



## Towards a 'smart grid' – *the roll-out of Advanced Metering Infrastructure*



VICTORIA

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Victorian  
Auditor-General

Towards a ‘smart grid’  
— *the roll-out of  
Advanced Metering  
Infrastructure*

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The Hon. Robert Smith MLC  
President  
Legislative Council  
Parliament House  
Melbourne

The Hon. Jenny Lindell MP  
Speaker  
Legislative Assembly  
Parliament House  
Melbourne

Dear Presiding Officers

Under the provisions of section 16AB of the *Audit Act 1994*, I transmit my performance report on *Towards a 'smart grid'—the roll-out of Advanced Metering Infrastructure*.

Yours faithfully



D D R PEARSON  
*Auditor-General*

11 November 2009



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# Audit summary

## Background

In a world facing the unknown and emerging challenges of climate change, energy efficiency is growing in importance as a community concern.

To achieve energy efficiency, and hence a corresponding reduction in carbon emissions, consumers and the electricity industry both need to work together to:

- reduce energy demand and waste where appropriate and possible
- promote the efficient use of household appliances, and limit the inefficient use of appliances such as air conditioners and pool filters
- shift consumption patterns to maximise the efficient use of power generating assets and smooth out peak consumption periods, which cause spikes in the cost of electricity and create inefficiencies in the allocation of capital to new generation capacity.

Mindful of these objectives, the government approved the Advanced Metering Infrastructure (AMI) project in February 2006. A large and complex project, it aims to record and measure electricity use in more detail than current meters allow. Between 2009 and 2013 the AMI project will replace accumulation meters in 2.4 million homes and small businesses with smart meters.

The *accumulation meter* is the most common type of electricity meter. It records energy consumption over time. However, industry has been increasingly using more advanced meters such as the *interval meter*, which records energy use over short intervals, typically every half-hour. The *smart meter* is even more advanced. It can communicate with the electricity supplier, enabling the supplier to offer new services to consumers.

The expected benefits of smart meters are to:

- improve consumers' ability to monitor and control their electricity use, potentially allowing for cheaper and more efficient energy use
- reduce the cost to industry of planning and managing power supply, potentially leading to lower retail prices for consumers
- increase retail competition through new services, potentially resulting in a greater choice of suppliers for consumers.

This report examines whether the advice and recommendations provided to government on the roll-out of AMI have been sound. It outlines the background to the project (Part 1), and evaluates:

- the effectiveness of project governance by the administering departments (Part 2)
- the robustness of the economic analysis underpinning the project (Part 3)
- the adequacy of technology risk assessment in dealing with implementation uncertainty (Part 4).

The AMI project is a partnership with the electricity industry. Victorian electricity distribution businesses are responsible for installing smart meters and their infrastructure. The government has amended the electricity regulations so that consumers will directly pay for AMI installation costs.

The former Department of Infrastructure (DOI) administered the AMI project until late 2006 when a 'machinery of government' change transferred administrative responsibility to the Department of Primary Industries (DPI).

## Overall conclusions

The AMI project has not used the checks and balances that would ordinarily apply to a major investment directly funded by the state. This highlights a gap in the project's accountability framework.

There have been significant inadequacies in the advice and recommendations provided to government on the roll-out of the AMI project. The advice and supporting analysis lacked depth and presented an incomplete picture of the AMI project in relation to economic merits, consumer impact and project risks.

Given the significant uncertainty about the cost of AMI to both industry and consumers, as well as the nature and scale of the market intervention, the project always warranted much stronger departmental governance and central oversight. DPI as the administering department has an enduring responsibility to provide structured and tight oversight of the project's establishment, planning and implementation activities.

During the implementation phase of the AMI project, DPI only has an observer role on the industry steering committee which oversees implementation of the project. DPI claims that this allows the department to make recommendations and give advice to the minister without a direct conflict of interest, but such a limited role inevitably diminishes DPI's ability to deal effectively and proactively with risks and issues.

## Main findings

### Project governance

The department's project governance has not been appropriate for the nature and scale of the market intervention the project poses. In particular:

- its advice to government on risk assessment has been inadequate
- the level of community engagement has been inadequate, given the significant effect on consumers
- DPI has engaged with the project in only a limited way as an 'observer' during its implementation phase.

As there were not enough staff assigned by DPI to the project, it has not been able to adequately engage with such a large scale and complex project. This highlights a gap in the department's understanding of its governance and accountability role in a non-budget-funded project.

## Economic merits

The cost-benefit study behind the AMI decision was flawed and failed to offer a comprehensive view of the economic case for the project. There are significant unexplained discrepancies between the industry's economic estimates and the studies done in Victoria and at the national level. These discrepancies suggest a high degree of uncertainty about the economic case for the project.

## Implementation risks

The AMI project has significant implementation risks that have been underestimated in advice to government. These risks, which relate to technology and relationships with national systems and processes, have started to materialise and are likely to erode the projected net benefits.

The advice to government that led to the AMI decision scarcely considered project risks. The risk management approach was to rely on the electricity industry to address and bear technology risks. However, the regulatory regime does not give the industry enough incentive to manage risks and associated costs that consumers are likely to pay. The project risks are therefore very likely to directly affect consumer prices.

The technology risks were underestimated when the government was recommended to commit to the project. Sufficient resources were not allocated to manage equipment trials. The trials did not offer reasonable assurance that the proposed technologies were viable. However, DPI persisted in advising government to proceed.

The department's lack of adequate risk management comes from its belief that industry is responsible for managing technology risks. However, given the extent to which the department promoted the project, the nature of the regulatory intervention, and the implications for consumers, the department is accountable for effectively managing risks that have the potential to undermine the economic case.

## Consumer implications

The cost-benefit analysis is unclear about how stakeholders, particularly consumers, will benefit and who should bear which costs. There is little evidence to show that when the project was designed, the resultant benefits and costs were adequately considered. It is therefore possible that there will be an inequitable, albeit unintended, transfer of economic benefits from consumers to industry.

The regulator recently determined that 'on average, customers will pay \$67.97 more in 2010 for metering services than in 2009, with a further increase of \$8.42 in 2011.' DPI estimated that consumers would pay \$40–50 a year for meter costs. Retailers could also pass their costs on to consumers, with one retailer recently indicating in a public statement that consumers may have to pay an extra \$100–150 each year. In another public report, a consumer advocacy group has estimated that the average annual cost of electricity may rise by \$120–170 due to the implementation of AMI.

If the project's emerging risks delay the installation of smart meters it is likely that consumers will face further cost increases and gain fewer benefits.

## Recommendations

Number	Recommendation	Page
	Without delay, DPI should:	
1.	Re-examine the existing governance structure of the AMI project to proactively identify, assess, own and manage the project's strategic risks.	20
2.	Develop, appropriately resource and implement a stakeholder engagement plan with a particular focus on addressing consumer issues arising from the AMI project.	20
3.	Actively engage with the relevant regulator to monitor and oversee the transfer of expected benefits to consumers.	20
4.	Commission a program review by the Gateway Unit of the Department of Treasury and Finance on governance and implementation of the AMI project to date.	20
5.	Re-assess the economic viability of the AMI project by updating the cost-benefit analysis to reflect existing and emerging risks as well as the impact of changes to scope and underlying assumptions.	32
6.	Use the Department of Treasury and Finance's business case development guidelines and other advice to produce an updated cost-benefit analysis.	32
7.	Obtain assurance from Victoria's electricity distributors that their candidate technologies for AMI are capable of achieving the expected functionality and service specification prior to the further installation of these technologies in customer premises.	41
8.	Adopt the Department of Treasury and Finance's risk management guidelines as a basis for monitoring and managing the risks that threaten the economic viability of the AMI project.	41

# Audit Act 1994 section 16— submissions and comments

## Introduction

In accordance with section 16(3) of the *Audit Act 1994* a copy of this report was provided to the Department of Primary Industries and the Department of Treasury and Finance with a request for comments or submissions.

The comments and submissions provided are not subject to audit nor the evidentiary standards required to reach an audit conclusion. Responsibility for the accuracy, fairness and balance of those comments rests solely with the agency head.

## Submissions and comments received

### **RESPONSE provided by Department of Treasury and Finance**

*The Department of Treasury and Finance did not provide a response to the report.*

### **RESPONSE provided by the Secretary, Department of Primary Industries**

*The following is an extract of the response provided by the Secretary of the Department of Primary Industries (DPI). The full response is provided in Appendix A of this report.*

*DPI accepts in principle most of the recommendations in the report, but for different reasons than those in your report. The project is a major undertaking that is now moving from planning to implementation and delivery; it is therefore an appropriate time to review governance, resourcing, risk, and stakeholder engagement. As set out below, some of these recommendations are already being progressed.*

**Recommendation 1.** *Re-examine the existing governance structure of the AMI project to proactively identify, assess, own and manage the project's strategic risks.*

*Already underway. DPI is currently reviewing the governance structure for all major energy and earth resources projects in which it has a significant accountability, including the AMI project.*

*The risks associated with the AMI project will continue to be allocated to the party best able to control the risks, to avoid the inappropriate transfer of risk and liability to government and/or the community.*

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

***Recommendation 2.*** Develop, appropriately resource and implement a stakeholder engagement plan with a particular focus on addressing consumer issues arising from the AMI project.

Already underway. A high priority has been placed on maximising consumer benefits from the AMI roll-out, and a stakeholder engagement plan has already been developed through the AMI Industry Steering Committee. Information is being provided to consumers as smart meters are rolled out in their local area. Consideration is also being given to the future scope of this campaign.

***Recommendation 3.*** Actively engage with the relevant regulator to monitor and oversee the transfer of expected benefits to consumers.

Already underway. For those benefits that will be realised through regulated network services, DPI has been actively engaged with the regulator from the outset of the project to ensure those benefits are passed through to consumers.

DPI continues to monitor the competitive parts of the energy sector to ensure that competition passes on benefits to consumers.

***Recommendation 4.*** Commission a program review by the Gateway Unit of the Department of Treasury and Finance on governance and implementation of the AMI project to date.

Support in principle. A program review will be commissioned by the Gateway Unit of the Department of Treasury and Finance on the next phase of the AMI project (benefit realisation). However, the Gateway Unit will not be engaged to undertake a retrospective review.

***Recommendation 5.*** Re-assess the economic viability of the AMI project by updating the cost-benefit analysis to reflect existing and emerging risks as well as the impact of changes to scope and underlying assumptions.

Already underway. The cost-benefit analysis is currently being updated and will use more up to date assumptions for the demand response estimate, which is expected to result in substantially higher benefits than previously quantified.

***Recommendation 6.*** Use the Department of Treasury and Finance's business case development guidelines and other advice to produce an updated cost-benefit analysis.

Support. The Department of Treasury and Finance's business case development guidelines and other advice will be referenced in producing the updated cost-benefit analysis. It is not expected that the results of the cost-benefit analysis will change materially by the application of the guidelines.

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

***Recommendation 7.*** Obtain assurance from electricity distributors that their candidate technologies for AMI are capable of achieving the expected functionality and service specification prior to the further installation of these technologies in customer premises.

Already underway. Assurance has been sought on this point at key stages in the project through the established governance arrangements (including a specific provision in one of the Orders-in-Council (OICs) that requires the distributors to prepare and submit to the Minister, on request, a comprehensive Risk Management Strategy for the project), and this will continue. However, for reasons given above, DPI does not plan to direct the use of particular technologies.

Further, the electricity distributors would be in breach of their licenses should their candidate AMI technologies not be capable of achieving the expected functionality and service specification (unless the cost of doing so exceeds the benefits, but only in the case of non-core functionality).

***Recommendation 8.*** Adopt the Department of Treasury and Finance's risk management guidelines as a basis for monitoring and managing the risks which threaten the economic viability of the AMI project.

Support.

## Further comment by the Auditor-General

I welcome DPI's acceptance of the recommendations in the report and the actions it has taken to improve the roll-out of AMI.

However, in his response to my report, the Secretary raised a number of concerns in regard to:

- the findings of the audit on the role of the department in governance of the AMI program
- the reasonableness of the evidence used in the audit report
- the weighting of views expressed by third parties without validating those views
- insufficient regard to project outcomes achieved to date.

I address each of these concerns in turn:

### Role of DPI in governance of the AMI program

My view is that because of the significant complexity, scale and consumer impact of the AMI roll-out, DPI, as the administering department, has an enduring responsibility to take an active oversight role so that the project can be appropriately governed, planned and implemented to deliver the expected benefits.

## Further comment by the Auditor-General – *continued*

In particular, the department should focus on the effective transfer of expected benefits to consumers, as consumers are directly funding the costs of implementation of the AMI program, under the cost pass-through model.

Audit observations of inadequate management of project risks and poor management of technology risks by the department are linked directly to the governance model and risk transfer approach adopted by DPI.

It does not necessarily follow that more active oversight would transfer risk to the department. But it is a truism in the public sector that while responsibility can be delegated, full accountability for achieving intended outcomes cannot be. This is perhaps more so for this case, where a mandated market intervention has occurred.

### Reasonableness of the evidence used in the audit report

All audits are conducted using my Office's internationally recognised performance audit methodology, which complies with the *Audit Act 1994* and the relevant professional auditing standards. The cornerstone of this audit methodology is independence built on a foundation of professional scepticism.

Our conclusions are based on evidence gathered from a wide range of sources in line with our audit methodology. All evidence presented by the department was reviewed and our analysis of that evidence is reflected in the audit report's conclusions and findings.

The recommendations, which have been accepted by the department, were developed through analysis of all the detailed evidence obtained during the audit.

### Weighting of views expressed by third parties without validating those views

The views expressed by third parties are a matter of public record and were not considered as evidence to support any findings or conclusions—they were representative of differing views held by sections of the community on the costs of the AMI program.

The Australian Energy Regulator's final determination on AMI-related direct cost increase for consumers confirmed on 30 October 2009 that 'on average, customers will pay \$67.97 more in 2010 for metering services than in 2009, with a further increase of \$8.42 in 2011.' This is higher than DPI's estimate of \$40–50 a year for meter costs, but lower than the estimates of third parties. It is important to note that further regulated charges will be based on actual expenditure by electricity distributors, so there is no guarantee that the recently announced regulated costs may not increase in the future due to the cost pass-through approach adopted for AMI.

## Further comment by the Auditor-General – *continued*

### Insufficient regard to project outcomes achieved to date

DPI did not furnish my office with any reliable evidence on the progress of the AMI project at this early implementation stage. We were therefore unable to express an opinion in regard to project outcomes achieved to date, apart from our findings arising from examination of the economic, regulatory and policy inputs to program decision-making processes.

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# 1 About the AMI project

## 1.1 Overview of Advanced Metering Infrastructure

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### 1.1.1 Electricity meters

Electricity meters are used by electricity suppliers to calculate the cost of power to customers as well as energy and transportation charges for electricity retailers.

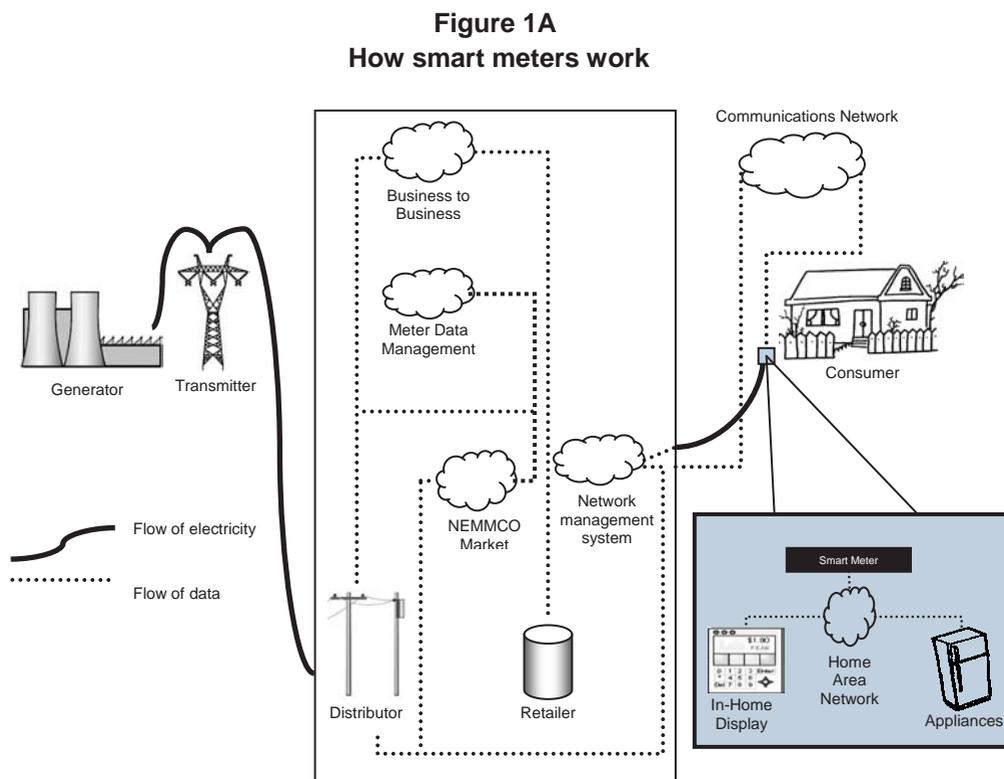
The most common type of meter is called an *accumulation meter*, which records energy consumption over time. Consumer premises are visited regularly to read the meters and assess how much power has been used in a billing period.

In recent years, industry has increasingly been using more advanced meters. One such meter is called an *interval meter*, which records energy use over short intervals, typically every half-hour. This allows suppliers to settle promptly on wholesale prices and to better understand and manage the pattern of electricity demand and thus design flexible pricing to reflect demand and the cost of supply.

The *smart meter* is an even more advanced meter. It allows communication between the electricity supplier and the meter, enabling the supplier to deliver efficient and innovative services to consumers such as the real-time display of usage information and automated control of power levels in appliances such as air-conditioners.

Electricity is typically measured in kilowatt-hours (kWh) and megawatt-hours (MWh or one thousand kWh). A residential household would typically use from a few hundred kWh per month, or about 6MWh of electricity per year on average.

Figure 1A shows how a smart meter works in the context of the electricity system.



Source: Victorian Auditor-General's Office.

### 1.1.2 The electricity market in Victoria

The National Electricity Market (NEM) enables the flow of electricity from generators to the consumer, acting as a wholesale exchange for the trading of electricity between generators and bulk buyers. The generators compete to sell their power into the NEM where retailers can buy it in bulk and then on-sell this power to customers at retail rates.

The electricity distributors own and manage the network of 'poles and wires' that takes electricity to the consumer. In Victoria, distribution is a 'natural monopoly', as each distributor is responsible for one geographic zone. Due to this, an independent regulator determines the aggregate charges the distributors can recover from the retailers, who are not restricted by geographic zones.

There are various regulatory bodies operating in the electricity market:

- The Australian Energy Market Commission (AEMC) administers the National Electricity Rules (NER) that govern the NEM in accordance with the National Electricity Law (NEL). The Ministerial Council on Energy (MCE), established by the Council of Australian Governments (COAG), is the national policy and governance body for the Australian energy market and sets the National Electricity Law (NEL).
- The Australian Energy Regulator (AER) regulates the wholesale electricity market and is responsible for the economic regulation of electricity transmission and distribution networks in the NEM, as well as compliance with and enforcement of the NER. The AER took over responsibility for economic regulation of the Victorian electricity distributors from the Victorian Essential Services Commission (ESC) on 1 January 2009.
- The ESC is the independent regulator of the retail energy industry in Victoria. It licenses the distribution and sale of energy in Victoria and ensures that licensees comply with its codes and guidelines.

### 1.1.3 Origins of the AMI project

In a July 2004 ruling the ESC directed that manually-read interval electricity meters should be installed across the state. The proposed meter installation period was based on the consumption profile of the user. For heavy to moderate consumers of electricity, such as business users, the installation period was between two to five years. However, for the majority of consumers, such as residential users, the installation period was to be on a 'new and replace' basis.

At that time, the implementation cost of the roll-out was estimated to be \$160 million for the deployment of meters to small consumers who consume less than 160MWh per year. These costs were expected to be recovered through regulated industry charges passed on to consumers.

The ESC decision also required these meters to be capable of incorporating communications technology in the future so that advanced capabilities such as remote meter reading could be added without the need for a further meter changeover.

In 2005 the then Department of Infrastructure (DOI) and the electricity industry commissioned a cost-benefit study to explore the benefit of adding two-way communications and other functionalities to the ESC-mandated interval meters.

The study concluded there was a net economic benefit to society in supporting a four-year 'accelerated' roll-out of 2.4 million smart meters with advanced communication technologies across Victoria. This was estimated to cost between \$353 million and \$406 million *in addition to* the costs estimated in the 2004 Interval Metering Roll-out (IMRO) report.

In February 2006 the government decided that these *smart meters* would be installed in all residential and small business premises over four years, starting in 2009. It stopped the earlier ESC-mandated interval meter roll-out and started the Advanced Metering Infrastructure (AMI) project. The AMI responsibilities held by DOI were subsequently moved to the Department of Primary Industries (DPI) in a 'machinery of government' change.

At the time of the 2005 cost-benefit study, the benefits of the AMI project were believed to include:

- lower electricity costs because consumers would have both the information and the opportunity to manage their energy usage better
- greater retail competition through the introduction of new services, such as prices tailored to suit consumers' needs
- more efficient electricity suppliers as a result of the ability to read meters and turn the electricity supply on or off without visiting the premises
- improved service quality through better network management, such as detecting and fixing faults remotely.

#### 1.1.4 The AMI project

Since the AMI project began in 2006 the government, in conjunction with industry and regulatory stakeholders, has:

- established enabling legislation
- formulated cost recovery methods
- set a project schedule
- developed specifications and service level requirements
- supervised technology trials
- confirmed its commitment to the AMI roll-out.

The government's AMI policy and legislative framework made distributors responsible for the AMI project as this was considered to be the most cost effective option. As the National Electricity Rules hold retailers responsible for the interval data collected remotely, the government gained a waiver from these rules, which is applicable for a period covering the project implementation timeframe.

In August 2006, the Parliament passed an amendment to the *Electricity Industry Act* that gave government the authority to make 'Orders-in-Council' (OIC)—which are enforceable orders by the executive branch of government—to establish a range of requirements for the deployment of AMI.

In August 2007 the government issued an OIC, setting up the initial regulatory framework for cost recovery and installation targets for distributors. This OIC was subsequently amended in November 2008.

Figure 1B shows the original and revised AMI deployment schedule.

**Figure 1B**  
**AMI roll-out schedule**

Cumulative targets for installed meters	Original schedule	Revised schedule
Start installation	Early 2009	Mid-2009
5%	31 December 2009	30 June 2010
10%	Not specified	31 December 2010
25%	31 December 2010	30 June 2011
60%	31 December 2011	30 June 2012
95%	Not specified	30 June 2013
100%	31 December 2012	31 December 2013

Source: Department of Primary Industries.

The OIC also establishes a regulated cost recovery framework to provide certainty for electricity distributors to commit to AMI deployment expenditure through to December 2013.

A further OIC in November 2007 mandated the initial minimum specifications for functionality, performance and service levels of the smart meters.

DPI coordinated technology trials to identify communication systems that would suit the AMI project objectives and produced a technology trial report in November 2007.

DPI transferred the AMI project governance to the Victorian electricity industry in October 2007 through an Industry Steering Committee (ISC) which has an independent chairperson. The ISC coordinates AMI implementation and its members include representatives of electricity distribution and retail businesses, as well as consumer advocacy groups and relevant energy policy and regulatory agencies.

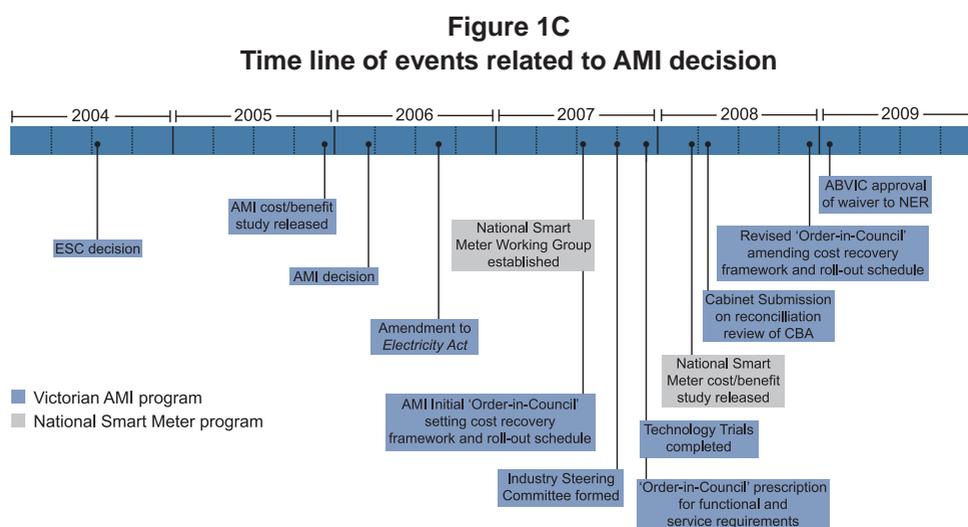
### 1.1.5 The national framework for AMI

In April 2007, COAG committed to a national roll-out of electricity smart meters to areas where benefits could be demonstrated to outweigh costs. These areas were chosen from a cost-benefit analysis which looked at different markets in each state and territory and the circumstances of different groups of consumers.

A national AMI cost-benefit report was released in mid-2008 and found a positive case for Victoria (and for most other jurisdictions). Despite the Council of Australian Governments' commitment to the development of a national smart meter legislative and regulatory framework, other jurisdictions have been more cautious than Victoria with its implementation.

### 1.1.6 Time line of AMI decision events

Figure 1C shows the events relating to the AMI decision.



Source: Victorian Auditor-General's Office.

## 1.2 Audit objective and approach

### 1.2.1 Objective of this audit

This audit assessed whether the advice and recommendations provided to government on the roll-out of AMI have been sound.

To address this objective, the audit examined:

- the robustness of the cost-benefit analysis underpinning the AMI roll-out decision
- the adequacy of stakeholder consultation and consideration of their issues in the design of the AMI project
- the management of uncertainty in the implementation of the AMI project, with particular emphasis on technology-related risks.

### 1.2.2 Audit approach

The audit examined documentation related to the AMI project, including cost-benefit studies, technology trial reports, regulatory material and other relevant project planning files. Representatives from DPI, the AMI project office, regulatory bodies, and consumer advocates were also interviewed during the audit.

Industry-generated documents relating to the AMI project were considered during the audit where that material was used by DPI in its own governance processes.

The audit was conducted in accordance with the Australian auditing standards applicable to performance audits.

The total cost of this audit, including staff overheads, expert advisers and the preparation and printing of this report, was \$490 000.

### 1.2.3 Structure of this report

The rest of this report is structured as follows:

- Part 2 reviews the governance of the project, covering:
    - the role of the administrative department in project coordination
    - the use of regulation for intended societal outcomes
    - stakeholder consultation.
  - Part 3 assesses the robustness of the economic analysis underpinning the project.
  - Part 4 analyses the adequacy of the technology risk assessment in dealing with implementation uncertainty.
-



# 2 Governance of AMI

## At a glance

### Background

The AMI project was administered by the former Department of Infrastructure (DOI) until late 2006, when it was transferred to the Department of Primary Industries (DPI) in a 'machinery of government' change.

### Conclusion

Governance of the AMI project has not been commensurate with the significance of the market intervention and its direct ramifications for consumers.

### Key findings

- Advice to government on the implementation of AMI did not provide sufficient analysis of costs, benefits and risks to reliably confirm the project's viability.
- Central agencies were not adequately engaged to provide oversight and support to this large and technically complex project.
- Electricity distributors may not be appropriately incentivised to tightly manage project risks and minimise costs.
- Consultation with consumers on the design of the project was inadequate.
- There has been little analysis to indicate whether the potential distribution of costs and benefits to stakeholders is consistent with the intended outcomes.
- Emerging risks are likely to further dilute the intended net benefits of the project.

### Recommendations

Without delay, DPI should:

- Re-examine the existing governance structure of the AMI project to proactively identify, assess, own and manage the project's strategic risks.
- Develop, appropriately resource and implement a stakeholder engagement plan with a particular focus on addressing consumer issues arising from the AMI project.
- Actively engage with the relevant regulator to monitor and oversee the transfer of expected benefits to consumers.
- Commission a program review by the Gateway Unit of the Department of Treasury and Finance on governance and implementation of the AMI project to date.

## 2.1 Introduction

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AMI is a large and complex transformational project that has been mandated by government. It will have a significant impact on all electricity users in Victoria and is being implemented in partnership with the electricity industry.

Given the extent of its impact upon all of Victoria's power users, the project needs strong governance in order to efficiently and effectively meet the government's policy objectives.

Governance is about ownership, control and stewardship. Better practice guides in project management characterise effective governance as having:

- appropriate oversight of project initiation, planning and implementation activities
- effective stakeholder engagement
- proactive resolution of issues and risks that threaten the realisation of intended benefits to stakeholders.

Depending on the nature of a project, the governance role can be delegated to entities outside of government, such as industry bodies. However, under these circumstances, established processes such as regulatory mechanisms play an important role in managing risk.

Since ultimate accountability for project outcomes remains with government, the administering department must make sure that effective project governance systems are established and maintained.

## 2.2 Conclusion

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DPI's approach to project governance has been inconsistent with the nature and scale of the significant market intervention made by the project. DPI did not allocate adequate or sufficient resources to provide appropriate review mechanisms for the economic and technical assessment of the project, stakeholder consultation and risk management.

There has been insufficient analysis to fully understand potential perverse outcomes, risks, and unintended consequences for consumers. This means that there is no clarity whether the distribution of costs and benefits between electricity businesses and consumers will be consistent with the intended outcomes of the program, and equitably allocated through the mandated cost recovery regime.

These inadequacies can be attributed to DPI's misapprehension of the extent of its fundamental governance accountability in a non-state-funded project.

## 2.3 Governance requirements for the AMI project

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### 2.3.1 Role of regulation

The Victorian electricity industry has been operating in a privatised and commercial environment since the early 1990s. As for-profit entities, the industry players bear commercial and technological risks within an appropriate regulatory framework.

Since the primary objective of the regulatory framework is to protect the interests of electricity consumers, it should incorporate adequate and appropriate mechanisms to discharge the government's governance obligations. To this end, multiple options exist for institutional arrangements involving the roles of the independent regulator and the administering department.

While independent regulators play a major role in the statutory regulation of the energy sector, administering departments also have a broader and enduring societal regulatory function especially when behavioural change is seen as necessary to achieve particular outcomes.

### 2.3.2 Characteristics of the AMI project

The AMI roll-out project is unique in Australia because:

- it is the result of a direct market intervention by government
- the established regulatory mechanisms surrounding its implementation activities have been changed
- the Victorian energy market is privatised and disaggregated.

The AMI project has high implementation risks, due to the:

- reliance on new and leading edge technologies that are not yet proven to be sufficiently mature for installation on a mass scale in the technical environment present in Victoria
- accelerated installation schedule that means it is more advanced than the developing national framework and potentially risks misalignment of the systems and processes necessary for service delivery.

In its 2008 decision paper for smart meters, the Ministerial Council for Energy (MCE) supports Victoria's initiative within the national roll-out plan, although agreement on the detail of the national framework across jurisdictions is still under consideration.

The AMI project directly affects consumers. Because the project is mandatory, any potential benefits, and resultant price implications make consumers significant stakeholders.

The regulatory mechanisms for the provision of electricity to consumers are intended to protect their interests. The AMI project, which includes a regulatory intervention, therefore needs to take into consideration the:

- implementation risks of the project that could lead to reduced benefits or an increase in costs that would undermine the net benefits of the project
- flow-on effect of project risks to consumers.

Although the state is not investing directly in the AMI project, there will be an initial net cost burden for consumers—to whom the state is ultimately accountable.

It is therefore important that the AMI project incorporates sufficient checks and balances so that any costs incurred by consumers and/or effort expended by industry, lead to the intended outcomes. To this end, DPI as the administering department has an enduring responsibility to provide structured and tight oversight of the project's establishment, planning and implementation activities.

Figure 2A is an overview of the department's observed role in the AMI project, compared to the governance responsibilities that should apply to its role, in line with better practice guidelines in project management such as PRINCE2.

**Figure 2A**  
**Overview of departmental role in the AMI project**

AMI project phase	Administering department's observed role	Governance responsibilities that should apply
Establishment	<ul style="list-style-type: none"> <li>• Undertake cost-benefit analysis</li> <li>• Delegate most stakeholder engagement activities to studies and working groups</li> <li>• Identify risks (limited).</li> </ul>	<ul style="list-style-type: none"> <li>• Establish project viability</li> <li>• Engage stakeholders</li> <li>• Identify risks, including potential for unintended consequences</li> </ul>
Planning	<ul style="list-style-type: none"> <li>• Design regulatory framework for project cost recovery, and risk management</li> <li>• Establish and chair Industry Strategy Group (ISG) involving stakeholders from the industry, the regulator and consumer groups</li> <li>• Define service requirements</li> <li>• Coordinate technology trials</li> <li>• Sponsor ongoing cost-benefit analyses.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish benefit realisation plan</li> <li>• Define risk management strategy</li> <li>• Manage stakeholders</li> <li>• Confirm ongoing project viability</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• Hand-over project lead to industry through the Industry Steering Committee (ISC)</li> <li>• Observer status</li> <li>• ISC risk register includes risks to DPI</li> <li>• Benefits management work is underway.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor and manage risks</li> <li>• Review and monitor ongoing project viability</li> <li>• Monitor benefits realisation</li> </ul>

Source: Victorian Auditor-General's Office.

The following governance responsibilities for AMI are considered in further detail:

- stakeholder engagement and management
- benefits realisation
- review and monitoring of project viability and management of risks.

## 2.4 Stakeholder engagement and management

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Stakeholders are individuals or groups that have an interest in the outcome of a project. These interests can be affected by the project's outcome in positive or negative ways.

Project success relies heavily upon the engagement of stakeholders. Effective stakeholder consultation provides a fair opportunity to engage and influence project design. A stakeholder consultation plan identifies the stakeholders, their interests and the approaches to engage them in the project.

There is no stakeholder consultation strategy for the AMI project. However, during this audit, a program education plan for AMI stakeholders was developed, and approved by the Industry Steering Committee (ISC) in August 2009.

There have been several stakeholder forums over the life of the AMI project, however, these forums were mainly conducted on an ad hoc basis.

### 2.4.1 Industry engagement

The Industry Strategy Group (ISG) and its successor, the ISC, have provided governance forums for the AMI project where stakeholders have been formally represented.

Industry stakeholders have been consistently involved in consultation processes and have been well represented in project stakeholder committees and forums.

### 2.4.2 Consumer engagement

There is little demonstrable evidence that the administering department had adequately or effectively consulted with consumers in the lead up to the AMI roll-out decision.

DPI relied heavily upon earlier stakeholder consultation work done by the ESC, but due to the significant differences between the IMRO and AMI programs, it is not considered sufficient for DPI to depend on previous IMRO studies or consultation processes.

Once the study was finalised, DOI held a public forum and invited submissions with a three week deadline. Seven days later, the decision was made to implement the AMI project. Given the scale of the proposed project and its impact on consumers, this was not a reasonable period to allow adequate consideration of consumer concerns. A submission from a consumer representative notes that *'(the department) extensively consulted the supply side in formulating this project, while the demand side was effectively excluded.'*

Stakeholder forums have provided limited opportunity to capture and feed consumer concerns into the project. These forums were conducted on an ad hoc basis, following or just prior to the announcement of significant project milestones.

Consumer advocacy representatives were invited to participate in the next phase of the project through representation on the ISG, the ISC and associated working groups. However, these consumer advocates were significantly under-represented, particularly in comparison to industry stakeholder representatives. While these forums provided an opportunity for consumer representatives to receive information and respond, their involvement and ability to influence outcomes was limited due to the industry dominance of these forums and the technical complexity of the issues considered.

There is little evidence of consumer consultation in relation to a decision to change the scope of the project in late 2008.

Although some work was done on smart meter functionality at the MCE level in 2008, the core and advanced national functionalities suggested by MCE were much more than the minimum functionalities included in the 2008 OIC. It was not reasonable for DPI to rely on MCE's consultation process, since many of the national functionalities have been excluded from the Victorian OIC.

Given that the AMI project will directly affect consumers across the state, inadequate consultation with consumers by the administering department is a significant deficiency in AMI project governance.

### 2.4.3 National engagement

Victoria's AMI project is being implemented within a national regulatory context. It is also being implemented on an accelerated basis compared to the AMI initiative currently under consideration at the national level.

The AMI project has dependencies on certain nationally enforceable procedures that affect the flow of data between distributors and retailers and ultimately the services available to the consumer.

Because of the unresolved uncertainties between the Victorian AMI project and the still developing national framework, there are indefinite delays in the delivery of enhanced services to consumers that use the real-time communication of price and usage signals.

The processes associated with the national consultation process are well defined, but there is no evidence that DOI adequately engaged with stakeholders at the national level when developing the original specifications. Substantive consideration of the regulatory and commercial requirements did not commence until October 2007 when industry took over the stewardship of the AMI project.

Although an AMI 'functionality group' involved DOI and certain stakeholders at the national level in 2006, there is no evidence that consideration was given to aligning with a potential national approach.

The emergence of a national smart meter framework could introduce uncertainties in its own right. However, adequate consideration of the national regulatory procedures was necessary to effectively plan the delivery schedule and proactively address risks and issues.

## 2.5 Benefit realisation

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Clearly understanding, planning and managing the intended benefits or outcomes are key to effective project governance. This includes understanding the potential for and impact of unintended outcomes on stakeholder groups and the application of regulatory mechanisms.

### 2.5.1 National electricity framework

The Australian Energy Regulator (AER) is the body responsible for economic regulation of electricity distribution in accordance with the National Electricity Rules (NER). These rules determine the basis of the electricity supply charge that distributors charge retailers. In turn, these charges affect the prices that retailers charge consumers.

In addition to enabling distributors to recover their service delivery costs, the NER also provides incentives for distributors to manage their costs. Distributors are required to forecast their costs, which the regulator takes into account when setting the basis for the distributor charges.

If the actual costs of delivering the service, which needs to conform to the quality levels mandated by the regulator, are lower than the benchmark efficient costs approved by the regulator, then distributors financially benefit by being more efficient. On the other hand, the distributors' service delivery costs are at risk if their actual costs exceed the benchmark. This approach to cost recovery is broadly described as 'incentive regulation'.

## 2.5.2 Victorian electricity framework

To implement the AMI project, the then DOI developed an Order-in-Council (OIC) which overrode the NER for the duration of the AMI implementation period. This means that the AER is temporarily required to regulate the AMI implementation charges in accordance with the OIC, rather than the NER.

The initial OIC in August 2007 required distributor charges to be based on forecasts of AMI expenditure, which is similar to the charging mechanism provided by the NER. However, in recognition of emerging risks to the project, government, on DPI advice, amended this OIC in November 2008. This amended OIC fundamentally changed the cost recovery model.

Under the revised OIC, budgets for the AMI roll-out are established by the distributors and agreed with the regulator at the beginning of the budget period. Annual charges are then determined based on a combination of actual and forecast expenditure verified with the regulator.

This process requires distributors to provide an initial budget to the regulator, which the regulator must approve, unless it can establish that the expenditure is for activities that are out of scope or are not prudent.

The revised OIC allows the distributors to incur actual expenditure of their approved budget plus a cost overrun of 20 per cent for the initial budget period (1 January 2009 to 31 December 2011) and 10 per cent for the next budget period (1 January 2012 to 31 December 2015) before the regulator examines the prudence of the expenditure incurred.

## 2.5.3 Prudence of expenditure by distributors

There are two important issues arising from the revised process:

- the incentive for distributors to minimise the costs—particularly to control the 20 per cent (or 10 per cent as applicable) overrun on approved budget—is reduced
- the regulator faces a substantial challenge in effectively examining the prudence of expenditure, even when the actual costs exceed the budgeted cost by 20 per cent (or 10 per cent as applicable), due to the inherent technical complexity and risks involved in the implementation of the AMI project.

The department's rationale for the change in the regulatory charging mechanism, from 'forecast oriented' to 'actual expenditure oriented', was to reduce the risk that contingency allocations in distributor forecasts could result in inflated charges.

However, while the need for distributors to build contingencies into their budgets may be lessened, there has been little analysis to understand the potential risks of following this approach. One likely risk is unintended equity effects. For example, there is a risk that consumers will incur higher than expected costs, arising from cost overruns of 20 per cent (or 10 per cent as applicable) by the distributors, before the regulator is able to investigate the prudence of any expenditure above the approved budget.

DPI believes a robust regime to discipline cost recovery is in place. This comprises the AER's oversight, which has the benefit of benchmarking the distributors' cost submissions against each other, and the OIC, which contains specific tests regarding prudence, competitive tendering, access to regulatory accounts and commercial practice, combined with specification of key parameters, such as depreciation periods, WACC and an overall project timetable.

Audit, nevertheless considers that as these checks and balances are detective and not preventative, they are less than ideal and that the regulator has not been provided with a clearly defined and detailed mechanism to effectively examine the prudence of expenditure.

## 2.5.4 Minimising unintended consequences

The cost-benefit analyses conducted in Victoria have not been clear about how the benefits will be distributed to the different stakeholders, particularly in relation to the costs being borne by them. This raises an important issue regarding the 'wealth transfer' effects of the AMI project.

That is, the project may cause a transfer of economic benefits from one group of stakeholders to another (i.e., from consumers to electricity businesses). There is little evidence to indicate that this issue has been adequately considered with respect to the intended outcomes in the design of the AMI project.

The national level cost-benefit study for AMI indicates that a mandatory distribution-led AMI roll-out would primarily deliver gross and net benefits to the distribution businesses, but not to retailers and consumers.

In order for consumers to benefit from the cost savings incurred by the distributors through AMI, the distributors will need to pass on the savings through to retailers who will need to pass on the savings subsequently to consumers. If this doesn't happen, then the benefits may not accrue to consumers who then ultimately fund the implementation costs of AMI.

Achieving full pass-through of AMI's 'bankable benefits' to consumers will require significant effort from the regulators. This is because, unlike many network investments, the expected benefits of the AMI project apply across many distribution business functions and services, ranging from meter reading to connection and disconnection costs. Also, the full realisation of AMI benefits related to improved industry efficiency could potentially take several years to become apparent.

As the administering department responsible for energy policy in Victoria, DPI has a key role to play in this process by actively engaging with the regulator to monitor and oversee the transfer of expected benefits to consumers.

A further issue is the extent of investment that retailers may choose to make in the systems and processes needed for AMI and how they will reflect this investment in their charges to consumers. In the 2005 cost-benefit analysis, the additional IT costs which would be incurred by the retailers were not deemed to be particularly material. However, some retailers have contended that they will need to make substantial investment in order to deal with an increased amount of data handling and processing. If this is the case, this could also mean substantial flow-on consumer charges.

While a key feature of smart meters is to provide better information about the cost of electricity at the time it is consumed, and for this information to be passed through to customers, as prices, or real time usage information, it is important that unintended consequences for the consumers are minimised. For example, consumers with a heavy consumption profile as a result of high usage volume or longer usage periods could see their bills increase if they do not change their pattern of consumption.

This is likely to occur particularly in relation to those customers with air conditioners and/or with residents at home during the day, which is when peak periods apply.

On the other hand, customers without these appliances and who are frequently not at home during the day could expect to see their bills fall.

How these costs and benefits will be finally allocated among stakeholders, and hence the implications on equity, is uncertain, as the detail of the regulatory framework is still under development. The AER made a final decision on the distribution businesses' initial budgets and charges on 30 October 2009, and confirmed that 'on average, customers will pay \$67.97 more in 2010 for metering services than in 2009'.

## 2.6 AMI project viability and management of risks

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A key principle of sound governance is that comprehensive and relevant information relating to benefits, costs and risks should be used when assessing whether a proposed project is desirable, viable and achievable.

This assessment should be done on an ongoing basis throughout the life of the project so that money is only invested if there is a continuing net positive benefit. There is no evidence showing that DPI reviewed earlier cost-benefit analyses before distributors submitted their price proposal in December 2007.

Parts 3 and 4 of this report examine the adequacy of the department's role in addressing the AMI cost-benefit analysis and the technology risk assessment.

### 2.6.1 Adequacy of departmental oversight

The department's approach to assessing the economic merits of the AMI implementation and its associated risks does not reconcile with the significant complexity, scale and consumer impact of the project.

While the industry is responsible for the operational aspects of project implementation and undertakes various risk mitigation actions to fulfil this role, the extent to which risks may negate the net benefits of the project and lead to significant increases in costs for the consumer means that the *strategic ownership* of risks must rest with DPI.

During the implementation phase of the AMI project, DPI only has an observer role on the ISC. DPI claims that this allows the department to make recommendations and give advice to the minister without a direct conflict of interest, but such a limited role inevitably diminishes DPI's ability to deal effectively and proactively with risks and issues.

DPI's allocation of human resources to the project has been inadequate, thereby preventing effective engagement with such a large and complex project. This can be attributed to a gap in DPI's understanding of its governance accountability role in a non-state-funded project.

### 2.6.2 Adequacy of central agency oversight

Central agencies such as the Department of Treasury and Finance (DTF) provide oversight for projects which have large capital expenditure, playing a key role as advisor and review mechanism for major government initiatives.

There has been limited involvement of central agencies in the AMI project, besides their coordination comments on DOI/DPI's cabinet submissions. This appears to be due to the funding arrangements; the project is being supported by industry using a consumer cost recovery mechanism, and not through the allocation of Budget funds.

If the AMI project was funded from the state Budget, the business case would automatically be subject to the scrutiny of central agencies and the project would likely be reviewed under the Gateway Review Process due to its risk and expenditure profile.

An acceptable business case describes how and why a proposal is viable, so that the funding authority has sufficient data to support its decision to invest in the project.

Given the scale of the project and the cost implications for consumers, the lack of involvement by central agencies represents a missed opportunity to more effectively oversee and engage with this project.

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## Recommendations

Without delay, DPI should:

1. Re-examine the existing governance structure of the AMI project to proactively identify, assess, own and manage the project's strategic risks.
  2. Develop, appropriately resource and implement a stakeholder engagement plan with a particular focus on addressing consumer issues arising from the AMI project.
  3. Actively engage with the relevant regulator to monitor and oversee the transfer of expected benefits to consumers.
  4. Commission a program review by the Gateway Unit of the Department of Treasury and Finance on governance and implementation of the AMI project to date.
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# 3 Consideration of economic issues

## At a glance

### Background

The audit examined the robustness of the cost-benefit studies underpinning the AMI project to provide assurance on whether projected benefits are sufficient to warrant expenditure on the project.

### Conclusion

The cost-benefit study supporting the advice to roll out AMI did not provide a comprehensive and realistic analysis of the AMI project. The merits of the economic case for the project are quite uncertain, and this not been adequately highlighted in advice to government.

### Key findings

- Optimistic assumptions have been used in Victorian AMI cost-benefit studies.
- Since the inception of the project, estimates of installation costs from various economic studies have ranged from \$800 million to \$1.56 billion. A recent industry estimate puts the full metering services costs at \$2.25 billion.
- The AMI project delivery schedule and scope were revised in November 2008 to address identified delivery risks, leading to a one year delay in the originally planned completion date of December 2012. The impact of these changes on the economic merits of the project has not been re-assessed.

### Recommendations

DPI should:

- Re-assess the economic viability of the AMI project by updating the cost-benefit analysis to reflect existing and emerging risks as well as the impact of changes to scope and underlying assumptions.
- Use the Department of Treasury and Finance's business case development guidelines and other advice to produce an updated cost-benefit analysis.

## 3.1 Introduction

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Proposals that require a government decision are, among other things, usually justified by an analysis of the net societal benefit of various options. A cost-benefit analysis is a mature and well developed economic tool that helps to assess the relative economic merits of a proposal.

If the expected monetary value of the benefits exceeds the anticipated costs, there is a net economic benefit, as long as the project team identifies and manages risks that could negate the benefits.

There have been a number of national and Victorian studies that have focused on the economic case for the Advanced Metering Infrastructure (AMI) project.

## 3.2 Conclusion

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The cost-benefit analysis used to support the advice recommending that the government roll-out AMI had significant deficiencies. Its incremental approach to assessing the net benefits of the AMI project failed to provide a complete perspective of the AMI project on a consolidated basis.

It also failed to take into account the implications of the implementation risks, particularly risks from unproven technology. These risks have now materialised and are starting to delay the roll-out of the AMI project.

The cost-benefit study supporting the advice to roll out AMI did not provide a comprehensive and realistic analysis of the AMI project. The merits of the economic case for the project are quite uncertain.

## 3.3 Economic studies for AMI

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In February 2006 the decision to mandate the roll-out of AMI to all residences and small businesses was endorsed. DOI provided advice leading up to this decision, based on its Advanced Interval Metering Roll-out (AIMRO) 2005 cost-benefit study.

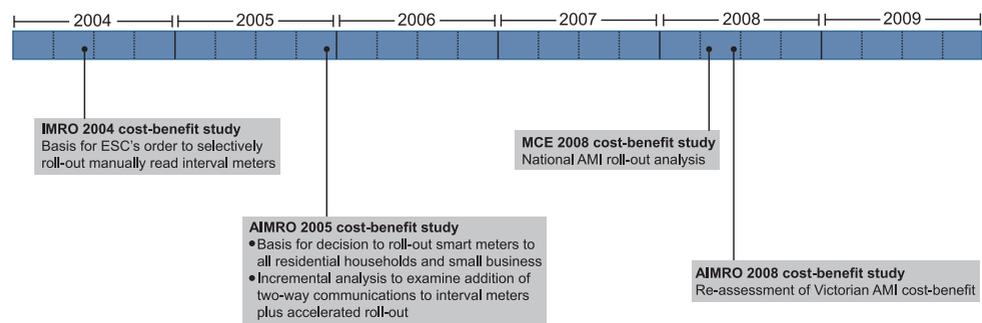
The AIMRO 2005 study investigated the possible net benefits of adding two-way communications to the manually read interval meters that the Essential Services Commission (ESC) had mandated in 2004. The ESC's decision was based on the findings of its Interval Metering Roll-out (IMRO) 2004 cost-benefit study.

In February 2008 the Ministerial Council on Energy (MCE) released a national AMI cost-benefit study (MCE 2008 study) that found there was a net economic benefit for AMI in Victoria (and for most other jurisdictions).

In early 2008 the Department of Primary Industries (DPI) commissioned a review of the cost-benefit analysis underpinning the original 2006 AMI roll-out decision (AIMRO 2008 study). This review concluded that there was a potential net societal benefit if project risks were well handled.

Figure 3A illustrates the timing of the economic studies related to AMI.

**Figure 3A**  
**Economic studies related to AMI**



Source: Victorian Auditor-General's Office.

## 3.4 Economic basis of the 2006 AMI decision

### 3.4.1 The IMRO 2004 study

After completing the 2001 distribution price review, the ESC undertook a cost-benefit analysis of various options for the roll out of interval meters by Victorian distributors. The results of the analysis were incorporated into the ESC's November 2002 Position Paper. In 2004, in response to a number of comments made by stakeholders, the ESC revised the analysis of costs and benefits presented in their position paper.

The IMRO 2004 study showed that benefits would exceed the incremental costs for each consumer segment identified in the position paper.

Figure 3B shows the costs and the benefits of an interval meter roll-out as assessed in the IMRO 2004 study.

**Figure 3B**  
**Costs and benefits of an interval meter roll-out by meter type**

Meter type	Implementation period	Consumption (mWh/year)	Cost (\$ million)	Benefits (\$ million)
Three phase, CT connected	Five years	<160	5	33
Three phase, direct connected	Five years	<160	145	252
Single phase, off-peak	Five years	All	115	129
Single phase, Non off-peak	New and replacement	All	160	158

Source: Mandatory roll-out of interval meters for electricity customers, ESC Victoria, July 2004.

### 3.4.2 AIMRO 2005 study approach

The AIMRO 2005 study looked at the *incremental* effect of adding two-way communications to the manually read interval meters and accelerated the roll-out compared to the schedule that the ESC mandated for roll-out in 2004. The study reviewed various assumptions used in the IMRO 2004 study but did not re-examine the basis for estimated costs and benefits in the 2004 study. Rather the 2005 AIMRO study took the ESC’s roll-out decision as the base case.

The AIMRO 2005 study examined a number of installation possibilities using combinations of different communication technologies and roll-out schedules. Apart from communication technologies, it also considered an accelerated four-year roll-out, compared with the ESC’s roll-out period for comparable cases.

### 3.4.3 Results of the AIMRO 2005 study

The study reviewed costs for:

- communications meter modules
- communications networks for each type of technology
- installation and project management.

The study identified the following benefits:

- reduced infrastructure costs due to reduced energy demand from consumers responding to price signals (such as peak and off-peak pricing)
- no regular meter reading costs
- no special meter reading costs (including activation and de-activation of electricity as a result of customers changing address).

The study noted there were other benefits that had not been quantified because of a lack of stakeholder information and limitations on the depth of analysis, given the relatively high-level nature of the project. Other quantifiable benefits included better outage detection, load management, and network control.

The study also stated that there were likely to be non-quantifiable benefits, such as more accurate settlement of bills, customer satisfaction, and product and service innovation.

Three of the study's six scenarios showed positive net benefits compared to the ESCs manually read interval meter project. These three scenarios had accelerated roll-out schedules using three different types of communication technology.

Figure 3C shows that there was a wide range of costs associated with adding communications technology and a marginal best case benefit-cost ratio (an indicator of monetary benefits of a project relative to monetary cost of undertaking the project).

**Figure 3C**  
**Summary of cost—benefit analysis for AMI accelerated roll-out scenario**

	<b>Worst case (GSM-based technology)</b>	<b>Best case (DLC-based technology)</b>
Costs (\$ million)	954	353
Benefits (\$ million)	432	432
<b>Net benefits (\$ million)</b>	<i>(a)</i> <b>(523)</b>	<b>79</b>
Benefit-cost ratio	0.5	1.2

Note: (a) Does not add due to rounding.

Source: Advanced Interval Meter Communications Study, 23 December 2005.

The AIMRO 2005 study concluded that there was enough net economic value to justify adding communications capability to the manually read interval meters and accelerating the roll-out. It recommended that the government and the electricity industry start an accelerated roll-out of AMI, which would add advanced communication technology to the interval meters (AIMRO).

### 3.4.4 Analysis of the AIMRO 2005 and IMRO 2004 studies

Figure 3D shows three differences between the AMI proposal and the original interval meter initiative.

**Figure 3D**  
**Differences between AIMRO versus IMRO initiatives**

Key characteristics	AIMRO	IMRO
Communications technology	Yes	No
Installation basis for small consumers (using less than 160 mWh per year)	Mandatory for all	Only on new and replacement units for those using less than 20 mWh per year and with single phase, non off-peak meters (representing the majority of small residential consumers)  Mandatory for others
Installation schedule for all small consumers	4 years	On a 'needs' basis for majority of small residential consumers  Completion for all other consumers by 2013

Source: Victorian Auditor-General's Office.

Given the significant difference in the characteristics of the two initiatives, as illustrated in Figure 3D, the incremental analysis approach used in the AIMRO 2005 introduced a number of uncertainties. This is because:

- there was no visibility of the total costs and benefits of the AMI roll-out on a consolidated basis. The characteristics of the AMI project were sufficiently different from the IMRO project to warrant a complete, separate review, and not an incremental analysis
- the reliance on the IMRO 2004 study, which was done a year earlier, meant that the validity of the assumptions used in that study were not confirmed against contemporary data.

A consequence of the incremental analysis approach was that the AIMRO 2005 study took as given the net benefits for a manually read interval meter roll-out found in the IMRO 2004 study. The IMRO 2004 study estimated significant benefits from savings in electricity generation and network capacity costs resulting from demand management – a predicted reduction in peak electricity demand as a result of consumers reducing their consumption at peak times on the basis of the higher peak tariffs.

However, the approach used to identify the benefits from demand management relied on two significant assumptions that appear to be optimistic:

- The assumed difference in the peak price of electricity and the pre-existing 'any time' average price of electricity, known as the peak-to-average price ratio, was much higher than could have reasonably been expected to eventuate in the retail market
- It was assumed that all consumers would respond to price signals as soon as the new meters were installed.

## Peak-to-average price ratio

The demand response concept is based on the link between the consumer demand for electricity and the pricing structure on offer. If the pricing structure varies with time so that prices are high during peak periods and lower during other periods, then there is an incentive for consumers to respond to high prices by reducing their usage at peak times.

The greater the difference between the peak price and average price, as reflected by a peak-to-average price ratio, the higher the likelihood that consumers will shift their demand away from peak periods. This potential reduction in peak demand can lead to reduced load on the electricity infrastructure, which in turn reduces the need for investment by the industry in maintaining and growing the power generation and network infrastructure.

The data used to calculate the peak tariff in the IMRO 2004 study came from the wholesale prices for February 2001 weekday afternoons. Demand in this month was unusual, as the (former) National Electricity Code Administrator (NECA) noted in its June 2002 report on the electricity market's performance. The peak wholesale electricity price in February 2001 weekday afternoons was \$353.60/mWh. This was over five times the comparable prices in 1999, 2000 and 2002, which were \$67.88/mWh, \$52.75/mWh and \$37.50/mWh, respectively.

The IMRO 2004 study's tariff assumptions were inappropriate because they were based on wholesale price data that reflected extreme conditions. This assumption translated into a peak-to-average price ratio of three (i.e., in that month, peak prices were three times the average) that in turn led to a substantially higher than reasonable estimate of demand benefits.

## Demand response behaviour shift

The IMRO 2004 study assumed that, as soon as an interval meter was installed, the average consumer would begin responding to a tariff structure that varied depending on when the electricity was being used ('time of use'). For peak periods the tariff was assumed to be significantly higher than the off-peak periods as well as the pre-existing 'any time' tariff.

A key assumption was made that all retailers, upon installation of a customer's interval meter, would immediately be in a position to offer that customer a variable tariff structure, and that all customers who had received the new meters would agree to accept the new tariff and, on average, immediately change their consumption patterns.

This need not always, or even usually, be a likely outcome. Notwithstanding the inclination and the effort required for the retailers to develop and offer such tariffs, some customers may be resistant to the variable tariffs offered to them, even if they could theoretically save money. Other customers may accept variable tariffs, but could take time to adjust their behaviours, as they monitor and assess the significance of the impact of their usage pattern on their bill.

DPI claims that a minority of consumers will be adversely impacted by the roll-out of AMI. However, it is not realistic to assume that all consumers can or will take up the new tariff structure. Where it is accepted, there will be a lag between the installation of an interval meter and customer response.

By comparison, the national MCE 2008 study made the assumption that only 42.5 per cent of Victorian consumers will take up the new tariff structure. Such a low take-up rate would lead to a lower estimation of benefits from demand response.

### 3.4.5 Implications of the AIMRO 2005 study

When the AIMRO 2005 study was done there was more data available on the average peak February weekday afternoon wholesale price, which was \$91.72/mWh for the period 1999–2005. However, the AIMRO 2005 study used the same tariff assumption from the IMRO 2004 study to estimate demand reduction benefits, which by then would have been demonstrated as clearly not realistic, based on the available historical data.

There is a significant difference in the characteristics of the AMI project compared to the manually read interval meter project it replaced, which was not addressed in the AIMRO 2005 study. The incremental analysis approach used in this study meant that the economic analysis of AMI did not provide a consolidated view of the AMI project in its entirety nor did it revisit the high-end demand response estimate in the IMRO 2004 study.

The AIMRO 2005 study did not address the issue of risks in considering the potential costs or expected benefits. The communications technologies being considered in 2006 for a mass roll-out were not mature and accordingly were inherently risky. This led to the likely costs of the project being underestimated. Part 4 of this report discusses technology risks in further detail.

Given the low benefit-cost ratio found in the AIMRO 2005 study and the high-end estimate of demand response benefits found in the IMRO 2004 study, as well as the results across all scenarios being highly sensitive to input costs and other assumptions, it is not certain that the net benefits case was as clearly positive as the former DOI advised government prior to their 2006 decision to roll-out the AMI program.

The former DOI advised government that the AMI roll-out was 'conservatively estimated to generate a net benefit to the community of \$79 million'. It is important to note that this advice was based on the Direct Line Carrier (DLC) technology option, which was later found to be unviable in technology trials. These trials are discussed in detail in Part 4 of this report.

The authors of the study also contended that other quantifiable, but not quantified, benefits would be significant. However, due to a lack of references or other evidence presented in the study to supporting this contention, there is little basis to believe that a quantification of these other benefits would have materially altered the results of the analysis.

### 3.5 Economic case since the 2006 decision

#### 3.5.1 National study on AMI

The MCE undertook a nationwide review of the costs and benefits of AMI over the period from September 2007 to July 2008. The MCE 2008 study considered the costs and benefits of an AMI roll-out across Australia and within individual jurisdictions. In addition to considering demand response benefits as per the Victorian analysis, the MCE studies considered the operational benefits to the industry from introducing two-way communications to interval meters.

The MCE 2008 study considered a number of scenarios for the roll-out, including assigning accountability for leading the implementation to different parties, such as electricity distributors and electricity retailers. It concluded that a distributor-led roll-out would deliver the greatest net benefit.

The net benefit for Victoria was estimated to range between negative \$90 million and positive \$670 million. Figure 3E below summarises the results.

**Figure 3E**  
**Summary of national study results on Victorian AMI cost-benefit analysis**

	Worst case	Best case
Costs (\$ million)	1089	673
Benefits (\$ million)	999	1343
<b>Net benefits (\$ million)</b>	<b>(90)</b>	<b>670</b>
Benefit-cost ratio	0.9	2.0

*Note:* Results for distributor-led roll-out scenario.

*Source:* Cost-benefit analysis study for MCE, 2008.

The result shown in Figure 3E was dominated by the benefits derived from industry efficiency gains as opposed to the demand response benefits, which was the case in the IMRO 2004 study. The MCE 2008 study used moderate assumptions about peak-to-average price ratios which led to the demand response benefits contributing only 3–8 per cent towards the total benefit. This contrasts dramatically with the IMRO 2004 and AIMRO 2005 studies, where demand response benefits accounted for 60 per cent of the total benefit.

MCE’s analysis indicates that the IMRO 2004 and AIMRO 2005 studies—on which the Victorian Government’s 2006 decision to proceed with AMI was based—had overstated the demand-related benefits due to its methodology and assumptions.

The MCE study also acknowledged the strong sensitivity of the overall results to the assumptions used.

### 3.5.2 Victoria’s AIMRO 2008 study

Under the AMI legislative and policy framework, the Victorian electricity distributors are responsible for the deployment of AMI. Consistent with the framework, and to allow cost recovery for the AMI project, the distributors lodged their AMI project pricing proposals with the ESC in December 2007. These proposals showed that the AMI implementation full metering services costs were projected to be \$2.25 billion.

This amount is nearly 50 per cent higher than the \$1.56 billion estimated in the 2008 national MCE and three times higher than the early cost estimate of \$800 million upon which the AMI project was recommended, and which was acknowledged by DPI in 2008 to be flawed.

In response to the significance of the estimated cost increases, DPI commissioned an independent expert review of AMI costs and benefits. The review (AIMRO 2008 study) was completed at the end of March 2008.

**Figure 3F**  
**Summary of AIMRO 2008 study results**

	Worst case	Best case
Costs (\$ million)	1 560	1 160
Benefits (\$ million)	1 100	1 750
<b>Net benefits (\$ million)</b>	<b>(460)</b>	<b>590</b>
Benefit-cost ratio	0.7	1.5

Source: DPI review of AIMRO cost-benefit analysis, 2008.

The benefits estimated by the AIMRO 2008 study were driven by estimated business efficiency gains and are shown in Figure 3F. However, there was a significant reliance on the benefit contribution from demand response which was estimated to range between 9–25 per cent of the total benefit.

The relatively high proportion of demand response benefits in the AIMRO 2008 study is at odds with the MCE 2008 study. The upper range of the demand response benefits found in the AIMRO 2008 study drew on the same 2001 peak pricing data used in the IMRO 2004 and AIMRO 2005 studies, which resulted in optimistic estimates of peak-to-average price ratio. Given that by 2008, the history of wholesale market prices showed that the 2001 prices were an anomaly based on extreme summer demand conditions, it is difficult to justify the repeated use of this ratio. Hence, the upper range of the demand response benefits used in the 2008 study were inappropriate meaning that the net benefits remain marginal due to the emerging higher costs of AMI.

An important aspect of the AIMRO 2008 report was that, unlike previous studies in Victoria, it did acknowledge and identify a number of risks to the project and commented that:

*'If implemented as currently proposed by the distributors, the business case for AMI in Victoria is likely to be negative. Even after reviewing and adjusting costs to an efficient level, current assessment is that the benefits and costs overlap to an extent where the net benefit position is not definite'.*

In April 2008 DPI advised government that there was a need to exercise care in managing uncertainties, risks and implementation pressures to ensure the delivery of intended benefits.

### 3.6 Implications for the AMI project

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In assessing whether to roll out AMI, a robust cost-benefit framework should account for the risks associated with the proposal. In particular, the framework should account for the probability of costs increasing or benefits decreasing as a result of the risks.

The AIMRO 2008 study provided a meaningful consideration of risks to the AMI project. These risks primarily relate to:

- performance of technology
- changes to national energy market rules, procedures and systems
- inconsistencies with the national AMI design framework.

Having recognised these risks, DPI advised government in 2008 to endorse the modification of the project's time lines and deliverables to improve the certainty of delivering the project. This recommendation was accepted and the project completion date was delayed by a year from December 2012 to December 2013.

This modification has meant that the full realisation of benefits available to consumers and retailers will be deferred by several years, at least until the procedures and systems are agreed at the national smart meter project.

A delay in the realisation of these benefits will have further implications on the economic merits of the project. Accordingly the cost-benefit analysis again needs revision to take into consideration the impact of these changes to the scope and schedule of the project.

## **Recommendations**

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DPI should:

5. Re-assess the economic viability of the AMI project by updating the cost-benefit analysis to reflect existing and emerging risks as well as the impact of changes to scope and underlying assumptions.
  6. Use the Department of Treasury and Finance's business case development guidelines and other advice to produce an updated cost-benefit analysis.
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# 4 Consideration of technology issues

## At a glance

### Background

The audit examined the extent to which technology issues were considered in assessing and addressing the viability of the AMI project, recognising that leading edge technologies have high implementation risks.

### Conclusion

The extent of technology risks and their implications on the economic case for AMI were significantly underestimated in the advice provided to government that recommended commitment to the project.

### Key findings

- Technology risks were not considered in the AMI cost-benefit analysis.
- There is no risk management strategy for AMI.
- There were significant flaws in the technology trials process that affected the transparency and objectivity of technology assessments.
- The initial trials outcome failed to provide reasonable assurance on the viability of technology choices for AMI.
- Technology risks have materialised since the project began. They are reducing the project scope, increasing costs and delaying the delivery schedule.

### Recommendations

DPI should:

- Obtain assurance from Victoria's electricity distributors that their candidate technologies for AMI are capable of achieving the expected functionality and service specification prior to the further installation of these technologies in customer premises.
- Adopt the Department of Treasury and Finance's risk management guidelines as a basis for monitoring and managing the risks that threaten the economic viability of the AMI project.

## 4.1 Introduction

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The Advanced Metering Infrastructure (AMI) project is technically ambitious. It will use a range of new, leading edge technologies on a mass scale at significant cost and risk. In such a project, a methodical and rigorous assessment of technology serves to reduce risk and uncertainty.

The AMI project was initially coordinated by the former Department of Infrastructure (DOI) until late 2006, when it was transferred to the Department of Primary Industries (DPI) due to a 'machinery of government' change. As the electricity industry operates in a regulated and administered market, DPI is implementing the project in partnership with the industry, on behalf of the state.

## 4.2 Conclusion

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The extent of technology risks inherent in AMI was underestimated at the time the initial recommendation was made that government commit to the project. Sufficient resources were not allocated by the administering department to oversee the trials process, which significantly diminished its value.

The trials outcome failed to provide reasonable assurance on the viability of the technologies underpinning the AMI project. However, DPI continued to underestimate the technology risks and persisted in advising government to proceed with the project.

The lack of adequate risk management appears to be attributable to a belief that industry is responsible for managing technology risks. However, given the extent of the department's role in promoting the AMI project, the nature of regulatory intervention, and the implications for consumers, the accountability for effectively managing risks, which have the potential to undermine the economic case, rests with the department.

## 4.3 Technology risks

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Technology risks in a complex project usually appear in two forms:

- costs rise if the development or integration of technology proves to be more challenging than expected
- realisation of benefits can be delayed if the technology development or its integration takes longer than expected.

Risk management requires a clear allocation of responsibilities and accountabilities. Better practice guidelines in project management recommend agreeing such responsibilities via a documented risk management strategy. This is particularly important in projects such as AMI which is being implemented in partnership between government and industry.

DPI does not have its own documented risk management strategy for the AMI project.

DPI believes that the electricity industry manages the technology risks of the AMI project. DPI's view relies on the broader outcome of the privatisation of the Victorian electricity industry, where the industry is expected to bear risks in conducting its business on a commercial basis within a regulatory framework.

Under the economic regulatory instruments governing the industry, participants have a commercial incentive and the operational discretion to select technologies that deliver the required outputs in the most cost-effective manner.

When the AMI project started, DOI undertook the role of overseeing the development of the AMI specifications, which defined the service requirements and made the industry responsible for finding the right technical solution. From the department's perspective, this approach made sure that the responsibility for managing technology risks remained with the industry.

However, the AMI project is unique. The department has championed significant changes to the original decision by the regulator, which was to mandate the replacement of accumulation meters with interval meters. These changes require significant technical innovation to be deployed within a shorter time period, and on a mass scale. This scenario has introduced a high degree of technology risk into the AMI project.

The risks associated with this highly technical roll-out will be represented in the cost recovery claims submitted by the distributors. For this reason the industry's management of technology risks has direct implications for consumers who rely on the government to protect their interests.

## 4.4 Technical components of AMI

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There are three main technical components of AMI:

- the **smart meter**, which is an interval meter collecting electricity data every half hour and providing other services for the consumer, the retailer and the distributor
- the **home interface** between the meter and devices in a consumer's premises
- the **communications system** between the meter and the electricity distributors allowing data to be transmitted in both directions.

In order for these technology elements to work together, distributors also need network control, data management and other back-end systems, which were not examined by this audit.

#### 4.4.1 The smart meter

Of the three key technology components of AMI, the smart meter is the most robust and mature component, as interval meters have been deployed for many years. The additional functionality offered by smart meters has also been deployed in a number of overseas locations.

Meter manufacturers are working from an existing product base and have been involved in the framing of the AMI functional specifications. The technology risks inherent in this component of AMI are low.

#### 4.4.2 Home interface

The home interface technologies enable innovative services to be offered to aid the consumer in managing energy use. The services can range from displaying price and electricity usage information, to remote control of in-home devices such as air-conditioning, heating or pool filters. In order to access these functions the smart meter must have an interface through which the home appliances can interact with the meter.

This technology is the least mature of the three system components.

There is no market-leading interface that naturally presents itself to fulfil the functionality required of the home interface. DPI performed a risk assessment of technologies inherent in this area and a wireless communications protocol known as 'ZigBee' was selected.

The decision by DPI to mandate the use of Zigbee as a particular technology of choice is at odds with DPI's approach of leaving the management of technology risk to the industry. The decision was driven by commercial concerns raised by some industry participants that a lack of a defined standard would hamper the ability of electricity retailers to offer common services to customers across different electricity distributors.

The principal risk with mandating ZigBee technology is whether suppliers of home appliances will include ZigBee compliant network devices with their products. Some have indicated that they will, but it will take several more years for the market direction to become clear.

If ZigBee does not emerge as a market standard then the AMI project has included some mitigation features to ease the transfer to another protocol. However, it remains to be seen how effective those features will be and whether electricity distributors would implement such changes.

### 4.4.3 Communications system

The communications technology required to enable smart meters on the scale of the AMI project has considerable bearing on project costs and presents significant risks.

The cost-benefit analysis report which was the basis for the AMI roll-out decision (discussed in detail in Part 3 of this report) identified potential technologies, but it offered no assessment of the maturity level and risks inherent in these technologies. The study recommended undertaking technology trials but did not consider the trials as a necessary factor in considering the decision to proceed with the project.

DOI staff conducted a global study tour in 2006, but no formal study report was offered for our review and there is no evidence that technology risk was studied in this tour. A document used in communicating the study's findings affirmed that, in their view, there was: *'No shortage of proven AMI technology'*.

## 4.5 Technology trials

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In complex projects involving new and leading edge technologies, trials generally constitute a project's agreed engineering strategy and plan.

Trials form a necessary part of a project's risk reduction strategy and are crucial in resolving matters related to user experience or technology assessment before significant capital investment is committed.

Depending on the nature and scale of the project, trials can be expensive, both from a cost and human resource perspective. Considerable scrutiny and detailed planning is required to make sure that investment in trials leads to important questions being answered.

These questions generally focus on determining:

- a system's readiness for installation
- extent of technical risk
- user acceptance issues
- performance deficiencies.

### 4.5.1 AMI trial decision

The 2005 AMI cost-benefit analysis noted the need for technology trials. In February 2006 DOI provided advice to government, recommending that a technology trial be conducted and that the government endorse the AMI project. Both recommendations were accepted.

DOI's recommendation to commit to AMI deployment before the technology trials had been undertaken introduced significant delivery risks to the project. This is especially significant as the 2005 AMI cost-benefit report did not include a technology feasibility study nor did it provide any analysis of the technology risks associated with the deployment of AMI.

### 4.5.2 Trials planning

In March 2006, following the government's endorsement of the AMI project, DOI established and chaired an Industry Strategy Group (ISG). The ISG's role was to provide advice to government on a range of matters affecting the implementation of the AMI roll-out. ISG members included representatives from industry, regulatory and consumer associations. A Trials Working Group (TWG) was established under the ISG in May 2006, which was also chaired by DOI.

TWG produced and documented a Trials Plan. However, this document lacked important information such as:

- pass/fail criteria
- a deliverables list
- a work breakdown structure
- allocation of responsibilities
- a budget for the trial.

The TWG had a responsibility to produce a complete and comprehensive Trials Plan and the ISG had a responsibility to give the Trials Plan due attention. Given the importance of the technology trial in informing the government about the viability of technologies underpinning AMI, the gaps in the Trial Plan approach and documentation is a significant shortcoming in the governance process.

The Trials Plan, as the capstone document for the management of the trials program, was not adequate.

### 4.5.3 Trials assessment criteria

A successful trials program has clear and unambiguous assessment criteria. Pre-agreed criteria set a benchmark for executive management and specialists to make sense of the results. Such pre-agreed criteria also make the trials transparent and assure that the trials assessment and results are objective.

The TWG had difficulty developing criteria for the department-sponsored trial to the extent that it agreed that '*...success criteria should only be identified and described in broad terms until further results of trials/testing are known*'. In fact, the trials' success criteria were not agreed until four months after the trials started.

Where the criteria were documented they do not show how to measure success or failure. The test procedures could not demonstrate whether the trialled technology actually met requirements.

The trials assessment approach used for AMI did not represent mature practice. It introduced a risk that the trials assessment was not objective and significantly diluted the effectiveness of the trials program.

The trials program was inadequate because:

- DOI did not allocate sufficient staff or experts to carry out the trials program, meaning it could not properly participate in the planning and management of the trials, verify results and develop suitable documents.
- The ISG did not adequately consider and approve the Trials Plan.

### 4.5.4 Results of the technology trials

The technology trials finished in August 2007 and concluded that '*The technologies implemented overseas are not suitable for the Victorian Specification without further development*.' The particular technologies referred to in this statement were the Distribution Line Carrier (DLC) and Power Line Carrier (PLC) systems.

The electricity distributors encountered many technical problems with the technologies put under trial. While such an outcome is not unexpected from a technology trials process, what is unusual is the level of immaturity of the technology observed in the trials, since all of the technologies that were trialled failed to meet the minimum AMI functionality.

For six of the eleven technology candidates that actually completed the trials process, **all technologies** were assessed as requiring further technical development.

The generally poor showing of the DLC and PLC technologies under trial raises issues about an unexplained anomaly, namely why the commitment to the AMI roll-out continued to be recommended, or at least why the technical vulnerabilities were not explained in any great detail in the advice.

It is evident that DOI embarked on a trials process without having a clear sense of the readiness of technologies that DOI assumed were available to support a mass roll-out.

The TWG did not adequately screen the candidate technologies for their ability to meet the AMI functional specification. This could have been done by requiring distribution businesses to attest compliance against the minimum requirements of the AMI functional specifications.

This would have provided an indication of what the technologies could achieve ahead of commencing specific trial activities. Instead, low maturity technologies were subjected to an expensive trials process that, according to DPI, cost around \$6 million. No documents have been sighted to verify the trial costs.

The Trials Report concludes '*...there are available AMI technologies that are suitable, from the perspective of communications performance, for a state-wide roll-out*'. This is a misrepresentation of the trials outcome.

Given the generally low maturity of the candidate technologies, the trials process essentially served as a 'concept technology demonstration program' and provided little assurance that these technologies were suitable for mass roll-out of AMI across Victoria in the required time frame.

Subsequent reductions in the scope of the program and the delay in the roll-out schedule confirm this assessment.

DPI has indicated that the electricity distributors conducted several further technology trials of their own in 2008 and 2009. Although these trials may help mitigate some key technology risks, DPI has not kept documentation on these trials. The department's lack of direct oversight of these trials means that DPI should use these results with caution.

## 4.6 Implementation uncertainty

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The high technical risks of mass-scale implementation of two-way communications technology over an aggressive schedule have been consistently underestimated throughout the project. This has created significant issues for the electricity industry to implement the project in the required time frame and within costs as originally envisaged by the government.

In 2006 DOI did not assess the technical risk before recommending that advanced communications be incorporated into the interval metering project, which was underway at the time. As a result, the AMI project commenced with little planning to anticipate and address the risks from relying on unproven technology.

In 2007 the technology trial results showed that there was no current communications technology suitable for the AMI Project. At this point it should have been recognised that a mass roll-out over a short time was highly risky. However, the risk continued to be underestimated and the government was advised that the roll-out should go ahead.

In 2008 industry identified a number of risks that would affect the AMI roll-out schedule. DPI consequently advised government to reduce the scope of the original project by deferring delivery of certain functionalities and services until later.

However, significant risks remain, such as:

- **AMI Technology Deployment risk:** AMI is not installed because new technology elements do not meet requirements.
- **AMI Technology Performance risk:** AMI technology does not perform to requirements, which may affect consumers and/or delay the project roll-out.

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## Recommendations

DPI should:

7. Obtain assurance from Victoria's electricity distributors that their candidate technologies for AMI are capable of achieving the expected functionality and service specification prior to the further installation of these technologies in customer premises.
  8. Adopt the Department of Treasury and Finance's risk management guidelines as a basis for monitoring and managing the risks that threaten the economic viability of the AMI project.
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# Appendix A.

## *Audit Act 1994* section 16— submissions and comments

### Submissions and comments received

#### ***RESPONSE provided by the Secretary, Department of Primary Industries (DPI)***

*In summary, your report notes that:*

- *DPI should play a stronger role in project governance, particularly to minimise technology risk.*
- *There is a material risk that the initial costs of Advanced Metering Infrastructure (AMI) will be inflated, and that the subsequent cost reductions and other benefits arising from the project will not be passed on to consumers.*
- *There were substantial flaws in the initial cost-benefit analysis of the project.*
- *Consumers have been insufficiently engaged in the design and delivery of the project, and inequities may arise from the impacts of the project.*

*The report makes a number of recommendations to address these concerns.*

*DPI has engaged actively in this audit, furnished you with considerable information, and carefully considered your findings with a view to improving the outcomes of the AMI project. Unfortunately, we find the report disappointing and of more limited value to the AMI project than we had hoped.*

*Our broad conclusions are that your findings:*

- *are predicated on a role for government in this project that would expose government to substantial risks that it is not well placed to manage;*
- *do not give reasonable weight to the evidence presented by DPI;*
- *give weight to the views of selected third parties without validating those views;*  
*and*
- *do not give sufficient regard to the sound project outcomes that have been achieved to date.*

*The AMI project is unusual in that it mandates a specific change to the services provided by regulated private companies. This has required government to carefully allocate risks and responsibilities between itself and the electricity industry, and to manage the evolving risks of the project progressively through the development stage. To date, DPI has actively and adaptively managed those risks.*

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

*DPI is also disappointed that much of the evidence we presented to you has not been referred to in your report. DPI submits that key evidence should have been explicitly summarised and responded to in drawing conclusions.*

*Despite our concerns about your findings, DPI largely accepts your recommendations, some of which had already been planned, and others which will help to refine the delivery of this important and challenging project.*

**Governance and technology risk**

*Responsibility for the implementation of the AMI project was allocated to Victoria's electricity distributors by the Victorian Government, a decision which has been validated by decisions of the Ministerial Council on Energy and the Australian Energy Market Commission.*

*DPI established the overarching policy and statutory framework for the project, and has subsequently played an observer role in the project governance structure managed by the industry for the project's implementation phase. Consistent with the policy framework, DPI has not taken day-to-day responsibility for governance, or sought to approve distributors' technology choices.*

*The key reasons for this approach are:*

- *The Minister for Energy and Resources has rule-making powers to direct the course of the project. DPI's observer role provides it with full access to the information it needs to advise the Minister on the possible exercise of his powers, to specify project outcomes and address any risks that are not adequately managed by the distributors.*
- *The electricity industry has major incentives to deliver the project and minimise technology risk. Without an effective AMI system, the distributors and retailers will face major revenue risks, and distributors will be unable to gain the initial benefit of the resultant cost reductions.*
- *Further, the industry, not DPI, has the capacity to deliver the AMI project through their ownership of the relevant assets and their expertise in metering and related services.*
- *While electricity distributors have an incentive to exercise their market power, including in cost recovery and metering service performance, the Australian Energy Regulator has been specifically established to constrain their market power. Were DPI to assume greater responsibility for the delivery of the project, this would constrain the AER in performing this role.*

*Given the above factors, DPI's proper role is to ensure that the project outcomes are clearly specified, to actively monitor project delivery, to advise the Minister whether to intervene through use of his powers, and to leave the AER with full scope to regulate the distributors' metering prices and services.*

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

*DPI's approach accords with the principle, annunciated (sic) by your office, of 'allocat[ing] business risk to the sector that is best placed to manage risk and where the appropriate commercial incentives operate.'*<sup>1</sup>

*For DPI to play a greater role in project governance would create unnecessary and inappropriate risks to the project and to Government.*

*Consistent with DPI's role in the AMI project and with the Victorian Guide to Regulation, DPI advised the Minister on the establishment of a performance-based Order in Council (OIC), which sets out the AMI project outcomes to be delivered by the industry. Recognising the risks associated with new technology, a process has been included in the OIC to amend these outcomes if it is evident that the costs to deliver the outcome outweigh the benefits. This ensures that customers' interests are protected.*

*A second OIC has been made to govern the recovery of metering service costs, including AMI costs. The OIC balanced the need to provide investment certainty—to allow project financing to be secured during the Global Financial Crisis—with the need to protect the long term interests of consumers with regard to the costs of metering services. This OIC includes a number of checks and balances: broad information gathering powers, access to regulatory accounts, and specific tests regarding competitive tendering, commercial practice and prudence. DPI has written to the AER to recommend that these powers be effectively and robustly exercised in its Final Determination on metering charges<sup>2</sup>.*

*On a specific technology matter, your report highlights that certain communications technologies that have been successfully deployed overseas may not perform well in the Victorian electricity network. However, you did not clarify that one particular communications technology (mesh radio) performed better than expected, and as a result will be predominantly deployed in Victoria.*

**Distributional impacts**

*The forecast distributional impacts of the AMI project on consumers have been assessed on several occasions, in each case showing that the impact on consumers is substantially progressive.*

**Consumer engagement**

*Consumer representatives have been extensively consulted, through written and oral submissions, and representation on key project committees.*

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<sup>1</sup> Auditor-General of Victoria Special report No 38 Privatisation: An Audit Framework for the Future, p14

<sup>2</sup> Department of Primary Industries Victoria - AMI draft determination- submission, AER website

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

*In recent correspondence, you state that the inadequacy of consumer engagement is evidenced by the fact that consumers' submissions constituted a minority of those received, and consumer representatives constitute a minority of the project committee on which they sit.*

*DPI does not accept this conclusion. Consumers' impact on the design and governance of the AMI project has not been determined by the balance of numbers, but by the merits of the arguments put.*

*Nevertheless, DPI recognises that a different approach to consumer engagement will be required for the delivery phase of the AMI project. Plans for this new engagement phase have been under development for some time.*

**Cost-benefit analysis**

*Three major cost-benefit analyses have been conducted through the development of the AMI project, and have provided an increasingly clear picture of likely costs and benefits.*

*You have expressed concerns about aspects of the initial cost-benefit analysis: that it was an update of an earlier study by the Essential Services Commission rather than a new study that it used an overly large ratio of peak-to-average electricity prices to inform its estimate of consumers' electricity demand reductions, and that it used an aggressive assumption regarding take up of time of use tariffs.*

*DPI has previously provided your office with detailed explanations as to why these criticisms are invalid. To summarise these:*

- DPI used those parameters in the ESC study that remained valid, and adjusted those for which better information was available. This was a reasonable and rigorous approach.*
- Your office has assumed that the peak-to-average price ratio in a retail tariff must accurately and dynamically reflect a historical average of wholesale price outcomes. This assumption is incorrect. The selection of future retail price ratios is informed but not determined by historical wholesale prices.*
- Whilst all customers will not be placed on specific time of use tariffs, this assumption will, on average, be correct.*
- At least two other key assumptions in the initial study were demonstrably conservative, for example, the assumed costs of augmenting peak capacity. To properly review a cost-benefit study requires consideration of all parameters, not one in isolation.*
- The later cost-benefit studies used different combinations of parameters, yet also concluded that substantial scope existed for net benefits to be realised. Importantly, these were performed in time to inform the State's decision whether to proceed with the rollout, and how to maximise its net benefits.*

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

*A further cost-benefit study is currently underway, using updated augmentation costs and observed rates of take-up of time-of-use prices by consumers in other markets. This is expected to produce a higher estimate of net benefits than previous studies.*

**Economic regulation**

*Your report expresses doubt as to the capacity of the AER to constrain cost over-runs, and to ensure that subsequent cost reductions arising from the use of AMI will be passed on to consumers.*

*First, your report does not make clear that the expected benefits to consumers will arise from a combination of competition in the generation and retail sectors, and economic regulation by the AER.*

*Further, the powers granted to the AER under the OIC for the recovery of metering service costs provide the AER with substantial scope to ensure that the costs incurred in the project are transparent and efficient, and that key cost reductions (for example, in the avoidance of meter reading) are passed on.*

*The expected benefits to consumers not only arise from eventual cost reductions, but also from service improvements—for example more rapid detection and restoration of supply interruptions.*

*DPI will continue to liaise with the AER on the adequacy of its powers and the effectiveness of its oversight of costs and benefit sharing. It is important to note that the AER regulates the prices charged by electricity and gas network companies with combined annual revenues of several billion dollars. A core feature of the regulatory regime is to reveal and pass on to consumers cost efficiencies.*

*DPI is concerned that, in drawing conclusions on the likely cost impacts of the AMI project, you have accepted on face value estimates by some stakeholders. DPI's analysis of one of those studies revealed fundamental flaws.<sup>3</sup> In the other case, you quote a media report which provides no information on which to validate the quoted figures.<sup>4</sup>*

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<sup>3</sup> Customer Protections and Smart Meters - Issues for Victoria, August 2009, St Vincent de Paul Society (note that this report has since been amended to correct one significant error identified by DPI, but not the second).

<sup>4</sup> Power surge as savings cost more, The Age, 26 July 2009 reporting comments made by Domenic Capomolla, Chief Executive Officer of Simply Energy.

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

*DPI accepts in principle most of the recommendations in the report, but for different reasons than those in your report. The project is a major undertaking that is now moving from planning to implementation and delivery; it is therefore an appropriate time to review governance, resourcing, risk, and stakeholder engagement. As set out below, some of these recommendations are already being progressed.*

***Recommendation 1. Re-examine the existing governance structure of the AMI project to proactively identify, assess, own and manage the project's strategic risks.***

*Already underway. DPI is currently reviewing the governance structure for all major energy and earth resources projects in which it has a significant accountability, including the AMI project.*

*The risks associated with the AMI project will continue to be allocated to the party best able to control the risks, to avoid the inappropriate transfer of risk and liability to government and/or the community.*

***Recommendation 2. Develop, appropriately resource and implement a stakeholder engagement plan with a particular focus on addressing consumer issues arising from the AMI project.***

*Already underway. A high priority has been placed on maximising consumer benefits from the AMI rollout, and a stakeholder engagement plan has already been developed through the AMI Industry Steering Committee. Information is being provided to consumers as smart meters are rolled out in their local area. Consideration is also being given to the future scope of this campaign.*

***Recommendation 3. Actively engage with the relevant regulator to monitor and oversee the transfer of expected benefits to consumers.***

*Already underway. For those benefits that will be realised through regulated network services, DPI has been actively engaged with the regulator from the outset of the project to ensure those benefits are passed through to consumers.*

*DPI continues to monitor the competitive parts of the energy sector to ensure that competition passes on benefits to consumers.*

***Recommendation 4. Commission a program review by the Gateway Unit of the Department of Treasury and Finance on governance and implementation of the AMI project to date.***

***RESPONSE provided by the Secretary, Department of Primary Industries – continued***

Support in principle. A program review will be commissioned by the Gateway Unit of the Department of Treasury and Finance on the next phase of the AMI project (benefit realisation). However, the Gateway Unit will not be engaged to undertake a retrospective review.

***Recommendation 5.*** Re-assess the economic viability of the AMI project by updating the cost-benefit analysis to reflect existing and emerging risks as well as the impact of changes to scope and underlying assumptions.

Already underway. The cost-benefit analysis is currently being updated and will use more up to date assumptions for the demand response estimate, which is expected to result in substantially higher benefits than previously quantified.

***Recommendation 6.*** Use the Department of Treasury and Finance's business case development guidelines and other advice to produce an updated cost-benefit analysis.

Support. The Department of Treasury and Finance's business case development guidelines and other advice will be referenced in producing the updated cost-benefit analysis. It is not expected that the results of the cost-benefit analysis will change materially by the application of the guidelines.

***Recommendation 7.*** Obtain assurance from electricity distributors that their candidate technologies for AMI are capable of achieving the expected functionality and service specification prior to the further installation of these technologies in customer premises.

Already underway. Assurance has been sought on this point at key stages in the project through the established governance arrangements (including a specific provision in one of the OICs that requires the distributors to prepare and submit to the Minister, on request, a comprehensive Risk Management Strategy for the project), and this will continue. However, for reasons given above, DPI does not plan to direct the use of particular technologies.

Further, the electricity distributors would be in breach of their licenses should their candidate AMI technologies not be capable of achieving the expected functionality and service specification (unless the cost of doing so exceeds the benefits, but only in the case of non-core functionality).

***Recommendation 8.*** Adopt the Department of Treasury and Finance's risk management guidelines as a basis for monitoring and managing the risks which threaten the economic viability of the AMI project.

Support.



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<b>Report title</b>	<b>Date tabled</b>
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