2nd Course: Dessert!

(Only After Your Veggies)

Moderator: Jim Knutson, Rocky Mountain Trane
Panelist: Dane Taival, Trane
Panelist: Andy Walker, NREL
Panelist: Leslie Laroque, McKinstry

Governor's Energy Office

A Perfect Storm for Performance Contracting

A Manufacturer-b a s e d E S C Oô s P e r

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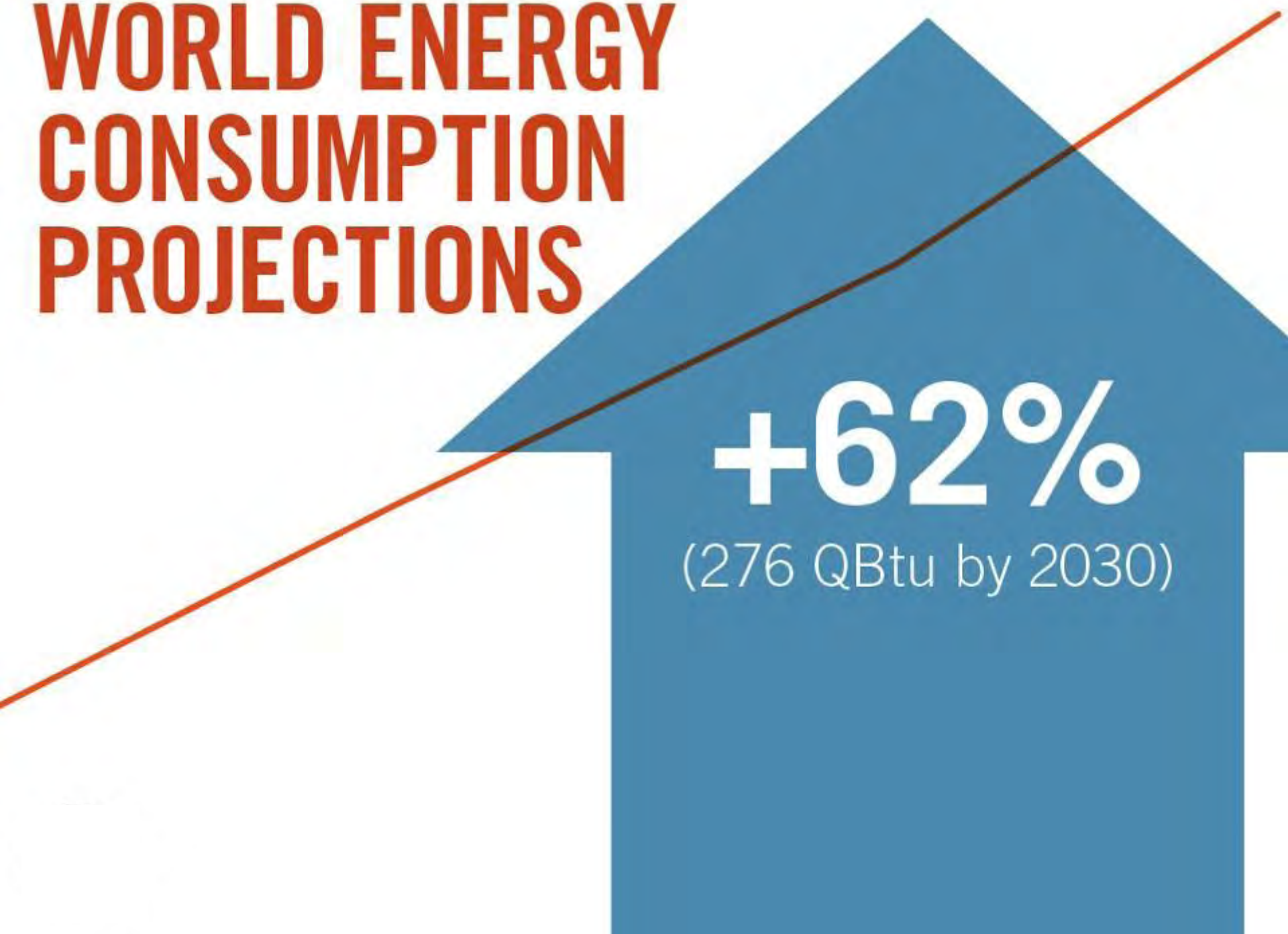
WORLD ENERGY CONSUMPTION PROJECTIONS



1 QBtu

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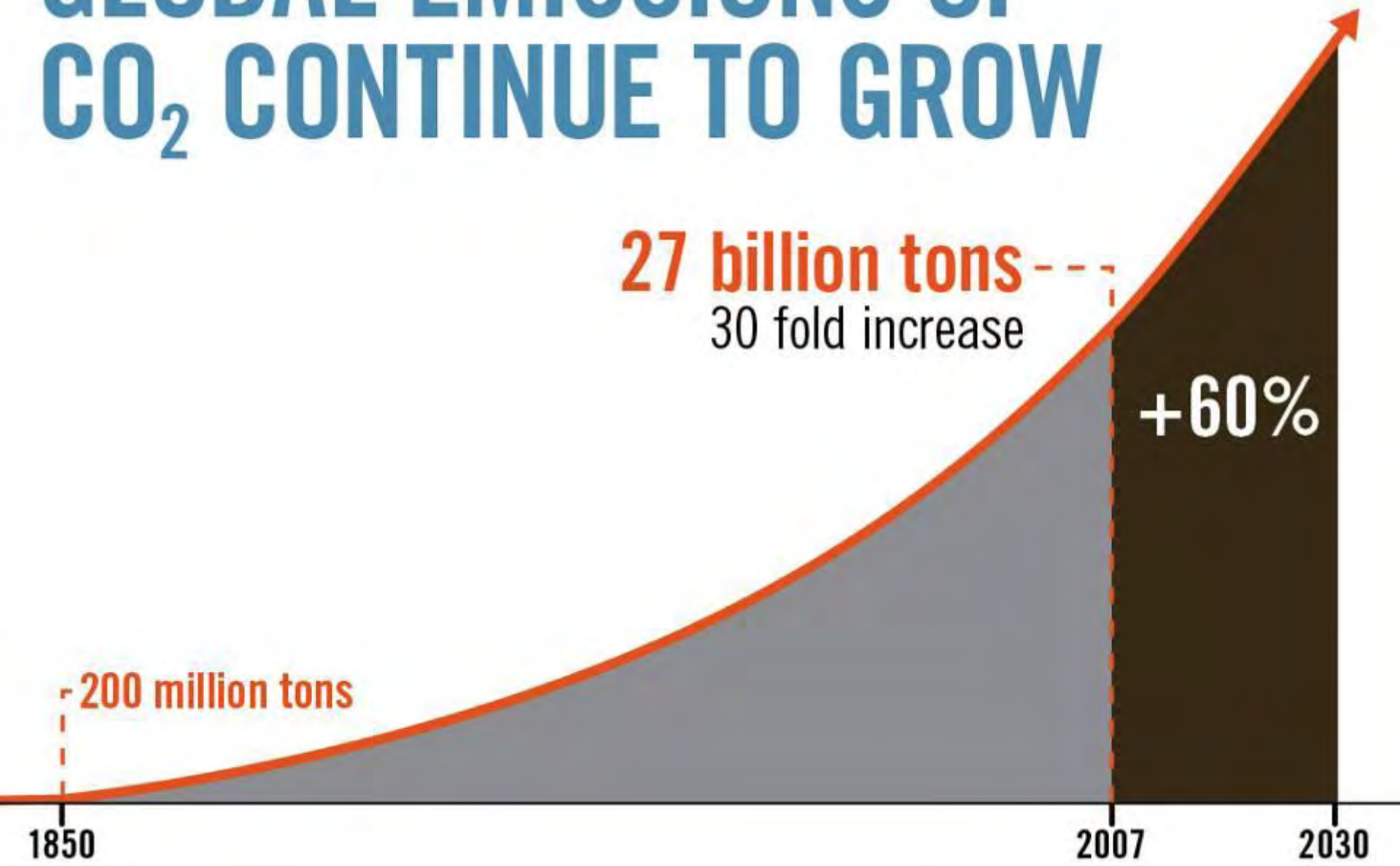
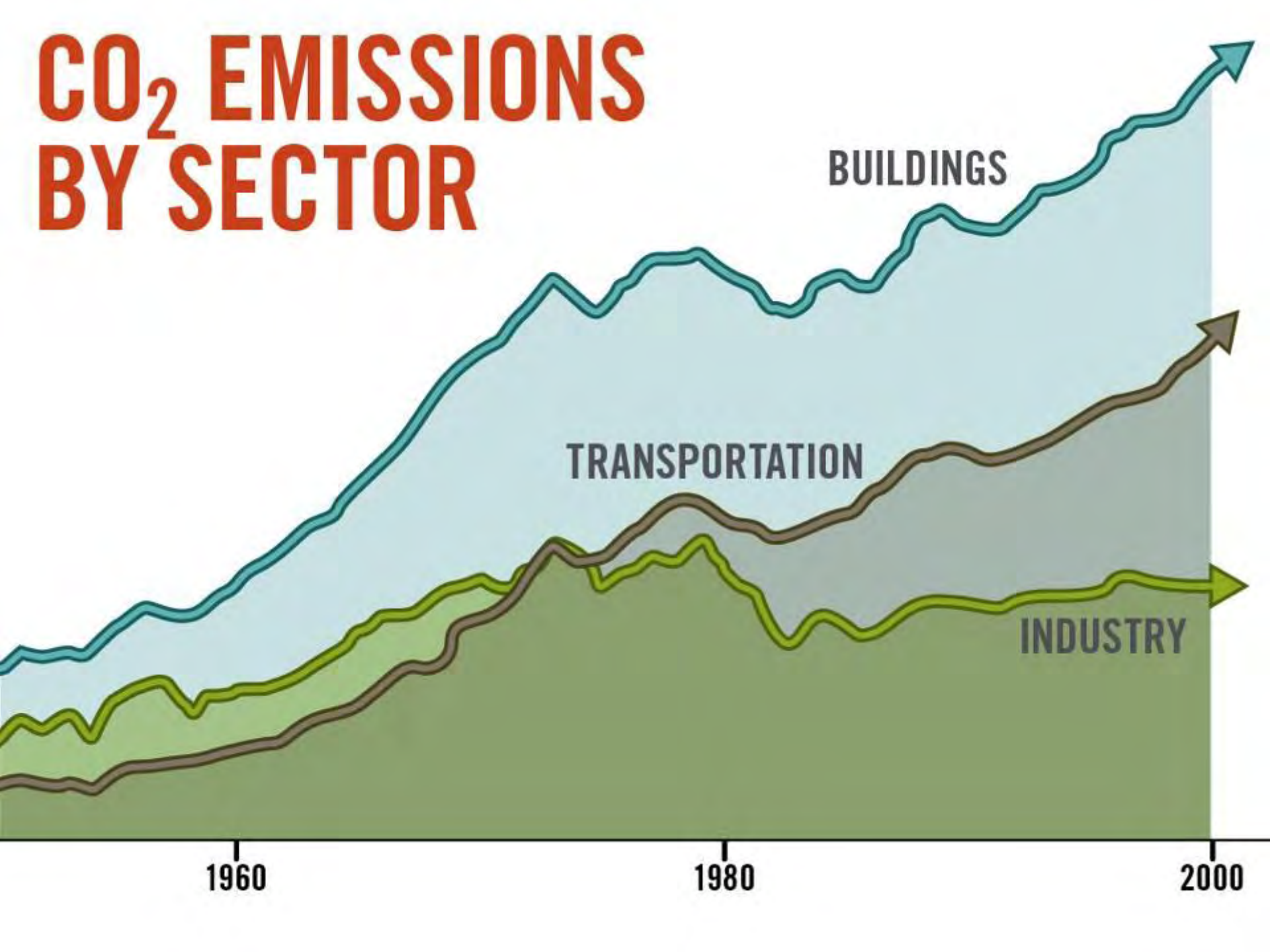
11,000
New Power Plants

GLOBAL EMISSIONS OF CO_2 CONTINUE TO GROW




CO_2 EMISSIONS BY SECTOR
BUILDINGS
TRANSPORTATION
INDUSTRY
1960
1980
2000

C40 CITIES
CLIMATE LEADERSHIP GROUP

CLINTON FOUNDATION

CLINTON CLIMATE INITIATIVE

ñClimate change is a global problem tha
banks and cities partnering with my foundation are addressing the issue of global
warming because itôs the right thing to
bottom line. Theyôre going to save mor
tremendous collective impact on climate
showing leadership on the critical issue of climate change and I thank them for their
commitment to this newWilliam J. Clintant ive.ò

Program Summary

- **Clinton Foundation partners**
  - City governments + Energy services companies + Financial institutions + Trade organizations
- **Program aimed at reducing energy use in existing buildings**
  - Responsible for over 50% of greenhouse gas emissions in most cities and over 70% in mature cities such as London and New York
- **Key way to reduce energy use and greenhouse gas emissions is to retrofit their <u>existing</u> buildings**
  - Retrofits and upgrades paid for from savings using performance contracts

Program Summary
c o n t i n u e d é

- **The four largest global energy services companies are CCI partners**
  - Agreed to scale up capacity for retrofits across C40 partner cities
  - Provide performance guarantees on the energy savings
- **Five major global financial institutions have agreed to finance the first generation of retrofit projects**
  - Each bank has committed to arrange $1 billion for this effort for a total pool of $5 billion
- **USGBC and ASHRAE to help coordinate training**
- **Program recently expanded to include Higher Education, Commercial Office buildings and other market segments**

Trends and Observations for Energy Efficiency

Energy Use in Buildings Projected to Continue Growing

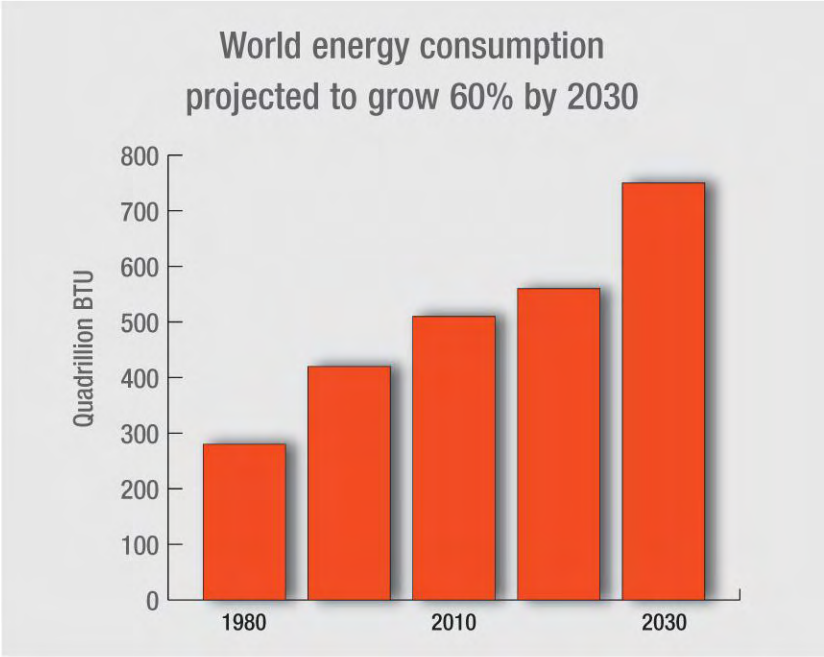
Buildings consume 1/3 of energy worldwide

Energy demand in buildings will continue to grow, due to:

- Population growth
- Construction in urban areas
- Developing nation progress

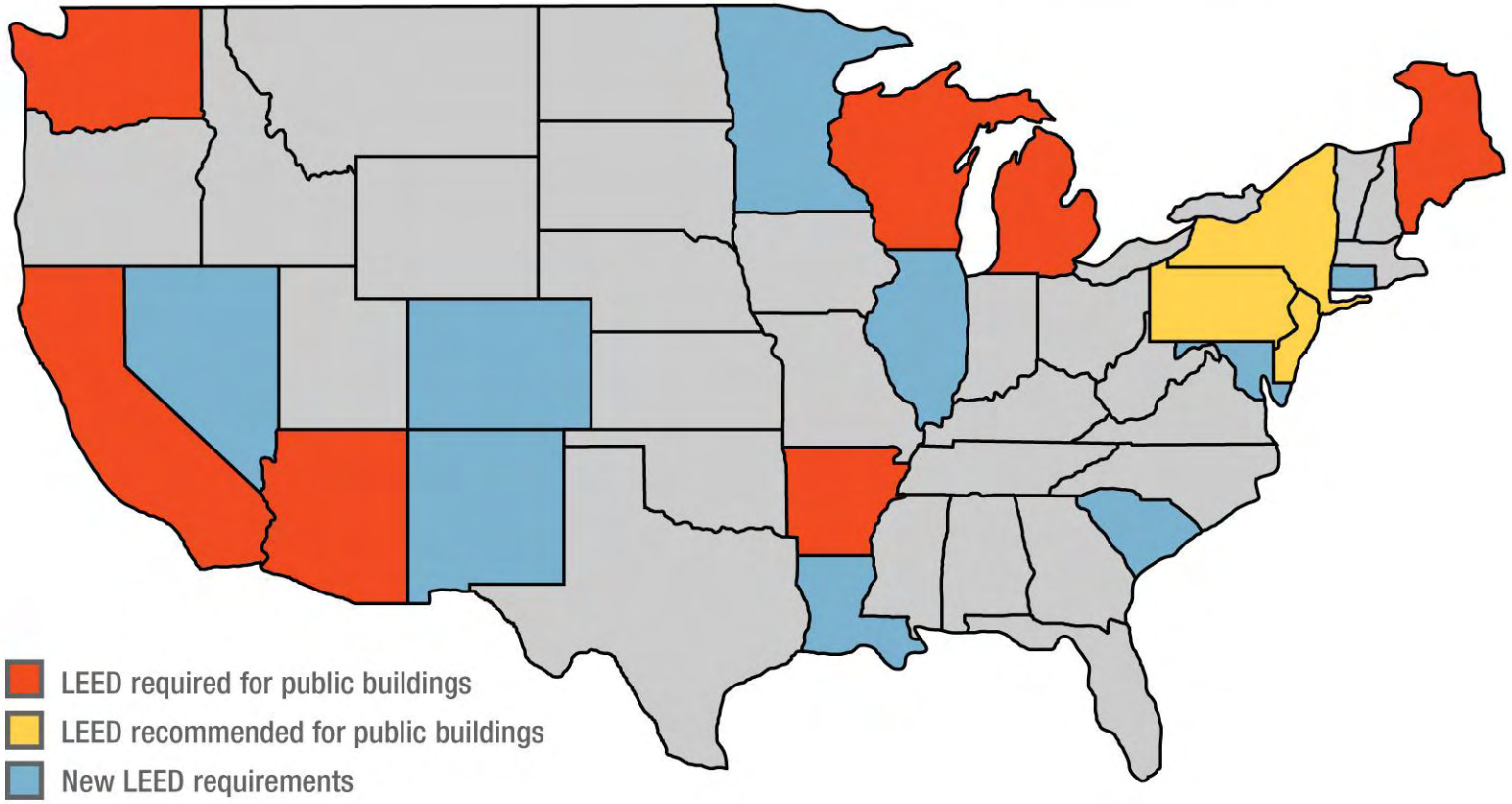
In the U.S. 15 million new buildings will be built by 2015

Building Sector Strains energy resources

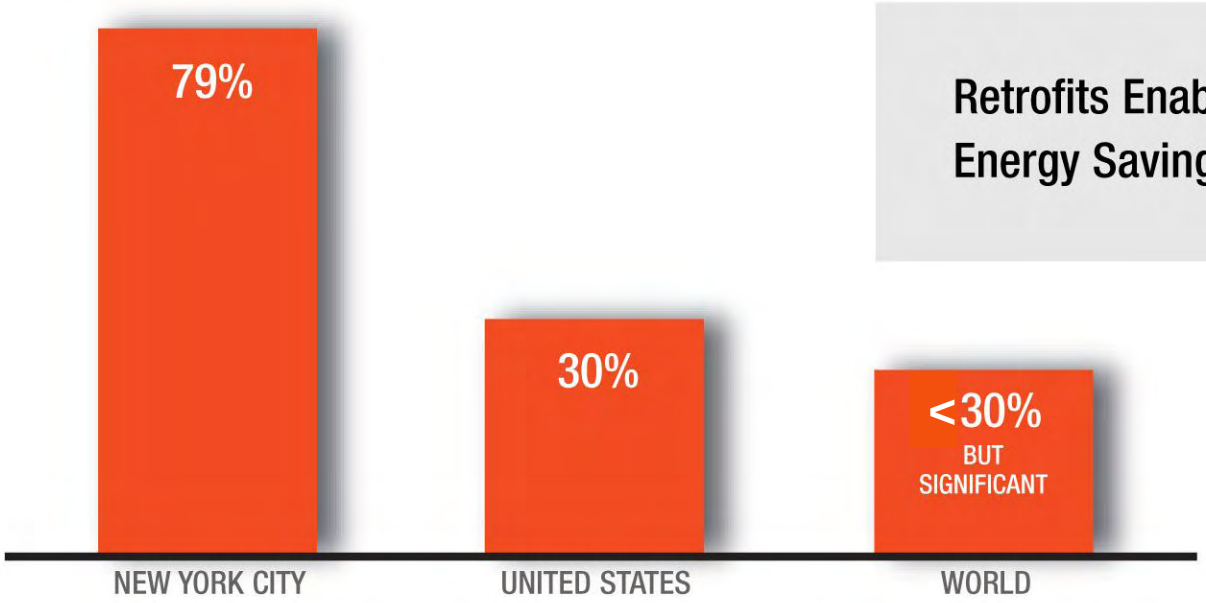


Source: Energy Information Administration

States Are Addressing This...
Increasing Focus on Energy Efficiency



Energy Use in Buildings – Single Greatest Contributor to Global Warming



Retrofits Enable 20-50% Energy Savings

% of Carbon Emissions Attributed to Existing Buildings

Energy Efficient Technologies: Today

HIGH EFFICIENCY CHILLED WATER SYSTEMS

- Large commercial/industrial buildings
- Generate chilled water for cooling
- Reduce energy consumption by half

ENERGY RECOVERY

- Commercial/industrial/school/hospital
- Less energy to cool fresh air brought into the building in summer
- Less energy to pre-heat cold fresh air from outside in winter
- Free energy to provide hot water

INDOOR AIR QUALITY

- Proper ventilation with minimum energy necessary
- Temperature and humidity control provide occupant comfort
- Filtration options ensure good IAQ
- Enhance individual performance level

DISTRICT COOLING/HEATING SYSTEM

- Multiple buildings/ campus/ industrial
- Higher overall system efficiency
- Beautify city outlook
- Diversity among the buildings to be served

GEOTHERMAL HEAT PUMP SYSTEM

- Residential and commercial buildings
- Pump energy from underground
- Enjoy energy saving all seasons

THERMAL STORAGE SYSTEMS

- Large city with high peak demand
- Shift demand from daytime to night
- Reduce blackout during hot summer

Renewable Energy Case: Geothermal Saves Fort Knox A Bundle

CHALLENGE:

- 170-square-mile U.S. army base, pop. 27,000
- Outdated systems, neglected maintenance
- Mandate to reduce energy use 35% by 2010

SOLUTIONS:

- World's largest geothermal heating and cooling system
- New and upgraded HVAC equipment and controls
- Performance contracting agreement to finance the project through energy & operational efficiency gains

OUTCOMES:

- On target for energy reduction goals
- Annual savings of $3.5 mil
- Cut emissions by 1/3

Thermal Storage Pays Off for Morgan Stanley

CHALLENGE:

- 3-story building in Westchester, NY
- Aging equipment, high energy costs
- Need for additional cooling capacity

SOLUTION:

- 1400 chiller operates at .576 kW/ton in day mode/ .733 kW/ton in ice-making mode
- Flexible system can run on chiller, ice or combined

OUTCOMES:

- Reduced fuel consumption by 15,000 MMBtu
- $300,000 incentive from state (NYSERDA)
- Reductions in carbon emissions equal to planting 1.5 million acres of trees

Update on EPACT 2005

Energy Policy Act of 2005

Energy Policy Act
EPACT 2005

- **What does it do?**
  - Tax incentives to purchase and install energy efficient equipment or make energy efficiency improvements to existing or new buildings
- **IRS Ruling**
  - Published last month
  - Expands and clarifies what constitutes a designer
- **IRS designer definition**
  - "a person that creates the technical specifications for installation of energy efficient commercial may include, for example, an architect, engineer, contractor, environmental consultant or energy services provideré ò

More on EPACT 2005

- **To qualify for the tax incentive**
  - Series of requirements
  - 3rd party must review the building plans and verify that:
    - Energy analysis by DOE-certified software
    - Energy savings technologies were installed during construction
- **Qualified software programs**
  - Trane TRACE 700, DOE-2.1E, VisualDOE, EnergyGauge Summit, EnergyPlus, EnerSim, Hourly Analysis Program (HAP), Green Building Studio, Owens Corning Commercial Energy Calculator

More on EPACT 2005

- **Performance contracts are now easier to have qualify**
- **Link to more infoé**
  - http://www.eere.energy.gov/buildings/info/tax_incentives.html

How the ñDessert the Performance Contracting ñ FuMeal ò Deal !

Typical payback 13 ¿100+ yrs.

Typical payback 7-12 yrs.

Typical payback 0 ¿6 yrs.

Larger Capital Improvements
Lower Savings or Return Items
- Major Mechanical Replacements
- Capital Improvement Item Priority List
- Central Heating & Cooling System Replacements
- Cogeneration CHP, Bio-Fuels and Bio-Mass
- Solar, Wind, Fuel Cell, Landfill Gas, etc.

Medium Capital Cost Medium Return Items
- Air Quality & Emissions Reduction
- Wastewater Reduction
- P2, Energy Star, CO2
- Safety & Environmental Controls
- Recycling and Waste Management

Lower Capital Cost + High Return Items
- Building Lighting, Controls, HVAC
- Equipment & Process
- Water Conservation
- Utility Supply Side and Building Demand Side
- On Site Energy Manager

Combined Projects

Typical program term 10 to 20 yrs.

Combine faster payback items to fund capital intensive items to optimize impact to business

Summary

- **Increased awareness has led to action**
  - Globally (e.g. Clinton Climate Initiative)
  - Nationally (e.g. Energy Policy Act of 2005)
  - State and local level Incentives
- **Renewable Energy Projects bundled into Performance contracts remain an excellent vehicle**
- **Choose your PC partner carefully**

Renewable Energy Optimization

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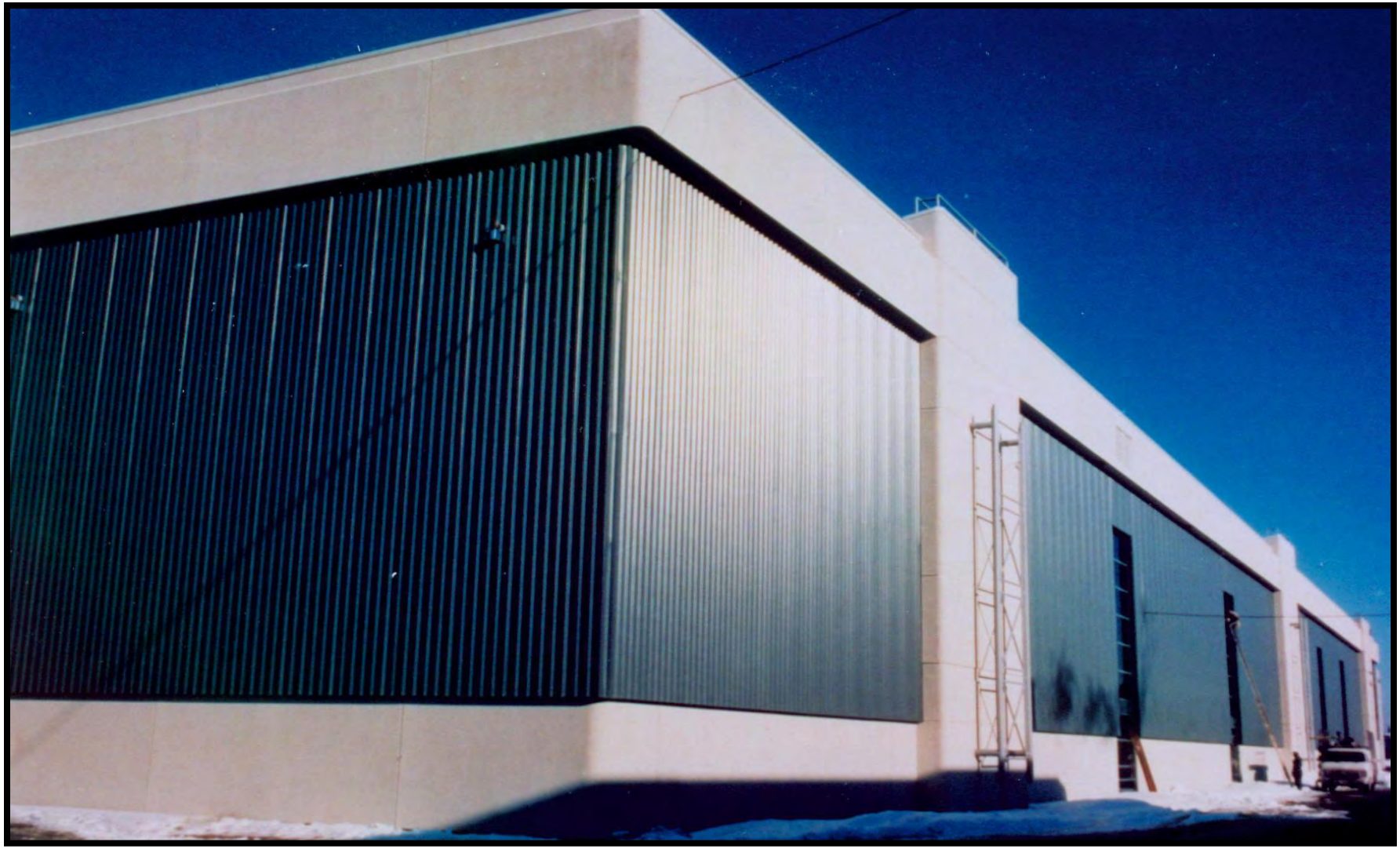
Renewable Energy Technologies Considered

- **Photovoltaics (solar electricity)**
- **Wind Power**
- **Solar Ventilation Air Preheating**
- **Solar Water Heating**
- **Solar Thermal/Solar Thermal Electric**
- **Biomass Heat/Biomass Electric**
- **Daylighting**

Photovoltaics

Wind Power

Solar Ventilation Air Preheat



Bombardier Inc., Canada

Solar Water Heating

Concentrating Solar Heat and Power

Biomass Energy

Daylighting