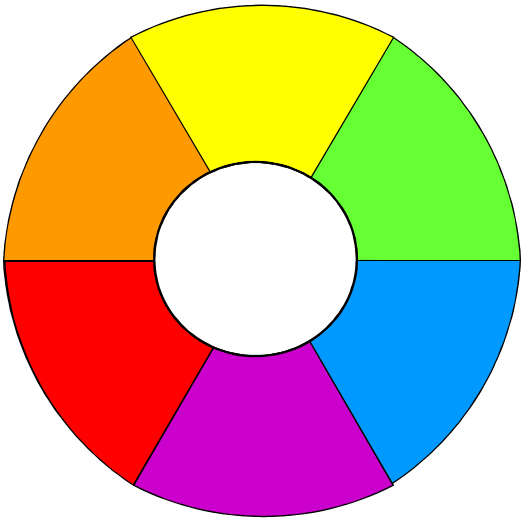
iGrid Project 4 -

Institutional Barriers, Economic Modelling and Stakeholder Engagement

20 Policy Tools for Developing Distributed Energy



Working Paper 4.2

Version 1: November 2009

20 Policy Options for Developing Distributed Energy

Working Paper 4.2

(Version 1)

Intelligent Grid Research Program
Project 4

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Institute for Sustainable Futures

Intelligent Grid Working Papers Series

Consultation and engagement with stakeholder are key elements of the Intelligent Grid Research Program. In order to encourage dialogue and collaborative learning, this series of working papers is being published during the course of the three-year program. These working papers will be revised and reissued from time to time as the research and consultation proceeds. Stakeholders are invited to comment on and contribute to the development of these working papers. At the conclusion of the Research Program, the working papers will be formalised as final reports.

At the time of writing, the proposed working papers include:

4.1	Institutional Barriers to Intelligent Grid	(Version 1 published June 2009)
4.2	20 Policy Tools for Developing Distributed Energy	(Version 1 published November 2009)
4.3	Evaluating Costs of Distributed Energy	(Version 1 published November 2009)
4.4	Evaluating Avoidable Network Costs	
4.5	Australian Distributed Energy Roadmap	

Submissions invited

This report is a working paper. We invite feedback and suggested improvements that we can consider in drafting subsequent versions of the document. In order to comment on this or other working papers, please email: louise.boronyak@uts.edu.au or refer to the Intelligent Grid website: www.igrid.net.au

Disclaimer

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Executive Summary

The Intelligent Grid (iGrid) Research Program is a three-year research collaboration between the CSIRO and five leading Australian universities under the CSIRO Energy Transformed Flagship. Its aim is to facilitate major greenhouse gas emission reductions by integrating Distributed Energy (DE) technology with a more intelligent electricity network.

The electricity supply industry is the biggest source of global greenhouse gas emissions and reducing these emissions is the most urgent challenge facing the industry. The electricity sector is also under pressure to limit cost increases which are largely being driven by network costs. 'Smarter' communication and control technologies in electricity networks have the potential to facilitate major emission reductions, limit cost increases and improve supply reliability and security. These three objectives can only be met simultaneously through the accelerated adoption of Distributed Energy technologies (that is, energy efficiency, distributed generation and load management). However, deliberate policy measures will be needed to achieve this accelerated uptake of Distributed Energy in the intelligent grid.

Rapid growth in low-emission Distributed Energy is both technologically possible and economically attractive but is being impeded by a range of 'institutional barriers'. Well-designed and implemented policy measures can be used to help overcome these barriers. This Working Paper reviews the types of policy tools that governments can apply to support the deployment of Distributed Energy technologies and services and presents a set of 20 such policy options for discussion.

The types of policy options for influencing the market are presented here in the form of a 'policy palette'. Types of policy options include the **primary** drivers of **regulation, incentives** and **information** which are complemented by the **secondary** drivers of **targets, facilitation** and **pricing**. In addition, coordination is a further crucial tool in ensuring an efficient policy response.

Just as there is no single institutional barrier to Distributed Energy, there is no single policy tool that can effectively address the barriers. For example, as important as putting a market price on carbon is, this alone will not lead to an efficient level of Distributed Energy adoption. A central premise of this Working Paper is the need for a balanced policy response that adequately supports the three complementary forms of Distributed Energy: energy efficiency, distributed generation and load management. An intelligent grid that delivers low-carbon, affordable electricity will need to harness the benefits available from both the supply and use of electricity, as the traditional distinction between generators and consumers of power breaks down.

In implementing government policy options, responsibility is shared across a range of agencies, regulators, rule makers, policy makers, legislators and program agencies. These actors need to play different but complementary roles in policy development and implementation from the national to the local level. While the role of the electricity supply industry is crucial to successful Distributed Energy and intelligent grid development, this Working Paper focuses on the public policy components. However, the more the electricity industry is empowered to overcome the institutional barriers itself, the less will be the need for policy interventions. The role of other stakeholders is also essential as effective policy cannot occur without effective advocacy.

This paper presents a suite of 20 policy options, with each one summarised, classified and mapped on the 'Policy Palette' and listed below. The policy options presented here are selected as representing a range of key reforms, but are not listed in order of importance.

Policy Palette

1: Decouple electricity sales from network profits
2: Reform National Electricity Rules
3: Streamline DG Licensing
4: Carbon Price
5: Cost reflective pricing
6: Network support payments
7: Distributed Energy Fund
8: Reform feed-in tariffs
9: Public recognition & awards
10: Streamline network negotiation process
11: DE Ombudsman
12: Annual DE Review
13: Training & skills development
14: Energy audits & technical support
15: Network planning info
16: DE handbook & advisory service
17: Resource assessments & case studies
18: Extend retailer EE targets
19: DE targets & reporting
20: DE Coordination Agency

The following criteria were applied in assessing the relevance and importance of each available policy option:

- Does it fall within the mandate of public policy makers? That is, can government effectively address the issue, or does the primary responsibility rest with industry or other parties?
- Is it an area that requires significant reform? Certain policy areas, such as Minimum Energy Performance Standards, are already fairly strongly covered.
- Could it have a significant impact?
- Does it strategically address an identified *institutional* barrier? This rules out options such as research and development, which addresses *technical* barriers.
- Does it relate to Distributed Energy? Many successful low carbon policy options, such as those targeting large-scale renewable power, are therefore not included in this list.

Not all policy options target the different forms of DE equally. That is, specific measures may be limited in scope to distributed generation, energy efficiency or load management, or any combination of these.

The following list summarises the policy options presented in this Working Paper. This list is by no means comprehensive, as there are many other policy options available. Stakeholders are invited to provide feedback on whether these policy options represent the highest priority measures.

20 policy tools for developing Distributed Energy:

1. ***Decouple network business profits from electricity sales**:* Reform economic regulations which financially penalise network businesses that reduce their electricity sales volume by supporting Distributed Energy.
2. ***Fair treatment of DE in National Electricity Rules**:* Change the National Electricity Rules to require Distributed Energy options to be implemented wherever they are cheaper than network augmentation.
3. ***Distributed generation licensing requirements**:* Streamline the complex and costly licensing requirements and procedures required for distributed generators to produce and supply electricity to the grid.
4. ***Impose a price on carbon pollution**:* Introduce an adequate market price on carbon such as through the proposed Carbon Pollution Reduction Scheme.
5. ***More cost reflective network pricing**:* Widely implement time-of-use pricing and deploy smart meters to residential and business customers.
6. ***Default network support payments**:* Establish a standard or default network support payment to be paid by the network business to distributed generators exporting to the main grid, and ensure that network businesses are not disadvantaged in providing such payments.
7. ***Distributed Energy Fund**:* Establish financial incentives to support Distributed Energy options.
8. ***Reform feed-in tariffs**:* Implement an adequate and nationally consistent feed-in tariff program for distributed, renewable energy technologies.
9. ***Public recognition and awards**:* Publicly recognise leadership in developing Distributed Energy options.
10. ***Streamline network connection negotiation process**:* Establish a clear and consistent framework governing the processes and timeframes surrounding the negotiation of generator connection agreements between distributed generators and local network businesses.
11. ***Distributed Energy Ombudsman**:* Establish a Distributed Energy Ombudsman with the knowledge, technical engineering skills and authority to assist in dispute resolution.
12. ***Distributed Energy Review**:* Publish a comprehensive annual Distributed Energy review.
13. ***Training and skills development**:* Establish an industry training program for Distributed Energy options, building on existing ‘Green jobs’ training efforts.
14. ***Integrated energy audits and technical support**:* Assist energy users to identify and implement energy saving opportunities.
15. ***Better information on network constraints and avoidable costs**:* Improve and standardise mandatory, easily accessible, up-to-date and relevant demand and network planning information.
16. ***Consolidate and disseminate information on Distributed Energy**:* Develop a Distributed Energy advisory service, website and/or handbook to provide information and guidance for Distributed Energy proponents.
17. ***Resource assessments and case studies**:* Present a concise, consistent and accessible source of information on opportunities for developing Distributed Energy options.
18. ***Extend retailer energy efficiency targets:*** Extend mandatory energy efficiency targets to capture more of the available cost-effective energy efficiency potential.
19. ***Targets and reporting for Distributed Energy development**:* Establish annual targets for Distributed Energy and publicly report on progress.
20. ***Agency to coordinate Distributed Energy development**:* Establish a suitable government agency to coordinate a coherent Distributed Energy strategy.

Abbreviations

AER	Australian Energy Regulator
AEMC	Australian Energy Markets Commission
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DE	Distributed Energy
DG	Distributed Generation
DM	demand management
IEA	International Energy Agency
iGrid	Intelligent Grid
DANCE	Dynamic Avoidable Network Costs Evaluation Model
D-CODE	Details and Costs of Distributed Energy Model
MCE	Ministerial Council on Energy
IPCC	Intergovernmental Panel on Climate Change
R&D	Research and Development

1 Introduction

Just as the information technology and telecommunications industries have over recent decades reversed the previous long-term trend towards larger scale and greater centralisation, so too the energy industry is now moving from the heavily centralised structure of the past to smarter and more decentralised models. This transition is being driven by technological, customer preference and environmental pressures.

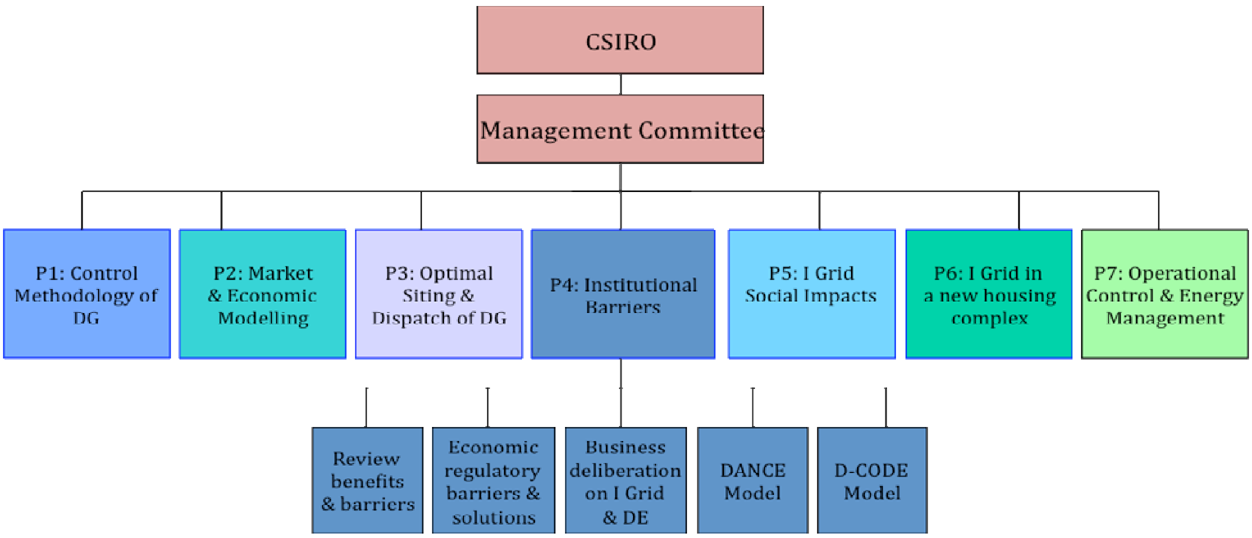
The electricity supply industry is the biggest source of global greenhouse gas emissions and reducing these emissions is the most urgent challenge facing the industry. The electricity sector is also under pressure to limit cost increases. 'Smarter' communication and control technologies in electricity networks electricity networks have the potential to facilitate major emission reductions, limit cost increases and improve supply reliability and security. However, deliberate and well designed policy measures are essential to achieving all three objectives simultaneously. Otherwise, the emergence of 'smart networks' could be accompanied by increasing greenhouse emissions and sharply increased electricity bills.

1.1 The Intelligent Grid Research Program

The Intelligent Grid (iGrid) Research Program is a three-year research collaboration between the CSIRO and five leading Australian universities under the CSIRO Energy Transformed Flagship. Its aim is *to facilitate major greenhouse gas emission reductions by integrating Distributed Energy technology with a more intelligent electricity network.* The iGrid program is an interdisciplinary venture that complements other research being undertaken through the CSIRO Energy Transformed Flagship. It brings together economists, engineers, social scientists, systems scientists and policy scientists to develop integrated insights that could not be achieved if members of these disciplines worked independently of each other.

Figure 1 below illustrates the structure of the iGrid Research Program and shows how Project 4, which focuses on institutional barriers, stakeholder engagement and economic modelling, fits into the wider program context. This working paper forms part of the institutional barriers work of Project 4. For more details about the iGrid Research Program please refer to the iGrid website www.igrid.net.au .

Figure 1: Intelligent Grid Research Program structure



1.2 Distributed Energy

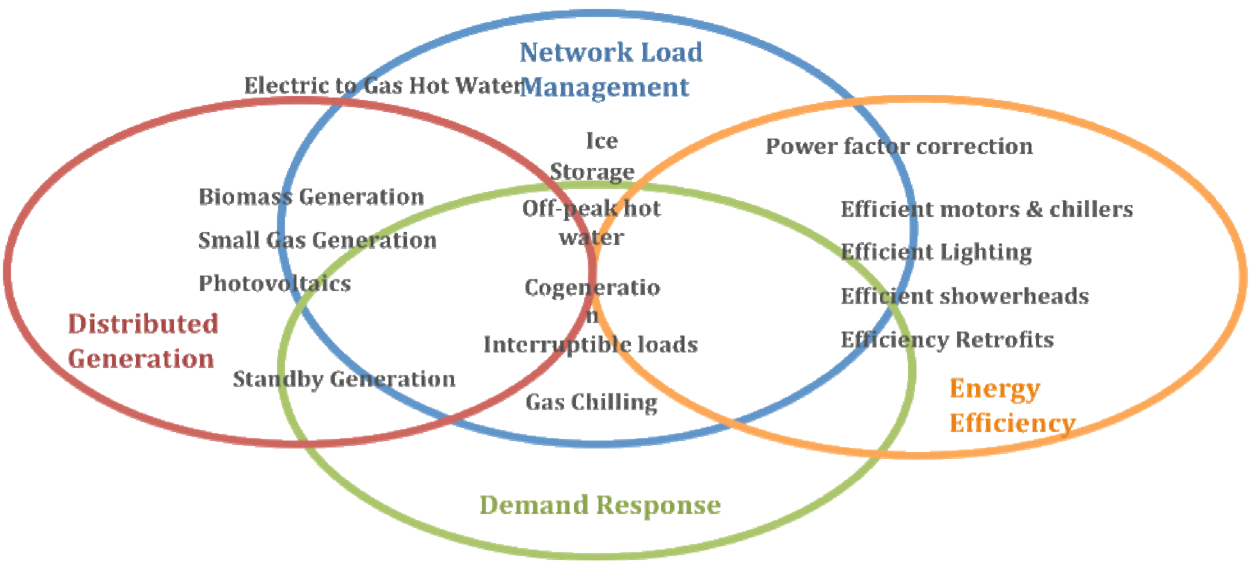
The terms 'Intelligent Grid' and 'Smart Grid' have become catchphrases over the past few years and care needs to be taken to clearly define them. For the purposes of this research program, an 'Intelligent Grid' is an electricity network that uses 'Distributed Energy' resources and advanced communication and control technologies to deliver electricity more cost-effectively, with lower greenhouse intensity, than the current electricity supply mix while being responsive to consumer needs.

In this context, the term 'Distributed Energy,' means electricity generation and management of energy use applied at the consumer or distribution network level. It includes distributed generation, load management and energy efficiency options. 'Distributed generation' refers to an array of technologies and can include wind turbines (but not those connected to the high voltage transmission network), solar panels, micro turbines, fuel cells and cogeneration (also known as 'combined heat and power').

These types of energy resources can generally be located closer to the users than large centralised sources. Some Distributed Energy resources rely on renewable energy with no greenhouse emissions and others make more efficient use of fossil fuels. For example, the application of Distributed Energy resources could involve heating, cooling and powering a commercial building using a combination of solar panels, micro turbines, fuel cells, energy efficiency and load control.

Advanced control and management technologies can also make the electricity grid run more efficiently. The widespread deployment of Distributed Energy resources 'requires a smart, interactive infrastructure, including a range of solutions that can be integrated all along the distribution system' (EPRI 2007, p. 3-1). Reductions in energy consumption and CO_2 emissions can be achieved through 'greater synergy … between energy consuming and producing devices and the electrical distribution system' (EPRI 2007, p. 3-1). This can be done, for example, with the use of advanced control systems and 'smart' electricity meters that show real-time use and costs and can respond to remote communication and dynamic electricity pricing.

Figure 2: Some Distributed Energy resources (adapted from IPART 2002, p. 102)



1.3 The Australian Distributed Energy Roadmap

This working paper and the associated industry forum are components of a two-year process to develop an Australian Distributed Energy Roadmap. The Roadmap will provide an assessment of the potential for Distributed Energy and identify the barriers that inhibit its implementation. The Roadmap is also intended to deliver a concise and practical set of recommendations to accelerate the deployment of Distributed Energy in Australia. Working papers such as this and the consultation process aim to provide opportunities for a wide range of stakeholders to contribute to the Roadmap's development.

The purposes of this particular working paper are:

1. to propose a simple, practical classification of policy options to support the use of Distributed Energy technologies in the context of an intelligent grid; and
2. to invite feedback from stakeholders: a) on possible gaps in the analysis and b) on the relative importance of the policy options presented.

Feedback on this working paper will be used in formulating the Australian Distributed Energy Roadmap, and as an input to other research within the iGrid Research Program.

2 Do we need policy tools to develop Distributed Energy?

2.1 Benefits of Distributed Energy

Identified potential benefits of Distributed Energy resources include:

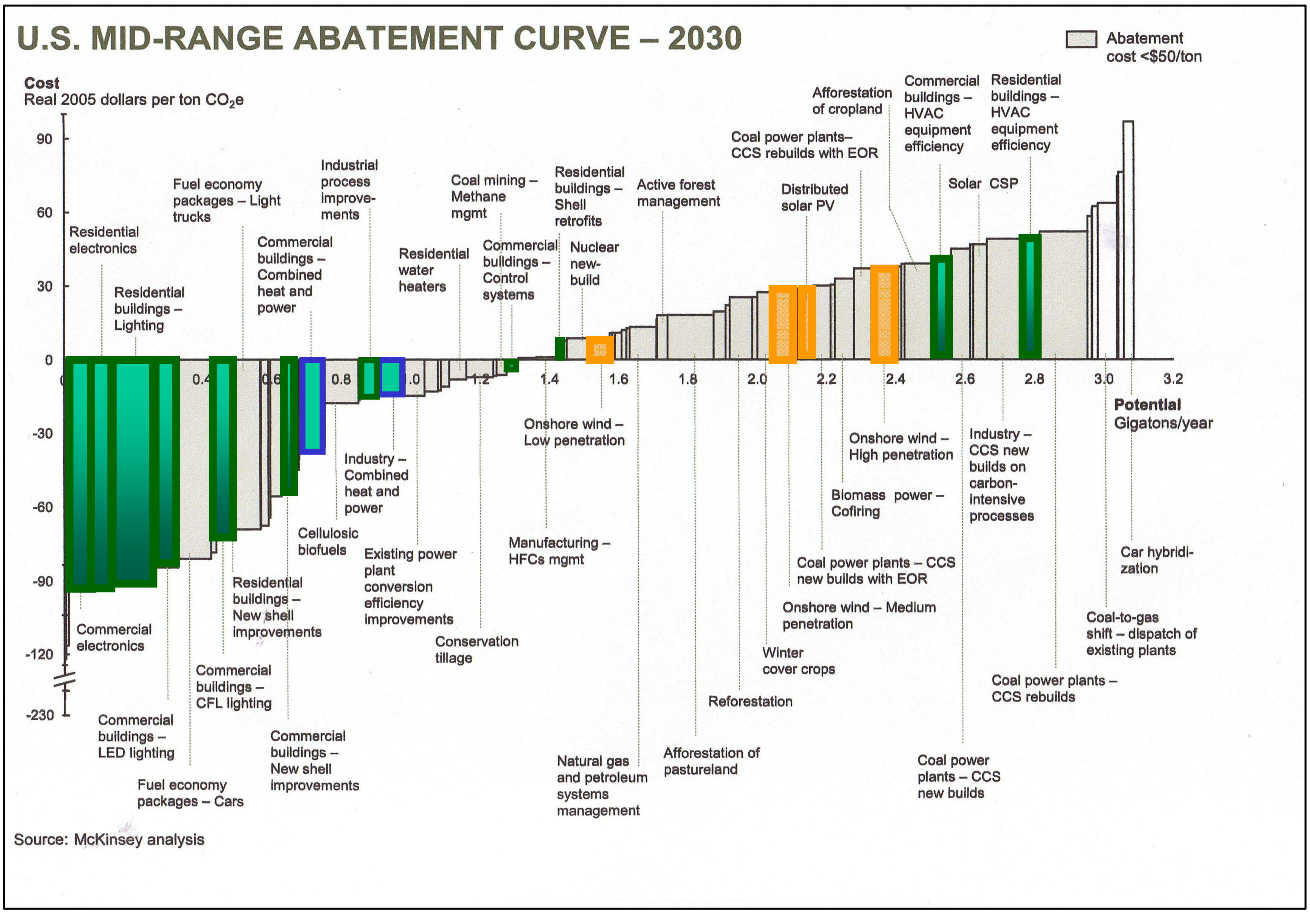
- lower greenhouse gas emissions
- improved fuel efficiency
- exploitation of cheap fuel options
- lower network system losses
- managed peak load
- reduced and optimised network investment
- increased reliability of supply
- improved energy security
- other network benefits such as voltage support and reduced reactive power losses
- the provision of system ancillary services, such as black start capability and spinning reserves
- enhanced social equity and delivery of social benefits
- reduced fuel poverty (i.e. reduced harm to disadvantaged consumers unable to afford energy bills) .

Of course, there are also costs associated with the use of Distributed Energy and technical issues that need to be addressed. However, numerous studies have concluded that the large cost-effective potential of Distributed Energy is not being realised. One such study by McKinsey and Company (2007, p. xii) found that 'almost 40 percent of [greenhouse gas emission] abatement could be achieved at 'negative' marginal costs, meaning that investing in these options would generate positive economic returns over their lifecycle'. A similar study undertaken by McKinsey and Company Australia (2008, p. 15) reached similar conclusions – it found that by 2030, greenhouse gas emission reductions of 35 per cent are achievable at no net cost.

Figure 3 below illustrates the potential for greenhouse emissions reduction in the United States as assessed by McKinsey and Company.

As highlighted in Figure 3, the large majority of these 'negative cost' options are Distributed Energy resources. If the benefits of creating an intelligent grid which incorporates the widespread use of Distributed Energy technologies are so substantial, how can we as a society tap into these benefits? In particular, what are the policy options that can be adopted by government to develop Distributed Energy? These questions are the focus of this working paper.

Figure 3: Greenhouse gas emission reduction potential (adapted from McKinsey & Company 2007, p. xiii)



2.2 Barriers to Distributed Energy

As discussed at length in Working Paper 4.1, there have been numerous studies of the barriers to Distributed Energy. As illustrated in Figure 4 below, these barriers can be broadly divided into technical barriers that relate to the nature of the technology and its cost, and institutional barriers that relate to how consumers, organisations and governments deal with the technology. In the case of Distributed Energy, there are many instances where technologies that are technically and economically viable are not applied because they face these institutional barriers.

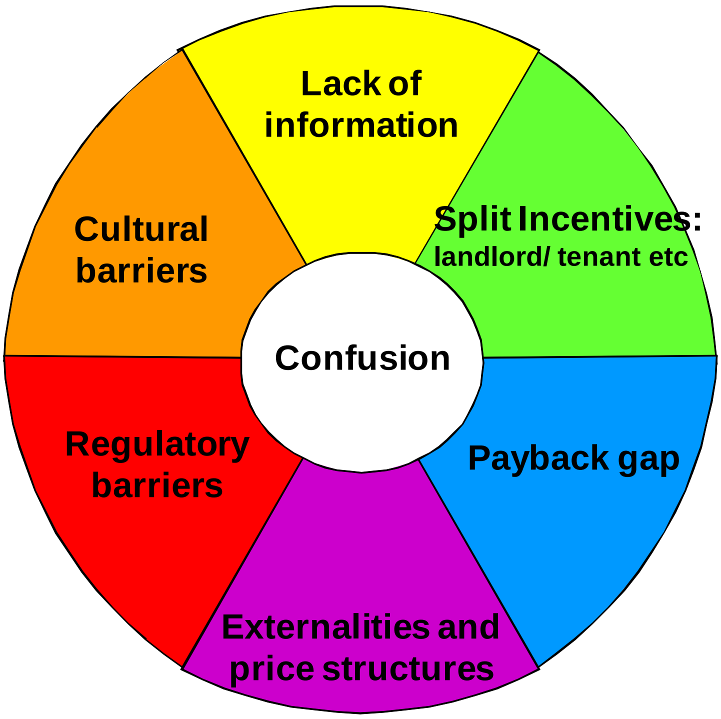
Figure 4. Barriers to changing practice

Barriers							
Technical		Institutional					
Current Technology	Current Costs	Regulatory Failure	Inefficient Pricing	Payback Gap	Split Incentives	Lack of Information	Cultural Barriers

Institutional barriers to Distributed Energy can be classified into six broad areas:

1. Regulatory failure – the biasing of regulation against Distributed Energy
2. Inefficient pricing – failure to reflect costs (including environmental costs) properly in energy prices
3. The payback gap – the difference in the acceptable periods for recovering investment between energy consumers (and Distributed Energy proponents) and large centralised energy supply utilities
4. Split incentives – the challenge of capturing benefits spread across numerous stakeholders
5. Lack of information – lack of, or difficulty of access to, relevant information
6. Cultural barriers – resistance to, and scepticism about, the use of Distributed Energy on the part of individuals and organisations (including utilities, regulators and policy makers).

Figure 5: Institutional barriers to Distributed Energy



This classification was used in Working Paper 4.1 to present barriers relevant to Distributed Energy projects.

The ultimate purpose of analysing institutional barriers to intelligent grid and Distributed Energy is of course, to develop effective strategies to overcome these barriers. As stated by Sanstad and Howarth (1994, p. 815) 'the important question for policy purposes is whether there are possible interventions or alternative institutional arrangements by means of which such costs can be overcome when they are present'.

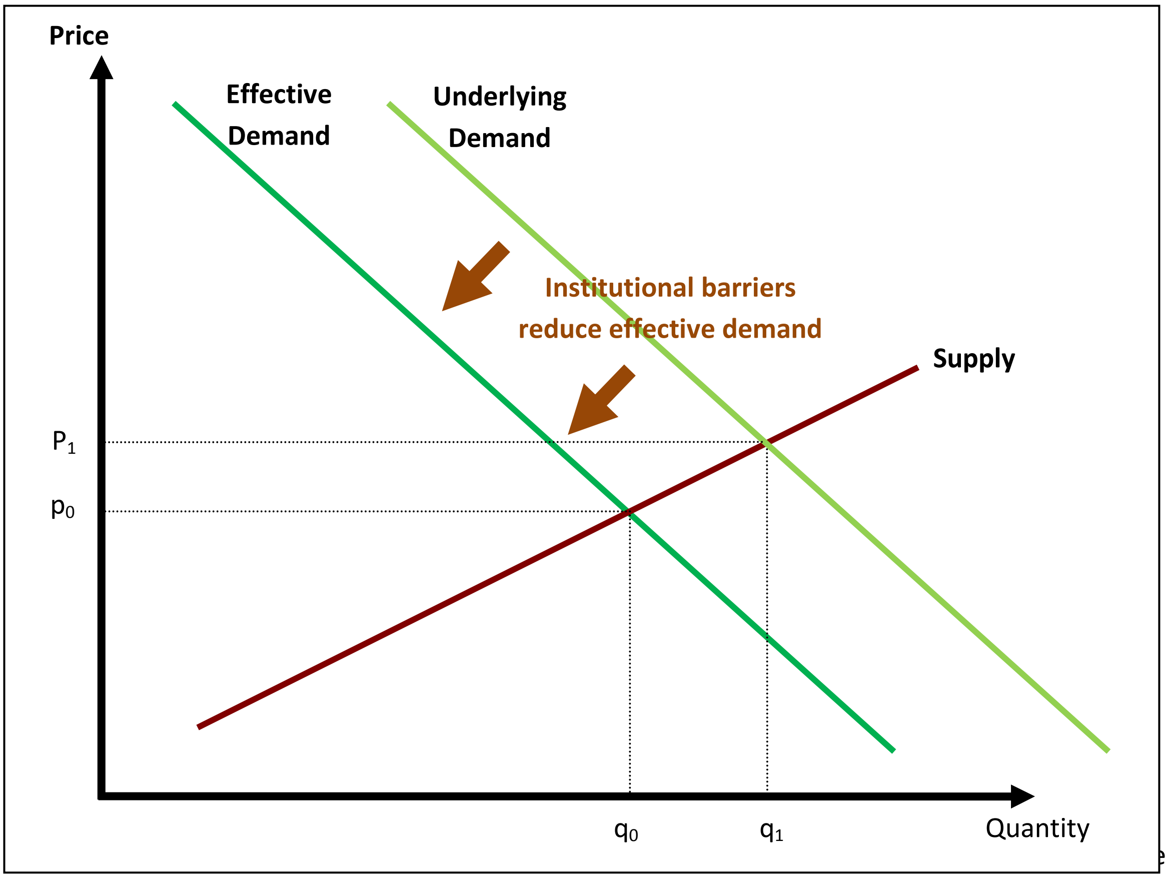
Policy tools are essential in developing Distributed Energy as they provide a means of unlocking the potential benefits of DE by addressing each of the above institutional barriers.

3 Classifying policy options

This section presents 20 priority policy options in the context of a proposed classification system.

Where institutional barriers do not entirely block Distributed Energy, the effect is to create additional costs in overcoming the barriers. These additional 'transaction costs' ultimately have to be borne by the purchaser of the Distributed Energy technology. This means that the *effective demand* for Distributed Energy falls short of the total potential demand or *underlying demand* and so the total adoption of Distributed Energy is reduced. This effect is illustrated in Figure 6.

Figure 6: Effect of institutional barriers on the demand for Distributed Energy

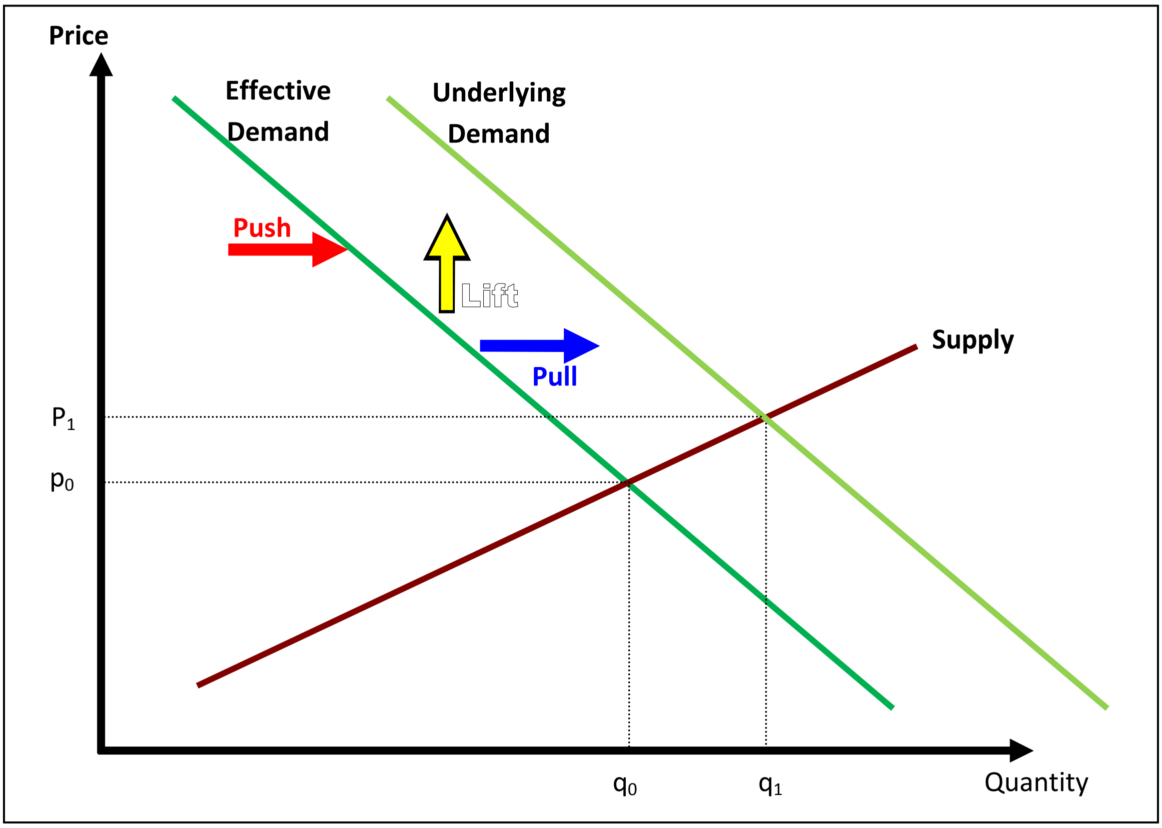


effective demand for Distributed Energy is restored to closer to the underlying demand.

Policy can increase the demand for Distributed Energy in three ways as illustrated in Figure 7:

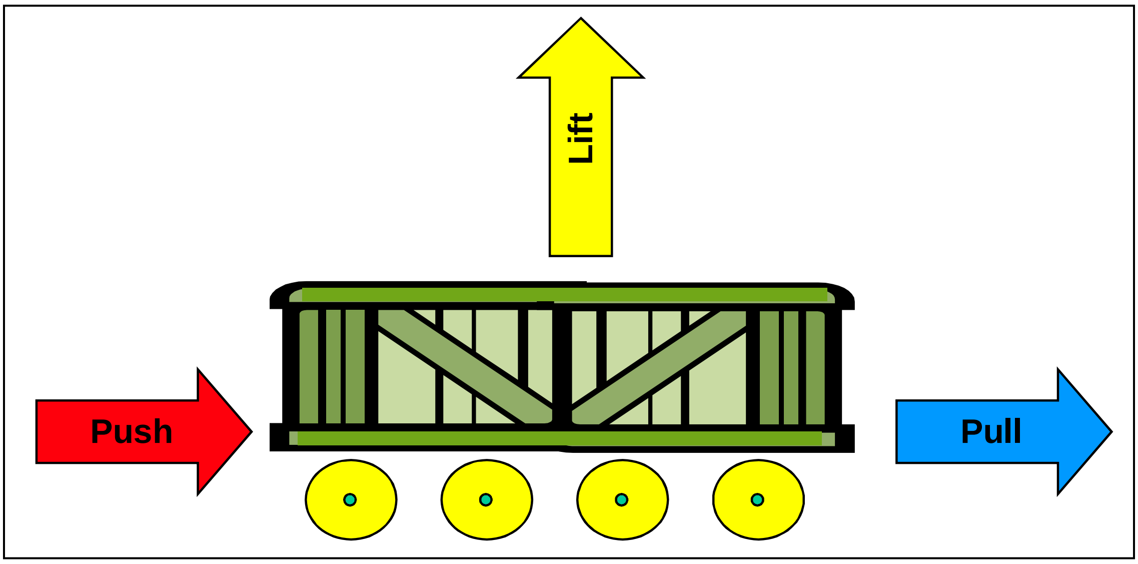
a) 'Pushing' the demand higher through regulation to mandate higher use of Distributed Energy technologies or lower use of centralised energy substitutes
b) 'Pulling' the demand higher by offering incentives; or
c) 'Lifting' demand by reducing the transaction costs so that the effective demand approaches underlying demand.

Figure 7: Moving the market (demand and supply)



The same principles are illustrated in a simpler form in Figure 7, in the form of 'pushing' the market by using mandatory measures such as regulation, 'pulling' the market by using incentives such as rebates or 'lifting' the market by reducing transaction costs such as making better information available.

Figure 8: Moving the market (push, pull, lift)



These three forces underlie the available policy options for moving the market as illustrated in the 'policy palette' presented in Figure 8. The categories of policy options include the primary drivers of regulation, incentives and information, complemented by the secondary drivers of targets, facilitation and pricing. This does not imply that the secondary drivers are less important, but rather that they are less clearly delineated.

This framework offers a structure that can be further developed for classifying and coordinating policy options to support Distributed Energy options.

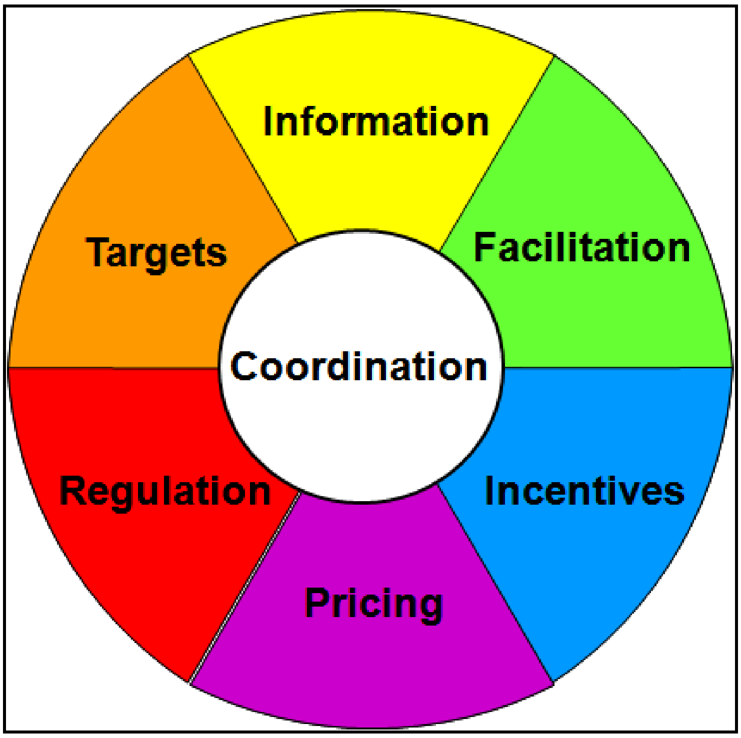
As with any classification system, the objective of classifying policy options is not to devise 'the correct system' but rather to develop 'a useful system' given the context. The classification system should be 'as simple as possible, but no simpler'. Ideally, the classification should include categories that are 'mutually exclusive and collectively exhaustive'. In other words, each policy option should fit into one category but no others. Based on these criteria the following simplified classification, using seven types of policy options to develop Distributed Energy, is proposed:

1. Regulation – establishing laws and rules to require desirable behaviour and penalise undesirable behaviour
2. Price Reform – more accurately reflecting costs (including environmental costs) in energy prices
3. Incentives – offering financial and other rewards for particular behaviour
4. Facilitation – making it easier for customer and suppliers to capture available benefits
5. Information – providing accessible, timely, relevant information
6. Targets – establishing specific objectives and measuring performance against them
7. Coordination – ensuring that policy options are applied in a coherent way.

These categories are illustrated in Figure 9 and discussed further below.

These seven categories of policy options provide, as indicated, a palette with which to address the institutional barriers described above. One of the key implications is that their use is most effective when the full range of policy options is deployed – that is, when policy options from the whole palette are included. For example, in isolation the use of regulation could elicit a backlash and/or reduced effectiveness due to a lack of information. Equally, the use of incentives and information alone may result in a weak uptake, or 'cream-skimming'. Above all, it is important to reduce the risk of fragmentation by the overall coordination of the implementation of the range of policy options.

Figure 9: The 'PIRFICT' palette of policy options



3.1 Regulation and regulatory reform

The energy market is highly regulated. Forms of regulation include:

- Technical and safety standards
- Economic regulation of monopoly utilities
- Environmental standards, including those relating to greenhouse gas emissions, local air pollution and noise
- Efficiency standards (Minimum Energy Performance Standards – MEPS) on appliances, equipment and buildings
- Information disclosure (appliance efficiency labelling).

Regulation is generally enacted for sound policy reasons. However, regulation can often create undesirable side effects. This type of regulatory failure is considered by many to be one of the key barriers to distributed energy development.

Option 1: Decouple network business profits from electricity sales

Description:

Reform economic regulation which currently financially penalises network businesses that reduce their electricity sales volume by supporting Distributed Energy.

Responsibility:

The Australian Energy Regulator (AER) is responsible for economic regulation of distribution network in the ACT and all states except WA.

Comment:

One key regulatory barrier is an unintended result of regulation to limit the market power of monopoly electricity suppliers. In NSW, Victoria and South Australia, electricity distribution network businesses (or 'electricity distribution network service providers' – DNSPs) are subject to economic regulation in the form of a maximum average price they can charge. Since network costs are mainly driven by capital costs, which in turn are linked to peak demand, a DNSP's cost structure is not strongly influenced by the volume of electricity flowing though its wires.

As a consequence, since revenue equates to price multiplied by sales volume, a maximum price cap means that total revenue is directly related to the volume of electricity delivered. On the other hand, total cost is generally not related to sales volume except for sales at the time of peak demand. Since profit is total revenue minus total cost, this means that the profitability of the network business is closely tied to the total sales volume. This puts the financial interests of the network business in direct conflict with any measures that would reduce the volume of electricity sales passing through the network. This means that distributed generation or energy efficiency, which reduce network sales volume, are a threat to the profitability of the network business.

In NSW, the D-Factor mechanism has been introduced to address this issue. Yet while in principle the D-Factor effectively addresses this regulatory dilemma, in practice its application has been fairly limited. This illustrates the principle that the barriers to DE are complex and the solutions therefore lie in the need for a suite of policy options which complement the D-Factor. For further discussion of the D-factor see Dunstan et al. (2008).

Option 2: Fair treatment of Distributed Energy in National Electricity Rules

Description:

Change the National Electricity Rules to require DNSPs to implement Distributed Energy options wherever they are cheaper than network augmentation.

Responsibility:

The Australian Energy Market Commission (AEMC) is responsible for managing changes to the National Electricity Rules. The state and federal energy ministers are responsible for changes to the National Electricity Law.

Comment:

The objective of National Electricity Rules requires the electricity market to be operated in the 'long term interests of consumers', and deliberately excludes consideration of environment. This approach has created some confusion as to how the long term impacts of climate change on consumers should be considered. For example, support for distributed energy measures that would reduce the expected future financial cost of carbon permits has generally not be considered in regulatory decisions. Similarly, while distributions network businesses are required to consider demand management where it would cost-effective, it is generally left to the network business to make this assessment. The AEMC and AER have not adopted principles that demand management and distributed energy should be implemented wherever it is a less costly option than augmenting supply infrastructure.

Changes to the National Electricity Rules and National Energy Law to level the playing field for distributed energy would include:

a) Requiring the AER to consider the expected financial impact of environmental pressure s and distributed energy options on the long term interests of consumers.

b) Requiring network businesses to implement all available and cost effective Distributed Energy options with lower greenhouse gas emissions prior to augmenting the network.

c) Allowing network businesses to invest in Distributed Energy options up to five years prior to the corresponding trigger point for network augmentation.

Option 3: Streamline licensing requirements for Distributed Generation

Description:

Streamline the complex and costly licensing requirements and procedures required for distributed generators to produce and supply electricity to the grid. This involves the review of generation, distribution and retail licensing requirements across the relevant types and scales of DG operators.

Responsibility:

This is a complex policy area involving contributions from different areas of regulatory responsibility:

- The Ministerial Council on Energy (MCE) is responsible for drafting legislation and initial National Electricity Rules (NER) governing the sector. Chapter 5 of the NER covers connection of registered generation to transmission and distribution systems.
- The AEMC oversees the NER and manages the progressive NER 'rule change' process, which can be proposed by any person or body.
- The AEMO manages the operation of the NEM including development and amendment of *procedures* governing market participants, including generator registration. Again, procedural changes can be proposed by any person or body.
- The AER is the economic and market/rules compliance regulator, which determines what DNSPs and TNSPs can charge for their services, oversees market participant compliance with the NER, and can issue distribution licensing exemptions to embedded generators in certain cases.
- Retail licensing is currently addressed at the state level, however retail licensing conditions are in the process of being standardised across the NEM under the auspices of the AER (see below).

Comment:

Generator licensing and connection procedures: Under the NER, any party who owns, controls or operates a generating system connected to a transmission or distribution network must register as a generator with AEMO (formerly NEMMCO). Exemptions to the registration process and associated fees can be obtained by generators under 5MW, or (through special application) by generators below 30MW that export less than 20GWh into the grid in a year (AEMO, 2009). This means that while small-scale renewable and other DG options are generally not required to register, larger-scale DG options such as co- and tri-generation can be required to pay registration and participant fees to AEMO. While there is no actual impediment to the ability of any willing participant to register as a generator, annual fees and processes can pose significant cost and administrative burdens to act as a barrier to registration as a market generator.

At the end of November 2009, the Ministerial Council on Energy's Network Policy Working Group (NPWG) is expected to release draft legislation establishing a national connections framework for electricity distribution, which aims to streamline the connections process for non-registered embedded generation. This provides an important opportunity to ensure that these barriers are overcome.

Retail licensing: Standardisation of retail licensing conditions across the NEM involves the drafting of new National Electricity Law and Rules. The second draft of the new legislation, which will cover the relationships between customers, retailers and distributors for both gas and electricity in a single package, is due to be released at the end of November 2009,. This offers a valuable opportunity to see the establishment of consistent and fair retail licensing arrangements for DG operators at a range of scales.

Given the above issues, elements of this broad regulatory reform to streamline licensing requirements for DG may include the following more specific components:

- Relaxing generator rules through the creation of a category for small non-market generators exporting less than 30MW, which can sell to any retailer at the connection point, or raising the threshold for registration exemption to 30MW. Lowering the registration fee burden for DG operators should also be considered by the AEMO.
- Ensuring the new draft legislation governing connection procedures establishes greater certainty regarding network connection costs and procedures for embedded generators, including the establishment of equitable and efficient network connection cost allocation guidelines to provide greater certainty around network connection costs for embedded generators.
- Relaxing distribution licensing rules for embedded generators where new or unusual distribution configurations are required.

3.2 Pricing Reform (including external environmental costs)

Option 4: Impose a price on carbon pollution

Description:

Introduce an adequate market price on carbon, such as by means of the proposed Carbon Pollution Reduction Scheme (CPRS).

Responsibility:

The Federal Government is the most appropriate body to apply such a far reaching policy measure as this. However, in the absence of such action at a federal level, it is quite possible for state and territory governments to impose a price on greenhouse gas emissions as the NSW and ACT governments have done through the Greenhouse Gas Abatement Scheme.

Comment:

The most prominent external cost of electricity supply is the cost of climate change caused by burning of fossil fuels to generate electricity. This means that the average price of electricity is set below its true cost of supply, thus leading to excessive consumption of centralised coal-fired electricity supply and reducing the uptake of lower carbon intensity Distributed Energy options.

The simplest mechanism to redress this barrier is to put a price on carbon through either a carbon tax or carbon emissions trading scheme as in the NSW Greenhouse Gas Abatement Scheme (GGAS) or the Federal Government's proposed Carbon Pollution Reduction Scheme (CPRS). Even though in principle the GGAS should perform this function adequately for NSW, due to a range of factors the GGAS credit price has been highly volatile and has generally been in the order of $3 to $7 per tonne of CO_2-equivalent displaced, which is too low to have a significant financial impact on most Distributed Energy projects. (Note: GGAS is scheduled to finish if or when the CPRS begins.)

Option 5: More cost-reflective network pricing

Description:

Widely implement time-of-use pricing and deploy smart meters to residential and business customers.

Responsibility:

DNSPs are primarily responsible for setting the prices, subject to overall limits imposed by their economic regulator (generally the AER). However, the AER and government departments can do much to encourage and support greater and faster application of time of use pricing.

Comment:

While less obvious than excluded external costs, pricing structures can be an even greater barrier to DE than the exclusion of external costs. Although interval meters and time-of-use tariffs are becoming more common, most electricity consumers in Australia, particularly smaller consumers, still pay a flat electricity tariff. That is, they pay the same electricity price all day, every day throughout the year.[1] This flat tariff is in contrast to the wide variations in the cost of providing electricity both in the wholesale (generation) price and reflecting the cost of providing peak capacity in networks. This flat price structure creates a bias against greenhouse gas emission abatement options that are well suited to respond to these cost fluctuations. While flat tariffs are sometimes defended as protecting vulnerable consumers, the effect is often to impose avoidable costs on all consumers to pay for large investment in centralised generation and networks to meet occasional peak demand.

Given the pre-eminence of peak demand growth in driving proposed network and generation investment decisions, in the long term it is crucial that electricity prices are fundamentally reformed. This relates to both retail and network prices.

In recent years, there have been numerous real-time metering and time-of-use pricing trials by Australian utilities. Nonetheless, the deployment of time-of-use and 'smart' meters and time-of-use pricing has generally been slow and has focussed on relatively weak time-of-use signals. Regulators and government should adopt measures to hasten the rollout of time-of-use pricing and in particular 'dynamic peak pricing' which involves much higher electricity prices at for the infrequent periods of the very highest power demand. Such measures include:

- Facilitate the regulated recovery of costs for smart meter rollout, wherever network businesses can demonstrate net benefits to customers, particularly in relation to load management and reduced demand.
- Assess and promote the benefits of cost-reflective network pricing by both transmission and distribution network businesses.
- Monitor and publicly report on progress in the uptake of time-of-use pricing across Australia, particularly in relation to reductions in energy consumption, peak demand and the use of DG.
- Publicly recognise best practice performance.

Option 6: Default Network Support Payments

Description:

Establish a standard or default network support payment to be paid by the network business to distributed generators exporting power to the main grid. Ensure that network businesses are not disadvantaged in providing such payments.

[1] The main exception to this rule is off peak electric water heating.

Responsibility:

DNSPs have the key responsibility for assessing the value of avoided network costs that can be used to fund network support payments. The AER could make provision for default network support payments in its network revenue regulation decision and the AEMC could make a rule to require the establishment of default network support payments.

Comment:

Most DGs are currently designed and sized to offset electricity purchases of the owner or host, thus avoiding the full retail cost of electricity supply, including network charges. However the export of power from such facilities to the grid typically only attracts the wholesale price, which is 40 to 60% lower than the retail cost. The wholesale price is much lower than the retail price, primarily because it excludes the network charges.

DGs can currently negotiate with DNSPs to be to paid a 'network support payment' for exported energy. This recognises that whenever a distributed generator exports energy to the grid and thereby reduces peak demand on the network, it is reducing the need for network infrastructure to deliver power from distant centralised power stations.

Currently, distributed generators are seldom rewarded for this (often significant) value of avoided network infrastructure. Under Clauses 5.5 (h) and (i) of the National Electricity Rules (ver. 30), the pass-through of avoided TUOS costs from DNSPs to distributed generators is mandatory, which is reflected in Energy Australia's standard generator connection contract (ver. 2, April 2009). Avoided Distribution Use of Service (DUOS) costs do not fall within the National Electricity Rules and there is no explicit wording around this issue contained in the AER's Final Distribution Determination for the 2009–10 to 2013–14 regulatory period (28 April 2009)[2]. Consequently, DNSPs seldom pass through to embedded generators significant avoided network costs.

It is often suggested that the value of distribution generation to the network is negligible because there is a significant risk that due to planned maintenance or unplanned faults, the distributed generator will not be generating at the time of peak demand. However, the unexpected unavailability of energy export from a distributed generator is comparable to an unexpected increase in customer demand of the same amount. Responding to unpredictable spikes in customer load is a routine matter for network businesses, so dealing with comparable dips in export of a power from distributed generators should also be manageable. DNSP concerns about distributed generator risks can, as with the management of customer demand, be managed through pricing incentives. Structuring the level of network support payments to reflect the different value of network support at different times can be an effective means of sharing risk between the DNSP and the distributed generator.

The focus of this negotiation process could be the setting of a 'default network support payment'. While the DNSP and distributed generator should still be free to negotiate alternative arrangements by mutual

[2] Note that the AER Determination does refer to the (indirectly) related D-Factor mechanism, which will be discussed later.

consent, a default network support payment would serve to both strengthen the negotiating position of distributed generators and streamline the negotiation process. The default network support payment could be based on the principle that energy exports receive a network support payment equal to the actual distribution and transmission network charges prevailing at the time, place and voltage level minus the off-peak network charges for that same place and voltage level. Provided the prevailing network charges were set at efficient levels, this approach would recognise the capacity value of the energy export, without including the value of base network connection costs. It is also essential that default network support payments be set for a reasonable minimum period of time, such as ten years. Network support payments should not only apply to exported power, but also for electricity 'exported' from the facility to other users on the same site.

Network support payments should be paid by the local DNSP, reflecting the avoided cost of providing network infrastructure. It should be recognised that DNSPs often hold the position that network support payments represent a real cost to their business, but that the avoided network costs do not represent real savings as existing capacity has already been built and must be paid for, and proposed capacity has not yet been built and the revenue to cover such investment has not yet been recovered. While commentators differ on this viewpoint, in any case it is likely to be easier to encourage DNSPs to offer network support payments if there is a specific mechanism for recovery of these costs by the DNSP.

In NSW the 'D-Factor'[3] scheme provides a suitable cost recovery mechanism for network support payments. It allows the DNSP to recover the electricity sales revenue foregone from demand management (DM) activities it has implemented as well as the direct cost of DM measures themselves up to the value of the avoided network investment. Therefore DM investments under the D-Factor result in reduced capital expenditure on new infrastructure, but no corresponding reduction in revenue for the DNSP. In the context of DE, the reduced sales revenue for the DNSP should be recoverable through the D-Factor, while the remainder of the avoided network costs can be recovered by the DNSP and 'passed through' to the project operator in the form of network support payments.

[3] Australian Energy Regulator's (AER) Final Determination, Appendix K, p.470

3.3 Incentives

Incentive measures are intended to stimulate behaviour change. They are economically beneficial wherever the total benefits of this behaviour change exceed the total cost of providing the incentive. Examples of incentives include:

- Cash rebates
- Competitive subsidy bidding programs (such as the one applied by the Victorian Demand Management Action Plan in the early 1990s)
- Financial support for research and development
- Loans and financial guarantees
- Expedited planning processes
- Public recognition and awards
- Prizes
- Community rewards, where a whole community is rewarded, for example through the provision of a new local playground as a result of a collective effort to save energy.

Option 7: Distributed Energy Fund

Description:

Establish a fund to specifically support Distributed Energy development.

Responsibility:

The AER has the power to establish Demand Management Incentive Schemes. Alternatively a fund could be established by Federal or state/territory governments.

Comment:

Distributed Energy generally has higher initial or capital costs and as such limited access to finance to manage the high initial costs is often cited as a barrier. Particularly the ‘payback gap’ (explained below) can make it difficult for low income earners to afford energy efficiency measures and makes Distributed Energy generation options unattractive to some in the commercial sector.

However, some care needs to be taken in relation to this issue. It is not clear that limited access to finance has been a major barrier retarding the development Distributed Energy. In particular, there appears to be ample evidence to suggest that Distributed Energy options such as trigeneration and energy efficiency represent a large neglected reservoir of cost-effective investment opportunities with relatively short payback periods of a few years or less. As the Stern Report observed,

> Individuals and firms should invest until the expected savings are equal to the opportunity cost of borrowing or saving (assuming risk neutrality). Studies suggest that individuals and firms appear to place a low value on future energy savings. Their decisions expressed in terms of standard methods of appraisal would imply average discount rates of the order of 30% or more. (Stern 2006)

This 30% discount rate implies that consumers and businesses require Distributed Energy investments to pay back their initial investment within about three years. The so-called 'payback gap' refers to this discrepancy between the payback period that consumers and businesses demand to be met by many Distributed Energy investments and the payback period that is required of many other investments (including those made by utility companies in energy supply infrastructure).

Given the strategic importance of the secure electricity supply, governments have for many decades provided preferential support for electricity utilities and in particular networks, both in the form of government ownership and investment and via regulated returns on investment and support for monopoly provision of services. This has given regulated monopolies access to finance with much longer long payback periods (of as much as 40 years) than which is available or applied to providers of Distributed Energy options.

In recognition of these barriers, and to support the development of energy service companies in Australia, a dedicated fund could be established to assist Distributed Energy development. To ensure widest possible impact, access to the finance should be open to all parties seeking to develop Distributed Energy options including electricity distributor network businesses. Specifically, the fund should have comprehensive coverage as outlined by the 2002 Demand Management Inquiry undertaken by the NSW Independent Pricing and Regulatory Tribunal (IPART). The Tribunal stated that:

> A Demand Management Fund or Funds should have the objectives of:
>
> - *Facilitating sustainable generation projects*
> - *Implementing energy efficiency and end-user fuel switching programs to supplement the retailer licence conditions*
> - *Assisting smaller scale, more diffuse energy efficiency programs*
> - *Encouraging energy efficiency initiatives with a wider range of partners, including equipment suppliers, the building industry and local government*
> - *Facilitating programs that tap the synergies between water and energy demand management.* (IPART, 2002)

This policy should build on existing state funds, such as the NSW Climate Change Fund (CCF). Currently the CCF provides one-off project support to Distributed Energy projects in the form of grants, although the publicised form of grant support is not entirely clear.[4]

[4] See: <http://www.environment.nsw.gov.au/grants/altpowgenprojects.htm>

Financial incentives, or subsidies, are often regarded as a 'second best' policy instrument as they generally aim to counteract market barriers rather than reduce those barriers. However, incentives can still be very cost effective. For example, the Energy Savings Fund component of the NSW Climate Change Fund is reported to have achieved 189,376 MWh p.a. of electricity savings at an average cost of $15/MWh (DECC 2008, p.21). This suggests a very cost-effective outcome when compared to an average retail electricity cost of $80/MWh for business and $150/MWh for residential consumers.

However, there remains large untapped potential to use incentives to support Distributed Energy options. As with facilitation, the measurement, evaluation and reporting of the effectiveness of incentives is incomplete and inconsistent. There is very little use made by energy utilities of incentives for Distributed Energy when compared to the increasing use of incentives for water saving by water utilities.

Option 8: Reform Feed-in Tariffs

Description:

Reform feed-in tariffs in order to support load management and energy efficiency.

Responsibility:

Federal or state/territory governments

Comment:

Feed-in tariffs have been implemented in a number of Australian states and other countries to enable distributed renewable technologies to enter the marketplace. For example, from 2000 the German feed-in tariff program fixed the price of payment for renewable generation on the grid so that renewable technologies had a stable market in which to mature. Beginning in 2002, the tariff rates were decreased at a consistent rate to reward early adopters of the feed-in tariff (Butler & Neuhoff 2005). The scheme is notable for three major differences from other programs:

- It pays for energy fed into the grid (in contrast to net metering programs in which the supplier can only return electricity drawn from the grid)
- It allows any generator to benefit from the feed-in tariff, regardless of whether it is a large supplier
- It pays electricity rates based on the generation technology used, thereby recognising that some renewable technologies are more mature (cost less) than others.

Measures to improve feed-in tariffs could include:

- Move from net to gross feed-in tariffs as applied by the ACT.
- Linking feed in tariffs to dynamic time of use tariffs to encourage load management

Option 9: Public recognition and awards

Description:

Publicly recognise leadership in developing Distributed Energy options .

Responsibility:

Government energy, environment/climate change or industry departments

Comment:

It is important to remember that while money can be a strong motivator, it is by no means the only incentive that individuals and organisation respond to. Public recognition of outstanding performance can sometimes provide a more powerful motivation. For example, high profile events such as the national Banksia Environmental Awards provide a strong reinforcement for excellence in environmental performance in the business and public sector. However, such awards can also be designed to motivation wider organisational behaviour change. For example, the NSW Government's Sustainability Green Globes Awards now in their tenth year of operation, were initially created to recognise achievement of milestones in saving energy through the Government's Energy Smart Business Program.

Establishing a public recognition for adoption of distributed energy by consumers and utilities could be an effective complement to other policy tools

3.4 Facilitation

Facilitation is intended to make it easier for consumers, businesses and service providers to access and deliver Distributed Energy options. This goes beyond information provision, but stops short of offering specific incentives, and is generally intended to support parties already seeking to adopt Distributed Energy options. This is the first tier of a Distributed Energy strategy. Facilitation is often aimed at reducing transaction costs, managing risk and building confidence. Facilitation can include some or all of the following:

- High level management commitment, to reduce administrative and cultural barriers
- Audits, advice and technical assistance
- Accreditation of service providers to provide potential clients with greater confidence (e.g. through the accreditation of solar panel installers)
- Training and skills development (e.g. through the NABERS assessor training program)
- Networking of customers and product and service providers (e.g. through seminars, conferences, websites)
- Government endorsement of products, to inspire greater consumer confidence
- Community engagement (e.g. though the Sustainability Street program).
- Standardised agreements for provision of Distributed Energy services, in order to reduce legal and negotiation costs.
- Innovative Procurement to accelerate product development such as more efficient or innovative appliances. See, for example, the Super Efficient Refrigerator Program (SERP, also known as the 'Golden Carrot' Program) was established in 1991 under the leadership of the US Environmental Protection Agency (Lee & Conger 1996).

While there are numerous facilitation initiatives provided by government and other organisations, there is no overall coordination or evaluation of their effectiveness. This leads to confusion, overlap, gaps and inefficiency.

Option 10: Streamline network connection negotiation process

Description:

Establish a clear and consistent framework governing the processes and timeframes surrounding the negotiation of generator connection agreements between DG operators and local DNSPs.

Responsibility:

As mentioned in Option 3, the MCE's Network Policy Working Group (NPWG) is expected to release draft legislation at the end of November 2009, establishing a national connections framework for electricity distribution. The negotiation framework could be established under this legislation.

Comment:

To connect generation equipment to the electricity network, an embedded generator must negotiate a connection agreement with the relevant Distribution Network Service Provider (DNSP), which sets out the connection costs and the standards of service that the connecting party will receive.

While some states establish principles for connection, there is generally no standard process for connecting distributed generators to the electricity grid, apart from small-scale solar PV which reflects the higher number and general consistency of annual connections for this type of embedded generation. For other DG options, each DNSP has its own requirements for connection of generation equipment to its network. In the case of technologies such as cogeneration, the process can be complex, time-consuming and expensive.

Another aspect of the complexity of the negotiation process is in managing the risks associated with the potential impacts on power quality at different network supply nodes. A key issue here is the existing vulnerability of the network to 'fault current' caused by supply disturbances within the electricity supply system and how this may be affected when distributed generators are connected. Distributed generators have the potential to contribute additional fault current due to malfunctions in the generator or the network and this may lead to the existing network's prescribed 'fault levels' being exceeded. Deciding who should bear the responsibility for managing this additional fault current needs to be clarified, particularly in circumstances where the existing network fault levels are exceeded *before* the distributed generator connects.

An effective negotiation framework can help to improve certainty and reduce delays for parties negotiating a connection agreement, and thereby substantially reduce transaction costs for organisations considering distributed generation.

Option 11: Distributed Energy Ombudsman

Description: Establish "Distributed Energy Ombudsman" with the knowledge, technical engineering skills and authority to assist in dispute resolution between Distributed energy proponents and utilities.

Responsibility:

To be established by Federal and/or state and territory government. This role could in principle be fulfilled by the existing state based Electricity and Water Ombudsman's' Offices provided additional skills and resources were made available.

Comment:

In most cases, the proponents of distributed energy are much smaller and with much fewer resources than the distribution network businesses with whom they must negotiate. This disparity can lead to a perception of unfair treatment on the part of DE proponent. While the National Electricity Law makes provision for disputes and dispute resolution, these processes are generally so resource intensive that they are seldom used. The establishment of a 'Distributed Energy Ombudsman' modelled on the low cost conflict resolution approach adopted by existing energy and water Ombudsman's offices around Australia could provide an effective mechanism for streamlining negotiations over distributed energy development

Option 12: Annual Distributed Energy Review

Description: State and Territory Governments should undertake and publish a comprehensive annual distributed energy review.

Responsibility:

Government energy, environment/climate change or industry departments

Comment:

This review should include (in relation to energy efficiency, distributed generation and peak load management):

a) A detailed and robust resource assessment of distributed energy potential

b) An accurate assessment of current distributed energy practice

c) An overview of international best practice in distributed energy programs and policy

d) An evaluation of facilitation measures for the adoption of distributed energy.

Option 13: Training and skills development

Description: Establish an industry training program for distributed energy options, building on existing "Green jobs" training efforts. The program is likely to cover different targeted streams for different types of participants. Options for building on should be explored.

Comment:

Due to the relatively small number of distributed energy projects actually undertaken to date in Australia, there is limited experience across the range of sectors required to successfully design, install and operate distributed energy such as trigeneration systems. This includes:

- Utilities – capacity to model and understand the implications of connecting embedded generators to the system, including realistic assessment of fault levels. This issue is related to perceived risks and network usage charges.
- Project proponents – many proponents are commissioning the design and installation of systems for the first time, and are not adequately informed of their needs, legal obligations or design requirements. A well-informed project proponent is critical to the success of future distributed energy expansion.
- Engineering consultants – for example recent trigeneration projects have reported issues with dramatic oversizing of plant for islanded systems due to design engineers not adequately understanding the year-round operation of trigeneration systems, and the interaction of the system with building particularly in highly efficient buildings. Note that these issues are of less significance if excess power can be exported to the grid and the plant can be operated at consistently higher load and also may not be such an issue for other technologies.

This issue of skills/experience shortage is particularly acute as it pertains to the operation of precinct scale distributed energy, which has seldom been applied in Australia.

Option 14: Integrated energy audits and technical support

Description:

Supporting the implement of energy efficiency and load management measures by linking energy audits to technical support, incentives and high level corporate commitment.

Responsibility:

Government energy, environment/climate change or industry departments

Comment:

A series of market barriers have been recognised as providing a rationale for government support for energy audits:

- Recognition that the firms have imperfect information (energy operating costs when purchasing, energy operating costs when operating, benchmarks for energy performance, lack of precedents and technologies and opportunities) about energy efficiency options.
- The firms' organisational failures probably led to poor energy performance, and were aggravated by the corporate cultural barriers.
- Undervalued energy efficiency contributed to the firms' poor energy performance and necessitated government intervention.

Government support for energy audits has long been a government policy measure of in Australia . For example, in 1996, the Australian Government established a program to assist commercial and industrial firms to undergo an energy audit by an accredited energy auditing company (Harris & Weston 1996). The audits provided the firms with a list of recommended energy improvements and a summary of expected costs and savings. The firm then elected whether to upgrade their systems. The federal government subsidised 50% of the cost of the audit. Participation in the program was optional. One year after the audit, a follow-up questionnaire was sent to determine which energy savings measures had been undertaken. However, the rate of implementation of opportunities identified was found to be very poor.

It has subsequently been recognised that energy audits will be most successful where they are supported by detailed implementation support and crucially, corporate commitment to implementing identified savings opportunities

3.5 Information

Policy options to overcome information barriers relating to distributed energy options include:

- Benchmarking of energy performance to advise energy users of what constitute efficient levels of energy consumption in different contexts
- Energy performance labelling on appliances and equipment
- Performance reporting (without targets)
- Community education and awareness campaigns
- Energy management systems
- Case studies.

Most of these are currently applied to varying degrees in Australia and each could be expanded. However, arguably the biggest information barrier in relation to distributed energy options is not at the consumer level but at the policy level. Reliable information about the current practice and future potential of distributed energy options is not available. Given the likely potential for distributed energy options to deliver major economic and environmental benefits, this deficiency should be urgently addressed.

Option 15: Better information on network constraints and avoidable costs

Description:

DNSPs to provide easily accessible, up-to-date and relevant demand and network planning information.

Responsibility:

DNSPs are the only possible sources of such information. Following its recent review, the AEMC has proposed a change to National Electricity Rules for Electricity Distribution Network Planning and Expansion including information reporting requirements. DNSPs would then be required to publish information in accordance with this Rule. This presents an opportunity to ensure improves network planning information disclosure in a useful form.

Comment:

Planning information can provide forecasts of network constraints and therefore economic opportunities for investment for proponents of DE. While states such as NSW and Victoria mandate the production of relevant annual planning information on capacity constraints at the substation level and costs of solutions, the presentation of this data in reports tends to be highly technical and inconsistent in format. This makes interpreting the data difficult for any proponent of DE options. Therefore not only is the key information planning required, but a simpler and more accessible presentation of the network constraint information is also necessary. The AEMC Rule change provides the opportunity to achieve a nationally consistent reporting framework.

Note that evaluating potential avoidable network costs is a key component of the Australian Distributed Energy Roadmap and will be the focus of a forthcoming Intelligent Grid Industry Forum in early 2010.

Further, in the case of DG, where multiple proponents seek access to spare capacity in the network, a more clear and transparent process is required to facilitate prioritisation of those projects. DG proponents pay for network studies with no guarantee results will be accepted by the DNSP, so all of the risk is with the proponent.

Option 16: Consolidate and disseminate information on Distributed Energy

Description:

Develop a Distributed Energy website and/or ‘Handbook’ to provide information and guidance for Distributed Energy proponents on areas such as: network connection processes (where relevant), costs, rights, responsibilities, financing, and legal requirements.

Responsibility:

Such an undertaking could be commissioned at the national level by the MCE to complement its electricity sector reform process. Alternatively or additionally, relevant state government agencies may be in a position to act independently, but should collaborate on collection and sharing of information to provide access to the broadest possible knowledge base.

Comment:

As has become evident from discussion of the various impediments to Distributed Energy development at different stages of the Distributed Energy development process, there is a significant lack of clear, accessible and relevant information easily available to distributed energy developers to assist in streamlining the development process. This policy initiative would act in concert with other regulatory, pricing, financing, facilitation and target setting reforms to accelerate Distributed Energy development as other barriers are overcome in parallel. This could be supported by a national ‘Distributed Energy Advisory Service’ to accumulate expertise and provide support and advice to prospective Distributed Energy service providers or investors.

The information handbook and advisory service would also be well placed to cover issues such as valuation of and available payments for electricity network benefits provided by Distributed Energy, technical information and standards, negotiation processes, and planning requirements.

Option 17: Resource Assessments and Case Studies

Description:

Publish comprehensive and accessible assessments of the opportunities for and successful case studies of Distributed Energy in Australia.

Responsibility:

Government energy, environment/climate change or industry departments

Comment:

In many areas of distributed energy, there is lack of precedents within Australia – that is, good examples of distributed energy in operation across a range of operational building scenarios at a range of scales. The lack of precedents is related to the element of risk associated with new and innovative approaches, as perceived by potential proponents and financiers. The lack of precedents results in a range of outcomes, including Unnecessary duplication of costs for connection, power system analysis and testing, reliability.

Each State and Territory should publish an annual consolidated Statement of Opportunities which draws on the ESDRs to present a concise, consistent and accessible description of opportunities for developing Distributed Energy options to address network constraints. This would include location, timing, load reduction required and the value of such load reduction. The Statement of Opportunities should be complemented by an effective communication strategy to raise awareness of opportunities and how potential DE project developers can take advantage of them.

Governments should capitalise on lessons learned from international experience to the greatest extent possible, to assist the industry in approaching issues that are new to the local market environment.

3.6 Targets

Targets are often adopted by businesses, governments and individuals as a means of assigning a high priority to desired outcomes. Where the prevailing culture, habits or tradition are not delivering appropriate outcomes, targets can be an effective means of changing behaviour. For example, electricity distribution network businesses are usually subject to both regulated and organisational targets for reliability, safety, profitability and price. However, they generally do not have targets for developing distributed energy or reducing greenhouse gas emissions. This is a mechanism the regulator can use to drive the organisations to focus effort on these priority areas.

Targets also imply both measuring and reporting performance at regular intervals. Targets can be 'hard', such as the Federal Government's Mandatory Renewable Energy Target , or 'soft', such as the Federal Government's aspirational greenhouse target of reducing greenhouse gas emissions to 60% by 2050, or targets can be somewhere between 'hard' and 'soft'.

In order to stimulate distributed energy options Governments should set targets for distributed energy development both in terms of energy (GWh per annum) and peak demand (MW). These targets should be adopted as soon as possible but need not necessarily be legislated. However, it is essential that annual targets be set, that performance towards these targets is publicly reported at least annually and that a strategy for implementation is adopted which includes clear accountabilities for performance.

Option 18: Extend Retailer Energy Efficiency Targets

Description:

Extend mandatory energy efficiency targets to capture more of the available cost effective energy efficiency potential.

Responsibility:

State and Territory or Federal Government.

Comment:

There are a number of barriers to the uptake of energy efficiency in Australia, including:

- Imperfect information about the real benefits of energy efficiency measures;
- The payback gap to which low-income earners are particularly subject to and are consequently unable to invest in energy efficient measures.

- Split incentives between tenant and landlord which were addressed through remediation and communication frameworks provided under the program
- Transaction costs associated with consumers lacking of motivation or awareness.

One important policy option to overcome these barriers is to mandate that energy retailers invest in energy efficiency, which can be achieved through a well designed target scheme such as the UK's Energy Efficiency Commitment.

In 2007, the UK Government established targets for energy efficiency through its Energy Efficient Commitment (EEC). This commitment requires energy suppliers to promote residential household efficiency improvements. Similar to a Renewable Energy Target, retailers are free to choose specific energy efficiency measures to meet their target. Typical measures deployed include insulation, low energy lighting or high efficiency appliances and heating systems. DEFRA (2007) states that "the EEC has been highly successful in delivering cost-effective energy efficiency improvements and has acted as a model for similar schemes in a number of countries within the EU."

Similar schemes have since been adopted in Australia through the Victorian Energy Efficiency Target (VEET), the South Australia Residential Energy Efficiency Scheme (REES) and NSW Energy Savings Scheme. However, each scheme is subject to a various limitation. For example, the Victorian and South Australian schemes only apply to the residential sector. These schemes should be expanded nationally and extended capture a wider range of sectors and energy saving technologies and behaviours.

Option 19: Targets and Reporting for Distributed Energy Development

Description:

State and local governments should establish annual targets for Distributed Energy. This would involve a publicly announcement of targets for DG and DM in 2009 for each year from 2010 to 2020 and annual reporting to track the progress.

Responsibility:

Federal, State and Territory and/or Local Government.

Comment:

As with all sectors, there is significant momentum driving the implementation of business-as-usual solutions, and organisational goals and processes are set up around functioning most efficiently and effectively with the existing model. This can be described as a "cultural" barrier to using DE solutions which make it very difficult for DE providers to displace business-as-usual solutions. Where the prevailing culture, habits or tradition are not delivering appropriate outcomes, targets can be an effective means of changing behaviour. For example, DNSPs in NSW are subject to regulated targets for reliability and price profitability, which is a mechanism for the regulator to drive the organisations to focus effort on these priority areas.

Targets also imply both measuring and reporting performance at regular intervals Targets can be "hard" such as the NSW Energy Efficiency Scheme, "soft" such as the Federal Government's aspirational greenhouse target of reducing greenhouse gas emissions to 60% by 2050, or something in between.

In order to stimulate DE implementation, targets could be set for both in terms of energy (GWh per annum) and peak demand (MW). These could be set by:

- A state government as a complement to an Energy Efficiency Scheme targets. While ideally these targets would be legislated, this need not necessarily be the case; or
- A local council in a publicly announced high-level (Lord Mayor/CEO) partnership with an electricity generation and retail business such as Energy Australia.

It is important to note that a medium or long term target by itself is insufficient to support distributed energy. Thus, it is essential that *annual* targets are set; performance towards these targets is publicly reported at least annually; and a strategy for implementation is adopted including clear accountabilities for performance.

3.7 Coordination

Coordination of effort is essential in any public policy activity involving multiple organisations. Given the scale and complexity of the task of rapid distributed energy development, effective mechanisms to coordinate the strategy are particularly necessary in this area. One straightforward mechanism to achieve this coordination is presented here.

Option 20: Agency to coordinate Distributed Energy development

Description:

Nominate an agency with appropriate resources and authority to co-ordinate a Distributed Energy strategy.

Responsibility:

Federal, State and Territory and/or Local Government.

Comment:

As will be apparent from this working paper, the barriers impeding the development of Distributed Energy and the mix of policy options available to address them are complex. However these complexities are no more challenging than those that have confronted the other key government endeavours in the past, including the development of the electricity industry during the 20th century. A key strategy that is usually applied by government to address matters of major public interest is to appoint an appropriate agency to deliver the required outcome.

In order to ensure that the development of distributed energy is are met, a suitable agency within the Government with appropriate skills, resources, commitment, and authority should be assigned ownership and responsibility for forming and managing a coherent Distributed Energy Strategy. This could be an existing or new organisation, but is it essential that the successful development of distributed energy is a core objective of the organisation and that it has clear performance indicators for success.

4. Developing and applying an effective policy strategy

In order to develop and apply an effective suite of a coherent and effective policy options, it is useful to consider:

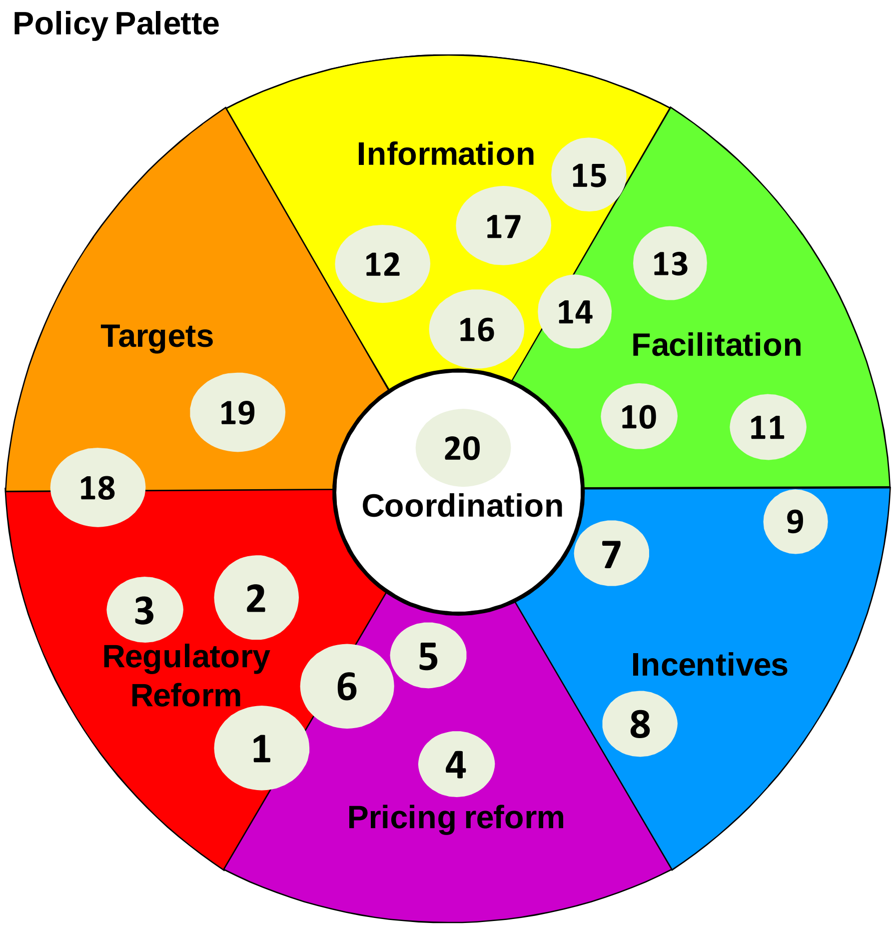
- how different policy options work together
- which specific barriers each measure is trying to overcome
- approaches for addressing barriers given funding and resourcing constraints
- what technologies are being targeted by each measure.

This section explores these issues to assist in framing the policy options presented in the previous section.

4.1 Planning and coordinating policy options

As no single policy option is a panacea, the suite of policy options implemented must operate in harmony, with limited duplication and effective targeting of the range of barriers. Therefore it can be useful to map the options on the 'policy palette' to visualise the 'policy balance' across different drivers, to enable effective planning and coordination of policy options, as illustrated in Figure 10.

Figure 10. The 'policy palette': mapping policy options for effective coordination



1: Decouple electricity sales from network profits
2: Reform National Electricity Rules
3: Streamline DG Licensing
4: Carbon Price
5: Cost reflective pricing
6: Network support payments
7: Distributed Energy Fund
8: Reform feed-in tariffs
9: Public recognition & awards
10: Streamline network negotiation process
11: DE Ombudsman
12: Annual DE Review
13: Training & skills development
14: Energy audits & technical support
15: Network planning info
16: DE handbook & advisory service
17: Resource assessments & case studies
18: Extend retailer EE targets
19: DE targets & reporting
20: DE Coordination Agency

The 20 policy options presented in Section 3 are classified and mapped on the 'Policy Palette' in Figure 4.1 . From Figure 4.1 it can be seen that there is a balanced representation of policy options across the range of primary and secondary policy drivers. This reflects the selection of these policy options based on their representation of a range of broad key reforms.

4.2 Addressing different forms of Distributed Energy

It is also important to understand that not all policy options target the three different forms of Distributed Energy equally. That is, specific measures may target distributed generation, or energy efficiency or load management, or any combination of these. It is vital to achieve a balance between these different forms to unlock the full potential of Distributed Energy. As shown in Table 1, the 20 policy options from Section 3 were assessed for their relevance to each of the forms of distributed energy. When prioritising policy options, a good representation of all three forms of DE should be achieved.

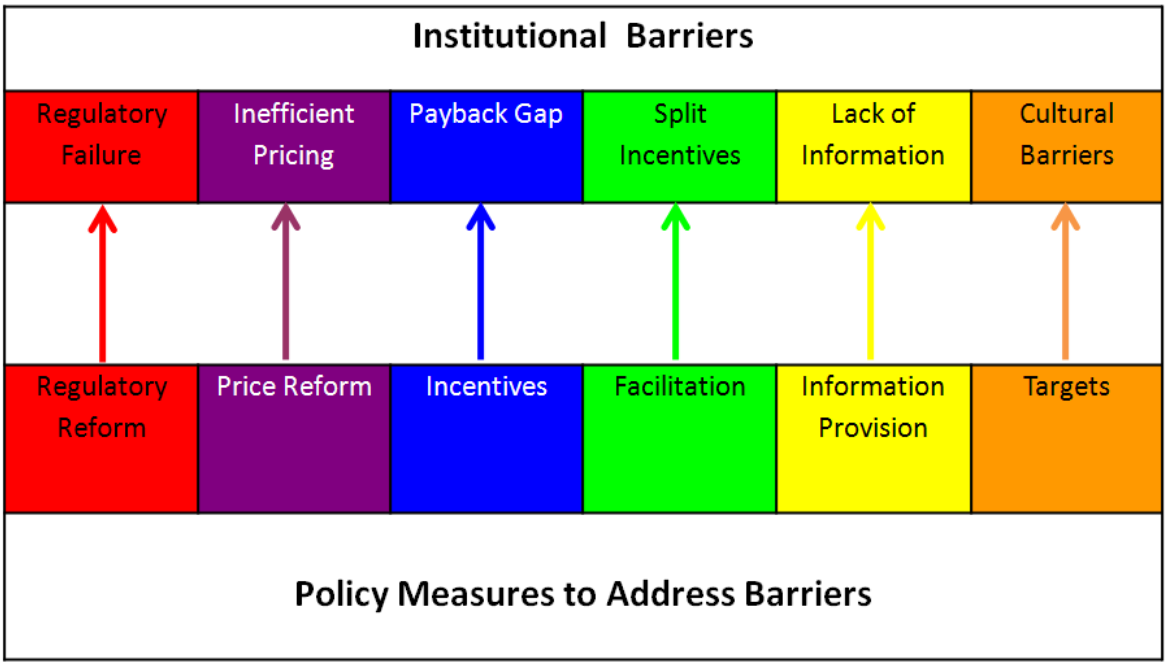
Table 1: Relevance of policy options to Forms of Distributed Energy

Number	Policy Option	Dist Gen	Energy Effic'y	Load Mgmt
	Regulation			
1	Decouple network business profits from electricity sales	✓	✓	✓
2	Fair treatment of Distributed Energy in National Electricity Rules	✓	✓	✓
3	Streamline licensing requirements for distributed generation	✓		
	Pricing Reform			
4	Impose a price on carbon pollution	✓	✓	
5	More cost reflective network pricing	✓	✓	✓
6	Default Network Support Payments	✓		
	Incentives			
7	Distributed Energy Fund	✓	✓	✓
8	Reform feed-in tariffs	✓		
9	Public recognition and awards	✓	✓	✓
	Facilitation			
10	Streamline network connection negotiation process	✓		
11	Distributed Energy Ombudsman	✓	✓	✓
12	Publish a Distributed Energy Review	✓	✓	✓
13	Training and skills development	✓	✓	✓
14	Integrated energy audits and technical support		✓	✓
	Information provision			
15	Better information on network constraints and avoidable costs	✓	✓	✓
16	Consolidate and disseminate information on Distributed Energy	✓	✓	✓
17	Resource assessments and case studies	✓	✓	✓
	Targets			
18	Extend retailer energy efficiency targets		✓	
19	Targets and reporting for Distributed Energy development	✓	✓	✓
	Coordination			
20	Agency to coordinate Distributed Energy development	✓	✓	✓

4.3 Symmetric and asymmetric policy responses

In principle, the simplest approach to implementing policy options for addressing institutional barriers to Distributed Energy is to identify the barriers and apply policies to counteract each barrier specifically. This represents a 'symmetric' response of addressing each barrier one by one. This can be an effective way of overcoming barriers, provided there are sufficient time, resources, personnel and, crucially, policy-makers' attention available to address all of these barriers simultaneously. The types of policy measures available are summarised in Figure 11, with policy measures that broadly correspond 'symmetrically' to identified barriers presented in corresponding colours.

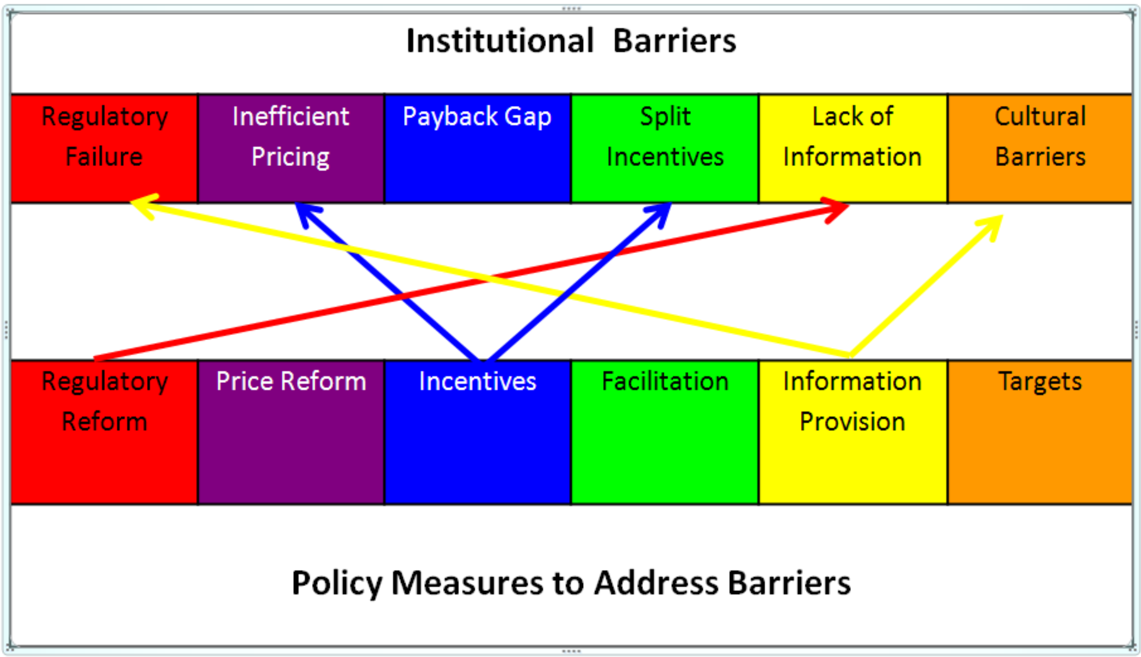
Figure 11: Symmetric policy response to address barriers



This *symmetric* policy response would involve each barrier being addressed with a proportionate and corresponding policy measure. In practice, this is seldom the case. For this reason, governments that wish to develop distributed energy options rapidly often apply an 'asymmetric' policy response of acting strongly in those areas where action is perceived to be easiest or most effective. Provided this limited number of policies is strong enough, it can in principle compensate for those barriers that are harder to address directly or are expected to take more time to overcome.

An optimal *asymmetric* response would involve a mix of policy measures designed to maximise effectiveness given the available resources, even though this may mean some measures may seem excessive compared to their 'corresponding' barrier, while other barriers may not be directly addressed at all. Figure 12 illustrates what an asymmetric policy response might look like, given constraints in funding, resources or policy choice.

Figure 12: Asymmetric policy response to address barriers



To assist in understanding the policy measures presented in Section 3, it is important to note that this working paper has not been structured with an explicit analysis of discrete barriers followed by a symmetric policy response. Rather, barriers are alluded to in the discussion of each specific policy option. Multiple barriers are often addressed by a single policy measure. That is, the 20 policy options presented in Section 3 represent a possible strategic mix of policy instruments that might be applied to address the barriers to distributed energy.

However, as it is unlikely that the funds, resources and political will to implement *all* 20 of the policy options will be available in the short term, the prioritising of options is vital. Stakeholder consultation on this working paper provides an opportunity to consider the overall prioritising of options emerging from different perspectives on the policy measures.

4.4 Roles and responsibilities for policy implementation

In implementing government policy options, it is important to recognise that responsibility is shared across a range of agencies, regulators, rule makers, policy makers, legislators and program agencies. From the national to the local level, these actors need to play different but complementary roles in policy development and implementation. This underscores the importance of effective coordination.

Note that while the role of the electricity supply industry is crucial to successful Distributed Energy and intelligent grid development, this working paper has focussed only on the public policy components. However, the more the electricity industry is empowered to overcome the institutional barriers itself, the less will be the need for policy interventions. The role of other stakeholders is also essential, as effective policy cannot occur without effective advocacy.

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