



Alberta's Oil Sands

The Role of Pipeline Infrastructure in U.S. Energy Security: Getting Canadian Oil to U.S. Markets

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Alberta Washington D.C. Office

July 28, 2012



Alberta's Location

Alberta covers
255,285 miles²,
an area slightly less
than **Texas**

Anchorage
1415 miles

Vancouver
507 miles

Ottawa
1,769 miles

New York City
2,032 miles

Houston
1,875 miles

Mexico City
2,469 miles

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What are the oil sands?

- Naturally occurring mixture of sand, clay, water and bitumen – a very heavy oil
- Bitumen is separated from the sand and upgraded to refinery-ready crude oil





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Oil sands: In situ and Mining

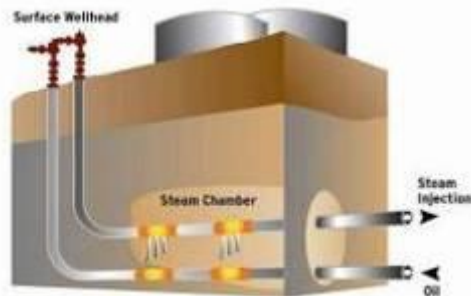
Mining



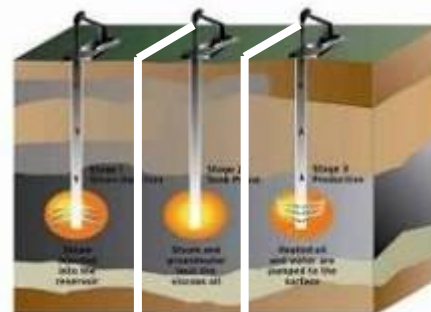
- 20% of resource
- 55% of production

In situ

Steam Assisted Gravity Drainage



Cyclic Steam Process



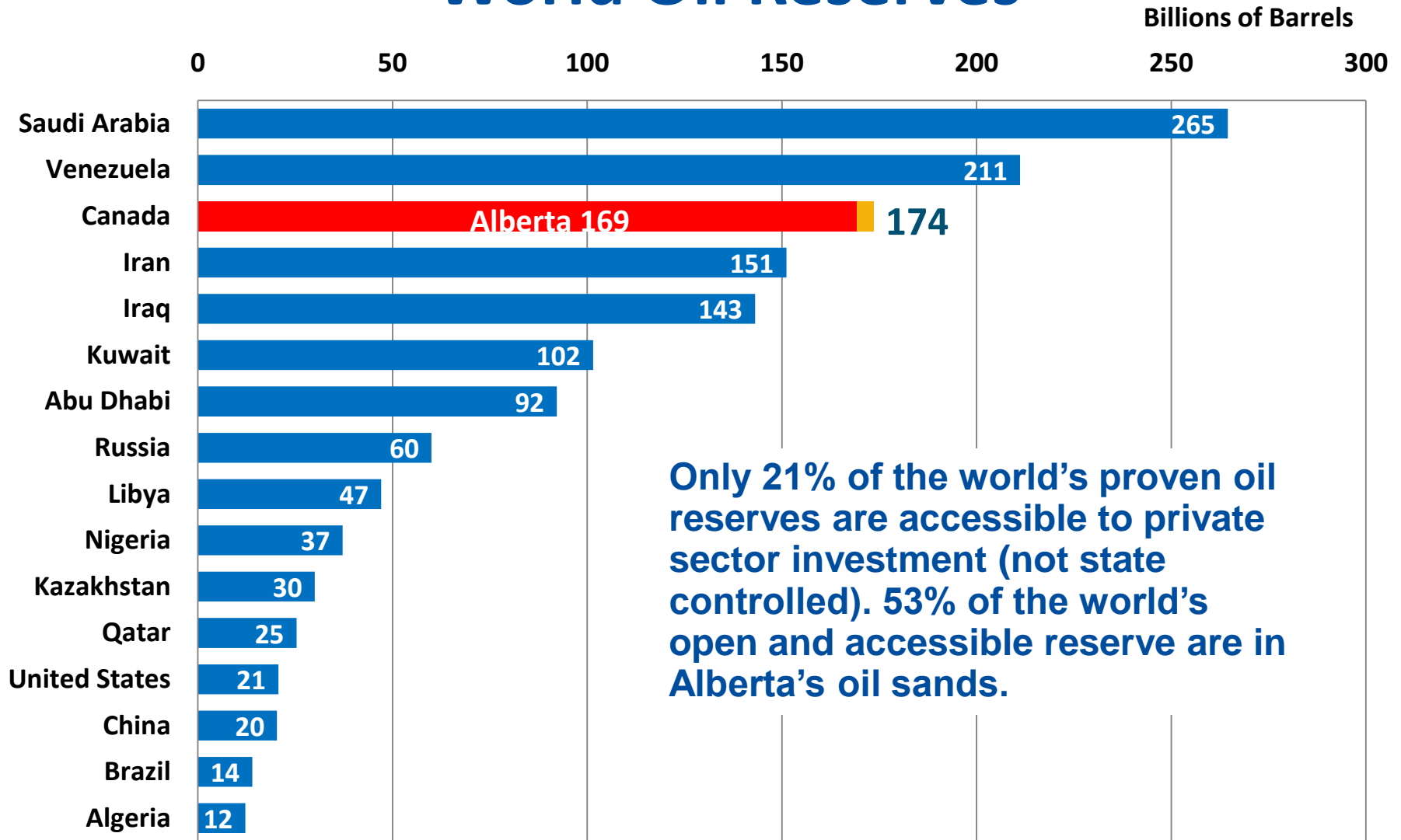
- 80% of resource
- 45% of production





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World Oil Reserves



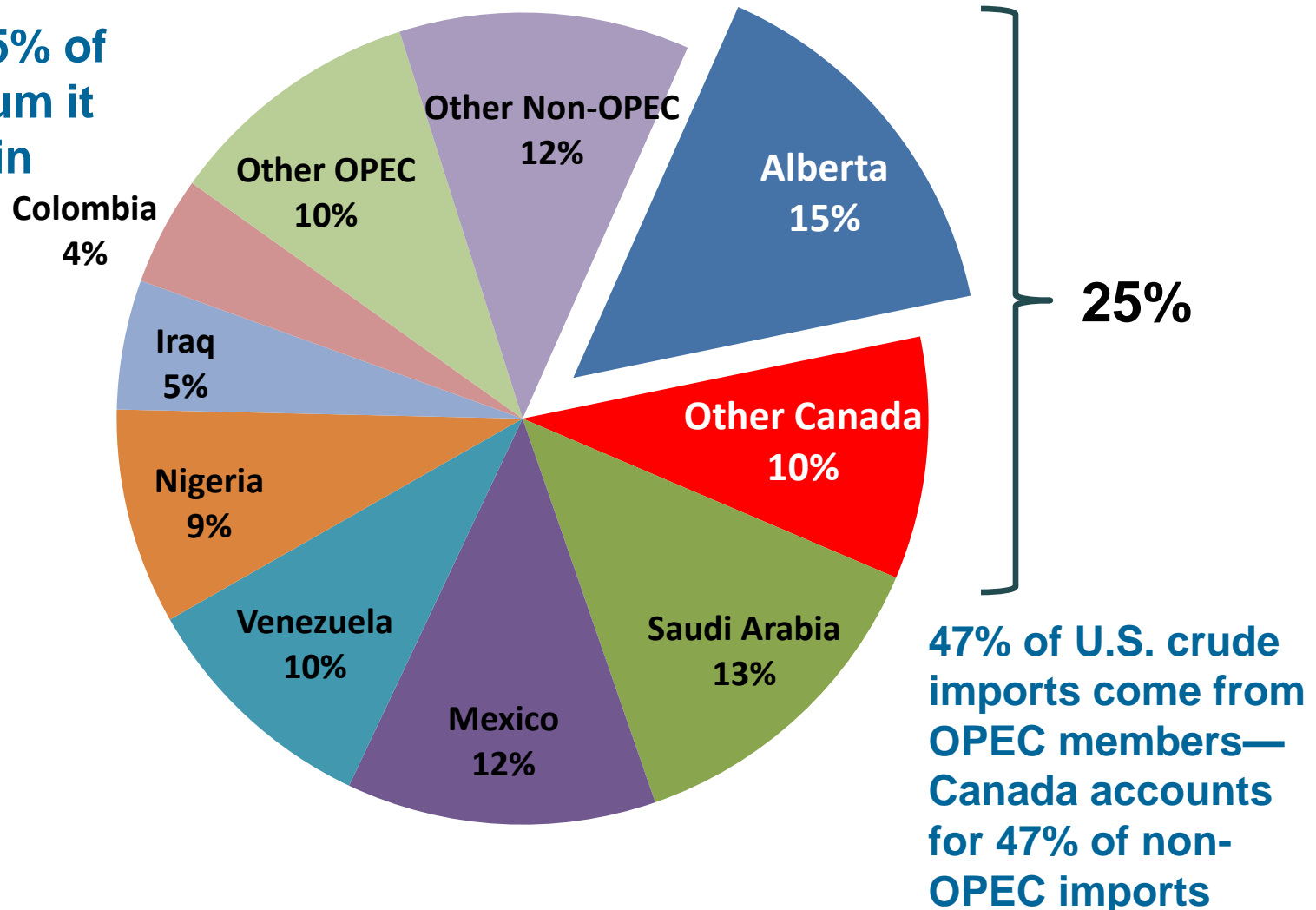
Source: Oil & Gas Journal
January 1, 2012



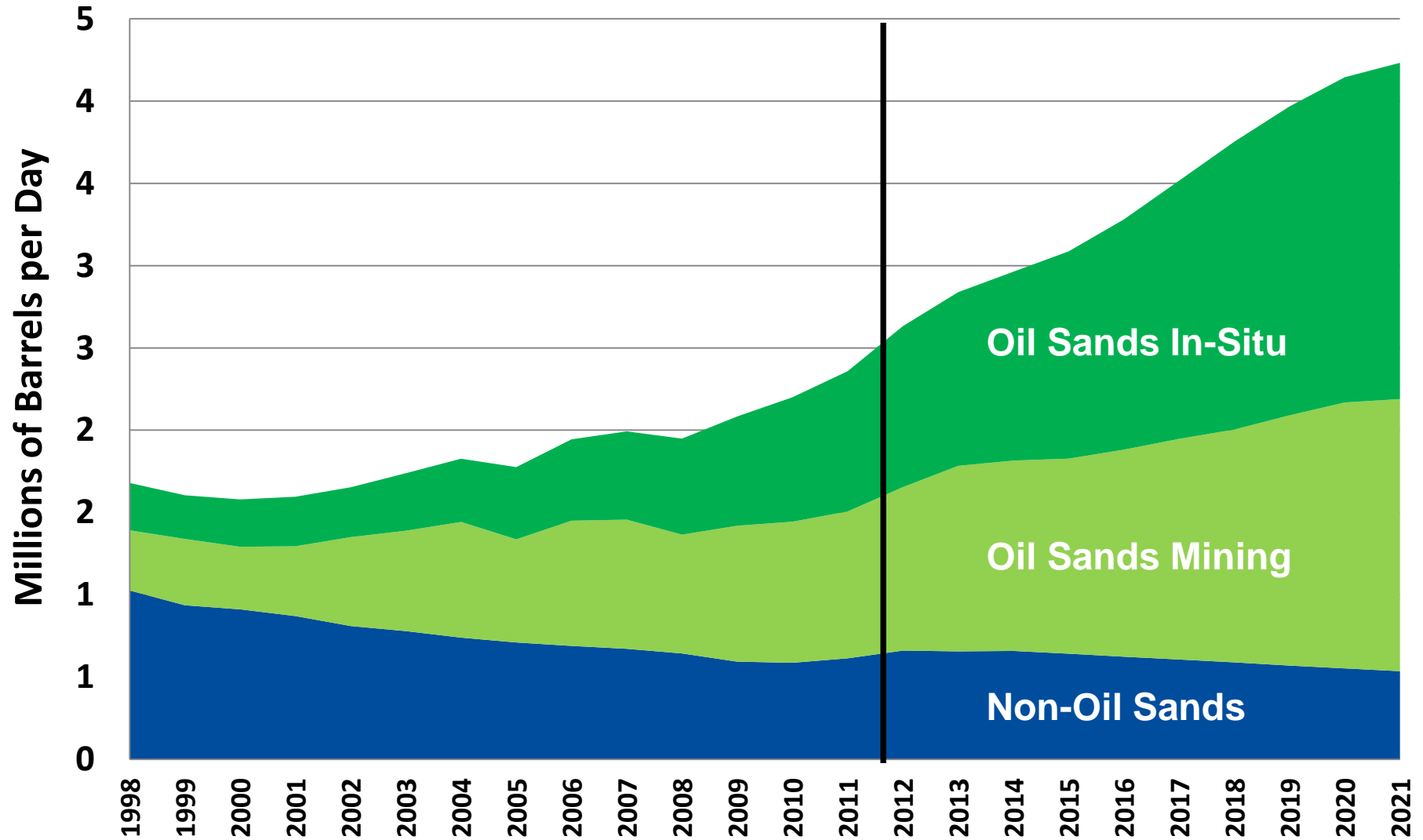
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Sources of U.S. Crude Oil Imports in 2011

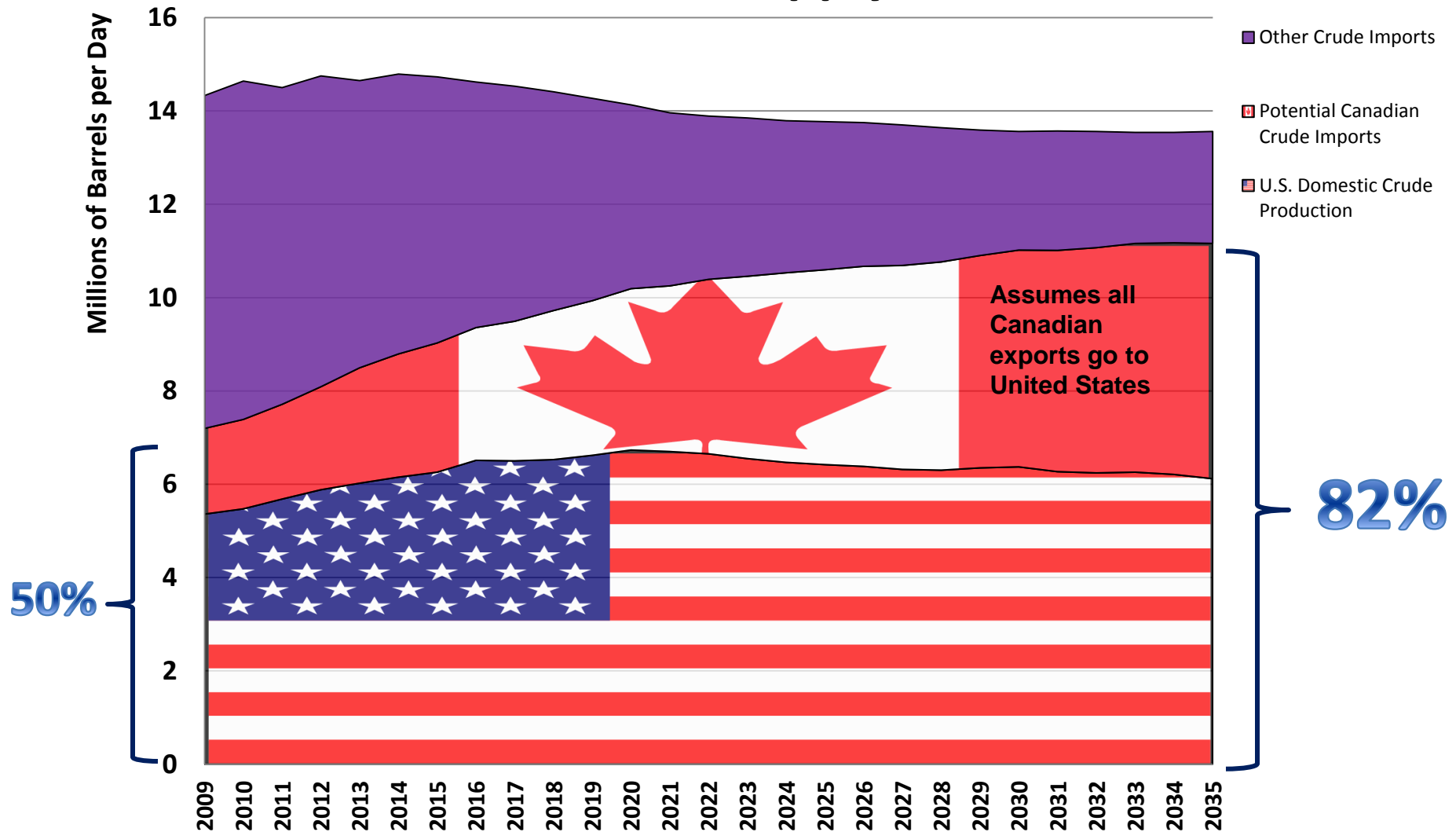
The U.S. imported 45% of the petroleum it consumed in 2011



Alberta Oil Production



U.S. Crude Oil Supply Forecast



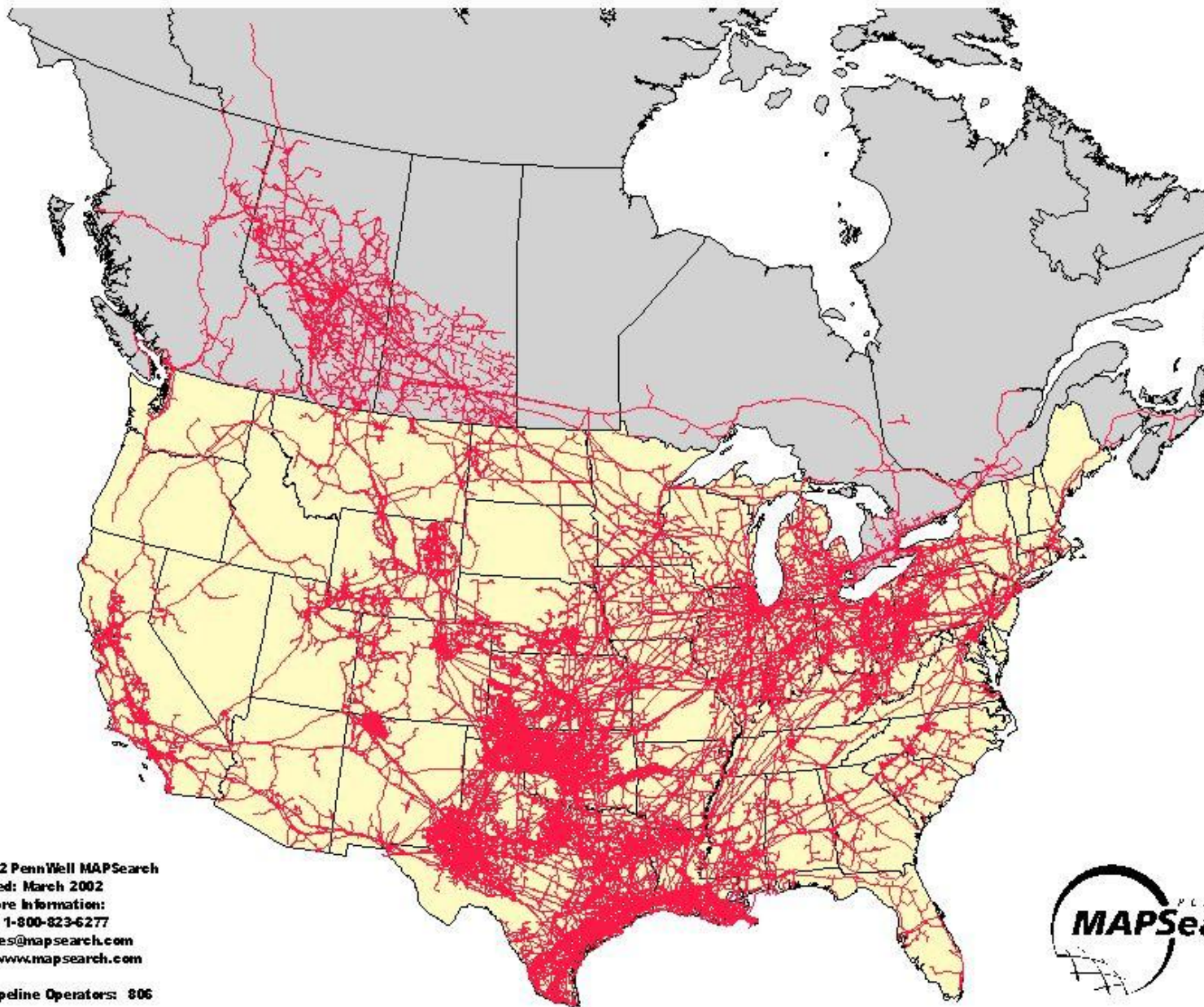


Moving Energy: Pipelines



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PennWell MAPSearch Pipeline Coverage - All Commodities



Copyright 2002 PennWell MAPSearch
Revised: March 2002
For More Information:
Phone: 1-800-823-6277
E-Mail: sales@mapsearch.com
Web Site: www.mapsearch.com

Number of Pipeline Operators: 806





- 1 - Enterprise/ETP Cushing-Gulf
- 2 - Enbridge Monarch
- 3 - Keystone Cushing MarketLink

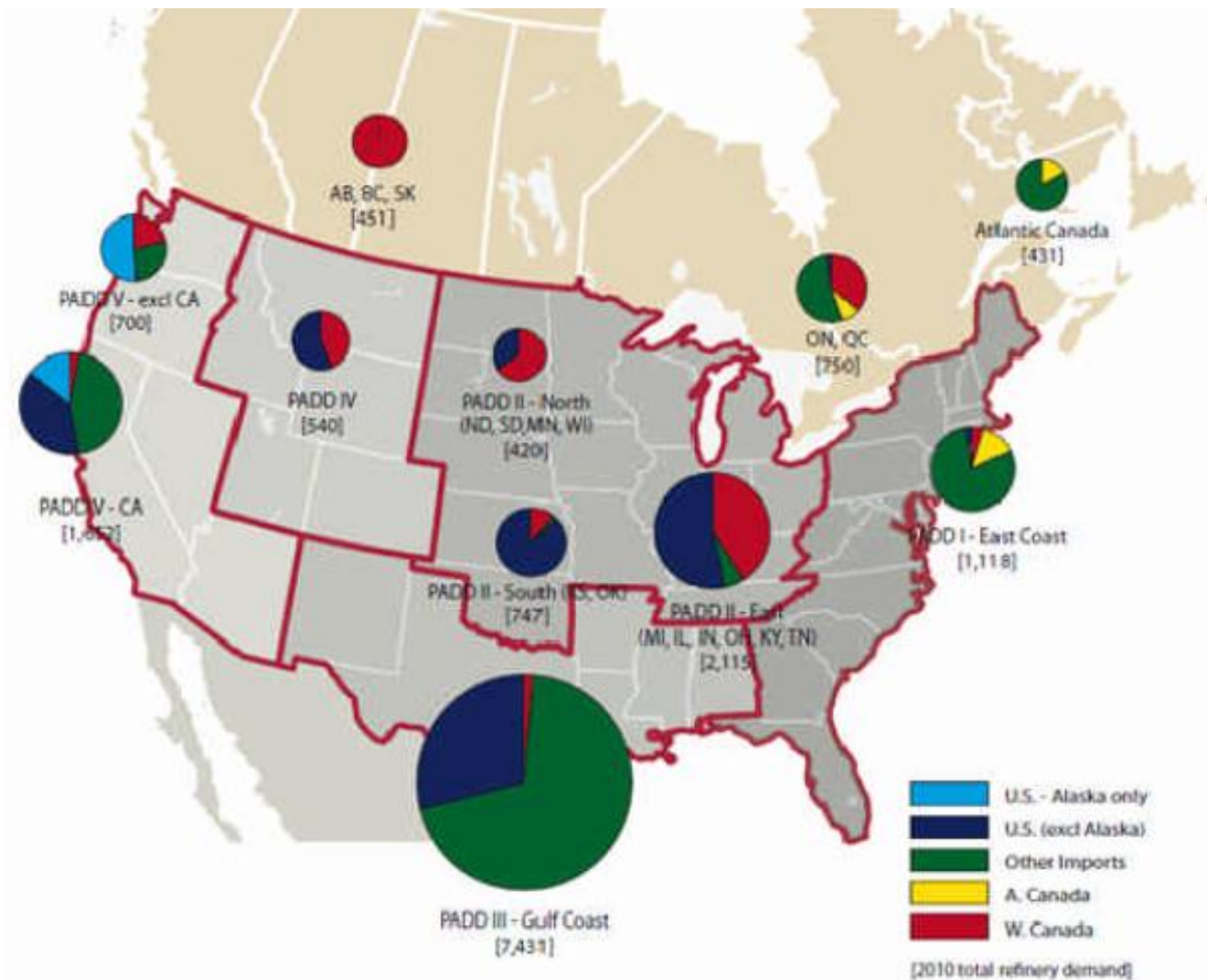
Canadian and U.S. Oil Pipelines

- Enbridge Pipelines, Alberta Clipper and connections to the U.S. Midwest
- Kinder Morgan Express
- Kinder Morgan Trans Mountain
- TransCanada Keystone
- ... Proposed pipelines to the West Coast
- / - - Existing / Proposed pipelines to PADD III
- ... Expansion to existing pipeline



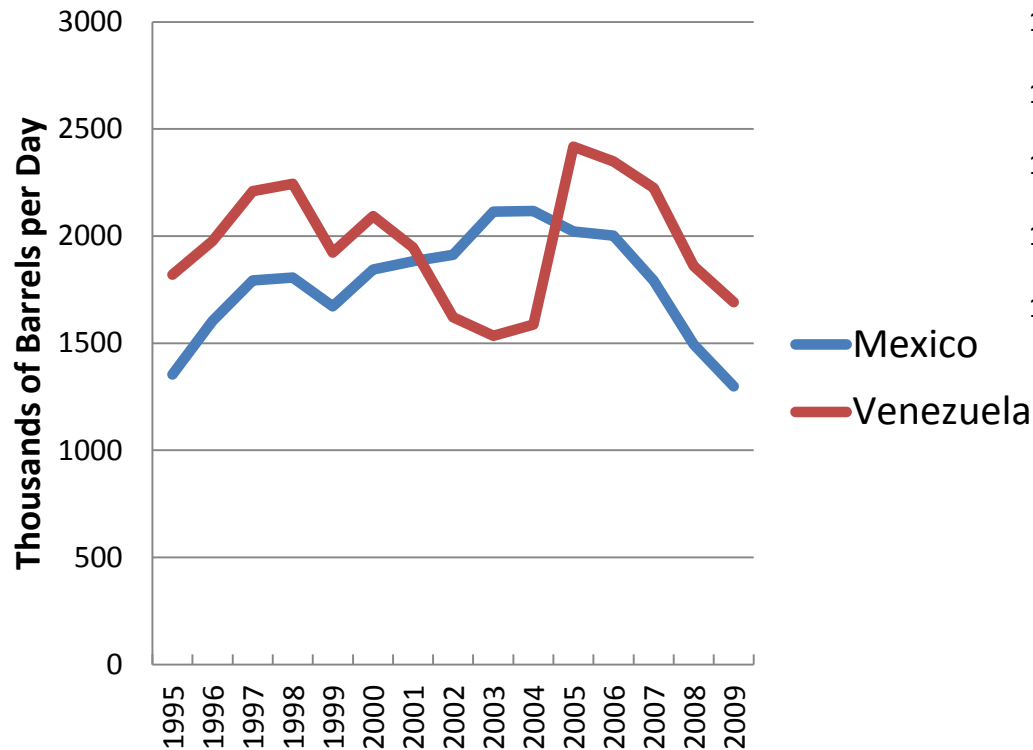
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Canadian oil in U.S. supply

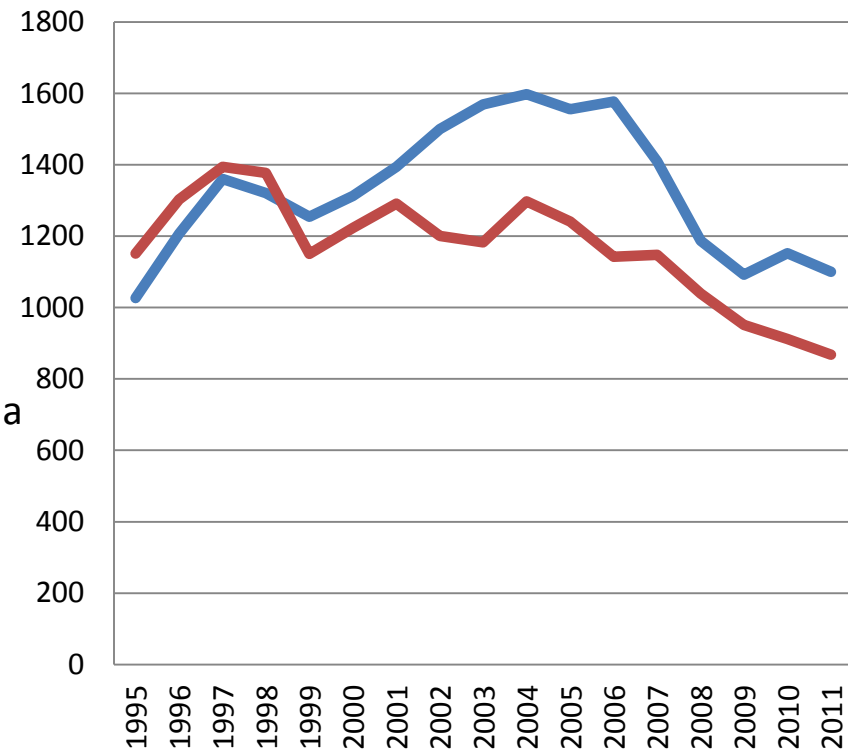


Gulf Coast Suppliers Decline

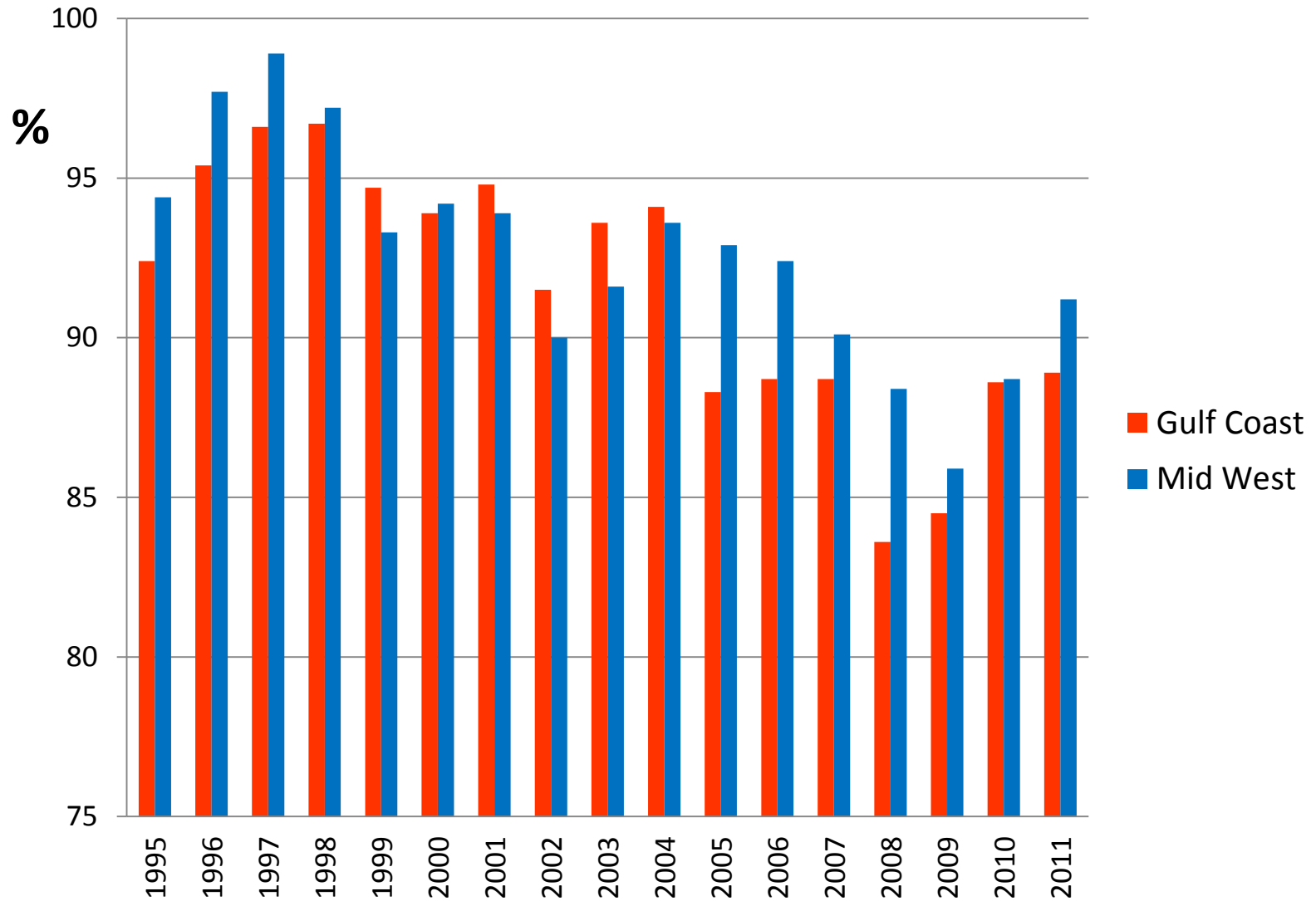
Crude Oil Production



US Imports of Crude Oil

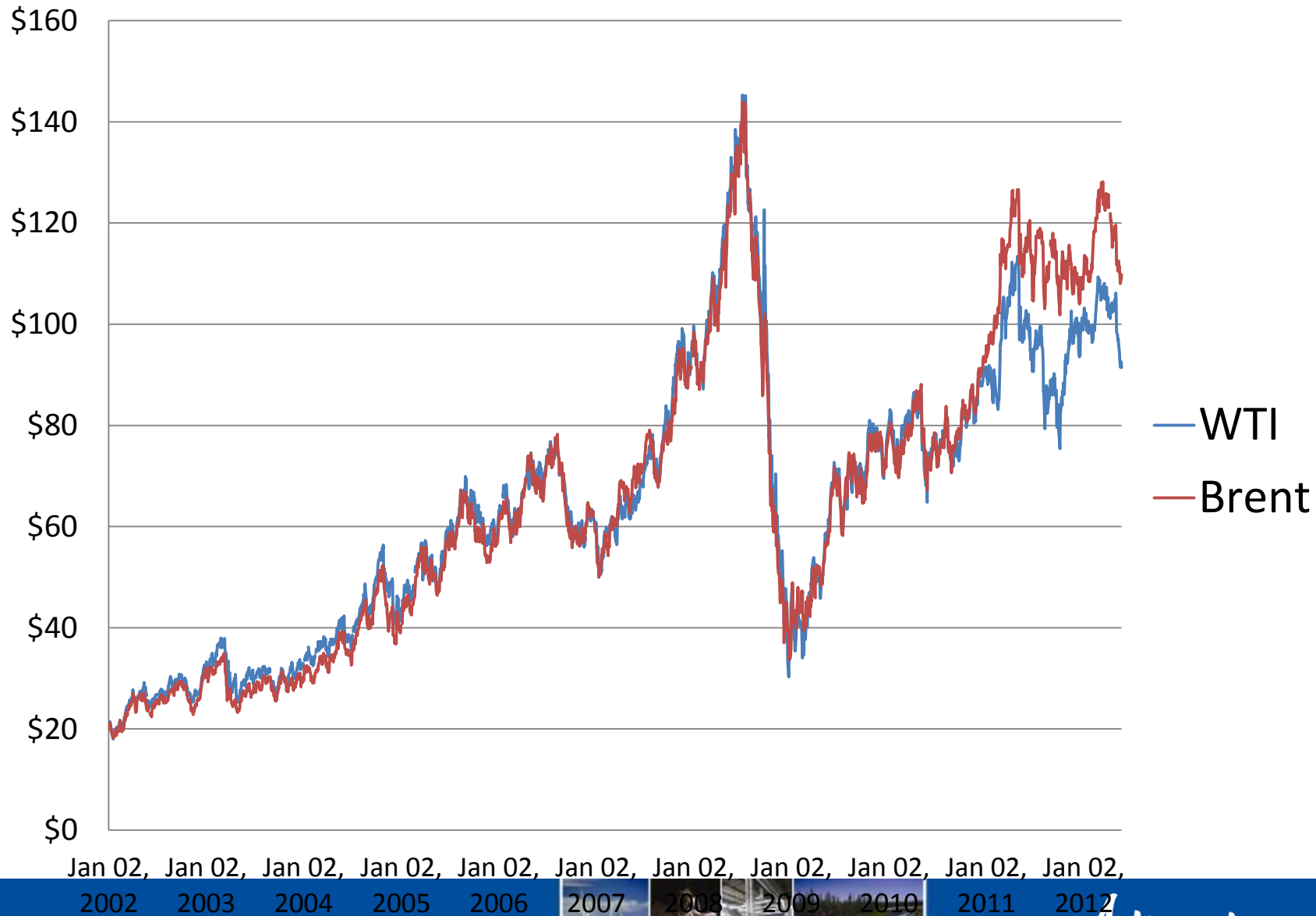


Refinery Utilization Mid-West vs Gulf Coast

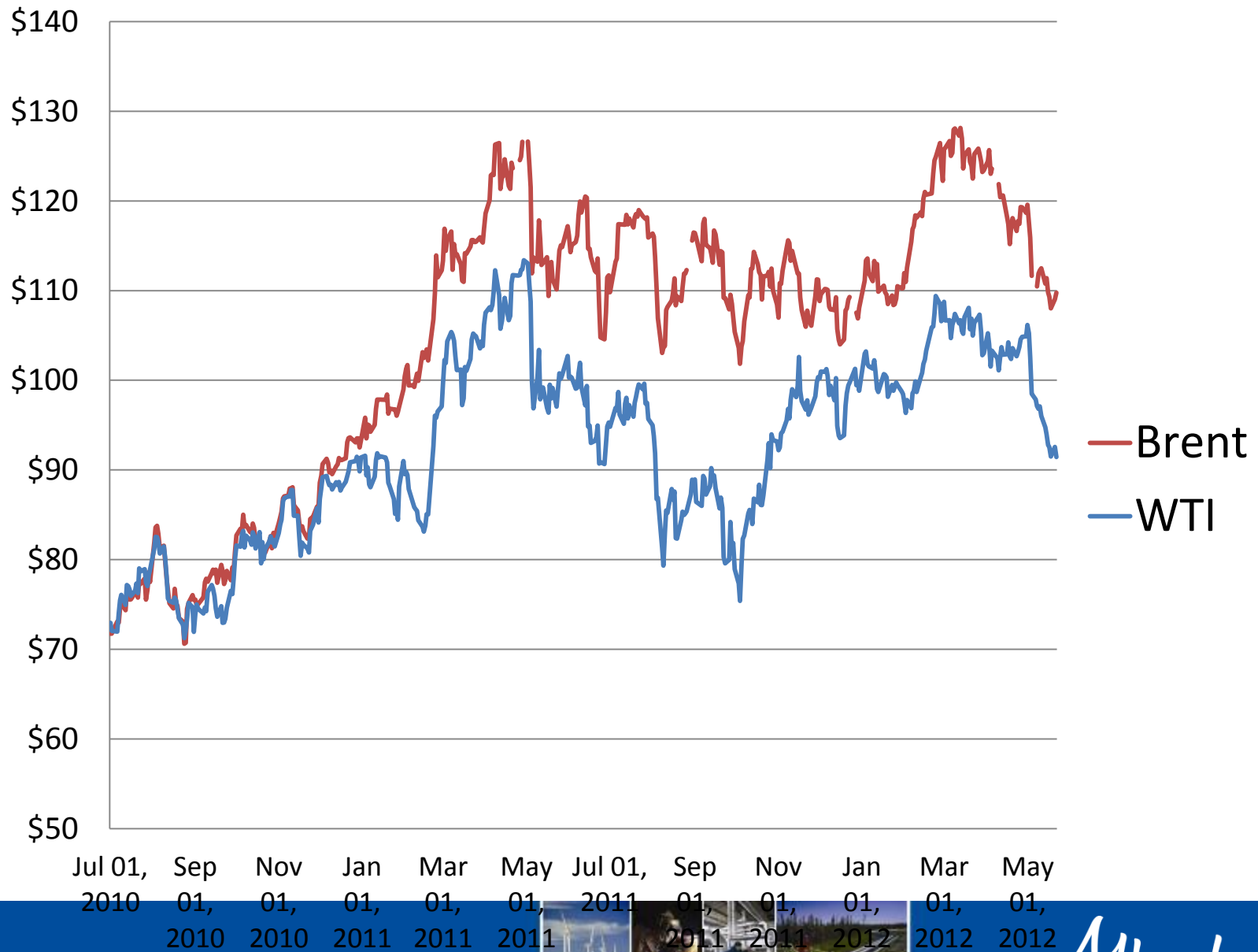




Price per Barrel



Price per Barrel



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Keystone XL



Keystone XL



- Keystone State Department Approval:
1 year, 11 months
- Alberta Clipper State Department Approval:
2 years, 2 months
- Keystone XL Environmental Impact Analysis:
2 years, 11 months + 1 year



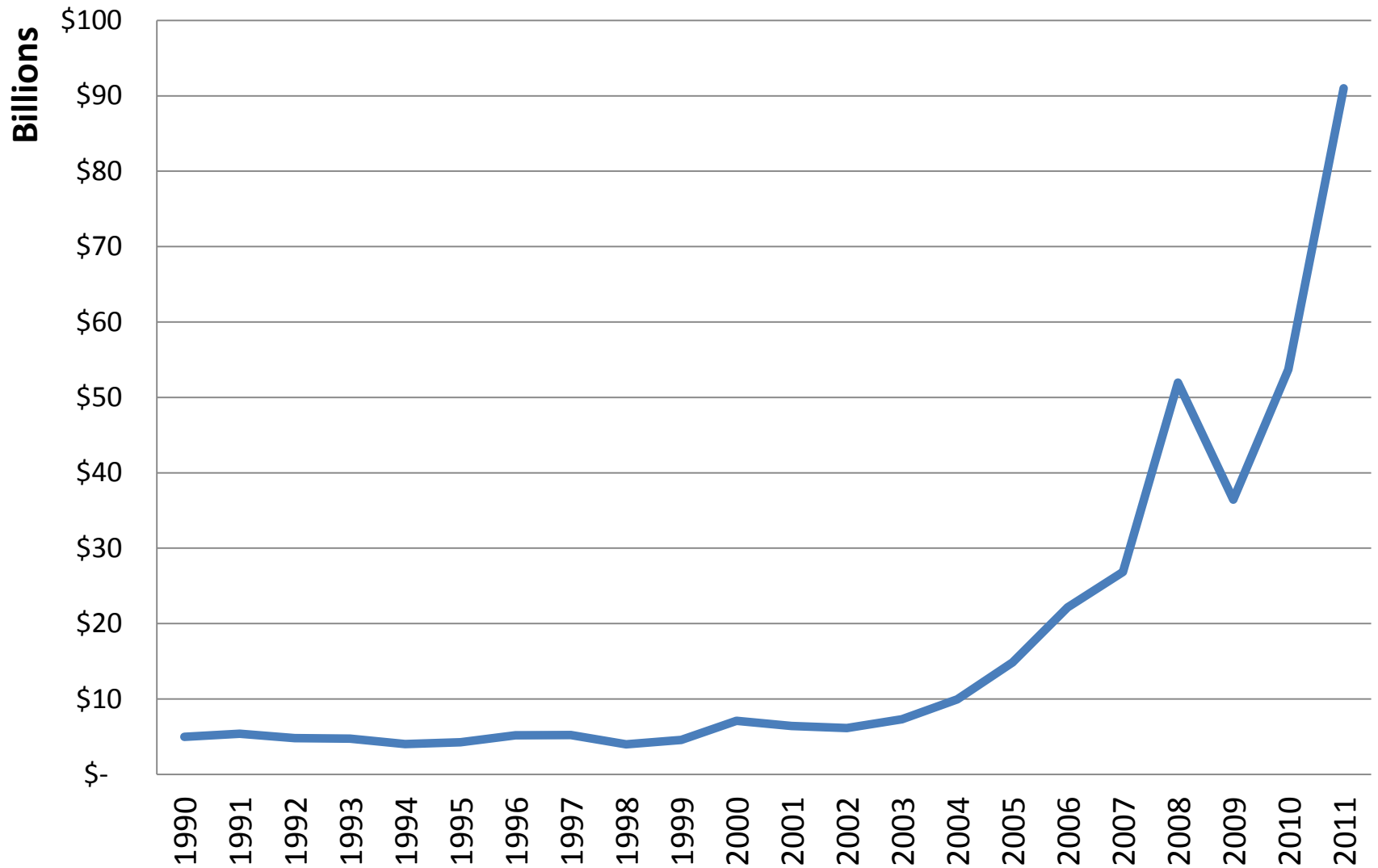
Intra-US Oil Sands Crude Movement



- 2011 volume roughly 2.5 times greater than previous 5-year period
- Large volumes of oil sands derived crudes are moving from Midwest to Gulf Coast through indirect/inefficient routes
 - Motivated by price differential
- Recent US EIA estimates:
 - Indirect/Older Pipeline → 166k bbl/d
 - Tanker/Barge → 28,000 bbl/d
 - Truck/Rail → Unknown, but may exceed pipeline shipments



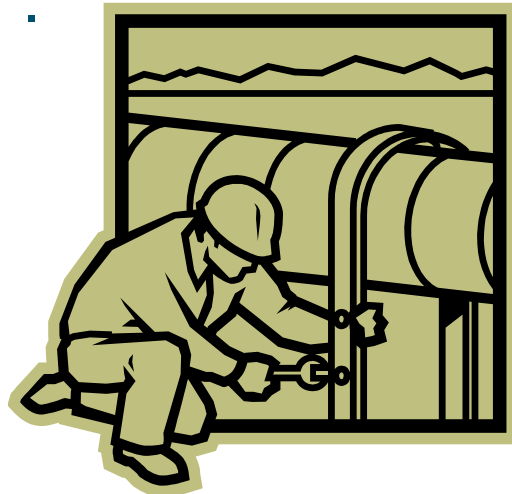
U.S. Exports of Refined Petroleum Products



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Pipeline Corrosion

- Oil sands products have been transported for decades through pipelines in the U.S. and Canada.
- The American Petroleum Institute (API) examined U.S. pipeline accident data from 2002 through 2011 and found “**no instances of crude oil releases caused by internal corrosion from pipelines carrying Canadian crude**”.



Pipeline Corrosion

“...the internal corrosion related failures in the Alberta system over this time period per 1,000 pipeline miles per year were approximately **24 percent lower than in the U.S. system**...Therefore, **there is no evidence that the transportation of oil sands derived crude oil in Alberta has resulted in a higher corrosion** related failure rate than occurs in the transportation of the variable-sourced crude oils in the U.S. system.”

U.S. State Department
Keystone XL
Supplemental Draft Environmental Impact
Statement





Energy and Security



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Energy and security

“ Significant growth in oil sands imports into the United States will reduce the required volume of oil imports from elsewhere in the world.

The oil sands are sourced from a politically stable and secure country adjacent to the United States. ”

SOURCE: Cambridge Energy Research Associates:
Growth in the Canadian Oil Sands: Finding the New Balance, May 2009



Energy and security

“ Perhaps the greatest impact of expanded oil sands exploitation would be a diversion of revenues away from adversarial governments. ”

Council on Foreign Relations, *The Canadian Oil Sands: Energy Security vs. Climate Change*, May 2009

“ Production from Canadian oil sands is set to continue to grow over the projection period, making an important contribution to the world’s energy security. ”

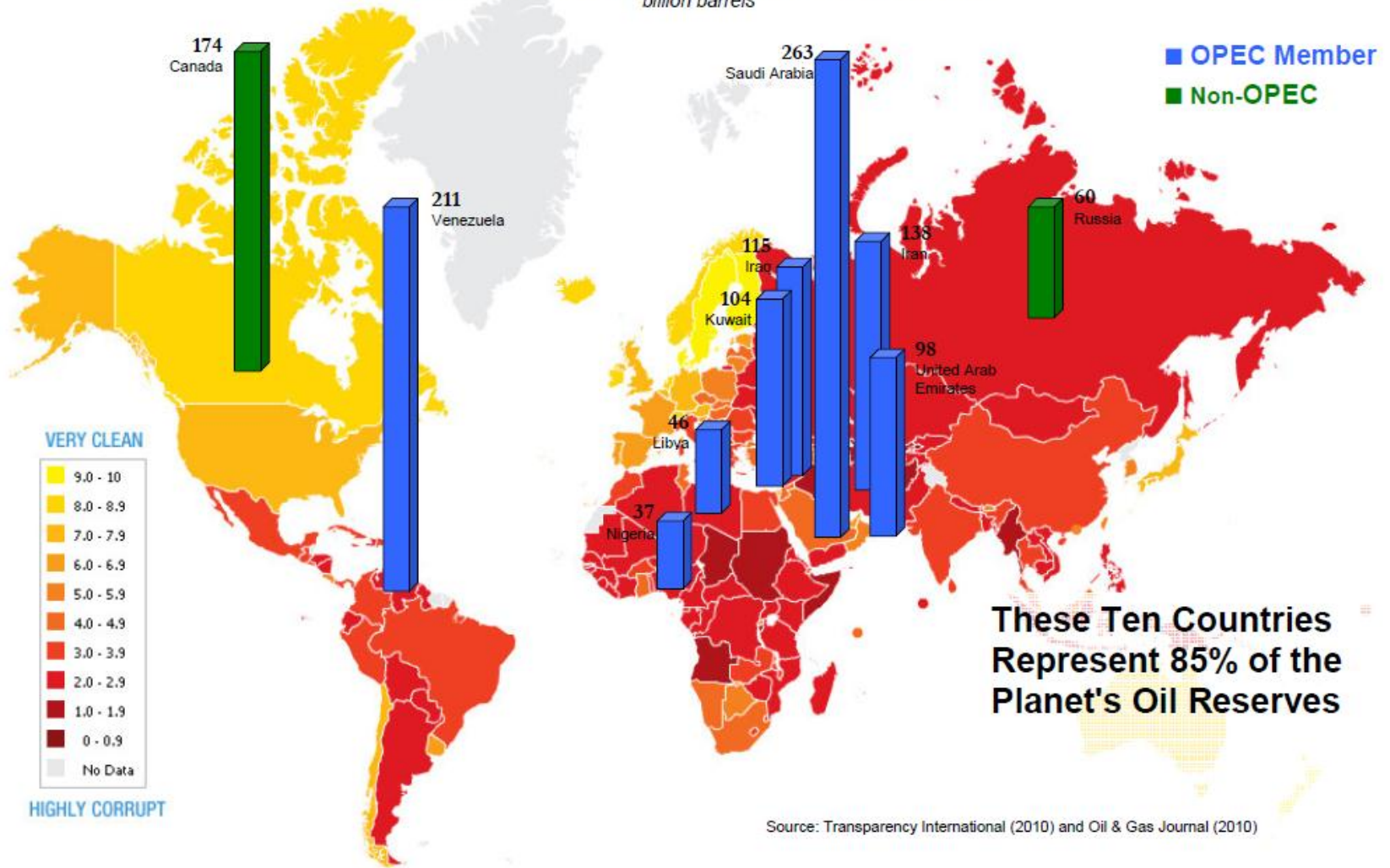
International Energy Agency, “2010 World Energy Outlook”



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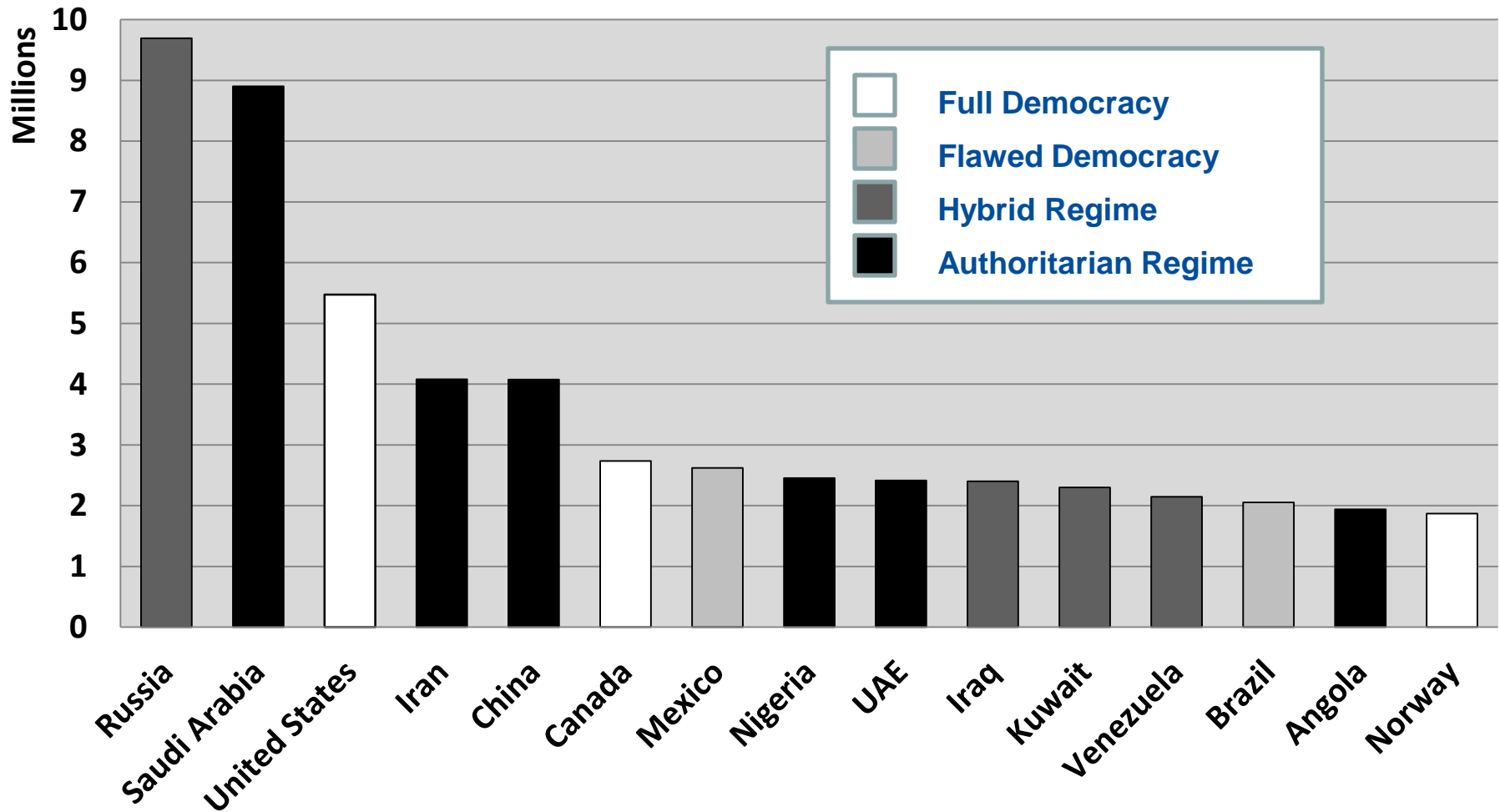
Energy Security

Corruption Indices of Countries with Top Global Reserves
*billion barrels



Oil and Democracy

World's Top 15 Oil Producers 2010 (Barrels per Day)



Major Oil Movement and Chokepoints

Major trade movements 2010

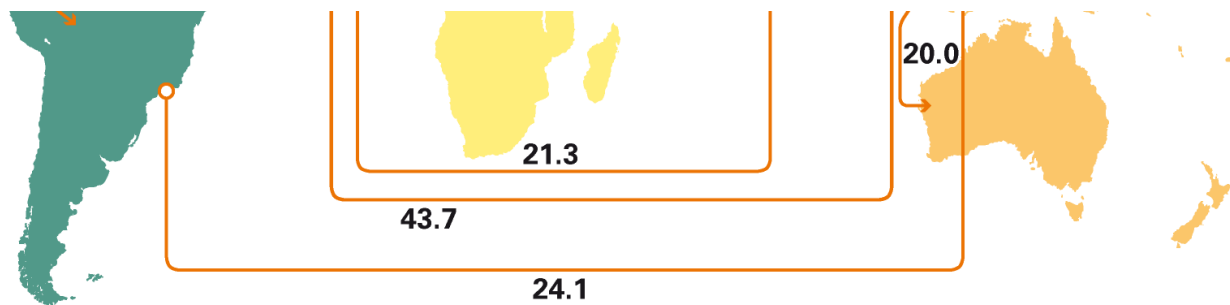
Trade flows worldwide (million tonnes)



“The international energy market is dependent upon reliable transport. The blockage of a chokepoint, even temporarily, can lead to substantial increases in total energy costs. In addition, chokepoints leave oil tankers vulnerable to theft from pirates, terrorist attacks, and political unrest in the form of wars or hostilities as well as shipping accidents which can lead to disastrous oil spills.”

U.S. EIA

- US
- Canada
- Mexico
- S. & Cent. America
- Europe & Eurasia
- Middle East
- Africa
- Asia Pacific



SOURCE: BP Statistical Review 2011



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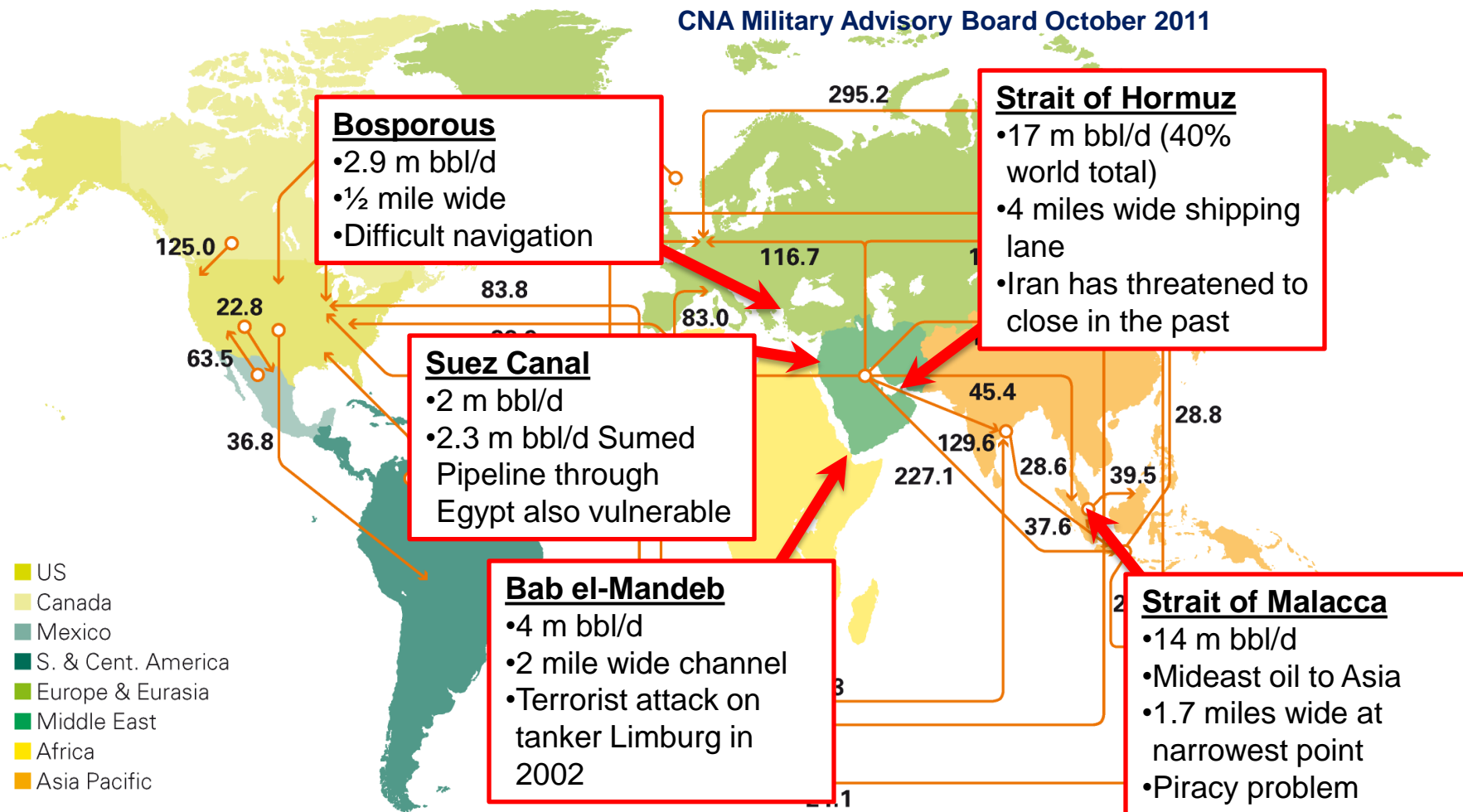
Major Oil Movement and Chokepoints

Major trade movements 2010

Trade flows worldwide (million tonnes)

A 30 day closure of the Strait of Hormuz would cost the U.S. \$75 billion in GDP

CNA Military Advisory Board October 2011



SOURCE: BP Statistical Review 2011



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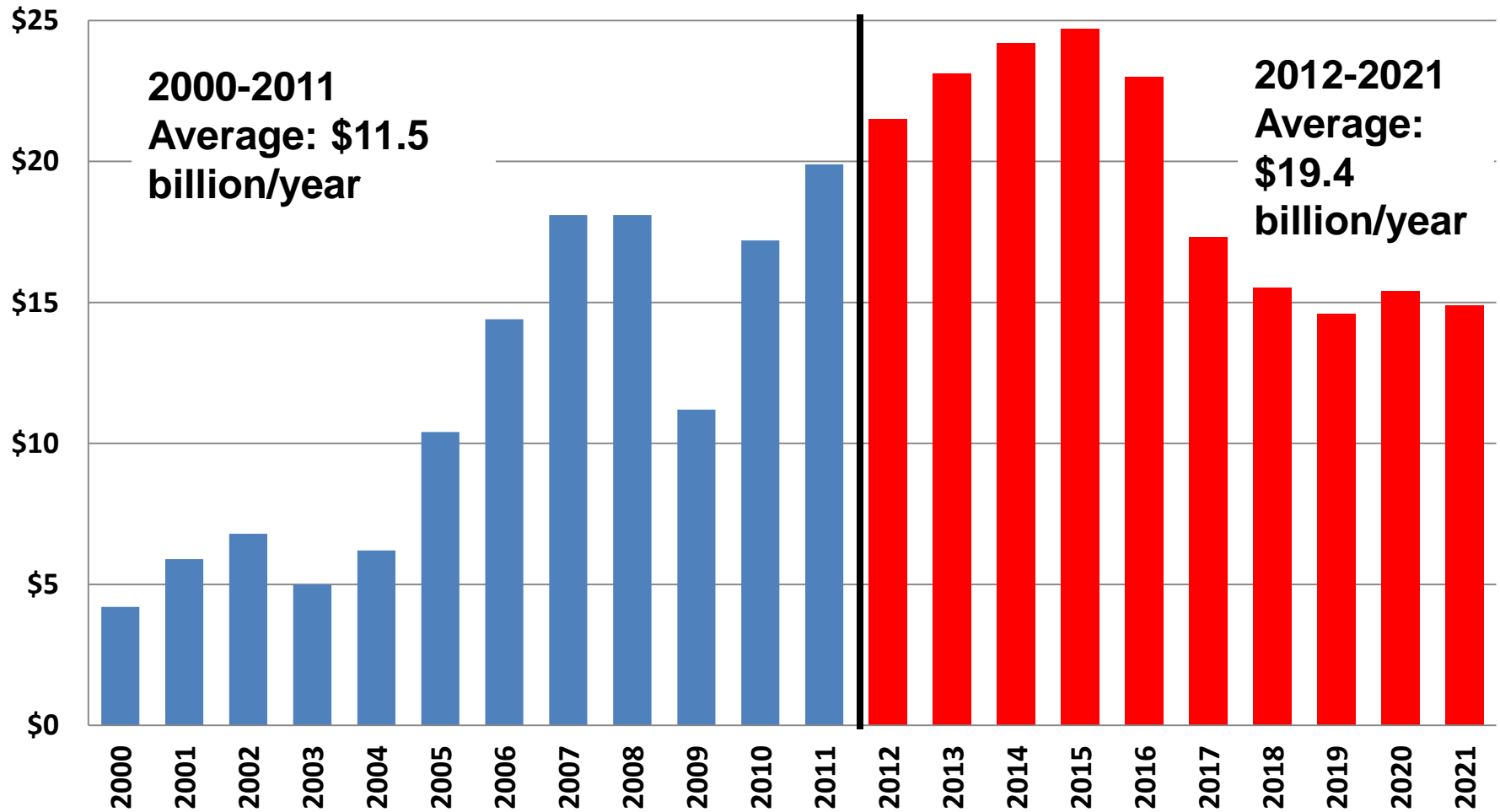
Economic impact of the Oil Sands: United States



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Investment

Oil Sands Capital Investment (Billions)



Oil Sands and the U.S. Economy

- With \$194 billion in forecast capital spending on oil sands development in the next 10 years a significant amount of that will be spent on purchasing material, equipment, parts and services from suppliers in the United States.
- “A greater fraction of money used to buy Canadian oil will likely later be spent directly on U.S. goods and services and hence contribute directly to U.S. growth.”

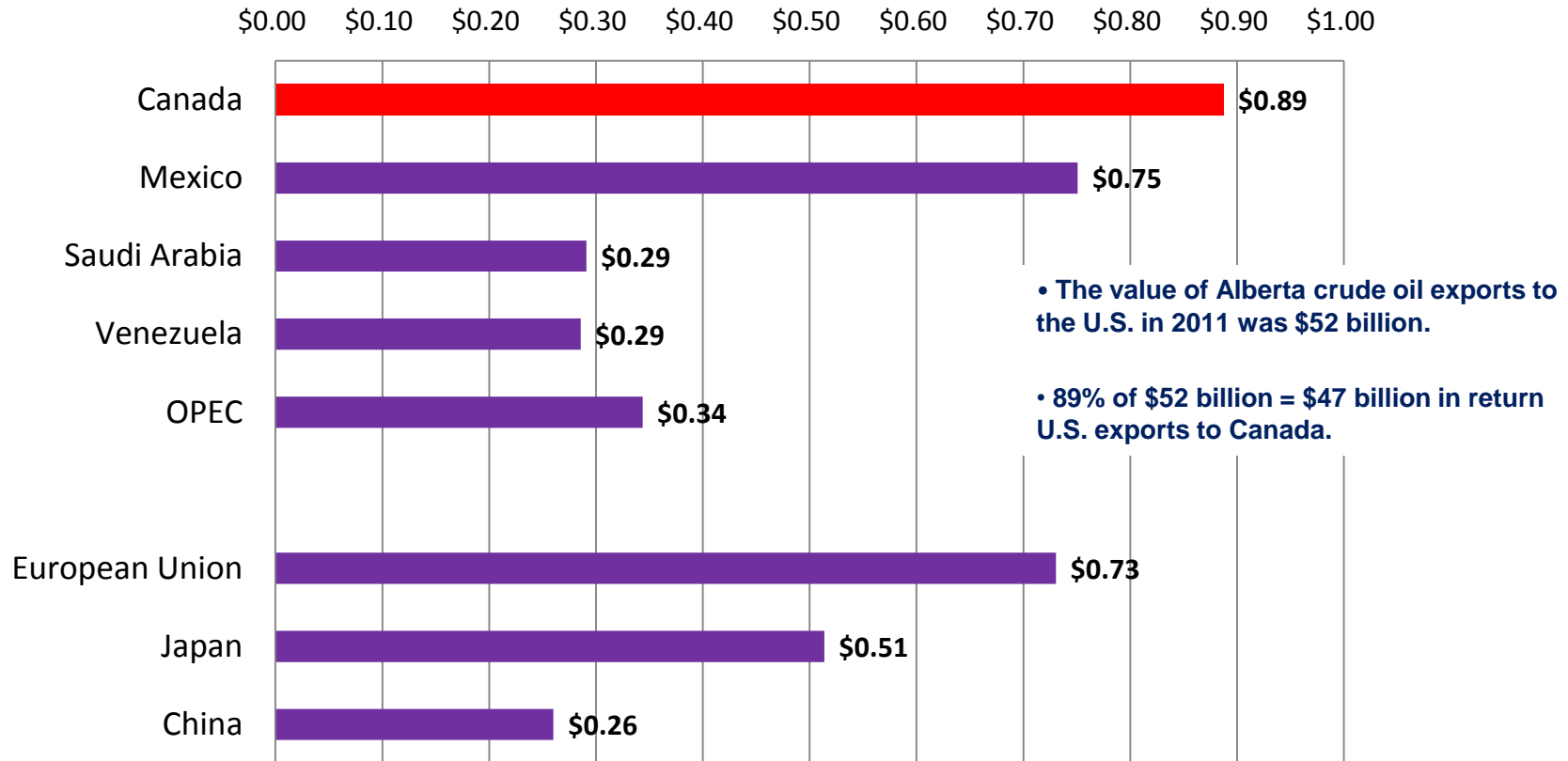
Council on Foreign Relations, “The Canadian Oil Sands: Energy Security vs. Climate Change”



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Economic impact in the U.S.

For every dollar spent on imported goods in 2011, this is how much returned to the US through exports



Source: US Census Bureau and Statistics Canada



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Number of Firms Supplying the Canadian Oil Sands

State	# Suppliers	State	# Suppliers	State	# Suppliers
Alabama	9	Massachusetts	38	Ohio	39
Alaska	1	Maryland	7	Oklahoma	36
Arkansas	2	Maine	1	Oregon	16
Arizona	8	Michigan	21	Pennsylvania	67
California	71	Minnesota	38	Rhode Island	3
Colorado	28	Missouri	19	South Carolina	10
Connecticut	17	Mississippi	3	South Dakota	2
Delaware	4	Montana	5	Tennessee	8
Florida	29	North Carolina	14	Texas	170
Georgia	26	North Dakota	4	Utah	10
Iowa	6	Nebraska	5	Virginia	12
Idaho	3	New Hampshire	3	Vermont	2
Illinois	69	New Jersey	28	Washington	20
Indiana	10	New Mexico	2	Wisconsin	34
Kansas	7	Nevada	2	West Virginia	2
Kentucky	3	New York	39	Wyoming	1
Louisiana	11				

Over **906** U.S. companies supply equipment, parts and services being used in oil sands operations.



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Oil sands development and the U.S. economy

- Oil sands development will, on average, contribute between **\$8.4 billion** and **\$15.9 billion** per year to the U.S. economy between 2010 and 2035.*



* On this and following slides, the actual U. S. benefit depends on the extent to which growing production has pipeline access to markets.

SOURCE: *Economic Impacts of Staged Development of Oil Sands Projects in Alberta (2010-2035)*, Canadian Energy Research Institute (CERI), June 2011



Oil sands development and U.S. jobs

- Oil sands development will support an average **93,000 to 175,000 U.S. jobs** per year between 2010 and 2035.
- The total earnings of these workers will average from **\$4 billion to \$7.5 billion** per year.



SOURCE: *Economic Impacts of Staged Development of Oil Sands Projects in Alberta (2010-2035)*, Canadian Energy Research Institute (CERI), June 2011



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SLC Oil Sands Economic Impact

Impact of Alberta Oil Sands Development 2010-2035

State	GDP Gain (\$ Millions) Annual Average		Employment Created or Preserved Annual Average		Annual Avg. Compensation of Employees (\$ Millions)	
	Low	High	Low	High	Low	High
Alabama	\$ 76	\$ 147	1,120	2,120	\$ 38	\$ 74
Arkansas	\$ 44	\$ 85	680	1,280	\$ 21	\$ 40
Florida	\$ 302	\$ 576	4,080	7,720	\$ 147	\$ 280
Georgia	\$ 166	\$ 317	2,240	4,240	\$ 87	\$ 165
Kentucky	\$ 71	\$ 139	1,040	2,000	\$ 35	\$ 68
Louisiana	\$ 209	\$ 388	1,600	2,960	\$ 67	\$ 123
Mississippi	\$ 45	\$ 86	680	1,320	\$ 22	\$ 41
Missouri	\$ 101	\$ 196	1,480	2,840	\$ 54	\$ 104
North Carolina	\$ 183	\$ 355	2,160	4,160	\$ 81	\$ 158
Oklahoma	\$ 80	\$ 155	960	1,840	\$ 33	\$ 63
South Carolina	\$ 65	\$ 128	1,040	2,040	\$ 35	\$ 69
Tennessee	\$ 109	\$ 214	1,600	3,080	\$ 56	\$ 109
Texas	\$ 766	\$ 1,457	7,080	13,400	\$ 303	\$ 576
Virginia	\$ 152	\$ 289	1,800	3,440	\$ 77	\$ 147
West Virginia	\$ 24	\$ 45	360	680	\$ 11	\$ 22
Sub Total	\$ 2,394	\$ 4,577	27,920	53,120	\$ 1,067	\$ 2,039
the United States	\$ 8,421	\$ 15,860	93,120	175,120	\$ 4,016	\$ 7,561



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Keystone XL Economic Impact on the U.S.

- + \$5.9 billion per year in GDP**
- + 65,480 U.S. jobs per year**
- + \$2.8 billion per year in wages.**



SLC KXL Economic Impact

US Impact of Keystone XL

State	GDP (\$ Millions)		Compensation of Employees (\$ Millions)		Employment Created or Preserved (Person-Years)	
	Total	Average per Year	Total	Average per Year	Total	Average per Year
Alabama	\$ 1,450	\$ 58	\$ 724	\$ 29	20,000	800
Arkansas	\$ 831	\$ 33	\$ 390	\$ 16	12,000	480
Florida	\$ 5,491	\$ 220	\$ 2,669	\$ 107	73,000	2,920
Georgia	\$ 3,037	\$ 121	\$ 1,578	\$ 63	40,000	1,600
Kentucky	\$ 1,378	\$ 55	\$ 676	\$ 27	19,000	760
Louisiana	\$ 3,554	\$ 142	\$ 1,105	\$ 44	27,000	1,080
Mississippi	\$ 825	\$ 33	\$ 398	\$ 16	13,000	520
Missouri	\$ 1,904	\$ 76	\$ 1,005	\$ 40	28,000	1,120
North Carolina	\$ 3,494	\$ 140	\$ 1,559	\$ 62	40,000	1,600
Oklahoma	\$ 1,512	\$ 60	\$ 617	\$ 25	18,000	720
South Carolina	\$ 1,267	\$ 51	\$ 676	\$ 27	20,000	800
Tennessee	\$ 2,130	\$ 85	\$ 1,084	\$ 43	30,000	1,200
Texas	\$ 13,871	\$ 555	\$ 5,484	\$ 219	127,000	5,080
Virginia	\$ 2,758	\$ 110	\$ 1,403	\$ 56	33,000	1,320
West Virginia	\$ 432	\$ 17	\$ 209	\$ 8	6,000	240
Sub-Total	\$ 3,190	\$ 128	\$ 1,612	\$ 64	39,000	1,560
Total US	\$ 148,636	\$ 5,945	\$ 70,813	\$ 2,833	1,637,000	65,480



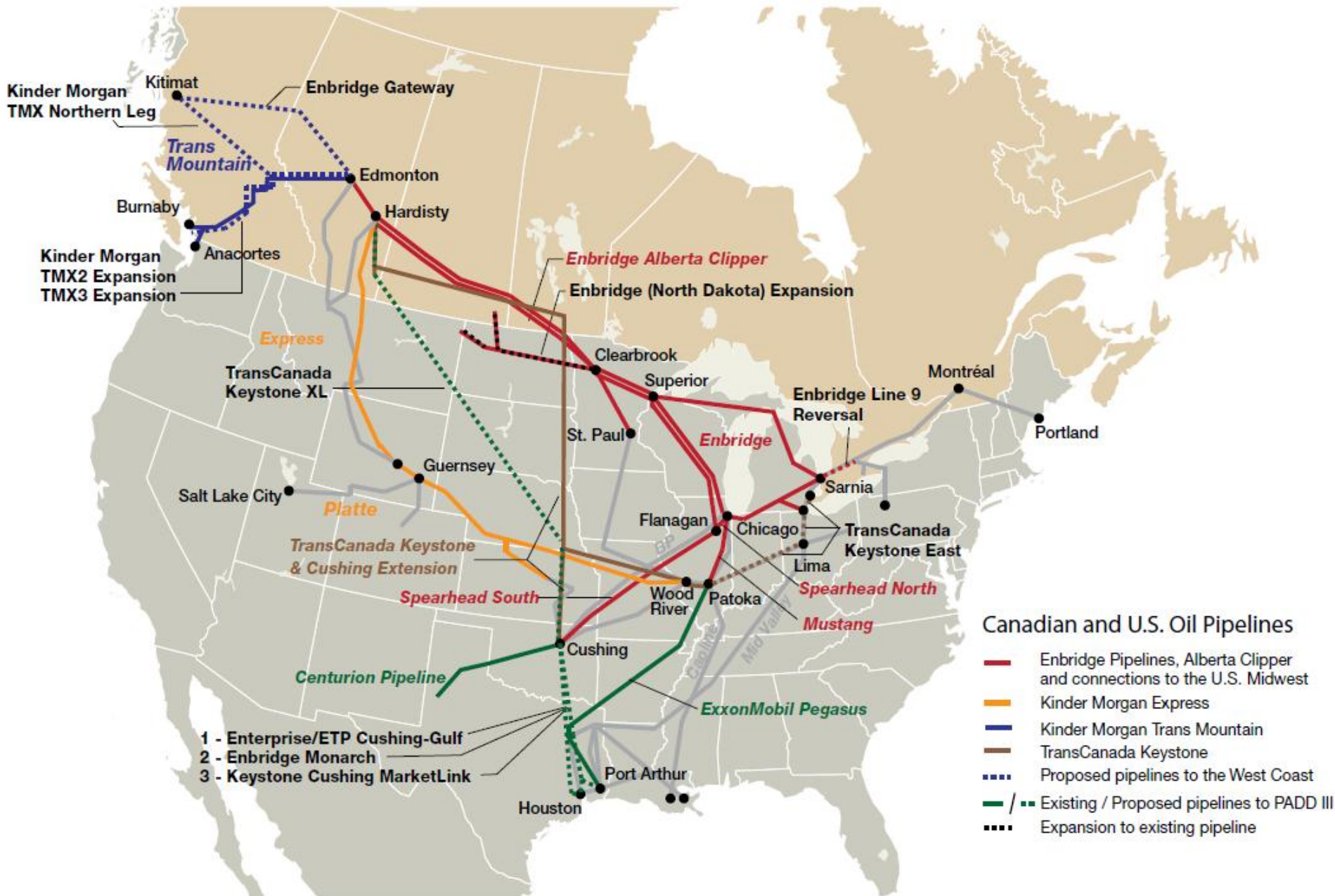
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Keystone XL Alternatives



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- 1 - Enterprise/ETP Cushing-Gulf
- 2 - Enbridge Monarch
- 3 - Keystone Cushing MarketLink

Canadian and U.S. Oil Pipelines

- Enbridge Pipelines, Alberta Clipper and connections to the U.S. Midwest
- Kinder Morgan Express
- Kinder Morgan Trans Mountain
- TransCanada Keystone
- ... Proposed pipelines to the West Coast
- / - - Existing / Proposed pipelines to PADD III
- ... Expansion to existing pipeline



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Kinder Morgan
TMX Northern Leg

Kitimat

Enbridge Gateway

*Trans
Mountain*

Edmonton

Burnaby

Hardisty

Kinder Morgan
TMX2 Expansion
TMX3 Expansion

Anacortes

Express

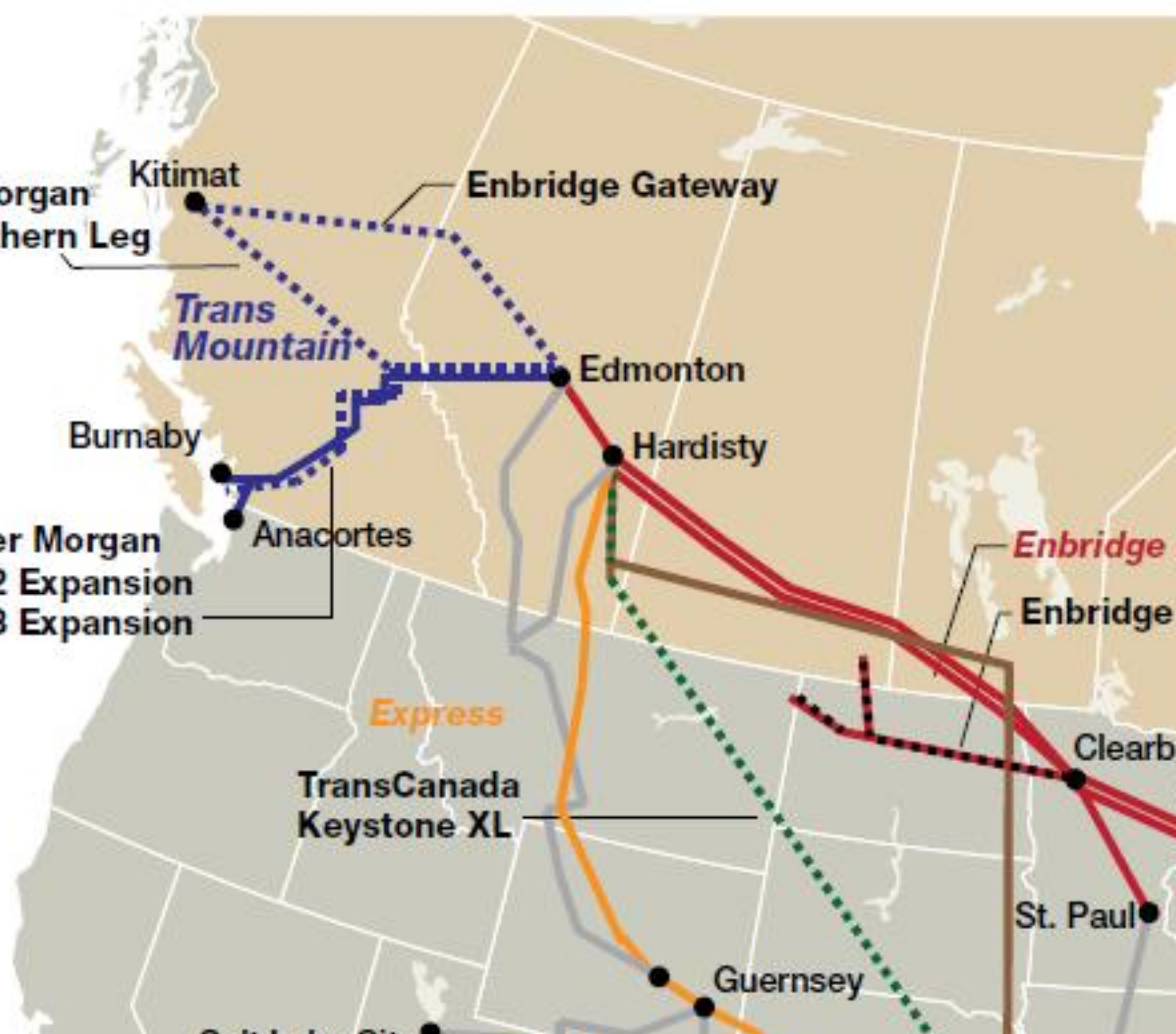
TransCanada
Keystone XL

Enbridge
Enbridge

Clearb

St. Paul

Guernsey



West Coast Pipelines



SOURCE: ENBRIDGE INC., KINDER MORGAN

JONATHAN RIVAIT / NATIONAL POST

Northern Gateway (Enbridge)

- \$5.5 billion
- 1,177 km
- 36 inch, 525,000 bpd crude oil
- 20 inch, 193,000 bpd condensate
- Kitimat
 - 3rd largest port in BC
 - Aluminum smelter
 - 2 LNG proposed LNG terminals

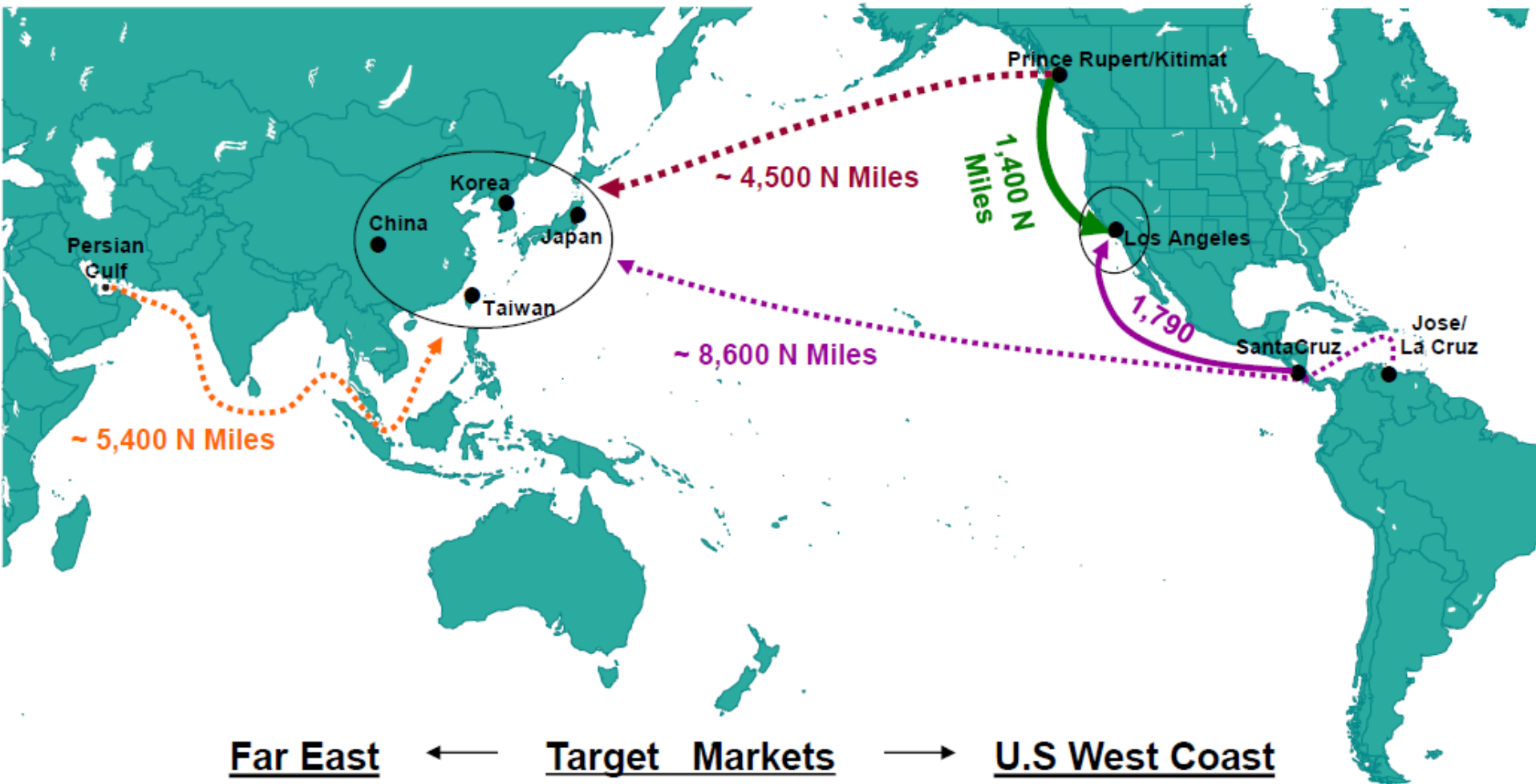
TransMountain Expansion (Kinder Morgan)

- Since 1957
- 1,150 km
- To Vancouver, Anacortes and Ferndale
- 300,000 bpd
- Proposed expansion +400,000 bpd
- Proposed Northern Expansion would link to Kitimat (400,000 bpd)



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West Coast Access

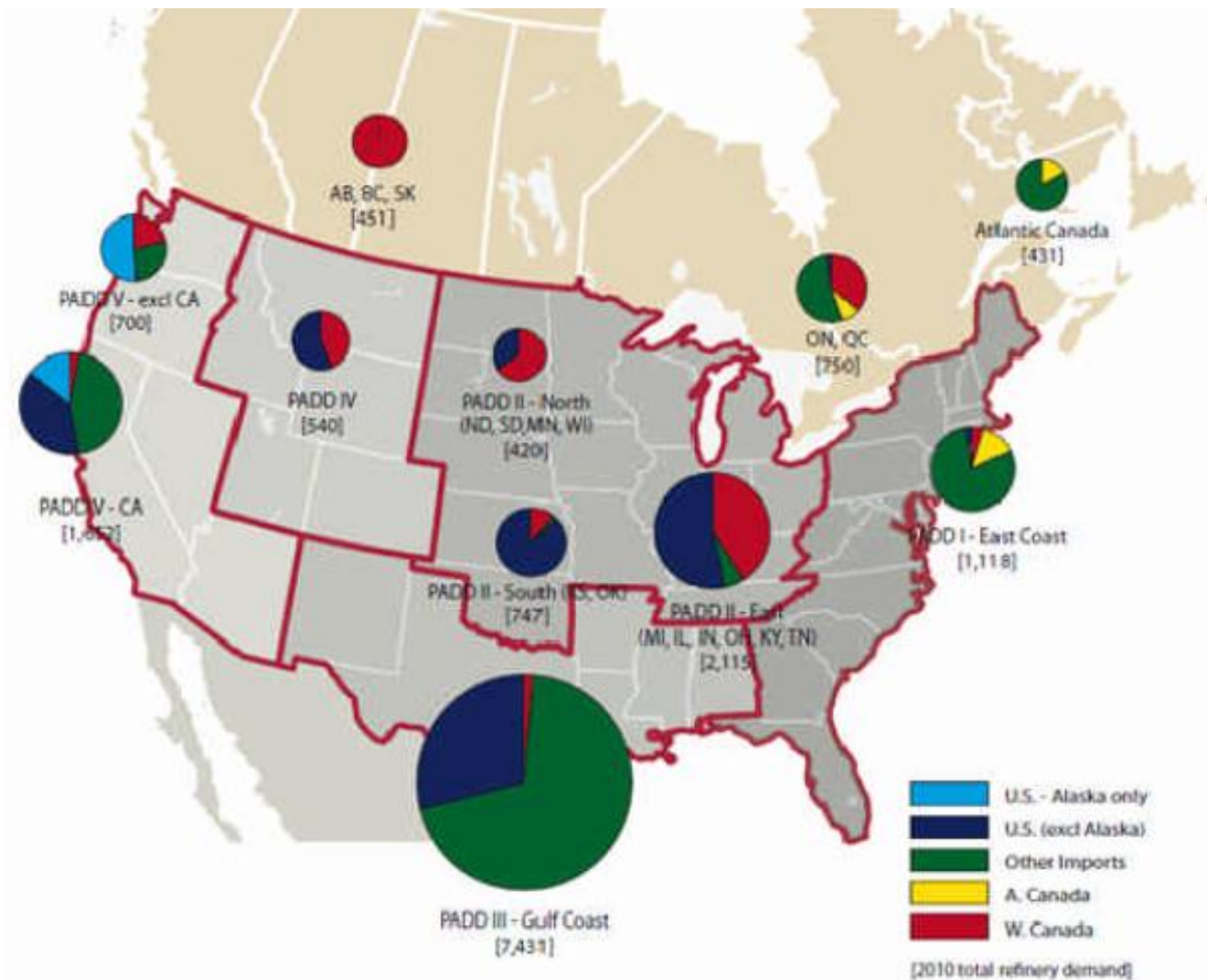


Competitive travel distances for Canadian supply to both markets



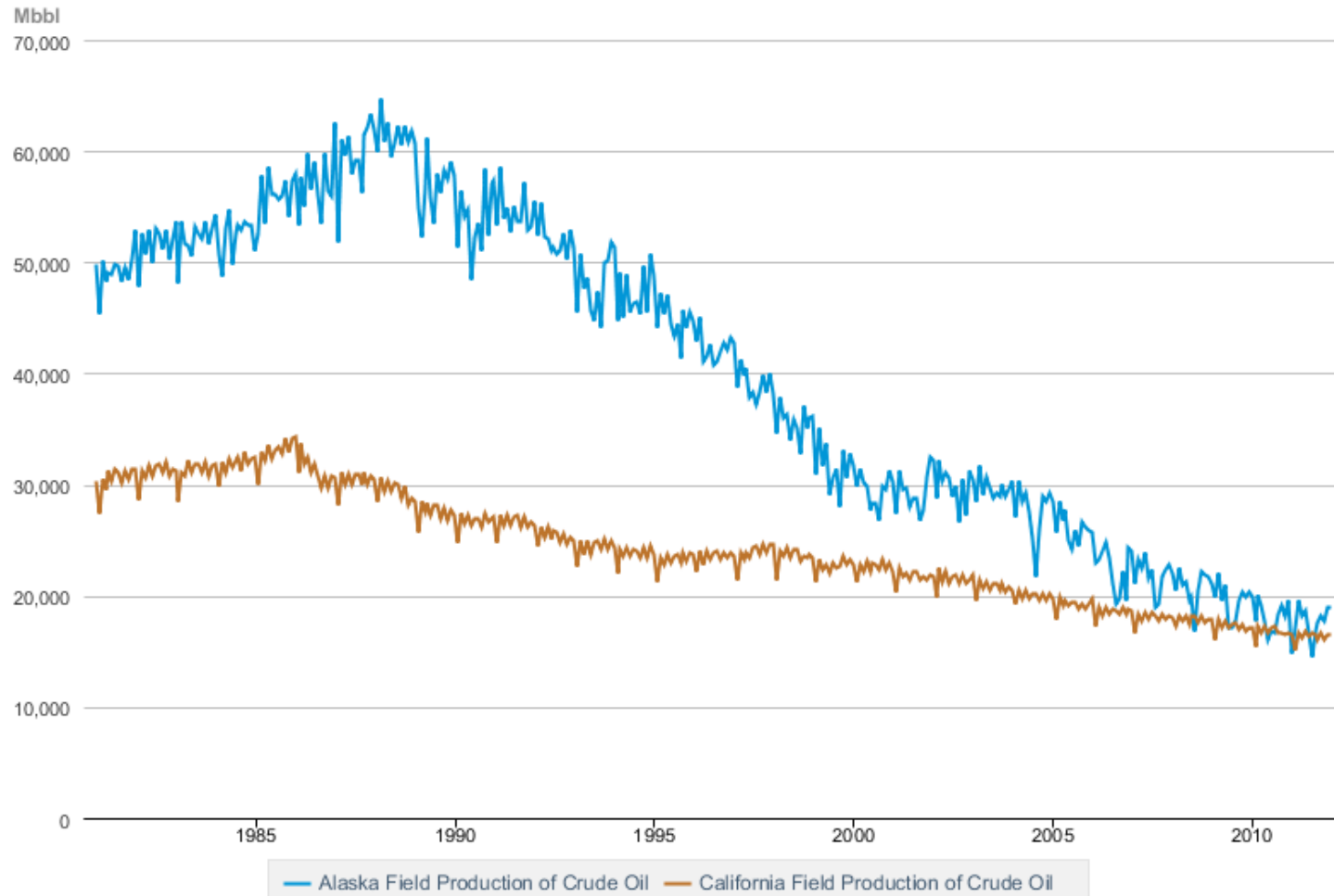
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Canadian oil in U.S. supply



Alaska and California Production

Crude Oil Production



Source: U.S. Energy Information Administration



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Eastern Canada Pipelines



- Western Canadian oil flows only as far East as Sarnia, Ontario
- Refineries in Eastern Ontario, Quebec and Maritimes provinces served by East Coast production and imports
- Enbridge Line 9 originally flowed East but reversed in 1999.
- Enbridge has applied to NEB to reverse direction between Sarnia and Westover, has indicated intention to apply for reversal to Montreal.
- Full reversal of the line would allow Western Canadian (and Bakken) production to reach tidewater at Portland, Maine.



