

# **BC Hydro Power Smart Partners Transmission Industrial Program**

An Energy Management program for  
BC's Industrial Sector

Consortium of Energy Efficiency, June 4th, 2009

Alex Adams, Power Smart Industrial Marketing

# Outline



- A. Introduction to your organization and Industrial Program
- B. Describe Program support for O&M Measures and Energy Management
- C. How have you approached evaluating these aspects of your industrial program?
- D. What are some of the unique challenges you have faced measuring progress and outcomes from these programs and how you overcome them?
- E. Please comment on any observations and lessons learned in this area

# BC Hydro Business Overview



## WE MAKE ELECTRICITY

**90%** Hydro = 10,200MW

**10%** Thermal = 1,090 MW



## WE BUY ELECTRICITY

- Independent Power Producers
- Electricity markets
- Customers




## WE MOVE ELECTRICITY

**74,000 km** of Distribution and Transmission lines

**AND...**

# BC Hydro Business Overview



It's amazing what you hear  
when you take the time to  
listen.

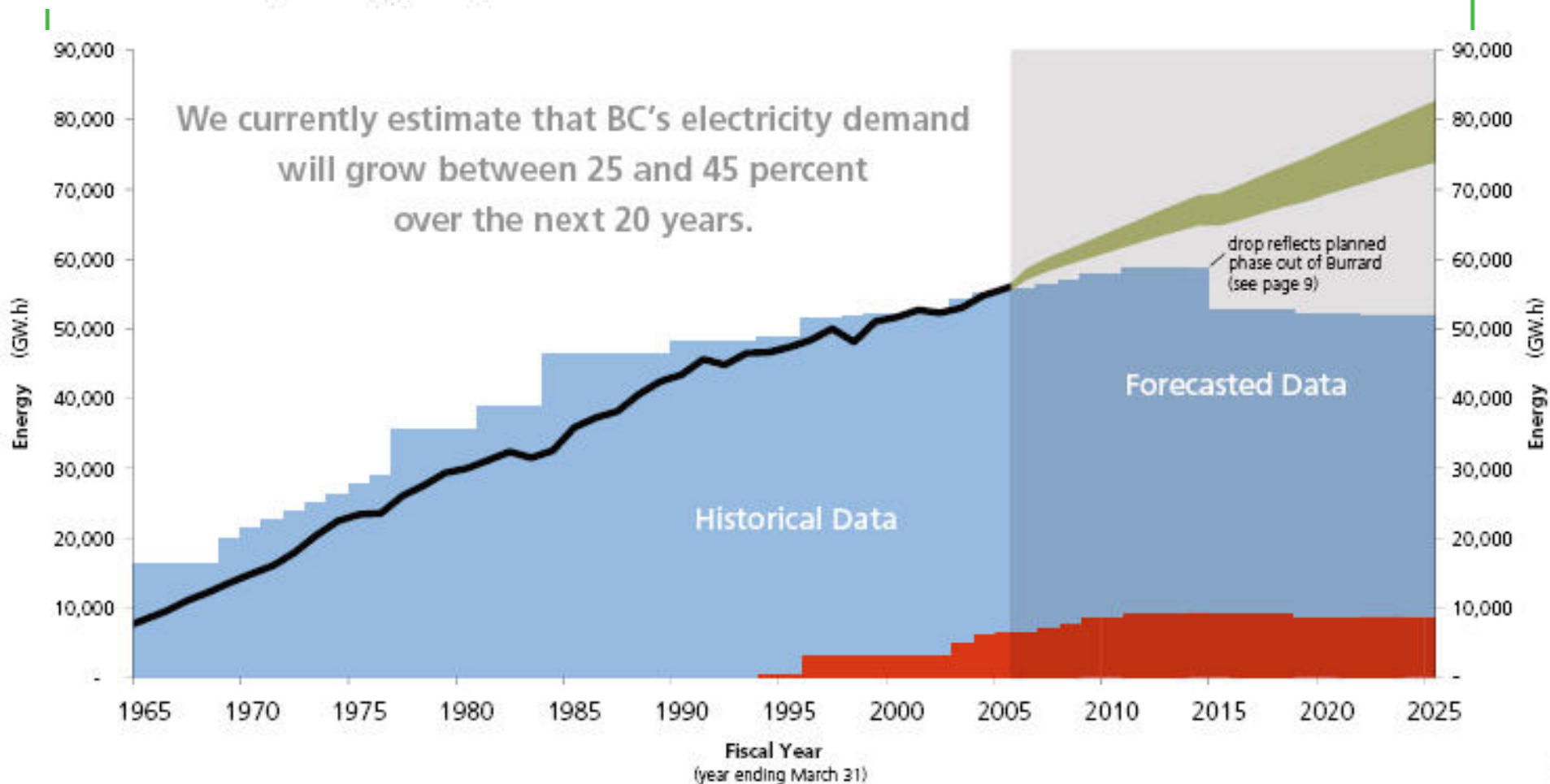
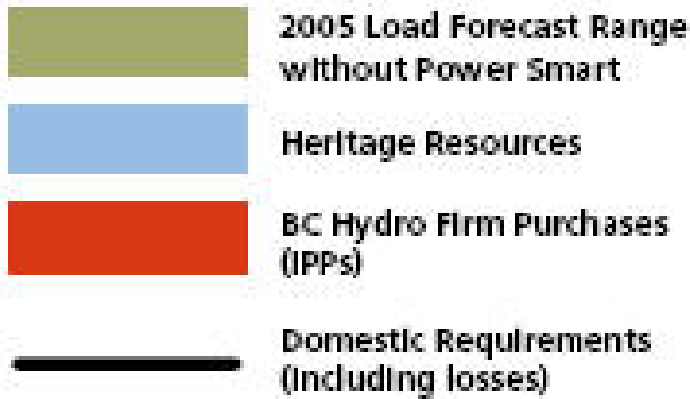
## WE SELL ELECTRICITY

- Residential
- Commercial
- Industrial
- Market/Trade

Domestic Energy Sales	\$M	%	GWh	%	\$/MWh
Residential	1,046	39%	16,261	31%	64
Light industrial + commercial	989	36%	17,913	34%	55
Large industrial	584	22%	16,428	31%	36
Other energy sales	91	3%	1,838	4%	50
<b>Total</b>	<b>2,710</b>		<b>52,440</b>		<b>52</b>

# Forecast Energy Gap

BC Hydro  powersmart



# Conservation Rate

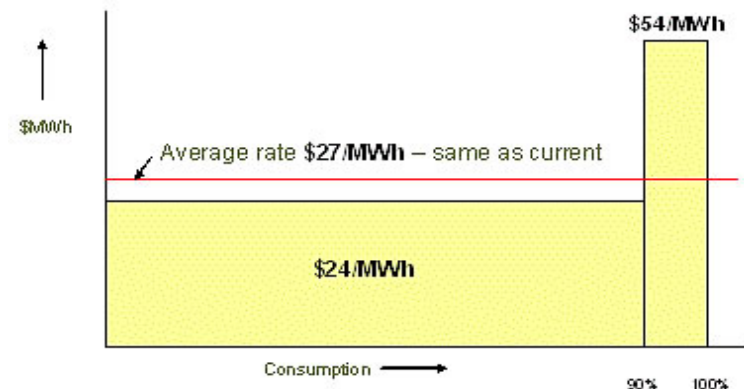
Enables – behavioural, projects, SG



- Conservation Rate, Inverted Block pricing model – implemented as of April 1<sup>st</sup>, 2006 (aka Stepped Rates)

- Balance between revenue loss  
DSM rate of return
- Incentive built into rate

## Stepped Rates – The Concept



- What it means to customer:

- 10% of Customer Base Line (CBL) priced at \$73.60/MWh
- 90% of CBL priced at \$24/MWh
- Do nothing or blended rate is ~\$30/MWh
- Incentives available at \$20/MWh for hard-wired projects

# THE PSP-T PROGRAM



## Industrial Programs

**PSP-T**

Alex Adams

**PSP- D**

Eddie Young

**NPD**

Steve Quon

Power Smart Partners

# THE PSP-T PROGRAM



- Continuous Improvement model for Industrial Energy Management
- Focused on moving customers “to the right” of the energy management continuum
- Designed to support the Transmission Service Rate



# What is energy management?



## Five Prevailing Industrial Strategies\*:

- ❖ DO NOTHING
- ❖ PRICE-SHOP FOR FUEL
- ❖ OCCASIONAL, LOW-BUDGET PROJECTS
- ❖ LARGE, CAPITAL PROJECTS
- ❖ CONTINUOUS ENERGY IMPROVEMENT

\**Energy Pathfinding*, Chris Russell

# ANSI MSE 2000/2005



**MANAGERIAL**

**PLAN:**

- Policy/goals/targets
- Resources

**DO:**

- Training
- Communication
- Control Energy Services

**CHECK:**

- Corrective/ Preventive Action
- Internal Audits

**ACT:**

- Management Review



**TECHNICAL**

**PLAN:**

- Energy Data Management
- Assessments

**DO:**

- Energy Purchasing
- Projects

**CHECK:**

- M & V

**ACT:**

- Process Control

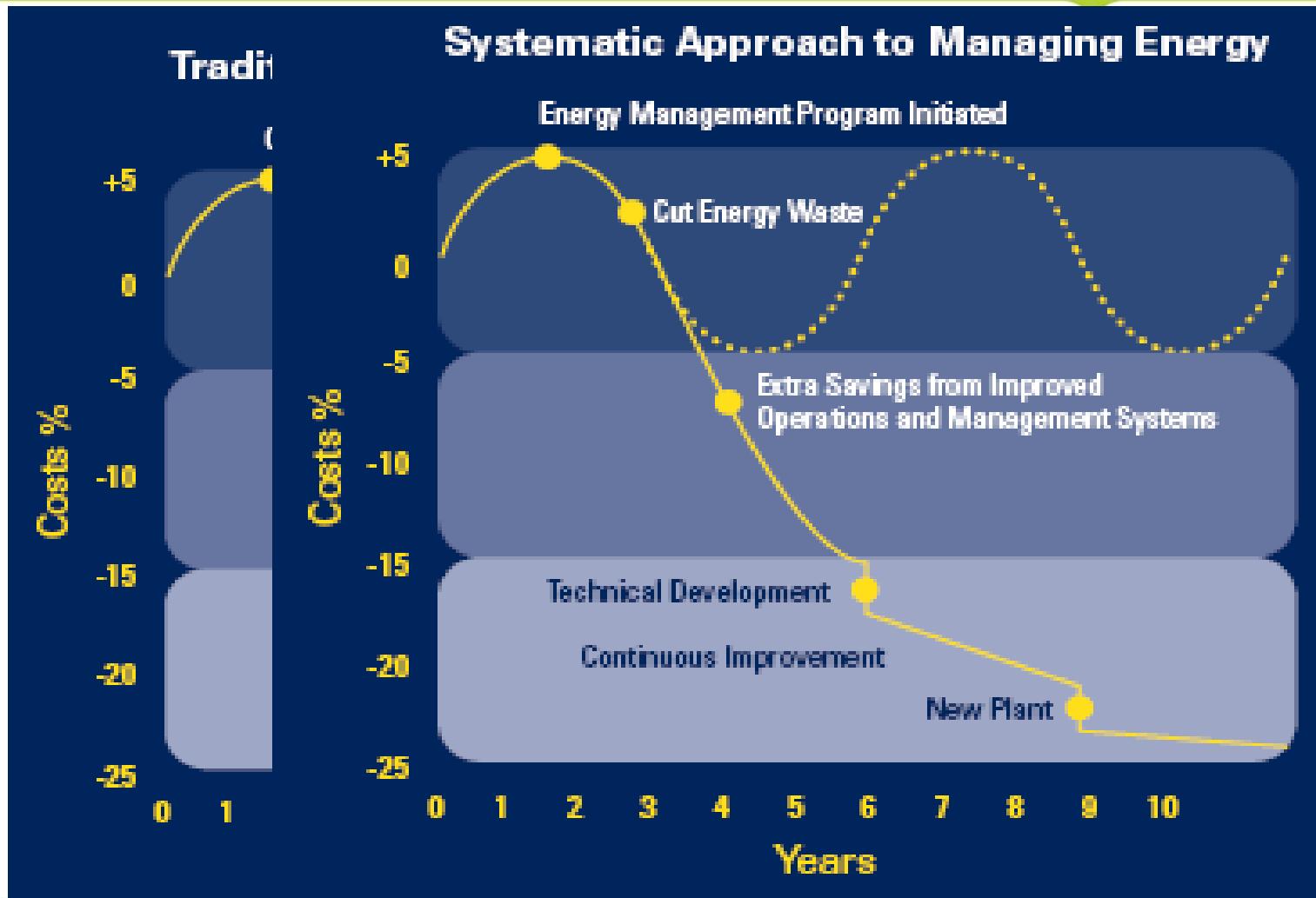
*\*Courtesy of Bill Meffert, Georgia Tech*

# What is a Sustainable Energy Management Program?

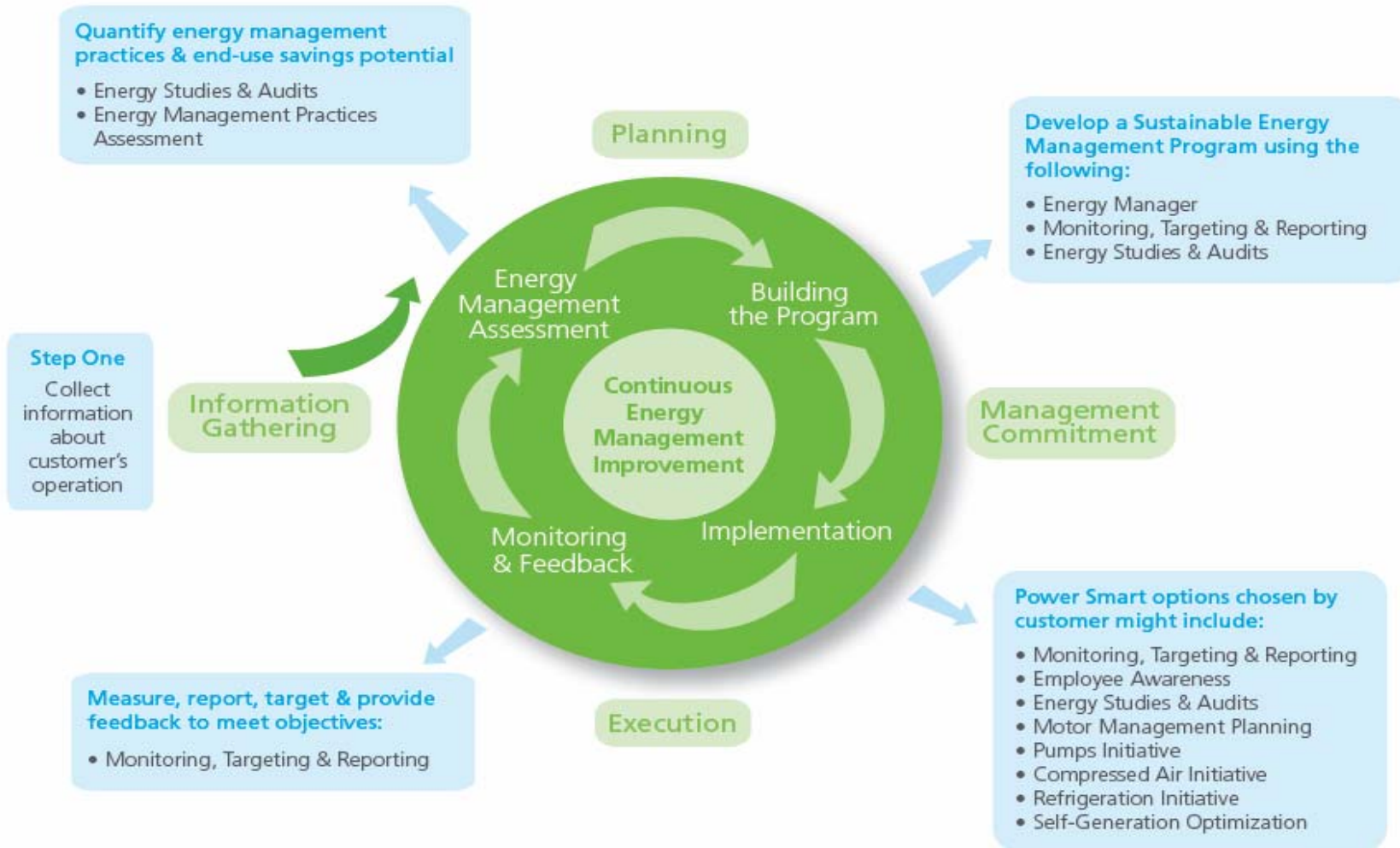
BC Hydro  
powersmart



# Benefits of Continuous Improvement



# Energy Management & Continuous Improvement



# PSP-T Business Case

## Metrics Used to track performance



KPI Status	Measure	Target (Business Case)	Actual	
			w/o Generation	w/ Generation
Energy Savings exceeded	GWh	163	222	650
Under Budget	Program Spending (\$M)	11.4	6.0	
Cost Effectiveness under	Utility Test – Levelized Cost (cents per kWh)	1.1	2.0	1.5
	Utility Test – NPV (\$M)	58.8	0.5*	0.2*
			110.0	259.3

# Program Support for O&M Measures that qualify



- Program support exists for:
  - Energy Management Assessments
  - Energy Manager
  - SEMP
  - Employee Awareness
  - Monitoring, Targeting and Reporting
  - Workshops and Training

# Measures that qualify



- Technology based
  - End-use performance related (ie lighting, compressors, pumps, TG, etc)
- Transformational
  - Production scheduling (ie sprint), purchasing strategy, engineering design

# Approach to evaluating behavioural aspects of industrial program



- What kinds of evaluations have you undertaken (process, formative or baseline in support of later impacts/outcomes evaluation, completed impacts/outcomes evaluation)?
  - ‘Dr. Reed’ Qualitative Evaluation Completed
  - TSR Year 2 and Year 3 Evaluations Year 2 done, Year 3 IP
  - PSP-T Evaluation IP due July 2009
  - Transmission Self-Gen IP due Dec 2009
- What has been your experience evaluating the program (from whatever kind of perspective(s) they’ve taken ?)
  - Separating Rate impacts and behavioural program impacts is difficult
  - Market Transformation contribution small component (15 of 302 GWh/yr)
  - ‘Enabler’ initiatives evaluated together as a bundle
- What has been your experience assessing energy savings and persistence of savings?
  - Behavioural savings given a 1 year persistence
  - ECM must be identified & measurement required

# Challenges to measuring progress and outcomes



- What challenges exist:
  - Challenge is availability of performance measurement data:
    - At 'low' enough level for accuracy
    - Availability of baseline data (pre ECM)
    - Lack of modelling to remove competing factors
- What appears to be working:
  - Requirement for specification of ECM
  - Program supported Monitoring, Targeting and Reporting
  - Training:
    - Technology specific behaviours
    - Employee Awareness program development

# Observations and lessons learned



- How might program designs need to change to accommodate O&M and energy management and evaluation approaches to support related progress & impacts/outcomes measurement?
  - Program design changes to accommodate both Energy Management and Technical approaches
  - Program support for Measurement and Verification (meters, training)
  - Post ECM persistence renewal (site visit, audit, meter)
- What are your plans going forward – program planning that builds on lessons learned?
  - Enhance the Employee Awareness Program to embed MT&R
  - Self-generator metering
  - Enhance KAM claiming process for Behavioural type savings (ECM, data, customer commitment)
  - Persistence renewal function
  - Adapt other sector/jurisdiction learnings to Industrial

# Conclusion



Please forward questions to:

Alex Adams

Industrial Program Manager

BC Hydro Power Smart

604-809-7116

[Alex.Adams@BCHydro.com](mailto:Alex.Adams@BCHydro.com)

# BC Energy Plan Policy Actions – A High Level View

BC Hydro   
powersmart

## BC Energy Plan – Key Strategies

1. Conserve more



2. Buy more



3. Build more



# Program Development

## 1. Conceptual Design



Based on the spectrum of energy management in the marketplace, offer two tiers of the program:

- Enabler stream, a la carte
- Sustainable Energy Management Program (SEMP), integrated
- Provide energy management enabler support at all phases of sustainable energy management

# Detailed PS Partners –

## 3. Transmission Detailed design



- Industrial Energy Manager initiative
  - Sustainable Energy Management Plan embedded within IEM as a deliverable (AEE Sustainable Energy Management Plan)
  - Scope of Work – used to build customized to customer energy management program
  - Screening: segmentation based on Customer Situation Assessment (CSA), based on Chris Russel, *Energy Pathfinding*

# How is SEMP stream eligibility determined?

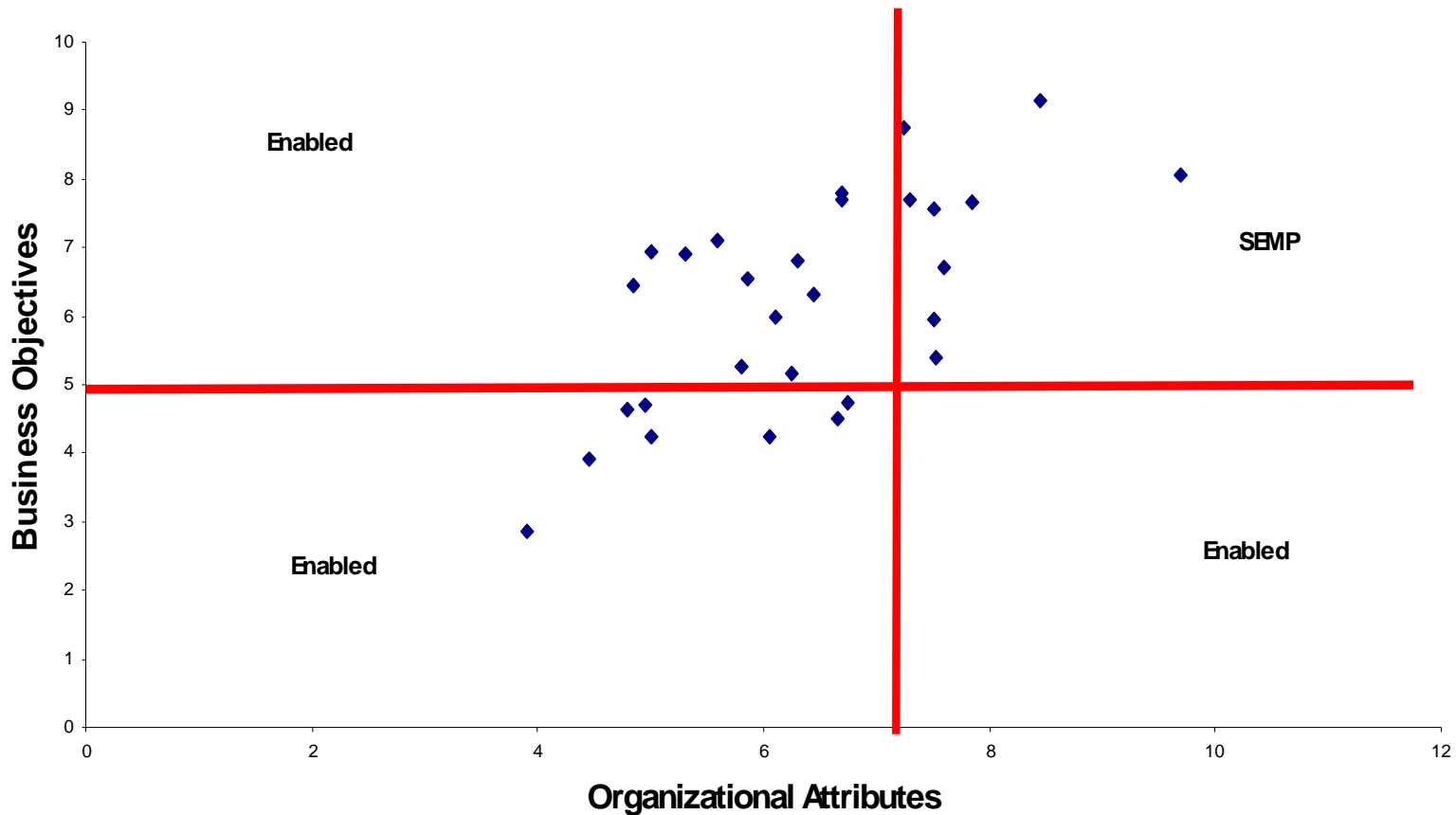


- Assessment of a customer's Organizational Attributes and Business Objectives:
  - A high Organizational Attribute score indicates that the customer is well positioned to implement a sophisticated Energy Management Program.
  - A high Business Objective score indicates that a customer has business objectives which are very much in line with the objectives of an energy management program.

# CSA Results



### Customer Situation Assessment - SEMP Selection



# Target CSA Customers



<b>Customer</b>	<b>Organizational Attribute Score</b>	<b>Business Objective Score</b>	<b>Rank</b>
Toyota CAPTIN	9.70	8.05	1
Taylor NGL	8.45	9.15	2
Graymont	7.25	8.75	3
Husky	7.85	7.65	4
Lafarge	7.50	7.55	5
Catalyst	7.30	7.70	6
Gibraltar Mines	6.70	7.80	7
Howe Sound P&P	6.70	7.70	8
Highland Valley Copper	7.60	6.70	9

# Final Ranking for SEMP



Parent Company Name	Company Total Identified Potential [kWh]	Rank	Company Total Identified Potential less Steam Cycle Improvement [kWh]	Rank	Company Total 2005 Purchased Electricity [kWh]	Rank	CSA Rank	Weighted Rank w/ SGO	Weighted Rank	Overall Rank
Catalyst Paper Corporation	657,048,015	1	387,367,015	1	4,566,100,221	1	6	3.00	3.00	1
West Fraser Timber Co Ltd - Pulp Mills	323,756,178	3	94,256,178	2	1,440,813,316	2	21	10.00	9.60	6
Highland Valley Copper	16,876,817	11	16,876,817	8	972,932,182	3	9	8.60	7.40	4
Howe Sound Pulp And Paper Ltd	97,056,746	5	89,756,746	3	676,332,671	4	8	6.00	5.20	2
Fording Coal Ltd	7,413,910	13	7,413,910	10	487,138,565	5	28	17.40	16.20	21
Canfor Taylor	33,668,177	8	16,668,177	9	451,458,712	6	16	10.80	11.20	9
Canfor Pulp Group	419,238,475	2	28,652,255	6	314,649,910	7	11	6.60	8.20	3
West Fraser Timber Co Ltd - Solid Woods	44,220,151	6	44,220,151	4	290,148,771	8	22	12.80	12.00	11
Canfor Solid Woods	40,547,314	7	40,547,314	5	272,516,182	9	23	13.80	13.00	12
Huckleberry Mines Ltd	5,245,829	15	5,245,829	12	228,679,703	10	24	17.60	16.40	20
Thompson Creek Mining Limited	4,661,071	18	4,661,071	16	192,752,560	11	13	14.60	13.80	13
Taylor NGL Partnership Limited	5,038,902	16	5,038,902	14	186,963,577	12	2	9.60	8.80	5
Imperial Metals Corporation	45,412	29	45,412	29	182,735,769	13	20	22.20	22.20	26
Taseko Mines	241,459	28	241,459	28	182,081,462	14	7	16.80	16.80	17

# CSA and SEMP



	ENABLER	SEMP
Howe Sound	✓	
Highland Valley Copper	✓	
West Fraser (QRP, Cariboo, Eurocan)	✓	
Catalyst		✓
Canfor Taylor		✓
Domtar Kamloops		✓

# Program Implementation



- Industrial Energy Manager
  - Scope of Work
  - Energy Management Team (EMT)
  - SEMP
  - Quarterly Reporting
  - Other initiatives
- Sales force
  - KAM's: trained in the program and in Continuous Energy Management
  - Association IEM's: Program Manager
  - Consortium IEM's: Program Manager

# The IEM with SEMP program features and options



- Scope of Work vs a fixed form
- Options related to:
  - Duration (1 yr, +6mth, to 2 yrs)
  - Energy Manager program content
  - Addition of:
    - SEMP workshop
    - Energy Management Assessment
    - Audits, Studies
    - MTR, etc, etc
    - Employee awareness
  - Contracting relationship
  - Reporting format (monthly vs quarterly)
  - IEM offer (standard vs SEMP)

Power Smart Industrial Energy Manager Scope of Work  
Industrial Energy Manager Initiative with  
Sustainable Energy Management Program (SEMP)

Energy Manager Start Date:		
Energy Manager Term:		<input type="radio"/> 12 months <input type="radio"/> 18 months <input type="radio"/> 24 months
<b>REPORT SUBMISSION DATES</b>		
Quarterly Summary Reports:		
<input type="radio"/> 1 <sup>st</sup> Summary Report Submission date:		hrs
<input type="radio"/> Quarterly Summary Reports:		hrs
<input type="radio"/> 1 <sup>st</sup> Monthly Scorecard Submission date: <small>(and continuing on one-month intervals)</small>		hrs
Sustainable Energy Management Program (SEMP) workshop scheduling date:		
<input type="radio"/> SEMP Plan submission date:		hrs
<b>ENERGY MANAGER PROGRAM DETAIL</b>		
<b>Electrical Energy Consumption</b> <small>(For multiple sites, show break-out on separate sheet)</small>	Annual (last 12 months) self-generated electricity (MWh):	MWh
	Annual (last 12 months) purchased electricity (MWh):	MWh
	Total annual electrical energy consumption (MWh):	MWh
Information required to be gathered by Energy Manager <small>(should include: consumption data, production data, KPI, benchmarking, load profiles, previous audits, preventative maintenance records, awareness programs, employee energy performance incentives and training records):</small>		hrs
Date of most recent energy management assessment conducted (Corporate wide or plant specific):		
Proposed timing of energy audit or study (if applicable):		
Assessments to be conducted by Energy Manager (energy management practices auditing):		
Proposed timing for new energy management assessment (One-2-Five, Carbon Trust) (if applicable):		
Date of most recent plant wide energy audit or study conducted (plant wide or specific):		
Proposed timing for new energy audit or study (if applicable):		

# SEMP Delivery



- Conducted by an Energy Management Team formed from BC Hydro employees to enable SEMP for you
- Customized BCH info:
  - SEMP overview & offer
  - Tier 2 potential
  - End-use potential
  - Consumption history
  - Power Smart history



# Success in Implementation

BC Hydro   
powersmart

**Canadian Forest Products Ltd.**



**Taylor Pulp**

## Sustainable Energy Management Policy

Canadian Forest Products Ltd. - Taylor Pulp, recognizes that consumption of energy is a controllable expense where continuous improvement results in

**Our organization is committed to:**

- **A Sustainable Energy Management Plan (SEMP)**

- Providing and maintaining an Energy System Manual outlining responsibilities for each part of the management system. The Energy Management Representative will be responsible for the Energy System Manual.
- Establishing annual objectives for energy reduction and providing procedures and strategies to meet these objectives through operating and maintenance initiatives.



*T. Bradford*

**Terry Bradford**  
Divisional Manager  
March 24, 2008

# Energy Manager Duties



## **APPENDIX 2.a. ENERGY MANAGER DUTIES**

- In connection with the identification, reporting, and implementation of energy saving opportunities, the minimum duties of the Energy Manager (EM) are expressed below.

- SEMP Workshop – Coordinate a SEMP workshop conducted by a suitable consultant at the Partner's facility and acquire the attendance of the Partner's appropriate personnel.

- Energy Tracking & Monitoring - Provide a database and an energy tracking and monitoring system for each facility / process that captures current monthly energy consumption. The EM will develop and deliver training to the Applicant's staff on the energy tracking and monitoring system.

Primary Assessment – Review existing energy study reports and perform a high-level assessment, including a walk through audit of each major process area of each site, to identify energy saving opportunities and to identify which systems will require more detailed evaluations.

Maintenance and Operating Schedules - Review and provide a description of the control systems, operating schedules, and maintenance practices at each facility / process to identify operational savings. Develop maintenance practices and programs to enhance energy efficiency. Examples would include: reprogramming controls to shutdown equipment and lighting when not required, developing a checklist to ensure that all shutdown procedures are properly implemented and followed.

- Energy Saving Opportunities & Action Plan - Identify, assess, prioritize and recommend to Partner / senior management energy-saving opportunity projects including both capital improvement projects and operational and maintenance changes. This will include the preparation of business cases to justify capital expenditure and the completion of applications to BC Hydro Power Smart Programs and to other agencies to maximize funding available for energy-saving projects.

# Energy Manager Duties (cont'd)



- Project Implementation & Electrical Energy Savings – Coordinate the implementation of energy-saving projects, including the planning, budgeting, and scheduling for the design, installation, commissioning, and verification of energy efficiency projects. It is expected that a project manager (not the EM) would be assigned for large capital projects.
- Measurement & Verification Strategy – Work with Partner to develop a strategy for the Measurement & Verification of energy-saving projects at a corporate level (i.e. not involved at project level).
- Energy Management Behaviour and Business Process Improvements – Work to create and foster a sustainable energy management culture at the Partner's facilities and provide an avenue for employees to recognize and report issues and ideas regarding energy conservation and efficiency.
- Employee Awareness Program - Implement an employee training and awareness program to promote energy conservation and communicate the energy efficiency initiatives undertaken.

Assistance to BC Hydro Power Smart Projects – Coordinate and assist with site inspections by BC Hydro from time to time of the various measures implemented at BC Hydro's sole discretion. Collect relevant information regarding additional electrical energy use (equipment purchases, schedule changes, occupancy changes, construction) to assist with base year adjustment issues to BC Hydro.

- SEMP Report – Develop the SEMP report by completing the necessary duties from those described above and by adhering to the minimum requirements of appendix 2.b.