



Green Buildings:

Market opportunities in a low carbon economy

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Outline

- Green building performance
- Policy fundamentals
- Case studies
 1. Differentiation and competitive advantage
 2. Conoco Phillips Settlement
 3. Oregon Carbon Trust
 4. NSW Trading Scheme
 5. Clean Development Mechanism
- Conclusions

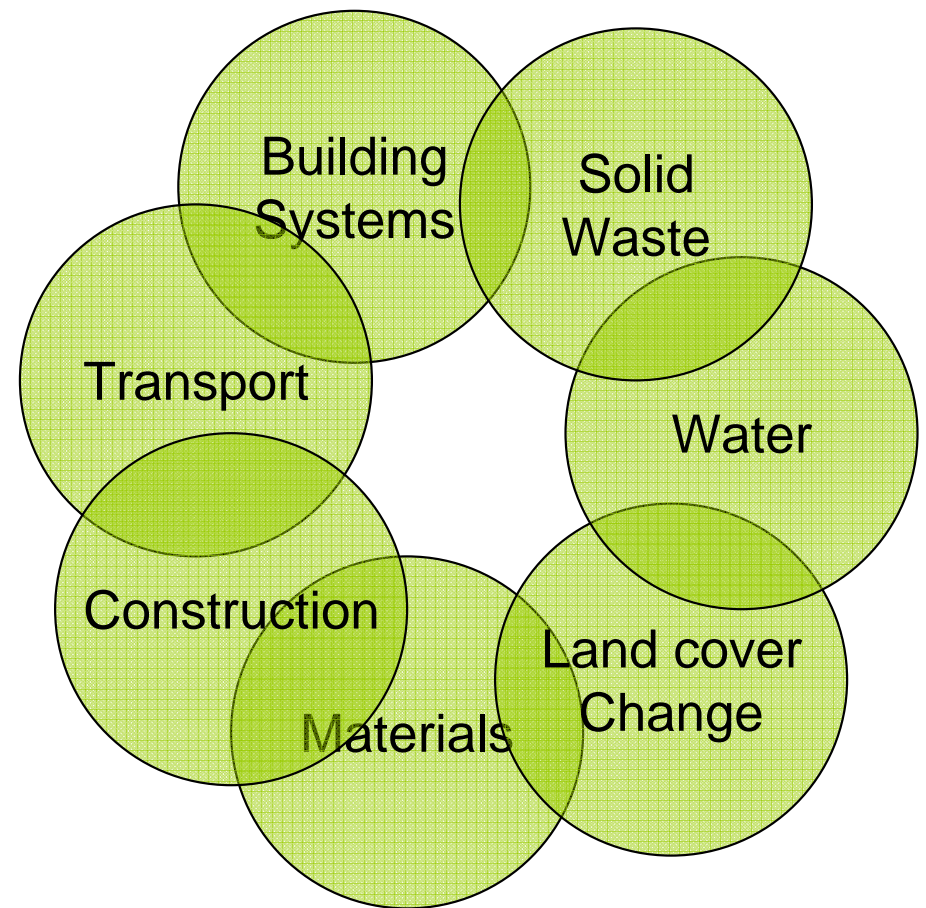
Green Building

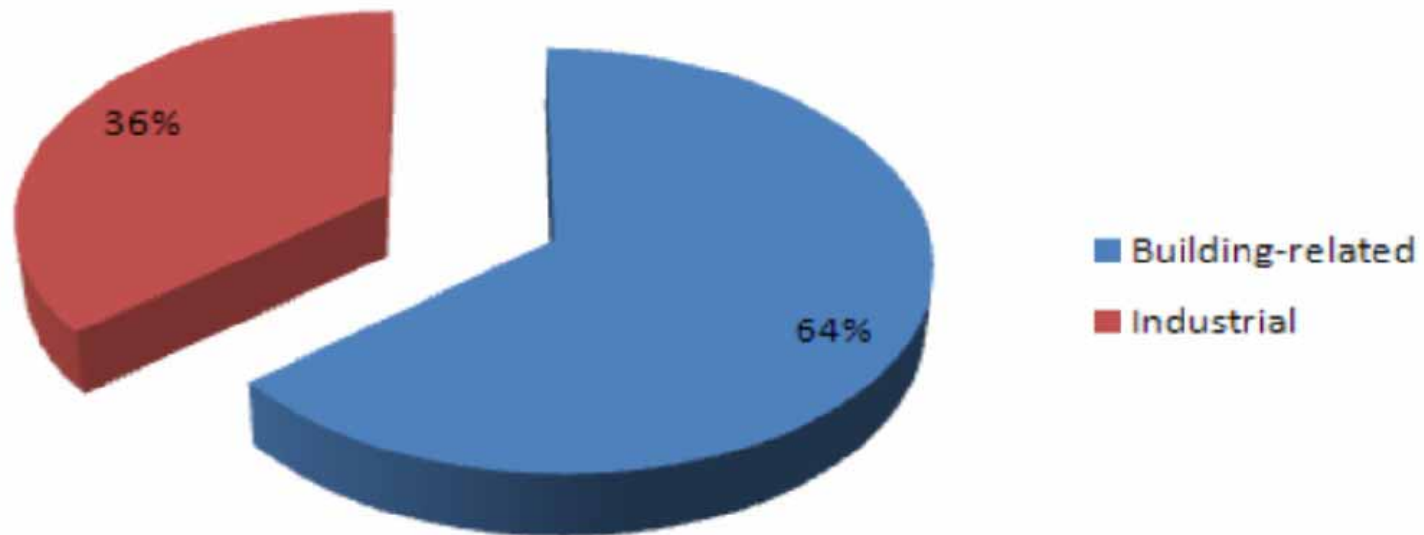
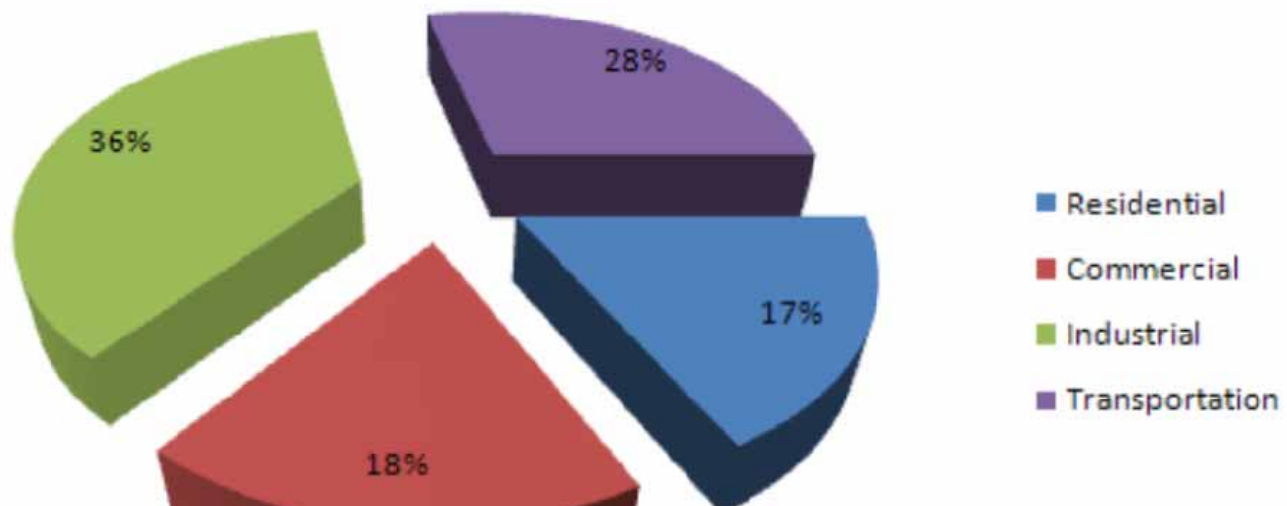
- Achieves market transformation through incentives and recognition for high-performance
- Ratings allow for market differentiation
- Defined by improvement with respect to prevailing practice



Greenhouse gas emissions

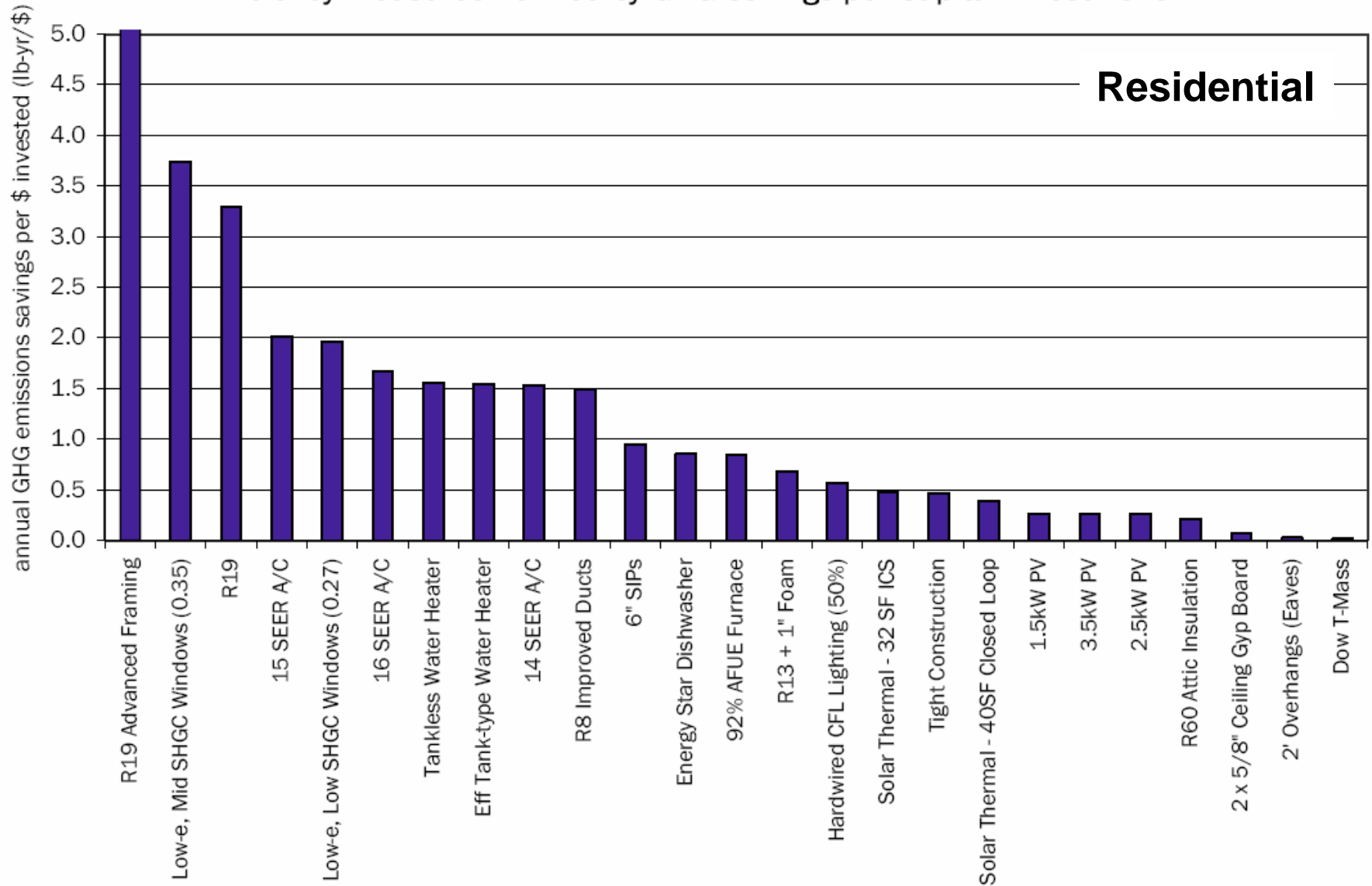
Buildings are a **nexus** for greenhouse gas emissions





Project potential

Efficiency Measures Ranked by GHG Savings per Capital Investment



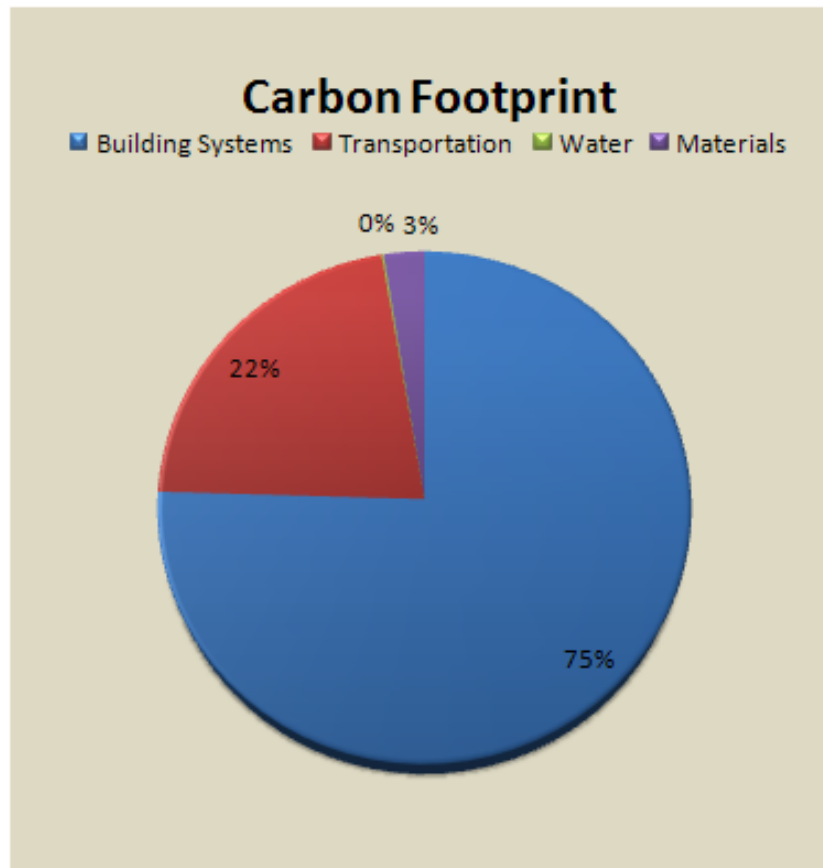
Source: CTG Energetics



Relative performance

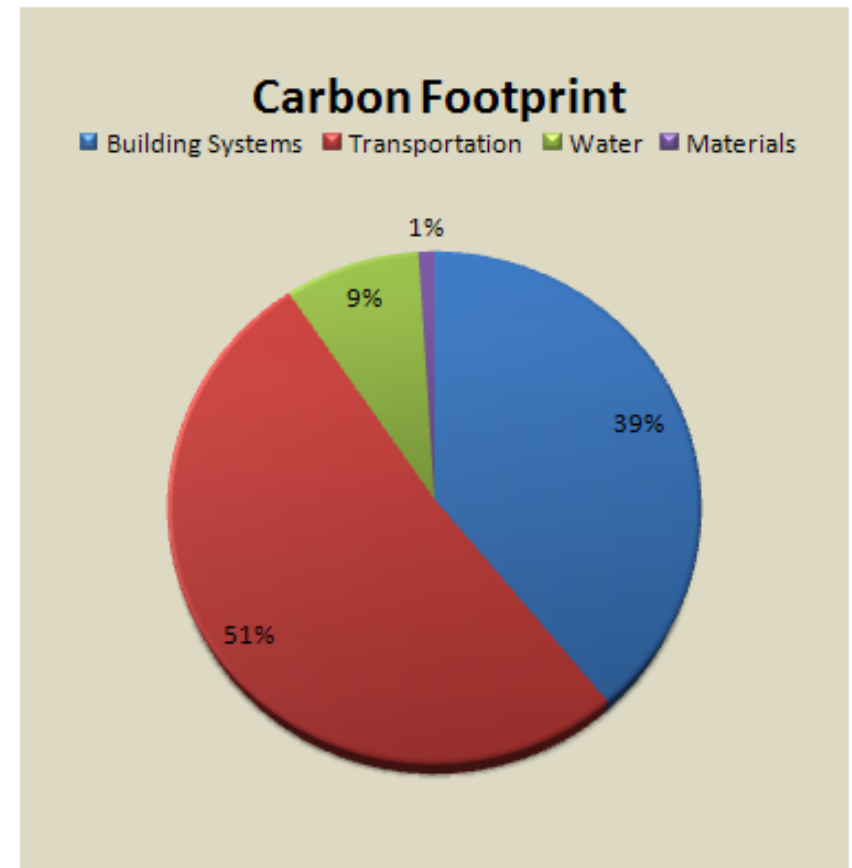
135,000 office building prototype

Great building *with* transit



3,233 T total or 4.6 T/person

Poor building *without* transit



8,375 T total or 11.8 T/person

Policy

- Buildings are unlikely to be a point-of-regulation for national policy
- Buildings may be a point-of-regulation for state and local programs
- Buildings may participate in markets through **offsets** or “**alternative compliance mechanisms**”

Cap-and-trade

- **Annual limit** on local, state, regional, or national greenhouse gas emissions
- Capped (regulated) “entities” can trade the right to pollute with covered and uncovered entities



Allowances

- Right to pollute by **covered entities**
- Upstream regulation:
 - Energy producing facilities (e.g., processing plants, refiners, mines, importers)
- Downstream regulation:
 - Energy consuming or transforming facilities (e.g., utilities, manufacturing, large sources of energy demand)

Offsets

Such as in “**baseline-and-credit**” systems:

1. Baseline emissions performance
2. Take action to reduce emissions
3. Sell the difference between the baseline and the achieved performance level



Barriers to participation

Buildings are a late entrant to policy discussion:

- Concern about “double-counting”
- Advantaged position of alternatives (e.g., agriculture and forestry)
- Lack of sector-specific protocols
- Lack of industry consensus about preferred policies

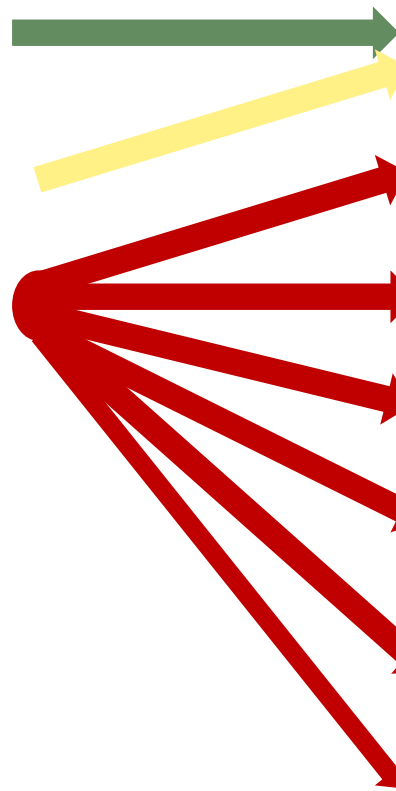
Limitations of protocols

Protocol:

- Scope 1
- Scope 2
- Scope 3

Buildings:

- Building systems
- Transportation
- Water
- Solid waste
- Materials
- Construction
- Land cover



“Non-market” opportunities

- Mandates to disclose performance information
- Opportunities for market differentiation and competitive advantage
- Grants, financing, and other incentives associated with revenue from carbon markets

1. Disclosure

New requirements and opportunities for disclosure create opportunities for market differentiation:

- Corporate-level disclosure
- Building-level disclosure

Building disclosure

UK Standard Assessment Procedure and National Home Energy Rating regulatory timeline for requiring **Energy Performance Certificate**.

For Scotland:

2007: New construction

2008: Point of sale

2009: Rental

Section H: Energy Performance Certificate

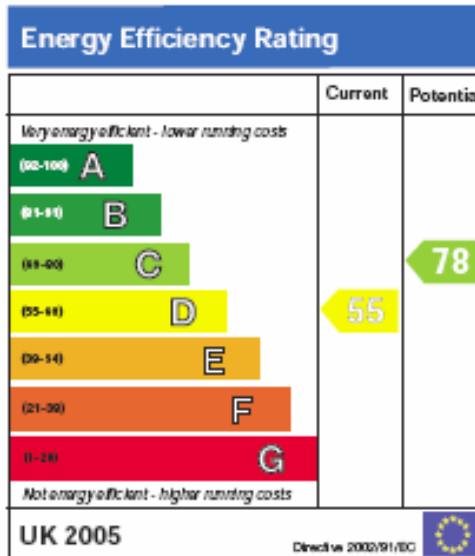
100 Any Street,
Any Town,
Anywhere, AB1 CD2

Dwelling type: Detached
Assessment method: SAP
Date of inspection: XXXX

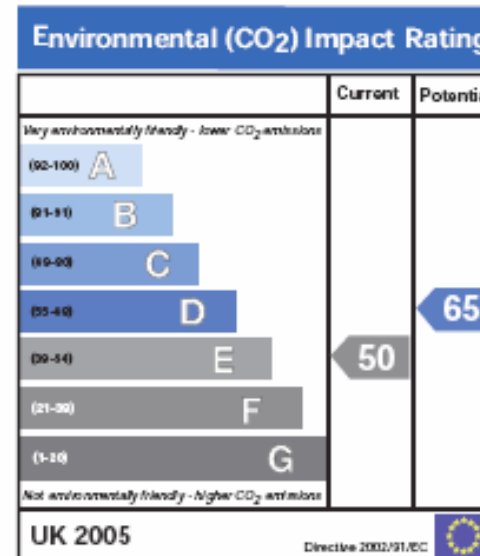
Certificate number: XXXX
Date issued: XXXX
Name of inspector: XXXX

This home's performance ratings

This home has been assessed using the UK's Standard Assessment Procedure (SAP) for dwellings. Its performance is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO₂) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills will be.



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide emissions. The higher the rating the less impact it has on the environment.

Typical energy use, carbon dioxide (CO₂) emissions and fuel costs of this home

This table provides an indication of how much it will cost to provide lighting, heating and hot water to this home. The fuel costs and carbon dioxide emissions are calculated based on a SAP assessment of the energy use. This makes standard assumptions about occupancy, heating patterns and geographical location. The energy use includes the energy used in producing and delivering the fuels to this home. The fuel costs only take into account the cost of fuel and not any associated service, maintenance or safety inspection costs. The costs have been provided for guidance only as it is unlikely they will match actual costs for any particular household.

	Current	Potential
Energy use	xxx kWh/m ² per year	xxx kWh/m ² per year
Carbon dioxide emissions	xx tonnes per year	xx tonnes per year
Lighting	£xxx per year	£xxx per year
Heating	£xxx per year	£xxx per year
Hot water	£xxx per year	£xxx per year

2. Litigation

ConocoPhillips Company settlement with California Attorney General.

- **EIR failed to adequately address** GHG emissions and climate change impacts associated with plans for the Rodeo California Refinery

Local offset program

- ConocoPhillips makes one-time \$7 million payment to a **carbon offset fund** created by the Bay Area Air Quality Management District (BAAQM)
- BAAQM will use the funds to achieve **verifiable, quantifiable reductions in GHG emissions** with priority given to projects near Rodeo Refinery

2. Oregon Climate Trust

- Offset Projects
 - \$8.8 million invested
 - 2.6 M metric tons avoided
- Offset RFPs
 - Projects have reduced or avoided 50,000 TCO₂
 - Project terms up to 15 years
 - Meet additionality criteria
 - No nukes or big hydro

Climate Trust RFP preferences

- Direct emissions reductions
- Transportation
- Fuel switching
- Material substitution
- Boiler efficiency/upgrades

3. NSW Trading Scheme

- USD \$225 million in 2006
- Second to EU ETS
- Reduce GHG emissions from the power sector
- Demand-side abatement “credits” are approx. 25% of the market

NSW Demand Side Abatement

- Energy efficiency projects
 - Replace existing installations
 - Install new, high-efficiency installations
- Fuel switching
- Reducing electricity consumption
- On-site electricity generation that replaces grid supply

4. Clean Development Mechanism

- Energy efficiency is a small component of CDM projects
- Buildings are even smaller fraction
- Reductions evaluated on within a baseline-and-credit framework

Technopolis, India

Alternative	Electrical End-use Totals (kWh)					Total electricity consumption of the HVAC system per annum
	Electrical Plug Loads	Chiller Plant	Cooling Tower	Chilled Water Circulation Pumps	AHUs	
Baseline Building - Air Cooled (COP 3.0)	4,120,022	8,084,944	0	549,125	3,474,910	16,229,001
Technopolis building as designed	4,120,022	2,646,941	396,286	99,942	593,304	7,856,495

Reduction in electricity consumption compared to baseline building (MWh/Year)	8,373
Emission Factor for electricity drawn from Eastern Regional Electricity Grid	1.042
Emission Reductions due to energy efficiency measures taken in the HVAC system of "Technopolis" (in t CO₂/annum)	8,724.15

Conclusions

- Green buildings can provide cost-effective GHG emissions
- Immediate opportunities for market differentiation and competitive advantage
- Expanding opportunities to expedite permitting and avoid litigation
- Emerging opportunities for new revenue sources

Questions

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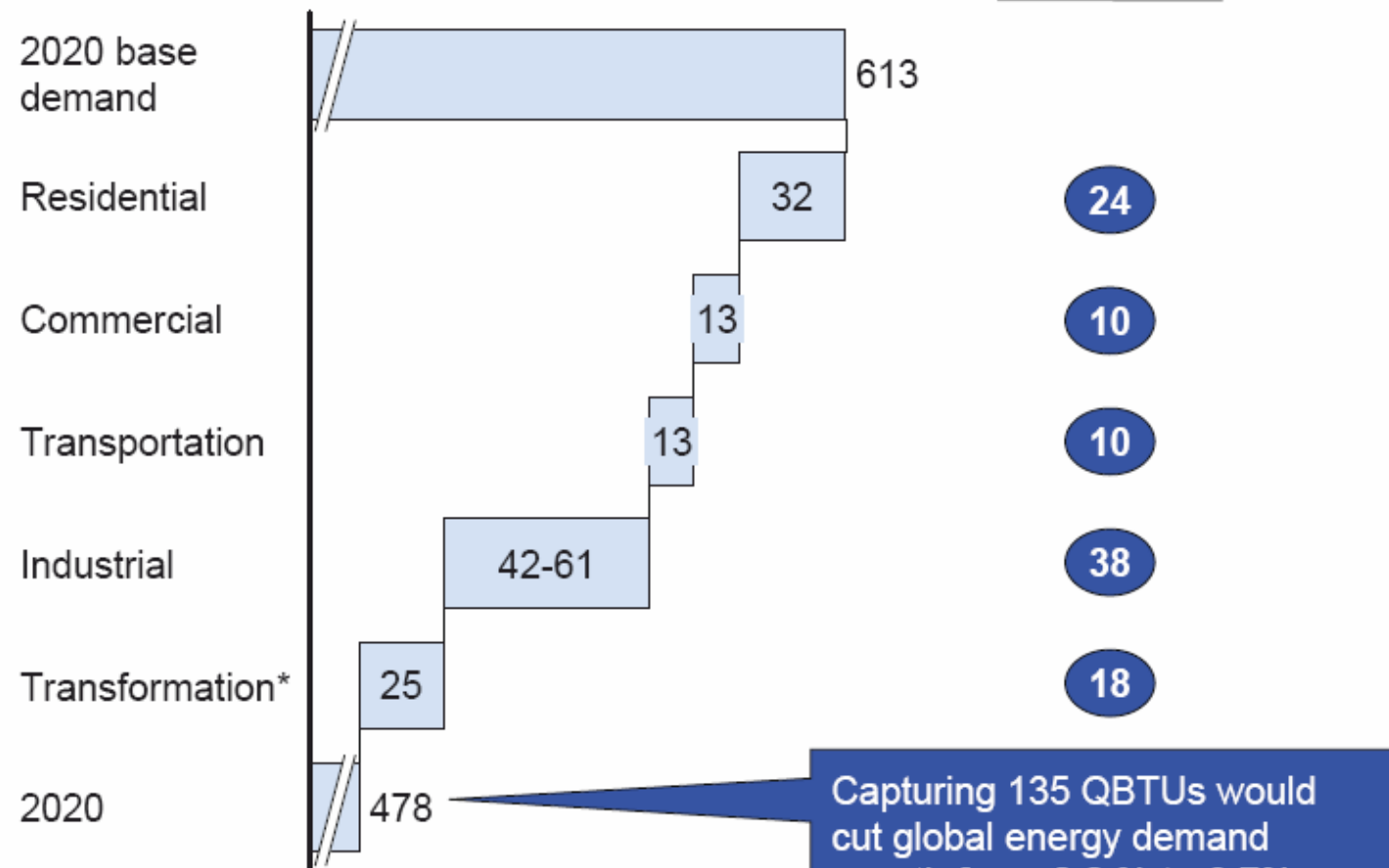


Global potential

LARGE OPPORTUNITIES FOR IMPROVING ENERGY PRODUCTIVITY ARE AVAILABLE ACROSS SECTORS...

Potential demand reduction in 2020 through enhanced energy productivity
QBTU

% of total opportunity



* Power generation and refining sectors

Source: MGI analysis

Source: McKinsey (2007)