



District Energy Study

Review Meeting

Sep 6, 2011 1:30 – 3:30pm

TRCA Downsview Office, 70 Canuck Ave

Conference Line: 416-343-4997 Conference ID: 9845649

Agenda

1. Introductions and Brief Update
2. Review Task 100 – Customer Demand
3. Review Task 200 – Energy Sources
4. Review Task 300 – Distribution
5. Next Steps

Attachments:

1. Checklist for Tasks 100 - 300
2. Presentation Slides from FVB Energy Inc.

Partners in Project Green – District Energy Study

Checklist of RFP Requirements for Tasks 100 - 300

Task 100 – Customer Demand

1. Determine feasible radius from energy suppliers where potential end users (customers) can be located.
2. Define potential users in the area and their profile (including type of activity, location, building typology)
3. Conduct a demand analysis, including load profiles and thermal load density. The analysis should include space heating and cooling, and process water heating. Consider both existing potential users and/or a theoretical scenario that would be needed to make the DES feasible. All major assumptions in the demand analysis should be clearly stated, with the forecast model designed so that future sensitivity analysis can be performed as needed by Partners in Project Green stakeholders.
4. Discuss energy transfer stations technology options and building / HVAC system conversion requirements to connect with the DES.
5. Prepare a summary of the typical characteristics of a suitable building and an unsuitable building for retrofit connection and the requirements for new constructions (e.g. the type of heating system).

Task 200 – Energy Sources

1. Assess the suitability for each of the potential energy suppliers (GTAA, TransAlta) to provide heating and cooling supply to a DES and meet customer needs. For the GTAA cogeneration plant, although the potential steam exporting capacity is detailed in “Gate Cycle” studies, the actual capacity would have to be verified.
2. Recommend modifications needed to enhance the availability of energy for the DES.
3. Recommend modifications needed to connect the energy generation facilities to the distribution network.
4. Discuss the implications for using one or a combination of the potential energy suppliers.
5. Evaluate processes, technologies and equipment for the facilities to be fully functional, flexible, effective and efficient in supplying energy to a DES.
6. Evaluate options for complementary and/or supplementary alternative energy supplies.

Task 300 – Distribution Systems

1. Recommend a distribution system concept to link energy sources to customers, including:
 - a. Heat transfer medium
 - b. Pipe size, technology, placement, loops configuration
 - c. Operating temperatures and flows
 - d. System monitoring, maintenance, operations
2. Discuss land requirements (e.g. underground routes, easements and pathways) that would be necessary to host the distribution network. Evaluate land availability in the study area. Identify potential route options. Show findings using GIS mapping.

Partners in Project Green District Energy Feasibility Study

Progress Review Meeting

September 6, 2011



Purpose of Meeting

- Provide an overview of findings:
 - Task 100 Customer Demand
 - Task 200 Energy Sources
 - Task 300 Distribution
- Confirm concept as basis of business model

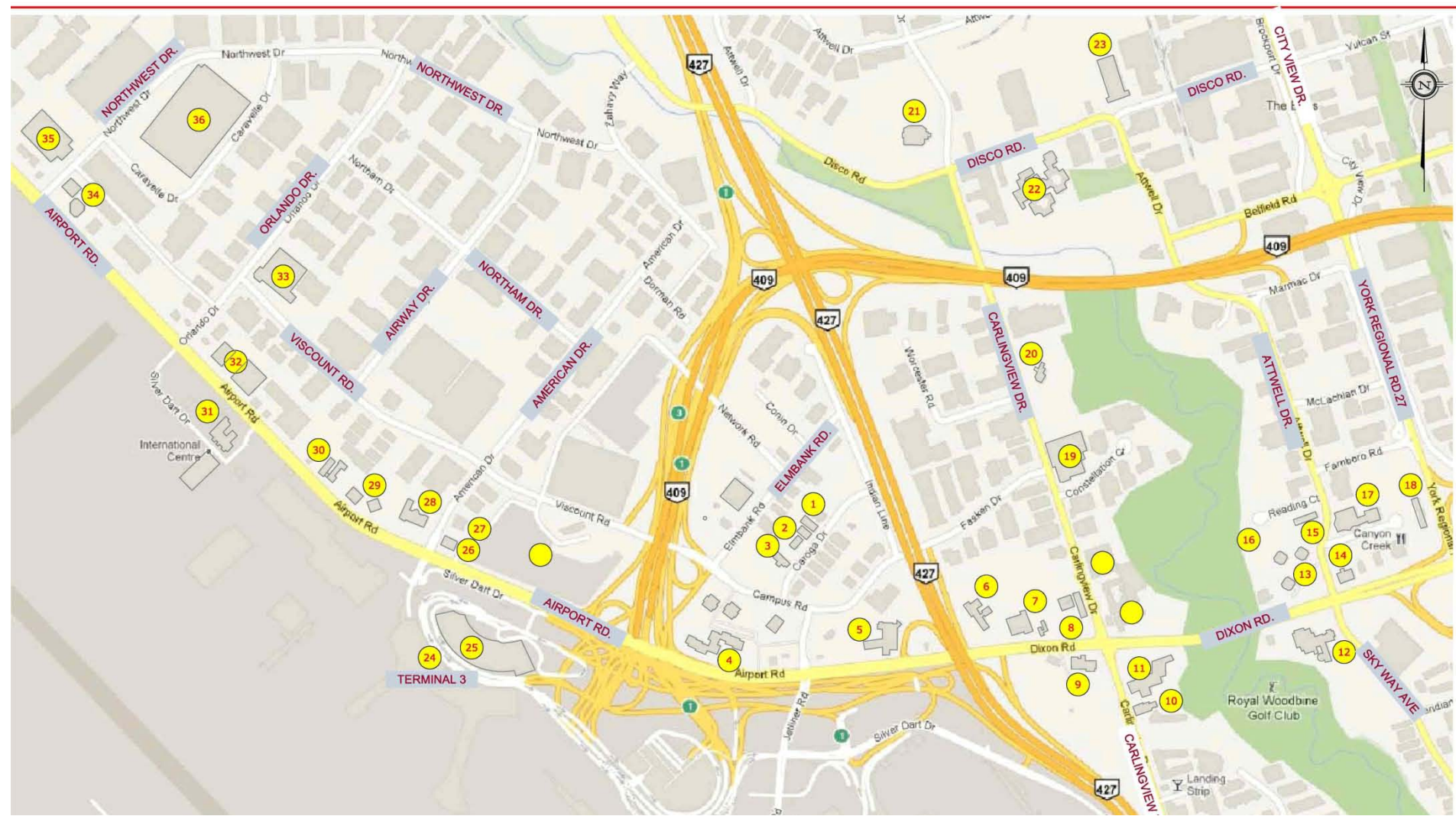


Overview of Task 100

Customer Demand

- Attempted to quantify at macro-level
- Building-by-building usual route to success
- Multi-storey are best
- List of 36 by ground survey/Google Earth
- 10 had been studied in 2008 (4 visited)
- Now have visited total of 15 (goal was 20)





Record of building visits & load estimates - 2008 & 2011 studies

1	Hilton Garden Inn	yes	2,200 kWt	19	BASF	Yes	2,300 kWt
2	Marriott Fairfield Inn & Suites	no	600 kWt	20	SNC Lavalin	No	200 kWt
3	Hampton Inn & Suites	yes	400 kWt	21	Transfer Station	No	1,800 kWt
4	Airway Center (4 bldgs)	yes	1,900 kWt	22	West Detention Centre	No	2,400 kWt
5	Hilton	yes	1,600 kWt	23	Dineen Corporate Centre	No	1,400 kWt
6	Holiday Inn	no	1,400 kWt	24	Terminal 3	No	17,700 kWt
7	Westin	yes	1,600 kWt	25	Sheraton Gateway Hotel	No	1,100 kWt
8	Quality Suite Inn	yes	900 kWt	26	Case Bank Building	Yes	200 kWt
9	Travel Lodge	yes	600 kWt	27	Orlando	Yes	400 kWt
10	Courtyard by Marriott	yes	2,200 kWt	28	Four Points Sheraton	No	500 kWt
11	Toronto Marriott Airport Hotel	yes	2,500 kWt	29	6299 Airport Rd	No	500 kWt
12	Renaissance Hotel	No	1,900 kWt	30	Comfort Inn	No	400 kWt
13	Skyway business park (3 bldgs)	No	900 kWt	31	Cara, Kitchen S	No	1,500 kWt
14	Alterna Savings	No	200 kWt	32	Cara (2 bldgs)	No	2,000 kWt
15	Residence Marriot	No	1,000 kWt	33	Cott Beverages	Yes	1,200 kWt
16	Sandman Signature	No	800 kWt	34	Winner Offices	No	1,200 kWt
17	Pearson Corporate Centre	No	800 kWt	35	International Center	Yes	500 kWt
18	Crown Plaza	No	800 kWt	36	Booth Centennial	Yes	4,200 kWt
Legend re visits & scope of 2008 study		2008	2011	Total estimated load (excl Terminal 3)			44 MWt



Proposed Phase 1 Load Summary

1	Hilton Garden Inn	2,200 kWt	4,700 MWht
2	Marriott Fairfield Inn & Suites	600 kWt	800 MWht
3	Hampton Inn & Suites	400 kWt	800 MWht
4	Airway Center (4 bldgs)	1,900 kWt	4,200 MWht
5	Hilton	1,600 kWt	2,800 MWht
6	Holiday Inn	1,400 kWt	3,100 MWht
7	Westin	1,600 kWt	3,800 MWht
8	Quality Suite Inn	900 kWt	1,900 MWht
9	Travel Lodge	600 kWt	1,300 MWht
10	Courtyard by Marriott	2,200 kWt	4,900 MWht
11	Toronto Marriott Airport Hotel	2,500 kWt	4,500 MWht
Totals		16 MWt	32,800 MWht



Overview of Task 200

Energy Sources

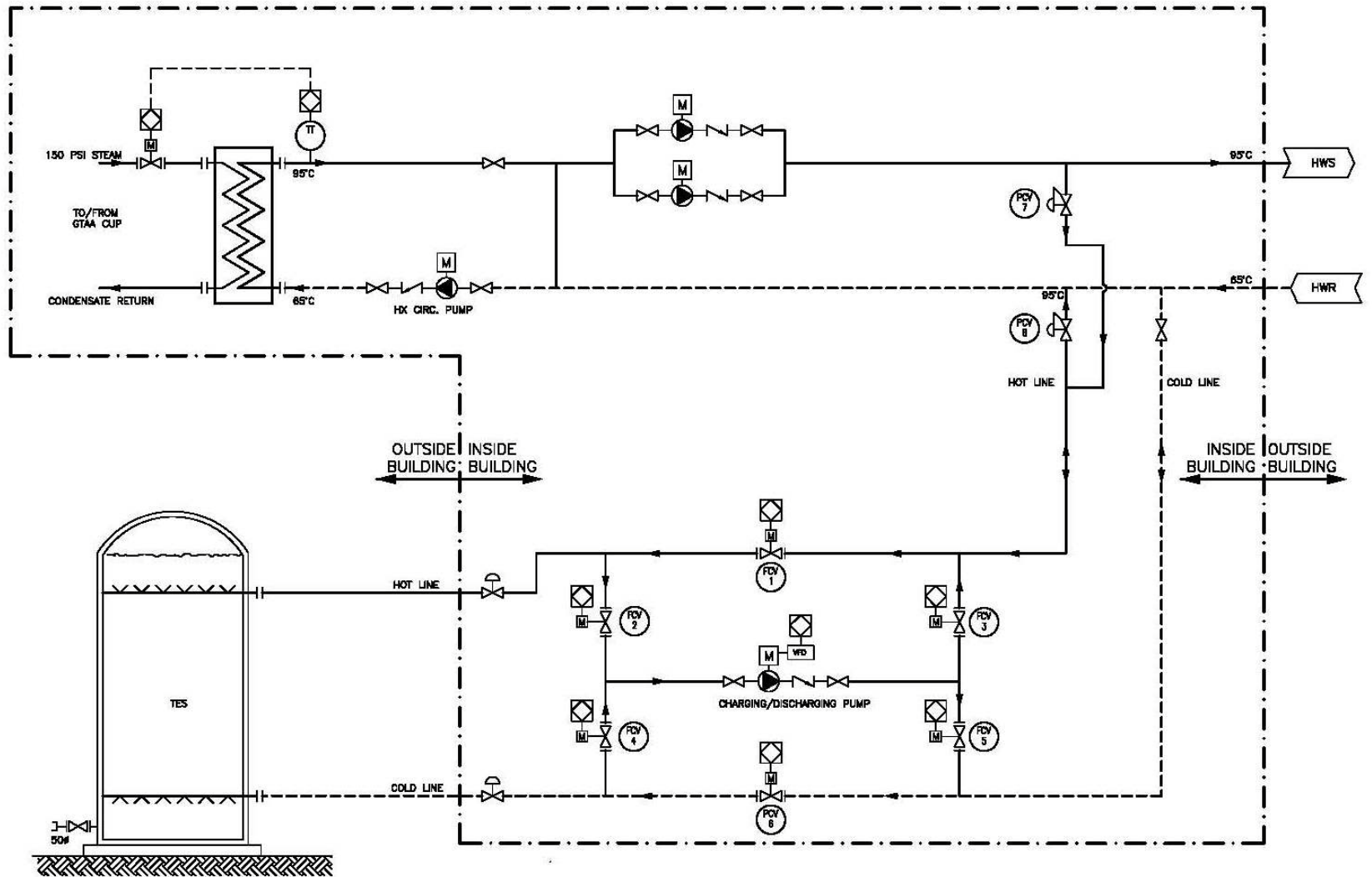
- No info yet from TransAlta or Magellan
- GTAA CHP has 30 MWt extraction capability
- Plus 4 * 19 MWt steam boilers
- Terminal 1 Load 29 MWt (*peak*)
- CHP runs ~ 30% of time (will vary)
- Thermal Energy Storage (TES) proposed



Average Loads in MWt			
Month	Terminal 1	Phase 1 DE	Total
Jan	10	7	17
Feb	10	7	17
Mar	8	6	14
Apr	6	4	10
May	5	4	9
Jun	1	1	1
Jul	1	1	1
Aug	1	0	1
Sep	1	1	2
Oct	3	3	6
Nov	6	4	10
Dec	9	7	16
AVERAGE	5	4	9

Note: typical load profiles applied





Energy Model - MWht						
Month	Terminal 1	Phase 1 DE	Total	CHP Run hours	CHP Heat	Discharge from TES
Jan	7,395	5,576	12,971	161	3,350	801
Feb	6,482	4,887	11,369	140	2,787	700
Mar	5,916	4,461	10,377	132	2,416	769
Apr	4,263	3,214	7,477	189	2,488	722
May	3,872	2,919	6,791	230	2,783	812
Jun	522	394	916	168	496	305
Jul	522	394	916	286	592	248
Aug	479	361	839	391	609	176
Sep	957	722	1,679	280	985	348
Oct	2,480	1,870	4,349	242	1,971	650
Nov	4,002	3,018	7,020	220	2,777	772
Dec	6,612	4,986	11,598	147	2,906	742
TOTALS	43,500	32,800	76,300	2,586	24,161	7,045

NOTES: Typical load profiles, CHP run hours per day varied according to FVB's general understanding of operation, 30 MWt of CHP extraction used, 10 MWt CHP low pressure capability ignored (a conservative assumption – to be refined), TES size roughly optimized and happens to equal the Markham District Energy TES, i.e. 35 MWht capacity with 6 MWt charge and discharge capacity (to be refined)



Energy Sources - MWht			
Month	Extraction Steam	Boilers	% from CHP
Jan	3,350	9,621	26%
Feb	2,787	8,581	25%
Mar	2,416	7,961	23%
Apr	2,488	4,990	33%
May	2,783	4,007	41%
Jun	496	419	54%
Jul	592	324	65%
Aug	609	230	73%
Sep	985	693	59%
Oct	1,971	2,378	45%
Nov	2,777	4,242	40%
Dec	2,906	8,692	25%
TOTALS	24,161	52,139	32%

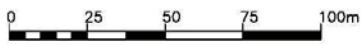
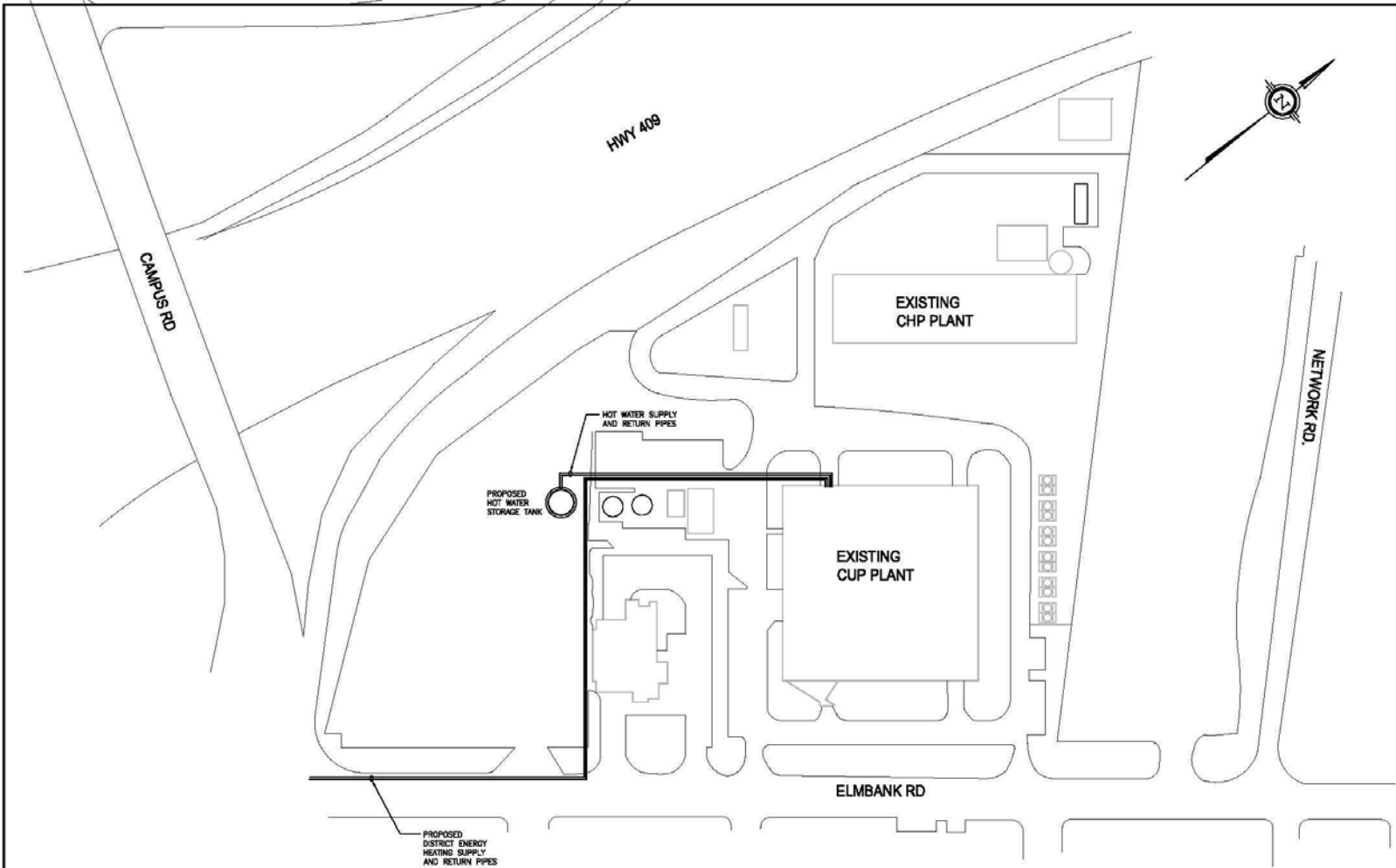
NOTE: % heat from CHP to DE expected to be almost same as for overall (to be refined)



Overview of Task 300 Distribution Serving Proposed Phase 1

- 30 C Δ T (65 to 95) on peak
- 3.1 trench kilometres distribution pipe (DPS)
 - Trunk lines 250 to 150 mm
 - Smaller branch lines
 - High congestion factor
- 11 Energy Transfer Stations (ETS)
 - 500 to 2,600 kWt (average 1,560 kWt)



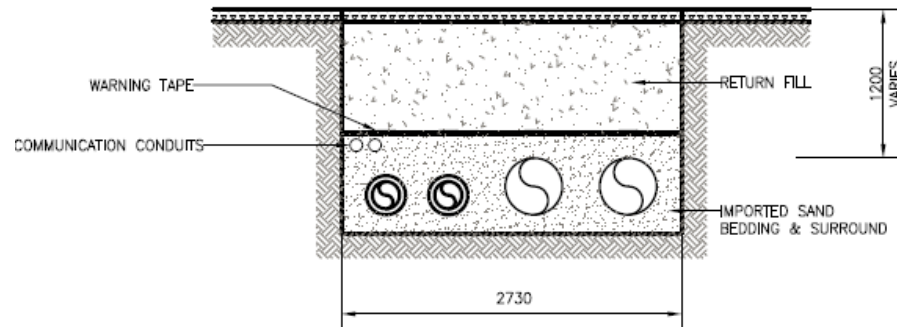


1.0 HOT WATER STORAGE TANK MAP
N.Y.S.



Typical DPS Cross-section

(heating & cooling – current proposal is for heating only)



ETS Sketch

(heating & cooling – current proposal is for heating only)

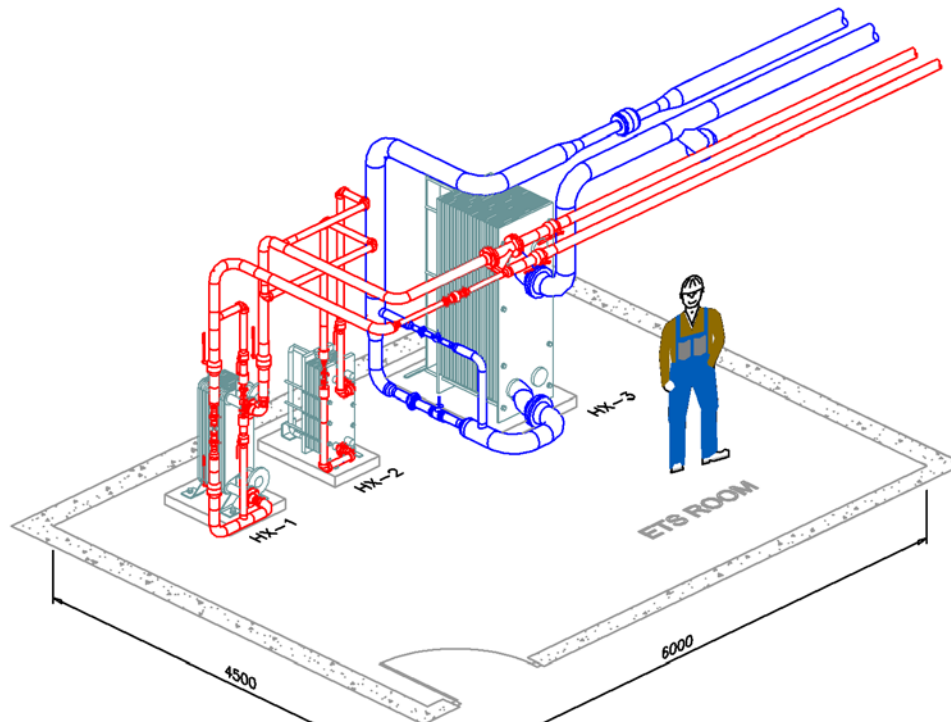
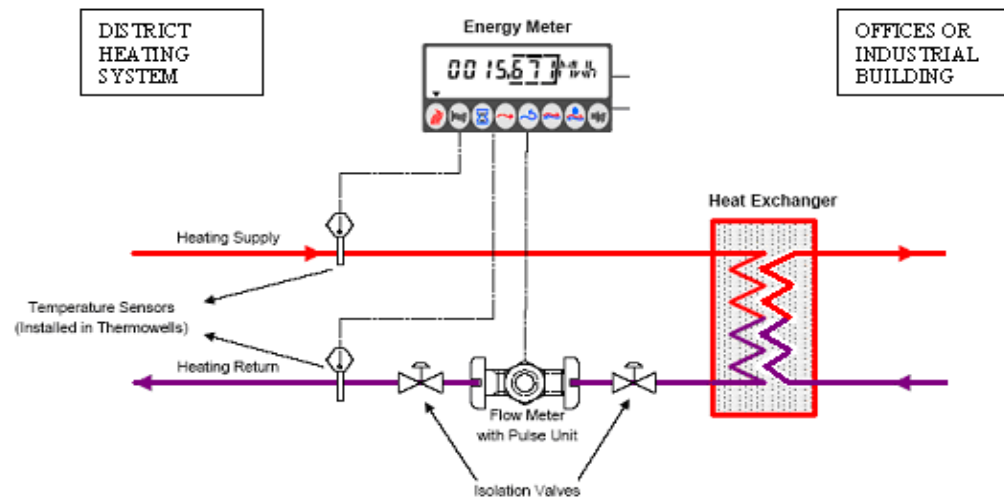
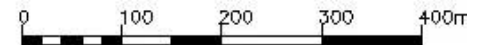
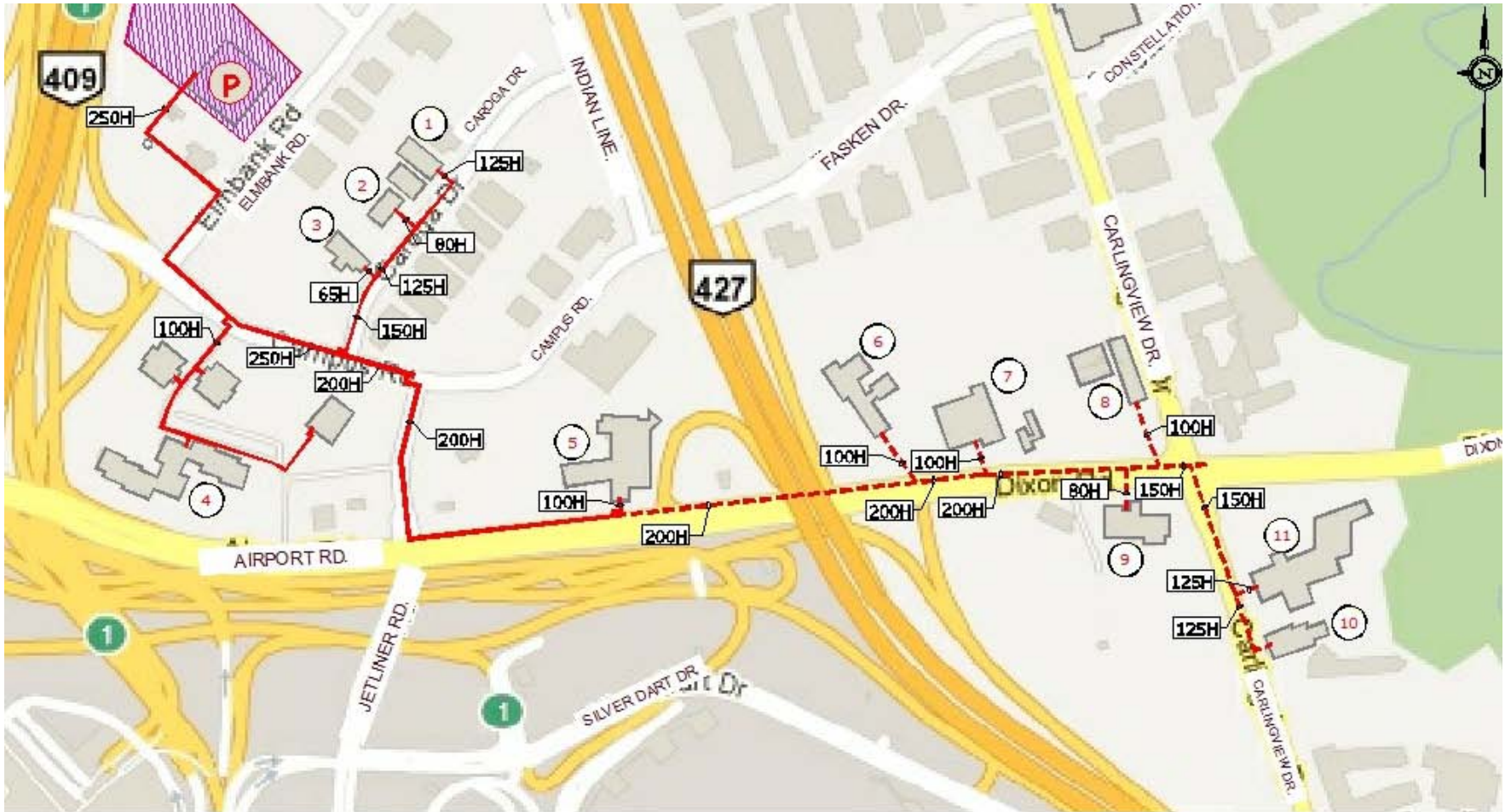


Illustration of Thermal Energy Metering



Phase 1 Preliminary DPS Route



Cost Estimate Summary

(Phase 1)

DE Component	Cost (\$1000)
Distribution Piping System	8,469
Heat Recovery & Storage	3,318
Energy Transfer Stations	2,201
TOTAL	13,988

ETS estimate based on 11 buildings connected

Likely some additional costs for secondary side modifications: e.g. risers to mechanical rooms in penthouses, possibly ~ 0.5 M\$



Preliminary Conclusions

1. As expected, heat load exists but pure economics look tight
2. Possibly viable if:
 1. Infrastructure Funding received
 2. Sufficient customer avoided Capital & O&M recovered in price (not just avoided energy)
3. Heat pricing critical for financial analysis



Schedule of Next Steps

ID	Project Name	Days	Start	End	9-Sep	16-Sep	23-Sep	30-Sep	7-Oct	14-Oct
	Partners in Project Green District Energy Feasibility Study	416	27-Aug-2010	17-Oct-2011						
100	Customer Demand	374	27-Aug-2010	5-Sep-2011						
200	Energy Sources	63	4-Jul-2011	5-Sep-2011						
300	Distribution	22	15-Aug-2011	6-Sep-2011						
400	BAU, Financial, Env Analyses	21	5-Sep-2011	26-Sep-2011						
500	Technical Memo	14	5-Sep-2011	19-Sep-2011						
600	Ownership & Ops Structure	21	5-Sep-2011	26-Sep-2011						
700	Regs, Legal & Risk Assessment	7	19-Sep-2011	26-Sep-2011						
800	Business Model Report	7	26-Sep-2011	3-Oct-2011						
900	Implementation Plan	14	3-Oct-2011	17-Oct-2011						
910	Implementation Plan Document	7	3-Oct-2011	10-Oct-2011						
920	Presentation	7	10-Oct-2011	17-Oct-2011						



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TOTALS	24,161	52,139	32%

NOTE: THESE ARE SOURCES FOR OVERALL SYSTEM (T1 + DE)



Energy Sources - MWht

Month	Extraction Steam	Boilers	% from CHP
Jan	1,750	3,826	31%
Feb	1,437	3,450	29%
Mar	1,366	3,094	31%
Apr	1,369	1,846	43%
May	1,586	1,333	54%
Jun	375	19	95%
Jul	391	3	99%
Aug	358	3	99%
Sep	613	108	85%
Oct	1,164	705	62%
Nov	1,555	1,463	52%
Dec	1,599	3,386	32%
TOTALS	13,564	19,236	41%

NOTE: THESE ARE SOURCES FOR DE ONLY

