

Building Connections

Marcel Reghelini Director, Regulatory Affairs Phone: 604 699-7331 604 699-7229 Fax:

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January 23, 2008

VIA E-MAIL

Ms. Erica M. Hamilton, Commission Secretary and Registered Intervenors

Re: **British Columbia Transmission Corporation (BCTC)**

Transmission System Capital Plan F2009 to F2018 – Project No. 3698492

Workshop on January 22, 2008 - Presentation Slides

BCTC filed its Transmission System Capital Plan F2009-F2018 with the British Columbia Utilities Commission (the Commission) on December 21, 2007. The Commission subsequently issued Order No. G-173-07 establishing a Written Public Hearing and Regulatory Timetable.

BCTC's January 7, 2008 letter provided notice of its plans to hold a workshop for Commission staff and Registered Intervenors on Tuesday January 22, 2008 from 8:30 a.m. to approximately 12:30 p.m. at the Terasen Building (Georgia Room - Main Floor) at 1111 West Georgia, Vancouver, B.C. The purpose of the workshop was to provide an overview of the Transmission System Capital Plan F2009-F2018.

The Capital Plan Workshop was held as planned. Attached is a PDF copy of the presentation slides that were used during the workshop and the attendance list.

Sincerely,

Original signed by:

Marcel Reghelini Director, Regulatory Affairs

Suite 1100, Bentall Centre **Telephone:** 604 669 7200

www. bctc.com

Capital Plan Workshop

January 22, 2008

Terasen Building
1111 West Georgia St.
Vancouver, BC
Georgia Room



Workshop Objectives

1. Overview of BCTC's F2009 Capital Plan Application

2. Opportunity for face-to-face discussions

3. Provide clarification on information in the application

Feedback on the benefit and value of the workshop will be appreciated



Intervenor Workshop – Agenda

January 22, 2008 - 8:30 a.m. to 12:30 pm

1. Opening Remarks Laurie Gray

2. Introductions and Purpose Ajay Kumar

3. Overview Paul Choudhury/Randy Bourne

4. Growth Portfolio (Section 5) Don Gillespie

5. Break

6. Sustain Portfolio (Section 6) Larry Haffner

7. BCTC Portfolio (Section 7) Ebrahim Vaahedi

After each presentation, 15 minutes will be allotted for discussion



Preview

- 1. This is a facilitated session and intended to be educational and interactive
- 2. Time is included for discussion, but we will need to follow agenda timing
- 3. Given time constraints, presentations will need to be high level
- 4. Discussion/questions do not need to be at a high level; however, it is suggested that questions be limited to clarification of the filed evidence
- 5. Please turn off all electronic devices cell phones, blackberries, etc.



Transmission System Capital Plan F2009 to F2018 Capital Plan Workshop

Paul Choudhury
Manager
System Planning and
Performance Assessment
22 January 2008



Planning for the Future



- Reliable electricity is the backbone of today's modern economy
- Last major investments in transmission infrastructure occurred in the 1970's & 1980's, and parts of the existing system are reaching the limits of capacity
- A large portion of the existing infrastructure was constructed in the 1950's & 1960's; parts of the system are reaching end-of-life
- Transmission investment is required to meet growing demand and maintain reliability of the existing system

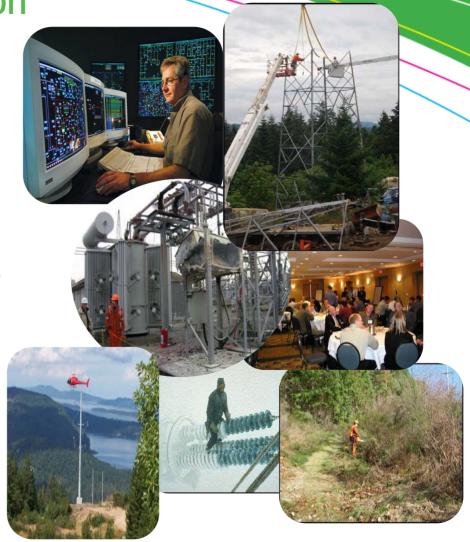


BC Transmission Corporation

Areas of Responsibility:

- Operation of the BC Hydro Transmission system - safety
- Transmission reliability
- Transmission planning
- Maintain/sustain the BC Hydro Transmission system & BCTC Control Centres
- Provision of Open Access
 Transmission Services





Capital Plan Process External Inputs BCTC Strategies and Business Plan Objectives Performance Results Project / Program **Planning** Portfolio Prioritization: (Sustain, Growth & BCTC) **BCUC** Approval **Project** Execution **Capital Plan BC** Transmission

CORPORATION

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Overview of Application

Provides a ten-year overview of future requirements and an analysis of the State of the Transmission System

Requests approval for:

- Projects starting in F2009 and definition funding for major projects
- Programs for F2009 and F2010
- Major projects identified in the plan, but BCTC will be seeking approval for these through the CPCN process

3 Key Portfolios: Growth, Sustain, BCTC

F2010 Capital Plan

Move to bi-annual filing



Key Business Drivers

- 1. Meeting forecast load growth
- 2. Meeting BC Hydro Resource Plan requirements
- 3. Integrating new generation resources
- 4. Addressing aging infrastructure
- 5. Ensuring transmission safety and reliability
- 6. Capitalizing on opportunities afforded through the Transmission Expansion Policy
- 7. Responding to applicable codes and regulation
- 8. Responding to third party requests
- 9. Keeping control centres, offices, and tools efficient



BCTC's Capital Investment Program

Total 10 year investment: \$5.1 billion

Key Portfolios:

Growth: Meet increases in demand and customer requests for service (\$2.7b)

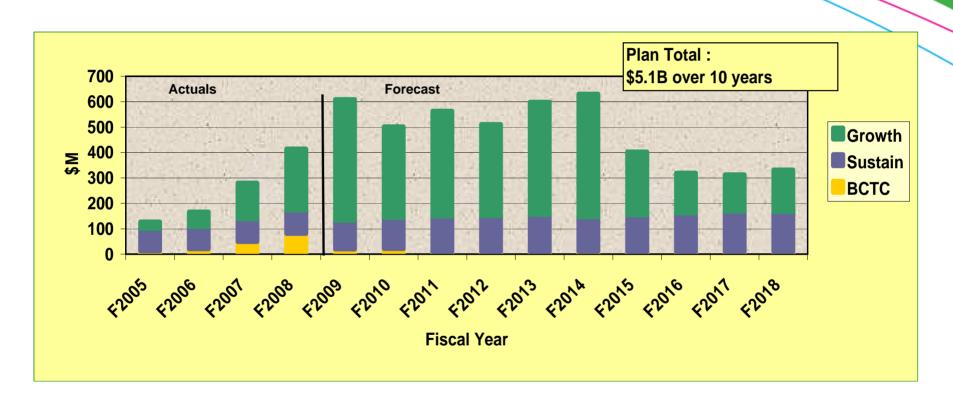
Sustain: Maintain the performance, safety and reliability of the existing transmission system (\$1.4b)

BCTC: Provide the technical and infrastructure requirements for control centres and business processes (\$0.1b)

Note: Plus an addition \$0.9b for Substation Distribution Assets



Capital Expenditures – History and Plan





Expenditures For Approval

Growth:

- \$51M
- Additional \$858M sought through CPCN Applications

Sustain:

• F2009: \$113M

• F2010: \$123M

BCTC:

• F2009: \$8.3M

• F2010: \$5M



Changes from F08 Capital Plan

	Particulars (\$ billions)	F2009 Capital Plan	F2008 Capital Plan	Increase (Decrease)	Reason for Change
1	Growth Portfolio	\$2.7	1.6	1.1	ILM cost increase (+\$0.3) Revised forecast of generation interconnection work (+\$0.7) Updated load forecast (+\$0.1)
2	Sustaining Portfolio	1.4	1.1	0.3	Asset demographics, downtown reliability, cost escalation
3	BCTC Capital Portfolio	0.1	0.2	(0.1)	
4	Total	4.2	2.9	1.3	
5	Add: SDA and Other	0.9	0.4	0.5	
6	Grand Total	\$5.1	\$3.2	\$1.8	

Impact on Transmission Revenue Requirement

F2008 Transmission Revenue Requirement (TRR) - \$ millions 517.							
	BC H	lydro	встс	Total Change	Annual % Change		
Annual Impact - \$ millions	Growth	Sustain					
	(a)	(b)	(c)	(d)	(e)		
F2009	24.6	9.7	21.6	55.9	10.8%		
F2010	32.0	8.6	(7.5)	33.1	5.8%		
F2011	29.7	7.9	1.5	39.1	6.4%		
F2012	30.4	5.2	1.4	37.0	5.7%		
F2013	23.7	8.9	1.0	33.6	4.9%		
F2014	20.4	11.0	(4.5)	26.9	3.8%		
F2015	48.2	5.1	(0.7)	52.5	7.1%		
F2016	33.8	6.8	(2.4)	38.2	4.8%		
F2017	5.8	7.0	(1.5)	11.3	1.3%		
F2018	5.6	8.7	(0.7)	13.7	1.6%		
Cumulative TRR Change over 10 Years:	254.2	79.0	8.1	341.3	65.9%		

Note 1 Numbers may not add due to rounding.

Note 2 () = reduction in revenue requirement.

2007 Energy Plan

Alignment with North American Standards

Mandatory Reliability Standards

Long-term Outlook Report

- 20 year + planning horizon
- Show areas of planned system development
- Incorporate need identified through Congestion Relief Policy,
 Transmission Expansion Policy and Loss Reduction Strategy
- Incorporate the long-term requirements of extending life and maintaining performance of the existing infrastructure



FERC 890

New industry pro-forma tariff issued last year

Key elements:

- Standardized Available Transmission Capacity methodology
- Documentation of BCTC planning process including opportunities for customer and stakeholder input

Consultation and application to Commission expected later this year



Continuous Improvement

Asset Management – Sustain Portfolio

- Commissioned study by UMS to review and evaluate BCTC's Asset Management program
- Key findings include:
 - BCTC has done well at extending the useful life of its assets but should expect increasing costs over the next 10 years for asset replacement
 - Current levels of spending below average, given system age demographics



Continuous Improvement

Cost Estimation & Project Management

- Lessons learned (Fox Creek), UMS Study and Goto Sargent Report
- Opportunities to improve cost estimation and project management
- Recent improvements:
 - Clearly identify level of estimate accuracy at each stage (study, definition and approval)
 - Expanded definition phase to include more planning work and route selection for projects to ensure better defined scope and more accurate estimates
 - Expanded project completion reports



Major Risks & Uncertainties

- Forecast uncertainty
- Cost escalation pertaining to material supply, equipment and construction labour
- Higher expectations for stakeholder and First Nations engagement
- Changing business and customer drivers (e.g., management of wind integration, configuration of new interconnections)
- Implications of key government initiatives e.g., Energy Plan implementation
- Execution risk availability of resources & equipment



Execution Risks

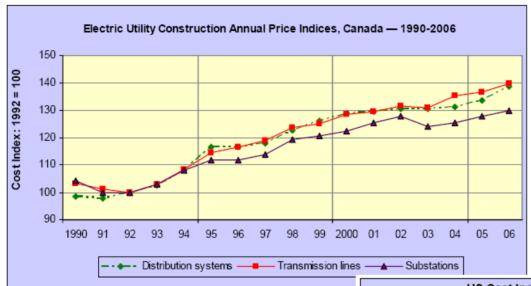
- Skill shortages
- Cost escalation
 (e.g. inflation, construction escalation, equipment costs)
- Lead times for equipment delivery increasing
- Unplanned and emergency risks

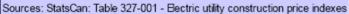
BCTC has developed strategies to mitigate identified risks in executing Capital Plan

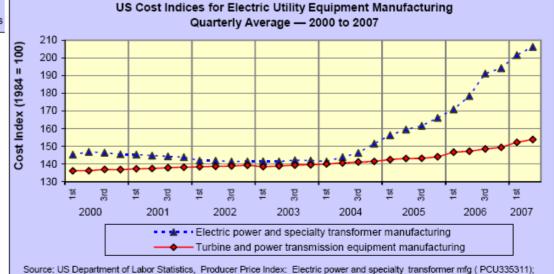




Cost Escalation







Turbine (gas, hydraulic, steam, water, wind) and power transmission equipment manufacturing (PCU33361)



Inflation





Execution Challenges & Mitigation Strategies

Challenges Mitigation

Engineering Resources SNC-Lavalin Contract

Material/Equipment Procurement Contracts with 20 suppliers

Construction Resources Alternate Contracting Strategies







- Select appropriate approach from a broad range of project delivery options and strategies for construction projects during definition stage
- The degree of risk transfer differs between options
 - Design-Bid-Build (e.g. Traditional) look at bundling similar work
 - Construction Management at Risk (e.g. SCMP Control Centres)
 - Design-Build (e.g. Greenfield Substations and VITR Submarine Cable)
 - Design-Build-Finance-Maintain (P3 model)
 - Alliance Contracts (pre-qualified contractors)



Execution Challenges & Mitigation Strategies (cont'd)

Challenges

Mitigation

Adequate Program Management

Project Management Handbook

Contract Management Manual

Risk Management

Goto Sargent retained



Goto Sargent Report

Opportunities for improvement:

- Risk Management
- Commercial Management
- Project Execution
- Planning and Estimating

Action Plan

- Developed in conjunction with Major Supplier of Engineering Services (e.g., BC Hydro)
- Implementing risk screening criteria and risk management workshops for higher risk projects
- Skills training (e.g., Project Management, Risk Screening & Management)
- Process improvement (reporting, forecasting, scheduling, etc.)
- New Project Management tools





Discussion





Growth Portfolio for Transmission System Capital Plan F2009 to F2018 Capital Plan Workshop

Don Gillespie
Manager, Transmission
System Planning
22 January 2008



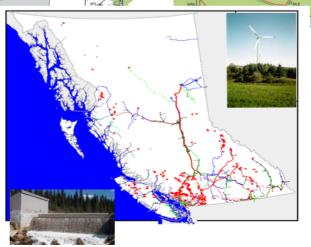
BC Bulk Transmission System Separation System Sep

Area Reinforcements & Station Expansion/Modification



Bulk System Reinforcements





Load/Customer Interconnections

Generation Interconnections

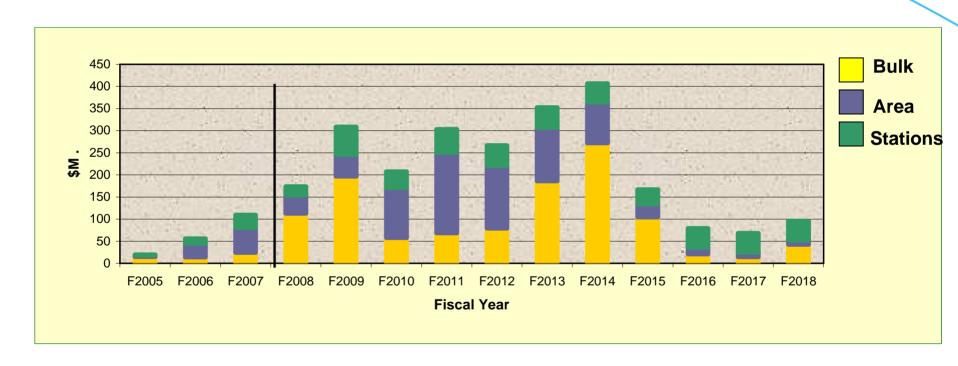
Growth Projects Financial Summary: F2009-F2018

Total Growth Portfolio for 10 Years: \$2.7 billion

- Bulk System: \$1.040 billion
- Regional System: \$0.763 billion
- Station expansion and modification: \$0.449 billion
- Generation Interconnections: \$0.983 billion
- Customer requested: \$0.007 billion
- Less Substation Distribution Assets (SDA): \$0.533 billion

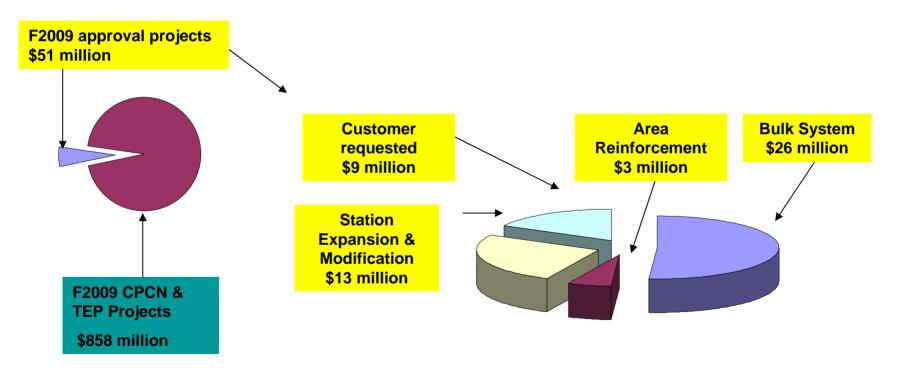


Growth Spending





Projects Seeking Approval





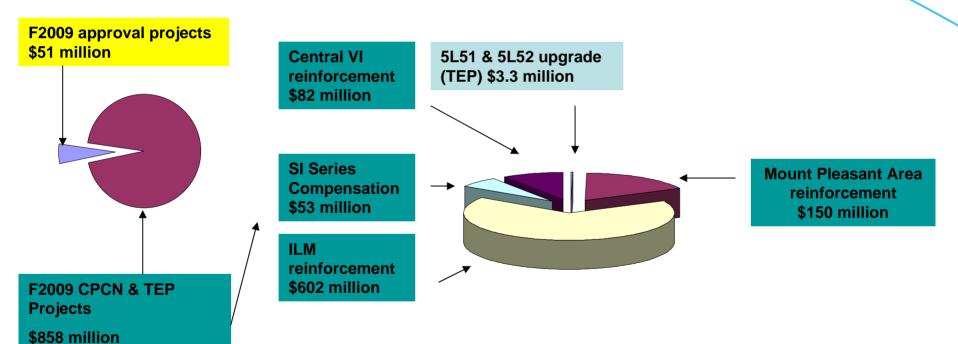
CPCNs & TEP Projects

(Implementation \$)

BC Transmission

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Basis of Growth Capital Plan

- BC Hydro's December 2006 System Load Forecast
- BC Hydro's July 2007 Distribution Substation Forecast
- Resource information from BC Hydro's Amended LTAP, Contingency Plans 1 & 2 (as filed with the Commission) and information contained in the Base Resource Plans with and without Burrard submitted to BCTC by BC Hydro in August 2007
- Generation & Customer Interconnections



Network Integrated Transmission Service (NITS)

Currently 1 NITS customer in the province: BC Hydro

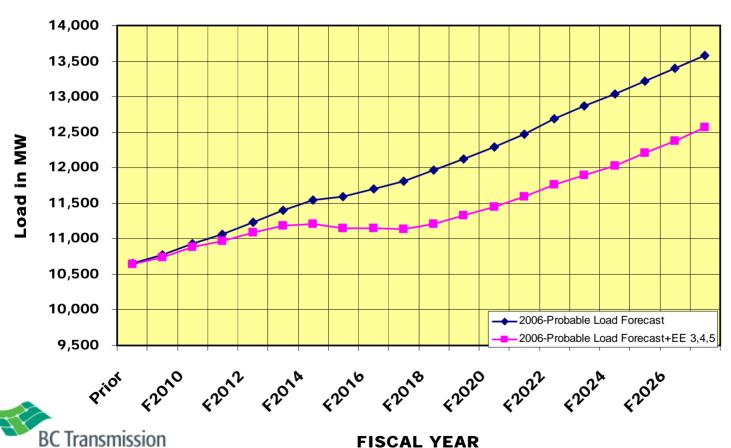
Primary driver for most of BCTC's Capital Plan:

- Bulk System Reinforcements (VITR, ILM, etc)
- Regional Reinforcement
- Generation Interconnections



20 Year System Load Forecast

2006 Load forecast

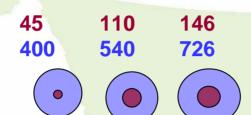


FISCAL YEAR

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Resource Plans

Peace Region

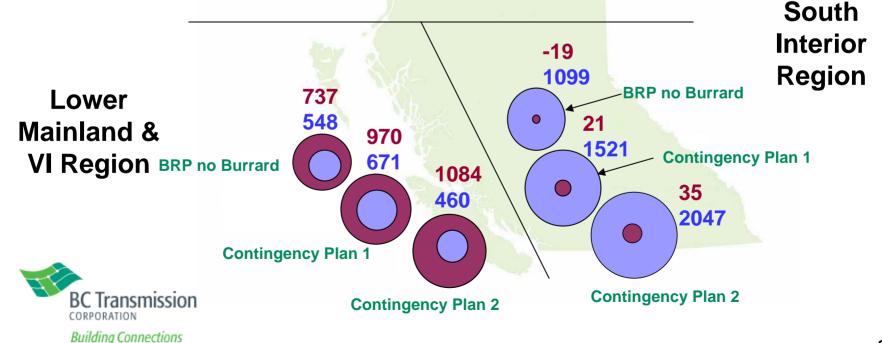


Load Growth less DSM in MW

Dependable Generation (MW) Additions

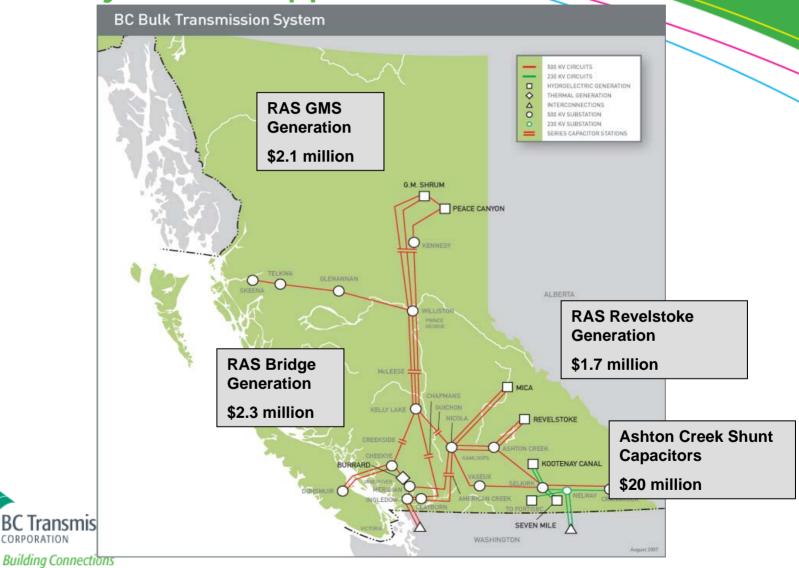
BRP= Base Resource Plan





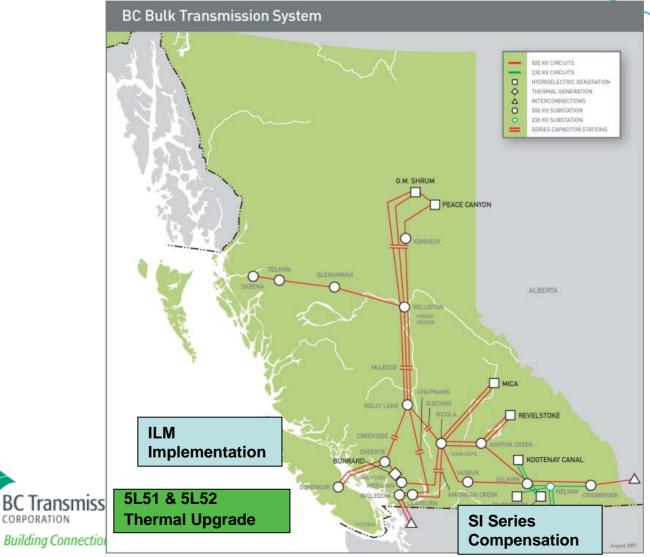
Bulk Projects For Approval

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Bulk System CPCN & TEP Applications

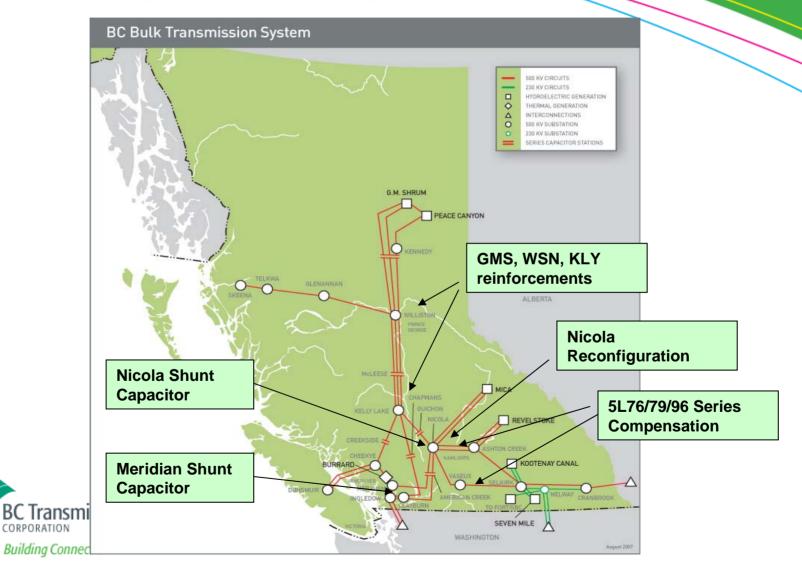
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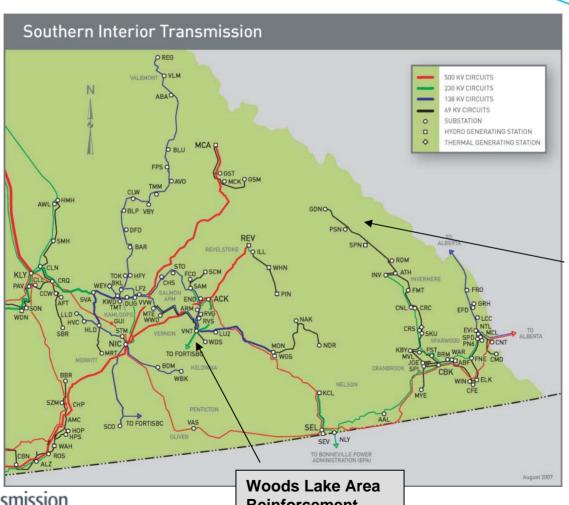
CPCN Applications

TEP Application

Future Projects - Bulk System



Regional System Projects for Approval



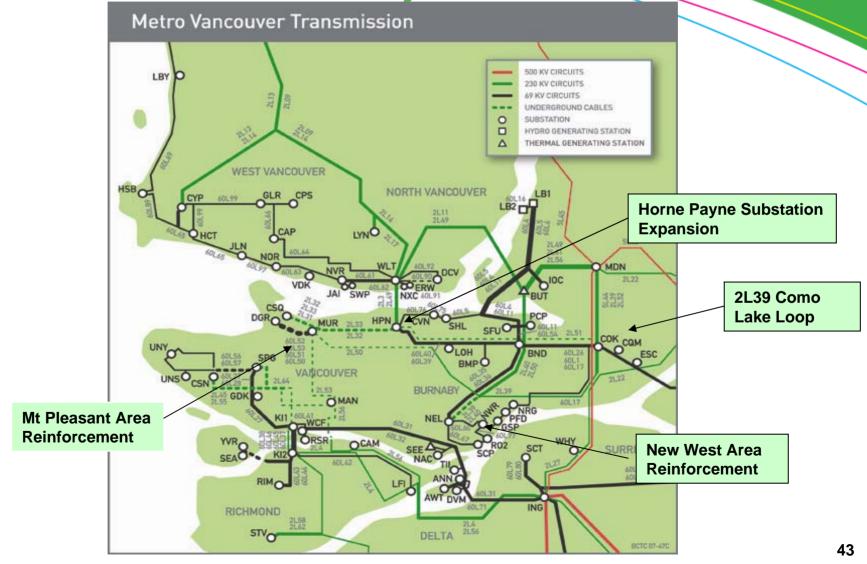
Golden 69 KV Reinforcement

\$ 3 million

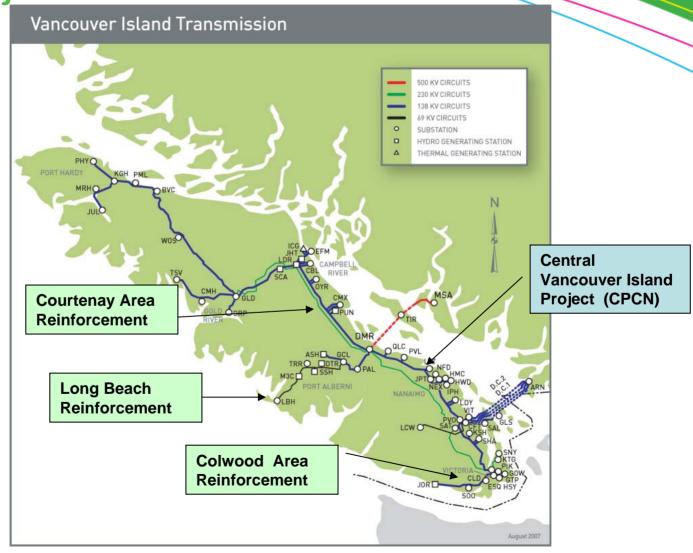
BC Transmission
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Woods Lake Area Reinforcement \$0.5 million

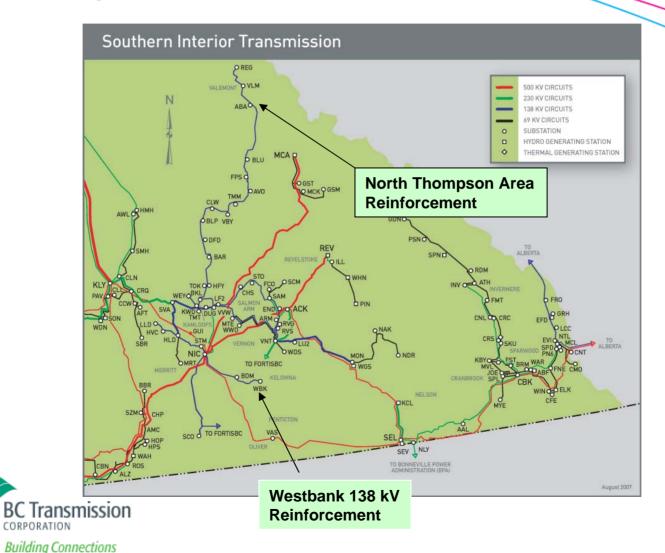
Metro Vancouver Future Projects



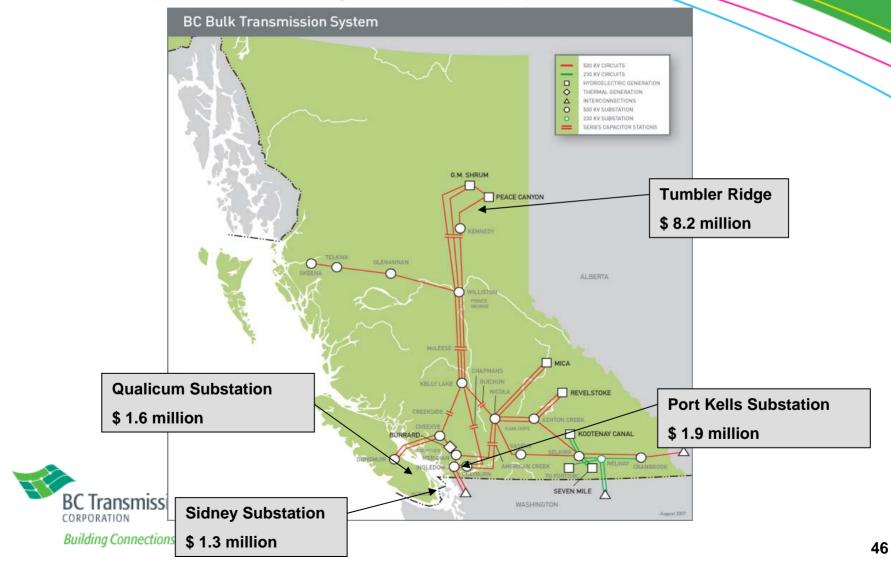
Future Projects Vancouver Island



Future Projects South Interior

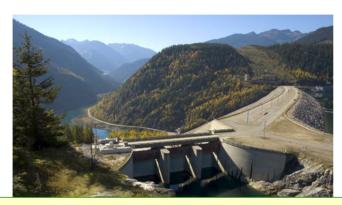


Station Expansion Projects for Approval

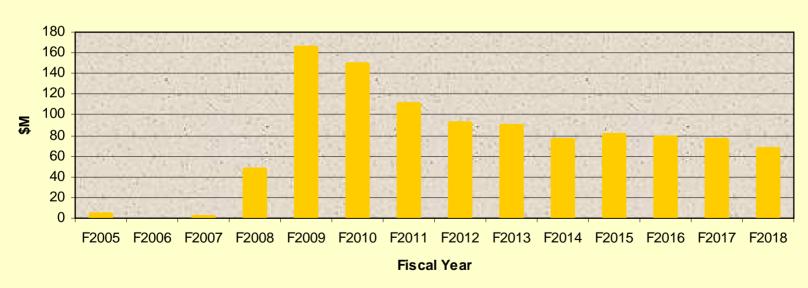


Interconnecting New Generation

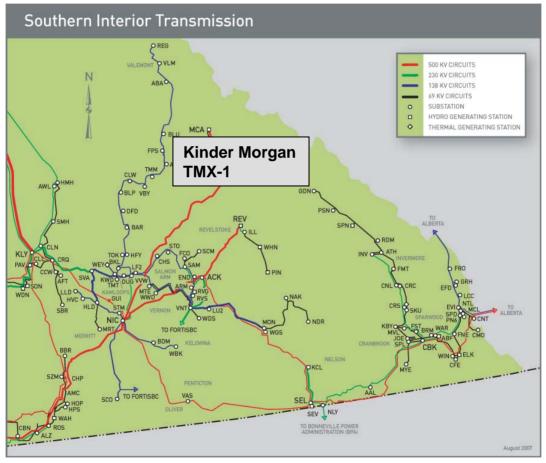








Customer Requested Projects





Projects to avoid Generation Shedding

Ashton Creek 2 x 250 MVAr 500 kV Shunt Capacitors

- Generation shedding considered as a project alternative
- Considerations:
 - Generation shedding is not a preferred alternative to alleviate voltage stability limits after a single contingency due to the amount of real and reactive power lost leading to a less robust transmission system
 - Relies on neighbouring jurisdictions to supply BC's firm load during the period the generation is off-line
 - Does not provide sustained single contingency transfer capability.



Re-dispatch

Definition:

 The reduction of generation in one area and an increase in generation in another to avoid or defer transmission reinforcement

Example of a project that could be deferred through re-dispatch:

Ashton Creek Shunt Capacitors

Re-dispatch in the context of IEP/LTAP/NITS

- Considers wide variety of transmission & generation options to determine a "preferred portfolio"
- Preferred option and dispatch provided1 to BCTC by BCH





Discussion





Sustain Portfolio for Transmission System Capital Plan F2009 to F2018 Capital Plan Workshop

Larry Haffner
Manager
Asset Program Definition
22 January 2008

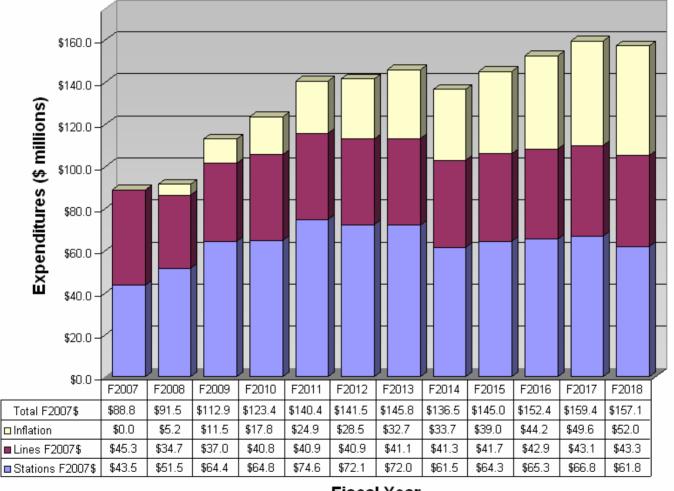


Portfolio Overview

- Includes stations, transmission lines and right-of-way assets
- Focus on maintaining reliability and managing risk
- Key priorities in this Capital Plan include:
 - Circuit Breaker Replacement
 - Risk Mitigation
 - Cathedral Square Fire Suppression
 - Murrin Seismic Stability
 - Overhead line risk mitigation



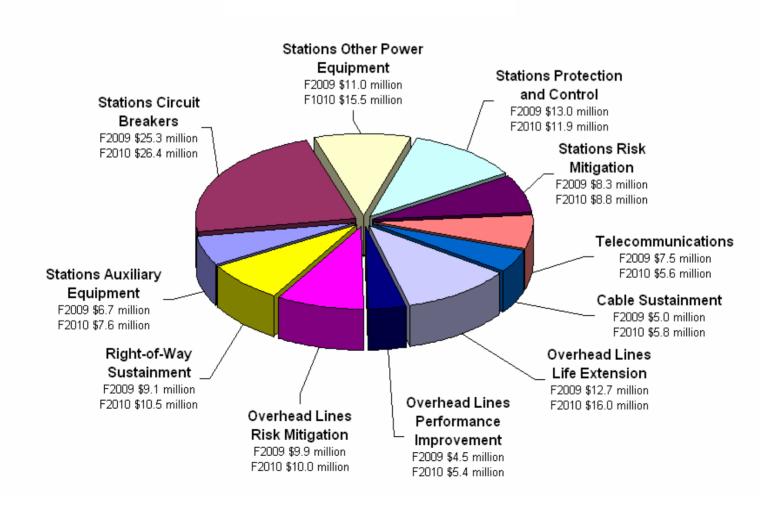
Sustaining Capital Plan Historical Expenditures and Proposed 10-Year Plan (F2009-F2018)



Fiscal Year

Sustaining Capital Portfolio

Distribution of Capital Expenditures by Program Area



Capital Plan - Drivers for Sustain Increases

- Asset demographic: investments required to manage asset end-of-life (e.g. circuit breakers, spacer dampers, corrosion protection for steel towers)
- Vancouver Area Reliability: Murrin substation reconfiguration and seismic upgrade
- Safety & Fire Risk Reduction: Cathedral Square
- <u>Substation Distribution Assets:</u> Asset demographic, safety upgrades and support of BC Hydro DSM programs.



Sustaining Capital Portfolio Explanation of changes in F2009/10 Sustaining Capital Plan

The following capital projects represent the significant increases to the Sustaining Capital Plan in F2009/10:

Project Name	Incremental Capital Increase (\$ millions)		Key issued required to be addressed:	
	F2009	F2010		
500 kV and 230 kV Air-Blast Circuit Breaker Replacement	\$6.0	\$4.5	Increased number of assets at end-of-life condition that need to be replaced by 2014	
Cathedral Square CO2 System Removal and 2L31/32 Line Termination Relocation	\$3.7	\$2.7	 Unacceptable life-safety and system reliability risks related to CO₂ based Fire Suppression System and fire/explosion hazards 	
Protection and Control Replacements	\$2.5	n/a	Replacement of defective substation control equipment (e.g. PLC984 Replacement)	
Chapman's Capacitor Station – Fibre Optic Cable Replacement	\$1.5	n/a	Replacement of fibre optic cable at end-of-life to ensure continued operation of capacitor switching station needed to maintain transmission line rating	
Cable Stop Joint Explosion Protection and Monitoring	\$1.8	\$1.8	Need to mitigate unacceptable fire/explosion risks in stop- joint cable vaults	
Overhead Lines Risk Mitigation – Seismic Withstand	\$1.0	\$1.1	Need to mitigate unacceptable seismic risks on transmission towers	

Objectives

Safety

- BCTC places a high priority on employee, worker & public safety
- Our safety programs are designed to improve safety and remedy situations that could escalate into a serious hazard

System Reliability

- A reliable transmission system is the backbone of the BC economy
- BCTC puts a high priority on projects that ensure a reliable system
- Examples of recent programs include bonding pole top insulators to avoid fires, replace failing circuit breakers to avoid system interruptions, etc



Objectives

Financial

- BCTC designs its sustain programs to minimize rate impacts to customers and avoid sudden and/or unexpected work/expenses
- Use a total life-cycle approach basis to evaluate options such as refurbish vs. replacement
- Example: Chapman Series Capacitor Station Fibre Optic Replacement Project

Environment

- BCTC is committed to minimizing the environmental impact of the transmission system
- Complies with current and emerging environmental standards
- Examples include oil containment, SF6 reduction

BCTC's Asset Management Strategy

- BCTC's Strategic Asset Management strategy:
 - Asset Health Index performance & condition based
 - Industry leading tools & methodologies
 - Closely coordinated with Growth portfolio
 - Continual Improvement



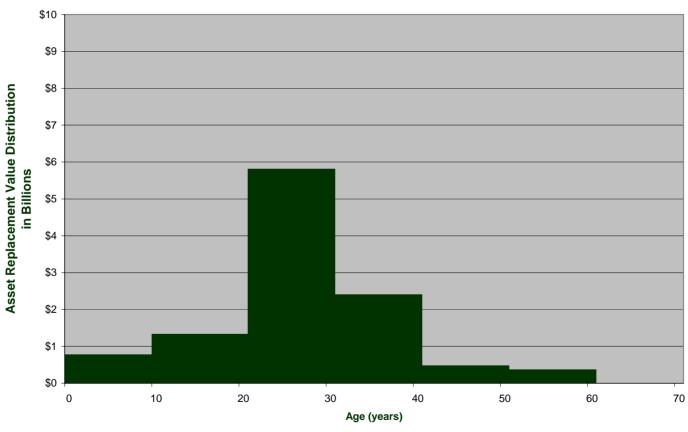


Long-term Sustainment Investment Model

- The average age of the transmission system is approximately 30 years
- BCTC tracks 33 equipment categories and has developed expected life curves for all significant asset classes
- Average life varies significantly for different types of equipment:
 - Batteries: 20 years
 - Underground Transmission Cables: 30 years
 - Circuit Breakers: 40 years
 - Transformers: 70 years
 - Transmission Towers: 90 years
 - Overhead Transmission Conductors: up to 100 years



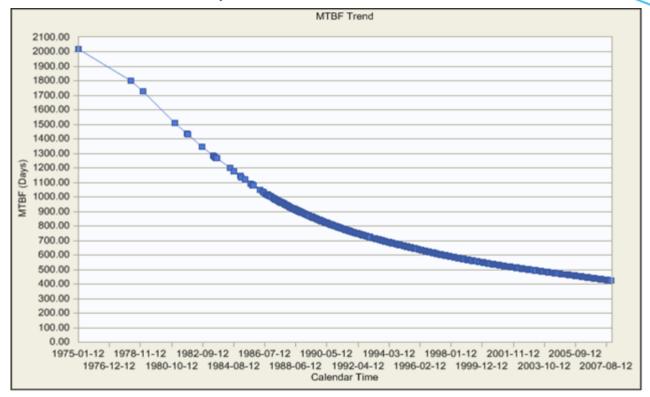
Asset Demographics





Mean-Time-Between-Failure

(All 500kV Circuit Breakers)



Deteriorating asset condition and performance suggest that the current Sustaining Capital funding level is not adequate to ensure the safe, reliable operation of the transmission system.



UMS Study

In 2007, BCTC contracted UMS to evaluate BCTC's Asset Management Strategy

Key findings:

- BCTC's system performance is good and is reflective of solid work being done by BCTC in managing assets and making sound investment decisions
- BCTC has continuously improved upon its Asset Management capabilities



UMS Study – Key Findings (con't)

- BCTC has seen a steady rise in its asset related spending, which suggests that in earlier years... spending may have been below the expected normal range for a comparable transmission system
- It is reasonable to expect BCTC's capital costs will rise at a higher rate than some of its peers who maintained consistent spending levels over the life-cycle of their assets
- BCTC's rate of re-investment is below that of other comparable utility companies i.e. National Grid UK, American Electric Power and Arizona Public Service



UMS Study

Recommendations:

- Continue towards evolution of a "one asset" view
- Develop a strategy and comprehensive plan to address the end of life replacement wave on the horizon
- Improve performance management systems and reporting beyond existing asset performance to include, for example, contractor performance



Risk Management



Purpose: To manage external hazards and risks to the transmission system

- Natural Risks: Seismic, snow creep, ice storms, fire, earthquake
- Operational & Maintenance Risks: Risks associated with equipment performance – e.g. reliability, safety & environmental

Program highlights:

- Station: Cathedral Square Fire Suppression, Murrin Seismic Upgrade, theft prevention
- Transmission Circuits: Seismic, Storm & Ice Mitigation





Sustaining Capital Portfolio

Future Years Capital Program Highlights

The following capital projects represent forecasted significant investments in future years:

- Risk Mitigation
 - Ice hazard reduction
- Circuit Breakers
 - Air-blast Circuit Breaker Replacements (by 2014)
- Cables Sustainment
 - Anticipated future cable refurbishment/replacement
- Overhead Lines Life Extension
 - Spacer-Damper and Insulator Replacements
 - Wood Pole Replacement and Corrosion Protection





Discussion



BCTC Capital Portfolio for Transmission System Capital Plan F2009 to F2018 Capital Plan Workshop

Ebrahim Vaahedi Chief Technology Officer 22 January 2008



BCTC Capital Portfolio

1. Control Centre Technologies

- > Technologies used within control centers
- > Facilities

2. Information Technology

- > Enterprise IT systems
- Business systems

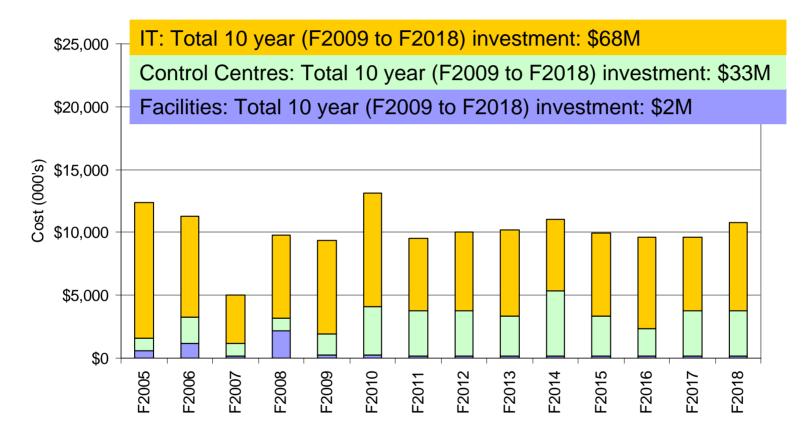
3. Facilities

Head office facilities

BCTC Portfolio consists of 3 major Asset Groups



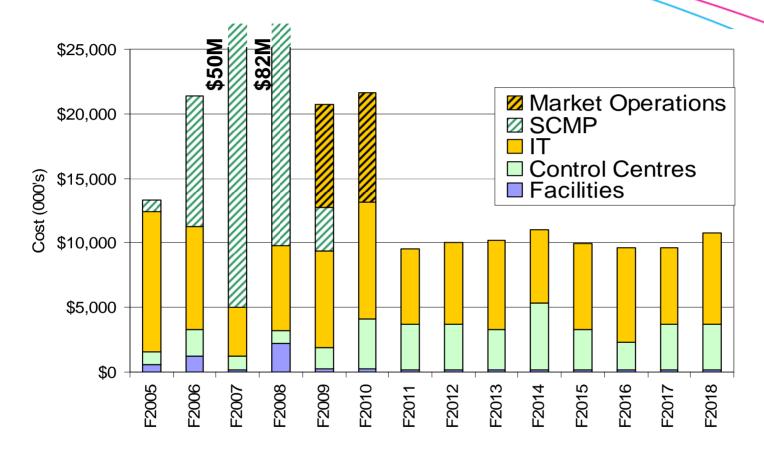
Portfolio Trends





BCTC Portfolio trend is relatively flat

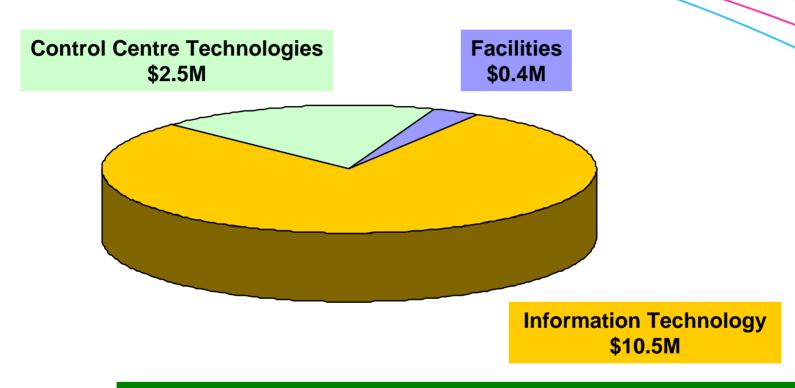
Portfolio Trends





Following the completion of 2 major initiatives, BCTC portfolio is projected to be flat

Projects for Approval

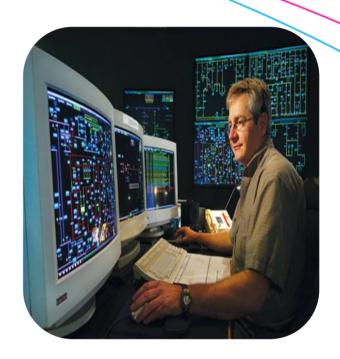


22 projects for approval, totalling \$8.3M in F2009 and \$5M in F2010 (Forecast future approval for another \$8M in F2010)



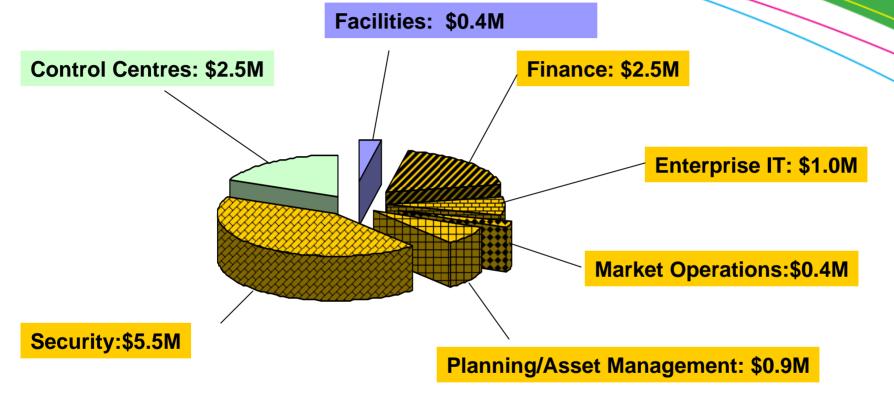
BCTC Capital Drivers

- 1. Increase Efficiency
- 2. Improve Decision Support
- 3. Sustain System Reliability
- 4. Sustain Asset Health
- 5. Improve Customer Relationship
- 6. Ensure Compliance





Projects for Approval



Major investments are in Security, Finance and Control Centre



Responding to the Commission's F2008 Capital Plan Decision

BCTC has investigated options to integrate with BC Hydro's IT system

Corporate Network Segmentation:

After further consultation with BC Hydro, the project is resubmitted. This project aligns with BC Hydro's new initiative to segment their network infrastructure.

Backup Environment Separation

After further discussions with BC Hydro, Backup Environment Separation is submitted as part of the Data Centre Redundancy project leveraging on new system delivered by BC Hydro's Disaster Recovery project which was not available at the time of F2008 submission.

BCTC portfolio addresses the Commission's feedback



Future Projects – Market Operations Business System Upgrade

 Study is underway to establish requirements, procurement options and better estimates of funding requirements for a separate future submission with \$8.0M/\$8.5M in F2009/F2010.



Discussion



Capital Plan Workshop Sign In Sheet

Name	Organization	Signature	Date
LAURIE GRAY	B.C. TRANSMISSION	De-X	JAN 22,2008
PAUL CHOUDHURY		Plhowlhy	Jan 22 2008
DONGILLESPIE	BCTC	Don Killering	i)
D. Stephenson	BCTC	29-85	Jan 22 68
W. KRAMPL	BeTC	phly	Jan. 22/68
Brian Williston	Bcac	Mililiation	Jan 24/2008
Claire Marshall	BCTC	Mondall	Jan 22/08
Jim Quail	BCPIAC	Soil	u u
Hoyd Guenthes	FSI rep JIRSC	The same of the sa	Jan 22, 2008
DAVE NEW /AUS	Eucc	11/165	ZANIZE/68
Lyle McClelland	BC Hydro 1	Minus	u
WAH SHUM	BETC	Naholin	JAN 22, 2008
STEVE DAVIS	IPPBE	Maliens	1/
JIM WEIMER	1PPBC	All Marin	Jan 22/08
GINETTE HANDFIED	BCTC	g. Handfuld	//
DOUG POBINSON	POWEREX	On O.	((
GORDON DOBSON - MAC	c Powersy	Bushy	u.
GILEN TANG	Powerex	Alen Jany	A
BRIAN WALLACE		XBhbll.	El
Jim Ko	BCTC	Ollo	11
JOHN PRVINE	BC HYDRO	All	η
ELROY SWITLISHOFF		The state of the s	/1
Gerry Garnett	Gerry Garnet Consulting	6 Carnet	11
SANOY CARPLANER	Fasken Mutineau		"
Ebrahim Voahed	BCTC	OZ MINIO)	11
L. Haffner	BCTC	for Haff	U
Randy Bourne	BC7C	Defourne	22 Jan 2008
J. Rich	RCH	LIKE	((
ATAY KUMAR	BCTC	() Brown	à
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