Alaska Highway Pipeline Project (AHPP) Summary of Findings

Informetrica Limited

May 3, 2002

The Future Demand for Natural Gas

- Gas demand in the North American economy is rising, with projections of 38.5 tcf per year by 2020
- The real price of NG is expected to rise
- Alaska supplies are competitive, if delivered through an efficient transportation system
- Incremental supplies of 1.4 tcf per year available from North Slope

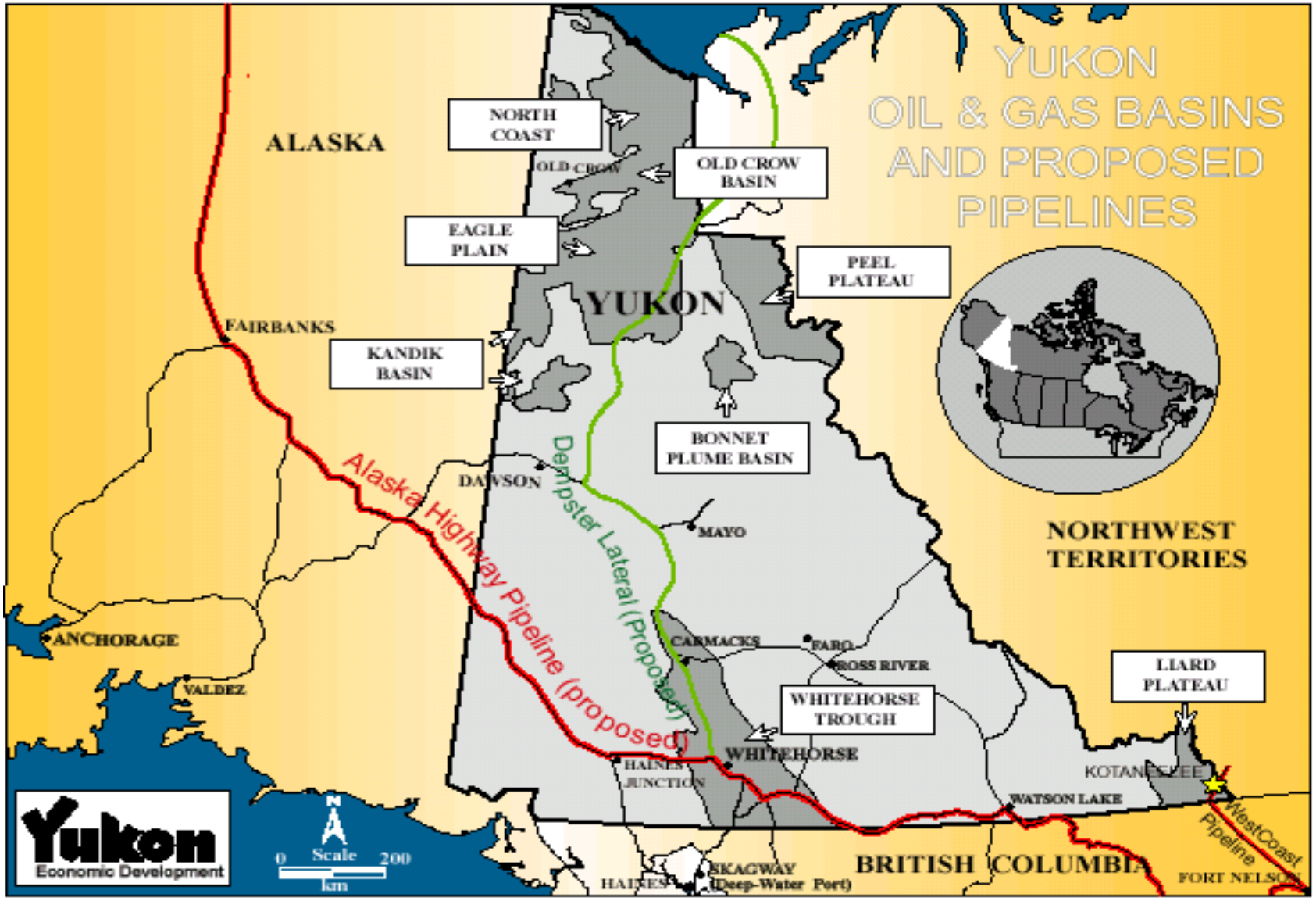
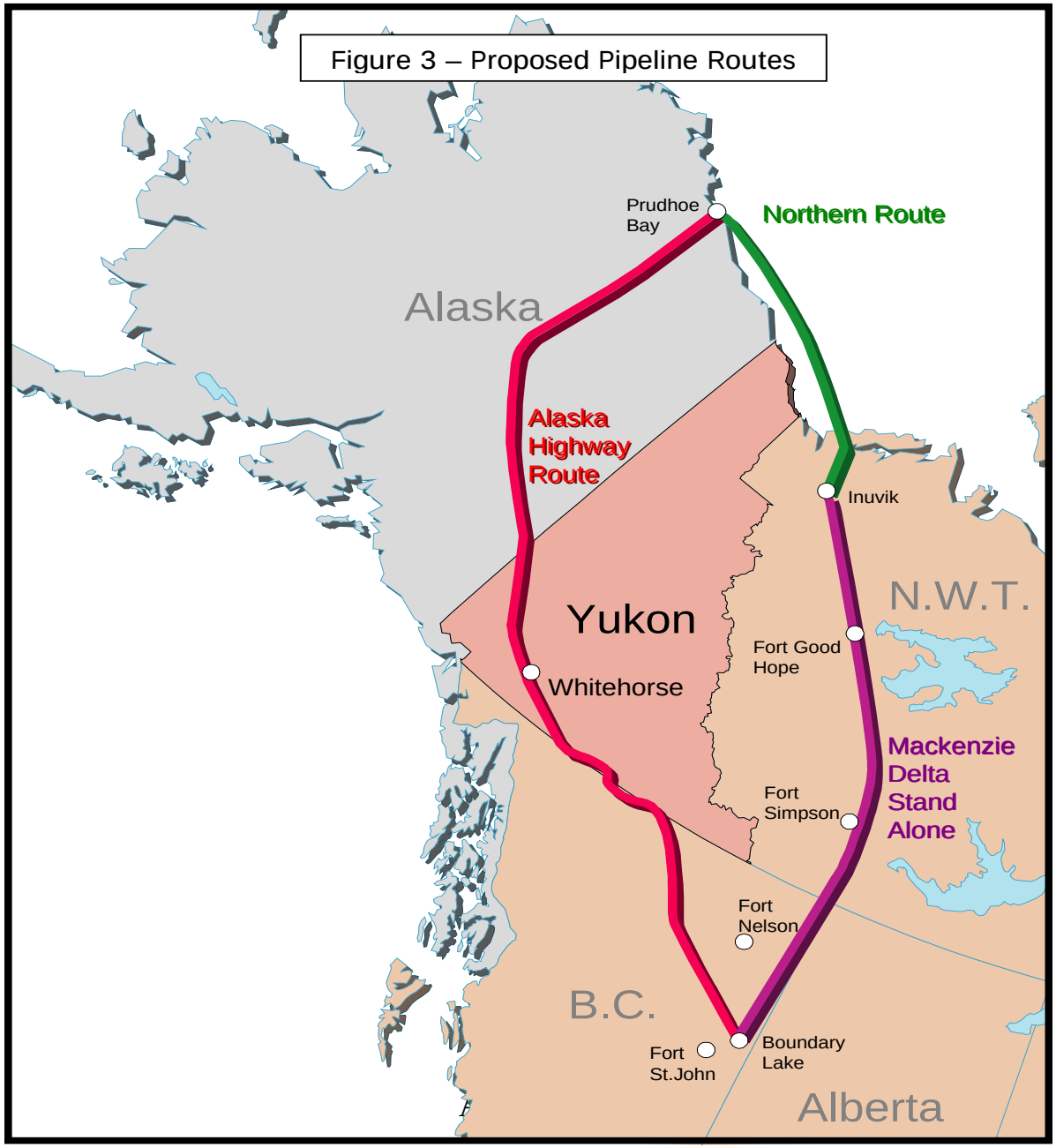

YUKON
OIL & GAS BASINS
AND PROPOSED
PIPELINES
ALASKA
NORTH
COAST
OLD CROW
OLD CROW
BASIN
EAGLE
PLAIN
PEEL
PLATEAU
YUKON
FAIRBANKS
KANDIK
BASIN
BONNET
PLUME BASIN
DAWSON
Dempster Lateral (Proposed)
Alaska Highway Pipeline (proposed)
MAYO
NORTHWEST
TERRITORIES
ANCHORAGE
VALDEZ
CARMACKS
FARO
ROSS RIVER
LIARD
PLATEAU
WHITEHORSE
TROUGH
WHITEHORSE
HAINES
JUNCTION
KOTANELEE
WATSON LAKE
WestCoast
Pipeline
Yukon
Economic Development
N
Scale
0
200
km
SKAGWAY
(Deep-Water Port)
HAINES
BRITISH COLUMBIA
FORT NELSON

Figure 3 – Proposed Pipeline Routes



Project Characteristics

- Length – 2, 810 km (1,746 miles)
- Pipe – 42”, 0.75” wall, X80
- Tons of steel pipe – 1,381,000
- Construction Costs – $13.6 B (US$9.1 B)
- Real Tariff – $1.57 /mcf (US$1.05)
- Volume – 2.5 bcfd rising to 4 bcfd
- Compressors - 40

Alaska

- Length – 1,193 km (741 miles)
- Pipe – 42”, 0.75” wall, X80
- Tons of steel pipe – 586,000
- Construction Costs – $6.6 B (US$4.4 B) 49%
- Real Tariff – $0.766 /mcf (US$0.51)
- Volume – 2.5 bcfd to 4 bcfd
- Compressors - 16

Yukon

- Length – 832 km (517 miles)
- Pipe – 42”, 0.75” wall, X80
- Tons of steel pipe – 409,000
- Construction Costs – $3.8 B (US$2.5 B) 54%
- Real Tariff – $0.435 /mcf (US$0.29)
- Volume – 2.5 bcfd to 4 bcfd
- Compressors – 10

British Columbia

- Length – 721 km (448 miles)
- Pipe – 42”, 0.75” wall, X80
- Tons of steel pipe – 355,000
- Construction Costs – $3.0 B (US$2.0 B) 43%
- Real Tariff – $0.348 /mcf (US$0.232)
- Volume – 2.5 bcfd to 4 bcfd
- Compressors - 14

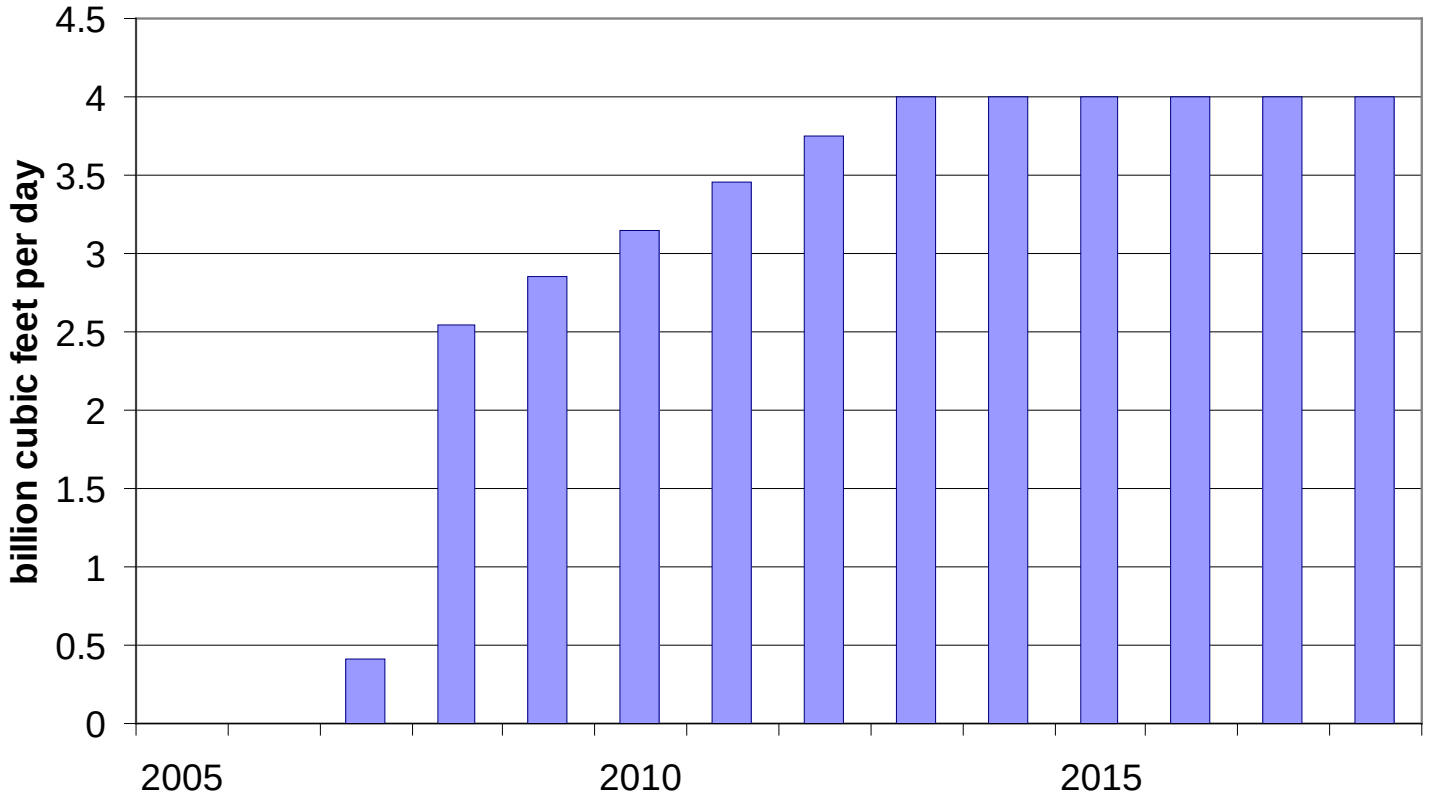
Alberta

- Length – 64 km (40 miles)
- Pipe – 42”, 0.75” wall, X80
- Tons of steel pipe – 32,000
- Construction Costs – $0.2 B (US$0.12 B) 3%
- Real Tariff – $0.023 /mcf (US$0.015)
- Volume – 2.5 bcfd to 4 bcfd
- Compressors - 0

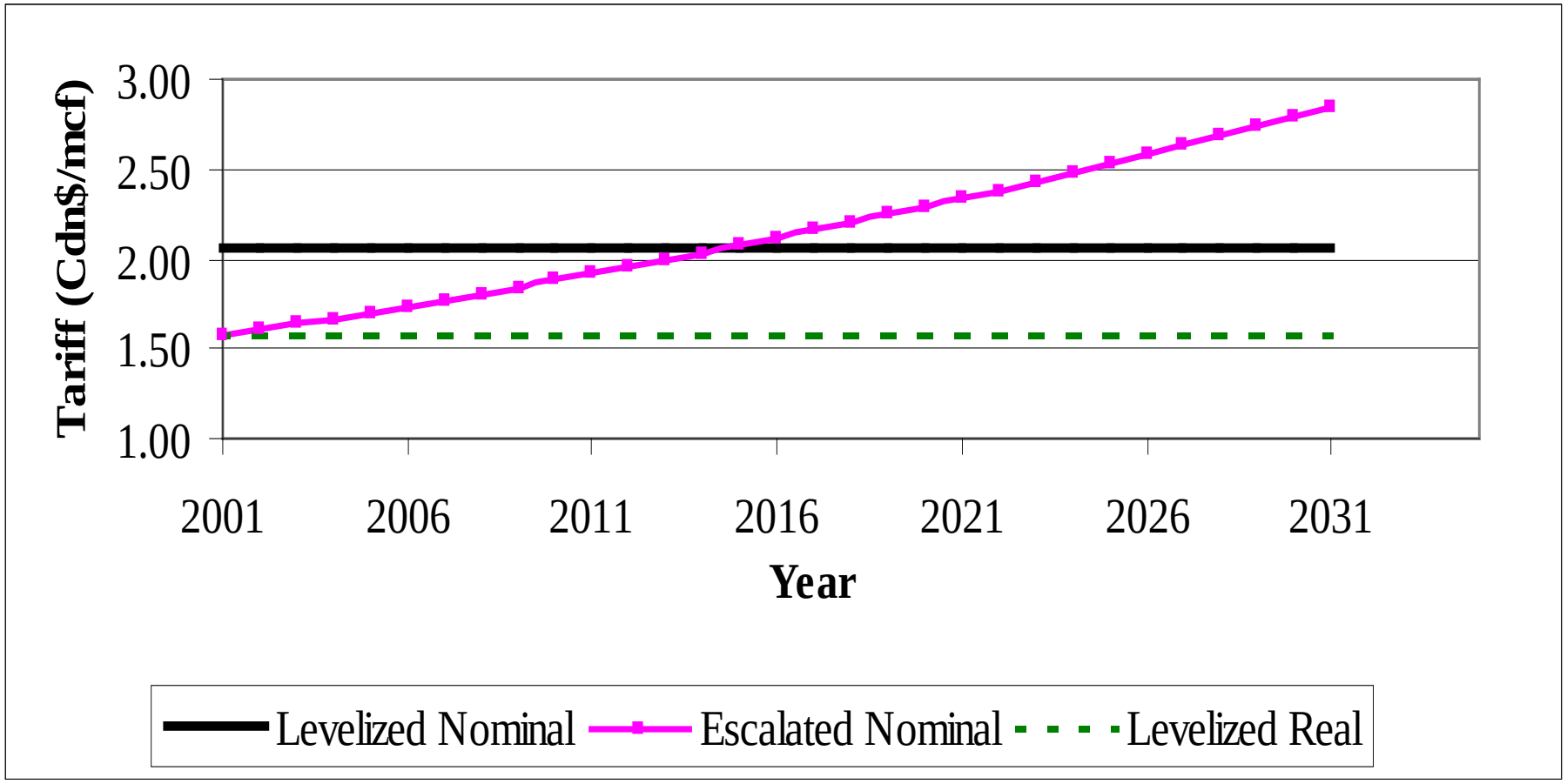
Comparison to TAPS

	AHPP	TAPS
Cost (2000$)	• US$9.1 B	• US$11.3 B
Length	• 1750 miles	• 800 miles
BTU Throughput per day	• 4.1 trillion	• 8.4 trillion
Tons of pipe	• 1,381,000	• 450,000
Employment	• 59,000	• 70,000

Volumes of Gas



Tariffs


Tariff (Cdn$/mcf)
3.00
2.50
2.00
1.50
1.00
2001
2006
2011
2016
2021
2026
2031
Year
Levelized Nominal
Escalated Nominal
Levelized Real

Tariff Analysis

- A nominal tariff of $2.05 per mcf (Canadian $) , or
- A real tariff that starts at $1.57 per mcf in 2001, escalated by CPI will produce equivalent incomes
- Alaska (C$0.766), Canada (C$0.805)
- Yukon (C$0.435), BC (C$0.348), Alberta (C$0.023)

Types of analysis for this project

- Benefit-Cost Analysis
- National Economic Impact
- Provincial/Territorial Economic Impact
- Regional-Urban Model
- Local Area Model
- Occupational Impact
- YTG Revenue and Expenditure Model

Benefit-cost Analysis

- Positive Net Benefits
- Net gains mainly in Alaska and lower 48
- Regulation of pipeline rate of return minimizes Canadian gains
- Increased government revenues in Canada

NPV of Net Benefits

B$, Canadian	**0%**	**7%**	**10%**	**15%**
Production, US	32.4	8.0	4.6	1.9
Transmission, US	15.4	2.3	0.6	-0.8
Transmission, Cdn	13.8	1.6	0.1	-1.1
Government, US	50.0	13.6	8.5	4.2
Government, Cdn	12.5	3.7	2.4	1.3
Federal	6.2	1.8	1.2	0.6
Provincial	6.3	1.9	1.2	0.7
Total	**124.1**	**29.2**	**16.0**	**5.5**

Implications of Benefit-cost

- Financing from US sources or normal financial markets
- Canadian interest hinges on federal & provincial revenue
- Yukon interest areas:
  - Jobs
  - Energy options
  - Minimizing adverse effects

Economic Impact Analysis

- Uses statistical/econometric methods to develop a mathematical model of the economy (the “Base Case”)
- Adds the project parameters (“Injection”) to the “Base Case” model to estimate Direct, Indirect and Induced Effects on a number of economic variables (e.g., GDP, employment, tax revenues)

Two Scenarios

- Scenario I – Governments retain all balance improvements, choosing to reduce outstanding debt
- Scenario 2 – Federal government recycles improved balances through:
  - Corporate tax reductions
  - Personal income tax reductions
  - Reduced EI contributions

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Key Impacts

- Investment
- GDP
- Employment
- Unemployment
- Inflation
- Fiscal Balances (Taxes, Govt. Spending, Debt)
- Current Account Balances

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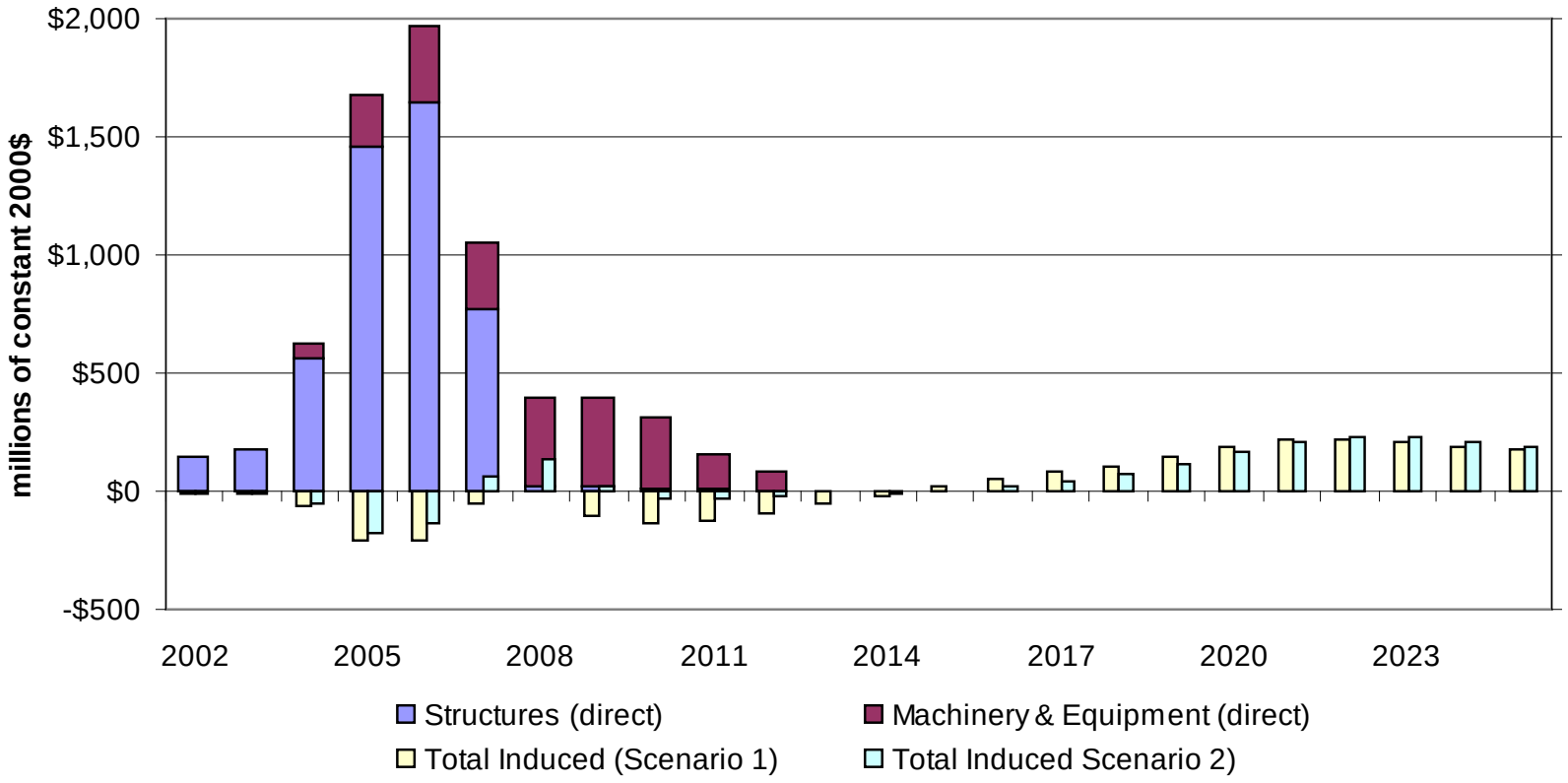
Construction Period Impacts, 2002-12

	GDP,Millions 2000$)	**Employment** (person-years)
Investment - Canada	6,990	30,440
Yukon	3,369	12,114
Scenario 1-Canada	9,762	72,799
Yukon	3,736	19,448
Scenario 2 - Canada	14,497	194,396
Yukon	5,082	28,585

Operations Period Impacts, 2013-25

	GDP,Millions 2000$)	**Employment** (person-years)
Revenue- Canada	15,288	4,253 (327)
Yukon	8,252	2,220 (171)
Scenario 1-Canada	16,678	34,921
Yukon	7,775	13,029
Scenario 2 - Canada	16,906	182,678
Yukon	8,911	21,998

Investment


$2,000
$1,500
$1,000
$500
$0
-$500
millions of constant 2000$
2002
2005
2008
2011
2014
2017
2020
2023
Structures (direct)
Machinery & Equipment (direct)
Total Induced (Scenario 1)
Total Induced Scenario 2)

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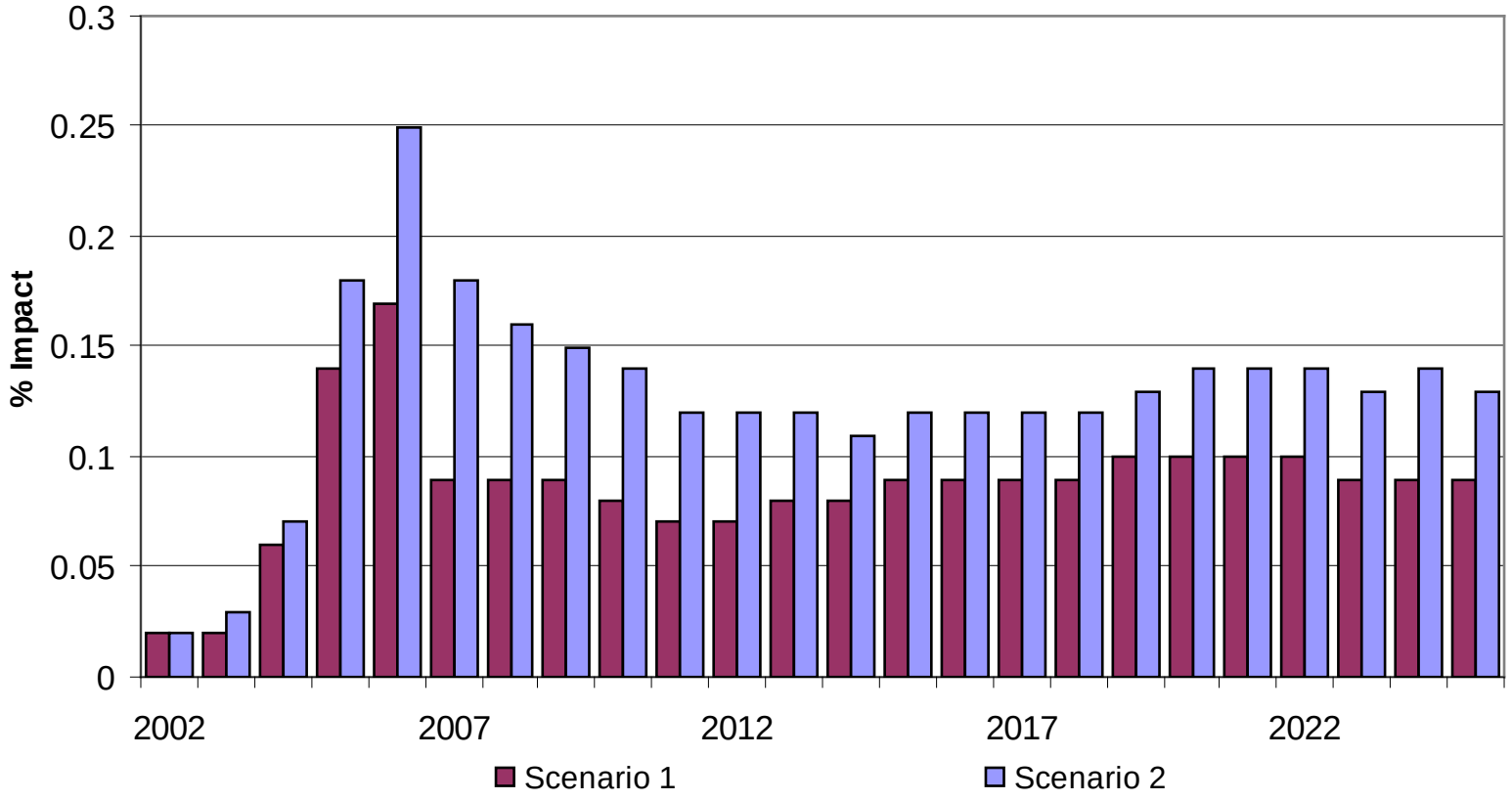
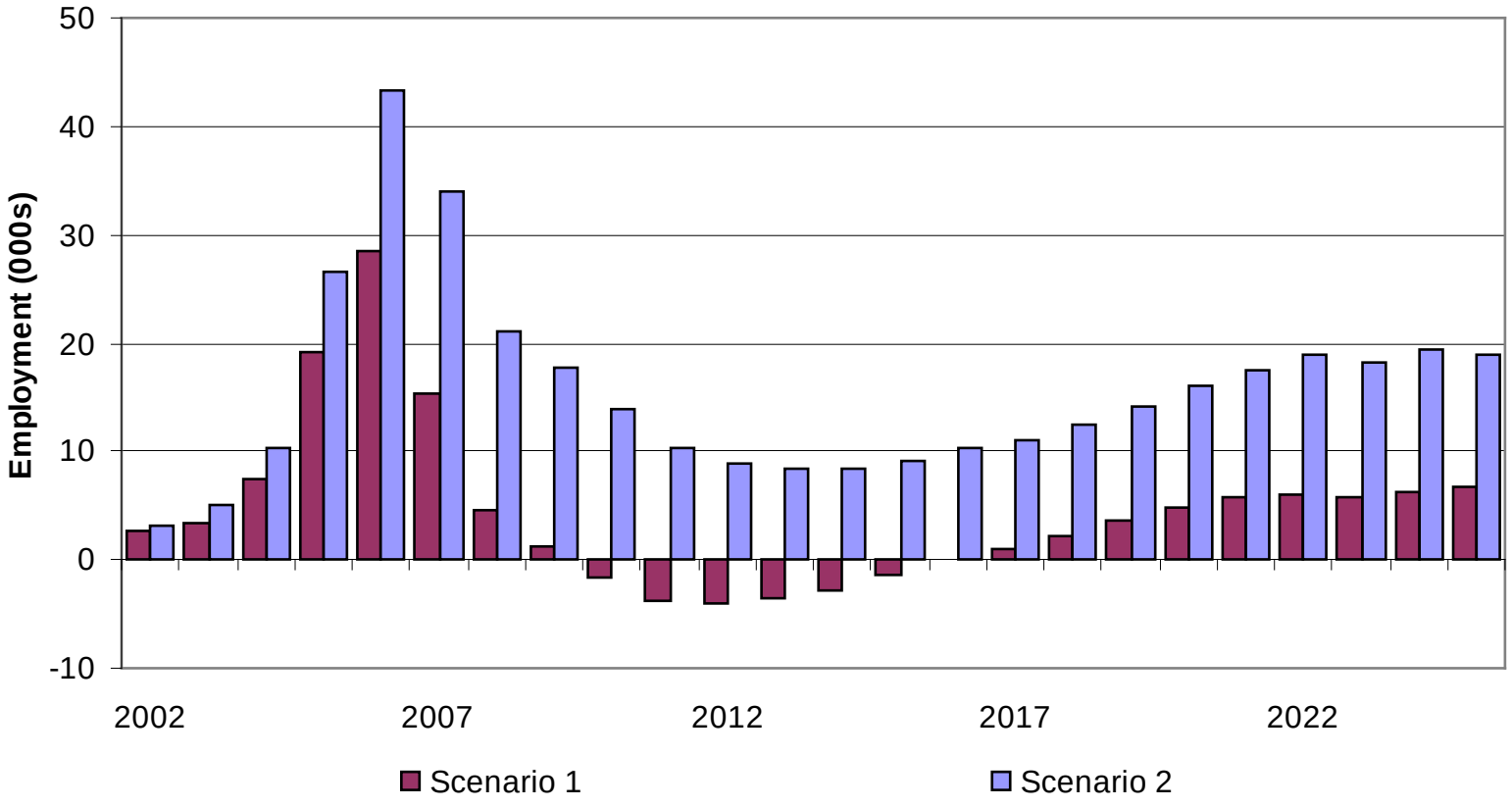
GDP

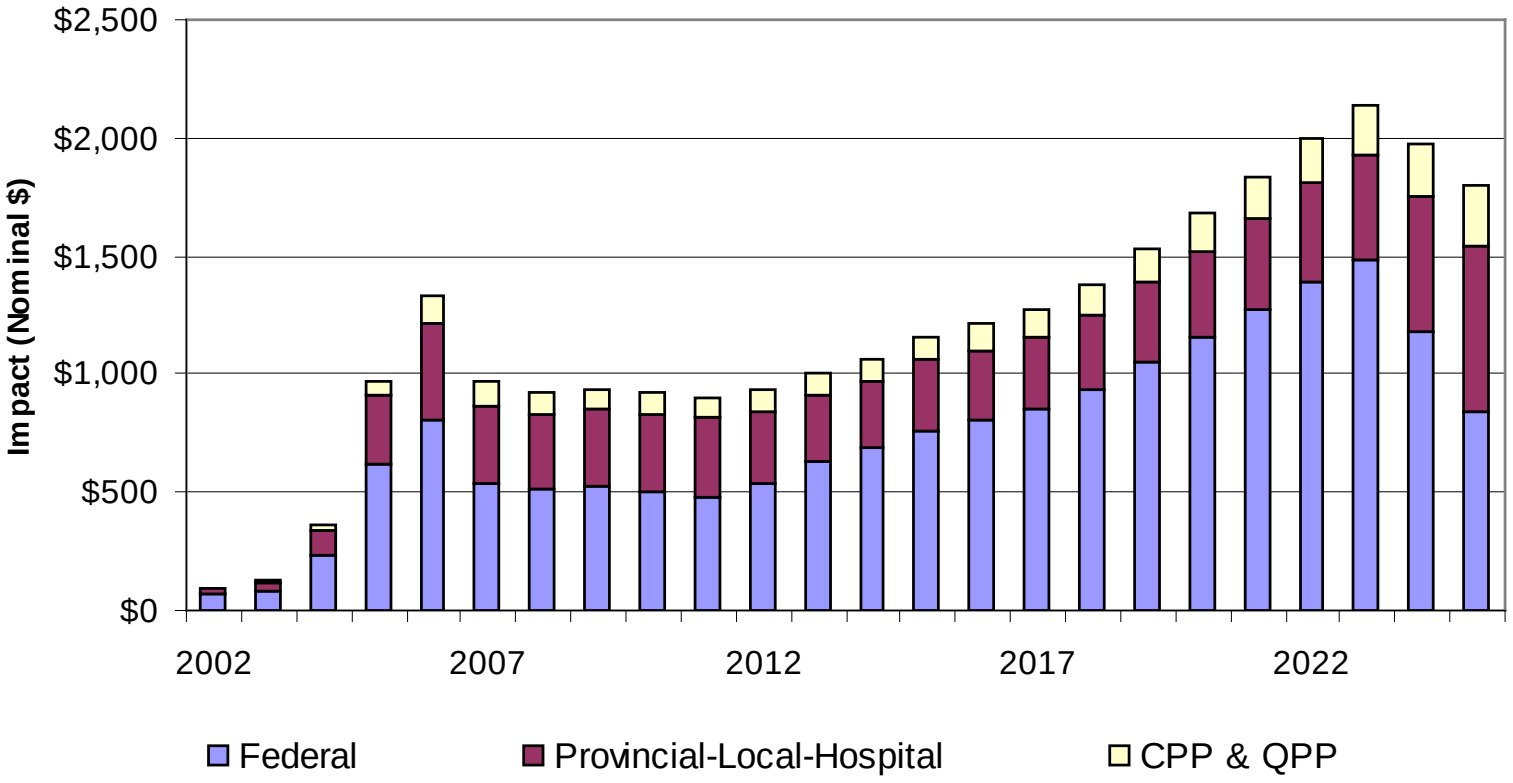


Employment


50
40
30
20
10
0
-10
Employment (000s)
2002
2007
2012
2017
2022
Scenario 1
Scenario 2

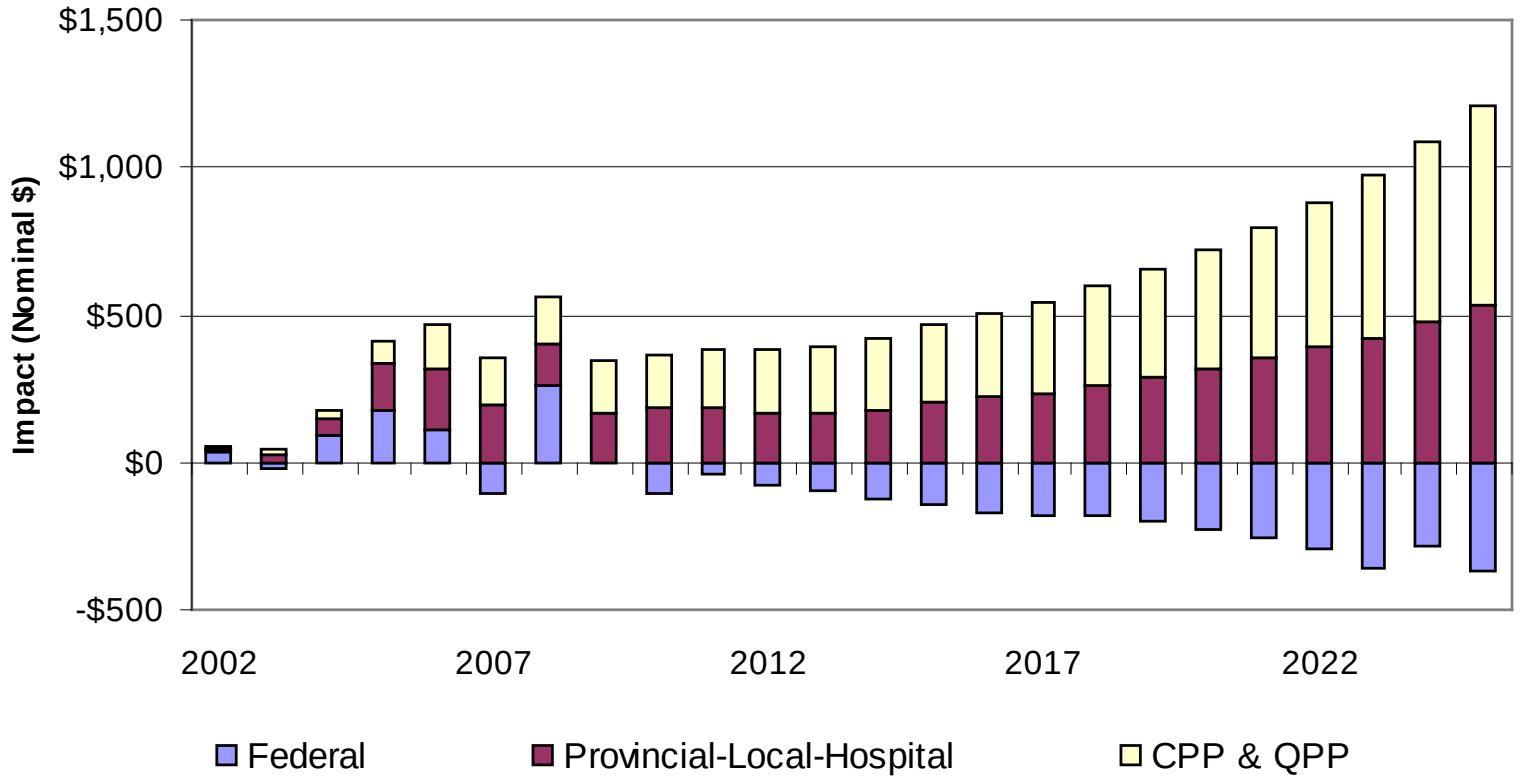
Fiscal Balances – Scenario 1

(millions of dollars)



Fiscal Balances – Scenario 2

(millions of dollars)



National Findings

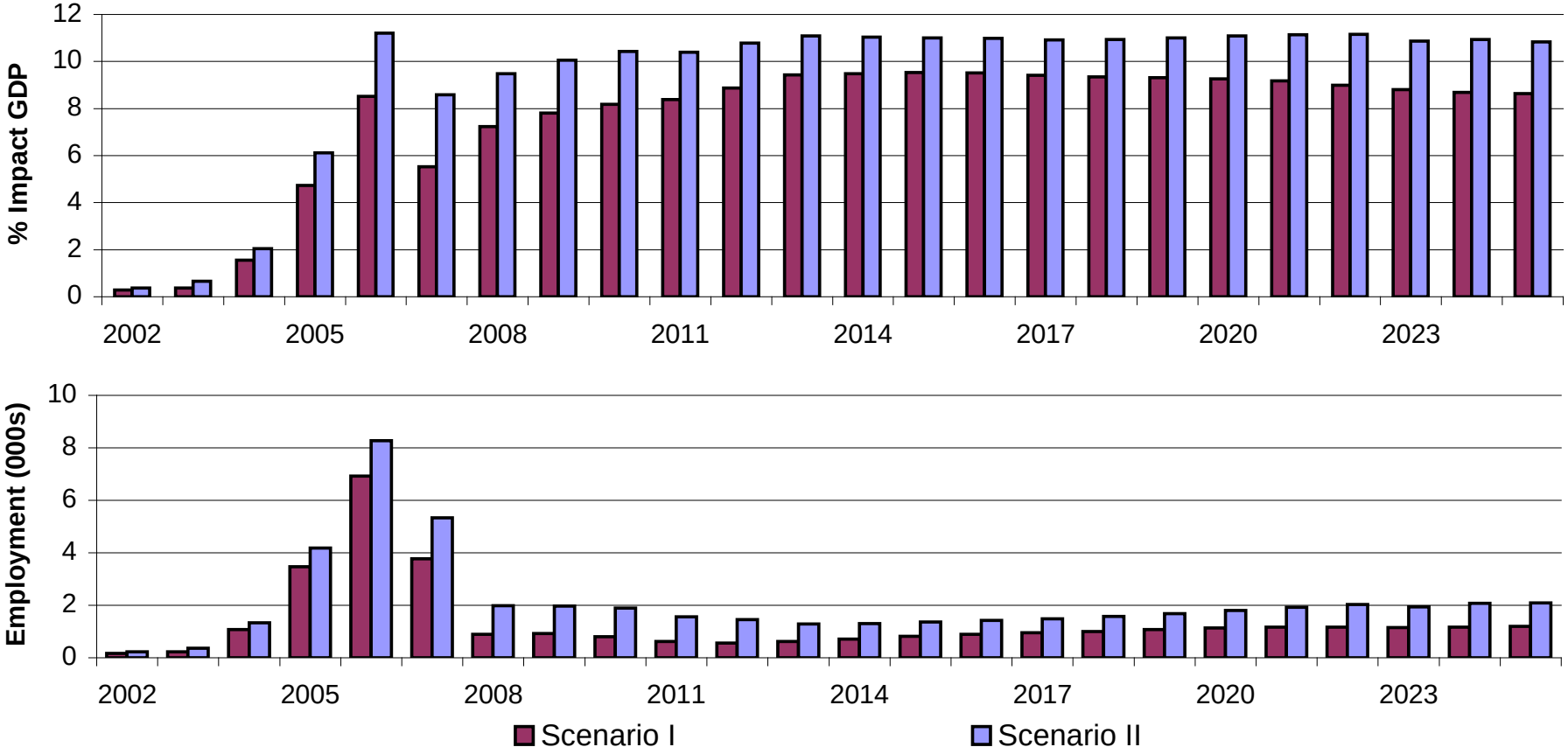
- No stresses on macro economy
- Procurement effects important to steel and turbines
- Additional investment may be needed in Alberta
- Larger impacts if governments recycle their “fiscal dividend”

Regional Impacts

- **Direct** spending on construction & operations determined by location of pipeline
- **Indirect** spending (commodity content of direct spending) determined by the location of suppliers and their suppliers
- **Induced** spending depends on distribution of wage income and sources of supply of consumer goods and services

Territories

(effects concentrated in Yukon)



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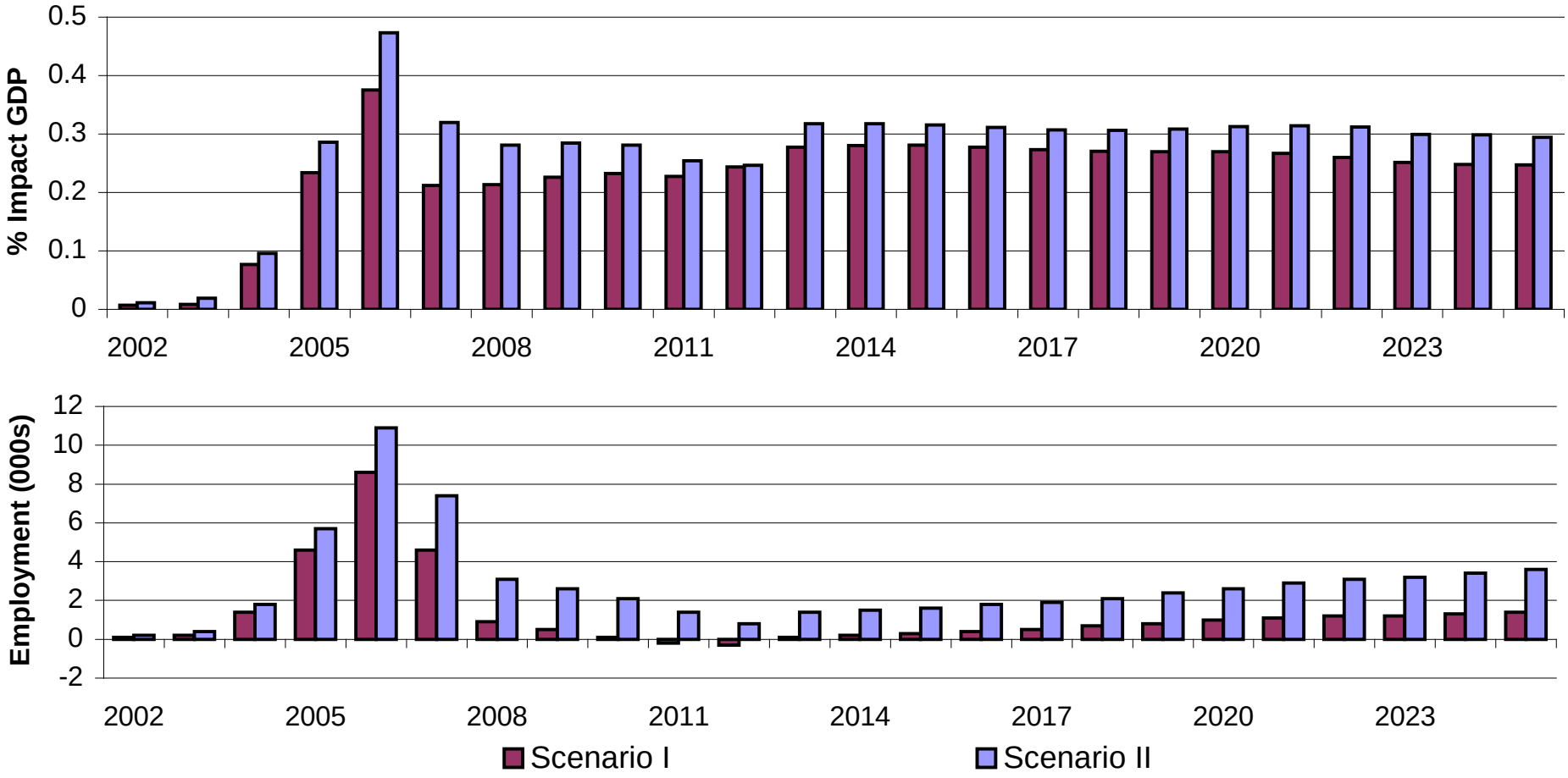
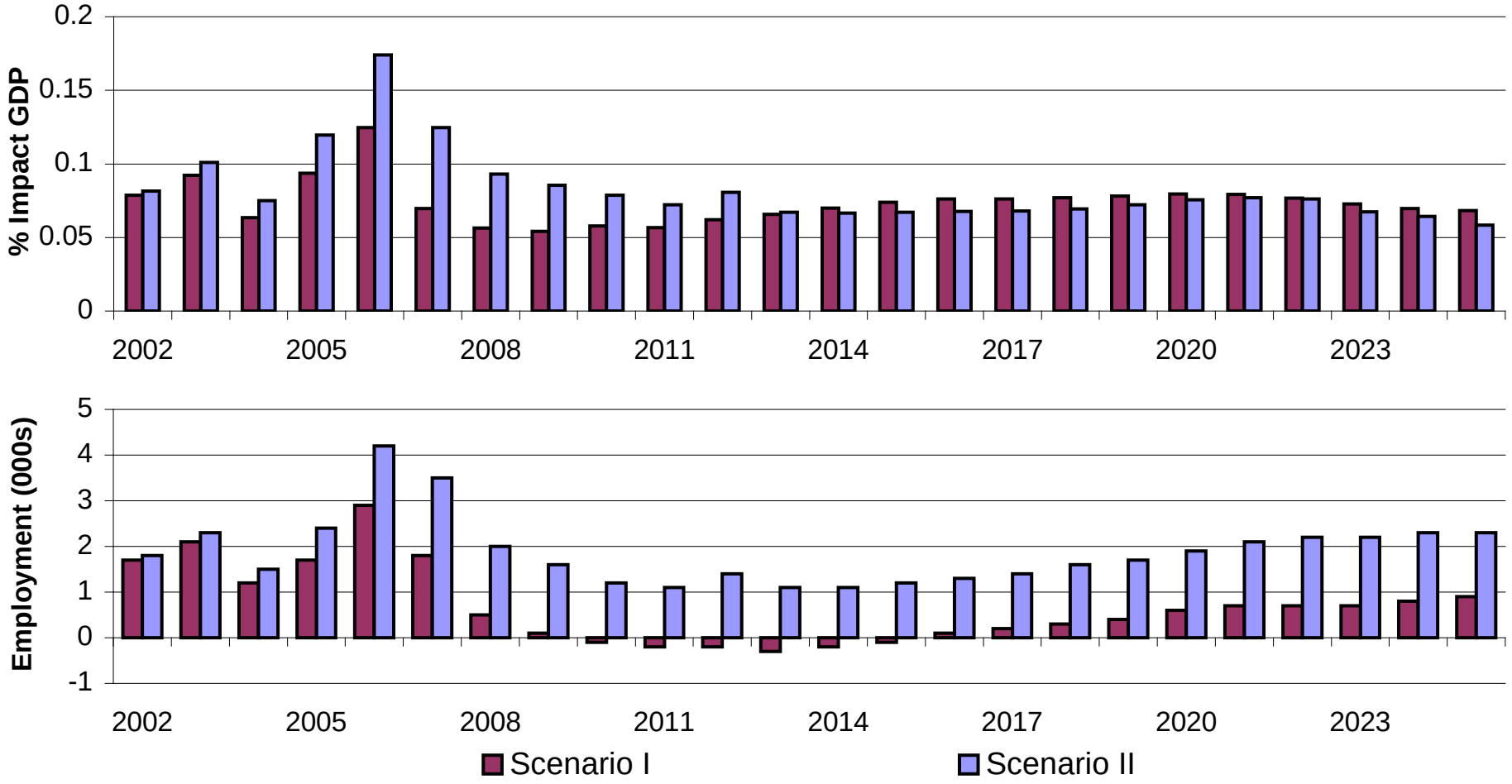
British Columbia



Alberta


% Impact GDP
0.2
0.15
0.1
0.05
0
2002
2005
2008
2011
2014
2017
2020
2023
Employment (000s)
5
4
3
2
1
0
-1
2002
2005
2008
2011
2014
2017
2020
2023
Scenario I
Scenario II

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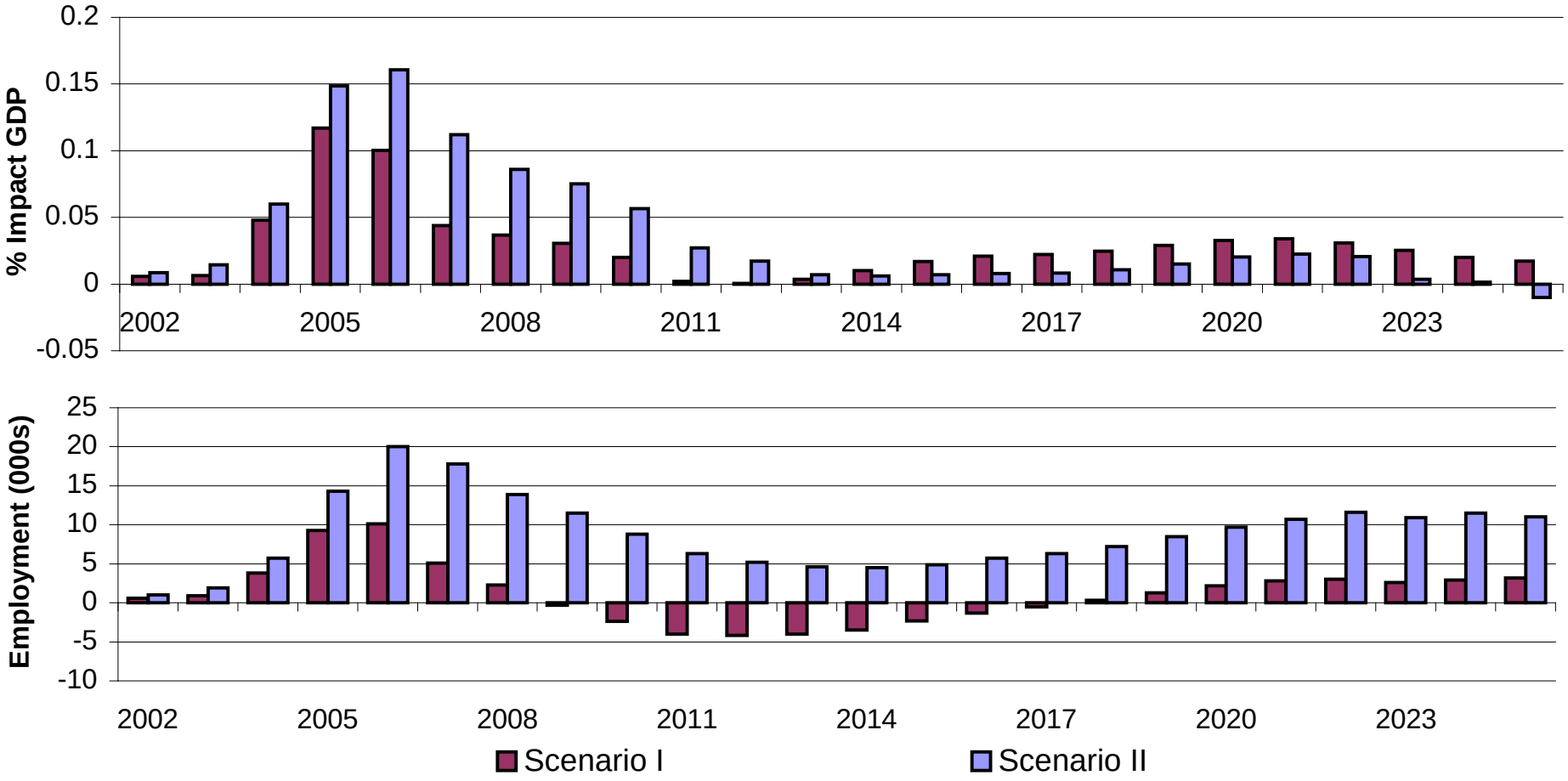
Rest-of-Canada



Regional Findings

- The impacts on the provinces are modest
- Impacts on Yukon are large
- Procurement has been directed to increase impact and test industrial capacities
- Distinction between residence of workers and place of work important
- Assumption that 80% of construction workers come from outside Yukon

Yukon Impacts

- Yukon economy identified separately
- Base Case View
- Impacts from RIM on Yukon Base
- Focus on:
  - Employment
  - Wage Bill
  - Disposable Income
- Direct and Indirect +Induced

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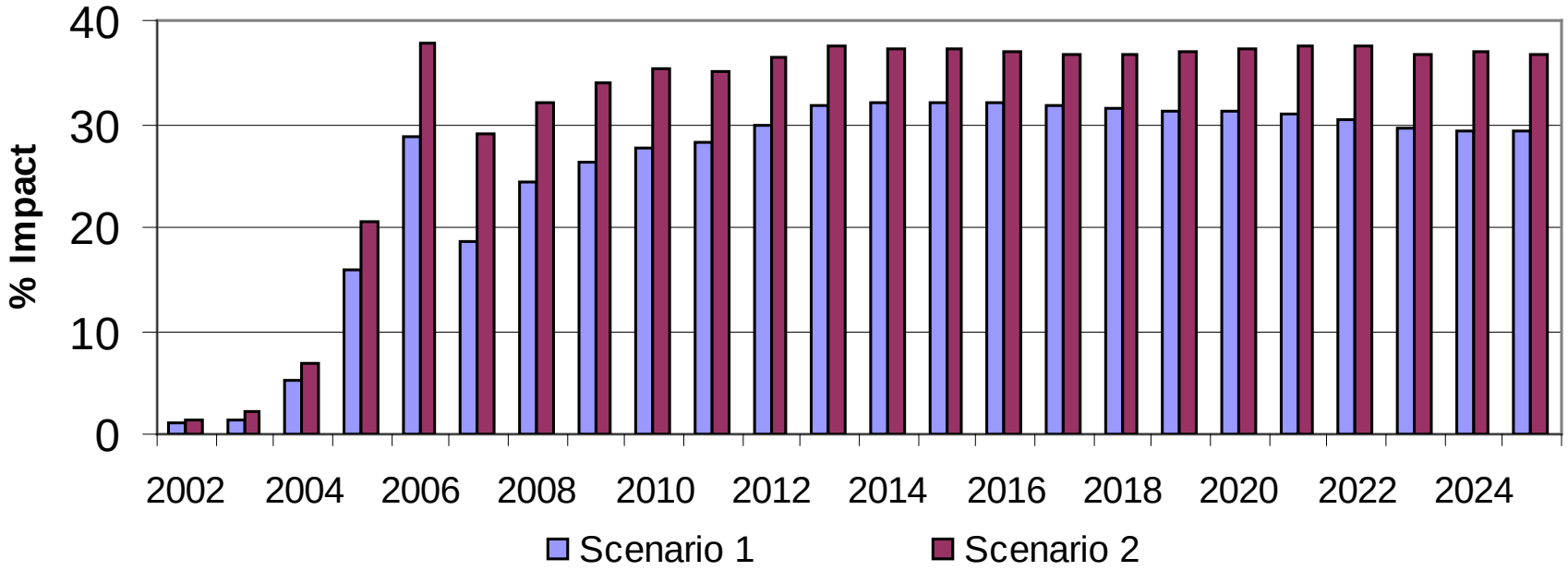
Yukon GDP Impact



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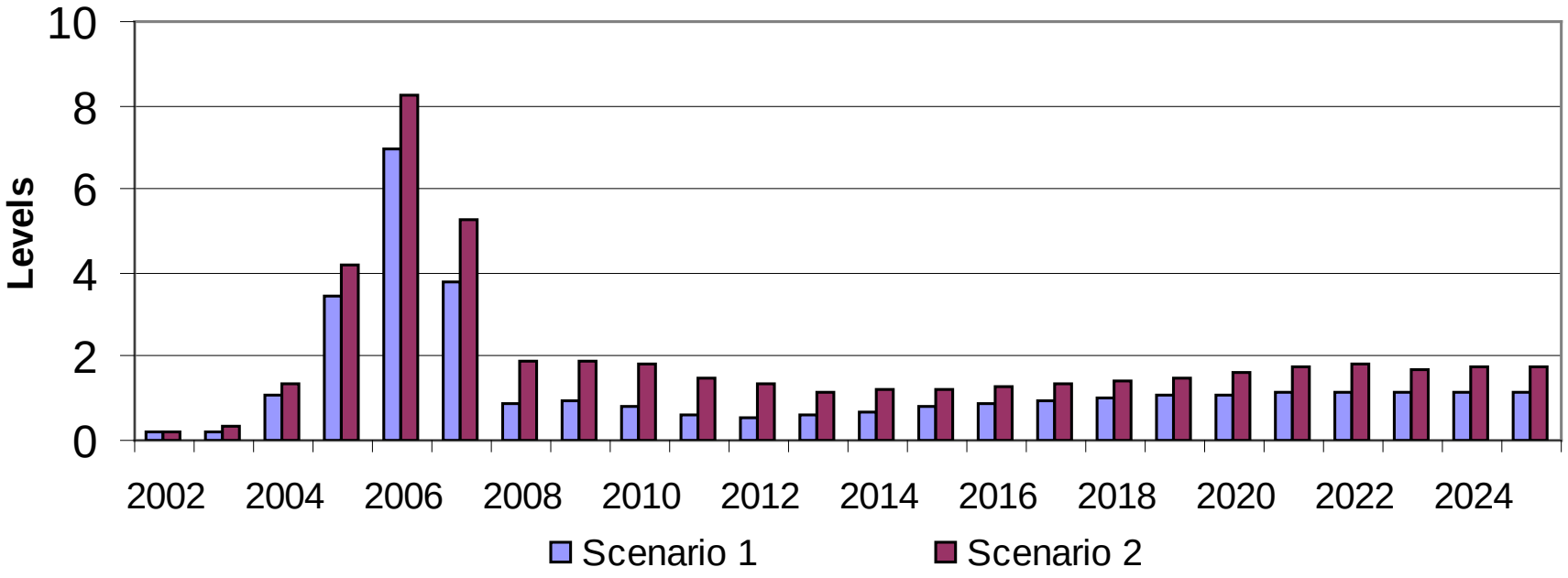
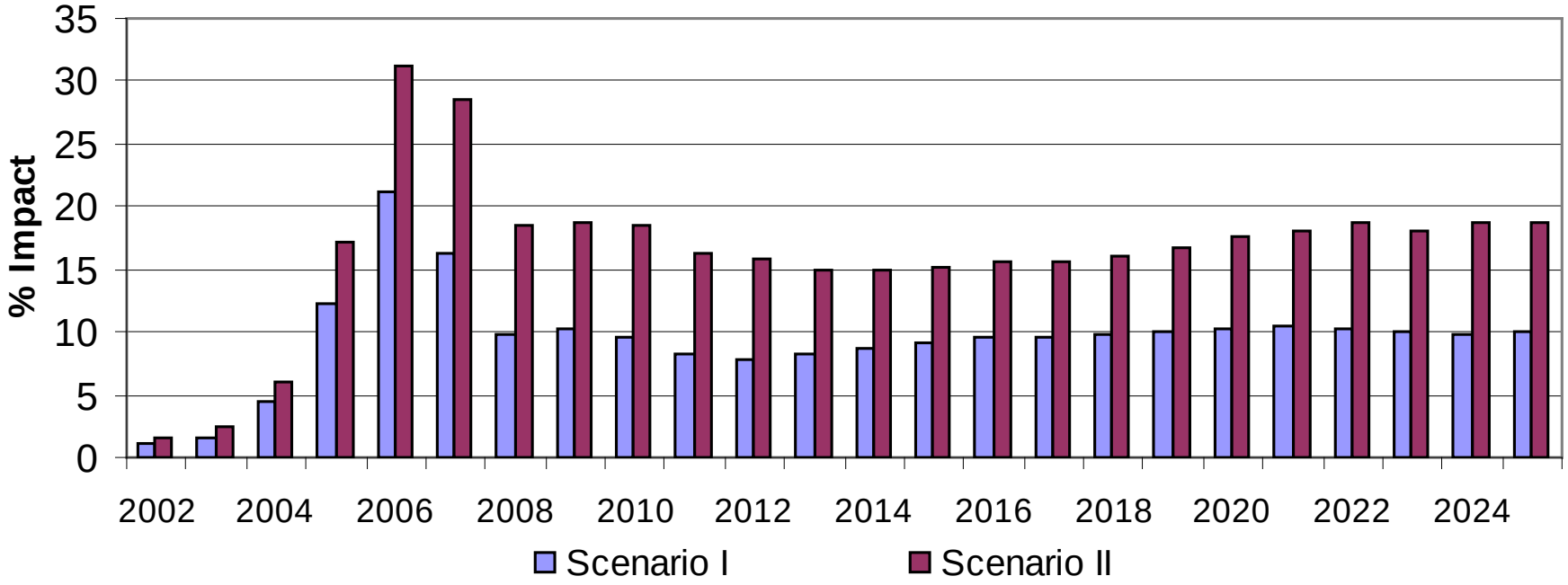
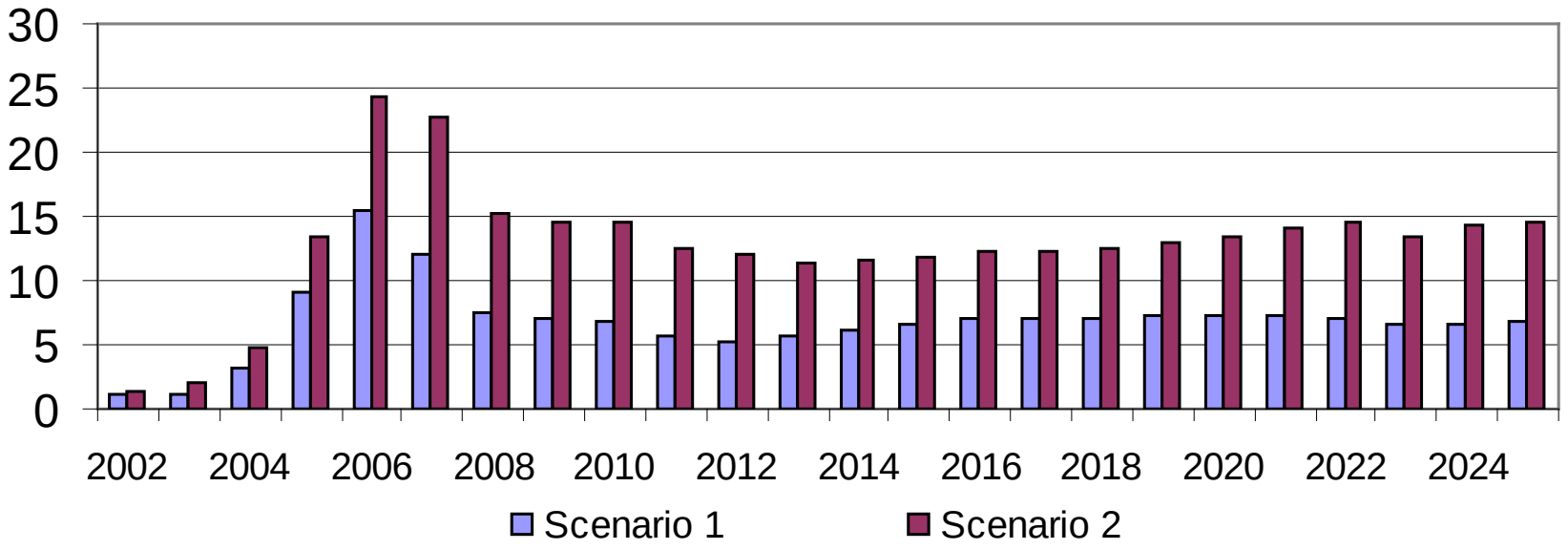
Yukon Employment



Yukon Wage Bill



Yukon Real Disposable Income



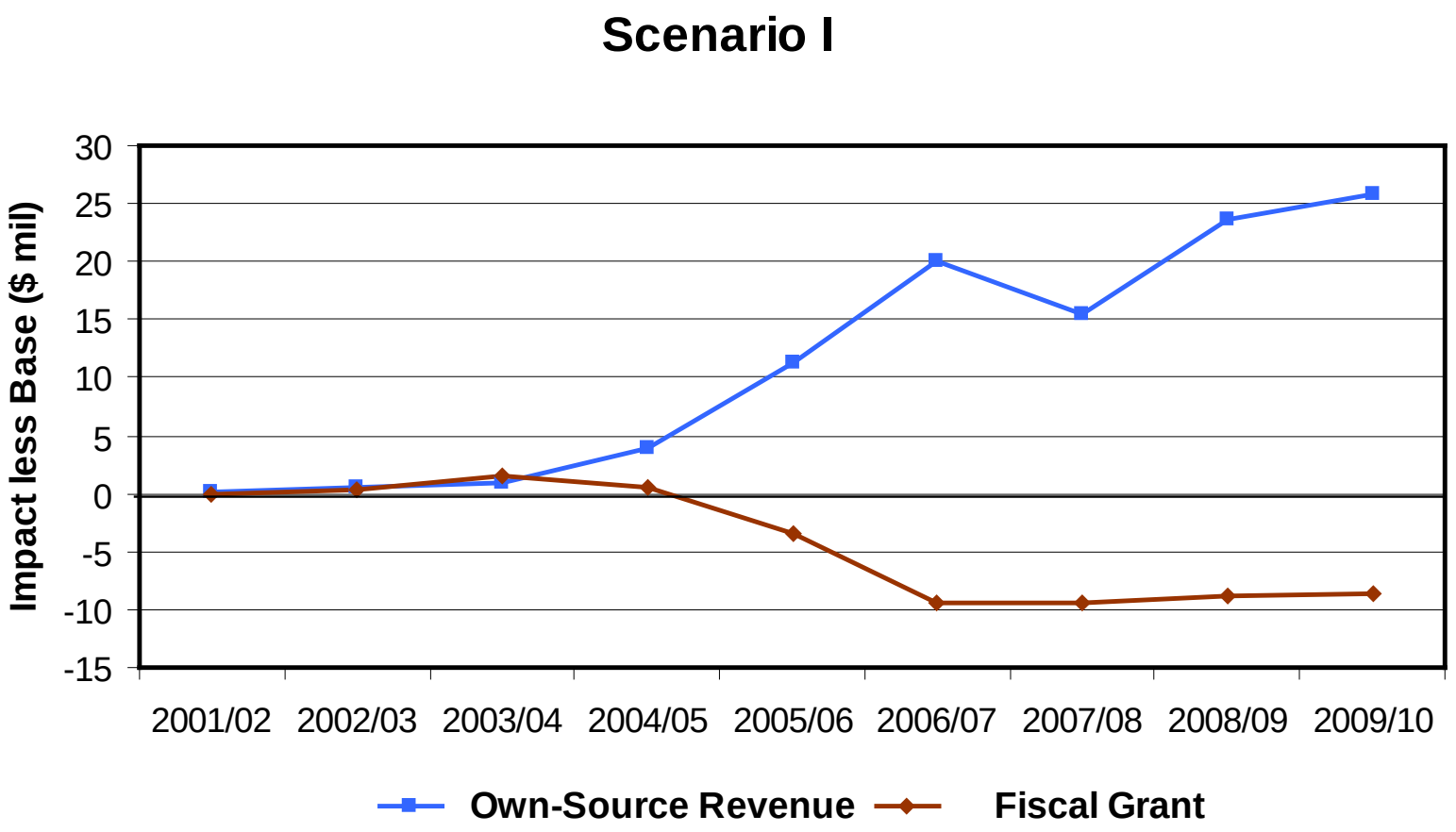
Key Industry Impacts - Yukon

Top 10 industry impacts during construction period

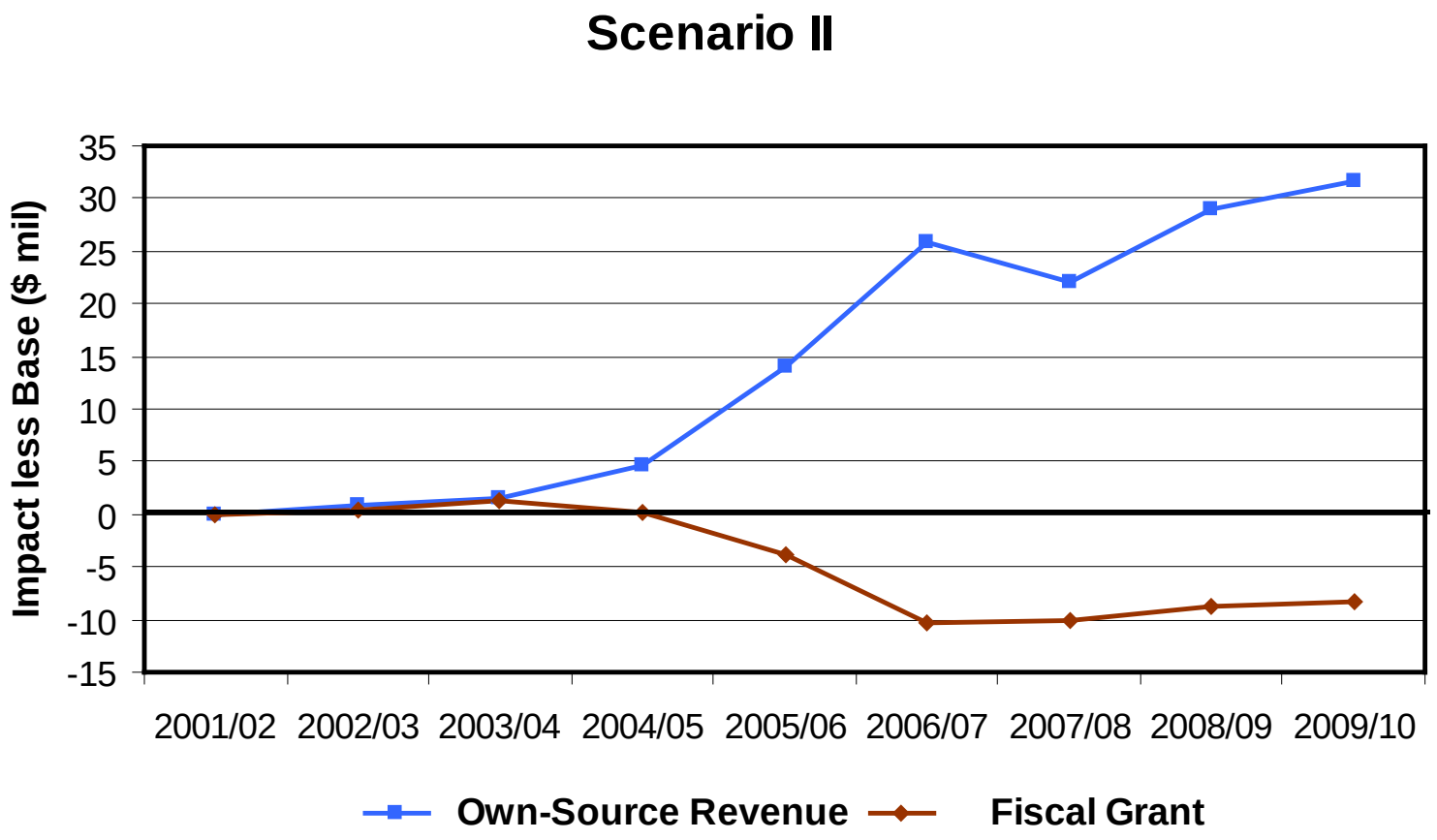
1. Construction
2. Professional Services to Business
3. Accommodation and Food
4. Personal Finance
5. Motor Transportation
6. Telecommunications
7. Other Personal Services
8. Retail Trade
9. Air Transportation
10. Printing and Publishing

Employment Impacts	Scenario 1	Scenario 2
Peak Employment	6930	8250
Average Employment 2005-07	4723	5900

Yukon Fiscal Impacts



Yukon Fiscal Impacts



Findings from Fiscal Model

- Own revenue increases from activity are offset by federal transfer reductions
- Expenditure increases will worsen Territorial Balance, unless financing arrangement made or territorial tax **rates** increased
- Revenue consequences of pipeline construction are modest at Territorial level
- Federal government is major beneficiary

Local Impacts

- Employment Effects
- Local supply
- Spending by non-residents
- Bidding up Local Wages

Occupational Impacts, Yukon

1. Construction (1128)
2. Clerical (432)
3. Services (370)
4. Managerial & Administration (366)
5. Sales (199)
6. Fabricating, Assembly (157)
7. Natural Sciences (132)
8. Transportation & Eqpt. Ops (104)
9. Farming (70)
10. Machining (55)

Tough Questions

- Construction costs determine tariff and wellhead prices: can costs be controlled?
- Problems on any segment can hurt project economics. How to coordinate and avoid difficulties?
- Will escalating tariff be acceptable?
- Need commitments to use the pipeline for some defined amount for twenty-five years in order to finance it. Who guarantees performance?

Yukon Development

- Expansion Opportunities – see industry forecasts
- New areas – not supplied by Yukon now What can be done here?
- Ancillary and Post-pipeline Opportunities
- When to start?

Comparison to Other Studies

- 2000 Federal Study
  - Longer Pipeline, including Alberta and Sask.
  - Pipe imported
  - Fiscal policy like Scenario 1
  - Construction costs per mile lower
  - Less Throughput
  - Total tariff larger (US$2.83 vs US$2.63 from Prudhoe Bay to Chicago)

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Next Steps

- Final Route Definition
- Define total direct HR requirements
- Review occupational requirements against supplies
- Contingency for low NG prices
  - Indexed bonds?
  - Long-tem contracts?

Steps after “Go”

- Procurement Plans
- ROW use
- Training of Yukoners
- Yukon business mobilization
- Federal-territorial agreements
- Agreements with Alaska and BC about people, goods and services, supply, regulatory, and information

AHPP – Will it Go?

- Cost effective – Alaska field costs are sunk and Alberta south has been pre-built
- Least-cost option for delivering Prudhoe Bay gas
- Most regulatory hurdles already jumped
- No insurmountable bottlenecks identified
- Do US consumers want the gas? Are producers ready to sell?