Electricity Efficiency Potentials Study - Briefing

Welcome . . .

Study results . . .

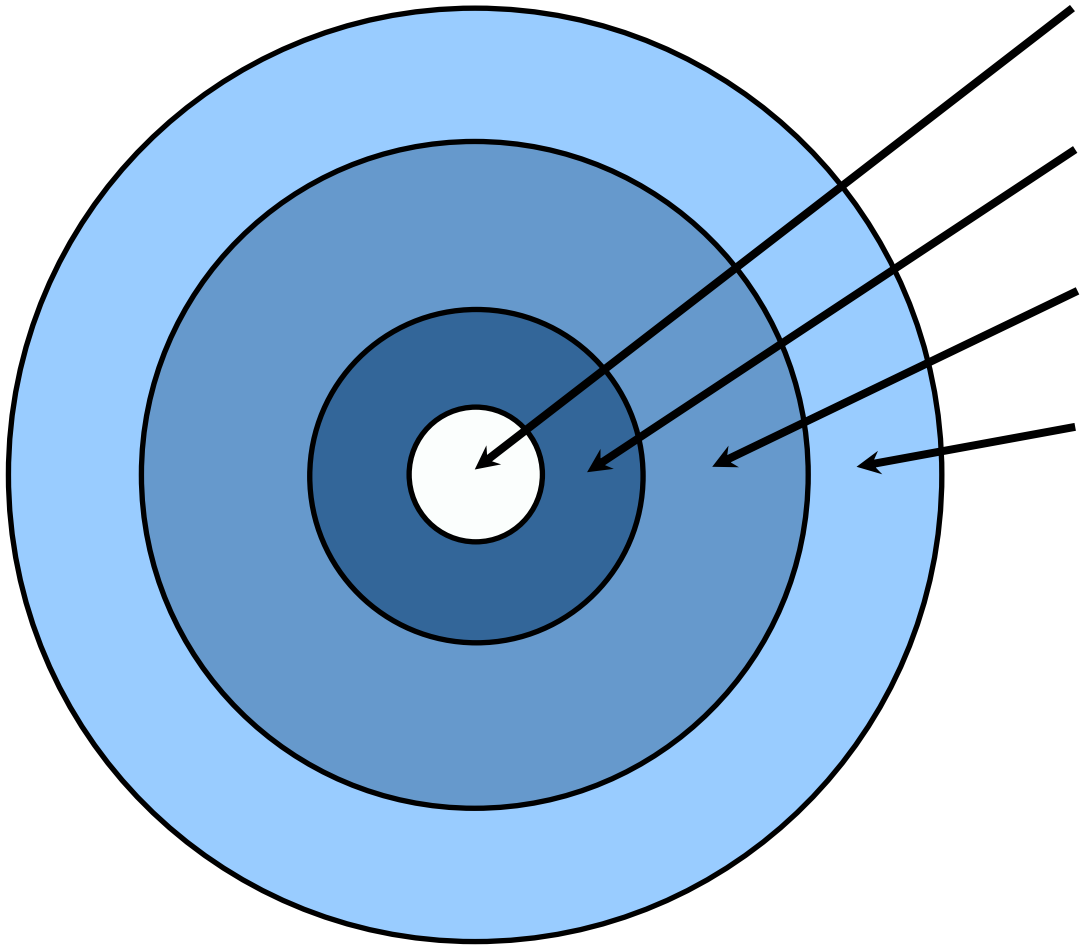
Overview

- Undertaken by KEMA
- Reviewed by NERI and EECA
- Most comprehensive study undertaken in New Zealand
- About 6400GWh/y of cost effective electricity efficiency
- Cost effective peak demand savings of about 1,740MW
- Some of the economic potential will be achievable
- Net benefits estimated at about 4 times cost
- Provides good basis for ongoing program development

Why undertake a potentials study?

- Better understand how electricity is used in New Zealand:
  - By technology
  - By sector
- Characterise New Zealand's electricity efficiency resource
- Provide a robust basis for program design

What is an electricity efficiency potentials study?



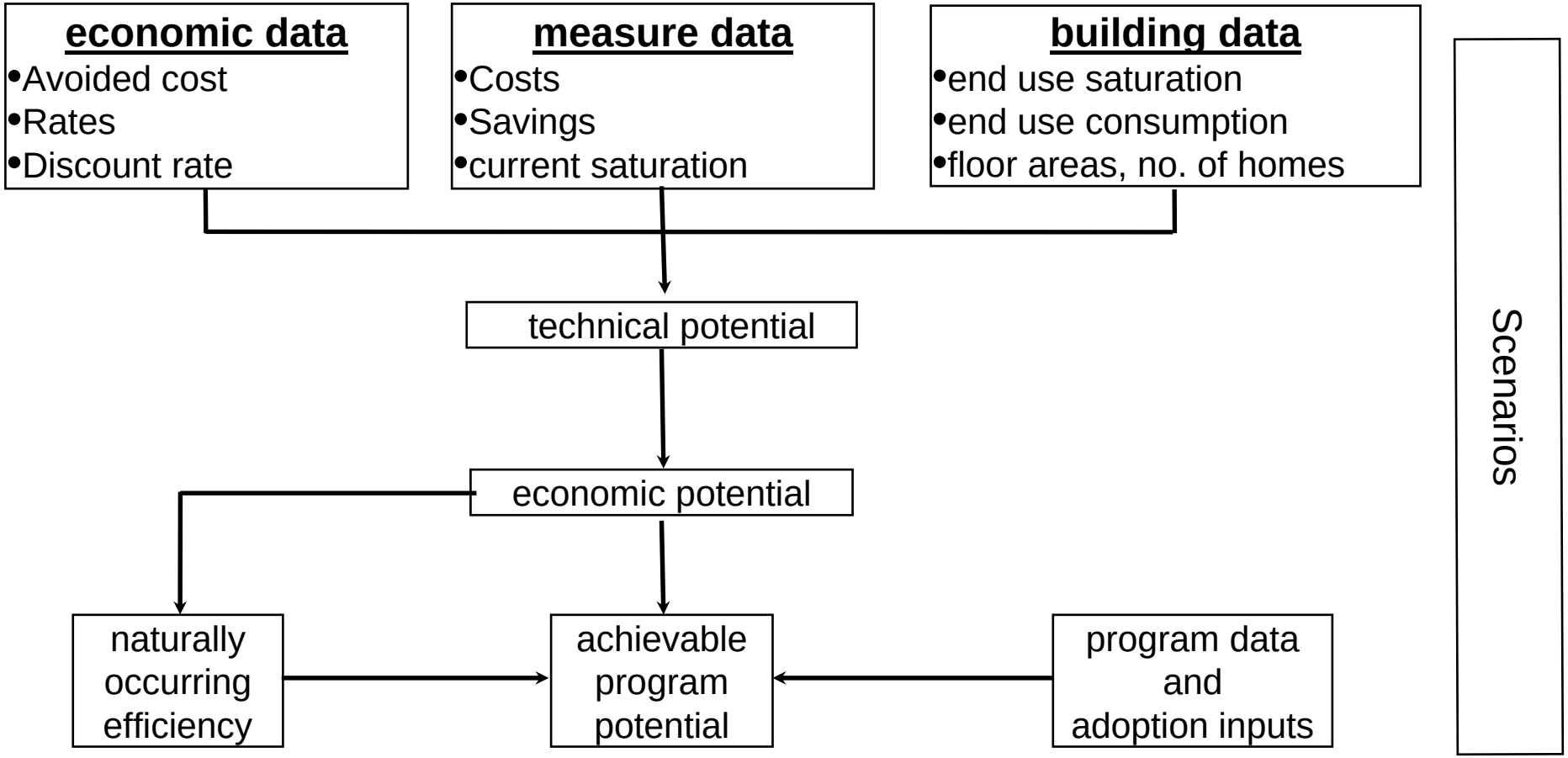
Naturally occurring

Achievable

Economically possible

Technically possible

The analysis framework



Inputs

- To quantify EE potential requires a detailed understanding of:
  - Installed technology
  - Market place

Inputs – installed technology

- BRANZ HEEP data
- MED Energy outlook
- Electricity Commission Statement of Opportunities
- Total count of energy using units (commercial floor space, no of dwellings etc)
- Annual energy consumption for each end use (GWh and intensity – kWh/m$^{2)}$
- Load shapes
- Saturation of end uses (% of floor space that is air conditioned)
- Market share of each base equipment type (% commercial space served by T8 with magnetic ballast)
- Market share of each energy efficient measure (% commercial space served by T8 with electronic ballast)

Inputs – market place characteristics

About 760 interviews were undertaken

- commercial end users
- lighting contractors
- HVAC
- motor rewinders
- commercial builders
- residential builders
- appliance stores
- large industrial end-users

Inputs – economic data

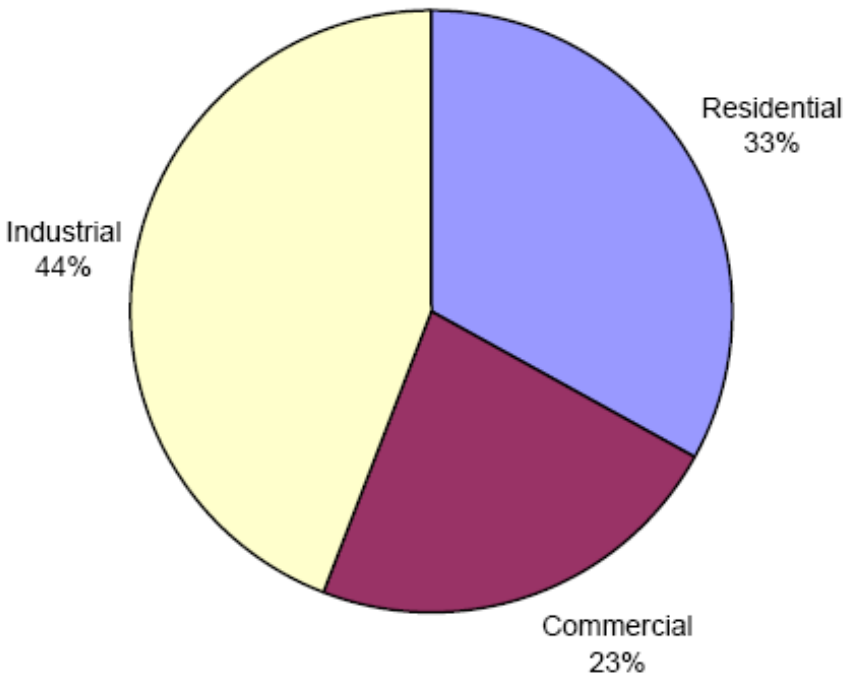
Program administrator discount rate	7%
Nominal inflation rate	2.5%
Customer discount rate	15%
Average retail electricity price	….c/kWh
Base year avoided energy cost (wind)	$0.07/kWh
Avoided generation capacity cost*	$94/kW
Avoided transmission capacity cost*	$23.20/kW

* $1000/kw levelised over 20 years at 7% discount rate

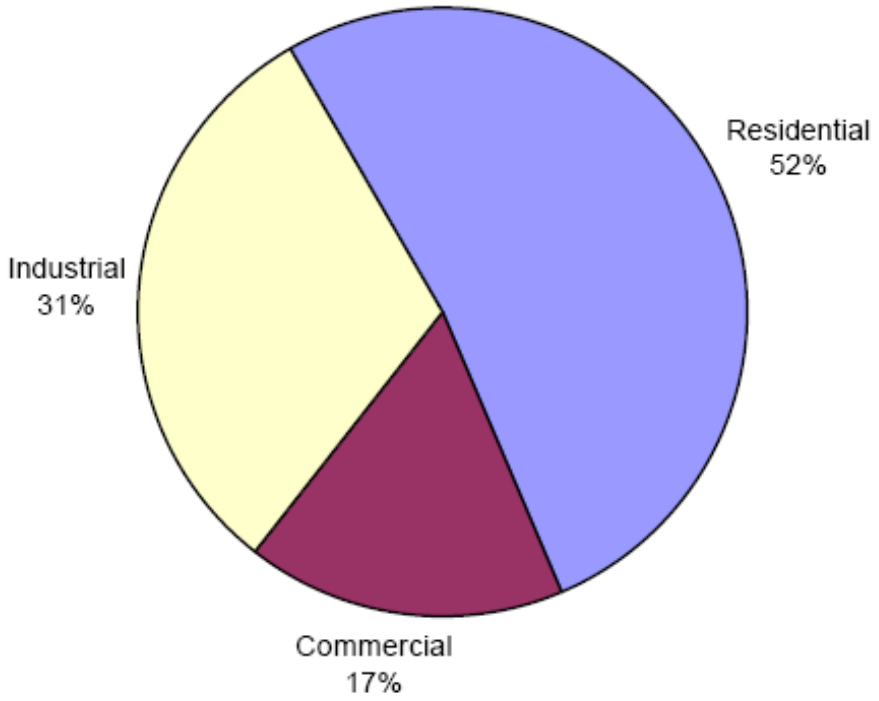
* $300/kw levelised over 35 years at 7% discount rage

2006 Baseline energy and peak demand by sector

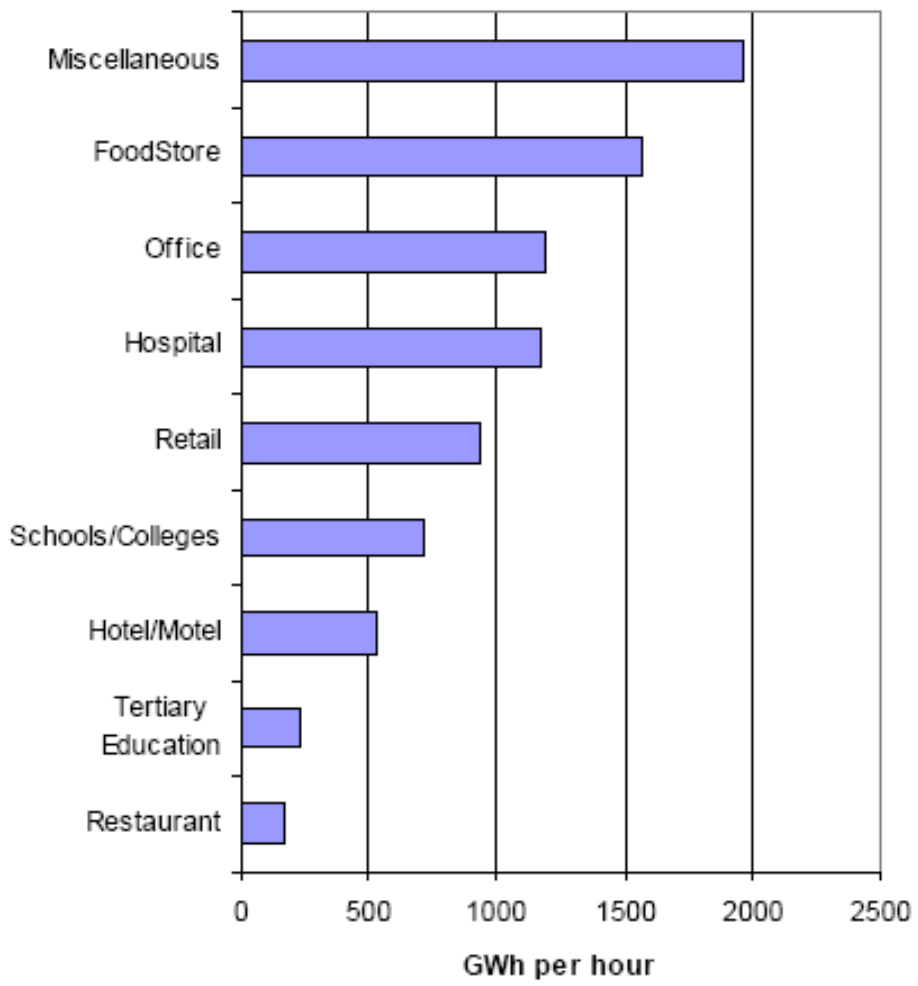
Estimated Energy Consumption by Sector (38,124 GWh in 2006)

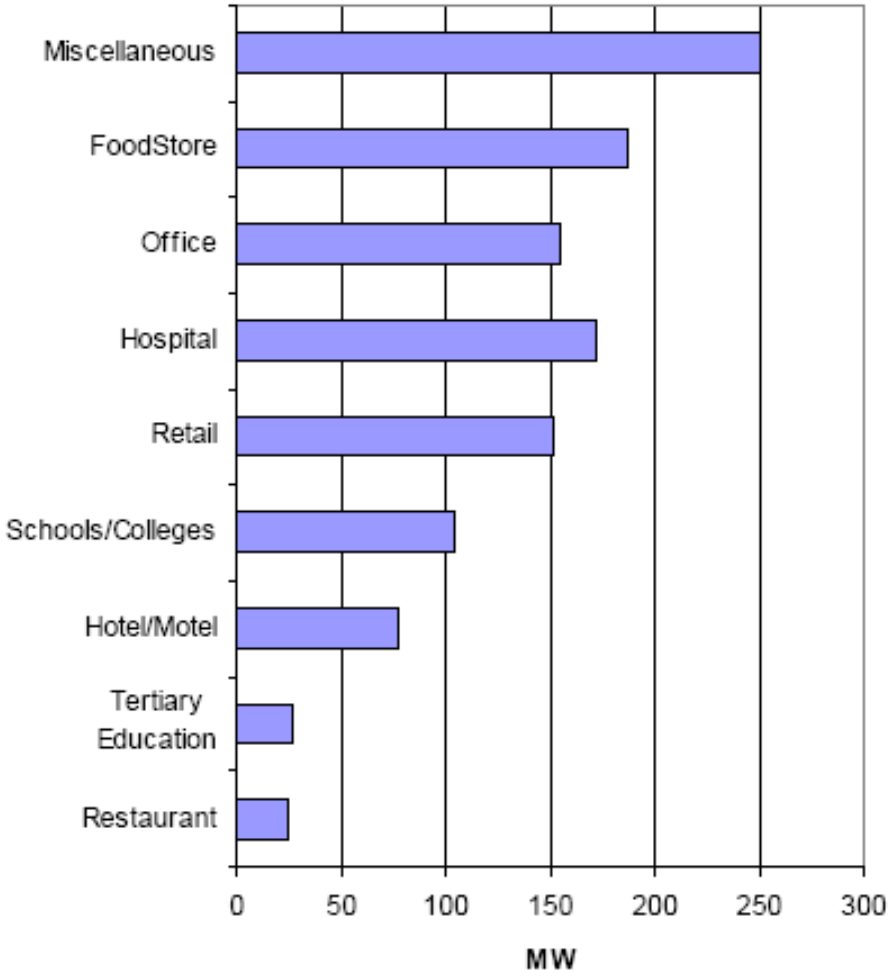


Estimated Peak Demand by Sector (6,503 MW in 2006)



2006: Commercial – by building type





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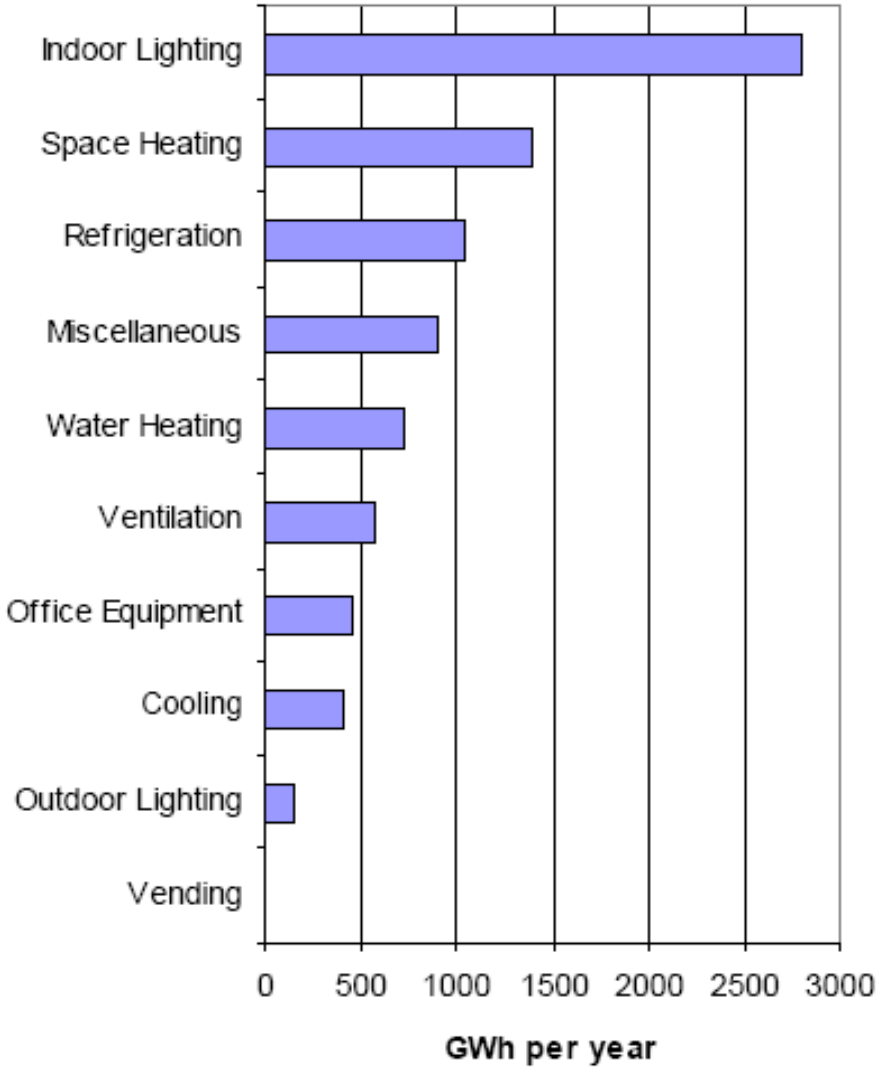
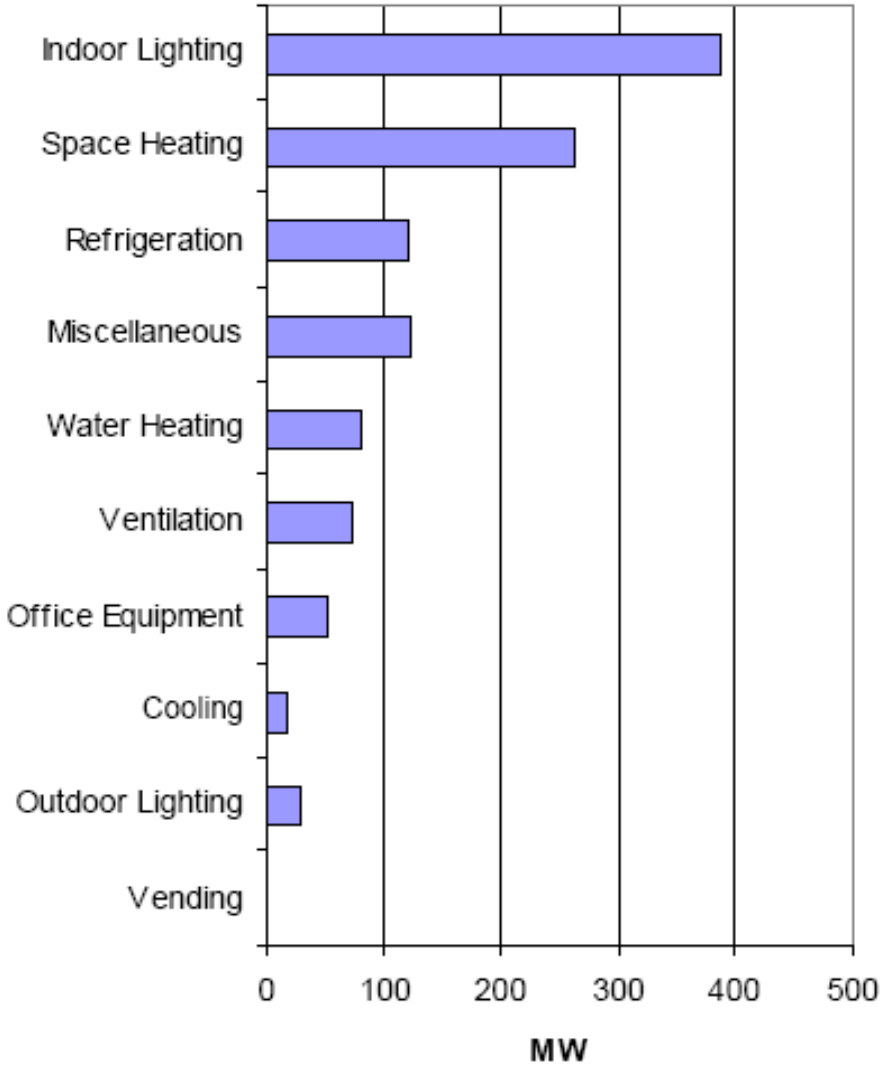
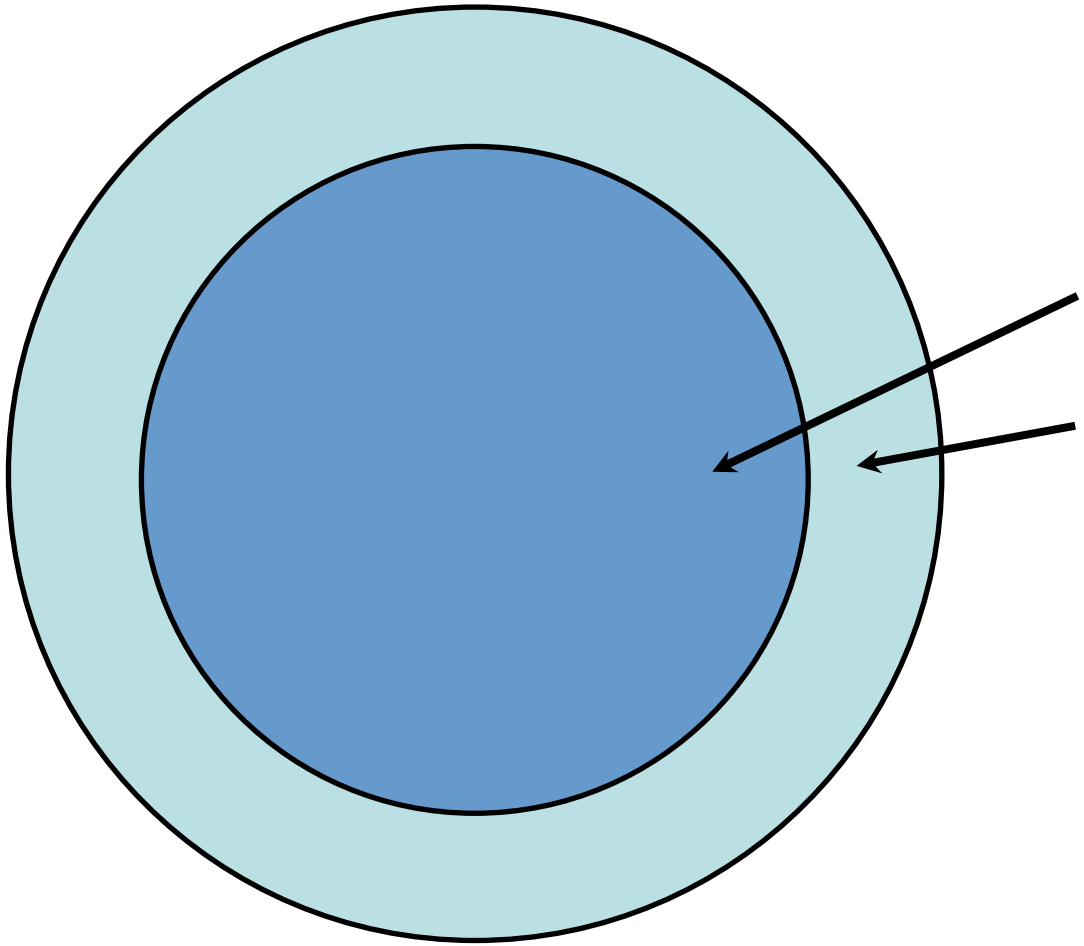
2006: Commercial – by end-use





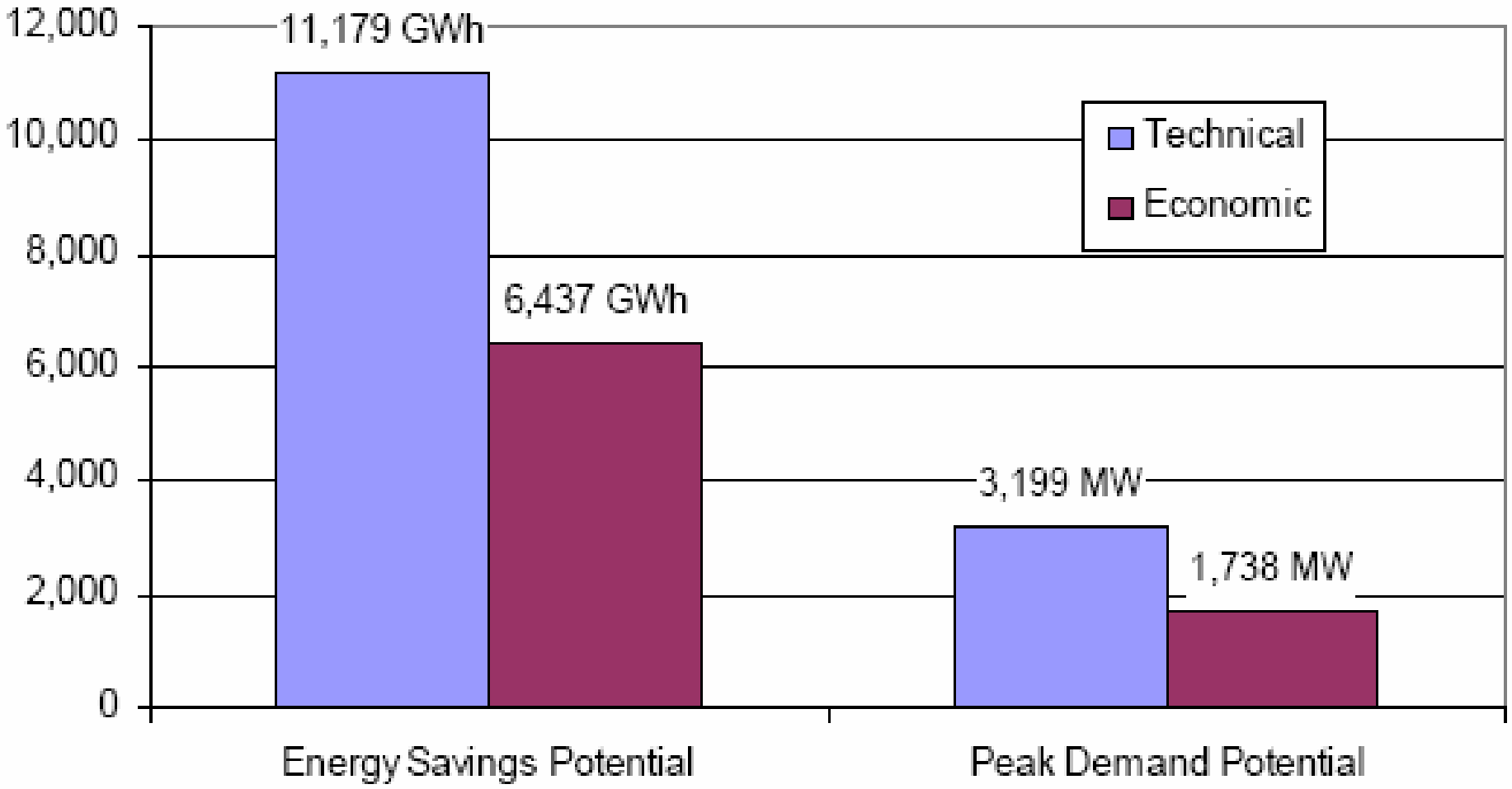
Technical and Economic Potential



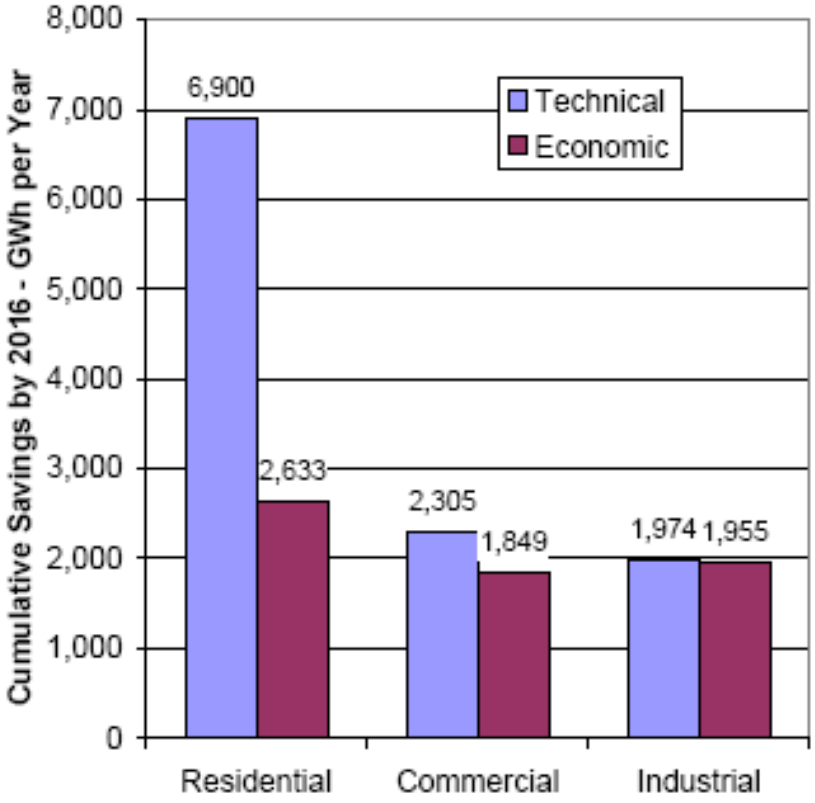
Economically feasible

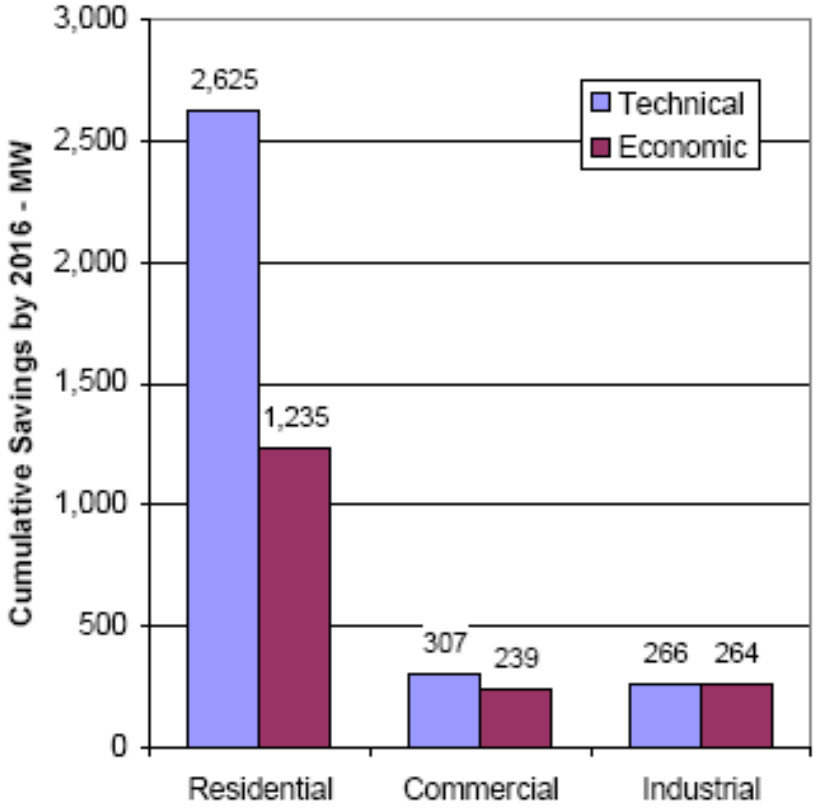
Technically possible

Estimated annual technical and economic potential (2016)



Estimated annual technical and economic potential by sector (2016)



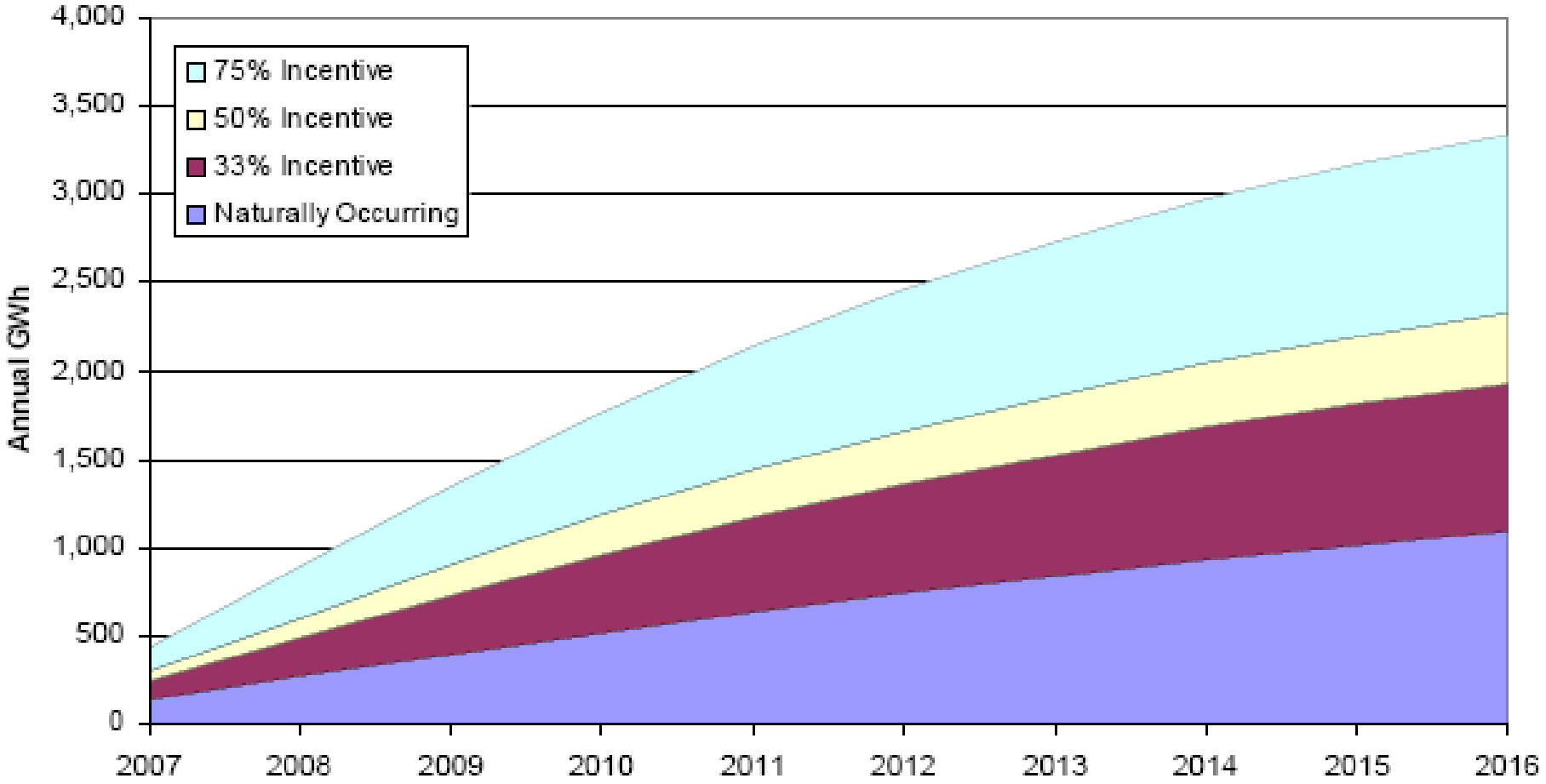


Achievable potential

- Accounts for market and other factors that affect adoption of measures (e.g., why don't people just buy CFLs)

- Three scenarios:
  - 33% incentive
  - 50% incentive
  - 75% incentive

Achievable potential (energy) – national view



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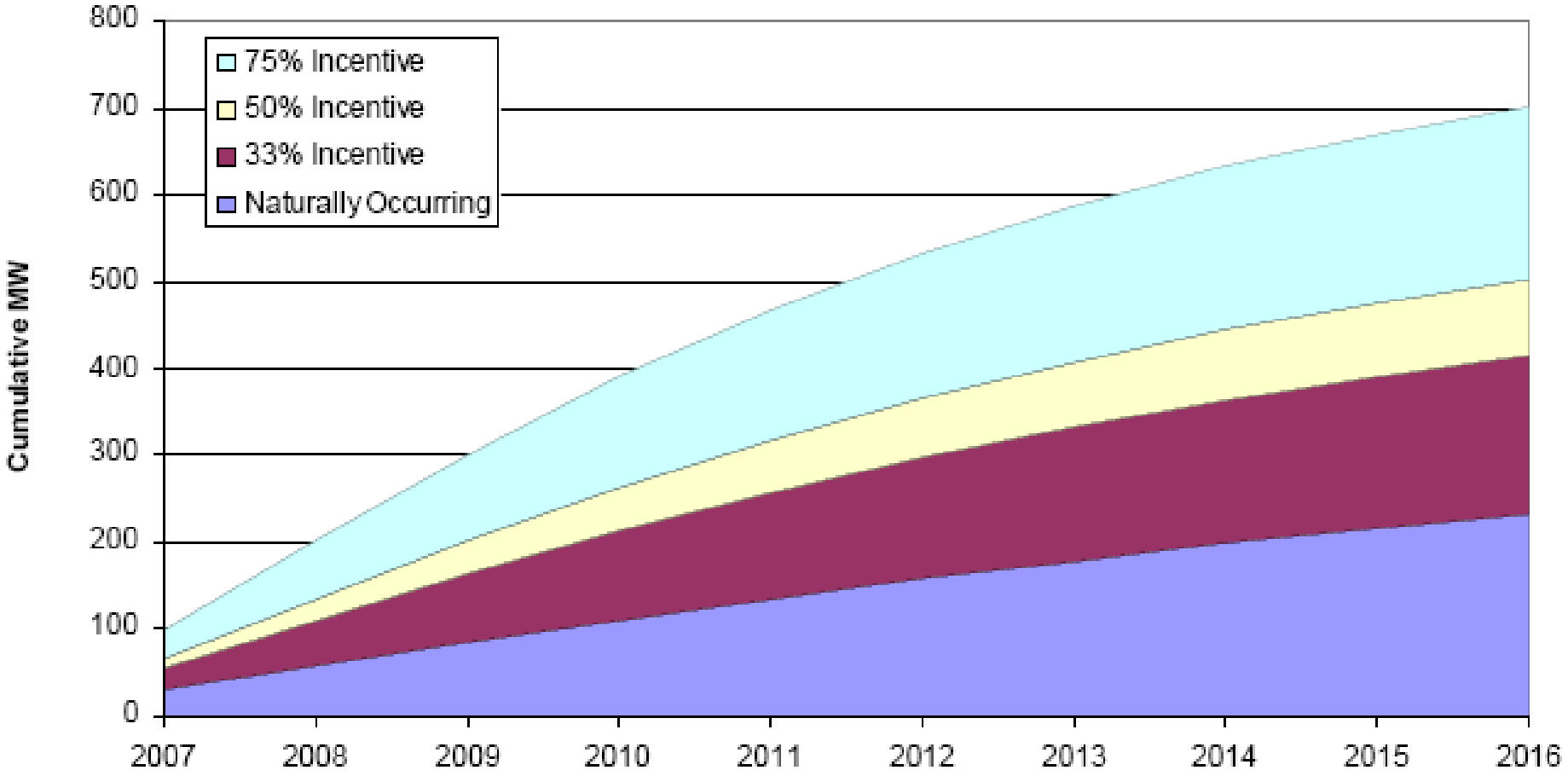
Achievable potential (peak) – national view



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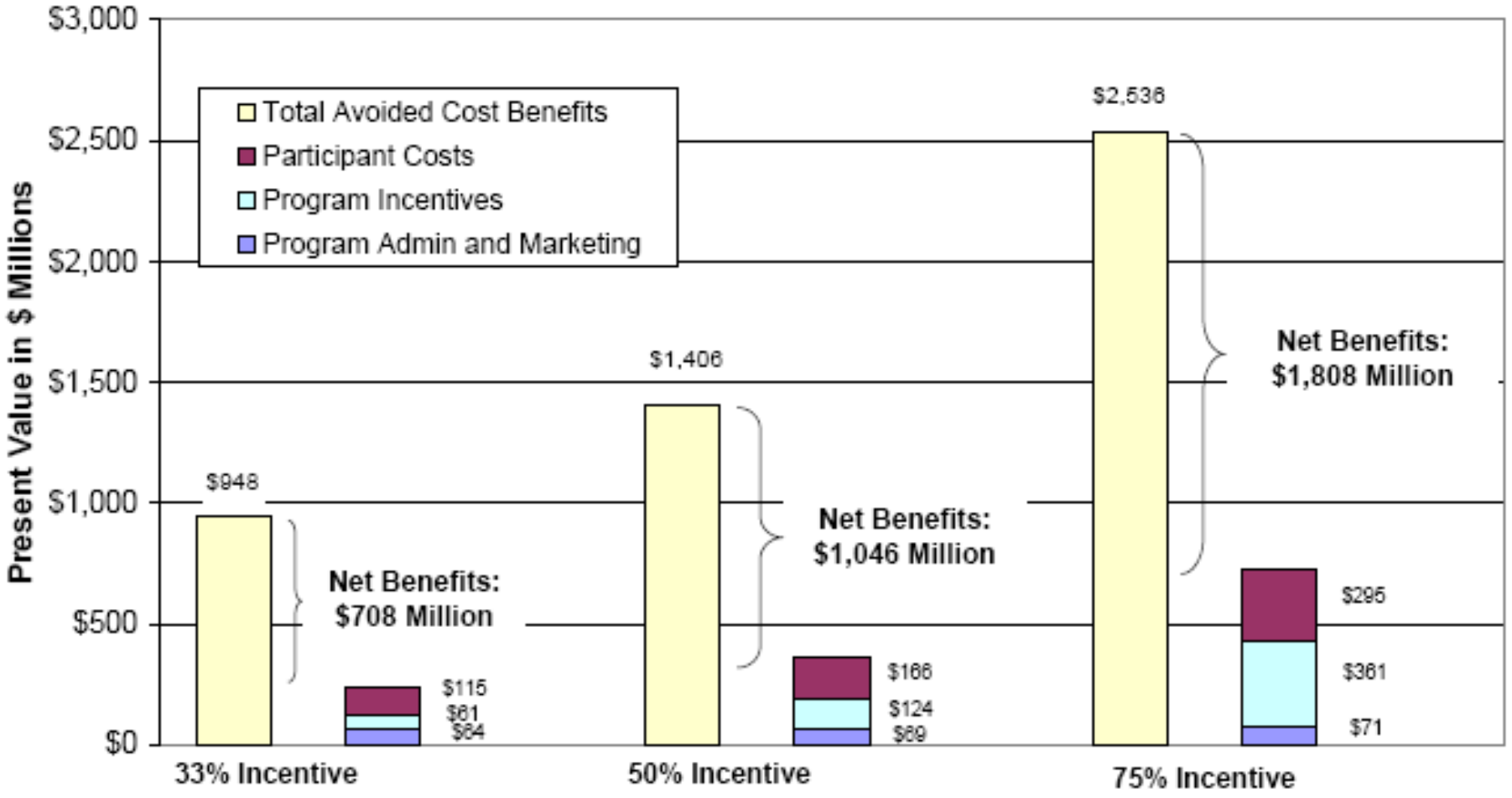
Benefit cost 2007-2016



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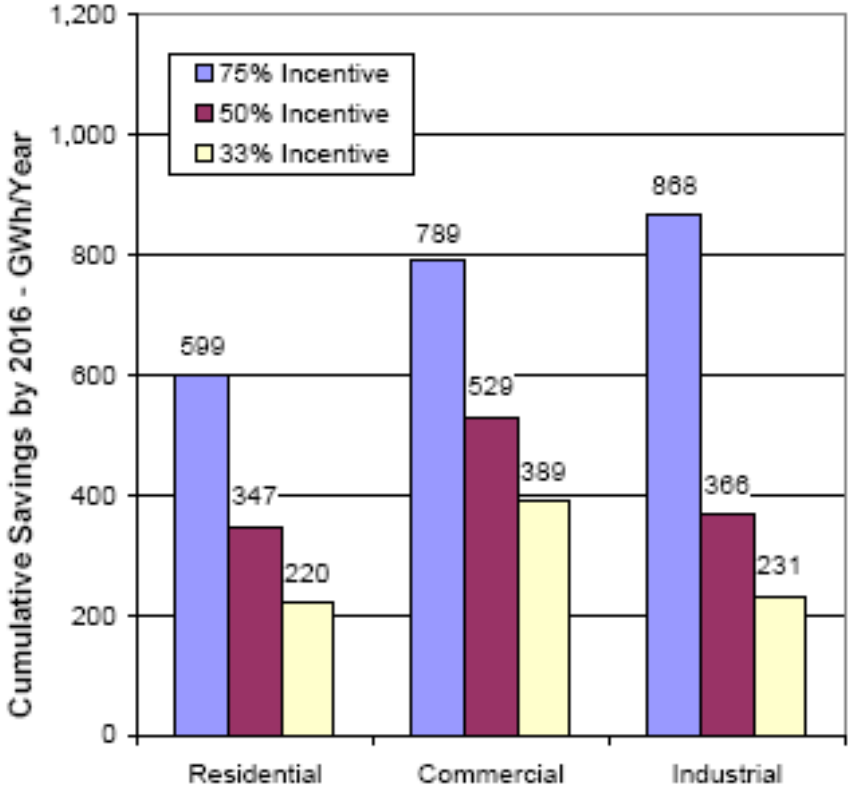
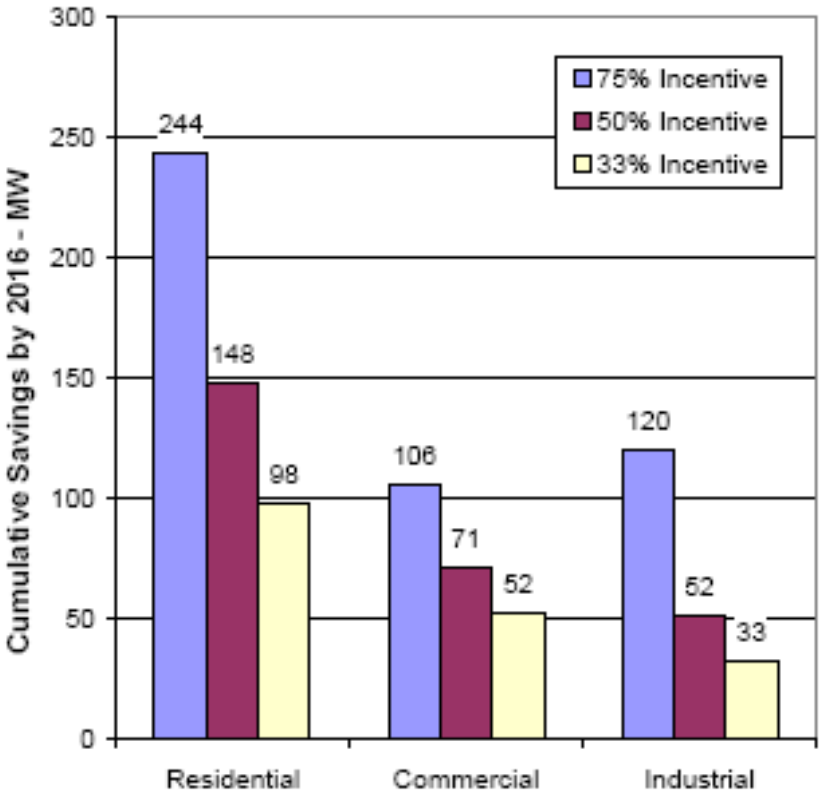
Comment on benefit cost analysis

- Costs and benefits are not absolute
- Reflect estimated costs
- Use conservative input cost assumptions
- Does not include externalities (environmental and health benefits)
- NET benefit : cost ratio of about 4
- Good basis for decisions

Achievable potential by sector (2016)

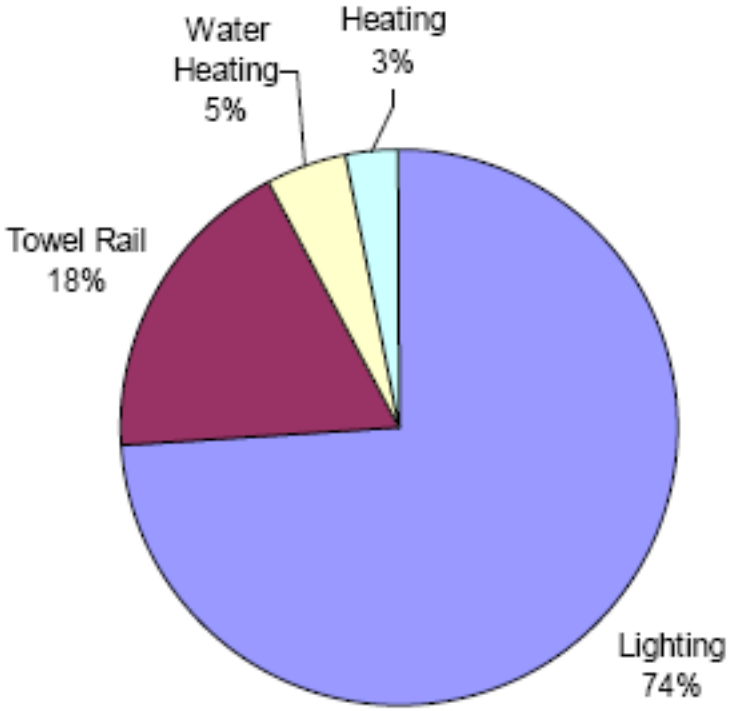




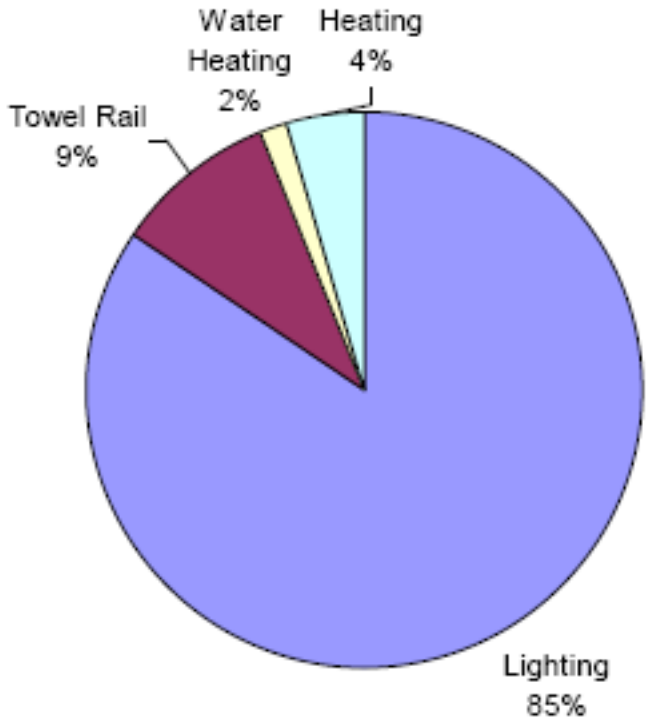
Electricity Commission

Residential – achievable potential (2016)

Residential Net Energy Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 220 GWH potential)

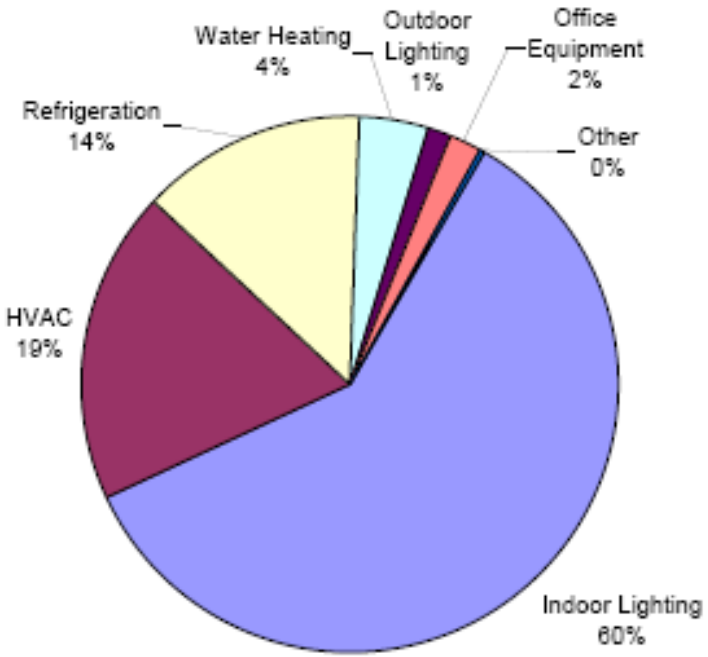


Residential Net Peak Demand Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 98 MW potential)

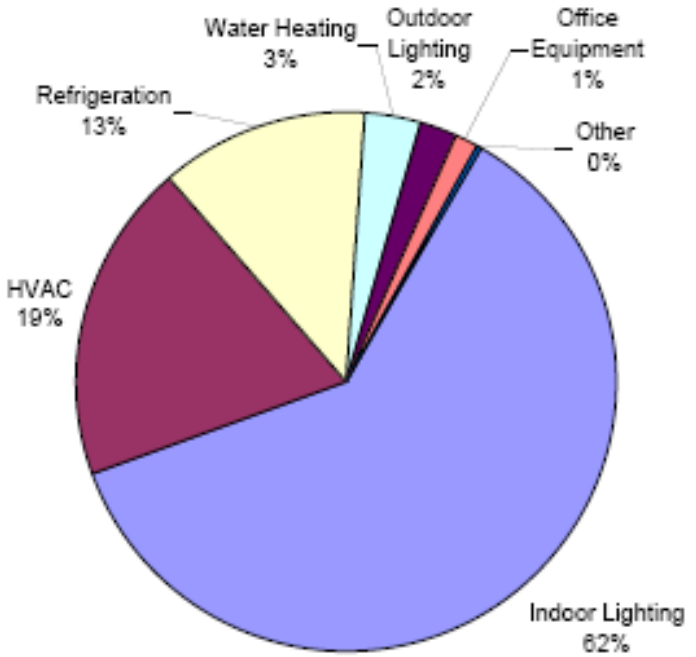


Commercial – achievable potential (2016)

Commercial Net Energy Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 389 GWH potential)

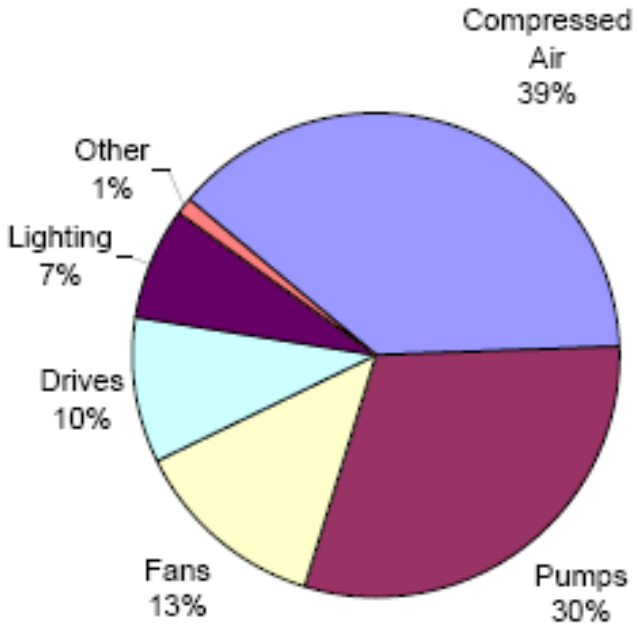


Commercial Net Peak Demand Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 52 MW potential)

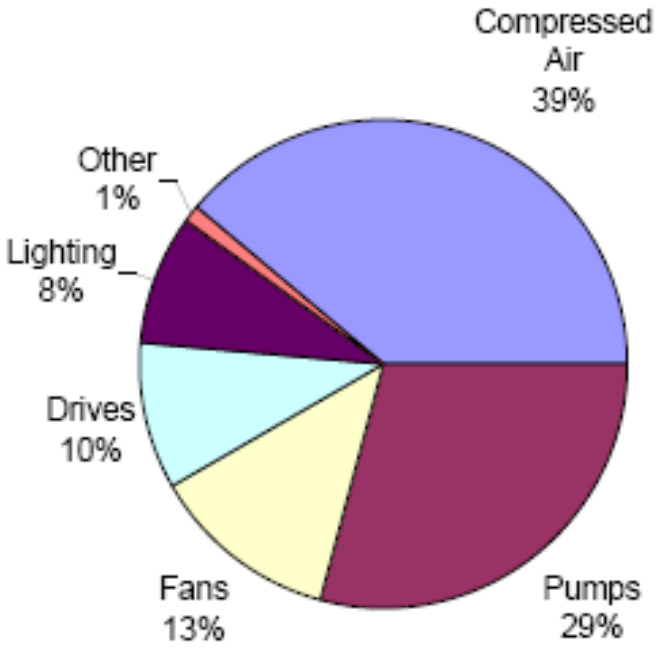


Industrial – achievable potential (2016)

Industrial Net Energy Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 231 GWH potential)



Industrial Net Peak Demand Savings Potential
End Use Shares (2016) – 33% Incentives
(based on 33 MW potential)



Summary

- Substantial annual economic potential savings by 2016:
  - 17% of 2006 base energy for each year measures apply

- Barriers to uptake include:
  - Information about measures
  - Capital cost focus (rather than lifecycle cost focus)
  - Equipment turnover rates (timing)

Further work

- Excellent starting point BUT scope for refinement:
  - Data limitations in non-residential sector
  - Surveys not comprehensive
  - Lack of load shape data for non-residential load
  - Avoided cost study
- Uncertainty
  - Estimates of peak savings
  - Costs avoided by energy efficiency projects probably underestimated
- Account for externalities
  - Environmental benefits
  - Health benefits

The model – next steps . . .

The model

Purchased the model

- Ability to refine and update the data

Received the model from Kema in January 2008.

The model is a complex excel/VB series of spreadsheets with multiple input and output worksheets.

Same model used in California and set the basis for the government spend on electricity efficiency.

Gap analysis

A gap analysis is underway to determine

- Gaps in data
- Identify any shortcomings of the report

Information for the analysis is being sourced from:

- The efficiency potential study report itself
- Feedback received so far from EECA, NERI, Lighting Council

Welcome feedback on the report on where the results do not feel intuitively right.

Gap analysis (2)

Examples of known gaps:

- US data used where NZ data was not available
- Limited data for the industrial and commercial areas
- Conflicting comments for some of the data used and assumptions made

Going forward

Once the gap analysis is complete:

- The Commission will update inputs for areas where it is likely to run programmes
- Assess new and improved technologies, and updated costs in the model
- May use independent parties / consultants to gather data as required
- The Commission intends to publish new information from the model to assist others to make a better decision.

The programmes . . .

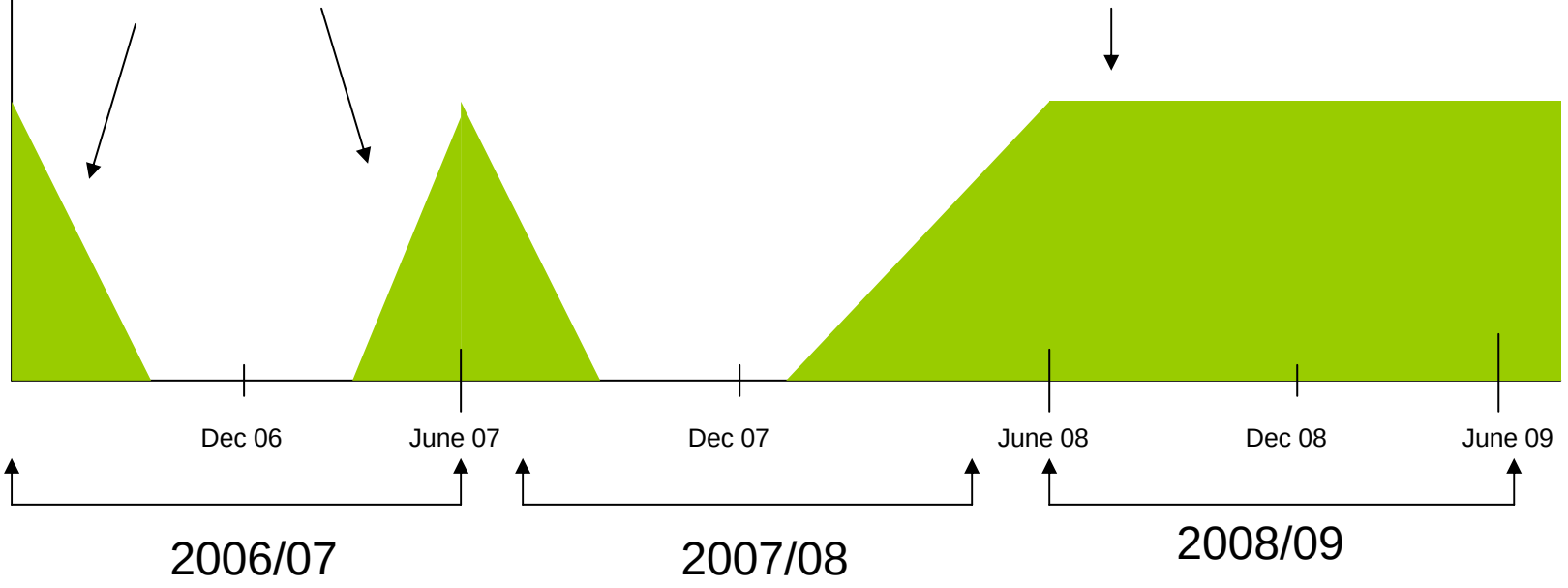
Electricity Commission - High level view of programme activity - past and present . . .

NEW PROGRAMS:

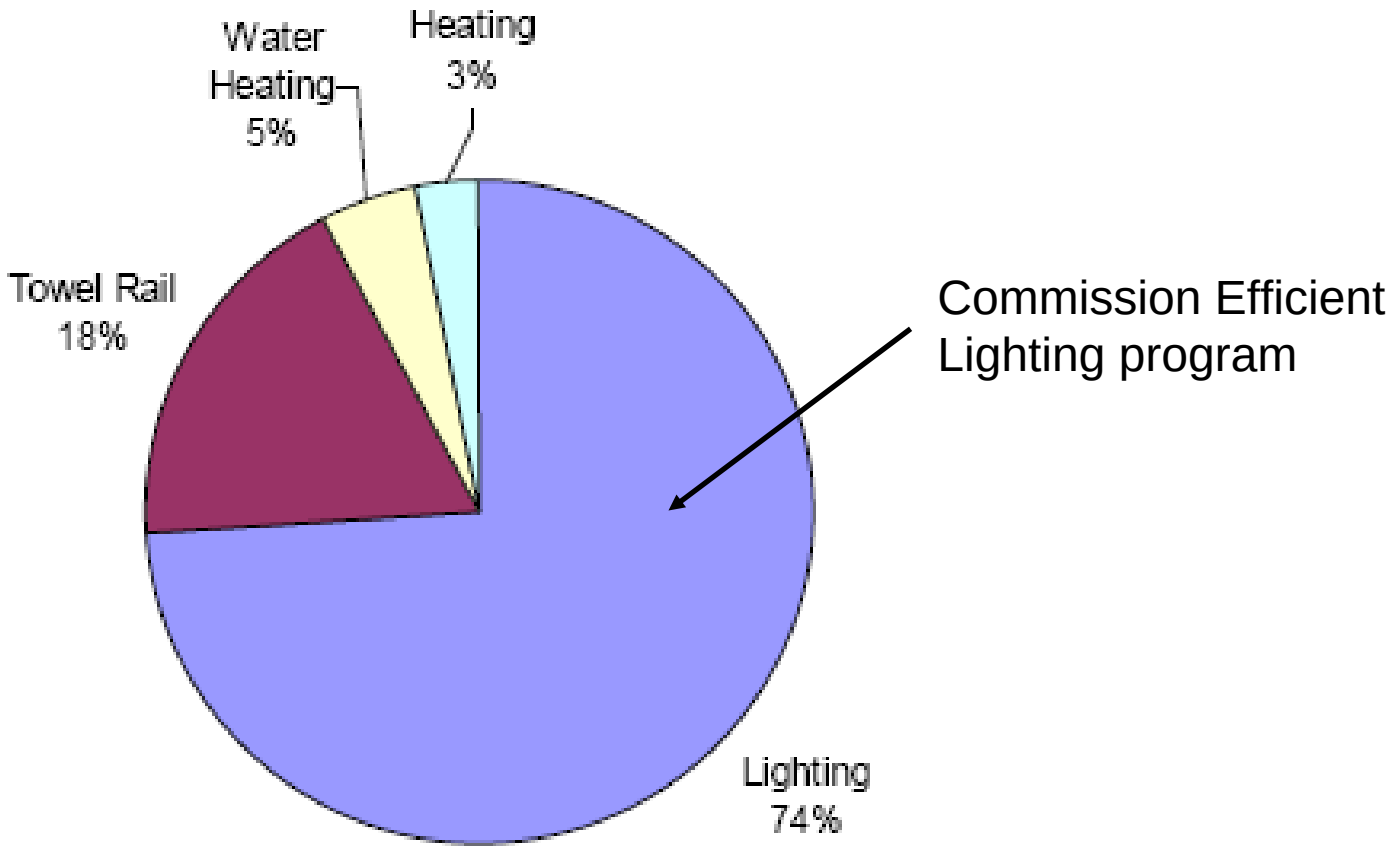
Lighting: **9** programmes

Commercial: **11** programmes

Industrial: Motors and CAS



Achievable Residential Savings by End Use (220GWh potential)



Efficient Lighting – New programmes . . .

THE PAST . . .

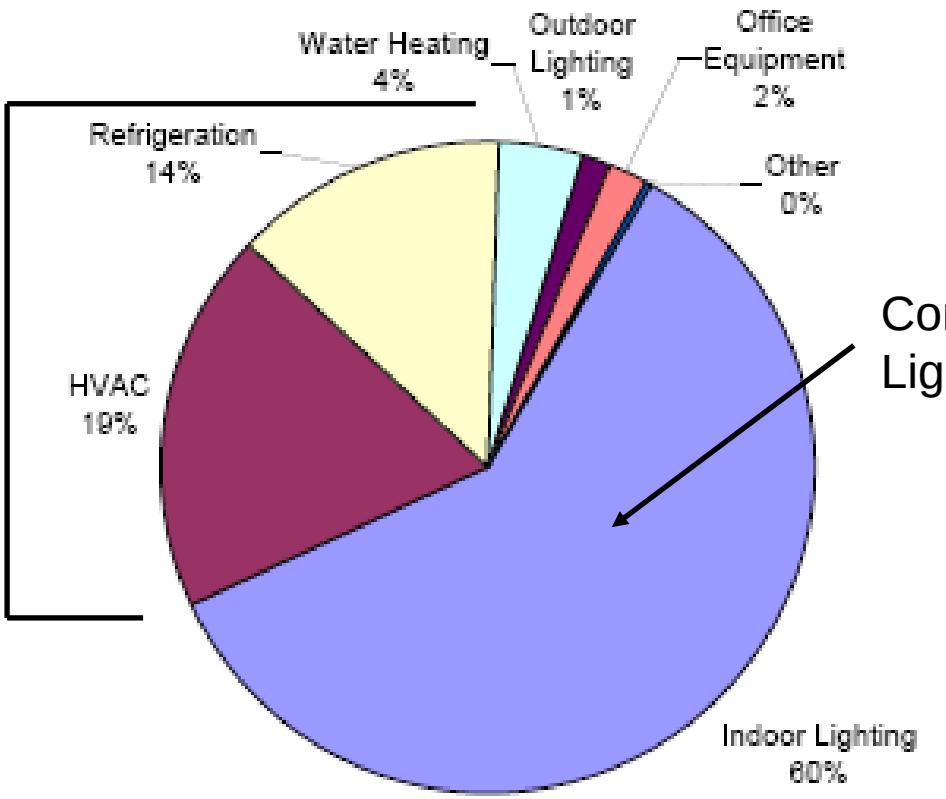
- 3.4 million CFLs subsidized to date

THE FUTURE . . .

- 9 new programmes now in place for 2008
  - CFL replacements for incandescents and halogens
  - Halogen replacements for incandescents
  - High efficiency halogens
  - More efficient fluorescent tubes
  - Lighting controls
  - Lighting design
- Targeting a further 150 GWh per year of savings

Achievable Commercial Savings by End Use (389 GWh potential)

Commission Commercial Buildings program



Commission Efficient Lighting program

Commercial – new programmes . . .

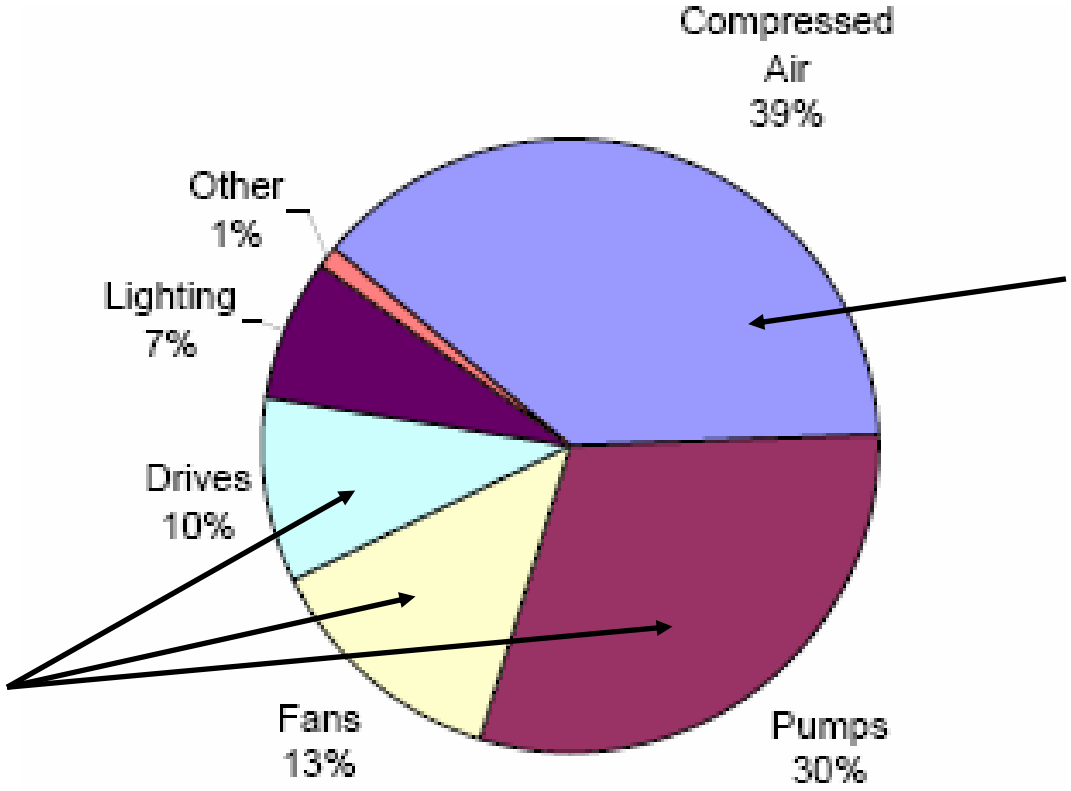
11 NEW PROGRAMMES IN PLACE FOR 2008 – 2010

Targeting:

- Types of buildings:
  - Commercial office buildings, hospitals, tertiary institutions, food stores and commercial enterprises with refrigeration equipment.
- Types of end use equipment
  - HVAC systems, refrigeration equipment, commercial lighting, and building management systems

- Targeting 100 GWhr of annual savings

Achievable Industrial Savings by End Use (220GWh potential)



Industrial – new programmes . . .

2 KEY FOCUS AREAS

- Electric motors
  - Bounty scheme
  - Policies and information
  - Rewind quality
- Compressed air systems
  - Operational best practice
  - Audits

Targeting 200 GWh annual savings