

Local Responses to Climate Change: The North American Experience

**Euskal Hiria
Vitoria**

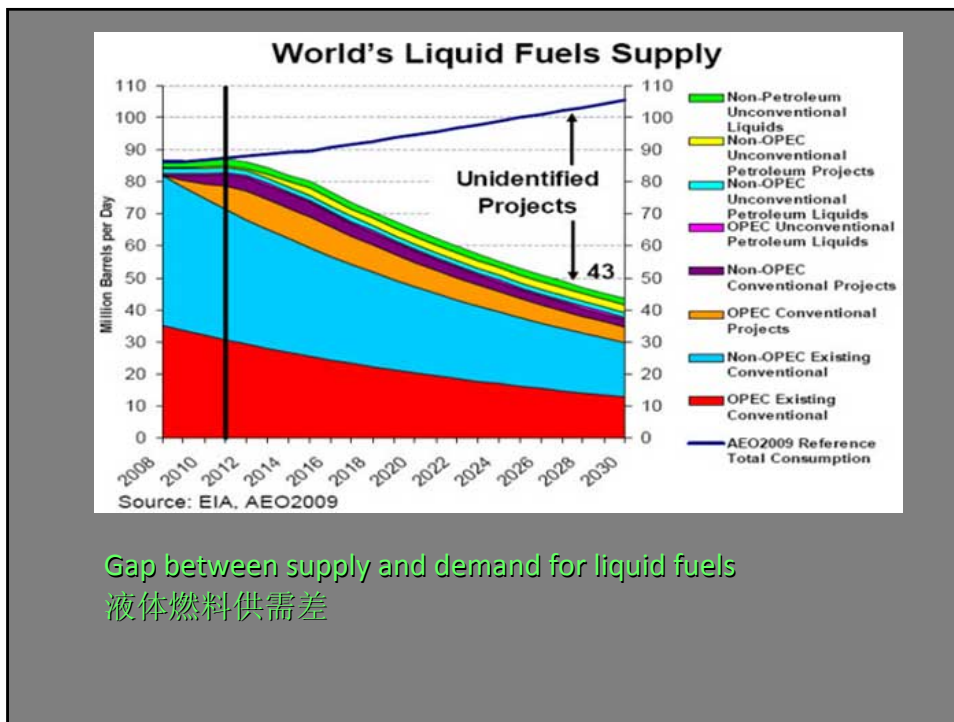
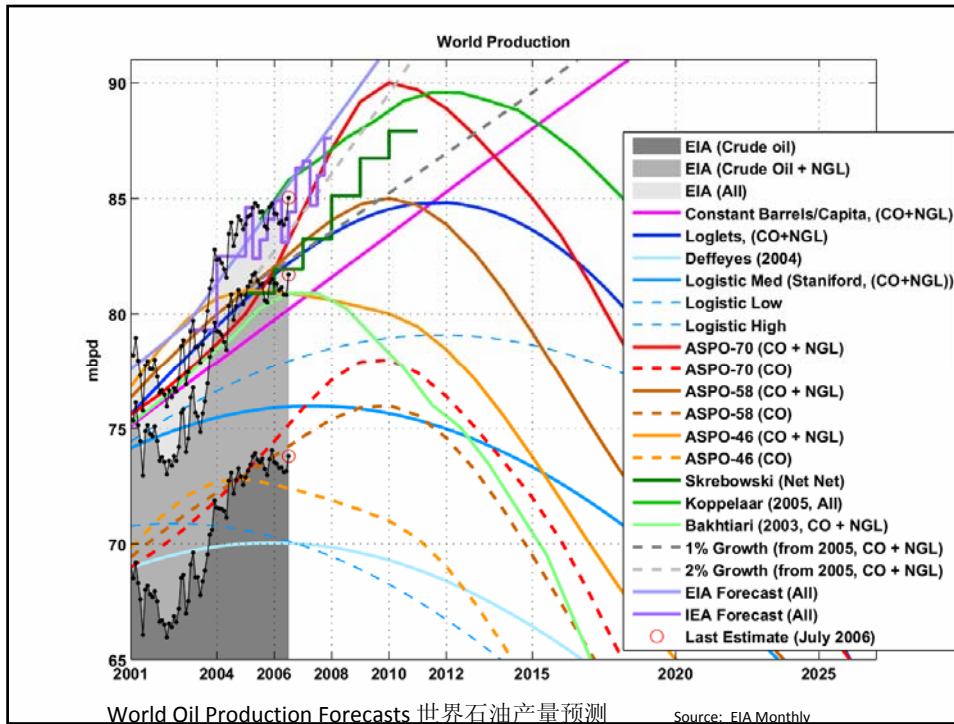
Gary Hack
Professor of Urban Design
University of Pennsylvania/MIT

THREE IMPORTANT FORCES WILL SHAPE URBAN DEVELOPMENT IN THE COMING DECADES:

Shortages and increased costs of fossil fuels

National standards forcing reductions of
greenhouse gas emissions

Climate change resulting from
accumulations of greenhouse gases

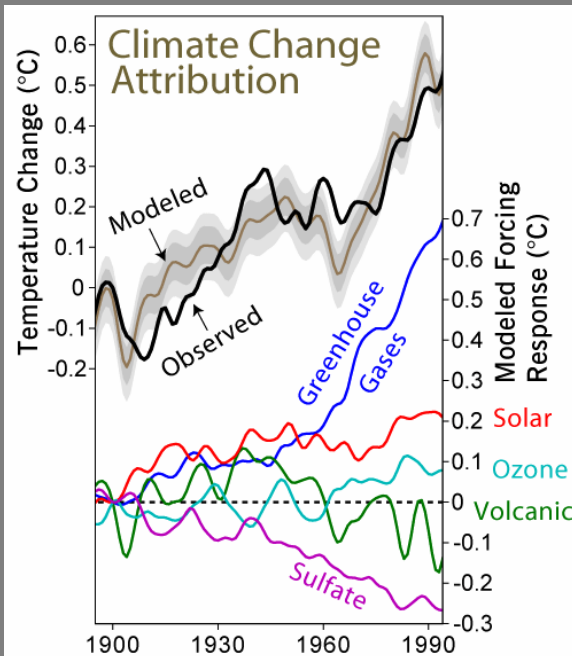




Alberta Tar Sands – Difficult to Extract, Devastates Environment
 阿尔伯塔油砂：难以提炼，危害环境



Deepwater Wells – Danger to Environment
 深海油田：对环境的威胁

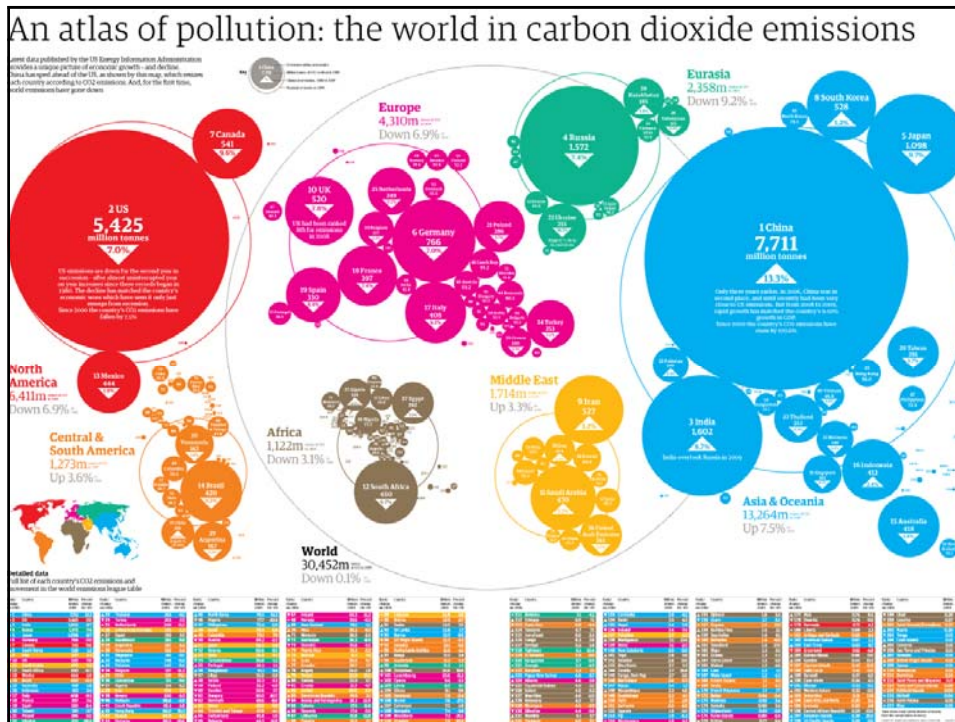


Greenhouse Gases
 and Climate Change

Fundamental Challenge of the Next Several Decades is Dealing with Carbon Footprint of Cities

Need to take action on three fronts simultaneously:

1. Mitigating effects of climate change
2. Adapting existing cities to reduce emissions
3. Planning new development to minimize carbon footprint



CARBON EMISSIONS FROM SELECT CITIES



Emissions in European Cities are lower than US or Asian Cities

IMPACTS OF GLOBAL WARMING ON CLIMATES

SEA LEVEL RISE

INCREASED HEAT ISLANDS IN CITIES

3.5-7 degree F rise in downtown temperatures

GREATER EXTREMES

Record high temperatures *and* record low temperatures

Higher rainfall amounts *and* prolonged droughts

Record snowfalls *and* snow free years

INCREASED FREQUENCY OF HURRICANES

SHIFTING PLANT ECOLOGIES



Australia Floods & Droughts
澳大利亚灾情和旱情

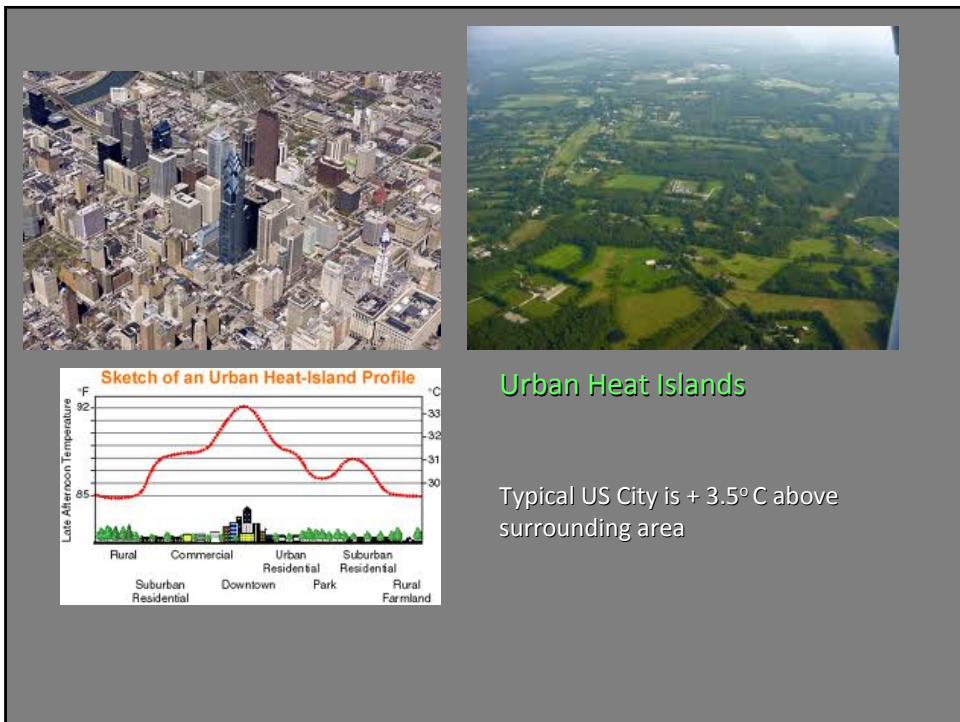


BOSTON TODAY



BOSTON WITH
3 M SEA LEVEL RISE
(Hurricane surge)

© 2030, Inc.
Google



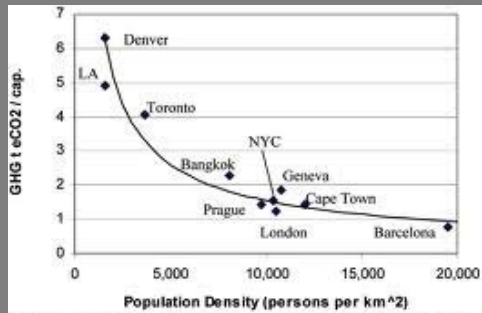
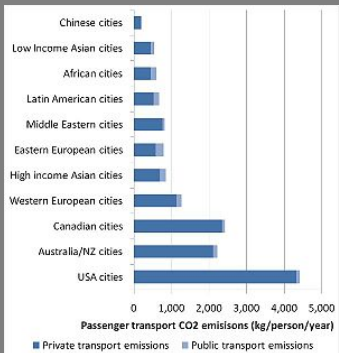
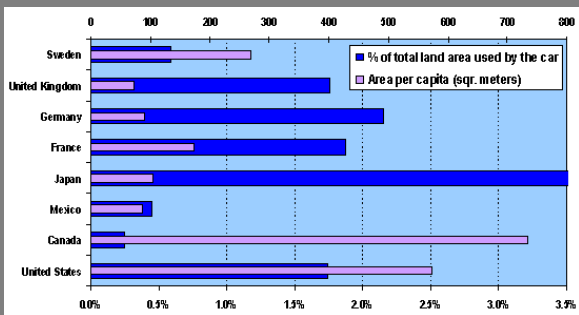


FIGURE 3. GHG emissions from ground transportation fuels are inversely related to population density.



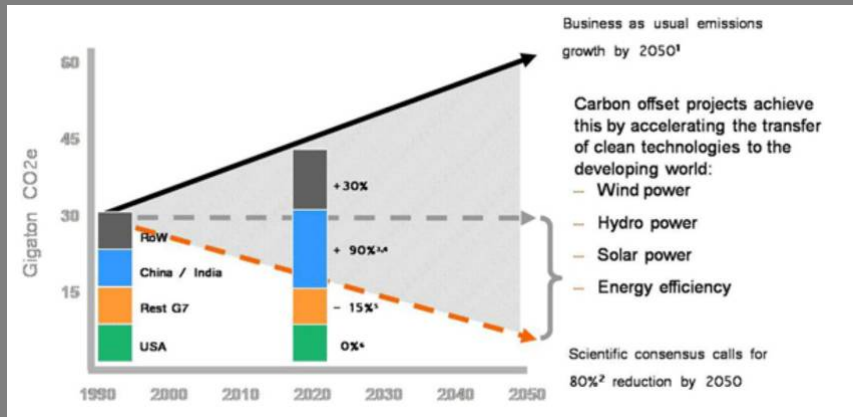
Transportation and Carbon Emissions

APPROACHES TO GREENHOUSE GAS REDUCTIONS:

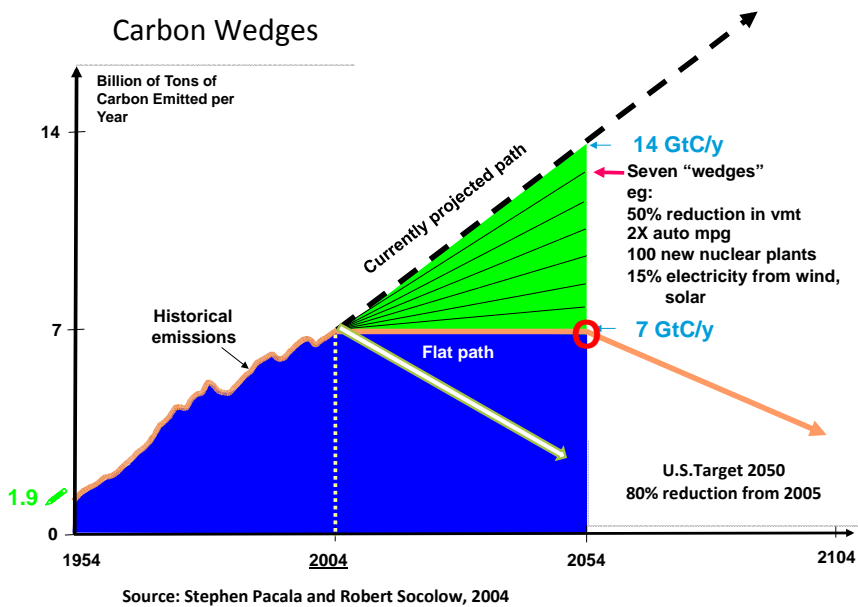
US Absolute reductions of emissions
 -17% by 2020 -80% by 2050
 Mix of national, state and local actions

EU Absolute reductions of emissions
 -20% by 2020
 Carbon trading
 Largely EU and national actions

WORLD CARBON REDUCTION TARGETS



Carbon Wedges



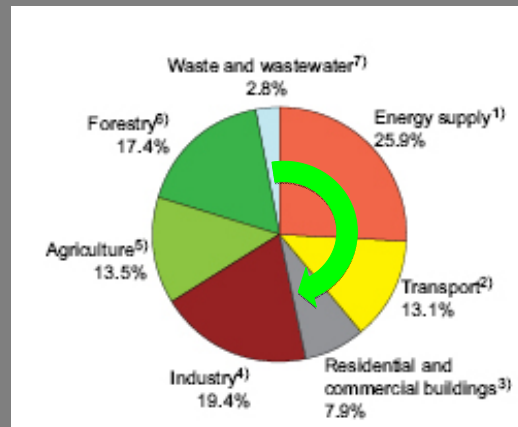
**POSSIBLE WEDGES NEEDED TO MEET US
COPENHAGEN GOALS:**

1. Doubling efficiency of all cars from 30 to 60 mpg
2. Cutting by 50% miles driven by cars
3. Using best available technology on all new buildings
4. Raising efficiency of electric plants by 50%
5. Constructing 100 new nuclear power stations
6. Covering 3% of US land area with wind farms
7. Creating equivalent of 100km x 200km in solar arrays

8. Increasing densities of cities by 40%
9. Sequestering CO₂ equivalent of all oil extracted
10. Replacing coal burning plants with natural gas plants
11. Using conservation tillage for all agriculture
12. Doubling non-carbon alternative energy sources

Rough estimates based on Pacala and Socolow

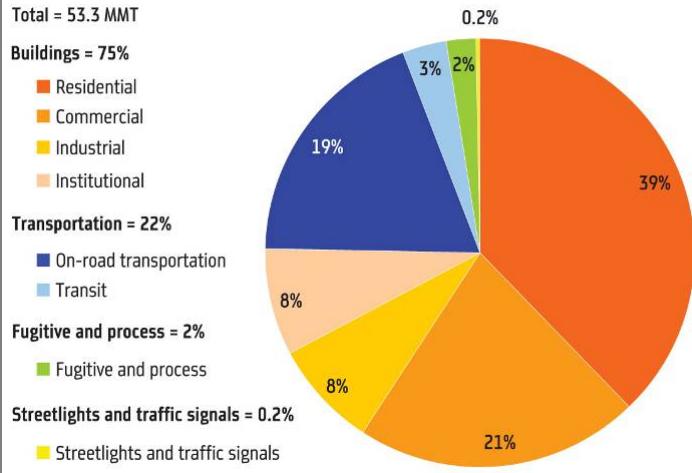
US Sources of GHG Emissions



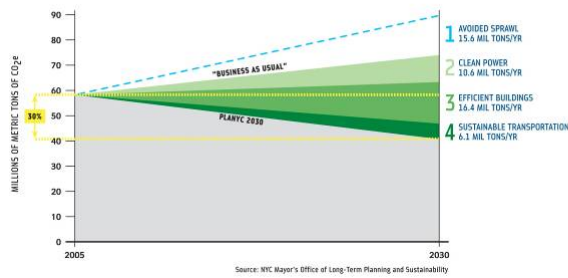
NEW YORK SUSTAINABILITY STRATEGY



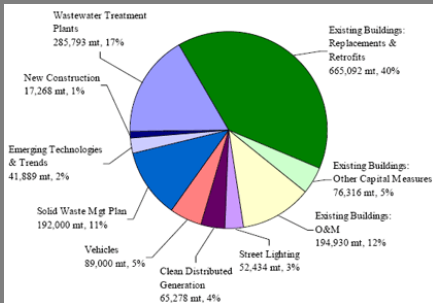
Figure 2: 2008 Citywide CO₂e Emissions by Sector



Projected Impacts of Our Greenhouse Gas Reduction Strategies



The result will be an annual reduction of 33.6 million metric tons—and an additional 15.6 million metric tons avoided by accommodating 900,000 people in New York City



New York City Sustainability Strategy

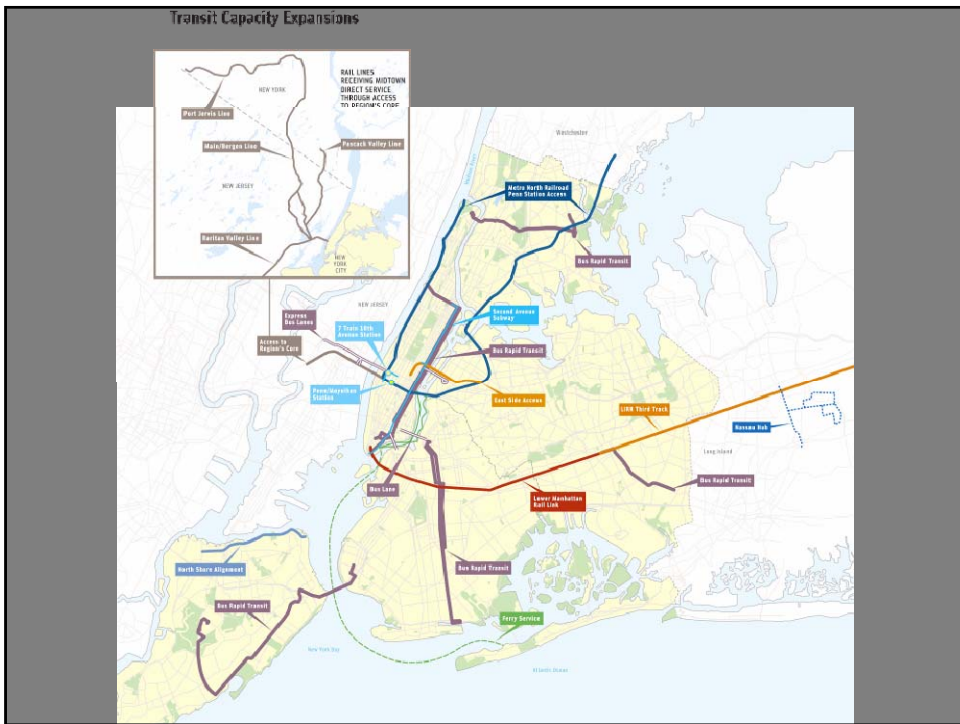


MORE SUSTAINABLE TRANSPORT

NEW YORK CITY STREET PRIORITIES

1. Pedestrians
2. Cyclists
3. Buses
4. Automobiles





GREEN INFRASTRUCTURE

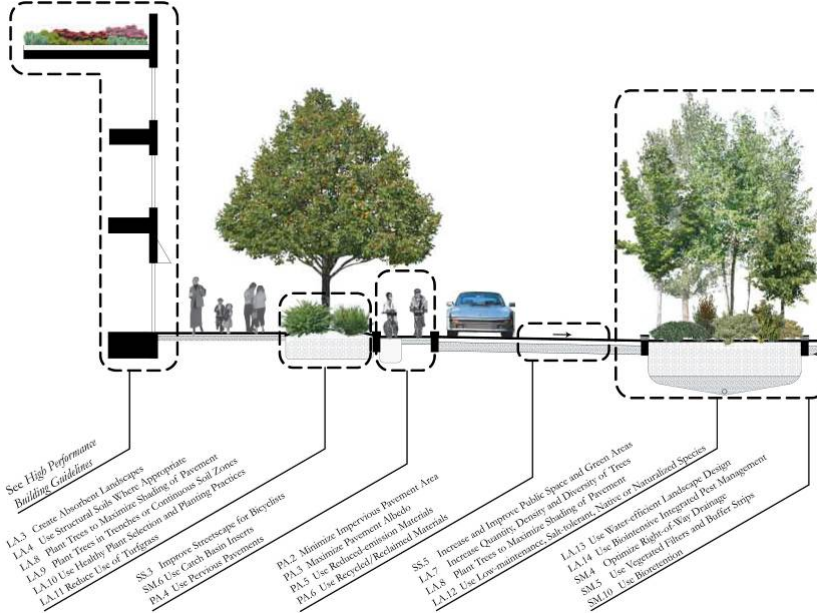
Table 1: Green Infrastructure Opportunities, Strategies, and Technologies (citywide)

Land Use	% of Combined Sewer Watershed	Potential Strategies and Technologies
New development and redevelopment	5.0%	Stormwater performance standard for new and expanded development Rooftop detention; green roofs; subsurface detention and infiltration
Streets and sidewalks	26.6%	Integrate stormwater management into capital program in partnership with DOT, DDC, and DPR Enlist Business Improvement Districts and other community partners Create performance standard for sidewalk reconstruction Swales; street trees; Greenstreets; permeable pavement
Multi-family residential complexes	3.4%	Integrate stormwater management into capital program in partnership with NYCHA and HPD Rooftop detention; green roofs; subsurface detention and infiltration; rain barrels or cisterns; rain gardens; swales; street trees; Greenstreets; permeable pavement
Parking lots	0.5%	Sewer charge for stormwater DCP zoning amendments Continue demonstration projects in partnership with MTA and DOT Swales; permeable pavement; engineered wetlands
Parks	11.6%	Partner with DPR to integrate green infrastructure into capital program Continue demonstration projects in partnership with DPR Swales; permeable pavement; engineered wetlands
Schools	1.9%	Integrate stormwater management into capital program in partnership with DOE Rooftop detention; green roofs; subsurface detention and infiltration
Vacant lots	1.9%	Grant programs Potential sewer charge for stormwater Rain gardens; green gardens
Other public properties	1.1%	Integrate stormwater management into capital programs Rooftop detention; green roofs; subsurface detention and infiltration; rain barrels; permeable pavement
Other existing development	48.0%	Green roof tax credit Sewer charges for stormwater Continue demonstration projects and data collection Rooftop detention; green roofs; subsurface detention and infiltration; rain barrels or cisterns; rain gardens; swales; street trees; Greenstreets; permeable pavement

Figure 20: Pilot - Model High Density Housing Retrofit

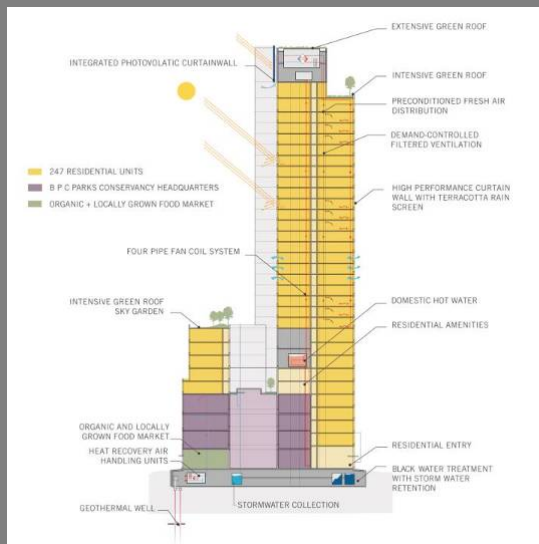


INTEGRATION OF BEST MANAGEMENT PRACTICES 最佳管理实践整合



High Performance Buildings

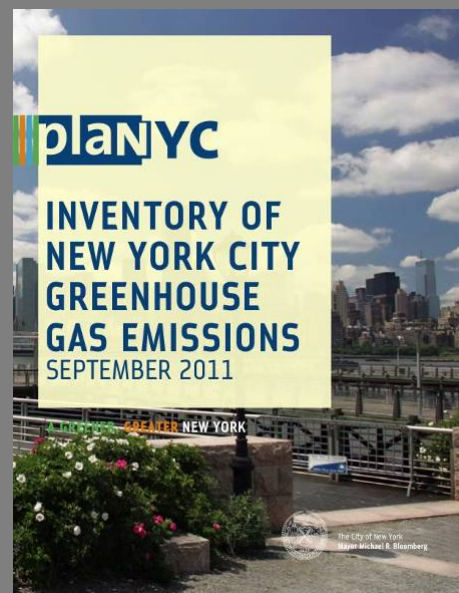
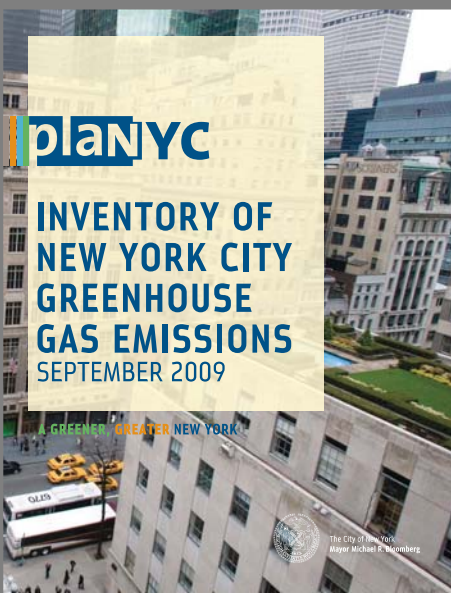
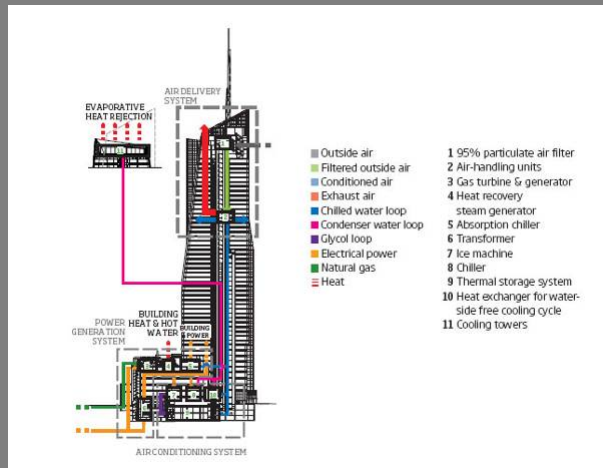
Visionaire





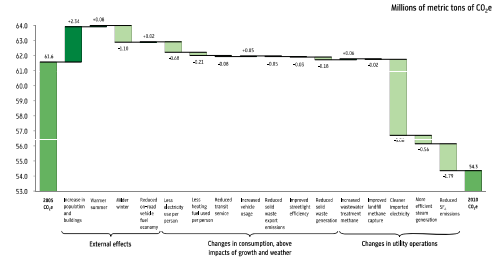
High Performance Buildings

Bank of America Tower



CITY CARBON FOOTPRINT

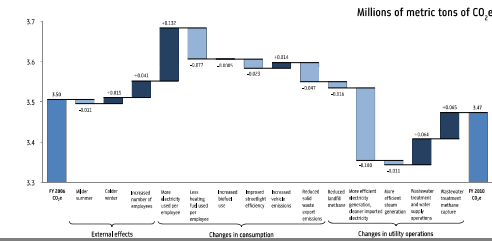
New York City's carbon footprint decreased 11.7% from 2005 to 2010, due to milder weather, reduced electricity use, reduced heating fuel use, reduced solid waste generation, new power plants and cleaner imported electricity, more efficient steam generation, and reduced SF₆ emissions



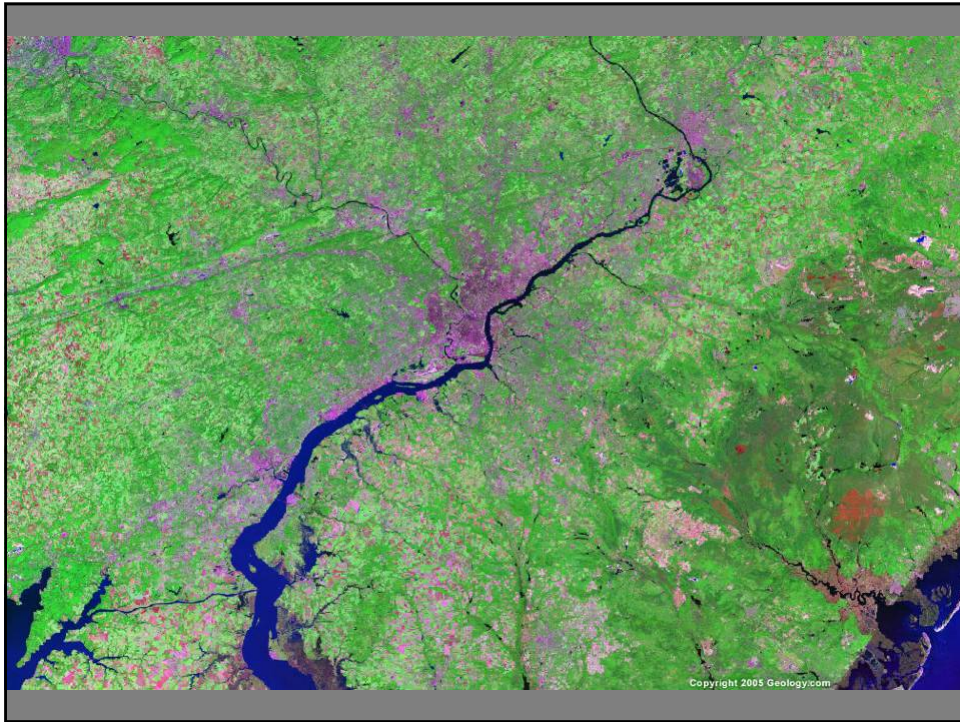
FY 2006 to FY 2010 Changes in New York City Government Greenhouse Gas Footprint

CITY GOV CARBON FOOTPRINT

From FY 2006 to FY 2010, the City government's carbon footprint decreased 0.9%. Combating an increase in GHG from electricity use and wastewater treatment and water supply operations, a net decrease resulted from more efficient electricity and steam generation, less heating oil used per employee, reduced solid waste export emissions, improved streetlight efficiency, and reduced landfill methane



PHILADELPHIA SUSTAINABILITY STRATEGY



GREENWORKS
PHILADELPHIA

Mayor Michael A. Nutter
CITY OF PHILADELPHIA

ENERGY ENVIRONMENT EQUITY ECONOMY ENGAGEMENT

Green City Clean Waters

The City of Philadelphia's Program for Combined Sewer Overflow Control
A Long Term Control Plan Update
Summary Report

Submitted by the Philadelphia Water Department
September 1, 2009

Philadelphia Sustainability Plans

The complex block contains the cover of a report. On the left, a grey vertical panel features the Greenworks Philadelphia logo, the Mayor's name, and the city's core values. The right panel has a light blue background with the title "Green City Clean Waters" in large green and blue text. Below the title is the subtitle and a small illustration of a city skyline with a waterfront park. At the bottom right, the text "Philadelphia Sustainability Plans" is written in green.



PHILADELPHIA GREENWORKS TARGETS 2015/25:

Energy

- 30% reduction of city government energy consumption
- 10% reduction of all building energy consumption
- 15% of housing stock retrofitted with insulation, air sealing, cool roofs
- 20% of all energy from alternative sources

Environment

- 20% reduction of greenhouse gas emissions
- 70% of all buildings and infrastructure in good repair
- 100% increase in number of green jobs

Equity

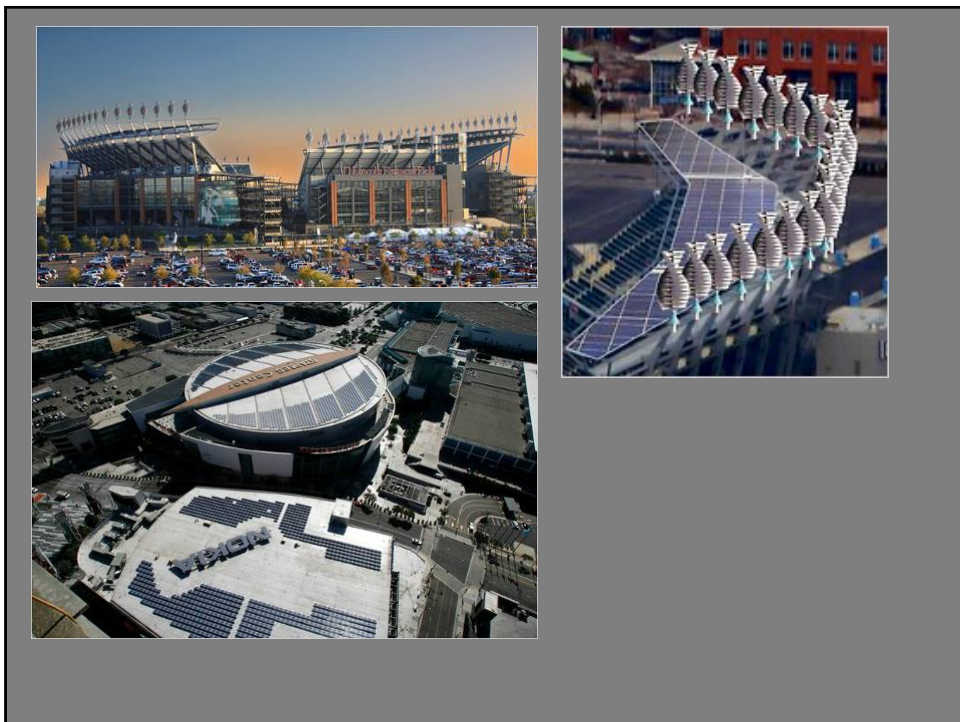
- Manage stormwater to meet Federal standards
- 75% of residents with 10 minutes of a park
- 75% of residents within 10 minutes of local food market or gardens
- 30% tree canopy over entire city (300,000 new trees)

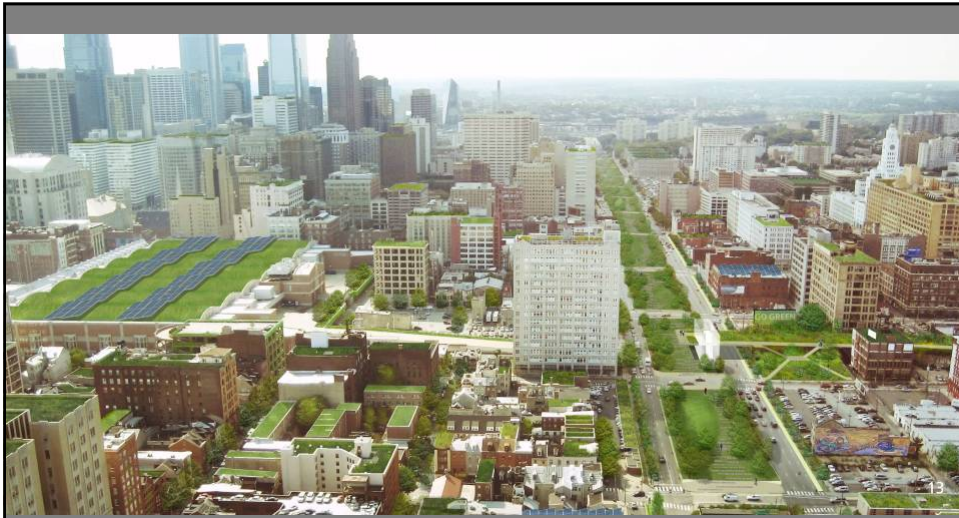
Economy

- 10% reduction of vehicle miles traveled
+ improved air quality to meet Federal standards
- 70% of solid wastes diverted from landfills

SUMMARY OF TARGETS

2008 BASELINE	2015 PROJECTION	GREENWORKS TARGET	GREENWORKS INITIATIVES WILL YIELD
TARGET 1: MUNICIPAL GOVERNMENT ENERGY USE			
3.64 trillion Btus	4.16 trillion Btus	30% < 2008=2.54 trillion Btus	1.42 trillion Btus saved in 2015
TARGET 2: CITYWIDE BUILDING ENERGY USE			
99.7 trillion Btus*	103 trillion Btus	10% < 2008=89.7 trillion Btus	12.9 trillion Btus saved in 2015
TARGET 3: RESIDENTIAL WEATHERIZATION			
3,500 projects	28,000 projects	15% of total housing=100,000 projects	72,000 additional projects by 2015
TARGET 4: ALTERNATIVE ENERGY			
0.34 million MWh	1.35 million MWh	20% of electricity=2.93 MWh	1.58 million MWh in 2015
TARGET 5: GREENHOUSE GAS EMISSIONS			
17.2 million tCO ₂ eq**	15.6 million tCO ₂ eq	20% < 1990=13.8 million tCO ₂ eq	1.77 million tCO ₂ eq in 2015
TARGET 6: AIR QUALITY ATTAINMENT			
20 "Unhealthy" AQI days	20 "Unhealthy" AQI days	2015 < 2008=2006 numbers	10 fewer "Unhealthy" AQI Days in 2015
TARGET 7: DIVERSION FROM LANDFILL			
1.56 million tons	1.56 million tons	70% diversion rate=890,000 million tons going to landfill	0.67 million tons diverted in 2015
TARGET 8: GREEN INFRASTRUCTURE			
51,000 pervious acres	51,000 pervious acres	60% of total surface=54,200 pervious surfaces	3200 additional pervious acres by 2015
TARGET 9: OUTDOOR AMENITIES			
10,300 green acres	10,300 green acres	75% of residents with access=10,800 green acres	500 additional green acres by 2015
TARGET 10: LOCAL FOOD			
230 gardens, markets	230 gardens, markets	75% of residents w/ access=316 gardens/farms/markets	86 additional gardens/farms/markets by 2015
TARGET 11: TREE CANOPY			
2.1 million trees	2.1 million trees	30% canopy by 2025=3.1 million trees	300,000 additional trees by 2015
TARGET 12: VEHICLE MILES TRAVELED			
6.40 million VMT***	6.91 million VMT	10% < 2005=5.76 million VMT	1.15 million fewer VMT in 2015
TARGET 13: STATE OF GOOD REPAIR			
73% of assets in SOGR	71% of assets in SOGR	80% in 2015	13% of assets raised to SOGR by 2015
TARGET 14: GREEN JOBS			
14,400 green jobs***	18,300 green jobs	Double 2005 by 2015=28,800 green jobs	10,500 additional green jobs by 2015

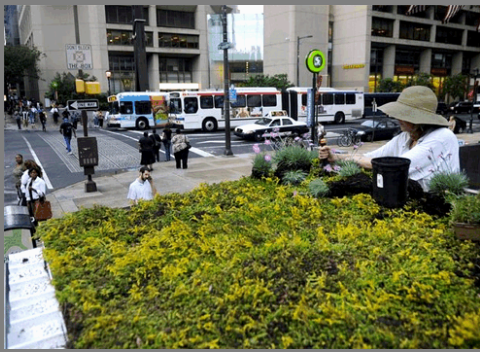




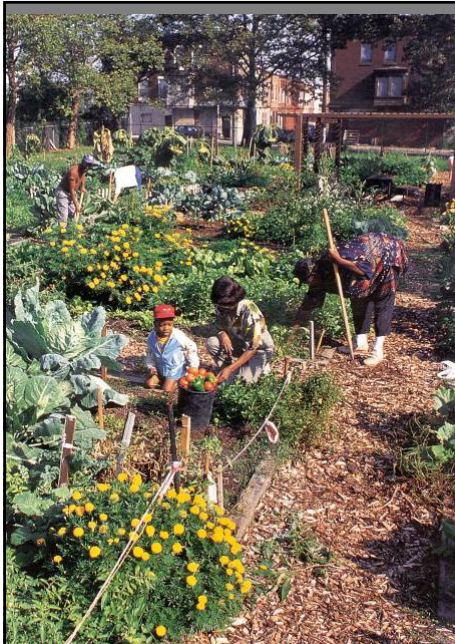
Philadelphia target: 40% pervious surfaces, holding first 1 inch of rainfall











Urban Agriculture on Vacant Lots



2010 PROGRESS REPORT



ENERGY ENVIRONMENT EQUITY ECONOMY ENGAGEMENT



CHICAGO CLIMATE ACTION PLAN




CHICAGO CLIMATE ACTION PLAN

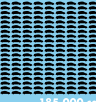
OUR CITY. OUR FUTURE.

KEY FACTS
AN ILLUSTRATION OF EMISSIONS REDUCTIONS

A reduction of one metric ton (one MT) of greenhouse gas emissions is equivalent to driving 2,300 fewer miles or removing almost 1/2 of a car from the road.

1 MTCO₂e reduction = 

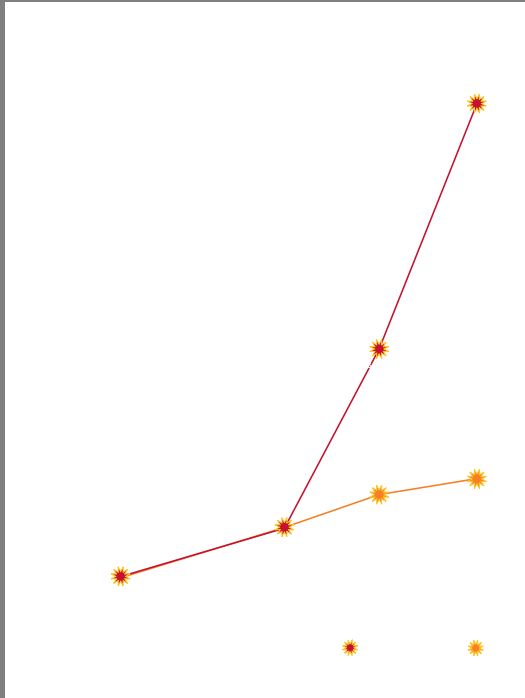
A reduction of one million metric tons (one MMT) of greenhouse gas is equivalent to removing nearly 185,000 cars from the road.

1 MMTCO₂e reduction =  = 185,000 cars
(Each icon in the above graphic represents 1,000 cars.)

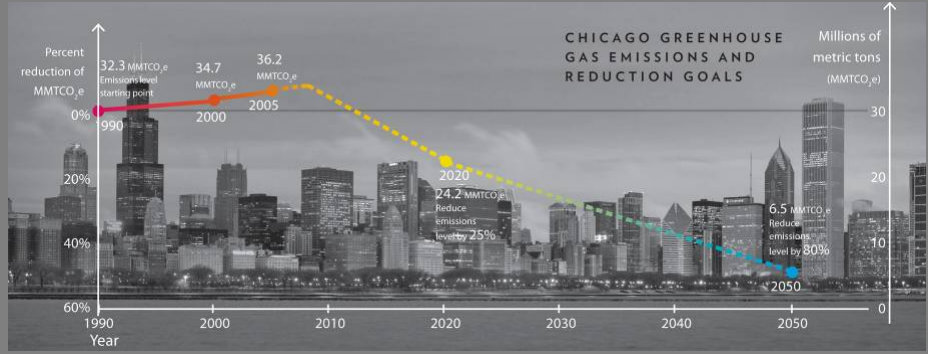
KEY FACTS
THE ANATOMY OF MMTCO₂e

MMTCO₂e
MMT = million metric tons

MMTCO₂e
CO₂e =
 the term for the quantity of any greenhouse gas, including carbon dioxide, methane and others, translated to CO₂ by weighting it by its relative global warming potential.



预测芝加哥每年超过 100华氏度 (37.7 ° C) 的天数



STRATEGY 1. ENERGY EFFICIENT BUILDINGS



Without global and local action, impacts on Chicago's weather could be dramatic.

Actions

1. Retrofit commercial and industrial buildings
2. Retrofit residential buildings
3. Trade in appliances
4. Conserve water
5. Update City energy code
6. Establish new guidelines for renovations
7. Cool with trees and green roofs
8. Take easy steps

For more information, see Chicago 2020 Mitigation and Adaptation Strategies chart on page 50.

STRATEGY 2. CLEAN & RENEWABLE ENERGY SOURCES



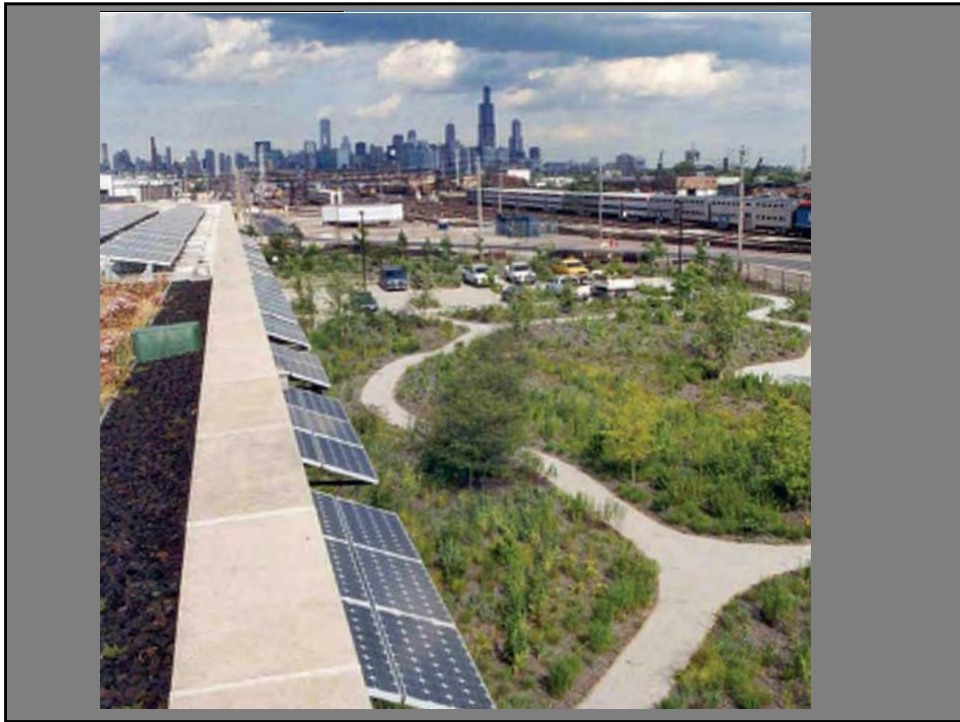
Electricity use, natural gas use and transportation are the main sources of Chicago's emissions that contribute to climate change.

Actions

1. Upgrade power plants
2. Improve power plant efficiency
3. Build renewable electricity
4. Increase distributed generation
5. Promote household renewable power

For more information, see Chicago 2020 Mitigation and Adaptation Strategies chart on page 50.





STRATEGY 3.
**IMPROVED
 TRANSPORTATION OPTIONS**



There is no single remedy, but rather many remedies with many benefits.

Actions

1. Invest more in transit
2. Expand transit incentives
3. Promote transit-oriented development
4. Make walking and biking easier
5. Car share and carpool
6. Improve fleet efficiency
7. Achieve higher fuel efficiency standards
8. Switch to cleaner fuels
9. Support intercity rail
10. Improve freight movement

For more information, see Chicago 2020 Mitigation and Adaptation Strategies chart on page 50.

STRATEGY 4.
**REDUCED WASTE &
 INDUSTRIAL POLLUTION**



While we reduce emissions, we must prepare for the changes already happening.

Actions

1. Reduce, reuse and recycle
2. Shift to alternative refrigerants
3. Capture stormwater on-site

For more information, see Chicago 2020 Mitigation and Adaptation Strategies chart on page 50.

STRATEGY 5. ADAPTATION

The benefits of early action will improve quality of life and position Chicago for continued prosperity.

Actions

1. Manage heat
2. Pursue innovative cooling
3. Protect air quality
4. Manage stormwater
5. Implement Green Urban Design
6. Preserve our plants and trees
7. Engage the public
8. Engage businesses
9. Plan for the future

For more information, see Chicago 2020 Mitigation and Adaptation Strategies chart on page 50.

战略5: 适应性行动

STRATEGY 5. ADAPTATION



LEADING BY EXAMPLE: THE CITY OF CHICAGO URBAN HEAT ISLAND POLICIES

Using advanced satellite imagery, the City of Chicago created a map that identifies hot spots in the city where urban heat island reduction strategies will have the greatest impact. The heat-shaped red field in this image falls over U.S. Cellular Field on Chicago's South Side. Over the last 15 years, Chicago has

planted more than 500,000 trees. The enforcement of the 1995 Chicago Landscape Ordinance has brought the city 150,000 new trees, including more than 45,000 new street trees—which represent over 8 percent of Chicago's estimated street tree population. In addition, new private buildings are required

to meet reflective roof standards since the adoption of the 2001 Chicago Energy Conservation Code. All of these policies reduce the impact of new development on the urban heat island and prepare the City to respond to areas already experiencing elevated heat.



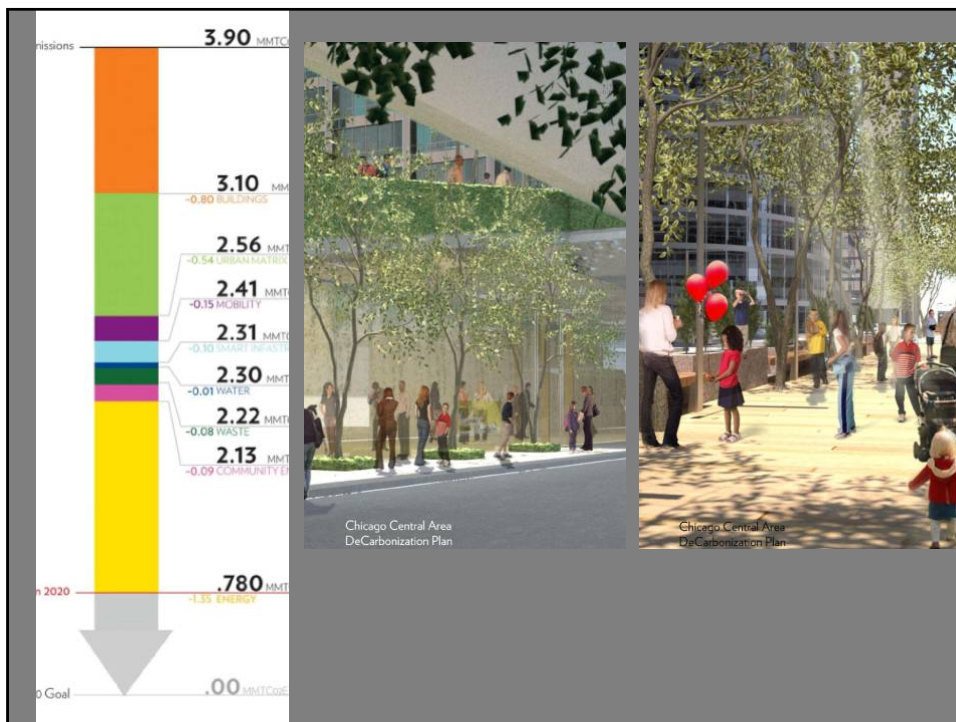
Traditional View:
City dwellers produce large amounts of GHGs.

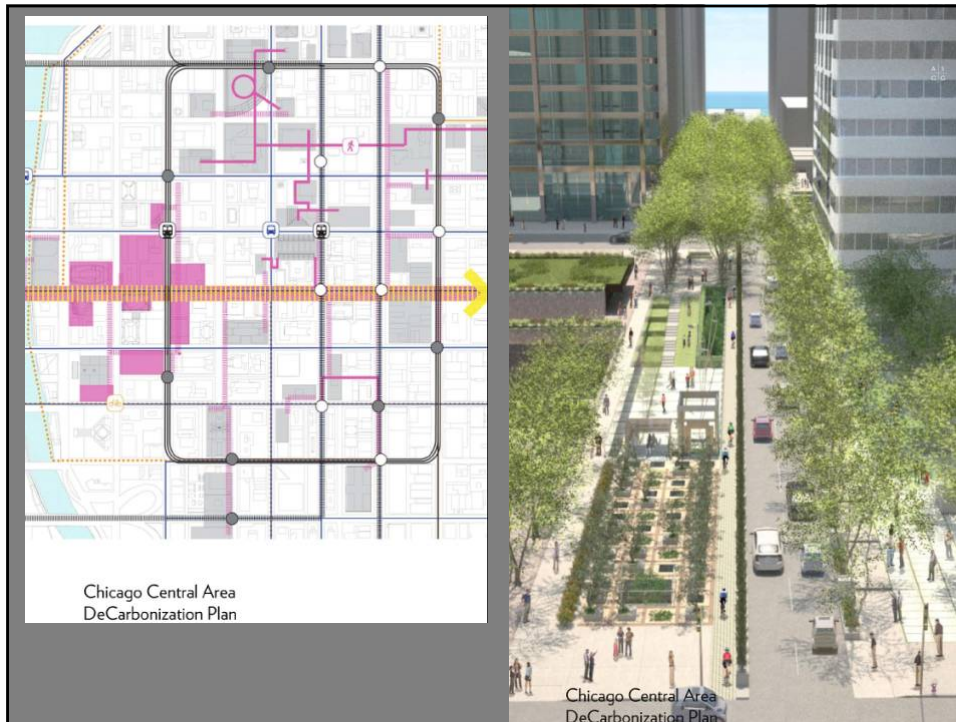
Emerging View:
City dwellers produce lower GHGs per household.

These maps, generated by the Center for Neighborhood Technology, show that people who live in cities produce fewer greenhouse gas emissions from their household transportation demand. Total CO₂ emissions levels from transportation are higher in the city center than the surrounding suburbs and rural areas because there are more people per square mile in urban areas than in rural areas. However, in the city center, the per household emissions are lower than in the surrounding areas because city households are closer to stores, parks and schools, reducing the need for extended trips.



Chicago Loop Decarbonization Strategy





CHICAGO CLIMATE ACTION PLAN DASHBOARD

25% reduction below to 1990 levels by 2020.
This equates to a reduction of **15.1 million metric tons of carbon dioxide equivalent emissions (MMTCO₂e).**

STRATEGY 1: ENERGY EFFICIENT BUILDINGS	STRATEGY 2: CLEAN & RENEWABLE ENERGY	STRATEGY 3: IMPROVED TRANSPORTATION OPTIONS	STRATEGY 4: REDUCED WASTE & INDUSTRIAL POLLUTION	STRATEGY 5: ADAPTATION
<p>2020 GOAL Reduce energy use in buildings</p> <ul style="list-style-type: none"> Retrofit 50% of buildings to achieve 30% reduction in energy use Update the City's building energy code Add 500 green roofs and 83,333 trees annually 	<p>2020 GOAL Turn to cleaner and renewable energy sources</p> <ul style="list-style-type: none"> 20% of the city's electricity supplied by renewable sources 5% of housing stock fitted with household scale renewable power 	<p>2020 GOAL Use a variety of transportation modes and cleaner vehicles</p> <ul style="list-style-type: none"> Increase transit ridership by 30% Increase the use of electric vehicles and alternative fuels Increase freight by rail and water, and make rail more efficient 	<p>2020 GOAL Prevent, reduce, reuse and recycle</p> <ul style="list-style-type: none"> Reduce, reuse or recycle 90% of methane-generating waste being landfilled Manage use and disposal of, and switch to less harmful refrigerants 	<p>2020 GOAL Ensure Chicago is a resilient city</p>
<p>ACHIEVED .33 MMTCO₂e</p>	<p>ACHIEVED .11 MMTCO₂e</p>	<p>ACHIEVED .2 MMTCO₂e</p>	<p>ACHIEVED .26 MMTCO₂e</p>	<p>IMPROVED quality of life, safety and health</p>
<p>HIGHLIGHTS</p> <ul style="list-style-type: none"> Over 20,000 buildings retrofitted Chicago Housing Authority per unit energy efficiency has improved by 55% Over 30,000 appliances traded in 	<p>HIGHLIGHTS</p> <ul style="list-style-type: none"> Chicago has the nation's largest urban solar field, supplying 10 MW of energy 20% of Chicago Public Schools comes from renewable energy, making it the largest K-12 purchaser of renewable energy in the nation 	<p>HIGHLIGHTS</p> <ul style="list-style-type: none"> Chicago's municipal fleet used 240,000 gallons of biodiesel in 2009 CTA 228 new hybrid buses, projected to save more than \$7 million annually Chicago leads with Quick Charge electric vehicle infrastructure 	<p>HIGHLIGHTS</p> <ul style="list-style-type: none"> Since 2007, Chicago decreased methane generating waste landfilled by 26% 18,304 kg of refrigerant properly disposed 4,025 tons of food scraps were composted in 2010 	<p>HIGHLIGHTS</p> <ul style="list-style-type: none"> 7 million sq. feet of green roofs are finished or under construction 120 green alleys have been installed 6,000 trees planted in urban heat island communities
<p>Already, CCAP has achieved 8% of its goal in the first 2 years.</p>		<p>2008</p> <p>Already Reduced 1.2 MMTCO₂e</p>	<p>2020</p> <p>2020 Goal: Reduction of 15.1 MMTCO₂e</p>	<p>City of Chicago Richard M. Daley Mayor</p>

芝加哥气候行动计划仪表盘：通过5项战略，设立不同目标，实现到2020年二氧化碳百万吨排放量比1990年降低25%

PROGRESS REPORT
First Two Years

CHICAGO
CLIMATE
ACTION
PLAN

OUR CITY. OUR FUTURE.

先期两年
进度报告

page 0 | IMPACT HIGHLIGHTS
page 1 | MESSAGE FROM THE MAYOR
page 2 | STRATEGY 1. ENERGY EFFICIENT BUILDINGS
page 3 | STRATEGY 2. CLEAN & RENEWABLE ENERGY SOURCES
page 4 | STRATEGY 3. IMPROVED TRANSPORTATION OPTIONS
page 5 | STRATEGY 4. REDUCED WASTE & INDUSTRIAL POLLUTION
page 6 | STRATEGY 5. ADAPTATION
page 10 | ENGAGEMENT
page 11 | RECOGNITION & PARTNERS



IMPACT HIGHLIGHTS
First Two Years

- 456 initiatives developed through 16 City departments and sister agencies to reduce emissions and adapt to change
- 13,341 housing units retrofitted to be more energy efficient
- 393 commercial and industrial buildings retrofitted to be more energy efficient
- 30,542 appliances traded in
- 20 million more Chicago Transit Authority rides annually
- 35 million gallons of water conserved per day
- 1.8 million square feet of additional green roofs installed or under construction
- 120 green alleys installed
- 636 new car share vehicles available
- 208 hybrid buses added to Chicago Transit Authority fleet
- 508,000 gallons of alternative fuel used
- 83 percent of construction and demolition debris recycled

2020 GOAL:
25% below 1990 levels
= 15.1 MMTCO₂e
(MMTCO₂e = million metric tons of CO₂e)

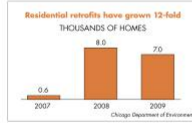
STRATEGY 1.
ENERGY EFFICIENT BUILDINGS

GOAL:
REDUCE ENERGY USE IN BUILDINGS

- CO-BENEFITS:
- reduced energy costs
 - jobs
 - improved air quality and health
 - water conserved
 - quality of life
 - adaptation

Energy usage in buildings is currently the source of 70% of emissions in Chicago, and 61% of emissions in the metropolitan area. This fact makes retrofitting buildings, which includes sealing air leaks, adding insulation, upgrading windows, and upgrading HVAC systems to make buildings more efficient, a vital plank of the strategy.

Support from local foundations helped to secure federal grants related to energy efficiency. From 2008 through 2009, more than 13,000 homes and 390 businesses have been retrofitted—with an energy savings of at least 21 percent. This is expected to increase to 30 percent energy efficiency by applying lessons learned from initial implementation to future years.



Debra partnered with Habitat for Humanity to weatherize low-income homes.

Energy Action Network



In 2009, the Chicago Climate Action Plan (CCAP) partners launched the Energy Action Network (EAN), a partnership between the City of Chicago, Community Economic Development Association of Cook County, the Field Museum, utility companies, energy service providers and community-based organizations.

Working with 21 community-based organizations, the network aims to create energy efficient communities across the city through bill payment assistance, weatherization services and energy efficiency programs and rebates. While the focus is currently on energy efficiency programs and education, this network may be leveraged for additional climate actions in the future and acts as a great connection to local communities.

"The Chinese American Service League (CASL) believes that the Energy Action Network (EAN) is a long-term solution to helping people save energy. That's why CASL decided to participate in the EAN. As a result, we're able to provide more needed energy assistance to the families in our community."
— Ben Liu, CASL

Making appliances work for us
The City and ConEd, through its Smart Ideas for Your Home Program, have collaborated to organize programs for residents to swap out old appliances and lighting for energy-efficient models.

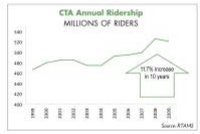
STRATEGY 3.
IMPROVED TRANSPORTATION OPTIONS

GOAL:
USE A VARIETY OF TRANSPORTATION MODES—AND CLEANER VEHICLES

- CO-BENEFITS:
- reduced energy costs
 - jobs
 - improved air quality and health
 - quality of life

In the last ten years, Chicago Transit Authority (CTA) ridership has increased by more than 10%. In early 2010, due to budget constraints, CTA was forced to reduce bus service by 18% and rail service by 9%.

These service reductions are likely to lead to lower CTA ridership in 2010. It is vital for public transportation to receive sufficient operating funding to provide a viable alternative to driving and expand its crucial role in reducing regional emissions.

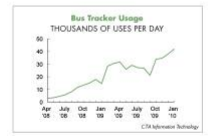


CTA Hybrid Bus Fleet
Since 2006, CTA has introduced 228 hybrid buses into its fleet, including 20 40-foot standard buses and 208 60-foot articulated buses, comprising more than 13% of CTA's fleet.



The 60-foot hybrid articulated buses are at least 30 percent more fuel-efficient than conventional diesel buses and are 60 percent lower in emissions. CTA estimates that the hybrid technology will help save more than \$7 million annually in parts, labor and fuel.

CTA Bus Tracker
CTA Bus Tracker is a Web-based program that uses global positioning system (GPS) technology to provide customers with real-time bus arrival information accessible from personal computers and mobile devices. This program has made the CTA more user-friendly for bus customers and helped to attract riders in 2009; the CTA expanded Bus Tracker to include all of its regularly-scheduled routes and added a text messaging service to reach a broader share of customers.



"BusTracker has helped me stay warm as long as possible! The mobile phone bus tracker site is easy to use and accessible, and really saves those precious minutes of each day. Bus Tracker is accurate and very dependable. It's OK with me if a bus is late once in a while, as long as the Tracker works!"
—Elin Wahlman, Bus Tracker Customer

STRATEGY 5.
ADAPTATION

GOAL:
MINIMIZE AND PREPARE FOR THE IMPACT OF CLIMATE CHANGE

- CO-BENEFITS:
- reduced energy costs
 - water quality
 - jobs
 - quality of life
 - improved air quality and health

The Chicago Climate Action Plan addresses the need to take action by adapting to and preparing for climate change impacts. These anticipated impacts include more extreme heat, more precipitation when we do not need it (and less when we do), and resulting impacts on our ecosystem, buildings and infrastructure.

Managing stormwater
Managing stormwater on site by creating permeable surfaces, a part of the green infrastructure, decreases the amount of rain and snow that is treated through our combined sewer system.

Since January 2008, 265 development projects have been addressed by the stormwater management ordinance, resulting in:

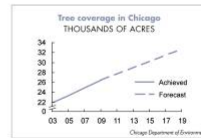
- 20% increase in permeable area per site
- increase of 55 acres of permeable surface area

Furthermore, 120 green alleys have been installed to date, resulting in the conversion of over 32,000 square feet of impervious surfaces to pervious surfaces.

Managing heat
Decreasing urban heat island, the effect of higher temperatures in built environments, decreases local impacts of extreme heat. Planting vegetation such as green roofs and trees not only has summertime energy efficiency benefits, but it also reduces the urban heat island effect by reducing exposures of heat-absorbing concrete and asphalt.

Beyond energy efficiency: trees and green roofs
The effects of vegetation in cooling, energy efficiency and other actions are increased as more green spaces are added. The City launched the Urban Forest Agenda in 2009 with partners of the Chicago Trees Initiative to understand, protect and expand the tree canopy and "urban forests" throughout city streets, parks and residential areas by maintaining and monitoring trees; expanding the urban forest; integrating green infrastructure; and fostering stewardship. Green roof and tree progress to date, includes:

- more than four million sq. ft. of green roofs planned or completed since 2008; and
- more than 9,000 acres of tree canopy added since 1993.



Jay's Park

VANCOUVER SUSTAINABILITY STRATEGY





VANCOUVER 2020 A BRIGHT GREEN FUTURE

AN ACTION PLAN FOR BECOMING THE WORLD'S GREENEST CITY BY 2020

2020 TARGETS

Achieving environmental sustainability may take a generation, but we must begin to act now. To become the greenest city in the world, Vancouver needs to reach the following measurable, ambitious, and achievable targets by 2020.

One: Green Economy, Green Jobs

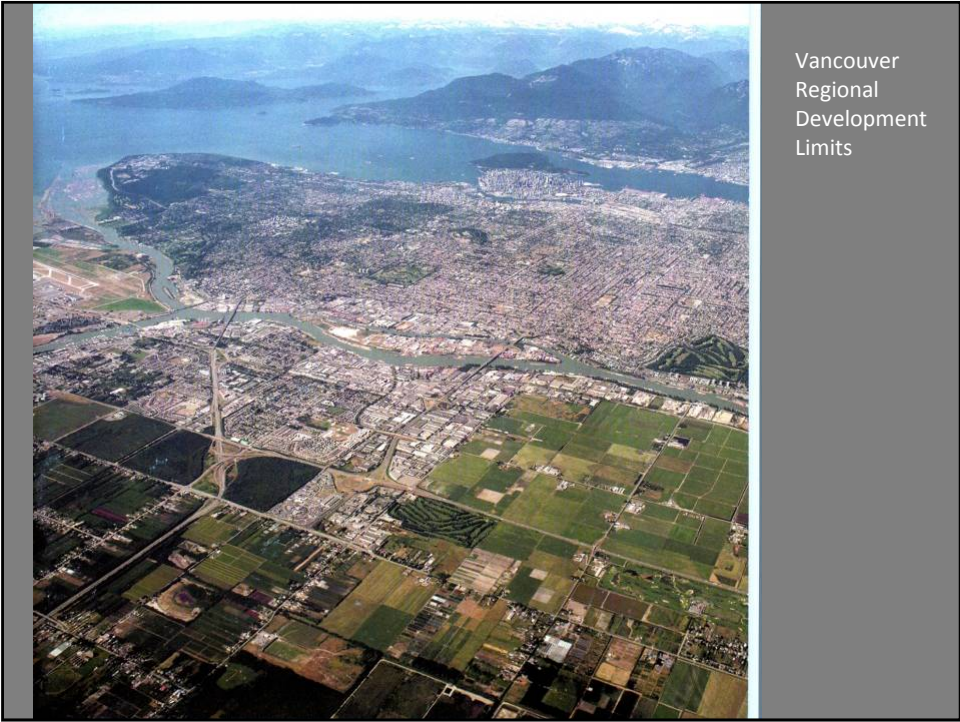
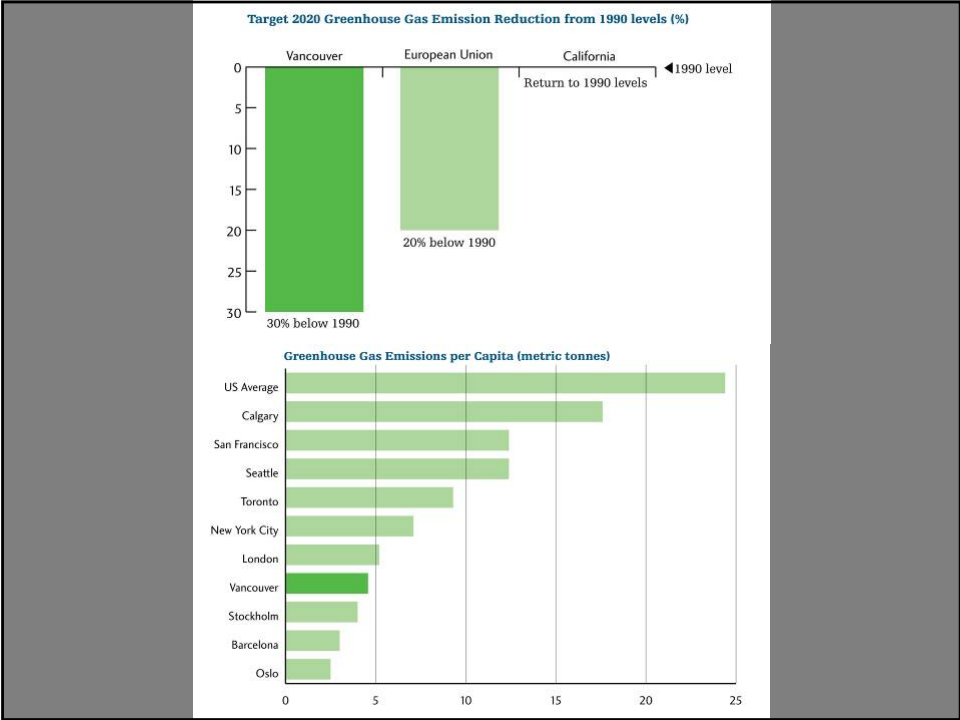
1. Green Economy Capital: 20,000 new green jobs
2. Climate Leadership: Reduce greenhouse gas emissions 33 percent from 2007 levels
3. Green Buildings: All new construction carbon neutral; improve efficiency of existing buildings by 20 percent

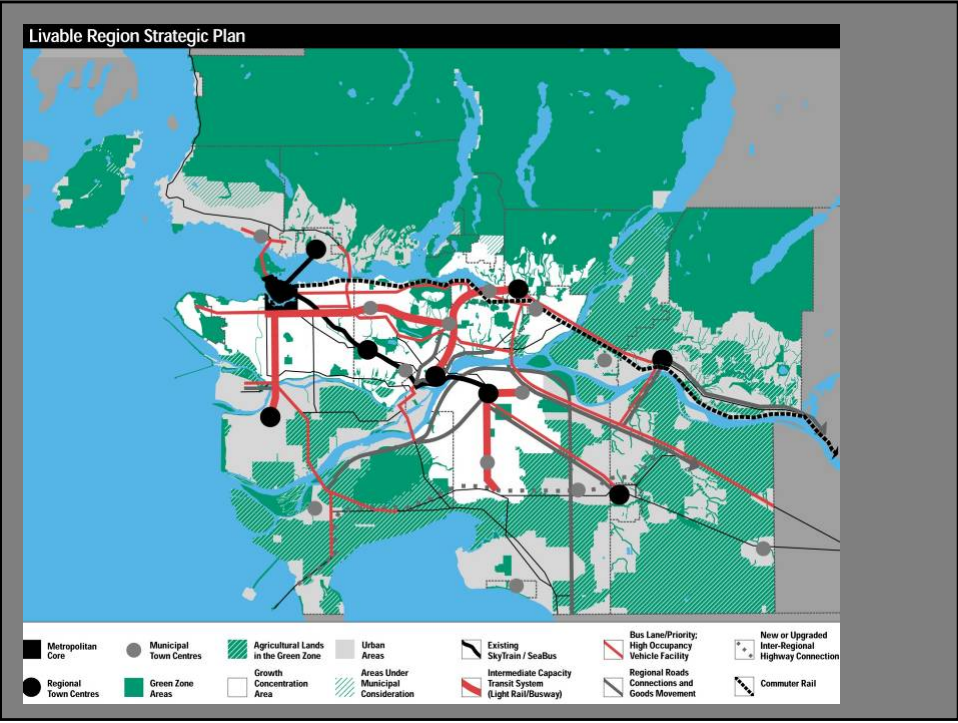
Two: Greener Communities

4. Green Mobility: Make the majority of trips (over 50 per cent) on foot, bicycle, and public transit
5. Zero Waste: Reduce solid waste per capita going to landfill or incinerator by 40 per cent
6. Easy Access To Nature: Every person lives within a five-minute walk of a park, beach, greenway, or other natural space; plant 150,000 additional trees in the city
7. Lighter Footprint: Reduce per capita ecological footprint by 33 percent

Three: Human Health

8. Clean Water: Always meet or beat the strongest of B.C., Canada, and World Health Organization drinking water standards; reduce per capita water consumption by 33 percent
9. Clean Air: Always meet or beat World Health Organization air quality guidelines, which are stronger than Canadian guidelines
10. Local Food: Reduce the carbon footprint of our food by 33 percent per capita





Vancouver Transit Priority Policy



Olympic Village District Energy Utility

Vancouver

EcoDensity



The Vancouver EcoDensity Charter
HOW DENSITY, DESIGN, AND LAND USE WILL CONTRIBUTE TO
ENVIRONMENTAL SUSTAINABILITY, AFFORDABILITY, AND LIVABILITY

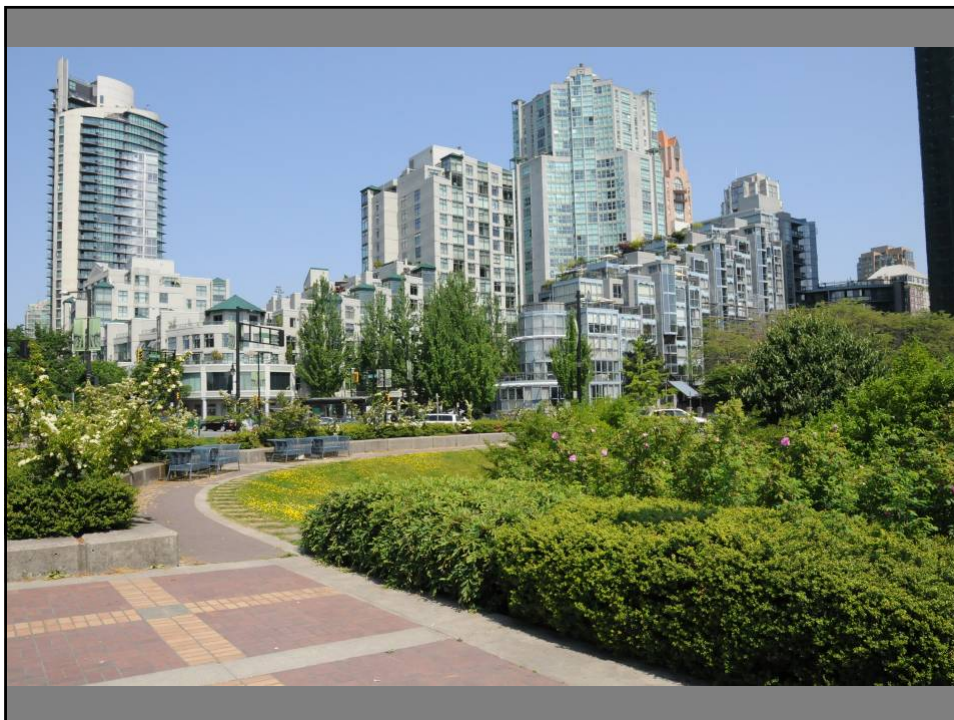


draft

ON NOVEMBER 27, 2007, COUNCIL RECEIVED AND REFERRED THE DRAFT ECO DENSITY CHARTER FOR PUBLIC CONSULTATION, ALONG WITH THE DRAFT ECO DENSITY INITIAL ACTIONS.



VANCOUVER, CANADA





Vancouver Laneway Housing
Increasing density painlessly

Sustainable Development Means:

TARGETS AND METRICS

And a system for measuring and reporting regularly

SUBSTITUTING GREEN INFRASTRUCTURE FOR GRAY INFRASTRUCTURE

Capital projects as well as pricing and incentives

CLOSED LOOPS FOR ENERGY AND WATER

No waste energy, all water re-used

CHANGES IN LIFESTYLE TO REDUCE AUTO DEPENDENCY

Alternative transportation – public transit, car sharing, bicycles, walking

IMPROVEMENTS TO QUALITY OF LIFE IN DENSER ENVIRONMENTS

Making density desirable, making it possible to live without autos

RELIANCE ON LOCAL RESOURCES

Food, water, materials, sources of power,

MAJOR CHANGES TO ENERGY GENERATION, USAGE AND DEPENDENCE