

Sustainable Energy Management

An emerging practice

A BCIT SEMAC alumni perspective

Agenda

1. Introduction:

- Who we are
- What is SEM
- Context video clip
- Greenwashing

2. Technical Courses:

- Course Reviews
- Panel Discussion

3. Business Courses:

- Course Reviews
- Panel Discussion

4. Conclusions and Questions:

- Context
- Art of Sustainability

SECTION

1

INTRO

Jay

- Consum • er
- Consum • a • holic
 - Must consume to survive
- Lo • Fi Energy Geek
 - The art of energy efficiency via simplicity

Blake

- Digital Arts Diploma from The Art Institute of Burnaby
- Insurance industry background
- Interested in Renewable Energy and Zero Point Energy
 - Prototype HHO generator, drafted designs for VAWT
- I am the possibility of Love for the Planet

Andrea

Alberta → Montreal → Vancouver

Alternative Energy → Demand Side Management

FYI - Disclaimer

- We are here to share our experience and expertise, to help demystify energy management!
- We do not represent BCIT
- We do not represent BC Hydro
- There are areas which official representatives from BCIT or BC Hydro can better address questions or concerns.

About this talk

- BCIT- SEMAC Course
- Why we chose SEMAC to explain Energy Management
- Buzz/Jargon word use WARNING!

Why SEM ~ Purpose (Jay)

- Sustainable
 - Enviro
 - Energy
 - Life
- Positive Action

Context ~ Sustainability

- Ponder: What is Greenwashing ?
- [TED.com ~ Beau Lotto ~ Context](#)
 - Desert video clip ~ 1 min (5m24 - 6m38)

Context ~ Greenwashing

One definition:

- 1. Branding or draping yourself in “green”
- 2. Brain-washing customers and employees

3 R's: A sustainable path

- 3 R's: In environmentally sustainable order
 - 1. Reduce
 - 2. Reuse
 - 3. Recycle
- Pervert that order, and you likely have an environmentally **unsustainable path**

Popular beverage brand

- Make your own conclusions...



Context

- Sustainable Energy Management is the story of **continuously** improving energy efficiency, for a **sustainable environment**, and a **profitable bottom line**.
- Now, let's break it down in to the **contexts** of the 9 BCIT courses...

SECTION

2

TECHNICAL COURSES

2009 SEMAC Program Content

Technical (Tek):

- 1101 EB: Energy Basics (Blake)
- 1102 BS: Building Systems (Blake)
- 2101 CS: Codes and Standards (Blake)
- 2102 Op: Operations (Andrea)
- 3101 EA: Energy Auditing (Andrea)

Business (Biz):

- 3102 CM: Change Management (Jay)
- 4101 SM: Strategic Management (Jay)
- 4102 DM: Decision Making (Andrea)
- 4103 PM: Project Management (Andrea)

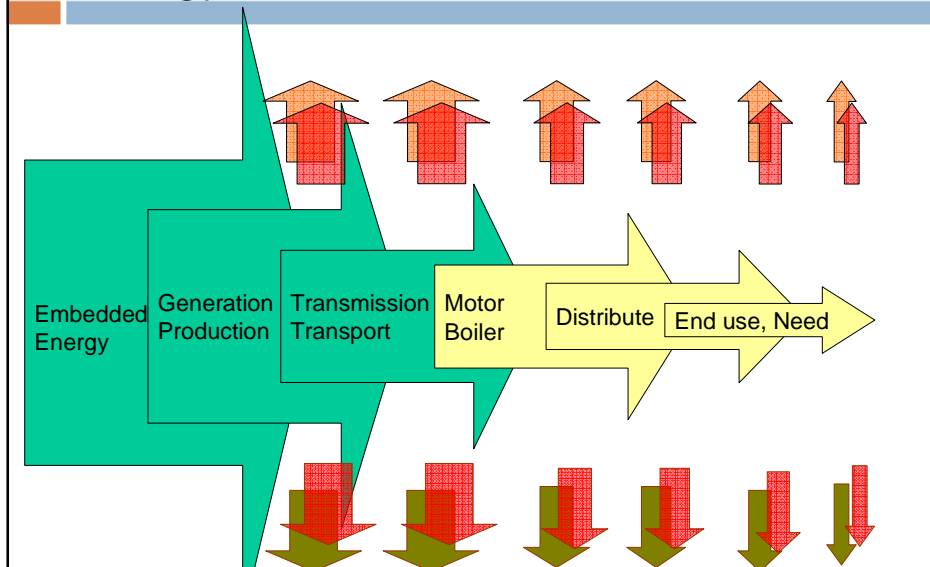
Tek: 1101~ Energy Basics

- **Electricity Basics**
 - Power, Voltage, Current, Demand, AC/DC
- **Units of Energy and conversions**
 - Joules, BTU, kWh, Tons
- **Units of Power and conversions**
 - kW, BTU/h, HP

Tek: 1101~ Energy Basics

- **Importance of workplace comfort**
 - Temperature, Humidity, Ventilation, Sunlight
- **Importance of measuring**
 - Can't save what you don't measure
 - How to read a meter, how to read a utility bill
- **Importance of demand side management**
 - Upstream affect on supply side
 - System wide efficiency

Energy Losses & Emissions



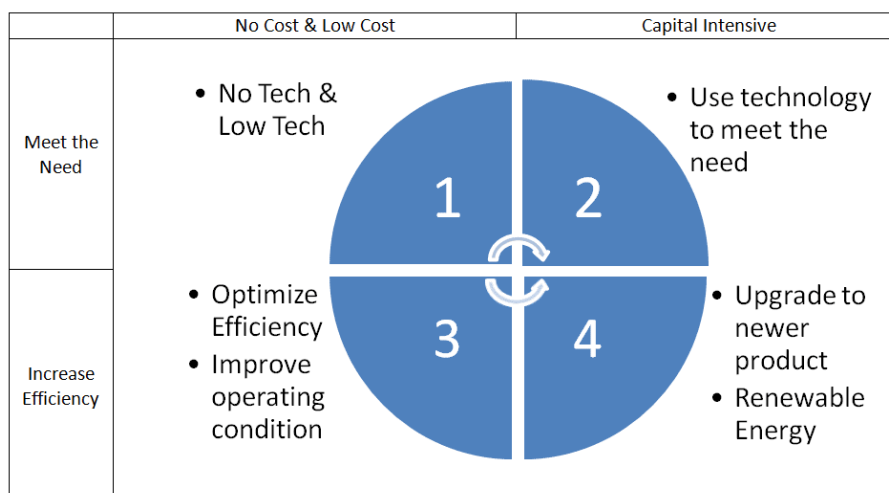
Tek: 1101~ Energy Basics

- What is “sustainable”?
- Applications for Renewable Energy
 - Pros/Cons
- BC Hydro Net-Metering/Distributed Generation
 - Feed-in tariffs
- When to use Renewable Energy

Tek: 1102~ Building Systems

- **Direct Digital Control (DDC)**
 - Automated building control software
 - Combination of input/outputs, digital and analog
- Heating, Ventilation, Air Conditioning, Refrigeration
- Variable Air Volume, Constant Air Volume
 - Pros/Cons
- Heat Pumps, Heat Exchangers, Chillers

Tek: 1102~ Building Systems



Tek: 1102~ Building Systems

- Future of automated building system tech
 - Wireless sensors, dampers
 - Zigbee
 - Open source vs. proprietary
- High Performance Buildings
 - U value, R value, What makes them special
 - New tech and low tech ways to improve energy use.

Tek: 2101~ Codes & Standards

- History & Purpose of Energy Conservation
- Timeline of the Model National Energy Code of Canada
 - Pre 1990, 1992, 1997, 2012
- Timeline of the BC Building Code
 - Pre 2008, 2008 xref ASHRAE 90.1-2004
- Timeline of the ASHRAE standard
- Timeline of the Vancouver City Building Bylaw
 - Pre 1991, 1991, 2008

Tek: 2101~ Codes and Standards

- Structure of the National Model Energy Code of Canada
 - Part (Part 1)
 - Section (Section 1.2)
 - Sub-section (Sub-section 1.2.3)
 - Articles (Article 1.2.3.4)
 - Sentence (Sentence 1.2.3.4.(5))
 - Clause (Clause 1.2.3.4.(5).(f))
 - Sub-clause (Sub-clause 1.2.3.4.(5).(f).(vii))
- Requirement Structure of the NMEC of Canada
 - Section x.1 = General Requirement
 - Section x.2 = Mandatory Requirement
 - Section x.3 = Prescriptive Requirement
 - Section x.4 = Alternate Requirement (Energy Modeling)

Tek: 2102~ Operations

- Facility Management
 - Building Systems Operations
 - Policy, Procedure, Controls & Automation
 - Building Systems Maintenance
 - Preventative, Predictive
 - Maintenance methods
 - Monitoring On-Going Performance
 - Key Performance Indicators
 - Protocols for inefficient equipment

Note from: CESA 2101 Operations Course, Mark Roozbahani

Tek: 2102~ Operations

- Facility Management
 - Building Use Issues
 - Consistent and quality power
 - After hours use & cleaning
 - Scheduling
 - Tennant/Landlord (Include in lease)

Note from: CESA 2101 Operations Course, Mark Roozbahani

Tek: 2102~ Operations

- Business Management
 - Transportation
 - Procurement
 - Waste Management
 - Water Management

Note from: CESA 2101 Operations Course, Mark Roozbahani

Tek: 3101~ Energy Auditing

- Audit types:
 - BC Hydro Opportunity Assessment
 - ASHRAE Level 1,2,3
 - Behavioural Walk-Thru (Very Broad Photos)
 - System Walk-Thru (Very Broad)
 - Energy Study (Broad)
 - Engineering / Investment Study (Specific)
 - BC Hydro / HATCH One-to-Five

Tek: 3101~ Energy Auditing

What is an energy audit?

How to get one done?

How to evaluate one?



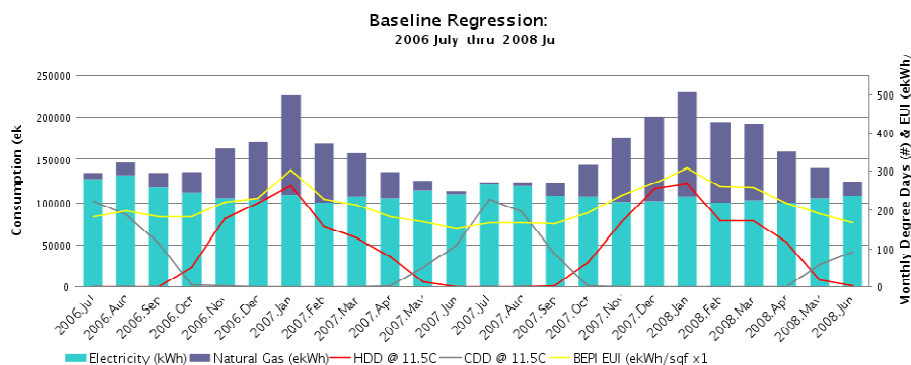
Tek: 3101~ Energy Auditing

- Measure: how much?
- Determine how it is being used?
- Look for obvious “fix its”?
- Use above info to determine Energy Saving Measures
- Quantify and report savings?

Note from: Energy Audits BCIT, Alex Hebert

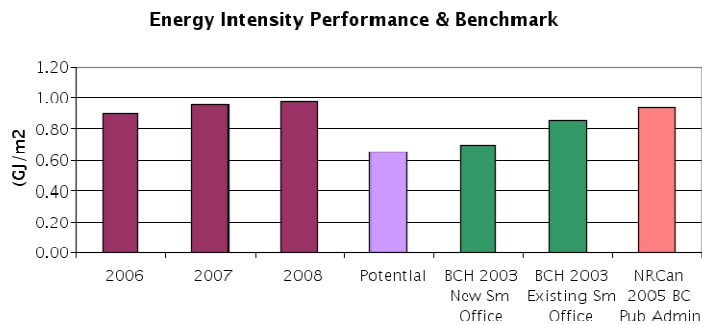
Tek: 3101~ Energy Auditing

- Baseline Energy Use



Tek: 3101~ Energy Auditing

- Benchmark Energy Use



SECTION 2 PANEL

~ 4 discussion topics RE: Technical ~ 90 sec / ea

- 2 pre-fab
 - Energy Manager latitude on technical projects?
 - Energy (kWh) savings VS GHG (t CO₂)?
- 2 from audience (Audience think of a Question!)
 - 4 min
 - 4 min
- Alternate Energy Prices, Renewable Energy?

SECTION

3

BUSINESS COURSES

Biz: 3102~ Change Management

- “*Who* is impacted?”
- “*What* behaviours must change?”
- “*How* can this fit or replace what we already do?”

- Operators
- Tenants
- Employees

Biz : 3102 ~ Change Management
Eg/Tool

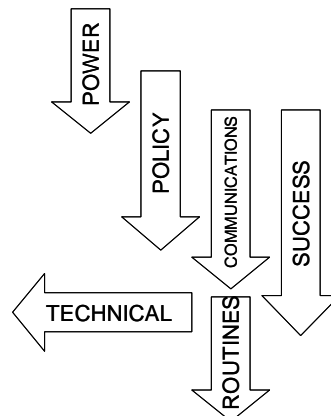
1. Identify sources of **urgency**
2. Translate and **communicate**
3. Form change **team**
4. Develop **Vision/Strategy**
5. **Listen** to objections:
 - \$1 at initiation becomes \$100 to \$1000 later
 - If issues not addressed, person may block next time
6. **Celebrate** wins & **Culture** change
7. **Solidify** the changes via training, policy, routines

Biz : 3102 ~ Change Management
Stakeholder Communication Paths

WHO

- General Manager ≈ CEO
- Executive Directors
- Departmental Heads
 - HR & Policy
 - Marketing & Comm
 - Implementation Dept.
- All Levels of Staff

RESPONSIBILITY



Biz: 4101 ~ Strategic Management

- “Is this beneficial on short and long term?”
- “What external trends are emerging?”
- “What are evolving internal goals?”

Biz: 4101 ~ Strategic Management No single right balance

- Company wants and needs differ
- Supporting employees differ
- Expectations of EM differ

Biz: 4102~ Decision Making

- Decision making process
 - Who's decision is it to make?
 - What steps are you going to take?
 - Evaluation of Alternatives- include do nothing
 - How will you justify your decision?
 - Financial
 - Weighted equivalent

Biz: 4102~ Decision Making

- Triple Bottom Line
 - Financial
 - Environmental
 - Social
 - Life Cycle Costing ~ NPV ~ Scope

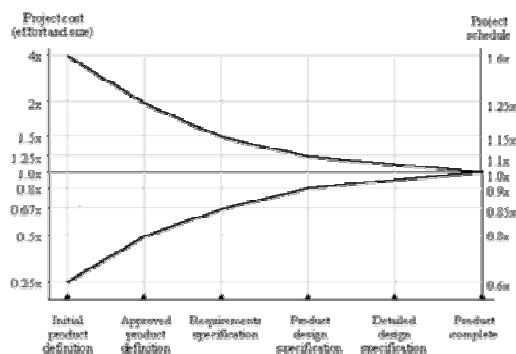


Biz: 4102~ Decision Making

- Decision making influences
 - Corporate culture
 - Autocratic vs. shared decision
 - Risk tolerance
 - The “right” people to know
 - Use triple bottom line to sell

Biz: 4103~ Project Development

- Project planning and development
 - Importance of Planning
 - Formal project management strategy PMI



Leading Answers:

http://leadinganswers.typepad.com/shared/image.html?photos/uncategorized/2007/11/03/estimate_convergence_2jpg_

Biz: 4103~ Project Development

- What is a performance contract?
 - An agreement to provide energy retrofit projects to an Owner with the costs repaid from savings.
 - The Contractor (ESCO) provides:
 - energy savings analysis,
 - design & construction,
 - guarantees the savings,
 - arranges financing and provides O&M, M&V, and training and program administration.



Biz: 4103~ Project Development

- Project Charters
 - How to present to the right audience
 - Goals & Objectives
 - Stakeholders
 - Scope Inclusions/Exclusions
 - Budget, Schedule, Effort
 - Risk Management
 - Feasibility
- Strategic Energy Management Plan (SEMP)

SECTION 3 PANEL

~ 4 discussion topics RE: Business ~ 90 sec / ea

- 2 pre-fab
 - At what corporate level should EM occur?
 - How to battle Greenwash?

2 from audience (Audience think of a Question!)

- 4 min
- 4 min

SECTION

4

SUMMARY

Summary ~ Context

- The 9 BCIT courses provide **context**, and enable us to see with new perspectives.
- Sustainable Energy Management is the story of **continuously** improving energy efficiency, for a **sustainable environment**, and a **profitable bottom line**.

Q & A

Contacts

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- <http://commons.bcit.ca/energy/semac.html>
Web out of date: Energy Manager Coordinator (EMC) role is the first step, unless experienced for EM role.
- www.bchydro.com/powersmart/commercial/energymanager.html
- simon.vickers (at) bchydro.com 604.453.9227

Recommended Reading

- Malcolm Gladwell
 - Blink
 - The Tipping Point
 - Outliers
- Mark Jaccard
 - Sustainable Fossil Fuels
 - Hot Air
- Peter Tertzakian
 - A Thousand Barrels A Second
 - The End of Energy Obesity
- Tim Flannery
 - The Weather Makers
- James Hoggan
 - Climate Cover Up