

Planning 4 Climate Change

Changing Land Use to Mitigate Climate Change

A Trans-Atlantic Collaboration Dubrovnik, Croatia | May 7-9, 2009

WEB SITES:

Planning for Climate Change

www.sxd.sala.ubc.ca/lincoln_climate_change.htm

Or google Planning for Climate Change Lincoln UBC

Sustainability by Design

www.sxd.sala.ubc.ca

Or google sxd ubc

Planning 4 Climate Change

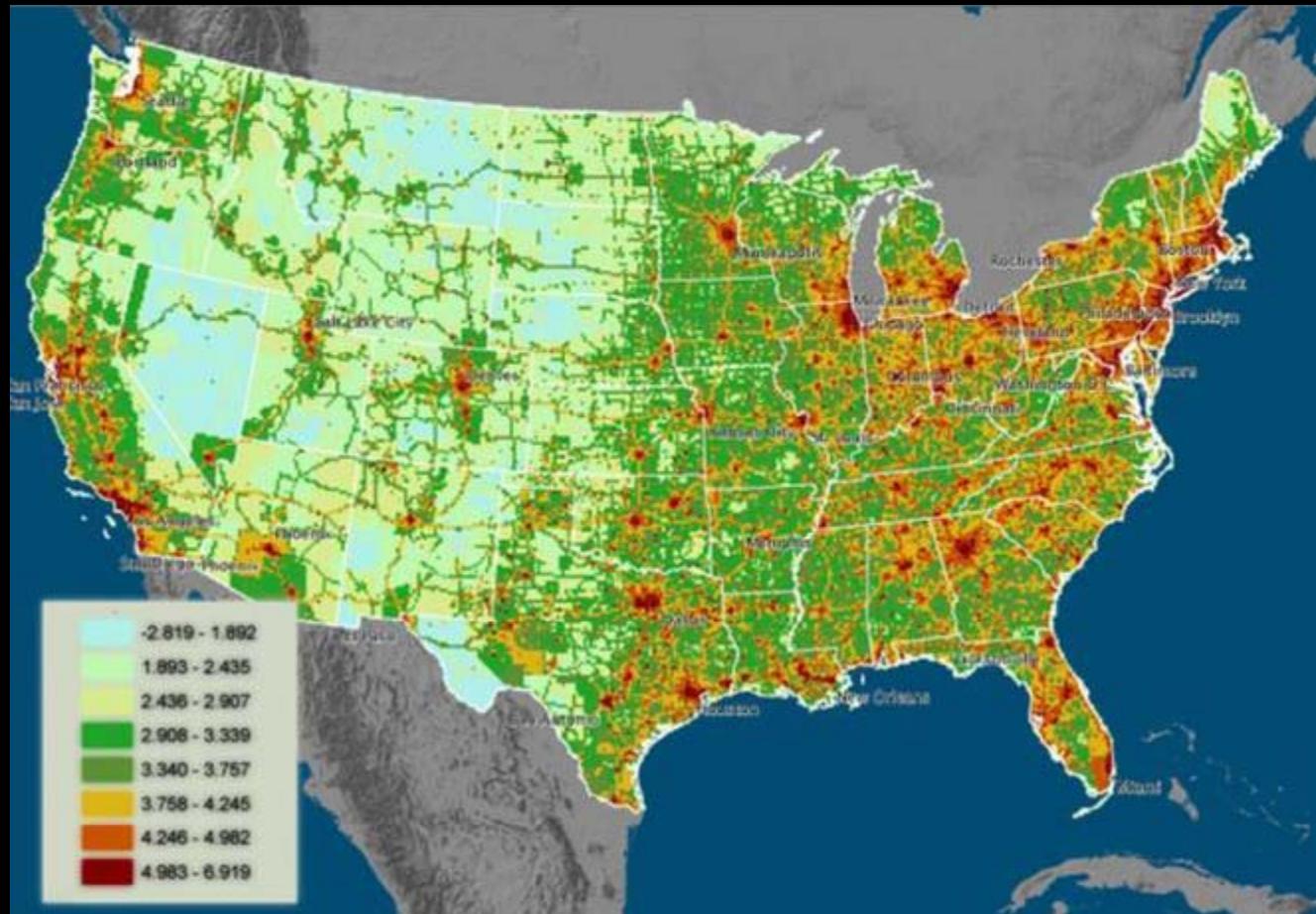
Cities as bad for Carbon

Most analysis shows cities as cause of global warming.

Cities are end users of +/- 80% of US energy

As end users cities are more significant than industry.

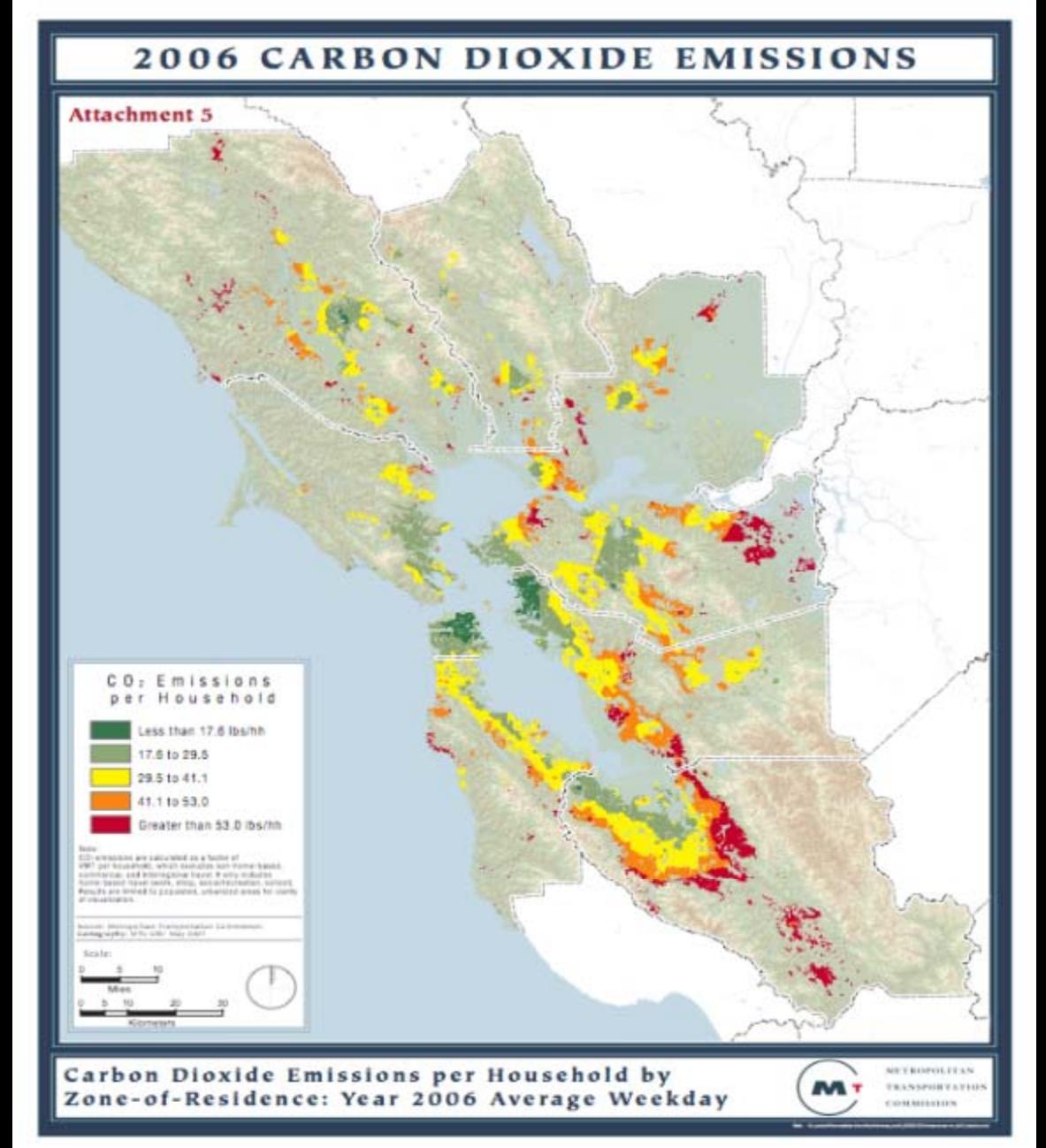
From
NASA/DOE
funded Vulcan
project



Planning 4 Climate Change

*Per Capita Basis
provides a
different picture*

*Center city
dwellers produce
only 25% GHG per
capita of third ring
suburb dweller.*



Planning 4 Climate Change



Why here?

Cascadia has unifying climate, ecology, geography, economy, and (despite the national boundary) culture.

Regional planning is more entrenched here than anywhere else in Canada or US.

Planning 4 Climate Change



Finding 1.

There is no concise frame to bound and ground this work.

"80% to 80% by 50"

Planning 4 Climate Change

Block Scale

*Finding 2
Models must
work simul-
taneously at
Block, District,
and Regional
scales.*

ELEMENTS OF NEIGHBORHOOD [Open Space](#) [Housing](#) [Commercial](#) [Industrial](#) [Civic](#) [Networks](#) [Streets](#)

ROSTER **Housing** **SELECT BY PLANNING TYPE:** Attached Detached Mixed

Code	Block ID	Address	Type	Size (ft)	Description
312.01	Block 4-1	1001-1005	House	10.8	Field of Dreams 2br: Attached two bedroom, one story dwelling for small family. Single family detached lots of approximately 1000 ft. without driveways.
312.02	Block 4-1	1006-1010	House	10.5	Field of Dreams 2.5br: Attached three bedroom, two story dwelling for small family. Single family detached lots of approximately 1000 ft. without driveways.
312.03	Block 4-1	1011-1015	House	12.1	Field of Dreams 3br: Attached three bedroom, two story dwelling for small family. Single family detached lots of approximately 1000 ft. without driveways.
312.04	Block 4-1	1016-1020	House	12.4	Cascadia: Mid-rise energy efficient affordable three bedroom dwelling for small single family households. Lots of approximately 1000 ft. with a central entry access.
312.05	Block 4-1	1021-1025	House	9.3	Champignon 2br: Three bedroom, two story dwelling for small family, approximately 900 ft. detached single family lots without driveways.
312.06	Block 4-1	1026-1030	House	12.5	Champignon Cottage: One or two story buildings, two story dwellings for small families, approximately 900 ft. detached lots with individual access.

ELEMENTS OF NEIGHBORHOOD [Open Space](#) [Housing](#) [Commercial](#) [Industrial](#) [Civic](#) [Networks](#)

DESCRIPTION

Planning **Attached** **planning lot: NWL Garage on Alley** **13.6** **ft**

Est. Service Rates

Residence	1
Business	1
Employment	0
F.A.R.	6.00
Net Density	13.6
Alt	—

Aerial View **Planning** **Key Photo**

ELEMENTS OF NEIGHBORHOOD [Open Space](#) [Housing](#) [Commercial](#) [Industrial](#) [Civic](#) [Streets](#)

DESCRIPTION

Housing **Attached** **planning lot: Bungalow** **25.0** **ft**

Est. Service Rates

Residence	4
Business	1
Employment	0
F.A.R.	0.43
Net Density	25.0
Alt	—

Aerial View **Description** **Aerial Photo**

ELEMENTS OF NEIGHBORHOOD
A visual database of city building blocks

OPEN SPACES
HOUSING
COMMERCIAL
INDUSTRIAL
CIVIC
STREETS

Planning 4 Climate Change

Finding 2
Models must work simultaneously at Block, District, and Regional scales.

District Scale

GROWTH RESIDENTIAL



Growth areas include the greenfield and infill development that will provide places to live and work outside of designated nodes and corridors as the city grows. This "urban fabric" is comprised of many uses, including residential, commercial, and industrial functions.

Patterns

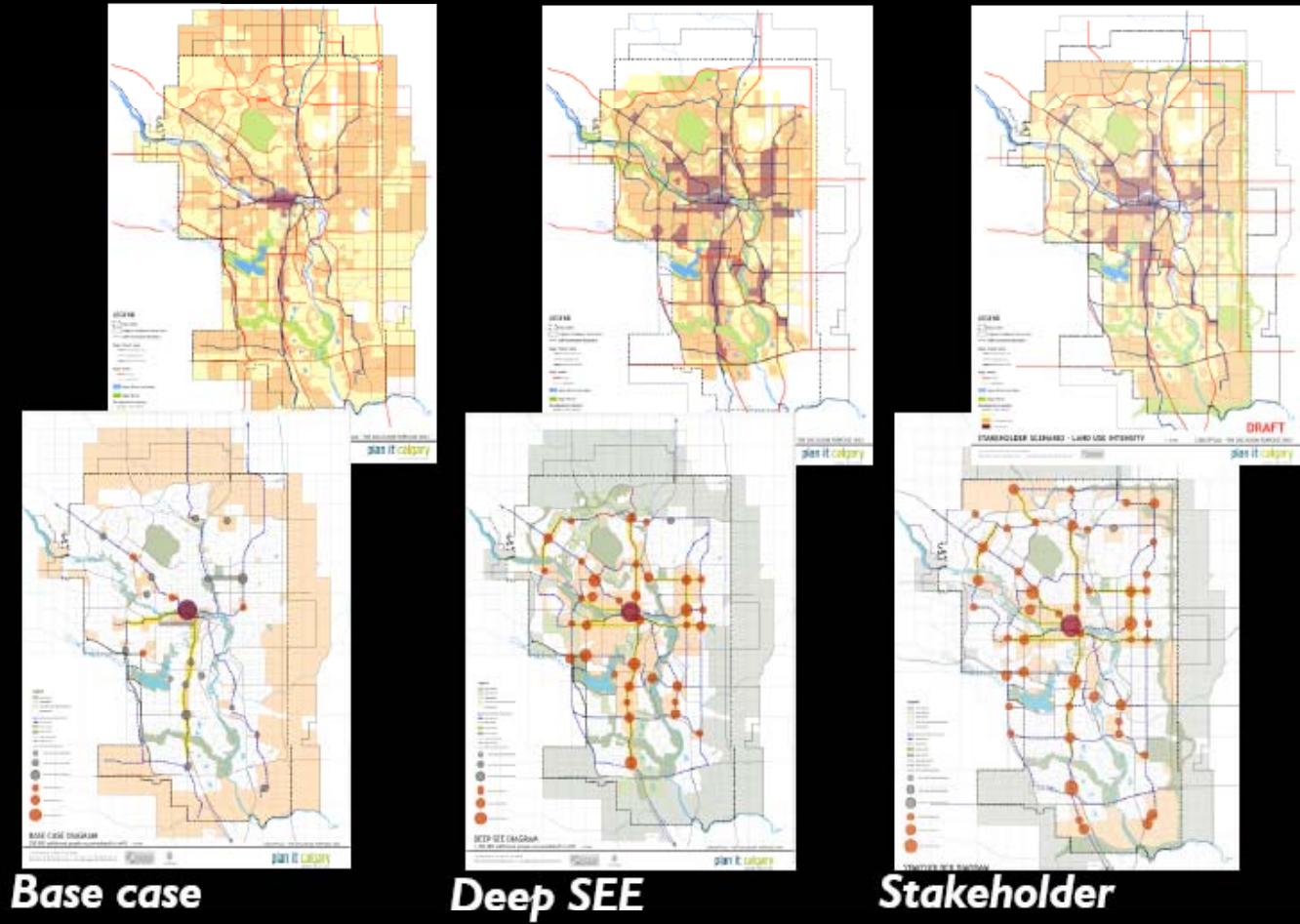
	close in view	contextual view	Assumed range of PEOPLE / ha (GROSS)	Assumed range of JOBS / ha (GROSS)
High Density Residential	 wellesley, inc	 wellesley, inc	<i>Mix of attached and multi-family development, sometimes including mixed use commercial. Additional commercial uses accommodated along major roads.</i>	175 250 15 35
Medium Density Residential	 concord, massachusetts	 concord, massachusetts	<i>Mix of single family, attached and multi-family development. Commercial uses often accommodated along major roads.</i>	50 100 10 20
Low Density Residential	 longmont, colorado	 longmont, colorado	<i>Mainly single family and low density attached development with minimal multi-family units and small commercial areas.</i>	25 50 0 10

Planning 4 Climate Change

Regional Scale

Finding 2

Models must work simultaneously at Block, District, and Regional scales.



Planning 4 Climate Change

Building type / design assumptions



Energy / Carbon consequences



Water demand consequences



LAND USE

Residential Land Area:	13.2 ha (67%)
Commercial Land Area:	0.7 ha (3%)
Institutional Land Area:	0.0 ha (0%)
Open Space Land Area:	1.6 ha (9%)
Mixed Use Land Area:	0.0 ha (0%)

Dwelling Units: 361
Retail Space: 1572 m²
Office Space: 0 m²



ENERGY

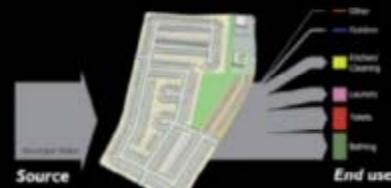
Single use buildings are organized on site according to conventional curvilinear street patterns with no attention to solar orientation. Buildings are designed to meet local building codes, but include no additional measures for energy efficiency. All energy consumed on site is considered to come from non-renewable sources, specifically natural gas and electricity generated through the burning of fossil fuels.

Total Energy Use per 100 m²: 33,333 kWh
Percent Renewables: 0%
Carbon per 100 m²: 6,224 kg



WATER

Low density single use buildings are designed to meet local building codes, and include no additional measures for water conservation. Landscaping does not consider local climatic conditions and requires additional irrigation during the summer. All water, including outdoor use, is considered to come from the municipal supply of potable water. Once used, all water is directed to the municipal sanitary sewer system.



Finding 3

Models must account for many variables without getting bogged down.

“Truth” may not be possible. Intelligent guidance for policy makers and education for citizens is.

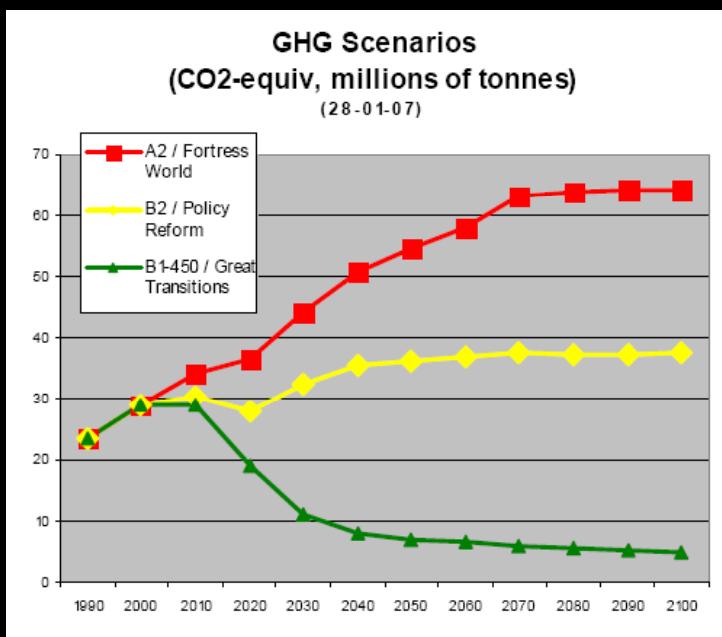
Planning 4 Climate Change



Finding 4.

Models must address the relationship between urban form and urban management.

Planning 4 Climate Change



Finding 5

Visualization tools must be an integral part of models. Data alone cannot provide a useful guide for citizens and policy makers.

Data with form can.



Planning 4 Climate Change

Framework 1: *Bending the trend lines.*

Start with existing negative trends, understand them, then bend the lines in a more positive direction. Represents the dominant paradigm today.

Example: *Growing Cooler*

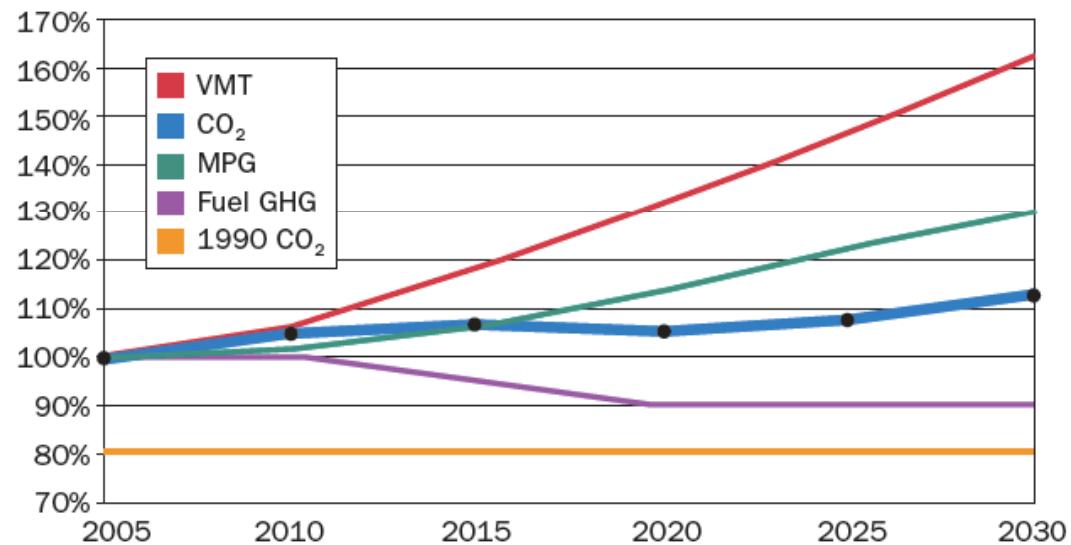
Pro:

Well supported methodology.

Con:

Based on existing behaviors, thus difficult to predict changed behaviors.

FIGURE 2
Projected Growth in CO₂ Emissions from Cars and Light Trucks Assuming Stringent Nationwide Vehicle and Fuel Standards



Source: Ewing et al. (2007)

NOTE: Projected growth with Senate CAFE levels—new passenger vehicle fuel economy of 35 mpg in 2020 and California low-carbon fuel standard of -10% in 2020 applied nationally.

Planning 4 Climate Change

Framework 2: Inherent Capacity.

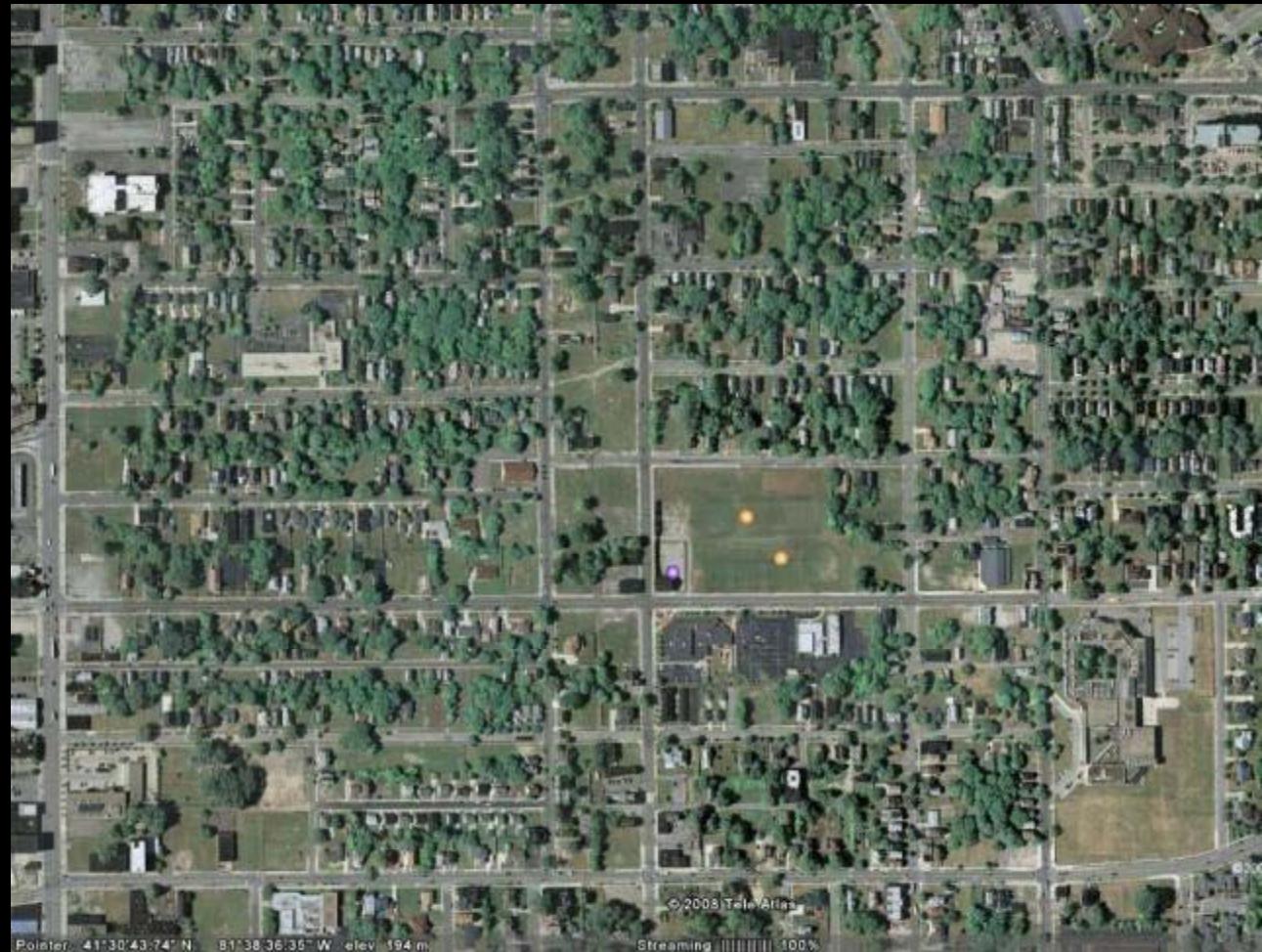
Start with an assessment of the latent capacity of the urban matrix and model strategies to maximize that capacity. Example: Cleveland.

Pro:

Shows better potential results.

Con:

Absent precedents, benefits shown are speculative.



Planning 4 Climate Change

Framework 2: Inherent Capacity.

Example: Vancouver BC. Sustainability by Design Project. Moving From 2 to 4 million people with less carbon.



Sustainability x Design

Regional Vision



SUSTAINABILITY principles

1 JOBS

Job sites located within compact, walkable areas to reduce time spent traveling to work.

CORE

CORRIDORS

CORRIDORS 2

High density commercial and residential corridors. Encourage growth along transit nodes.

3 WALKABILITY

Interconnected street systems that encourage walking and the reduction of car use.

WALKABILITY

GREEN SPACE

GREEN SPACE 4

Green spaces provide recreation opportunities and connect people with natural systems.

5 INFRASTRUCTURE

Integrating natural, economic, and infrastructure needs and environmental impacts.

INFRASTRUCTURE

HOUSING

HOUSING 6

A range of housing types and affordabilities of differing economic situations to live in the same neighbourhood and have access to the same

Planning 4 Climate Change

Framework 3: The City as Machine for Carbon Mitigation.

Start with the existing urban matrix but model dramatic changes to the way infrastructure and buildings would interact.

Pro:

Capable of showing 80% reductions in CO₂ using known technologies.

Con:

Would require huge urban development paradigm shift.

There is one precedent.



Planning 4 Climate Change

Framework 3: The City as Machine for Carbon Mitigation.

Start with the existing urban matrix but model dramatic changes to the way infrastructure and buildings would interact.

Precedent: “Futurama” General Motors Pavilion. 1939 NY Worlds Fair.

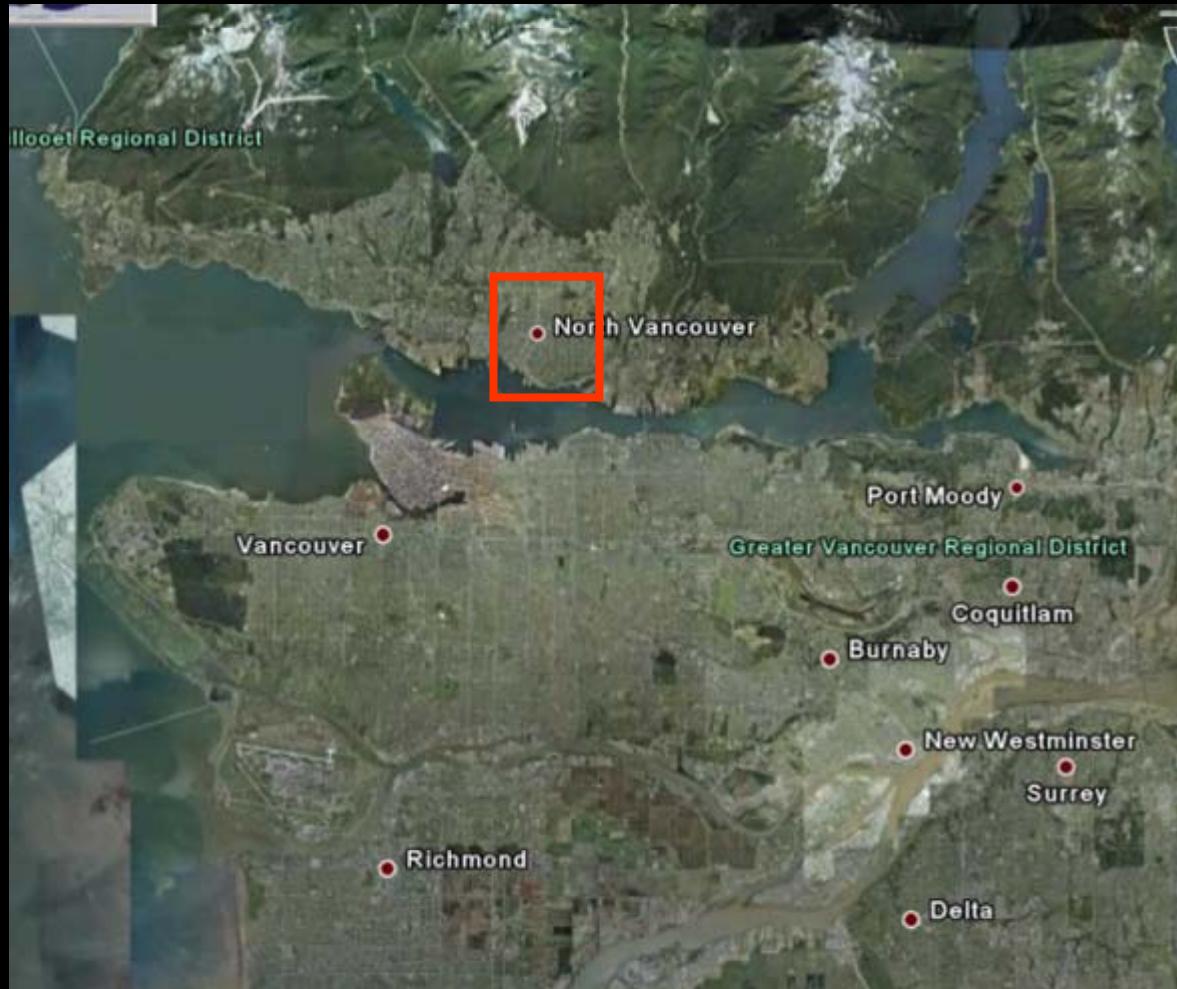


Planning 4 Climate Change

Greenhouse Gas case study:

Sustainability x Design City of North Vancouver.

100 Year Sustainability Vision.



Planning 4 Climate Change

Greenhouse Gas case study:

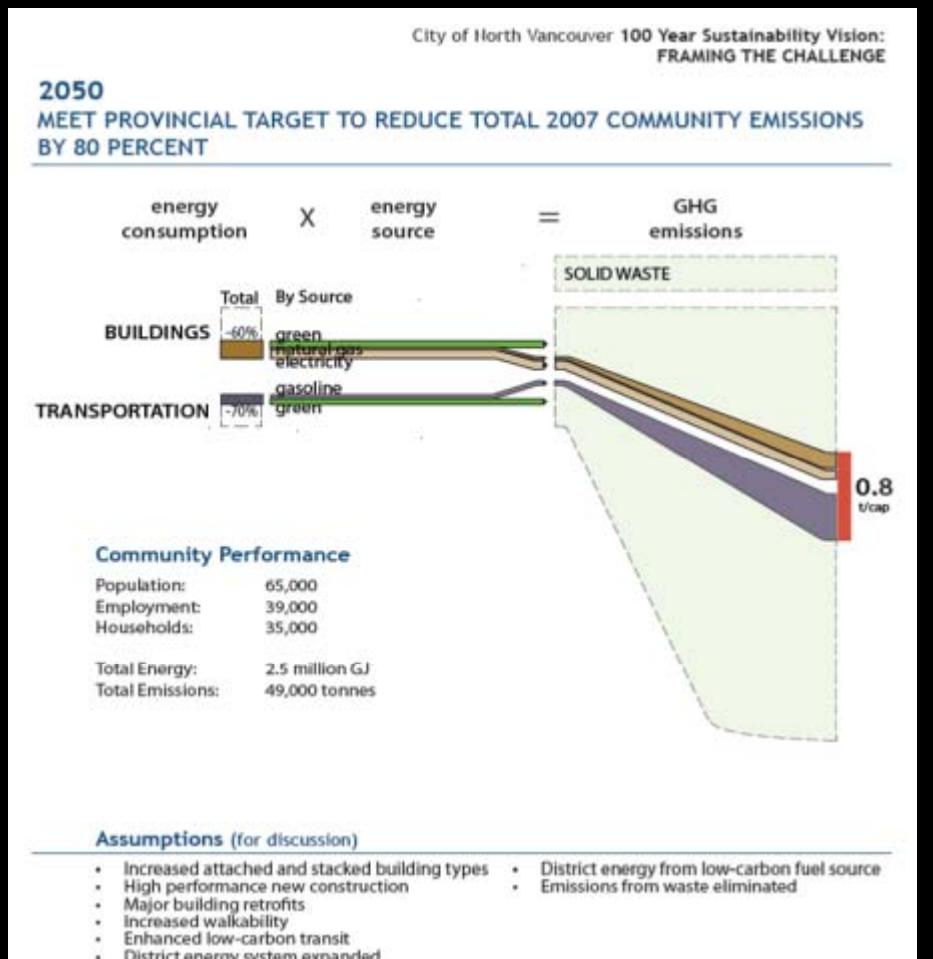
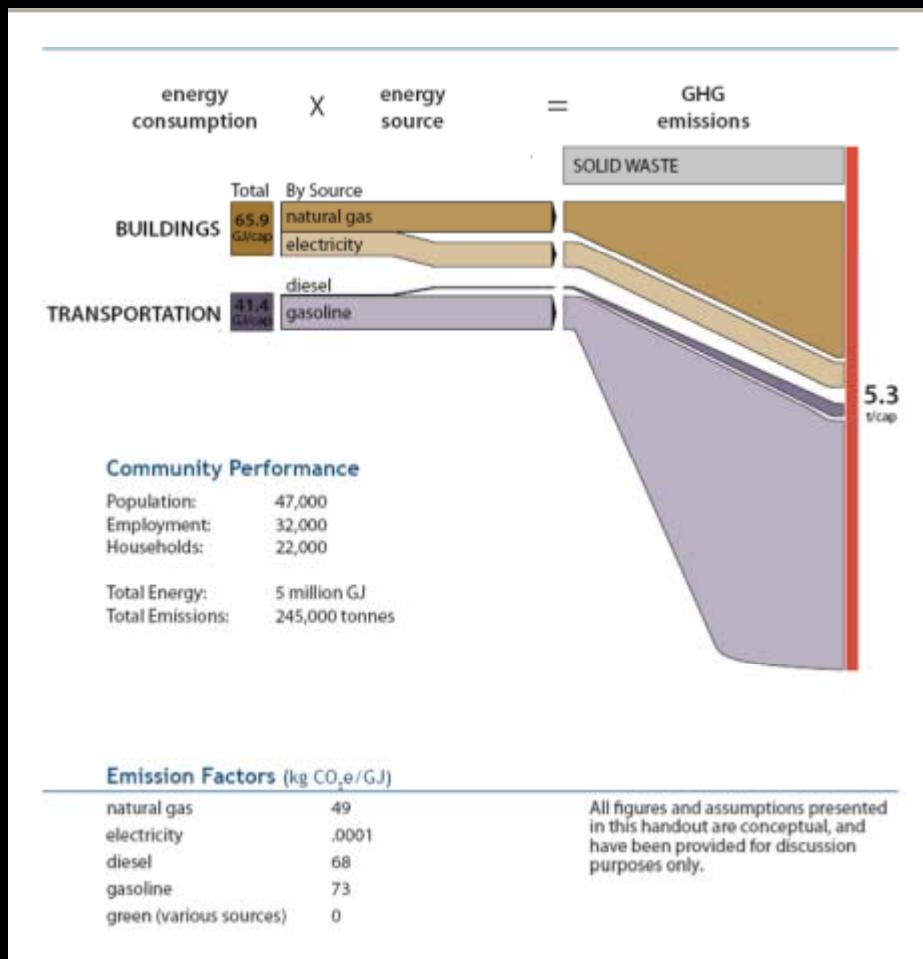
Sustainability x Design City of North Vancouver.

100 Year Sustainability Vision.



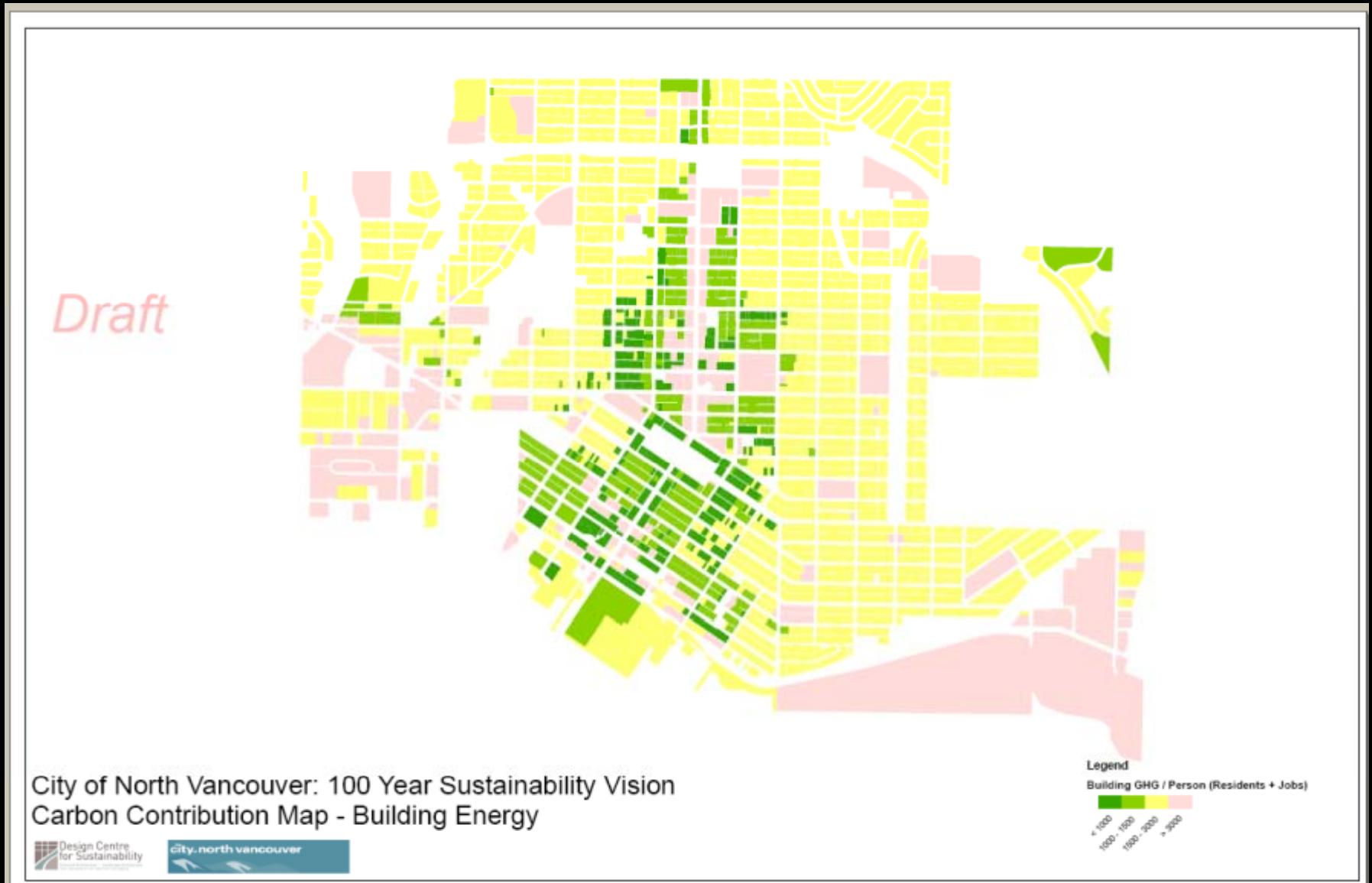
Planning 4 Climate Change

Greenhouse Gas case study:



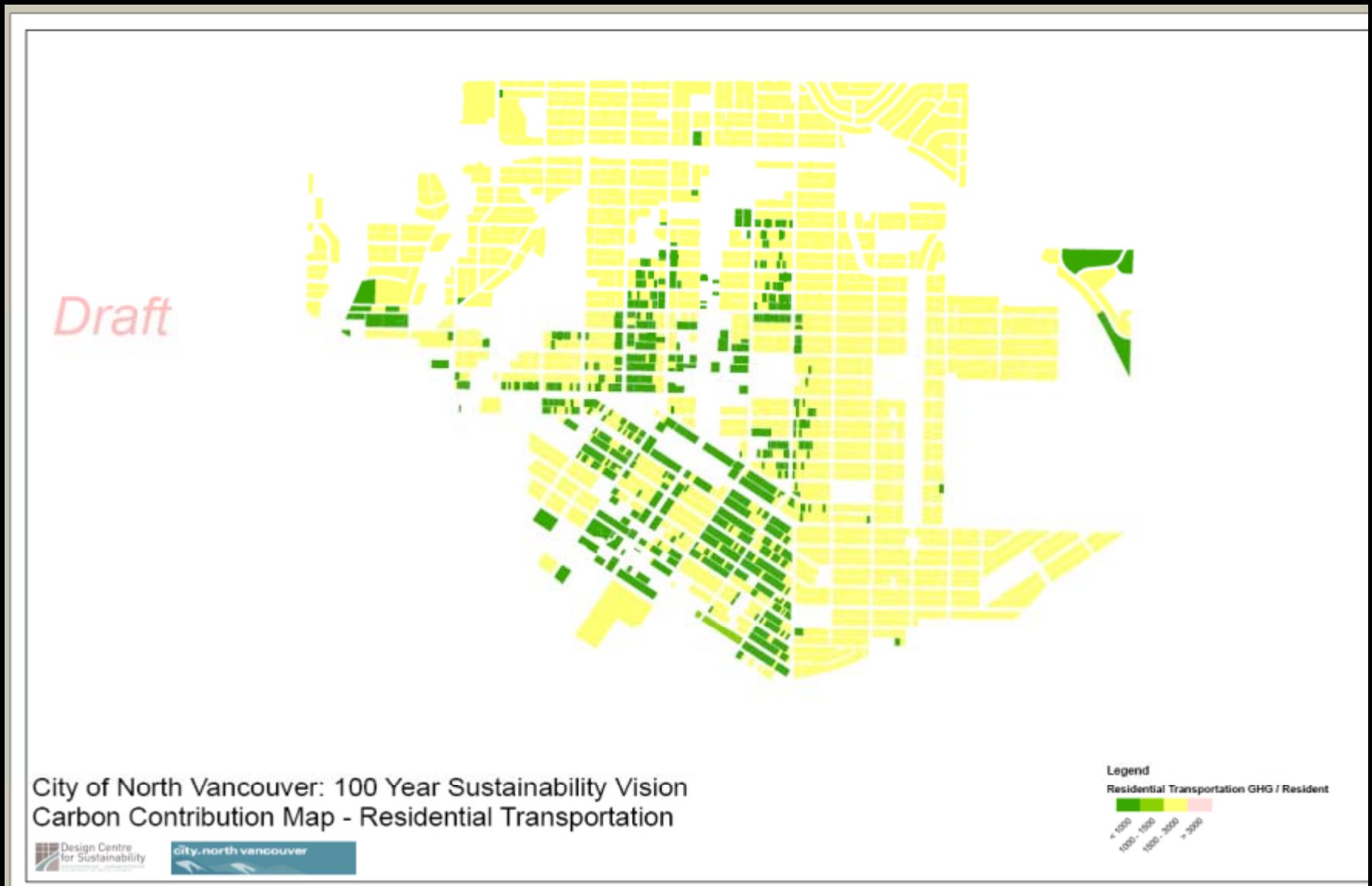
Planning 4 Climate Change

Greenhouse Gas case study:



Planning 4 Climate Change

Greenhouse Gas case study:



Planning 4 Climate Change

Greenhouse Gas case study:

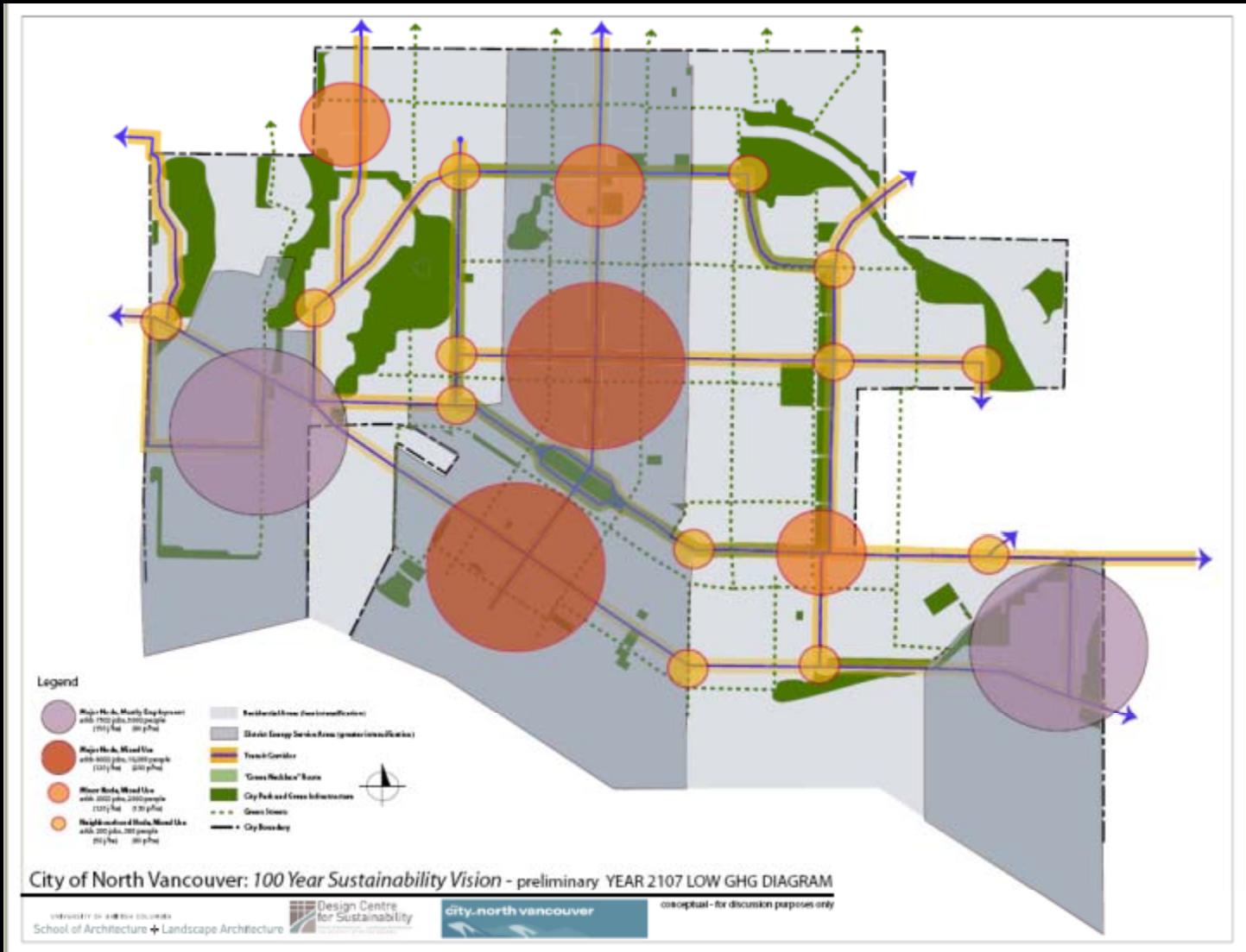
Sustainability x Design City of North Vancouver.

100 Year Sustainability Vision.



Planning 4 Climate Change

Greenhouse Gas case study:



Planning 4 Climate Change

Greenhouse Gas case study:

Sustainability x Design City of North Vancouver.

100 Year Sustainability Vision.



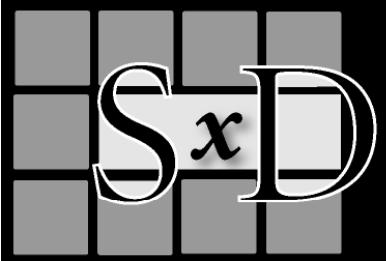
Planning 4 Climate Change

Greenhouse Gas case study:

Sustainability x Design City of North Vancouver.

100 Year Sustainability Vision.





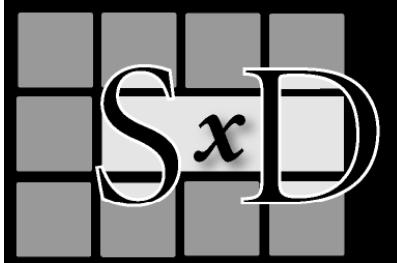
Sustainability *by* Design

City of North Vancouver
100 Year Sustainability Vision

Two types of
urban
landscapes:

Corridors

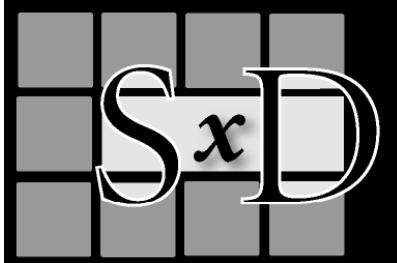




Sustainability by Design

City of North Vancouver
100 Year Sustainability Vision

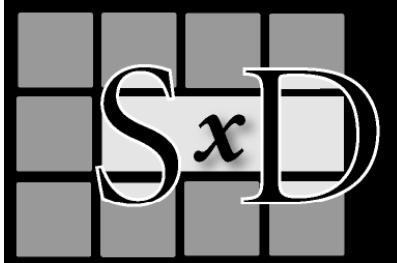




Sustainability by Design

City of North Vancouver
100 Year Sustainability Vision

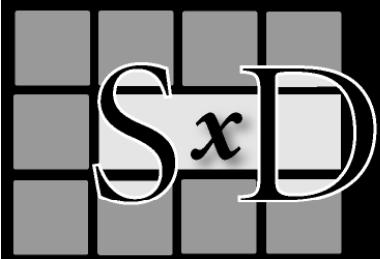




Sustainability *by* Design

City of North Vancouver
100 Year Sustainability Vision





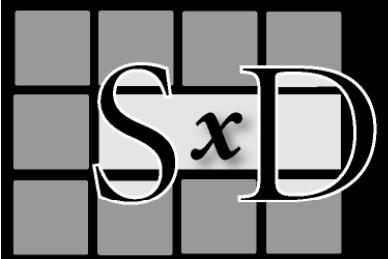
Sustainability *by* Design

City of North Vancouver
100 Year Sustainability Vision

Two types of
urban landscapes:

**The Stuff in
Between
Corridors**





Sustainability *by* Design

City of North Vancouver
100 Year Sustainability Vision

Two types of
urban landscapes:

**The Stuff in
Between
Corridors**



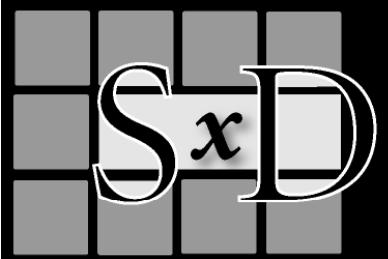


Sustainability *by Design*

City of North Vancouver
100 Year Sustainability Vision

Existing energy
use per capita.
Transportation
and building
conditioning





Sustainability *by Design*

City of North Vancouver
100 Year Sustainability Vision

Proposed energy
use per capita.
Transportation
and building
conditioning

