

Renewable Heat Workshop – Integrating Solar & Heat Pumps
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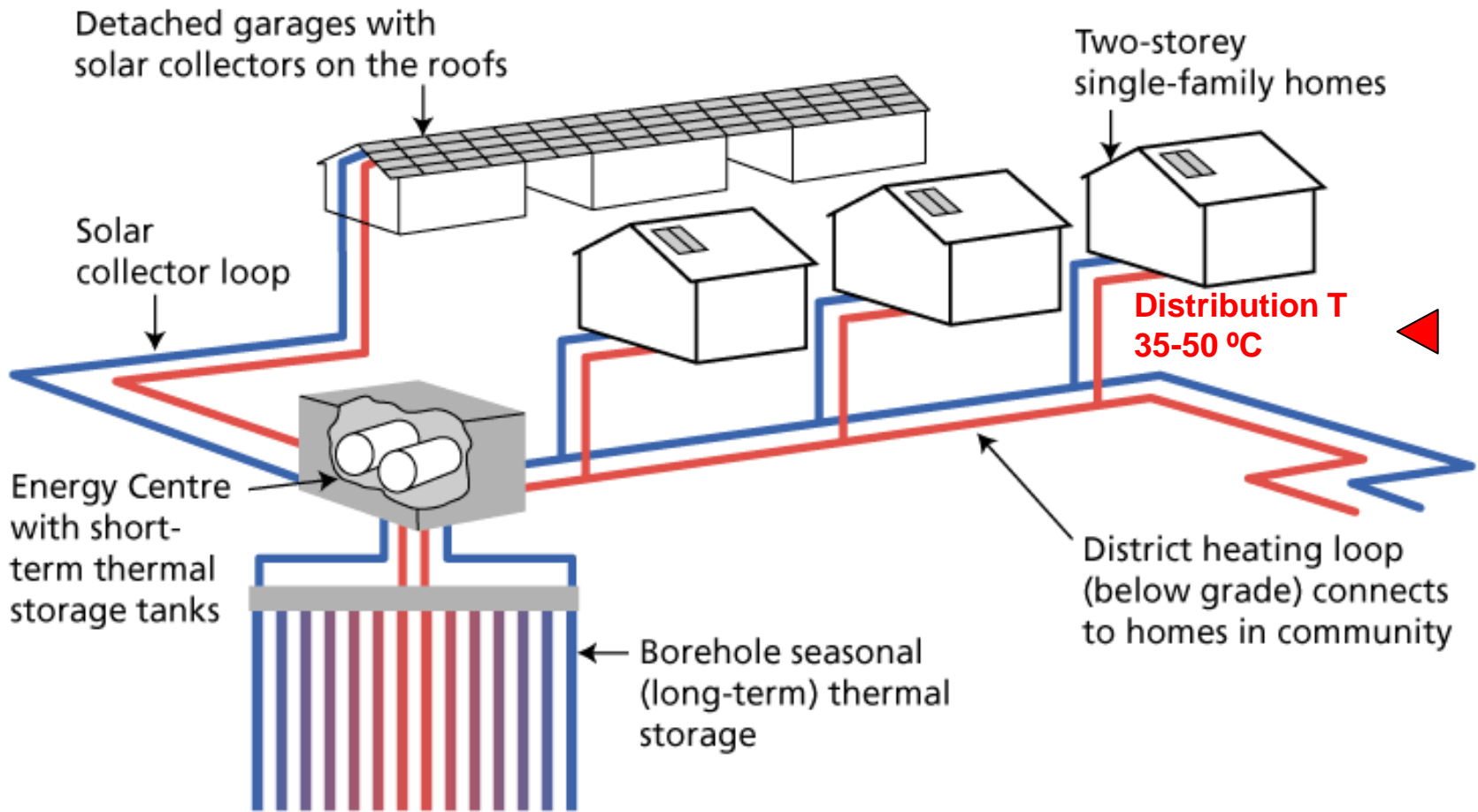
Drake Landing Solar Community Okotoks, Alberta, Canada

- First solar seasonal storage community in North America
- First in world greater than 90 percent solar fraction (97% in 2011/12)
- Energy Globe World Award 2011 (Wels, Austria)

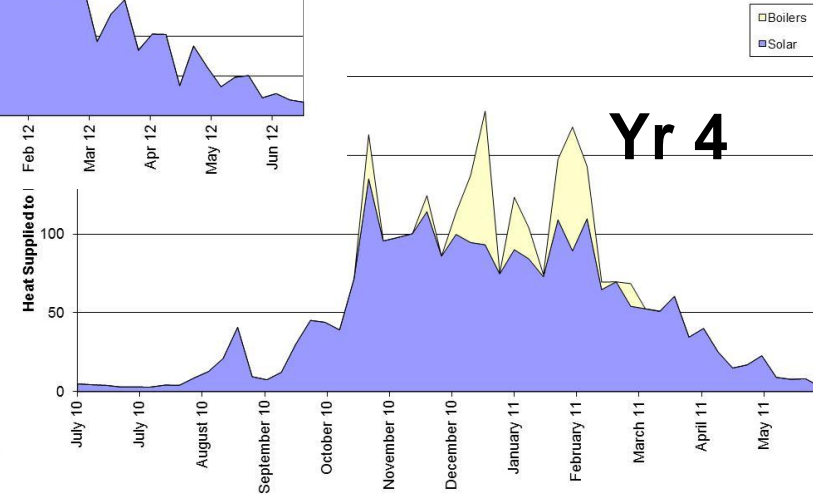
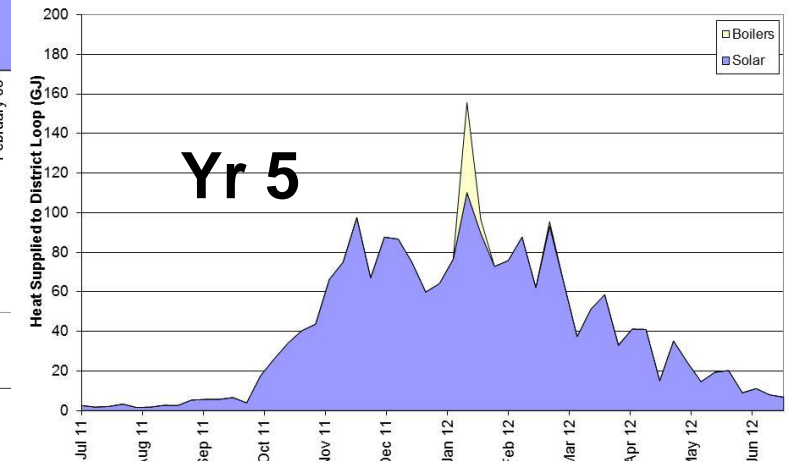
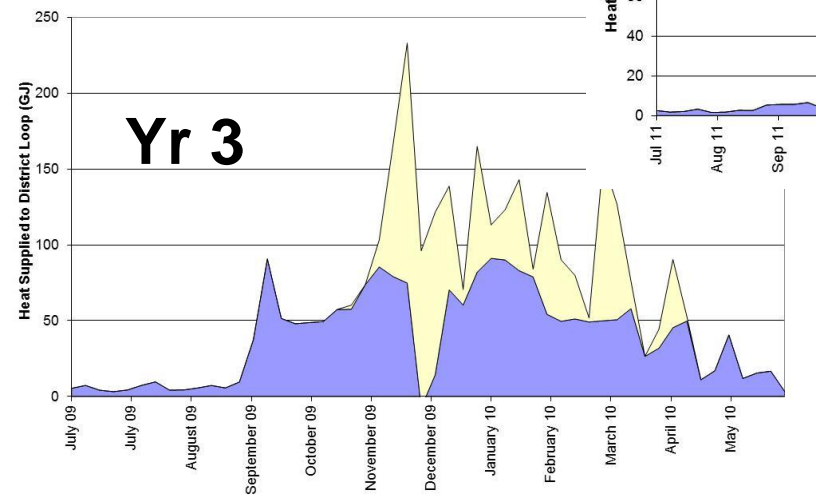
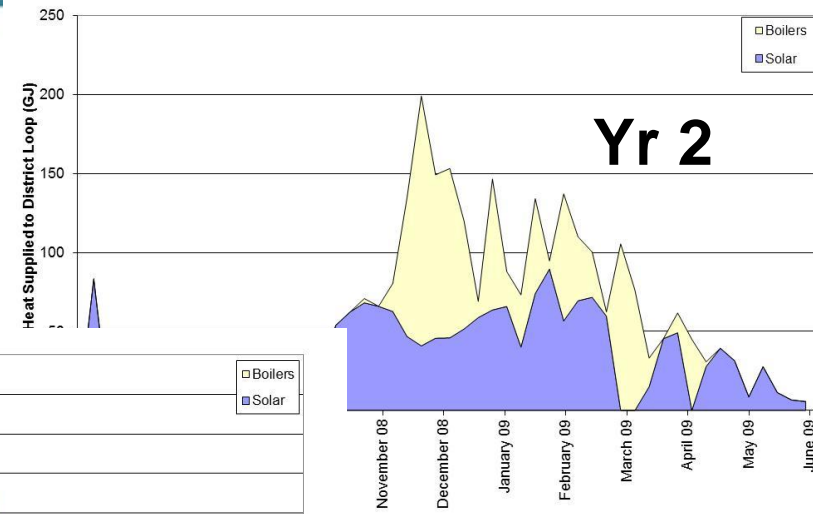
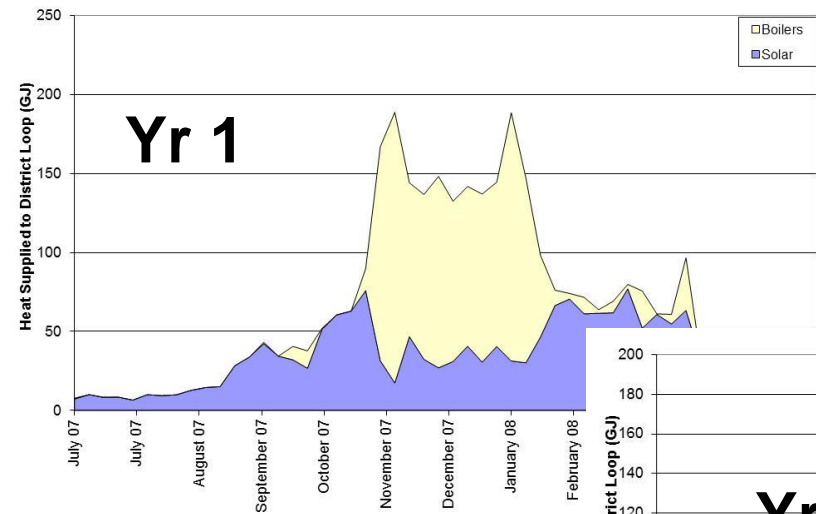


Feasibility study completed in 2003/04
Construction started March 2005
Fully operational July 2007
Five years of successful operation

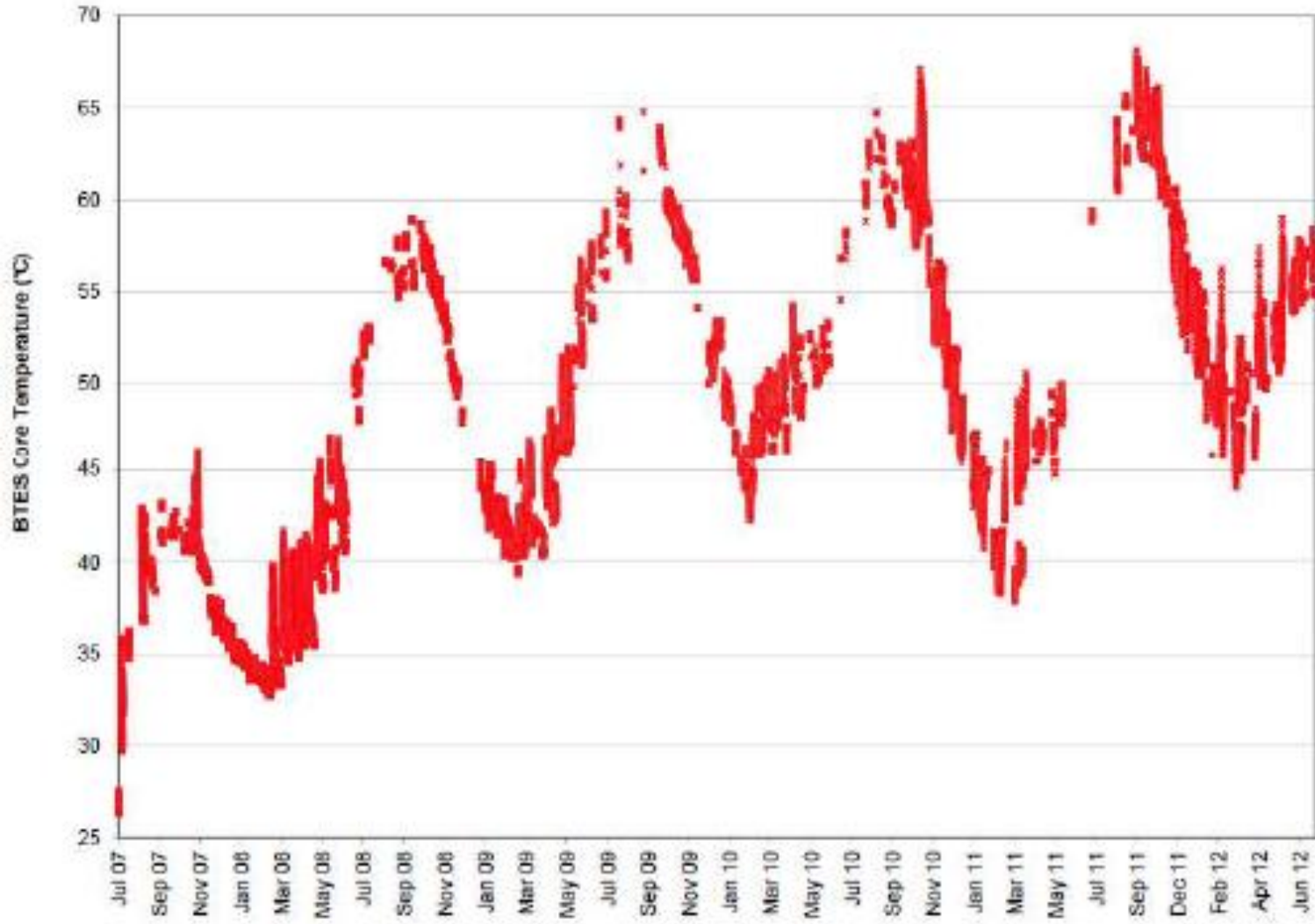
DLSC Simplified System Schematic



DLSC System Performance – Solar Fraction First 5 Years



DLSC BTES Core Temperature

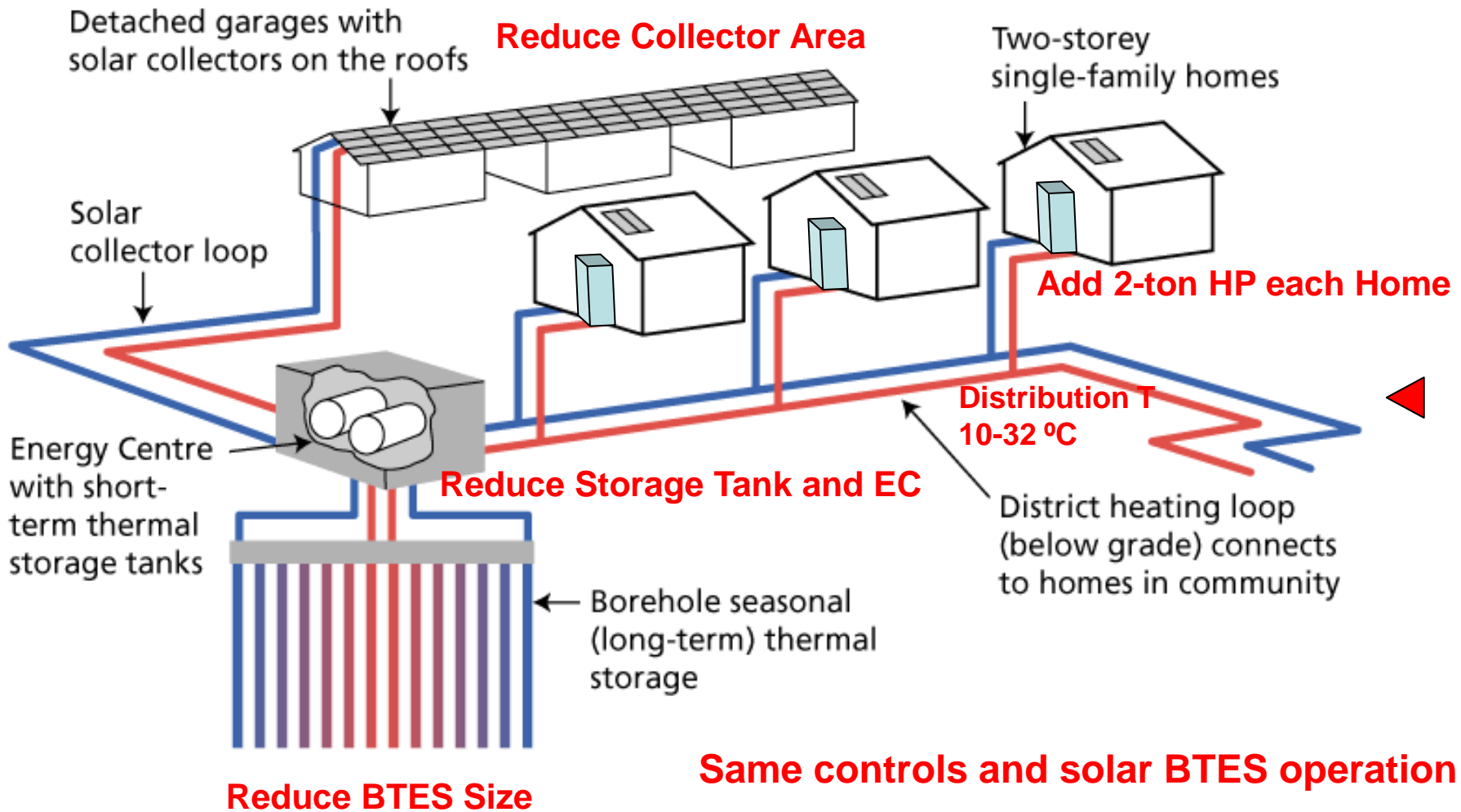


Expanded DLSC Project Study (Led by NRCan) 1,000+ Home Community at 90% S.F.

Community	Capital \$ per Home
52-home DLSC Community	83k
1,000+-home DLSC Community	~ 18k



Solar HP Hybrid System – Calibrated TRNSYS Model Simulation



Capital Cost Comparison

Home Heating System	Incremental Capital \$ per Home
Conventional Natural Gas furnace	0
52-home DLSC Community	83k
52-home Solar HP Hybrid Community	~ 59k
1,000+-home DLSC Community	~ 18k
1,000+-home Solar HP Hybrid Community	~ 18k

Estimated installed HP cost based on information from “*The State of the Canadian Geothermal Heat Pump Industry 2011 – Industry Survey and Market Analysis*” Canadian GeoExchange Coalition.

Home Heating System	GHG Emissions (tonnes CO₂ eq / home per year)
Conventional Natural Gas furnace	~ 3.3
DLSC (Solar BTES)	~ 0.2
Hybrid Solar Heat Pump (Alberta EF)	~ 3.3
Hybrid Solar Heat Pump (Ontario EF)	~ 1.1

Environment Canada electricity intensity table, <http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=EAF0E96A-1>
Natural Resources Canada Natural Gas Primer, <http://www.nrcan.gc.ca/energy/sources/natural-gas/1233>

- **Optimization solar/BTES heat pump configuration**
- **Integration with domestic hot water service**
- **Include cooling service**
- **Marginal cost analysis**
- **Ownership and responsibilities**

Questions and Discussion



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