Other Cities' Plans

Electricity and Natural Gas TAG

August 14, 2014

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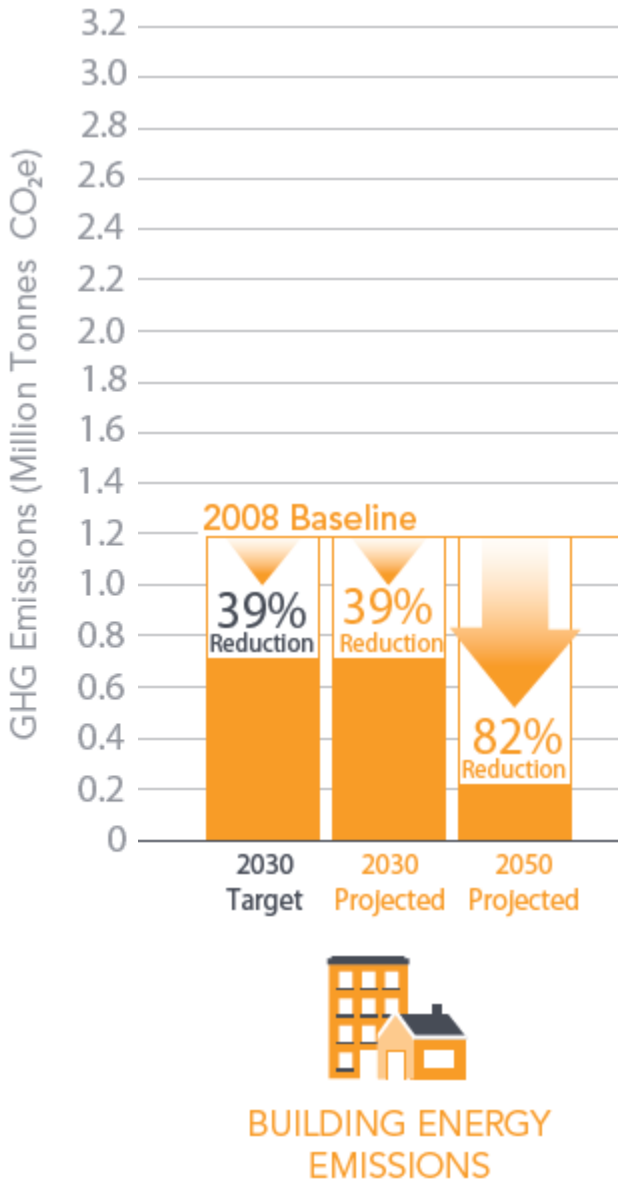
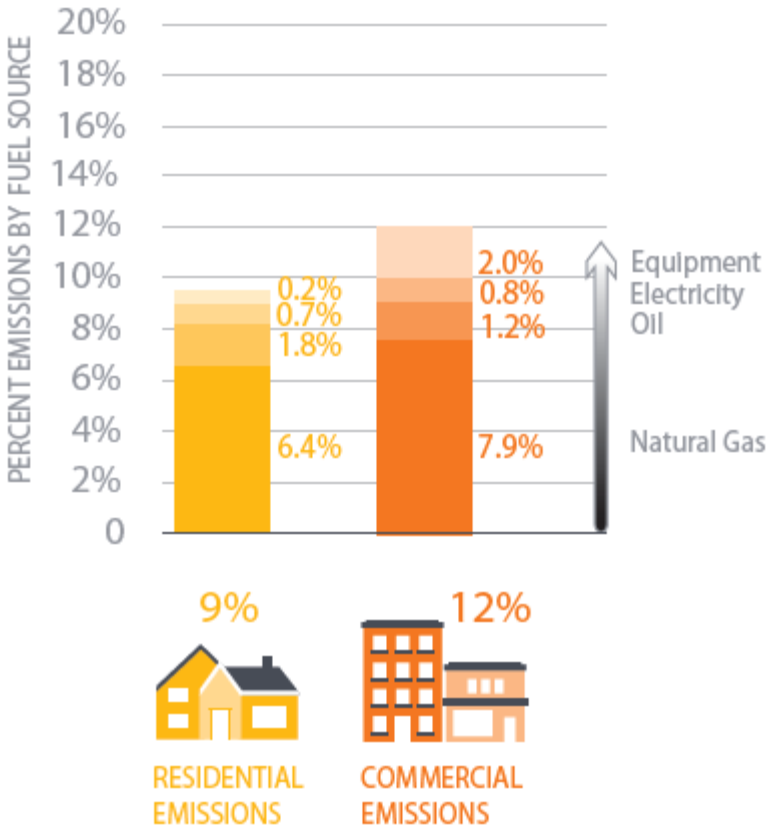
CITY OF AUSTIN

Seattle





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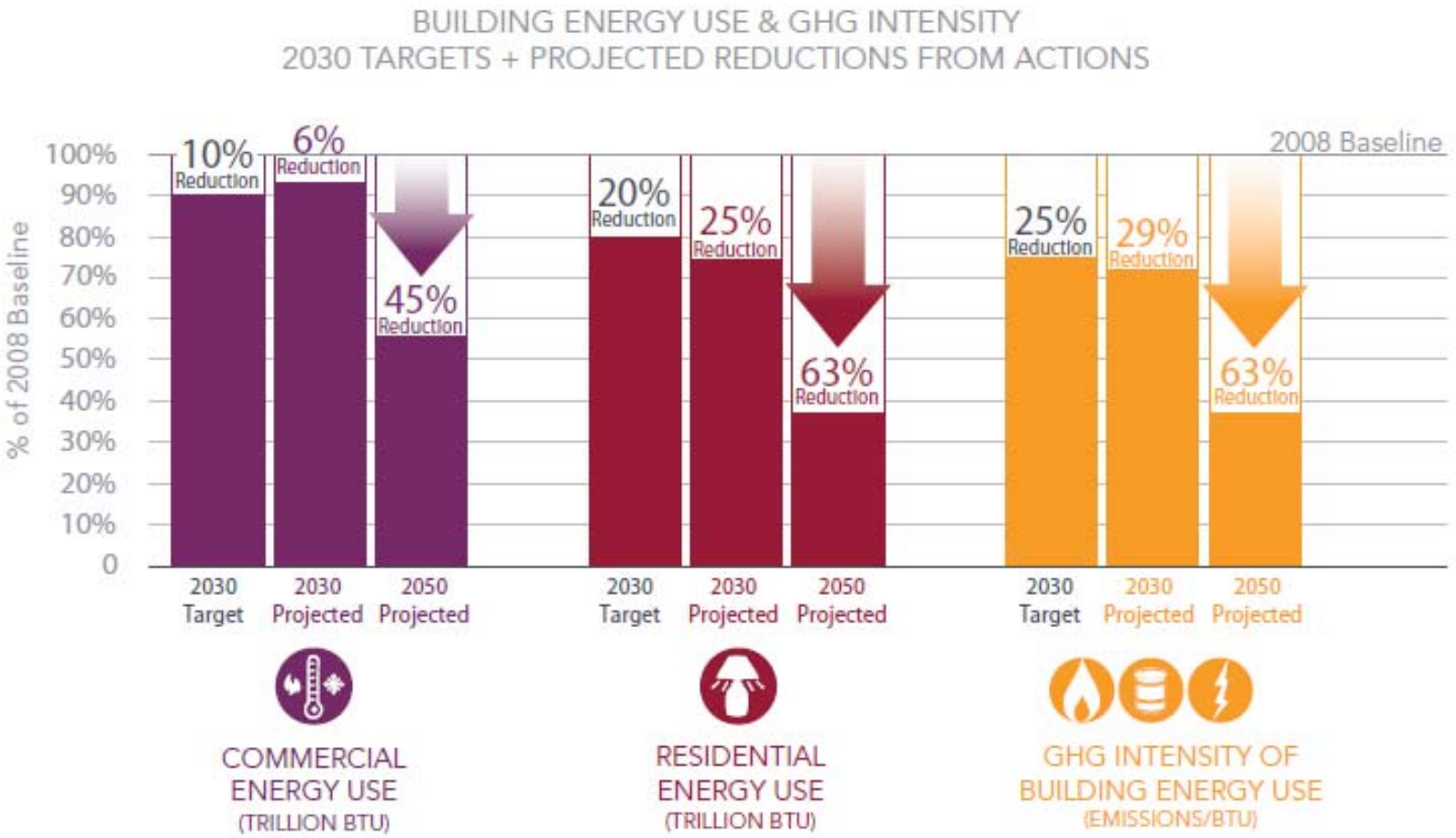
Seattle



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Seattle

Table: Climate Action Outcome Indicators

SECTOR		INDICATOR	TARGET
BUILDING ENERGY	Commercial Bldgs	Commercial Building Emissions (Million Tonnes CO_2e)	45% Reduction by 2030
		Energy Use (Trillion BTU)	10% Reduction in Energy Use by 2030*
	Residential Bldgs	Residential Building Emissions (Million Tonnes CO_2e)	32% Reduction by 2030
		Energy Use (Trillion BTU)	20% Reduction in Energy Use by 2030*
	Commercial & Residential (Combined)	Building Energy Emissions (Million Tonnes CO2e)	39% Reduction by 2030
		GHG Intensity of Building Energy Use (Emissions/BTU)	25% Reduction by 2030*
	Multifamily Residential & Commercial Bldgs	Energy Use Intensity (EUI) of Existing Bldgs	Average EUI (kBtu/SF/year) for buildings greater than 20,000 sq ft: Decrease in average EUI Develop EUI target by 2020
		New Buildings, and Major Renovations, Meeting Green/Sustainability Standards	50% of permitted new construction projects achieve one of the following green building standards by 2025: Living Building Challenge, Built Green, LEED, Evergreen Sustainable Development Standard, or Passive House

*Target included in the Comprehensive Plan

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Seattle

ENERGY SUPPLY

Reaching the goal of carbon neutrality requires actions beyond increasing energy efficiency. While Seattle is fortunate to benefit from Seattle City Light's carbon-neutral electricity, there are many buildings that use fossil fuels, such as natural gas and oil, to heat their buildings. On-site renewable energy systems and district energy systems are important strategies to transition away from fossil fuels. District energy systems, heating and cooling shared by multiple buildings, can use waste heat and renewable energy sources, and move these resources around to where and when they are most needed.

2030 Vision

- Seattle buildings are fueled by a portfolio of renewable and low- or no-carbon energy sources. Seattle City Light continues to provide carbon neutral electricity, and multiple neighborhood district energy systems are using renewable and waste heat sources.

Actions to Implement by 2015

1. Expand district energy systems on First Hill and into the South Lake Union and Denny Triangle neighborhoods.
2. Develop an alternative energy master plan that focuses on low-carbon energy solutions, such as district energy, solar energy, and geothermal energy in the public right-of-way.
3. Maintain Seattle City Light's commitment to conservation and renewables, as well as to providing carbon neutral electricity.
4. Continue Seattle City Light support for solar energy through net metering, which reduces the quantity of electricity billed to the customer by the amount of solar energy produced.

Actions to Implement by 2030

1. Establish a diversity of low- to no-carbon energy sources through district energy systems and on-site renewable energy systems to supplement the City's carbon-neutral electricity, create diversity in supply, and contribute to the market growth of renewable energy systems.
2. Integrate land use and infrastructure planning to optimize opportunities for heat exchange between sources that generate excess heat (e.g. data centers or sewer lines) and buildings that require additional heat (e.g. office buildings or apartments).

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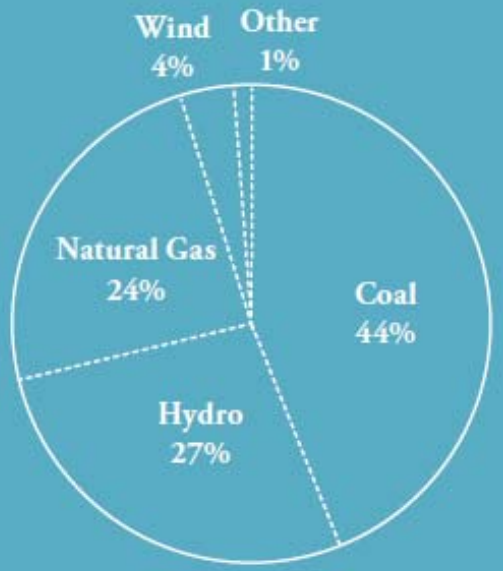
Portland

FIGURE 9

2008 SOURCES OF ELECTRICITY FOR UTILITIES SUPPLYING CUSTOMERS IN MULTNOMAH COUNTY



Oregon Department of Energy for overall resource mix of each utility; *Bureau of Planning and Sustainability* for weighted average mix based on electricity supplied by Portland General Electric and Pacific Power to customers in Multnomah County

2030 OBJECTIVE 1.

Reduce the total energy use of all buildings built before 2010 by 25 percent.

To be on track to reach the 2050 emissions reduction target, all buildings must consume 25 percent less energy than today. By 2030, many new and highly efficient buildings will have been built that will consume less than half the energy of today's buildings. However, because over two-thirds of the buildings that will exist in 2030 are in place today, existing buildings must be retrofitted with energy-saving measures to achieve the necessary aggregate building efficiency improvements.

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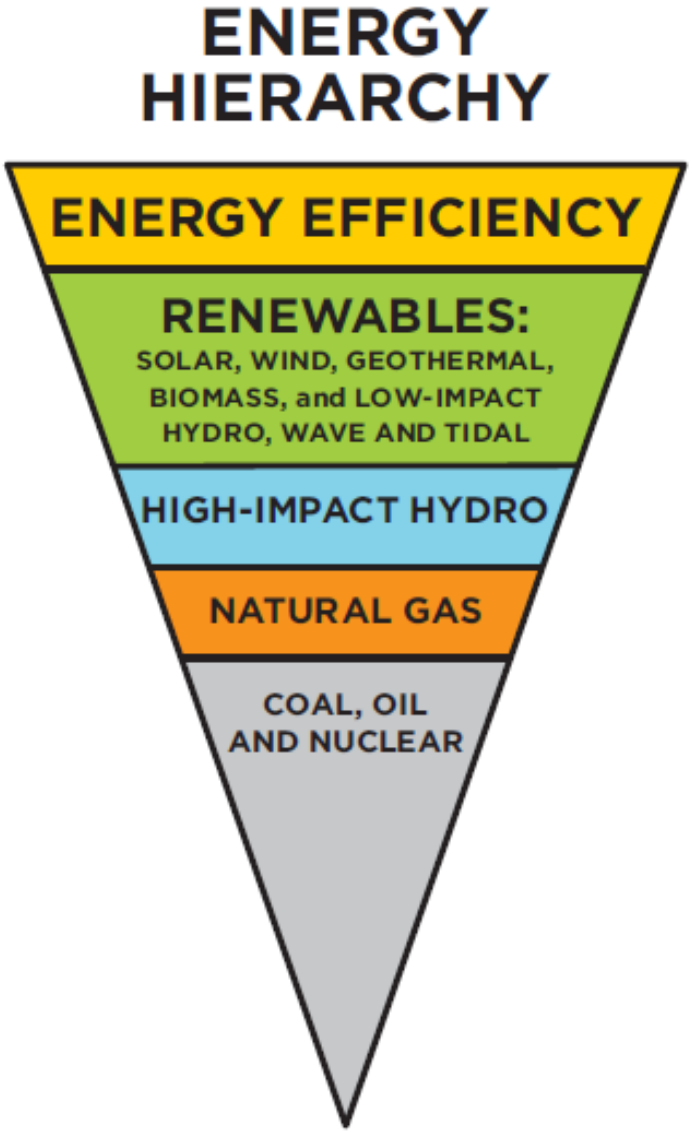
Portland



2030 OBJECTIVE 2.
Achieve zero net greenhouse gas emissions in all new buildings and homes.

2030 OBJECTIVE 3.
Produce 10 percent of the total energy used within Multnomah County from on-site renewable sources and clean district energy systems.

2030 OBJECTIVE 4.
Ensure that new buildings and major remodels can adapt to the changing climate.

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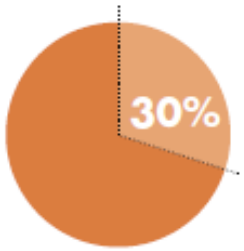
Chicago

STRATEGY 1.
ENERGY EFFICIENT BUILDINGS



30% of Total Chicago GHG Reductions
= 4.6 MMTCO$_2$e

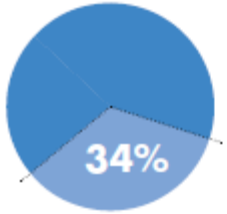
Without global and local action, impacts on Chicago's weather could be dramatic.

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



34% of Total Chicago GHG Reductions
= 5.33 MMTCO$_2$e

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.

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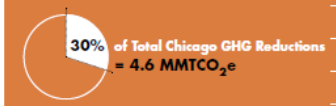
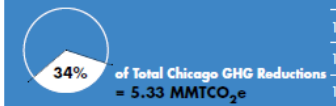
Chicago

Strategy		Action	Target (Government, Business, Residential)	Description	$MMTCO_2e$ Reduction
ENERGY EFFICIENT BUILDINGS	1	Retrofit commercial and industrial buildings	G B R	Retrofit 50 percent of commercial and industrial building stock, resulting in a 30 percent energy reduction.	1.3
 **of Total Chicago GHG Reductions = 4.6 $MMTCO_2e$**	2	Retrofit residential buildings	G R	Improve efficiency of 50 percent of residential buildings to achieve a 30 percent reduction in energy used.	1.44
	3	Trade in appliances	G B R	Expand appliance trade-in and lightbulb replacement programs.	0.28
	4	Conserve water	G B R	Improve water use efficiency in buildings as part of retrofits.	0.04
	5	Update City energy code	G B R	Align Chicago's Energy Conservation Code with latest international standards.	1.13
	6	Establish new guidelines for renovations	G B R	Require all building renovations to meet green standards.	0.31
	7	Cool with trees and green roofs	G B R	Increase rooftop gardens to total of 6,000 buildings citywide and plant an estimated 1 million trees.	0.17
	8	Take easy steps	G B R	Encourage all Chicagoans to take easy steps to reduce their emissions by one metric ton of CO_2e per person.	0.8
CLEAN & RENEWABLE ENERGY SOURCES	9	Upgrade power plants	G B	Upgrade or repower 21 Illinois power plants.	2.5
 **of Total Chicago GHG Reductions = 5.33 $MMTCO_2e$**	10	Improve power plant efficiency	G	Raise efficiency standards for new and existing power generators.	1.04
	11	Build renewable electricity	G B R	Procure enough renewable energy generation for Chicagoans to reduce electricity emissions by 20 percent	3.0
	12	Increase distributed generation	G B	Increase efficient power generated on-site using distributed generation and combined heat and power.	1.12
	13	Promote household renewable power	G B R	Double current household-scale renewable electricity generation.	0.28

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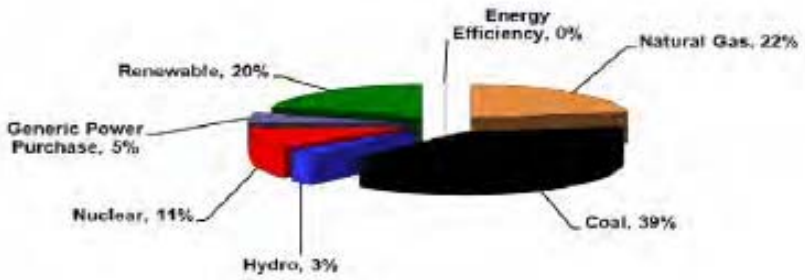
LA Water and Power

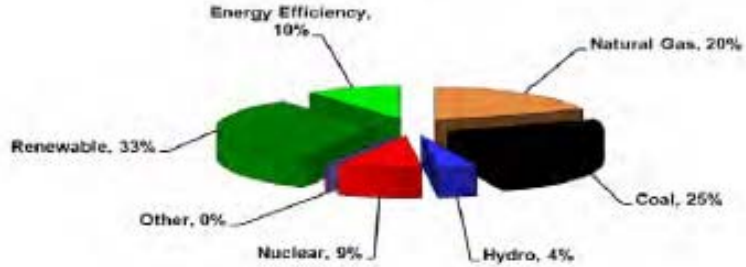
2013 POWER INTEGRATED RESOURCE PLAN

December 2013

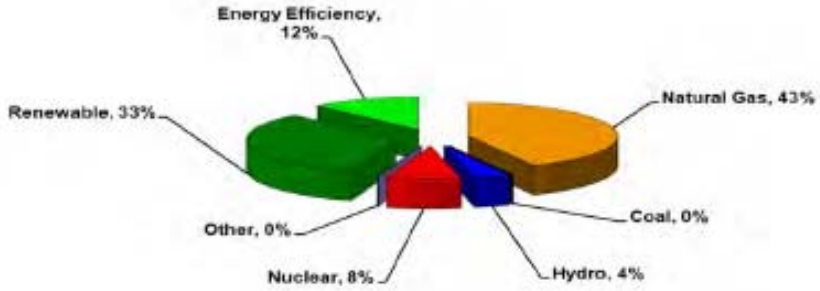
2010



2020



2026



Power Resources (2012)*

(As reported to CEC)

Renewable energy	20%
Biomass & Biowaste	5%
Geothermal	0%
Small hydroelectric	2%
Solar	0%
Wind	13%
Natural gas	21%
Nuclear	10%
Large hydro	4%
Coal	33%
Other/Unspecified	12%

*Unaudited and Preliminary Figures

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LA Water and Power: CO2

- Historical LADWP Power Generation CO2 Emissions
  - Total CO2 from Owned & Purchased Generation
    - 1990: 17,925,410 metric tons → 2012: 13,968,172 metric tons (-22%)

- Early coal replacement continues to be a key strategy to reduce greenhouse gas emissions.
- As with last year's IRP, this 2013 IRP recommends divestiture of the Navajo coal plant by 2015, four years ahead of the scheduled 2019 contractual expiration date.
- LADWP will replace the loss of capacity from Navajo with energy efficiency, renewable energy, and natural gas generation.

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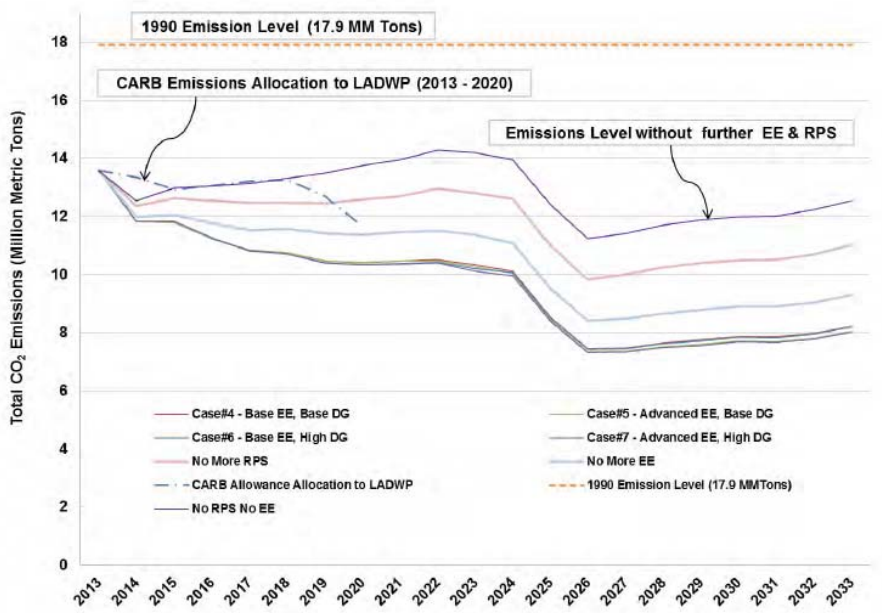
LA Water and Power: Coal, EE, and DG



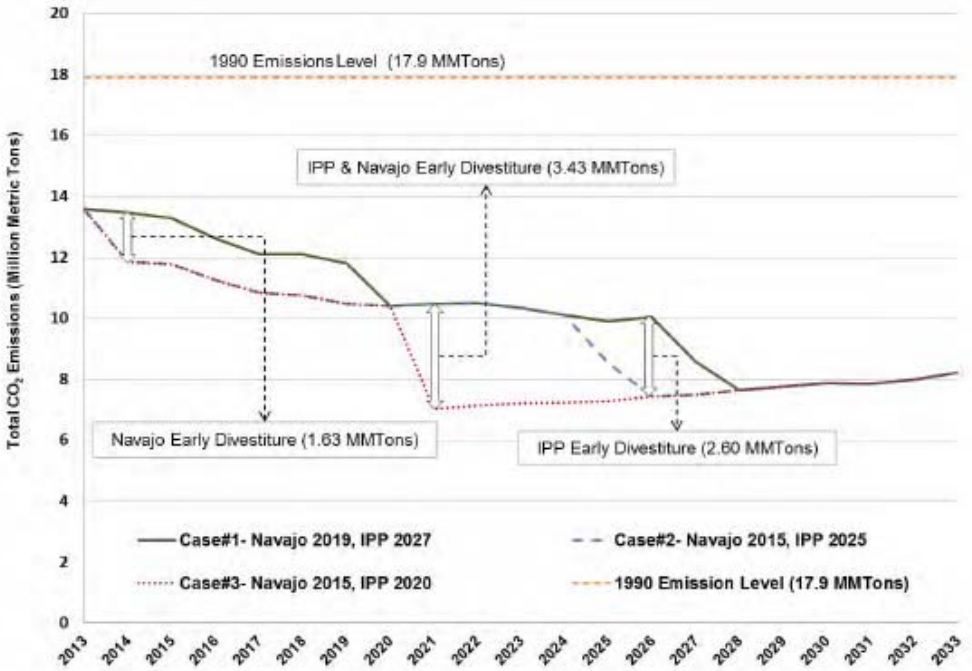


TABLE ES-4 INCREMENTAL NOMINAL COST COMPARISONS BETWEEN CASES

Coal Case Summary

	Case 1	Case 2	Case 3
Case Description	Navajo 2019, IPP 2027	Navajo 2015, IPP 2025	Navajo 2015, IPP 2020
Total Incremental Revenue $M	$0	$48 to $70	$610
Average Incremental Revenue ($M/yr)	$0	$9 to $13	$111

EE & DG Case Summary

	Case 4 (Baseline) *	Case 5	Case 6	Case 7
Case Description	Base EE & Base DG	Base EE & High DG	Advanced EE & Base DG	Advanced EE & High DG
Total Incremental Revenue $M	$0	$74	$590	$716
Average Incremental Revenue ($M/yr)	$0	$4	$28	$34

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LA Water and Power: EE

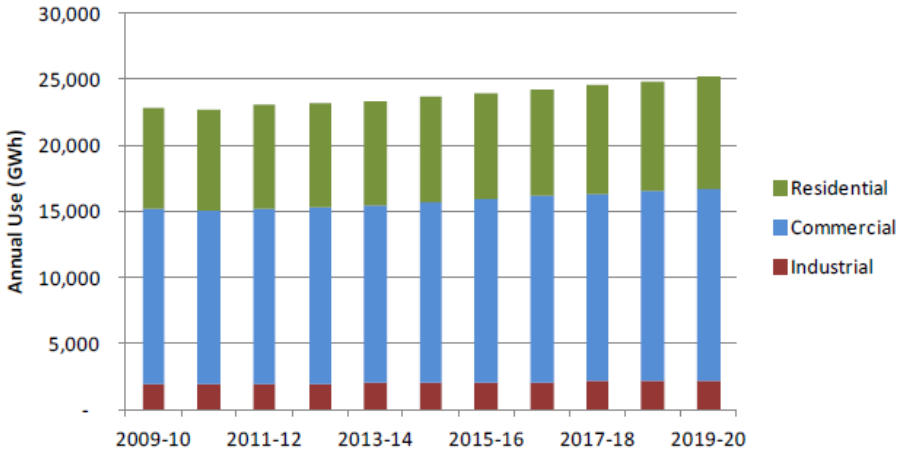

Figure B-2. Baseline forecast results through 2019-20.

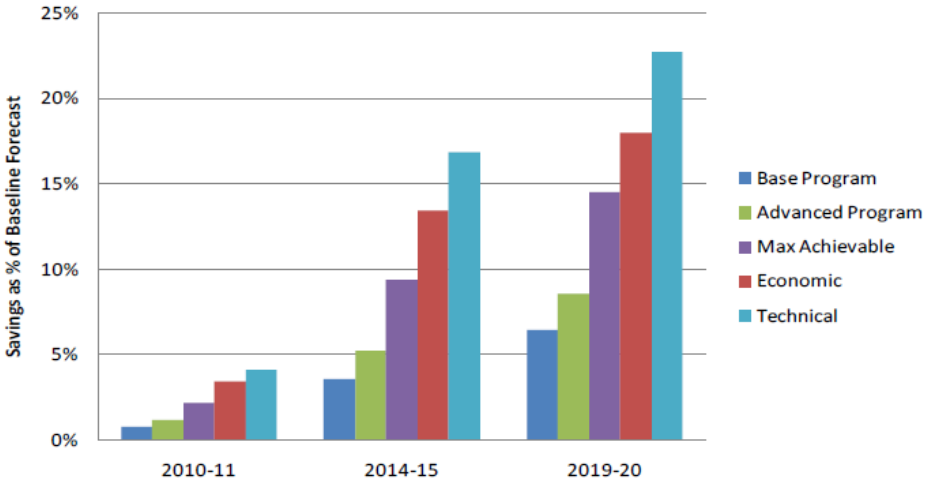

Figure B-6. Cumulative energy savings as a percentage of the baseline forecast.

Table B-2. Financial Metrics

	Total Savings (GWh)	Total Cost ($Million)	Total Benefits ($Million)	Net Benefits ($Million)	Benefit/ Cost	Cost of Conserved Energy (cents/kWh)
Base Program	18,719	$1,073	$1,092	$18	1.02	5.73
Advanced Program	25,290	$1,411	$1,483	$72	1.05	5.58
Max Achievable	46,209	$2,139	$2,681	$542	1.25	4.63

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Fort Collins: Jan. 2014 Report

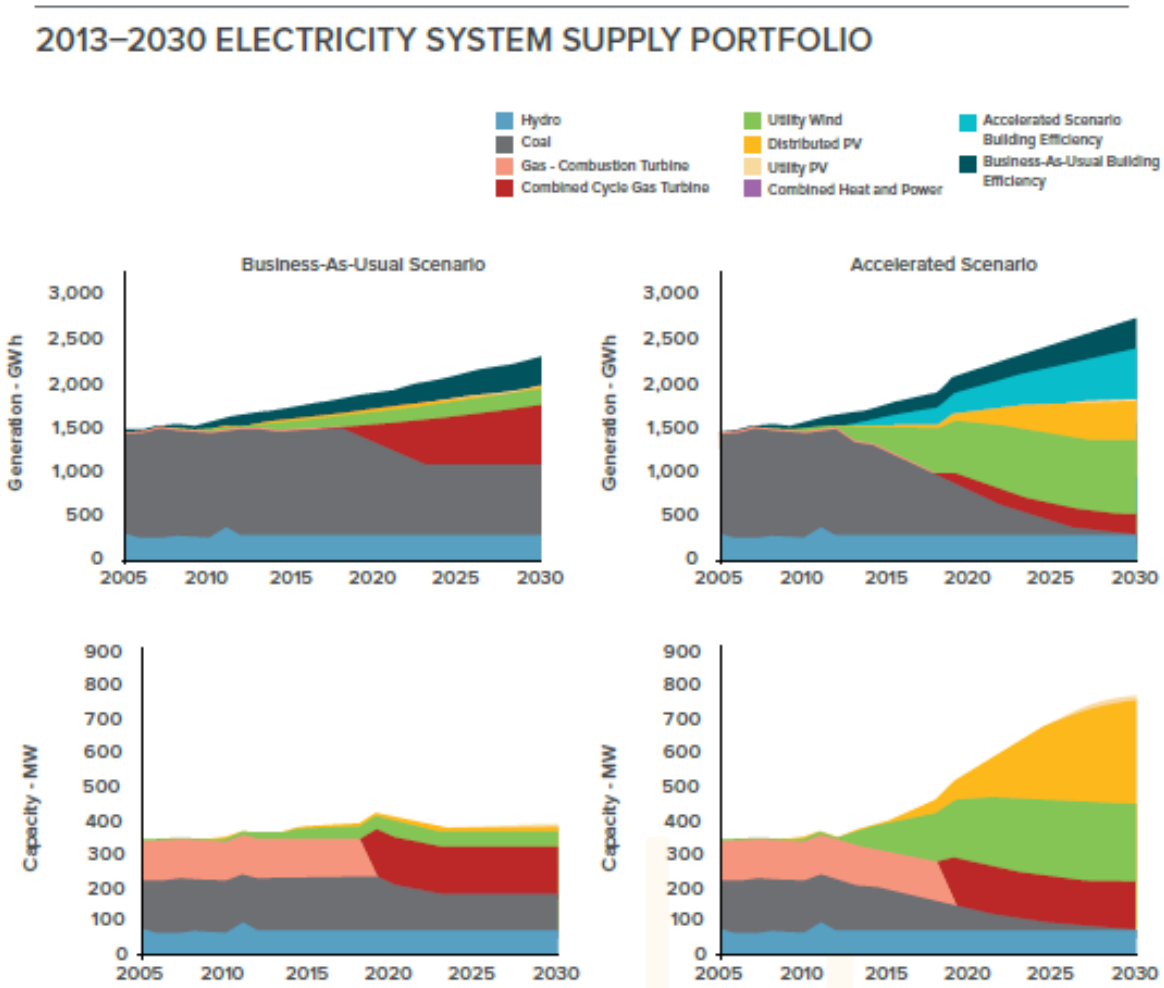

Figure 1: Fort Collins' accelerated clean electricity pathway (right) reflects 100% net electricity emissions reduction by 2030. The business-as-usual pathway (left) is a projection of 2005–2012 trends to 2030. Capacity is much higher for the accelerated case due to renewables' lower capacity factors relative to fossil-fueled generation sources. Excess renewables are generated to offset remaining natural gas generation.

City of Fort Collins Light & Power

Rocky Mountain Institute

STEPPING UP:
BENEFITS AND COST OF ACCELERATING FORT COLLINS' ENERGY AND CLIMATE GOALS

RENEWABLE ELECTRICITY SUPPLY: FORT COLLINS CAN ACHIEVE A CARBON NEUTRAL ELECTRICITY SYSTEM BY 2030.

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Fort Collins: Jan. 2014 Report

EFFICIENT BUILDINGS:
BY 2030, ACCELERATION COULD REDUCE ENERGY USE IN BUILDINGS BY 31% COMPARED TO BUSINESS AS USUAL, SAVING THE COMMUNITY $140 MILLION.

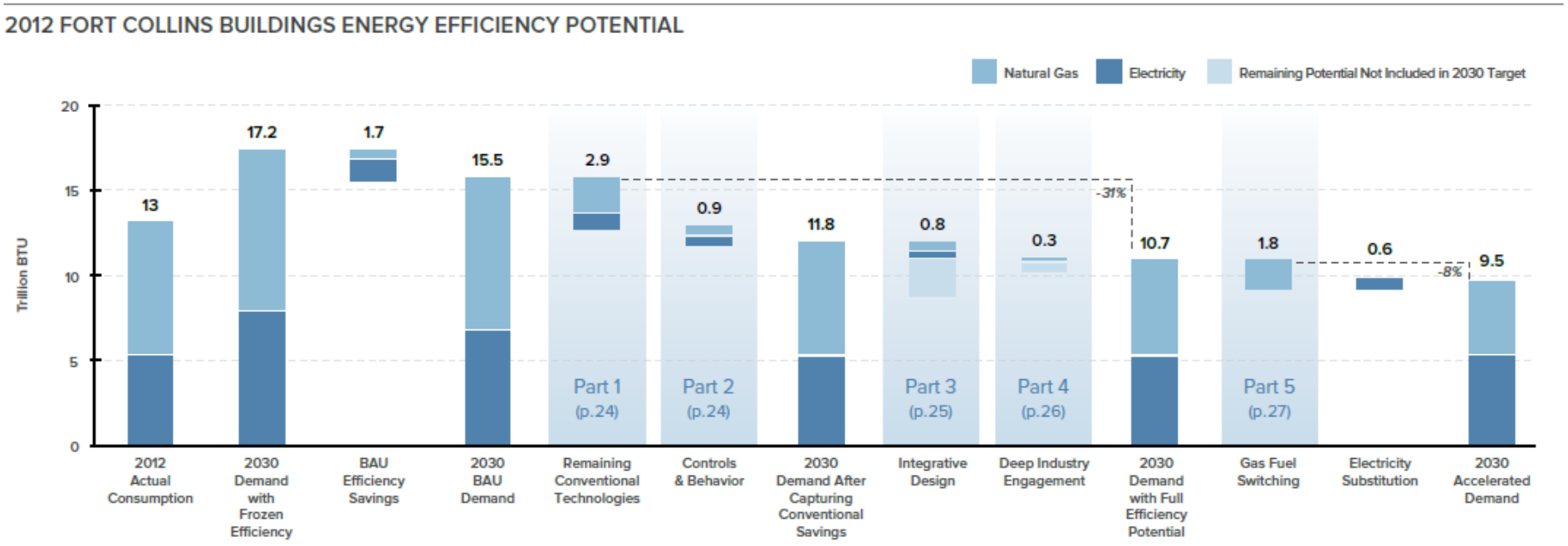

Figure 1: This building energy efficiency potential estimate for Fort Collins is based on a detailed, national-level analysis conducted by Rocky Mountain Institute for Reinventing Fire, which draws from analysis by National Academies and Lawrence Berkeley National Laboratory. Potential savings from industrial process loads, while not strictly addressing building end use, are also included

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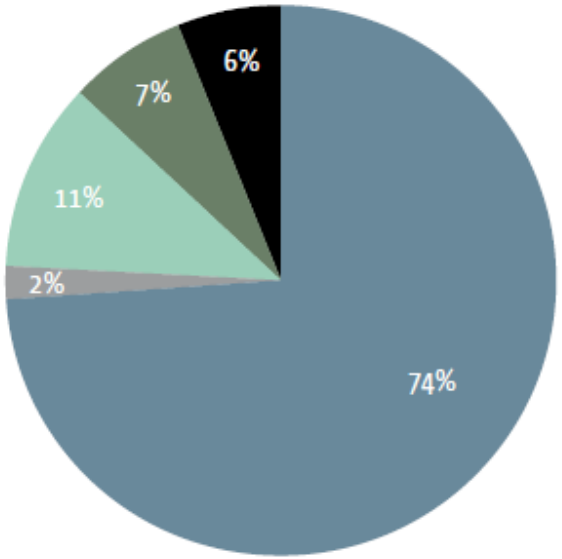
Carbon Neutral Cities: Copenhagen

Today, Copenhagen emits 1.9 million tons of CO_2. By 2025, this will have fallen to 1.16 million tons due solely to a number of planned activities, such as switching from coal to biomass in combined heat and power plants in the Capital Region and because of the conditions in the existing legislation on energy and transport.

In order to become carbon neutral by 2025, the city must use less energy than it does today and at the same time divert energy production to green energy. In addition, a surplus of green energy must be produced to offset the emissions that will continue to be generated from for example transport.

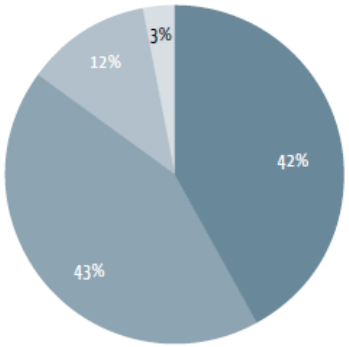


Share of Carbon Reduction

- New initiatives
- Energy Production
- City administration initiatives
- Mobility
- Energy Consumption

ALLOCATION OF REDUCTIONS FROM ENERGY PRODUCTION INITIATIVES

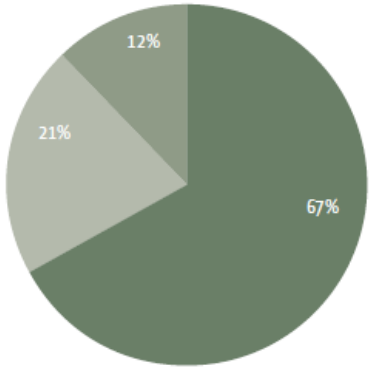
855.000 TONS CO_2



- Wind turbines
- New biomass-fired combined heat and power plant
- Separation of plastic from burnable waste
- Conversion to biomass-fired peak load produktion

ALLOCATION OF REDUCTIONS FROM ENERGY CONSUMPTION INITIATIVES

80.000 TONS CO_2



- Commercial buildings
- Households
- Photovoltaics

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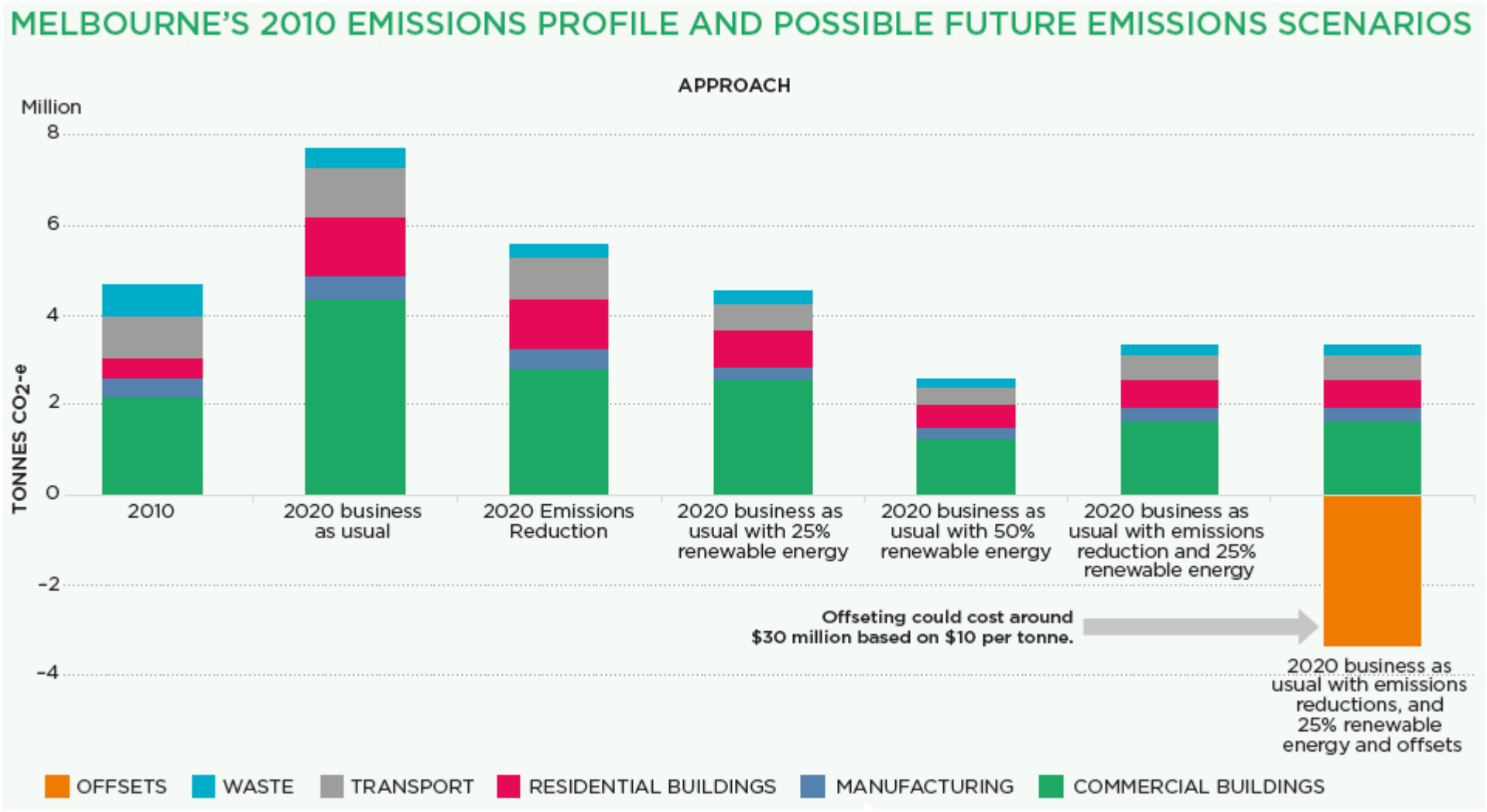
Carbon Neutral Cities: Melbourne



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