



Terasen Gas Inc. & Terasen Gas Vancouver Island (TGVI) 2006 Resource Plans

June 20th, 2006 Stakeholder Workshop

Contact

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Terasen Gas

www.terasengas.com

Introduction

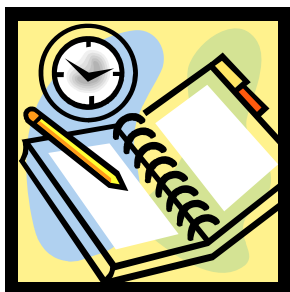
Tom Loski

Director of Regulatory Affairs

Purpose of Today's Workshop is to:

- Explain the role of Resource Planning at Terasen Gas
- Provide planning background
- Discuss the evaluation of resource options for meeting future demand:
 - Terasen Gas (Vancouver Island) Inc., and
 - Terasen Gas Inc. (Mainland service area)
- Obtain feedback, and
- Outline the next steps

Today's Agenda & Speakers



Introduction	Tom Loski • Director, of Regulatory Affairs
Regional Gas Supply Issues In the Pacific North West	Dan Kirschner Executive Director, Northwest Gas Association
Terasen Gas – Energy Outlook	Doug Stout Vice President, Marketing and Business Development
Demand Forecasts	Greg Caza • Energy Forecasting Manager
Energy Efficiency and Optimization	Sarah Smith • Manager, Marketing and Energy efficiency
Terasen Gas Supply Planning	Tania Specogna • Manager, Business Development
Resource Options to Meet Future Gas Demand	Edmond Leung • System Capacity Planning Manager & Dave Perttula • Manager, Business Development
Update – Mt. Hayes LNG Project	Guy Wassick • Manager, Business Development
Conclusions, Action Plan, Next Steps	Cynthia Des Brisay • Director, Business Development

Workshop Format and Feedback

Format of Today's Workshop: 1:30pm to 4:30pm



Opportunities will be provided to **offer comments and ask questions** during the presentation



We will be **logging comments and questions** raised during the session for consideration in the Resource Plan filing.

Written comments to Ken Ross at
Ken.Ross@terasengas.com by July 4th.



An electronic copy of the presentation material will be posted on the Terasen Gas web site at www.terasengas.com

Terasen Gas Company Overview

Terasen Gas

- ❑ 125 communities in B.C.
- ❑ 900,000 customers

Parent Company:

Kinder Morgan Inc.

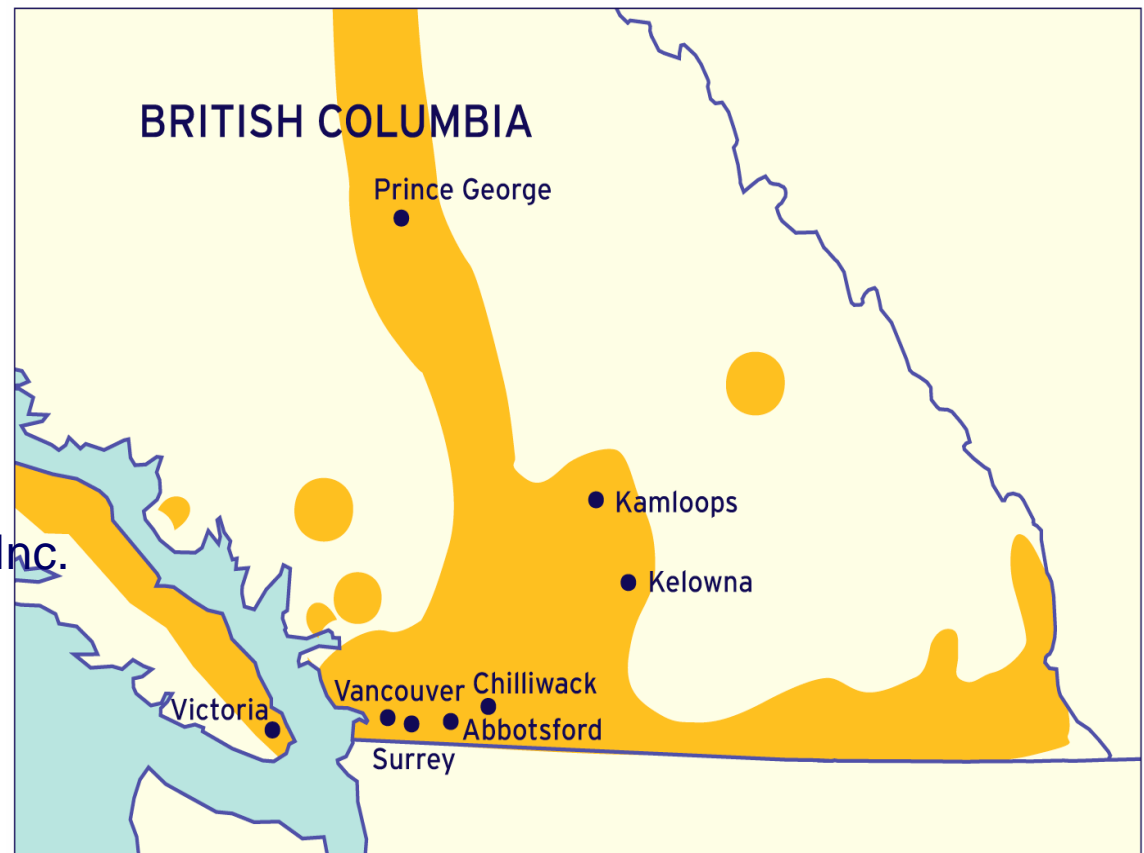
Four Subsidiaries:

Terasen Gas Inc.

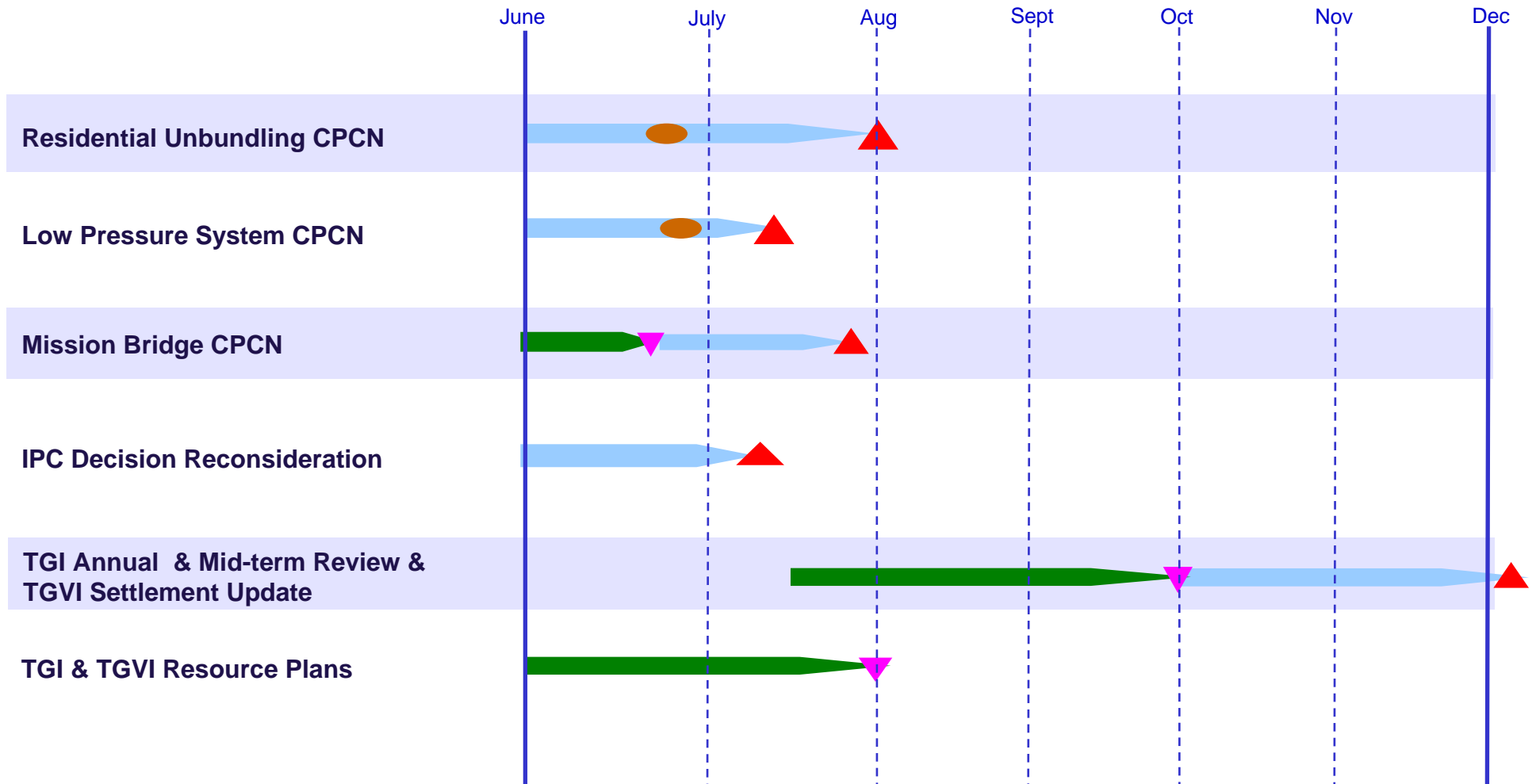
Terasen Gas (Vancouver Island) Inc.

Terasen Gas (Squamish) Inc.

Terasen Gas (Whistler) Inc.



Terasen Gas Inc. Regulatory Calendar June - December 2006



LEGEND

-  Application Preparation
-  Hearing Process (Oral or Written)
-  Filing
-  Decision
-  Review & Decision Process

What is a Resource Plan?

- A long-term plan for the acquisition of resources to meet forecasted customer needs.
- A planning document that outlines stakeholder input and analyzes financial, environmental and social impacts.

“Resource Planning is intended to facilitate the selection of cost-effective resources that yield the best overall outcome of expected impacts and risks for ratepayers over the long run.” - BCUC Resource Planning Guidelines, 2003

- Resource Plans submitted to the BCUC for review and acceptance
- Approval for specific actions still subject to other regulatory review processes

Evaluating the Resource Options

Objective	Attribute	Measure
Ensure reliable and secure supply.	<ul style="list-style-type: none"> System reliability Security of supply 	<ul style="list-style-type: none"> Risk of outages Gas supply diversity
Provide service to customers at least delivered cost.	Financial evaluation of supply side and demand side resources	<ul style="list-style-type: none"> Net Present Value Total Resource Cost (TRC) Ratepayer Impact (RIM)
Reduce rate volatility.	Expected rates	<ul style="list-style-type: none"> Risk trade-offs
Balance socio-economic and environmental impacts.	Social costs / benefits including: <ul style="list-style-type: none"> Local emissions Greenhouse gas Land use impacts Employment/local economic impacts Stakeholder consultation 	<ul style="list-style-type: none"> Air pollutants Quantity of CO₂ equivalent Area impacted Jobs created Stakeholder input

David Bennett, Director of Energy Management Services at
Terasen Gas will now introduce:

Mr. Dan Kirschner
Executive Director,
NORTHWEST GAS ASSOCIATION

To speak on
Regional Gas Supply Issues

NW Natural Gas Market Outlook

*Dan Kirschner, Executive Director
Northwest Gas Association*

TGI Resource Plan – Stakeholder Workshop
June 20, 2006





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NWGA Members:

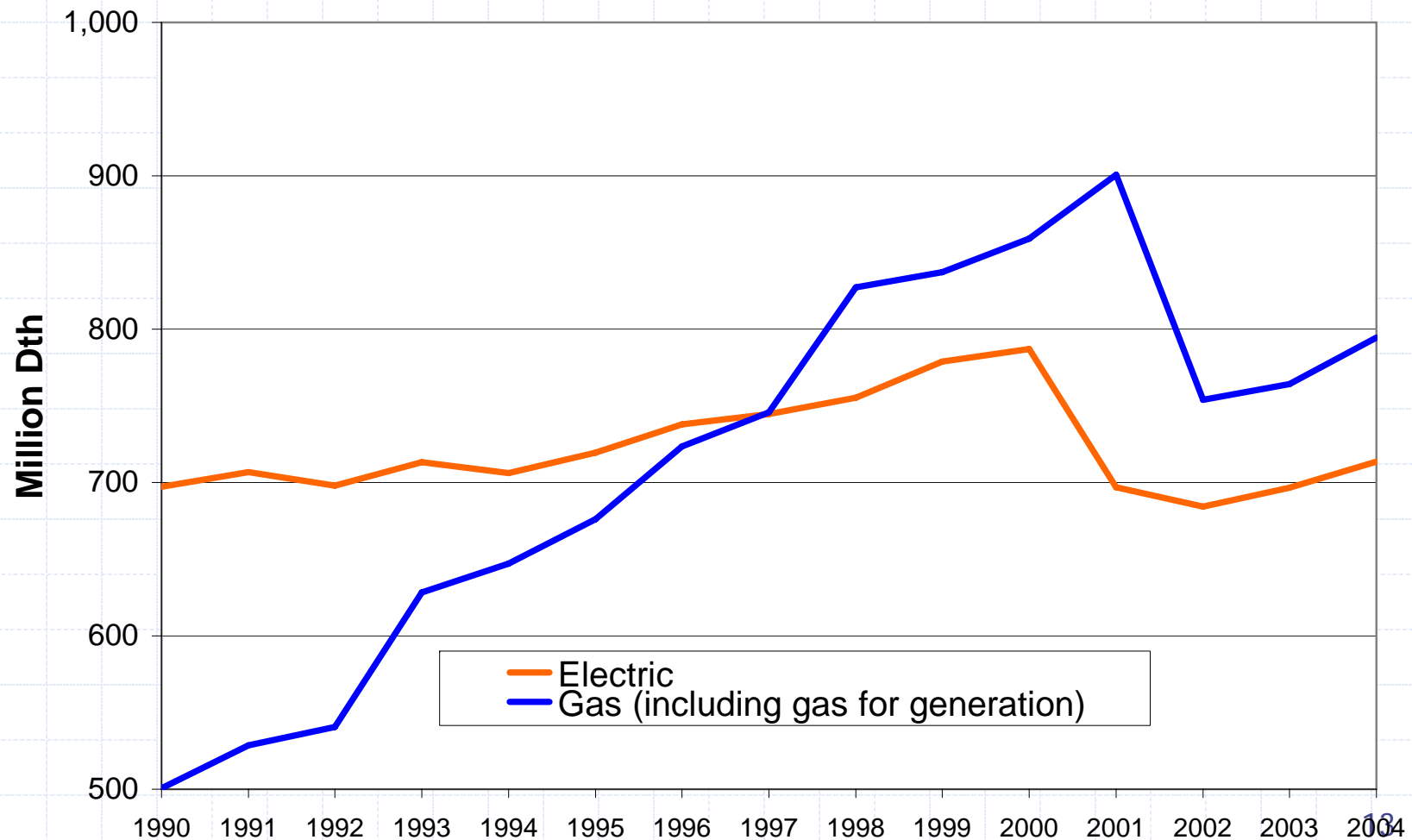
Avista Corporation
Cascade Natural Gas Co.
Intermountain Gas Co.
NW Natural
Puget Sound Energy
Duke Energy Gas Transmission
Terasen Gas
TransCanada's GTN System
Williams NW Pipeline



Gas a Vital Part of NW Energy Scene

NW Consumption by Energy Source

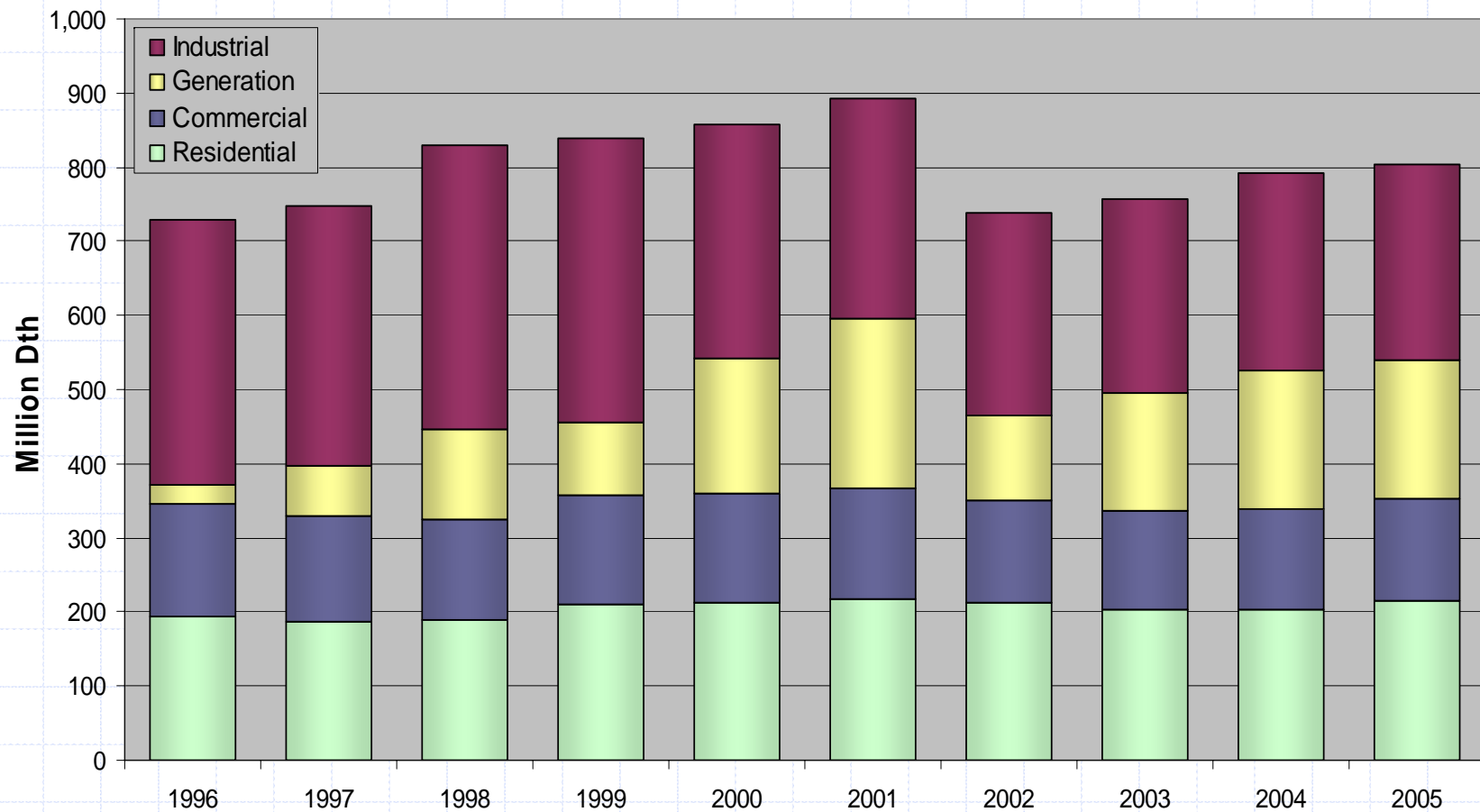
(Including BC, ID, OR, WA; Source: USA-EIA, CAN-StatCan)



Recent Gas Demand

Cumulative PNW Gas Deliveries* (source: USA-EIA, CAN-StatCan)

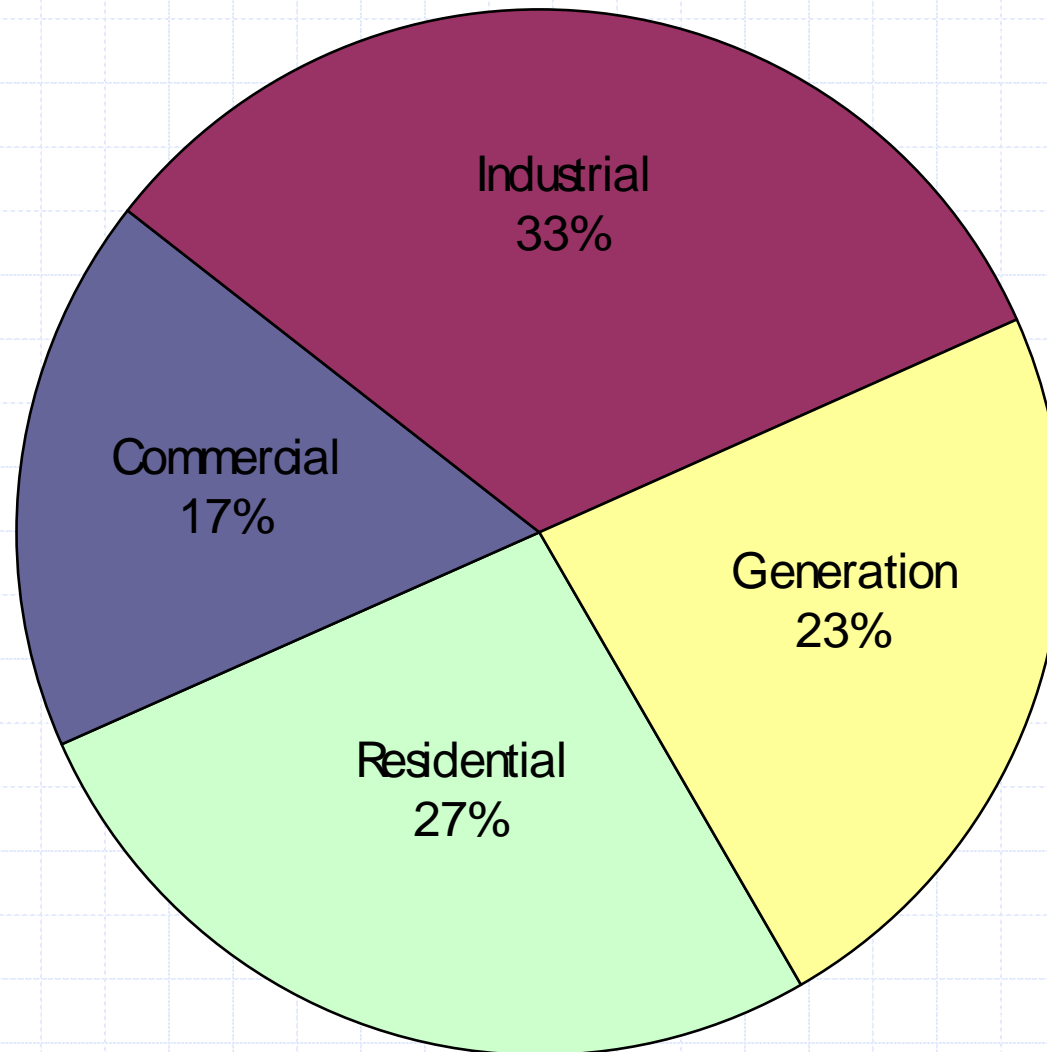
*2005 BC estimated from preliminary StatCan data



Proportion of Gas Demand by Sector - 2005

Composition of 2005 PNW Gas Demand

Source: EIA, StatCan



Gas Demand Forecast

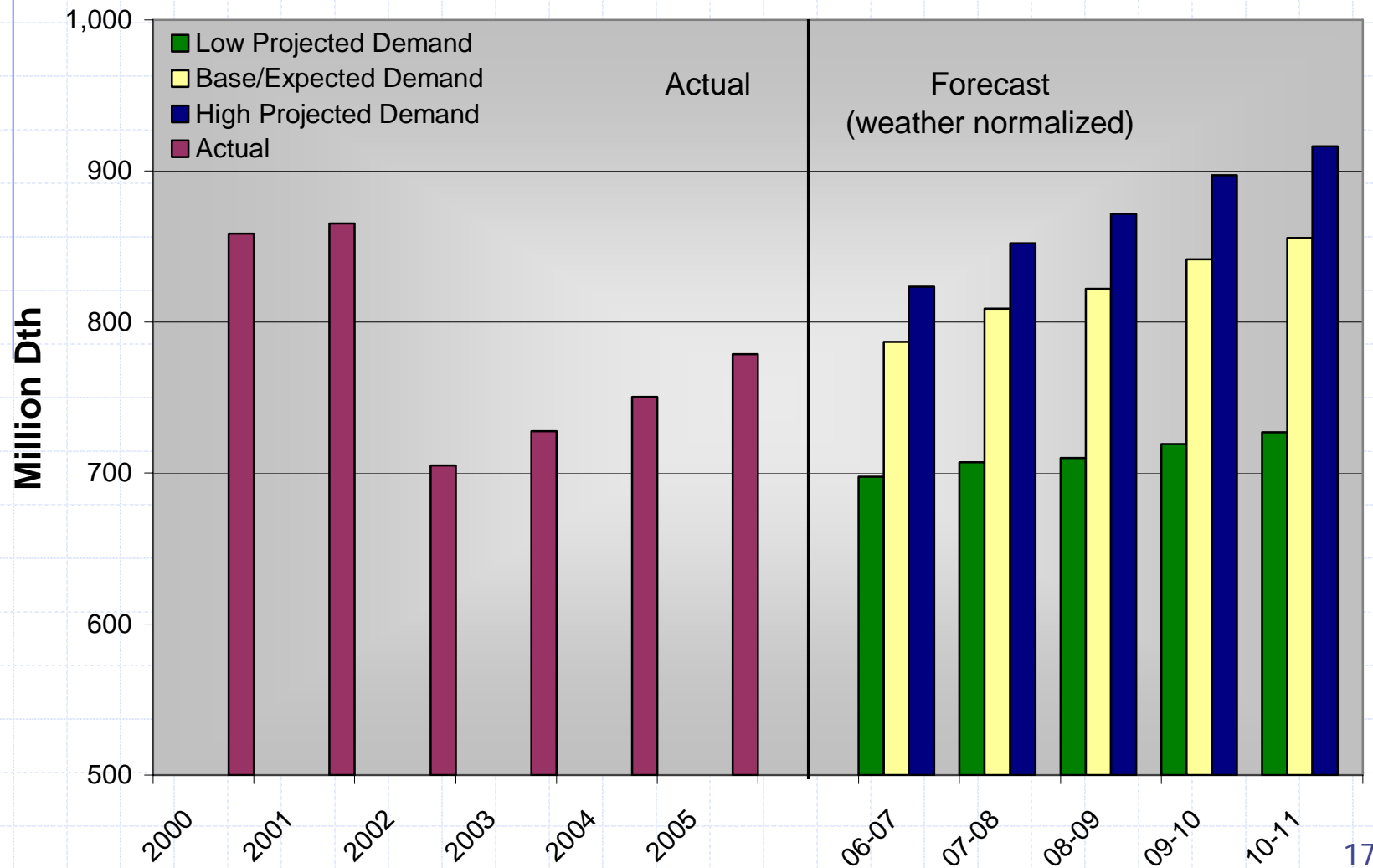
(2006-07 through 2010-11)

	Low Growth Case		Base (expected) Case		High Growth Case	
	Average Annual	Cumulative	Average Annual	Cumulative	Average Annual	Cumulative
Total	1.0%	4.1%	2.1%	8.1%	2.7%	10.2%
Residential	1.9%	7.3%	3.2%	11.9%	4.2%	15.2%
Commercial	1.3%	4.9%	2.5%	9.3%	3.1%	11.5%
Industrial	0.0%	0.1%	0.5%	2.0%	0.6%	2.4%
Generation	1.1%	4.1%	2.6%	9.7%	3.2%	11.9%

Demand Forecast

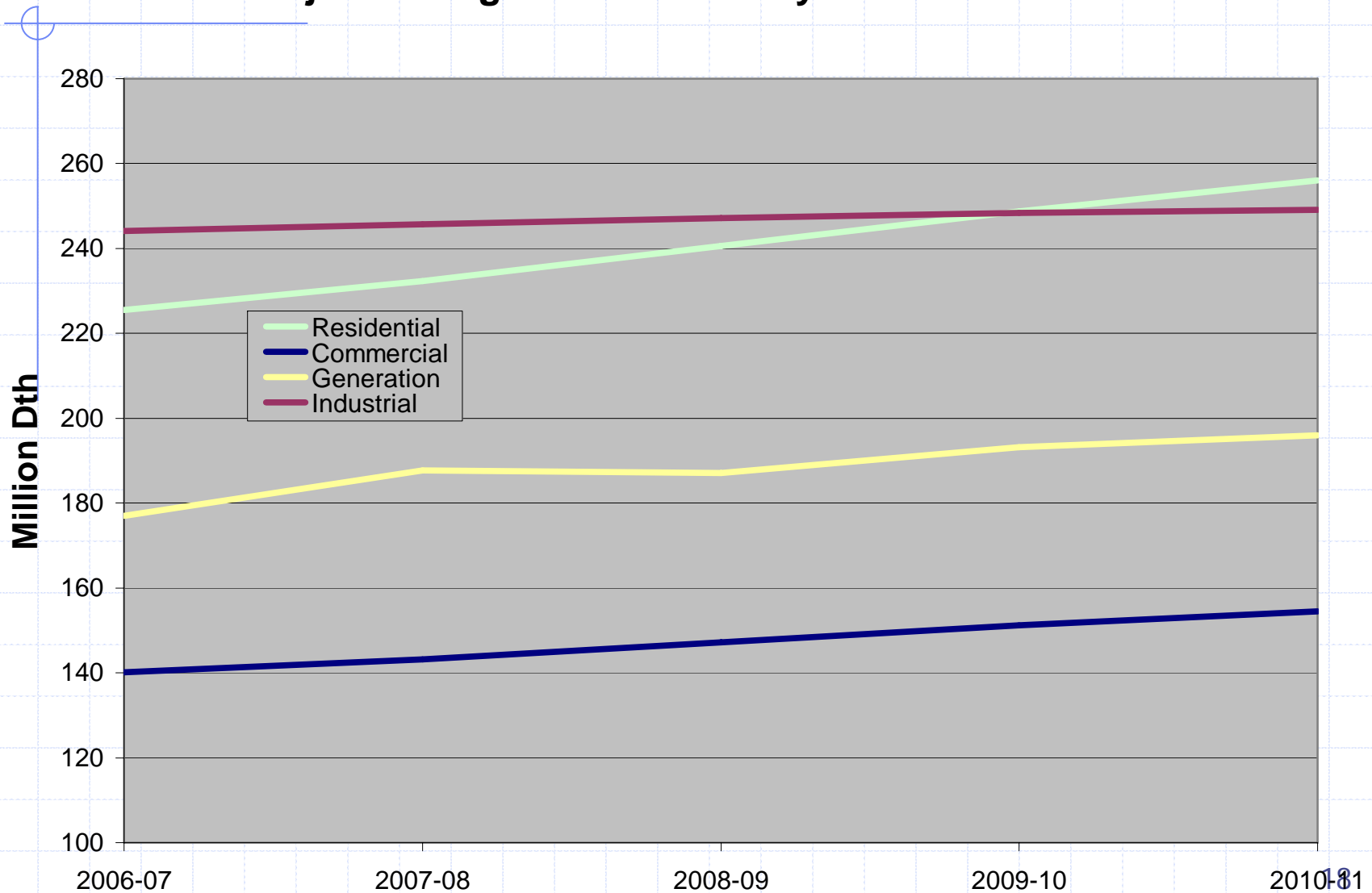
Projected Regional Demand

(Source: 2006 NWGA Outlook)



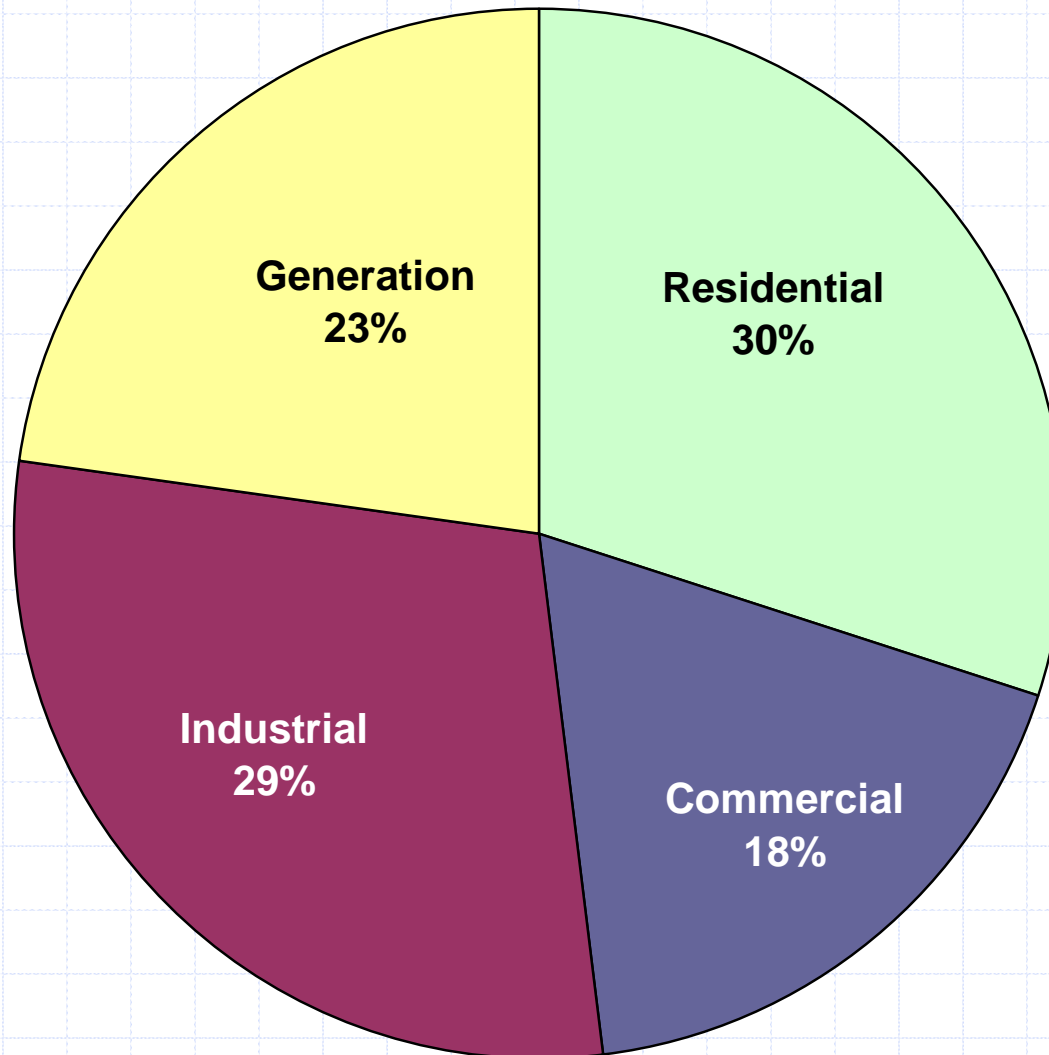
Demand Forecast by Sector

Projected Regional Demand By Sector - Base Case



Proportion of Projected Gas Demand by Sector: 2010-2011

Composition of PNW Demand - Base Case



Change from
2005:

Residential

↑ 3%

Commercial

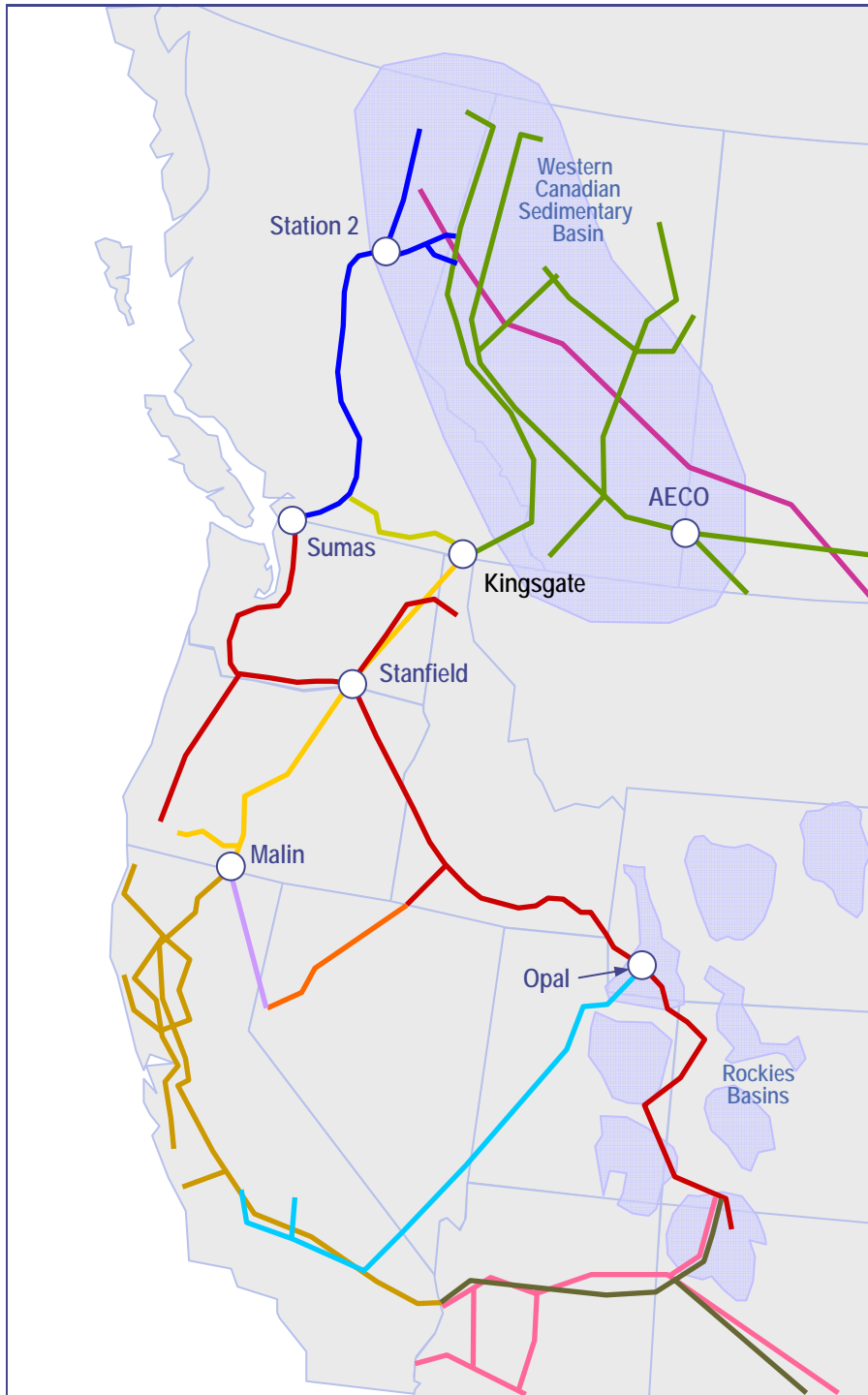
↑ 1%

Industrial

↓ 4%

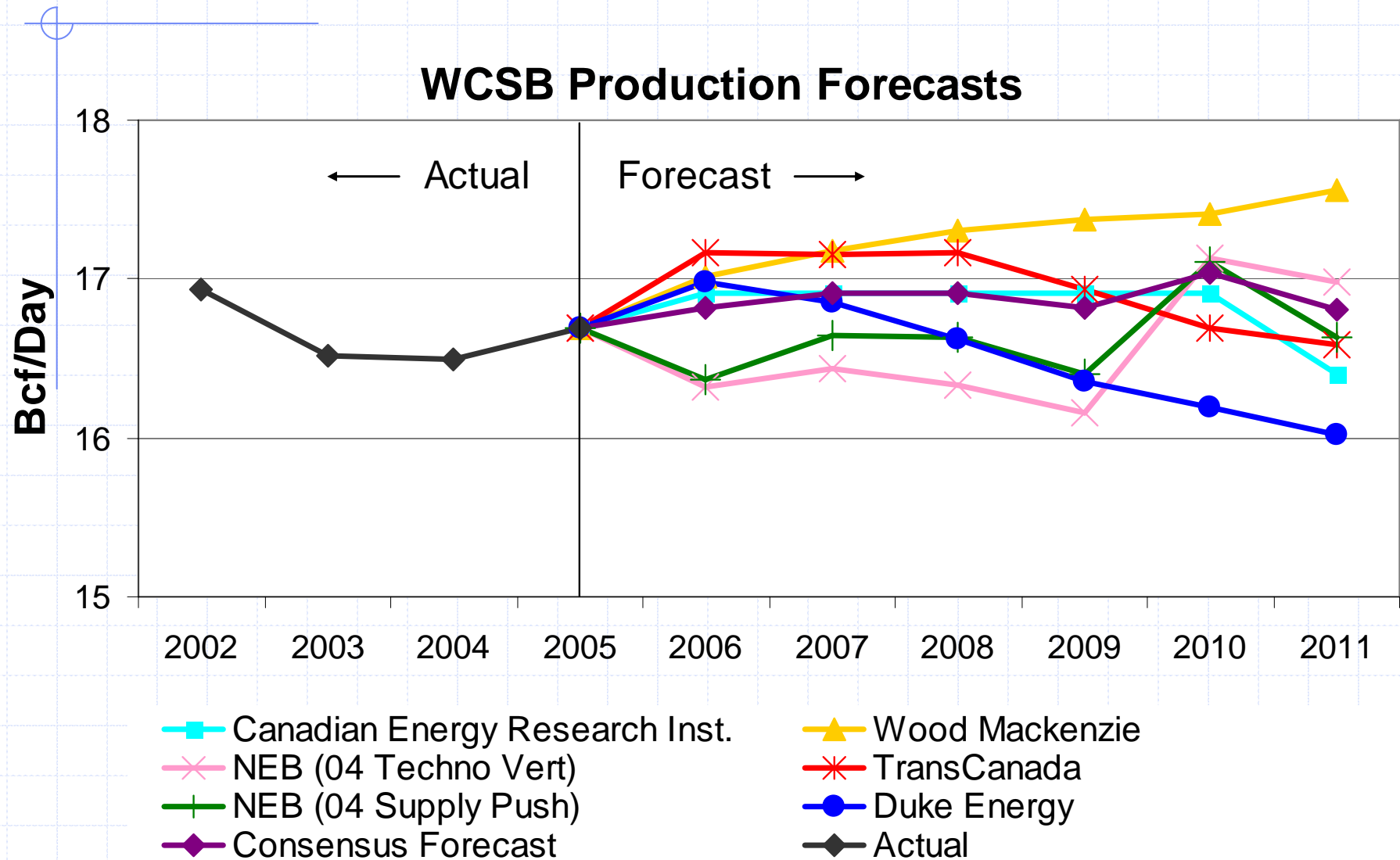
Generation



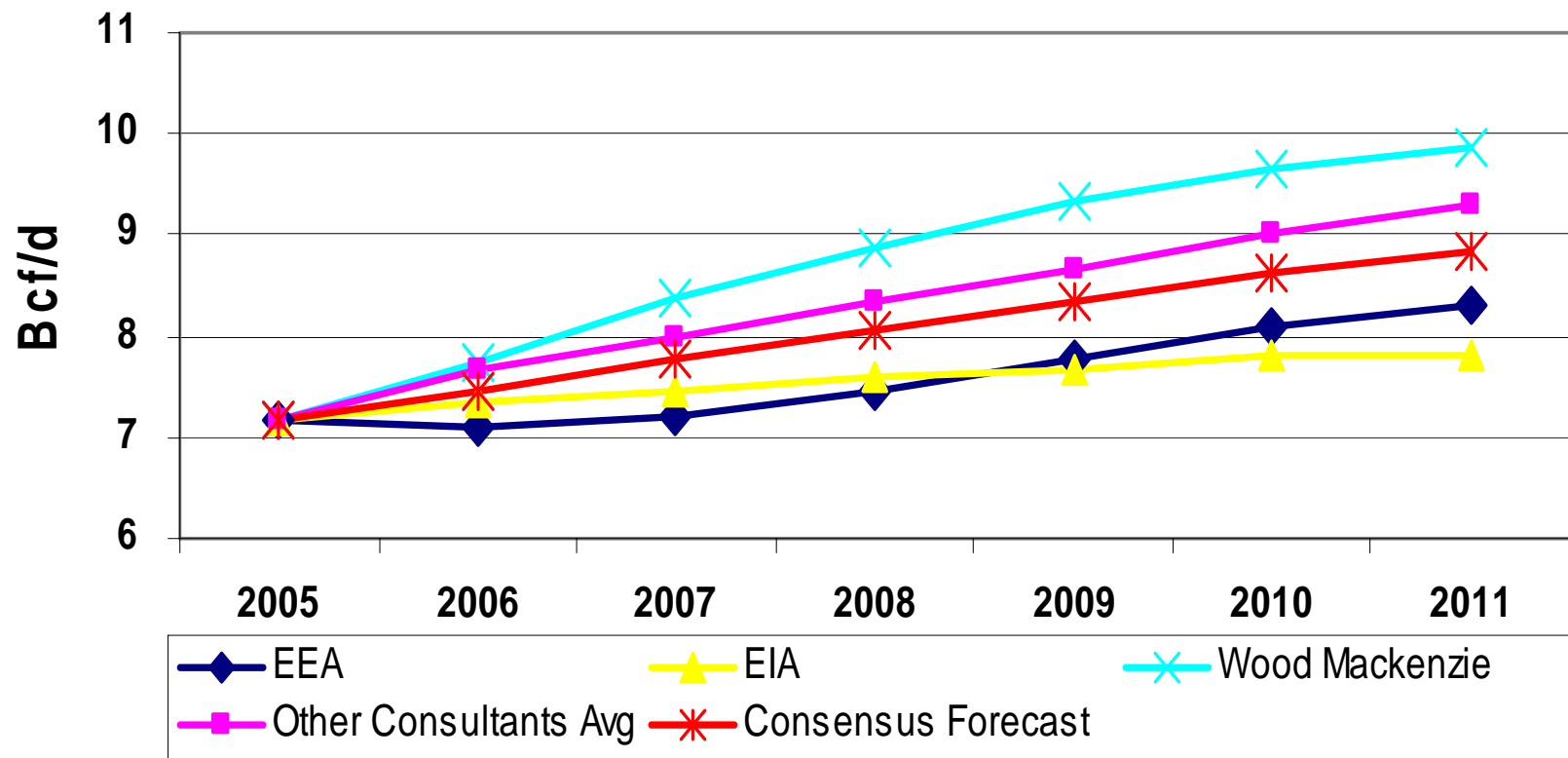


Northwest Gas Supply

WCSB Production



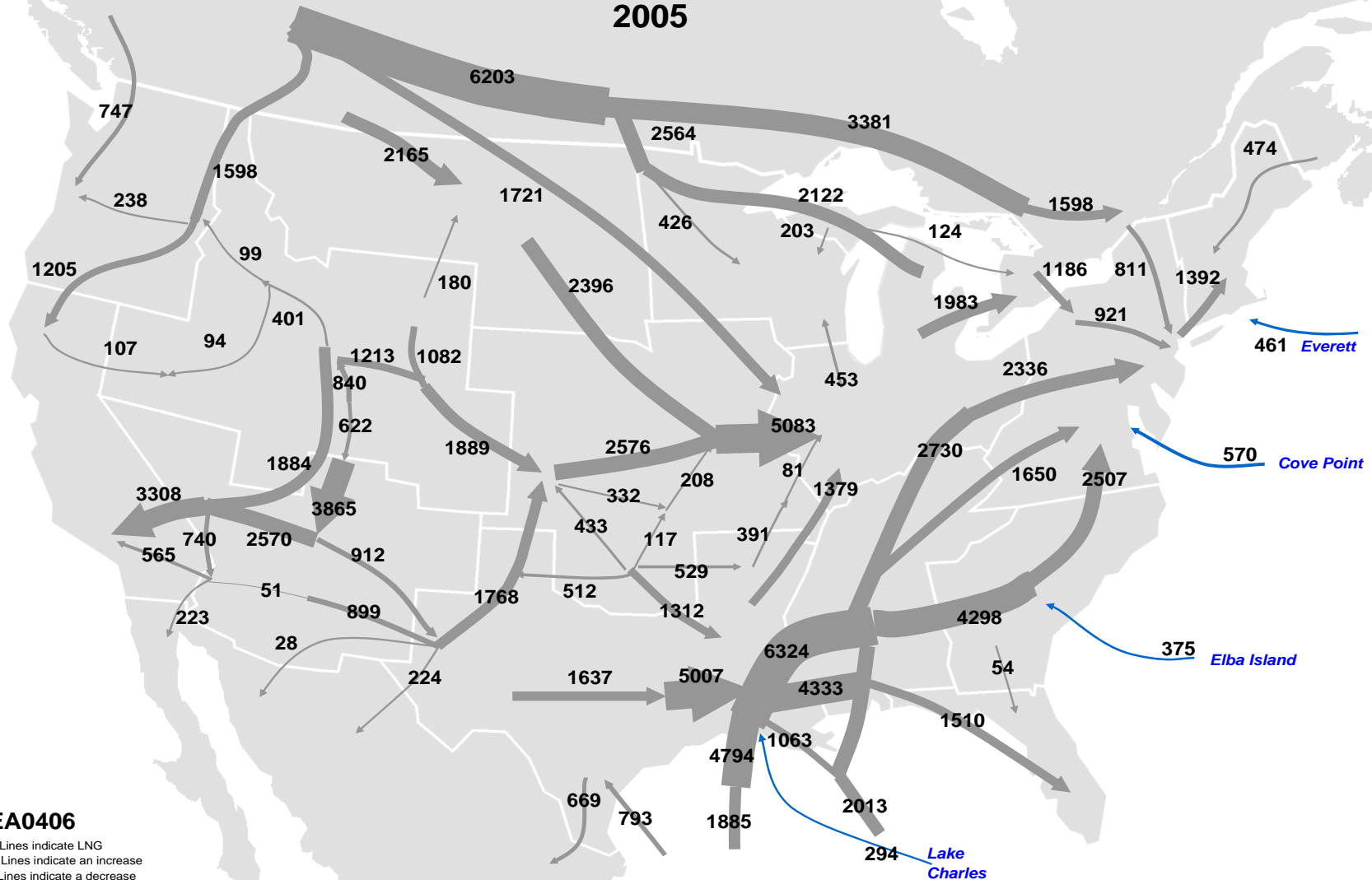
Rockies Production



Supplies Flow to Demand

Pipeline Flow (MMcfd)

2005



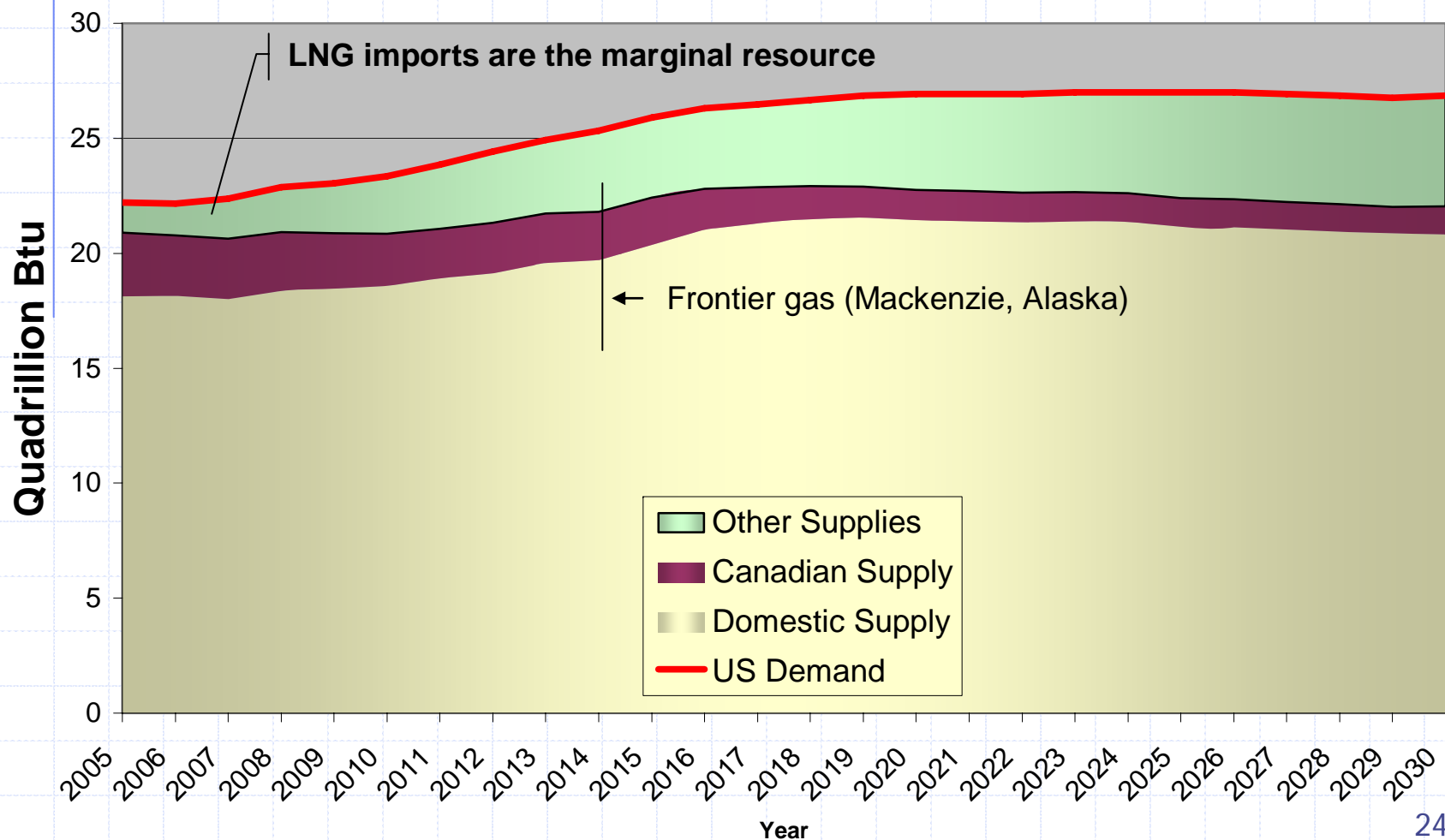
EEA0406

Blue Lines indicate LNG
Gray Lines indicate an increase
Red Lines indicate a decrease

Growing Demand, Slowing Supply

Projected US Supply/Demand Balance

(EIA Annual Energy Outlook 2006)



Northwest LNG Proposals

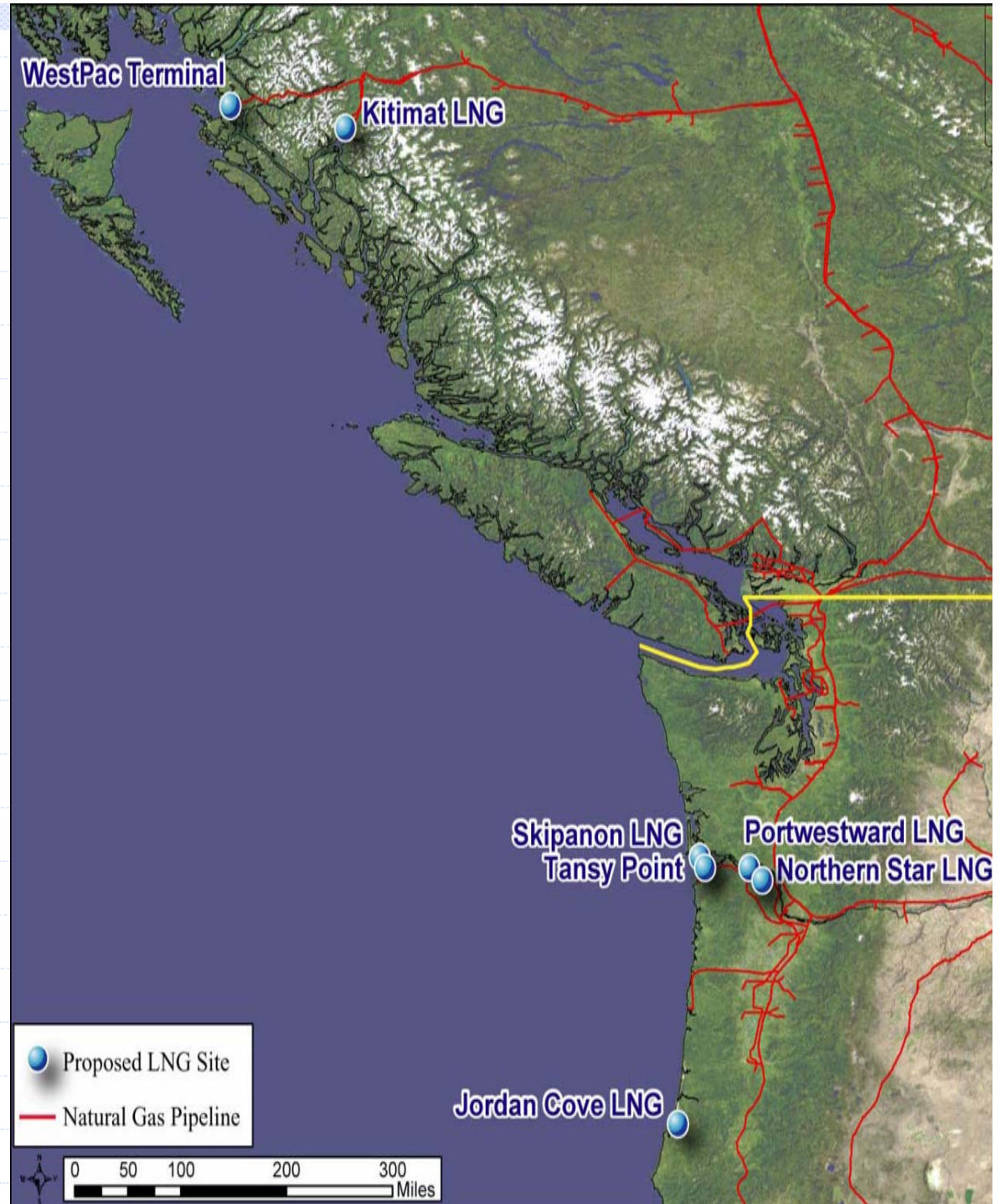
- ① PortWestward LNG
- ② Skipanon LNG
- ③ Jordan Cove LNG
- ④ Northern Star LNG
- ⑤ Tansy Point
- ⑥ Kitimat LNG
- ⑦ WestPac Terminal

Why LNG?

- Vast reserves
 - no local market
 - pipelines not viable
- decreasing costs

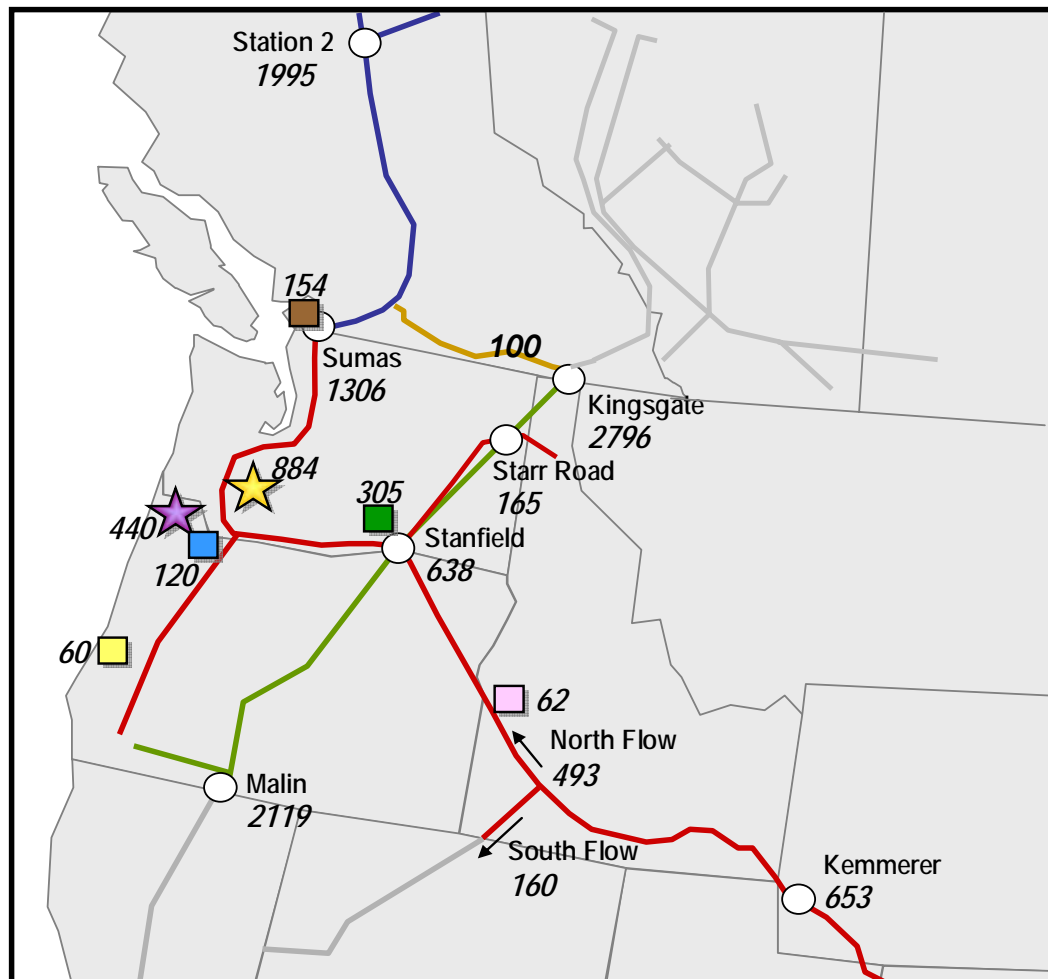
Challenges include:

- Local acceptance
- Regulatory/Permitting
- Commercial considerations:
 - economics/financing
 - takeaway infrastructure
 - worldwide competition
 - supplier commitment



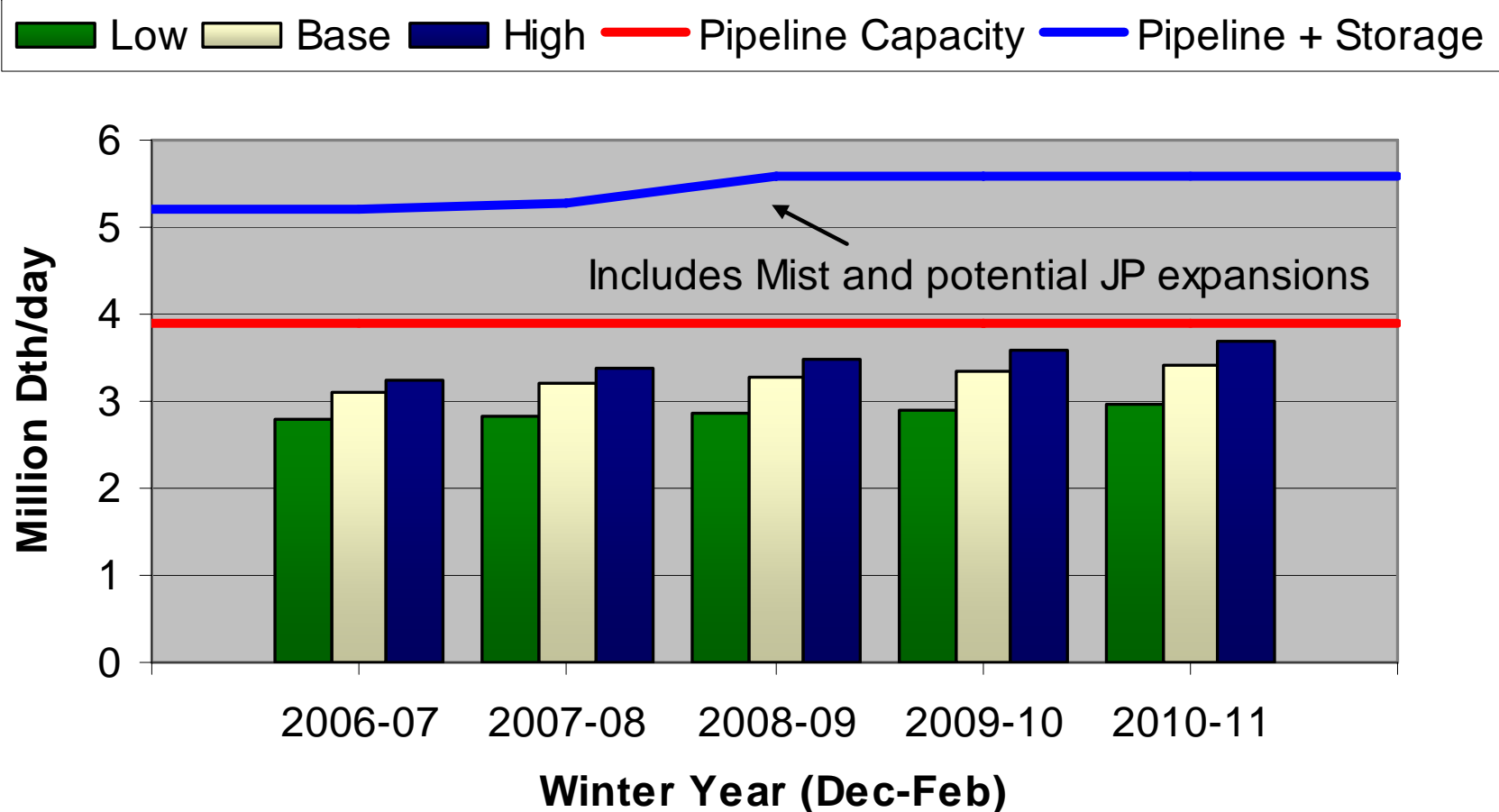
Northwest Gas Infrastructure

Capacity at Major Interconnects & Storage Facilities (MDth/day)



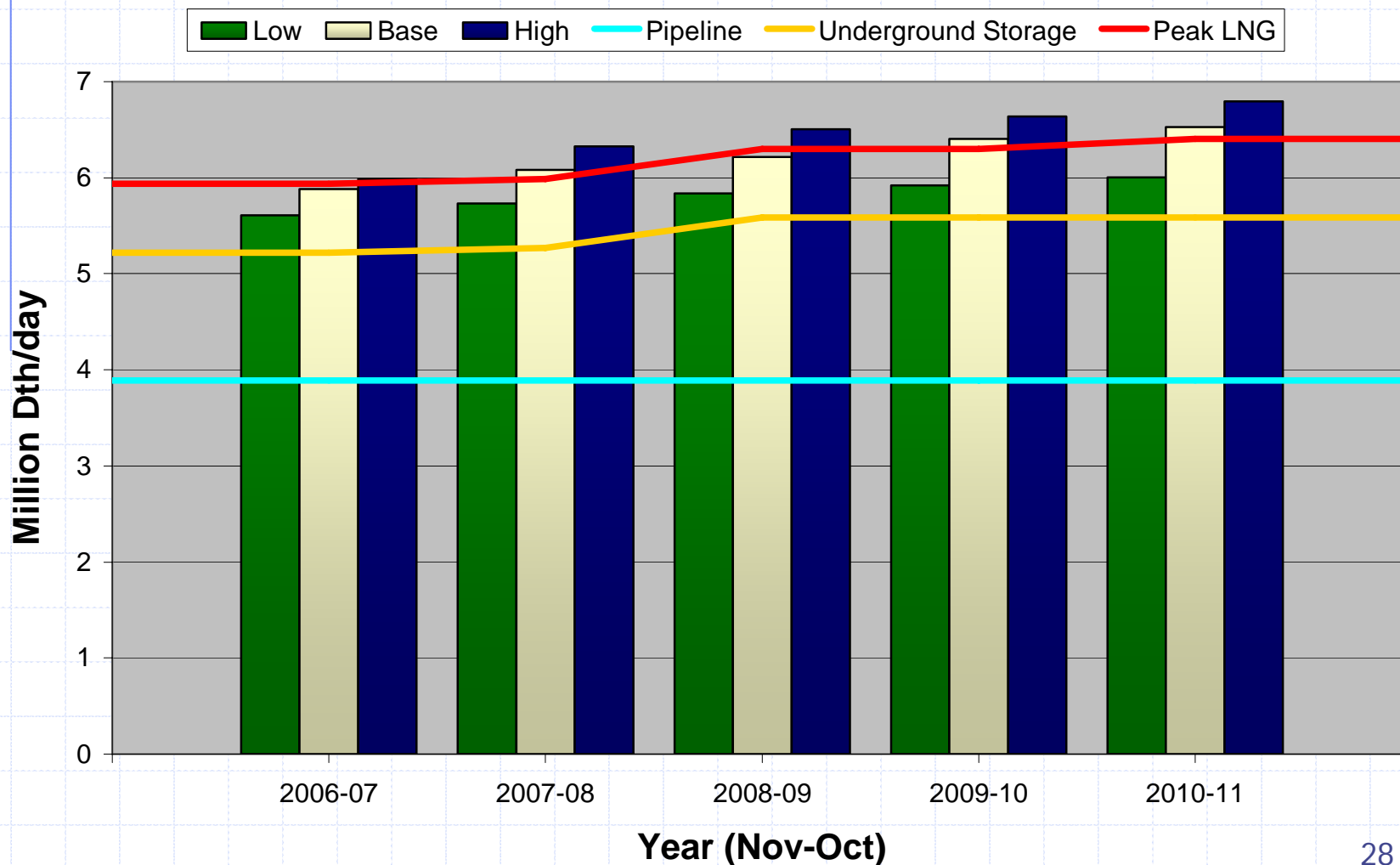
Capacity to Serve NW Demand: Average Winter Day

Pipeline & Storage Capacity vs. Avg. Winter Day Demand



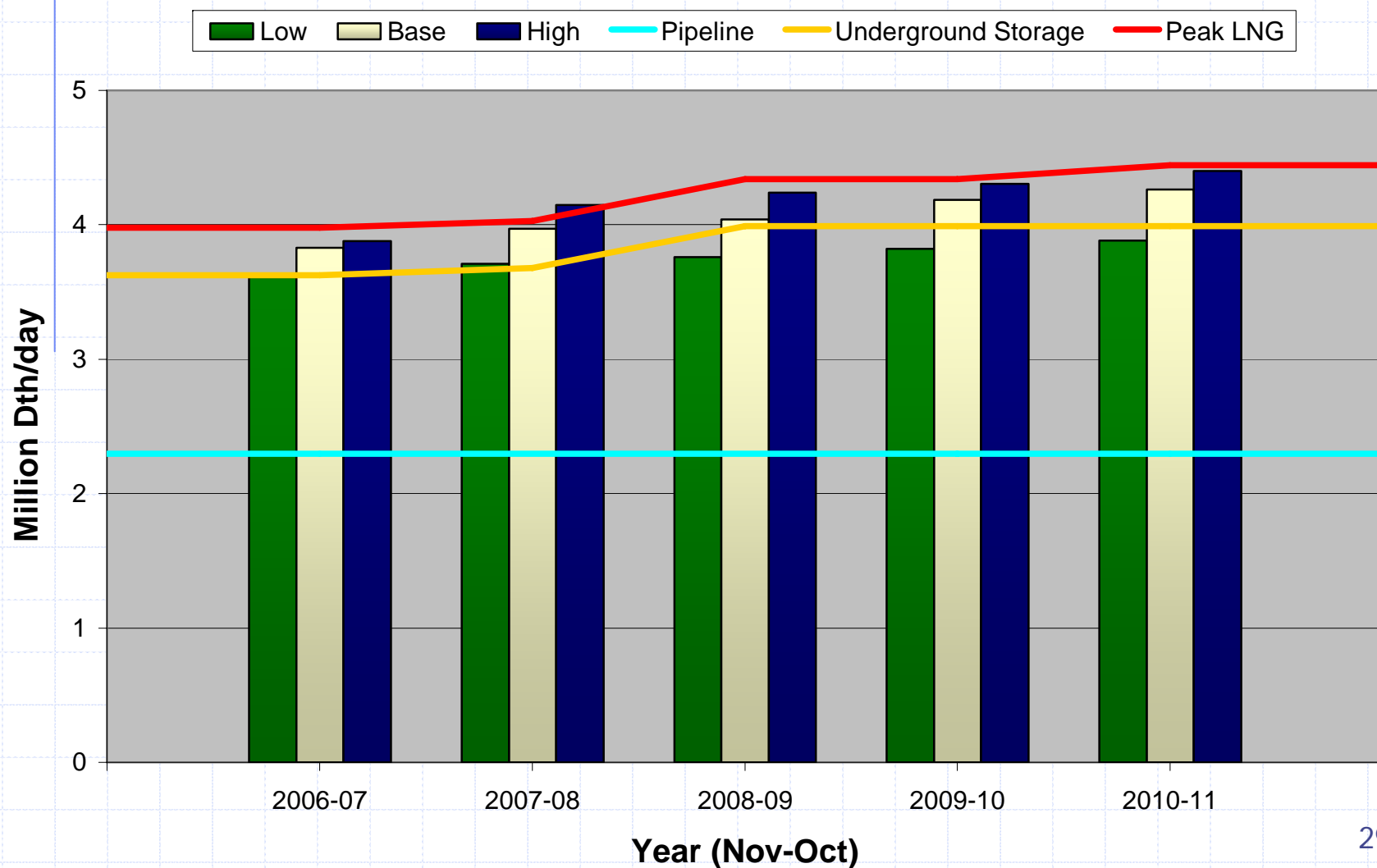
Capacity to Serve Demand: Region-wide Peak Day

NW Total Firm Peak Day Demand/Capacity Balance
(ID, OR, WA, BC)



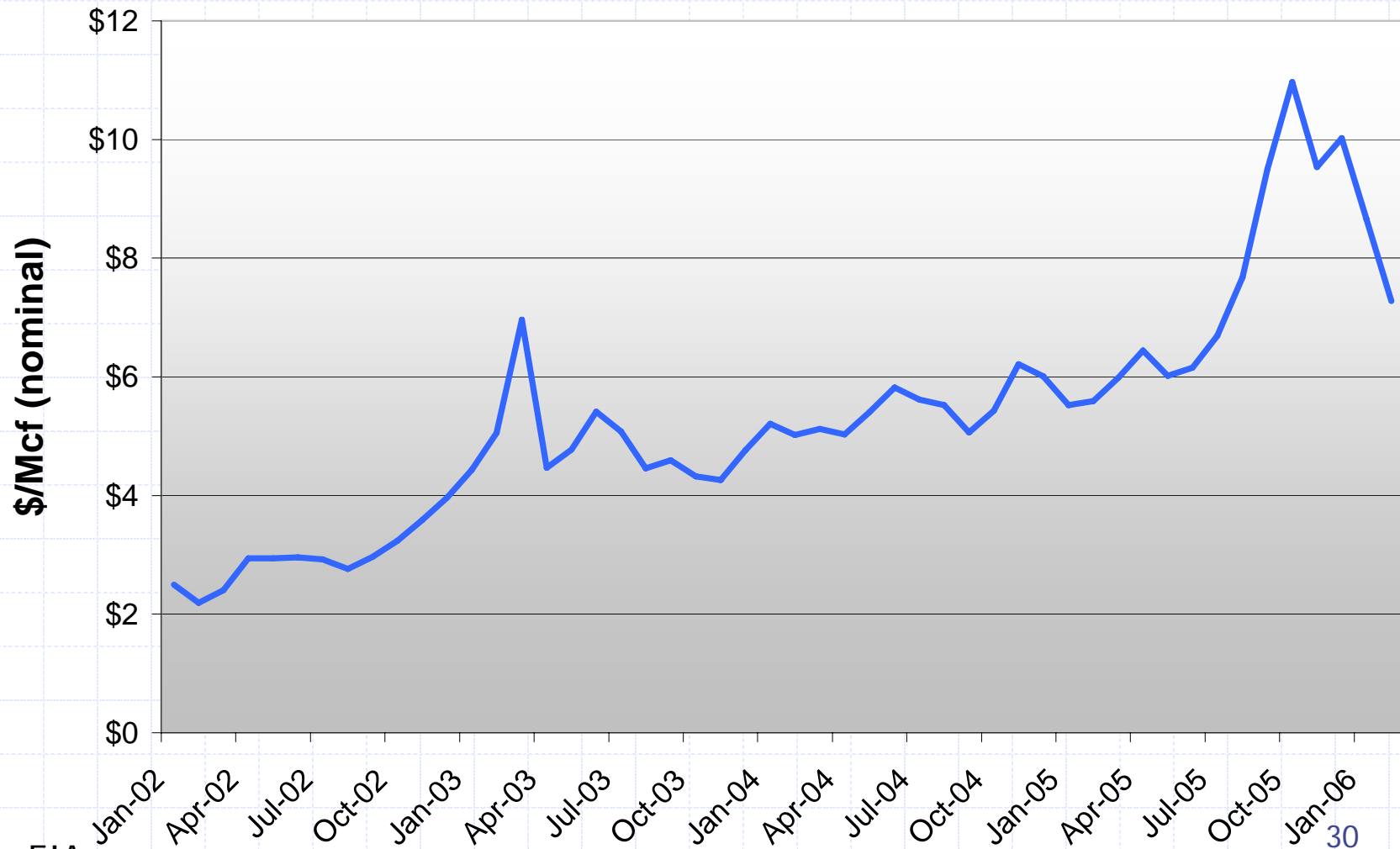
Capacity to Serve Demand: *I-5 Peak Day*

I-5 Total Firm Peak Day Supply/Demand Balance



Recent Gas Prices

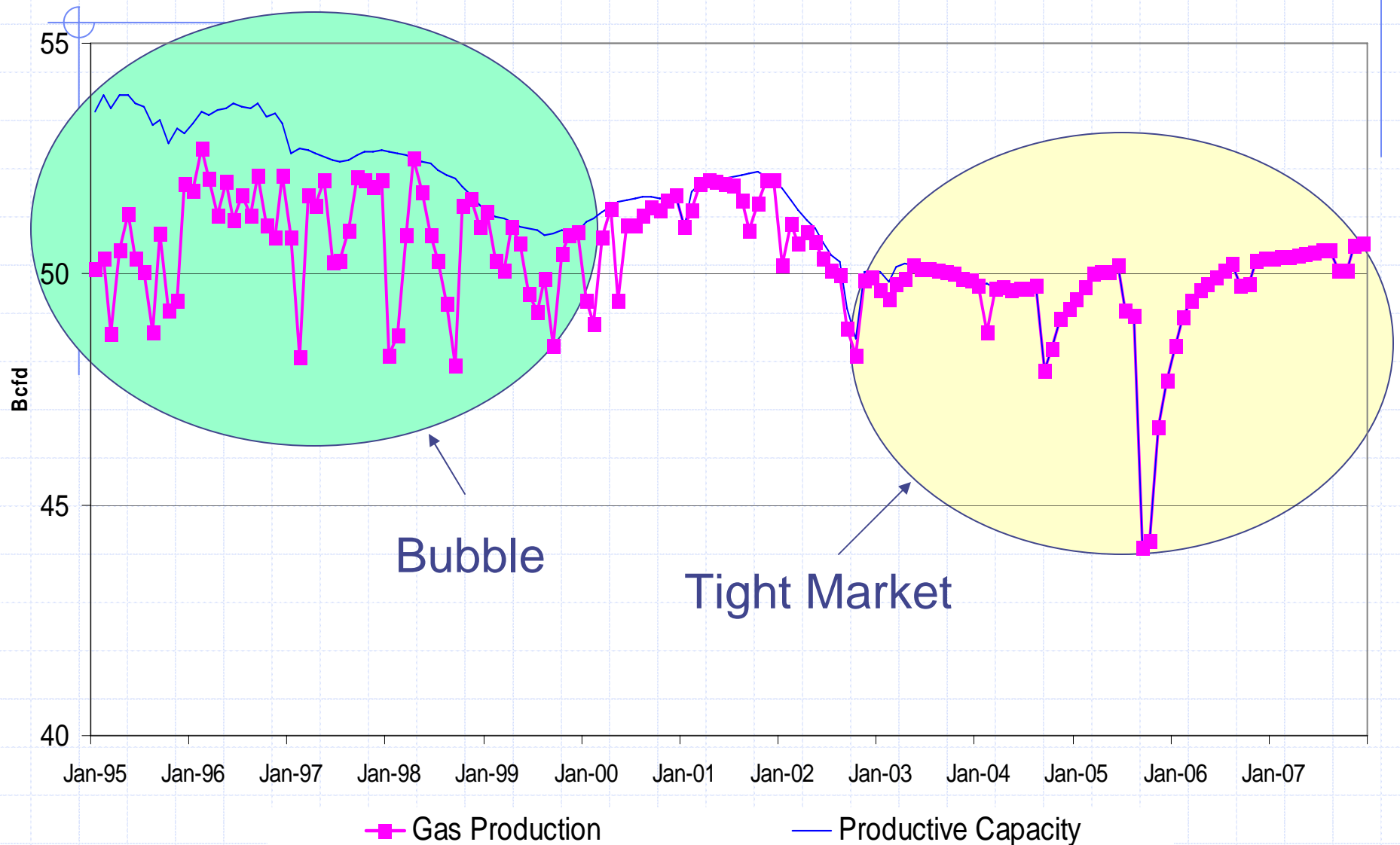
U.S. Natural Gas Wellhead Price



Source: EIA

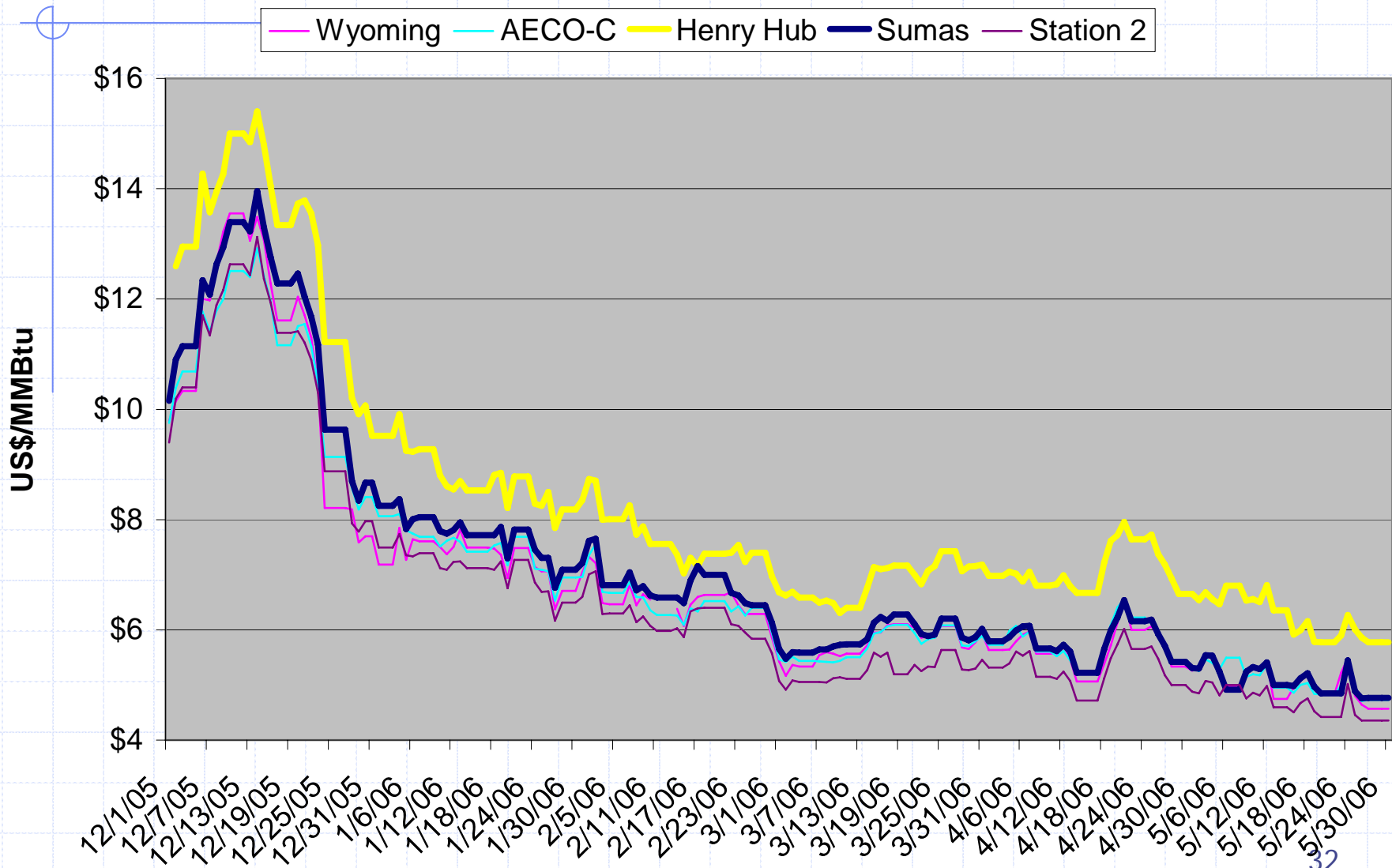
Productive Capacity

Source: Energy and Environmental Analysis, Inc.



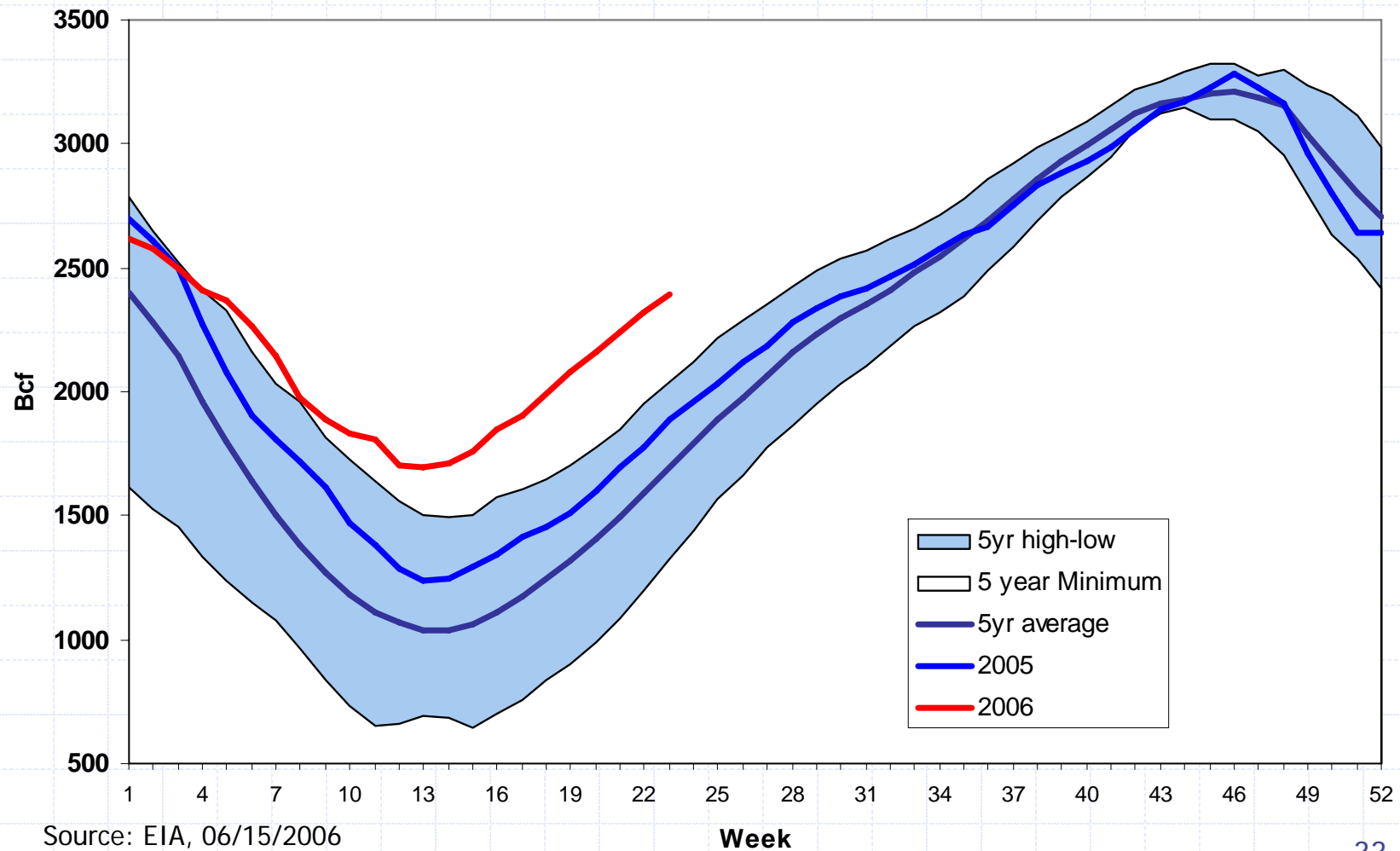
The Good News (but for how long?)

Daily Prices



Source: Platts Gas Daily and EIA Natural Gas Weekly Update

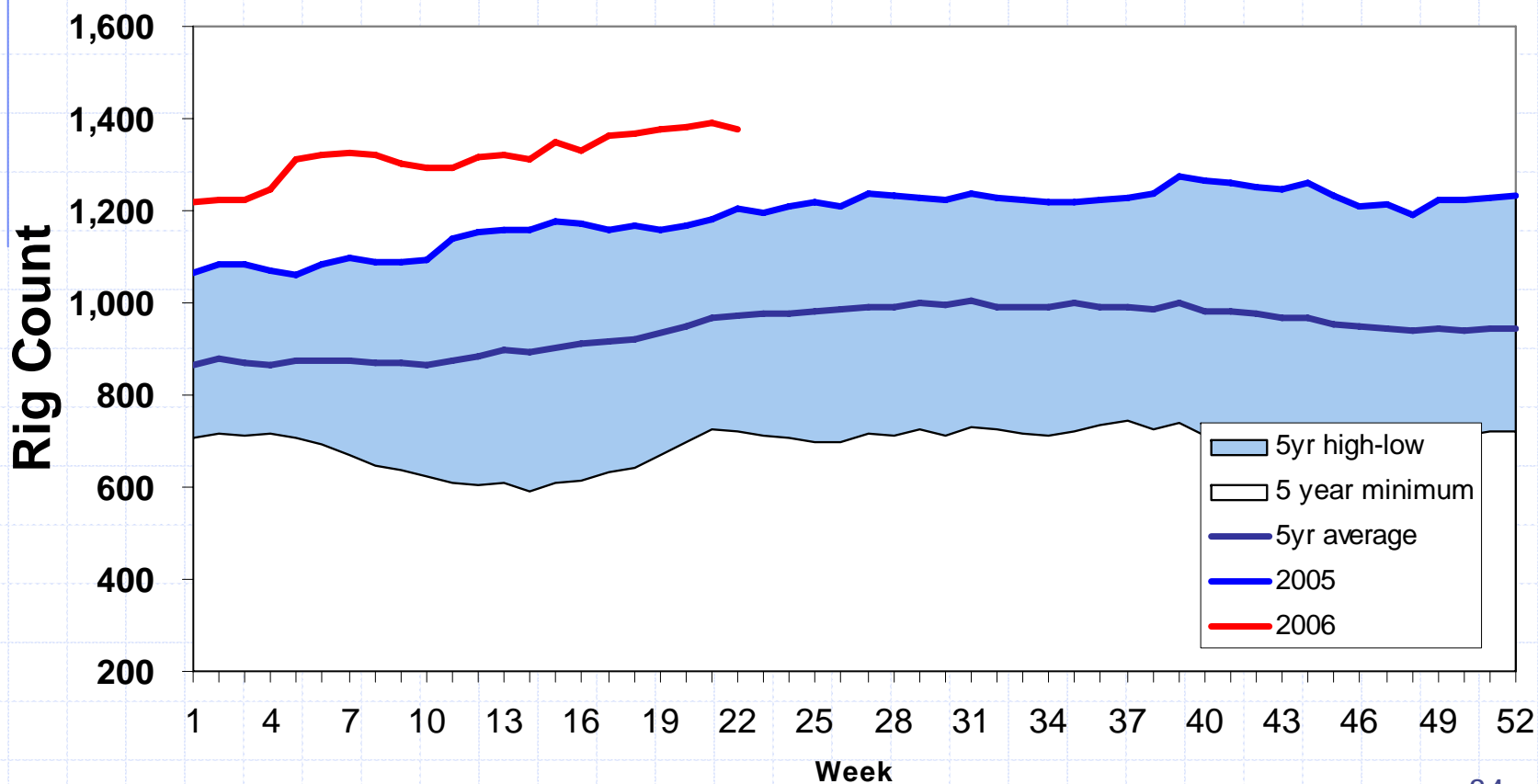
Price Drivers: Storage (Supply)



Source: EIA, 06/15/2006

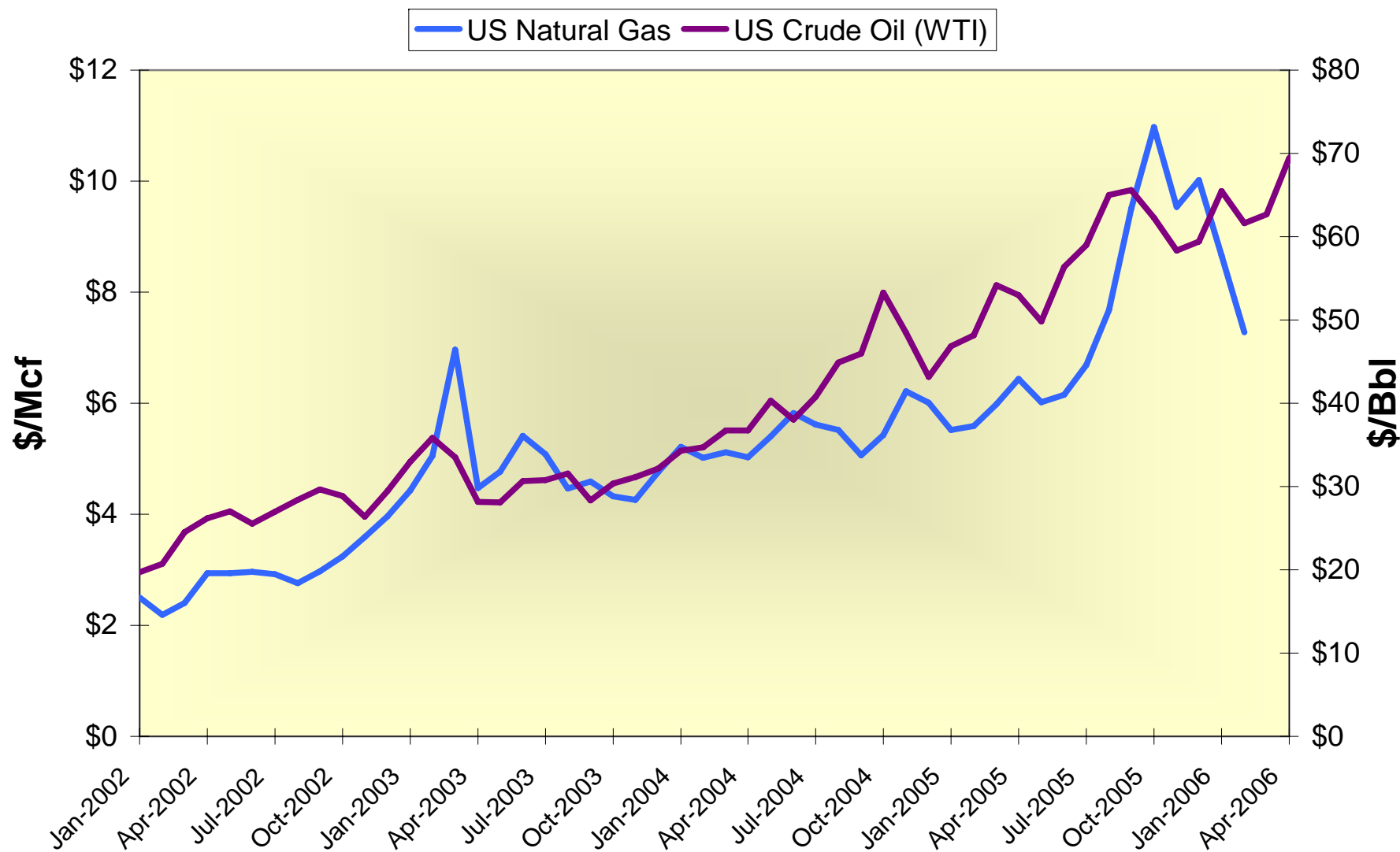
Price Drivers: Production

U.S. Gas Rigs In Operation



The Price of Oil Has an Impact...

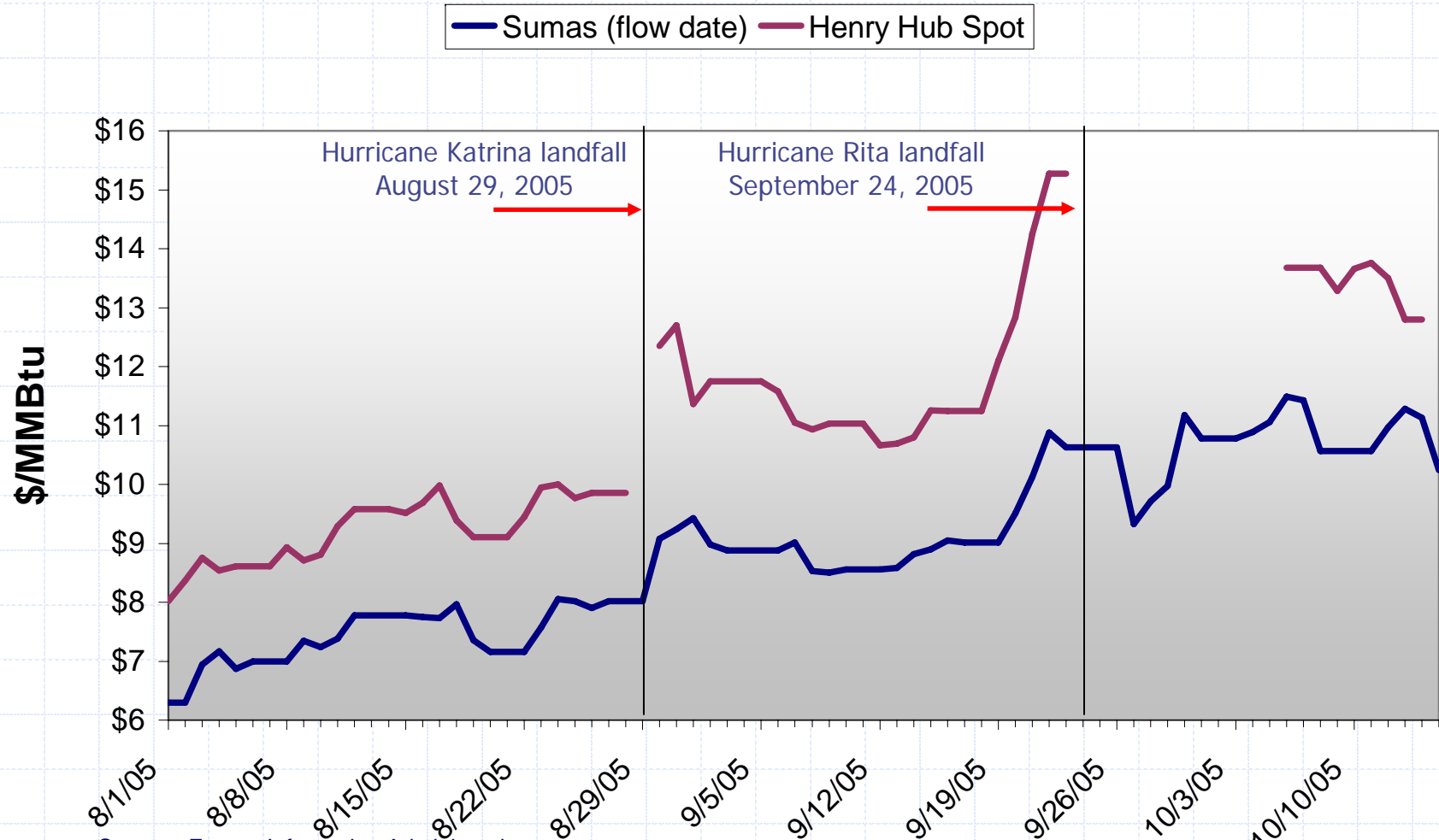
Crude Oil:Natural Gas Price Correlation = 0.875



Source: EIA

As Does the Weather

Weather Affect on Prices

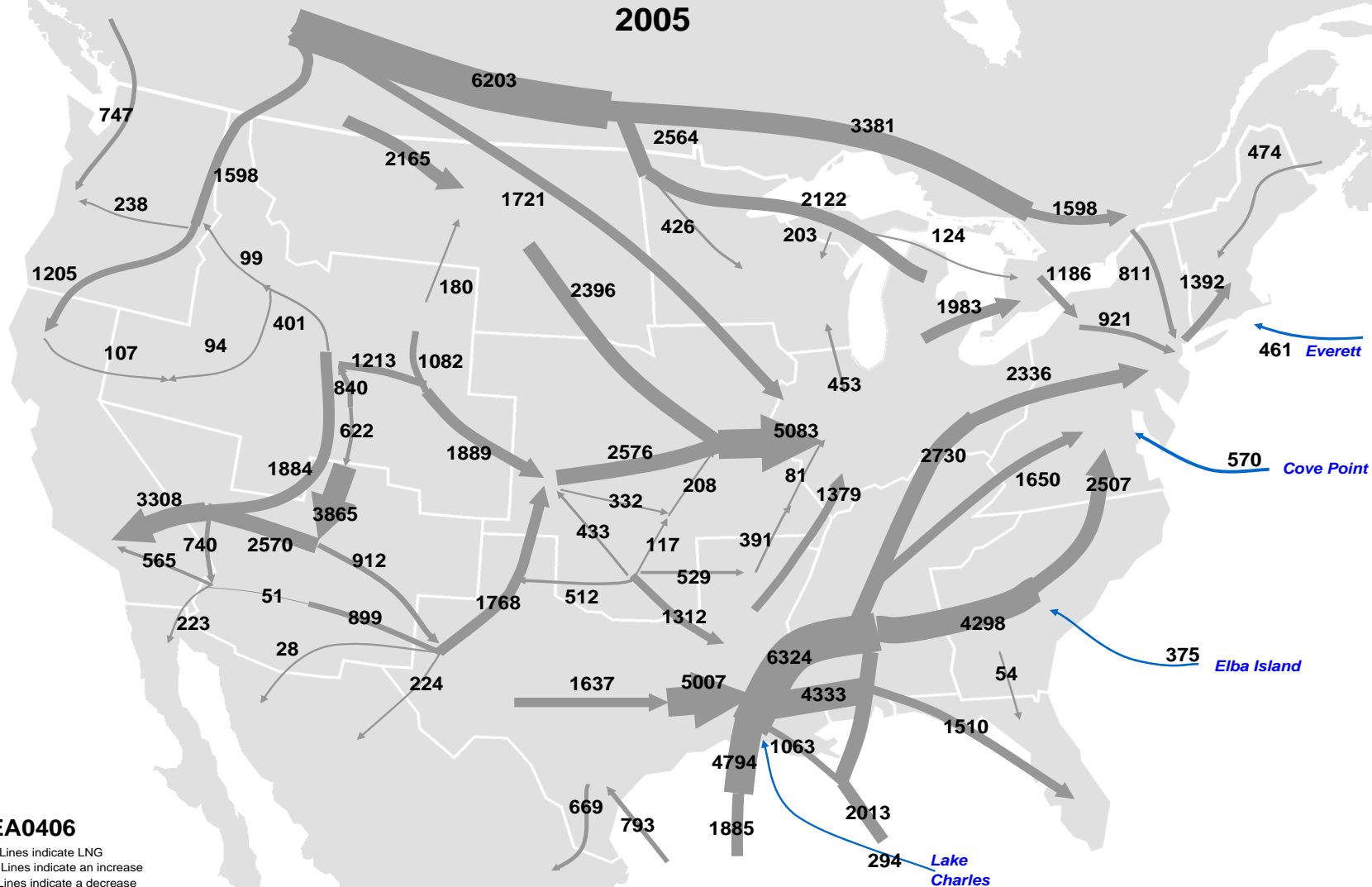


Source: Energy Information Administration

Markets Are Connected

Pipeline Flow (MMcfd)

2005



EEA0406

Blue Lines indicate LNG
Gray Lines indicate an increase
Red Lines indicate a decrease

Natural Gas Demand

- ◆ Natural gas demand in PNW will grow moderately over next five years.
 - normal weather, economic conditions
- ◆ Load shape changing: peak loads growing faster than base.

Natural Gas Supply

- ◆ There is plenty of gas, but...
 - N. American production struggling to keep up with growing demand.
- ◆ N. America increasingly integrated
- ◆ PNW consumers will benefit from incremental supplies.

Natural Gas Prices

- ◆ Natural gas prices have moderated;
- ◆ Prices remain volatile: tight supply/demand balance
 - weather, production, etc.

Natural Gas Infrastructure

- ◆ Transmission/storage capacity adequate to serve region at present.
- ◆ Very efficient system; little redundancy; how to serve changing load shape.
- ◆ Permitting/regulatory processes must be nimble; facilitate necessary projects when required.
- ◆ Infrastructure takes time. Information sharing helps ensure supply is available when needed.



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NWGA Members:

Avista Corporation
Cascade Natural Gas Co.
Intermountain Gas Co.
NW Natural
Puget Sound Energy
Duke Energy Gas Transmission
Terasen Gas
TransCanada's GTN System
Williams NW Pipeline



Energy Outlook

Doug Stout, Vice President

Marketing and Business Development

The Benefits of Natural Gas

Terasen Gas offers a **safe, reliable, secure, affordable and efficient energy choice** to meet the growing needs of businesses and communities while enabling the pursuit of sustainability over the long run.

Affordable

Environmentally Acceptable

Pipeline to the Future

Natural Gas In BC: playing a vital role

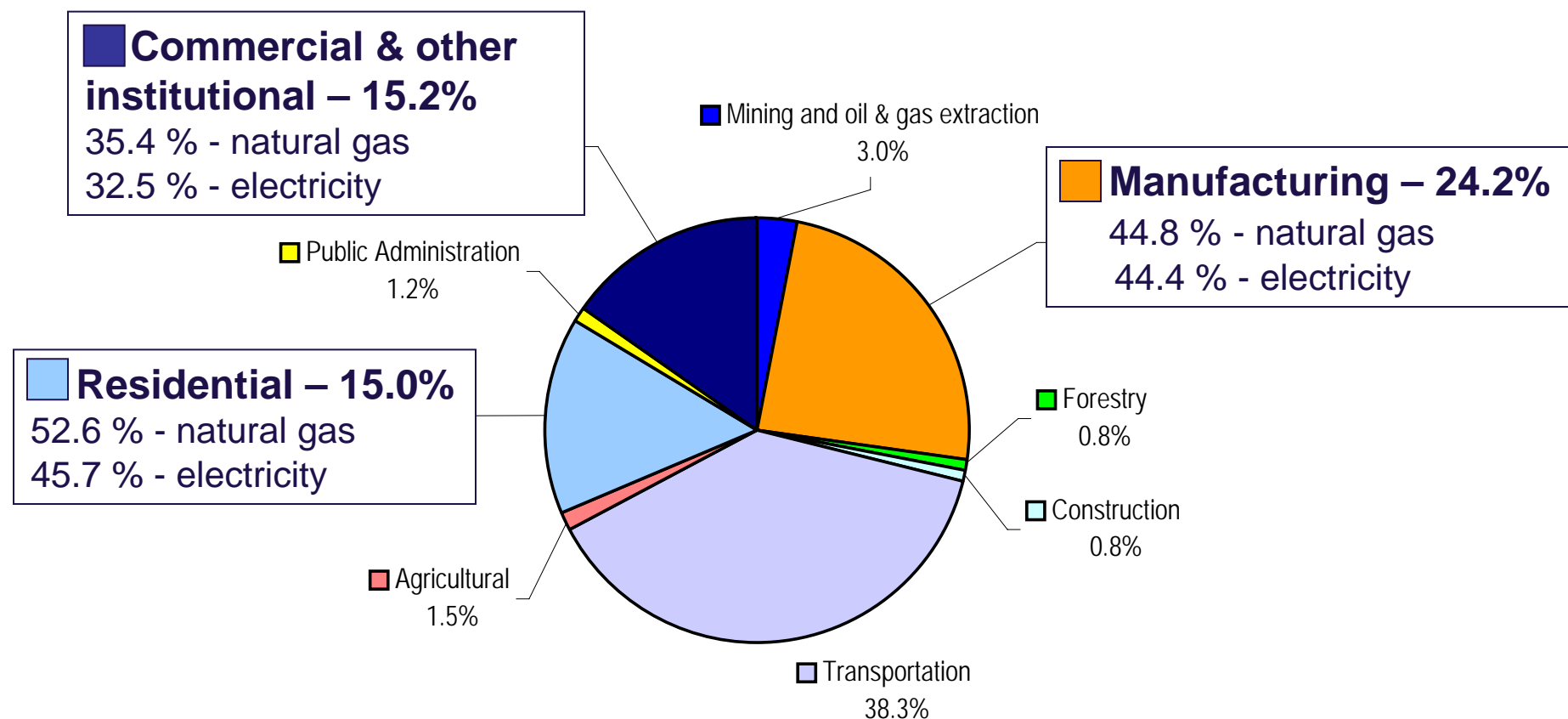


- The energy industry is integral to the economy of British Columbia
- We are all committed to responsible and sustainable development
- Natural gas is vital to the prosperity of the province
 - 11,400 jobs in 2006
 - \$1.9 billion in Provincial Revenue

Natural gas & BC's energy picture

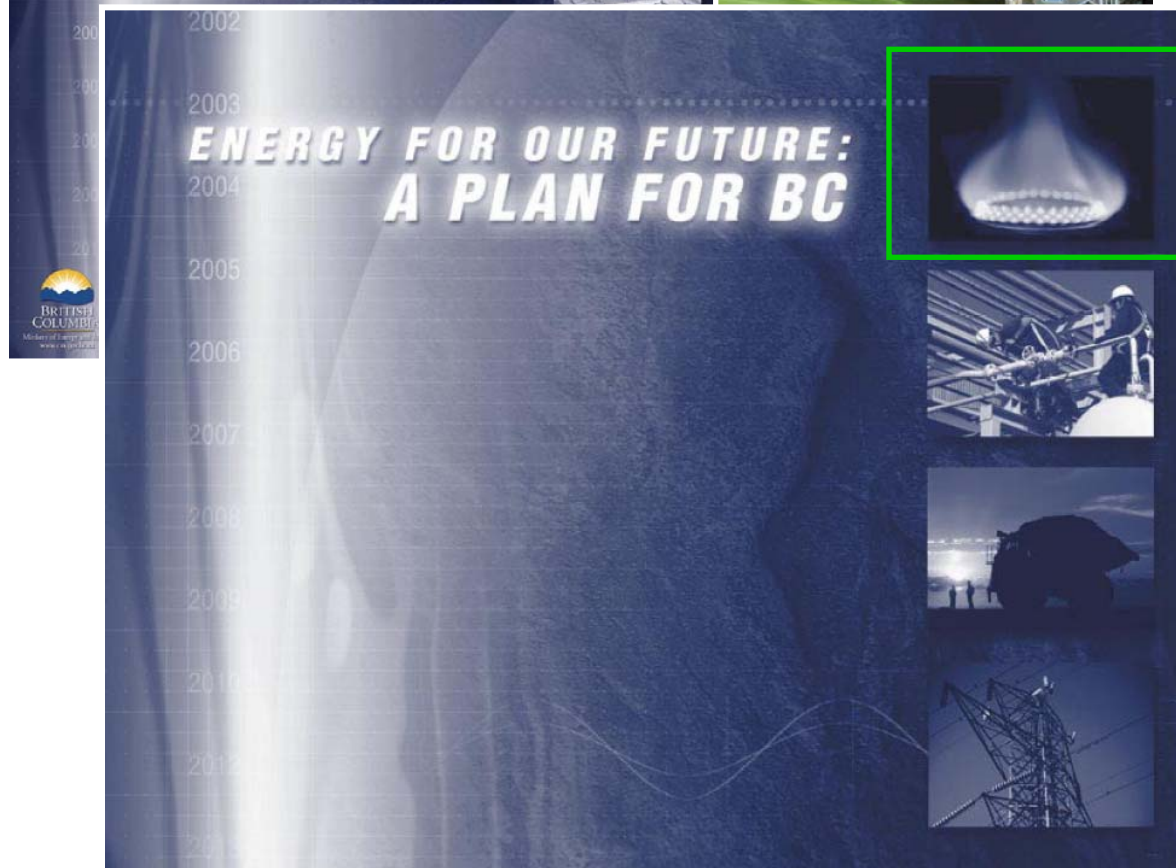


Energy Use in British Columbia in 2004 By Sector



Source: BC Ministry of Energy, Mines and Petroleum Resources

BC's Energy Plan



Electricity deficit

Marginal source / cost of electricity

Natural gas role in conserving heritage resources

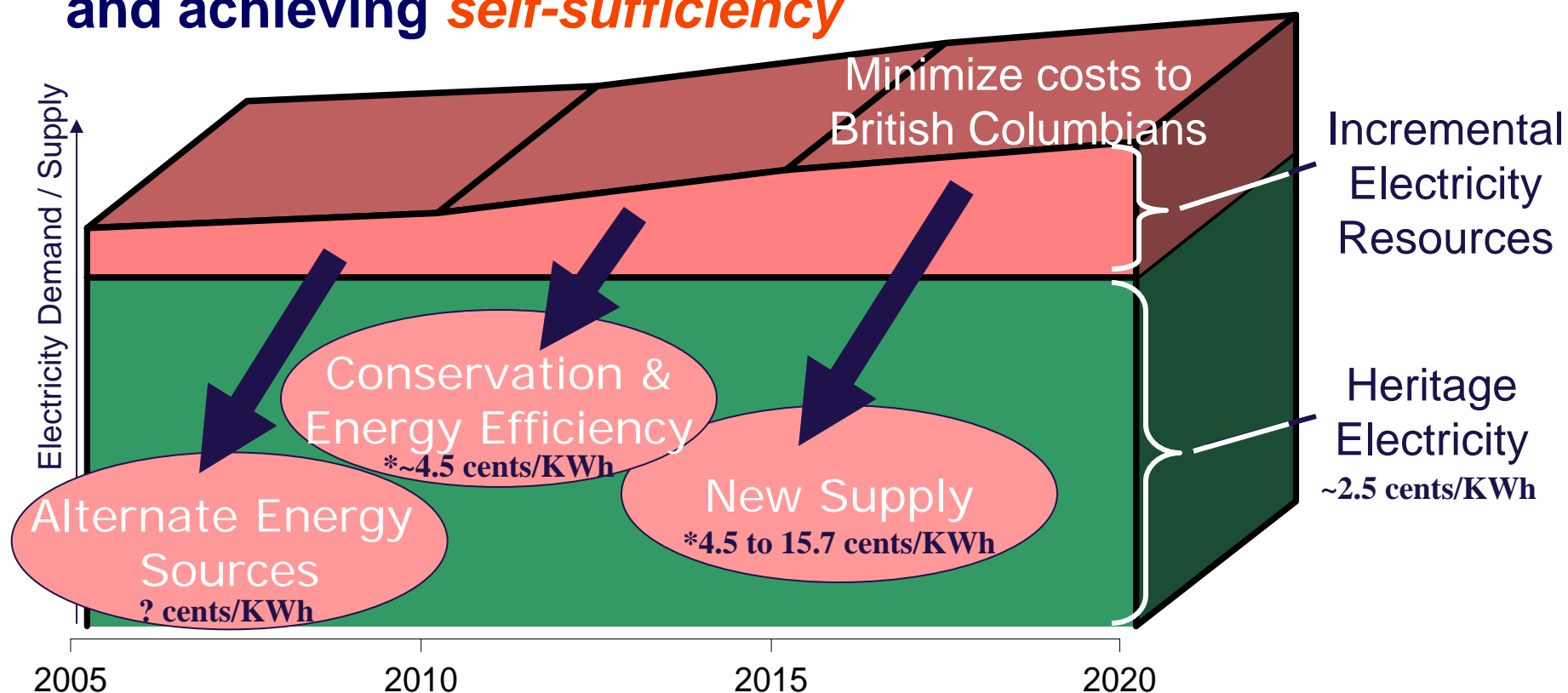
Renewables and emerging technologies

New energy cost reality

New energy mix

Challenges in Meeting British Columbia's Energy Needs

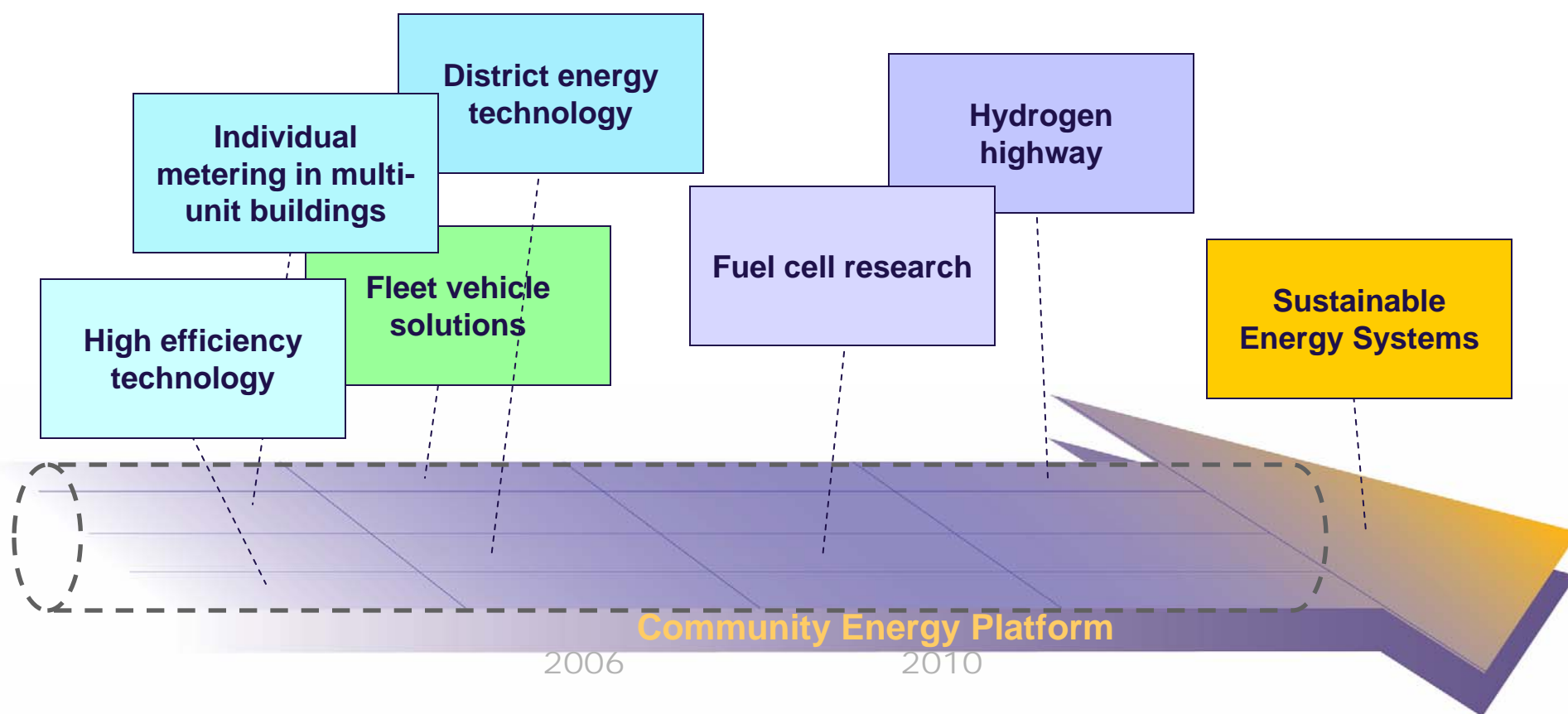
Options for meeting *new electricity demand* and achieving *self-sufficiency*



* Resource type unit energy costs from BC Hydro 2006 IEP, Table 5-5

A Flexible Energy Platform...

Pipeline to the Future: Natural Gas is an important part of an efficient, environmentally sensitive, economic and cost effective energy platform today, and an important bridging fuel for advancements in energy system technology for tomorrow...



Right Fuel,
Right Use,
Right Time!

Demand Forecast

Greg Caza

Energy Forecasting Manager

Demand Forecast Overview

- Use and Development
- Methodology
- TGVI Demand Forecast
- TGI Demand Forecast Update
- Core Market Demand Summary

Demand Forecasts – Use & Development

- Terasen develops demand forecasts as key inputs to:
 - 1) System planning 2) Annual contracting plan 3) Revenue forecasting
- Key activities
 - Customer account additions
 - Use rates
 - Annual demand
 - Design day and design year demand
- Customer Segmentation
 - Core market demand
 - Residential, commercial and industrial (TGI only) customers
 - Squamish & Whistler
 - Transportation demand
 - Vancouver Island Gas Joint Venture (VIGJV), Generation - Island Cogeneration Plant (ICP) & Burrard Thermal

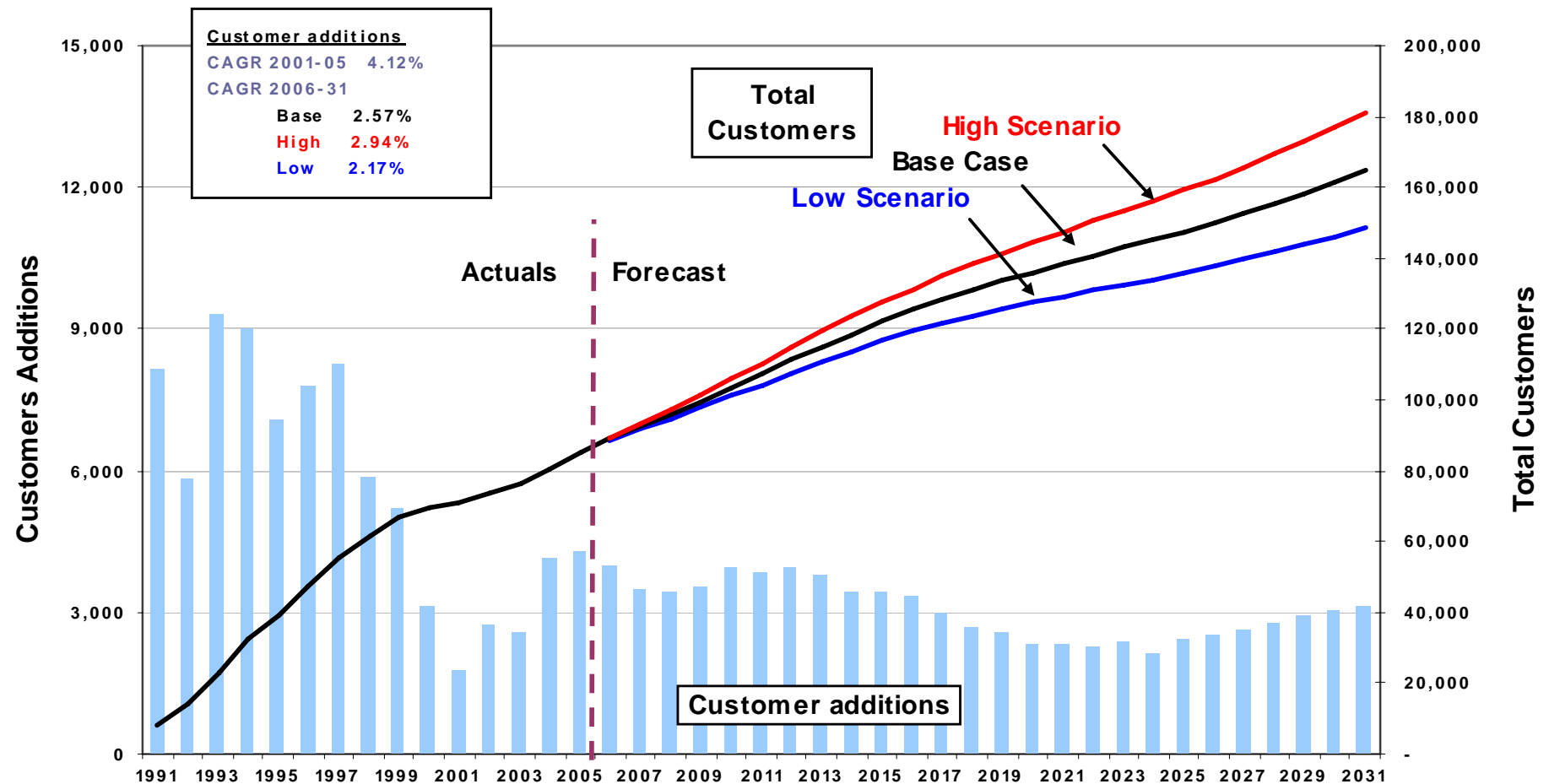
Forecast Methodology

- Core customer demand forecast
 - Customer account additions
 - Conducted on a community level
 - Use rates
 - Derived for each rate class (excluding industrial)
 - Customer survey used for TGI industrial customers
 - Peak day & design year demand
 - Regression analysis of weather data to determine peak day
 - Design year based on five coldest winters

TGVI Demand Forecast

TGVI Core Customer Additions

TGVI Customer Growth




TGVI Use Rate

- Residential use rates are forecasted to remain stable over the planning period
 - No change in normalized use rates over 2004 to 2005 period
 - Natural gas appliances on Vancouver Island are relatively new as compared to the Lower Mainland
- Commercial and industrial use rates are also forecasted to remain the same
 - Known load changes are reflected in the forecast

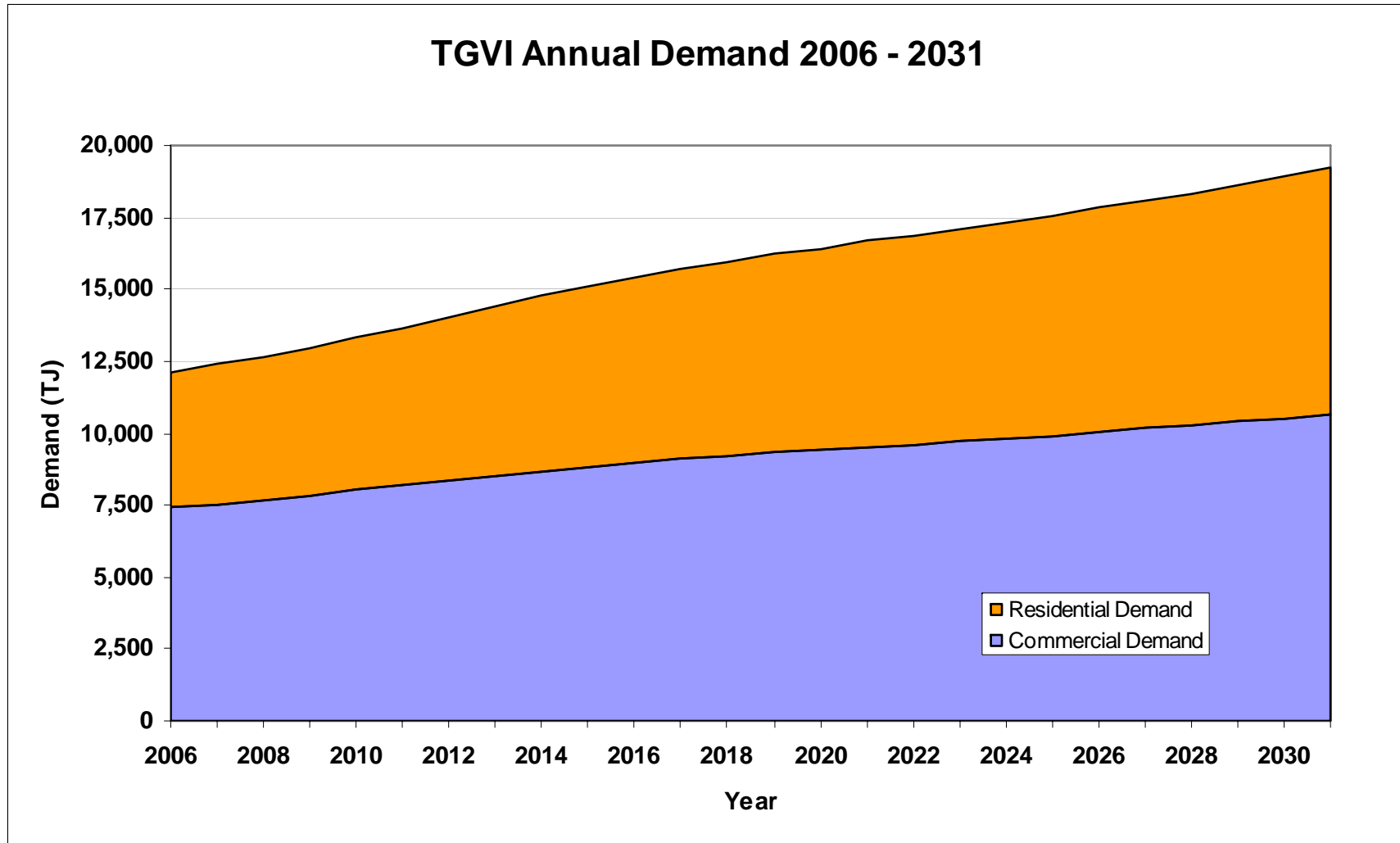
TGVI Core Customer Annual Demand

- Growth in residential annual demand is forecasted to outpace commercial demand growth
 - Residential customer additions form the majority of total additions

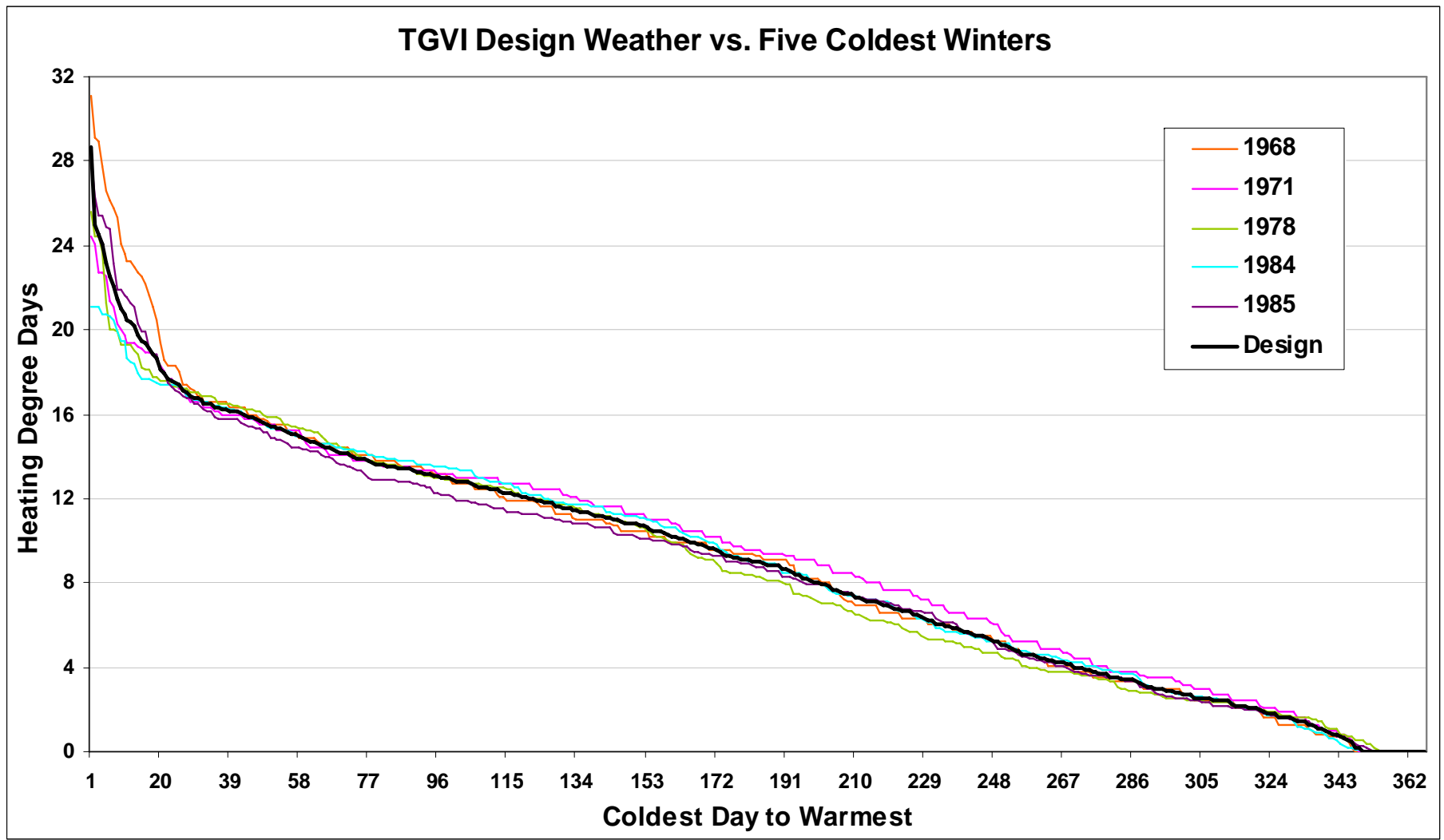
Total Core Market Annual Demand

	<u>2006</u>		<u>2031</u>
Residential	39%		45%
Commercial	61%		55%

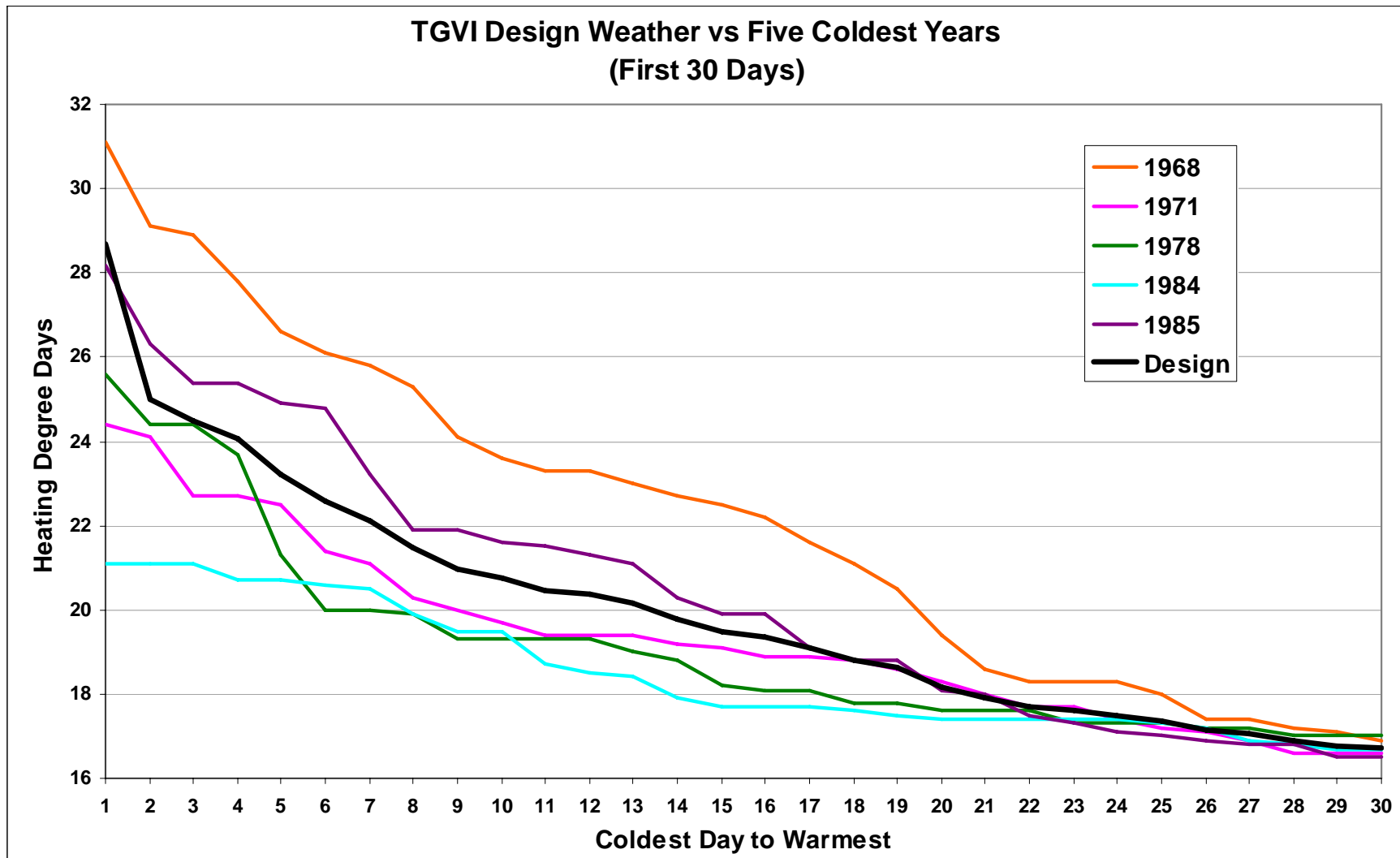
TGVI Core Customer Annual Demand



TGVI Design Weather

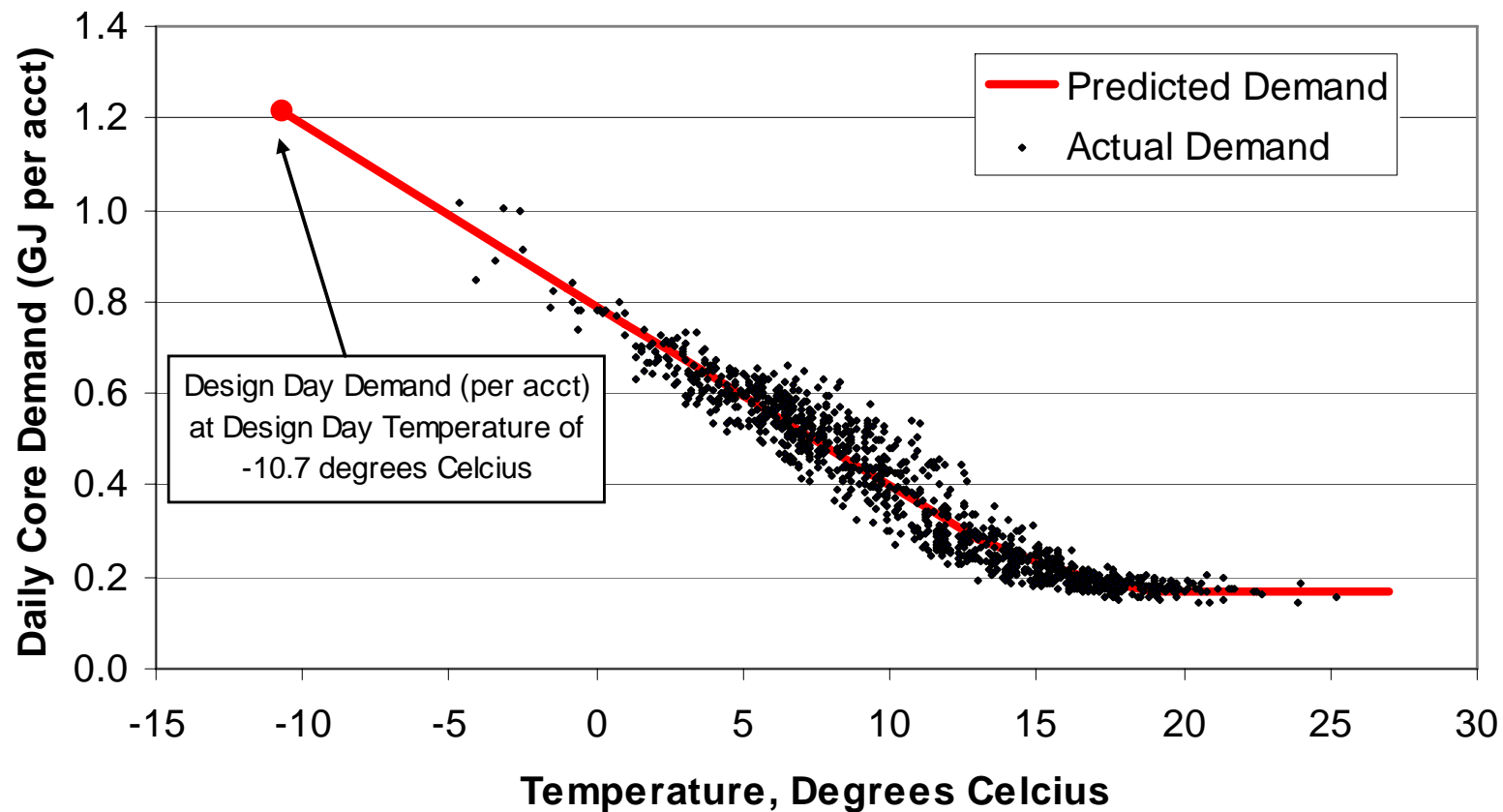


TGVI Design Weather – First 30 Days

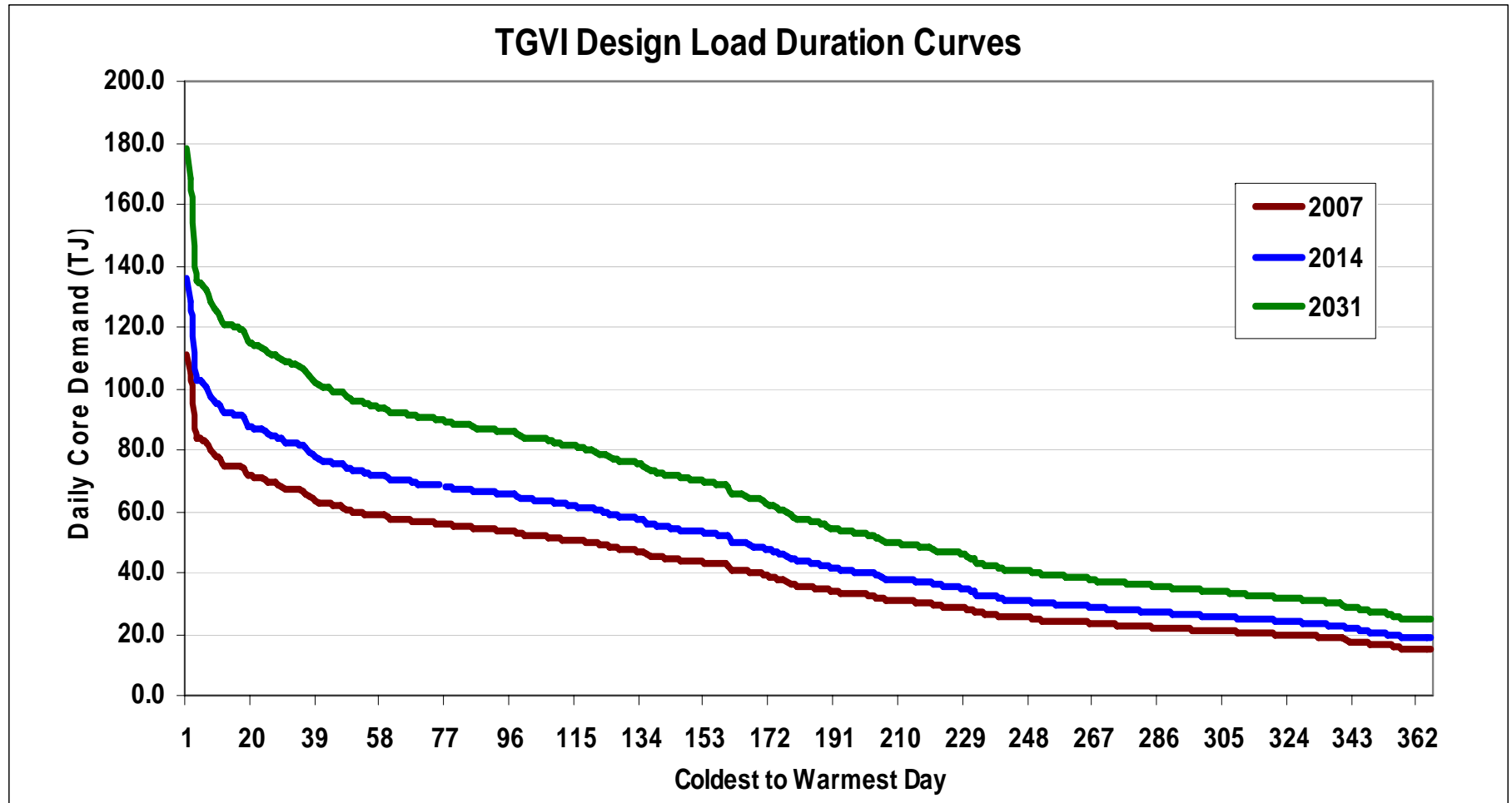


TGVI Core Customer Design Day

TGVI Core Customer Demand vs Weather (2002-2004)

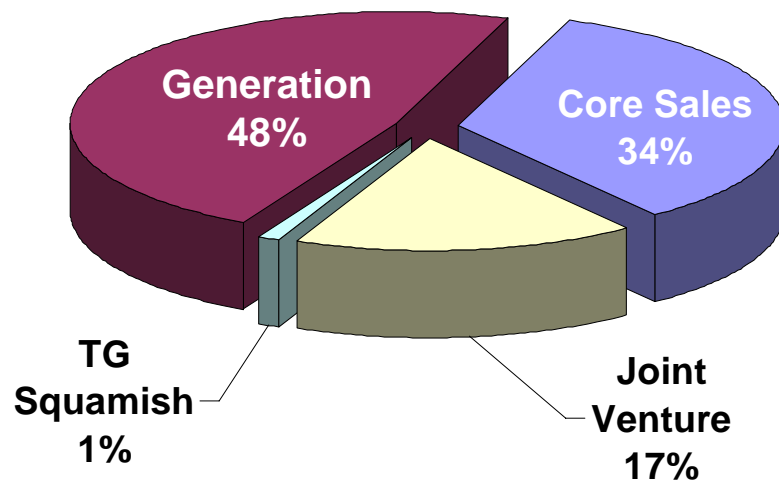


TGVI Core Customer Design Year

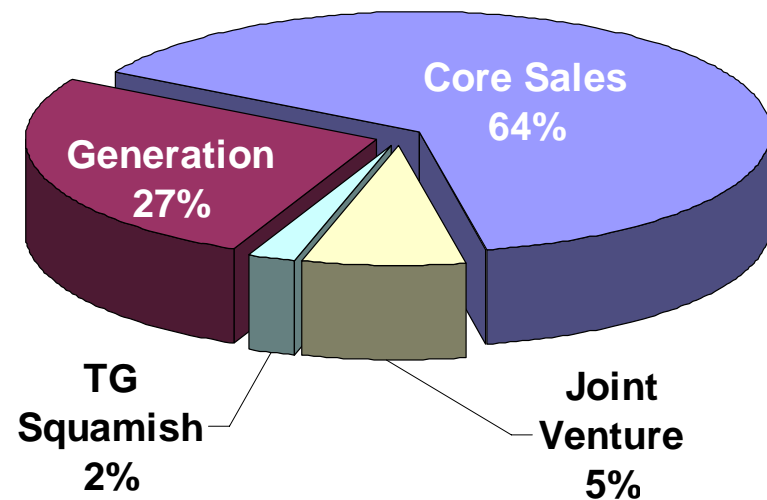


TGVI Total Demand – 2005

Annual Demand



Peak Demand

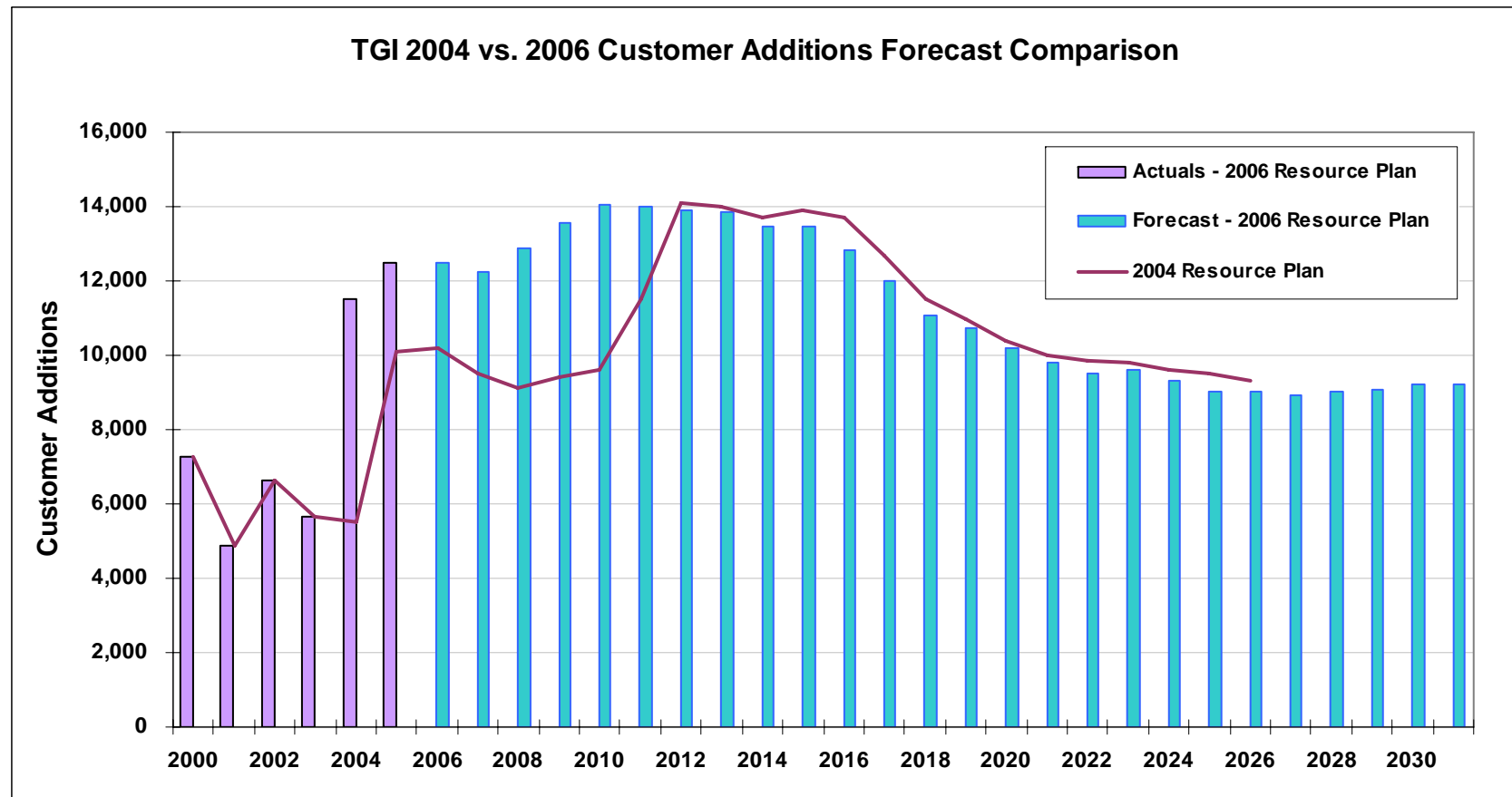


TGI Demand Forecast Update

TGI Account Additions

- Significant change since the 2004 Resource Plan
 - Dramatic increase in housing construction during the 2004-05 period as compared to the three previous years
 - Higher growth projections from household formation

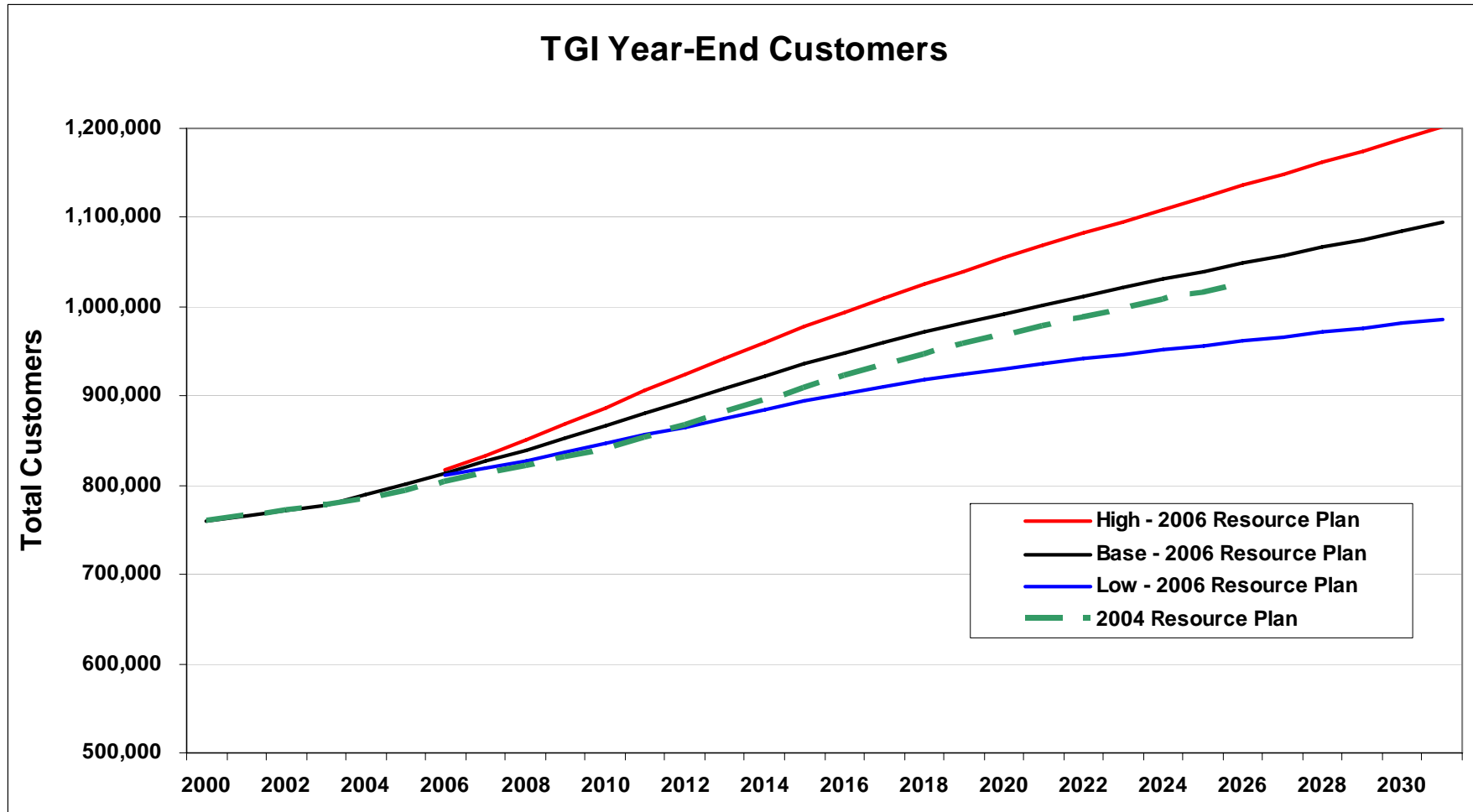
TGI Customer Account Additions Comparison



TGI Total Account Forecast

- Total number of customers over the planning period is higher than in the 2004 Resource Plan
 - Strong growth in customer additions during 2004-05 has moved the anchor point up
 - Higher forecasted growth rates from the household formations report has also shifted the total number of forecasted customers upwards

TGI Total Account Forecast Comparison



Core Market Demand Summary

TGI & TGV I Core Market Demand Summary



	TGI	TGV I
2005		
Customers	799,804	85,016
Annual Demand (TJ)	113,319	11,653
Peak Demand (TJ/Day)	1,256	105.9
2021		
Customers	1,000,200	138,302
Annual Demand (TJ)	138,801	16,667
Peak Demand (TJ/Day)	1,507	154.3
2031		
Customers	1,092,116	164,627
Annual Demand (TJ)	149,593	19,197
Peak Demand (TJ/Day)	1,600	178.3
Average Annual Demand Growth ('05-'31)	1.07%	1.94%

All figures year-end

Design day figures for TGI do not include Squamish

Squamish 2005 Design Day = 4.0 TJ, 2021 Design Day = 7.0 TJ, 2031 Design Day = 7.8 TJ

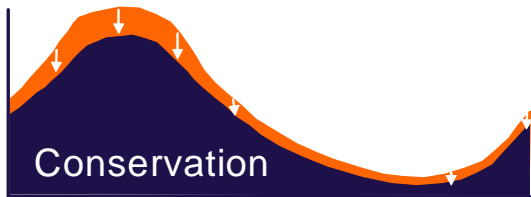
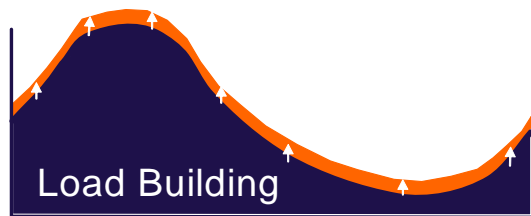
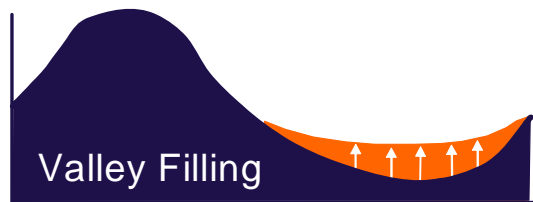
Energy Efficiency & Optimization

Sarah Smith

Manager, Marketing and Energy Efficiency

- DSM – what is it and why do we do it?
- DSM Tactics
- Conservation Potential Review
- Where do we go from here?

What is DSM?

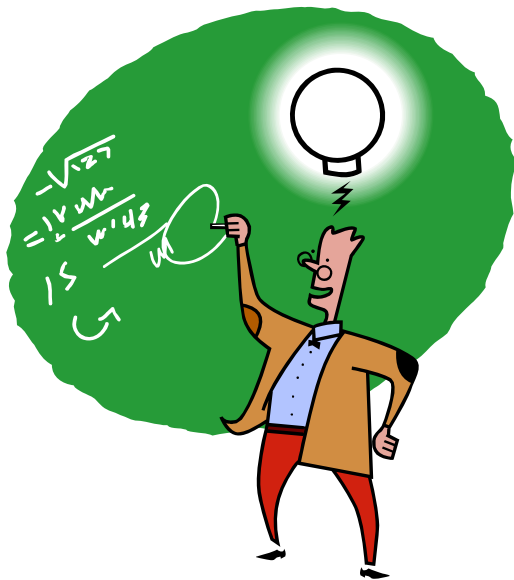


- “Utility activity that modifies or influences the way in which customers utilize energy services”

Why do DSM?

- Enhances customer satisfaction
- Allows us to use our delivery system more efficiently
- Improves local air quality
- Reduces GHGs
- Improves economic competitiveness
- Can help defer major capital investment

What's our approach to DSM?



Technology

Tactics



Tactics - Partners

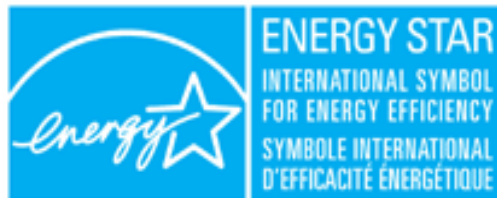


Ministry of
Energy, Mines and
Petroleum Resources



Natural Resources
Canada

Ressources naturelles
Canada



Partner recognition



terasen Gas

2006

Energy

Can

plus the PST

additional - \$150 to \$1,000

terasen Gas

Is he eating you out of house and home?

Get rid of your greedy old furnace and upgrade to high efficiency now.

Upgrade and save up to \$550 plus the PST

www.terasengas.com

terasen Gas

Is he robbing you blind?

Get rid of your greedy old furnace and upgrade to high efficiency now.

Upgrade and save up to \$550 plus the PST

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Tactics – Programs - TGVI



terasen Gas

Arrest your energy bandit and save



REWARD

\$300-\$450


FOR APPREHENDING THE ENERGY BANDIT

www.terasengas.com

terasen Gas

Yank the tank

Pull the plug on that old electric water heater, switch to natural gas, and get a \$400 rebate



Yank the tank rebate **save \$400**

www.terasengas.com

terasen Gas

Think Grand


Home Builders' New Construction Offer



It pays to build with energy-efficient natural gas

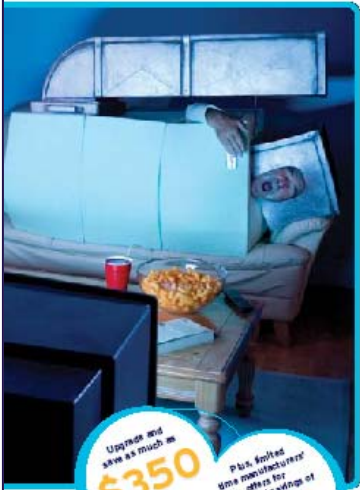
Get a \$1,000 rebate per home when you install high-efficiency natural gas heating equipment.

Tactics – Programs - TGI



Is he lying down on the job?

Replace your inefficient furnace or boiler with the Terasen Gas ENERGY STAR® Qualified Heating System Upgrade



Upgrade and save as much as **\$350** plus the PST

Plus, locked time manufacturer offers for additional savings of **\$150 to \$1,000**



Build your next home with more efficiency

Residential New Construction Heating Program

Get \$500 cash when you install high-efficiency natural gas equipment



www.terasengas.com




EFFICIENT BOILER PROGRAM

Tactics – Building on Partnerships



Build a better home, a Power Smart home.

BC Hydro Power Smart is set to launch a four year program encouraging builders to build more energy-efficient homes. Monetary incentives will be available for single family homes, town homes and multi-family buildings.

The most cost-effective way to save energy in the home is to start with an energy-efficient design. Build a Power Smart home and you provide homeowners with added quality and comfort that lasts. When participating in the Power Smart New Home program you'll set your development apart from the rest, as it will be identified with the Power Smart brand.

Energy-Efficient Incentives For Every Home

Single Family Dwellings and Town Houses

Using the EnerGuide New Houses (EGNH) performance rating, builders will receive monetary incentives for building homes to an EGNH 80 level. Using this rating, a home's energy efficiency level is rated on a scale of 0 to 100, the higher the number the more energy efficient. EGNH is an independent third party testing and rating backed by the federal government.

The performance rating will provide home owners an estimate of what the annual energy consumption will be in the home, similar to the mileage label on a new car. Together, the EGNH label and the Power Smart Brand will easily identify homes as more energy efficient.

In a Power Smart labelled home, homeowners will enjoy comfort and lower operating costs for the lifetime of the home. Each home receives an EGNH label that will form part of the home's value for years.



... More incentives details other side

BChydro
POWER SMART

www.bchydro.com

New Home Program

- Launch Summer 2006
- BC Hydro, MEMPR
- Up to \$3,000
- Includes \$600 for gas appliances

Tactics – Conservation Potential Review

- Marbek, in association with Habart and Willis Energy Services
- Alignment with Hydro CPR
- Outlook to 2015/2016
- **Potential** results, dependent on external conditions
- Regional results

CPR Results – Total Potential GJ per year

By 2015/2016, GJ per year	TGVI	Lower Mainland	Interior	Total
Residential EE	-369,000	-5,298,000	-1,847,000	-7,514,000
Commercial EE	-385,000	-1,396,000	-431,000	-2,212,000
Industrial EE	-32,430	-933,064	-924,210	-1,889,704
Subtotal	-786,430	-7,627,064	-3,202,210	-11,615,704
Residential Fuel Sub				1,453,000
Potential Annual Impact				-10,162,704

CPR Results – Potential Peak Day Reduction



By 2015/2016, GJs	TGVI	Lower Mainland	Interior	Total
Residential EE	-2,646	-45,933	-16,641	-65,220
Commercial EE	-2,147	-7,787	-3,282	-13,216
Industrial EE	-175	-14,031	-5,716	-19,922
Sub Total	-4,968	-67,751	-25,639	-98,358
Residential Fuel Sub	2,912	5,878	3,327	12,117
Potential Peak Day Impact, GJ	-2,056	-61,783	-16,500	-80,339

Where do we go from here?

Table 4 2004 DSM expenditures, by company, as a proportion of revenue

LDC	DSM expenditure ¹ (\$ millions)	Total utility revenue (\$ millions)	% of total utility revenue	Utility revenue less cost of gas (\$ millions)	% of utility revenue less cost of gas
Atco	\$ 4.30	1,550 ²	0.28%	407 ²	1.06%
Enbridge	\$ 13.09	2,408 ¹	0.54%	987 ³	1.33%
Gaz Métro	\$ 5.55	1,783 ⁴	0.31%	555 ⁴	1.00%
Manitoba Hydro	\$ 0.46	494 ⁵	0.09%	119 ⁵	0.39%
SaskEnergy	\$ 0.73	317 ⁶	0.23%	167 ¹	0.43%
Terasen	\$ 2.20	1494 ⁷	0.15%	609 ⁷	0.36%
Union	\$ 4.60	1,791 ⁸	0.26%	885 ⁸	0.52%

¹ Based on PEI responses

TGI and TGV Gas Supply Issues

Tania Specogna

Manager, Business Development

Overview of gas supply planning at Terasen Gas

- Meeting Future Peak Load Growth
- Infrastructure projects have long lead times

Regional Resource Options Available

- Current and Future
- Best Fit for TGI/TGVI

Market Valuation of Resources Options



terasen
Gas

Gas Supply Planning Criteria / Managing Risks

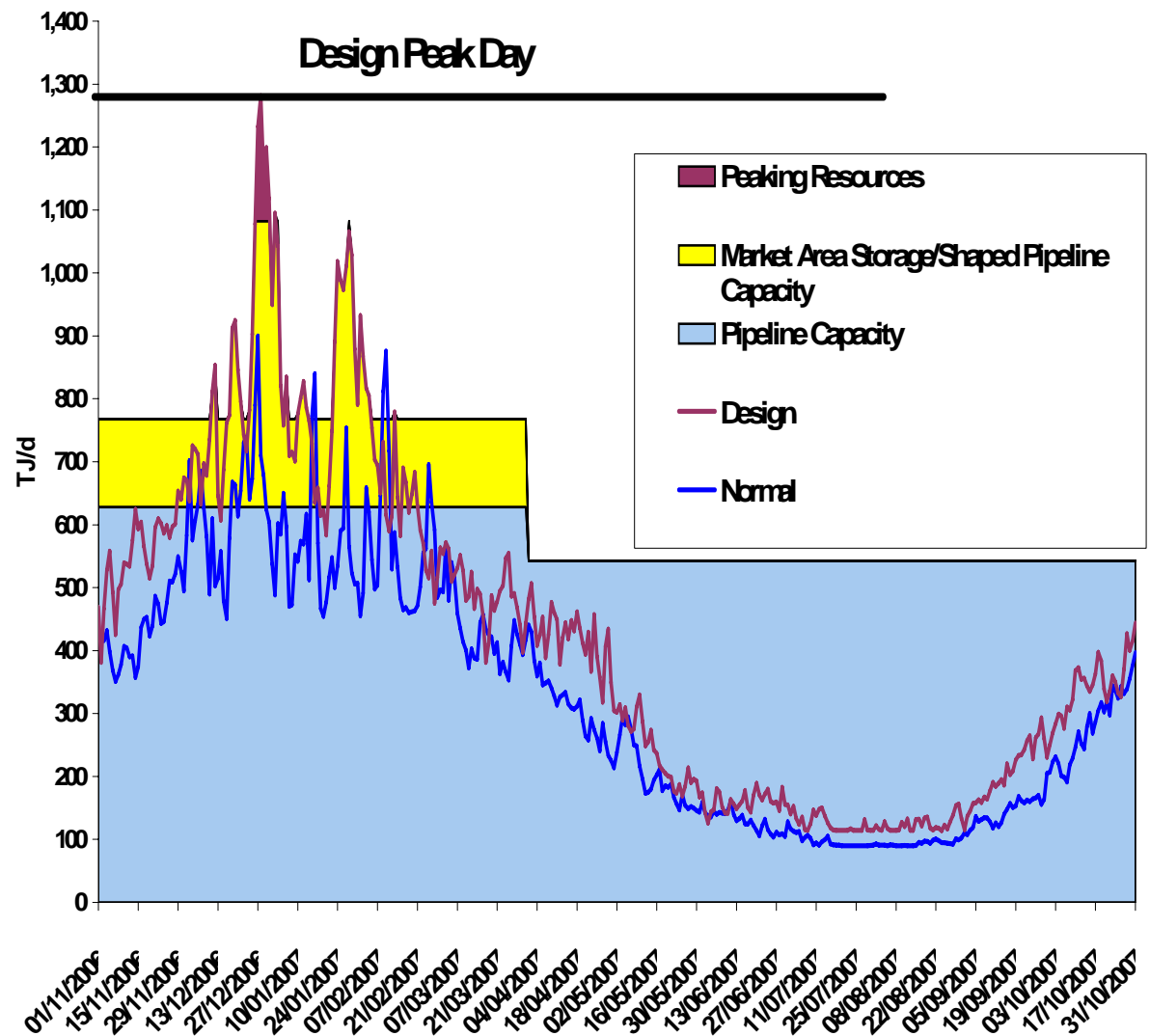
- **Build supply diversity into portfolio**
 - Ideally have multiple suppliers, pipelines, storage resources, supply basins.
 - Attempt to limit exposure to problems associated with a single source.
- **Support regional infrastructure planning-NWGA**
 - Work cooperatively with other utilities in the region.
 - Ensure adequate supply.
 - Infrastructure projects have long lead times.
 - Add resources that reduce price volatility.
- **Manage price risk**
 - Store gas in summer
 - Use financial tools (buy at fixed prices in advance).
- **Build a flexible plan**



2006/07 TGI Normal and Design Load vs Supply Typical Resource Fit

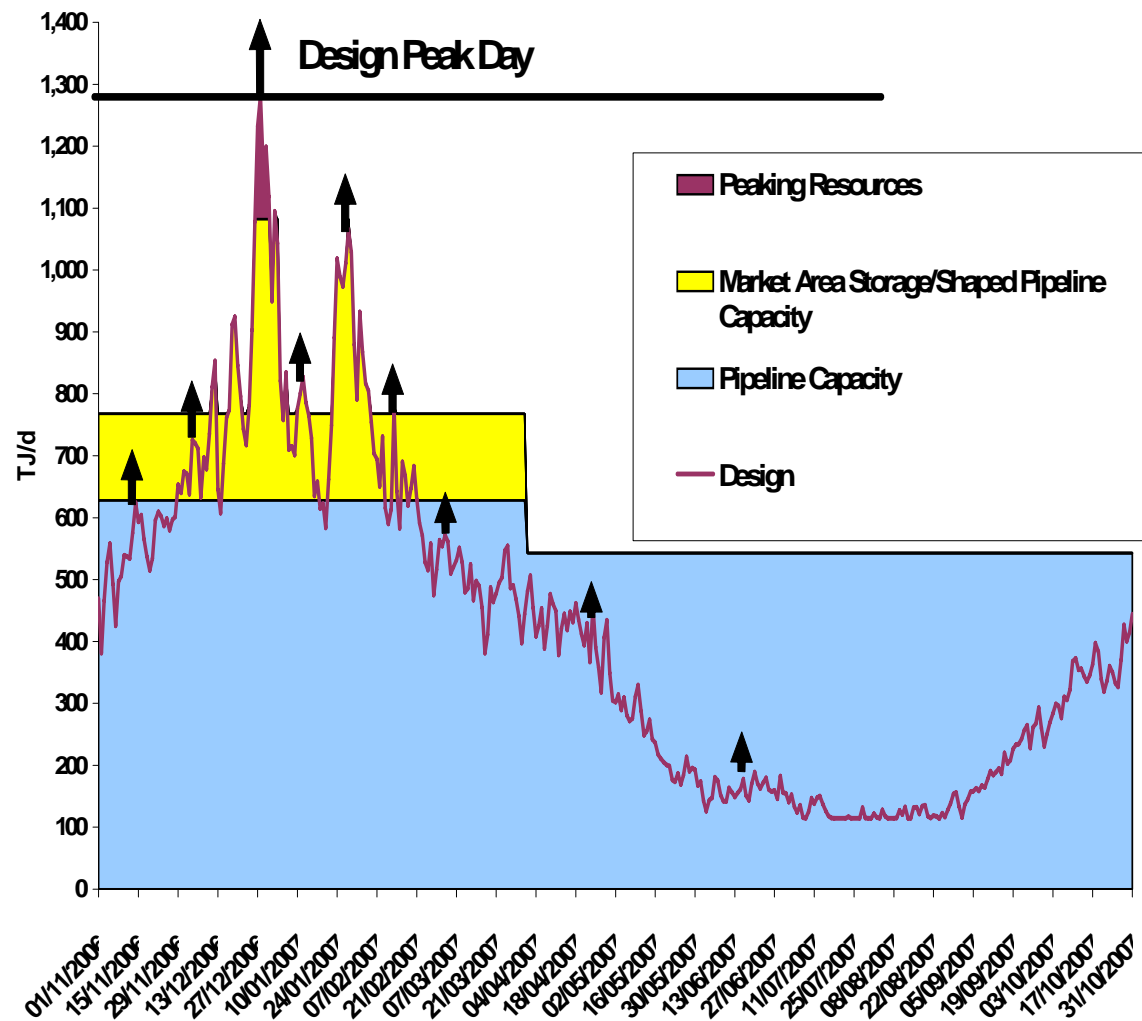


- Create a portfolio to meet Design Peak Day Requirements
- Baseload/Seasonal Pipeline for average day supply
- Shorter-term pipeline contracts and upstream storage for winter average day
- Market Area storage most efficient for short term peaks
 - Provide security of supply in event of failures
 - Pipeline capacity sets a price cap

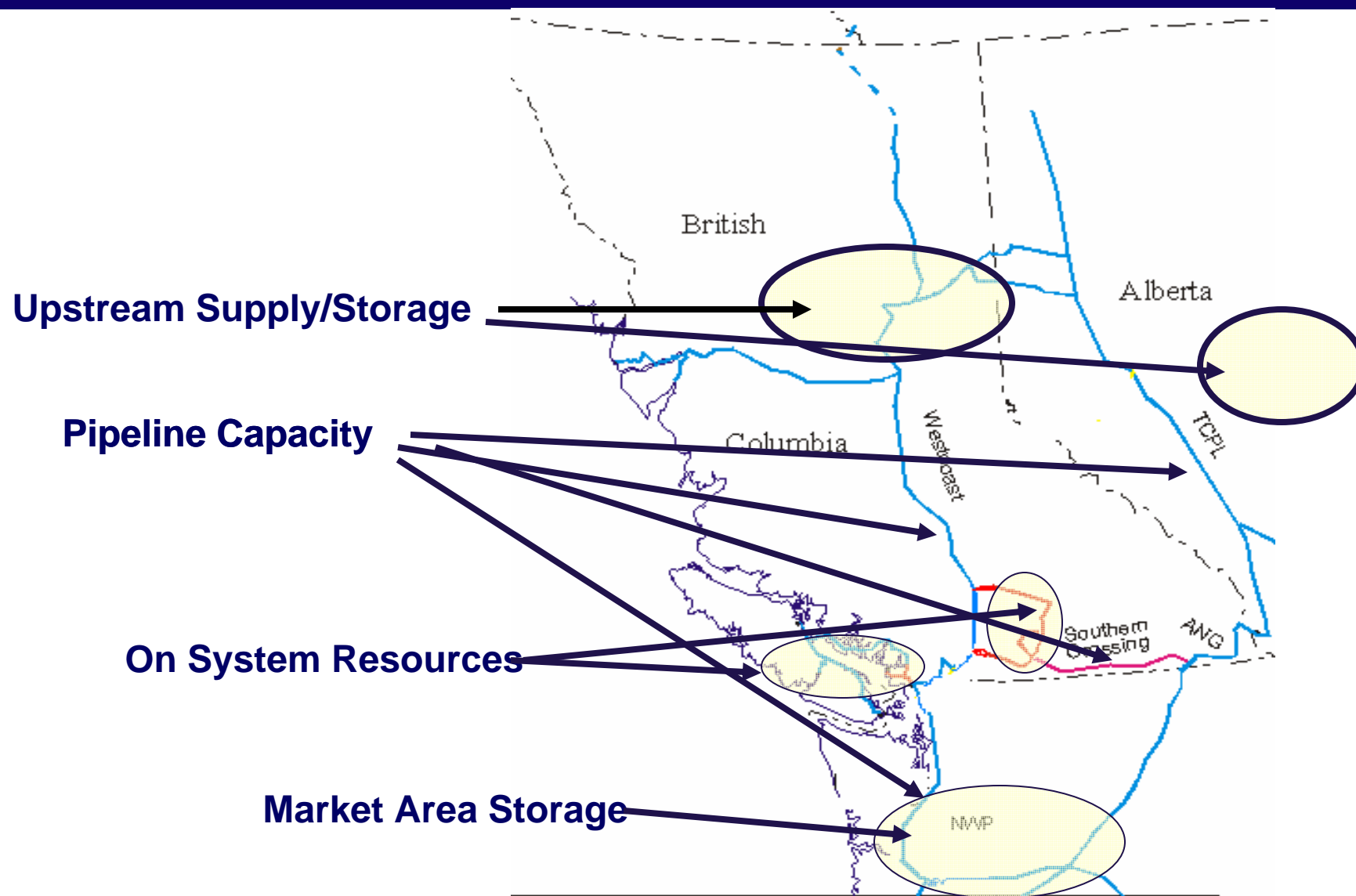


Meeting Future Demand Growth

- As peak day grows each year need combination of pipe/incremental shorter duration resources.....
- **Regional Issues**
 - Growth in peak day requirements is higher than average day.
 - All utilities in our region face need to add new resources to meet growth.
 - Availability of Shaped Resources vs baseload
 - Large infrastructure projects require longer lead times

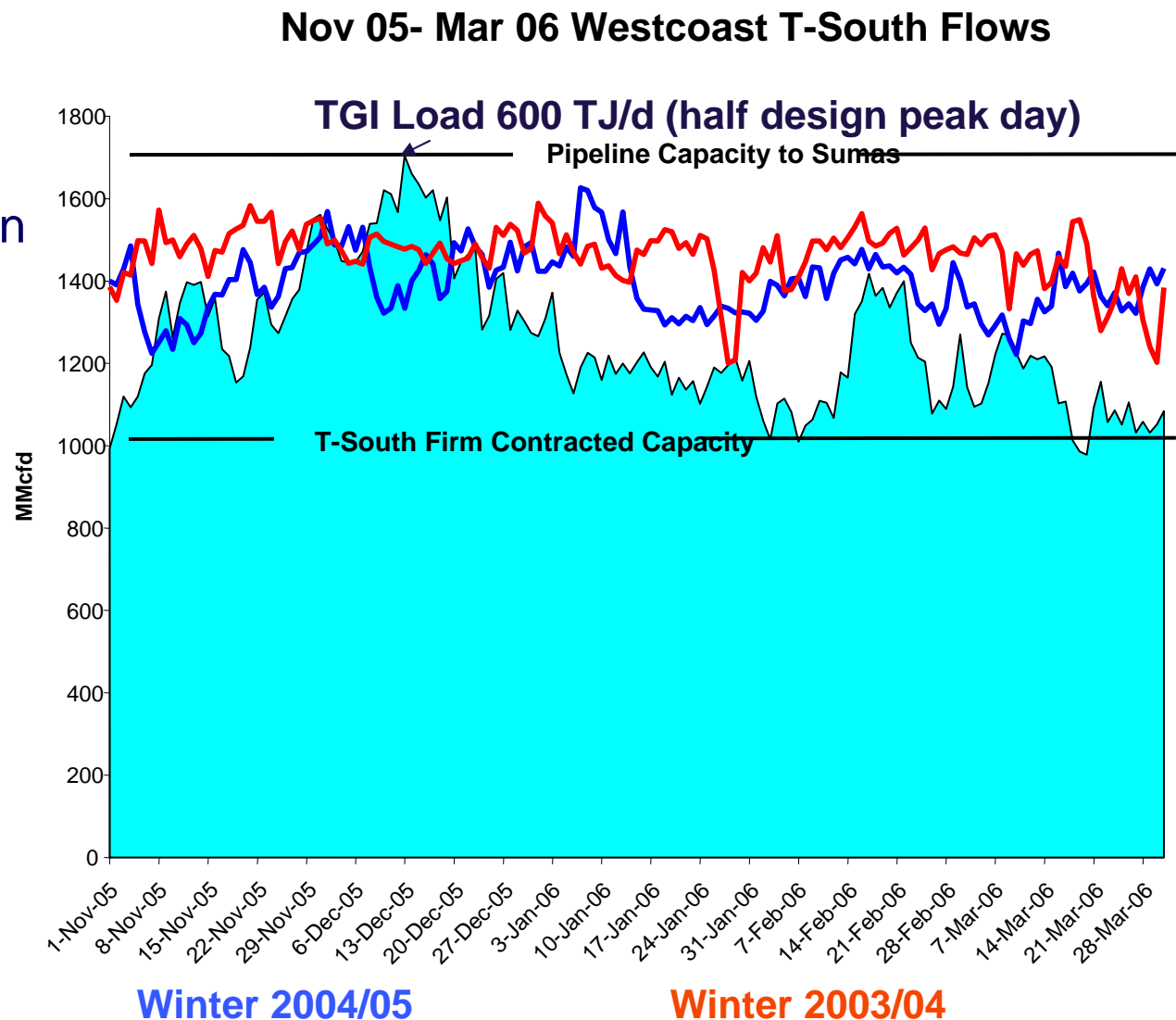


Regional Resource Options



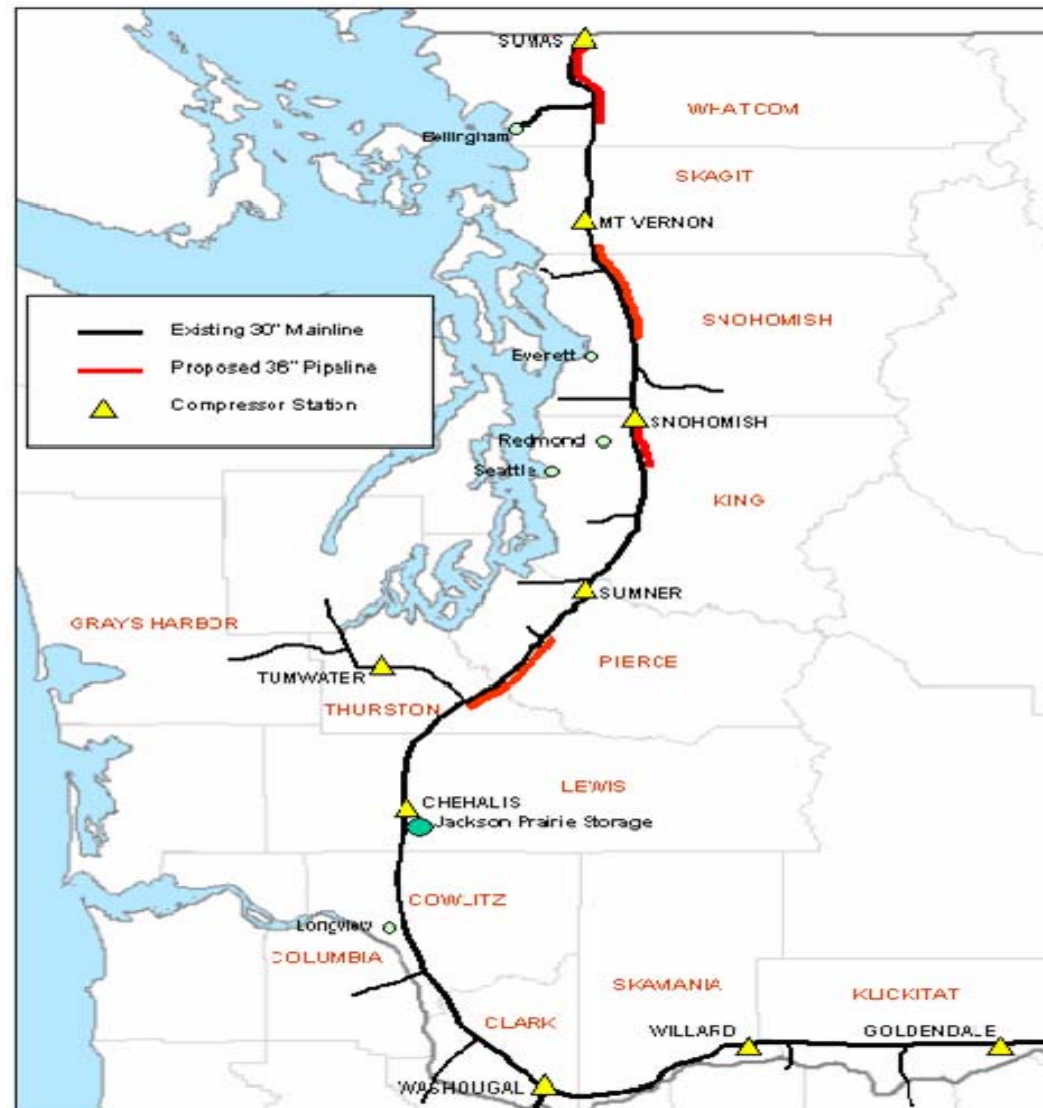
Westcoast Pipeline Infrastructure

- 700 MMcfd uncontracted capacity
- Market requires capacity on colder than normal days
- Already accounted for in today's regional design peak day
- Pipe expansion to meet future design peak day growth
- No expansion pipe capacity until T-South recontracted



NorthWest Pipeline Infrastructure

- Replaced 26" line from service with looping, compression and capacity turn-back
 - No incremental Capacity
- No additional I-5 expansions scheduled



Market Area Storage Infrastructure

On & Off System Market Area Storage Resources



- **Off System Storage**

- JPS Expansion

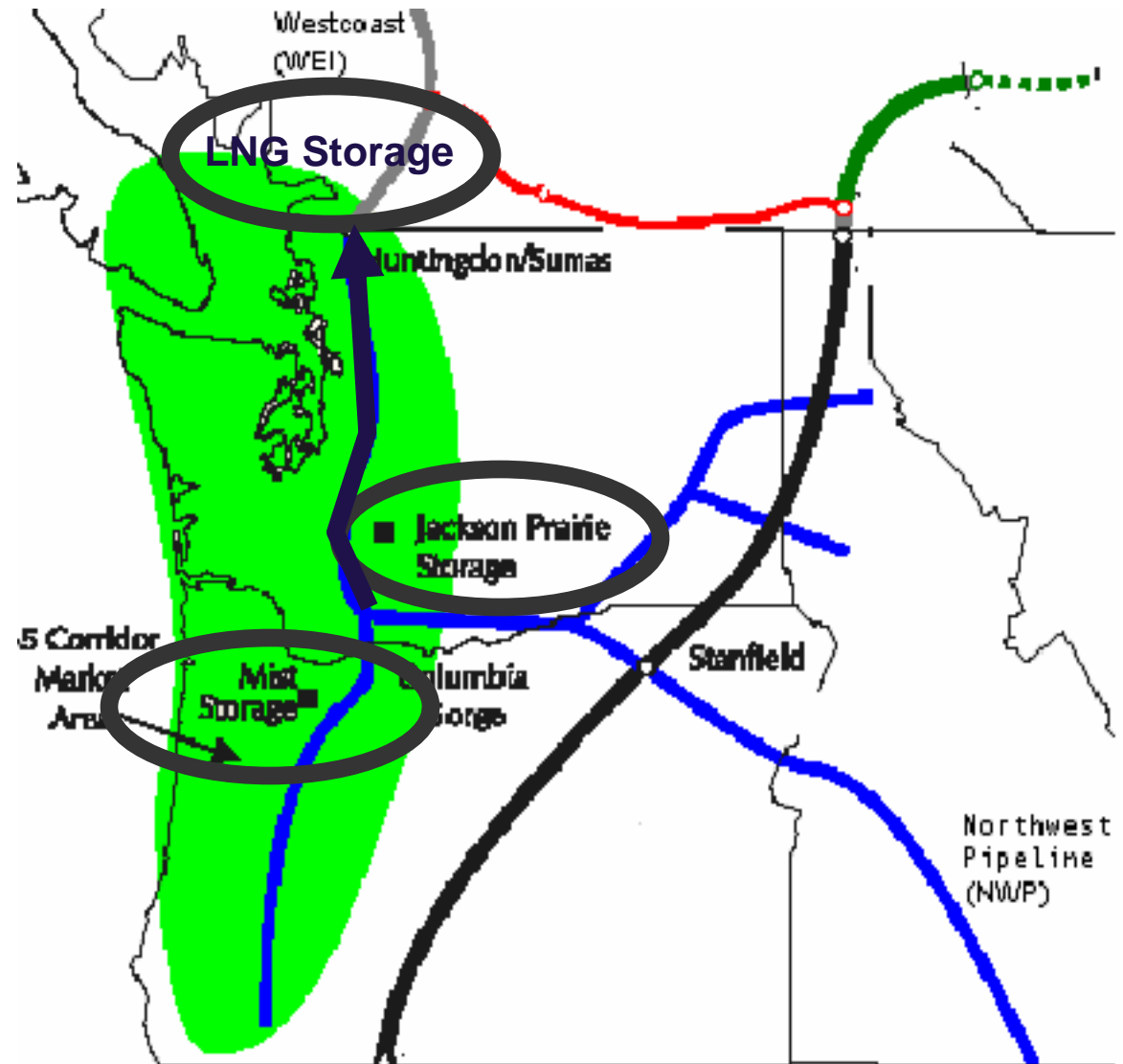
- Up to 300 MMcfd
 - One third contracted for avg term 32 years
 - Redelivery More Expensive (30-50% of Firm NWP Rate)

- Mist Expansion

- Potential for Future Expansions
 - Issue of Redelivery

- **On System**

- Tilbury LNG Storage Expansion
 - New LNG Storage

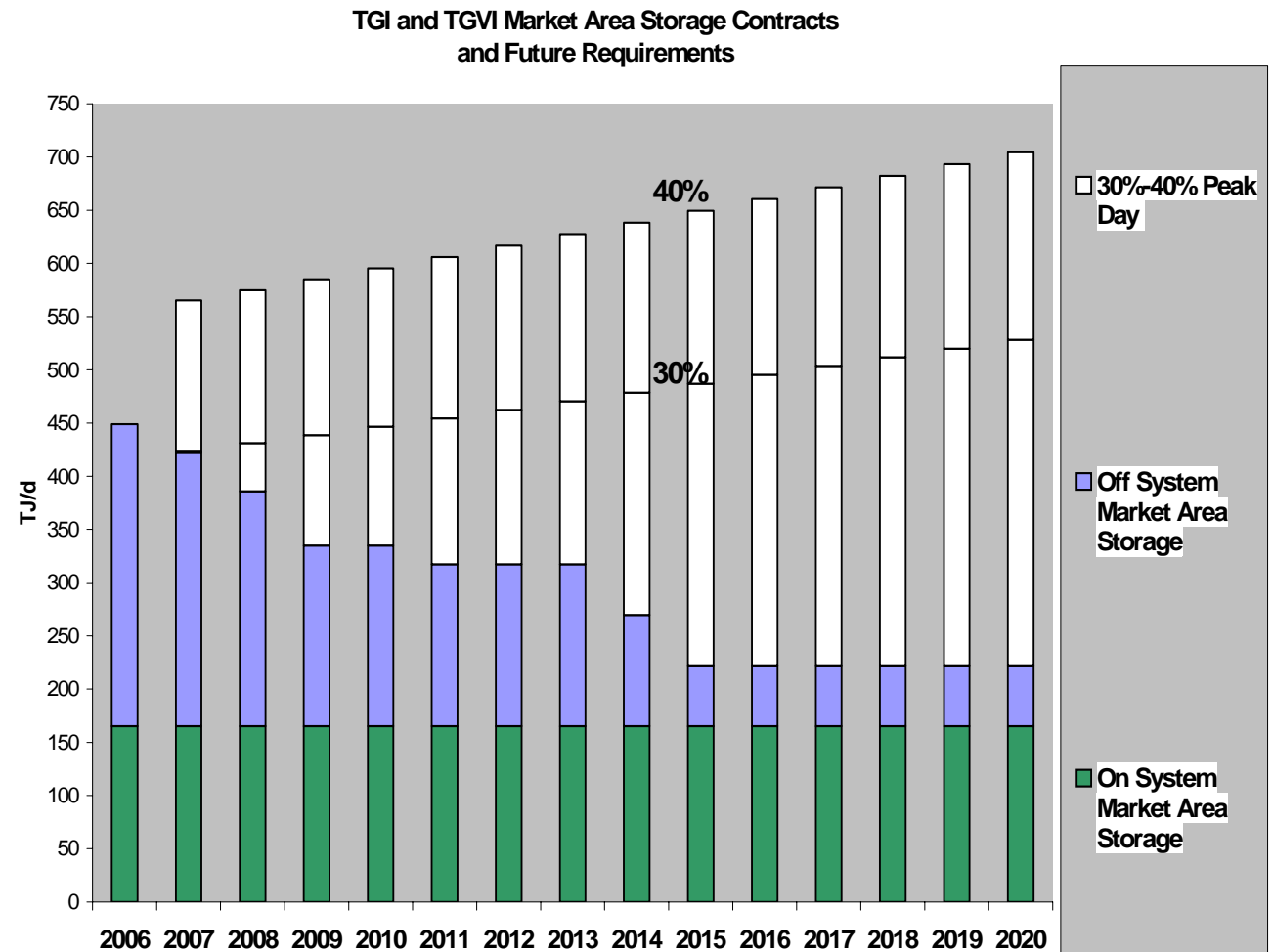


TGI & TGVI

Off System & On System Market Area Storage & Future Requirements

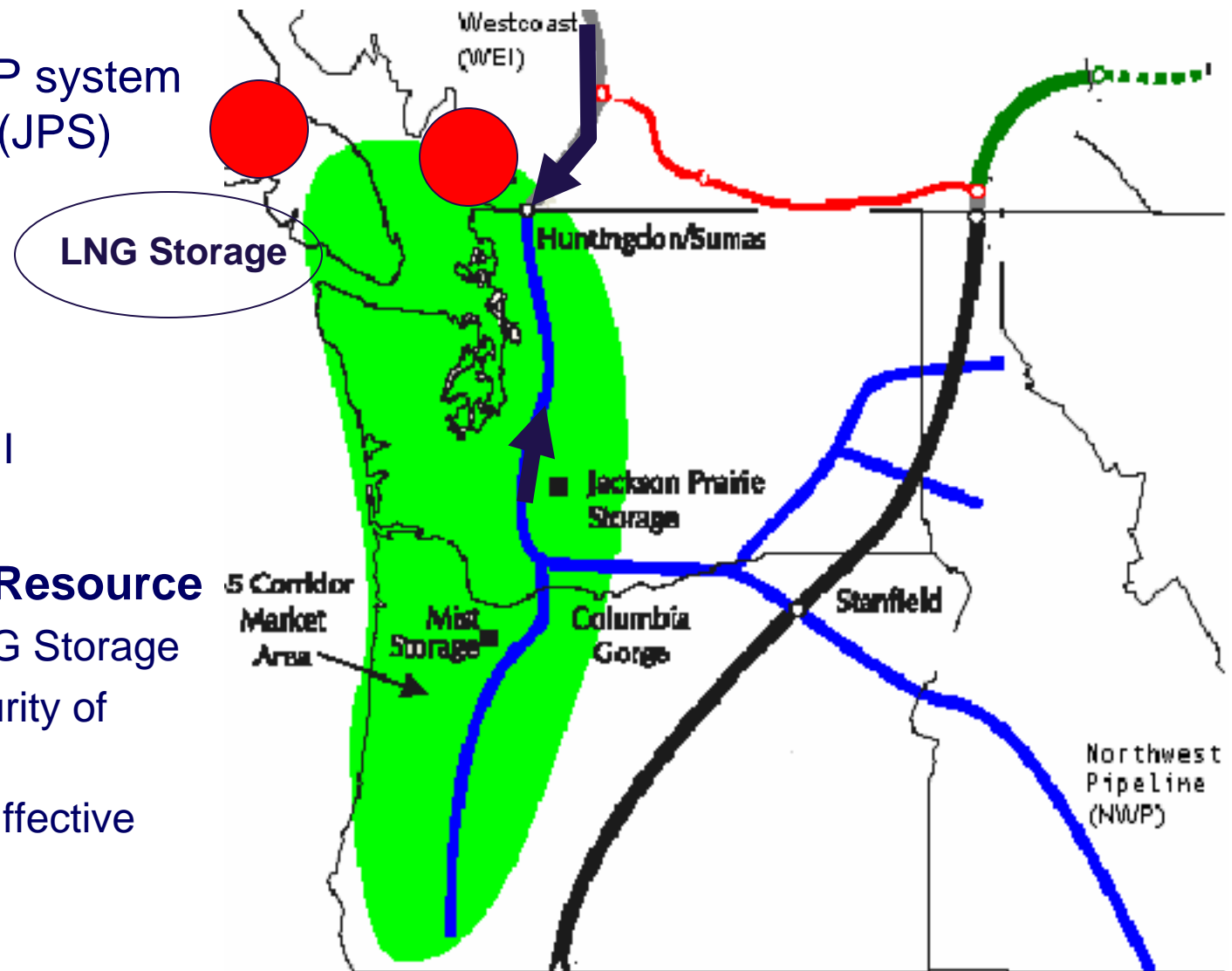


- Market area storage
30-40% of design
peak day
 - Puget and NWN
50-60% of design
peak day
- 75% of TGI/TGVI
Off System storage
has renewal risk
(price and/or
availability)



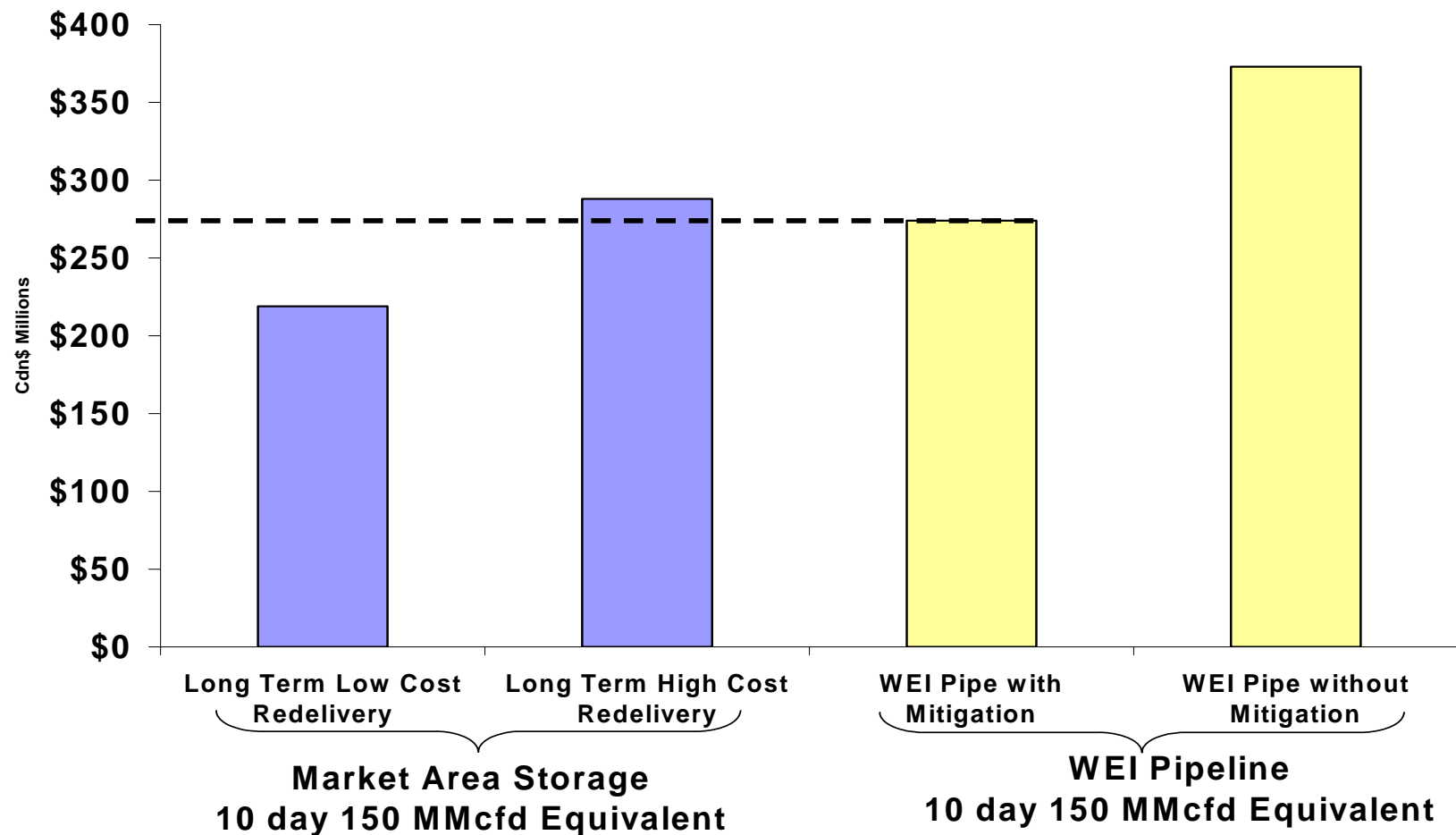
Incremental Capacity in the Region

- Expansion of NWP system north of Chehalis (JPS)
 - No scheduled expansion
- Expand upstream Pipe Capacity
 - 700 MMcfd WEI uncontracted
- **Add On System Resource**
 - On System LNG Storage
 - Increases Security of Supply
 - Must be Cost Effective



Market Valuation For On System Resource

25 Year PV; 6.1% Discount



- **Need to Evaluate Resources to Meet Future Peak Growth**
 - Infrastructure projects have long lead times
- **Pipeline Expansions**
 - No Expansion on T-South in the near term
 - No Expansion North of JPS scheduled
- **Storage Expansions**
 - JPS Expansion and potential Mist Expansion
 - Firm redelivery will cost more than existing contracts
- **On System resource better fit**
 - Security of Supply
 - Cost of Off System Market Area Storage and Westcoast Pipe provide proxy

Resource Portfolio Development

Edmond Leung

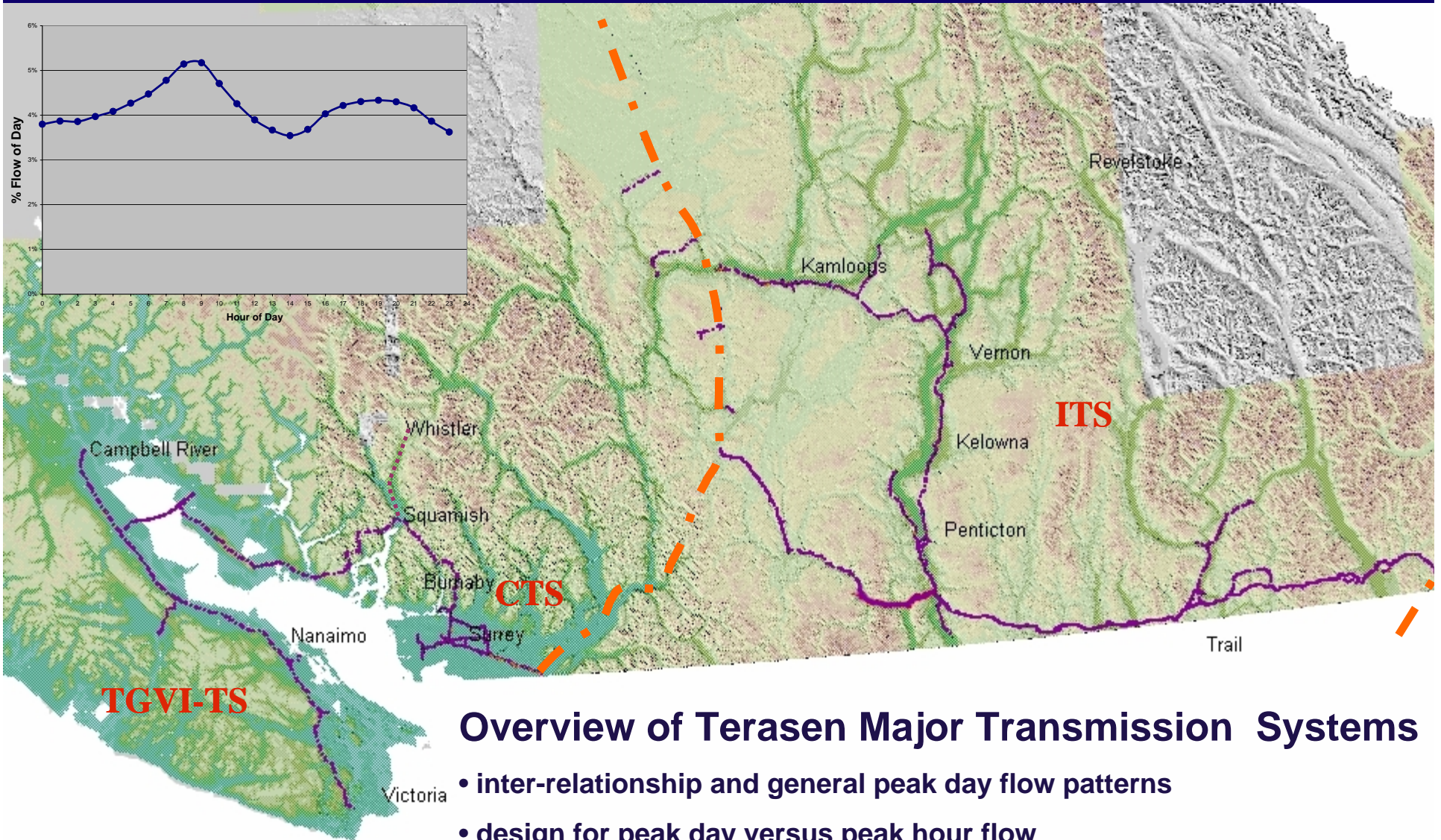
System Capacity Planning Manager

Resource Planning Portfolio Analysis Overview

Agenda

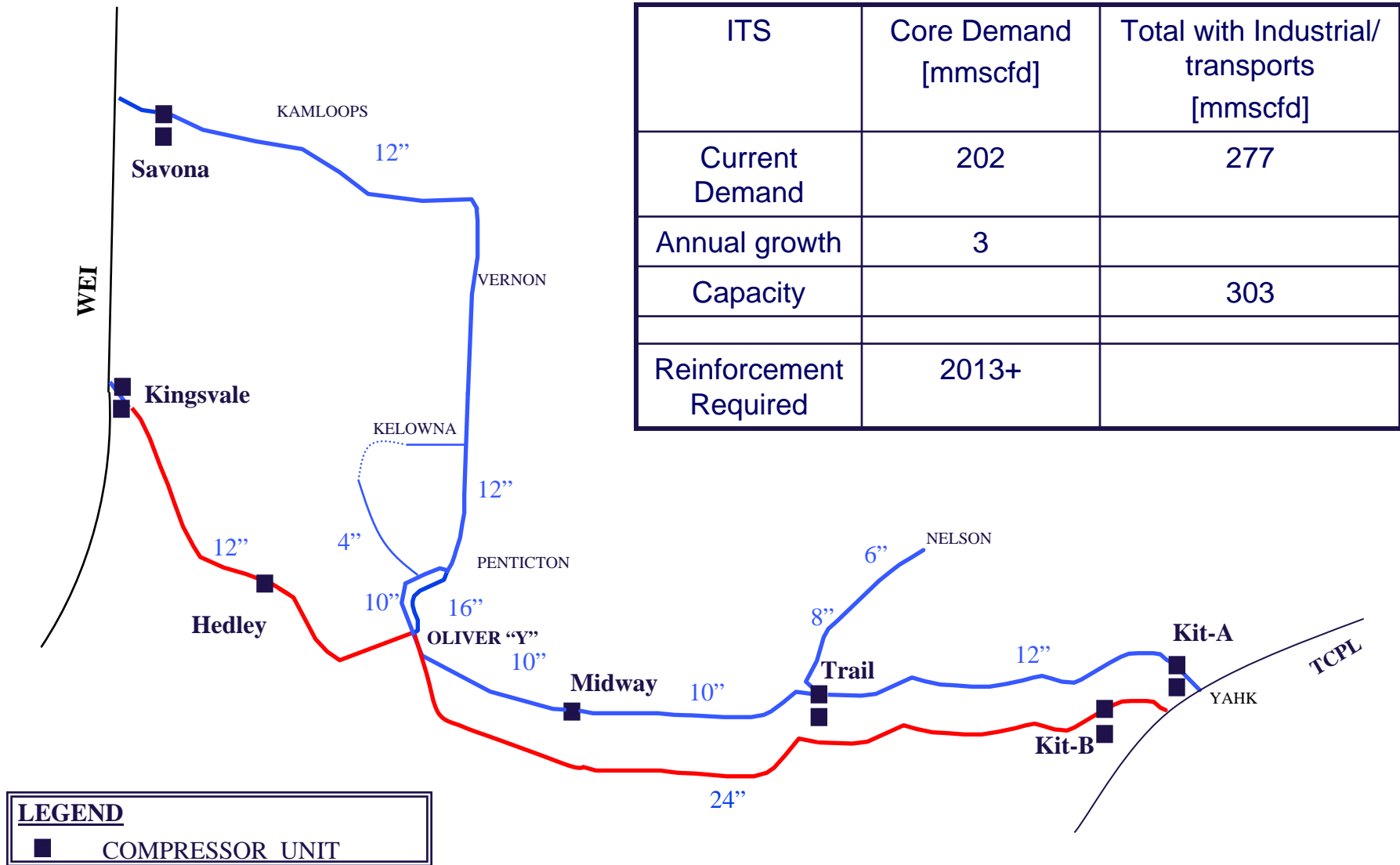
- Brief System Overview
- 3 Major Transmission Systems
(TGVI, TGI – Coastal, TGI – Interior)
 - *Drivers for infrastructure resource additions*
 - *Anticipated constraints and timing for reinforcement*
 - *Resource options*

Resource Planning Portfolio Analysis Overview



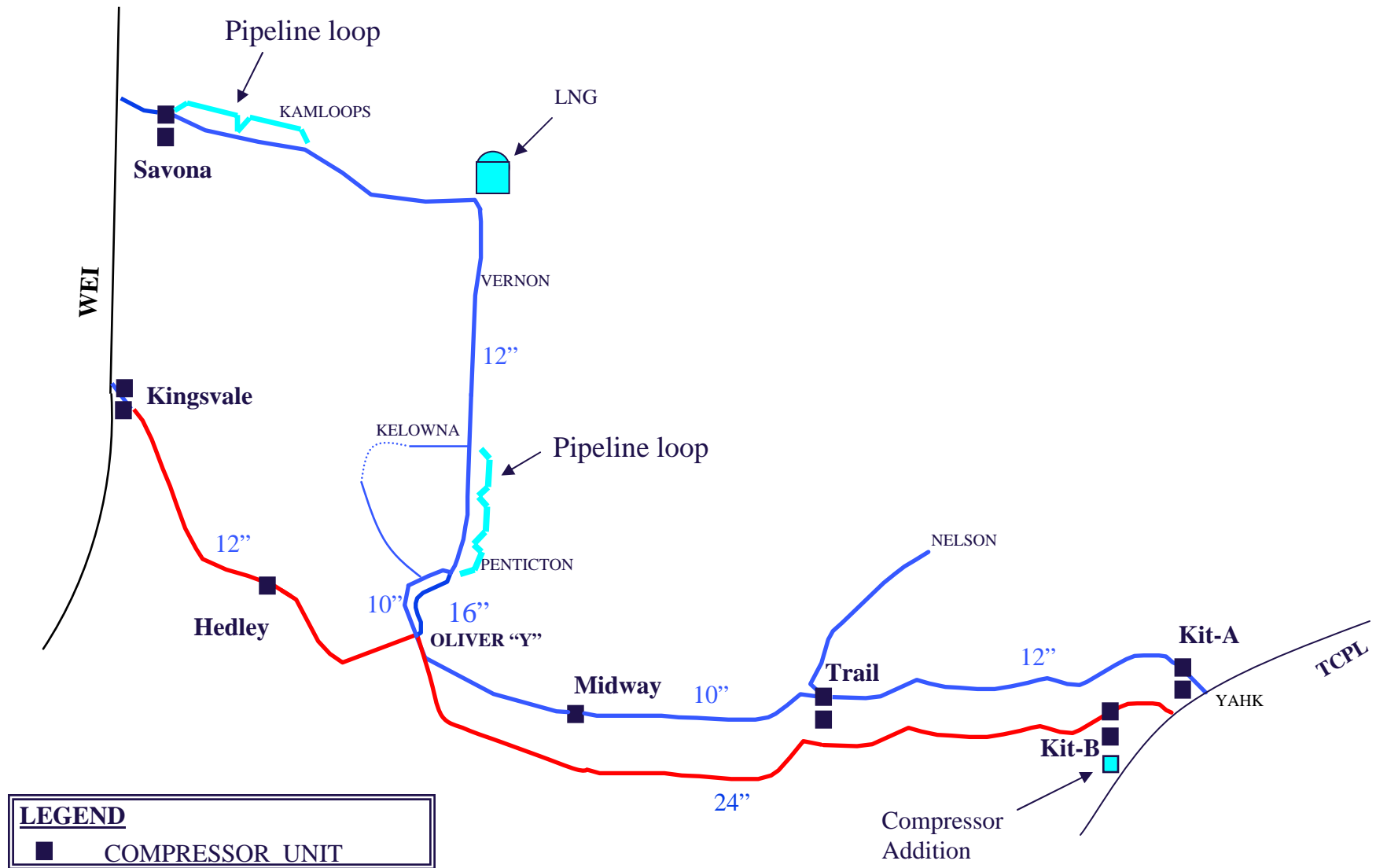
Resource Planning Portfolio Analysis Overview

- Interior Transmission System

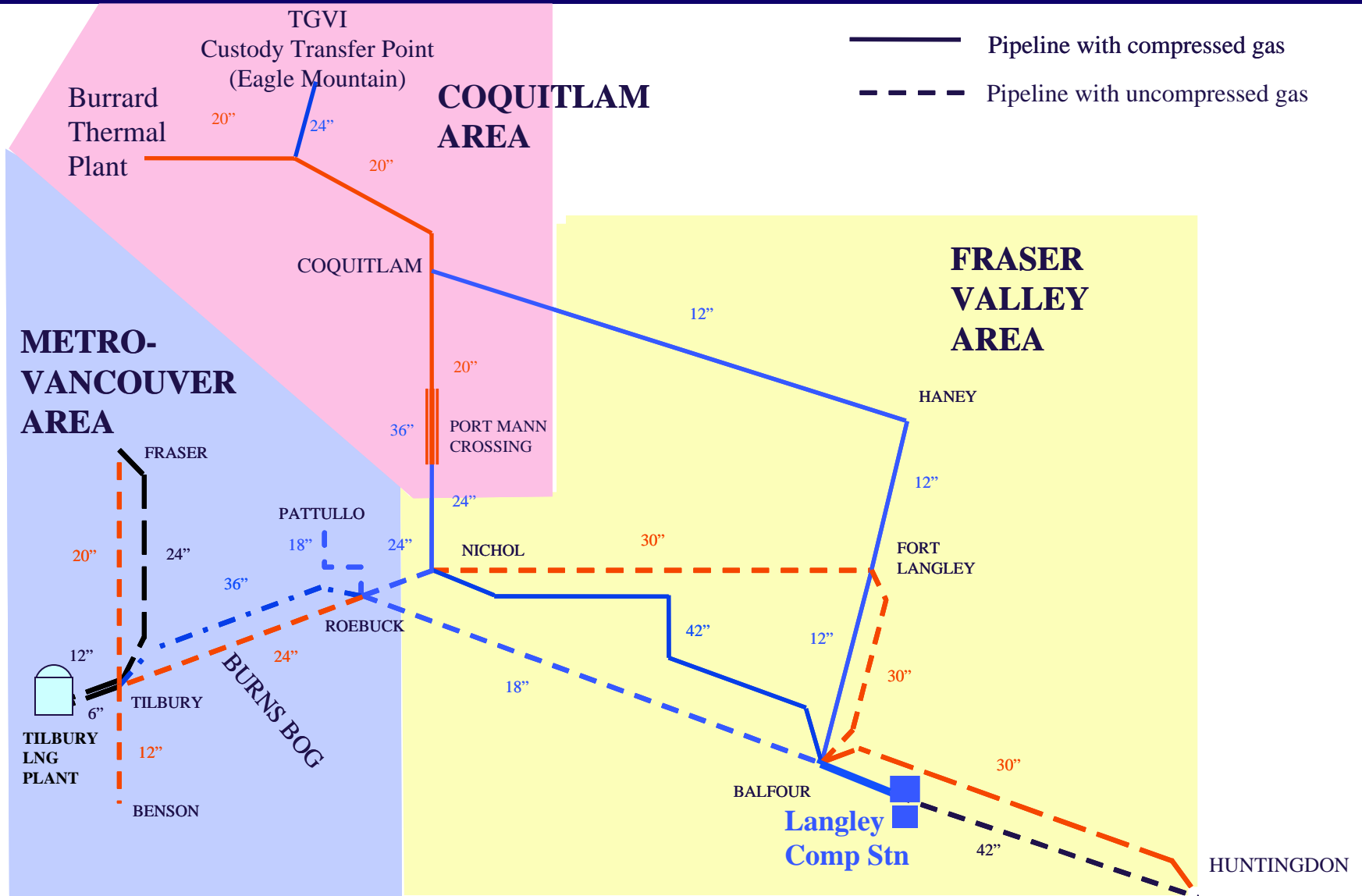


Resource Planning Portfolio Analysis Overview

- Interior Transmission System



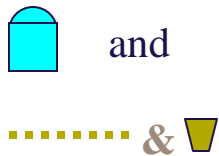
Resource Planning Portfolio Analysis Overview - Coastal Transmission System



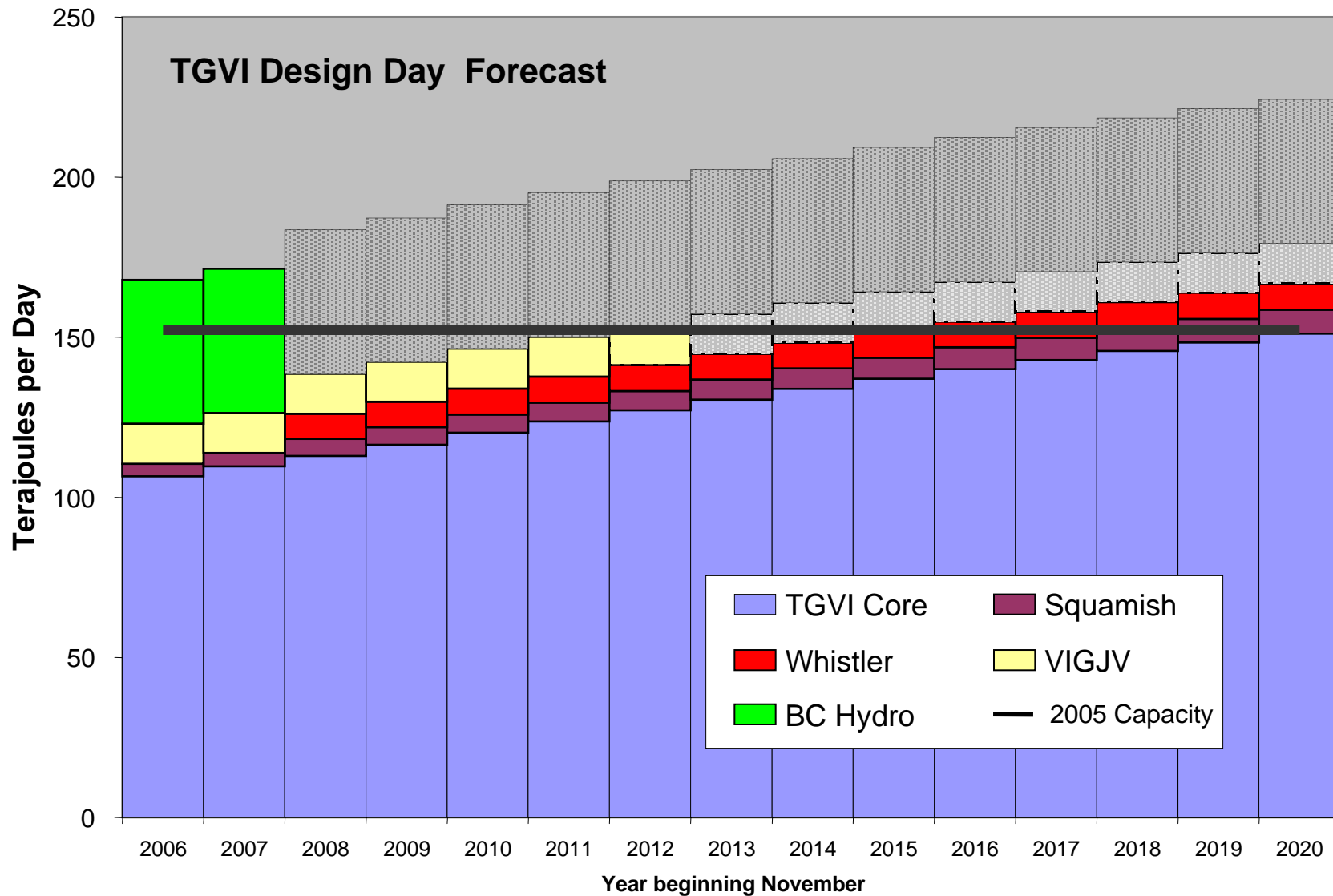
Resource Planning Portfolio Analysis Overview - TGVI Transmission System



Proposed Reinforcement



TGVI current System Capacity vs Demand Projection



Pipe & Compression Portfolio



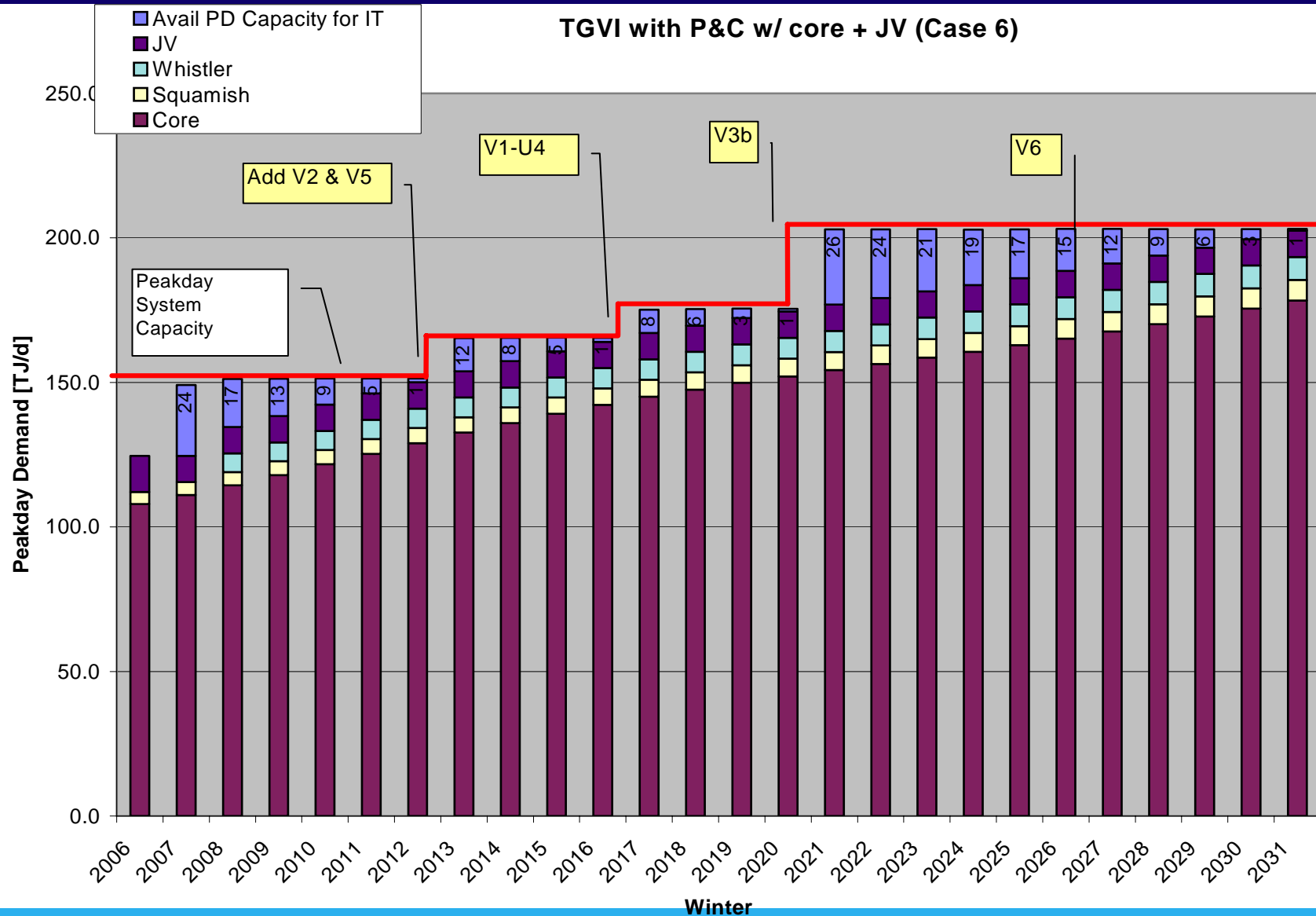
Long Term Demand Scenario

- TGVI, TGS and TGW Core Market Demand
- Joint Venture Mills



Pipe & Compression Portfolio

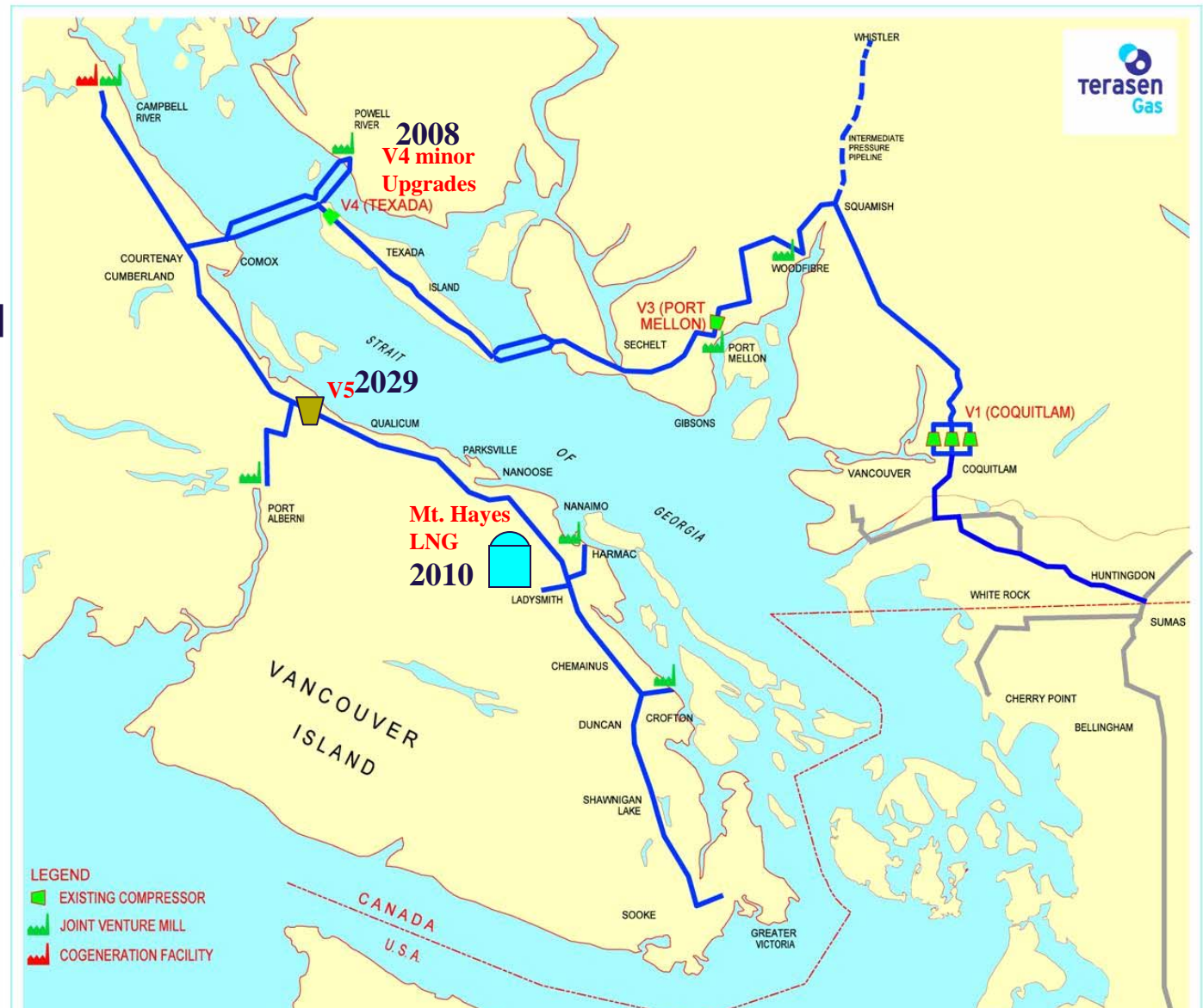
Peak Day System Capacity Versus Demand



LNG Storage Portfolio

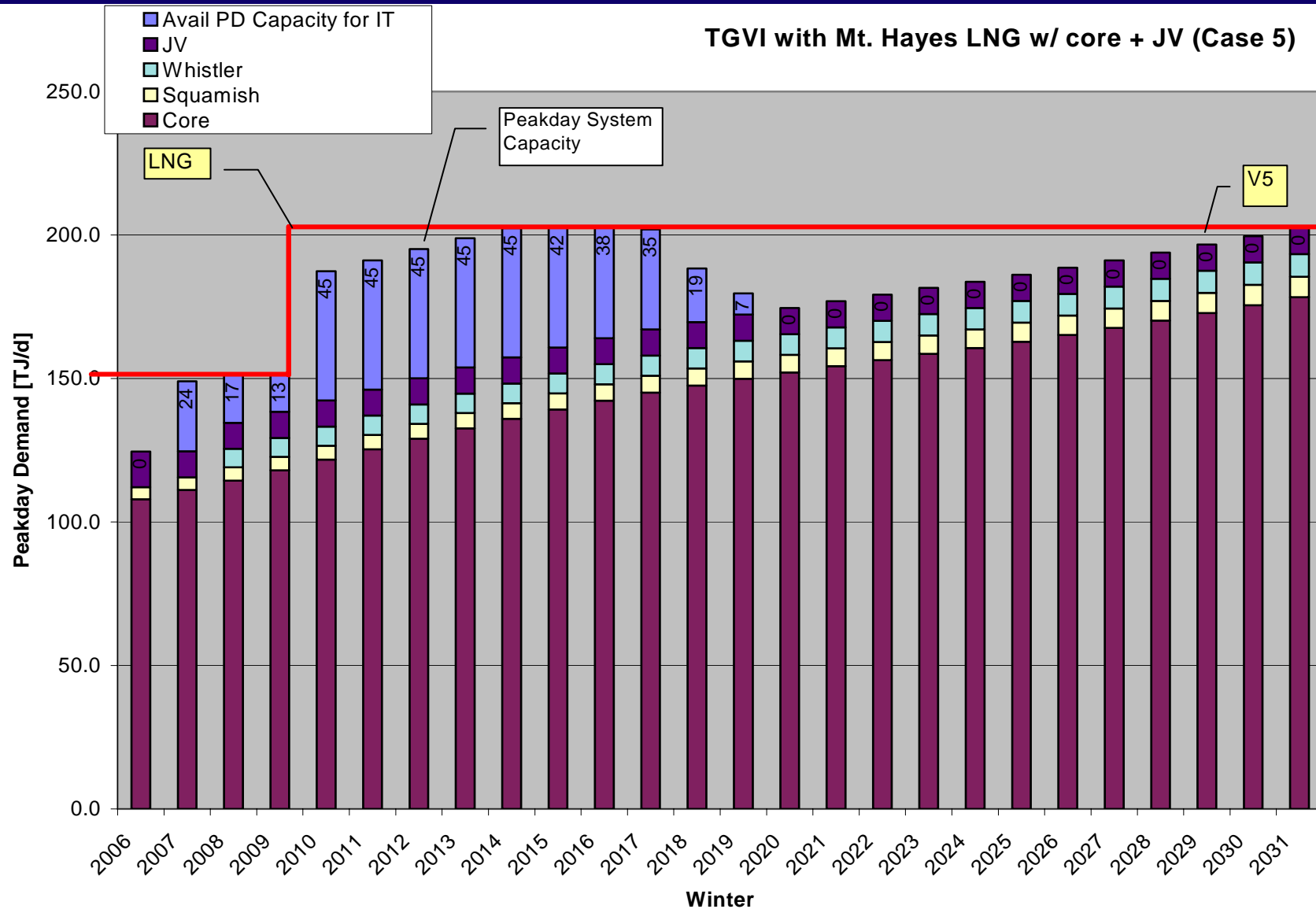
Long Term Demand Scenario

- TGVI, TGS and TGW Core Market Demand
- Joint Venture Mills



LNG Storage Portfolio

Peak Day System Capacity Versus Demand



Resource Planning Portfolio Analysis Overview

- Portfolio Summary



Resource Portfolios: LNG Storage versus Pipe & Compression

Pipe and Compression Portfolio	Squamish V2	Dunsmuir V5	Coquitlam V1-U4	Sechelt V3b	Crofton V6	Watershed 25.3 km Loop	Total Expenditure
millions 2006\$ direct	\$22.7	\$21.6	\$15.6	\$21.6	\$21.6	\$27.7	
Core Markets (TGVI, TGS, TGW)	2016	2016	2021	2025	2030		\$103.1
Core Markets + JV	2013	2013	2017	2021	2027		\$103.1
Core Markets + JV + ICP	2010	2013	2012	2013	2027	2029	\$130.8
LNG Storage Portfolio	Squamish V2	Dunsmuir V5	Coquitlam V1-U4	Sechelt V3b	Crofton V6	Watershed 25.3 km Loop	Total Expenditure
millions 2006\$ direct	\$22.7	\$21.6	\$15.6	\$21.6	\$21.6	\$27.7	
Core Markets (TGVI, TGS, TGW)							
Core Markets + JV		2029					\$21.6
Core Markets + JV + ICP	2019	2029	2028				\$59.9

Resource Portfolio Evaluation

David Perttula

Terasen Gas Business Development

TGVI Portfolio Analysis

TGVI Portfolio Analysis Process

1. TGVI System Costs - incremental facilities cost of service, system fuel and wheeling
 - a) Most likely demand forecast & Industrial load variations
 - b) Core Market demand variations
2. Gas Supply Issues – LNG vs. Market Storage
3. Combined Evaluation of TGVI System Costs and Net Cost of On-System LNG Storage
4. Balanced Portfolio Considerations
5. Conclusions / Recommendations

1. TGVI System Costs (LNG vs. Pipe & Compression Portfolios)



Most Likely Demand Forecast Scenario and Industrial Load Variations

TGVI System Costs (\$ Millions)						
Discount Rate 6.2%	15 - Year PV COS			25 - Year PV COS		
	LNG Storage Portfolio	P&C Portfolio	Difference	LNG Storage Portfolio	P&C Portfolio	Difference
Core Markets (TGVI, TGS, TGW)	\$46	\$78	(\$31)	\$66	\$148	(\$82)
Core Markets + JV (Base Case)	\$51	\$107	(\$56)	\$81	\$185	(\$104)
Core Markets + JV + ICP	\$103	\$176	(\$73)	\$172	\$279	(\$108)
Discount Rate 10%	15 - Year PV COS			25 - Year PV COS		
	LNG Storage Portfolio	P&C Portfolio	Difference	LNG Storage Portfolio	P&C Portfolio	Difference
Core Markets (TGVI, TGS, TGW)	\$36	\$57	(\$21)	\$46	\$91	(\$45)
Core Markets + JV (Base Case)	\$39	\$78	(\$39)	\$54	\$117	(\$63)
Core Markets + JV + ICP	\$79	\$133	(\$54)	\$112	\$183	(\$71)

1. TGVI System Costs (LNG vs. Pipe & Compression Portfolios)



Core Market Demand Variations

TGVI System Cost (\$ Millions)						
Discount Rate 6.2%	15 - Year PV COS			25 - Year PV COS		
	LNG Storage Portfolio	P&C Portfolio	Difference	LNG Storage Portfolio	P&C Portfolio	Difference
Low Core Markets + JV	\$52	\$88	(\$36)	\$77	\$152	(\$75)
Core Markets + JV (Base Case)	\$51	\$107	(\$56)	\$81	\$185	(\$104)
High Core Markets + JV	\$57	\$127	(\$70)	\$114	\$219	(\$105)
Discount Rate 10%	15 - Year PV COS			25 - Year PV COS		
	LNG Storage Portfolio	P&C Portfolio	Difference	LNG Storage Portfolio	P&C Portfolio	Difference
Low Core Markets + JV	\$40	\$64	(\$24)	\$52	\$96	(\$44)
Core Markets + JV (Base Case)	\$39	\$78	(\$39)	\$54	\$117	(\$63)
High Core Markets + JV	\$44	\$94	(\$50)	\$72	\$139	(\$67)

1. TGVI System Costs (LNG vs. Pipe & Compression Portfolios)



Comments / Observations

- Demand forecasts with increased Industrial or Core Market Load provide a greater benefit to having On-System Storage

2. Gas Supply Issues

LNG Storage vs. Market Storage



On-System LNG Storage

(\$ Millions) (6.2% Discount Rate)	15-Year PV COS			25-Year PV COS		
	0.5 Bcf Facility	1.0 Bcf Facility	1.5 Bcf Facility	0.5 Bcf Facility	1.0 Bcf Facility	1.5 Bcf Facility
On-System LNG Storage (\$ Millions)	\$99	\$143	\$186	\$127	\$182	\$237
Level Unit Cost (\$/Mcf)	\$20.7 →	\$14.9 →	\$12.9	\$20.3	\$14.5	\$12.6
(10% Discount Rate)						
On-System LNG Storage (\$ Millions)	\$79	\$113	\$147	\$92	\$133	\$172
Level Unit Cost (\$/Mcf)	\$20.6	\$14.8	\$12.8	\$20.4	\$14.6	\$12.6

2. Gas Supply Issues

LNG Storage vs. Market Storage



Estimated Value of Market Storage

(\$ Millions) (6.2% Discount Rate)	15-Year PV Off-System Storage and Redelivery		25-Year PV Off-System Storage and Redelivery	
	Low Cost ¹ Range	High Cost ² Range	Low Cost ¹ Range	High Cost ² Range
0.5 Bcf LNG Equivalent	\$55	\$72	\$72	\$95
1.0 Bcf LNG Equivalent	\$110	\$145	\$145	\$190
1.5 Bcf LNG Equivalent	\$165	\$217	\$217	\$285
(10% Discount Rate)				
0.5 Bcf LNG Equivalent	\$44	\$57	\$52	\$69
1.0 Bcf LNG Equivalent	\$87	\$115	\$104	\$137
1.5 Bcf LNG Equivalent	\$131	\$172	\$157	\$206

Notes: 1 Low Cost Range for Off-System Storage based on Storage Contract Costs plus Redelivery at 30% of NWP TF-1

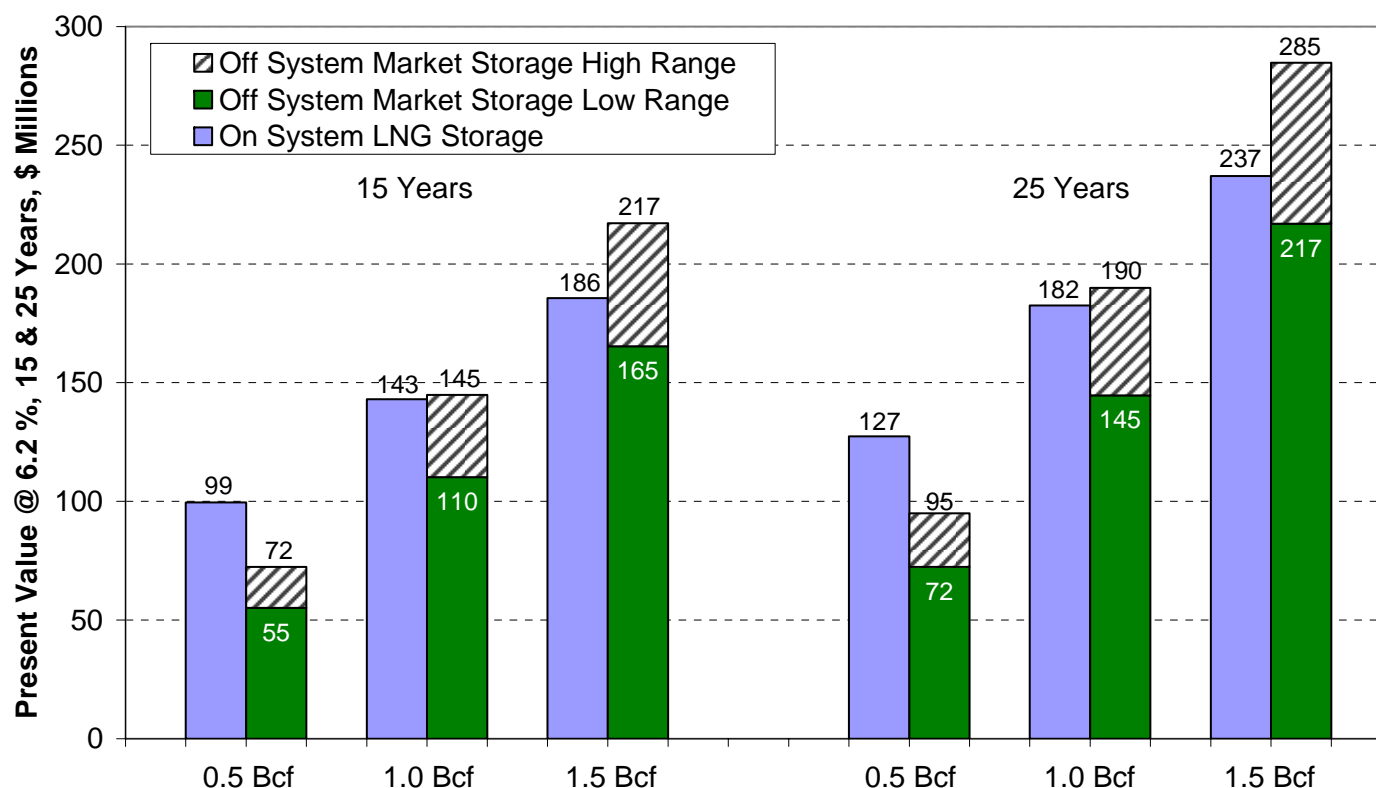
2 High Cost Range for Off-System Storage based on Storage Contract Costs plus Redelivery at 50% of NWP TF-1

2. Gas Supply Issues

LNG Storage vs. Market Storage



On System LNG Storage vs Off System Market Storage (PV@6.2%)



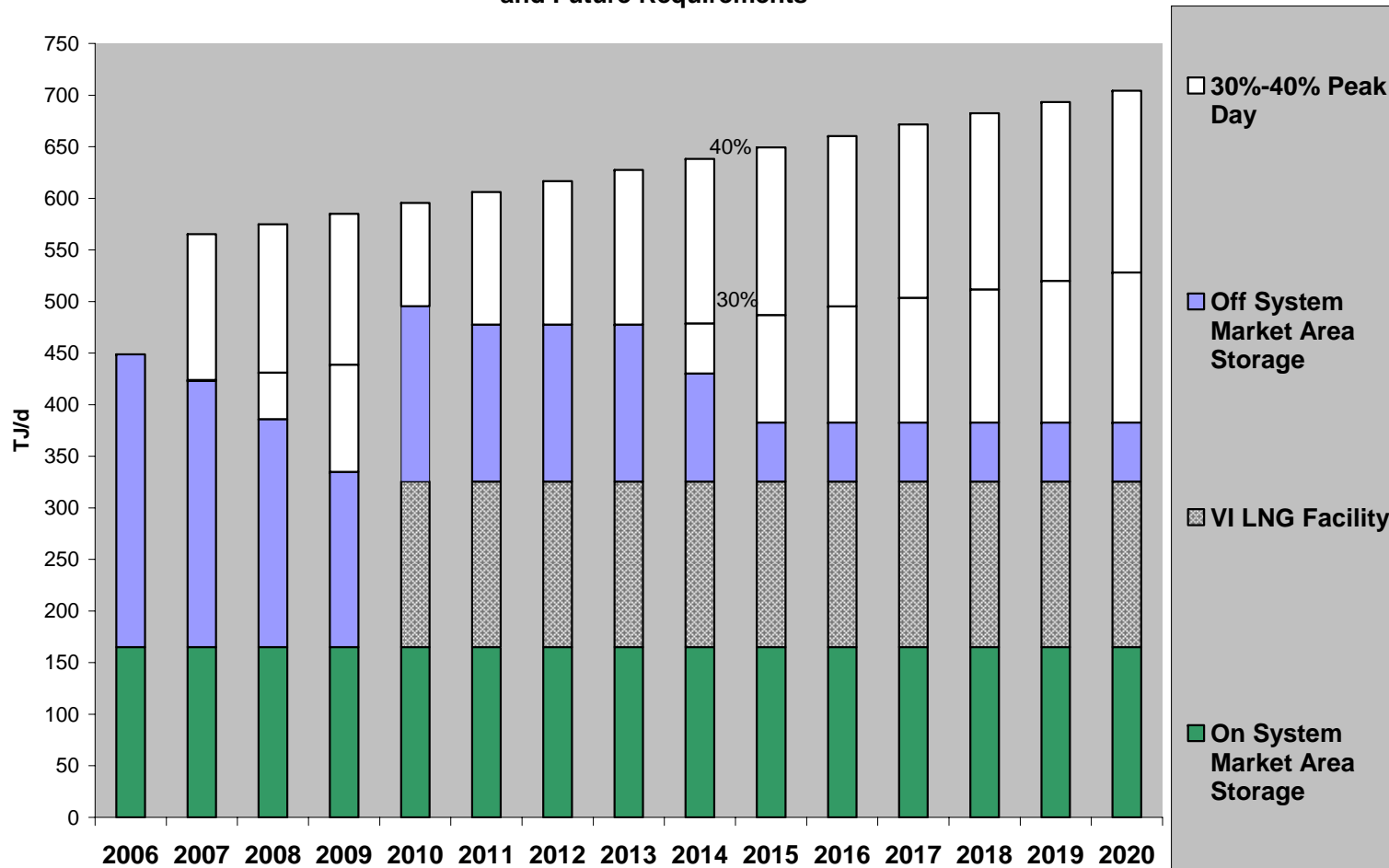
Observations:

- There is a net cost of on-system LNG storage relative to the low end cost range of market storage.
- With larger LNG facilities, the high cost range of market storage, and the longer evaluation period, the net cost of LNG becomes a net benefit.

2. TGI & TGVI - Future Storage Requirements – assuming LNG in 2010



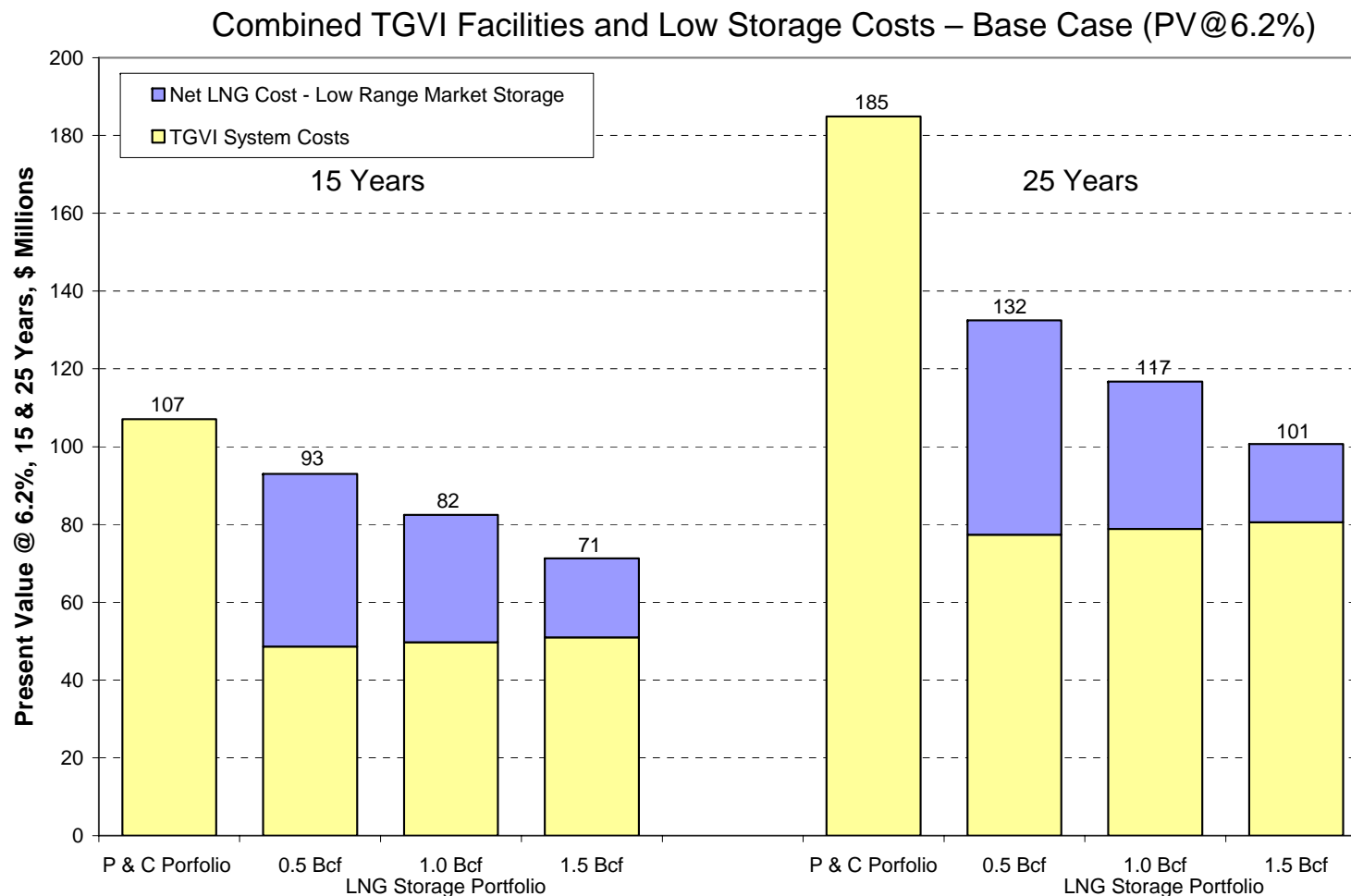
TGI and TGVI Market Area Storage Contracts
and Future Requirements



3. Combined Evaluation of TGVl System Costs and Net Cost of LNG Storage



Most Likely (Base) Demand Forecast



3. Combined Evaluation of TGV System Costs and Net Cost of On-System Storage



Comments / Observations

- Portfolios including on-system LNG storage are favoured relative to Pipe & Compression portfolios
- As consideration is given to:
 - larger LNG facilities,
 - higher cost range of market storage, and
 - the longer evaluation periodthe net benefit of on-system LNG storage increases

4. Security of Supply, Rate Volatility and Balanced Impacts



- Security of Supply and Rate Volatility
 - LNG Storage portfolio
 - Increases Vancouver Island local gas supply diversity
 - Provides supply protection against upstream pipeline disruptions
 - Alleviates TGI/TGVI winter flow requirements at Huntingdon which reduces NWP downstream concerns
 - Provides buffer against price disconnects due to regional capacity constraints
- Balanced Impacts
 - Emission factor comparable between portfolios
 - Land Use favours Pipe and Compression portfolio
 - Employment favours LNG Storage portfolio

	LNG Storage	Pipe and Compression
CO ₂ e (average tonnes per TJ delivered)	2.58	2.56
NO _x (average kg per TJ delivered)	1.56	1.55
SO ₂ (average kg per TJ delivered)	0.051	0.051
Land Use (acres)	92	60
Employment – construction (person years)	188	101
Employment – permanent	9.5	2.5

5. Resource Evaluation Matrix

- LNG Storage portfolio is preferred
 - Lowest delivered cost based on avoided facilities and value of market area storage
 - Increased regional supply diversity improves security of supply and reduces rate volatility
 - Portfolios are comparable on Balanced Impacts of emissions, land use, and employment

	LNG Storage	Pipe & Compression
Lowest Delivered Cost	✓	
Security of Supply	✓	
Rate Volatility	✓	
Balanced Impacts	✓	✓

5. Conclusions / Recommendations

- Portfolios with On-System LNG storage are preferred.
- There are opportunities to achieve greater benefits for the region by building a larger-sized LNG facility
- Action items
 - TGVl should pursue arrangements with TGI, other utilities and regional gas market participants to realize the regional benefits associated with the larger LNG facilities.
 - TGVl will develop and file a revised CPCN application for an on-system LNG storage

Update on the Mt. Hayes LNG Project

Guy Wassick
Manager, Projects

Agenda

- LNG General
- Approvals
- Project Costs

What Is LNG?



- **LNG (liquefied natural gas) is natural gas cooled until it condenses into a clear liquid.**
- **LNG is stored at -162° C (-260° F) at atmospheric pressure in a “thermos” like storage container.**
- **LNG takes up far less space – about 1/600th of its original volume as a gas.**
- **LNG (the liquid itself) is not flammable or explosive.**

Types of LNG Facilities

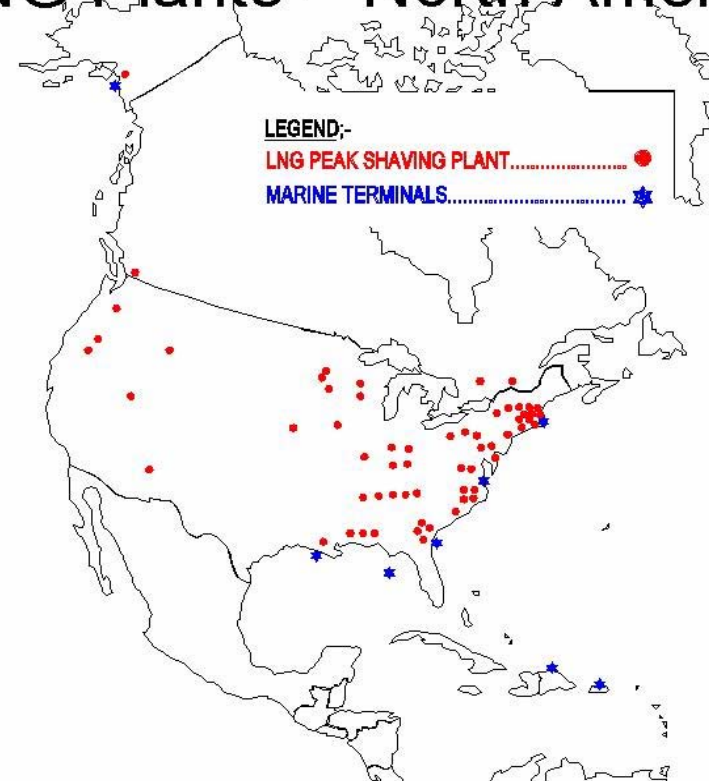
Peak Shaving:

- Peak days sendout
- Small storage capacity
- Onsite liquefaction and vaporization
- Annual fill and use

Base Load - Import/Export Terminal:

- Base load supply
- Large storage capacity
- Daily liquefaction or send out
- Supplied to/by marine tanker

LNG Plants – North America



Tilbury Island (Delta, B. C.) “Peak shaving” LNG Plant (1970) - 0.6 bcf



LNG Facility Site – Near Ladysmith

LNG Storage Facility

- Storage: 0.5 to 1.5 bcf
- Send-out: 10 days at max. rate
- Liquefaction: 200 days
- 6km NW of Ladysmith, West of Mt. Hayes
- Located near load center on Southern Vancouver Island



LNG Project Approvals

APPROVALS RECEIVED

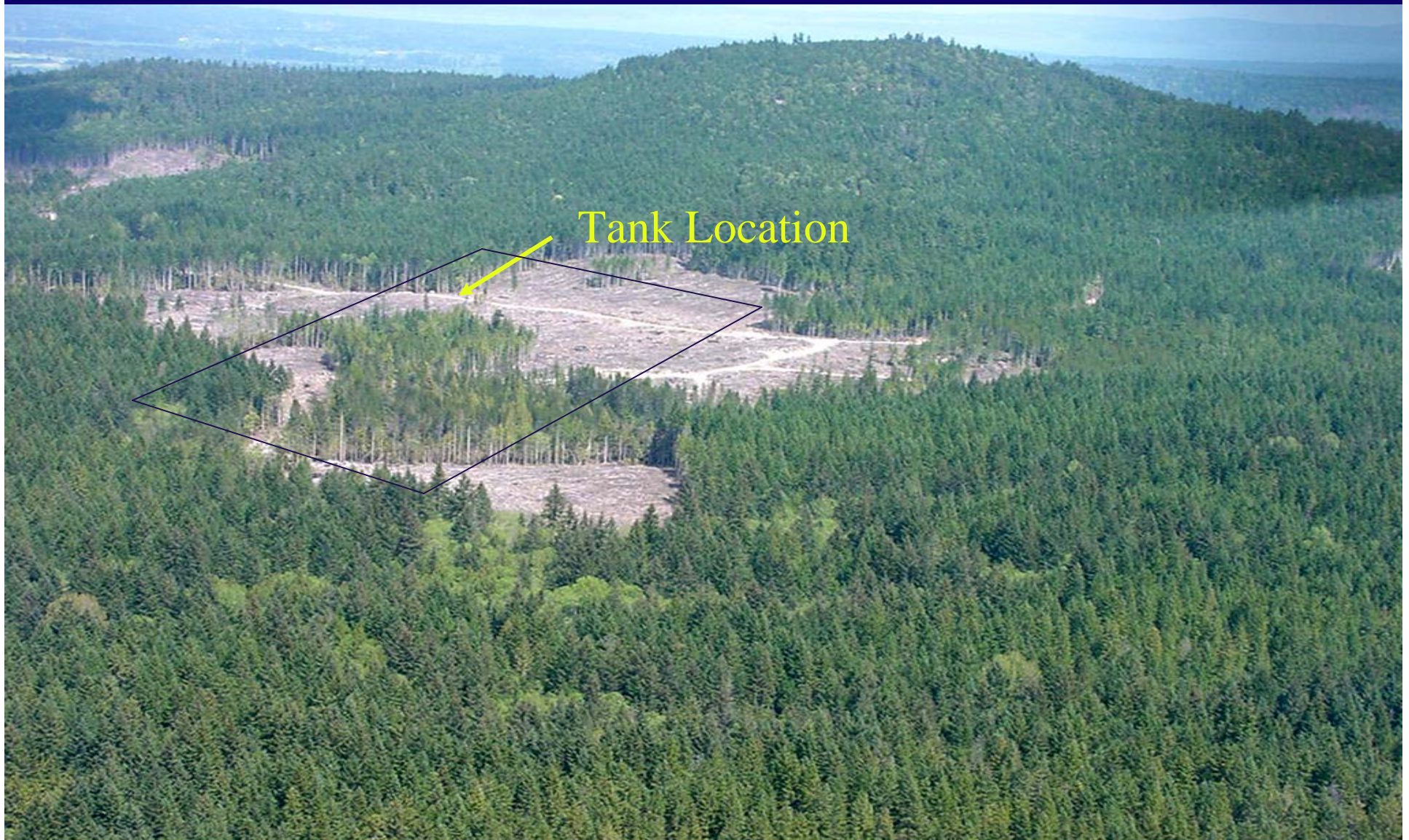
- Site Re-Zoning
- Environmental Assessment
- Site Purchase Option
- Agreements with local First Nations
- Crown Land Permits
- Previous conditional CPCN

OUTSTANDING APPROVALS

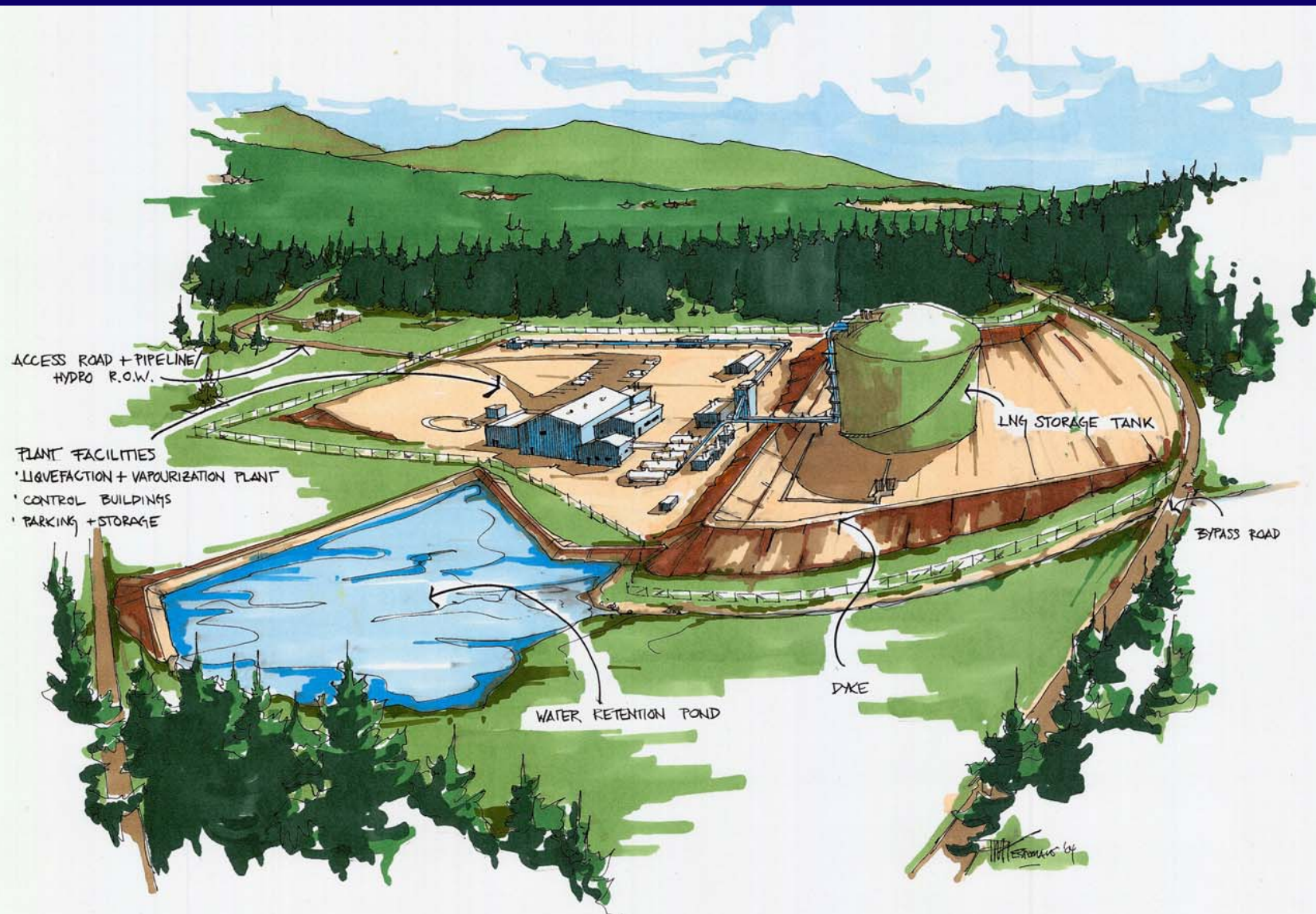
- BCUC CPCN
- OGC Construction Permit (req'ts confirmed)
- Prov. & Local permits (req'ts confirmed)

Site Photograph

Mt. Hayes in background - view to east



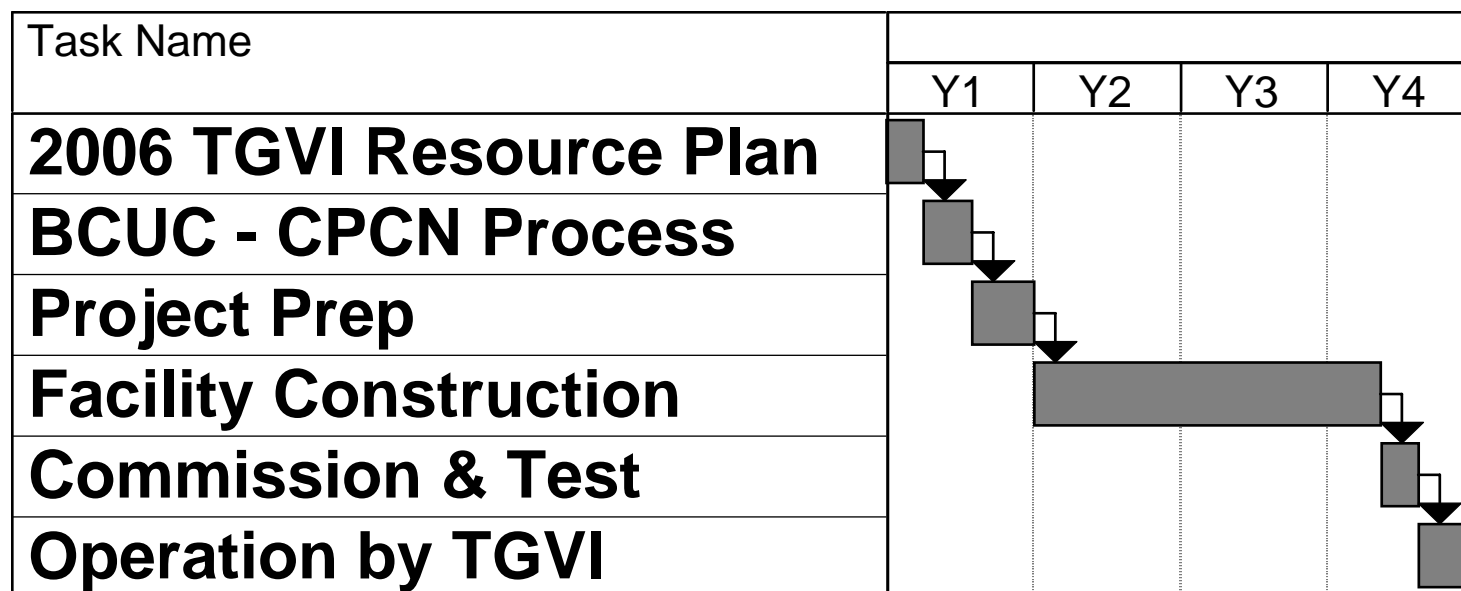
Artist Rendering



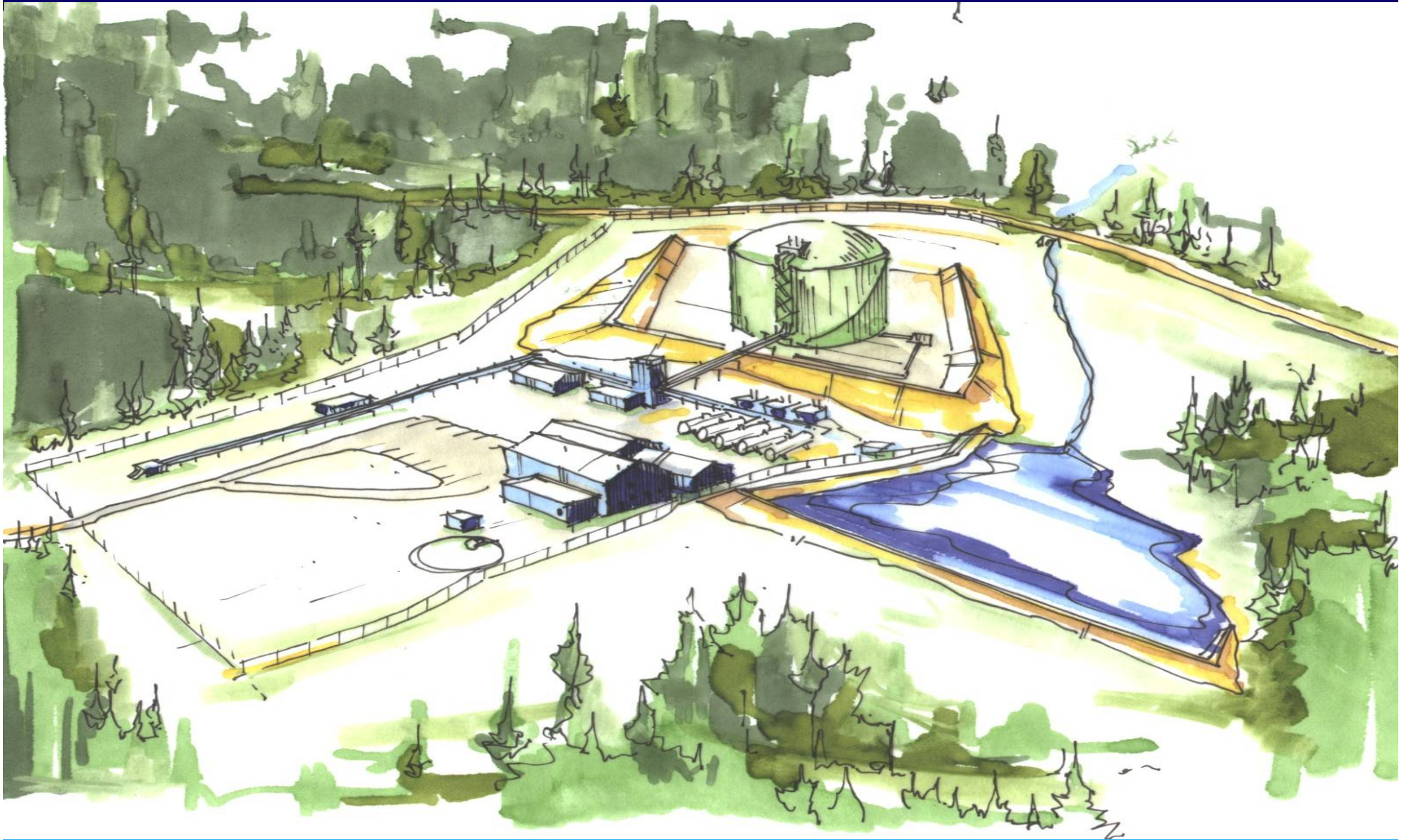
Capital Costs, 2006 \$million

Facility Size	<u>0.5 BCF</u>	<u>1.0 BCF</u>	<u>1.5 BCF</u>
EPC Contract	\$57.3	\$86.0	\$111.1
Owner's Costs	\$18.0	\$24.4	\$31.7
TOTAL	\$75.3	\$110.4	\$142.8

Projected Timing



Artist Rendering



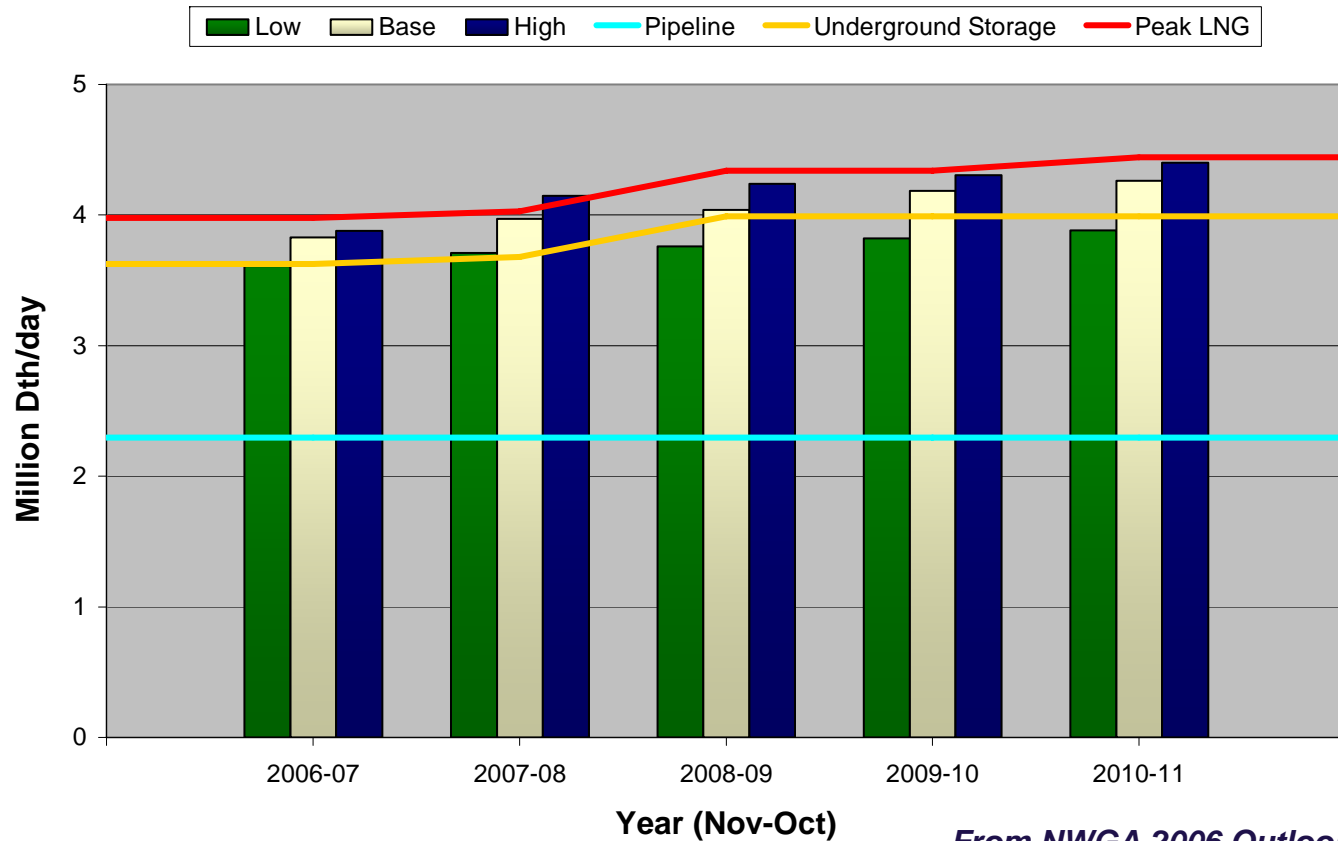
Wrap-Up & Next Steps

Cynthia Des Brisay
Director, Business Development

Regional Supply and Demand Balance

- Demand Growth will result in infrastructure constraints by the end of the decade

I-5 Total Firm Peak Day Supply/Demand Balance



Terasen Gas Demand Growth

	TGI	TGVI
2005		
Customers	799,804	85,016
Annual Demand (TJ)	113,319	11,653
Peak Demand (TJ/Day)	1,256	105.9
2021		
Customers	1,000,200	138,302
Annual Demand (TJ)	138,801	16,667
Peak Demand (TJ/Day)	1,507	154.3
2031		
Customers	1,092,116	164,627
Annual Demand (TJ)	149,593	19,197
Peak Demand (TJ/Day)	1,600	178.3
Average Annual Demand Growth ('05-'31)	1.07%	1.94%

All figures year-end

Design day figures for TGI do not include Squamish

Squamish 2005 Design Day = 4.0 TJ, 2021 Design Day = 7.0 TJ, 2031 Design Day = 7.8 TJ

Conservation Potential

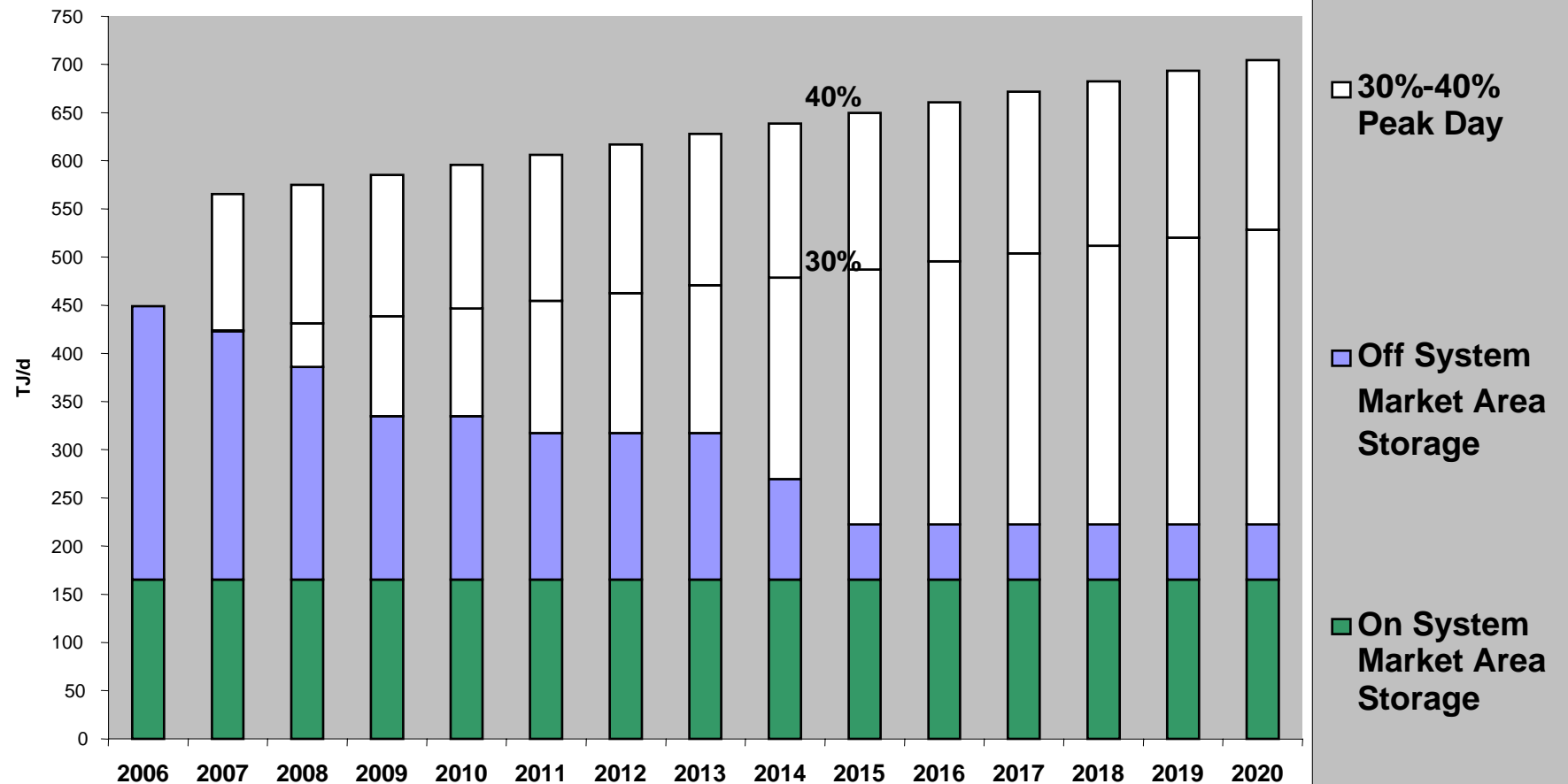
By 2015/2016, GJ per year	TGVI	Lower Mainland	Interior	Total
Residential EE	-369,000	-7,417,000	-1,847,000	-9,633,000
Commercial EE	-385,000	-1,850,000	-431,000	-2,666,000
Industrial EE	-32,430	-933,064	-924,210	-1,889,704
Subtotal	-786,430	-10,200,064	-3,202,210	-14,188,704
Residential Fuel Sub				1,453,000
Potential Annual Impact				-12,735,704

TGI & TGVI Gas Supply Portfolio

Increasing need for Storage Resources



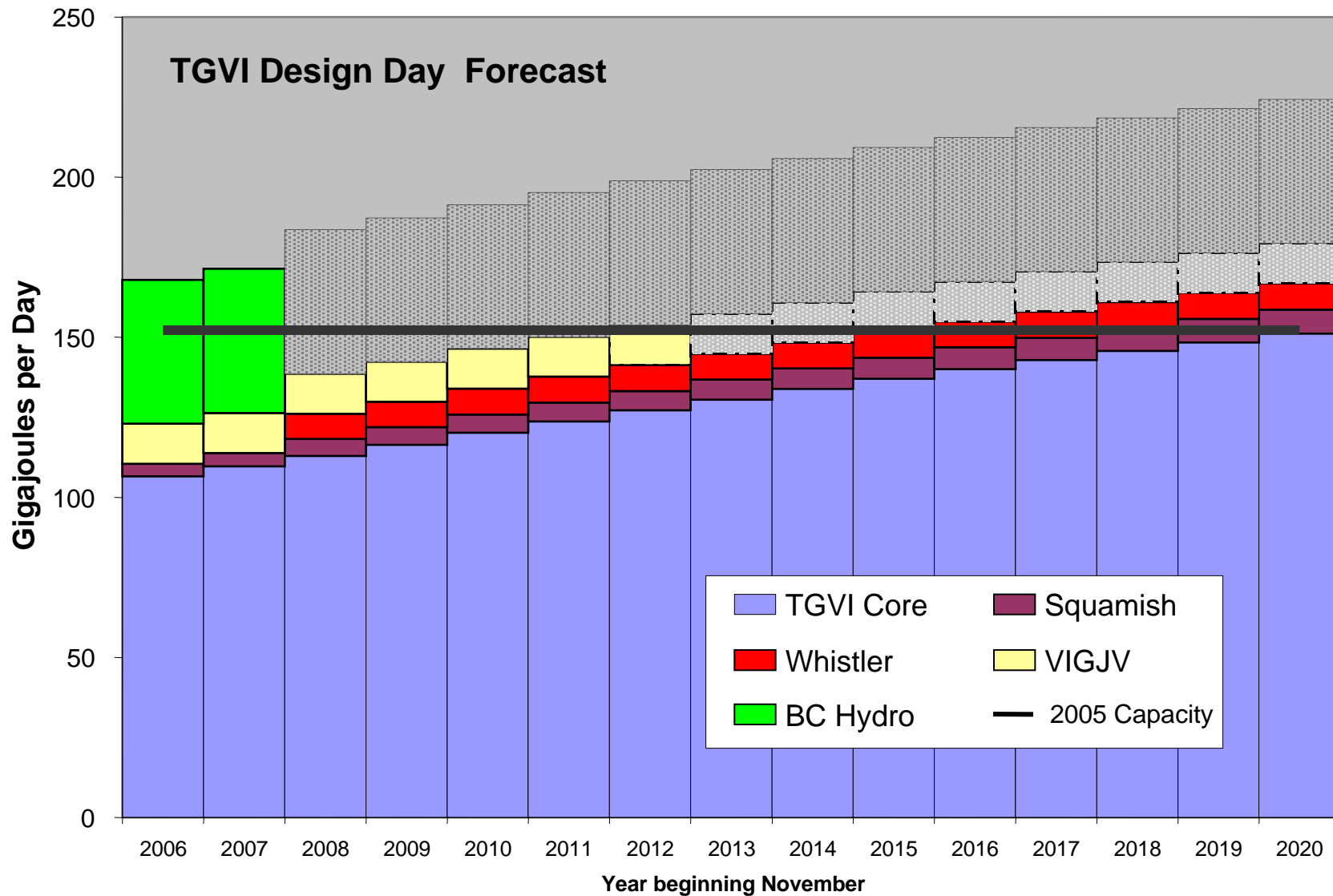
TGI and TGVI Market Area Storage Contracts
and Future Requirements



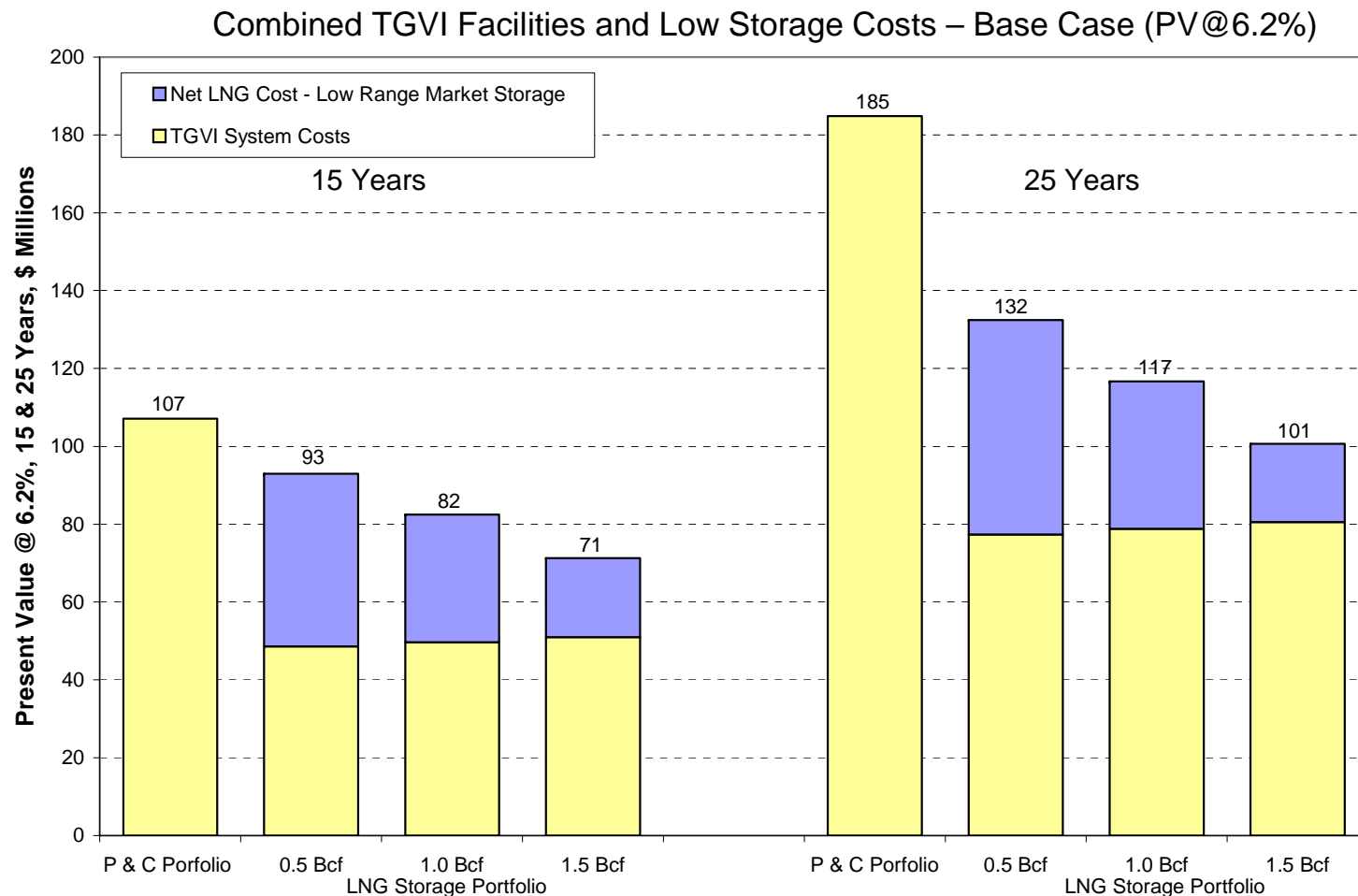
System Expansion Requirements

- Terasen Gas
 - Lower Mainland –
 - Requirements depend on future of Burrard Thermal and ICP
 - No major requirements before 2010
 - Interior System
 - Requirements driven by Core market growth
 - No major requirements before 2012
- Terasen Gas (Vancouver Island)
 - System currently constrained
 - Future requirements driven by industrial and generation (ICP) loads
 - Expansion facilities could be required by 2010

TGVI Current System Capacity vs Demand Projection



On Island Peak Shaving Facility



Next Steps

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|------|--|
| July | <ul style="list-style-type: none">• TGI and TGVl Resource Plans complete |
|------|--|
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- | | |
|----------------------|--|
| June to
September | <ul style="list-style-type: none">• Storage Services Agreement between TGVl and TGI• Develop Energy Efficiency strategy and programs• Stakeholder Consultation |
|----------------------|--|
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- | | |
|----------------------|---|
| September
October | <ul style="list-style-type: none">• Potential CPCN filing for MT Hayes Facility to support 2010 in-service date |
|----------------------|---|
-
- | | |
|---------------------|---|
| October
November | <ul style="list-style-type: none">• Request for approval for Energy Efficiency programs |
|---------------------|---|
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Thank you,
...for your participation