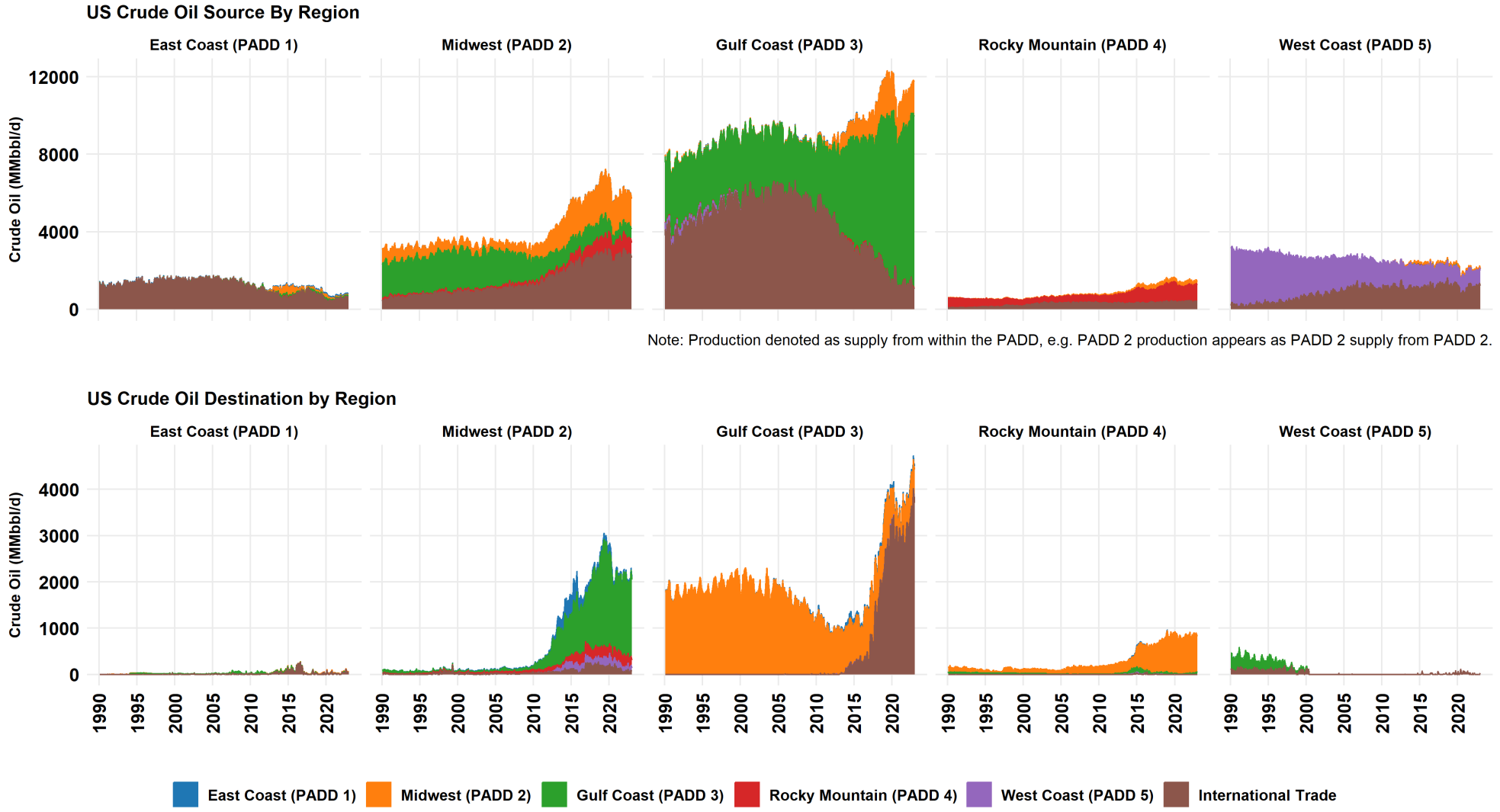

Source: Data via EIA, graph by Andrew Leach

Oil take-aways

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- an expanding global market for oil is inconsistent with action on climate change
- insofar as economists are predicting the expansion of oil consumption, they are assuming exacerbated climate change (which might be the right assumption)
- existing Canadian oil assets are well-positioned to continue existing (and even expanded) production
- royalty regime does provide some protection (more on this in a bit)
- new production, and the booming labour markets that come with it, are likely a thing of the past

What about gas?

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- gas is, in many ways, more interesting than oil in the context of a climate-constrained world
- gas provides (as we have seen in Alberta) an alternative to coal
- gas also locks-in dependence on fossil fuels
- we'll see how there is more variability in gas projections, but similar central narratives to those discussed re: oil

How much gas does the world use? And where does it use gas?

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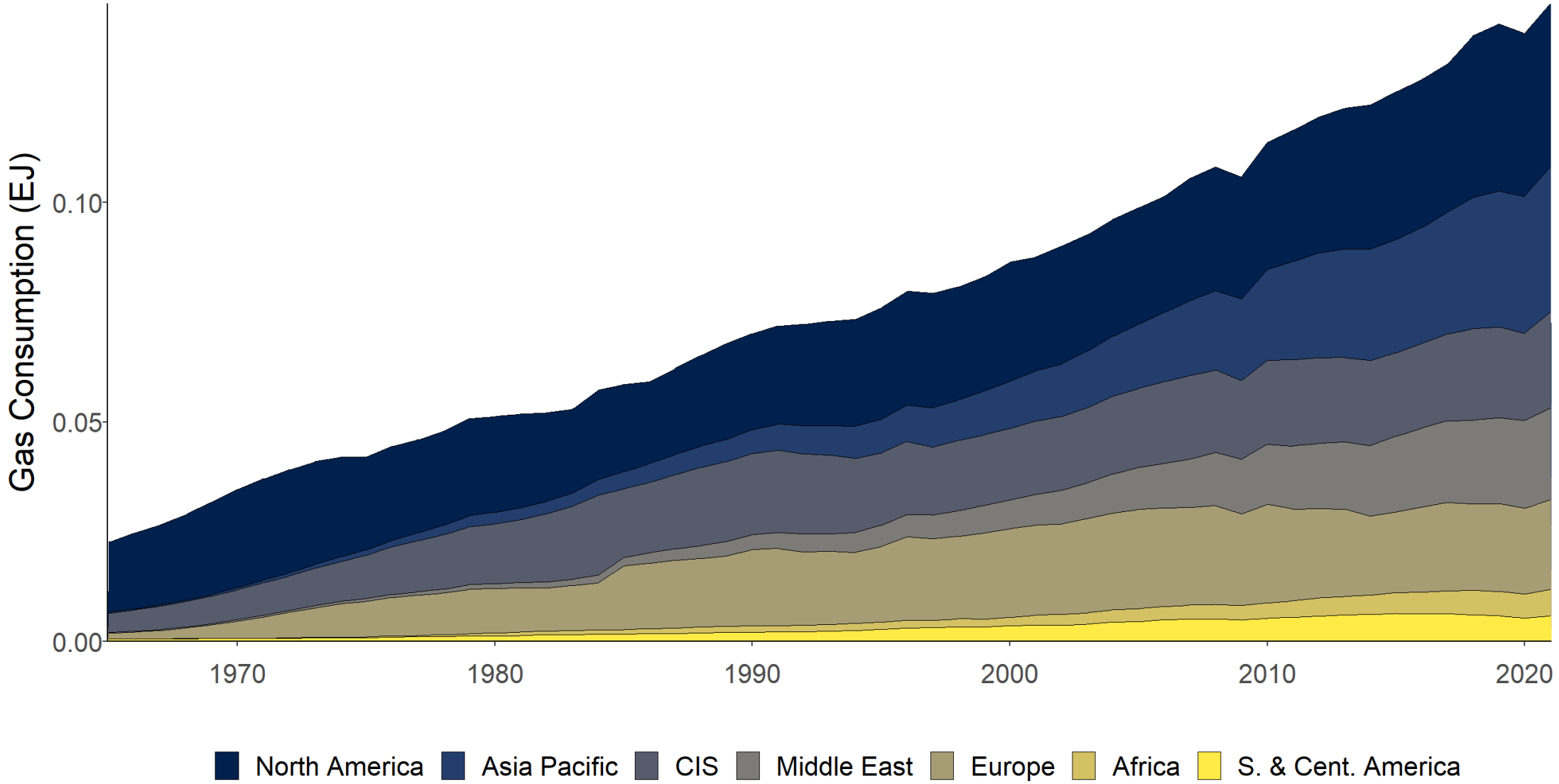

Source: BP Statistical Review of World Energy

North American Gas Use

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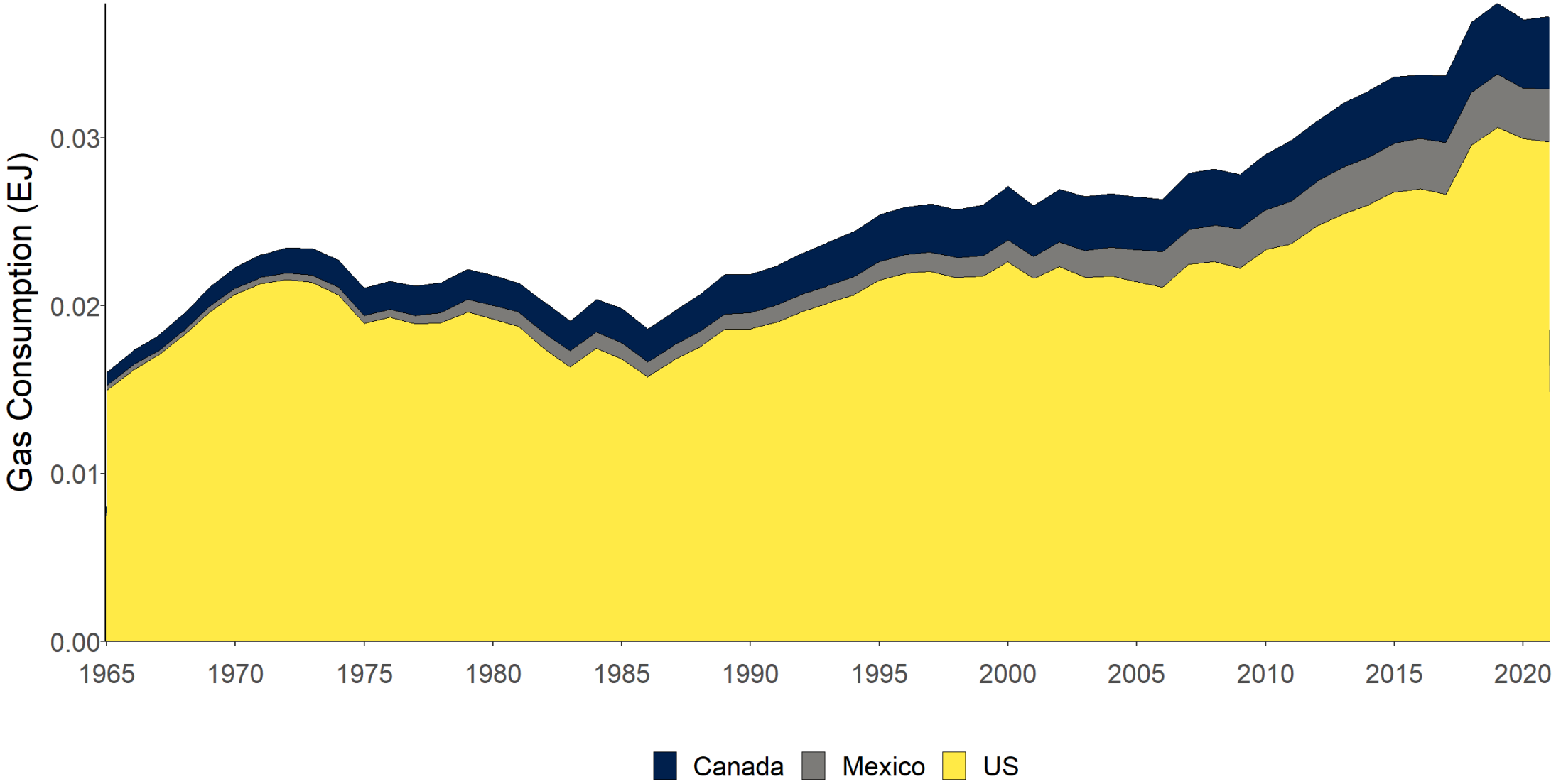

Source: BP Statistical Review of World Energy

The climate story is more complicated for gas

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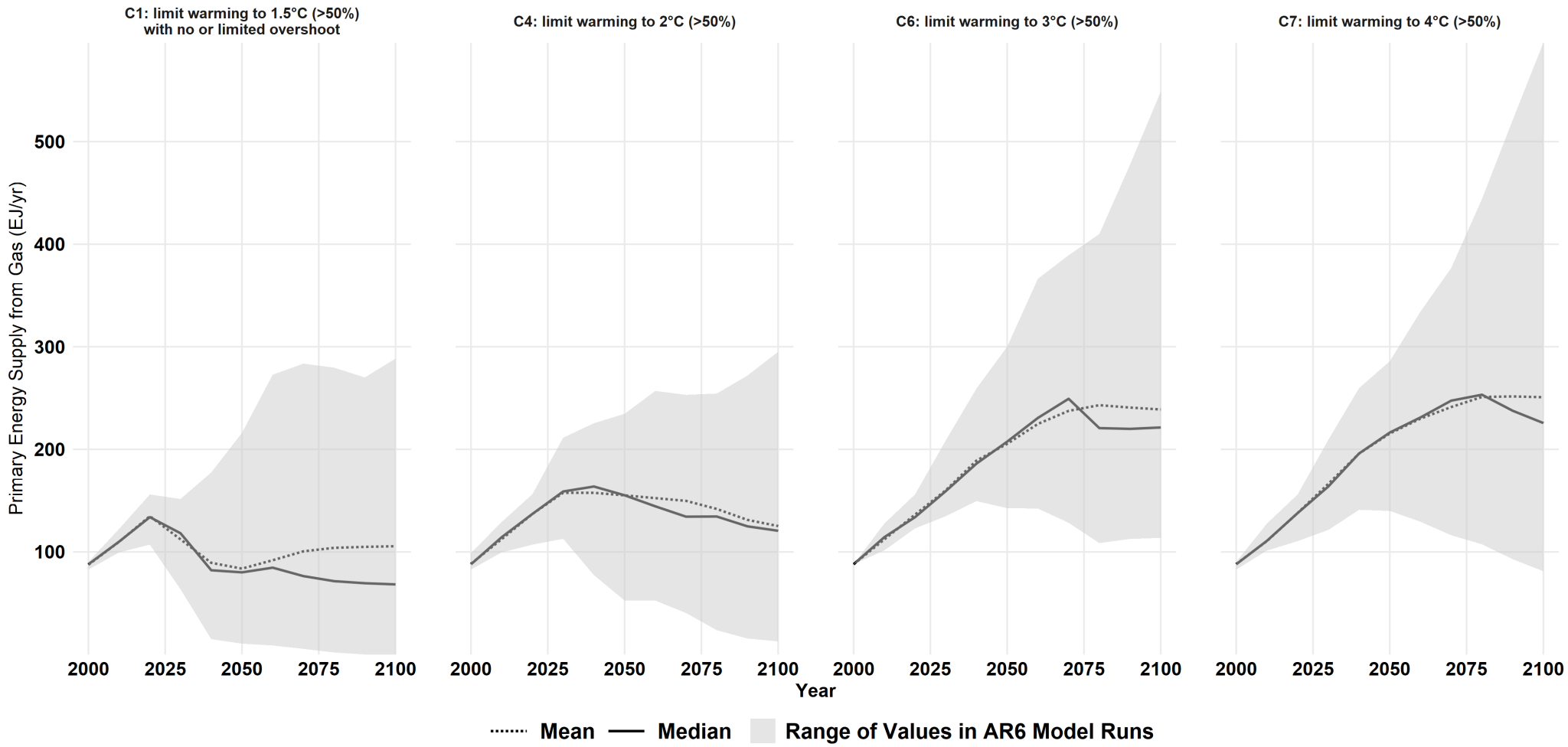

Data: Byers et. al. 2022. AR6 Scenarios Database hosted by the International Institute for Applied Systems Analysis (IIASA). doi: 10.5281/zenodo.5886912 | url: data.ene.iiasa.ac.at/ar6/. Graph by Andrew Leach

IIASA AR6 Database

The world will keep using gas...but where?

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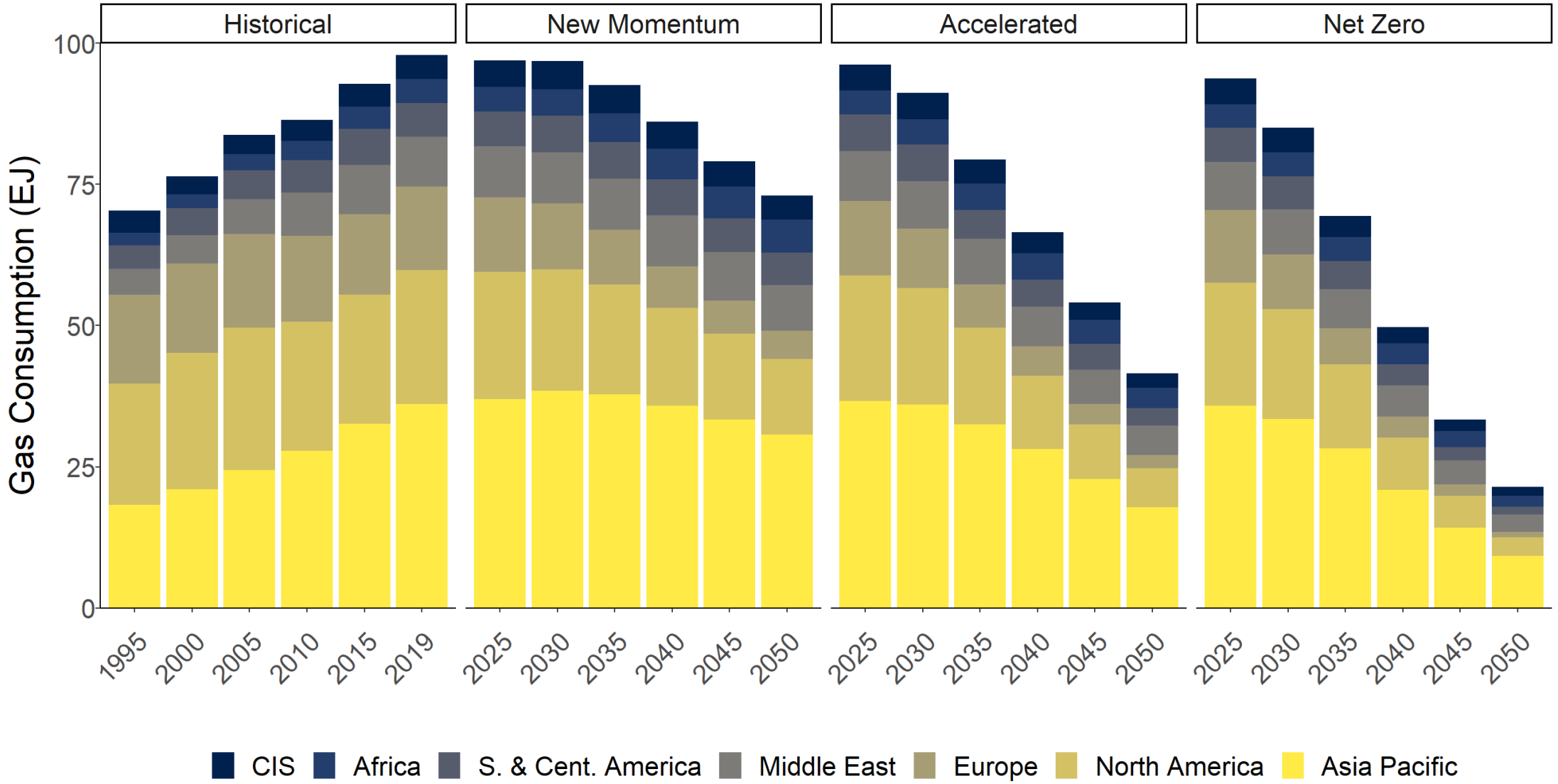

Source: BP Energy Outlook, 2023

North American Gas Use by Scenario

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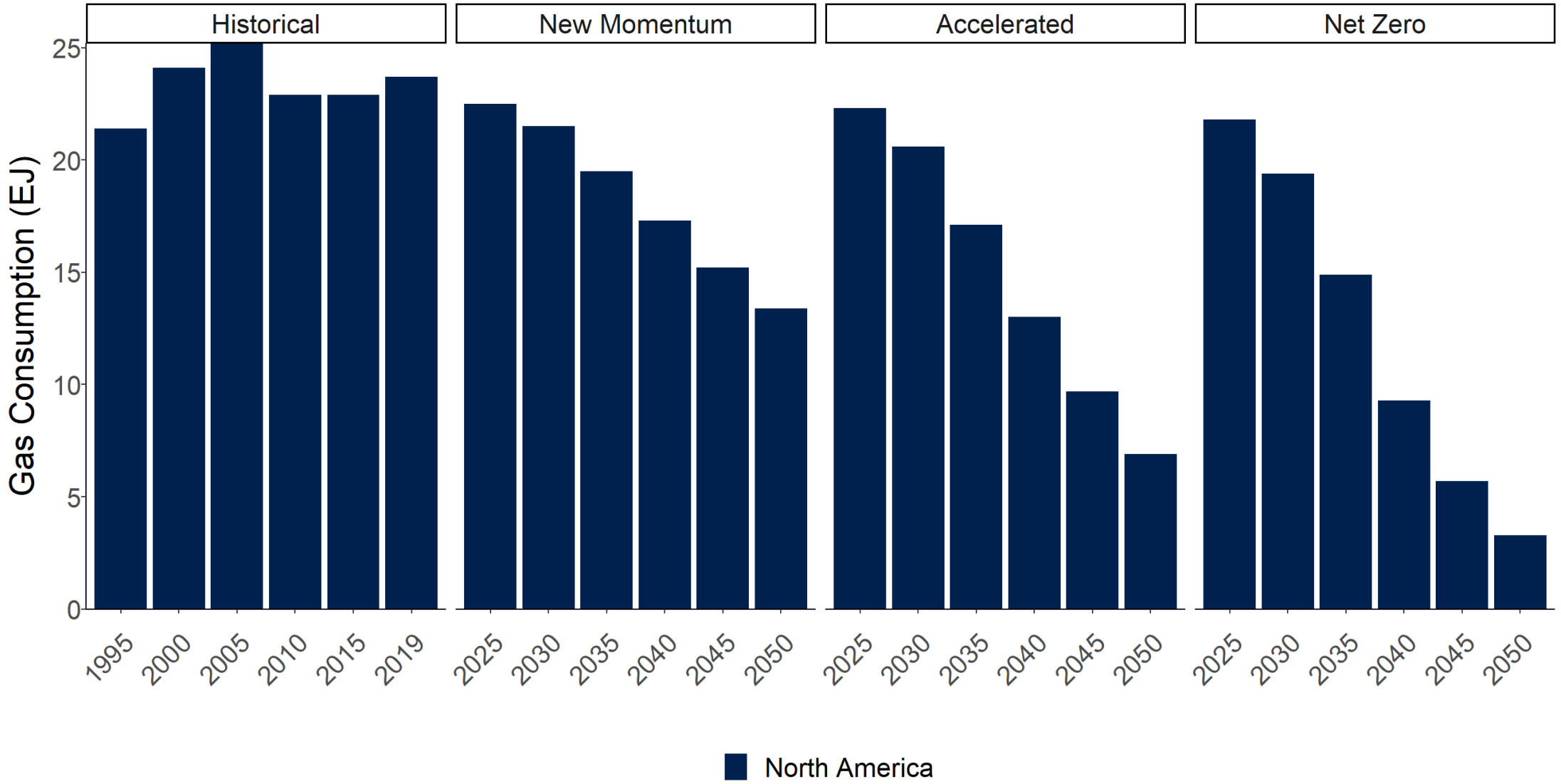

Source: BP Energy Outlook, 2023

LNG is a bet on regional arbitrage, not demand or price levels

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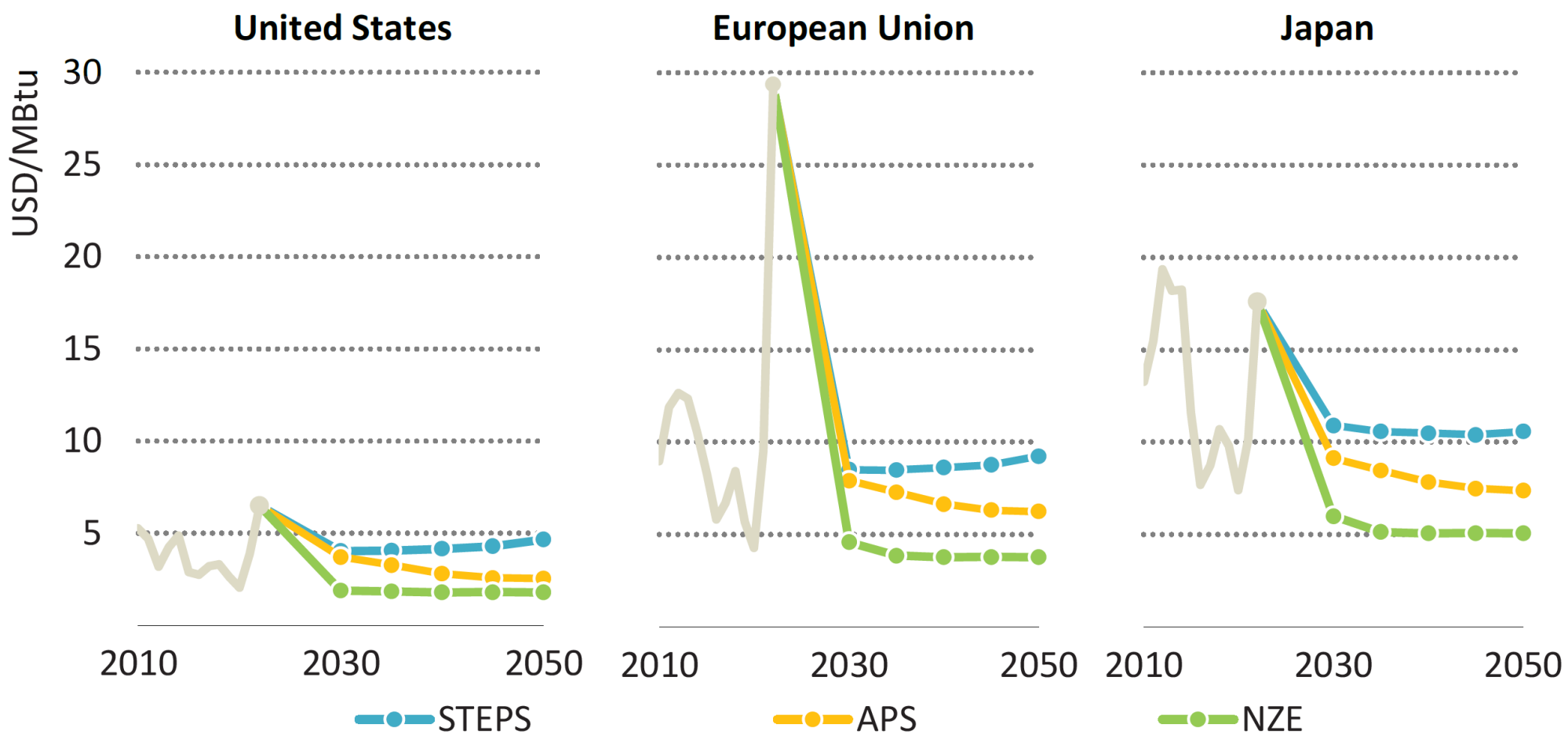
Figure 8.1 ▷ Natural gas prices by region and scenario



IEA World Energy Outlook 2022

LNG is also a bet on climate policy around the world

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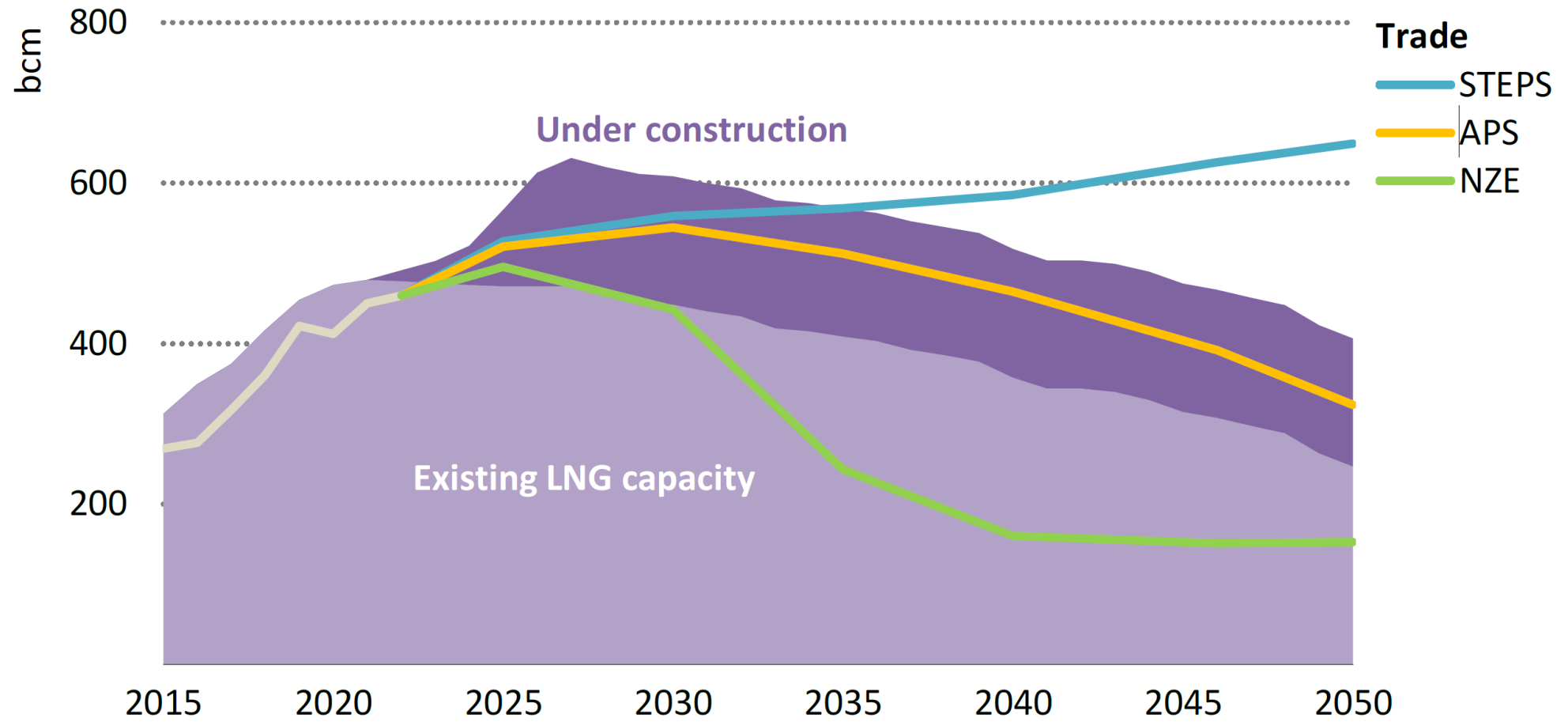
Figure 8.8 ▷ **Existing and under construction LNG capacity and total inter-regional LNG trade by scenario, 2015-2050**



Interest in LNG in Canada fluctuates with the value of the arb

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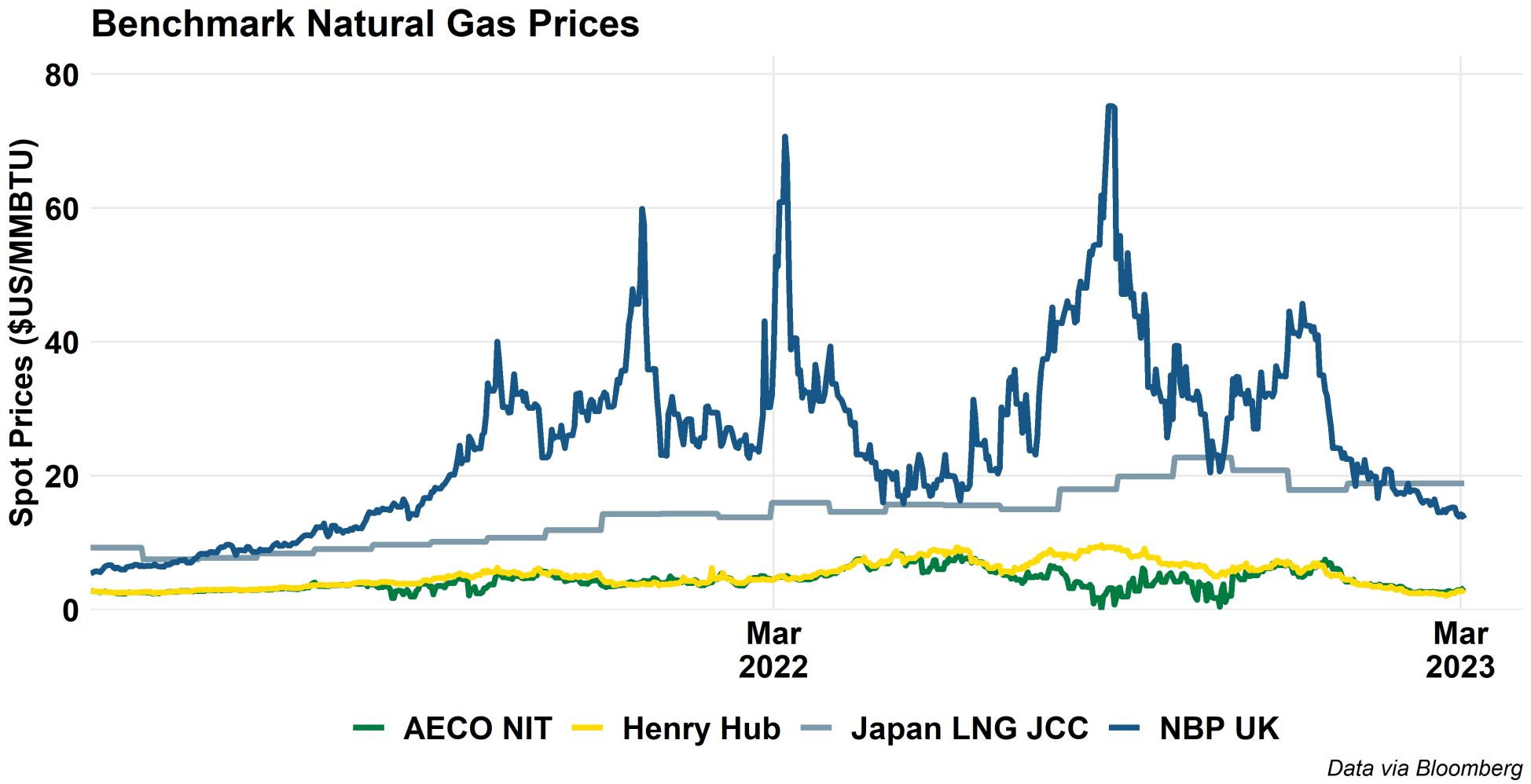

Leach's Weekly Energy Charts

Interest in LNG in Canada fluctuates with the value of the arb

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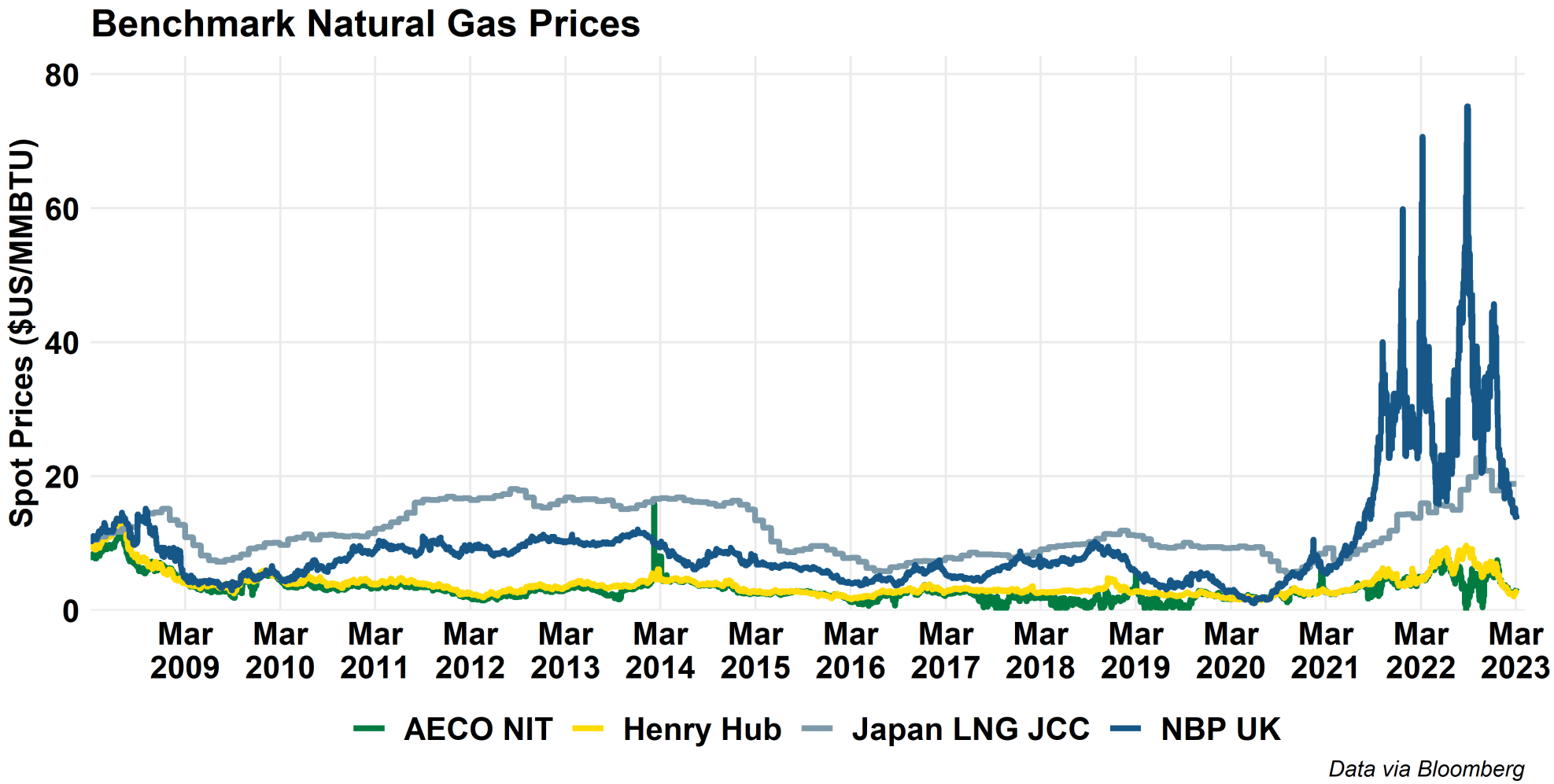

Leach's Weekly Energy Charts

If Canadian LNG is more expensive, they'll be white elephants

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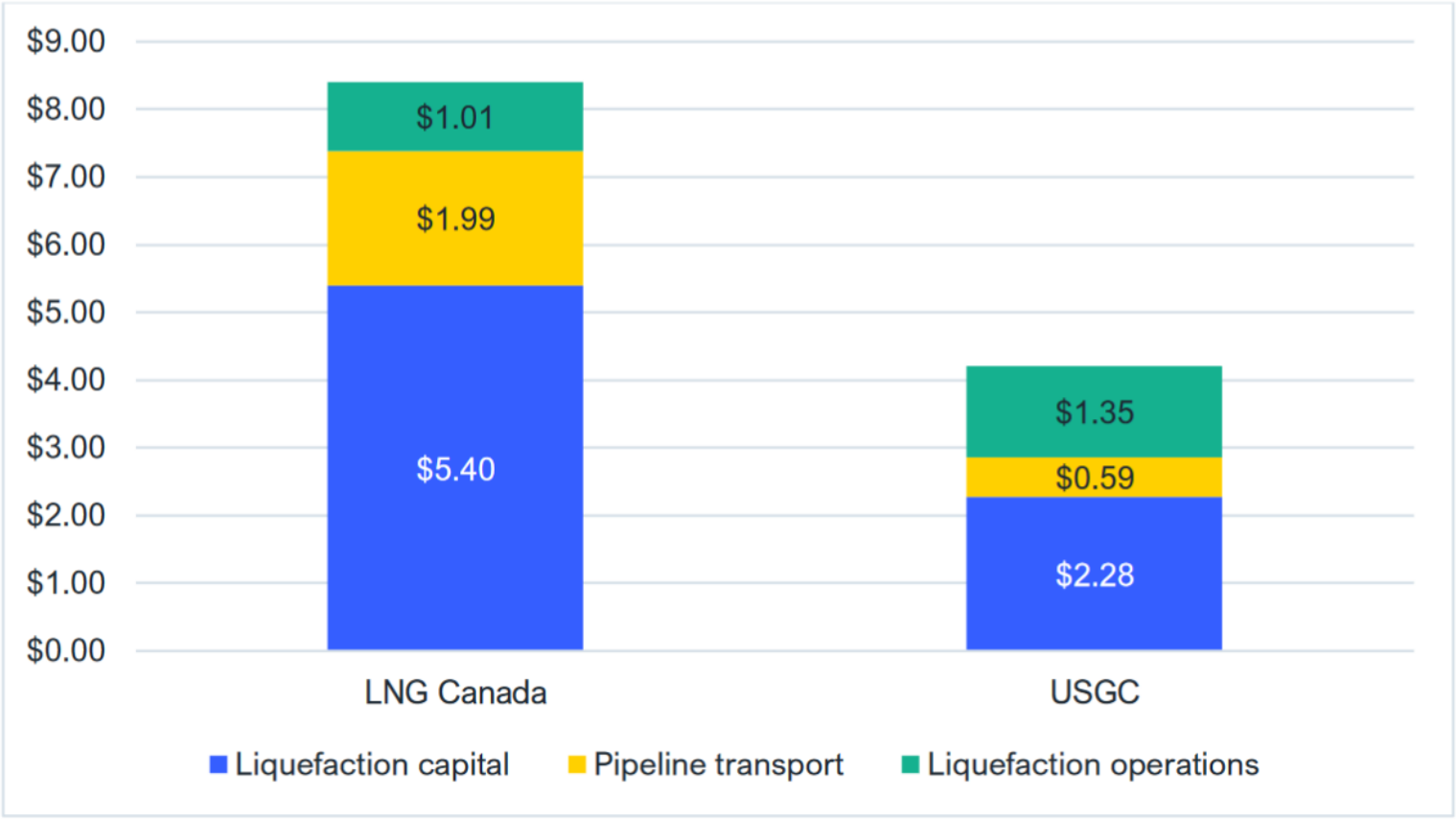
Figure 1: Selected Costs, LNG Canada vs. U.S. Gulf Coast LNG Projects[12,13,14,15]



Note: All figures in 2022 Canadian dollars. Conversions from USD at 1.3.

IEEFA British Columbia LNG project costs rising again

If Canadian LNG is more expensive, they'll be white elephants

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Table 1: Cost estimates for LNG Canada delivery to Asia, 2019 vs. 2022[16,17,18,19,20,21,22]

	2019 Estimate	2022 Estimate
Upstream development costs	$0.30	$0.30
Gas costs	$2.60	$4.52
CGL pipeline costs	$1.17	$1.99
Liquefaction capital costs	$4.94	$5.40
Operating costs	$0.90	$1.01
Shipping	$0.83	$1.13
Cost, DES Asia	**$10.74**	**$14.35**

Note: All figures in Canadian dollars. Figures for 2019 in 2019 dollars, figures for 2022 in 2022 dollars. Conversions from USD at 1.3.

IEEFA British Columbia LNG project costs rising again

Domestic Emissions

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- what about the domestic situation? How does oil and gas fit in Canada's domestic emissions commitments?
- Canada's emissions commitments are only compatible with oil and gas expansion if expansion is coupled with CCUS
- CCUS exacerbates some of the existing issues facing the sector and, depending on Canadian governments' resolve, may need to be mostly paid for by governments not oil corporations

The domestic emissions challenge leaps off the page

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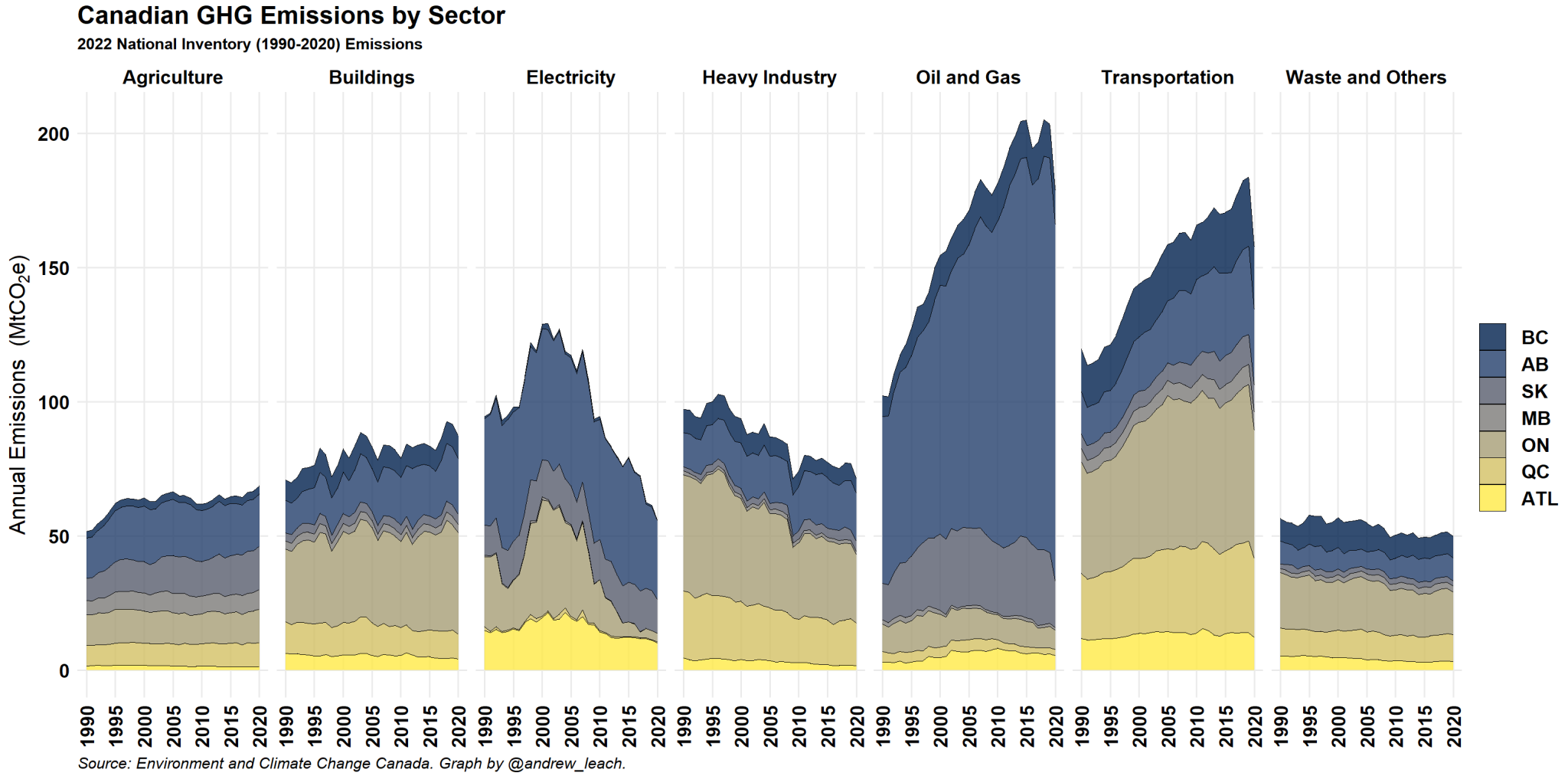

Canada's National Inventory Report, via Leach's Data Page

And carbon pricing alone won't solve it

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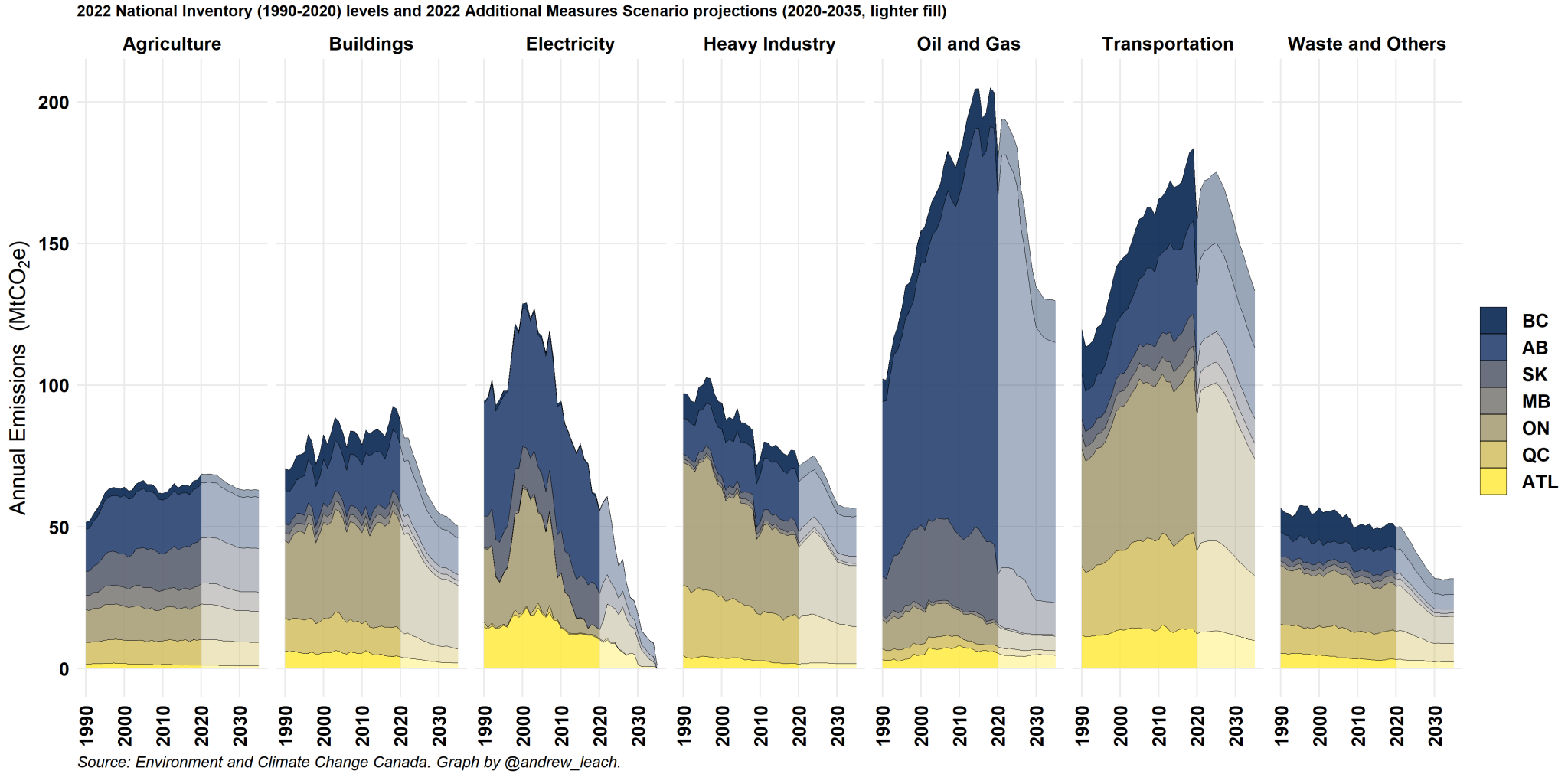

Canada's National Inventory Report, via Leach's Data Page

CCUS: Fixing your roof, or buying a hobby farm?

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Two ways to think about a CCUS project:

- as preserving your investment in an existing asset

- as a stand-alone investment that might not earn a merchant return, but isn't coming at a cost

CCUS: **Fixing your roof**, or buying a hobby farm?

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Two ways to think about a CCUS project:

- as preserving your investment in an existing asset

- if we think of CCUS as existential for the oil sands (ditto electric drive for LNG) in Canada, then you have to look at the rate of return as a function of the project as a whole

- the CCUS investment creates the conditions under which you can still earn returns from the existing project

CCUS: Fixing your roof, or **buying a hobby farm?**

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- thought of in a vacuum, CCUS must compete with other bespoke investment opportunities
- CCUS must earn a rate of return, and shareholders will be unwilling to bet on carbon credit values over time
- this means it will only happen if it's subsidized/under-written by governments

- as a stand-alone investment that might not earn a merchant return, but isn't coming at a cost

CCUS: Fixing your roof, or **buying a hobby farm?**

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Industry has, to date, framed it as Canada's job to fix industry's roof:

> What is in it for the Canadian public for (doing that)investing billions in CCUS for the oil sands)? And I think right off the bat, you have to look at the contribution of this industry. This year in 2023 will probably represent something in the range of about 10% of Canada's GDP. And according to Revenue Canada, we employ directly or indirectly the better part of 450,000 Canadians. This year alone, we're going to pay $50 billion in royalties and taxes. I think our industry represents something like 13% of the Canadian government's tax revenues. So there is a huge benefit from this industry continuing.
>
> Alex Pourbaix, Cenovus CEO, *The Current*, Monday March 6, 2023

Industry is asking Canadians to make a big bet on domestic action to reduce emissions from fossil fuel production

Will that bet pay off in a world acting on climate change?

Should Canada make this bet?

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Canadian Climate Poker

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A climate unconstrained world

- Limited global action on climate
- Limited global investment in fossil fuel production

- Limited global action on climate
- Aggressive global investment in fossil fuel production

Canadian Climate Poker

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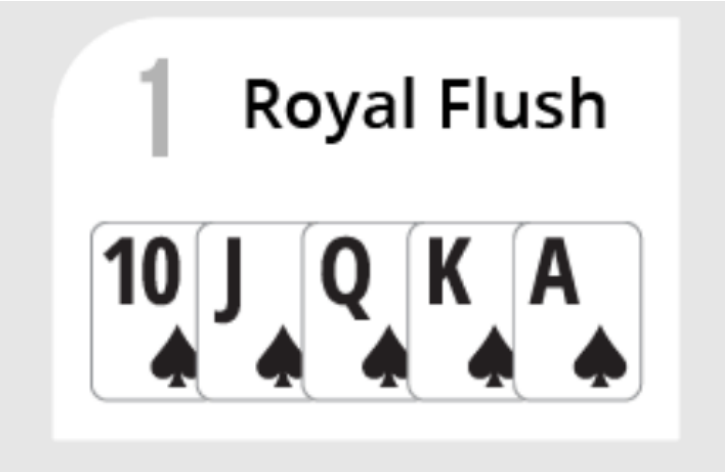
Or, the climate constrained world:



- Aggressive global action on climate
- Limited global investment in fossil fuel production

- Aggressive global action on climate
- Aggressive global investment in fossil fuel production

Conclusions

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- Global energy markets are sending conflicting signals to Canada
    - Desire for energy security
    - Desire for emissions reductions
- A bet on increasing fossil fuel consumption is a bet against action on climate change
- The surest cure for low prices is…everyone betting on low prices
- I can't tell you what the right answer is, only what I hope will happen
    - Global producers *bet* on action on climate change, leaving a lucrative market for Canadian production
    - Canadian producers limit investments in new, long-lived projects and regulators ensure downside protection
    - Regulators ensure environmental cleanup is prioritized and bonded