Opportunities for Energy Efficiency in NSW

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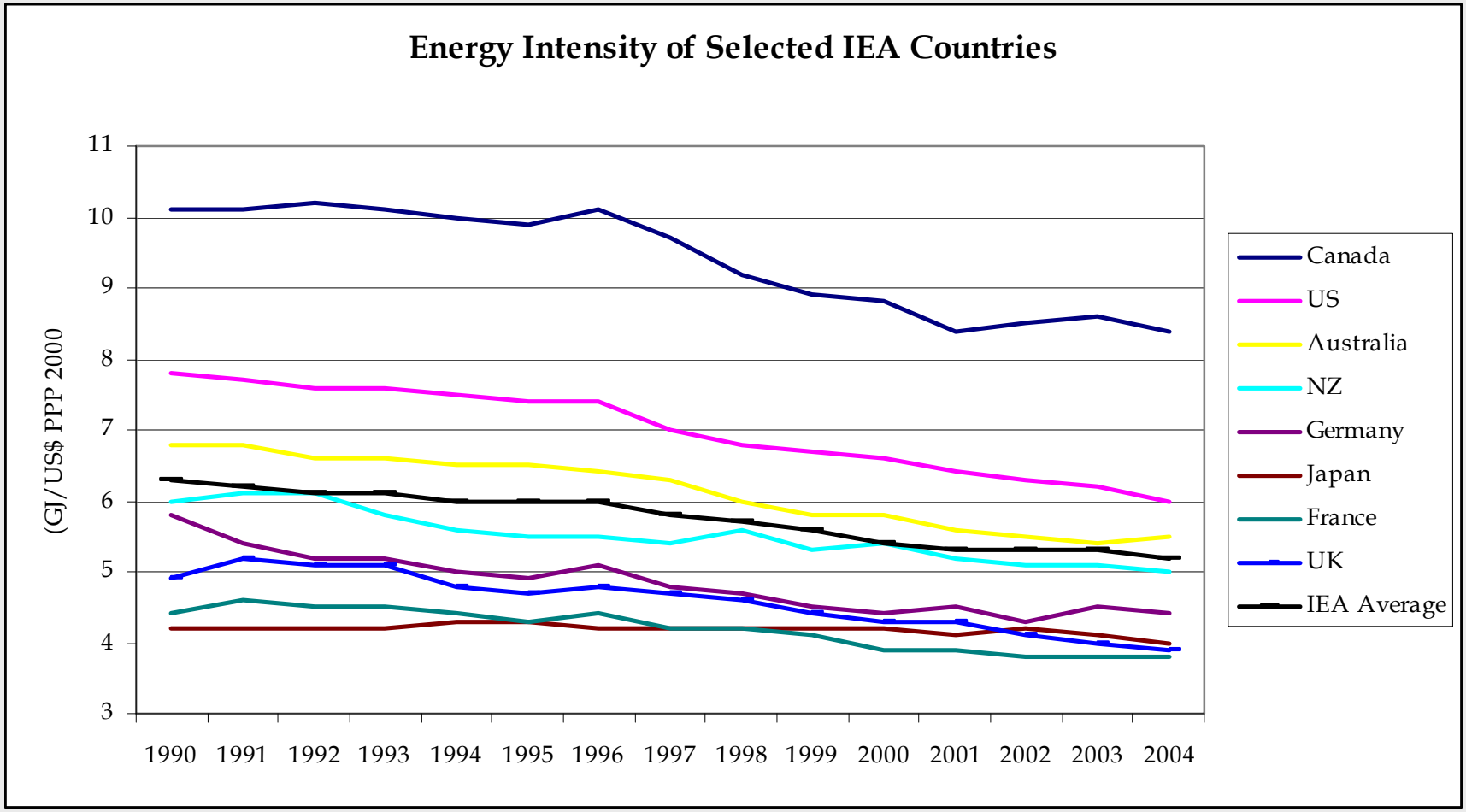
Why Energy Efficiency?



Principles

- **Opportunities based on private benefits and costs**
  - Subject to limits on adoption rates
- **Private benefits:**
  - Energy savings
  - Improved "service"
- **Private costs**
  - Capital (purchase) cost
  - Ongoing operating and maintenance costs
- **Opportunity where lifetime private benefits exceed private cost**
  - If net private benefits positive implies option not being taken up for other reasons

Residential Sector: Options

- Improvement of building code for new homes
- Lighting code
- Water heating code
- Water heater replacement
- Water heater insulation program
- Roof space insulation program
- Window shading
- Phase out of halogen lights
- Time switch lights
- Performance standards in appliances

Residential Sector: Potential in Australia

Option	Qnty (Mt CO2e)	Levelised Cost ($/t CO2e)
Time Switch Lights	0.1	-21
Water Heater Replacement	4.5	-19
Water Heater Code	0.5	-18
Water Heater Insulate	1.5	-15
Window Shading	1.1	10
Phase Out Halogen Lights	1.4	10
Building Star Rating	0.3	14
Roof Space Insulate	3.0	15
Lighting Code	0.0	16
Change Thermostats	1.1	17
Air Conditioning MEPS	5.7	20
Refrigerator MEPS	2.7	20
Consumer electronic meps	4.9	21

Commercial Sector: Options

- Star ratings for commercial buildings.
- Retail refrigeration efficiency improvement.
- Retail lighting efficiency program.
- Retail air-conditioning upgrades.
- Hospital lights replacement program.
- Hospital air-conditioning replacement program.
- Hospital wall insulation replacement program.
- Other commercial building lighting upgrade program.
- Other commercial building air-conditioning upgrade program.

Commercial Sector: Potential in Australia

Option	Qnty (Mt CO2e)	Levelised Cost ($/t CO2e)
Retail Air Conditioning	0.1	-41
Hosp Air Conditioning	0.3	-41
Other Commercial Space Air Conditioning	0.3	-39
Hosp Insulation	0.3	-38
Office Building Code	2.9	-21
Hosp Light	0.1	-19
Other Commercial light	0.1	23
Retail Refrigeration	0.1	95
Retail Light	0.7	108

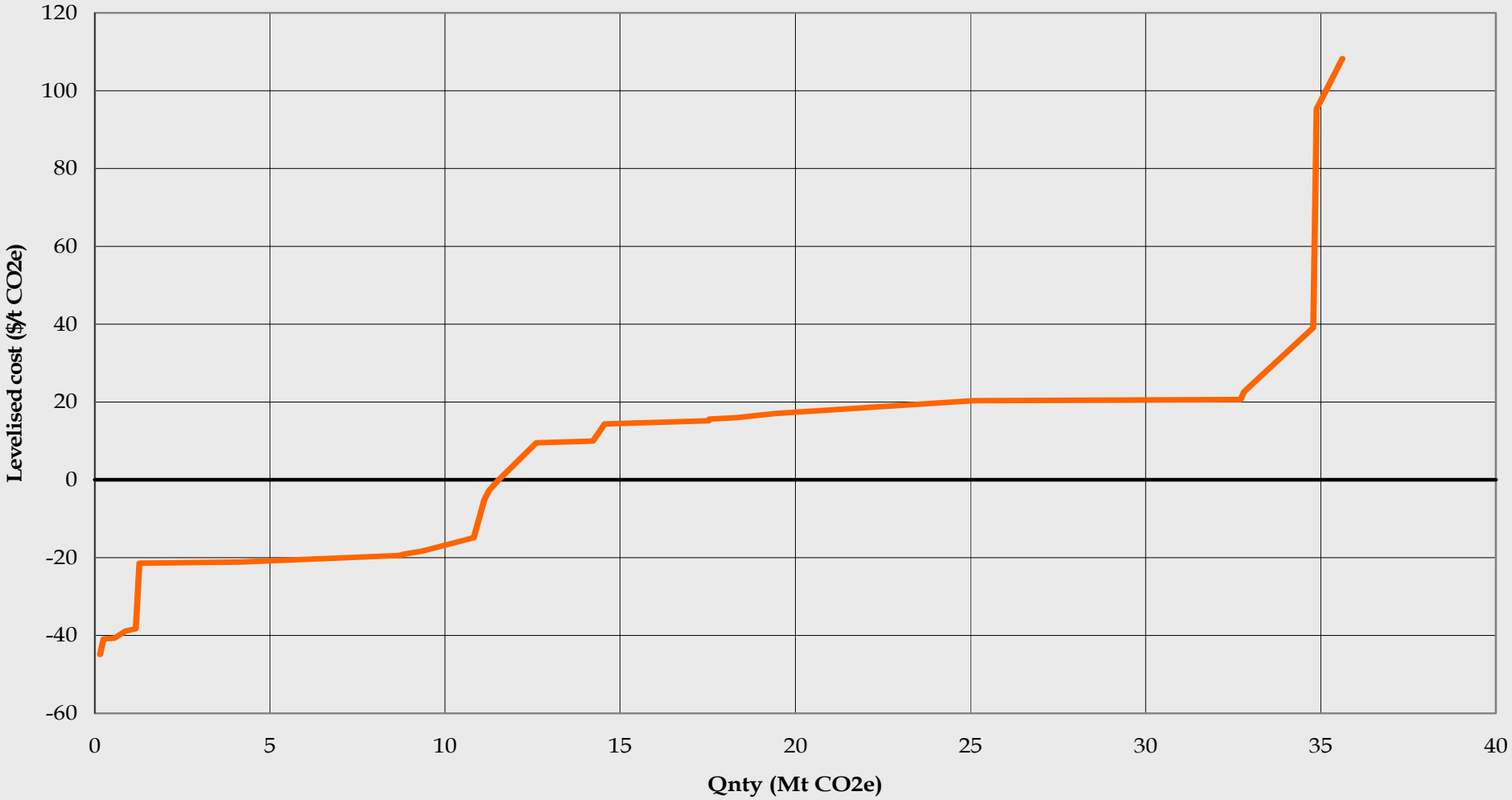
Industrial Sector: Options

- Covers industrial, mining and agriculture sectors
  - **60% of total energy use in NSW**
- Using a different approach due to large range of options available, the difficulty of modelling individual sub sectors, and variations within subsectors.
- Energy efficiency potential in these sectors were modelled as a function of the level of energy improvement.

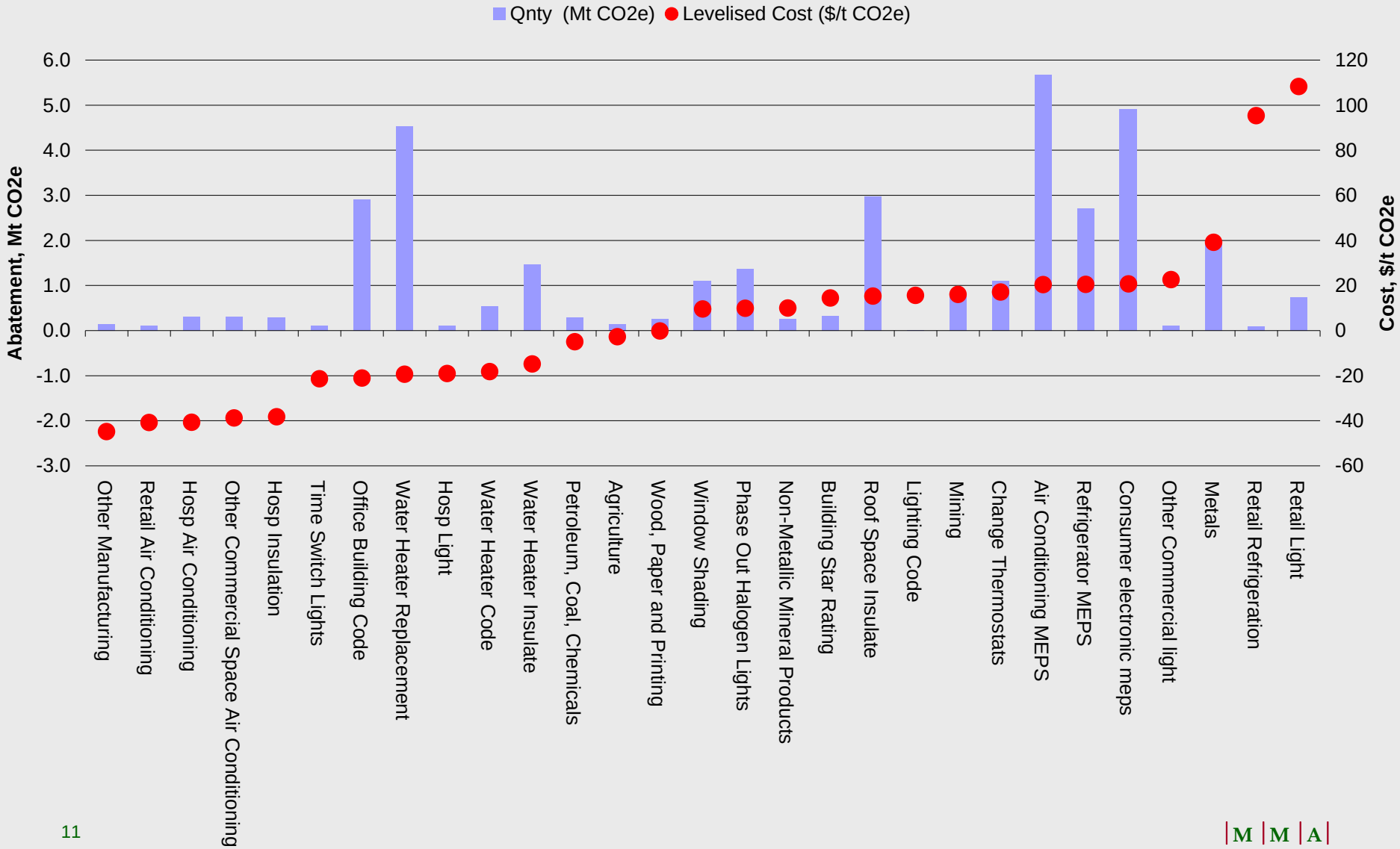
Industrial Sector: Potential in Australia

Option	Qnty (Mt CO2e)	Levelised Cost ($/t CO2e)
Other Manufacturing	0.1	-45
Petroleum, Coal, Chemicals	0.3	-5
Agriculture	0.1	-3
Wood, Paper and Printing	0.2	0
Non-Metallic Mineral Products	0.3	10
Mining	0.8	16
Metals	2.0	39

Preliminary Estimates: Australia



Preliminary Estimates: Australia



Issues in Modelling Opportunities

- Double counting of energy savings
- Accounting for uncertainties in benefits and costs
- Rebound effect
- Interpreting negative cost options:
  - Market failure
  - Transaction and search cost
  - Other non pecuniary cost

Market Barriers to Uptake

- Information failures
- Transaction costs
- Incentive misalignments
- Public good aspects of information and RD&D
- Capital constraints
- Behavioural and organisational barriers

Benefits of Improving Energy Efficiency

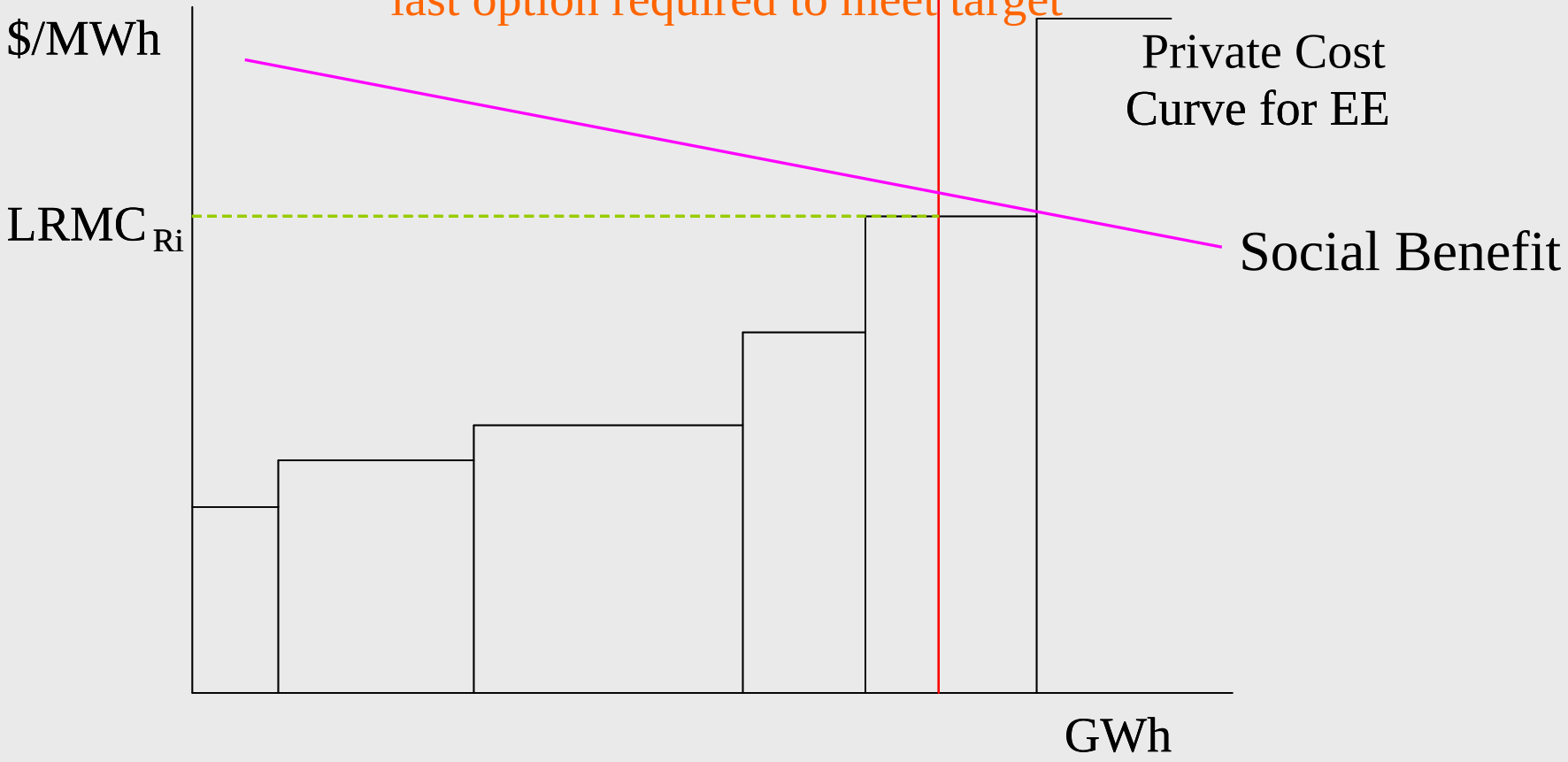
- Reduce Greenhouse Emissions
- Reduce pollutants other than greenhouse gases that arise from energy production and/or use
- Increasing energy security
- Infrastructure savings as well as deferral of new investments and thus allowing the deployment of more advanced and less carbon intensive technologies
- Ameliorating the impact of emission trading on energy prices

Energy Efficiency Certificate Scheme

- Market based mechanism to enhance uptake of energy efficient appliances and practises
- Retailers are liable to redeem a certain number of certificates each year in accordance with some prescribed target for energy efficiency improvement
- Certificates are created from eligible options for energy efficiency improvement
- Liability on retailers creates a need to purchase certificates. This "need" creates a market for certificates.

Energy Efficiency Certificate Scheme: Price Setting

Certificate price = Marginal cost to encourage energy users (LRMC) to adopt last option required to meet target



Target set so that private marginal cost < or = social benefit

Energy Efficiency Certificate Scheme: Price Setting

- Private costs includes transaction and search costs and other non pecuniary costs
  - **Do not include wider energy market and social benefits**
- Certificate price provides the financial incentive required to overcome these market barriers and costs to realise the energy efficiency potential
  - **Should be designed so that private costs equal wider social benefits**
  - **Social benefits include reduced resource costs in energy supply, lower emissions air pollutants and greenhouse gases**
- In competitive, liquid markets, price of certificate equal to LRMC to the end user of last EE option required to meet target.
  - **Cost of purchasing certificates < Social benefits from energy efficient adoption**
- Because of market failures, these options would not normally be adopted. The EECS has to be designed to lead to the uptake of socially beneficial energy efficiency.

Benefits of certificate trading scheme

- Potential for overcoming market barriers by providing financial incentive
- Allows participants to go beyond "minimum standards"
- Well functioning market should lead to the adoption of the least cost options for energy efficiency
- Can complement emission trading in the short to medium term

Other implications of certificate trading scheme

- Could put downward pressure on wholesale prices by lowering energy demand and reduce the price of emission permit to meet given target
- Impact on retail prices unclear, as depend on cost of certificates, which may or may not outweigh any reduction in wholesale price
- Could encourage substantial savings in capital, fuel and operating costs
- Could reduce burden of emission trading

Issues with certificate trading scheme

- Ensuring Additionality
- Minimising administrative and compliance costs
- Crowding out of other low cost greenhouse gas abatement options
- Time lines for measure
  - When will it devolve into an emission trading scheme
- Potential for market power and inefficient market structures
  - Depends on liquidity and transparency of market