

# BCIT Factor Four Project Metering Project Charter

## 1 Revision history table

Version Number	Version Date	Added By:	Revision Description
1	January 12, 2012	Andrea Linsky	First Draft
2	February 3, 2012	Andrea Linsky	Second Draft (comments from stakeholders added.)
3	February 3, 2012	Andrea Linsky	Revisions based on feedback from Alex and Joey.

## 2 Intro

The Factor Four Project has a goal of realizing a fourfold decrease in material and energy throughput in buildings NE1-8 at the BCIT Burnaby Campus, without compromising service levels. This project charter is related to the energy piece of Factor 4. In order to reduce energy by 75%, a baseline of energy consumption for each building in the Factor Four Project must be developed. Real-time monitoring at the building level is also an asset for good energy management. Currently, there is no isolated electrical measurement for the buildings in the Factor Four Project. An analysis was completed and four electrical meters must be installed in order to have enough information to calculate each building's consumption. This project is to install and make these meters operational.

## 3 Problem/Opportunity Statement(s)

### **Problem:**

You can't manage what you don't know. The Factor Four project aims at a 75% reduction and tracking of progress is impossible without meters that cover the buildings within the project boundaries. Currently, there are not enough electrical meters to isolate the buildings within that boundary.

Furthermore, the metering in place does not allow for real time monitoring at the building level (see opportunity section below to understand the value of such a setting).

### **Opportunity:**

The opportunity is to add meters that will allow for granular real time tracking of the energy within the boundaries of the Factor Four project.

Examples of such opportunities from such metering include:

- Creating a baseline to track progress and measure success
- assigning a budget in order to drive change through cost accountability
- implementing behavioural change campaigns
- improve reporting granularity (internally, externally: SMARTtool)

- identifying high energy users (opportunities), benchmark and prioritize energy saving areas
- creating simple awareness and external exposure
- providing building operators alarms (could be added to job description - performance oriented)
- Supporting full building continuous Recommissioning.

#### 4 Goal

To have real time on line accessible monitoring at the building level of the electricity used at BCIT in the Factor Four Project before fiscal end 2010/2011.

The following chart outlines the meters and meter math that will be necessary to isolate each building.

Building	Meter Configuration	Number of Meters	New Meters Needed	Meter Location	Meter Type
NE02	(PDC-C)-(SDC-NW03)-(SDC NE23) - (PDC NE23)	4		PDC-C SDC-NW03 1 SDC NE23 1 PDC NE23	Facilities -Existing Facilities -Existing <b>New</b> <b>New</b>
NE04	(PDC-D)-(SDC-8)-(SDC-6)- (ERP)	4		PDC-D 1 SDC-8 1 SDC-6 1 ERP	Facilities -Existing <b>New</b> <b>New</b> Not Needed
NE06	SDC-6	1		SDC-6	<b>New -Duplicate</b>
ERP	ERP	1		ERP	Not Needed
NE08	(PDC-W)-(SDC-NE10)	2		PDC-W SDC-NE10	Facilities Facilities
NE03 AFRESH	NE03 AFRESH			NE03 AFRESH	GAIT
NE03 CAE	(SDC-NE03)- (NE03 AFRESH)	2		SDC-NE03 NE03 AFRESH	Facilities -Existing GAIT- Duplicate
NE01	(PDC-N/1/2) -(SDC-NE03)-( SDC-NE09)	3		PDC-N/1/2 SDC-NE03 SDC-NE09	Facilities -Existing Facilities - Duplicate Facilities -Existing

## 5 Scope Inclusions and Exclusions

### Included in Scope

- a) The Factor Four Project consists of the following buildings:
- NE01
  - NE02
  - NE03 AFRESH
  - NE03 Centre for Architectural Ecology
  - NE04
  - NE06
  - NE08

- b) installing four meters at the following electrical locations in order to isolate the buildings mentioned above:

<b>Meter Type</b>	<b>Location</b>
ION 7300	SDC-NE23
ION 7300	PDC-NE23
ION 7300	SDC-8 (May be labeled SDC NE21)
ION 7350	SDC-6

- a) Each meter will have the following points of measurements:

- "Active Energy Delivered"; "kWh" (cumulative)
- "Active Power Mean Demand Delivered"; "kW"
- "Interval Active Energy Delivered"; "kWh"
- "Power Factor Signed Mean"; "PF"

...and optionally if required, any from the following list:

- "Active Power Sliding Window Demand Delivered-Received"; "kW"
- "Apparent Energy Delivered + Received"; "kVAh" (cumulative)
- "Apparent Power Mean"; "kVA"
- "Average Voltage Line-to-Line Mean"; "V"
- "Average Voltage Line-to-Neutral Mean"; "V"
- "Current Phase Average Mean"; "A"
- "Current Total Harmonic Distortion Phase A Mean"; "A"
- "Current Total Harmonic Distortion Phase B Mean"; "A"
- "Current Total Harmonic Distortion Phase C Mean"; "A"
- "Current Unbalance Mean"; "A"
- "Frequency Mean"; "Hz"
- "Reactive Energy Delivered"; "kVARh" (cumulative)
- "Reactive Energy Received"; "kVARh" (cumulative)
- "Reactive Power Mean"; "kVA"
- "Voltage Total Harmonic Distortion Mean on Input V1"; "V"
- "Voltage Total Harmonic Distortion Mean on Input V2"; "V"
- "Voltage Total Harmonic Distortion Mean on Input V3"; "V"
- "Voltage Unbalance Mean"; "V"

- Connecting the meters to the GAIT EMS system so that there is easily accessible real time data for the electrical consumption of each individual building in the Factor Four Project.
- The final result of the four above meters installed will be the capability to measure all buildings mentioned above at the building level, in real-time.

### Not included in scope

The energy monitoring rationale described earlier also applies to sources of energy other than electricity (e.g.: natural gas and hot water). Phase 1 of the Factor 4 project includes buildings NE2 to 8 only. These buildings all have sub meters for their only other energy source: natural gas. Therefore, it is already possible to create a baseline for natural gas and track conservation progress. Note: phase 2 of Factor 4 will include building NE1 where a heat meter for hot water will be needed. This is not included in the scope of this phase but should be included in a second phase. The

possibility of adding real time monitoring on the NE2 to 8 gas meters should also be considered during phase 2 but not included in this scope.

Future work not included in this scope: Map and regression feature in EMS

## 6 Costing

Cost breakdown and cross charge dates:

Item	Cost	Who	Cross Charge/Invoice Date
Meters 1: ION 7350 Meter & 3: ION 7300 Meters	\$3,800 \$2,000 *3=6000 <b>Total \$9,800</b>	Andrea Linsky & SOCE	December 2011 PO#: P0062897
Meter installation and setup including wiring and other equipment needed. Any necessary permitting.	\$2500/meter 4 meters +400permitting fees <b>Total = \$10,400 (+) 20% contingency (\$2,000)</b>	Facilities	March 1, 2012 (upon completion) work order submitted January 17 <sup>th</sup> .
Network Configuration, SOW, EMS integration.	<b>\$5,100 (From quote)</b>	GAIT Group	March 28 <sup>th</sup> , 2012 (upon completion).
<b>Total:</b>	<b>\$21,300 (+\$2,000 contingency)</b>		

## 7 Main Stakeholders to consider

- School of Construction and the Environment Factor Four Project team members: Jennie Moore, Alexandre Hebert, and Andrea Linsky.
- The GAIT Group: Joey Dabell, Joe Newton, Eric Hawthorne.
- The Facilities department: Adrian Lee, Marvin Rogers and any electricians involved.
- External contractors for installation if necessary.

## 8 Responsibilities

Funding: of \$35,000 has been provided by the School of Construction and the Environment.

Equipment selection:

- Meters: GAIT Group, Andrea Linsky, Alexandre Hebert and Adrian Lee.
- IT equipment: GAIT Group, and Adrian Lee.

Equipment Purchase: Andrea Linsky/SOCE

Permitting: GAIT

Meter and Communications Installation: Facilities

Wiring: Facilities

Network Configuration and Tuning: GAIT Group

EMS Set up and debugging: GAIT Group

Approval of final product: Andrea Linsky and Alexandre Hebert

## 9 Requirements

- Compatible with new BC Hydro smart meters communication.
- Possibility to switch to Ethernet or PLC (avoid radio frequency).
- Everything must be completed, installed and paid for by March 31, 2012.

- d) Hardware design decision (Ethernet or wireless) for meter communications made by Jan 11, 2012.
- e) Meters installed, configured, communications hardware/Ethernet connected and live by Feb 29, 2012.

## 10 Notes

Deliverables and timeline:

Milestone	Date	Department Responsible
Meters Purchased	December 2011	Andrea Linsky (SOCE)
Meters Delivered	Expected February 4 <sup>th</sup> , 2012	(SOCE)
Meters Installed and data accessible through an IP address on the BCIT network	February 28, 2012	Facilities (Adrian Lee)
Data accessible to all stakeholders through EMS system	March 31, 2012	GAIT (Joey Dabel and Eric Hawthorne)

## 11 Stakeholders Approval

Stakeholder	Name	Approval Email Date
School of Construction and the Environment	Jennie Moore	
School of Construction and the Environment	Andrea Linsky	
School of Construction and the Environment	Alexandre Hebert	
The GAIT Group	Joey Dabell	
The Facilities department	Adrian Lee	