

**CITY OF REDMOND
RESOLUTION NO. 1408**

A RESOLUTION OF THE CITY COUNCIL OF THE CITY
OF REDMOND, WASHINGTON, SUPPORTING A
PARTNERSHIP WITH PUGET SOUND ENERGY FOR A
DISTRICT ENERGY FEASIBILITY STUDY IN OVERLAKE
VILLAGE

WHEREAS, Redmond's adopted vision for Overlake in 2030 is a thriving, dense urban neighborhood where 16,000 people live and 70,000 people work; and

WHEREAS, the energy demand of this additional growth is estimated at over 145,000 MMBtu/year at a cost of approximately \$823,000/year, and producing 11,734 tCO₂/year of carbon emissions; and

WHEREAS, the City has been exploring district energy concepts that would reduce energy consumption, cost, and associated carbon emissions consistent with the City's *Climate Action Strategy*; and

WHEREAS, Redmond's Comprehensive Plan policy UT-73 supports the use of clean alternative energy by advocating for the development of renewable energy sources and facilitating development and use of innovative technologies such as alternative fuels and on-site renewable energy; and

WHEREAS, a concept-level pre-feasibility study for district energy in Overlake Village was developed in partnership with the HUD-funded Growing Transit Communities and Puttman Infrastructure,

and concluded that a district energy system can potentially reduce energy use by ten percent to 30 percent, and reduce energy costs related to heating and cooling by ten percent to 50 percent, and reduce carbon emissions by 15 percent to 45 percent; and

WHEREAS, Puget Sound Energy (PSE) and its partners, being the primary energy provider for Overlake Village, has expertise regarding the local and regional energy system, is uniquely positioned to further evaluate district energy potential, and is willing to lead a feasibility study in partnership with the City; and

WHEREAS, timely completion of a district energy feasibility study allows potential implementation activities to sync with planned capital projects and anticipated private investment in Overlake Village; and

WHEREAS, one of the intended outcomes of the proposed feasibility study is to determine how a district energy system can fit within the vision for Overlake village and work in conjunction with future public and private development activity; and

WHEREAS, the proposed study also does not preclude the City from working with other parties either concurrent, or subsequent to completion of the study; and

WHEREAS, the City will be actively involved in developing the proposed study to ensure it supports mutual goals.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDMOND,
WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. The Redmond City Council supports the proposed partnership with PSE to develop a feasibility study for district energy in Overlake Village.

Section 2. The study is to be initiated and substantially completed in 2014.

Section 3. The City will provide staff support and direction, and contribute an amount to PSE not-to-exceed \$20,000, commensurate with progress and completion of tasks as described in the *Agreement and Scope of Work* included with City Council's May 6, 2014, agenda and attached here.

Exhibit 1: *Partnership Agreement: Proposal to Perform Overlake Village District Energy Feasibility Study*

Exhibit 2: *Scope of Work for partnership agreement*

Exhibit 3: *Overlake Village District Energy Pre-Feasibility Study (Nov 2013)*


ADOPTED by the Redmond City Council this 20th day of May,
2014.

APPROVED:



JOHN MARCHIONE, MAYOR

ATTEST:



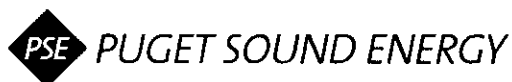
MICHELLE M. HART, MMC, CITY CLERK

(SEAL)

FILED WITH THE CITY CLERK: May 6, 2014
PASSED BY THE CITY COUNCIL: May 20, 2014
RESOLUTION NO: 1408

YES: Allen, Carson, Margeson, Myers, Shutz, Stilin

RECUSED: Flynn



John Marchione
Mayor, City of Redmond
15670 NE 85th Street
Redmond, WA

April 18, 2014

Subject: Proposal to Perform Overlake Village District Energy Feasibility Study

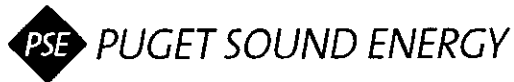
Dear Mr. Marchione:

The purpose of this letter ("**Letter**") is to set forth certain nonbinding understandings and certain binding agreements between Puget Sound Energy, Inc., a Washington corporation, ("PSE") and the City of Redmond, Washington ("**City**") with respect to the completion of a feasibility study (as described in Attachment A) to evaluate the development of a district energy system for Overlake Village. District energy generally refers to a system of centralized heating – and possibly cooling – that can be implemented using a variety of energy sources and distribution systems. The purpose of the feasibility study is to determine which specific system configuration(s) and associated technology(ies) would be economically feasible to construct and operate in Overlake Village, while also reducing energy costs and carbon emissions (per Redmond Comprehensive Plan policy UT-73), and helping catalyze development in Overlake consistent with the area's future vision. The purpose of the study is also to recommend a preferred system (if more than one option is economically feasible), and describe the strategies and next steps for implementation.

Unless otherwise noted, references to "PSE" and "City" also apply to any sub-contractors or 3rd parties that may be involved in developing, executing, or evaluating the study on behalf of either party.

Overlake Village District Energy Concept

The City has been exploring the development of district energy concepts in conjunction with redevelopment of Overlake Village and in a manner that is consistent with the City's Climate Action Strategy. The City received via a HUD-funded Growing Transit Communities study an initial evaluation of district energy concepts by Puttman Infrastructure ("**Puttman**", see Attachment 1) and this document described the location, extent, and character of the proposed district energy zone. Generally, the proposal considers centralized heating and cooling facilities for a mixed use 175-acre area bounded by SR-520 to the north, 156th Avenue NE to the east, NE 20th Street to the south, and 148th Avenue NE on the west. The study area may be revised during development of the feasibility study – either to achieve the goal of evaluating feasibility or to leverage expandability options – if the change is discussed and agreed to by PSE and City. Puttman describes the basic district energy concepts, modeling input assumptions and methods, and concludes that the district energy proposal can potentially reduce energy use by



10% to 30%, energy costs related to heating and cooling by 10% to 50%, and carbon emissions by 15% to 45%.

PSE and City Participation

PSE is lead for the study. The City of Redmond is participating as partner, and the City reserves the right to review and comment on tasks and make decisions - together with PSE - about scenario development and analysis and the content of draft documents and final deliverables. PSE and the City desire to cooperate in the completion of a feasibility study to further evaluate the district energy concepts for Overlake Village (the "Feasibility Study"). Both parties agree to share responsibility for the execution and completion of the Feasibility Study as follows below. Specifically, the City agrees to:

1. Participate in monthly project status review and oversight meetings held at Redmond City Hall.
2. Provide available data for study, including but not limited to all data made available to Puttman, including AIM model inputs and scenario, geospatial inventory, land use, and planning data and growth projections.
3. Provide staff time and resources necessary to coordinate Feasibility Study activities and communications.
4. Pay to PSE certain costs directly incurred by PSE in its completion of the Feasibility Study, on a monthly basis, as further described under "**Costs**" below.

PSE shall be responsible for the following:

1. Execution of the Feasibility Study scope of work described in this Letter.
2. All work necessary to engage, direct and oversee all third-party contractors, vendors or consultants necessary to complete the scope of work, and the resultant integration of such persons' work products into the Feasibility Study.
3. Any costs associated with the performance of the work required to complete the Feasibility Study not otherwise defined in **Costs** below.

Project Scope, Schedule, and Budget

The Feasibility Study's scope of work will follow from the Puttman conceptual review and will include appropriate engineering analysis and economic evaluation sufficient to define the economic feasibility of implementing district energy for Overlake Village. Specifically, the scope of work includes the following:

1. Evaluation of heating and cooling loads based on land use planning data in order to determine if district energy is feasible. And also to determine which specific system configuration is preferred, the cost of building, operating and maintaining the system, who would pay the costs, phasing for development, timeline and ownership model.
2. Assessment of potential technologies for energy generation, distribution, consumption, and storage.
3. Evaluation of technical issues, costs, and regulatory issues associated with integration of an energy district with PSE's utility grid.
4. Evaluation of potential ownership structures and the potential capital and operating requirements of each.

5. This agreement does not preclude City of Redmond from engaging with other parties on District Energy, Clean Energy, and associated applications.
6. Deliverable to include a feasibility study report including implementation actions.

The scope of work, schedule, and budget is included as Attachment 2, and further describes who will participate in work activities. Work products will be co-owned by both parties as the study is developed, and after completion.

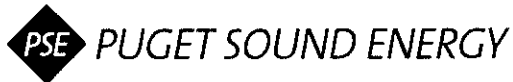
Confidentiality and Communications

PSE and the City will coordinate their respective external communications regarding the subject matter of this Letter and respective obligations arising hereunder. The parties agree that, unless and to the extent required by law, neither party will make public announcements regarding this Letter or its subject matter unless both parties consent in advance in writing to the substantive content of such statements. The intent of the preceding clause is to ensure both parties maintain a spirit of coordination prior to issuing major announcements. The intent is not to unreasonably limit both parties from discussing the project as needed to develop the study or respond to questions about the study. Some examples of public announcements are presentations at public meetings, web pages, social media posts, printed flyers or mailings, press releases, and email newsletters. The City may discuss matters related to this Letter that arise in the context of public meetings of the City so long as none of the statements made by the City or its agents are attributed to PSE without PSE's prior approval.

Except as and to the extent required by law, the City shall not disclose or use, and it shall cause its representatives not to disclose or use, any Confidential Information (as defined below) that was or is furnished by PSE or its representatives to the City or its representatives in connection herewith at any time or in any matter other than in connection with the work described in the Letter. For the purposes of this section, "**Confidential Information**" means any nonpublic information of PSE; provided that it does not include information that the City can demonstrate (i) is generally available or known to the public other than as a result of the City's improper disclosure or (ii) was obtained by the City from a source other than PSE, provided that such source was not bound by a duty of confidentiality to PSE or another party with respect to such information. If the City is required by law to make any such disclosure, it must, at a reasonably time prior to such disclosure, provide to PSE the content of the proposed disclosure, the reasons that such disclosures are required by law, and the time and place that the disclosure will be made, and agrees to cooperate with PSE as PSE requests in efforts to limit the extent and scope of such disclosure including, without limitation, establishing the applicability of any exemptions set forth in RCW 42.56.210 regarding any information otherwise subject to such disclosure.

At various stages, PSE or Redmond may wish to communicate publicly about the Study or engage other parties in discussions related to the study. Notification and contact could include press releases, community bulletins, flyers, post cards, e-newsletters, social media updates, and related meetings. These and similar public communications shall be confirmed in advance by both parties.

Use of either Party's name or logo may not be used without the other Party's permission. Also, communicating with 3rd parties (either sub-contractors or other stakeholders) may be needed to



help develop the Study. Effort should be made to ensure 3rd parties are aware of, and act consistently with, this Agreement, for example maintaining confidentiality and refraining from communicating with outside parties about the Study, unless needed for its development.

Costs

The City agrees to pay PSE an amount not to exceed of \$20,000 in five equal monthly payments commensurate with progress on milestones related to work products defined herein (the "Study Fee"). The timing and amount of each installment may be revised if discussed and agreed to by both parties.

Except for the Study Fee, the parties agree that each shall be responsible for and bear all its own costs and expenses incurred in connection with the preparation of the Feasibility Study, including those of any representatives, vendors or consultants.

Entire Agreement

This letter constitutes the entire agreement between the parties and supersedes all prior oral or written agreements, understandings or other communications between the parties on the subject matter hereof.

Governing Law; Jurisdiction; Venue

This Letter shall be governed by and construed under the laws of the State of Washington with regard to principles of conflicts of laws. The parties irrevocably consent to the jurisdiction and venue of the state and federal courts located in King County, Washington, in connection with any action relating to this Letter.

Termination

Either party may terminate this Letter by providing ten (10) business days' prior written notice of termination to the other Party. In the event of termination by the City prior to the delivery by PSE of the Feasibility Study, the City agrees to pay PSE such portion of the Study Fee, as determined by PSE in its sole discretion, reflected in the work performed and/or costs incurred by PSE on the Feasibility Study to the date of termination.

Please indicate your agreement to this Letter by signing and returning a copy of the Letter to the undersigned no later than June 15, 2014. This Letter and all of the obligations set forth herein will terminate and become void if the City has not returned a signed copy of this Letter by that time.



Very truly yours,

Puget Sound Energy, Inc.

By: _____

Name: _____

Title: _____

Date Signed: _____

Acknowledged and Agreed:

City of Redmond

By: _____

Name: _____

Title: _____

Date Signed: _____

Attachments:

1. Overlake Village District Energy Feasibility Study, Scope of Work, April 2014.
2. Overlake Village District Energy Concepts (Draft), Putman Infrastructure, November 2013.

OVERLAKE DISTRICT ENERGY FEASIBILITY STUDY**SCOPE OF WORK**

April 18, 2014

The City of Redmond, Washington ("City") and Puget Sound Energy, Inc., a Washington Corporation, ("PSE") have agreed to complete a feasibility study of the development of a district energy system in Overlake Village. "Parties" include PSE, City, and associated 3rd parties and contractors. This Scope of Work ("SOW") defines the tasks and deliverables that will be completed to produce a final feasibility study report for the City and PSE of the district energy options at Overlake Village. Upon execution of the Agreement, a steering committee will be formed, consisting of the appropriate members of all parties. The committee's role will be to facilitate communication, collaboration, technical oversight and problem-solving, direction and decision-making, and project delivery.

Overlake Village District Energy Concept – supporting the future vision

The City has been exploring district energy concepts in conjunction with redevelopment of Overlake Village that are consistent with the City's Climate Action Strategy. The City commissioned an initial evaluation of district energy concepts by Puttman Infrastructure and this document described the location, extent, and character of the proposed district energy zone. Generally, the proposal considers centralized heating and cooling facilities for a mixed use 175-acre area that is bounded by SR-520 to the north, 156th Avenue NE to the east, NE 20th Street to the south, and 148th Avenue NE on the west. Puttman describes the basic district energy concepts, modeling input assumptions and methods, and concludes the district energy proposal can potentially reduce energy use by 10% to 30%, energy costs related to heating and cooling may be reduced by 10% to 50%, and carbon emissions may potentially be reduced by 15% to 45%. This concept and associated figures are based on 2030 growth projections for Overlake Village and the urban center vision as described in Redmond's Comprehensive Plan.

The future vision for Overlake is summarized as follows:

Redmond's adopted vision for Overlake in 2030 is a thriving, dense urban neighborhood where 16,000 people live and 70,000 people work. In 2030, thousands of new residents walk from their homes to their jobs or to patronize neighborhood shops and services. Many stroll along a redesigned 152nd Avenue NE, the neighborhood's main street. Others use new streets and urban pathways established as the neighborhood is redeveloped.

The neighborhood contains three major parks, two of which also serve as regional stormwater management facilities and provide an important green contrast to surrounding urban development. Employees relax in the park refuge spaces while visitors take in live music. From the parks, one can see residents of adjacent mid-rise condominiums hosting family and friends on balconies overlooking the neighborhood and beyond.

Each day, light rail quickly and conveniently transports residents, employees, and visitors between two Overlake stations and regional destinations. For those preferring bicycles to trains, regional trails have been improved, reducing congestion at street crossings. Complete streets and new non-motorized crossings of State Route (SR) 520 make transit convenient for more people and provide new connections between Overlake Village and the Employment Area to the

north. The Overlake of 2030 succeeds as a regional hub of activity because the community at large, together with private property owners and developers, established a vision and followed through on a strategy to achieve it.

The feasibility study tasks are defined as follows. Each task represents a milestone, in which work products or deliverables are provided to all parties, with opportunity to review and comment prior to progressing to the next task. The intent is to share information, avoid needing to re-work any tasks due to lack of earlier input, and provide direction that reflects consensus among the parties.

TASK 1: DATA ACQUISITION AND QUALITY ASSURANCE

McKinstry will acquire and review planning and engineering information available from the City. McKinstry may also need to contact known private developers or property owners to determine whether district energy will realistically align with current or future private development plans. McKinstry will coordinate with the City prior to such contact with private parties.

DELIVERABLE

Data inventory and summary of planning/space use assumptions will be developed and the final will be included in the feasibility study report.

TASK 2: ENERGY USE AND ENGINEERING STUDY

PSE will hire energy service company McKinstry to determine thermal loading and energy use, conceptual design, price estimates, and infrastructure needed to build, operate and maintain the district energy system. Key information includes the location, footprint, materials and equipment associated with an energy generation and distribution system. McKinstry will provide:

1. Baseline energy consumption for code minimum development;
2. Descriptions of proposed district energy models and concepts;
3. Rough Order of Magnitude (ROM) incremental cost and energy saving estimates for each proposed model; and
4. Total Cost of Ownership Analysis including cost of ongoing maintenance of proposed systems and any incentives available in the industry.

With the results of McKinstry's analysis, PSE will provide a description of the current and planned electric grid infrastructure and natural gas infrastructure that will likely serve the District. This description will include:

1. An inventory of electric substations and gas distribution stations serving the District;
2. A capacity analysis of PSE's electric and gas infrastructure including where improvements may be required to support the District;
3. A reliability assessment of the electric grid serving the District; and
4. Key engineering considerations around siting electric and gas facilities in and around the District.

DELIVERABLE

A written summary of McKinstry's and PSE's analyses will be developed and the final will be included in the feasibility study report. All parties will collaborate on the development of the scenarios in Task 6 as needed, and appropriately utilize the conclusions of their analyses.

TASK 3: TECHNOLOGY ASSESSMENT

District energy has potential for furthering Redmond's vision for Overlake and the City's Climate Action Strategy. PSE will perform a technology assessment for the District to consider for inclusion into the scenarios. This assessment will consider the suitability and applicability of the following categories of technology:

1. Generation technologies (such as natural gas, geothermal, waste heat capture, solar, or other) for on-site distributed generation including combined heat and power technologies that might support the District Energy plant;
2. Distribution Automation solutions to support enhanced reliability through automation of fault detection, fault isolation and restoration;
3. Demand Response technologies that support shaving load during particular events, to facilitate better peak load management and impact on the grid serving the site;
4. Smart Meter and Advance Meter Infrastructure solutions to provide enhanced energy use information for consumers and load management capabilities;
5. Energy efficiency/conservation technologies and incentive programs for new construction;
6. Electric vehicle integration;
7. Energy storage technologies; and
8. Renewable Energy Credits.

For each of these categories of technologies, PSE will research the types of solutions available, the market readiness and adoption of these technologies, and how they could be used to meet the purpose as stated in the opening paragraph of the Agreement.

DELIVERABLE

A summary of the technology assessment will be developed and the final will be included in the feasibility study report. Conclusions from the technology assessment will be utilized in development of the scenarios in Task 6.

TASK 4: UTILITY INTERCONNECTION AND REGULATORY ANALYSIS AND REVIEW

PSE will evaluate how the District can connect and participate in the utility grid. This evaluation will consider interconnection for district energy developments, distributed generation as well as interconnection for residential and commercial facilities. This evaluation will provide an analysis of the following:

1. PSE's existing rate schedules and tariffs and a discussion of the different options for interconnecting importing and exporting loads under existing tariffs;
2. WUTC rules as they apply to district energy developments; and
3. FERC, State, and WUTC rules governing ancillary services provided by generators and their applicability to generation projects the District might consider.

PSE anticipates that the District may want to consider some interconnection scenarios that may not fit within PSE's current tariffs and/or the WUTC rules for utilities. In collaboration with the City, PSE will also participate in a discussion around changes to tariffs that might be considered to better optimize the interconnection for the District.

DELIVERABLE

A written summary of the interconnection and regulatory analysis will be developed and the final will be provided in the feasibility study report. Any recommendations will be used to guide the scenario development.

TASK 5: OWNERSHIP STRUCTURES AND FINANCING METHODS EVALUATION

Sound Energy Investments will identify and evaluate public, private, or a combination thereof ownership structures. Parties will meet in advance to discuss options for consideration and to ensure coordination. Purpose is to identify future costs and potential revenues for the City and other parties related to capital investment, operations, and maintenance. This evaluation will include the following:

1. Define general segmentation and points of demarcation of District Energy assets – identify how new facilities and infrastructure might be organized based on recommended Public, Private or P3 ownership models;
2. Describe stakeholder responsibilities and potential risks based on ownership models;
3. Describe potential public funding mechanisms and possible private financing methods; and
4. An assessment of possible revenues and costs from new District Energy facility.

DELIVERABLE

A written summary of potential ownership structures and financing methods will be developed and the final will be provided in the feasibility study report. Any recommendations will be used to guide the scenario development.

TASK 6: SCENARIO DEVELOPMENT

For tasks 6-8, the objective is to identify model scenarios, analyze their implications and economic feasibility, and form a preferred recommendation and next steps. For Task 6, PSE will lead the development of model scenarios for evaluation in collaboration with McKinstry, Sound Energy Investments and City. Scenarios will include combinations of technology assemblages and prospective ownership structures, including responsible party demarcation, primary implementation actions, potential risks, and one-time investment vs ongoing operational costs. Scenarios will be consistent with the desired land use, expected rate and location of growth, and timing for planned capital investments, and may include a range of slow vs fast rates of growth. Scenario analysis will also determine whether policies and regulations for the City or other entities are supportive, and recommend potential amendments as needed.

DELIVERABLE

A written summary of all scenarios considered in the Study will be included in the feasibility study report. A presentation to the Steering Committee will include the set of scenarios eligible for further analysis.

TASK 7: SCENARIO ANALYSIS AND DISCUSSION

PSE will evaluate the model scenarios and provide an assessment relative to total cost to develop and operate, energy consumption, carbon emissions and implementation feasibility. The modeling results will be summarized in scorecard form, including initial capitalization and possible funding options based on stakeholder segmentation. The analysis will identify and evaluate potential implementation issues, including risks and possible mitigation strategies, and recommend next steps for development, implementation, and future operation.

DELIVERABLE

The full analysis will be developed and presented to the Steering Committee. The final will be included in the feasibility study report.

TASK 8: FEASIBILITY STUDY REPORT

PSE will lead the development of the Draft and Final Feasibility Study Reports which will recommend the optimal and most realistic path forward, and associated policy and code updates, as well as needed investments, preferred technologies, energy generation and distribution system, and layout. The feasibility study report will be a collaborative effort of all parties involved in the study. Recommendation will be presented as a draft action plan, available for review and comments and, once finalized, issued as a final report.

DELIVERABLE

Draft and Final Feasibility Study Reports will be provided to the City as well as a presentation to the Steering Committee.

TIMELINE

PSE is responsible for coordinating between all parties involved in this Study and will provide monthly status report to the City. Schedule shall be further developed during kick-off meeting, and may be amended over the course of the Study as agreed upon by the City and PSE.

The goal is to complete the project in 2014. If additional time is needed, both parties will agree to a new target. Once the Agreement is executed, parties shall hold a pre kick-off meeting to develop a set of milestone dates, consistent with task development and other constraints either party may have.



Memo

Puttman Infrastructure, Inc.
620 SW Fifth Avenue, Suite 1007
Portland, OR 97204 USA
P +1 503 224-3454

www.puttman.com

RE: Overlake Village District Energy Concepts (DRAFT)

BACKGROUND AND PROJECT OBJECTIVE

AS PART OF THE EAST CORRIDOR IMPLEMENTATION SUPPORT PROJECT FOR THE GROWING TRANSIT COMMUNITIES PARTNERSHIP, AN EVALUATION OF THE POTENTIAL FOR IMPLEMENTING DISTRICT ENERGY IN THE OVERLAKE VILLAGE STATION AREA WAS CONDUCTED BY THOMAS PUTTMAN OF PUTTMAN INFRASTRUCTURE. DISTRICT ENERGY IS VIEWED AS A POTENTIAL OPPORTUNITY TO CREATE A MARKET ADVANTAGE FOR NEW DEVELOPMENT IN OVERLAKE VILLAGE, AND AS SUCH, COULD BECOME A CATALYST FOR URBANIZING THE NEIGHBORHOOD AS ENVISIONED IN THE ADOPTED NEIGHBORHOOD PLAN. IMPLEMENTING GREEN TRANSIT ORIENTED DEVELOPMENT, INCLUDING DISTRICT ENERGY AS PART OF THE MIX, CREATES MULTIPLE SOCIAL, ENVIRONMENTAL AND ECONOMIC (PEOPLE, PLANET, PROSPERITY) BENEFITS. AN EXPLORATION OF THESE BENEFITS IS ADDRESSED IN A SEPARATE DELIVERABLE MEMORANDUM FOR THE EAST CORRIDOR IMPLEMENTATION SUPPORT PROJECT, *BENEFITS OF GREEN TRANSIT ORIENTED DEVELOPMENT*.

The objective of the preliminary evaluation presented in this memorandum was to explore the value proposition of developing a district energy system for Overlake Village. This memorandum should be considered a supporting document to the Overlake Village District Energy Concepts powerpoint presentation provided by Puttman Infrastructure, Inc. (see attached).

Focusing on Overlake Village, this preliminary evaluation has been organized into the following sections:

1. Potential District Energy Value Proposition
2. District Energy Implementation Recommendations

The findings and recommendations of this evaluation should be considered preliminary in nature. Additional evaluation should be conducted to further validate these findings and recommendations (see Section 2 for next steps).

POTENTIAL DISTRICT ENERGY VALUE PROPOSITION

Overlake Village Overview and Development Assumptions

Located in the City of Redmond, Washington, Overlake Village is the mixed-use heart of the Overlake urban center as identified in the Overlake Master Plan & Implementation Strategy (City of Redmond, 2007). At 175-acres the district is bounded by SR-520 to the north, 156th Avenue NE to the east, NE 20th Street to the south, and 148th Avenue NE to the west. An exhibit of the potential build out of Overlake Village is provided on Slide 2 of the powerpoint presentation.

Projected 2030 development assumptions for Overlake Village, based on transportation analysis zones overlapping Overlake Village, were provided by the City of Redmond as follows (summarized on Slide 2 of the powerpoint presentation):

Office:	1,610,224 SF (22%)
Retail:	1,113,369 SF (15%)
Institutional:	7,163 SF (<1%)

Memo

Hotel:	99,812 SF (1%)
Residential (multi-family):	4,364,500 SF (61%)
Total:	7,195,068 SF (100%)

NOTE: All projected development within the district is assumed to be new development. It should be noted that development assumptions did not include current development specific plans for the GroupHealth/Capstone site located in the NE corner of the district. The reason this area was excluded is that it was thought development plans may be too far along to begin to integrate district energy at that site or to bring the site into the fold of a larger district. However, if that assumption were to change, it is anticipated that integration of the GroupHealth/Capstone site would result in the same potential value proposition as the rest of area covered in this analysis. All development assumptions were based on full build out per the assumptions noted above. A deeper assessment of the future development potential for Overlake Village should be conducted as district energy feasibility efforts progress.

Overlake Village Energy Use, Cost and Carbon Estimates

For each land use type identified in the development assumptions above, energy use intensity factors (EUIs) were established to estimate annual energy consumption. As Overlake Village is envisioned to be a green development, EUIs typical of green building in the Puget Sound region were utilized. As a result, future annual energy use for Overlake Village was estimated as follows (summarized on Slide 4 of the powerpoint presentation):

Office:	104,665 MMBtu/year (27%)
Retail:	53,442 MMBtu/year (14%)
Institutional:	401 MMBtu/year (<1%)
Hotel:	6,787 MMBtu/year (2%)
Residential (multi-family):	218,225 MMBtu/year (57%)
Total:	383,520 MMBtu/year (100%)

Multi-family residential and office will generate the majority of energy use within Overlake Village at almost 84% of the energy use estimated because they make up over 80% of the development assumed for the district.

Further assessing energy use for each land use type allows thermal and non-thermal energy uses to be identified. Thermal uses include building heating and cooling while non-thermal energy use includes elements such as lighting, air movement, and plug loads. As a result, thermal energy use for Overlake Village was estimated at 49% of the total energy use for the district and non-thermal was estimated at 51%. Further refinement of energy use allows estimated thermal energy use to be distributed into energy used for building heating (92%) and energy used for building cooling (8%). As a result, building heating and cooling energy use, cost and carbon emissions were estimated as follows:



Memo

Future Estimated Annual Heating Energy Summary

Energy Use:	1,454,988 therms
Cost:	\$480,146
Carbon:	9,748 tCO ₂

Future Estimated Annual Cooling Energy Summary

Energy Use:	3,817,695 kWh
Cost:	\$343,593
Carbon:	1,985 tCO ₂

Overall, annual energy use for building heating and cooling is estimated at over 145,000 MMBtu/year with a cost of approximately \$823,000/year and carbon emissions of 11,734 tCO₂/year. This summary will be consider the "business-as-usual" (BAU) scenario as it represents the performance and cost of conventional building with in-building heating and cooling systems. Please note that all cost estimates are represented in 2013 dollars.

District Energy Overview

District energy is a highly efficient solution to produce and distribute thermal energy at a local scale. Not only are transmission losses reduced from conventional centralized utilities but opportunities for recovered thermal load are also realized as well as the potential for future fuel switching to further reduce carbon emissions (see Slide 6 of the powerpoint presentation for further information). As a result, district energy systems allow for enhanced energy efficiency, reduced cost and reduce carbon emissions at a district scale when compared to conventional in-building heating and cooling systems.

Traditional district energy systems are comprised of a central plant to generate heating and cooling energy typically with natural gas boilers (heating) and electric chillers (cooling), a distribution network to supply heating (2-pipes) and cooling (2-pipes) energy to buildings throughout the district, and energy transfer stations at each building to provide heating and cooling thermal energy to building systems (slide 7 provides a diagram of a typical district energy system).

Although more common in Scandinavian and other northern European countries, district energy is not new in the United States. Currently, there are over 700 district energy systems in the United States today. District energy has been increasingly viewed by environmentally and fiscally progressive communities in North America as a more effective energy solution – from a performance, cost and carbon reduction perspective – than convention in-building heating and cooling systems. Advances in more sustainable city development, most notably catalyzed by the EcoDistrict concept, focuses the need for district infrastructure systems like district energy to further accelerate sustainability in the built environment. (See more about EcoDistrict potential at the end of this memorandum.)



Memo

District Energy systems similar in nature to what would be considered for Overlake Village include South False Creek (Vancouver, BC), Docksider Green (Victoria, BC), Regent Park (Toronto, ON), The Brewery Blocks (Portland, OR), and The Round (Beaverton, OR). New district energy systems are being implemented in Los Angeles, San Francisco, Eugene, Portland, Seattle and Bellingham just on the west coast alone. Some examples of these projects are provided on Slides 8-10 of the powerpoint presentation.

District Energy and Overlake Village

From an energy efficiency, cost and carbon emissions perspective, would district energy make sense in Overlake Village? To answer this question, two conceptual district energy options were established as follows:

Option A – District Energy

District Energy Option A includes a central plant located in the middle of the district to simplify distribution network piping. The central plant is assumed to be located within a building to avoid the need for a stand-alone central plant building that would not fit with the desired urban village vision of Overlake. The central plant would include a natural gas boiler(s) and electric chiller(s) to produce heating and cooling energy for all the buildings in the district. Based on other systems of similar scale to Overlake Village, the footprint of the central plant would likely be around 20,000-30,000 SF. Distribution piping for heating (2-pipe) and cooling (2-pipe) has also been identified. See Slide 11 for further detail.

Option B – District Energy with Geothermal

The efficiency of Option A could be further enhanced with the addition of a ground-source geothermal system to reduce the natural gas and electricity requirements to produce the same amount of heating and cooling energy. District Energy Option B builds on the same central plant and distribution network identified in Option A but includes an open-loop geothermal system. An open loop geothermal system utilizes constant temperature groundwater as a thermal supply input to the central plant. The open loop system would likely include one production well and two reinjection wells. See Slide 12 for further detail.

NOTE: Open Loop vs. Closed Loop Geothermal Options

Both open loop and closed loop geothermal options were considered; however, due to the intensity of development anticipated for Overlake Village a closed loop system, which requires much greater open space than what is available in Overlake, is not likely feasible at a scale that would significantly benefit the district energy system.

Open loop is not without its regulatory and technical challenges however. Further evaluation from a regulatory and technical perspective should be con-

ducted to further assess the viability of open-loop geothermal for Overlake Village.



Memo

Puttman Infrastructure's proprietary AIM Model (Assess to Invest) was utilized to analyze the performance of each district energy option allowing each option to be compared to each other based on City of Redmond defined criteria including energy use, energy cost and carbon emissions. Moreover, AIM allows proposed district energy options to be compared to the BAU option (i.e., in-building heating and cooling systems).

The results from the preliminary AIM Model evaluation are summarized below (see Slide 14 of the powerpoint presentation):

Heating and Cooling Energy Use

BAU:	145,499 MMBtu/year
DE Option A:	126,521 MMBtu/year
DE Option B:	101,217 MMBtu/year

Heating and Cooling Energy Cost

BAU:	\$823,738/year
DE Option A:	\$700,178/year
DE Option B:	\$350,089/year

Heating and Cooling Energy Carbon Emissions

BAU:	11,734 tCO ₂ /year
DE Option A:	9,974 tCO ₂ /year
DE Option B:	7,040 tCO ₂ /year

From an energy efficiency, cost of energy, and carbon emissions perspective, implementing district energy in Overlake Village appears to have clear benefits as compared to conventional development with in-building heating and cooling systems. Energy used for heating and cooling was estimated at approximately 10-30% less than BAU. Heating and cooling related energy costs were estimated at 10-50% less than BAU. Carbon emissions associated with heating and cooling energy production were estimated at 15-40% less than BAU. See slide 14 of the powerpoint presentation for more detail.

Heating Dominated Energy Use

With 92% of thermal energy use associated with heating, Overlake Village would be considered a heating dominated district creating good opportunity for a district heating system to supply heat to building within the district cost effectively. For a cooling perspective, at only 8% of thermal energy use, Overlake Village likely lacks the cooling load to justify a district cooling system. Redmond could consider a heating only district energy system.



Memo

DISTRICT ENERGY IMPLEMENTATION RECOMMENDATIONS

Clearly, the value proposition for implementing district energy in Overlake Village is positive. But how are district energy systems developed? What are the next steps the City of Redmond should take to catalyze district energy in Overlake Village? The next sections of this memorandum explore potential answers to these questions.

District Energy Development Models

There are four development models under which district energy is implemented. In the case of Overlake Village, the public development model assumes the City of Redmond would finance, develop and operate the district energy system. Under the private development model, the City of Redmond would engage with a third party, district energy provider to finance, develop and operate the district energy system. A public private partnership development model would be used to leverage the expertise of a third party district energy provider with the low cost financing, public engagement, and policy development capacity of the City of Redmond to finance, develop and operate a district energy system. A cooperative development model would require Overlake Village property developers and owners to come together, typically creating a new non-profit company, to finance, develop and operate a district energy system.

Each model is summarized below and further summarized on Slide 15 in the power-point presentation.

Public Development Model

Ownership:	Public
Funding:	Public
Design/Build/Permit:	Public
Operations:	Public
Customer Relationships:	Public

Private Development Model

Ownership:	Private
Funding:	Private
Design/Build/Permit:	Private
Operations:	Private
Customer Relationships:	Private

Public Private Partnership Development Model

Ownership:	Public/Private
Funding:	Public/Private
Design/Build/Permit:	Private
Operations:	Private
Customer Relationships:	Private

Cooperative Development Model



Memo

Ownership: Property Owners via Non-Profit Company
Funding: Property Owners via Non-Profit Company
Design/Build/Permit: Property Owners via Non-Profit Company
Operations: Property Owners via Non-Profit Company
Customer Relationships: Property Owners via Non-Profit Company

Recent district energy development efforts in Portland, Oregon and Seattle, Washington initially began as private development models where the city engaged with a third party district energy provider through a competitive, public procurement process. However, based on the results of these initial efforts, it became evident that the third party district energy providers needed some type of partnership with cities – either financially or policy wise – to ensure commercial viability for the district energy system. As a result of these recent efforts, it is recommended that the City of Redmond pursue a public private partnership (P3) development model to implement district energy in Overlake Village.

A P3 development model for district energy in Overlake Village would require the City of Redmond to engage with an experienced third party district energy provider (DE Provider). The terms of the P3 would likely include the following:

Overlake Village DE P3 Development Model (Example)

Ownership:	City/DE Provider
Funding—	
Central Plant:	DE Provider
Distribution Network:	City
Design/Build/Permit—	
Design/Build:	DE Provider
Permit:	DE Provider
Policy Support:	City
Operations:	DE Provider
Customer Relationships:	DE Provider

The City and DE Provider would jointly own the district energy system. Each partner would be responsible for financing specific components of the system consistent with financial return needs and risk profiles. This would likely result in the City financing the distribution piping network – to be constructed with public street improvements – and the DE Provider financing the central plant – based on the timing of heating and cooling energy growth within the district. The DE Provider, utilizing their expertise and experience, would design/build/permit the system as well as operate and manage customer relationships. The City would support system development through the creation of support policies such as mandatory connection requirements for each building developed in the district to connect to the district energy system. Revenue generated from the district energy systems would be shared by the City and DE Provider based on the capital and risk invested into the system.



Memo

Other Partner/Stakeholder Engagement

In addition to the P3 development model recommended above, it will also be important to engage with key stakeholders early in the district energy system development process to ensure support. These stakeholders include:

- Property Developers/Owners – Early in the process, property developers and owners should be engaged with to ensure system acceptance. Particularly outreach should be made to Microsoft as its adjacent campus and employees are such a significant presence in Overlake Village.
- PSE (electricity and natural gas) – Puget Sound Energy should be engaged early to help shape system development, including potential incentives and other forms of support.
- Regulators (Washington UTC) – The Washington Utility and Transportation Commission (UTC) should be engaged early as well to understand permitting requirements including specific requirements of the UTC related to developing district energy systems under a P3 development model.
- Local NGOs – Local non-profits should be engaged to foster support for the district energy system as a means to accelerate sustainability nationally and in the Puget Sound region and Redmond.

District Energy Implementation

Development will drive district energy implementation in Overlake Village. The following steps should be considered to ensure district energy is ready to meet the energy demands of future development when it comes:

1. District Energy Feasibility Evaluation (Consultant Cost = \$200,000, Staff Cost TBD, Timeframe = 9-12 months)
A detailed district energy feasibility evaluation should be conducted to refine the value proposition for district energy in Overlake Village including:
 - Energy, cost and carbon savings.
 - DE system options (including technologies and distribution networks)
 - Detailed cost estimate
 - Cost of energy service comparison (BAU vs. DE with various options)
 - DE utility development model refinement including roles and responsibilities for public and private partners.
 - Identification of key “enabling strategies” to ensure DE system development (i.e., mandatory connection policies).
2. Preliminary Go/No Go Decision (Consultant Cost = \$0, Staff Cost TBD, Timeframe = 2 months)
Based on the findings of the feasibility evaluation, City Council makes a go/no go decision to engage with a third party district energy provider and makes preliminary commitment of capital for distribution network piping.



Memo

3. Third Party District Energy Provider Selection (Consultant Cost = \$0, Staff Cost TBD, Timeframe = 2-3 months)
City to develop and issue an RFQ to select a third party DE provider. Based on experience with other cities, this effort will probably take about 2-3 months to develop the RFQ including internal review and approval, issue the RFQ, review responses and make a selection (with or without interviews).
4. District Energy Evaluation Refinement and Initial Agreements (Consultant Cost = \$0, Staff Cost TBD, Timeframe = 6 months)
Once the DE Provider is selected, an initial MOU will be established between the City and DE Provider to outline requirements for further evaluation including go/no go decision criteria. Refinement efforts will focus on commercial viability (i.e., cost of service acceptable to building owners, investment requirements acceptable to City and DE Provider).
5. Final Go/No Decision (Consultant Cost = \$0, Staff Cost TBD, Timeframe = 2 months)
Based on the go/no go criteria identified in Step 4, City and DE Provider to make go/no go decision.
6. District Energy Development (Consultant Cost = TBD, Staff Cost TBD, Timeframe = 18 months)
DE Provider to design, permit and build district energy system.
7. District Energy Operations (Cost = TBD, Time = Ongoing)
DE provider to operate district energy system.

Overall, development of district energy based on the preliminary implementation schedule identified above should take around three (3) years.

EcoDistrict Development Potential and Application to Other Station Areas, Including 130th Avenue NE

According to the EcoDistricts organization based in Portland, Oregon (formerly the Portland Sustainability Institute), accessible at EcoDistricts.org, more people live in cities than ever before, and development of EcoDistricts provides the opportunity to address several pressing challenges and our world urbanizes. EcoDistricts represent a shared vision for creating sustainable cities from the neighborhood scale up centered on these values:

- Neighborhoods are building blocks of sustainable cities.
- Everyone deserves to live in a healthy, safe, connected, and vibrant neighborhood.

Memo

- Economic opportunity, community well-being, and ecological health are fundamental ingredients for sustainable neighborhoods and cities.
- Neighborhood sustainability requires a new model for action—rooted in collaboration and inclusion—to co-create innovative district-scale projects.
- Organization—the EcoDistricts board and staff—is committed to meeting the mission and reflecting the diversity of the clients and communities served.

What is an EcoDistrict?

An EcoDistrict is a new model of public-private partnership that emphasizes innovation and deployment of district-scale best practices to create neighborhoods of the future—resilient, vibrant, resource efficient, and just. Some common components of EcoDistricts are listed in the graphic below and further described in the document *The EcoDistricts Framework*, May 2013, prepared by EcoDistricts (attached).

EcoDistrict Projects

EcoDistrict projects can take many forms, depending on the unique characteristics of a neighborhood and a community's priorities. Examples of potential projects include:

• Smart grid	• Tree planting campaigns
• District energy and water management	• Transportation demand management
• Bike sharing	• Car sharing
• Rainwater harvesting	• Bike lanes
• Green streets	• Sidewalk improvements
• Zero waste programs	• Urban agriculture
• District composting	• Public art
• Waste to energy	• Green maps
• Safe routes to schools	• Multi-modal transit

Source: The EcoDistricts Framework—Building Blocks of Sustainable Cities

EcoDistricts should include as many of these components as possible, and in the case of the East Corridor transit oriented neighborhoods being planned in Overlake Village and the BelRed corridor, many of these are already being implemented.

Applicability to the East Corridor

Overlake Village and the BelRed Corridor, including the 130th Avenue NE and 120th Avenue NE station areas represent potential opportunities for EcoDistrict implementation

Memo

because wide scale district redevelopment to create vibrant urban neighborhoods is envisioned in these areas. Additionally, the City of Redmond's adopted plan and code provisions for Overlake Village and the City of Bellevue's adopted plan and code provisions for the BelRed already call for many of the components recognized as eco-friendly and relevant to EcoDistricts. In these proposed new districts, some of these components that are considered to be EcoDistrict relevant are required by the cities of new development, while others are voluntary. For example, district energy implementation is one of these key components, but district energy is not required by code. While there is not a specific formula of requirements for EcoDistrict designation and there appears to be some flexibility in how EcoDistricts are recognized, every effort should be made to achieve net zero energy efficiency—as one goal of the program. (Refer to the attached *Framework* document.)

An immediate priority in pursuing formal EcoDistrict designation for either Overlake Village or the 130th Avenue NE station area (or the BelRed corridor as a whole) would be to coordinate with the EcoDistricts organization to confirm how districts can be formed, the advantages of designation, and the implications on potential redevelopment. Again, according to EcoDistricts, urban development leaders from mayors to universities to affordable housing providers see EcoDistricts as a powerful way to address many of the pressing challenges faced in today's world such as climate change, neighborhood degradation, the need to improved health and expanded transportation choices in our communities, and the importance of offering a high quality of life in our cities. In order to facilitate policy-making at the leadership level in both areas, it will be important to clearly explain the economic, environmental, and social benefits achieved through EcoDistrict designation and how these benefits apply to the private sector as well as local governments. As such, it is highly recommended that if either city is interested in moving forward toward EcoDistrict formation, the first step would be a full study of implementation feasibility that would quantify the full-scale benefits, similarly to how this memorandum has quantified the value proposition for implementing district energy in Overlake Village.

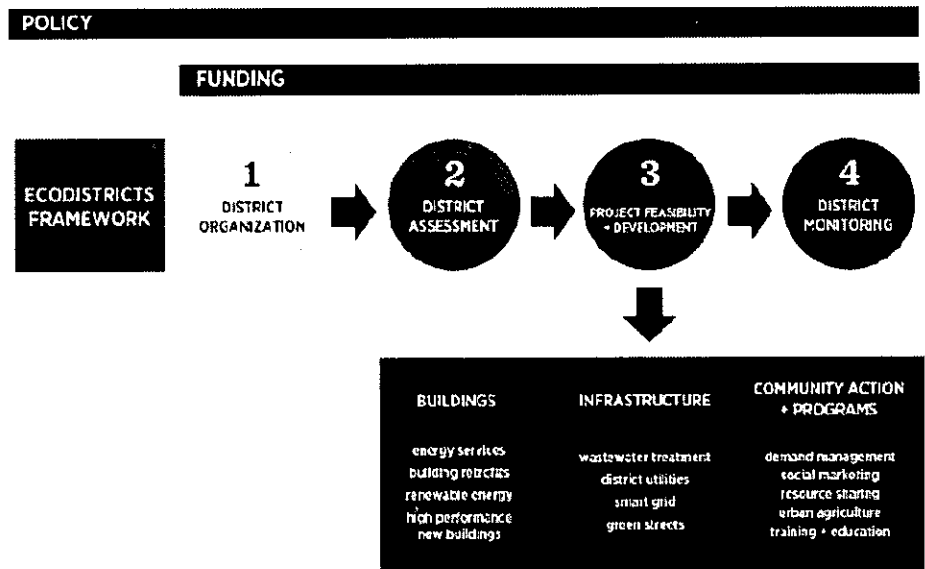
One of the key benefits of implementing EcoDistricts is the potential to create a market advantage. More home buyers and renters are demanding to live in walkable, environmentally-friendly urban neighborhoods and in homes where long-term energy and life-cycle costs are lower.

The graphic on the next page depicts the process of EcoDistrict formation. As shown, important principles of EcoDistrict development include establishing a policy with leadership support; organizing and assessing the district; implementing improvements at the site/buildings, infrastructure, and community programs levels; and then ongoing monitoring of district performance. A challenge is obtaining the support and commitment of property owners in the district for implementation. In both the Overlake Village neighborhood and BelRed corridor, there are multiple property owners and some who have already moved forward with redevelopment plans for their sites. Most of the basic principles of EcoDistrict development exist within these proposed developments,

with the exception of district energy, but perhaps future projects could include retrofitting these sites to connect them to district energy systems.

Memo

THE **EcoDistricts** APPROACH



Source: *The EcoDistricts Framework—Building Blocks of Sustainable Cities*

The EcoDistricts organization brings together innovative practitioners and policy makers, providing a clearinghouse of information and resources to support EcoDistrict implementation regionally, nationally, and internationally. The organization sponsors an EcoDistrict Summit each year as a key outreach activity. Refer to Ecodistricts.org for additional information.

Attachments:

1. Slide Show - Overlake Village District Energy Concept



PROJECT:

OVERLAKE VILLAGE DISTRICT ENERGY CONCEPT

LOCATION:

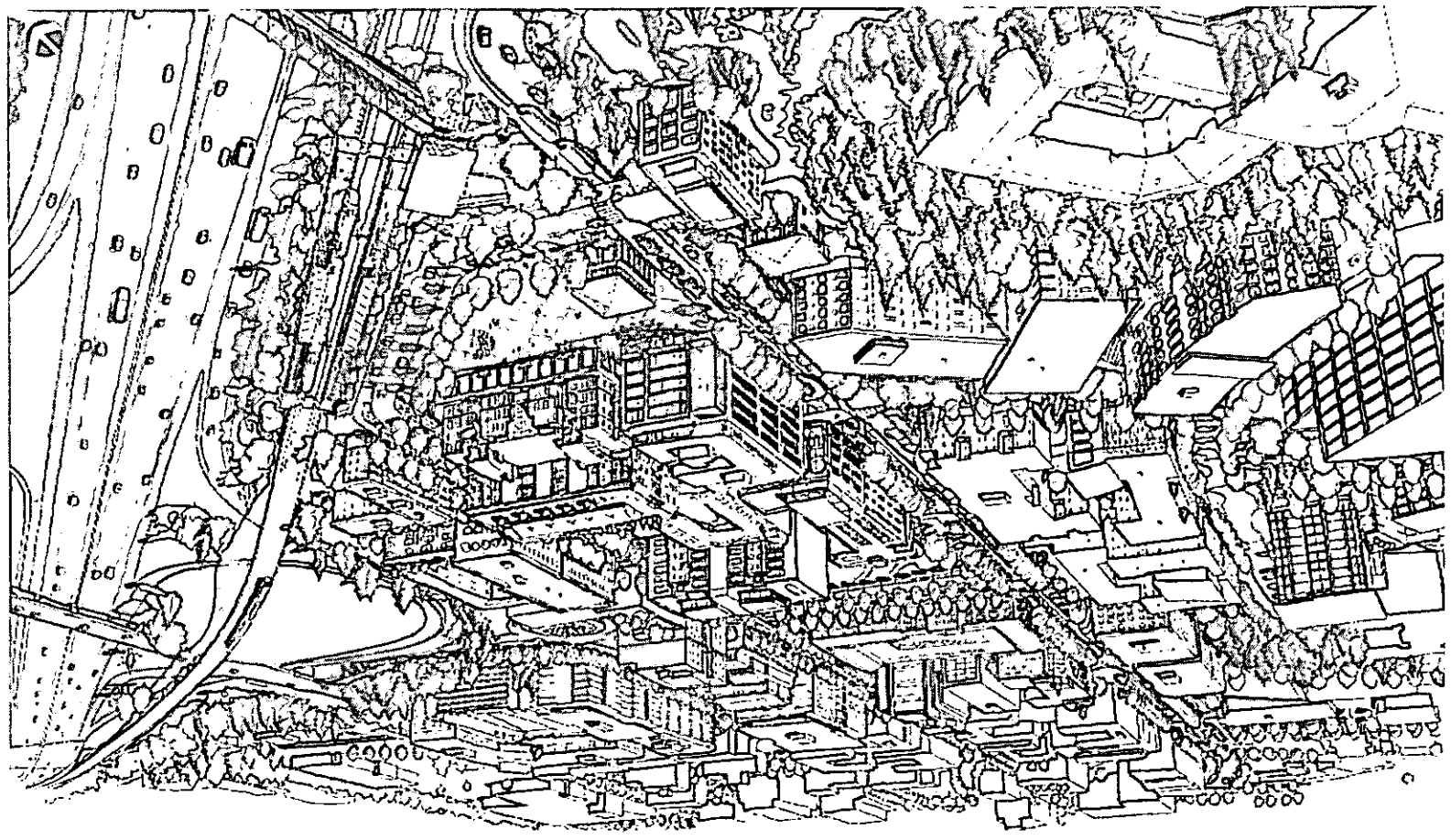
REDMOND, WASHINGTON USA

DATE:

NOVEMBER 2013

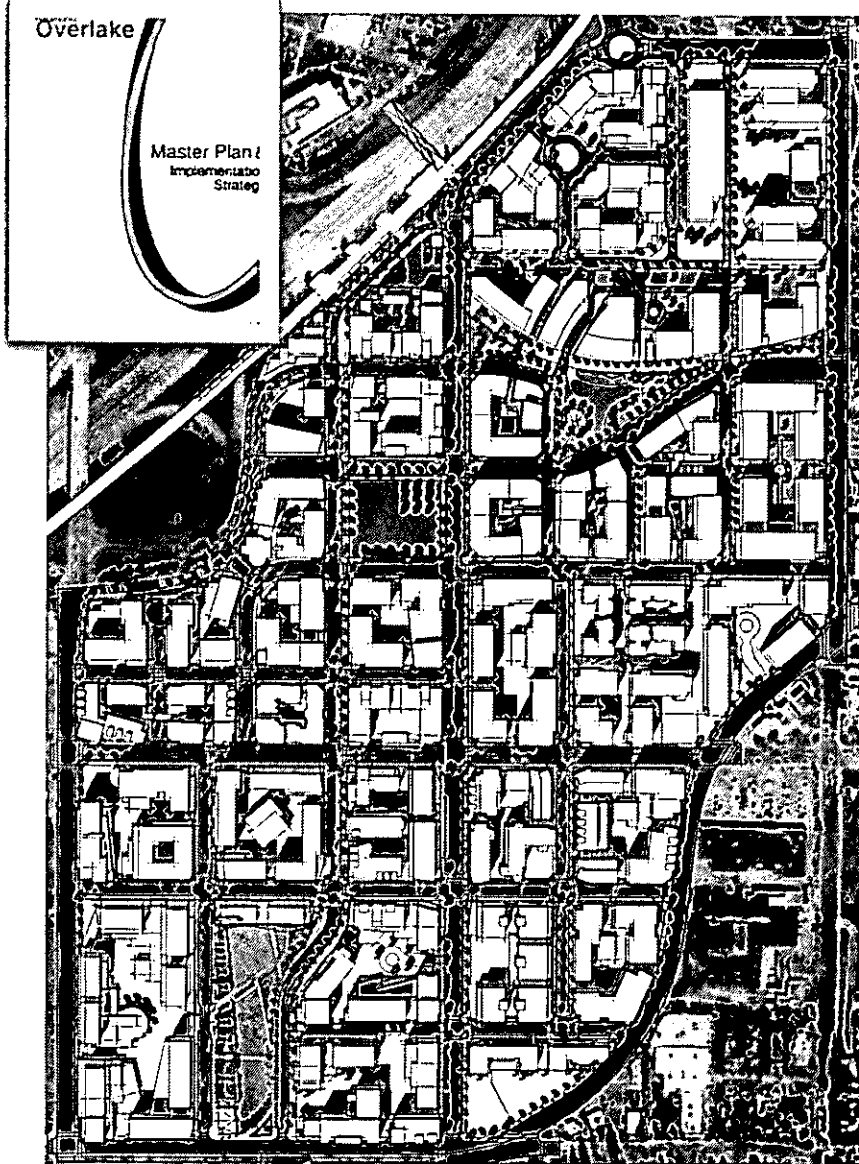
Visualization - Final Phase
May 27, 2011

CRANDALL ARAMBULA
Residential Architecture Group

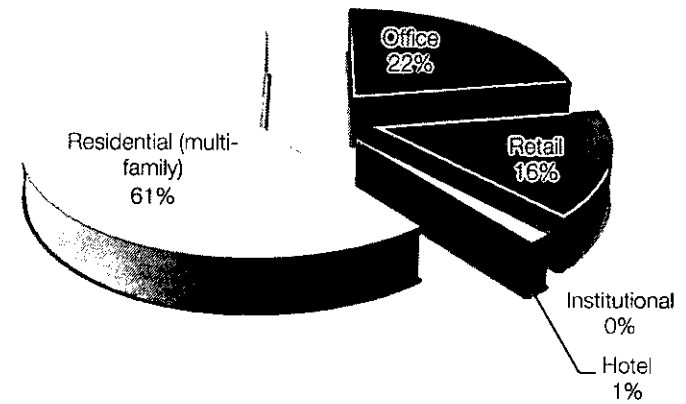


OVERLAKE VILLAGE

DEVELOPMENT



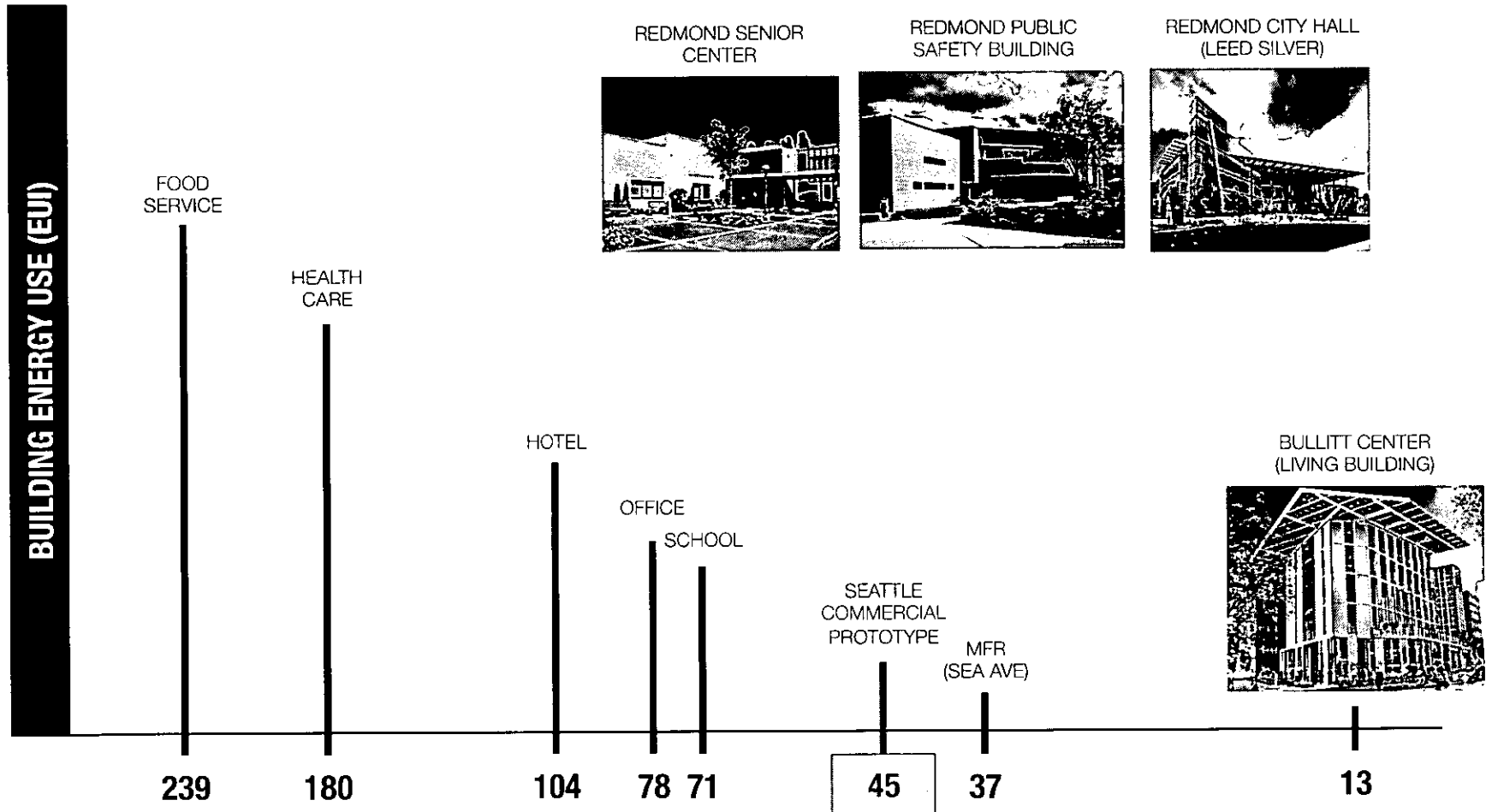
2030 Development Assumptions



Land Use	Area	Units	%
Office	1,610,224		22%
Retail	1,113,369		15%
Institutional	7,163		0%
Hotel	99,812		1%
Residential (multi-family)	4,364,500	4,988	61%
Total	7,195,068		100%

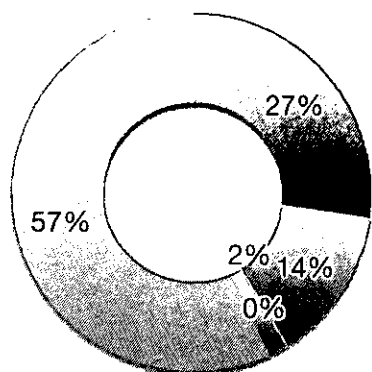
BUILDING PERFORMANCE

Energy Use Intensity (EUI) = kBTU/sf year



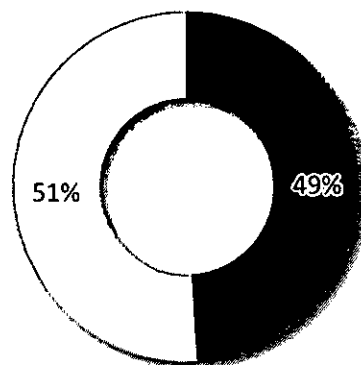
ENERGY DEMAND PROJECTIONS

Energy Use Distribution



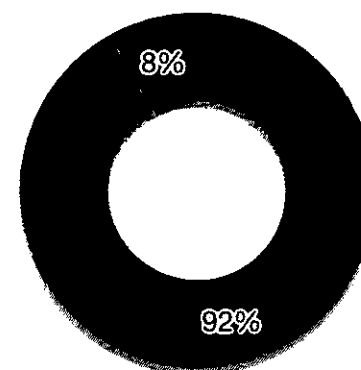
- Office
- Retail
- Institutional
- Hotel
- Residential (multi-family)

Thermal Energy Distribution



- Thermal
- Non-Thermal

Heating and Cooling Distribution



- heating
- cooling

FINDINGS

- Total annual energy demand estimated at 383,520 MMBtu.
- Residential and office make up over 75% of the district.
- Almost 50% of projected energy use is related to thermal energy (ie, heating and cooling).
- Heating dominated district with 92% of thermal demand.

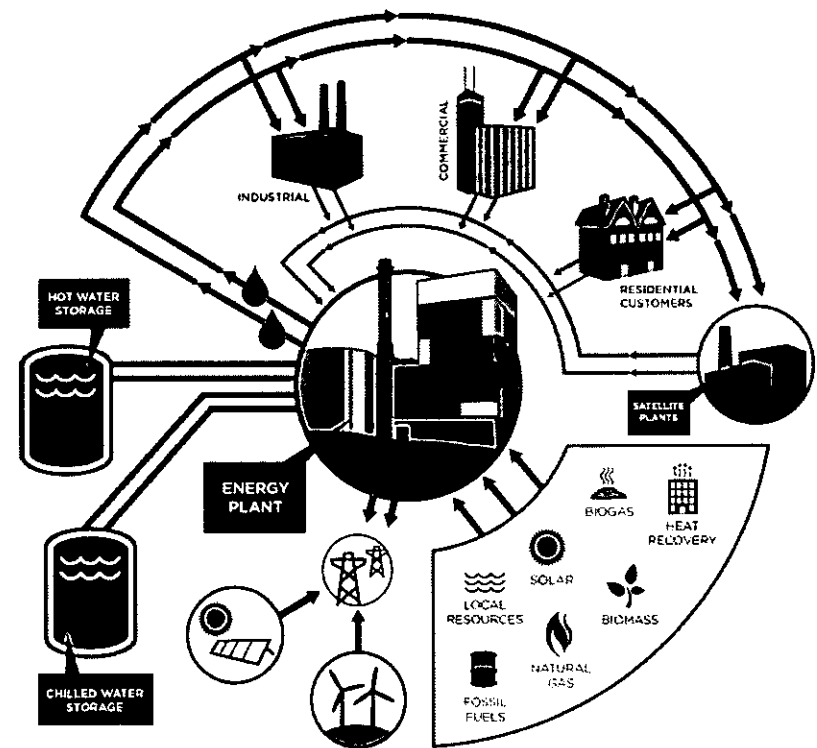
WHY DISTRICT ENERGY?

DISTRICT ENERGY

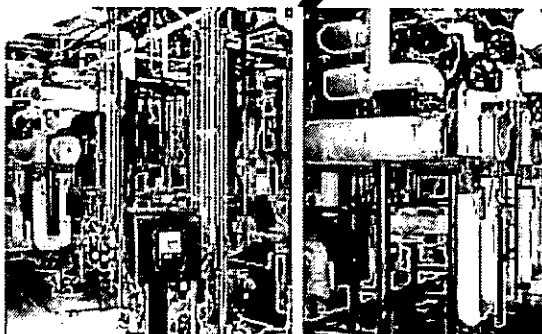
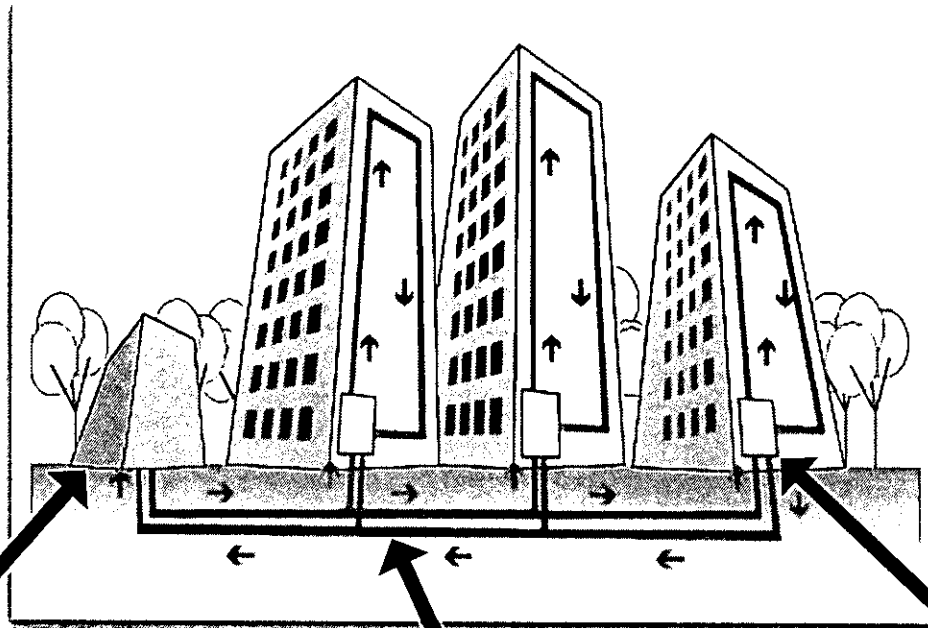
- District energy is the local production and distribution of thermal energy.
- It is a highly efficient means of providing locally generated thermal energy for heating and cooling homes, commercial and institutional buildings, and industrial processes.
- District energy systems are comprised of two main elements: central plant and distribution network.

WHAT THE FUTURE HOLDS

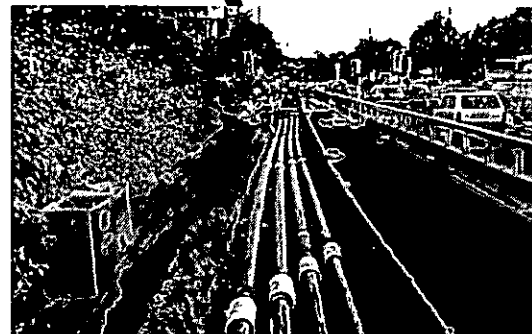
- More efficient use of resources
- Community-based economic engine
- Safe, secure and reliable energy
- Affordable, high-quality thermal services
- Attractive local environments
- Livable towns and cities



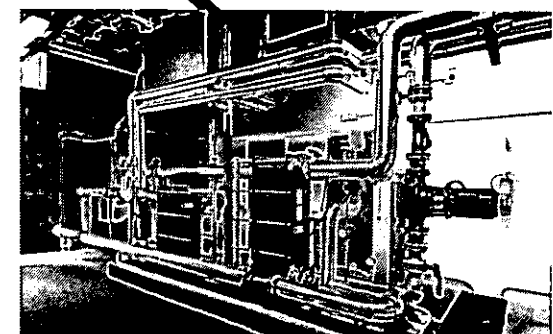
DISTRICT ENERGY SYSTEM



CENTRAL PLANT
Plant Integrated into Building



DISTRIBUTION PIPING



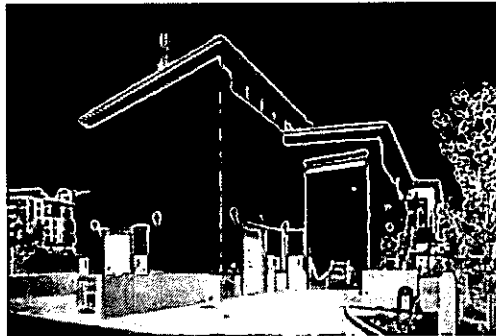
BUILDING CONNECTION
Energy Transfer Station

CENTRAL PLANT EXAMPLES



SOUTH FALSE CREEK

Vancouver, BC



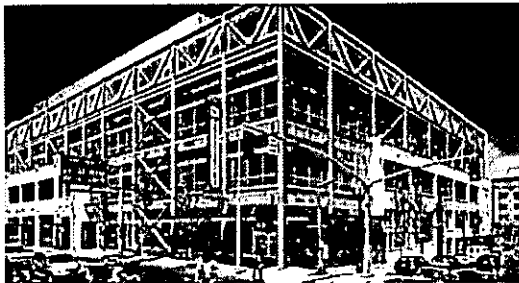
DOCKSIDE GREEN

Victoria, BC



REGENT PARK

Toronto, ON



THE BREWERY BLOCKS

Portland, OR



THE ROUND

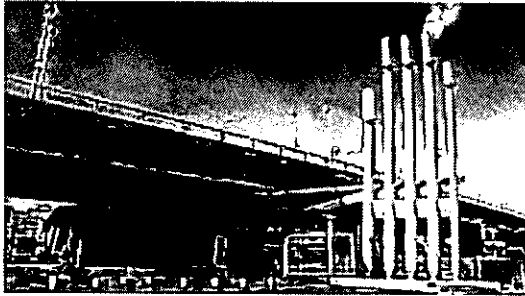
Beaverton, OR



Hartford Central School District

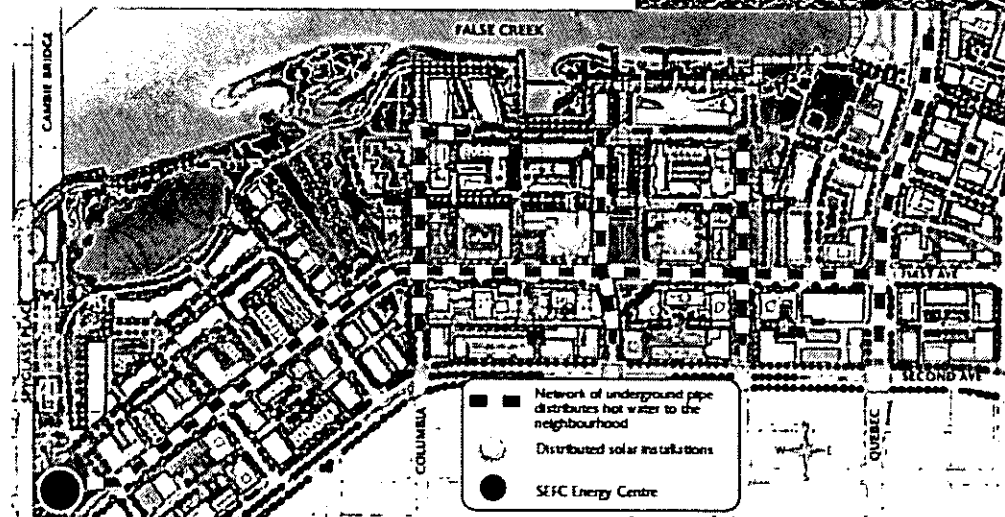
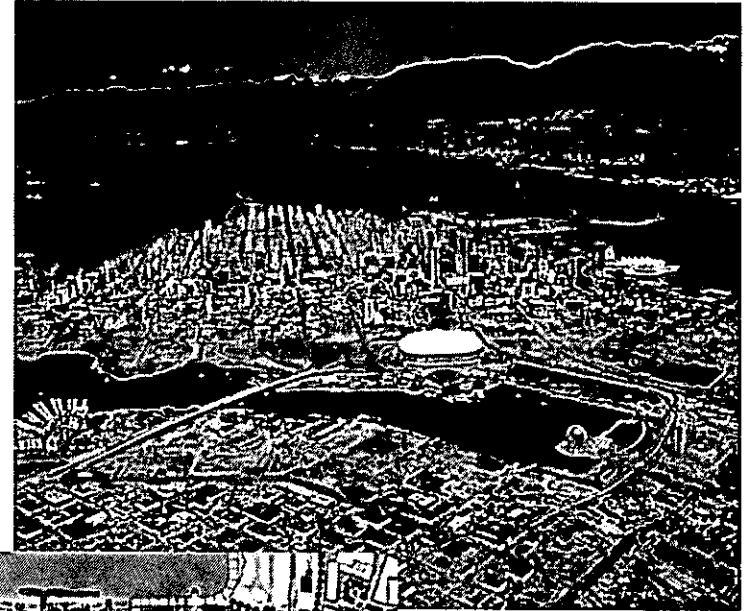
Hartford, NY

CENTRAL PLANT EXAMPLES



SOUTH FALSE CREEK

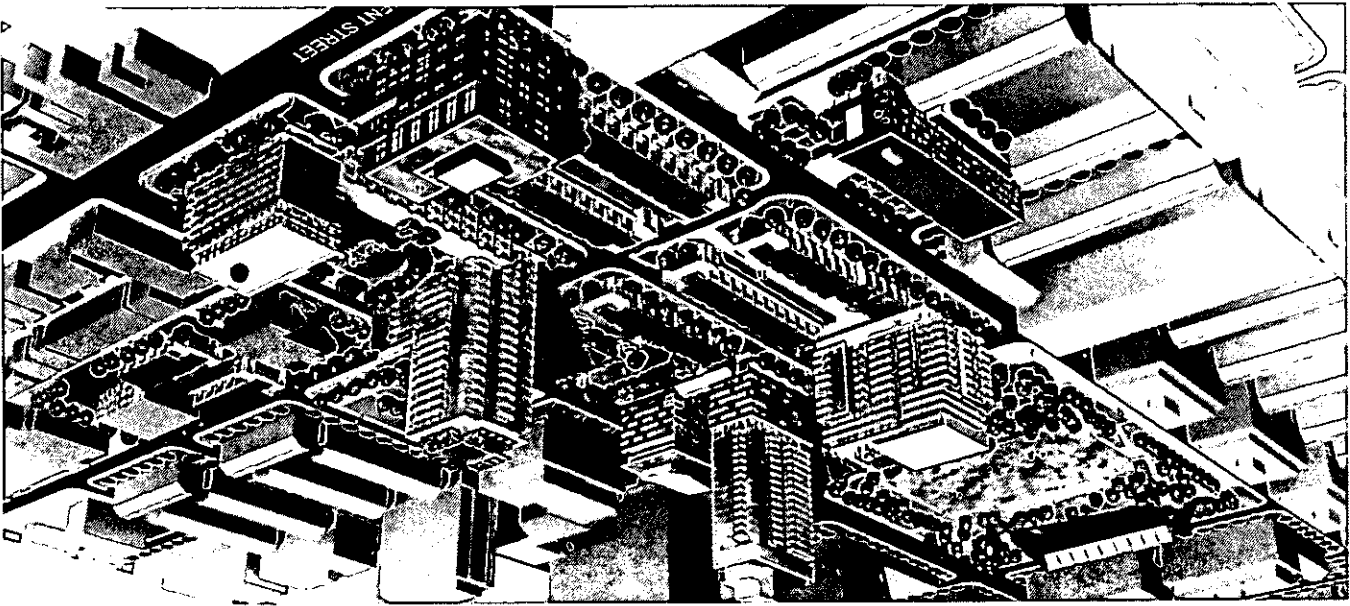
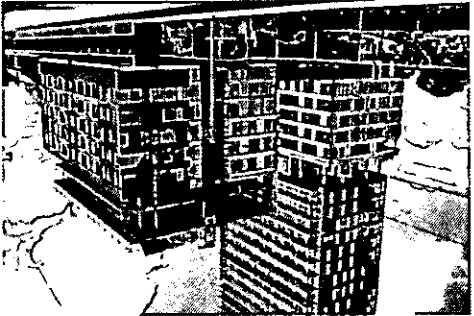
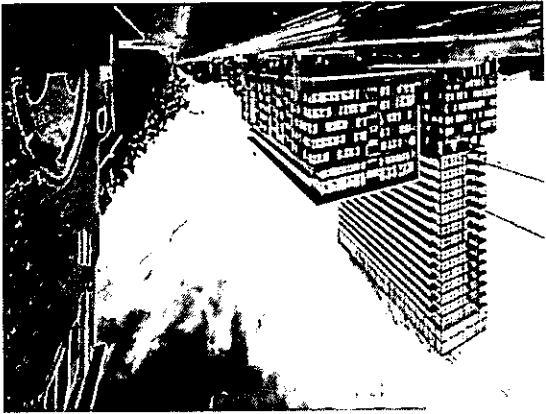
Vancouver, BC



Mixed Use Development

76 acres

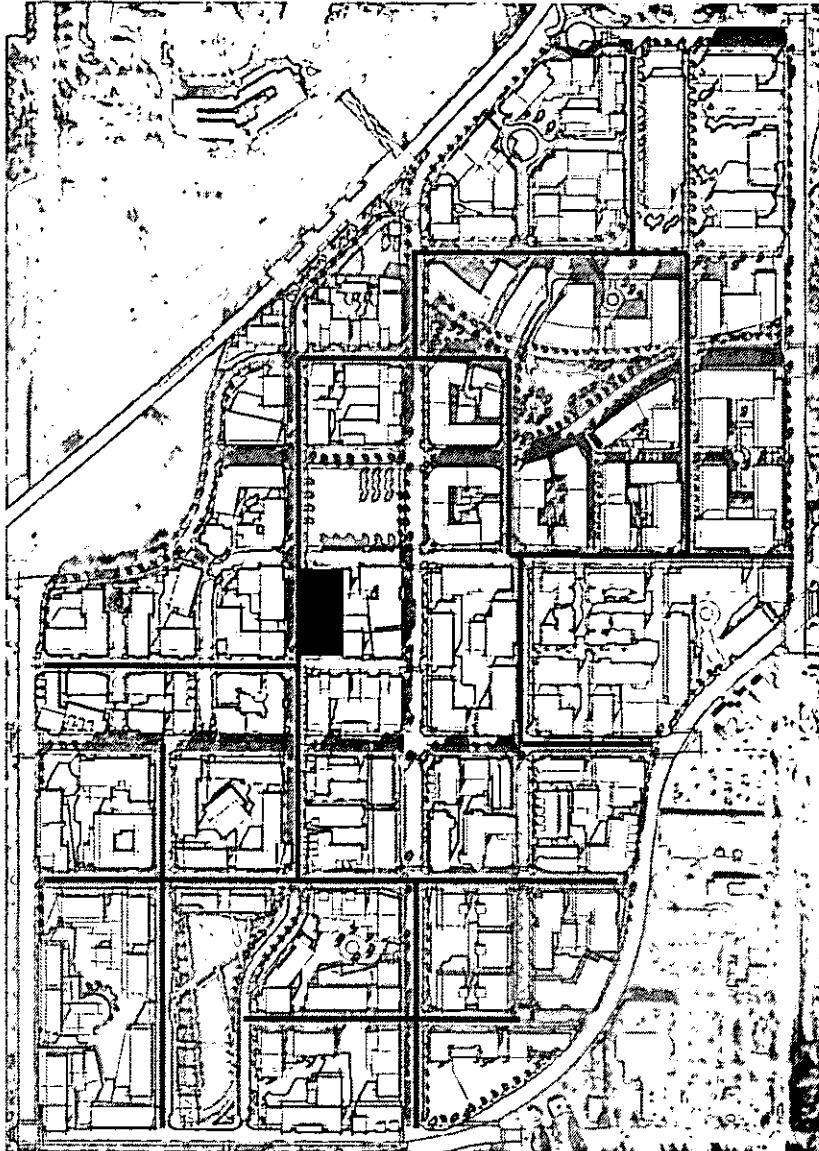
CENTRAL PLANT EXAMPLES



REGENT PARK
Toronto, ON

Mixed Use Development
70 acres

DISTRICT SCALE ANALYSIS

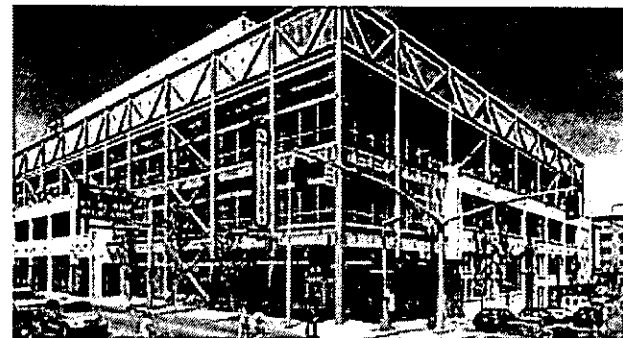


CENTRAL PLANT

- Central generation of heating (boilers) and cooling (chillers)
- Boilers to be natural gas fired.
- Chillers to be electric.
- Footprint likely 20,000-30,000 SF.
- Central plant can be integrated into open space or buildings.

DISTRIBUTION SYSTEM

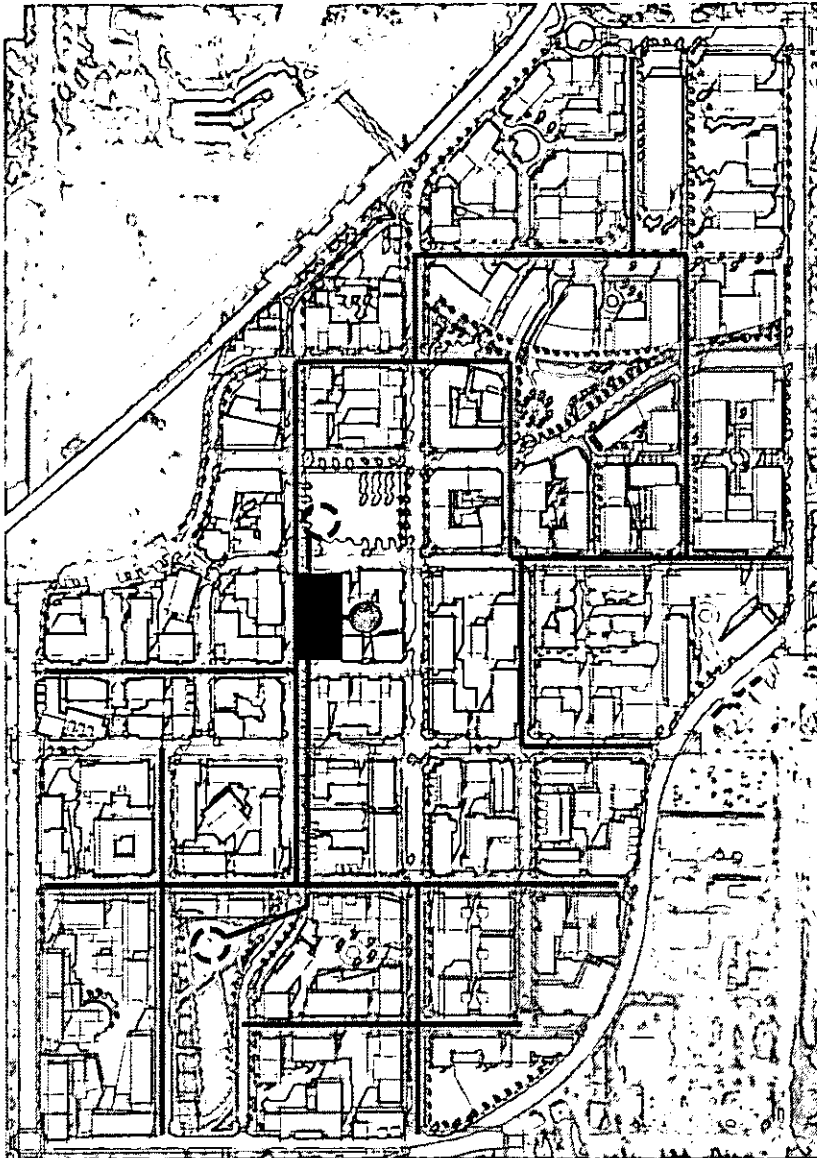
- Traditional four pipe system.
- 2 pipes for heating (supply and return)
- 2 pipes for cooling (supply and return)



CENTRAL PLANT INTEGRATED INTO URBAN FABRIC

The Brewery Blocks (Portland, OR)

DISTRICT SCALE ANALYSIS



CENTRAL PLANT

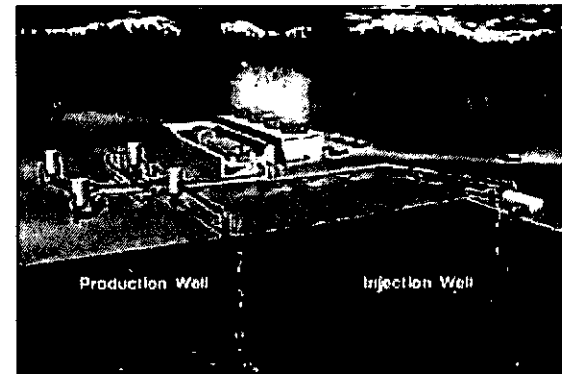
- Central generation of heating (boilers) and cooling (chillers)
- Boilers to be natural gas fired.
- Chillers to be electric.
- Footprint likely 20,000-30,000 SF (to confirm).
- Central plant can be integrated into open space or buildings.

DISTRIBUTION SYSTEM

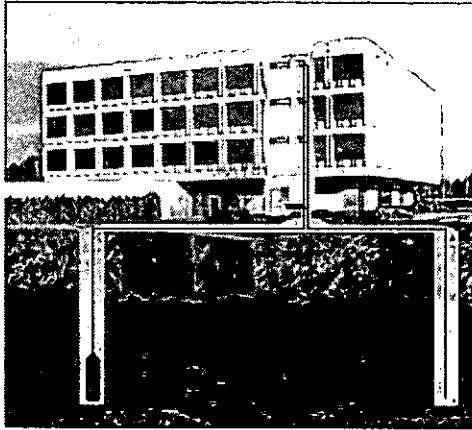
- Traditional four pipe system.
- 2 pipes for heating (supply and return)
- 2 pipes for cooling (supply and return)

GEOHERMAL SYSTEM

- Open loop groundwater source heat pump
- Production well and injection well system.
- Well locations in open space.

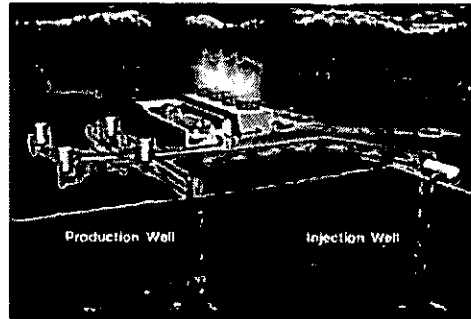


GEOHERMAL OVERVIEW



OPEN LOOP SYSTEMS

Production well and injections well(s). Groundwater withdrawn and re-injected.

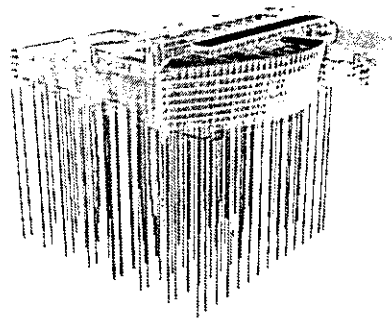


PROS

- Highly efficient
- Simple system (2-3 wells)
- Less space requirements
- Locate in publically owned property
- Least cost (compared to closed loop)

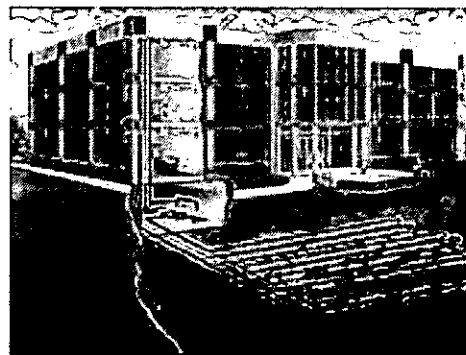
CONS

- Regulatory requirements (water rights)
- Depth to groundwater (TBD)
- Well cost higher (larger diameter)



CLOSED LOOP SYSTEMS

Multiple "wells" but no groundwater withdrawn.



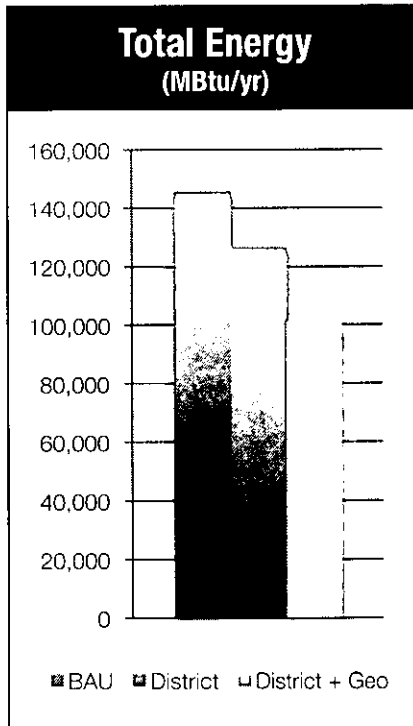
PROS

- Efficient
- Less regulatory hurdles

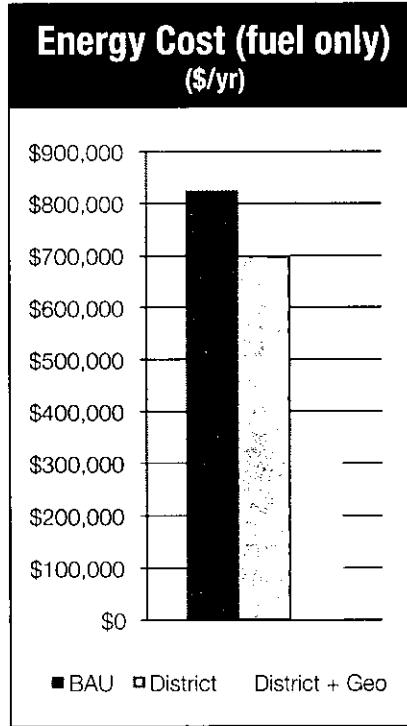
CONS

- More costly
- More complicated system (lots of parts)
- Lots of "wells" (100-1,000s)
- Public space/ROW constraints

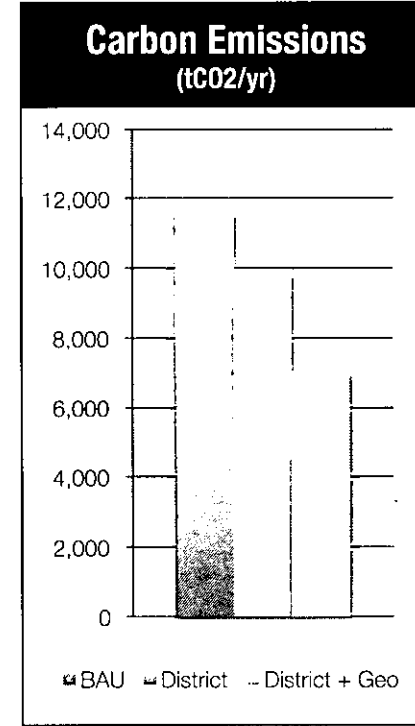
BUILDING VS. DISTRICT ENERGY



10-30% Savings



10-50% Savings



15-40% Savings

FINDINGS

- District energy system reduces overall energy demand, energy cost and carbon emissions within Overlake Village.
- Moreover, district energy allows opportunity for fuel switching and more efficient technology to further improve efficiency and reduce carbon emissions.

OWNERSHIP & DEVELOPMENT MODELS

PUBLIC

- Ownership = Public
- Funding = Public
- Design/Build & Regulatory = Public
- Operations = Public
- Customer Relationships = Public

PRIVATE

- Ownership = Private
- Funding = Private
- Design/Build & Regulatory = Private
- Operations = Private
- Customer Relationships = Private

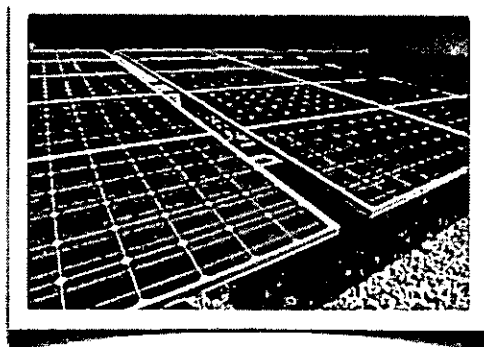
PUBLIC PRIVATE PART.

- Ownership = P3
- Funding = P3
- Design/Build & Regulatory = P3
- Operations = P3
- Customer Relationships = P3

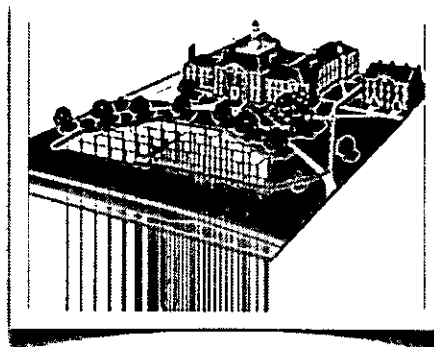
COOPERATIVE

- Ownership = Properties
- Funding = Properties
- Design/Build & Regulatory = Properties
- Operations = Properties
- Customer Relationships = Properties

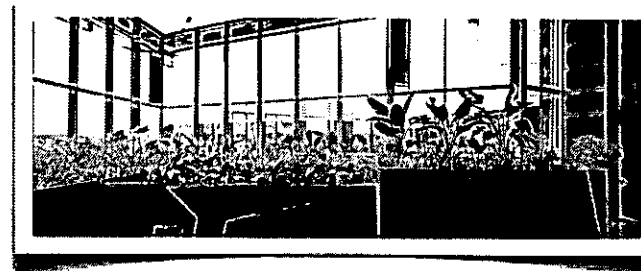
BUSINESS RELATIONSHIPS	SERVICE AGREEMENT	OPERATING AGREEMENT	MANAGEMENT AGREEMENT	DEVELOPMENT FEE
Design, Build, Own, Operate and Maintain (DBOoM)	Yes			
Design, Build, Operate and Maintain (DBOM)		Yes	Yes	Yes
Design, Build and Operate (DBO)		Yes		Yes
Design/Build (BD)				Yes
Design, Bid, Build (Conventional)				Yes



Solar PV

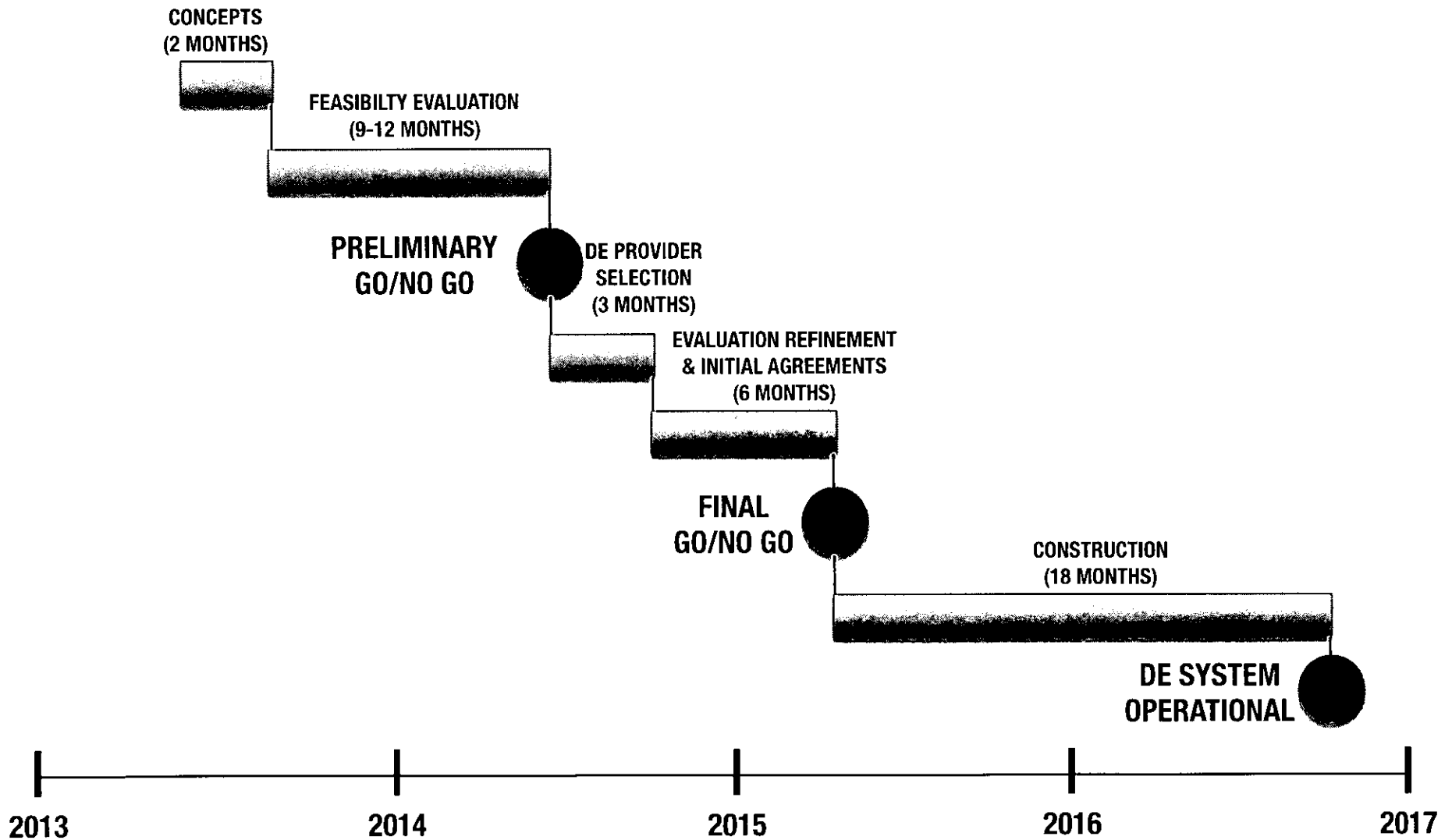


Groundsource Geothermal

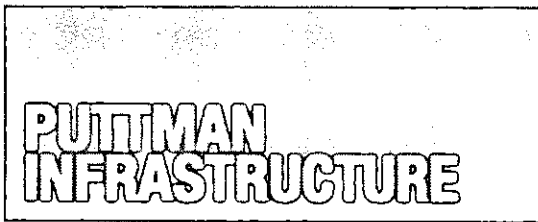


Living Machine Wastewater Treatment and Reuse

DEVELOPMENT PATHWAY



THANK YOU



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