

Eco-Grids for Resilient Communities

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A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Architecture

University of Washington
2017

Committee:
Mehlika Inanici
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Program Authorized to Offer Degree:
Architecture

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Abstract

Eco-grids for Resilient Communities

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Architecture Department

The amount of collected knowledge and information of a community's resources is disproportionate to its implementation within existing and future development for resiliency in the face of disruption. Natural resource data collection and the technologies used for collection should be engineered to provide a community within predetermined urban grids their environmental and economic potential. This thesis proposes the development of an 'eco-grid' to investigate the potential for a community's collective energy production as a means for commodity exchange and the determined neighborhood grid's ability to withstand disruption as a result.

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INTRODUCTION

disruption: [dis-ruh-p-shuh n]

noun

1. the forcible separation or division into parts
2. a disrupted condition
3. a radical change in an industry, business strategy, etc., especially involving the introduction of a new product or service that creates a new market

Disruption can be broken into two main categories: acute and gradual. Natural disasters, which include hurricanes and earthquakes, are only two examples of acute disruption. The Pacific Northwest in particular is located within the highest hazard seismic zones in the nation. In contrast, gradual disruptions include climate and population change along with economic recessions.

In these moments of disruption what happens to resilience?



1.01



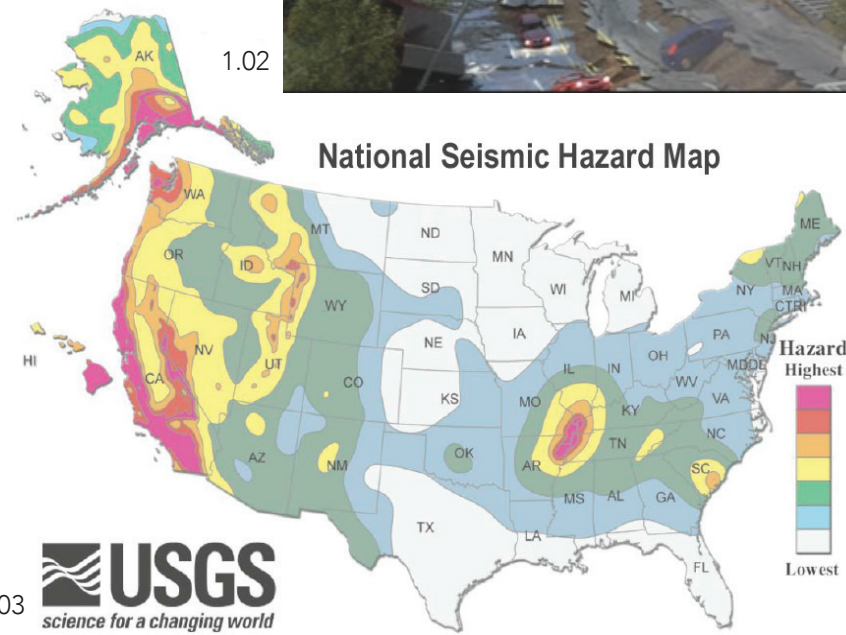
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1.06

- 1.01 Acute disruption: Hurricane
- 1.02 Acute disruption: Earthquake
- 1.03 USGS National Seismic Hazard Map
- 1.04 Gradual disruption: Climate change
- 1.05 Gradual disruption: Population change
- 1.06 Gradual disruption: Economic change

PROBLEM

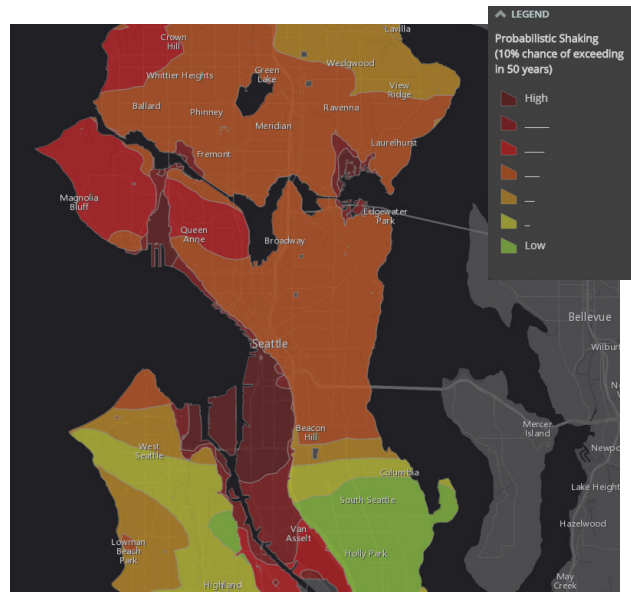
Resource knowledge and measurement are disproportionate to the implementation of such metrics into existing and future development for resilient use in the face of disruption.

Most communities today are directly or indirectly affected by global industries, whether good or bad, causing local needs to become dependent on international markets, policy and industry. In the face of a community losing a major employer, suffering increased healthcare costs or being hit by a natural disaster the maintaining of place and identity become key to community survival. Communities often lack the ability to sustain major loss or even rebuild afterward due to the heavy burden of sustaining basic needs like loss of electricity, water or structural damage. Even severe economic disruption hinders a community's ability to maintain basic needs.

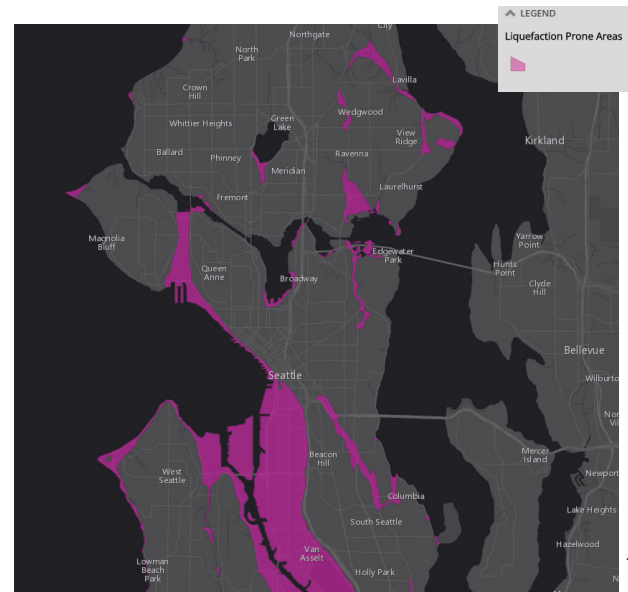
What is this resource knowledge?

In the following chapter several examples of available resource knowledge is researched to demonstrate its abundance and the need for this data to inform more resilient community design.

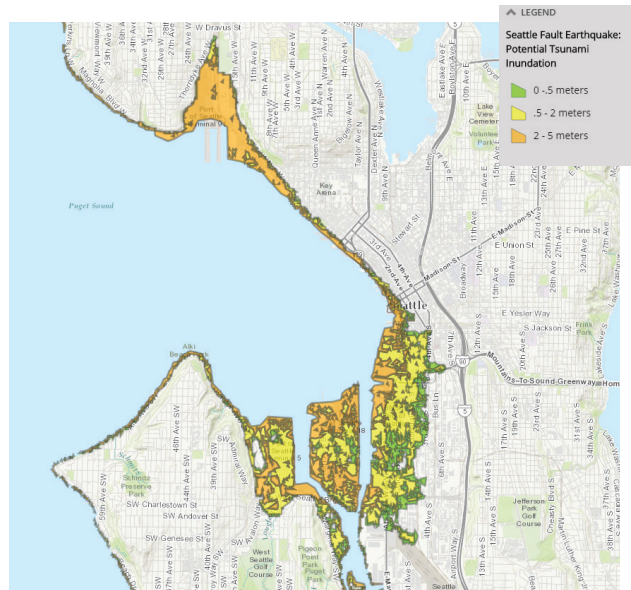
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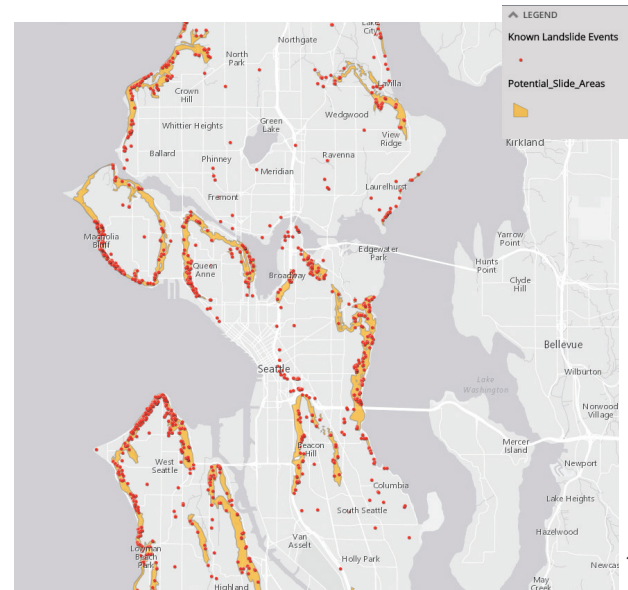
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1.09



1.10



- 1.07 Earthquake shake map
- 1.08 Liquefaction map of Seattle
- 1.09 Tsunami inundation map
- 1.10 Landslide areas in Seattle

Regional Knowledge: Hydroelectric Power

Focusing attention on Washington state, and more specifically Seattle, there is an abundance of climate and population data on observed and projected trends that has already begun to affect the region's energy production. Currently, Washington exports between 2 and 6 million megawatt hours of hydroelectric power to the surrounding Pacific Northwest region and makes up 68% of the total energy in the state. Washington's hydroelectric power generation is the largest in the nation.

There are forty-seven dams in the region that comprise the hydroelectric power generation. The Skagit River Hydroelectric Project alone supplies 25% of Seattle's electric power. Because the region is so heavily dependent on its waterways to produce electricity it has become imperative to address the observed and projected climate that affects it.

The projection of sea levels rising could put many of these hydroelectric power plants in jeopardy. Infrastructure damage is a concern within the next 50 years if carbon emissions continues to increase. The Electric Power Research Institute (EPRI) projects that by 2030 25% of existing power generation facilities nationwide will face some type of water sustainability issue. The Pacific Northwest region in particular relies heavily on snow melt in warmer months to offset the reduction in precipitation during the rainy winter season. This dependency on water availability is reliant upon climate stability which is currently threatened.



1.11



1.12



1.13



1.14

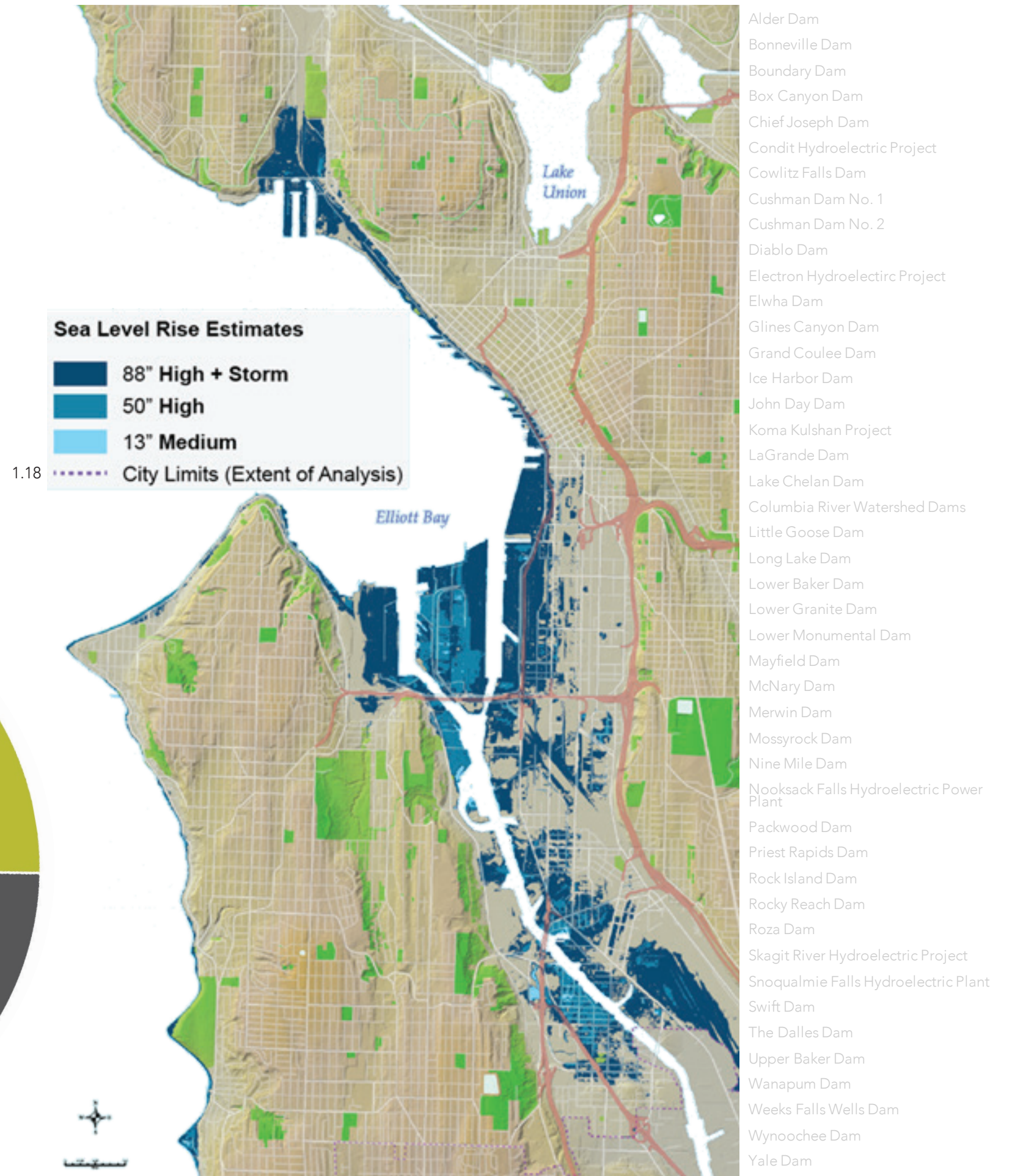
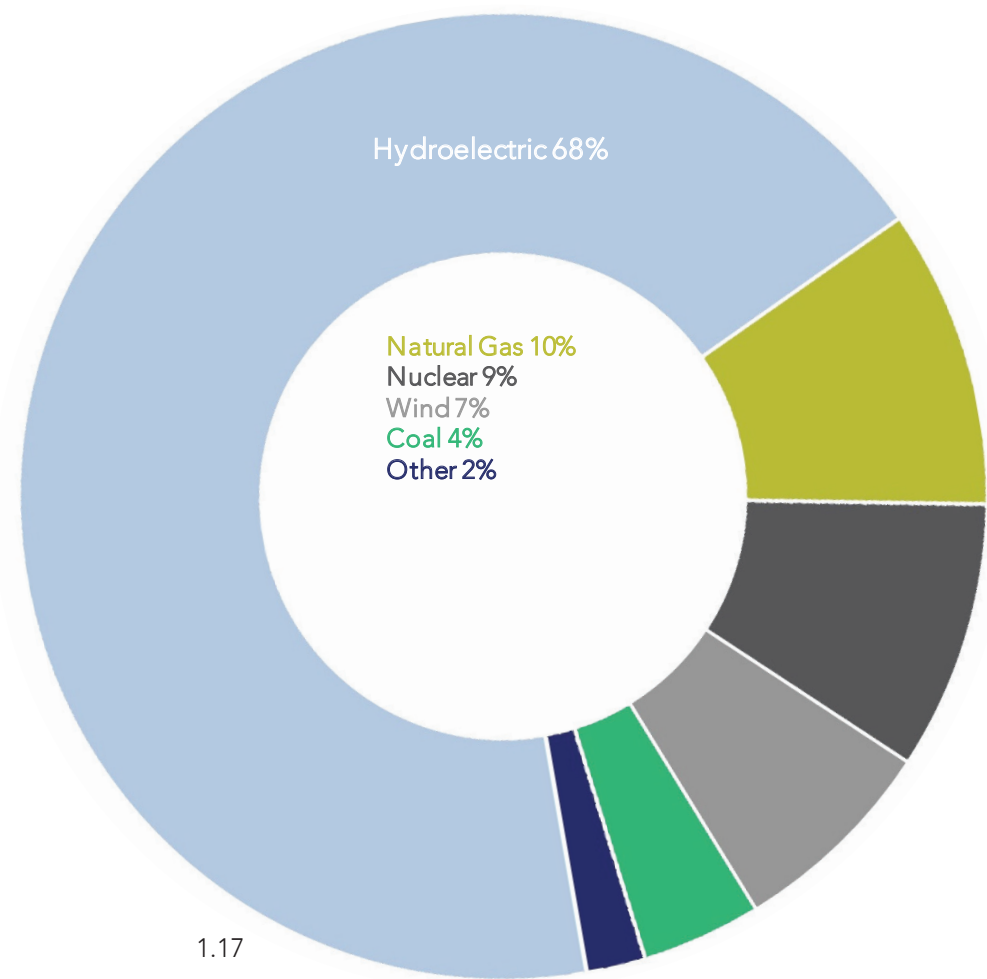


1.15



1.16

- 1.11 Image of Gorge Dam
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- 1.17 Breakdown of Seattle energy distribution by production type
- 1.18 Sea Level Rise Estimates map and a list of 42 dams that contribute to the energy in the Puget Sound region.



Changing Climate: Precipitation Change

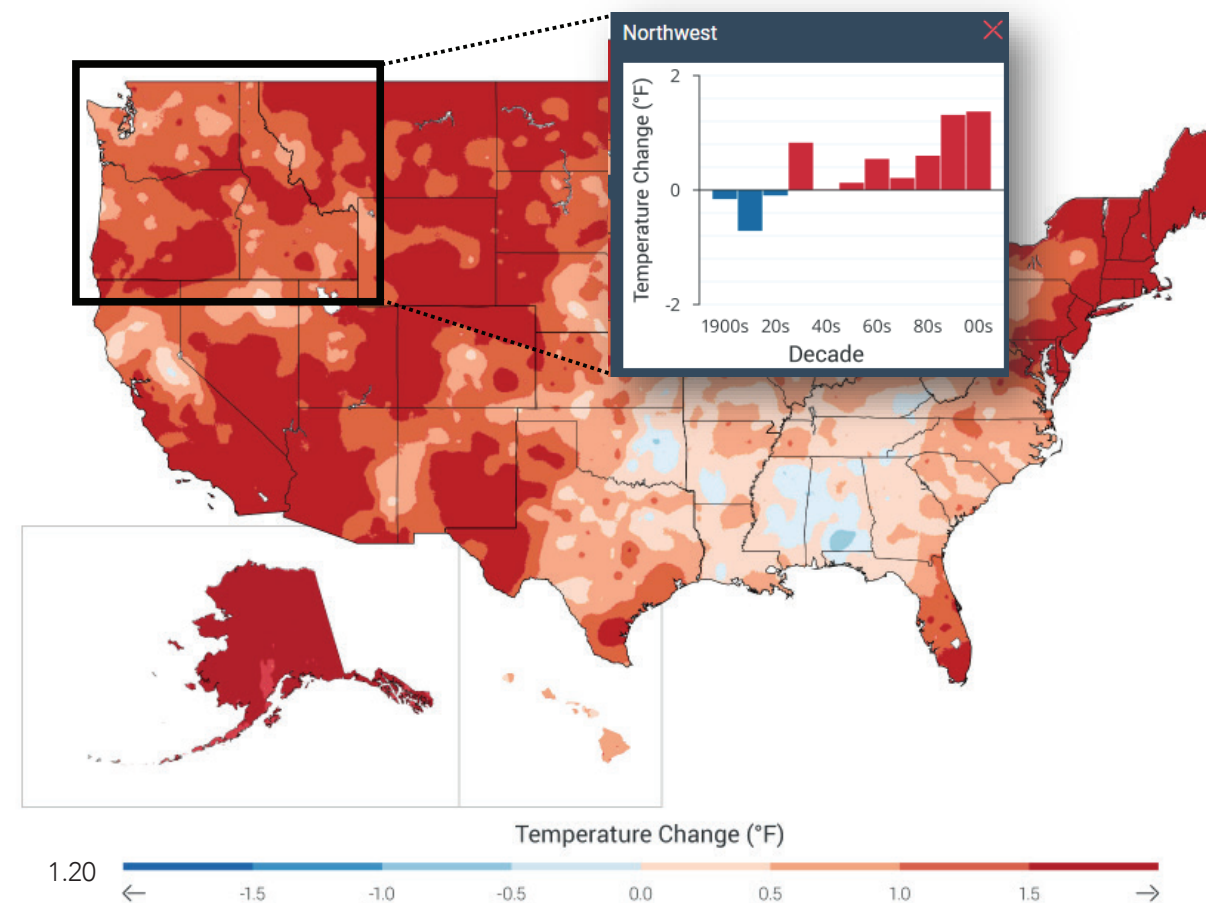
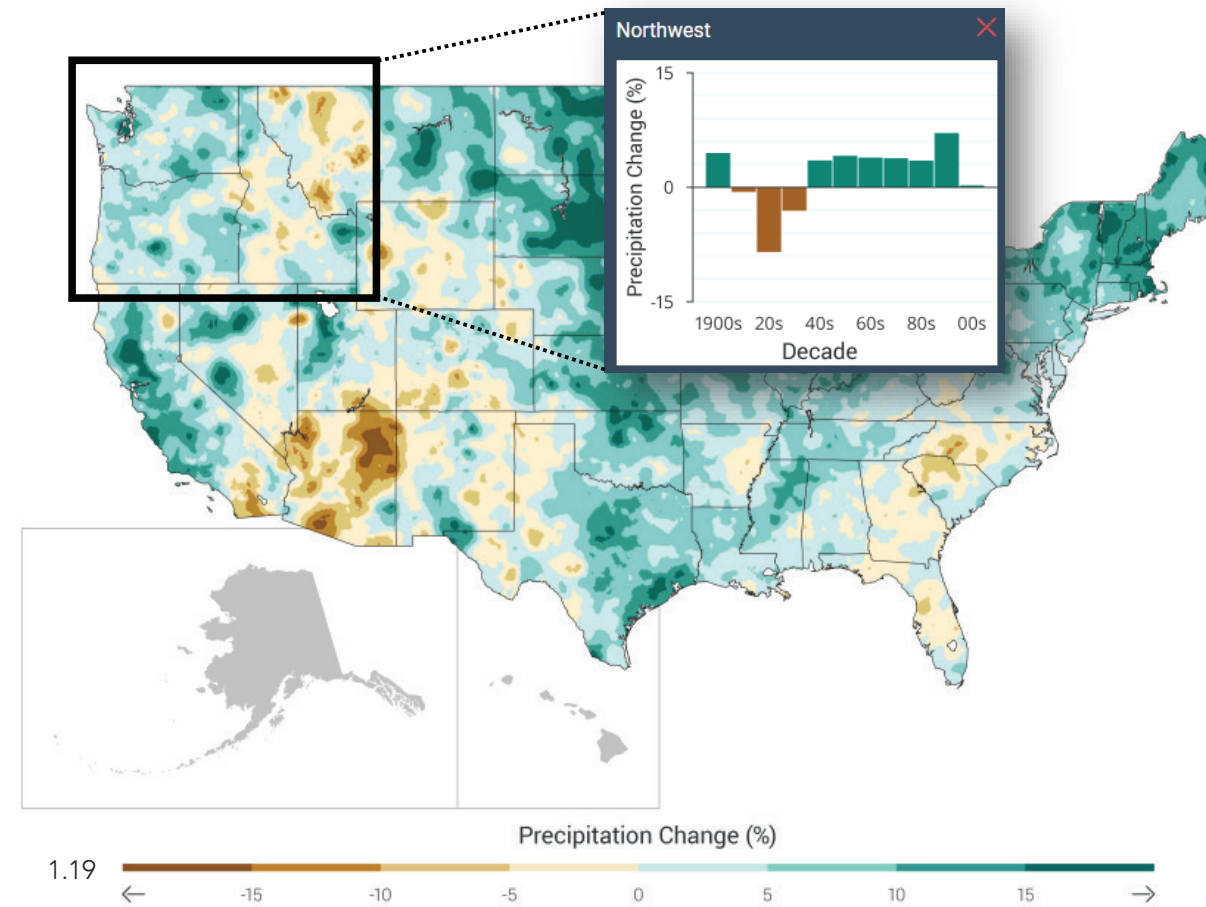
Observed | Substantial research is available that illustrates this climate change threat, specifically in this region, through observed change and the projections that are developed from it. In Image 1.19 observed precipitation in the Pacific Northwest is illustrated over the past 100 years by decade. The latest decade shows a substantial decrease in annual precipitation.

Projected | In Image 1.20 projections are broken down into seasonal data showing that summer months in particular will suffer the greatest reduction in precipitation by 20-30%.

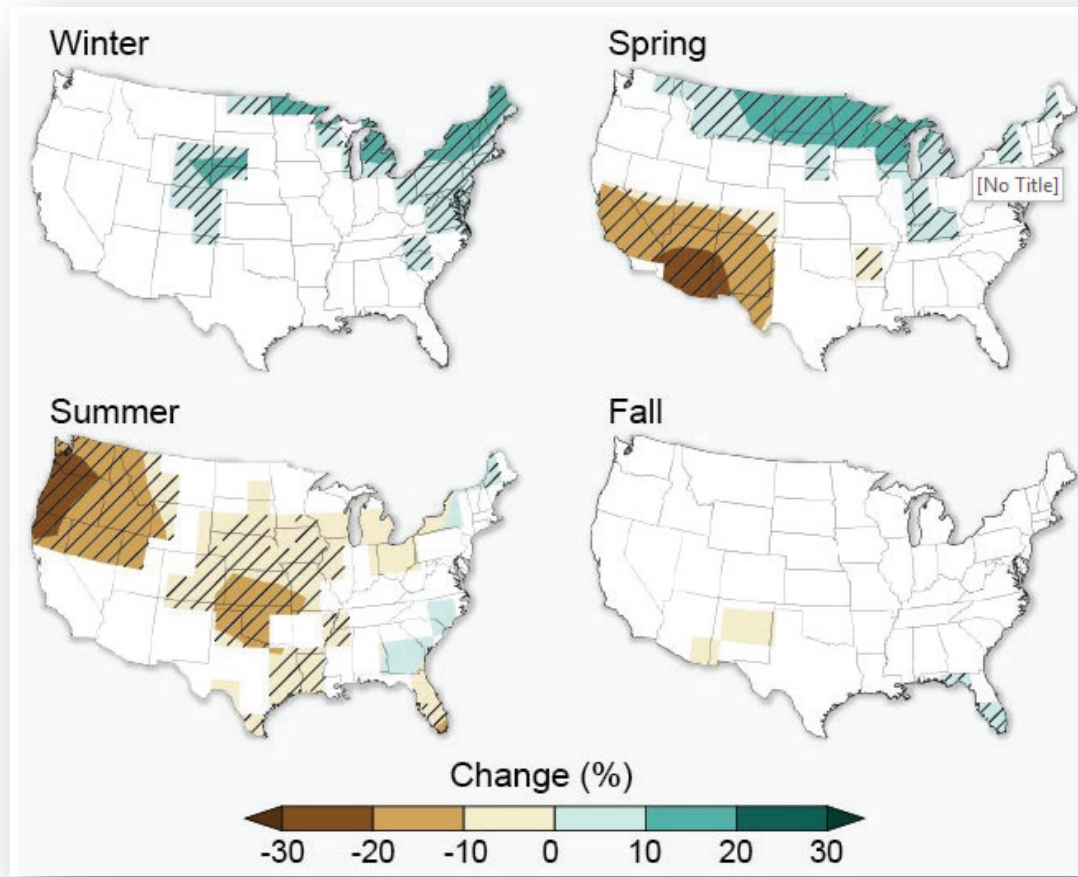
Changing Climate: Temperature Change

Observed | Temperature change observations show the last decade to be the hottest on record shown in Image 1.21. This has resulted in much of the snow melt within the region to decrease water levels that many hydroelectric plants rely on in spring months.

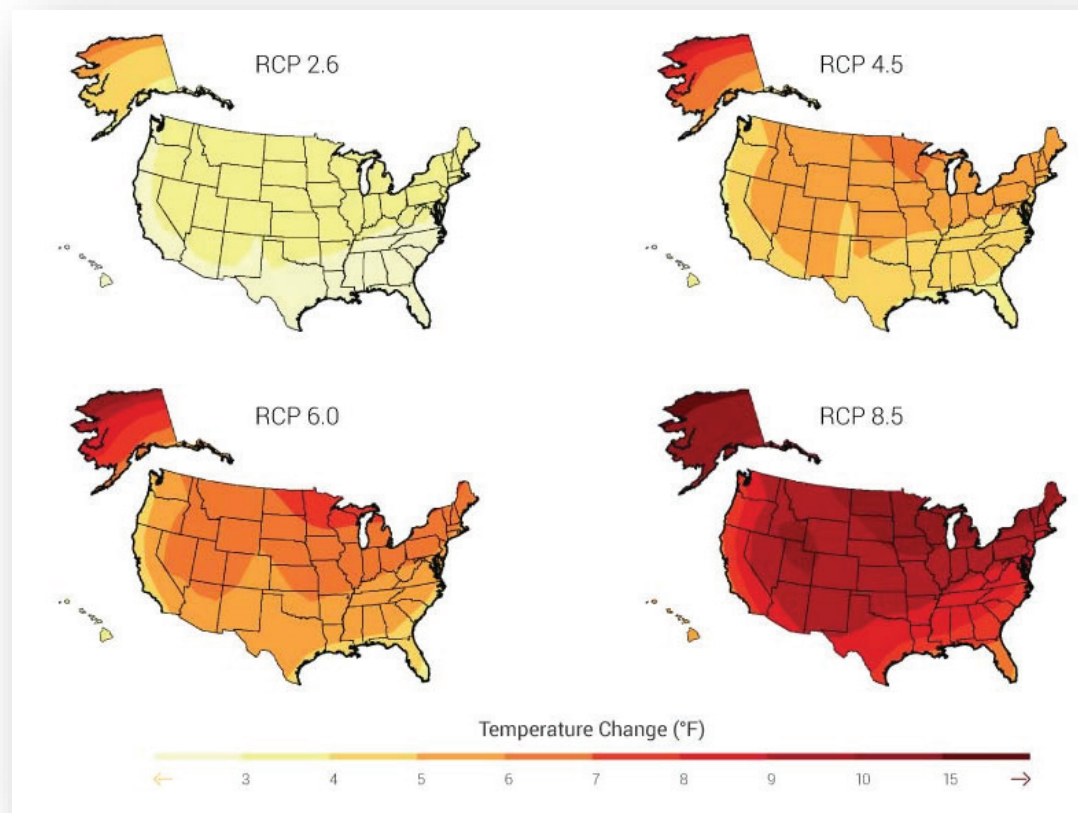
Projected | The projection map in Image 1.22 illustrates four different models of the next 50 years based on carbon emissions intensity. If significant reductions are applied, as in RCP 2.6, there is a slight temperature increase overall. The most extreme scenario shows what temperature change is projected assuming continued increases in emissions.



- 1.19 Observed precipitation change map
- 1.20 Observed temperature change map
- 1.21 Projected precipitation change map
- 1.22 Projected temperature change map



1.21



1.22

Population Change

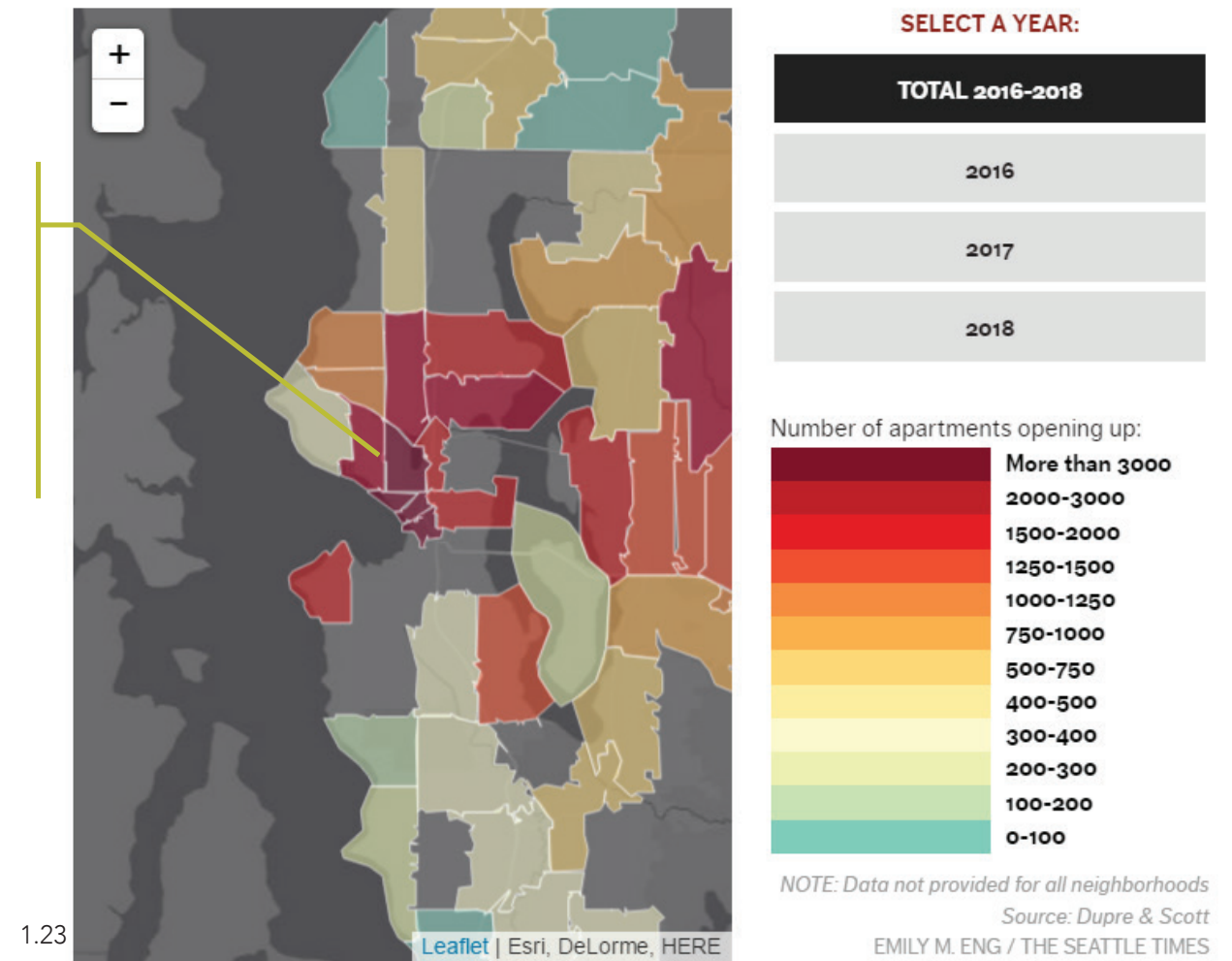
Observed | Specifically within Seattle the projection in just the next year or two shows a continued influx of people moving into the city proper. Seattle also has one of the highest live-work percentages in the nation - in 2016 37% of residents also worked in the city. The total number of apartments already completed or slated for construction between 2016 and 2018 totals 16,582. As housing density increases within the city center the live-work percentage demonstrates that a large amount of the growing population remains stationary within the city as opposed to the city becoming dense from commuting populations.

Projected | Population change over the next 20 years estimates a steady increase within the Seattle area - projected to increase by an additional 25%. A different model shows housing density over the next 80 years in the Puget Sound region. The darker brown illustrates a significant urbanization projected to occur in the next decades. A separate study shows the comparison of Seattle housing density to employment change from 2014 to 2040 to surrounding cities. All this data means is a continued influx of construction and development in the city and greater region.

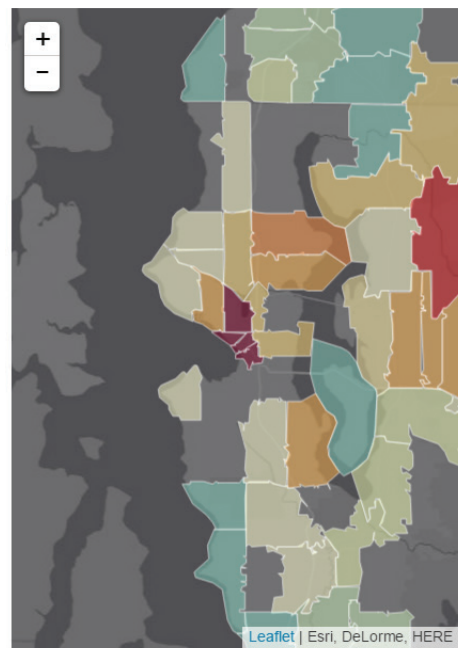
Overall, consumption demands are increasing while energy production is threatened. With a changing climate and with greater demands from a growing population what are the implications on Seattle's future energy production?

Seattle Residential Growth Total apartments opening in 2016-2018: 16,582

2016: 3,223
2017: 5,937
2018: 7,422



- 1.23 Seattle housing density through years 2016 and 2018
- 1.24 Seattle housing density in 2016
- 1.25 Seattle housing density in 2017 projection
- 1.26 Seattle housing density in 2018 projection



SELECT A YEAR:

TOTAL 2016-2018

2016

2017

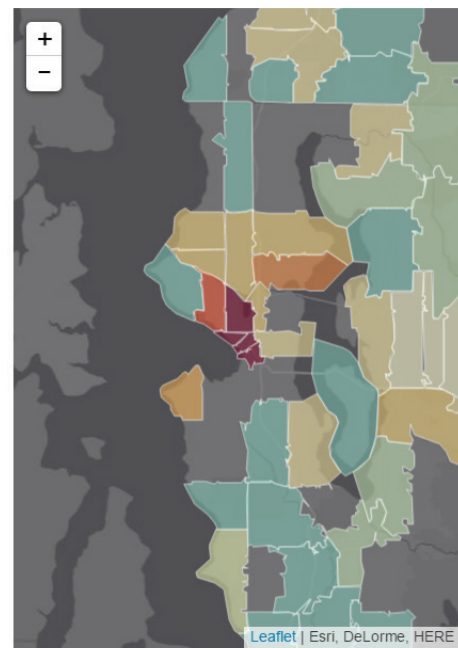
2018

Number of apartments opening up:

- More than 3000
- 2000-3000
- 1500-2000
- 1250-1500
- 1000-1250
- 750-1000
- 500-750
- 400-500
- 300-400
- 200-300
- 100-200
- 0-100

NOTE: Data not provided for all neighborhoods
Source: Dupre & Scott
EMILY M. ENG / THE SEATTLE TIMES

1.24



SELECT A YEAR:

TOTAL 2016-2018

2016

2017

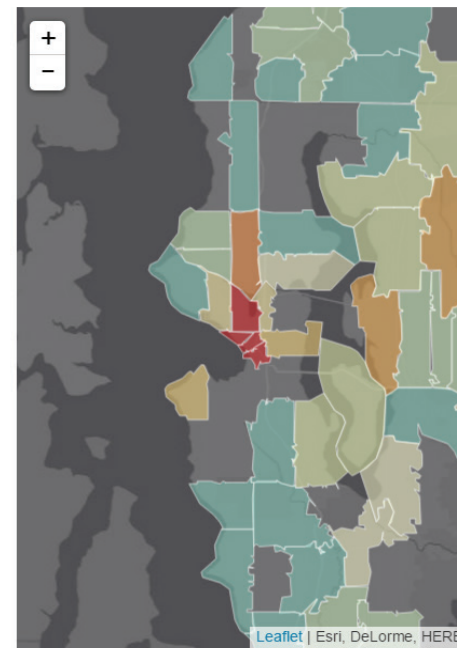
2018

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- 200-300
- 100-200
- 0-100

NOTE: Data not provided for all neighborhoods
Source: Dupre & Scott
EMILY M. ENG / THE SEATTLE TIMES

1.25



SELECT A YEAR:

TOTAL 2016-2018

2016

2017

2018

Number of apartments opening up:

- More than 3000
- 2000-3000
- 1500-2000
- 1250-1500
- 1000-1250
- 750-1000
- 500-750
- 400-500
- 300-400
- 200-300
- 100-200
- 0-100

NOTE: Data not provided for all neighborhoods
Source: Dupre & Scott
EMILY M. ENG / THE SEATTLE TIMES

1.26

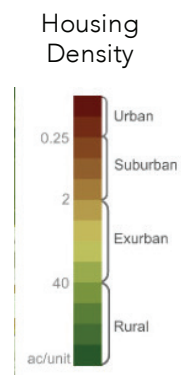
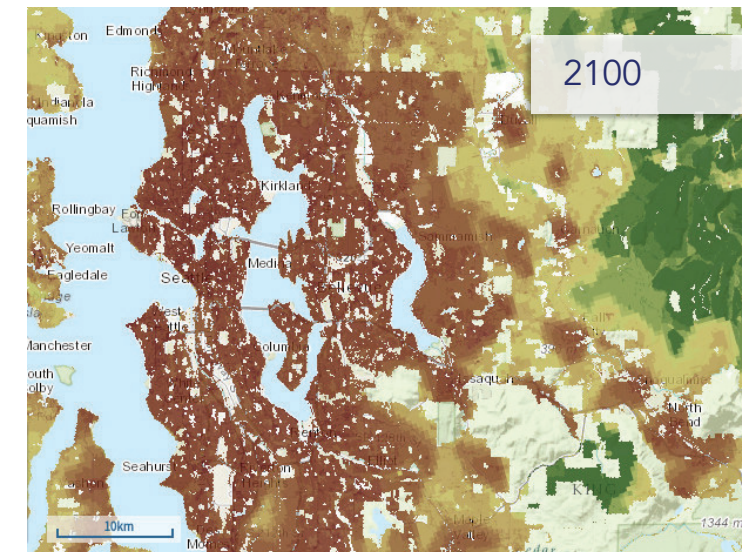
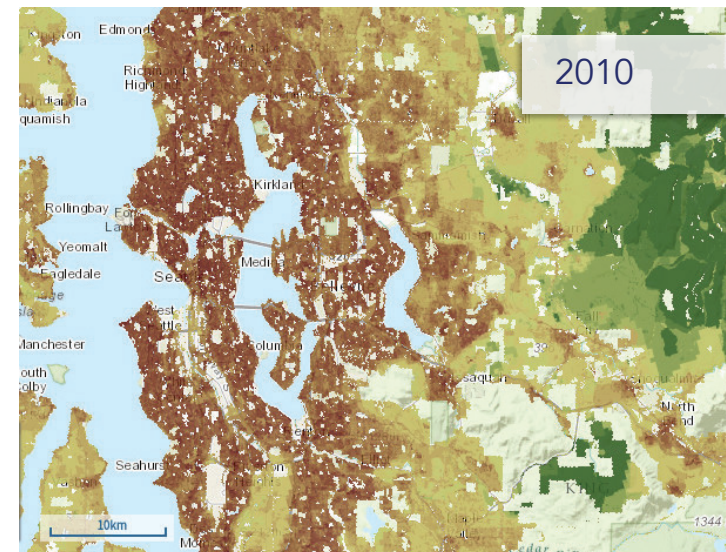
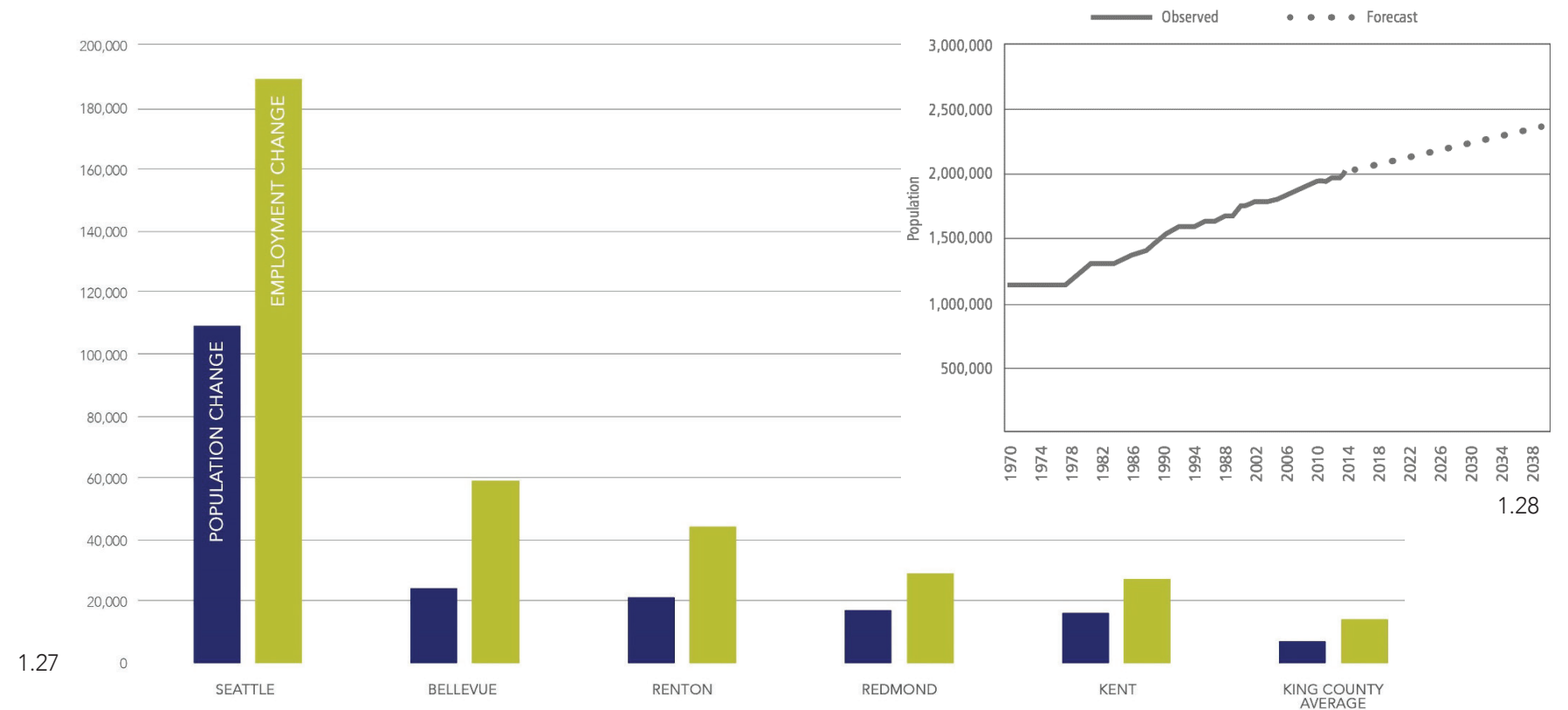
Population Change

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Overall, consumption demands are increasing while energy production is threatened. With a changing climate and with greater demands from a growing population what are the implications on Seattle's future energy production?

Housing and Employment Change Projection from 2014-2040



- 1.27 Housing and employment change projection 2014-2040
- 1.28 Seattle population observed and projected through 2040
- 1.29 Observed housing density in 2010 within the Puget Sound
- 1.30 Projected housing density in 2100 within the Puget Sound

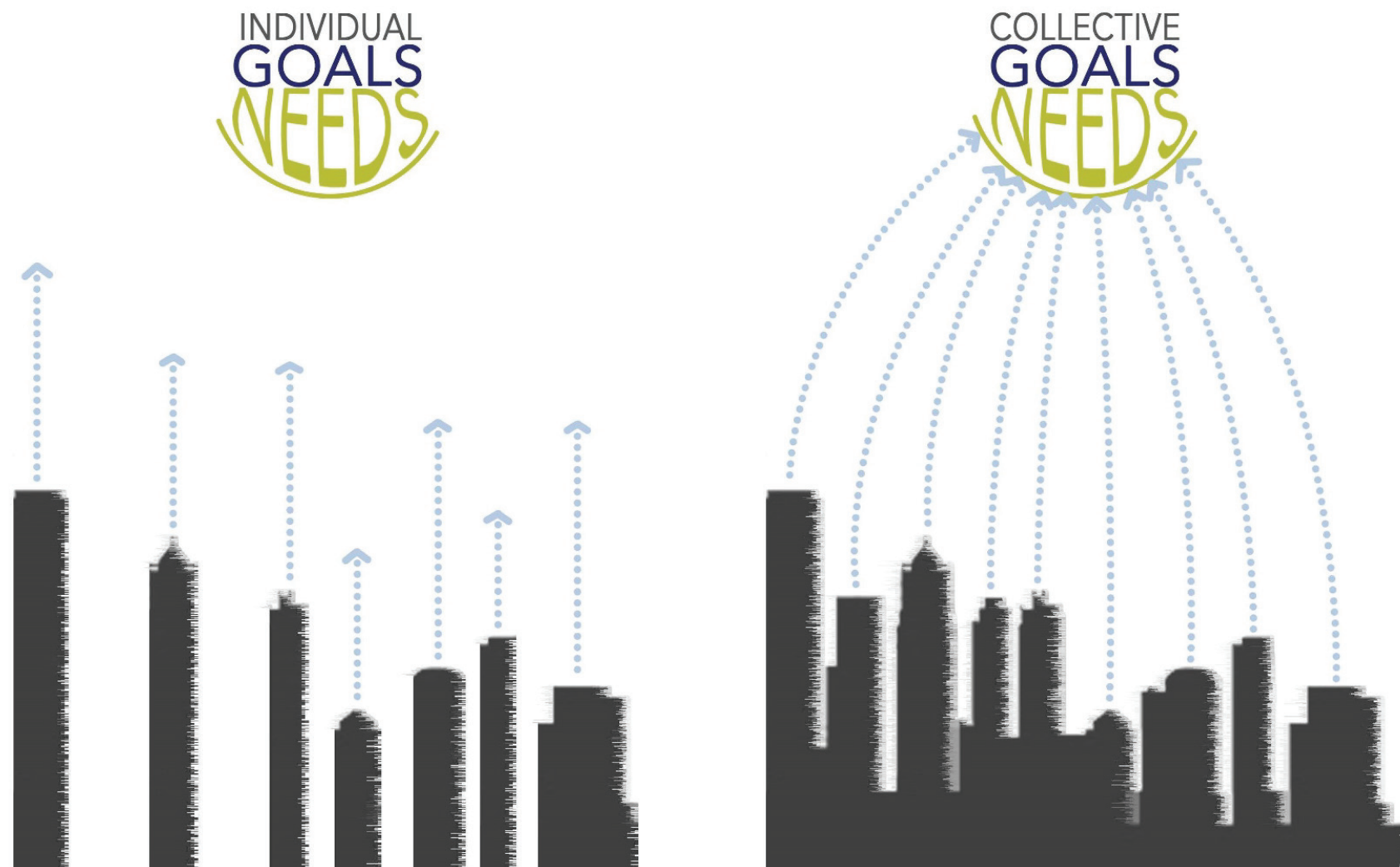
- Rising sea levels → Infrastructure Damage
- Precipitation decrease → Less Energy Production
- Temperature increase → Increase electricity demand for agriculture, municipal uses; snow melt reduction needed to power hydro plants
- Growing population → Increase energy demand
- Increase of development & construction → Higher energy demands; Increase in carbon emissions

Energy consumption demands are increasing while energy production is threatened.

When the knowledge of consumption and production values are implemented into communities, the potential for regions to become resilient in moments of disruption is becoming a more realistic goal. As several communities already tout a "resilient" label even without the use of current energy production models the design of resiliency with an existing site is a real possibility. There is an abundance of information collection on regional and community resource consumption and newer technologies are allowing more accurate and varied methods of calculating energy potentials making it easier than ever before to develop methods for meeting energy demands.

The understanding that the power of a community is greater than that of an individual is common understanding. This idea plays into the identification of energy potentials within an urban area where its collective implementation for common benefit has a more significant potential for adoption. Incentives also become more enticing when their realization is more viable. Quantifying a community's energy potentials is becoming increasingly more accessible and accurate with the introduction of various resource mapping platforms outlined in Chapter Two.

Understanding that resources for quantifying energy production are available what should this mean for future design and development?



1.31

1.31 Individual vs collective goals illustration

For the purposes of this thesis the exploration of precedents includes built projects and communities, literature on the nature of communities and their ideals for which a resilient community could be established and the methods of performative modeling used in resource collection. The integration of each of these is important through the investigation of historical precedent and the means for which a successful resilient approach could be made upon existing communities. In many of the examples of built projects the means for energy production is through the implementation of a localized power plant, typically operated using a combination of steam, gas and electricity. Although these communities function as stand-alone resilient grids, producing their own power and, in many cases water, it is the aim of this project to investigate the means of a resilient community without the additional need of a power plant. The study of built precedents is merely for establishing the capacity for community autonomy.

Precedent Categories

Built Projects

- NYU's Mayor's Carbon Challenge
- Co-op City in Bronx, NY

Literature

- Sustainable Communities

Resource Mapping

- NYC Street Tree Map
- MyHeat
- Map Dwell
- Project Sunroof
- Boston Community Energy Study

BUILT PRECEDENT

University Campus | NYU: New York City

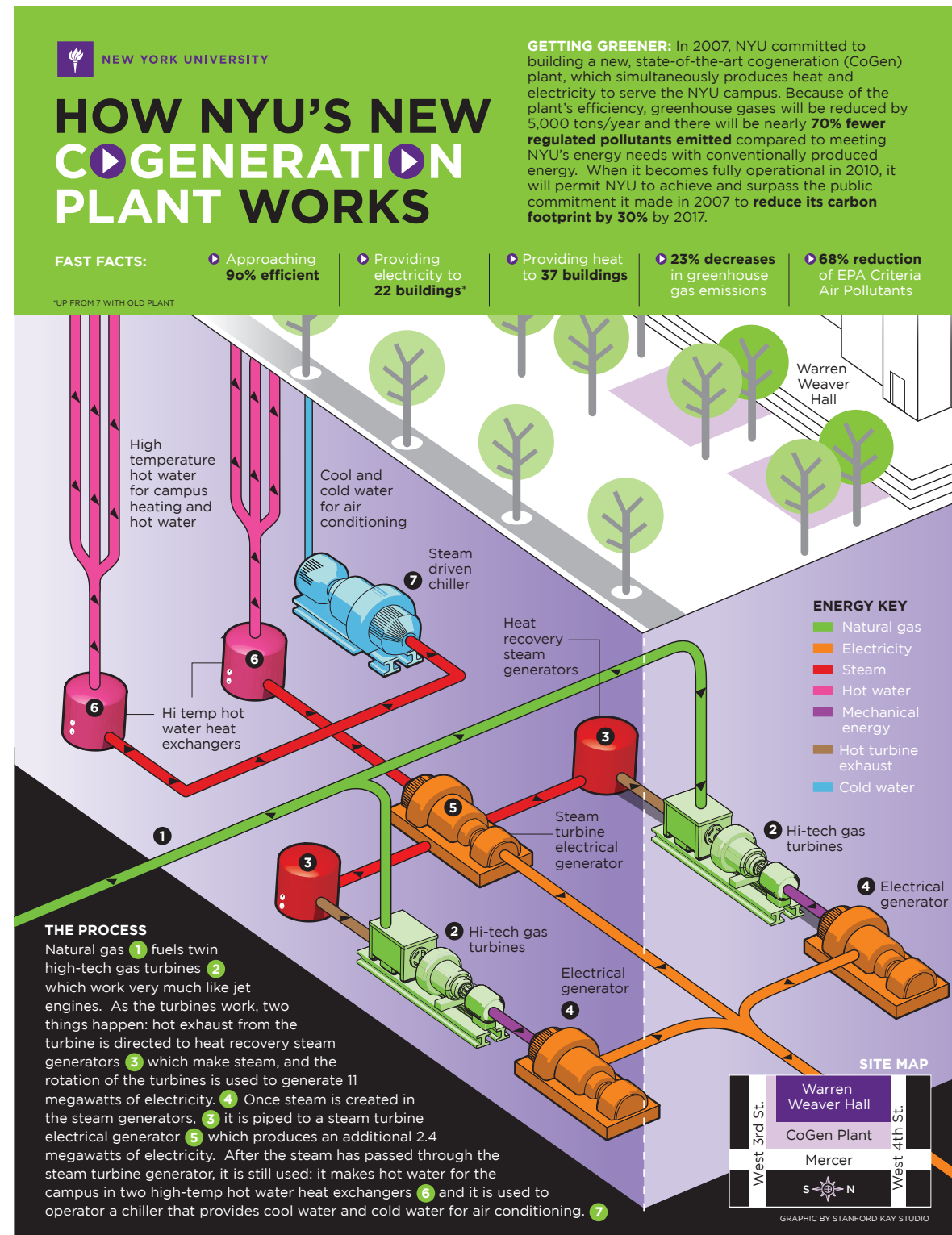
NYU was among several universities in New York to accept the Mayor's Carbon Challenge in 2007 to reduce its emissions by 30% by the year 2017. Within five years the school met the challenge.

Buildings included:	40 buildings (heat & cool) 26 buildings (electricity)
Total Square Feet:	??
Types of energy:	NYC Grid Electricity Natural Gas Light Fuel Oil #2 Heavy Fuel Oil #4 Heavy Fuel Oil #5 R2 Biodiesel NYC Steam
Power Plant:	Co-generation CHP

Several strategies were implemented at the start to cut emissions like the commitment to adhering to building standards and certifications to ensure construction (new and renovation) would achieve "high performance EUI targets". Along with this was the planning of upgrades to buildings and facilities and the utilization of building management systems including monitoring, facility controls and operator training to aid in achieving these performance goals. Educating building occupants on sustainable behavior and practice to motivate change at the human scale was also a priority for long term change. These methods combined with an advanced upgrade to the existing co-generation power plant in 2010 on campus culminated in the use of cleaner, more efficient energy use and the reduction of fuel oil.



2.01



2.02

The NYU co-generation power plant is a unique combination of natural-gas fired heat and power (CHP) reducing the dependence on city power and reduces the production of greenhouse gases by 23%. However, the school isn't new to producing its own power – energy production began in the 1960s with the power plant being installed in 1980. When the original oil-fired plant reached its useful service life NYU made the decision to upgrade and expand its facilities resulting in the move toward its own micro-grid within the city. To date there are 40 buildings supplied with heating and cooling and 26 buildings running on electricity produced through the on-campus plant. High-temperature hot water is also produced through the plant aiding in the reduction of carbon-intense fuel oil and natural gas combustion in buildings. Moving toward a more resilient environment prepares the campus in moments of brown or black-outs as in the situation during Hurricane Sandy.

The campus is able to “island” from the city distribution grid and purchases power when energy demands become greater than the plant can produce on its own. The CHP plant produces twice the energy capacity as that of the previous facility with a significant reduction of energy waste resulting in greenhouse gases. In moments of natural disaster or city grid failure NYU has been able to sustain itself without major disruption and has been a source of help during these times to the surrounding community. The economic impact of the university has been substantial with energy cost savings of \$5 to \$8 million per year despite the hefty price tag of the installation of the CHP plant (\$126 million).

- 2.01 Image of NYU campus
- 2.02 NYU Co-generation power plant overview illustration

<https://www.nyu.edu/life/sustainability/areas-of-focus/energy.html>
<https://building-microgrid.lbl.gov/new-york-university>
<http://www.nyc.gov/html/gbee/html/challenge/universities.shtml>
<https://serv.cusp.nyu.edu/projects/evt/>

BUILT PRECEDENT

Housing Development | Co-Op City: Bronx, New York

Cooperative City in the Bronx is an expansive housing development established in 1973 and the largest of its kind in the world. The site was previously home to an amusement park that operated in the early 1960s but was later developed into the current community consisting of 35 high rise buildings, 15 houses of worship, seven town home buildings, eight parking garages, three shopping centers, a high school, two middle schools, three grade schools, six nursery & daycare centers, a multiplex movie theater, supermarket, firehouse, power plant and an air conditioning generator building. In 2007 significant efforts have been made to rehabilitate the community and reduce facility, operations and overall energy and waste costs through implementing new standards for sustainability and resiliency.

Buildings included:	85 buildings
Population & Density:	43,752 (2010 United States Census)
	857.55 acres
	51.0 inhabitants per acre
Types of energy:	NYC Grid Electricity
	Natural Gas
	NYC Steam
	Oil
Power Plant:	Tri-generation

Co-op City produces its own electricity by use of a tri-generation power plant which services all residents in the community. The district is self-sustaining but can engage the city's electrical grid in moments of emergency. In 2012 Hurricane Sandy swept the Northeast coast causing devastating disaster throughout the region. Co-op City maintained its power and heat during and after the storm despite the power outages and damage to city infrastructure in surrounding areas. The tri-generation plant provides heat, hot water, air conditioning and electrical distribution to all buildings within the community. This community has become somewhat of a safe-haven in moments of disruption due to its ability to maintain resource need.

The tri-generation power plant on site "involves a complex network of interdependent systems with chillers, boilers, and power generation equipment." By focusing on maximizing energy and steam use during peak and off-peak times the plant employed the reconfiguration of power and energy generation systems.



2.03



2.04

- 2.03 Co-op City in the Bronx. Photo by David L Roush (Own work)
<http://creativecommons.org/licenses/by-sa/3.0>
https://commons.wikimedia.org/wiki/File%3AAerial_Image_of_Harry_S_Truman_High_School_and_Co-Op_City_Area.jpg
- 2.04 Co-op City area image

https://en.wikipedia.org/wiki/Co-op_City,_Bronx
<http://www.wsp-pb.com/en/WSP-USA/What-we-do-USA/Projects/Co-op-City-Cogeneration-Plant/>

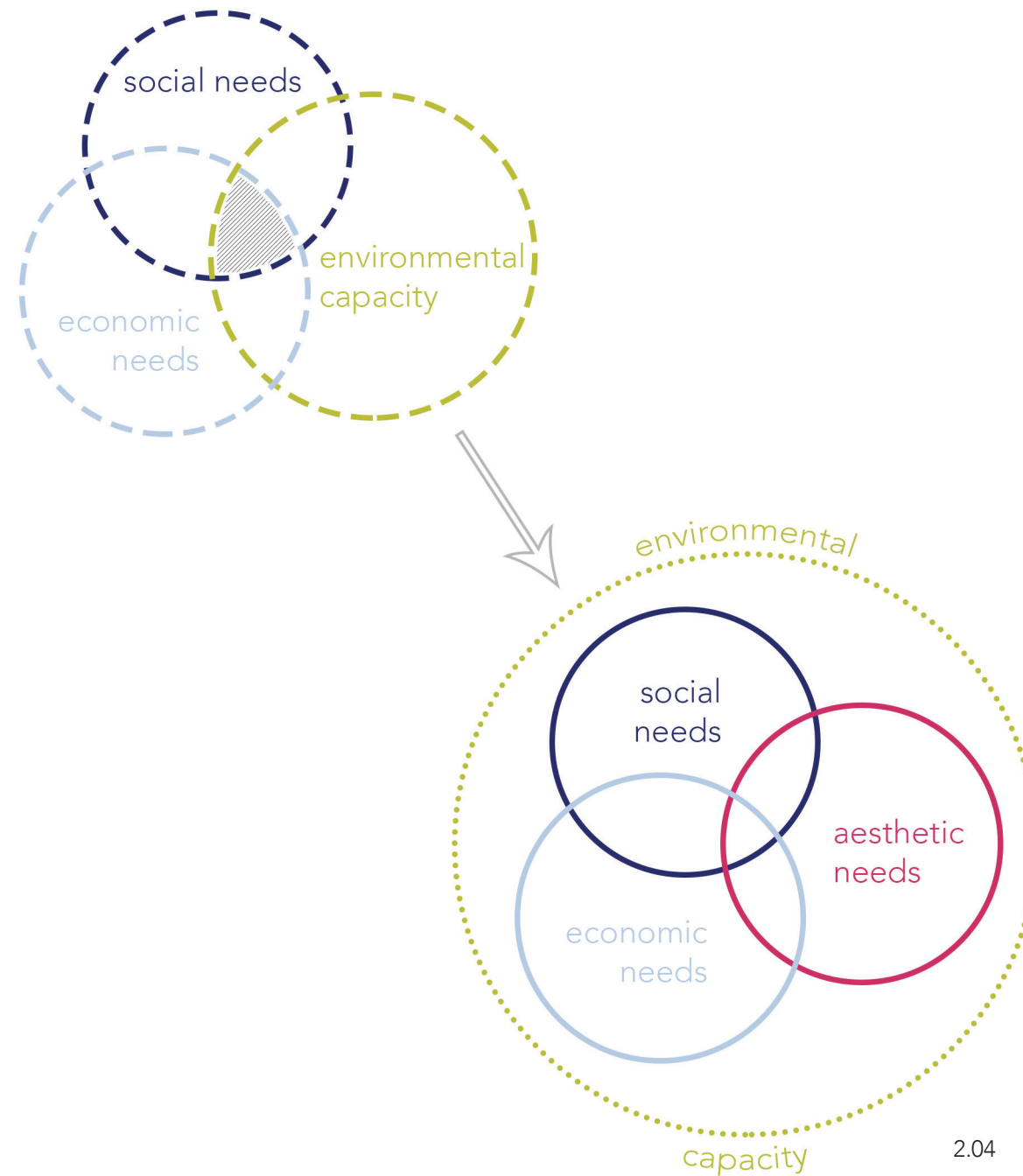
Sustainable Communities: Potential for Eco-Neighborhoods

Sustainable Communities by Hugh Barton is broken into four main themes: context, neighborhoods, communities and resource management. The initial aim is to make a distinction between 'neighborhood' and 'community' and subsequently what constitutes a sustainable version of each.

The book dissects the concept of a 'neighborhood' and critiques its ability for sustainability of economy and resources. To preserve accuracy in terminology 'neighborhood' is defined as "a locality which is familiar or has a particular unifying character" and is not simply the district itself. Throughout history neighborhoods have evolved through function. The needs of a collection of people created schools where they were needed, markets where needed, factories where needed and so on. As described in the book:

In historic towns and cities neighbourhoods are neither the stylized neat catchment zones of tradition nor atomized housing units of the house-builders, but something much more organic: neighbourhoods blend into each other as part of a wider urban continuum. There are few firm edges but rather there is a permeability between one area and another. Land use and social character are often much more diversified than more recent peripheral estates or new town neighbourhoods. (4-5)

In recent years the neighborhood concept is designed through the lens of market interest and planning commissions eliminating any natural development of occupancy need.



2.04 Creative policy making. Defined in Sustainable Communities as socially inclusive, economically viable, resource conserving and aesthetically pleasing.

2.04

NYC's Street Trees

The New York City Street Tree Map brings New York City's urban forest to your fingertips. For the first time, you have access to information about every street tree in New York City. Learn about the trees that make up our city's urban forest, mark trees as favorites and share them with your friends, and record and share all of your caretaking and tree stewardship activities. Learn more [About The Street Tree Map](#).

Citywide Statistics

Mapped Trees	Activities Reported	Trees Favored
682,295	6,180	2,379

Number of Species
215

Most Common Species
London Planetree
87,736 trees, 13% of trees on the map

Recent Tree Care Activities

- The Pin Oak near 81 1 Avenue, New York, NY 10003 was Managed Soil on 04/26/2017
- The Pin Oak near 81 1 Avenue, New York, NY 10003 was Managed Soil on 04/26/2017
- The Oak near 372 Grand Street, New York, NY 10002 was Managed Soil on 04/25/2017

Learn
Visit the tree care Library for tree care tips, stewardship groups in your area, a printable watering calendar, and more. [Carina for Street Trees](#)

Find Events
Join others in caring for NYC's urban forest by attending a tree planting or care events. [View Events](#)

2.05

RESOURCE MAPPING

Tree Mapping | New York City Tree Map

Trees within the city limits are catalogued and organized online for anyone to access. You can find out what type of tree it is, its age, carbon sequestration and storm-water runoff abatement amount.

Bushwick South

Neighborhood Statistics

Trees on the Map	Activities Reported	Trees Favored
4,761	0	5

Number of Species
100

Most Common Species
Thornless Honey Locust
1,044 trees, 22% of Bushwick South trees on the map

Recent Tree Care Activities
There are no activities reported for this species. Click on a tree to report your care.

Ecological Benefits
Benefits are calculated using formulas from the U.S. Forest Service. Learn more about the [benefits of trees to NYC](#).

- Stormwater intercepted each year: 6,852,595 gallons Value: \$57,944.53
- Energy conserved each year: 4,029,824 kWh Value: \$508,744.61
- Air pollutants removed each year: 7,612 pounds Value: \$39,803.04
- Carbon dioxide reduced each year: 2,361 tons Value: \$16,772.79
- Total Value of Annual Benefits: \$638,037.85**

2.06

Pin Oak

Quercus palustris

Species Map and Details

- ID Number: 3728313
- Trunk Diameter: 18 inches
- Suggest an Edit
- Closest Address: 209 JOHNSON AVENUE, BROOKLYN, NY 11209

Tree Care Activity
There are no activities reported for this tree. Get tips on tree care activities in the [Learn](#) section. [Record Your Care](#)

Ecological Benefits
Benefits are calculated using formulas from the U.S. Forest Service. Learn more about the [benefits of trees to NYC](#).

- Stormwater intercepted each year: 2,742 gallons Value: \$27.19
- Energy conserved each year: 1,456 kWh Value: \$183.78
- Air pollutants removed each year: 3 pounds Value: \$14.22
- Carbon dioxide reduced each year: 3,742 pounds Value: \$12.50

2.07

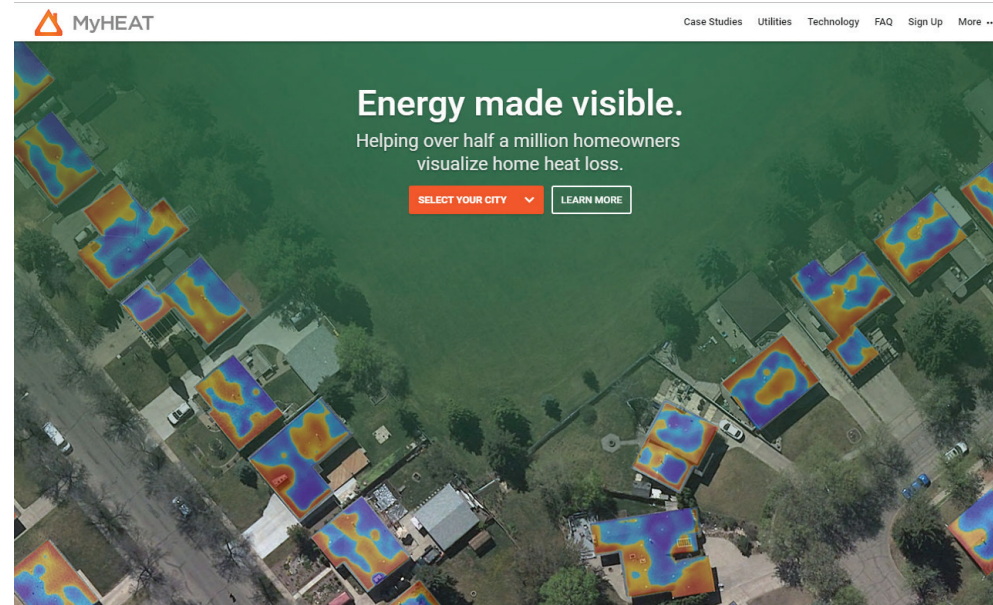
- 2.05 NYC Tree Map homepage screenshot
- 2.06 NYC Tree Map neighborhood selection
- 2.07 NYC Tree Map specific tree selection and resulting data

RESOURCE MAPPING

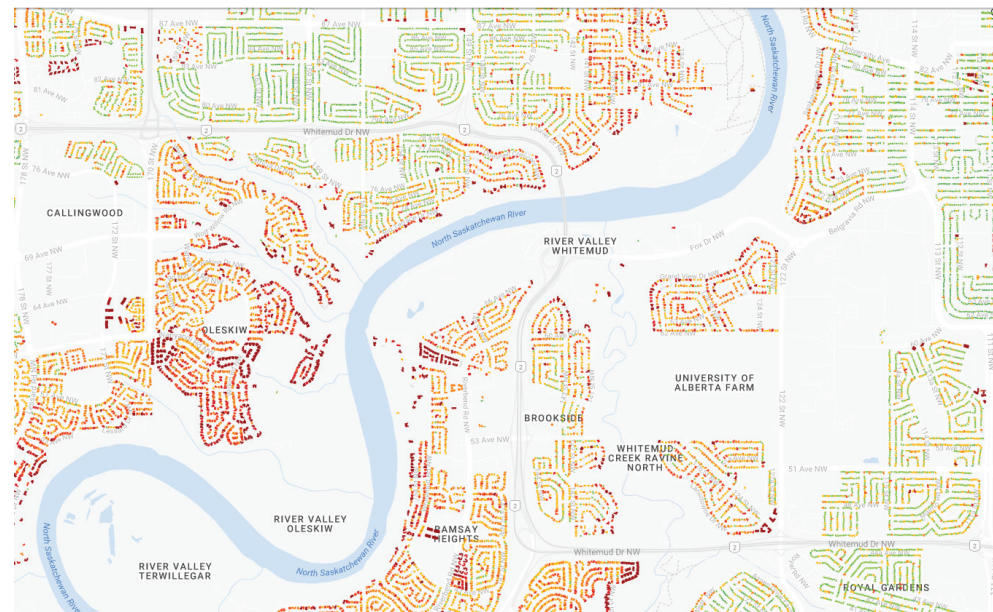
Heat Mapping | MyHEAT

Collects waste heat data through aerial heat mapping of regions in Canada for consumers “to understand their energy loss, increase efficiency, reduce consumption and save money.”

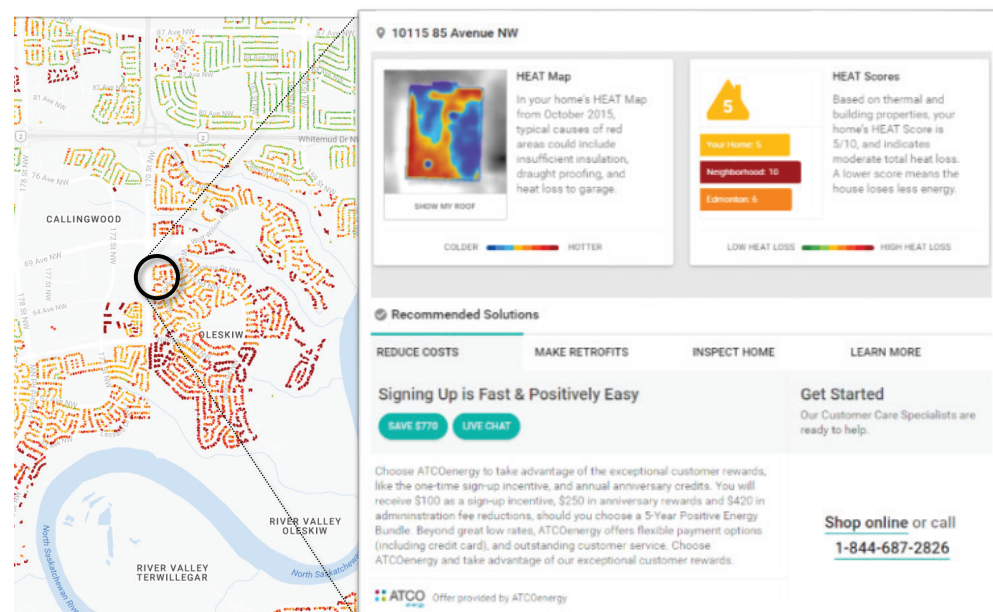
2.08



2.09



2.10



- 2.08 MyHeat homepage screenshot
- 2.09 MyHeat website image
- 2.10 MyHeat website image

RESOURCE MAPPING

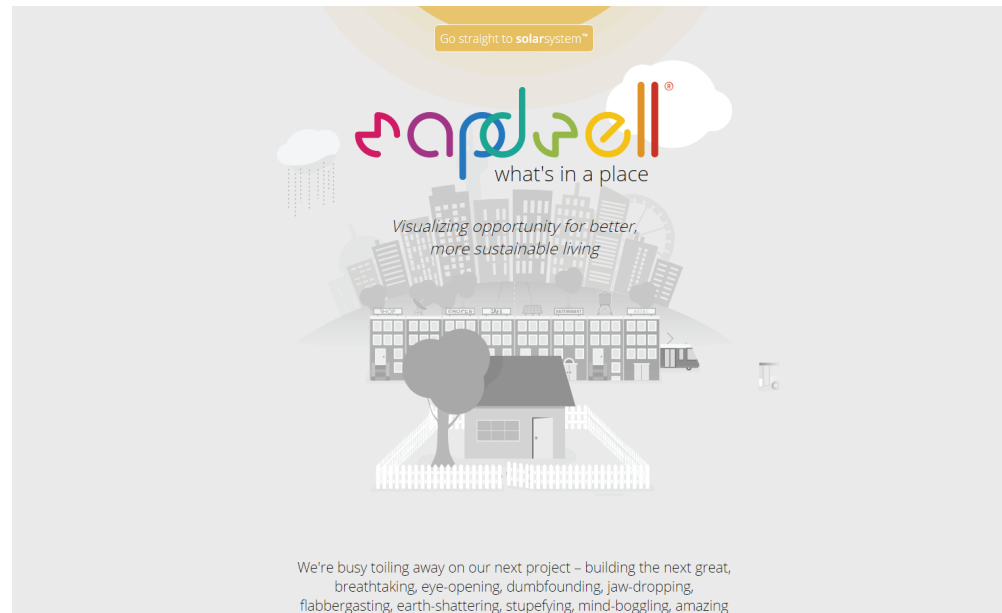
Solar Mapping | Map Dwell

Map Dwell, Boston Community Energy Study and Project Sunroof are all software programs that collect solar potential of buildings and area using satellite data of rooftop area, slopes and annual tree or shade cover. The results are collected and shared online for free. Each of these programs calculate average energy consumption of buildings (commercial and residential) based on available building area and construction. The average usage is then used for calculating annual savings with the integration of solar energy collection.

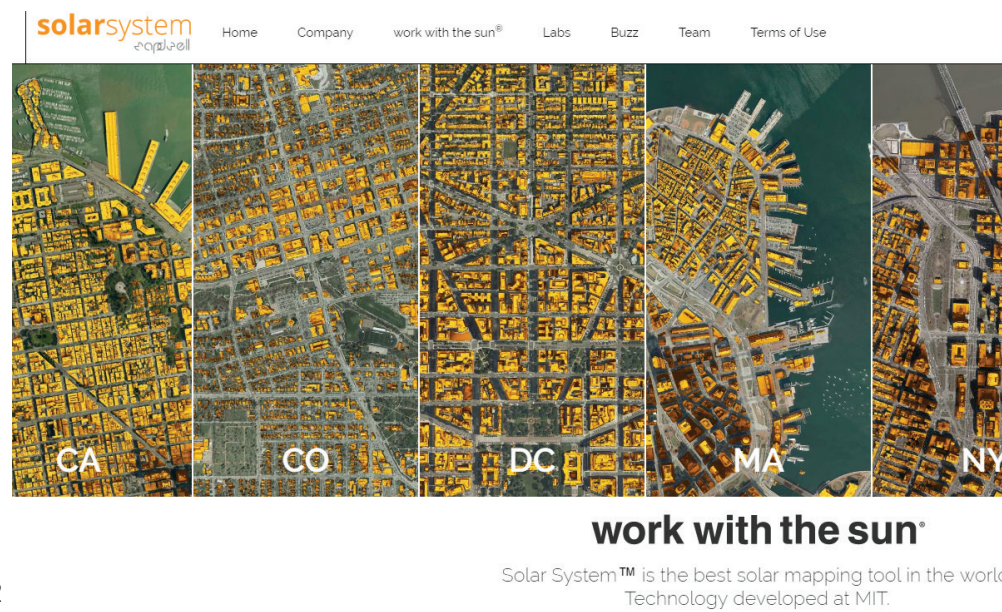
Map Dwell and Project Sunroof both aim to connect consumers with potential solar energy providers. Map Dwell also provides more detailed information on carbon offset (if proposed solar panels are installed), the number of trees yielded from the energy savings and so on. Boston Community Energy Study

Boston Community Energy Study goes a step further in locating regions of Boston that create sub-regions within the city based on a collective energy potential. This method of generating energy regions from solar energy proposes an idea of community or regional autonomy potential. The study generated "energy use data for each building including hourly demand data for lighting, plug loads, heating, cooling, and hot water." The BCES maps potential "districts" within, adjacent to and outside of existing district energy regions showing the different opportunities available when collective energy districts tap into existing power plant districts or create stand-alone energy production regions. The study also locates affordable housing regions as separate energy districts on their own.

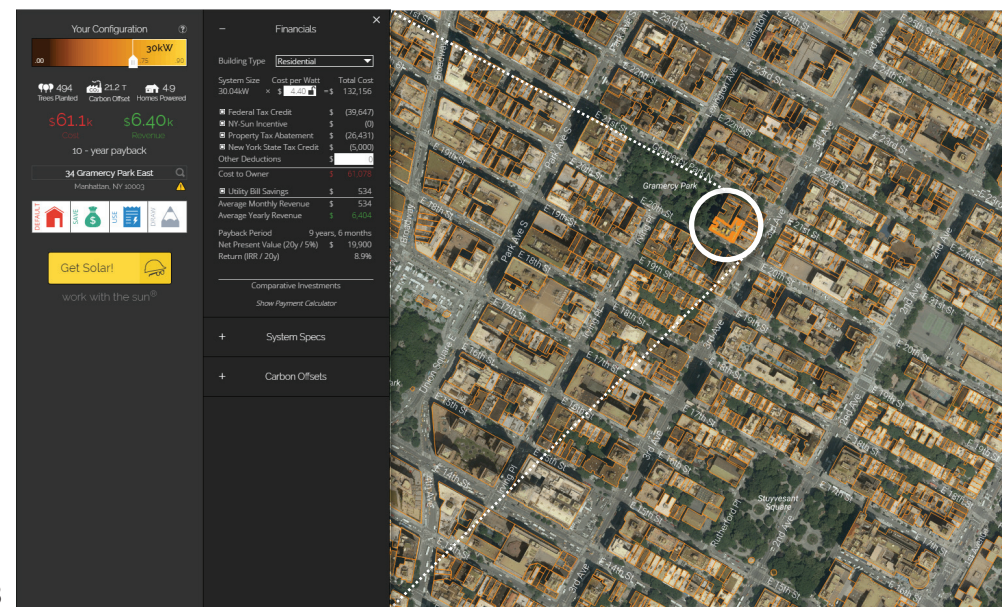
2.11



2.12



2.13



2.11 Map Dwell homepage screenshot

2.12 Map Dwell website image

2.13 Map Dwell website image

RESOURCE MAPPING

Solar Mapping | Google Project Sunroof

As described on its webpage Project Sunroof uses a solar calculator developed by Google that “helps you map your roof’s solar savings potential.”



2.14

How Project Sunroof Works

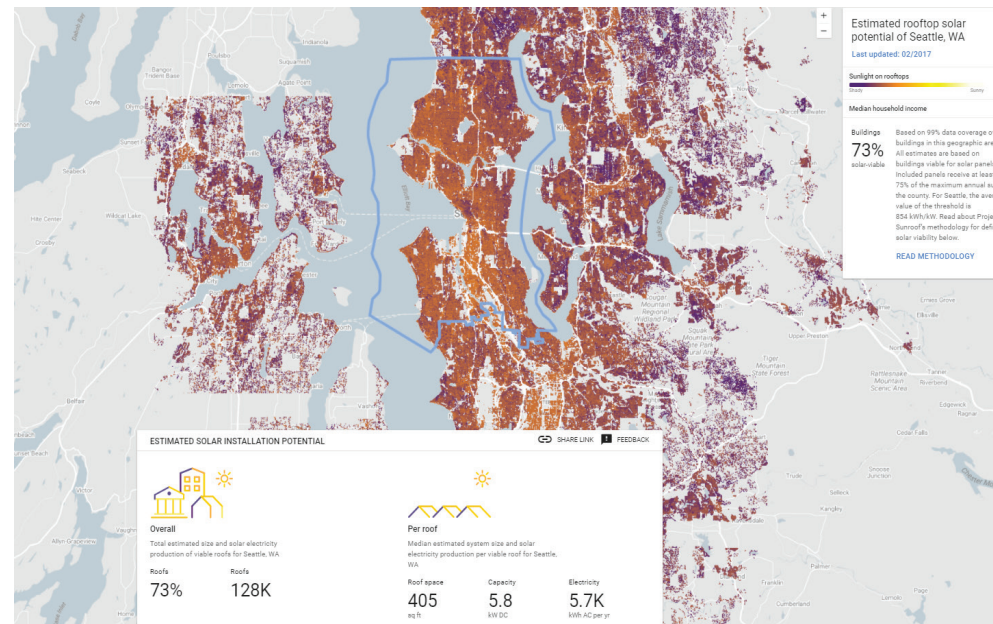
Your own personalized solar savings estimator, powered by Google Earth imagery.



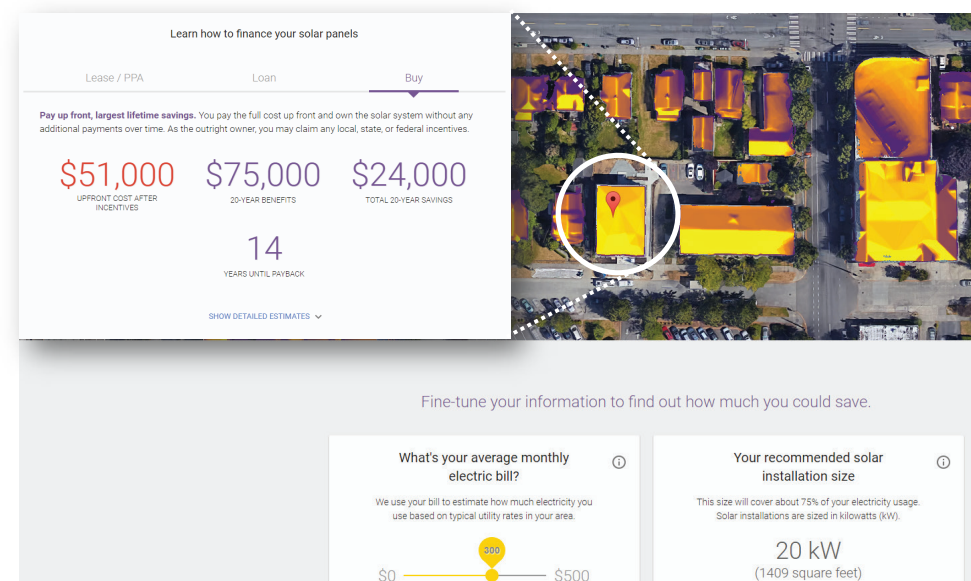
1

Search for your home

We use Google Earth imagery to analyze your roof shape and local weather patterns to create a personalized solar plan.



2.15



2.16

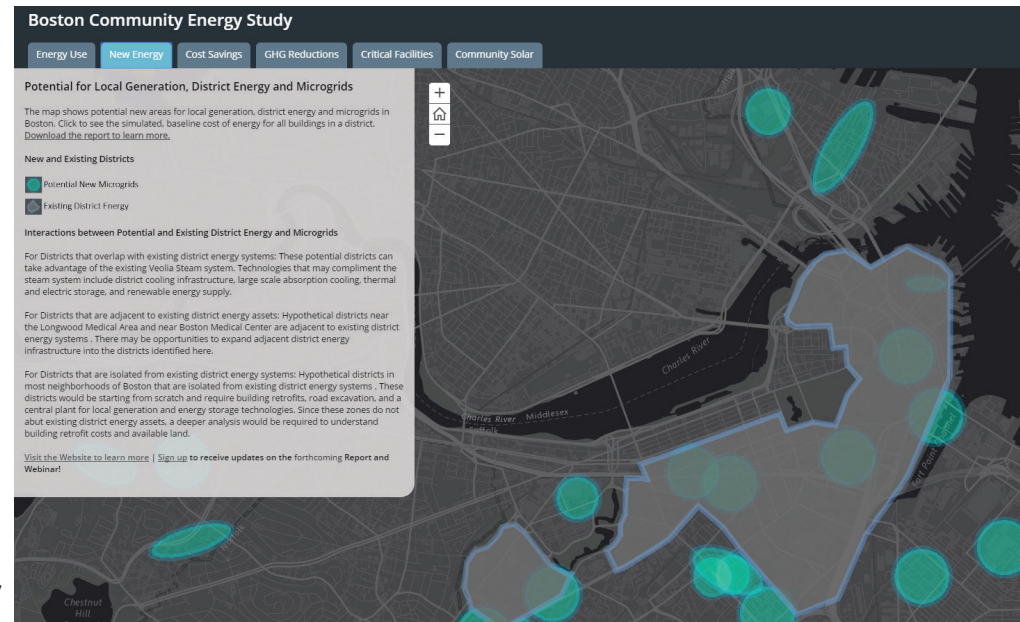
- 2.14 Google Project Sunroof homepage screenshot
- 2.15 Project Sunroof website image
- 2.16 Project Sunroof website image

RESOURCE MAPPING

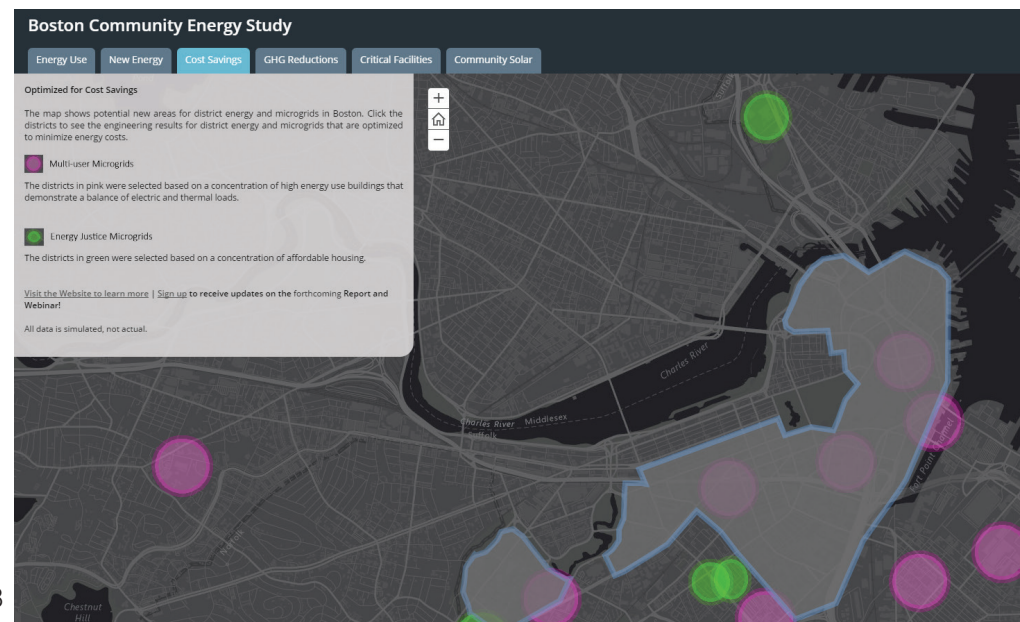
Solar Mapping | Boston Community Energy Study

“Explores the potential for local energy generation, district energy and micro-grids.”

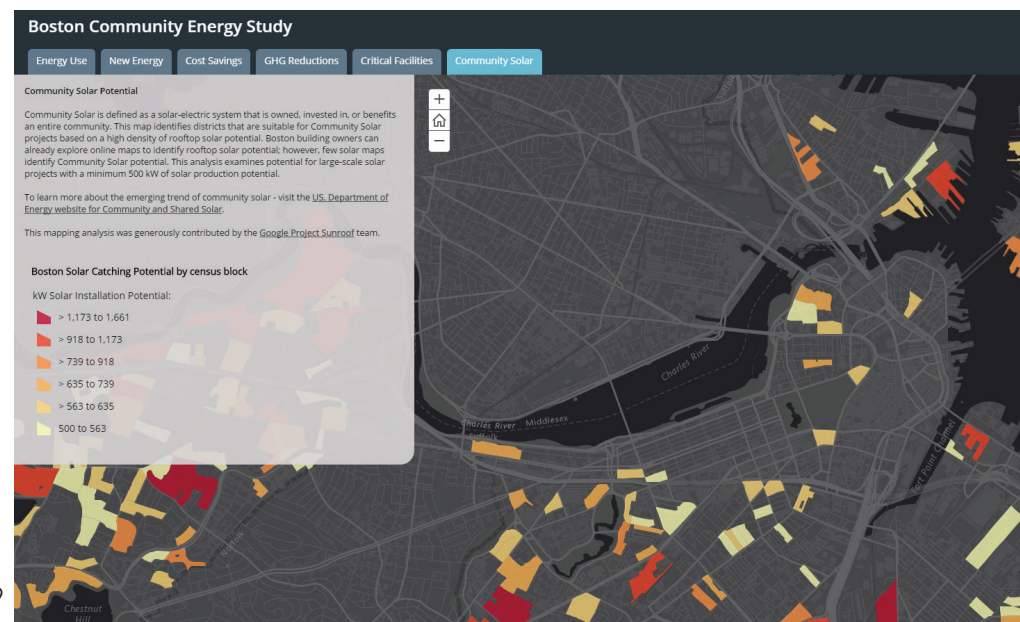
2.17



2.18



2.19



- 2.17 Boston Community Energy Study homepage screenshot
- 2.18 Boston Community Energy Study website image
- 2.19 Boston Community Energy Study website image

SITE SELECTION AND ANALYSIS

Exploring density requirements, occupancy and building types may help to narrow the broad-brush approach to applying sustainable features to an urban area. Defining the limits for an eco-grid adoption will establish a baseline from which to measure from. Study of the greater area context surrounding the Bullitt Center becomes the initial approach as the “patient zero” method helps to segue into the concept of a high performance community. The Capitol Hill & First Hill areas in Seattle present a unique opportunity to use the Bullitt Center in an approach to the site that springboards community wide resiliency through ‘infecting’ neighboring development. This location is ideal as it is situated at the culmination of several different occupancy zones, neighborhoods and has a diverse mix of commercial, education, religious, government and residential buildings. The area also met the established eco-grid requirements for this thesis.



This spread:

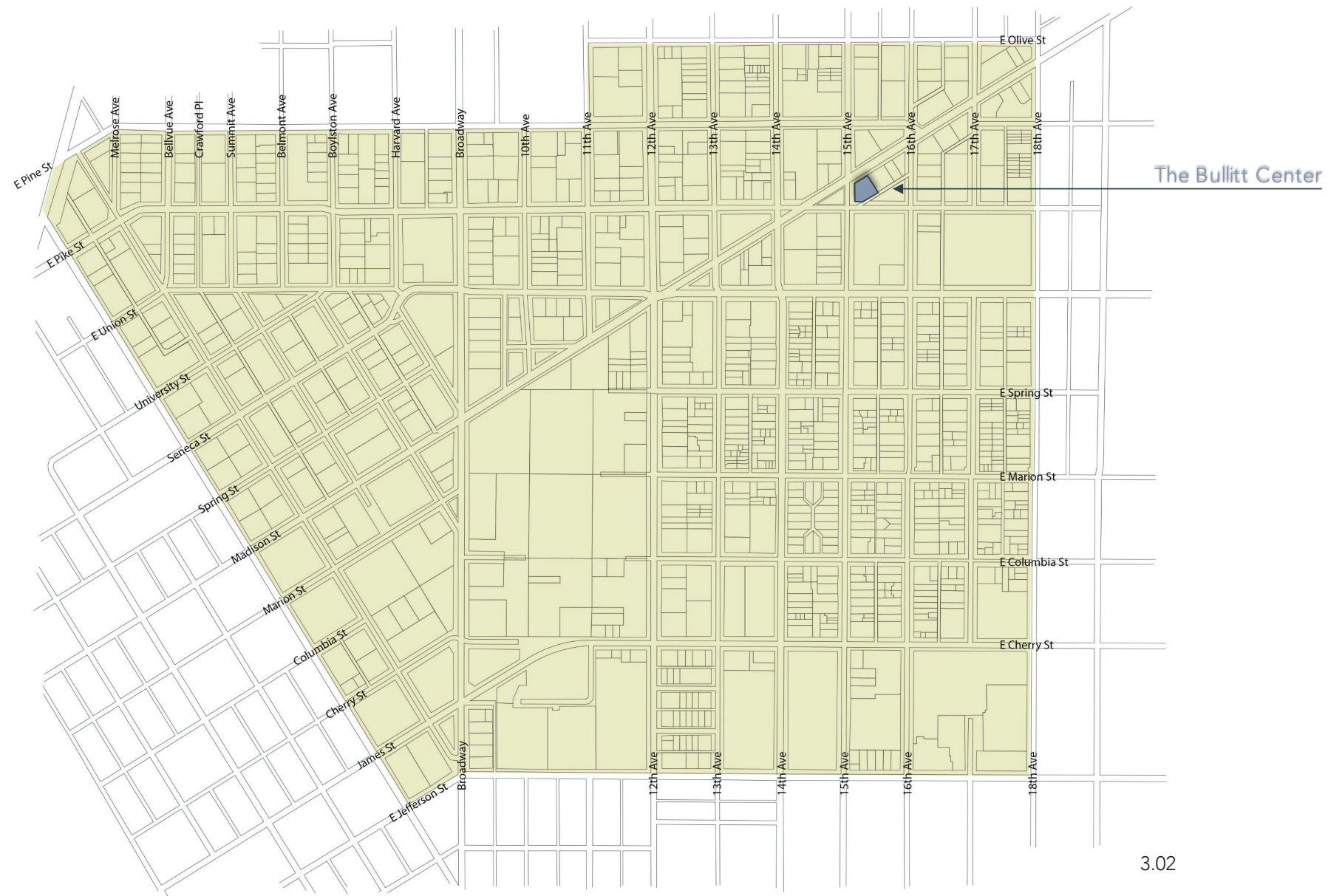
3.01 *Aerial image of Seattle provided by Google Maps. Highlighted region shows specific site location for project analysis*

3.02 *Site location highlighting the Bullitt Center for reference*

Following spread:

3.03 *Occupancy breakdown by parcel area of site for deeper analysis of the site*

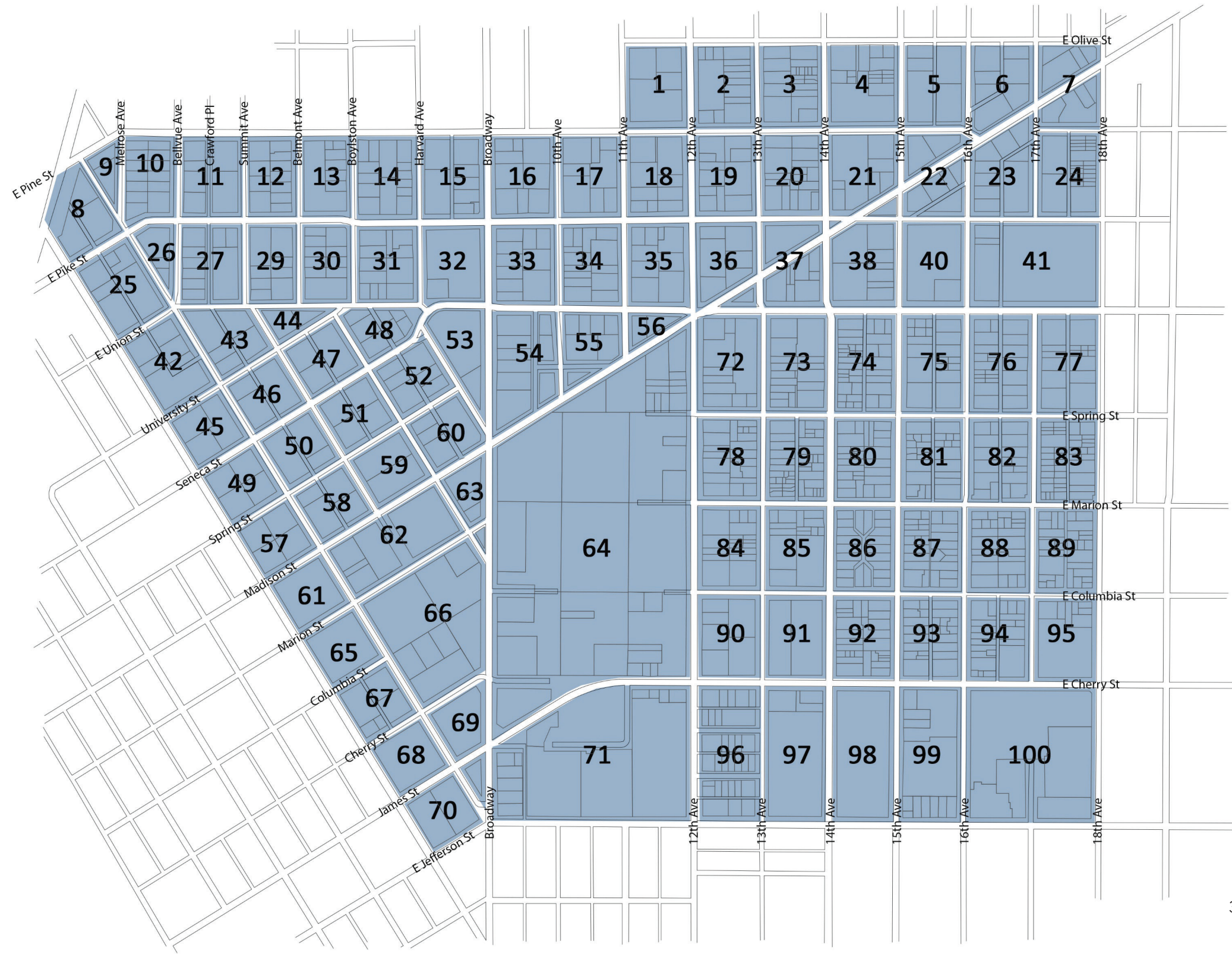
3.04 *Each block within the site is assigned a number for individual analysis*



Some of the main objectives in proposing such an eco-grid is to help incentivize sustainable methods through the engagement of communities. Pushing to implement ways in which greater areas can save on building maintenance costs, utility costs and overall healthier living without major renovation or reconstruction could motivate business owners and residents to adopt a more resilient community environment. Also, the integration of an eco-grid would set requirements on new construction within that grid to maintain or improve upon itself. This approach makes a community's collective needs a top priority and gives immediate owners and residents more influence on the decisions made within the grid area.

Establishing a baseline community area to apply a resilient design approach includes the consideration of population density and historical precedent of community definition. For this project requirements were set for essential building occupancy types, in that if all surrounding development and infrastructure were to vanish the collection of each of the parts would sustain life within the boundaries of the established community. A variety of transportation options and an already established sense of identity were also key.



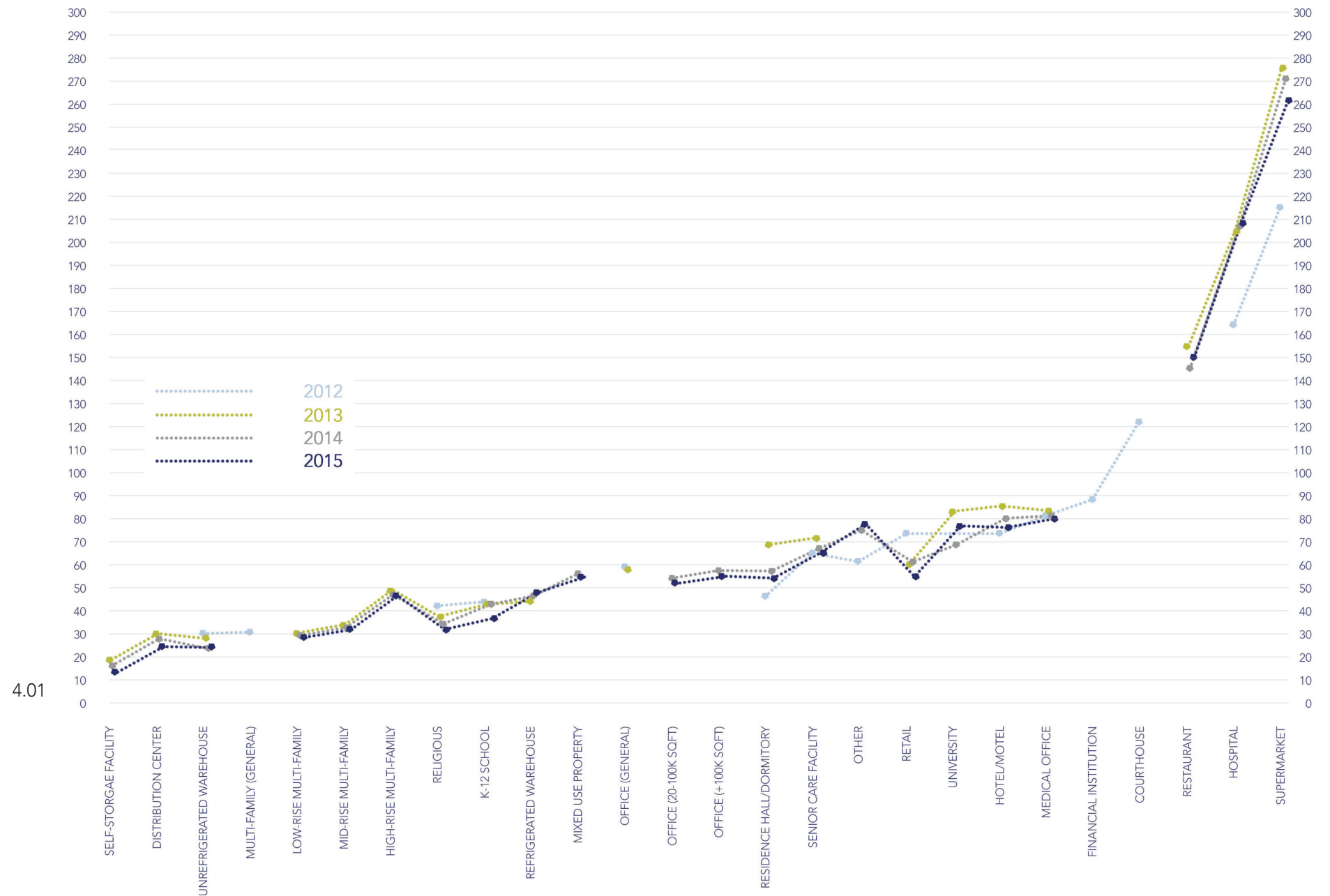


METHODOLOGY

In order to begin calculating consumption of the site, analysis of existing buildings was first collected and catalogued. Maintaining consistency in calculations, the most recent EUI data was used to determine each building's annual energy consumption. Median values from EnergyStar's EUI report for Seattle along with King County's Parcel data were combined to achieve a median baseline consumption for the site.

King County data: building sqft, construction type, exterior material, construction year, number of floors and units, occupancy.

Collecting seasonal consumption data through analysis of a baseline building's monthly energy use is used to determine consumption models throughout the year. This data aims to provide alternate resiliency models when acute disruptions occur within the region.



4.01 Chart representing the Energy Star EUI median values by occupancy in Seattle from 2012 to 2015

GOALS AND OBJECTIVES

Goals for this thesis are establishing a framework for an 'eco-grid' model and incentivizing adoption and energy transparency within the community.

In order to meet the goals the objectives set include calculating energy consumption of the community, determining solar potential for each building, and resolving the discrepancy between consumption and production values. In all, what level of 'business as usual' can be achieved? And to what degree?

ASSUMPTIONS

The focus of the analysis is on electricity.

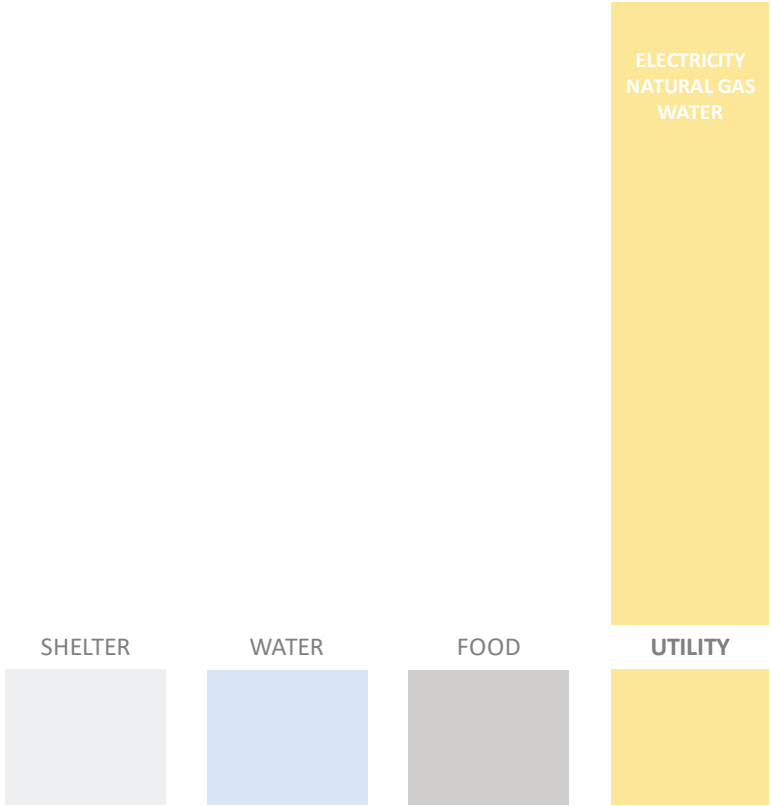
And assumptions are established for consumption and production simulations. Consumption values are calculated using the 2015 Energy Star Seattle median values by occupancy in conjunction with net square footages on record with King County.

Where net square footage is not provided by King County 50-80% of the total parcel area of building properties are taken and multiplied by the number of listed floors for an assumed net square footage. If in the case of a condominium building where a number of units is listed the assumed net square footage is divided by the number of units ensuring a minimum mean area of each unit of not less than 650 square feet. Parcel area percentage in calculating assumed building net square feet is adjusted to meet the minimum unit area but not to exceed 80% of the parcel area.

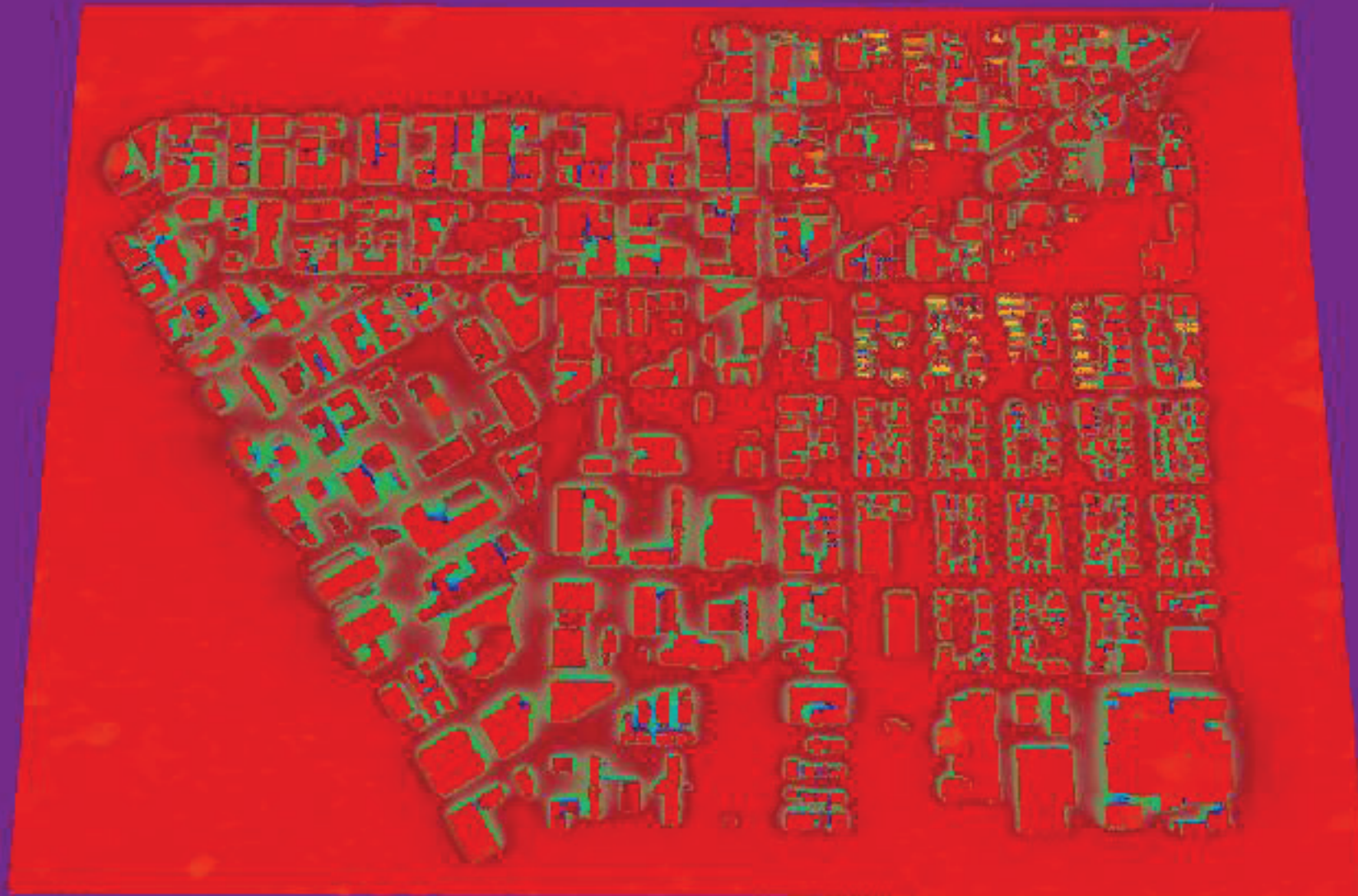
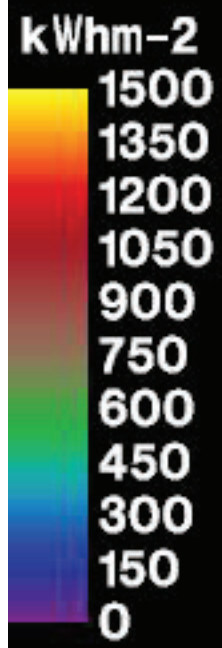
Production values assume 73% solar viability as determined by Google's Project Sunroof.

KBtu values converted to kWh and compared to the solar availability calculated through applying a radiation grid along modeled rooftops in Rhino and Grasshopper.

Complete and more detailed property data with energy consumption values by building are found in the Appendix of this document.



4.02

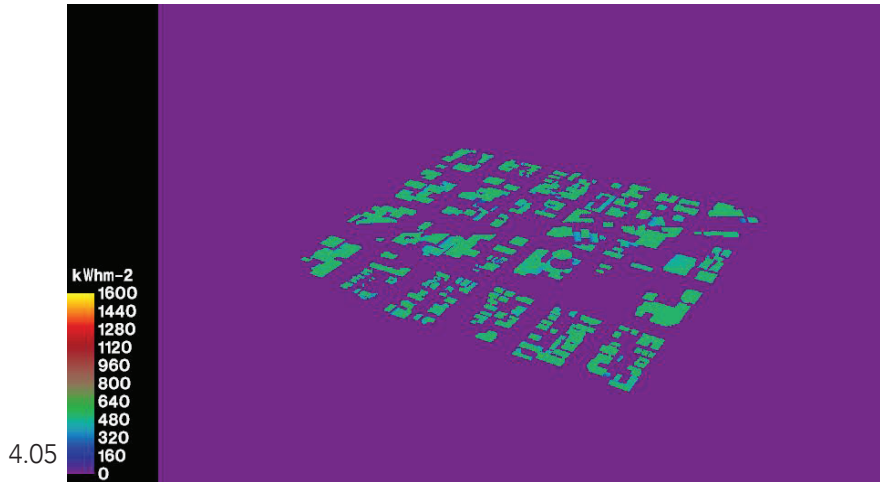
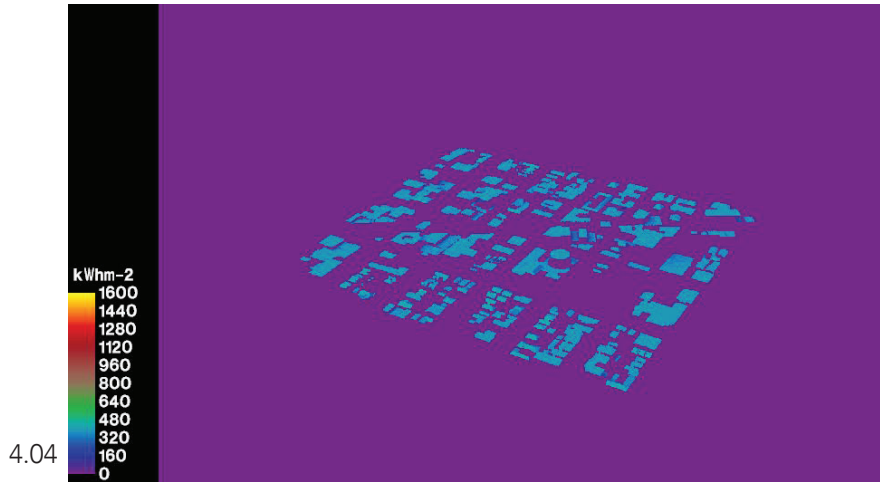


INSOLATION ANALYSIS

At the start of the study initial insolation analysis was necessary to study the overall radiation potentials of the site. The majority of the site is such that building height restrictions within zoning areas of the site allow for a degree of solar equity. The west side of the site features a few high rise buildings and a large hospital which overshadow surrounding structures, illustrated in the image on the opposite page.

Insolation grids illustrated on this page show the differences in solar potential by season. Seasonal analysis is calculated by month with Winter insolation simulated from December 1st through February 28th; Spring insolation simulated from March 1st through May 31st; Summer season includes June 1st through August 31st and Fall season simulates September 1st through November 30th. These seasonal calculations are purposely calculated to maintain consistency when comparing seasonal energy consumption data.

Insolation analysis grids created using DIVA for Rhino visualization metric.



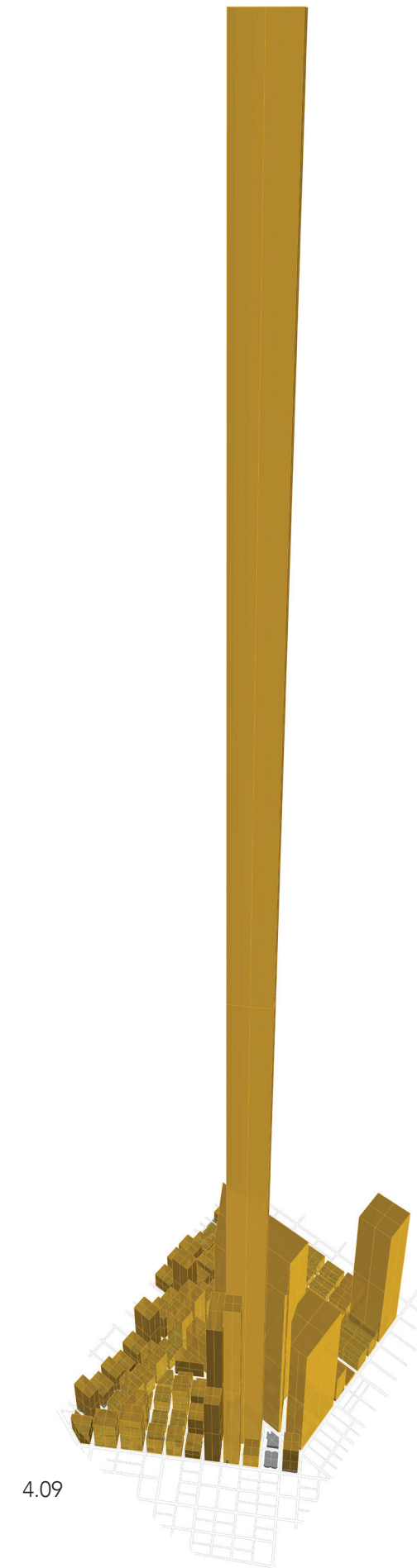
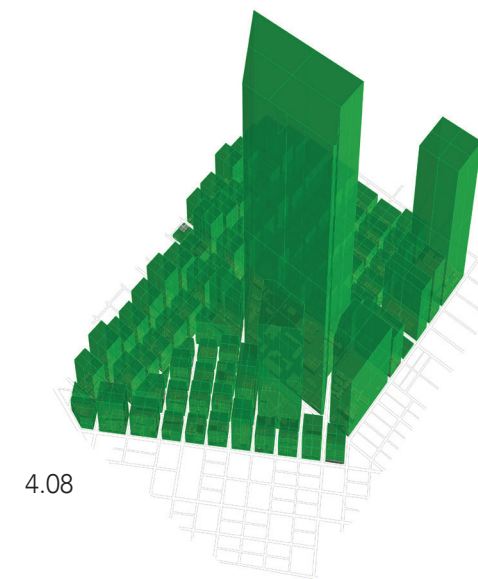
- 4.03 Winter insolation false color from December 1 through February 28
- 4.04 Spring insolation false color from March 1 through May 31
- 4.05 Summer insolation false color from June 1 through August 31
- 4.06 Fall insolation false color from September 1 through November 30

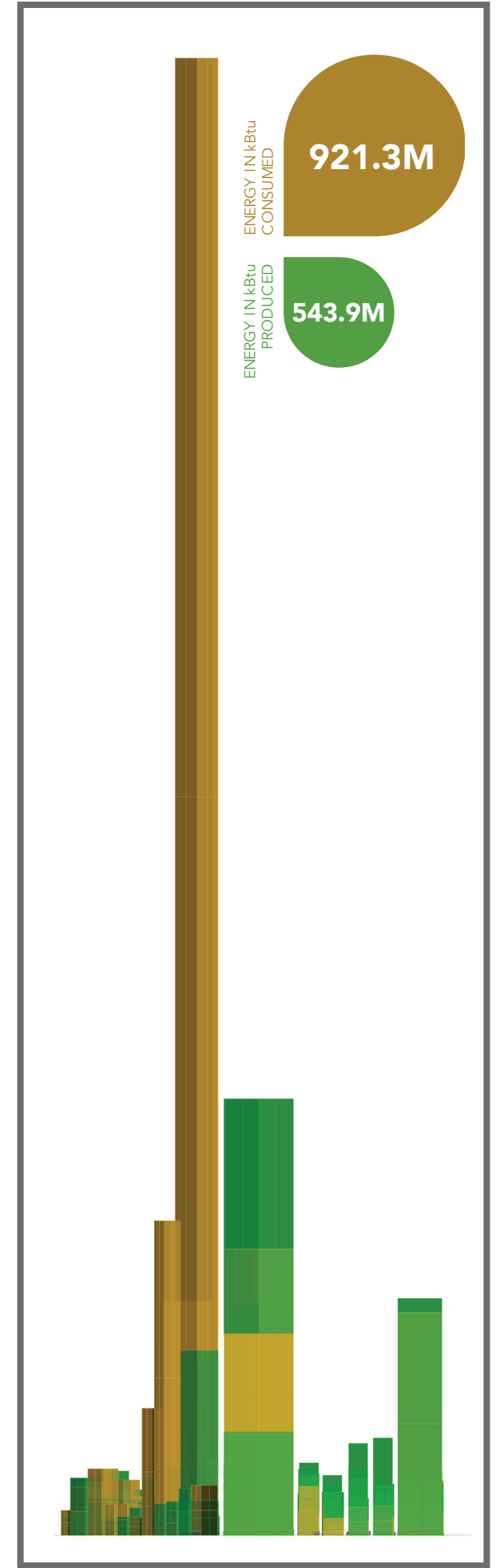
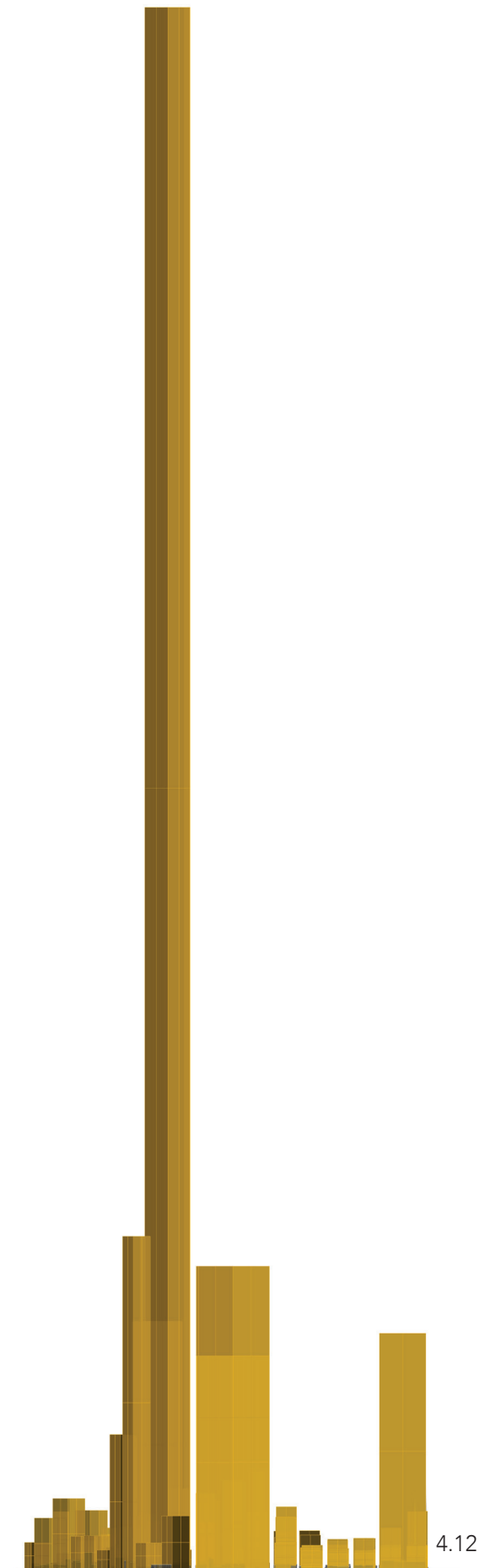
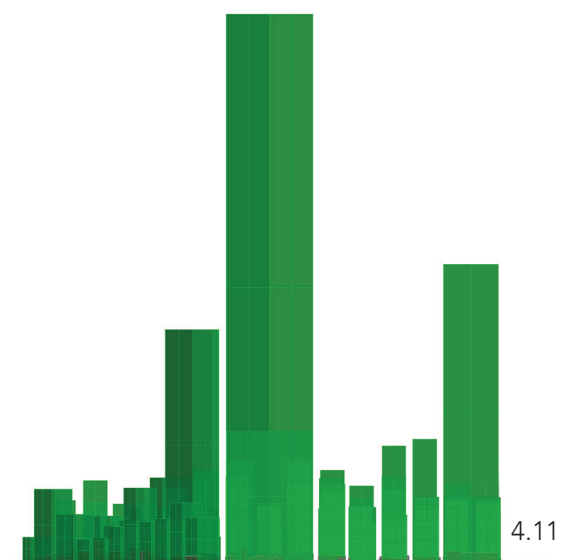
ANNUAL ANALYSIS

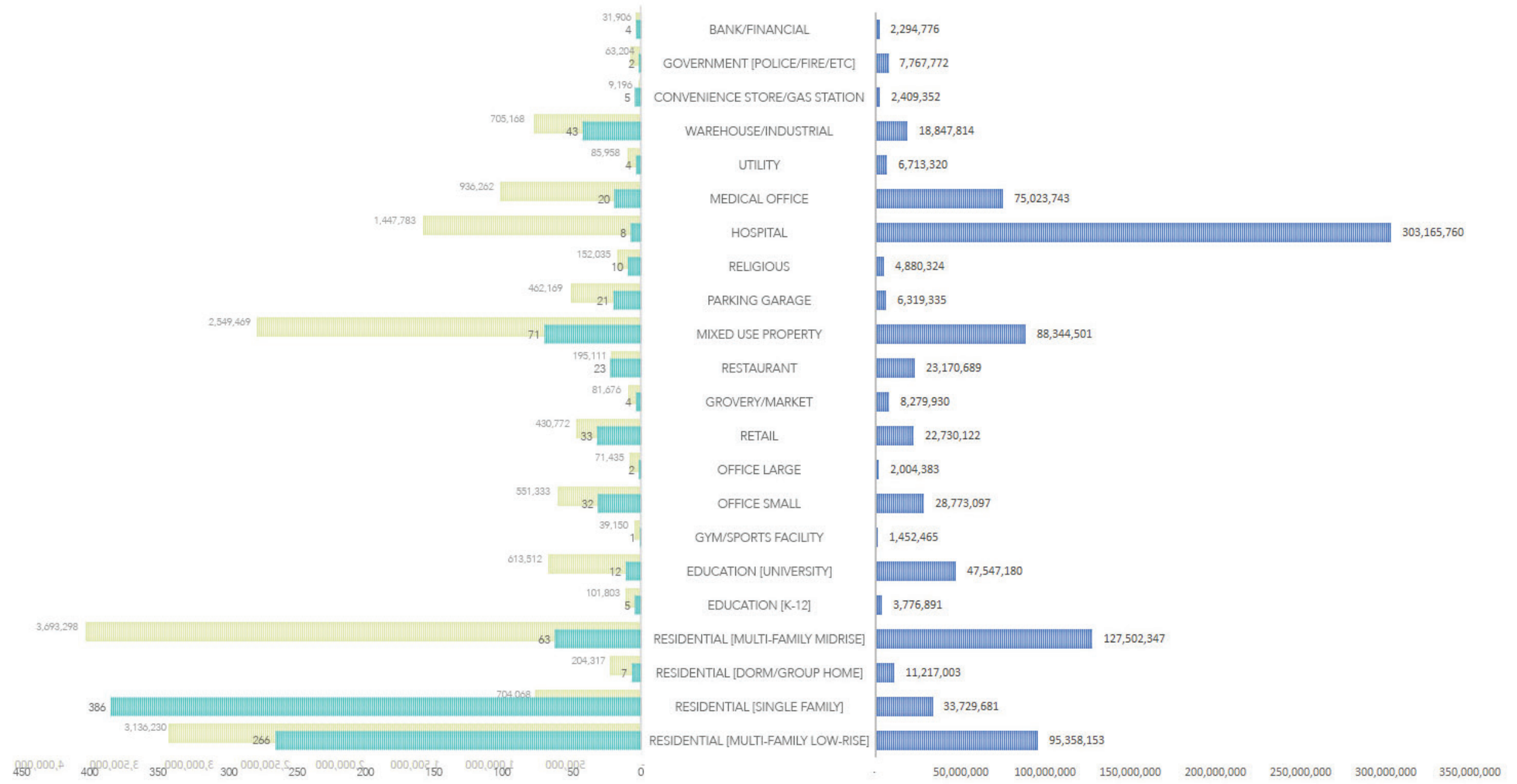
After gathering the site and building data and running calculations the total annual energy production potential to be 543.9 million kBtu compared to 921.3 million kBtus of consumption. The site is analyzed on a block-by-block level when calculating consumption and production values. This approach means that a mixture of occupancy types are calculated together so the representation of use and production to the right is a reflection of this analysis.

The annual analysis represented here shows that particular blocks within the site are capable of generating more electricity through use of photovoltaics than other blocks due to their quantity and availability of rooftops. In the consumption illustration there is one block (Block 66) showing an outstanding amount of consumption compared to the other blocks in the site. This block includes a hospital, which shown in an earlier EUI chart is the highest energy consuming occupancy.

- 4.07 *Bird's eye view of the buildings within the site*
- 4.08 *Bird's eye perspective. Production values represented as masses by block where 1 foot in height equals 1 kBtu of energy produced. Production calculations use Google Project Sunroof Seattle estimate of 73% solar viability.*
- 4.09 *Bird's eye perspective. Consumption values represented as masses.*
- 4.10 *South elevation view of buildings on site*
- 4.11 *South elevation view. Production values represented as masses.*
- 4.12 *South elevation view. Consumption values represented as masses.*
- 4.13 *South elevation view. Consumption and production masses combined for comparison.*







Total Building Count by Type

Total Annual kBtu by Building Type

OCCUPANCY ANALYSIS



4.15

Breaking down these numbers by building type the aim is to determine the greatest energy users and the most frequent building types within the site.

Hospitals, by far, use the most energy whereas single family and low rise residential buildings were the most frequent building type on site. Also comparing the building counts to the total square footages by type – mid and low rise residential have the most square feet by type in the designated eco-grid.

Since we know that the eco-grid’s production potential is significantly less than its consumption – what would happen in the event of a natural disaster? How would this affect energy resources when broken down into seasons? If disruption occurs in winter versus summer what is the impact?

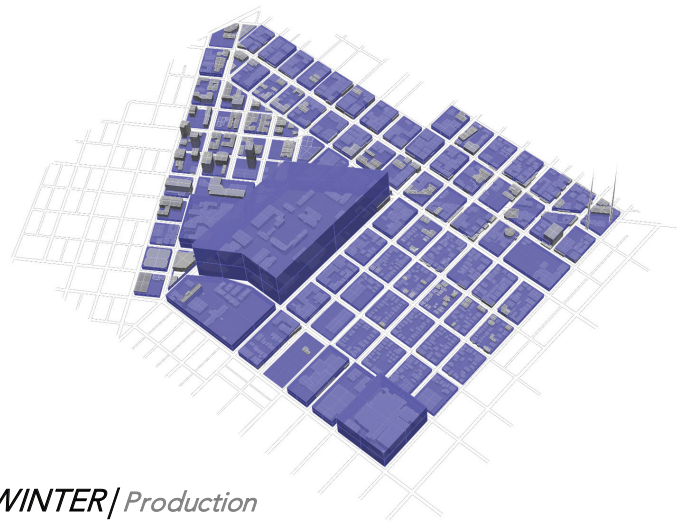
This spread:

- 4.14 Value comparison by building type of building quantity, total area in square feet, and total annual energy in kBtu.
- 4.15 Image representing seasons

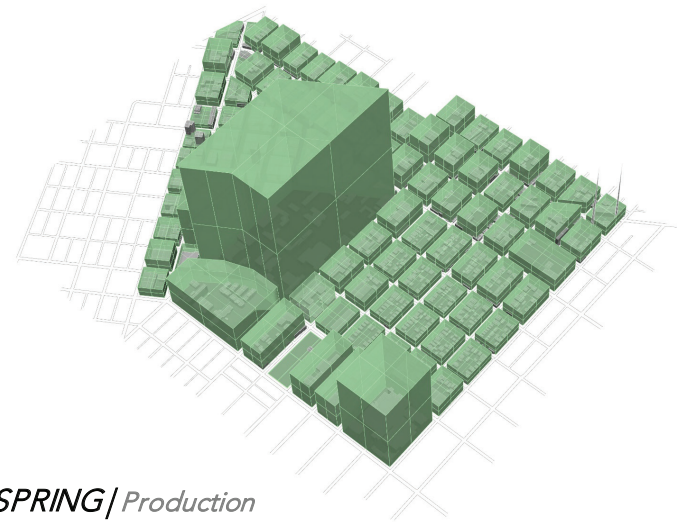
Following spread:

- 4.16 Winter production values illustrated in bird’s eye perspective view
- 4.17 Winter consumption values illustrated in bird’s eye perspective view
- 4.18 Spring production values illustrated in bird’s eye perspective view
- 4.19 Spring consumption values illustrated in bird’s eye perspective view
- 4.20 Summer production values illustrated in bird’s eye perspective view
- 4.21 Summer consumption values illustrated in bird’s eye perspective view
- 4.22 Fall production values illustrated in bird’s eye perspective view
- 4.23 Fall consumption values illustrated in bird’s eye perspective view
- 4.24 Winter production values illustrated from south elevation view
- 4.24 Winter consumption values illustrated from south elevation view
- 4.25 Spring production values illustrated from south elevation view
- 4.26 Spring consumption values illustrated from south elevation view
- 4.27 Summer production values illustrated from south elevation view
- 4.28 Summer consumption values illustrated from south elevation view
- 4.29 Fall production values illustrated from south elevation view
- 4.30 Fall consumption values illustrated from south elevation view

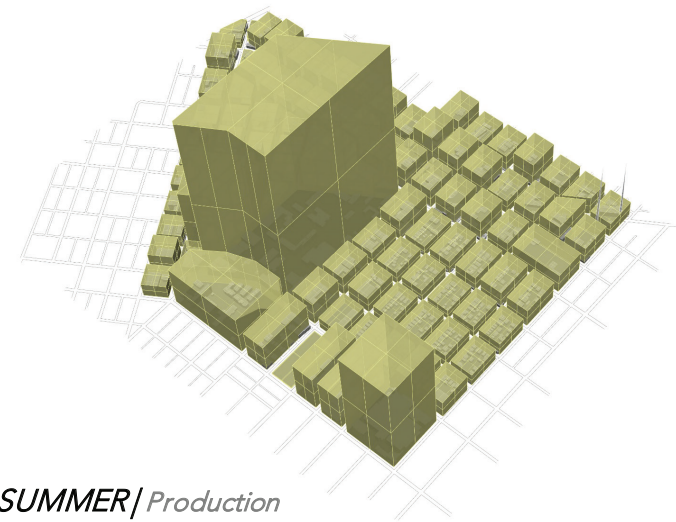
Energy by block represented as:
1 deci-Btu = 1 foot
73% solar viability used in
production calculation



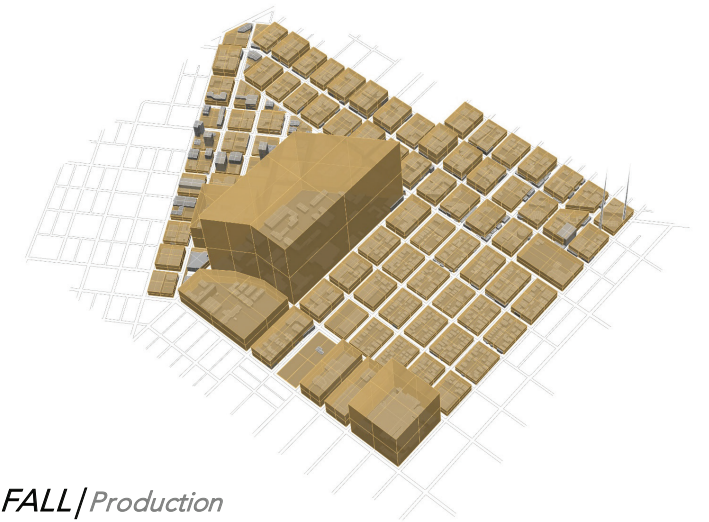
WINTER/ Production
4.16



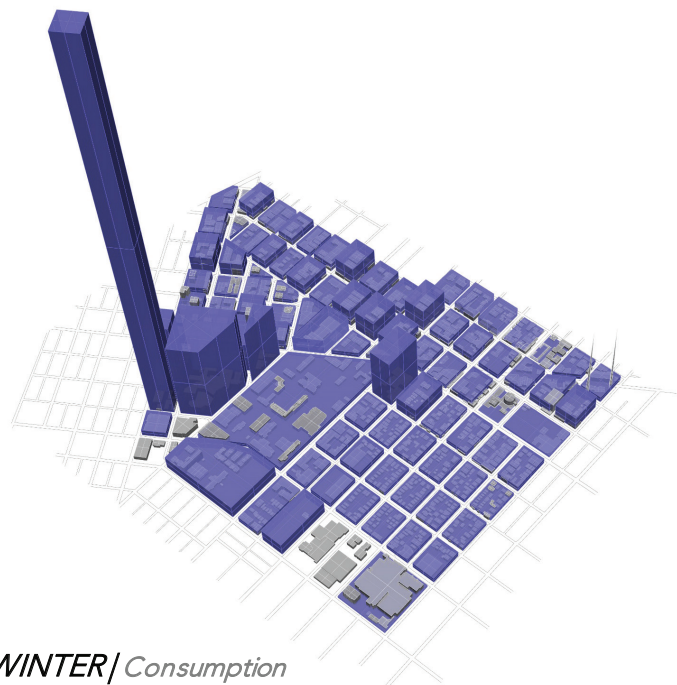
SPRING/ Production
4.18



SUMMER/ Production
4.20



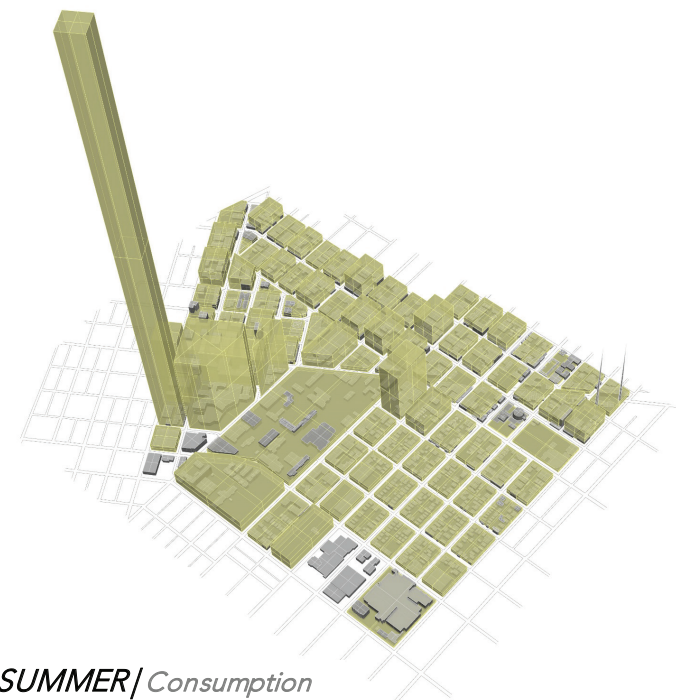
FALL/ Production
4.22



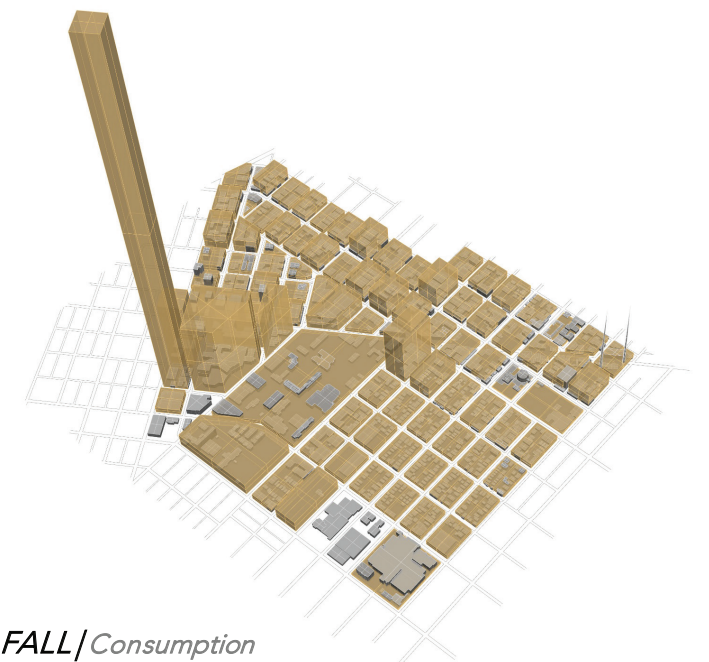
WINTER/ Consumption
4.17



SPRING/ Consumption
4.19



SUMMER/ Consumption
4.21



FALL/ Consumption
4.23

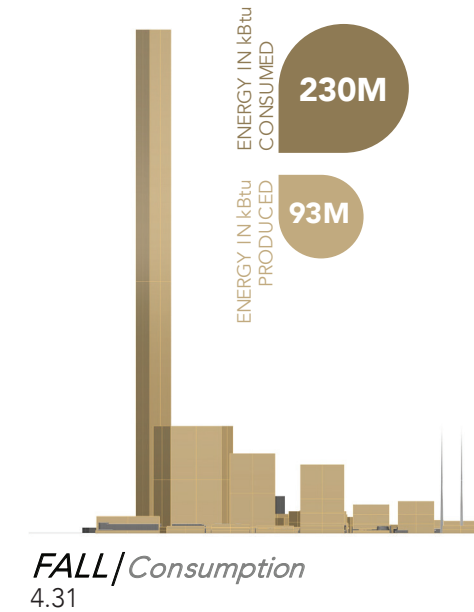
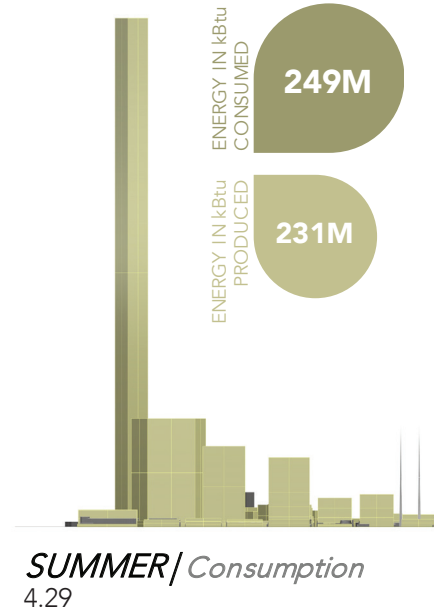
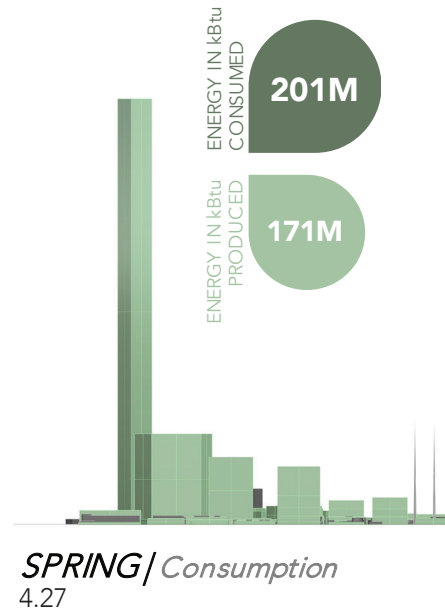
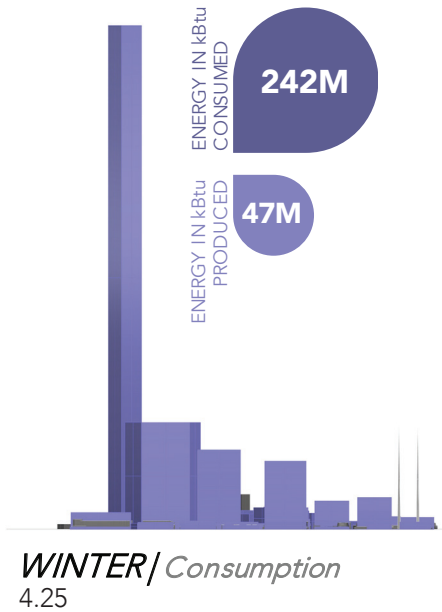
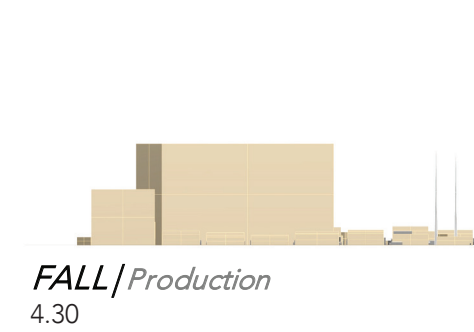
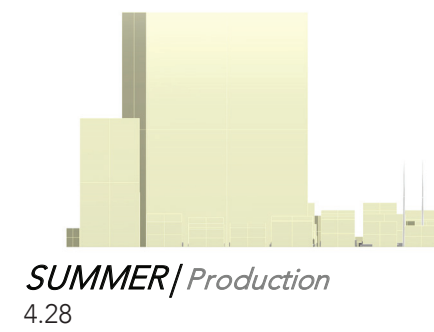
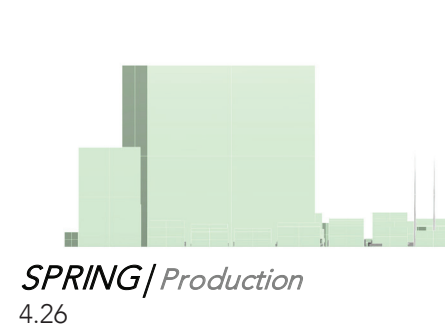
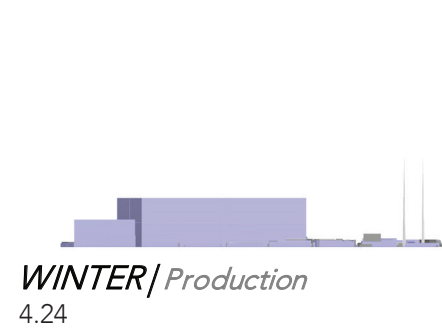
(Production is assuming a 73% solar viability in calculations.)

Winter production: 47,248,801
Winter consumption: 241,929,875

Spring Production: 171,078,858
Spring Consumption: 200,732,056

Summer Production: 231,511,397
Summer Consumption: 248,929,860

Fall Production: 93,255,894
Fall Consumption: 229,716,846

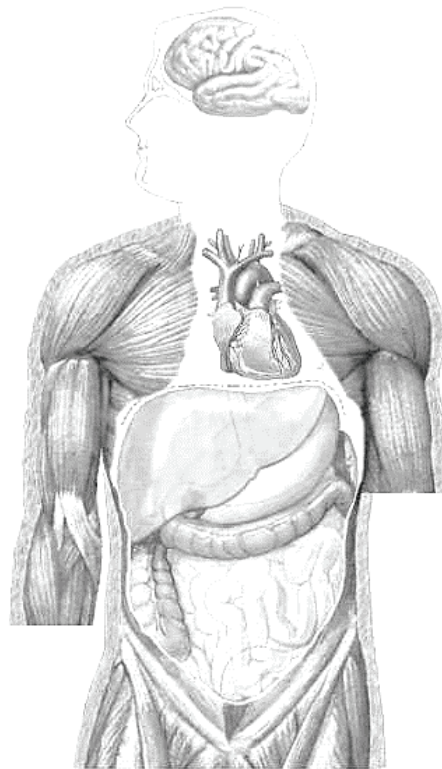


HUMAN BODY AS MODEL

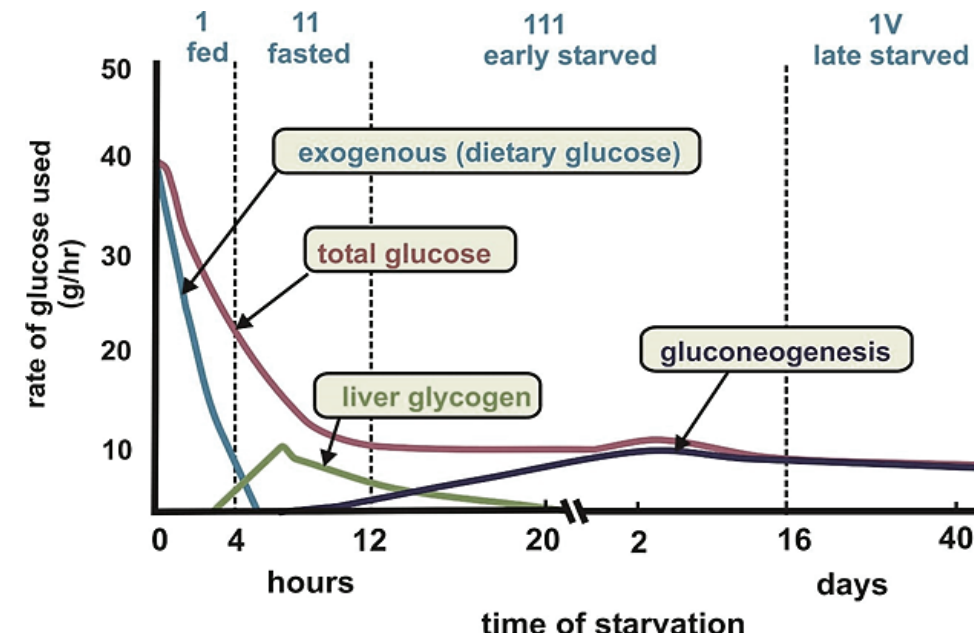
Starvation: imbalance between energy intake and energy expenditure

In summer and spring the energy produced is almost at the level of energy being used. But in winter and fall the production levels aren't meeting consumption needs. Because of this I'm proposing a starvation model (as starvation of the human body is defined simply as the "imbalance between energy intake and energy expenditure").

This model could provide the means for systematic phasing out of less imperative community occupancies in the face of disruption.



5.01



5.02

- 5.01 Illustration of human anatomy
5.02 Chart of glucose depletion in the body over the course of prolonged starvation

CRITICAL OCCUPANCIES

In order to determine this starvation model I assigned specific occupancies into critical zones that would maintain as much as possible current energy consumption levels with each preceding zone implementing consumption reduction levels to meet the needs of Zone 01.

Critical Zone 01 | Hospitals, medical offices, police, fire, EMT
(all emergency response teams)

Critical Zone 02 | Groceries, Pharmacies, Gas stations
(for supplies and sustenance)

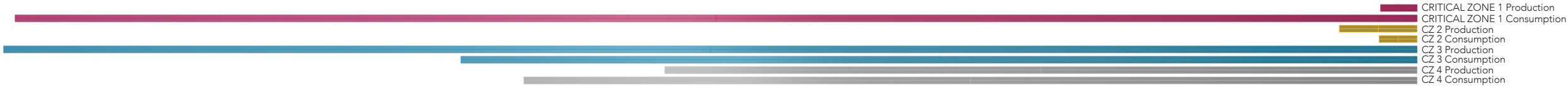
Critical Zone 03 | All residential
(single family and multi family)

Critical Zone 04 | All other occupancies
(retail, restaurants, offices, education)

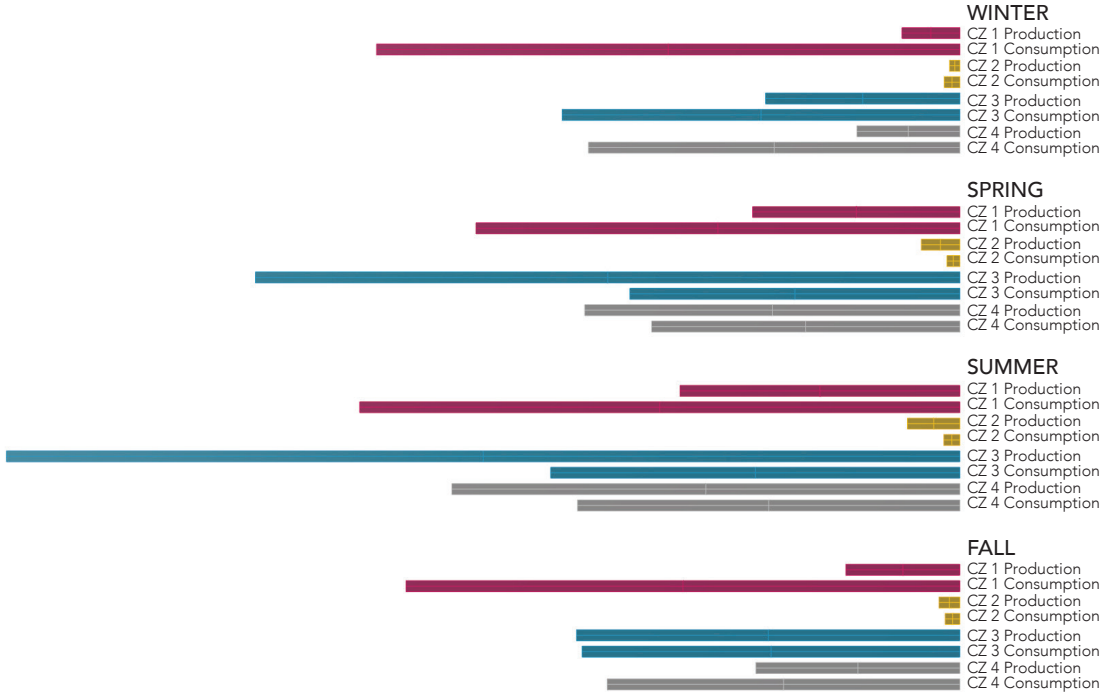


5.03 Site plan with critical occupancies identified
5.04 Critical occupancy consumption and production values quantified annually and seasonally

Annual Critical Consumption and Production

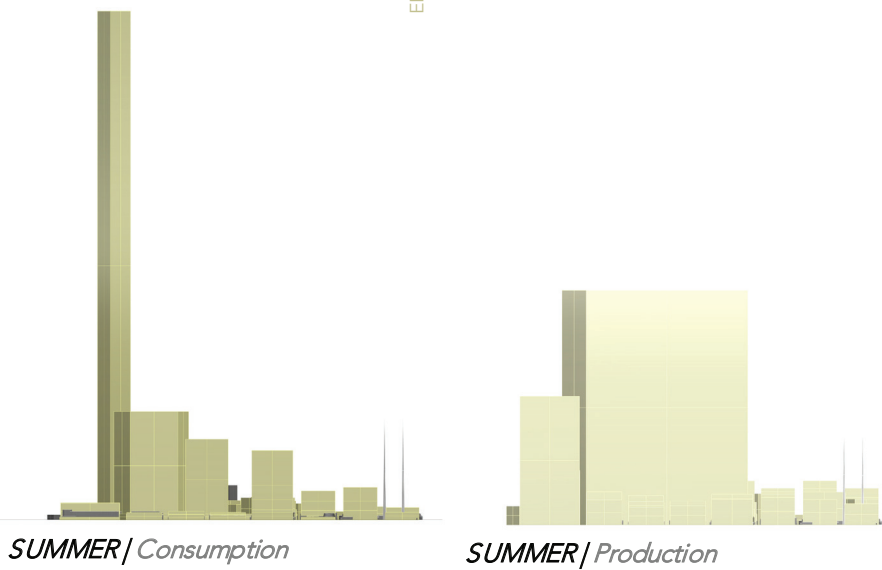
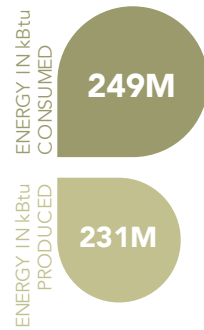


Seasonal Critical Consumption and Production



Zones to maintain the following consumption percentages in moment of disruption:

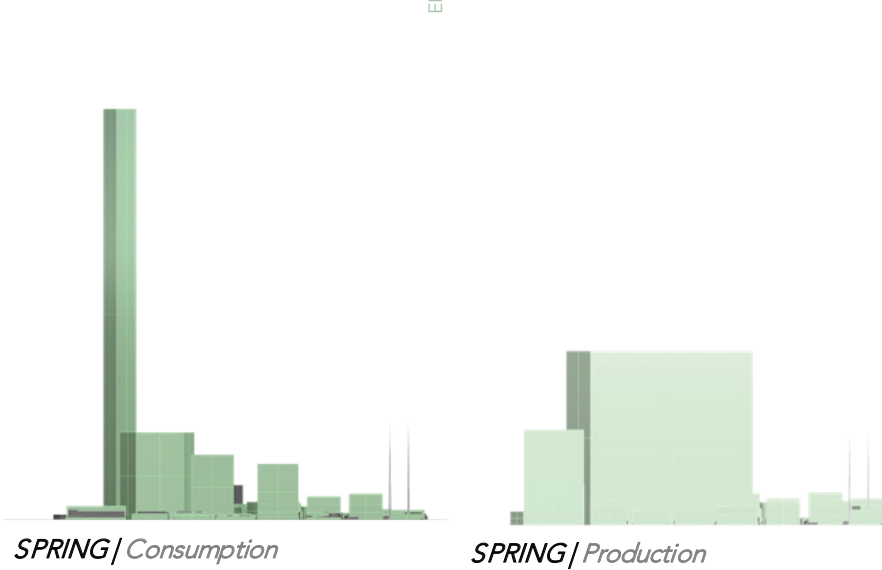
- Critical Zone 01 = 100%
- Critical Zone 02 = 100%
- Critical Zone 03 = 90%
- Critical Zone 04 = 80%



SUMMER [06/01-08/31]
93% of production meeting current consumptions demands
 Occupancy type reductions to meet Hospital energy demands
 5.05

Zones to maintain the following consumption percentages in moment of disruption:

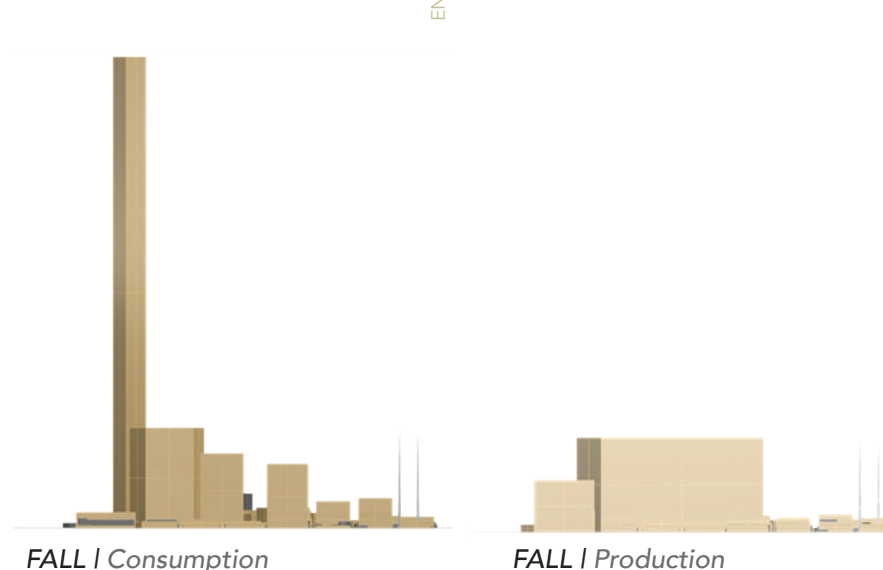
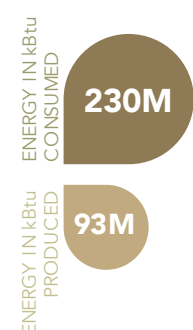
- Critical Zone 01 = 100%
- Critical Zone 02 = 100%
- Critical Zone 03 = 76%
- Critical Zone 04 = 70%



SPRING [03/01-05/31]
85% of production meeting current consumptions demands
 Occupancy type reductions to meet Hospital energy demands
 5.06

Zones to maintain the following consumption percentages in moment of disruption:

- Critical Zone 01 = 80%
- Critical Zone 02 = 50%
- Critical Zone 03 = 20%
- Critical Zone 04 = 0%



FALL [09/01-11/30]
41% of production meeting current consumptions demands
 Occupancy type reductions to meet Hospital energy demands
 5.07

SEASONAL CRITICAL ANALYSIS

Starting with the best case scenario: SUMMER.

Energy produced is 93% of the amount being consumed (249M vs. 231M kBtu) which is great. This means that when the critical zones implement the starvation model both zones 01 and 02 can maintain 100% consumption demands. Zones 03 and 04 would have to reduce to 90% and 80%, respectively, of their typical consumption demands.

Next best: SPRING

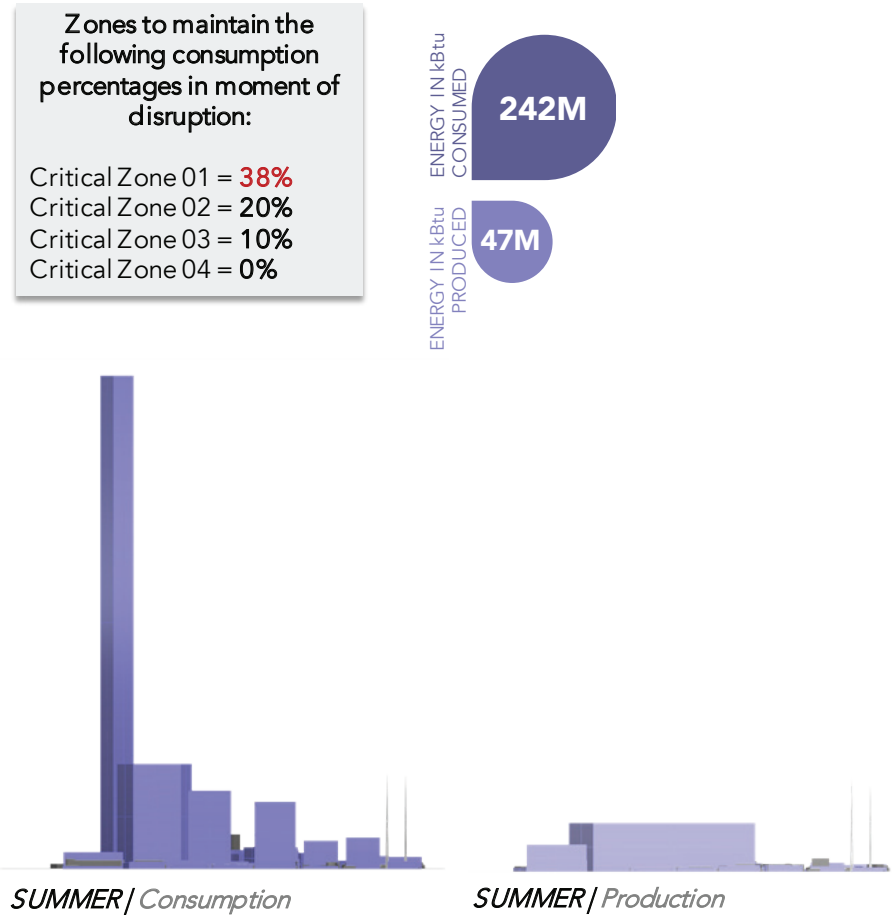
Energy produced is 85% of the amount being consumed (201M vs. 171M kBtu) which is also very good. Zones 01 and 02 can maintain 100% consumption demands while Zones 03 and 04 would have to reduce to 76% and 70% consumption demands, respectively.

Not so good: FALL

Energy produced is 41% of the amount being consumed (230M vs. 93M kBtu) which is not great. Zones 01 will only be able to maintain 80% of its consumption demands, Zone 02 will be required to drop to 50% and Zone 03 to 20%. Zone 04 is reduced to 0% consumption demand in this model in order to maintain a minimum of 80% consumption level for critical zone 01.

Terrible: WINTER

Energy produced is only 20% of the amount being consumed (242M vs. 47M kBtu) which is terrifying. Zone 01 will only be able to maintain 38% of its consumption demands if the other critical zones do not fall below the minimums set for this analysis. Zone 02 drops to a minimum of 20%, Zone 03 drops to 10% and Zone 04 to 0% again.



WINTER [12/01-02/28]
 20% of production meeting current consumptions demands
 Occupancy type reductions to meet Hospital energy demands

5.08

- 5.05 Summer consumption breakdown by critical zones to ensure priority occupancies receive the energy they need to function during disruption
- 5.06 Spring consumption breakdown by critical zone
- 5.07 Summer consumption breakdown by critical zone
- 5.08 Fall consumption breakdown by critical zone

SOLUTION

Returning to the site all parking lots within the site have been identified that have the best solar potential to test the possibility of applying PVs for supplementing the fall and winter season production numbers.

Fall | The production percentage goes up from 41% to 47%
230M vs. 109M (Previously 93M)

	Was	Now
Zone 01 -	80%	89%
Zone 02 -	50%	75%
Zone 03 -	20%	20%
Zone 04 -	0%	10%

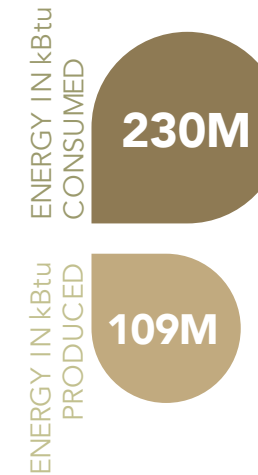
Winter | The production percentage goes up from 21% to 23%
242M vs. 55M (Used to be 47M)

	Was	Now
Zone 01 -	38%	45%
Zone 02 -	20%	20%
Zone 03 -	10%	10%
Zone 04 -	0%	0%



Zones to maintain the following consumption percentages in moment of disruption:

Critical Zone 01 = 89%
Critical Zone 02 = 75%
Critical Zone 03 = 20%
Critical Zone 04 = 10%



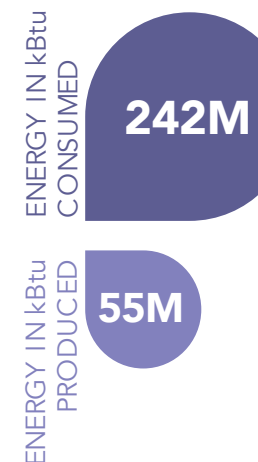
FALL [09/01-11/30]

47% of production meeting current consumptions demands
Occupancy type reductions to meet Hospital energy demands

6.01

Zones to maintain the following consumption percentages in moment of disruption:

Critical Zone 01 = 45%
Critical Zone 02 = 20%
Critical Zone 03 = 10%
Critical Zone 04 = 0%



WINTER [12/01-02/28]

23% of production meeting current consumptions demands
Occupancy type reductions to meet Hospital energy demands

6.02

- 6.01 *If surface parking lots utilized photovoltaic panel covers installed at 25ft above ground production values increase by 6% in the fall season and provide additional energy for each critical zone to meet minimum energy consumption needs.*
- 6.02 *When PV covered lots are employed production values in winter months increase by 3%. Consumption values in critical zones meet minimums except critical zone 1 with only a slight increase of 7% consumption allowance.*
- 6.03 *Surface parking lots identified within the site.*



■ Parking lots in Eco-grid

CONCLUSION

Completing the analysis of the establish eco-grid's energy potential through photovoltaic use compared to its consumption amounts shows drastic discrepancies within fall and winter seasons. The introduction of utilizing surface lots within the site for additional PV use was just one way that the production needs could be supplemented. Upon final review and discussion many ideas have been proposed for further research and study.

Diving deeper into the consumption number by building and occupancy, the Capitol Hill 2030 District has recently collected accurate EUI quantities of its occupied structures. These would help to better understand the consumption of the site and test the production potentials proposed in this thesis. Utilizing accurate numbers would be the first step in many of the following proposals for further study.

Emergency Preparedness Plan within Eco-Grid

The analysis and proposal of an eco-grid could propel a community wide emergency preparedness plan to inform its occupants of the best use of energy in the event of a disruption by season. For instance, if a natural disaster struck or a major power outage occurred there would be step-by-step directions for homes to reduce their energy use through the knowledge of appliance energy use along with times of day to reduce peak energy loads.

Peak Energy Loads

If peak loads are taken into account how does this affect the study? Consumption reduction recommendations by occupancy could function on an hourly basis to ensure production levels are appropriately distributed to critical occupancy zones.

Thermal Analysis

Along with testing electricity potentials through the use of photovoltaics running thermal analysis on each building to determine energy reduction efforts is another possible research direction. If every building in the eco-grid were brought to efficient thermal standards could this help to conserve energy in the fall and winter seasons so the production amounts are more easily disbursed to meet minimum consumption needs?

In a similar model, if every building in the eco-grid were new construction rather than a collection of existing structures how could this production/consumption model be implemented? What would be the result?

Gas Heat vs. Electric Heat?

Determining the number of buildings that use gas heat as opposed to electric heat and the result of this reduction in the consumption calculations would be a more accurate portrayal of the site analysis. How much does this affect the consumption numbers?

Median EUI by Building Type

	2012		2013		2014		2015	
	EUI (kBtu/ft ²)	kWh/m ² annual	EUI (kBtu/ft ²)	kWh/m ² annual	EUI (kBtu/ft ²)	kWh/m ² annual	EUI (kBtu/ft ²)	kWh/m ² annual
Self-Storage Facility	n/a	n/a	19.0	55.9	17	50.0	14.4	42.3
Distribution Center	n/a	n/a	30.6	90.0	28.6	84.1	26.6	78.204
Warehouse	30.4	89.4	29.4	86.4	25.7	75.6	25.8	75.9
Multi-family (General)	31.9	93.8	n/a	n/a	n/a	n/a	n/a	n/a
Low-rise Multifamily	n/a	n/a	30.3	89.1	29.6	87.0	29.1	85.554
Mid-rise Multifamily	n/a	n/a	34.3	100.8	33.2	97.6	32.9	96.7
High-rise Multifamily	n/a	n/a	49.0	144.1	47.7	140.2	47.3	139.1
Religious	42.0	123.5	38.9	114.4	35.4	104.1	32.1	94.4
K-12 School	43.5	127.9	43.1	126.7	42.5	125.0	37.1	109.1
Refrigerated Warehouse	n/a	n/a	44.6	131.1	47.2	138.8	48.8	143.5
Mixed Use Property	n/a	n/a	n/a	n/a	56.9	167.3	56.1	164.9
Office (General)	59.7	175.5	58.0	170.5	n/a	n/a	n/a	n/a
Office (20-100k sf)	n/a	n/a	n/a	n/a	54.9	161.4	52.3	153.762
Office (+100k sf)	n/a	n/a	n/a	n/a	58.1	170.8	56.4	165.8
Residence Hall	47.3	139.1	69.3	203.7	57.4	168.8	54.9	161.4
Senior Care Facility	65.6	192.9	72.4	212.9	67.8	199.3	65.6	192.9
Other	61.7	181.4	n/a	n/a	75.2	221.1	78.1	229.6
Retail	74.1	217.9	60.4	177.6	61.8	181.7	56.1	164.9
University	n/a	n/a	83.1	244.3	69.5	204.3	77.5	227.9
Hotel/Motel	73.1	214.9	85.8	252.3	80	235.2	76.9	226.1
Medical Office	82.9	243.7	83.7	246.1	82.5	242.6	80.1	235.5
Financial Institution	89.0	261.7	n/a	n/a	n/a	n/a	n/a	n/a
Courthouse	122.9	361.3	n/a	n/a	n/a	n/a	n/a	n/a
Restaurant	n/a	n/a	156.2	459.2	145.8	428.7	150.7	443.1
Hospital	166.5	489.5	205.3	603.6	208.2	612.1	209.4	615.6
Supermarket	215.4	633.3	277.4	815.6	272.3	800.6	262.0	770.3

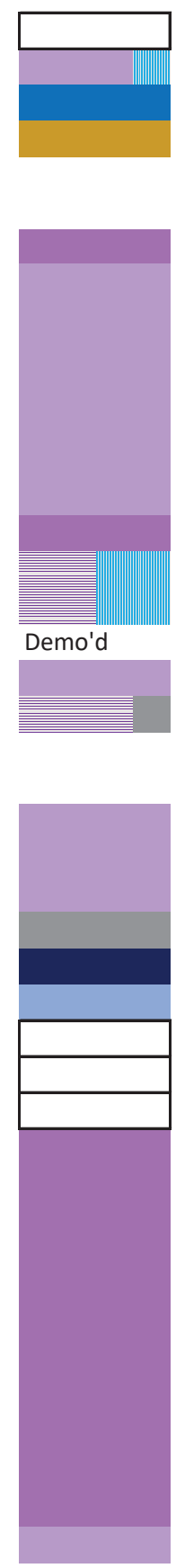
Seasonal Consumption by Critical Zones (kBtu)						
Critical ONE	34	103,112,837	85,553,931	106,096,298	97,907,527	392,670,594
Critical TWO	9	2,806,938	2,328,950	2,888,154	2,665,239	10,689,282
Critical THREE	722	70,324,488	58,349,053	72,359,253	66,774,390	267,807,185
Critical FOUR	261	65,685,611	54,500,122	67,586,154	62,369,690	250,141,577
		241,929,875	200,732,056	248,929,860	229,716,846	921,308,638
Seasonal Production by Critical Zones (kBtu)						
Critical ONE	34	10,279,000	36,675,000	49,504,000	20,171,000	116,810,000
Critical TWO	9	1,874,700	6,860,600	9,307,900	3,721,800	21,799,000
Critical THREE	722	34,380,000	124,490,000	168,520,000	67,778,000	395,860,000
Critical FOUR	261	18,240,000	66,329,000	89,807,000	36,077,000	210,650,000
		47,284,801	171,078,858	231,511,397	93,255,894	543,936,870
		20%	85%	93%	41%	59%
Proposed Seasonal Consumption by Critical Zones (kBtu)						
Critical ONE	34	82,490,270	85,553,931	106,096,298	78,326,022	333,770,005
Critical TWO	9	1,403,469	2,328,950	2,888,154	1,332,620	8,551,425
Critical THREE	722	14,064,898	44,345,280	65,123,328	13,354,878	267,807,185
Critical FOUR	261	6,568,561	38,150,085	54,068,924	6,236,969	250,141,577
		104,527,198	170,378,246	228,176,704	99,250,488	860,270,192

Winter Critical Breakdown Options

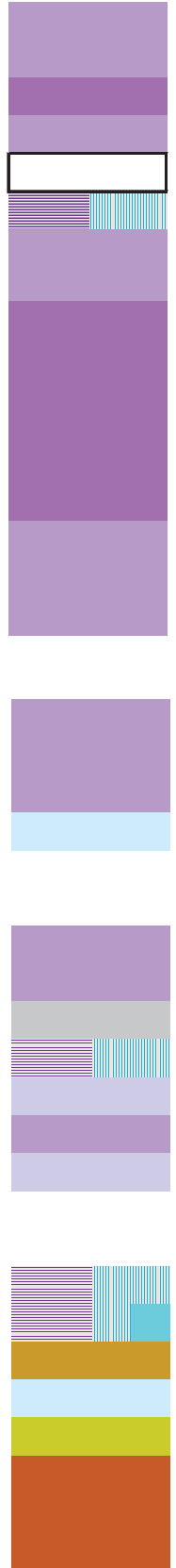
@ 24.4%	25,159,532	@ 73.8%	72,255,755
@ 50%	1,403,469	@ 50%	1,332,620
@ 20%	14,064,898	@ 20%	13,354,878
@ 10%	6,568,561	@ 10%	6,236,969
	47,196,460		93,180,222
With Parking PV		With Parking PV	
@ 31.8%	32,789,882	@ 89.5%	87,627,237
@ 50%	1,403,469	@ 50%	1,332,620
@ 20%	14,064,898	@ 20%	13,354,878
@ 10%	6,568,561	@ 10%	6,236,969
	54,826,810		108,551,704
@ 45%	46,400,777		
@ 20%	561,388		
@ 10%	7,032,449		
@ 0%	-		
	53,994,613		
Critical ONE Only			
@ 53.2%	54,856,030		
@ 0%	-		
@ 0%	-		
@ 0%	-		
	54,856,030		

Fall Critical Breakdown Options

Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 01							
600350-0535		*19,200					Vacant (Multi-Family)
639550-0000	2001	46,548	1,354,547	62	5	CompHVAC	Condos (Mixed Use)
600350-0575	1917	16,856	945,622	1	1	SH	Retail
600350-0510	1927	64,316	1,659,353	1	1	SH	Industrial (Heavy)
BLOCK 02							
600300-0690	1903	2,190	105,120	1	3	OHW	Single Family
600300-0680	1902	2,280	66,348	3	2	E BB	Triplex
600300-0685	1924	2,070	60,237	4	2	FAU	4-Plex
600300-0695	1964	6,400	186,240	13	3	E Wall	Apartments
600300-0700	1901	4,150	120,765	3	2	OFA	Triplex
600300-0705	1904	2,840	82,644	3	2	GFA	Triplex
600300-0710	1904	3,290	95,739	2	2	GFA	Duplex
600300-0715	1903	2,570	74,787	2	2	GFA	Duplex
600300-0720	1900	4,270	204,960	1	2	OFA	Single Family
600300-0725		3,840*					Apartments (Mixed Use)
600300-0730	2014	57,167	2,102,282	75	6	PackU	Apartments (Mixed Use)
600300-0640	1910	2,785	81,044	4		E Wall	4-Plex
600300-0635	1908	14,242	414,442	27	4	NH	Apartments
872570-0000	2015	29,058*	1,807,679	88	6	CompHVAC	Apartments over garage
BLOCK 03							
600300-0770	1900	3,866	112,501	6	2	HW	Apartments
600300-0765	1908	19,716	573,736	25	4	HW	Apartments
600300-0760	1908	12,688	369,221	25	4	HW	Apartments
600300-0755		7,620*					Parking (Garage)
600300-0740	1969	20,824	2,559,270	1	2	?	Government (Fire Station)
600300-0820	1920	6,108	920,476	1	2	FAU	Retail (Bakery)
600300-0814		9,780*					Vacant (Commercial)
600300-0805		3,840*					Vacant (Multi-family)
600300-0810		3,840*					Vacant (Multi-family)
600300-0802		1,470	70,560				
600300-0801	2006	1,100	52,800	1	3	GFA	Townhouse Plat
600300-0803		1,470	70,560				
600300-0800		1,160	55,680				
600300-0795		1,420	68,160				
600300-0794		1,390	66,720				
600300-0793		580	27,840				
600300-0792	2015	1,690	81,120	1	3	GHW	Townhouse Plat
600300-0791		1,250	60,000				
600300-0790		1,170	56,160				
600300-0785	1904	2,660	127,680	1	1	OHW	Single Family
600300-0775	1908	6,864	199,742	10	3	HW	Apartments



EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 04										
			600300-0875	1992	10,145	295,220	9	3	E Wall	Apartments (Subsidized)
			600300-0850	1919	5,628	163,775	12	3	HW	Apartments
			600300-0851	2008	550	26,400	1	2	E BB	Single Family
			600300-0852	1965	1,790	52,089	2	2	GFA	Duplex
			600300-0877		1,910*					Vacant (Multi-family)
			103660-0000	2005	49,640*		154	6	CompHVAC	Condos (Mixed Use)
			600300-0860	1905	11,810	343,671	30	3	E Wall	Apartments (Subsidized)
			172880-0115	1907	16,361	476,105	27	4	E Wall	Apartments
			172880-0105		1,570	75,360				
			172880-0104		1,430	68,640				
			172880-0106		1,550	74,400				
			172880-0103	2006	1,430	68,640	1	3	GFA	Townhouse Plat
			172880-0107		1,570	75,360				
			172880-0102		1,490	71,520				
			172880-0100	1963	4,800	139,680	6	2	E Wall	Apartments
			172880-0085	1945	3,240	94,284	3	2	GFA	Triplex
			172880-0090	1945	3,240	94,284	2	1	GFA	Duplex
BLOCK 05										
			723460-0290	1900	3,625	105,488	5	3	Electric	Apartments
			269520-0000	1929	28,842*		74	3	?	Condos
			179260-0000	1944	28,845*		24	2	?	Condos
			723460-0310	1958	13,330	697,159	1	2	FAU	Office Building
BLOCK 06										
			723460-0475	1926	30,084	875,444	37	4	HW	Apartments (Co-op)
			723460-0470	1901	3,617	105,255	5	2	HW	Apartments
			723460-0465		7,800*					Parking
			723460-0515	1998	38,409	1,263,656	?	6	PU	Apartments (Mixed Use)
			723460-0500	1906	8,394	460,831	?	3	HW	Group Home (Elderly)
			723460-0490	1924	19,032	553,831	34	4	HW	Apartments
			723460-0485	1900	4,000	219,600		2	HW	Group Home (Halfway)
BLOCK 07										
			723460-1085	2008	16,093	529,460	20	6	HP	Apartments (Mixed Use)
			723460-1100	2004	57,264	1,883,986	60	6	Electric	Apartments & Trade Joe's
			723460-1095	1974	1,773	45,743	1	?	SH	Industrial (Light) Laundromat
			723460-1090	1905	2,900	151,670	1	?	HW	Office Building
			723460-1043	1987	1,372	359,464	1	1	Electric	Conv Store with Gas
			723460-1045	1977	3,602	281,316	1	1	HP	Utility, Private (Radio/TV)
			723460-1065	1900	1,952	152,451	1	?	?	Utility, Private (Radio/TV)
			723460-1070	1966	400	31,240	1	?	?	Utility, Public (Transmitter)

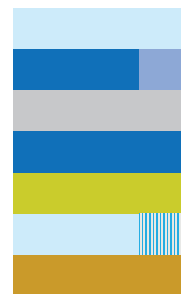
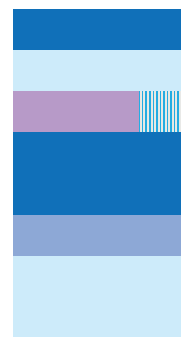
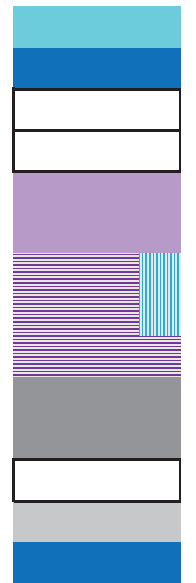
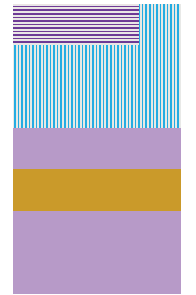


Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 08							
066000-1875	1908	21,535	626,669	62	4	FAU	Apartments (Mixed Use)
066000-1905	2013	69,222	2,277,404	120	7	Electric	Apartments (Mixed Use)
066000-1920	1920	15,923	893,280		2	CompHVAC	Mixed Use (Office, Retail, Restaurant)
BLOCK 09							
066000-2765	1912	8,433	473,091		1	CompHVAC	Mixed Use (Retail, Restaurant)
066000-2760	1912	11,000	283,800		1	SH	Auto Showroom and Lot
BLOCK 10							
872560-0240	2015	136,648	4,495,719	211	9	CompHVAC	Apartments (Mixed Use)
872560-0245							
872560-0250							
872560-0255	1916	12,000	349,200	30	4	HW	Apartments
872560-0305							
872560-0300							
872560-0295							
872560-0260	1906	2,367	123,794	1	2	HW	Office Building
872560-0265	1930	9,317	522,684	1	2	SH	Mixed Use
872560-0270	1910	6,987	365,420	1	2	CompHVAC	Office Building
872560-0290	1953	5,556	161,680	12	2	HW	Apartments
872560-0285	1925	9,760	284,016	24	3	FAU	Apartments
872560-0275	1909	7,316	1,916,792	1	1	SH	Grocery Store
BLOCK 11							
872560-0445	1910	19,688	1,104,497	1	2	FAU	Mixed Use
872560-0455	1918	10,800	278,640	1	2	SH	Industrial (Light)
872560-0460	1926	10,724	352,820	83	7	HW	Apartments
872560-0475	1910	24,600	789,660	1	2	HW	Church/Religious
687140-0000	1919	6,783	197,385	36	5	FAU	Condos (Mixed Use)
880490-1025	1954	46,560	1,354,896	1	2	W&C	Clubhouse & Parking Garage
BLOCK 12							
880490-0900	1912	12,900	674,670		3	CompHVAC	Office & Retail
880490-0890	1916	14,400	807,840		2	FAU	Private Bath Club
880490-0880	1980	24,180	703,638	29	5	HW	Apartments
890490-0865	1924	22,476	1,260,904		2	HP	Retail
880490-0825	1910	12,880	374,808	23	4	HW	Apartments
880490-0830	1910	4,570	132,987	9	2	FAU	Apartments
880490-0840		*5,000					Parking (Commercial)
880490-0845		*5,000					Parking (Commercial)
880490-0850	1908	8,960	260,736	20	3	HW	Apartments
880490-0855	1947	10,000	561,000		2	SH	Retail
880490-0860	1926	4,400	246,840		1	SH	Retail

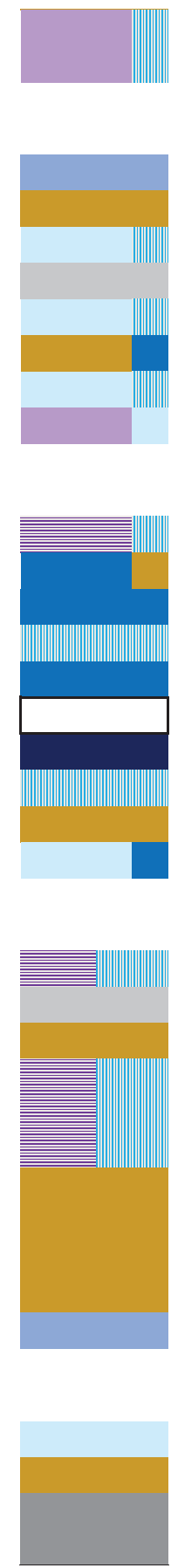


EUI	Color Code	Occupancy Type
29.10		Residence, Low-Rise Multi-family
48.00		Residence, Single Family
54.90		Residence, Dorm
32.90		Residence, Mid-Rise Multi-family
37.10		Education, K-12
77.50		Education, University
37.10		Education, Gym
52.30		Office Small
56.40		Office Large
56.10		Retail
262.00		Grocery/Market
150.70		Resaurant
56.10		Mixed Use Property
0.00		Parking Lot
10.00		Parking Garage
32.10		Religious
209.40		Hospital
80.10		Medical Office
78.10		Utility
25.80		Warehouse/Industrial
262.00		Convenience w/gas
0.00		Park/Green space
122.90		Government (Police/Fire/Court)
0.00		Vacant
89.00		Bank/Financial

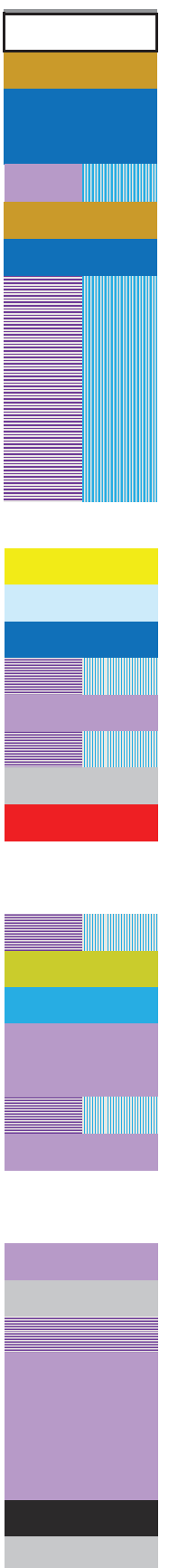
Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 13							
880490-0390	2016	42,991	1,414,404	249	7	E Wall	Apartments (Mixed Use)
880490-0350	1916	3,360	188,496		1	SH	Mixed Use Retail
880490-0345	1917	8,960	502,656		2	SH	Mixed Use Retail
880490-0355	1908	7,734	225,059	25	2	HW	Apartments
880490-0360	1919	4,900	126,420	1	1	SH	Garage Service Repair
880490-0365	1910	10,124	294,608	39	3	HW	Hotel/Motel
880490-0370	1907	12,660	368,406	22	3	HW	Apartments
BLOCK 14							
880490-0175	1927	3,176	832,112	1	1	SH	Grocery/Market
880490-0176	1927	2,600	145,860	1	1	SH	Retail
880490-0185		*5,100					Vacant (Commercial)
880490-0190		*5,100					Vacant (Commercial)
880490-0195	1910	11,352	330,343	24	3	HW	Apartments
880490-0205							
880490-0230	2015	13,993	460,370	260	7	FAU	Apartments (Mixed Use)
880490-0215							
600300-0550	2015	80,371	2,644,206	90	7	CompHVAC	Apartments
600300-0555		*2,883					Parking Garage
600300-0545		*2,781					Parking Garage
600300-0535							
600300-0540		*2,934					Parking (Commercial)
600300-0530	1920	6,364	357,020	1	1	SH	Retail
BLOCK 15							
600300-0470	1915	63,330	3,552,813		5	HW	Entertainment/Theatre
750250-0010	1912	64,820	3,390,086		2	HP	Office Building
112950-0000	2006	74,202	2,159,278	44	4	CompHVAC	Apartments (Mixed Use)
600300-0505	1925	1,040	58,344	1	1	SH	Retail
600300-0510	1912	7,200	403,920	1	1	SH	Retail
600300-0520	1911	7,604	1,145,923		1	CompHVAC	Restaurant
750250-0015	1912	11,811	617,715		2	CompHVAC	Office Building
600300-0525	1913	3,953	206,742		2	HW	Office Building
BLOCK 16							
600300-0445	1906	18,000	941,400		3	HW	Office Building
600300-0442	1912	4,720	264,792		2	SH	Retail Café
600300-0440		*7,680					Parking (Commercial)
600300-0430	1909	8,900	499,290		1	HP	Retail
600300-0410	1966	1,898	497,276		1	HP	Convenience w/ Gas
600300-0460	1908	55,520	2,903,696		4	CompHVAC	Office (Mixed Use)
600300-0470	1920	35,631	919,280		1	CompHVAC	Warehouse



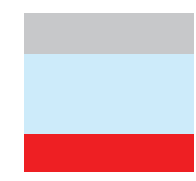
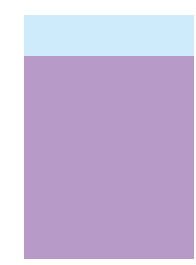
Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
600300-0416	1908	13,985	406,964	17	3	E Wall	Apartments (Mixed Use)
600300-0480	1910	10,700	311,370	28	3	HW	Apartments (Mixed Use) - Uninhabitable
BLOCK 17							
600350-0365		*16,320					Fast Food Restaurant
600350-0360	1926	14,400	371,520	1	1	SH	Auto Garage
600350-0345	1912	34,914	1,826,002	1	2	HP	Office Building (Mixed Use)
600350-0400		*4,800					Parking Lot
600350-0395	1906	18,158	949,663		3	CompHVAC	Office Building (Mixed Use)
600350-0420	1916	36,940	953,052		2	Electric	Warehouse Retail
600350-0440	1913	22,866	1,195,892		3	HP	Office Building (Mixed Use)
556966-0000	1913	2,656	77,290	28	4	FAU	Condos & Office
BLOCK 18							
600350-0305	2014	74,440	2,449,076	92	7	Electric	Apartments (Mixed Use)
600350-0295	1915	21,600	1,211,760		2	PU	Retail/Warehouse
600350-0290	1916	15,600	875,160		2	SH	Retail
600350-0280	1912	16,224	910,166		3	W&C	Mixed Use
600350-0285	1916	6,840	383,724		2	Electric	Retail
600350-0306		*960					Right of way/Utility Road
600350-0315	1926	42,380	5,208,502		2	W&C	Governmental Services (Police)
600350-0330	1917	30,720	1,723,392		3	SH	Mixed Use Retail
600350-0335	1927	13,680	352,944		1	SH	Industrial
600350-0340	1916	21,312	1,114,618		2	CompHVAC	Retail & Office
BLOCK 19							
600300-0355	2009	53,679	1,766,039	61	6	Electric	Apartments (Mixed Use)
600300-0350		3,240*					Parking
600300-0340	1922	7,240	186,792	1	2	CompHVAC	Warehouse
600300-0320							
600300-0310	2015	52,340	1,721,986	88	6	CompHVAC	Apartments (Mixed Use)
600300-0315							
600300-0400							
600300-0375	1958	18,300	472,140		2	SH	Mini Warehouse
600300-0335							
600300-0370	1929	5,965	153,897	1	1	SH	Industrial (Light)
600300-0365	1927	6,656	213,658	1	1	FAU	Restaurant/Lounge
BLOCK 20							
600300-0235	1969	5,192	271,542	1	1	FAU	Office Building
600300-0220	1920	23,040	594,432	1	1	NH	Warehouse
600300-0205		3,840*					Parking Garage
600300-0210		3,600*					Parking Garage



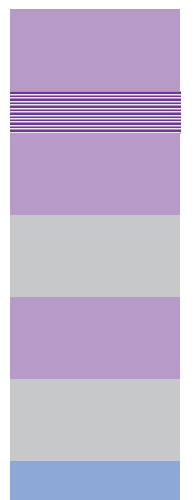
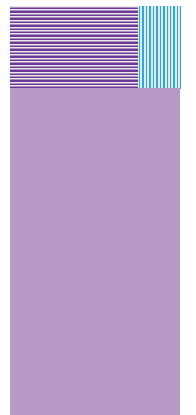
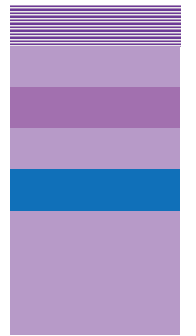
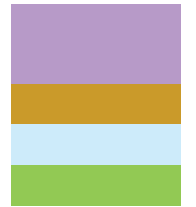
EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
29.10		Residence, Low-Rise Multi-family	600300-0200		1,680*					Vacant (Commercial)
48.00		Residence, Single Family	600300-0170	1926	6,560	169,248	1	2	HP	Warehouse
54.90		Residence, Dorm	600300-0175	1905	3,274	183,671	1	?	HW	Retail Store
32.90		Residence, Mid-Rise Multi-family	600300-0160		3,680*					Retail Store
37.10		Education, K-12	600300-0300	1906	8,502	247,408	4	3	FAU	Apartments (Mixed Use)
77.50		Education, University	600300-0295	1926	2,788	71,930	1	2	SH	Industrial (Light)
37.10		Education, Gym	600300-0270	1908	1,626	91,219	1	2	FAU	Retail Store
52.30		Office Small	600300-0275		2,555*					Apartments (Mixed Use)
56.40		Office Large	600300-0255		2,340*					Apartments (Mixed Use)
56.10		Retail	600300-0260	2013	3,680*	2,641,837	108	6	PU	Apartments (Mixed Use)
262.00		Grocery/Market	600300-0250		4,220*					Apartments (Mixed Use)
150.70		Resaurant	600300-0245		80,299					Apartments (Mixed Use)
56.10		Mixed Use Property	600300-0240	1910	17,427	573,348	26		E Wall	Apartments (Mixed Use)
0.00		Parking Lot								
10.00		Parking Garage								
32.10		Religious								
BLOCK 21										
209.40		Hospital	022200-0010	1988	16,776	538,510	1	2	FAU	Church/Welfare/Religious
80.10		Medical Office	022200-0034	1904	3,483	182,161	1	3	FAU	Office Building
			022200-0020	1909	11,400	639,540	1	2	SH	Retail Store
78.10		Utility	173880-0066	2013	45,196	1,486,948	58	6	CompHVAC	Apartments (Mixed Use)
25.80		Warehouse/Industrial	172880-0070	1910	21,564	627,512	32	4	HW	Apartments
262.00		Convenience w/gas	172880-0080		6,398*					Apartments (Mixed Use)
0.00		Park/Green space	172880-0075		5,868*					Parking (Commercial) Park (McGilvra Place)
122.90		Government (Police/Fire/Court)								
0.00		Vacant								
BLOCK 22										
			723460-0240	2008	61,400	2,020,060	80	6	Electric	Apartments (Mixed Use)
89.00		Bank/Financial	723460-0255	1980	2,500	655,000	1	1	PU	Conv Store with Gas
			723460-0195	2012	41,929	461,219	1	6	W&C	Office Building
			723460-0205	1908	11,190	325,629	35	4	E Wall	Apartments
			723460-0215	1920	9,442	274,762	19	4	HW	Apartments
			723460-0220	2015	19,659	646,781	55	7	CompHVAC	Apartments (Mixed Use)
			501150-0000	1980	10,106*		12	3	?	Condos
BLOCK 23										
			723460-0570	1904	19,600	570,360	23	4	HW	Apartments
			723460-0550		10,000*					Parking
			723460-0545	1912	34,471	1,134,096	27	6	HW	Apartments
			723460-0542	1958	5,382	156,616	6	?	FAU	Apartments
			723460-0540	1901	3,004	87,416	6	2	HW	Apartments
			723460-0535	1904	2,410	70,131	6	2	HW	Apartments
			723460-0530	1958	7,376	214,642	10	3	FAU	Apartments
			723460-0600	1972	77,320	3,657,236	164	12	E Wall	Apartments (Subsidized)
			723460-0580		4,303*					Parking



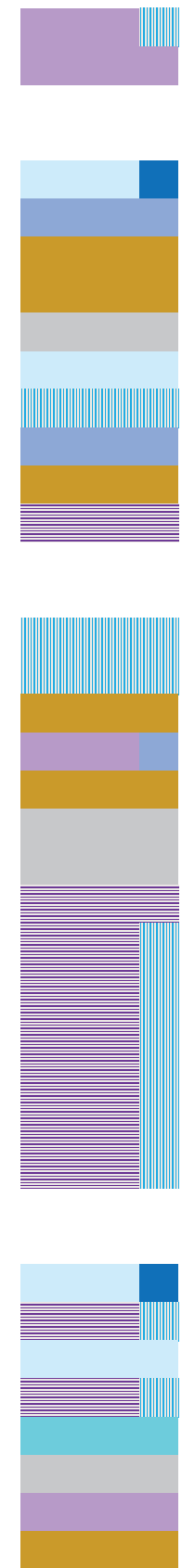
Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 24							
723460-1000		21,600*					Parking
723460-0985	1926	80,004	6,248,312	1	3	HW	Utility, Public
723460-1035	1988	17,725	515,798	34	4	E Wall	Apartments
723460-1033		1,280	61,440				
723460-1032		1,470	70,560				
723460-1034	2004	1,440	69,120	1	3	GFA	Townhouse Plat
723460-1031		1,470	70,560				
723460-1036		1,450	69,600				
723460-1030		1,330	63,840				
723460-1027		1,420	68,160				
723460-1026		1,670	80,160				
723460-1028	2008	1,300	62,400	1	3	GHW	Townhouse Plat
723460-1025		1,380	66,240				
723460-1029		1,300	62,400				
723460-1024		1,400	67,200				
723460-1020	1904	3,620	105,342	4	2	FAU	Apartments
723460-1018		1,450	69,600				
723460-1014		1,450	69,600				
723460-1017		1,440	69,120				
723460-1013	2007	1,440	69,120	1	3	GFA	Townhouse Plat
723460-1016		1,440	69,120				
723460-1012		1,440	69,120				
723460-1015		1,450	69,600				
723460-1011		1,460	70,080				
BLOCK 25							
066000-1860	1946	15,954	834,394		2	W&C	Office
066000-1855	1925	17,884	520,424	45	3	E Wall	Apartments
197820-0425	1925	47,320	1,377,012	63	4	E Wall	Apartments
872560-0355	1906	10,800	314,280		3	HW	Clubhouse
872560-0350	1909	50,350	1,465,185		6	HW	Boarding House/Group Home
872560-0380	1969	95,117	2,767,905	99	6	CompHVAC	Retirement Facility
BLOCK 26							
678490-0000	1998	57,727	1,899,218	61	7	?	Apartments (Mixed Use)
872560-0330		*3,973					Parking
872560-0325	1909	10,400	302,640		3	HW	Apartments
BLOCK 27							
872560-0410		*9,652					Parking (Commercial)
872560-0420	1911	7,093	370,964		3	FAU	Office
872560-0425	1909	4,810	251,563		2	FAU	Office
872560-0430		*5,362					Sports Field



EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
29.10		Residence, Low-Rise Multi-family	872560-0435	1909	4200	122,220	6	2	E Wall	Apartments
48.00		Residence, Single Family	872560-0440	1962	7,570	220,287	20	3	E Wall	Apartments
54.90		Residence, Dorm	880490-0990	1924	7,400	190,920		2	CompHVAC	Industrial
32.90		Residence, Mid-Rise Multi-family	880490-0985	1920	9,225	482,468		2	HP	Office
37.10		Education, K-12	880490-1000	1904	48,783	1,809,849		3	PU	Private School
77.50		Education, University								
37.10		Education, Gym								
52.30		Office Small	BLOCK 29							
56.40		Office Large	880490-0975	2016	74,471	2,450,096	89	8	E Wall	Apartments
56.10		Retail	880490-0955	1908	20,140	586,074	60	5	HWR	Apartments
262.00		Grocery/Market	880490-0950	1913	4,060	194,880	1	2	GFA	Single Family
150.70		Resaurant	880490-0940	1910	8,870	258,117	16	2	FAU	Apartments
56.10		Mixed Use Property	880490-0910	1910	24,750	1,388,475	1	2	HW	Retail
0.00		Parking Lot	880490-0925	1964	7,489	217,930	10	4	E Wall	Apartments
10.00		Parking Garage	880490-0930	1909	2,800	81,480	3	2	Electric	Triplex
32.10		Religious	880490-0935	1924	24,080	700,728	42	3	E Wall	Apartments
209.40		Hospital	BLOCK 30							
80.10		Medical Office	880490-0340	2016	45,187	1,486,652	60	7	Electric	Apartment (Mixed Use)
78.10		Utility	880490-0335							
25.80		Warehouse/Industrial	064260-0000	1900	1,854	53,951	5	2	?	Condos
262.00		Convenience w/gas	880490-0287							
0.00		Park/Green space	880490-0282	1901	1,508	43,883	4	2	FAU	Fourplex
122.90		Government (Police/Fire/Court)	880490-0300	1925	46,510	1,353,441	84	4	HW	Apartment
0.00		Vacant	780433-0000	1999	25,349	737,656	16	5	?	Condos
89.00		Bank/Financial	880490-0283	1912	3,891	113,228	8	3	Electric	Apartment
			880490-0284	1901	3,989	116,080	8	3	Electric	Fourplex
			880490-0286	1901	5,049	146,926	17	3	E Wall	Apartment
			BLOCK 31							
			750250-0018	1910	20,740	603,534	40	3	E Wall	Apartments
			750250-0020	1910	5,820	169,362	12	3	HW	Apartments
			558150-0000	2007	19,637	646,057	23	6	CompHVAC	Condos
			750250-0035	1905	6,006	174,775	8	2	HW	Apartments
			750250-0042	1905	2,264	65,882	4	2	HW	Four-Plex
			750250-0041		*2,866					Parking (Commercial)
			750250-0040		*2,866					Parking (Commercial)
			750250-0062	1911	4,480	130,368	6	3	HW	Apartments
			750250-0061	1910	7,488	217,901	26	3	E Wall	Apartments
			750250-0060		*5,760					Parking (Commercial)
			750250-0050		*15,360					Parking (Commercial)
			750250-0045	1912	33,196	5,002,637	1	3	HW	Entertainment/Club

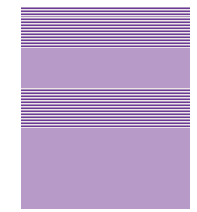
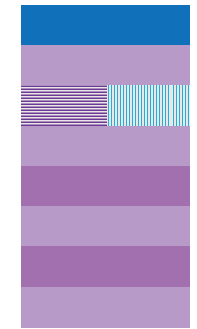
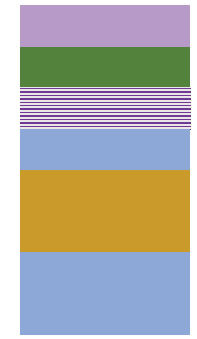
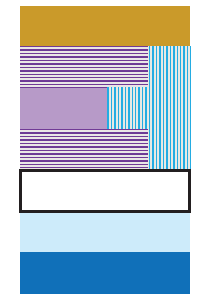


Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 32							
314865-0000	1996	87,495	2,546,105	5	3	HP	Condos (Mixed Use)
255725-0000	1908	14,250	414,675	6	2	Electric	Condos
BLOCK 33							
600300-0035	1912	30,464	1,593,267		3	Electric	Retail & Office
600300-0030	1912	10,725	1,616,258		2	CompHVAC	Restaurant/Bar
600300-0025	1904	10,680	275,544		2	SH	Warehouse
600300-0020	1907	22,320	575,856		2	SH	Auto Garage
600300-0015		*7,680					Parking (Commerical)
600300-0010	1911	7,160	374,468		2	FAU	Office
600350-0005	1912	18,000	1,009,800		3	CompHVAC	Mixed Use Retail
600350-0010	1916	14,980	2,257,486		1	CompHVAC	Restaurant/Bar
600350-0025	1907	36,000	928,800		2	SH	Warehouse
600350-0040	2014	66,510	2,188,179	79	6	CompHVAC	Apartments
BLOCK 34							
600350-0085	1916	12,536	703,270		2	FAU	Retail Mixed Use
600350-0095	1910	9,500	532,950		2	SH	Retail Mixed Use
600350-0090	1910	8,791	226,808		1	SH	Auto Garage
600350-0115	1905	16,977	494,031	20	3	HW	Apartments (Tavern & Spa)
600350-0076	1913	7,920	204,336		2	FAU	Warehouse
600350-0074		*5,280					Parking (Commercial)
600350-0077		*2,400					Parking (Commercial)
600350-0075	2016	92,069	3,029,070	135	6	Electric	Apartments
600350-0065							
600350-0070							
600350-0060							
600350-0055	2014	229,625	7,554,663	248	7	Electric	Apartments (Mixed Use)
600350-0135							
600350-0140							
600350-0150							
BLOCK 35							
600350-0190	1911	18,720	979,056		3	Electric	Retail & Office
230230-0000	2008	22,890	753,081	28	6	CompHVAC	Condos (Mixed Use)
600350-0240	1914	5,670	296,541		2	SH	Offices
600350-0245	2007	30,298	996,804		6	HP	Apartments (Mixed Use)
600350-0255	1920	13,920	3,647,040		1	HW	Grocery/Market
600350-0170		*10,240					Parking Lot
600350-0155	1916	22,826	664,237	12	3	HWR	Apartments
600350-0265	1913	35,340	911,772		1	HP	Auto Garage



EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 36										
			600300-0065	1920	14,152	365,122	1	2	SH	Warehouse
			866497-0000	2007	21,780*		100	6	?	Condos (Mixed Use)
			866495-0000	2007	11,452*		42	4	?	Condos (Mixed Use)
			600300-0090	2011	65,492	2,154,687	107	6	Electric	Apartments (Mixed Use)
			600300-0085		10,244*					Vacant (Service Building)
			600300-0070	1920	22,272	1,164,826	1	3	CompHVAC	Office Building
			600300-0095	1941	1,224	68,666	1	1	SH	Retail Store
BLOCK 37										
			386540-0010	1907	24,888	724,241	30	4	E Wall	Apartments
			600300-0100	1963	6,122		1	?	HP	Bank
			860035-0000	2001	3,200*		8	7	?	Condos
			386540-0005	1911	3,560	536,492			SH	Restaurant/Lounge
			600300-0150	1920	14,765	380,937	1	2	SH	Service Building (Auto)
			386540-0030	1963	9,440	243,552	1	2	SH	Warehouse
			600300-0155	1928	2,920	440,044	1	1	HP	Restaurant/Lounge
			600300-0140	1937	4,928	742,650	1	1	SH	Restaurant/Lounge
BLOCK 38										
			783680-0025		25,865*				?	Retail Stores
			172880-0005	1905	15,750	458,325	15	3	Electric	Apartments (Subsidized)
			783680-0005	2009	88,125	2,899,313	120	6	HW	Apartments (Mixed Use)
			172880-0030	1907	18,422	536,080	29	4	HW	Apartment
			172880-0046	1900	1,860	89,280	1	2	GFA	Single Family
			608180-0000	2000	7,583*		9	3	?	Condos
			172880-0056	1900	2,010	96,480	1	2	GFA	Single Family
			172880-0062	1928	13,390	389,649	21	4	HW	Apartment
BLOCK 40										
			723460-0135	1960	16,238	521,240	1	2	?	Church/Welfare/Religious
			723460-0185	1900	5,376	172,570	1	?	?	Church/Welfare/Religious
BLOCK 41										
			639680-0000	2003	7,200*		6	3	?	Condos
			723460-0626	1904	4,270	124,257	3	2	GFA	Triplex
			723460-0605		32,400*					Parking (For School)
			723460-0635	1940	32,212	1,195,065	1	2	HW	School (Public)
BLOCK 42										
			197820-0440	1925	43,320	1,425,228	76	6	E Wall	Apartments
			197820-0460	1963	9,720	282,852	18	3	E Wall	Apartments
			197820-0470	1962	206,836	6,804,904	179	18	HW	Apartments
			197820-0445							
			197820-0450	1991	53,108	1,545,443	72	5	E Wall	Apartments

EUI	Color Code	Occupancy Type
29.10		Residence, Low-Rise Multi-family
48.00		Residence, Single Family
54.90		Residence, Dorm
32.90		Residence, Mid-Rise Multi-family
37.10		Education, K-12
77.50		Education, University
37.10		Education, Gym
52.30		Office Small
56.40		Office Large
56.10		Retail
262.00		Grocery/Market
150.70		Resaurant
56.10		Mixed Use Property
0.00		Parking Lot
10.00		Parking Garage
32.10		Religious
209.40		Hospital
80.10		Medical Office
78.10		Utility
25.80		Warehouse/Industrial
262.00		Convenience w/gas
0.00		Park/Green space
122.90		Government (Police/Fire/Court)
0.00		Vacant
89.00		Bank/Financial



Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 43							
880895-0000	1989	60,305	1,984,035	84	6	Electric	Apartments (Mixed Use)
197820-0860		*7,200					Vacant (Commercial)
197820-0875	2000	207,022	6,024,340	150	13	CompHVAC	Retirement Home
197820-0830							
197820-0865	1930	12,250	356,475	32	3	HWR	Apartments
BLOCK 44							
860030-0000	1980	44,408	1,461,023	56	11	?	Condos
197820-0885	1966	2,236	179,104		1	HP	Medical Office
BLOCK 45							
197820-0505	1927	57,127	1,879,478	83	9	HW	Apartment
197820-0525		*16,320					Parking
815570-0000	1960	84,755	2,788,440	115	10	?	Condos
BLOCK 46							
197820-0785		*9,450					First Hill Park
197820-0805	1910	13,140	339,012		3	HW	Art Gallery/Museum
197820-0790	1993	61,309	1,784,092	100	5	Electric	Apartments
BLOCK 47							
197820-0895	1916	26,000	756,600	32	4	E Wall	Apartment
197820-0915	1903	18,900	549,990	18	3	E Wall	Apartment
152250-0000	1989	74,722	2,174,410	123	5	Electric	Apartment
BLOCK 48							
197820-1220	1905	10,785	313,844	22	3	HW	Apartments
197820-1230	1998	18,152	528,223	32	5	E Wall	Apartments
507070-0000	1960	31,850	1,047,865	49	10	?	Condos
197820-1225	1902	5,659	164,677	11	3	FAU	Apartments
197820-1240	1918	15,823	460,449	31	4	HW	Apartments
197820-1226		*2,820					Parking (Commercial)
197820-1241	1949	2,201	115,112		1	HW	Office
BLOCK 49							
666914-0000	1981	65,448	2,153,239	54	18	?	Condos
197820-0580							Single Family (Bishop's House)
197820-0550	1907	6,050	484,605		3	HW	Medical Office
380100-0000	1982	64,046	2,107,113	62	17	?	Condos
BLOCK 50							
197820-0745	1997	58,376	1,698,742	97	4	E Wall	Apartments
197820-0750	1928	46,284	1,346,864	86	4	E Wall	Apartments



EUI	Color Code	Occupancy Type
29.10		Residence, Low-Rise Multi-family
48.00		Residence, Single Family
54.90		Residence, Dorm
32.90		Residence, Mid-Rise Multi-family
37.10		Education, K-12
77.50		Education, University
37.10		Education, Gym
52.30		Office Small
56.40		Office Large
56.10		Retail
262.00		Grocery/Market
150.70		Resaurant
56.10		Mixed Use Property
0.00		Parking Lot
10.00		Parking Garage
32.10		Religious
209.40		Hospital
80.10		Medical Office
78.10		Utility
25.80		Warehouse/Industrial
262.00		Convenience w/gas
0.00		Park/Green space
122.90		Government (Police/Fire/Court)
0.00		Vacant
89.00		Bank/Financial

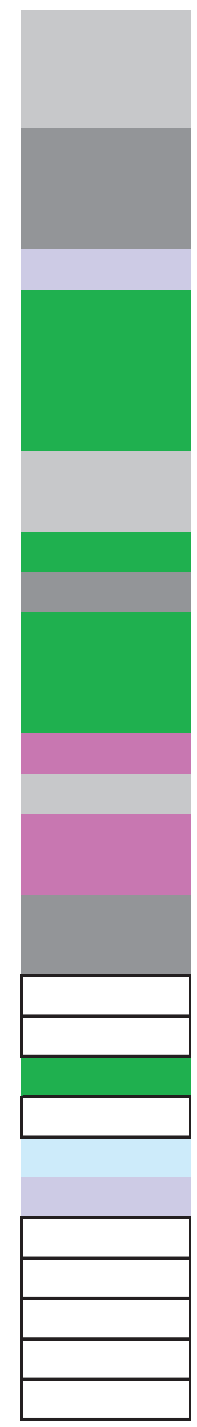
Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
197820-0775		*7,200					Parking
BLOCK 51							
197820-0935	1948	14,400	753,120		2	CompHVAC	Office
197820-0955	1956	8,544	684,374		2	HW	Medical Office
445871-0000	2015	155,736	5,123,714	168	23	?	Condos
197820-0960	1987	36,489	1,200,488	52	9	E Wall	Apartment (Mixed Use)
BLOCK 52							
197820-1180		*7,200					Parking Garage
197820-1195		*7,200					Parking Garage
197820-1200		*14,768					Parking Garage
197820-1185	1910	31,917	1,024,536		2	FAU	Church/Religious
197820-1205	1910	23,760	762,696		3	FAU	Church/Religious
197820-1210	1910	17,872	573,691		2	FAU	Church/Religious
BLOCK 53							
197820-1270	1965	57,882	4,636,348		3	Steam	Medical Office
197820-1290		*9,715					Vacant (Commercial)
BLOCK 54							
197820-1295	1920	18,507	2,789,005		1	E Wall	Restaurant/Bar
197820-1300	2008	20,346	1,141,411		1	CompHVAC	Bowling Alley
197820-1305	1927	14,380	806,718		1	W&C	Bowling Alley
197820-1310	1927	7,080	1,066,956		1	CompHVAC	Restaurant/Bar
197820-1315		*13,482					Parking Garage
197820-1320	2003	100,528	2,925,365	179	6	CompHVAC	Hotel/Motel
925690-0100	1918	1,848	47,678		1	PU	Auto Garage
925690-0115	1917	19,572	504,958		2	CompHVAC	Mini Warehouse
925690-0010	1965	3,213	484,199		1	FAU	Restaurant/Bar
BLOCK 55							
925690-0080	1911	18,354	473,533		2	?	Garage/Storage
925690-0065	1956	7,296	1,099,507		1	CompHVAC	Restaurant/Lounge
925690-0050	1910	10,742	602,626		1	SH	Retail Store
925690-0036		*6,261					Vacant (Commercial)
925690-0035							Vacant (Commercial)
925690-0061	1922	14,160	525,336		1	CompHVAC	Daycare Center
926690-0030	1950	1,470	385,140		1	NH	Convenience/Gas
925690-0005	1959	2,088	53,870		2	FAU	Dry Cleaners
BLOCK 56							
925690-0020	2014	82,627	2,718,428	105	6	CompHVAC	Apartment
322504-9001							










Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 57							
193815-0000	1950	90,190	2,967,251	145	13	?	Condos
197820-0605	1912	12,648	368,057		3	FAU	University Club Building
268067-0000	1930	63,728	2,096,651	56	14	?	Condos
197820-0610	1956	4,182	630,227		1	HP	Restaurant
BLOCK 58							
197820-0710	1905	17,300	503,430	22	4	HW	Apartments
197820-0720	2012	165,816	5,455,346	236	17	CompHVAC	Apartments (Mixed Use)
872620-0000	1929	55,770	1,834,833	22	12	?	Condos
197820-0730	1924	8,480	754,720		1	HP	Bank
BLOCK 59							
256030-0000	1982	192,793	6,342,890	139	33	?	Condos
256035-0000	1981	19,511	567,770	2	2	FAU	Condos
BLOCK 60							
197820-1140		*7,200					Parking Garage
197820-1155	1953	3,234	259,043		1	HW	Medical Office
197820-1160	1975	7,189	639,821		1	CompHVAC	Bank
636008-0000		*28,216					Vacant (Commercial)
BLOCK 61							
197820-0625	1992	239,250	19,163,925		14	CompHVAC	Medical Office
BLOCK 62							
197820-0670	1976	10,115	900,235		1	W&C	Bank
197820-0690		*3,840					Parking
197820-0691		*11,520					Parking
872599-0000	2004	164464	34,438,762		15	CompHVAC	Hospital
197820-1015		*41,968					Parking Garage
610845-0000							
BLOCK 63							
197820-1116	1962	18,240	1,461,024		2	CompHVAC	Medical Office
197820-1130	1966	7,960	637,596		1	FAU	Medical Office
197820-1135	1946	8,108	649,451		3	HW	Medical Office
197820-1115		*71					Vacant (Commercial)
BLOCK 64							
322504-9002	1910	48,000	1,238,400		5	HW	Warehouse/Storage
000240-0004		*17,522					Apartment (Under Construction)
322504-9003	1919	6,640	372,504		2	CompHVAC	Retail/Café
000240-0005		*3,287					Parking

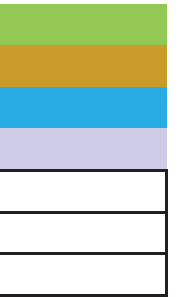


EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
29.10		Residence, Low-Rise Multi-family	322504-9004		*2,287					Parking
48.00		Residence, Single Family	000240-0006		*3,959					Parking
54.90		Residence, Dorm	322504-9007		*2,782					Parking
32.90		Residence, Mid-Rise Multi-family	000240-0009		*4,100					Parking Garage
37.10		Education, K-12	000240-0008		*2,679					Parking Garage
77.50		Education, University	000240-0007		*3,840					Parking Garage
37.10		Education, Gym								
52.30		Office Small	322504-9009	1955	56,610	3,107,889		4	?	Dormitory
56.40		Office Large	552560-0010	1951	36,225	2,807,438		2	?	Seattle University
56.10		Retail	000240-0001	1910	24,876	1,927,890		1	HW	Seattle University
262.00		Grocery/Market	197820-1335	1900	18,348	1,421,970		3	HW	Seattle University
150.70		Resaurant	225450-0025	1956	76,090	5,896,975		5	HW	Seattle University
56.10		Mixed Use Property	225450-0465		*92,148					Parking
0.00		Parking Lot	225450-0530							
10.00		Parking Garage								
32.10		Religious	225450-0555	1930	22,720	1,760,800		1	FAU	School Theatre
			197820-1340	1970	99,933			3	NH	Parking Garage
209.40		Hospital	197820-1345	1955	50,450	3,909,875		5	HW	Seattle University
80.10		Medical Office	225450-0075	1987	9,999	774,923		5	FAU	Seattle University
			225450-0404	1946	22,440	1,739,100		1	HW	Seattle University
78.10		Utility	197820-1400			-				Seattle U Medical Office
25.80		Warehouse/Industrial	197820-1407		*3,740					Parking
262.00		Convenience w/gas	197820-1421	1988	28,108	2,251,451		5	PU	Seattle U Medical Office
0.00		Park/Green space	197820-1435	1963	39,115	3,133,112		3	HW	Seattle U Medical Office
			197820-1405		*49,735					Parking Garage
122.90		Government (Police/Fire/Court)	197820-1446		*6,556					Parking Garage
0.00		Vacant	219760-0250		*24,955					Vacant (Commercial)
			225450-0195		*4,830					Vacant (Commercial)
89.00		Bank/Financial	225450-0165	1965	112,800	8,742,000		5	W&C	Seattle University
			225450-0315		*7,254					Vacant (Commercial)
			225450-0320	1911	6,916	361,707		2	HW	Seattle U Offices
			225450-0271	1960	67,080	3,682,692		7	HW	Seattle U Dorm
			225450-0285		*4,830					Vacant (Commercial)
			225450-0275		*9,660					Vacant (Commercial)
			225450-0255		*4,518					Vacant (Commercial)
			225450-0260		*2,372					Vacant (Commercial)
			225450-0265		*2,372					Vacant (Commercial)
BLOCK 65										
			859090-0646	1975	226,274	47,381,776		7	CompHVAC	Hospital
BLOCK 66										
			197820-0665	1912	73,288	15,346,507		6	CompHVAC	Hospital
			197820-1055	1970	62,151	4,978,295		4	HW	Medical Office
			197820-1060	1946	9,522	762,712		2	HW	Medical Office
			859090-0951							



Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type	
859090-0950	1975	298,219	62,447,059		12	HW	Hospital	
859090-0955								
197820-1096	1994	504,262	105,592,463		8	HW	Hospital	
859090-0970	1978	158,659	33,223,195		6	CompHVAC	Hospital	
BLOCK 67								
859090-0685		*21,600					Parking Garage	
859090-0721		*4,500					Vacant	
859090-0720	1982	7,826	227,737	13	4	HW	Apartment	
859090-0690	1956	21,277	1,704,288		3	HW	Medical Office	
859090-0710	1959	22,546	1,805,935		3	HW	Medical Office	
BLOCK 68								
859090-0725		*60,885					Parking Garage	
BLOCK 69								
7803970-0000		*49,358					Vacant	
BLOCK 70								
859090-0765	1988	77,775	6,229,778		5	HP	Medical Office	
859090-0770	1958	10,612	850,021		1	HW	Medical Office	
859090-0845	1925	16,896	491,674	33	3	E Wall	Apartment	
BLOCK 71								
219810-0021								
219810-0025	2016	103,118	3,392,582	170	6	E Wall	Apartment (Mixed Use)	
219810-0020								
219810-0015								
219810-0010	1908	20,334	591,719	43	3	HW	Apartment (Mixed Use)	
219810-0005	1922	7,550	219,705	8	2	HW	Apartment (Mixed Use)	
219760-0275		*13,672					Vacant	
219810-0030	1965	179,604	13,919,310	362	12	W&C	Seattle University	
219760-0315	1999	289,752	9,532,841	205	7	HW	Apartment	
219810-0110	1990	49,159	2,698,829		3	W&C	Residence Dorm	
219760-0926		*3,286					Seattle University	
219760-0927		*1,840					Parking	
219760-0931		*2,880					Vacant	
219760-0930		*4,800					Vacant	
219810-0120		*142,056					Sports Field	
BLOCK 72								
225450-0595	2015	29,173	2,260,908		5	CompHVAC	Seattle Academy STREAM (Single Family/C/I Zone)	
225450-0565	2001	39,150	1,452,465	1	2	CompHVAC	Seattle Academy Gymnasium	
322504-9022	1921	30,787	2,385,993		2	PU	Seattle Academy of Arts & Sciences (Private)	

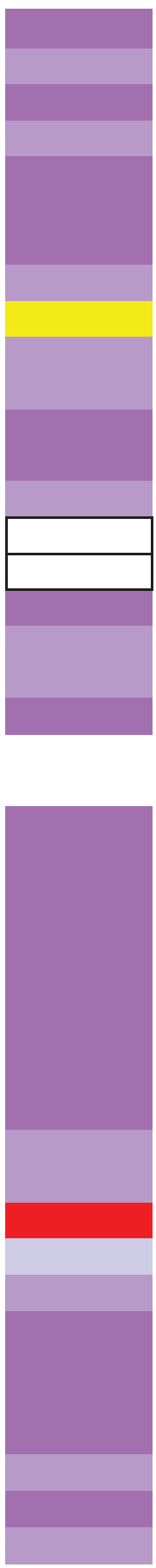
EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
29.10	[Purple]	Residence, Low-Rise Multi-family	322504-9019	1930	2,548	94,531		1	CompHVAC	Mother's Place Daycare Center
48.00	[Purple]	Residence, Single Family	322504-9017	1962	24,248	625,598		1	SH	Warehouse (Roberts Delbert W + Inez)
54.90	[Purple]	Residence, Dorm	322504-9015	1920	29,506	1,543,164		2	FAU	Seattle Academy Office Building
32.90	[Purple]	Residence, Mid-Rise Multi-family	322504-9016	1900	9,534	523,417		3	Steam	Residence Hall/Dorm
37.10	[Green]	Education, K-12	322504-9023		8,289*					Vacant (Commercial)
77.50	[Green]	Education, University	225450-0600		4,254*					Vacant (Multi-family)
37.10	[Green]	Education, Gym	322504-9020		5,652*					Vacant (Commercial) - Parking
52.30	[Light Blue]	Office Small								
56.40	[Blue]	Office Large								
56.10	[Dark Blue]	Retail								
262.00	[Cyan]	Grocery/Market								
150.70	[Light Blue]	Resaurant								
56.10	[Blue]	Mixed Use Property								
0.00	[Grey]	Parking Lot								
10.00	[Dark Grey]	Parking Garage								
BLOCK 73										
			225450-1260	1924	24,649	717,286	31	4	HW	Apartments (Co-op)
			225450-1240	1923	16,144	469,790	25	4	HW	Apartments (Subsidized)
			225450-1275	1909	23,764	691,532	38	4	HW	Apartments
			225450-1235	1900	2,480	72,168	2	2	GFA	Duplex (Single Family Converted)
			225450-1295	1903	2,700	78,570	3	3	EFA	Triplex (Single Family Converted)
			225450-1290	1903	2,200	105,600	1	2	OFA	Single Family
			225450-1300							Parking
			225450-1305							Parking
			225450-1310	1907	11,346	364,207	1	3	?	Church/Welfare/Religious
			225450-1220	1900	1,840	88,320	1	2	GFA	Single Family
			225450-1215	1900	2,180	63,438	2	3	GFA	Duplex (Single Family Converted)
			225450-1205	1900	1,900	91,200	1	2	GFA	Single Family
			225450-1200	1900	1,160	55,680	1	2	OFA	Single Family
			225450-1185	1900	1,840	88,320	1	2	E BB	Single Family
			225450-1170	1900	2,930	140,640	1	3	GFA	Single Family
			225450-1180	1900	940	45,120	1	1	GFA	Single Family
BLOCK 74										
			225450-1365	1963	5,573	162,174	8	3	E Wall	Apartments
			225450-1355	1900	1,860	54,126	2	3	GFA	Duplex (Single Family Converted)
			225450-1350	1900	2,160	103,680	1	2	E BB	Single Family
			225450-1342	2001	1,140	54,720		3	GFA	Townhouse Plat
			225450-1343	2001	1,290	61,920		3	GFA	Townhouse Plat
			225450-1344	2001	1,290	61,920		3	GFA	Townhouse Plat
			225450-1341	2001	1,140	54,720	1	3	GFA	Townhouse Plat
			225450-1345	2001	1,140	54,720		3	GFA	Townhouse Plat
			225450-1347	2001	1,290	61,920		3	GFA	Townhouse Plat
			225450-1346	2001	1,290	61,920		3	GFA	Townhouse Plat
			225450-1335	1902	1,460	42,486	2	3	E BB	Duplex (Single Family Converted)
			225450-1340	1902	1,610	77,280	1	2	GFA	Single Family
			225450-1327	2009	1,590	76,320		2	GFA	Townhouse Plat
			225450-1331	2009	1,770	84,960		1	GFA	Townhouse Plat
			225450-1328	2009	1,620	77,760	1	2	GFA	Townhouse Plat
			225450-1330	2009	1,770	84,960		1	GFA	Townhouse Plat



Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
225450-1329	2009	1,680	80,640		2	GFA	Townhouse Plat
225450-1325	1903	3,076	89,512	5	3	HW	Apartments
225450-1321	2015	1,690	81,120	1	3	GFA	Townhouse Plat
225450-1320	2016	1,610	46,851	5	3	GHP	Apartments
225450-1324	2016	1,800	86,400	1	3	GFA	Townhouse Plat
225450-1323	2016	1,860	89,280	1	3	GFA	Townhouse Plat
225450-1322	2016	1,660	79,680	1	3	GFA	Townhouse Plat
225450-1440	1901	1,890	54,999	3		GHP	Triplex (Single Family Converted)
225450-1435	1900	1,900	60,990	1	?	Electric	Church/Welfare/Religious
230250-0000	1983	7,341*		8	3	?	Condos
225450-1425	1905	3,380	98,358	3	3	GFA	Triplex (Single Family Converted)
225450-1420	1902	2,490	119,520	1	2	GHW	Single Family
225450-1415	1901	3,590	172,320	1	3	GFA	Single Family
225450-1405	1900	2,780	80,898	1	2	GFA	Duplex (Single Family Converted)
225450-1406		4,080*					Vacant (Multi-family)
225450-1326		3,181*					Vacant (Commercial)
225450-1385	1903	5,990	287,520	1	3	GFA	Single Family
225450-1380	1903	3,010	87,591	3	4	GFA	Triplex (Single Family Converted)
225450-1370	1903	4,108	119,543	8	2	FA	Apartments
225450-1373	1903	3,030	145,440	1	1	GFA	Single Family

BLOCK 75

723460-0092	2005	1,330	63,840	1	3	GFA	Townhouse Plat
723460-0093	2005	1,320	63,360	1	3	GFA	Townhouse Plat
723460-0094	2005	1,320	63,360	1	3	GFA	Townhouse Plat
723460-0095	2005	1,330	63,840	1	3	GFA	Townhouse Plat
723460-0098	2005	1,330	63,840	1	3	GFA	Townhouse Plat
723460-0097	2005	1,320	63,360	1	3	GFA	Townhouse Plat
723460-0091	2005	1,320	63,360	1	3	GFA	Townhouse Plat
723460-0096	2005	1,330	63,840	1	3	GFA	Townhouse Plat
723460-0090	1904	3,190	153,120	1	3	GFA	Single Family
723460-0085	1900	3,080	89,628	2	3	GFA	Duplex
723460-0075	1982	7,089	206,290	8	2	E Wall	Apartments
723460-0065		14,400*					Public Park
723460-0125	1906	9,540	523,746			HW	Group Home/Mental Health
134750-0000	1987	7,200*	-	10		?	Condos
723460-0116	2013	1,810	86,880	1	3	GHW	Townhouse Plat
723460-0118	2013	1,770	84,960	1	3	GHW	Townhouse Plat
723460-0115	2013	1,810	86,880	1	3	GHW	Townhouse Plat
723460-0117	2013	1,770	84,960	1	3	GHW	Townhouse Plat
723460-0110	1904	3,980	191,040	2	3	GFA	Duplex (Single Family Converted)
723460-0105	1902	2,820	135,360	1	3	GFA	Single Family
253885-0000	1981	7,200*	-	10	4	?	Condos



EUI	Color Code	Occupancy Type
29.10		Residence, Low-Rise Multi-family
48.00		Residence, Single Family
54.90		Residence, Dorm
32.90		Residence, Mid-Rise Multi-family
37.10		Education, K-12
77.50		Education, University
37.10		Education, Gym
52.30		Office Small
56.40		Office Large
56.10		Retail
262.00		Grocery/Market
150.70		Resaurant
56.10		Mixed Use Property
0.00		Parking Lot
10.00		Parking Garage
32.10		Religious
209.40		Hospital
80.10		Medical Office
78.10		Utility
25.80		Warehouse/Industrial
262.00		Convenience w/gas
0.00		Park/Green space
122.90		Government (Police/Fire/Court)
0.00		Vacant
89.00		Bank/Financial

Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 76							
723460-0695	1980	2,660	77,406	3	2	EFA	Triplex
723460-0696	1902	2,640	126,720	1	3	GFA	Single Family
723460-0690	1902	4,480	130,368	2	2	OFA	Duplex
723460-0685	1904	3,770	180,960	1	3	GFA	Single Family
723460-0681	1904	3,440	165,120	1	3	GFA	Single Family
723460-0682	2012	1,250	60,000	1	3	E Wall	Townhouse Plat
723460-0683	2012	1,250	60,000	1	3	E Wall	Townhouse Plat
723460-0680	1904	3,450	165,600	1	3	OFA	Single Family
723460-0674	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0679	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0675	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0678	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0676	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0677	2016	1,520	72,960	1	1	GR	Townhouse Plat
723460-0670	2016	7,842	228,202	14	3	E Wall	Apartments
723460-0665	1950	6,344	184,610	10	2	FA	Apartments
524510-0000	1928	7,200*	-	32	4	?	Condos
723460-0725	1928	8,726	253,927	15	3	HW	Apartments
723460-0720	1929	8,738	254,276	14	3	HW	Apartments
723460-0715	1929	11,802	343,438	15	3	HW	Apartments
723460-0714	2000	8,231	239,522	8	3	Electric	Apartments
723460-0705	1928	8,760	254,916	14	3	HW	Apartments
723460-0700	1971	8,495	247,205	9	3	E Wall	Apartments
BLOCK 77							
723460-0880	1948	14,625	702,000	18	4	E Wall	Apartments
723460-0876	1903	2,700	129,600	1	2	GFA	Single Family
723460-0875	1902	1,980	95,040	1	2	GFA	Single Family
078400-0000	1928	7,200*	-	16	2	?	Condos
257210-0000	1927	10,095*	-	16	4	?	Condos
723460-0855	1929	20,064	963,072	22	4	HW	Apartments (Co-op)
743980-0000	1928	14,400*	-	9	2	?	Condos
723460-0910	1900	4,881	234,288	8	3	FAU	Apartments (Co-op)
723460-0901	1925	3,140	150,720	2	2	GHW	Duplex
723460-0902	2008	1,180	56,640	1	1	E Wall	Townhouse Plat
723460-0900	2008	1,300	62,400	1	1	E Wall	Townhouse Plat
723460-0899	2008	1,320	63,360	1	1	E Wall	Townhouse Plat
723460-0903	2008	1,180	56,640	1	1	E Wall	Townhouse Plat
723460-0904	2008	1,300	62,400	1	1	E Wall	Townhouse Plat
723460-0898	2008	1,320	63,360	1	1	E Wall	Townhouse Plat
723460-0890	1966	15,580	747,840	20	3	E Wall	Apartments

Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
BLOCK 78							
225450-0645	1919	10,500	270,900		1	SH	Auto Garage
225450-0635	1920	1,728	96,941		1	SH	Retail
225450-0625		*3,840					Parking Lot
225450-0630		*3,804					Parking Lot
225450-0615	1930	8,756	225,905		1	CompHVAC	Warehouse
225450-0610	1926	3,573	92,183		1	SH	Warehouse
225450-0605	1923	10,440	269,352		2	CompHVAC	Gallery
225450-0660	1910	9,850	472,800	22	3	HW	Apartment
225450-0650	1904	2,785	133,680	4	2	HW	Apartment
225450-0654	2015	1,080	31,428	1	3	EHP	Townhome
225450-0655	2015	1,080	31,428	2	3	EHP	Townhome
225450-0656	2015	1,310	38,121	2	3	EHP	Townhome
225450-0670	1903	2,140	102,720	1	2	GFA	Single Family
225450-0664		*5,120					Vacant
225450-0685	1900	3,190	153,120	2	2	OFA	Duplex
225450-0690	1900	2,210	106,080	4	2	E Wall	4-plex
225450-0692	1997	2,480	119,040	4	2	E Wall	4-plex
225450-0700	1997	2,484	119,232	4	4	E Wall	4-plex
225450-0695		*3,424					Parking
225450-0705		*3,840					Parking
225450-0710		*3,840					Parking
BLOCK 79							
225405-1085	1953	4,100	152,110	1	2	FAU	Day Care Center
225450-1080	1900	2,220	106,560	1	2	OFA	Single Family
225450-1070	1902	2,280	109,440	1	2	GFA	Duplex
225450-1065	1906	3,092	148,416	1	2	FAU	4-Plex
225450-1060	2010	4,080	195,840	1	3	E BB	Single Family
225450-1055	1906	2,610	125,280	1	2	GFA	Single Family
225450-1051	1906	1,000	48,000	1	2	GFA	Single Family
225450-1052	2015	1,300	62,400	1	3	GFA	Townhome
225450-1050	2015	1,160	55,680	1	3	GFA	Townhome
225450-1046	2015	1,320	63,360	1	3	GFA	Townhome
225450-1047	2015	1,400	67,200	1	3	GFA	Townhome
225450-1048	2015	1,400	67,200	1	3	GFA	Townhome
225450-1049	2015	1,240	59,520	1	3	GFA	Townhome
225450-1045	2015	1,440	69,120	1	3	GFA	Townhome
225450-1039	2009	1,340	64,320	1	2	GFA	Townhome
225450-1044	2009	1,340	64,320	1	2	GFA	Townhome
225450-1040	2009	1,200	57,600	1	2	GFA	Townhome
225450-1043	2009	1,200	57,600	1	2	GFA	Townhome
225450-1041	2009	1,390	66,720	1	2	GFA	Townhome
225450-1042	2009	1,350	64,800	1	2	GFA	Townhome
225450-1100	1903	2,220	106,560	1	2	GFA	Single Family

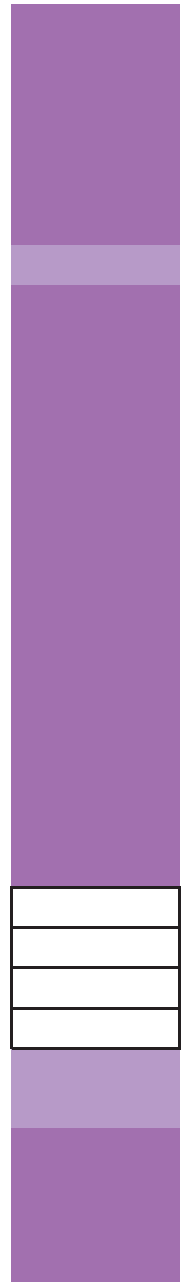
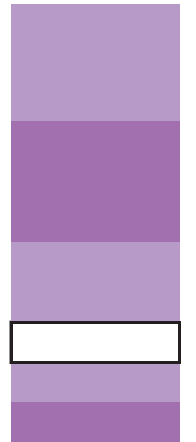


EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
29.10		Residence, Low-Rise Multi-family	225450-1090	1902	3,240	155,520	1	2	GFA	Single Family
48.00		Residence, Single Family	225450-1096	2014	1,260	60,480	1	2	GFA	Townhome
54.90		Residence, Dorm	225450-1097	2014	1,260	60,480	1	2	GFA	Townhome
32.90		Residence, Mid-Rise Multi-family	225450-1095	2014	1,630	78,240	1	2	GFA	Single Family
37.10		Education, K-12	225450-1115	1909	4,894	142,415	6	2	HW	Apartments
77.50		Education, University	225450-1120	1981	2,863	83,313	5	2	FAU	Apartments
37.10		Education, Gym	225450-1125	2016	1,450	69,600		3	GHP	Townhome
52.30		Office Small	225450-1124	2016	1,430	68,640		3	GFA	Townhome
56.40		Office Large	225450-1123	2016	1,450	69,600		3	GHP	Townhome
56.10		Retail	225450-1122	2016	1,430	68,640		3	GFA	Townhome
262.00		Grocery/Market	225450-1136	2004	750	36,000		2	GFA	Townhome
150.70		Resaurant	225450-1137	2004	750	36,000		2	GFA	Townhome
56.10		Mixed Use Property	225450-1135	1902	2,270	108,960	1	2	GFA	Single Family
0.00		Parking Lot	225450-1140	1902	2,530	121,440	1	2	GFA	Single Family
10.00		Parking Garage	225450-1150	1903	1,980	95,040	1	2	GFA	Single Family
32.10		Religious	225450-1145	1902	2,250	108,000	1	2	GFA	Single Family
209.40		Hospital	225450-1160	2015	1,220	58,560	1	3	GHW	Townhome
80.10		Medical Office	225450-1159	2015	1,220	58,560	1	3	GHW	Townhome
78.10		Utility	225450-1158	2015	1,220	58,560	1	3	GHW	Townhome
25.80		Warehouse/Industrial	225450-1157	2015	1,220	58,560	1	3	GHW	Townhome
262.00		Convenience w/gas								
0.00		Park/Green space								
BLOCK 80										
122.90		Government (Police/Fire/Court)	225450-1505	1950	1,130	54,240	1	1	GFA	Single Family
			225450-1510	1903	3,350	97,485	2	2	GHW	Duplex
0.00		Vacant	225450-1500	1901	2,540	121,920	1	2	OFA	Single Family
			225450-1489	2015	1,800	86,400	1	3	GHW	Townhome
89.00		Bank/Financial	225450-1495	2015	1,510	72,480	1	1	GHW	Townhome
			225450-1490	2015	1,890	90,720	1	3	GHW	Townhome
			225450-1495	2015	1,510	72,480	1	1	GHW	Townhome
			225450-1496	2015	1,230	59,040	1	1	GHW	Townhome
			225450-1497	2015	910	43,680	1	1	GHW	Townhome
			225450-1480	1904	1,440	69,120	1	1	OFA	Single Family
			225450-1485	1901	2,770	80,607	1	2	GFA	Duplex
			225450-1475	2004	2,900	139,200	1	3	GFA	Single Family
			225450-1476	2004	830	39,840	1	2	GFA	Townhome
			225450-1477	2004	830	39,840	1	2	GFA	Townhome
			225450-1460	1901	2,620	125,760	1	2	GHW	Single Family
			225450-1455	1901	2,340	112,320	1	2	GFA	Single Family
			225450-1450	1901	880	42,240	1	1	GFA	Single Family
			225450-1525	1908	2,270	108,960	1	2	GFA	Single Family
			225450-1526	1908	2,180	104,640	1	2	GFA	Single Family
			225450-1515	1906	2,470	71,877	2	2	GFA	Duplex
			225450-1530	1906	2,210	106,080	1	2	GFA	Single Family
			225450-1545	1906	2,350	112,800	1	2	GHW	Single Family

Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
363600-0000	1904	6,480	188,568	8	3	?	Condos
225450-1555	1903	3,336	97,078	4	2	HW	4-Plex
225450-1560	1900	2,376	69,142	4	1	HW	4-Plex
225450-1556	1911	6,218	180,944	8	3	HW	Apartment
225450-1445	1909	4,928	143,405	7	3	HW	Apartment
225450-1575	1901	5,183	150,825	9	2	FAU	Apartment
BLOCK 81							
793860-0000	1982	4,741	137,963	11	3	?	Condos
723460-0029	2016	1,750	84,000	1	3	GFA	Townhome
723460-0028	2016	1,860	89,280	1	3	GFA	Townhome
723460-0027	2016	1,970	94,560	1	3	GFA	Townhome
723460-0025	2016	2,040	97,920	1	3	GFA	Townhome
723460-0026	2016	2,040	97,920	1	3	GFA	Townhome
723460-0020	2016	1,930	92,640	1	3	GFA	Townhome
723460-0021	2016	1,930	92,640	1	3	GFA	Townhome
723460-0022	2016	1,930	92,640	1	3	GFA	Townhome
723460-0023	2016	1,930	92,640	1	3	GFA	Townhome
723460-0015	1943	1,300	37,830	1	1	GFA	Duplex
723460-0010	1943	1,300	37,830	1	1	GFA	Duplex
723460-0005	1943	1,300	37,830	1	1	EHP	Duplex
723460-0007	2012	1,780	85,440	1	3	GHW	Single Fam
723460-0008	2012	1,810	86,880	1	3	GHW	Single Fam
723460-0035		*6,720					Group/Halfway Home
723460-0037	2014	1,590	76,320	1	3	ER	Townhome
723460-0036	2014	1,720	82,560	1	3	ER	Townhome
723460-0034	2014	1,720	82,560	1	3	ER	Townhome
723460-0038	2014	1,590	76,320	1	3	ER	Townhome
723460-0039	2014	1,720	82,560	1	3	ER	Townhome
723460-0033	2014	1,720	82,560	1	3	ER	Townhome
723460-0045	1963	5,570	162,087	8	2	E Wall	Apartments
723460-0050	1902	3,690	177,120	1	2	GFA	Single Fam
723460-0055	1901	2,490	119,520	1	2	GFA	Single Fam
723460-0056	1901	2,610	125,280	1	2	GFA	Single Fam
723460-0060	1904	2,580	75,078	2	2	GFA	Triplex
BLOCK 82							
723460-0760	1901	2,988	86,951	5	3	HW	Apartments
723460-0761	1901	2,650	77,115	2	3	GFA	Duplex
723460-0755	1932	9,300	270,630	11	3	HW	Apartments
723460-0750	1900	3,850	112,035	1	2	E BB	Duplex
723460-0745	1924	2,160	62,856	4	2	HW	4-Plex
723460-0737	1904	4,060	194,880	1	3	OFA	Single Family
723460-0735		*3,934					Vacant
723460-0736	1918	1,680	80,640	1	1	OFA	Single Family



EUI	Color Code	Occupancy Type	Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type	
29.10		Residence, Low-Rise Multi-family	769827-0000	2004	8,984	261,434	8	3	?	Condos	
48.00		Residence, Single Family	723460-0770	1906	3,200	93,120	4	3	HW	4-Plex	
54.90		Residence, Dorm	723460-0775	1900	4,402	128,098	4	3	E Wall	4-Plex	
32.90		Residence, Mid-Rise Multi-family	723460-0774	1911	2,290	109,920	1	2	GFA	Single Family	
37.10		Education, K-12	723460-0776	1902	2,930	140,640	1	2	GFA	Single Family	
77.50		Education, University	723460-0779	2008	1,840	88,320	1	3	GFA	Single Family	
37.10		Education, Gym	723460-0780	1900	2,890	84,099	2	3	GFA	Duplex	
52.30		Office Small	723460-0785	1943	1,720	50,052	1	1	E BB	Duplex	
56.40		Office Large	225450-2530		*230					Vacant	
56.10		Retail	515610-0000	1910	2,244	65,300	2	2	?	Condos	
262.00		Grocery/Market	723460-0786	1902	3,040	145,920	1	2	GFA	Single Family	
150.70		Resaurant	BLOCK 83								
56.10		Mixed Use Property	723460-0820	2007	1,300	62,400	1	2	GHW	Townhome	
0.00		Parking Lot	723460-0821	2007	1,210	58,080	1	2	GHW	Townhome	
10.00		Parking Garage	723460-0822	2007	1,320	63,360	1	2	GHW	Townhome	
			723460-0827	2007	1,240	59,520	1	2	GHW	Townhome	
			723460-0824	2007	1,200	57,600	1	2	GHW	Townhome	
			723460-0823	2007	1,310	62,880	1	2	GHW	Townhome	
			723460-0815	1900	6,426	186,997	6	3	E Wall	Apartment	
			723460-0810	2000	1,640	78,720	1	2	GFA	Townhome	
			723460-0811	2000	2,020	96,960	1	2	GFA	Townhome	
			723460-0813	2000	1,640	78,720	1	2	GFA	Townhome	
			723460-0812	2000	2,020	96,960	1	2	GFA	Townhome	
			723460-0805	2000	1,660	79,680	1	2	GFA	Townhome	
			723460-0806	2000	1,820	87,360	1	2	GFA	Townhome	
			723460-0807	2000	1,660	79,680	1	2	GFA	Townhome	
			723460-0808	2000	1,820	87,360	1	2	GFA	Townhome	
			723460-0800	1997	1,210	58,080	1	2	GFA	Townhome	
			723460-0801	1998	1,210	58,080	1	2	GFA	Townhome	
			723460-0802	1997	1,210	58,080	1	2	GFA	Townhome	
			723460-0803	1998	1,210	58,080	1	2	GFA	Townhome	
			723460-0796	1903	1,850	88,800	1	3	GFA	Single Family	
			723460-0797	2008	1,120	53,760	1	2	GFA	Townhome	
			723460-0798	2008	1,120	53,760	1	2	GFA	Townhome	
			723460-0792		*865					Unknown	
			723460-0793		*684					Unknown	
			723460-0794		*720					Unknown	
			723460-0795		*2,006		1			Single Family	
			723460-0825	1936	2,170	63,147	1	1	HW	Duplex	
			723460-0826	1939	7,656	222,790	13	3	FAU	Apartment	
			723460-0832	2006	1,310	62,880	1	2	GHW	Townhome	
			723460-0833	2006	1,350	64,800	1	2	GHW	Townhome	
			723460-0831	2006	1,190	57,120	1	2	GHW	Townhome	
			723460-0830	2006	1,310	62,880	1	2	GHW	Townhome	



Parcel #	Year Built	Net SqFt	Annual kBtu	Units	Floors	Heat Type	Building Type
723460-0829	2006	1,230	59,040	1	2	GHW	Townhome
723460-0835	2016	1,710	82,080	1	3	GR	Townhome
723460-0836	2016	1,650	79,200	1	3	GR	Townhome
723460-0837	2016	1,690	81,120	1	3	GR	Townhome
723460-0939	2016	1,970	94,560	1	3	GR	Townhome
723460-0838	2016	1,740	83,520	1	3	GR	Townhome
133600-0000	1901	7,254	211,091	4	2		Condos
723460-0845		6,414	186,647	4	3		4-Plex
723460-0850		2,490	72,459	2	2		Duplex
723460-0851		3,140	150,720	1	2		Single Family



EUI	Color Code	Occupancy Type
29.10		Residence, Low-Rise Multi-family
48.00		Residence, Single Family
54.90		Residence, Dorm
32.90		Residence, Mid-Rise Multi-family
37.10		Education, K-12
77.50		Education, University
37.10		Education, Gym
52.30		Office Small
56.40		Office Large
56.10		Retail
262.00		Grocery/Market
150.70		Resaurant
56.10		Mixed Use Property
0.00		Parking Lot
10.00		Parking Garage
32.10		Religious
209.40		Hospital
80.10		Medical Office
78.10		Utility
25.80		Warehouse/Industrial
262.00		Convenience w/gas
0.00		Park/Green space
122.90		Government (Police/Fire/Court)
0.00		Vacant
89.00		Bank/Financial

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