

Document purpose:

This document is the result of the programme reviews EECA and MBIE conducted across EECA's programme portfolio in 2016. The reviews were in response to a requirement to reprioritise the EECA's portfolio in the context of the new NZEECS, the new EV programme, and expanded levy. The framework for the review is available [here](#).

The reviews were based on existing documentation and workshops with MBIE, PwC and EECA staff.

About the Equipment Energy Efficiency Programme

The Equipment Energy Efficiency (E3) Programme consists of Minimum Energy Performance Standards (MEPS) and Mandatory Energy Performance Labelling (MEPL).

MEPS set a minimum level of efficiency that a product must meet to be eligible for sale. They prevent the most inefficient technologies from accessing the market, prompt manufacturers and suppliers to raise the efficiency of their products, and ensure efficiency gains are made whether or not energy performance is a factor in consumers' purchase decisions.

MEPL ensures that potential purchasers are provided with clear and accurate energy performance information at the point of sale, enabling them to compare the energy performance of similar models within a class of products. Products are given an energy performance rating based on the results of testing to agreed technical standards. Sellers are required to display the energy performance information on a label on the product.

Conclusions

There is a strong role for government to address the market failure and barriers. The E3 Programme is sound and has proven effective and efficient in addressing the problem of a lack of consumer information about energy efficiency, and setting minimum standards for products.

While developing and implementing new standards under the E3 Programme is well established, changes to the E3 Programme agreement mean that compliance activities are funded separately by New Zealand and Australia and EECA will need to resource any MEPS compliance activity.

The E3 Programme supports the Trans-Tasman Mutual Recognition Agreement (TTMRA) between Australia and New Zealand. The alignment of standards and labelling supports the TTMRA by reducing the potential for disputes between the two parties. The work of the E3 Programme is also part of the wider international development of standards. The wider impact of decisions about EECA's E3 Programme must therefore be considered.

Electricity generation in Australia is carbon-intensive and so its E3 priorities tend to favour energy efficiencies related to electricity. New Zealand's highly renewable electricity generation means that the public cost-benefit assessment of gains from energy efficiency is not always as clear.

Recommendations

As the New Zealand programme lead, EECA must ensure that future E3 projects are prioritised (as much as possible) based on their benefit to New Zealand, particularly as it relates to the Government's priorities of a low-carbon economy and increased productivity through energy efficiency. This will require further analysis of New Zealand's priorities, but it also presents an opportunity to work more closely with the Australian Federal Government. Where projects are of more value to New Zealand, than Australia, additional resourcing may be required, which would need to be considered against EECA's collective work programme priorities.

It is also recommended that EECA considers how E3 can remain relevant by looking at new, emerging, or disruptive technologies. EECA can leverage its participation in the E3 Programme to ensure that such opportunities are prioritised.

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1 The problem

The price of a product is rarely linked to its energy use. Often products of the same size and technology, sold at the same or a similar price, can vary widely in the amount of energy they use. The lack of available information on, or a clear price signal linked to, energy efficiency means that consumers do not tend to consider whole-of-life costs when buying a product. Consumers also lack any other means to compare how much energy products use and how much the products cost to operate.

In turn, the lack of consumer awareness of or ability to identify the energy performance of products means that there is little demand for energy efficient products and little incentive for industry to introduce more efficient technologies to New Zealand markets¹.

1.1 Why is it a problem?

Energy-using products vary widely in their type and application. They include fridges, washing machines, electric motors, refrigerated display cabinets, distribution transformers, and external power supplies. In aggregate, they contribute significantly to New Zealand's energy demand and greenhouse gas emissions – so improvements in efficiency can quickly add up and result in significant reductions in greenhouse gas emissions across the country.

Residential energy-using products (hot water heating, space heating, electronics, refrigeration and lighting) contribute to 8% of New Zealand's energy-related greenhouse gas emissions. In the business sector, motor systems, lighting, refrigeration, and space conditioning make up 7% of New Zealand's energy emissions².

By 2035, New Zealand's energy demand is forecast to increase by 8% producing an estimated 29.8 million tonnes of CO₂ emissions.

1.2 The programme

1.2.1 Origins

New Zealand adopted Minimum Energy Performance Standards (MEPS) and Mandatory Energy Performance Labelling (MEPL) in 2002 under the *Energy Efficiency (Energy Using Products) Regulations 2002*.

MEPS and MEPL are components of the Equipment Energy Efficiency (E3) Programme. This operates as a bilateral programme between Australia and New Zealand as part of the Trans-Tasman Mutual Recognition Arrangement (TTMRA). Under this agreement, goods legal for sale in either country can legally be offered for sale in both³. A decision to partner with Australia in a jointly funded programme came in 2004, after misalignment of standards for water heaters and lighting ballasts

¹ While very few products are developed specifically for the New Zealand market, some are (e.g. heat pumps) and aligning with international partners (Australia) prevents product dumping in New Zealand.

² [EECA analysis based on MBIE Energy in New Zealand tables and EECA's Energy End-Use Database.](#)

³ If one country has more stringent regulations than the other, there is a risk of products being imported which do not meet the higher standard. Such imports may have an effect of undermining national energy savings targets.

created issues under the TTMRA. New Zealand's participation in the E3 Programme is underpinned by a non-binding bilateral agreement.

1.2.2 Purpose

The programme targets energy-using products (mainly electrical, but including gas and potentially extending across any energy sources) for both commercial/industrial products and consumer appliances. It seeks to raise the efficiency of these products sold in New Zealand by regulating their energy performance and/or regulating the provision of information about their energy performance.

1.2.3 Key components

The two regulatory tools used under the E3 Programme are MEPS and MEPL (the energy rating label). Often they are both used on the same product, but sometimes only one is used. Voluntary measures are also considered as part of the programme.

The technical requirements of regulatory proposals are developed in partnership with industry representatives through standards committees or technical working groups. Regulatory proposals are subject to public consultation and are approved through the Council of Australian Governments (on which New Zealand is represented) and the New Zealand Cabinet (on the recommendation of the Minister of Energy and Resources).

Regulatory compliance is monitored through activities such as market surveillance and product testing. Fines of up to \$1,000 per offence can be imposed under the regulations.

MEPS and MEPL are reviewed regularly to keep them in step with technological developments and capture opportunities for further efficiency gains.

Minimum Energy Performance Standards

MEPS set a minimum level of efficiency that a product must meet to be eligible for sale. They prevent the most inefficient technologies from accessing the market, prompt manufacturers and suppliers to raise the efficiency of their products, and ensure efficiency gains are made whether or not energy performance is a factor in consumers' purchase decisions.

The key components of MEPS are:

- development of an energy performance testing standard for each product type
- regulations requiring manufacturers to meet the specified energy performance standards
- requirement to register products and report sales data to EECA annually
- compliance activities (buying and testing products to check compliance with the relevant standard)

Mandatory Energy Performance Labelling

MEPL ensures that potential purchasers are provided with clear and accurate energy performance information at the point of sale, enabling them to compare the energy performance of similar models within a class of product. Products are given an energy performance rating based on the results of testing to agreed technical standards. Sellers are required to display the energy performance information on a label on the product.

The key components of MEPL are:

- development of an energy performance testing standard for each product type
- regulations requiring those products to be labelled with their energy performance
- requirement to register products and report sales data to EECA annually
- compliance activities (store surveys to check products are labelled at point-of-sale)

1.3 Market characteristics

The market includes both business and residential energy-using and energy-conserving products (e.g. windows). For the purposes of this review it does not include transport products.

New Zealand is primarily an importer (not manufacturer) of energy-using products. Most of the products are available internationally.

Imported products are usually subject to standards and labelling requirements overseas meaning that decisions on whether or not to apply standards locally should consider how fit for purpose the international standards are for local conditions (such as climate and market composition) and how closely any proposed New Zealand standards will align with existing ones.

Overseas manufacturers supplying the Australasian market are reluctant to bear the cost of meeting two sets of requirements for Australia and New Zealand (e.g. different label designs) given the additional cost this would incur.

Major international manufacturers tend to base their Australasian headquarters in Australia, meaning that Australian market activities can have a strong influence on the New Zealand market for these products.

The market for energy using products is difficult to characterise as it encompasses a wide range of product types, each with its own market attributes. The price, pathway to purchase and product characteristics can vary widely; each is described further below.

1.3.1 Pathway to purchase

Residential products are often sold through appliance retailers, such as Harvey Norman. For some products, such as lighting, a large percentage is sold either in supermarkets, specialist retailers such as Lighting Direct or in hardware stores such as Mitre 10. Windows are often purchased as part of a larger building project or renovation to increase the performance of the thermal envelope, and can be chosen by a third party (i.e. a builder).

Online sales are an increasing trend. Most of the larger retailers offer online purchase, and there are brand specific websites, such as Dell computers and Apple which offer online purchase, as well as comparison sites such as PriceSpy and PriceMe. Many consumers, even if they purchase in store, do some research online⁴. For some residential products, installers are the main point of contact for consumers, for example space and water heating products.

In the business area, products include items such as office equipment and commercial lighting there is also cross-over with residential products, such as laptop computers. Regardless, the pathway to purchase for business products tends to be quite different, with more products being sold via

⁴ The frequency of this varies depending on the product, but [EECA's Quantitative Labels Research](#) showed it was reasonably common.

installers, or specified in contracts, and less focus on customers physically viewing an appliance in-store.

1.3.2 Scale of price

The price bracket varies across products, from a low outlay (e.g. one compact fluorescent lamp is less than \$10) to whiteware and heating appliances which can be over a thousand dollars each. Industrial products like motors and transformers have a much higher cost.

1.3.3 Product characteristics

For some categories, the number of factors influencing the consumer decision is limited while in others there are many (e.g. appearance, perceived quality/brand, price, size). Therefore the importance a purchaser places on energy consumption in the decision to buy varies.

2 Strategic fit

The New Zealand Energy Strategy 2011-2021 notes that one of the Government's four key priorities is the efficient use of energy. This is to be achieved through four focus areas, including "warm, dry energy efficient homes", "enhanced business competitiveness through energy efficiency" and by providing "better consumer information to inform energy choices".

The New Zealand Energy Efficiency and Conservation Strategy (NZECS) 2011-2016 includes the objective of "Greater business and consumer uptake of energy efficient products" and the goal to "extend minimum energy performance standards, labelling and ENERGY STAR product coverage to remain in line with major trading partners."

The programme is also consistent with Government initiatives such as the energy and climate area in the [Business Growth Agenda \(BGA\)](#) Natural Resources chapter. The BGA signals that New Zealand should "ensure well-functioning markets, and identify and remove regulatory barriers to support renewable energy and reduce carbon emissions."

[EECA's strategy](#) has objectives related to the energy efficiency of products.

- Residential consumers understand and consider the energy cost impact of choices they make when selecting and using appliances.
- Annual residential energy use per household is less than the 2015 baseline.
- By 2020, 25% of the total identified economic potential for energy efficiency improvement has been accessed in the key areas of space heating, water heating, refrigeration and lighting.

Average energy intensity of appliances and products sold in New Zealand (and covered by an efficiency standard) is improving by 0.5% per year by product line.

3 Role for government

3.1 Market failures and barriers

In a fully functioning market, consumers would appreciate the lifetime (purchase and operating) costs for different purchase options and have access to clear and trustworthy energy consumption information for those options. Manufacturers would then also have incentives to improve the energy efficiency of their products.

The market failures and barriers that prevent this from occurring include:

3.1.1 Market failure

Imperfect information: Prior to the E3 Programme, search costs for energy efficiency information were high because the information either did not exist or was not made readily available. This means consumers were unable to minimise the total cost of ownership by taking energy efficiency into consideration when purchasing a product.

Principle-agent issue: In some instances, builders, tradespeople or landlords may be responsible for the purchase of the product. They don't prioritise energy performance as they don't stand to benefit from reduced energy costs.

3.1.2 Market barriers

Lack of capacity: Purchasers lack the time, ability or inclination to collate and analyse energy consumption data for the products they are considering purchasing.

Preferences: Purchasers prioritise other features for the products they are considering purchasing (e.g. a television's picture quality)

Present bias: Purchasers prioritise the capital cost of the product rather than the whole-of-life costs.

3.2 Potential benefits

Table 1: Public and private benefits expected from the E3 Programme

Public	Private
<ul style="list-style-type: none">• Avoided greenhouse gas emissions	<ul style="list-style-type: none">• Reduced energy costs for consumers• Improved business competitiveness• Deferred need to invest in new generation infrastructure

3.2.1 Primary public good benefits

Products sold under the programme will consume less energy than those that would otherwise have been sold, resulting in fewer greenhouse gas emissions.

3.2.2 *Private good benefits*

Products will use less energy, for the same output, leading to lower energy costs for consumers. (As MEPS and MEPL are required to deliver a net benefit, any increase in purchase price will be outweighed by savings over the product's lifetime of service.)

More efficient products will result in lower overheads for businesses, enabling them to be more competitive.

Lower energy demand due to more efficient products will allow New Zealand to defer investment in new generation infrastructure and continue to meet most of its stationary energy needs from renewable and low-emissions energy sources.

3.3 Potential costs

There is limited potential for the private sector (such as through third party websites, or industry associations) to provide clear and accurate energy performance information or warn of substandard products. However, no single party has the ability to solve the failures and barriers without government intervention.

There are potentially compliance costs as manufacturers, importers, retailers and consumers adjust to a new regulation. This is mitigated by the criterion for adopting new MEPS and MEPL which is that it delivers a net national benefit without imposing prohibitive costs on industry, limiting competition, or limiting consumer choice.

Consumers sensitive to capital cost (as opposed to whole-of-life cost) could be inconvenienced if the less energy-efficient models were no longer available – but only if these were cheaper than energy-efficient models.

The programme is not limiting consumer choice; through implementation, it is clear that it is obtaining the right balance between promoting quality and consumer choice.

4 Intervention

4.1 Intervention logic

There is no intervention logic for the programme currently⁵.

4.1.1 *MEPS*

MEPS require manufacturers and importers to supply only products that meet the stated requirements, preventing the least efficient products from entering the market.

MEPS address the imperfect information and principle-agent market failures, as well as market barriers listed above, especially consumers' lack of capacity. MEPS also address information failures where products are not suited to labelling (e.g. where this is a limited range of product or the product is not displayed on shop floors).

⁵ One will be developed depending on the outcome of programme reprioritisation.

4.1.2 MEPL

MEPL addresses the imperfect information market failure, as energy rating labels on appliances give consumers awareness and a better understanding of the energy efficiency and lifetime energy costs of different purchase options. This information also helps overcome the market barriers listed above.

This leads more consumers to purchase more efficient products (performing over and above the MEPS baseline, or in the absence of MEPS) than they otherwise might have. Higher sales of more efficient products contribute energy savings additional to those achieved by MEPS.

4.2 Options

Alternatives to regulating the energy efficiency of products include:

- Information-only campaigns – to influence purchase decisions and user behaviour (how owners of products operate those products).
- Endorsement labelling to promote the most efficient products (such as ENERGY STAR).
- Dis-endorsement labelling to alert consumers to poorly-performing products.
- Voluntary codes of practice to obtain industry's agreement to meet energy efficiency criteria – these work best when the industry is willing to cooperate and is small in scale (thereby making it easier to ensure maximum coverage of the market).
- Procurement guidelines to specify energy efficiency criteria for bulk purchases of products.

Standards, labelling and information measures can be complementary. For a given product class, mandatory MEPS can prevent the worst-performing models from gaining entry to the market while a voluntary high-efficiency standard or endorsement label can be used to promote high-performance models. High efficiency standards can also be used as criteria in other programmes, for example procurement guidelines and subsidy schemes.

4.3 Investment objectives

- Electricity savings of 78 GWh per annum (2016/17 Business Plan)
- No less than 95% labelling compliance (2016/17 SPE)

4.4 Potential impact

A forward looking cost-benefit analysis was produced for regulatory amendments made in 2011. This included adding new regulation or revising existing under the *Energy Efficiency (Energy Using Products) Regulations*. The total benefits described in the Cabinet paper of September 2010 [EGI (10) 195 refers] were \$474m and 2820 ktCO₂-e. The cost-benefit ratios varied for different products but were all between 1.6 (for gas water heaters) and 7.4 (for air conditioners/heat pumps).

4.5 Market readiness

Manufacturers of energy-using products are largely familiar with and able to respond to standards and labelling interventions as these have now been operating in some economies for up to four decades and for more than two decades in New Zealand.

Where the market for a product is less established or a technology is less mature, the E3 Programme would look to defer MEPS and MEPL or provide a long lead-in time., The programme may also consider a voluntary alternative (such as a code of conduct or ENERGY STAR endorsement) if viable.

4.6 Risks of failure

Table 2: Identified risks to the success of the E3 Programme

Risks	Impact	Mitigation
Breakdown of the relationship with the Australian Government programme partners.	This would make it difficult to run the programme, and could considerably increase the associated costs both to EECA and potentially industry	Maintain good working relationships and active participation in the programme
Cabinet defers decisions, or does not accept final recommendations, on proposed measures	Delays to implementing New Zealand regulations with significant net national benefits	Seek Cabinet agreement on forward work programme as an indicator when developing policy proposals Consult other government agencies closely as proposals are developed (MBIE, Treasury) Keep Minister well-informed
Delays in programme caused by political environment (such as the Australian Government's regulatory reform agenda)		Highlight and escalate potential trans-Tasman issues as appropriate
Public perception that MEPS and MEPL regulation is 'nanny state' and limits consumer choice	Public opposition to the programme, loss of political support	Promote the E3 Programme as best regulatory practice, and provide a clear message that labelling facilitates consumer choice by providing better information on the total costs of appliance ownership (including ongoing running costs)
Adverse response from industry regarding regulatory proposals	Industry opposition to the programme, loss of political support	Undertake early and ongoing consultation with industry; report on issues raised by industry and how these have been addressed in final regulatory recommendations; provide adequate notice before new regulations come into force; ensure industry understands the regulatory development process and is aware of all the opportunities for input.

4.7 Interdependencies

There are financial and resource interdependencies with the Australian Government programme partners under existing commitments; these are set out in the programme's Policy Framework and Funding Arrangement. New Zealand and Australian agencies also work together to maintain a registrations database that is critical to compliance and monitoring for the programme.

MEPS and MEPL complement EECA's ENERGY STAR programme. MEPS act as a 'minimum acceptable' baseline, MEPL highlights the range of performance across the product class, and ENERGY STAR indicates 'best in class' in terms of energy efficiency. Because ENERGY STAR is voluntary, it is quicker to implement than a new MEPS and MEPL regulation. This means it is sometimes used as a 'warm-up' to regulation or a way to start securing benefits sooner.

Australia and New Zealand work with other trading partners through the Asia-Pacific Economic Cooperation and the International Standards Organisation (ISO) to align standards and labelling requirements (to promote global best practice and avoid creating barriers to trade), and to improve compliance outcomes (e.g. by corroborating compliance testing results). This approach reduces technical barriers to trade, upholding New Zealand's commitment to the World Trade Organisation's Technical Barriers to Trade agreement. It also promotes trade in environmental goods and services.

4.8 Resource allocation

EECA has spent \$26.9m on developing, promoting and enforcing MEPS and MEPL since 2002, and currently spends around \$1.5m per annum. In recent years, costs have been sourced from EECA baseline funding and/or the electricity levy.

5 Performance

5.1 Effectiveness

Twenty product categories are currently regulated for energy efficiency, including household appliances (such as refrigerators and televisions), and commercial and industrial equipment (such as commercial lighting and electric motors) (Table 3).

Table 3: Product categories covered by the E3 programme including those that are also covered by ENERGY STAR

Product Categories	MEPS	MEPL	ENERGY STAR
Air conditioners/heat Pumps	✓	✓	✓
Clothes dryers	✗	✓	✗
Clothes washers	✗	✓	✓
Computer monitors	✓	✓	✓
Computers	✓	✗	✓
Dishwashers	✗	✓	✓
Electric storage water heaters	✓	✗	✗
External power supplies	✓	✗	✗
Gas water heaters	✓	✗	✗
Household refrigerators and freezers	✓	✓	✓
Set top boxes	✓	✗	✗
Televisions	✓	✓	✓
Compact fluorescent lamps	✓	✗	✓
Linear fluorescent lamps	✓	✗	✗
Ballasts for fluorescent lamps	✓	✗	✗

Product Categories	MEPS	MEPL	ENERGY STAR
Close control air conditioners	✓	✗	✗
Commercial chillers	✓	✗	✗
Distribution transformers	✓	✗	✗
Electric motors	✓	✗	✗
Refrigerated display cabinets	✓	✗	✗

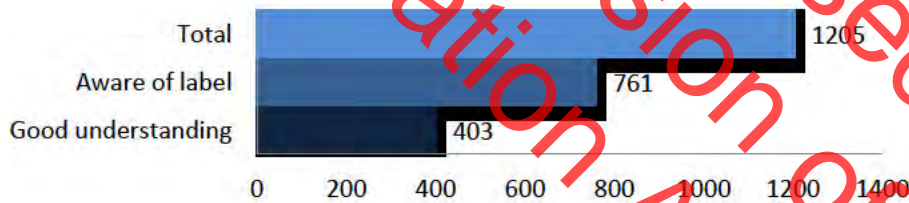
The efficacy of MEPS and MEPL is contingent on the following assumptions:

- MEPS do not limit the choice of products and technologies available to consumers or adversely affect the price or functionality of products.
- MEPS are set at levels higher than efficiency gains that would have been made under business as usual.
- Manufacturers, suppliers and retailers fulfil their obligations under regulation with respect to MEPS and labelling.
- Energy rating labels are seen and understood by consumers and influence consumers' purchase decisions

For MEPL, compliance surveillance activities indicate that retailer compliance with regulatory labelling requirements currently sits at 98% (against a target of 95%).

In 2015, EECA commissioned some detailed market research of its labels and endorsement marks. The [research](#) found that 63% of those surveyed were aware of the MEPL label and 53% of those had a good understanding⁶ of what it meant (Figure 1).

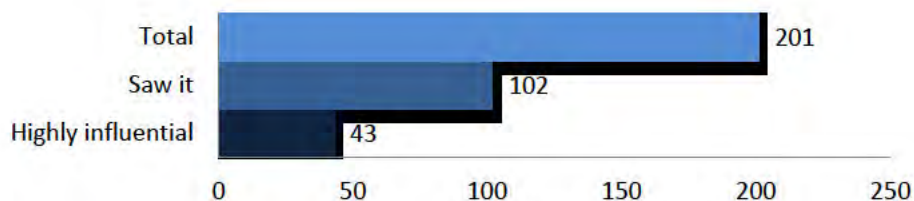
Figure 1: Awareness and understanding of the MEPL label



Using heat pumps as an example, the research also found that 42% of those who recalled seeing the label when shopping for a heat pump stated it was highly influential in their decision (Figure 2).

Figure 2: Visibility and influence of the heat pump MEPL label

⁶ Self-reported good understanding.



5.2 Achieved benefits

Energy savings accrue as households and businesses purchase new products to replace their older, less efficient ones, resulting in reduced national energy demand and avoided greenhouse gas emissions from the use of these products.

EECA annually collects and analyses sales data to monitor the impacts of the programme. From 2002 to March 2015, the 54 million products sold under the programme have saved 22.9 PJ, worth \$560m in national benefits⁷. This has been achieved at a total cost to EECA of \$26.9m. This is equivalent to 878 ktCO₂e⁸ which is equivalent to about 3% of New Zealand's energy-related emissions in 2014.

Products sold under the regulations remain in use for relatively long lifetimes (10-20 years in many cases) and they continue to consume less energy than the products that would otherwise have been in use under a business-as-usual scenario. For example, the expected lifetime savings for products sold in 2015 are 8.6 PJ of energy, 329kt CO₂e and \$210m in national benefits.

The method for calculating these estimates is in Appendix One.

5.3 Value-for-money

A cost-benefit analysis was conducted to assess the quantifiable outcomes of EECA's expenditure from programme inception through to the end of the 2015/16 financial year. The results are summarised in Table 4 and details and assumptions are outlined in Appendix Two.

Table 4: Cost-benefit analysis results for E3 from inception to March 2015

Metric	Description	Value	Comment
Net present value		\$889m	
Benefit-cost ratio	PV all benefits/PV all costs	2.72	
ROI-Government	PV public (government) benefits/PV public (government) costs	0.58	

⁷ Using a long-run marginal cost of electricity of 8.8c/kWh.

⁸ Using the average emissions factor for electricity from MFE (0.138).

5.4 Programme future

The E3 Programme is ongoing. Development of new and revised specifications is governed by the E3 forward work plan and EECA's business plan and strategy. New Zealand has agreed to contribute to the ongoing funding of the programme until at least 2016, through the Australia–New Zealand Joint Policy Framework and Funding Arrangement, signed by Ministers in 2012.

There is also an ongoing requirement to maintain product registration and compliance activities for the products already covered by the existing regulations.

The work programme currently includes:

- Air conditioners and chillers – decision RIS expected by June 2017.
- LED MEPS – consultation RIS out for comment at present.
- Commercial refrigeration – decision RIS expected November 2017.
- Industrial fans – consultation RIS early 2017.
- Household fridges and freezers – consultation RIS in early 2017.

6 Lead organisation

As the New Zealand programme lead, EECA project manages implementation of the forward work programme, provides technical expertise, maintains the registrations database and runs the compliance programme. EECA is uniquely well placed to deliver a MEPS and labelling programme given the legislative framework that EECA operates under and EECA's history of working with Australian Government agencies under the E3 Programme.

EECA is both willing and has proven capability having run the programme successfully for 14 years.

Other agencies involved in programme delivery:

- The Australian Commonwealth Government manages the E3 Programme on behalf of E3 Programme partners and has oversight of the relevant Australian legislation.
- The Ministry of Business, Innovation and Employment (MBIE) has oversight of the programme in New Zealand, including briefing the Minister on key policy decisions and providing advice on amending the *Energy Efficiency (Energy Using Products) Regulations* to give effect to new MEPS and labelling requirements.
- EECA works with the Commerce Commission in some instances to take action on non-compliance with the regulations.

Alternative lead agencies:

- MBIE: MBIE is familiar with the E3 Programme and has knowledge of the energy sector and the standards and labelling framework
- Ministry for the Environment (MfE): the programme fits well with MfE's objectives
- Ministry of Foreign Affairs and Trade (MFAT): MFAT is the lead agency responsible for maintaining New Zealand's bilateral relationship with Australia and is well placed to assess the trade implications of policy proposals.

None of these agencies have both the appropriate mandate and capability to run the programme.

7 Conclusions

There is a strong role for government to address the market failure and barriers. The E3 Programme is sound and has proven effective and efficient in addressing the problem of a lack of consumer information about energy efficiency, and setting minimum standards for products.

While developing and implementing new standards under the E3 Programme is well established, changes to the E3 Programme agreement mean that compliance activities are funded separately by New Zealand and Australia and EECA will need to resource any MEPS compliance activity.

The E3 Programme supports the Trans-Tasman Mutual Recognition Agreement (TTMRA) between Australia and New Zealand. The alignment of standards and labelling supports the TTMRA by reducing the potential for disputes between the two parties. The work of the E3 Programme is also part of the wider international development of standards. The wider impact of decisions about EECA's E3 Programme must therefore be considered.

Electricity generation in Australia is carbon-intensive and so its E3 priorities tend to favour energy efficiencies related to electricity. New Zealand's highly renewable electricity generation means that the public cost-benefit assessment of gains from energy efficiency is not always as clear.

8 Recommendations

As the New Zealand programme lead, EECA must ensure that future E3 projects are prioritised (as much as possible) based on their benefit to New Zealand, particularly as it relates to the Government's priorities of a low-carbon economy and increased productivity through energy efficiency. This will require further analysis of New Zealand's priorities, but it also presents an opportunity to work more closely with the Australian Federal Government. Where projects are of more value to New Zealand, than Australia, additional resourcing may be required, which would need to be considered against EECA's collective work programme priorities.

It is also recommended that EECA considers how E3 can remain relevant by looking at new, emerging, or disruptive technologies. EECA can leverage its participation in the E3 Programme to ensure that such opportunities are prioritised.

9 Appendices

9.1 Appendix One – Savings calculation methodology

When regulated products are tested and registered, their energy performance characteristics are recorded in a shared database between New Zealand and Australia. Every year when EECA receives sales data it is matched to this database so that the sales and energy performance for each model are together. These key data sources are described in Table 1.

The annual energy use is calculated slightly differently for different product classes but is generally as follows:

$$\text{(Total Sales} \times \text{Energy Used Per Hour or Use)} \times \text{Typical Annual Use}$$

Where the Energy Used Per Hour/Use measure varies depending on the product class and may already have Typical Annual Use incorporated. For example, in clothes washers where the efficiency measure is calculated based on usage assumptions.

For each product type the annual energy savings are calculated using the same basic formula:

$$\text{(Annual Energy Use in the base year} - \text{Annual Energy Use in the current year} + \text{or} - \text{adjustments)} \times \text{Number of Units Sold in the current year}$$

The base year is ideally the year before MEPS was introduced but is often the year of introduction as it is the first available year of robust energy consumption information. Sometimes the RIS can provide enough information to be able to estimate the year before MEPS introduction but this is not always the case.

The key assumptions are described in Table 2.

Table 1: Key data source and metric

Data source	Metric
Web tool data - Manufacturers of regulated products classes are required to provide their sales data to EECA every year under the <i>Energy Efficiency (Energy using Products) Regulations 2002</i> , and they report this data using an EECA online tool. This data is broken down by model and is at the point-of-sale to the retailer not sale to the consumer.	Sales data
E3 database of product registrations and performance characteristics - Appliances covered by MEPS and MEPL need to be registered with the E3 programme and must provide each model's energy performance characteristics as per a test against the relevant standard. This data is stored in the E3 database which is managed by the Australian Government.	Energy used per hour of use

Table 2: Assumptions and associated rationale

Assumption	Source/Rationale
Definition of "base year"	The base year is ideally the year before MEPS was introduced but is often the year of introduction as it is the first available year of robust energy consumption information.

Assumption	Source/Rationale
Baseline energy efficiency	The baseline energy efficiency of a product class is sourced from work that is done prior to regulation. It may be from the Regulatory Impact Statement or the product profile.
Typical Annual Use	The Typical Annual Use is sourced from the most reliable sources available. It may be monitored data from BRANZ or estimates in the Regulatory Impact Statement.
Sales are equivalent to products in use	Sales data is representative of sales from manufacturer to retailer rather than retailer to customer. While there may be a time lag the total savings should not change as a result of this. In some cases there will be unused products in showrooms but this number is likely to be relatively small and unlikely to have a material impact on energy savings.
Every unit is installed and maintained correctly to manufacturer's specification	Incorrect installation of some products will affect their energy efficiency. We have no data on the quality of installations and assume that the majority of appliances are installed correctly.
Energy efficiency of the product does not decrease with age	No data source is available to support this. It is not expected to be a significant enough impact to be worth the work of obtaining the information.
Changes in efficiency are due to the intervention, e.g. MEPS, MEPL	Some products have a factor incorporated into the calculation to allow for what we know is a business-as-usual improvement in efficiency that would occur without the intervention. We have used the Regulatory Impact Statements to guide these decisions in each case unless more recent, compelling evidence is available.
Lifetime	Typical product lifetimes are estimated for each product class and are taken from the Regulatory Impact Statements unless more compelling evidence is available.
The testing standard is representative of actual energy use except where we have information to the contrary	Each testing standard and Regulatory Impact Statement includes assumptions about typical product use in terms of time in use, capacity, and product settings. These have been used unless there is convincing evidence to the contrary. For example, the standard assumes all clothes washers are used on hot wash all of the time. We used data from the Australian Bureau of Statistics to shift this to a more realistic 30% of washes are hot. Therefore, where we have evidence to the contrary, an adjustment is made to the "Annual Energy Use in the current year" figure in the calculation for annual energy savings for each product class.
Products sold in a year are assumed to be saving for the entire year	Our data does not tell us what time of year each sale was made. While this is unrealistic it doesn't change the total savings as the product is assumed to have the same lifetime.

9.2 Appendix Two – Cost-benefit analysis summary

1 Scope

This analysis assesses the quantifiable outcomes of EECA's E3 Programme since its start in 2001.

General assumptions applied in the analytical framework used in this review:

- EECA costs include all direct internal costs but not the general EECA overheads allocated to the programme.
- All third party costs are included. These consist of any additional costs resulting from the purchase by consumers of more energy efficient appliances.
- Annual energy savings are determined on a semi-cumulative basis, i.e. sales of an appliance subject to a MEPS standard in any year subsequent to the implementation of the MEPS are attributed to the programme. Hence the need to extend the scope of this analysis back to the programme start so all attributable appliance sales can be included. Where included in Regulatory Impact Statements the business-as-usual efficiency improvement is subtracted from the benefits attributable to the programme.
- Future energy savings accruing beyond 2015/16 for appliances purchased prior to the end of that year are included.
- Cash flows are expressed in NZ\$2016 discounted at the default Treasury rate of 8%.

2 Costs

- Cumulative EECA direct costs up to 2013 were \$21 million. These have been averaged for each year back to the start of the programme. Direct costs in subsequent years have been taken from EECA's E3 budget.
- The additional costs of more efficient appliances are drawn from Concept Consulting's recently completed review of the Energy Star programme⁹. This review included a survey of appliance retail prices and corresponding energy efficiencies to identify any significant changes in price with increased appliance efficiency. Little other New Zealand information is available for the range of appliances included in the E3 Programme. These are private costs.

3 Benefits

- The principal benefit from the programme is reduced energy consumption through the purchase of more efficient appliances mandated under the energy performance scheme. Each year suppliers are required to provide EECA with performance details of all appliances sold under the scheme. EECA uses this data to calculate the resultant energy savings, which have been used directly in this analysis. These energy savings are private benefits.
- Reduced carbon dioxide emissions can be directly associated with the fuel savings. This is a public benefit.

⁹ Review of ENERGY STAR Prepared for EECA, Concept Consulting Group Ltd, June 2016. Costs have been included for refrigerators/freezers, dishwashers, clothes washers, clothes dryers, air conditioners/heat pumps and gas water heaters. Zero marginal costs are assumed for CFLs, TVs, computers and laptops, and monitors.

- MBE's price monitors have been used for deriving economic prices for fuels. Market prices have been used for fuels not included in the monitors and all future prices are maintained at the 2016 level. Carbon dioxide prices are set at the average value of an NZU in each year of the programme and valued at \$25 per tonne thereafter.

Costs and benefits are summarised in the table below.

	2002	2003	2004	2005	2006	2007	2008	2009
Energy Saved PJ	0.000	0.042	0.099	0.163	0.273	0.472	0.742	1.119
CO2 Reduction tpa	0	1620	3799	6242	10448	18085	28449	42913
Expenditure \$ million nominal								
EECA	-1.75	-1.75	-1.75	-1.75	-1.75	-1.75	-1.75	-1.75
Third Party Expenditure	0.00	-13.79	-11.58	-13.80	-15.80	-16.56	-16.02	-19.45
Value of Energy Saved \$ million nominal	0.00	0.66	1.66	3.05	5.01	10.25	15.90	25.78
Value of Emissions Reduction \$ million nominal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4 Outputs

Key conclusions for the E3 Programme over the life of the programme:

- The net present value of the programme to date is \$889 million (NZ\$2016) including the value of forward energy savings to be accrued from appliances sold to date.

		2002	2003	2004	2005	2006	2007	2008	2009
Cash Flow: \$2016 million	<i>PV 2016 \$M</i>								
EECA Costs	-53.050	-2.345	-2.356	-2.335	-2.265	-2.180	-2.114	-1.993	-1.872
Third Party Costs	-463.109	0.000	-18.562	-15.450	-17.859	-19.676	-19.996	-18.240	-20.803
Energy Saved	1374.472	0.000	0.885	2.216	3.954	6.243	12.377	18.104	27.582
CO2 Reduction	30.873	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Net Present Value	889.186								
Ratios									
All Benefits/All Costs	2.72								
Public Benefits/Public Costs	0.58								
Public Benefits/Private Benefits	0.02								
Private Costs/Public Costs.	8.73								

- This corresponds to a benefit to cost ratio in the order of 2.72:1. The ratio is highly sensitive to the marginal costs of appliances due to improved energy efficiency which have been taken from Concept's Energy Star analysis of retail prices. Retail prices do not necessarily reveal the true marginal economic costs, and in most cases follow a year on year downward trend, making difficult estimates of marginal price increases relative to a counterfactual.

Some other detailed analysis of these trends indicate that these marginal costs tend to be overestimated or zero¹⁰, suggesting there is considerable upside potential to this ratio.

- The reduction in carbon dioxide emissions from the more efficient appliances results in a public benefit to public cost ratio of 0.58:1. This is a relatively robust estimate being based on EECA's cost records and the detailed appliance sales and performance data provided by the suppliers. It should be noted that this ratio would increase to 1.01:1 if a carbon dioxide price of \$25 per tonne is applied from the start of the programme.

Proactively released
under the provision of
the Official Information Act 1982

¹⁰ "Achievements of appliance energy efficiency standards and labelling programs, A Global Assessment", IEA; and "Greenhouse and Energy Minimum Performance (GEMS) Impact Analysis", Department of Industry, Innovation and Science (Australia).