



AIRTRAV INC.
INTERNATIONAL AVIATION ADVISORY

Evaluation of Federal Carbon Backstop Tax Costs on Domestic Air Travel

AirTrav Report to the National Airlines Council of Canada (NACC)



Introduction and report contents

Introduction and report contents

- Toronto-based AirTrav Inc. has been retained by the National Airlines Council of Canada (NACC) to evaluate cost impacts of the federal carbon Backstop¹ tax on domestic air travel, including select intra-provincial routes, and a “what-if impact” on all domestic^{2,3}
- This report follows others recently prepared by AirTrav for NACC:
 - *Carbon Pricing in the Canadian Aviation Sector*, 3 April 2018
 - *Impacts and Analysis of Carbon Pricing on Canada’s Trade Exposed Aviation Sector*, October 2018 (revised November 2018)
- AirTrav holds expertise in the calculation of fuel consumption and greenhouse gas emissions in the aviation sector

¹ On 3 October 2016, the Government of Canada (“Canada”) published the *Pan-Canadian Approach to Pricing Carbon Pollution*, which is also referred to as the Federal Carbon Pricing Backstop (the “Backstop”). This is part of *Pan-Canadian Framework on Clean Growth and Climate Change* (the “Framework”), released by Canada in November 2016. The explicit price-based Backstop will tax a broad set of emissions throughout the country, including those generated by the trade-exposed aviation sector, with increasing stringency over time.

² As announced on October 23, 2019, the Backstop tax will apply in jurisdictions that do not meet the benchmark established by the Framework – Saskatchewan, Manitoba, Ontario, and New Brunswick. The Backstop tax will not initially apply in other provinces, and will not apply on aviation in the three northern territories which have been exempted.

³ AirTrav has projected that effective 2022, in keeping with the long-term direction of the Framework, it is possible that Canada will extend the federal carbon Backstop tax to cover fuel consumed by all domestic air transport.

Introduction and report contents

Report contents

- Methodology
- Intra-domestic route costs for SK, MB and ON
- “What-if” scenario pan-Canadian carbon tax - inter-provincial connecting flight costs
- “What-if” scenario pan-Canadian carbon tax - inter-provincial nonstop flight costs
- Total intra-provincial fuel and Backstop tax revenues
- Total domestic aviation fuel & Backstop tax revenues
- Terms of reference
- Sources used



Methodology

Methodology

- The analysis in this report covers the period from 2019 to 2022, plus 2026 and 2030
 - 2019 to 2022 examines intra-provincial application of the carbon tax, and other fuel taxes that apply to intra-provincial flights. Calculations for this period are based on published carbon pricing values
 - “What-if” analysis was applied to inter-domestic routes, assuming that the carbon tax could be extended to those flights in keeping with current government policy beginning in 2022 — 2022 was chosen to because it is the last year for which published carbon pricing values exist

Methodology

- Route level analysis was based on:
 - Published air schedules, appropriate to the listed route direction as flight duration is affected by upper level winds (i.e. Thunder Bay-Toronto means the eastbound routing, and not Toronto-Thunder Bay westbound)
 - When multiple flights were provided for a city pair, used narrowbody jets and turboprops where possible for consistency purposes
 - Gate-to-gate times (often called “block” times)
 - Seat capacity of the applicable aircraft types
 - Assumed passenger load factor of 80 percent (number of seats filled)
 - Industry-standard fuel consumption rates
- Backstop carbon tax and other fuel tax rates were then applied against the fuel consumption derived above to determine the fuel tax revenues collected on each route’s estimated fuel consumption
- HST, GST and QST were applied to the Backstop carbon tax rate as applicable to intra- what-if inter-provincial fuels

Methodology

- The carbon tax was calculated using the per litre cost for CO₂e (carbon dioxide equivalent) emissions as published in the *Technical Paper on the Federal Carbon Pricing Backstop in 2017*
- As no carbon pricing values beyond 2022 exist:
 - Looking at changes in year-over-year growth rates, we estimated Backstop tax rates through to 2030
 - Year/year Backstop carbon tax rates increases fall from 2019 through 2022
 - After year 2022, we further reduced the forecast Backstop growth rate such that the year/year change declines by 2.00 percent each year
- The table on the next page shows confirmed Backstop tax rates on jet fuel for 2019 to 2022, and forecast rates from 2023 to 2030
- Our 2022-30 projected carbon price/tonne progression is a conservative estimate and in keeping with that of the Ecofiscal Commission

Methodology

- Backstop carbon tax rates used in this report

Canada's Backstop Tax Prices on Jet Fuel	Per Backstop Technical Paper, 2017				Estimated by AirTrav							
Applicable Backstop Year	2019	2020	2021	2022	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e
\$/Tonne Levy on Liquid Fuels (including jet fuel)	\$20.00	\$30.00	\$40.00	\$50.00	\$59.00	\$69.00	\$79.00	\$89.00	\$99.00	\$108.00	\$116.00	\$122.00
Backstop Cents/L on Jet Fuel to Cover CO2e emissions*	5.16	7.75	10.33	12.91	15.23	17.82	20.40	22.98	25.56	27.89	29.95	31.50
Backstop Growth Rates on Jet Fuel:												
Year/year rate of increase in Levy and in Backstop	100.0%	50.2%	33.3%	25.0%	19.0%	17.0%	15.0%	13.0%	11.0%	9.0%	7.0%	5.0%
Actual and estimated rate of change		-49.8%	-16.9%	-8.3%	-6.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%

* Cents/L on jet fuel CO2e calculated at ECCC rate of 3.23 units of CO2e emitted per unit of fuel burned.

- Key terms used:
 - “Intra-provincial” refers to flights within an applicable province
 - “Inter-provincial” refers to flights between provinces
- The Backstop carbon tax will apply:
 - Initially to intra-provincial flights in MB, NB, ON and SK (expected to be extended to inter-provincial flights after year 2022)
 - Intra-provincial aviation fuel in the other provinces and the three territories will be exempt from the Backstop carbon tax

Methodology

- Calculated the following Backstop carbon tax costs:
 - Per passenger, one-way and roundtrip (only one-way shown herein)
 - Per family of four, one-way and roundtrip (only roundtrip shown herein)
- Analyzed intra-domestic routes for SK, MB and ON
 - The Backstop carbon tax will apply to SK, MB, ON and NB – however, there are no scheduled commercial flights within NB
 - 13 nonstop flights only
 - By province: SK (2), MB (2), and ON (9)
- Analyzed “what-if” inter-domestic *connecting* flights
 - One domestic connection between an all-domestic origin and destination routing, with one of the flights operated in a Backstop-applicable intra-domestic province
 - 12 routes covering all 10 provinces
 - 11 routes include an Ottawa flight

Methodology

- Analyzed “what-if” inter-domestic *nonstop* flights
 - Nonstop inter-domestic flights only
 - 14 routes covering all 10 provinces, with eight routes based on a YOW-Ottawa departure
- Slides don’t show intra-domestic to other domestic, or intra-domestic to U.S. transborder
 - Only applicable flight sector would be intra-domestic, and those routes have already been calculated in the other analysis
 - This report does show, however, estimated price-elasticity effects on total ticket prices for transborder routings including a Backstop-applicable domestic connection

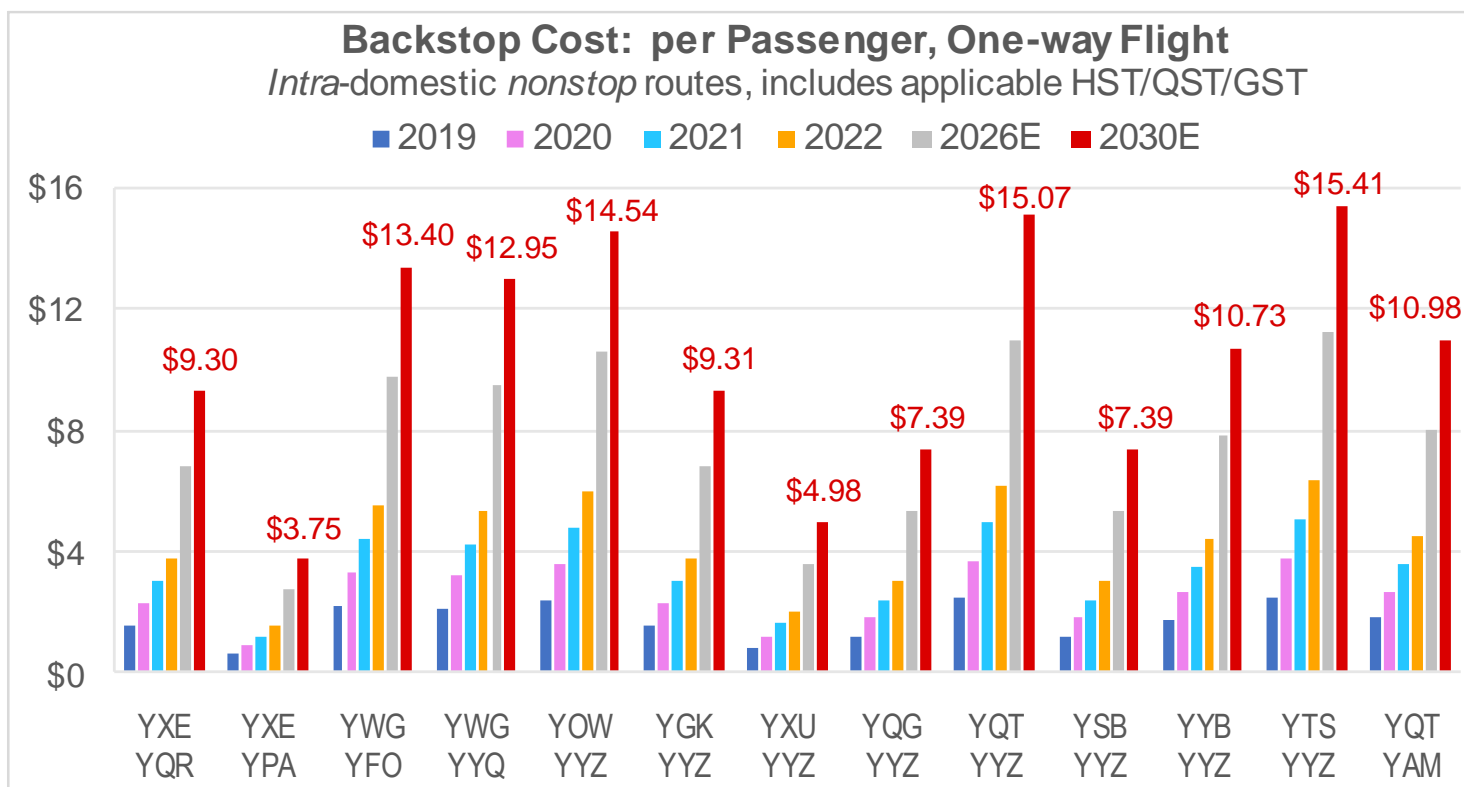


Backstop carbon tax cost of intra-domestic air routes for SK, MB and ON

(excludes NB due to no intra-domestic
commercial flights)

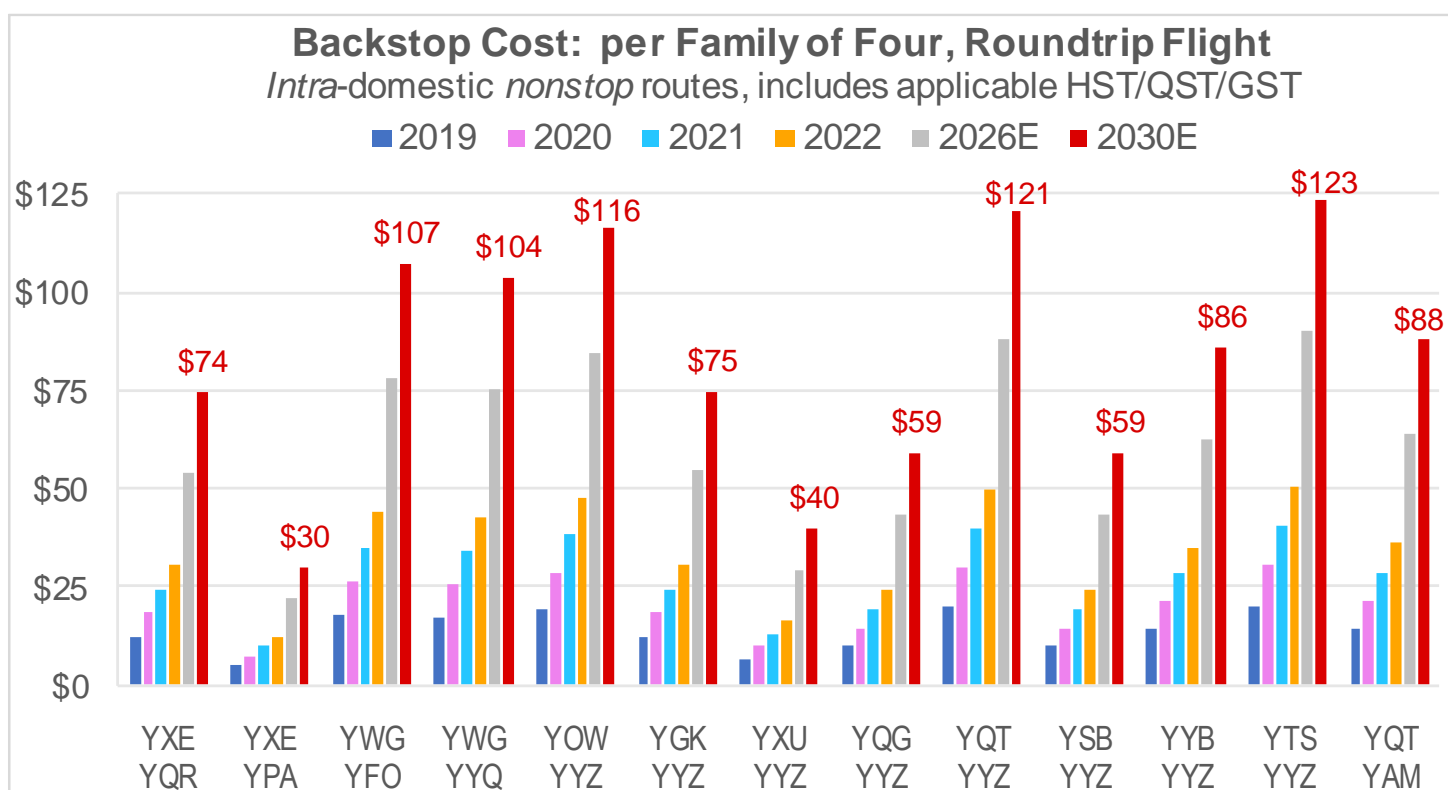
Intra-domestic route costs for SK, MB and ON

- Intra-domestic **nonstop** routes for SK, MB and ON
- Backstop carbon tax cost expressed **per passenger**, **per one-way flight** (includes HST or GST, as applicable)
- Many northern routes have a high carbon tax cost per passenger owing the marginal route bias of typically smaller/older aircraft



Intra-domestic route costs for SK, MB and ON

- Intra-domestic nonstop routes for SK, MB and ON
- Backstop carbon tax cost expressed per family of four, per roundtrip flight (includes HST or GST, as applicable)





Backstop carbon tax cost of **inter-provincial *connecting* flights**

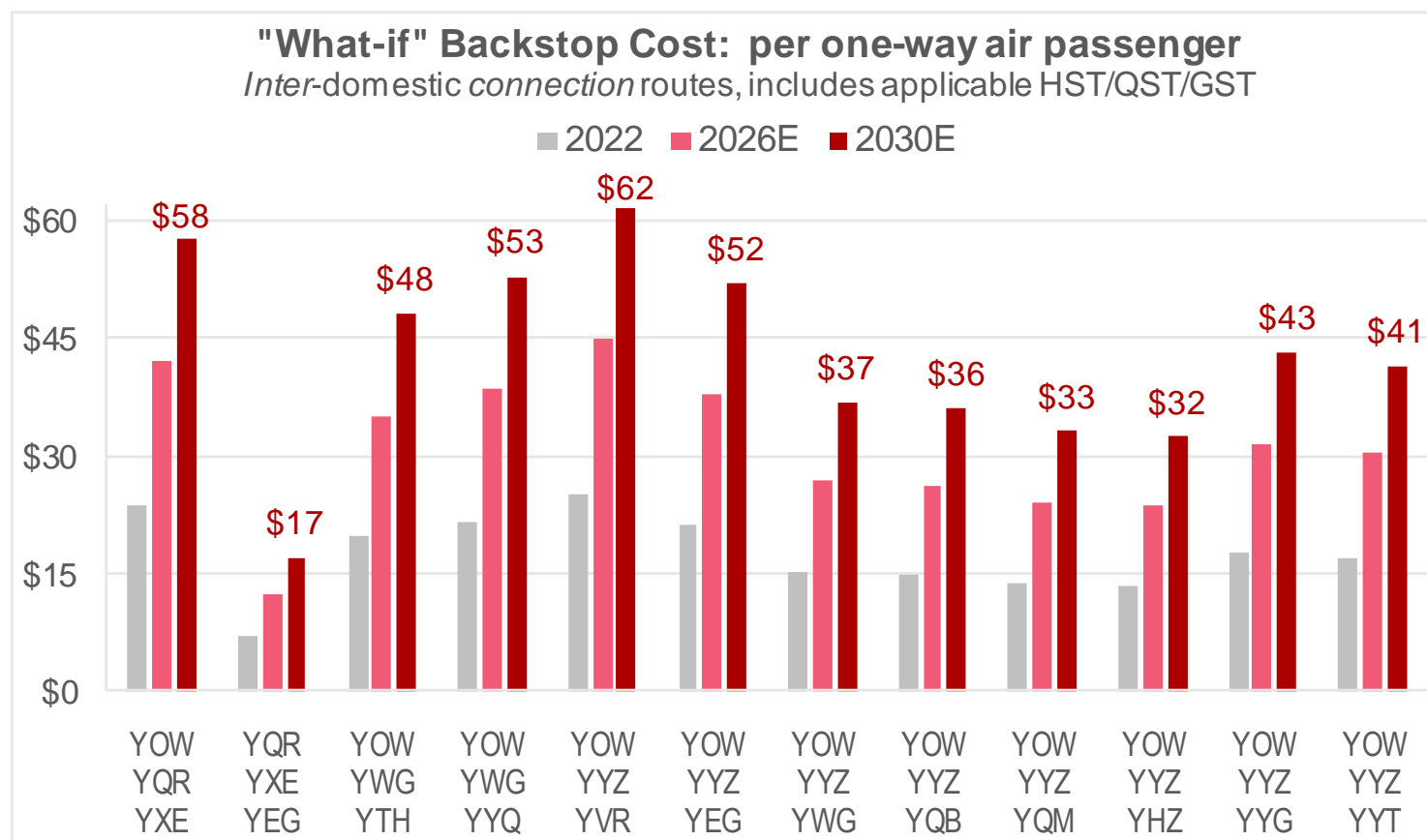
("what-if scenario projected for inter-provincial implementation after 2022)

“What-if” inter-provincial connecting flight costs

- This section is predicated on the reality that many Canadian domestic air journeys include a connection point
- Should the Backstop carbon tax become applicable to *inter-domestic* domestic air travel after 2022, the fuel for all flight segments in a total journey would be taxed
 - The flight time sum of most connecting flight segments is typically greater than the flight time of a connecting journey
 - Assuming airlines will pass on all of the Backstop carbon tax, passengers with a connection will face a higher charge than nonstop passengers
- Example:
 - Ottawa-Vancouver nonstop = 5 hours, 16 minutes
 - Ottawa-Vancouver, connecting via Toronto:
 - = 1 hour, 8 minutes + 5 hours, 3 minutes = 6 hours, 11 minutes
 - = 17 percent longer time than the nonstop flight...
 - = ... and a similar, higher amount of taxable fuel consumption

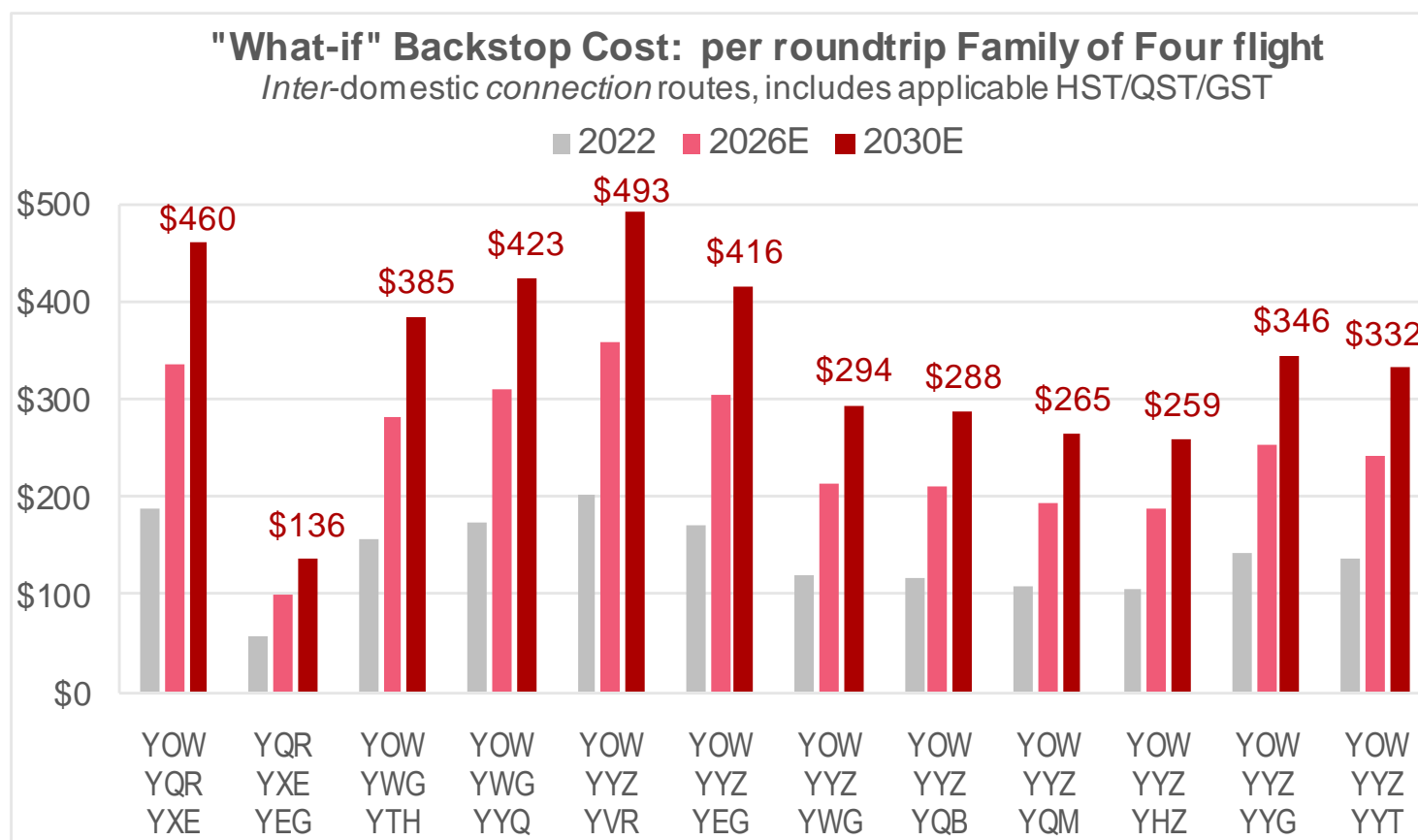
“What-if” inter-provincial connecting flight costs

- Inter-domestic connecting routes, national, what-if 2026 and 2030
- Backstop cost expressed per passenger, per one-way flight
- Includes HST, or GST, or QST+GST as applicable



“What-if” inter-provincial connecting flight costs

- Inter-domestic connecting routes, national, what-if 2022 - 2030
- Backstop cost expressed per family of four, per roundtrip flight
- Includes HST, or GST, or QST+GST as applicable



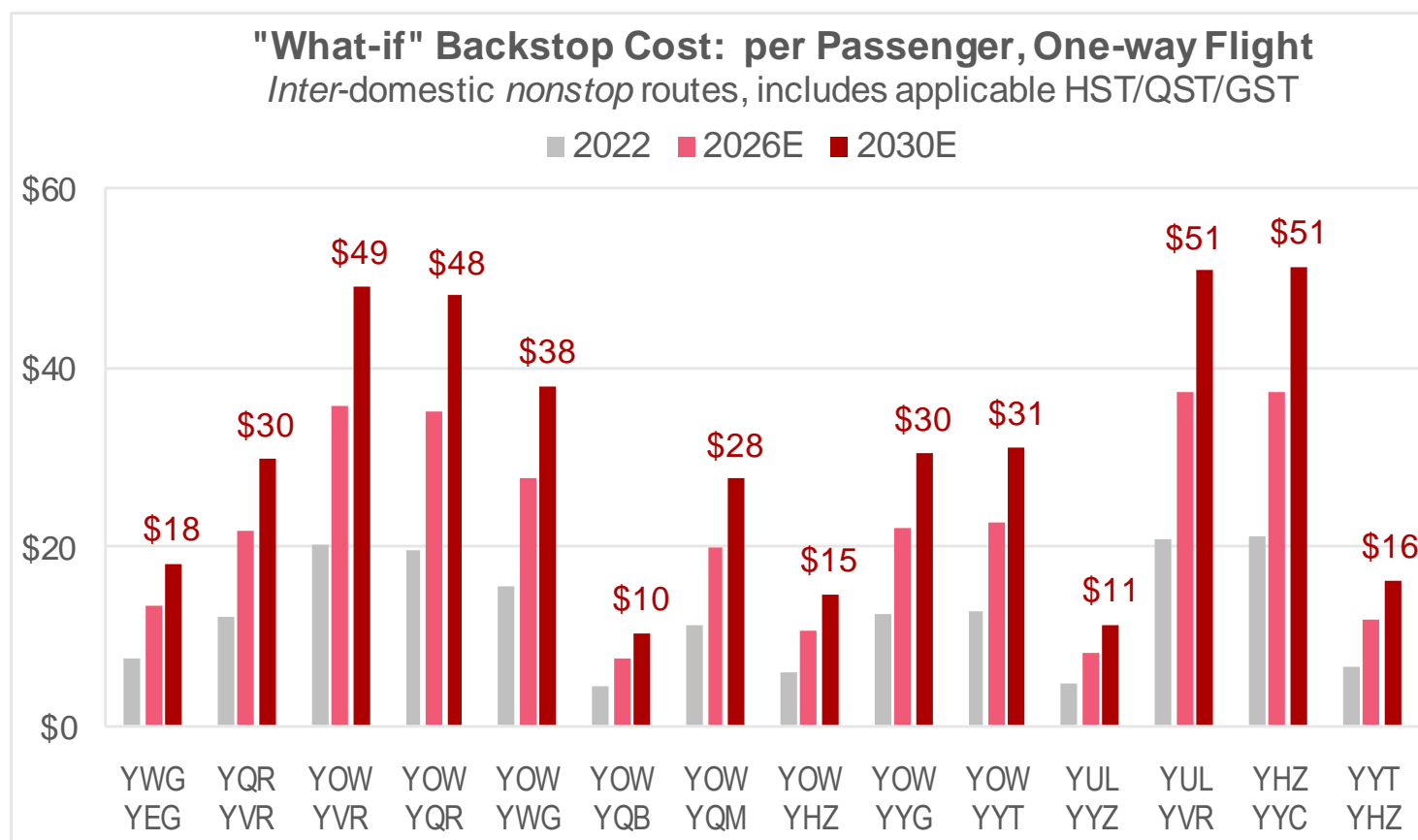


Backstop carbon tax cost of inter-provincial *nonstop* flights

("what-if scenario projected for inter-provincial implementation after 2022)

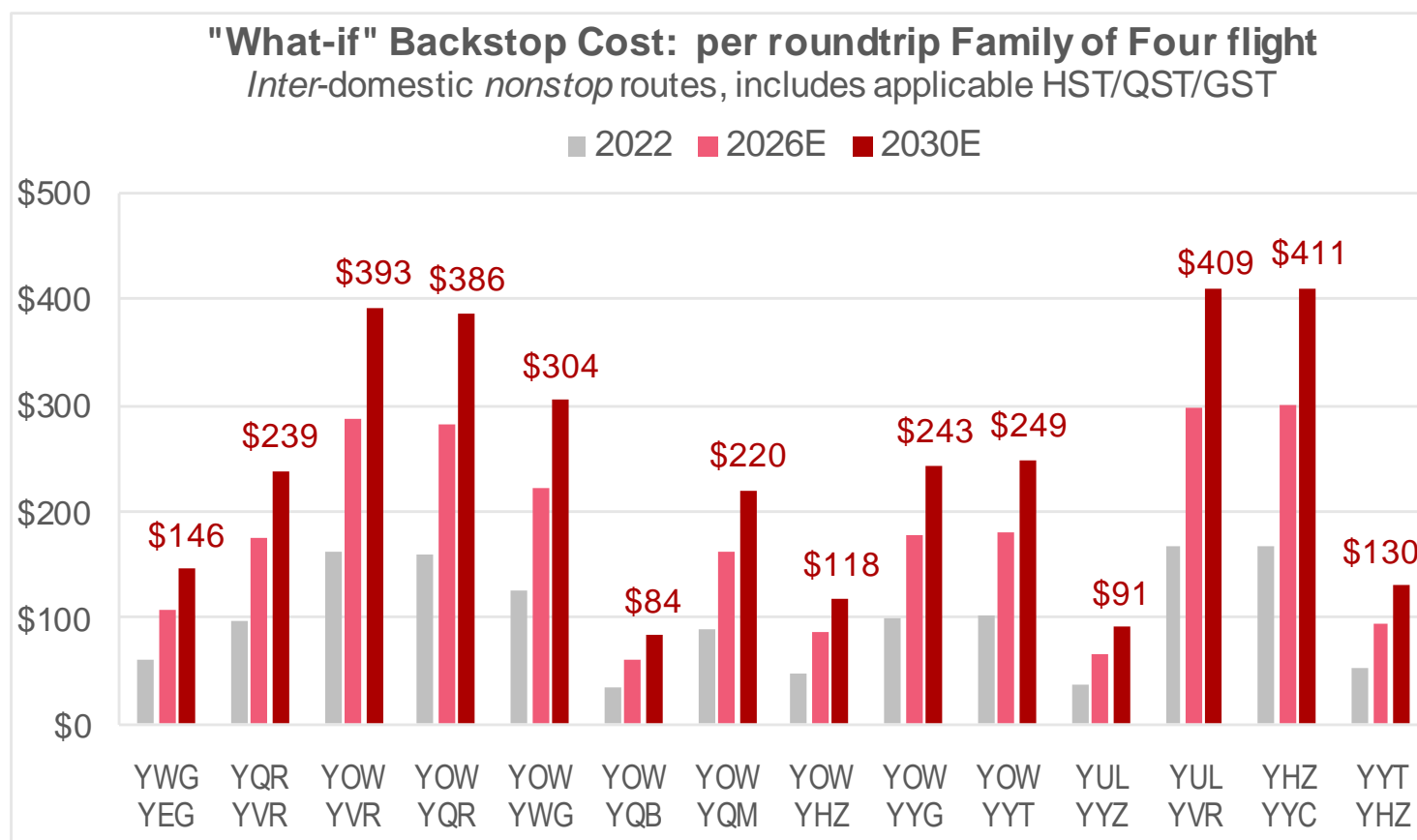
“What-if” inter-provincial nonstop flight costs


- Inter-domestic nonstop routes, national, what-if 2026E and 2030E
- Backstop carbon tax cost expressed per passenger, per one-way flight
- Includes HST, or GST, or QST+GST as applicable



“What-if” inter-provincial nonstop flight costs

- Inter-domestic nonstop routes, national, what-if 2026E and 2030E
- Backstop carbon tax cost expressed per family of four, per roundtrip flight (includes HST, or GST, or QST+GST as applicable)





Projected total government revenues from fuel taxes and the Backstop carbon tax for **intra-provincial air transport in SK, MB and ON** (excludes NB due to no intra-domestic commercial flights)


Total intra-provincial fuel and Backstop tax revenues

- This section only examines the four provinces in which the Backstop carbon tax would apply to intra-jurisdictional travel
 - NB yields no Backstop carbon tax as there are no commercial intra-provincial flights
- The Backstop carbon tax will only apply to intra-provincial fuel, so other fuel taxes were applied to the same fuel volumes
 - To keep this section an apples-to-apples comparison, the federal excise tax and provincial fuel taxes were applied only to intra-provincial fuel volumes (even though they would apply to all fuel uplifted for all domestic flights)

Total intra-provincial fuel and Backstop tax revenues

- By 2022 when the Framework Benchmark price hits \$50 per tonne of carbon, federal government revenues from the Backstop carbon tax will *exceed* those from the FET and all PFTs

Backstop Provinces - Aviation Fuel and Backstop Tax Costs	2019E	2020E	2021E	2022E	2026E	2030E
Intra-provincial aviation fuel on which Backstop tax applies (Estimated fuel consumption, millions of litres)						
Manitoba	42	43	43	44	48	52
New Brunswick	0	0	0	0	0	0
Ontario	343	350	357	365	398	431
Saskatchewan	30	31	32	32	35	38
Subtotal, millions of fuel litres	415	423	432	441	482	522
Intra-provincial aviation - cost of fuel taxes and Backstop tax in Backstop provinces (CAD, millions)						
Federal Excise Tax (FET)	\$16.6	\$16.9	\$17.3	\$17.7	\$19.3	\$20.9
Provincial Fuel Taxes (PFT) per above rates, based on per litre rates of: MB 3.2¢, NB 2.5¢, ON 6.7¢, SK 1.5¢	\$24.7	\$25.3	\$25.8	\$26.3	\$28.7	\$31.1
Subtotal	\$41.3	\$42.2	\$43.1	\$44.0	\$48.0	\$52.0
Plus federal Backstop tax, including HST/GST	\$23.8	\$36.5	\$49.7	\$63.5	\$119.8	\$178.0
Total tax costs	\$65.1	\$78.7	\$92.8	\$107.5	\$167.8	\$230.0

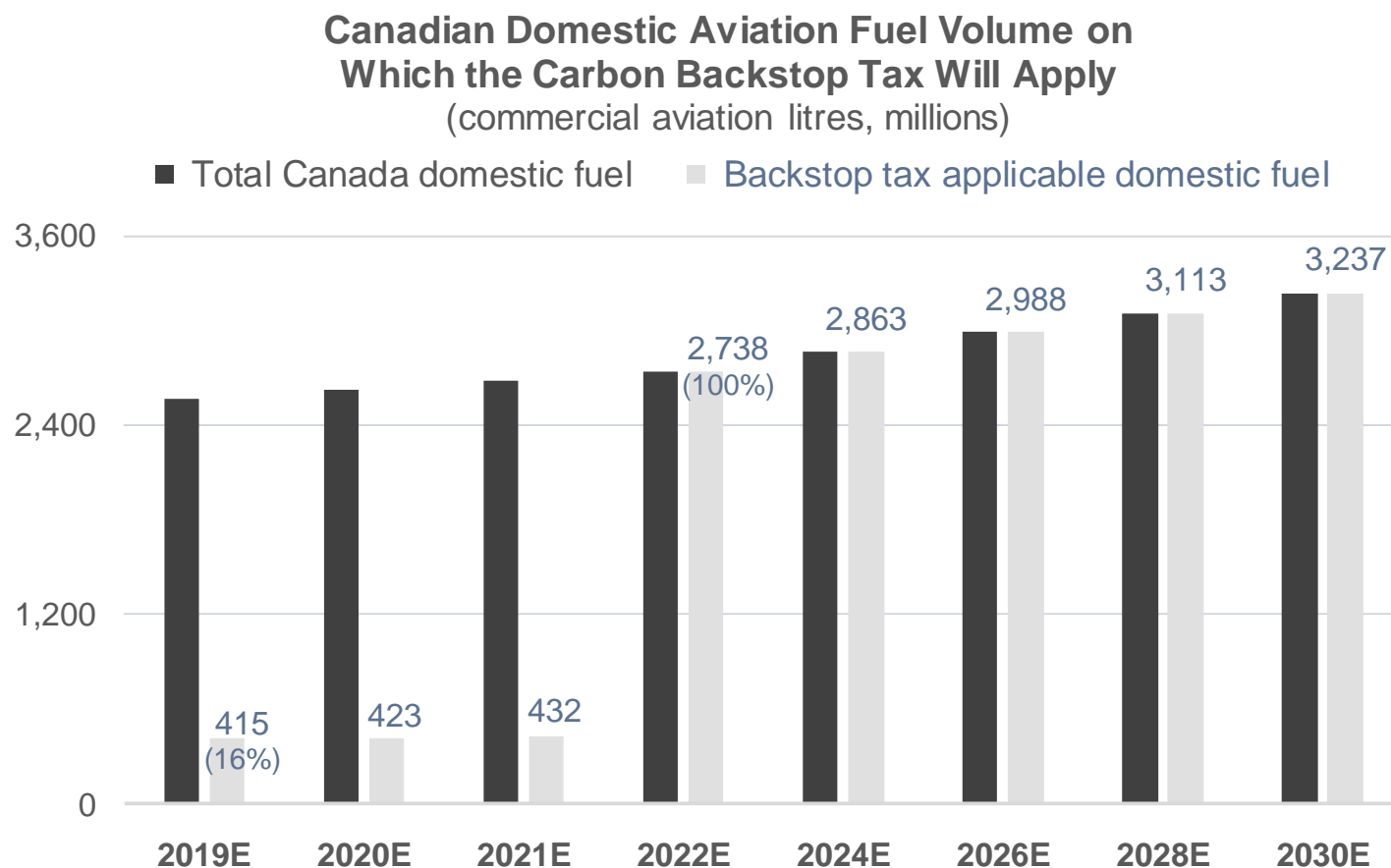


Projected total fuel tax and Backstop carbon tax revenues collected for all domestic air transport

- Assumes Backstop will be extended to inter-domestic air transport effective 2022
- Assumes the six provinces and all three territories will continue to be exempt from the Backstop for intra-jurisdictional flights

Total domestic aviation fuel & Backstop tax revenues

- The table below projects fuel volume from total domestic commercial aviation from 2019 to 2030, and the amount of fuel on which the federal carbon Backstop tax will be applicable



Total domestic aviation fuel & Backstop tax revenues

- The table below incorporates the projected fuel volume with fuel tax and Backstop carbon tax rates, to determine estimated total government fuel tax revenues from domestic aviation, 2019 to 2030
- By 2022, carbon Backstop revenues taxes are projected to exceed the combined total of federal excise tax and all provincial fuel taxes
- By 2030, total fuel tax revenues are projected to exceed \$1 billion, with 23% from FET and PFT taxes, and 77% from the Backstop

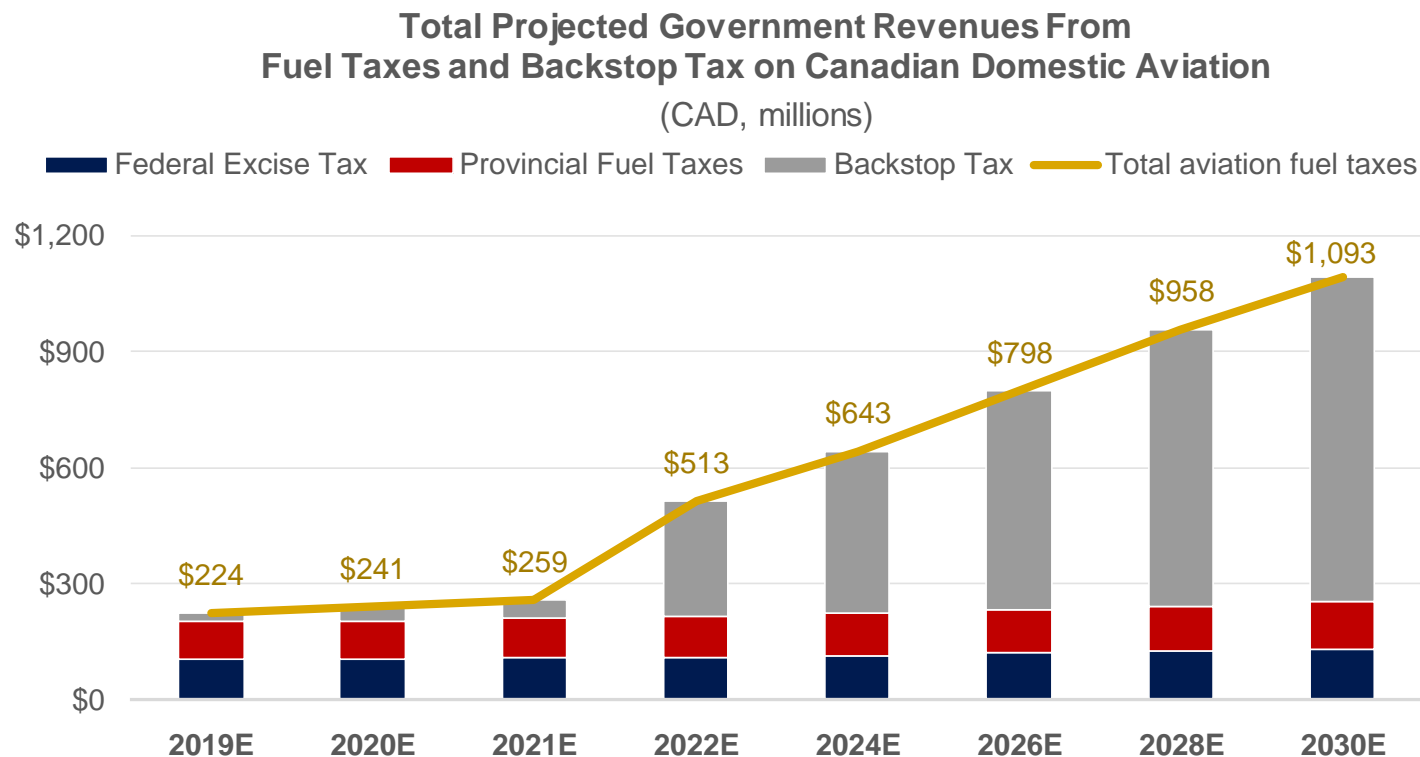
Total Cost of Canada Domestic Aviation Fuel Taxes & Backstop	2019E	2020E	2021E	2022E	2024E	2026E	2028E	2030E
(CAD, millions)								
Federal and provincial fuel taxes:								
Federal Excise Tax	\$102.9	\$105.0	\$107.3	\$109.5	\$114.5	\$119.5	\$124.5	\$129.5
Provincial Fuel Taxes	\$97.4	\$99.4	\$101.5	\$103.7	\$108.4	\$113.2	\$117.9	\$122.6
Subtotal FET and PFT¹	\$200.2	\$204.5	\$208.8	\$213.2	\$222.9	\$232.7	\$242.4	\$252.1
Plus federal Backstop tax (including applicable HST/GST/QST):								
Applicable intra-provincial fuel, 2019-2021	\$23.8	\$36.5	\$49.7	– Included in the Pan-Canadian Backstop tax below –				
Pan-Canadian carbon Backstop tax (assumption), 2022 onwards ²	n/a	n/a	n/a	\$299.6	\$420.3	\$565.8	\$715.3	\$840.4
Backstop Tax	\$23.8	\$36.5	\$49.7	\$299.6	\$420.3	\$565.8	\$715.3	\$840.4
Total aviation fuel taxes	\$224.1	\$241.0	\$258.5	\$512.9	\$643.3	\$798.5	\$957.7	\$1,092.5

1 Based on a weighted average PFT across all provinces and territories of 3.787 cents per litre.

2 Assume the Backstop will become pan-Canadian by 2022, applying to all aviation fuel used by commercial air carriers on both intra- and inter-domestic routes.

Total domestic aviation fuel & Backstop tax revenues

- This chart displays visually the same results as the table on the previous slide
- Government fuel tax revenues, a direct cost on the aviation industry and its passengers, surge after 2021 in the event of a pan-Canadian carbon tax

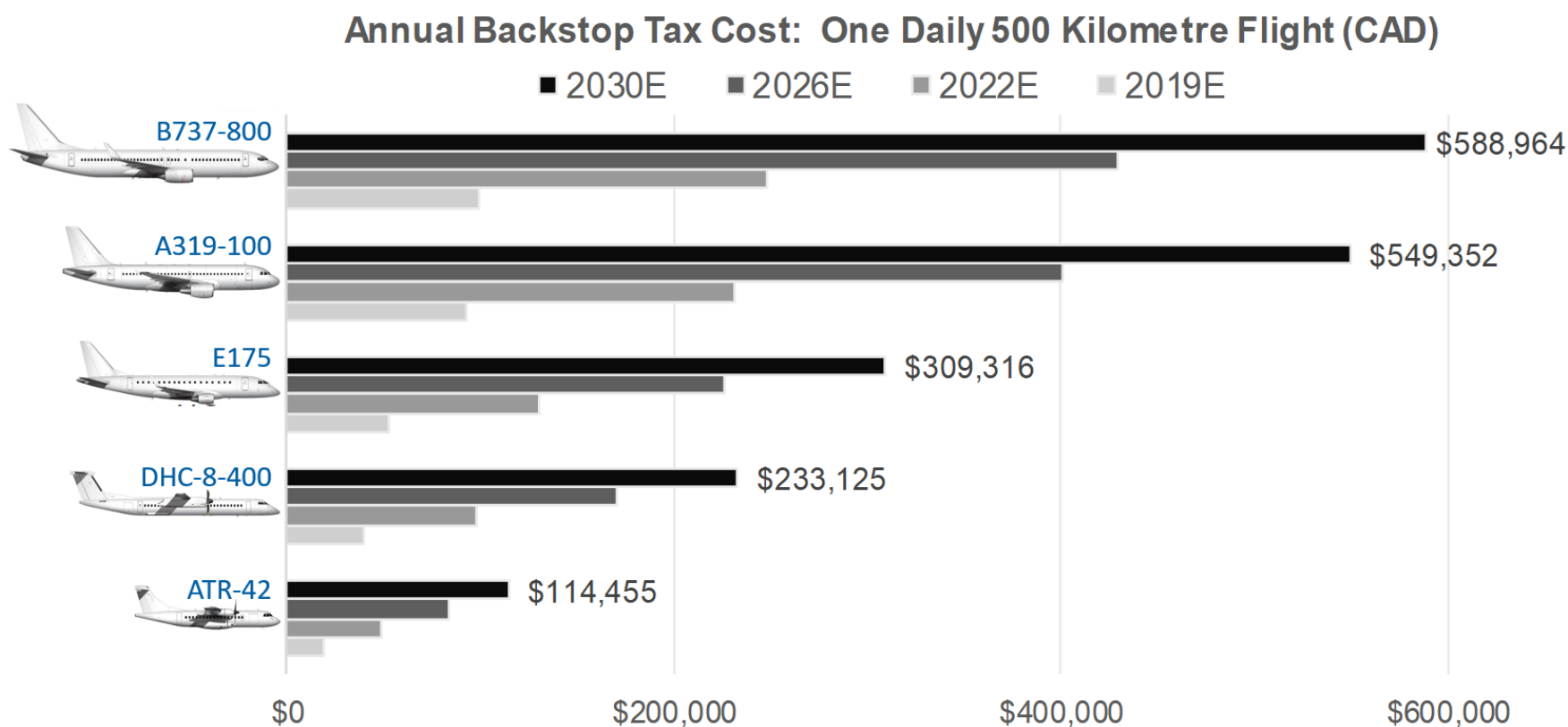


Total domestic aviation fuel & Backstop tax revenues

- What would this surge in fuel tax costs mean to airlines and their paying passengers?
- The next two slides take just the Backstop – projected to be the largest source of fuel taxation after 2022 – and translates it into the annual cost, for just one daily flight
 - Based on five different commercial aircraft types, from large to small
 - Evaluated two types of flights:
 - A typical domestic short-haul flight: at 500 kilometres, similar in distance to Toronto to Montreal
 - A typical domestic long-haul flight: at 3,500 kilometres, similar in distance to Ottawa to Vancouver
- The results paint a devastating picture of unsustainability by 2030

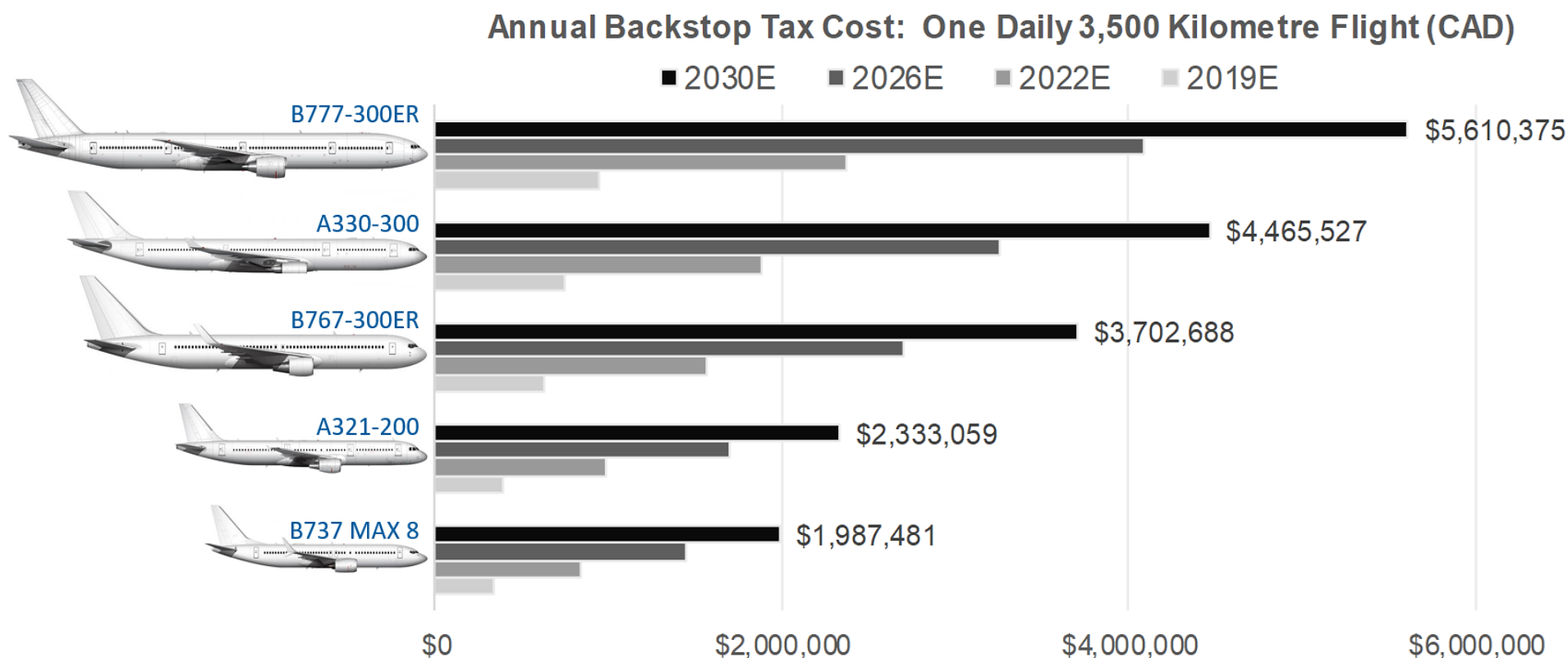
Total domestic aviation fuel & Backstop tax revenues

- Domestic narrowbody jets and turboprops – **500 km** flight
 - Annual **Backstop** cost for **one daily flight** (and excluding all other fuel taxes) is projected to become unsustainable within the next five years



Total domestic aviation fuel & Backstop tax revenues

- Domestic widebody and narrowbody jets – **3,500 km** flight
 - Annual **Backstop** cost for **one daily flight** (and excluding all other fuel taxes) is projected to become unsustainable within the next five years





Terms of reference

Terms of reference

- ➔ Legend of airports used in this report, sorted by International Air Transport Association (IATA) code*

IATA Airport Code (alphabetical)	City	Province
YAM	Sault Ste. Marie	ON
YEG	Edmonton	AB
YFO	Flin Flon	MB
YGK	Kingston	ON
YHD	Dryden	ON
YHZ	Halifax	NS
YOW	Ottawa	ON
YPA	Prince Albert	SK
YQB	Quebec City	QC
YQG	Windsor	ON
YQM	Moncton	NB
YQR	Regina	SK
YQT	Thunder Bay	ON
YSB	Sudbury	ON

IATA Airport Code (alphabetical)	City	Province
YTH	Thompson	MB
YTS	Timmins	ON
YUL	Montreal	QC
YVR	Vancouver	BC
YWG	Winnipeg	MB
YXE	Saskatoon	SK
YXU	London	ON
YYB	North Bay	ON
YYC	Calgary	AB
YYG	Charlottetown	PE
YYQ	Churchill	MB
YYT	St. John's	NL
YYZ	Toronto (Pearson)	ON

* Red font colour denotes airports in current Backstop provincial jurisdictions.

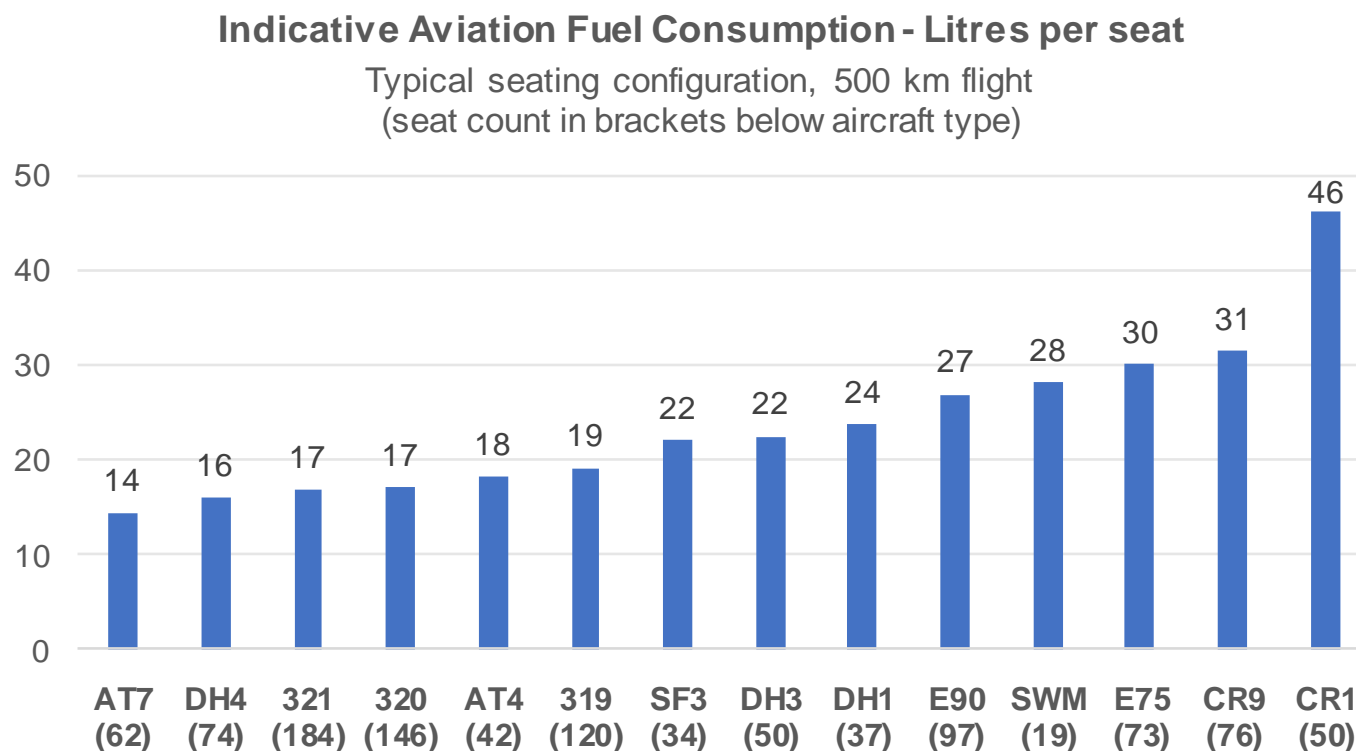
Terms of reference

- ➔ Legend of aircraft used in this report, sorted by International Air Transport Association (IATA) codes

IATA Aircraft Code (alphabetical)	Description	Typical Seat Capacity
319	Airbus 319-100	120
320	Airbus 320-200	146
321	Airbus 321-200	184
788	Boeing 787-8	251
AT4	ATR 42-600	42
AT7	ATR 72-600	62
CR1	Canadair Regional Jet-100	50
CR9	Canadair Regional Jet-900	76
DH1	De Havilland Dash-8-100	37
DH3	De Havilland Dash-8-300	50
DH4	De Havilland Dash-8-400	74
E75	Embraer Regional Jet-175	73
E90	Embraer Regional Jet-190	97
SF3	Saab 340	34
SWM	Fairchild Swearingen Metroliner III	ON

Terms of reference

- Fuel consumption varies by aircraft type and by number of seats and passengers, affecting the results shown in this report
- The below chart shows indicative fuel consumption per seat





Sources used

Sources

Fuel consumption by aircraft type and flight distance:

- “Carbon Emissions Calculation Methodology, Version 10”, International Civil Aviation Organization (ICAO), Montreal, June 2017
- Airfinance Journal

Published airline schedules from:

- Air Canada, Air Canada Express, Air Transat, Bearskin Airlines, Calm Air, WestJet Airlines
- Majority of airline schedules checked for 05 April 2019, except for some routes that operate during summer season only

Canada’s top 25 domestic passenger air routes and top 10 busiest airport by passenger volume:

- “Transportation in Canada 2017, Statistical Addendum”, Transport Canada, Ottawa, 2018.

Sources

“Technical Paper on the Federal Carbon Pricing Backstop”, Environment and Climate Change Canada, Ottawa, May 2017

Various current provincial taxation guides pertaining to aviation fuels

“The Aviation Industry as An Economic Enabler”, Air Canada submission to the review of the Canada Transportation Act, page 24, Feb 2015

“Air passenger traffic at Canadian airports, annual, Table 23-10-0253-01”, Statistics Canada, Ottawa, 2018

“2017 Population, Canada at a Glance, CANSIM table 051-0005”, Statistics Canada, Ottawa, 2018