New Energy Cities: Buildings & Efficiency

January 27, 2011

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Buildings & Efficiency

- Using less energy easiest & most economical step
- Critical to large-scale deployment of new, clean technologies
- Policies are starting to move rapidly
  - Financing
  - Aggregation
- Not an option for buildings; question is whether or not to be strategic

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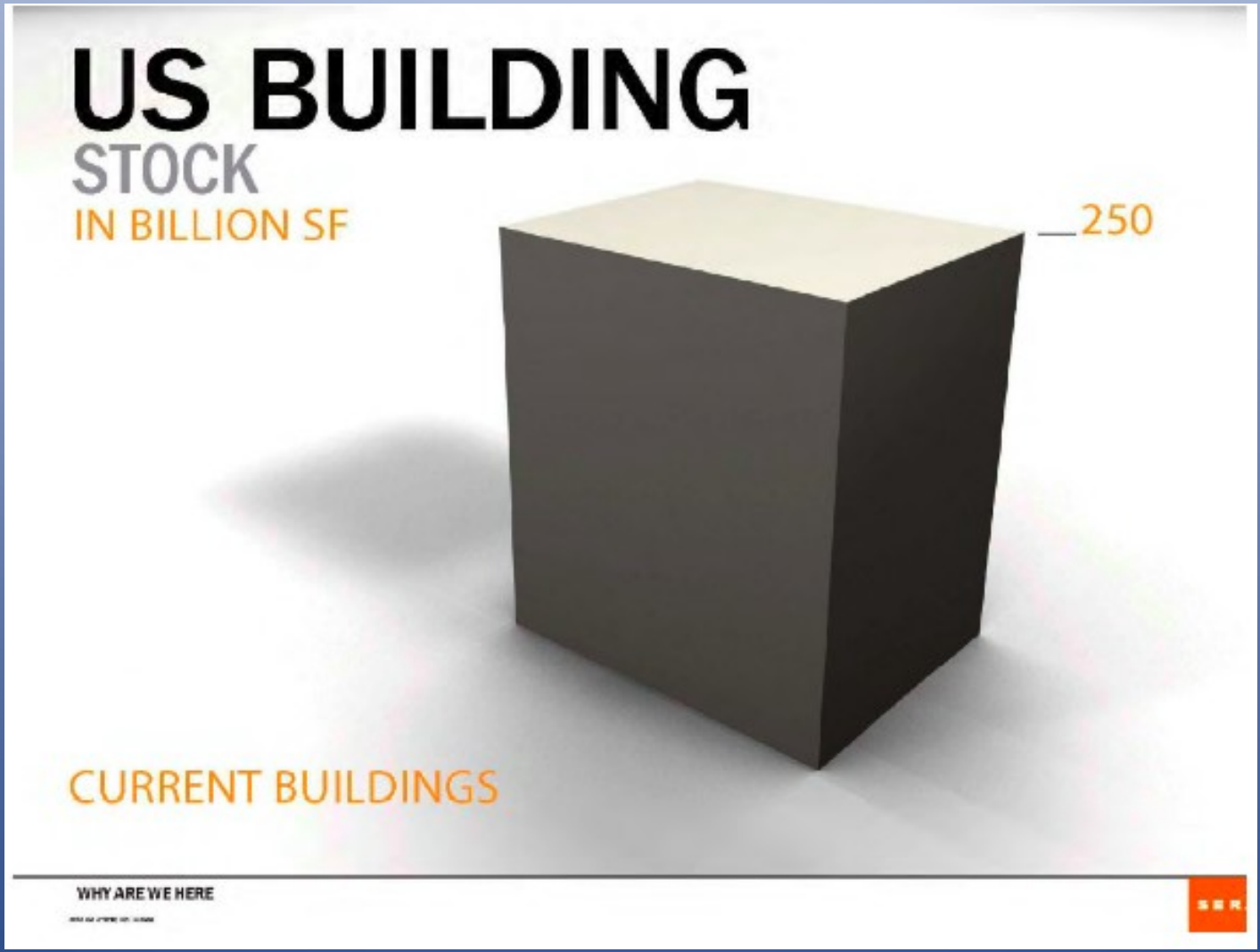

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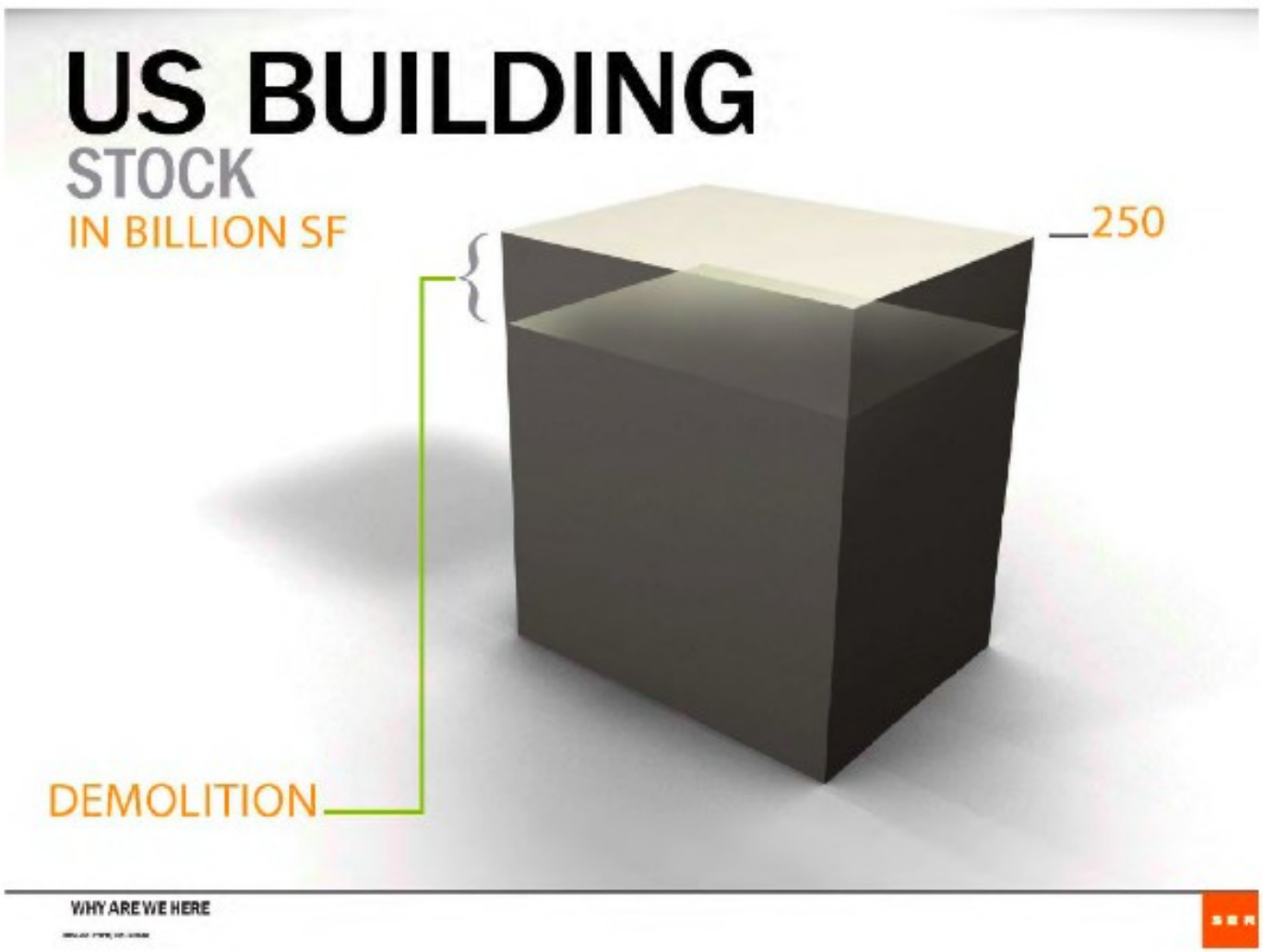

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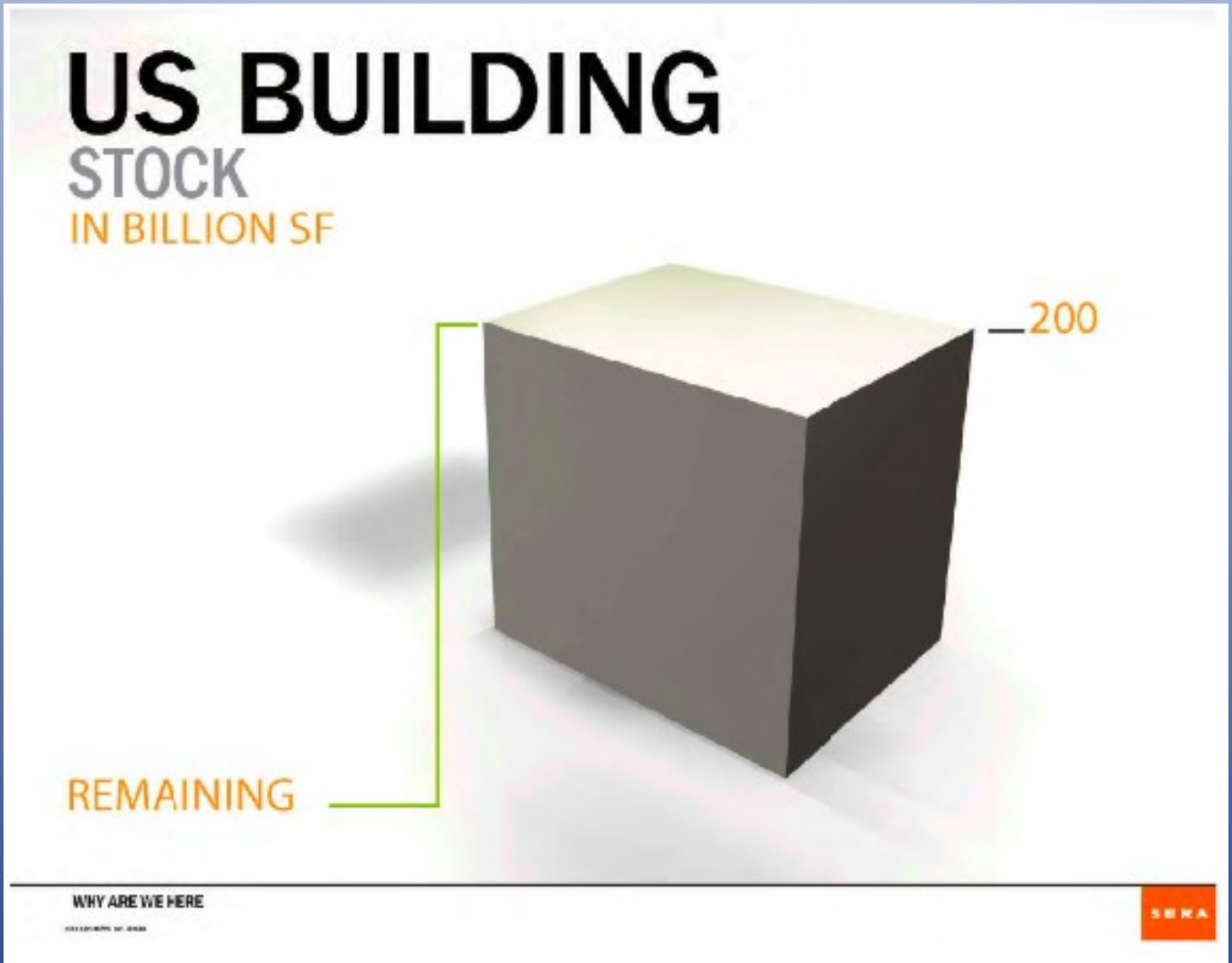

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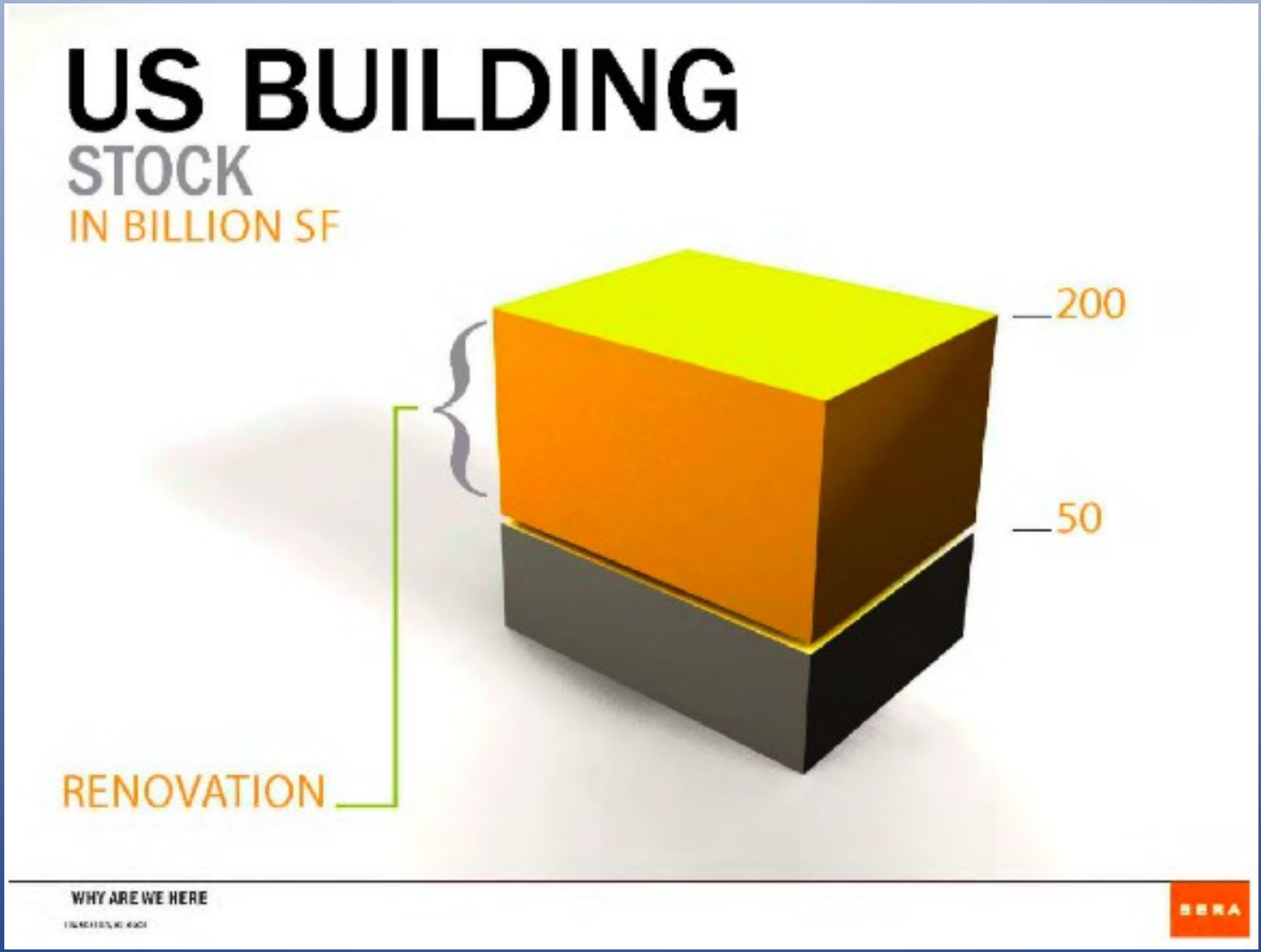

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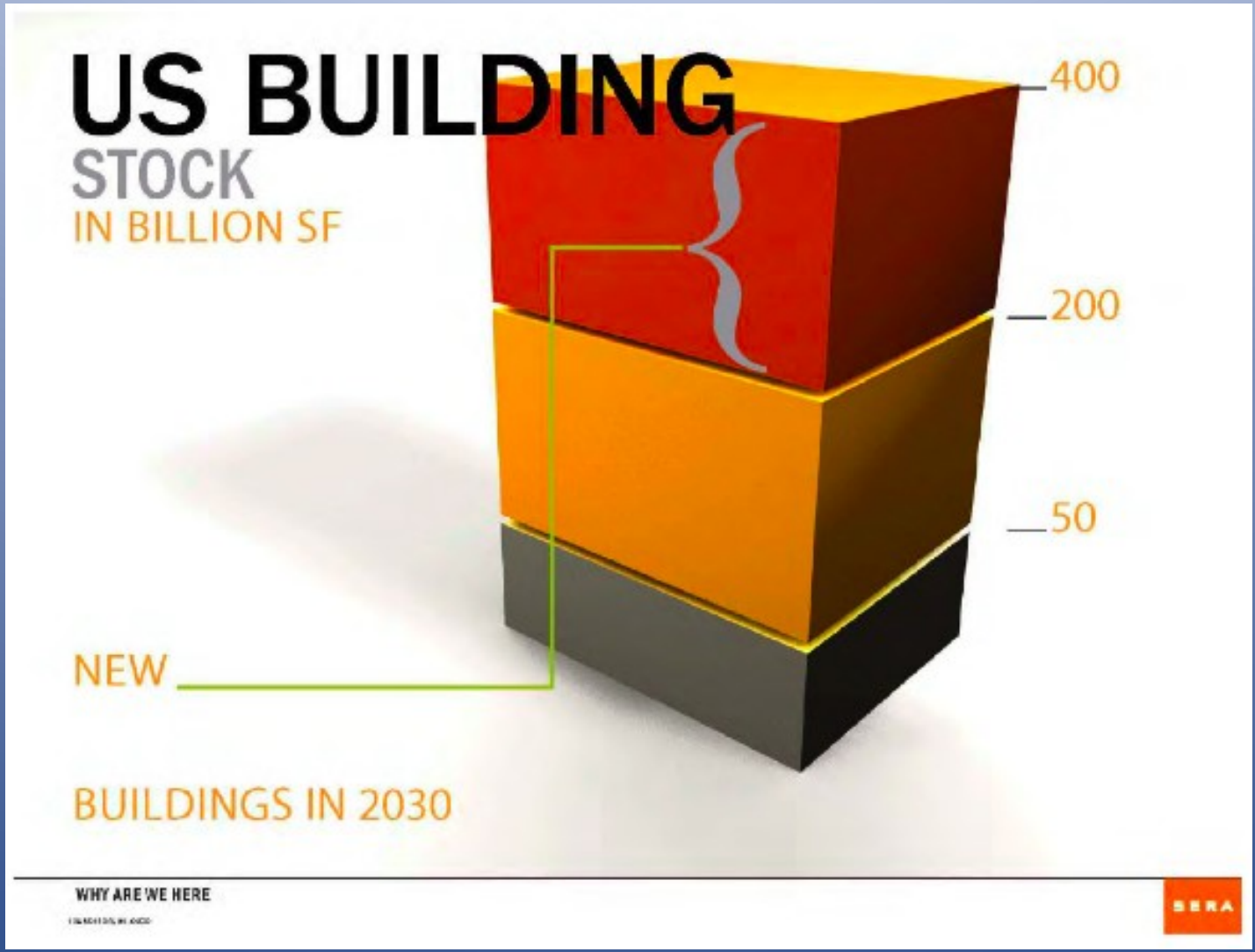

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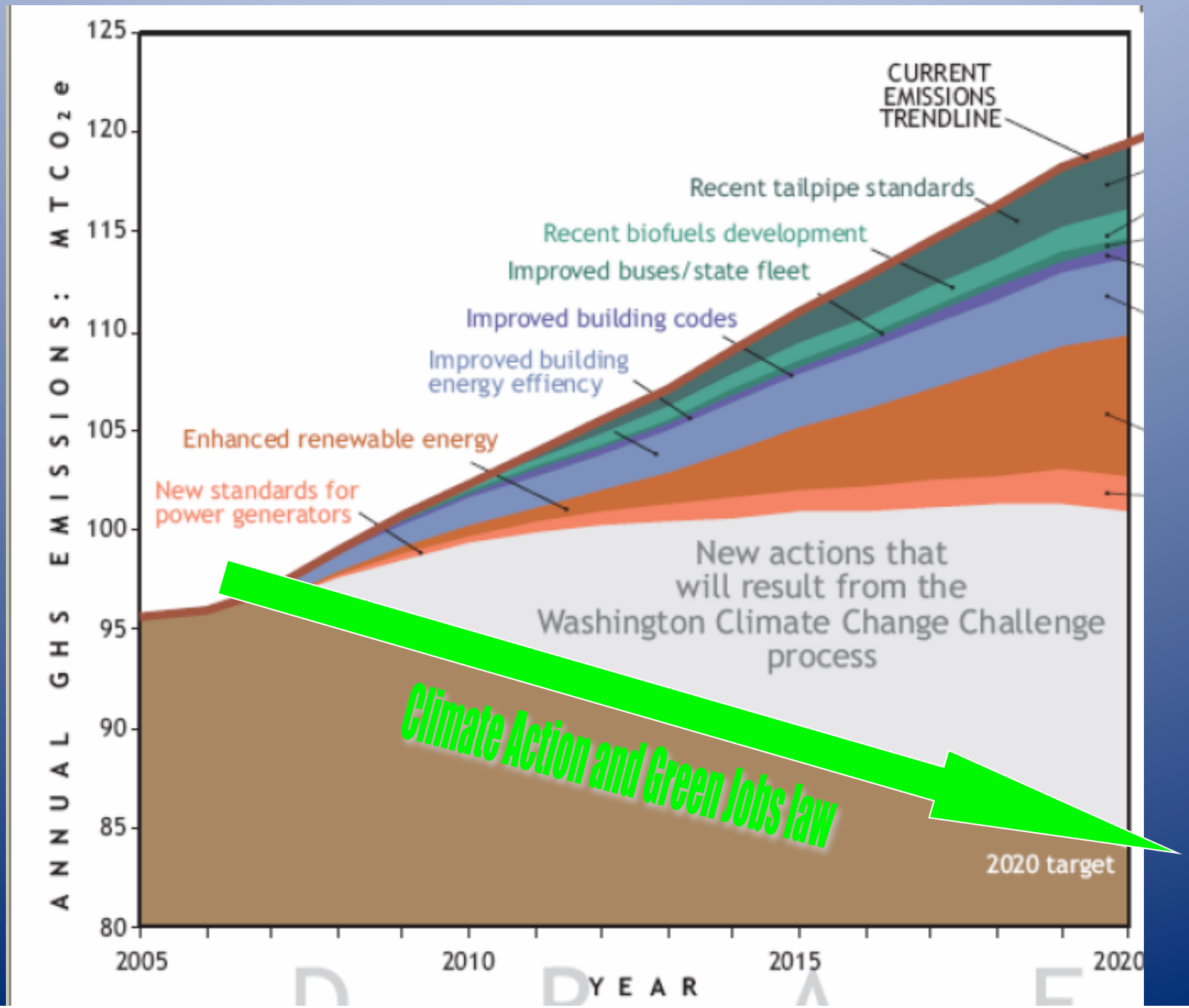
ANNUAL GHS EMISSIONS: MTCO2e
125
120
115
110
105
100
95
90
85
80
2005
2010
2015
2020
YEAR
CURRENT EMISSIONS TRENDLINE
Recent tailpipe standards
Recent biofuels development
Improved buses/state fleet
Improved building codes
Improved building energy effiency
Enhanced renewable energy
New standards for power generators
New actions that will result from the Washington Climate Change Challenge process
Climate Action and Green Jobs law
2020 target

Overview of WA Climate/Clean Energy Policy Framework

- I-937 Renewal Portfolio Standards
- Greenhouse Gas Emissions Limits
- Emissions Inventory and Reporting
- Creating Green Economy Jobs
- Reducing Emissions from Transportation
- Reducing Emissions from Electricity and Buildings

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WA Energy Efficiency Standards

- Washington has some of the most aggressive energy efficiency standards in the country:
  - Minimum standards for appliances
  - Requirements for energy efficient new buildings, especially publicly funded buildings

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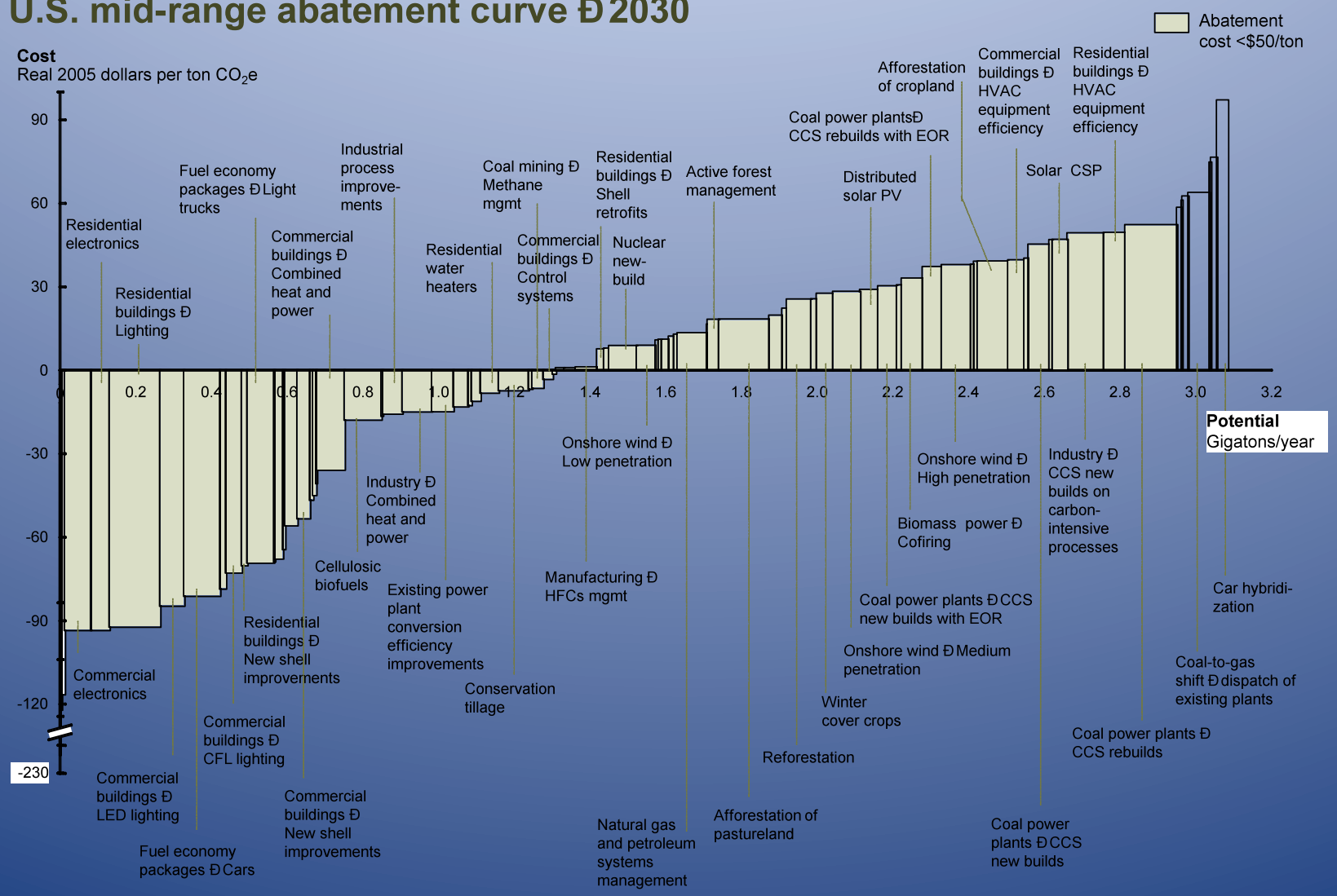
U.S. mid-range abatement curve Ð 2030



Source: *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?*, Executive Report, McKinsey & Company, December 2007

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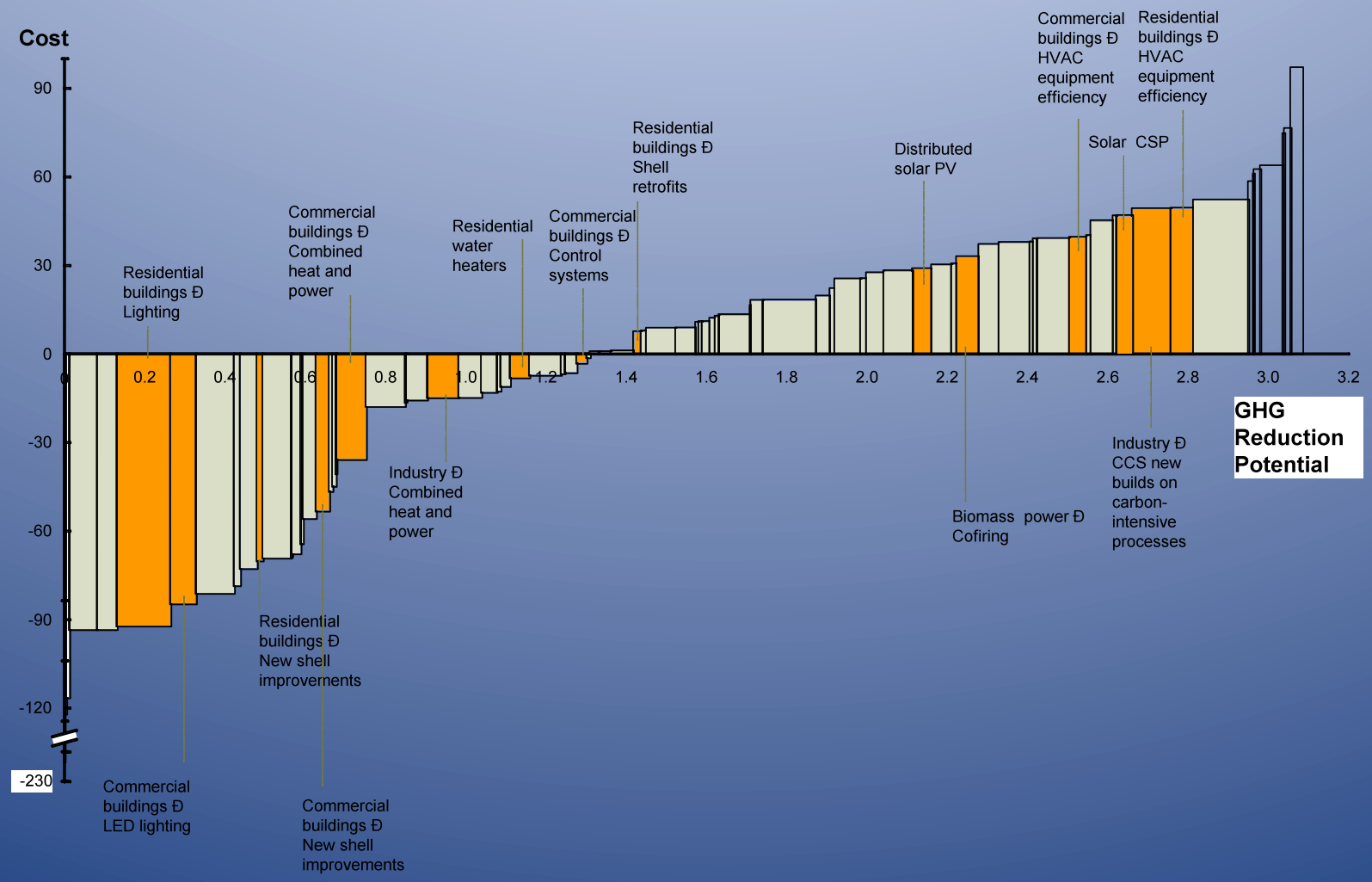
U.S. mid-range abatement curve Ð 2030



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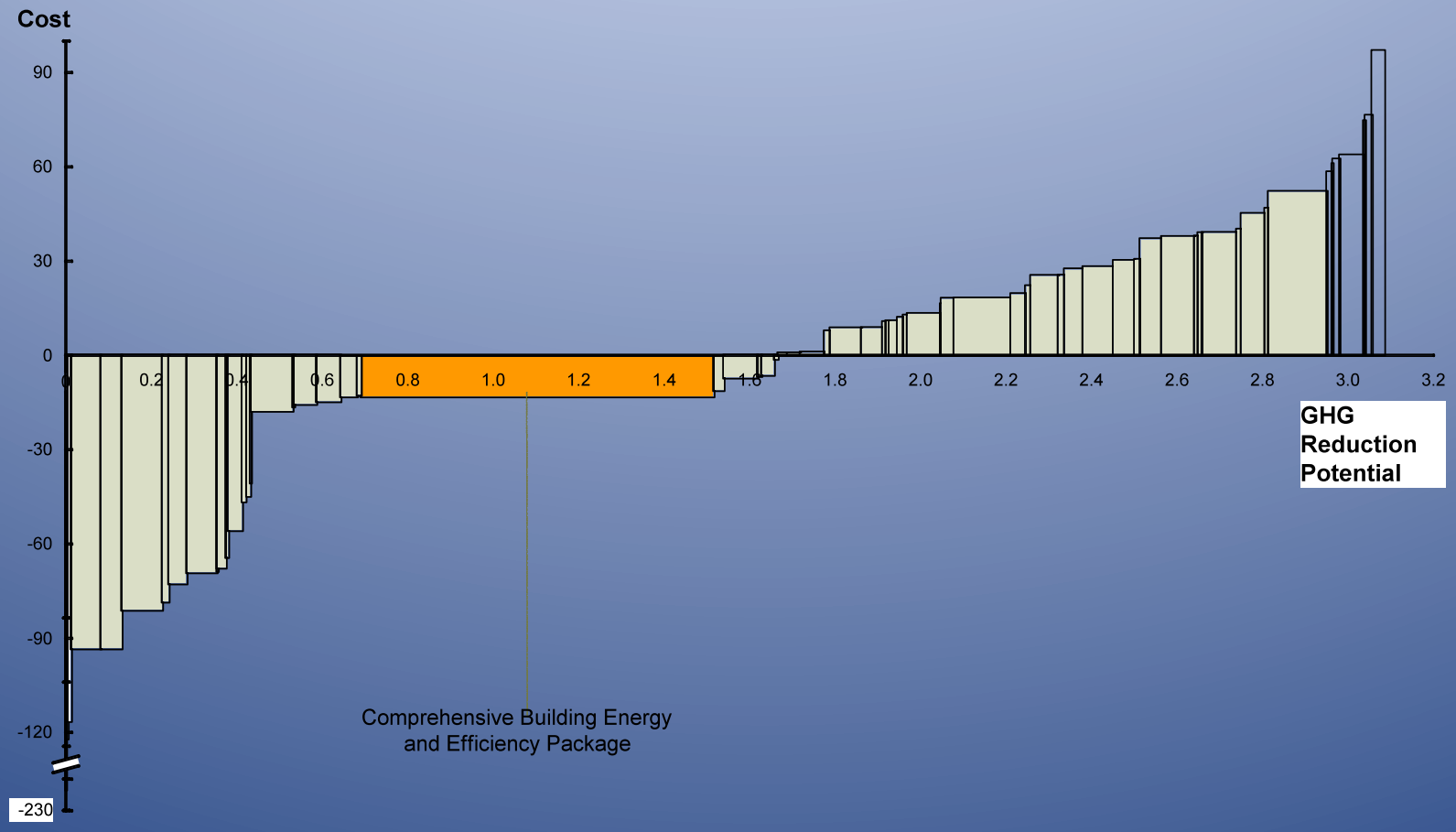
U.S. mid-range abatement curve Ð 2030



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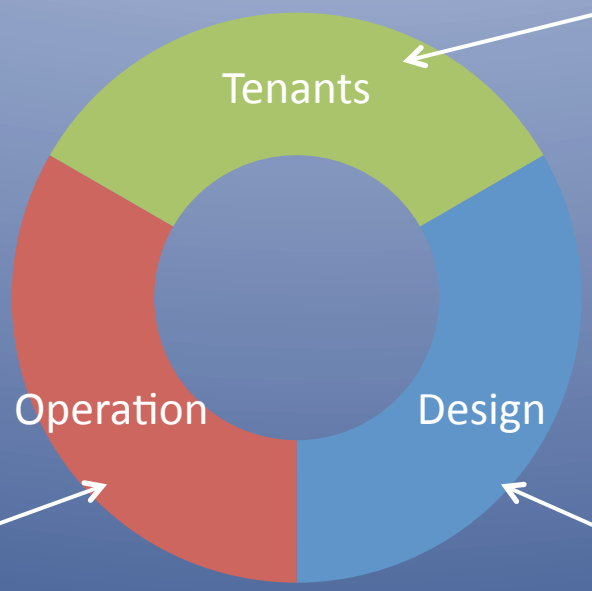
What Drives Building Performance?



Computers
and Equipment
Schedule
Habits

Staffing
Controls
Maintenance
Commissioning

Layout
Integration
Installation
Components and Features

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Feedback to Building Occupants

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Real-Time Performance Information

Energy Certificate

Building Energy Performance >		As built:	In use:
Certificate type	FULL	Asset Rating	Operational Rating
Building Type	Office		
Whole or part of building	Whole building		

Very energy efficient

A

B

C

D

E

F

G

Not energy efficient

As built: **B**

In use: **D**

		Calculated	Actual
Asset rating method:	UK National Standard 2004		
Operational rating method:	UK Office Tailored Benchmarks 2002	**48**	**83**
Units used:	**kg CO_2 per sq m of net area per annum >**		
Occupancy level	Square metres net lettable area per person	14	12
Equipment heat gain level	Watts per square metre net	12	12
Weekly occupancy hours	Hours per week	55	58
Heating performance ratings		ABCDEFG	ABCDEFG
HVAC performance ratings *(cooling, fans and pumps)*		ABCDEFG	ABCDEFG
Lighting performance ratings		ABCDEFG	ABCDEFG
Management rating *(for in-use performance only)*			ABCDEFG
Internal Environmental Quality			Not assessed
Risk level			Not assessed

Further information can be found in the Energy Log Book

GB 2004

Directive 2002/91/EC

Building Labeling

CITY OF EDMONDS

Inc. 1890

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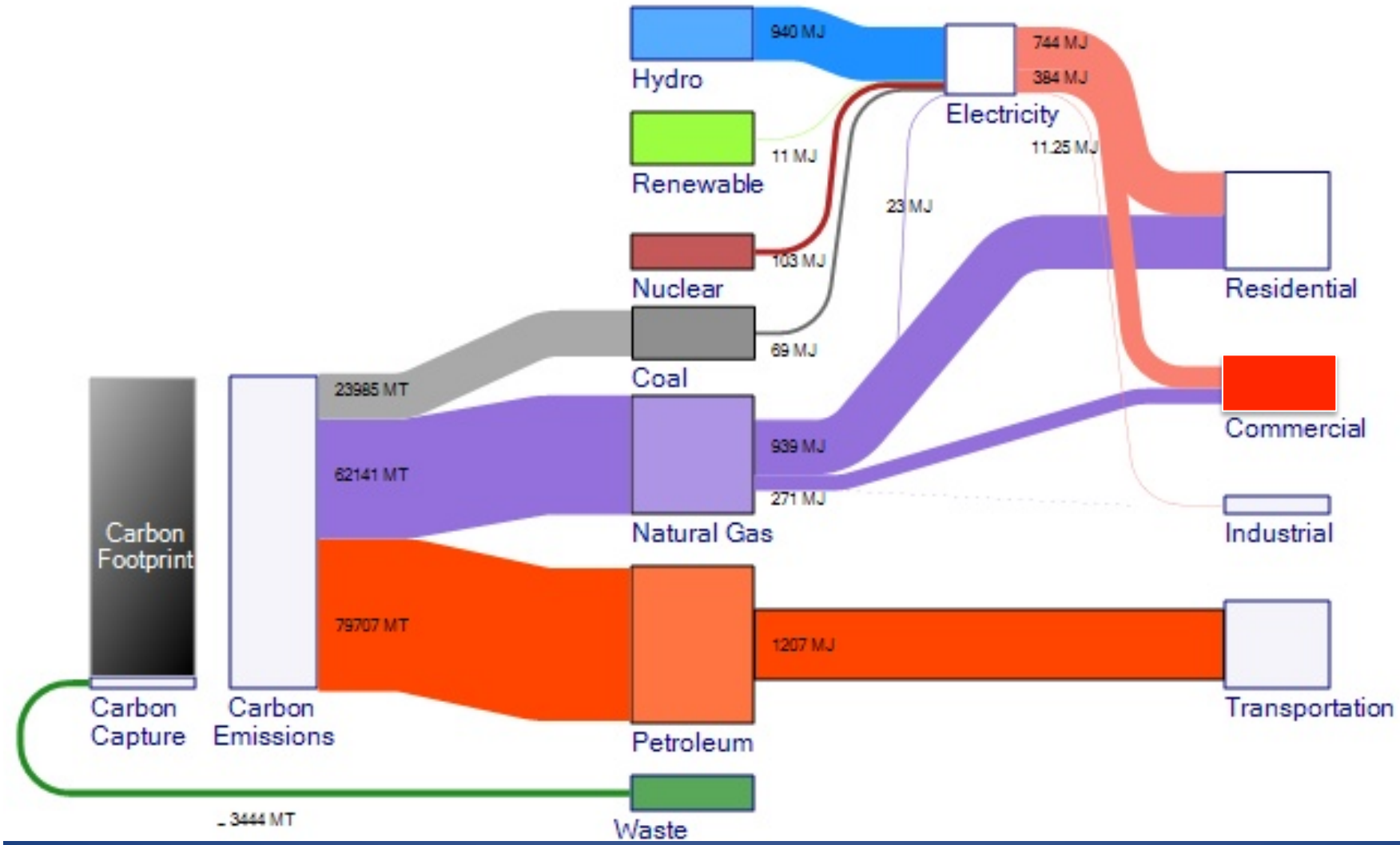
City of Edmonds Energy Map 2009



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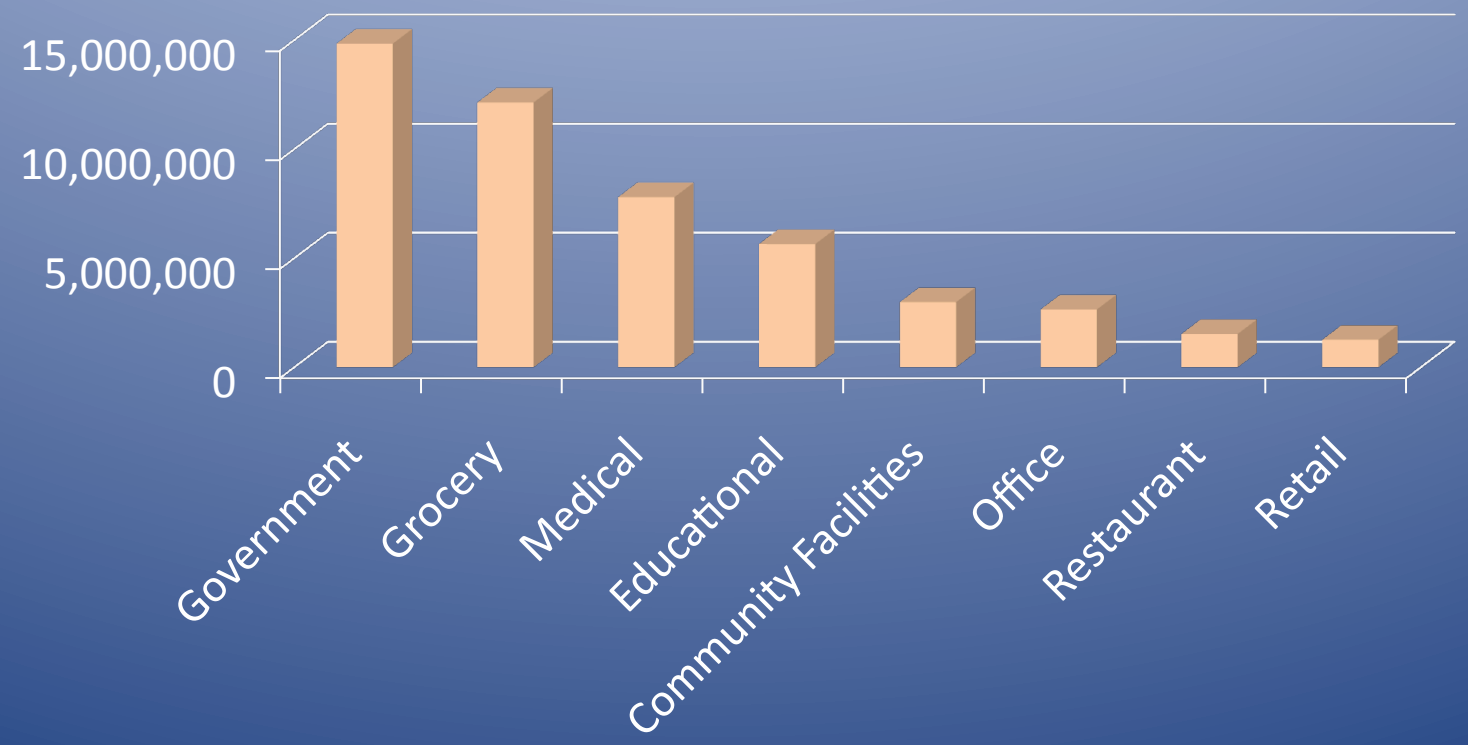
Where are Opportunities?

KWh Usage for Top 20 Commercial Customers by Sector



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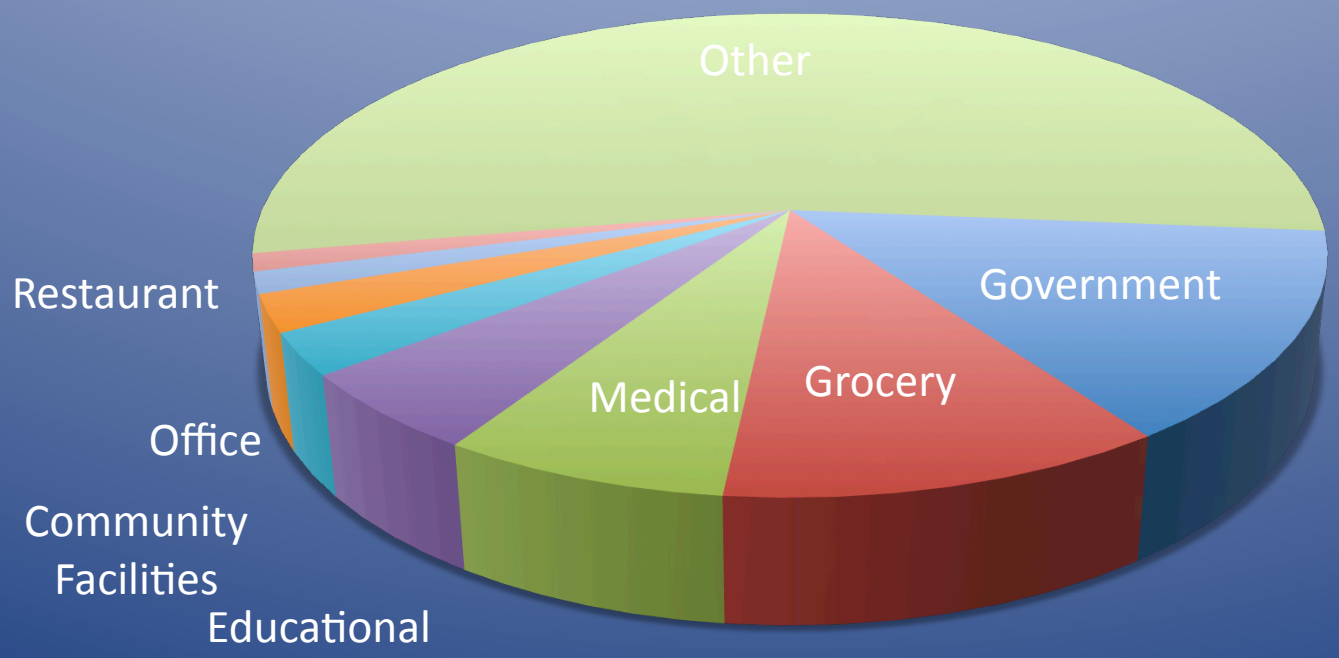
Where are Opportunities?

Top 20 Commercial Customers
Use 48% of KWhs



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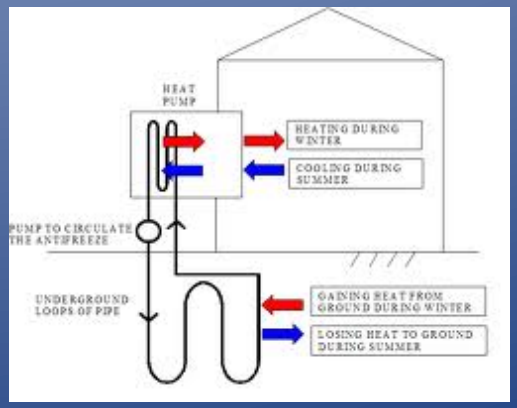
Edmonds Library Retrofit

- Building energy retrofit in 2006
- Two stage heat pumps
- New Direct Digital Controls (DDC)



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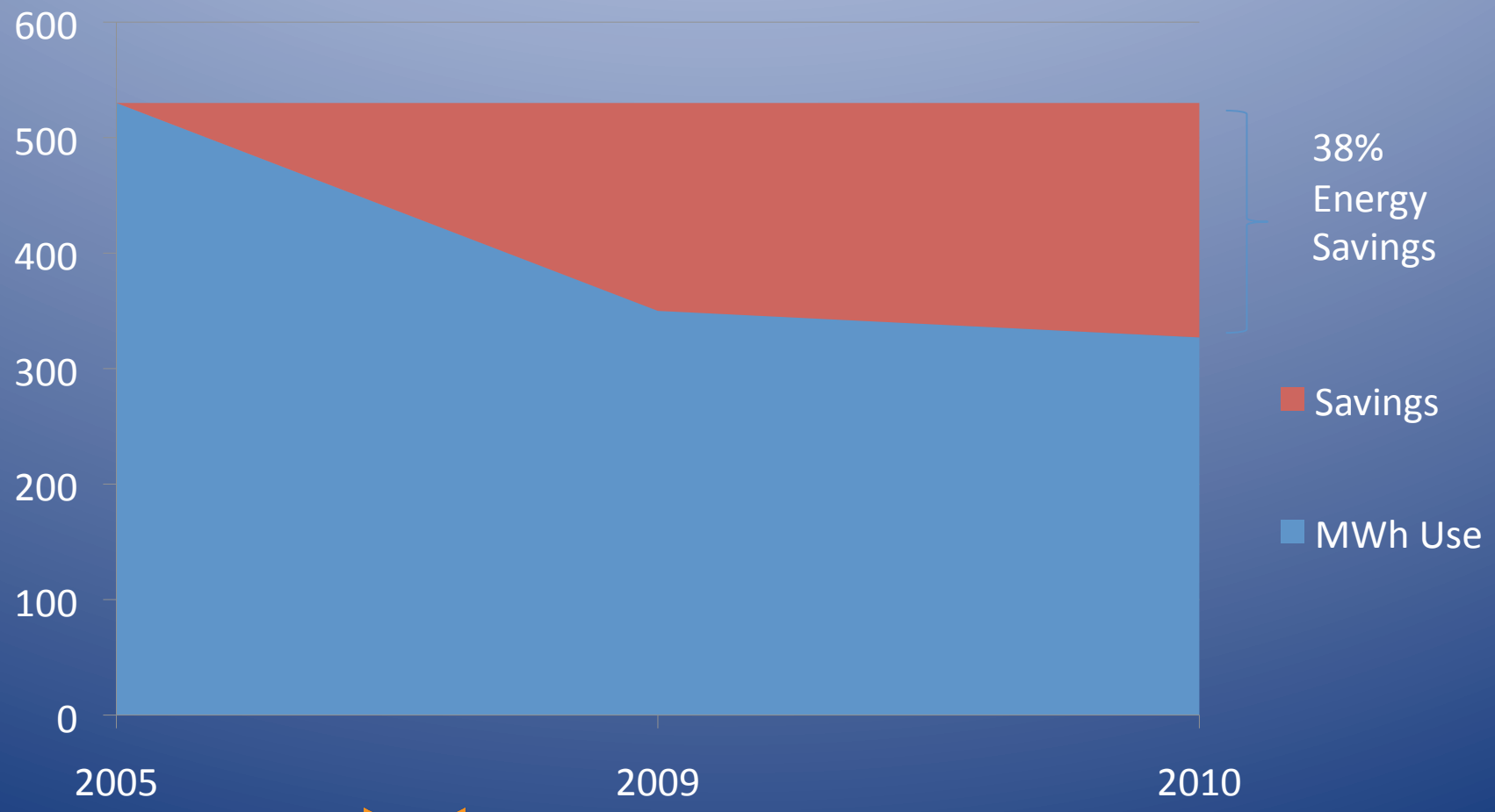

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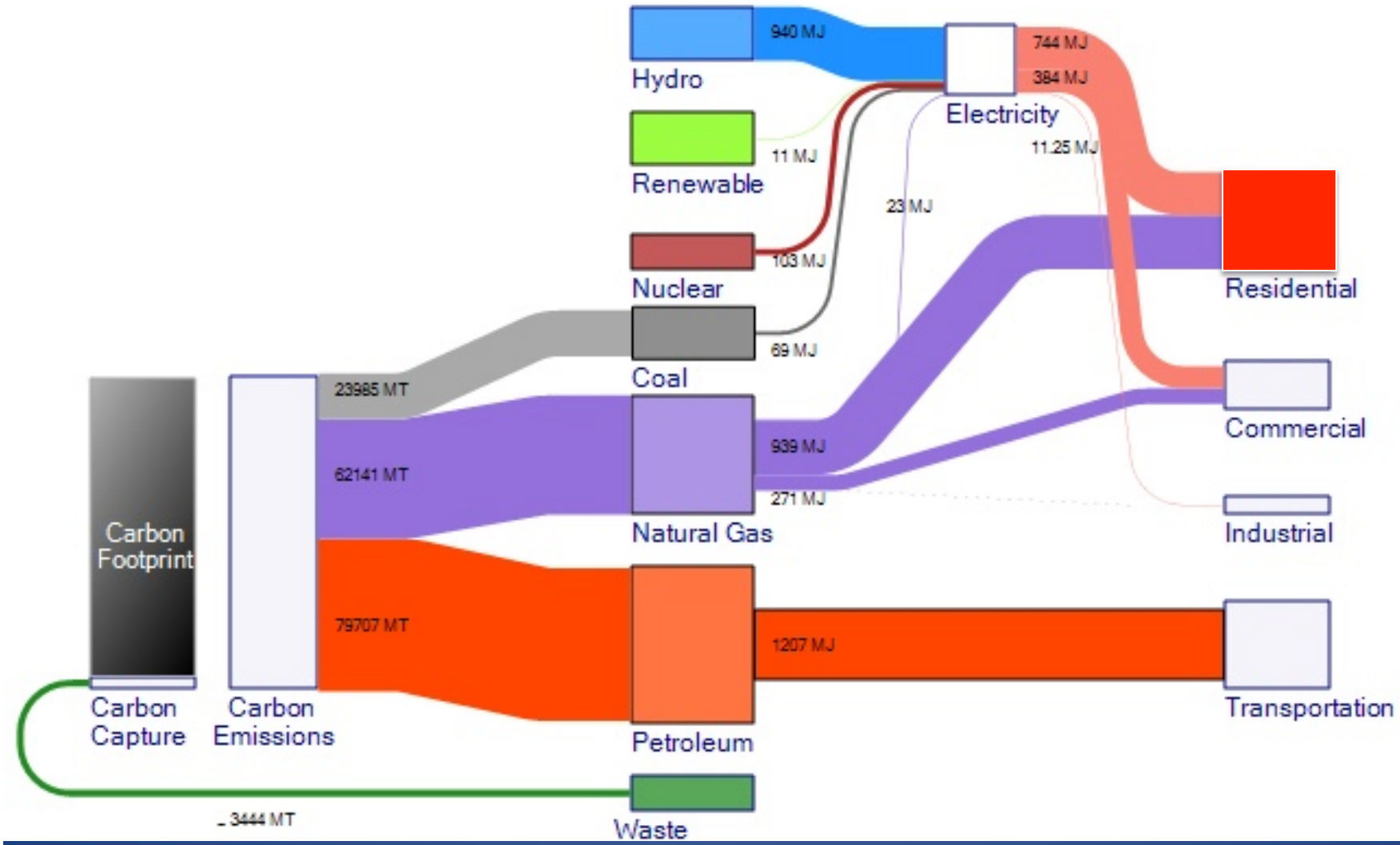

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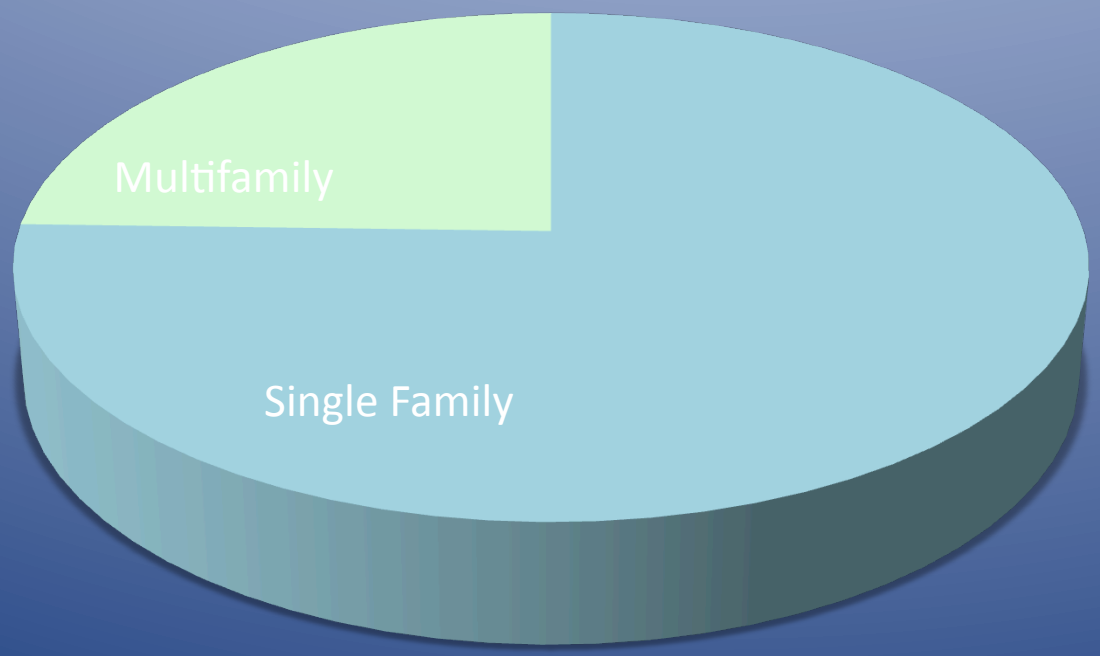
Residential

18,016 Units

Edmonds Housing Units



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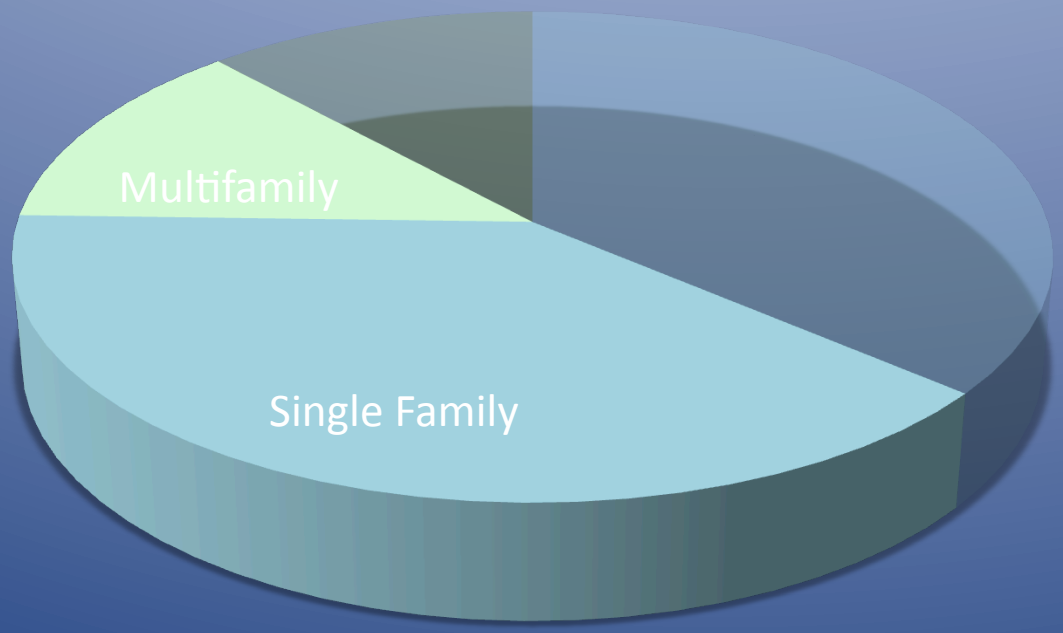
Residential



18,016 Units

9,486 built prior to 1980

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Residential

- Residential Pilot Program Partners
  - Sustainable Edmonds
  - Sustainable Works
  - Snohomish County
  - Washington State Department of Commerce
  - Puget Sound Cooperative Credit Union

Sustainable Edmonds
Local actions for global challenges

SustainableWorks
Conserving Energy. Creating Jobs.

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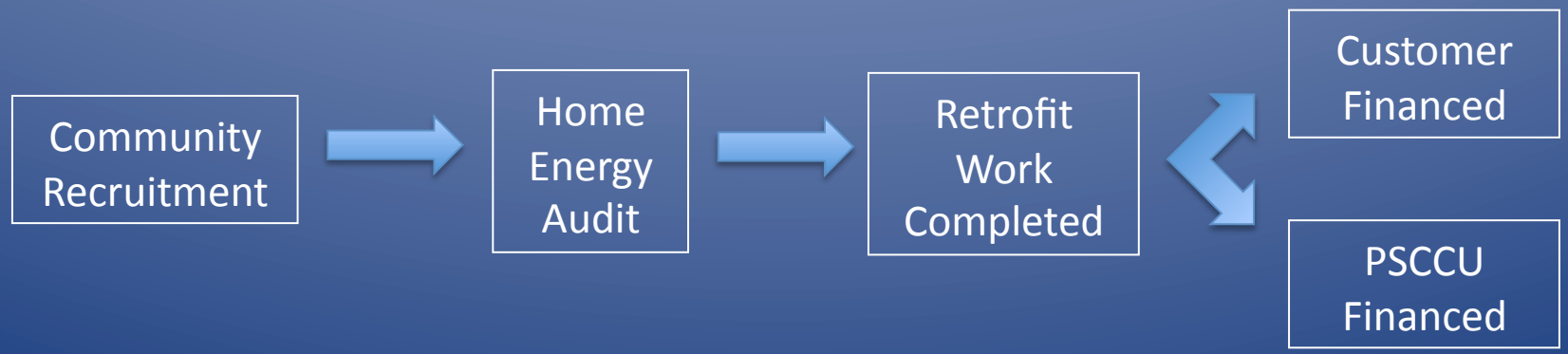
Residential

- Sustainable Works Residential Model
  - Community Organizing
  - Neighborhood Economies of Scale
    - Reduced Contractor Mobilization Costs
    - Bulk Purchasing



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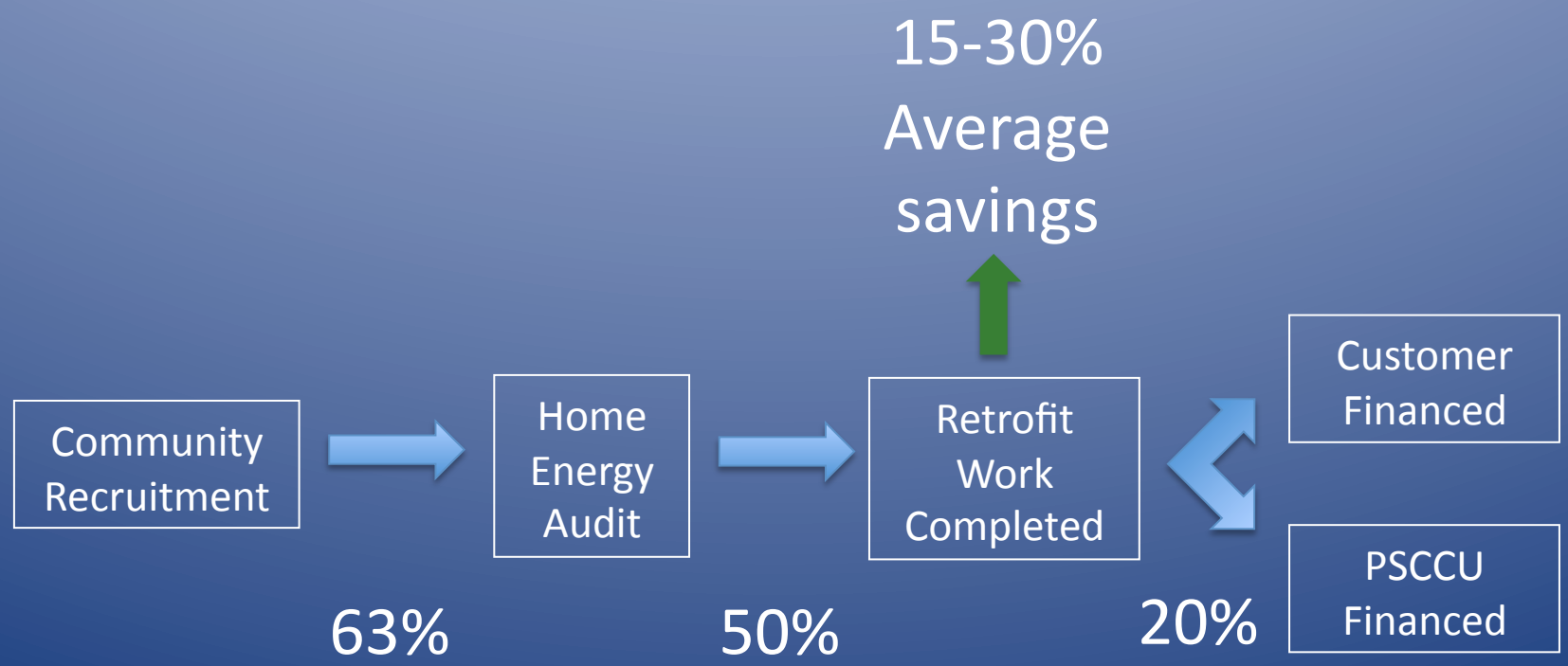
Residential

- Sustainable Works Residential Results



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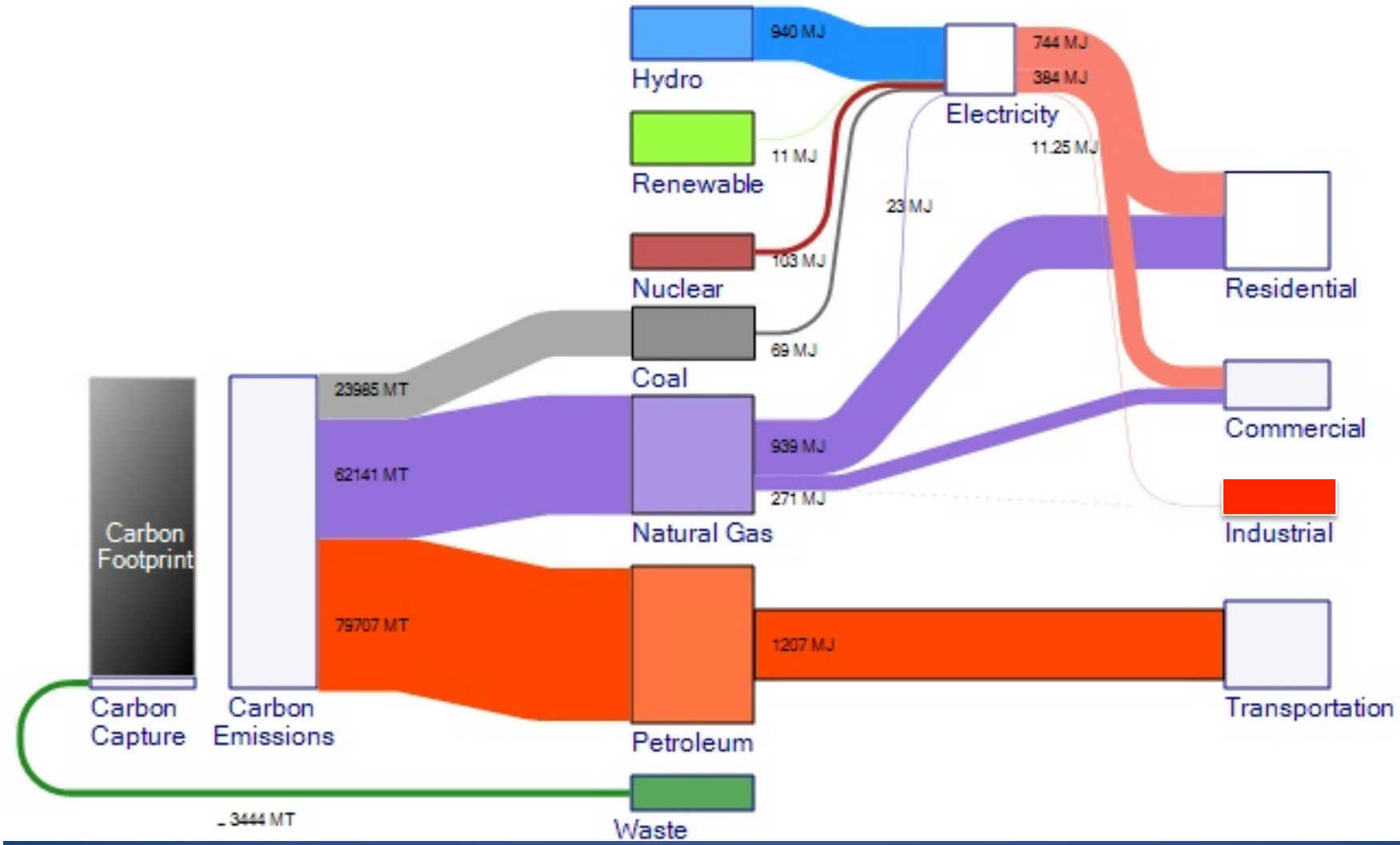

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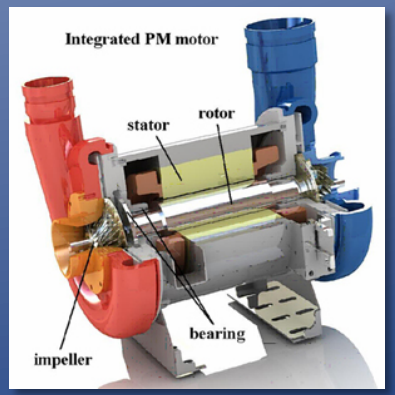
Industrial

- Edmonds Wastewater Treatment Plant
  - 4,000 MWh total energy consumption
    - 4% of citywide electrical load
  - Centrifugal blowers use 38% of energy
  - Variable speed drive blowers 30% more efficient
  - Reduced overall facility usage by 11%



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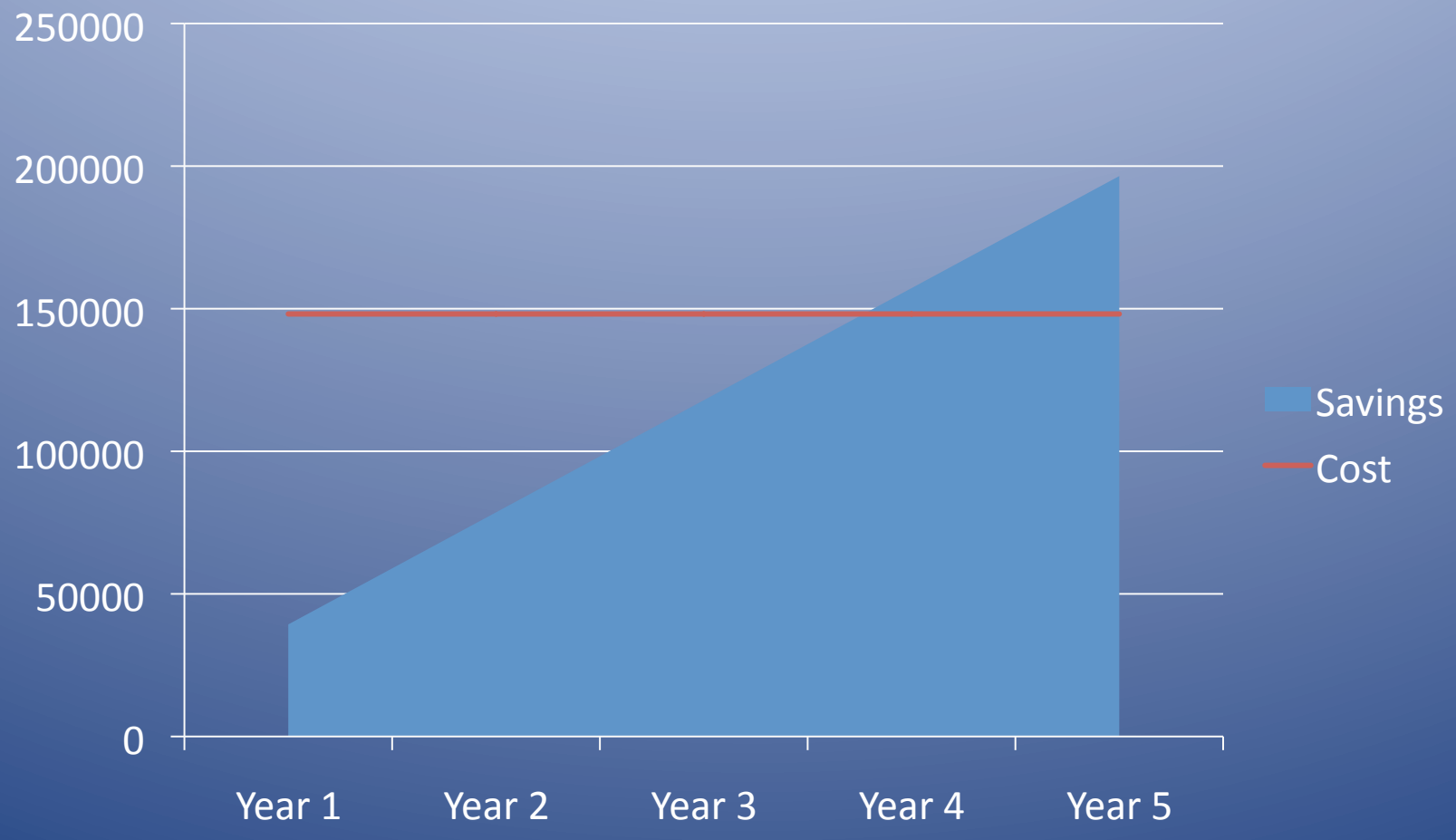
Industrial



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