

# Can you have your cake and eat it too?

## energy efficiency and the 'takeback' effect

Mike Underhill  
Chief Executive, EECA

EFNZ  
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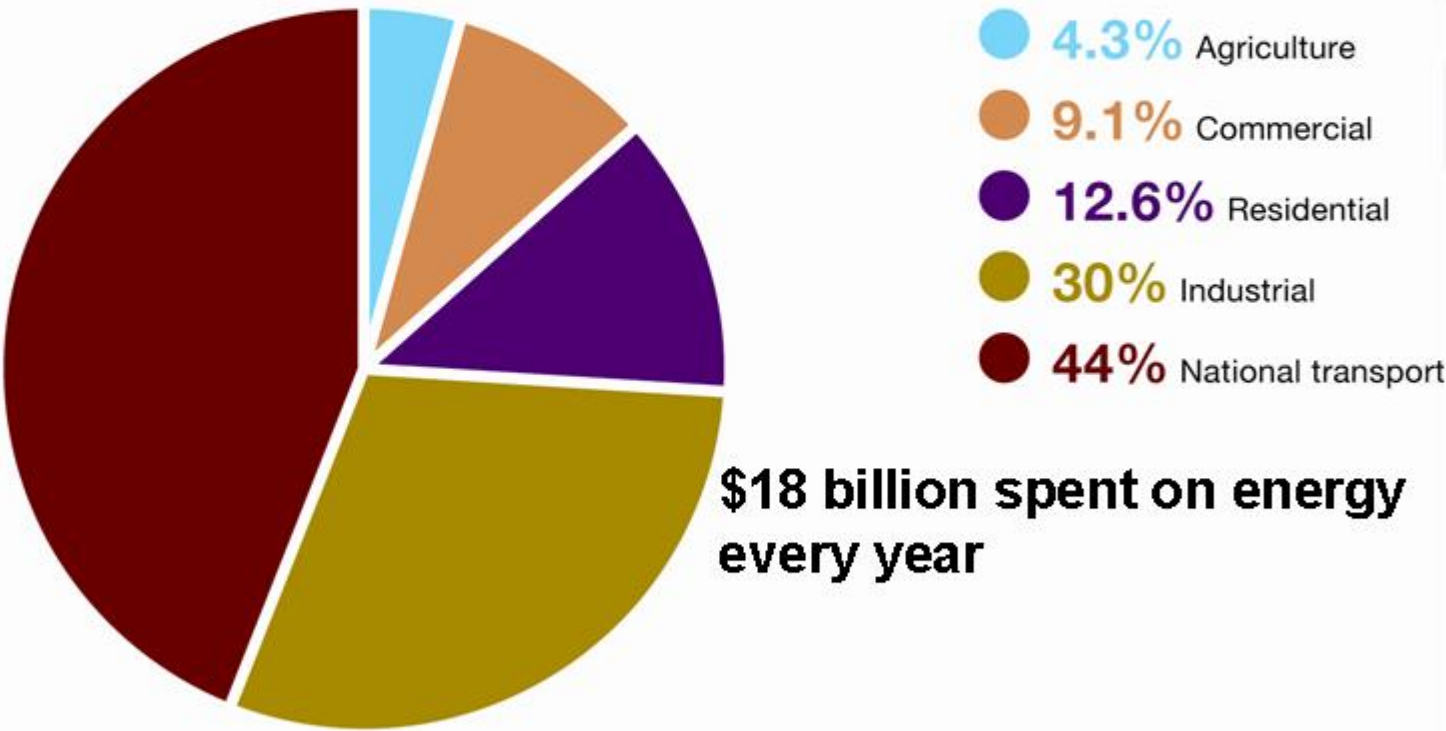
# The question

*Will energy efficiency deliver actual savings ?*

*Or will we just change the way we use energy, improve our lifestyles and keep increasing consumption?*

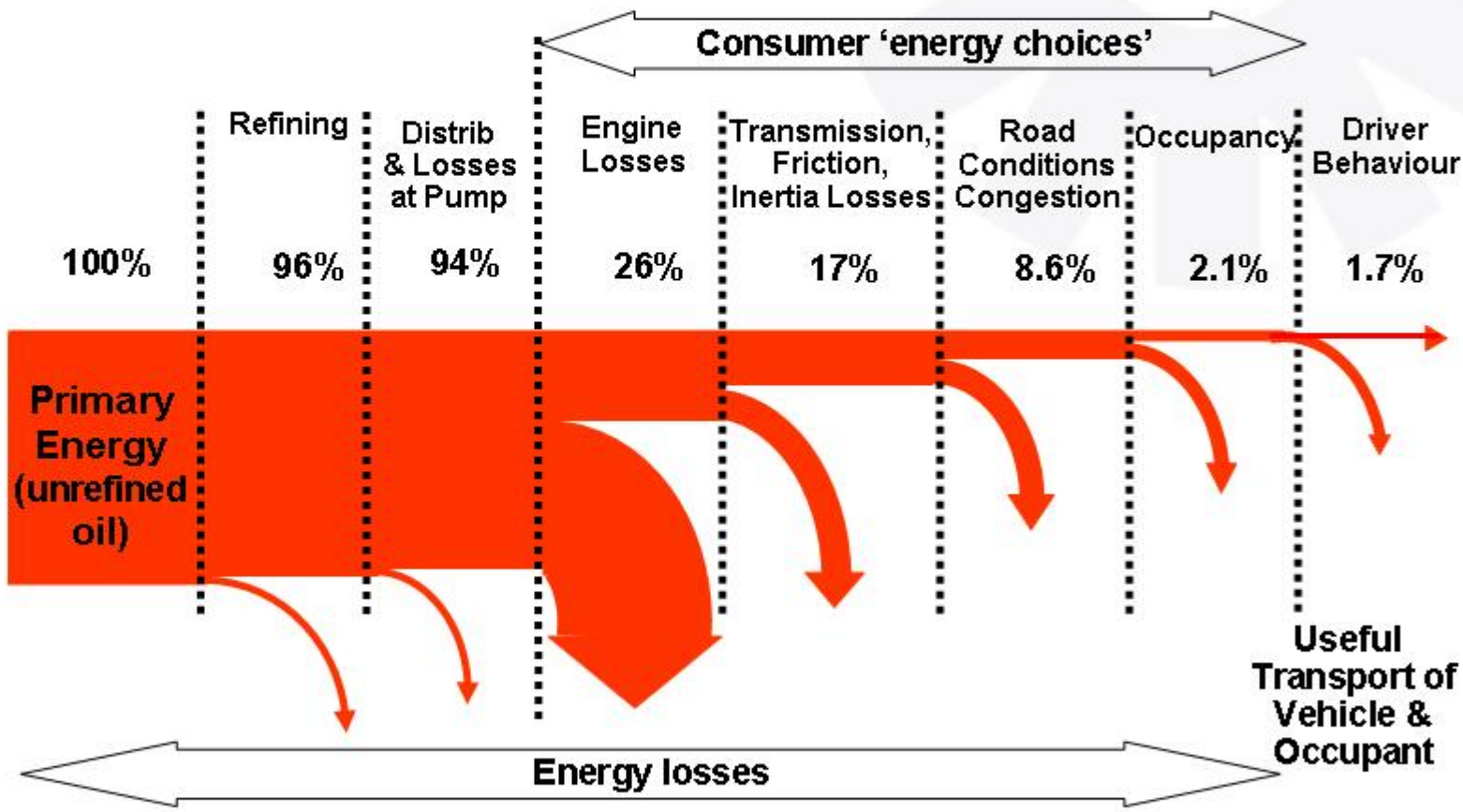
# Energy use

Figure 1.1: Total consumer energy by sector in 2006<sup>2</sup>

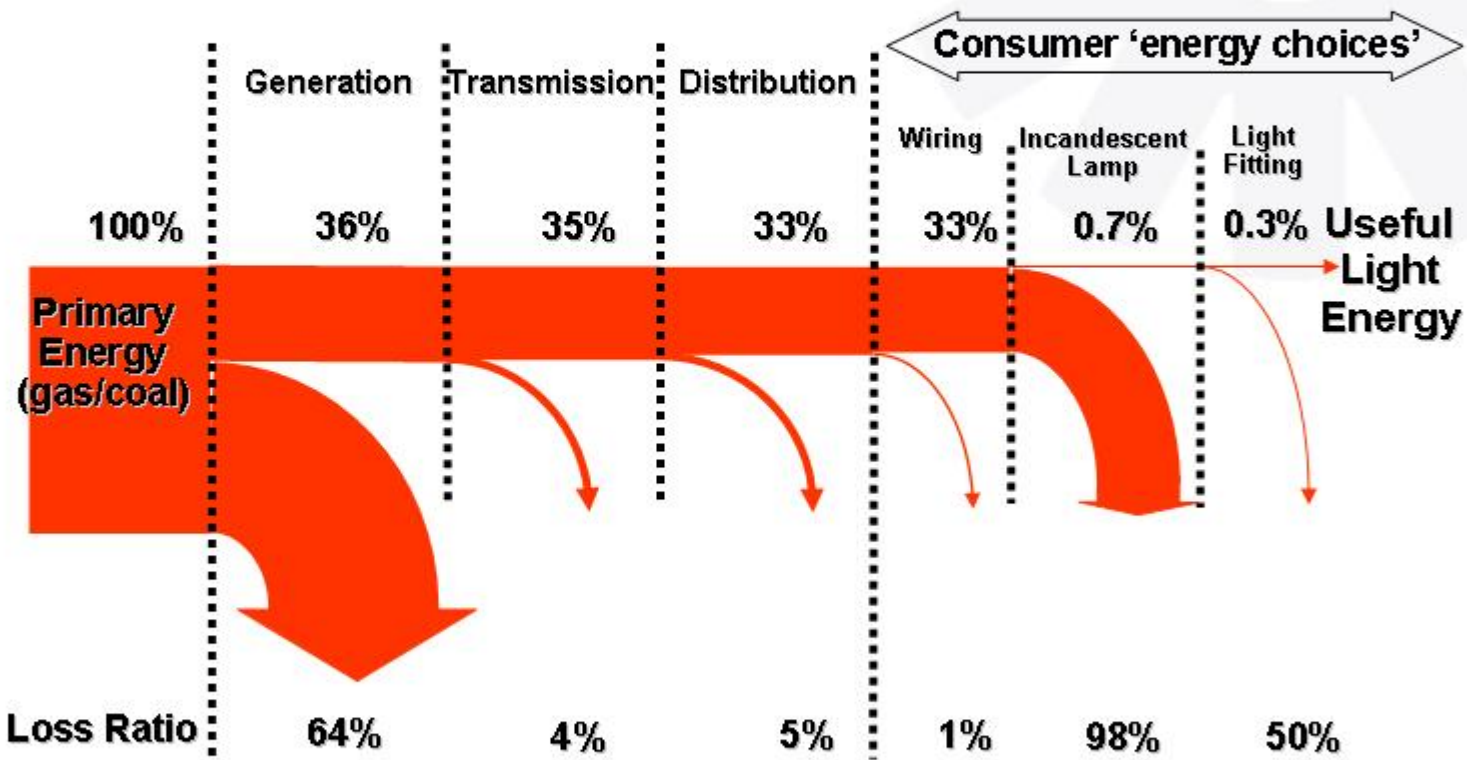


Source: Ministry of Economic Development

# Transport energy losses



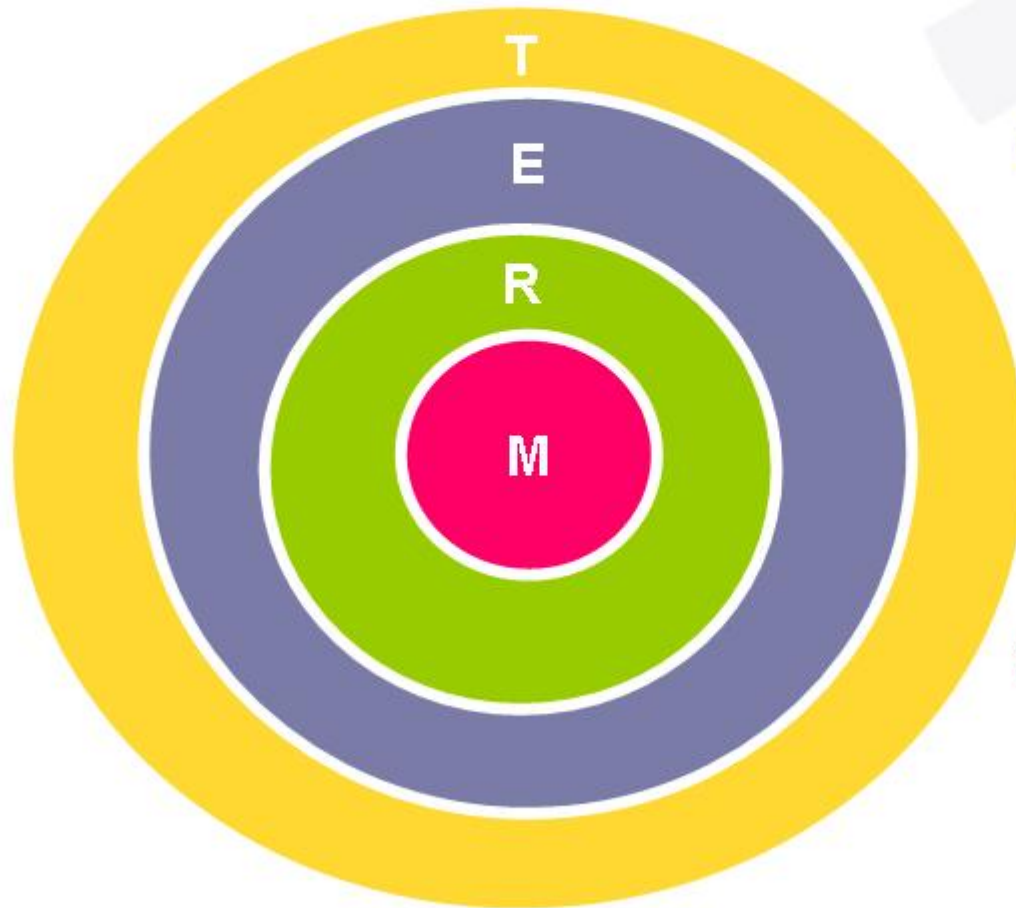
# Huntly power station to electric light bulb



Need to focus on both supply and demand sides

# Potential for energy efficiency

- Economic – what is cost effective
- Technical – theoretical potential, ignores cost and uptake
- Realisable – the gains that can be made on top of market, with some form of intervention
- Market – what will be delivered anyway if market left to its own devices



# New Zealand Energy Efficiency and Conservation Strategy

- 30PJ of savings in non-transport energy per year by 2025
- 9.5PJ of additional direct use renewable energy per year by 2025
- 20PJ of energy savings in the transport sector by 2015

# With success come challenges

IEA identified the following criticisms

- The takeback effect will erode most or all energy savings
- The economy wide effect will also erode savings
- Most energy savings would happen anyway due to ongoing technological advances or rising energy prices
- The discount rates used are too low
- The market failures used to justify energy efficiency policies and programmes are mostly a myth
- Energy savings are impossible to meter and too difficult or costly to estimate accurately

In addition

- Fuel poverty is a serious issue
- Embodied energy – is it worth it when you add it all up?

# Takeback and rebound

*Refers to the increase in the demand for energy services (heating, refrigeration, lighting) when the cost of the service declines as a result of technical improvements in energy efficiency*

*The Experience With Energy Efficiency Policies and programmes in IEA Countries, IEA August 2005*

For example:

- Fit a low-flow shower head and spend longer in the shower
- Install a heat pump, and use it for longer
- Buy a fuel efficient car and drive it more

## Evidence of the rebound effect in the U.S

Sector	End Use	Size of rebound effect
Business	Lighting	0-2%
Business	Process uses	0-20%
Residential	Water heating	<10-40%
Residential	Lighting	5-12%
Residential	Appliances	0%
Residential	Space heating	10-30%
Transport	Automobiles	10 -20%

Sources: IEA 1998; Greening, Greene and Difiglio 2000.

# Why does this happen?

- Takeback is a function of consumer preference – consumers take back because its worth more to them than the 'saved' energy
- People will seek out justification for existing behaviours
- And some people are in fuel poverty and they need to!

# Fuel poverty

*A household which **needs** to spend more than 10% of its income on all fuel use, including home heating to an adequate standard of warmth*

*Source: Department of Trade and Industry – Energy Group – 2001. The UK fuel poverty strategy*

- 10% of New Zealand population could fall into this category
- Cross government working group currently looking at the size of the issue
- Serious social problems

# Embodied energy

*The life cycle energy. Embodied energy is the sum total of the energy necessary - from the raw material extraction, to transport, manufacturing, assembly, installation as well as the capital and other costs of a specific material - to produce a service or product and finally its disassembly, deconstruction and/or decomposition.*

*Wikipedia, 2008*

- For example - moving to hybrid cars – what is the additional embodied energy from manufacturing and batteries ? Would it be better to build more efficient traditional cars?
- Embodied energy and life cycle costs hard to measure
- Crosses different sectors
- Increasingly being considered and factored in

# The flipside – co-benefits

*In each sector, the co-benefit is almost the bigger selling point*

## Business

- bottom line
  - increased productivity
  - brand profile
  - national branding
  - environmental – emissions reduction
- 
- Transport - \$125 US per barrel!

# Co-benefits

## Residential sector

- Health – massive health benefits  
e.g. 40 - 50% reduction in colds and respiratory problems in insulated homes
- Social benefits
- Improved standard of living
- Environmental
- Green feel good factor - inspires other behaviours

# Capitalising on co-benefits

- Historically, funding for energy efficiency can be a challenge
- Co-benefits opens up new funding avenues
- For example – Housing NZ funding insulation retrofits reduces health costs and increase well being of tenants
- Additional motivators for people

# How do you motivate those who can make changes ?

- Education and information
- Incentives to act – fridge replacement scheme
- Regulation – minimum energy performance standards
- Technology – smart meters

# Motivating behaviour change

- **Education and information encouraging action over time**
- **Focus on the co-benefits**
- **Address people's different drivers – 4.2 million individuals**
- **Make it easy for people to make the right choice – e.g energy rating labels at point of sale**
- **Normalise the behaviour**
- **Continuous research into peoples attitudes**
- **Price** – petrol and electricity

# Putting it in perspective

Takeback against existing targets is noticeable....but put in perspective....

- Transport – our biggest energy using sector
- NZEECS goal = 10% reduction in fuel
- Efficient driving = 20% savings

# Driving tips

- Check tyre pressure – save 5%
- Drive smoothly
- Watch your air con – it uses 10% more fuel
- Keep the load down – each 50kg of weight adds 2% more fuel
- Slow down – driving over the speed limit adds up to 10%
- Avoid short trips – cold engine has double the fuel consumption

# Putting it in perspective

Takeback against existing targets is noticeable

But put in perspective....

Transport – biggest energy using sector

- NZEECS goal = 10% reduction in fuel
- Efficient driving = 20% savings
- Choose the right car – vehicle fuel labels show 30% variation in a class
- Choose a smaller car – 60% savings

So, takeback against what is actually possible is not so significant

# International experience

## The IEA found

- Takeback does exist but erosion of savings is modest in most cases
- Some savings and cost effectiveness have been overstated by energy efficiency advocates
- But, estimating the net outcome from energy efficiency policies is complicated
- And critics also overstate their claims of the erosion of savings from takeback
- When all factors considered, energy efficiency is still very worthwhile
- Combined, major OECD countries used 1/3 less energy per unit GDP in 2000 against 1973
- Decline in intensity is a result of energy efficiency in key areas

# Conclusion

- Takeback does exist and it is provided for in the NZEECS
- At the same time, you must consider the co-benefits of energy savings
- In many cases, the co-benefits exceed the energy benefits
- Increase energy use for healthier life is vital in some cases
- The strategy has naturally taken a conservative view
- But if we get close to potential energy savings, it is clear we can have both