

NSW WATER REFORM ACTION PLAN

Water take measurement and metering

Consultation paper

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Water take measurement and metering—consultation paper

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Introduction

Water is one of the most important natural assets in New South Wales (NSW). The community, businesses and the health of the environment all rely on our surface and groundwater.

In December 2017, the NSW Government released the Water Reform Action Plan in response to the *Independent investigation into NSW water management and compliance*, conducted by Ken Matthews, AO (the Matthews Report) and the *Murray–Darling Basin Water Compliance Review* (the MDB Compliance Review).

The plan will deliver on the state's responsibility to ensure we have an equitable and transparent approach to water management for current and future generations.

As part of the plan, the NSW Government has released three consultation papers for community input on:

- Water take measurement and metering (this document)
- Transparency measures
- Better management of environmental water

The NSW Government seeks to implement a robust framework to measure and meter water take, that meets the objective of 'no meter, no pump'. This paper seeks your views on particular aspects of this framework and the way in which it may be rolled out. In particular, the NSW Government recognises that it is impractical to immediately implement new statewide metering requirements, as it will rely on the market quickly responding to increased demand for meters.

Why do we need to measure and meter water take?

There are 40 water catchments across NSW which are critical to the social, economic and environmental wellbeing of the state.

The NSW Government has implemented a water-sharing framework across these catchments that includes water-sharing rules. These rules ensure water is shared sustainably and equitably between the environment and water users, including urban and rural communities, agriculture and other industries.

To support this framework, it is important that water taken is accurately and reliably measured and recorded. Accurately measuring water take provides benefits to communities, businesses and the environment:

- **Communities:** for the community as a whole, accurately measuring water take will contribute to a number of benefits. It can reduce overuse of water, increase water available to downstream users, ensure transparency and equity in how water is shared, allocated and managed in NSW, improve river operations and give greater confidence that water is being taken according to legal frameworks and licence conditions. It also ensures users who take water are properly charged for their take.
- **Businesses:** accurately measuring water take will help demonstrate that the majority of water users comply with the rules. Accurate water measurement can also provide important information to manage pump performance, irrigation system performance and farm water use. It can help measure water efficiency gains and allow businesses to more confidently participate in the water market.
- **Environment:** accurately measuring water take can help ensure that water take complies with any requirements put in place to better manage environmental water.

Accurately measuring water take is critical to maintaining the value and integrity of the water-sharing framework.

This paper applies to water which is taken from regulated rivers, unregulated rivers and groundwater systems under a licence and can be measured with a meter. Water will be measured at the time it is taken from the water source, and not at the time it is used by the licence holder. The section 'Type of water take not covered by this paper' sets out the water take that this paper does not apply to. All references to 'meters' in this paper refer to non-urban meters.

Background

Since 2009, water metering has been guided by the National Water Initiative, the National Framework for Non-urban Water Metering and the NSW Interim Water Meter Standards.

There are a number of meters across NSW in many irrigation communities. However, the standard of meters and their distribution is not uniform across the state, with limited metering in northern NSW and greater meter coverage in the south.

In 2014, as part of Murray–Darling Basin (MDB) Plan commitments, the NSW Government agreed to specify measures for maintaining and, if practicable, improving water take measurements and standards in water resource plans.¹

To inform the implementation of this, the NSW Government released a discussion paper for public consultation² on a draft water take measurement policy in 2015.

More recently, the Matthews Report and the MDB Compliance Review have highlighted the need for a more comprehensive and robust metering framework, and for further consultation with the community.

Both of these documents made consistent recommendations to implement a ‘no meter, no pump’ policy. The Minister for Regional Water has committed to making installation of meters for all large users a top priority and to implementing the ‘no meter, no pump’ objectives in a staged process based on risk.

What licences and approvals do you need to take water?

To take water in non-urban areas, generally three licences or approvals are needed:

- A water access licence entitles the holder to shares in the available water and also sets out the circumstances in which water can be taken and the locations from which water can be taken
- A water supply work approval authorises the holder to construct and use infrastructure to take water at a specified location, and
- A water use approval authorises the holder to use water for a particular purpose at a particular location.

How do different types of meters work?

Water meters quantify the volume of water flowing through a conveying work. A conveying work is generally an enclosed pipe, but may also include open channel type structures.

There are three standard types of water meters:

- mechanical—these use a rotating turbine, paddle wheel or propeller to measure the amount of water flowing through a pipe. These meters are considered an older technology
- ultrasonic—these use sound waves to measure the amount of water flowing through a pipe
- electromagnetic flow—these use electricity to measure the amount of water passing through a pipe.

Further information on water meters is in Attachment A.

Meter coverage

The extent of metering in NSW varies across the state, depending on geography (inland and coastal) and the water system (groundwater, regulated and unregulated rivers). Generally, metering in NSW:

¹ *Basin Plan 2012* (Cth), s10.45.

² Department of Primary Industries – Water (2015), *Discussion paper – Water take measurement in NSW, a way forward*.

- is not comprehensive—metering policies have been inconsistently applied and government-sponsored metering programs have clustered in the southern areas of the state
- does not meet consistent standards—not all meters meet the Australian standard.
the proportion of metering is highest in regulated systems and lowest in groundwater coastal and unregulated systems.

Objectives

The options in this paper seek to ensure that:

- the take of water can be accurately and reliably determined
- meters used to measure water take are auditable, verifiable and accurate
- data from meters can be easily communicated to relevant authorities
- mandatory requirements and resources are targeted to higher risk users, that is, those that have a greater capacity to take water and high risk water systems
- the benefits of water measurement (including risk management benefits) outweigh the costs
- the framework is simple to understand, comply with, administer and enforce.

Consultation question

- What, if any, additional objectives should be considered?

Consultation topic 1: When should a meter be required?

The NSW Government has committed to implementing a ‘no meter, no pump’ approach. All new water licences and approvals could be required to have a meter. For existing licences, this section presents a number of approaches for when meters could be required. We seek your views on these approaches.

The NSW Department of Industry (the department) engaged an independent consultant, Aither, to conduct a preliminary economic analysis of metering thresholds based on the risks and costs of metering. The consultant’s preliminary analysis has informed the options presented in this paper. The department recognises that there are limitations in the data available and further analysis will be required to inform the settled policy.

Option 1: No meter, no pump (‘universal’ metering)

The Matthews Report and the MDB Compliance Review recommended a policy of ‘no meter, no pump’ across NSW. However, both reports recognised that this should not cover 100% of water take. For example, the MDB Compliance Review considered a metering target of 95% per water resource area for meterable take would meet the no meter, no pump principle, while avoiding undue cost burdens on small entitlement holders.

Preliminary analysis indicates that metering 100% of water use would come at a very high cost. For users with very small and/or occasional water extractions, the costs of metering may outweigh the benefits.

In NSW a large proportion of water is extracted by a small proportion of water supply works. This means that most water use can be covered by metering a modest number of water supply works:

- metering 20% of water supply works would cover around 78% of water use
- metering 30% of water supply works would cover around 87% of water use
- metering 46% of water supply works would cover around 95% of water use.

The remaining 54% of water supply works are attached to licences with small share components. This is illustrated in Figure 1. Metering these last 54% of works to achieve universal metering would increase coverage of water use by only 5%, and would nearly double the cost.

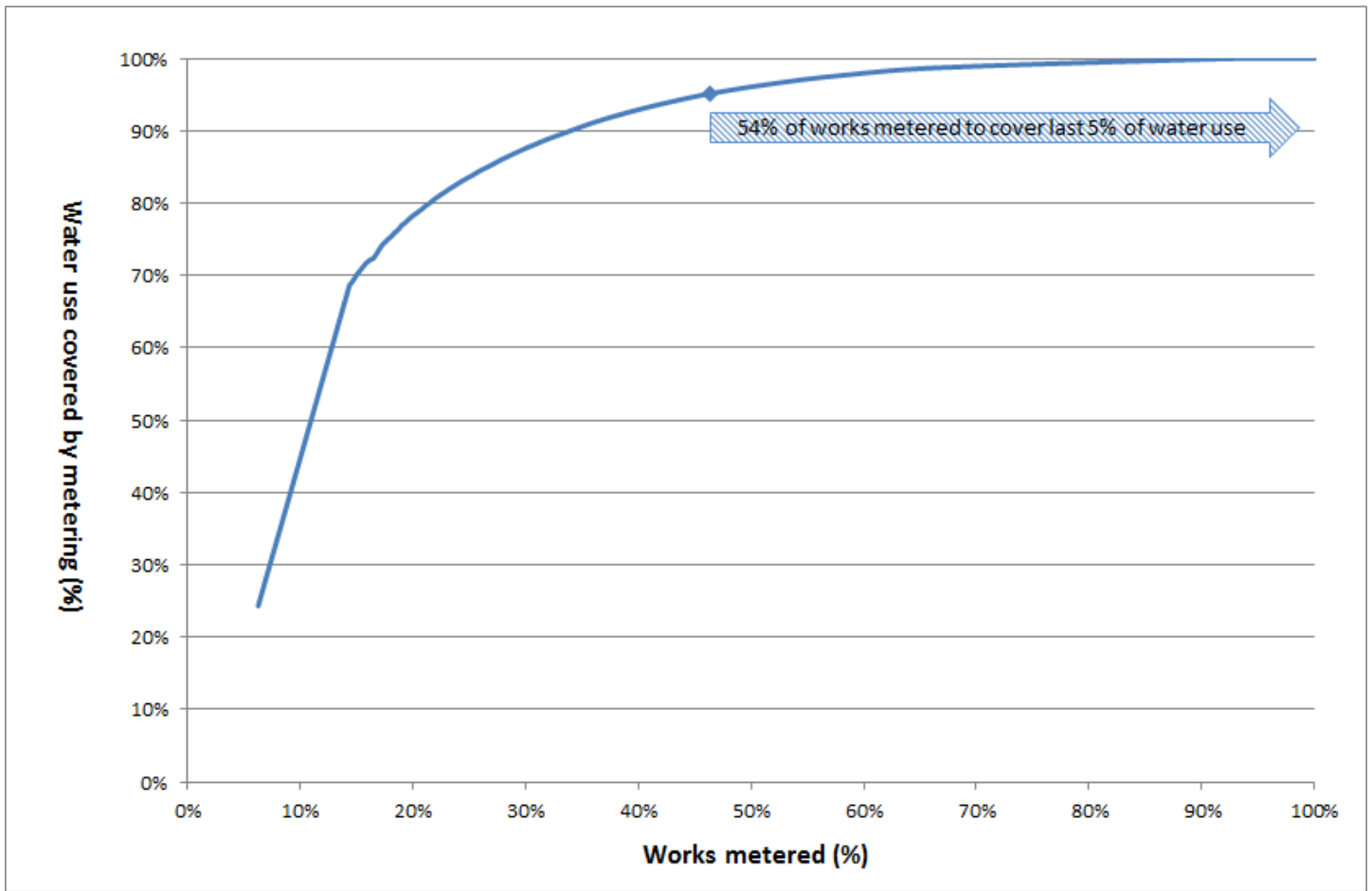


Figure 1. Proportion of water use compared to water supply works

Consultation questions

- Should every water user be metered, or should thresholds apply?

In order to balance the costs and benefits of metering, we have examined the potential for setting thresholds, above which all licensed water users would be required to have a meter. In line with our key objectives, the thresholds proposed are linked to the risks metering can mitigate:

- risks posed by individual water users—based on the capacity of individual water users to extract water (that is, large extractions impose a higher risk)
- risks associated with particular water sources, such as environmental and socio-economic risks, which may vary by water source.

There may be scope for different thresholds to be set for different water sources and/or for tiered thresholds to be set.

Option 2: Water share component

In NSW, the taking of water from a water source, such as a river or aquifer, requires a water access licence (unless otherwise exempt). Water access licences define the number of shares a licence holder holds in the available water in a water source.

The threshold for when a meter is required could be linked to a licence holder's share component, which is the number of shares they hold in a water source at any time.

The benefit of this approach is that it is a proxy for capturing the relative risk that the individual licence holder poses to the water source. It does this by linking the capacity of water a licence holder may legally take to the need for a meter, relative to other licence holders in the region or water system.

However, shares can be traded, so the number of shares attached to a licence can fluctuate. In addition, some licence holders can have water entitlements, but without any linked works approvals for infrastructure to extract this water.

Conversely, licence holders may sell their shares in some years and pump water in others. In such cases, a user may have a low number of shares, but a large pump. This could still present a compliance risk, as they would have the physical capacity to take water, despite not being legally entitled to do so.

What should the threshold be?

There could be a single threshold applied across the state. However, a statewide approach does not capture a consistent proportion of water users across NSW. For example, Table 1 shows that while setting the threshold at 370 shares captures 84% of users across NSW, only 47% of coastal groundwater users are captured.

Alternatively, the thresholds could vary by water source and location. For instance, to capture approximately 75% of the water use in each system, the threshold could be:

- 97 shares for all coastal regions
- 370 shares for inland groundwater and unregulated systems
- 5,800 shares for inland regulated.

Table 1. Thresholds based on licence share components

Region	System	5,800 shares		370 shares		97 shares		5 shares	
		Water use covered	Works metered	Water use covered	Works metered	Water use covered	Works metered	Water use covered	Works metered
NSW	All	54%	10%	84%	25%	94%	43%	100%	91%
Coastal	Regulated	6%	2%	51%	18%	86%	44%	100%	89%
	Unregulated	30%	2%	46%	5%	74%	21%	100%	89%
	Groundwater	16%	0%	47%	7%	78%	25%	100%	91%
Inland	Regulated	76%	38%	96%	57%	99%	70%	100%	93%
	Unregulated	37%	3%	78%	14%	91%	32%	100%	93%
	Groundwater	15%	3%	79%	34%	95%	57%	100%	92%

Consultation questions

- Should the metering threshold be linked to a licence holder's shares in a water source?
- What is a reasonable threshold to set?
- Should there be a different threshold for groundwater, regulated rivers and unregulated rivers?

Option 3: Infrastructure size

Metering requirements could be linked to the size of the infrastructure a licence holder uses to take water.

The benefit of this approach is that the metering requirement is linked to a licence holder's physical capacity to take water.

Ultimately, the infrastructure, or size of the pipe will constrain the volume of water that can be taken. In NSW, a landholder will generally be approved to install a certain size pump on their property. The pump size will relate to the size of the pipe. The threshold could then be linked to the size of the pump.

However, linking the threshold to pump size may not allow the regulatory framework to keep up with technology. In NSW the size of a pump is used as a proxy to estimate the capacity of the pump. Pumps have become more efficient over time and this trend is likely to continue into the future. Even with existing technology, two pumps of the same size might have different capacities.

In addition, it may be difficult to capture licence holders that have multiple pumps on the one property, which may be approved via different works approvals. In this circumstance, each individual pump may fall below the threshold, but the combined capacity of each pump will meet the thresholds. We seek your views on how to overcome this issue.

What should the threshold be?

As above, a state-wide threshold will disproportionately capture more inland regulated users at each threshold. Table 2 sets out indicative thresholds. For example, at a threshold of 251 mm pumps or 474 mm bores, only 9% of regulated coastal water use would be captured.

To capture at least 80% of use in each region, the following thresholds could apply:

- 110 mm pumps or 270 mm bores for inland regulated and unregulated systems, and
- 47 mm pumps or 152 mm bores for inland groundwater sources and all coastal water sources

Table 2. Thresholds based on pump/bore size (mm)

Region	Threshold System	500/759 mm pump/bore		251/474 mm pump/bore		110/270 mm pump/bore		47/152 mm pump/bore	
		Water use coverage	Works metered	Water use coverage	Works metered	Water use coverage	Works metered	Water use coverage	Works metered
NSW	All	41%	15%	52%	21%	73%	35%	97%	91%
Coastal	Regulated	6%	2%	9%	2%	29%	12%	94%	87%
	Unregulated	7%	3%	11%	3%	19%	8%	94%	87%
	Groundwater	29%	24%	30%	24%	34%	27%	87%	83%
Inland	Regulated	59%	37%	72%	52%	95%	75%	100%	98%
	Unregulated	45%	7%	61%	12%	81%	33%	99%	93%
	Groundwater	5%	12%	12%	17%	36%	36%	90%	91%

Consultation questions

- Should metering be linked to the size of the infrastructure that takes water? If so, what size thresholds should apply?
- Should there be different thresholds for inland and coastal regions? for regulated, unregulated and groundwater sources?
- How do you capture multiple works which effectively belong to one user?

Option 4: Risk of water sources

Metering requirements could be linked to risks associated with a particular water source. For example, if competition for water is high due to scarcity or high value of production in a particular water source, there may be greater risk of non-compliance with licence requirements. Similarly, over-extraction would pose a greater environmental risk in water sources with high ecological value.

Under this option, all water users captured under 'high-risk' water-sharing plans would be required to install and maintain a meter.

Preliminary analysis has indicated that 25 of the 57 water-sharing plan regions could be considered as high risk. These regions were identified through various processes:

- **regulated and unregulated rivers:** a high level risk assessment was undertaken of regulated and unregulated rivers. The risk assessment considered the competition for water, the value of production and an assessment of the ecological value in each water source. A summary of the approach to the assessment is in Attachment B.
- **groundwater:** the groundwater sources that were identified as high risk for inland regions were those that are at risk of over-extraction. Further information on this is in Attachment B. The risk assessment for coastal groundwater sources is ongoing. Usage is not known in these sources because of the low meter coverage. There are a number of coastal groundwater sources that are likely to be at risk of over-extraction.

Further work is underway to refine the assessment of risks associated with metering and ensure greater consistency across water sources.

Table 3: High-risk water-sharing plan regions—Preliminary analysis

Column 1: Unregulated - inland	Column 2: Unregulated - coastal	Column 3: Regulated	Column 4: Groundwater (inland)
<ul style="list-style-type: none"> • Barwon-Darling Unregulated Rivers • NSW Border Rivers Unregulated water sources • Castlereagh River Unregulated water sources • Macquarie Bogan Unregulated water sources • Murrumbidgee Unregulated water sources • Namoi Unregulated water sources • Peel Valley Unregulated Water 	<ul style="list-style-type: none"> • Bega and Brogo Rivers Unregulated water sources • Central Coast Unregulated water sources • Clarence River Unregulated water sources • Greater Metropolitan Region Unregulated water sources • Hunter Unregulated water sources • Lower North Coast Unregulated water sources • Macleay Unregulated water sources • Richmond River Unregulated water sources 	<ul style="list-style-type: none"> • Gwydir Regulated River • Macquarie and Cudgegong Regulated Rivers • Lachlan Regulated River/Belubula Regulated River 	<ul style="list-style-type: none"> • Lower Lachlan Groundwater Source • Upper and Lower Namoi Groundwater Sources • Lower Gwydir Groundwater Source' • Murrumbidgee Alluvial Water sources • Macquarie Bogan Alluvial Water Source • Lower Murrumbidgee Groundwater sources

The benefit of this approach is that take from the highest risk water sources would be closely monitored and regulated. However, this approach may not be able to be used in isolation. For example, it may not capture licence holders in lower risk areas that are large users and therefore pose a significant risk regardless of the water source.

In addition:

- the risk assessments may not be comparable across regions or water sources, and risks can change over time. The risk assessment would need to be periodically reviewed
- the risk assessment is a complex process and as a result it may be difficult to reach agreement on how to assess risks
- it is resource intensive, particularly if risks need to be regularly re-assessed
- there may be limited certainty for water users who may fall in or out of the system over time as risks change.

Consultation questions

- If a risk approach is adopted, should other types of risks be considered in the analysis?
- Should exemptions be applied to this approach? If so, how would we capture these users?

Option 5: combination of infrastructure, water shares and risk of water sources

The threshold could be linked to a combination of options 2–4. For instance, a licence could be required to have a meter if any of the following conditions are met:

- they are located in any of the regions listed in Table 3 above, or
- have a share component of 97 shares or more at any time, or
- have a pump size of 110mm / bore size of 270mm or larger.

The requirement would need to select the appropriate combination of risk, shares and infrastructure size.

The benefits of this option are that:

- it tailors metering requirements to the risk characteristic of a water user or a water source
- the threshold does not rely on one factor that could be subject to change over time (such as the efficiencies of pumps or the risks associated with individual water sources).

However, this option may be more complex for water users and the community to understand and may require more resources to administer and enforce.

Consultation questions

- Should metering be linked to a combination of infrastructure, water entitlement and risk of water sources?
- What is a reasonable combination of thresholds?

Consultation topic 2: What type of metering equipment and reporting will be required?

Currently in NSW, some water-sharing plans include requirements for metering. These requirements vary considerably depending on the water source, age of the water-sharing plan and individual water licence conditions.

Where metering rules are in place, they require installed meters to be pattern approved with data logging capability and to be compliant with Australian Standards. This requirement has been set by the NSW Interim Water Meter Standards, in accordance with the 2009 National Framework for Non-urban Water Metering.

Where a meter is not installed or is installed but does not include data logging capabilities, water take measurement must be recorded in a logbook and kept for five years.

Proposed future metering requirements

The principle underlying the metering requirements is that all meters should be **accurate, verifiable and auditable**.

To achieve this, it is proposed that all meters in New South Wales should meet the following requirements:

- **Accuracy:** meters must meet the Australian Standard 4747 Meters for non-urban water supply. This standard focuses on the accuracy of meters
- **Pattern approved:** all meters must be pattern approved. Pattern approval means the design of these meters has been verified by the National Measurement Institute (NMI) to meet national metrological specifications. There may not currently be pattern approved models for every type of meter, such as open channel meters. Interim arrangements may need to be developed for these meters until the market responds.
- **Installation and validation:** meters must be installed correctly. The NSW Government will develop an installer accreditation and competency framework with which all meter installers will be required to comply. While this is being developed, all meters must be installed or recertified by a Certified Meter Validator which appears on the Irrigation Australia Meter Validator/Installer list (see www.irrigationaustralia.com.au).
- **Seals:** all meters must have tamper-proof seals.
- **Maintenance schedule:** meters must be maintained by an accredited installer every five years. This ensures that meters are maintained to an acceptable standard and remain accurate.
- **Data capture:** the meter must have the capacity to record: volumetric flow rate and the date, time and duration of water taken. Data loggers allow for this data to be captured. This is important for the data to be auditable and verifiable.
- **Transmission of data:** it is proposed that all meters have telemetry, or some mechanism that allows for the information captured by the metering equipment to be remotely collected by WaterNSW and reviewed by regulators. The costs of telemetry have decreased over recent years, and many water users may use telemetry for other parts of their business.

Metering data needs to be collected by WaterNSW and reviewed by the Natural Resources Access Regulator (NRAR) at regular intervals and with sufficient precision for water management and billing purposes, and to allow breaches of compliance to be investigated.

As part of its compliance program, NRAR will audit compliance with metering requirements.

The department will also seek information from the market on techniques available to improve remote access to water data information, which will include telemetry. Further information on this technology challenge will be communicated shortly.

Consultation questions:

- Are the proposed metering requirements practical and effective?
- Should existing non-pattern approved meters be replaced with pattern approved meters?
- Are there any barriers to entry into the pattern approved meter market?
- Is telemetry practical in all situations? If not, please provide details of any constraints.
- Are there any other complementary measures that if implemented would encourage compliance with the metering requirements?

Self-reporting

Log books will be phased out

In NSW, if a licence holder does not currently have a meter or their meter is not connected to a data logger, any water taken from a water source must be estimated and recorded through a log book. There is limited scope for logbooks to be audited and the Matthews Report recommended that all scope for self-reporting be removed.

The NSW Government supports this position in principle and proposes to phase out log books. However, self-reporting may need to continue in limited circumstances. Any self-reporting will need to:

- be recorded at the same time (or within a reasonable timeframe) as the water take
- specify the purpose the water is taken for.

One option may be to require self-reporting through a digital online portal.

Consultation questions

- What is a reasonable time frame for self-reporting?
- Are there any additional criteria that should be applied to self-reporting?

When will self-reporting be permitted?

It is proposed that self-reporting is only permitted in certain circumstances:

1. Where the water user is not required to have a meter

Water users who are not required to have a meter will be able to self-report. This will include water users that fall below the metering thresholds or water users not captured by this paper. This would include water taken under:

- basic landholder rights
- floodplain harvesting.

2. When a water meter is not working

Currently, Section 91I of the *Water Management Act 2000* allows for a licence holder to take water when the meter is not operating properly, if they are authorised in writing to take water. There are concerns that this authorisation can take a significant amount of time to process and cannot be issued outside usual business hours.

To address this, it is proposed that water users can take water for a defined period, subject to the following conditions:

- The licence holder notifies the authority within 24 hours of becoming aware the meter is faulty and provides details of why the meter may be faulty
- The water user complies with any written direction requiring alternative water measurement methods to be used

- Records are kept of how much water is taken, the purpose for which the water is taken and the size of the pump or infrastructure used to take the water
- The faulty metering equipment is repaired within 21 days or another time frame authorised by the authority
- The licence holder provides evidence of how much water was taken, which could be by presenting energy data or fuel use.

We seek your views on whether these requirements balance the need for accurate measurement of water take, with the need for water users to maintain their meters and the practical issues businesses face when meters develop a fault.

3. When the licence holder has been given express permission in writing to self-report

This could be in instances where the meter needs to be taken off site for testing or recalibration.

Consultation questions

- Are there any other circumstances when self-reporting should be permitted?
- Are the proposed requirements around faulty meters practical?

Consultation topic 3: How should the metering requirements be rolled out?

It is impractical to immediately implement new metering requirements state-wide. Issues to consider include the availability of meters that can meet the required standard (that is, pattern approved) as well as the availability of suitably trained installers. Rolling out metering requirements in stages will have additional benefits by providing an iterative approach in which 'lessons learned' in one stage can be applied to later implementation stages.

The Minister for Regional Water has committed to a staged approach to rolling out metering requirements, with large users and high risk areas top priorities. The threshold options outlined in this consultation paper will help assist in identifying what a 'large user' means.

Why can't new metering be implemented immediately?

The proposed metering requirements will significantly increase demand for pattern-approved meters in NSW. A key issue is whether there will be enough pattern approved meters on the market, and certified installers to meet this demand.

Currently, there may not be a sufficient supply of pattern approved meters to meet the initial demand, and there are a limited number of Certified Meter Validators/Installers that reside in NSW.

Imposing a mandatory metering requirement through legislation will send a signal to the market. It is expected the market will respond to this and meet the future demand for meters.

The NSW Government will work with Irrigation Australia and other relevant providers to increase the number of Certified Meter Validators/Installers to meet the expected demand.

Consultation questions

- Will staging implementation be sufficient to address the supply of meters and certified installers?
- Are there any other market barriers that should be considered?
- Will manufacturers of pattern approved meters have the capacity to produce enough meters to meet the demand?
- Will the market signals be strong enough to encourage other manufacturers to seek pattern approval?

When would metering requirements be imposed?

It is proposed that the metering requirements are implemented in three stages:

- **Stage 1: 2019–20:** large users and selected high risk areas. Selected areas could be unregulated inland water sources.
- **Stage 2: 2020–22:** other high risk areas.
- **Stage 3: 2022–24:** the rest of the state

Consultation questions

- Are these timeframes achievable?
- Should the staging be based on the size of user and risk of region?

What are large users?

It is proposed to define large users as those falling within the top 20% of any metering threshold.

Consultation questions

- Is this an appropriate way to categorise “large users”?

What are high-risk areas?

High-risk areas are proposed to be inland unregulated regions where there are high risks to the ecology, high competition for water and high value of production.

Inland unregulated rivers are considered the highest risk relative to other water systems, because these systems have:

- **a low proportion of meters**—unregulated rivers have a low proportion of meters.
- **water is less reliable**—the amount of water that can be taken from an unregulated river is considerably less reliable than regulated rivers as they do not have a regulated flow.
- **competition between water users**—generally there are more users seeking to take water from inland water sources than coastal water sources. Where there is greater competition for water or a water user is taking more than their entitlement, it is likely to impact a larger number of other water users.
- **community confidence**—following the Four Corners’ report into water management in NSW airing in July 2017, there is less confidence in the management of water in inland unregulated systems. Focusing the first stage in these regions will help rebuild community confidence and a social licence for businesses in these regions.

The six water-sharing plan regions this would apply to are set out in Table 3 (column 1 unregulated - inland).

However, there may also be a case to include certain coastal and groundwater water sources in the definition of ‘high-risk areas’ because:

- there has historically been very low meter coverage in coastal regions, and
- over 60% of groundwater is taken from four groundwater sources.

Regulated systems are not intended to be defined as ‘high-risk’ because there is a larger proportion of metering in regulated systems and more certainty over water availability.

Consultation questions

- Do you agree that inland unregulated water sources should be prioritised?
- Should any groundwater and coastal water sources be considered as ‘high-risk’?
- Are there any other priorities that should be considered?

Consultation topic 4: Who should own meters?

The principle is that users will pay for the costs of installing and maintaining meters. This was recommended by the Matthews Report and has been accepted by the NSW Government.

The costs of meters vary by size, and location. As a broad estimate:

- the cost of meters can range from \$2,000 for small meters to over \$10,000 for larger or bespoke meters
- telemetry can cost approximately \$2,000 when installed with a new meter, or approximately \$12,000 when retrofitted to existing meters
- stock fences may cost in the order of \$1,500
- installation costs can vary from \$5,000 for standard small meters, to over \$40,000 for larger or complex installations.

Ownership

Currently, ownership of water meters in NSW is shared between WaterNSW and individual licence holders.

Precedents exist for both private and government ownership of meters throughout Australia. We can also look to other, similar industries, such as electricity, gas and urban water to examine the pros and cons of each approach when considering which model to adopt. Attachment C provides a summary of the meter ownership models in other jurisdictions and industries.

We seek your views on whether future meters should be owned:

- by government
- by individual licence holders, or
- mixture where:
 - all meters are owned by government unless licence holders request to own their own meters; or
 - smaller meters are owned by government, with larger meters owned by licence holders.

Option 1: Government ownership

Government ownership of meters would involve government coordinating the installation and maintenance of the meter infrastructure.

This is the model used in the metropolitan water supply industry, where Sydney Water Corporation and Hunter Water Corporation own and are responsible for installing and maintaining water meters. However, the key difference between metropolitan and regional water metering is:

- the concentration of meters in metropolitan areas
- there is less variation in water users and their metering needs, and
- the meters are generally connected to government-owned infrastructure.

Benefits of government ownership include:

- **Market certainty**—suppliers would have certainty about the demand for meters in a given period. This would help ensure a sufficient supply of meters and a more efficient roll-out
- **Costs**—water users would not face high up-front costs associated with purchase and installation of new meters, as costs would be recovered over time through water charges. However, this could be the case regardless of ownership

- **Coordinated program**—government will be able to roll out a coordinated program and there will be efficiencies of scale

Potential disadvantages of government ownership include:

- **Complicates compliance**—there may be a public expectation that the onus to maintain meters and report defects is on the government and not the water user, despite regulations in place
- **Limited consumer choice**—as meters installed will be bulk purchases and customers will have limited ability to tailor the meter to their individual business requirements
- **May stifle innovation**—if a particular technology is chosen
- **Costs**—shifts business cost of compliance from the user to government. In addition, government bears the risk of funding the costs of the meter if the expenditure cannot be recovered from the water user

Option 2: Private ownership

Private ownership of meters would involve licence holders owning, installing, validating and maintaining meters in accordance with guidelines or regulations. This is the model used in South Australia which has the highest metering rate of the Murray–Darling Basin states, with around 96% of surface water take and 88% of groundwater take currently metered.

The benefits of private ownership are:

- **Greater customer choice**—licence holders will have the flexibility to tailor their meters to their needs subject to the minimum requirements for meters. For example, larger businesses may choose to invest in more sophisticated technologies that allow them to access data that can be used to inform and improve their business operations
- **Clear compliance responsibilities**—there would be greater clarity on responsibility for maintaining meters with all requirements relating to meters falling on the licence holder
- **Costs**—the decisions surrounding the costs of installing and maintaining meters lies with the individual or business that benefits from the water take.

Potential disadvantages of private ownership include:

- **Upfront costs**—there may be a significant upfront investment from licence holders to pay for meter installation which could be prohibitive for smaller businesses. This could be addressed by the market, or government:
 - the market may respond by establishing metering lease arrangements, similar to the solar panels market where customers can choose to buy or lease solar panels
 - the NSW Government is exploring options for how the barrier of upfront costs could be addressed. This could include low interest loans and/or recovery of costs through IPART water pricing determinations
- **Reduced visibility**—while metering and installation standards will be mandated by government, there will be less government visibility over the installation and maintenance of meters. The correct installation and maintenance of meters is critical to ensuring meters work effectively. However this could be addressed through regular audits of the installation and maintenance of meters.

Option 3: Mixed ownership model

Under a mixed ownership model, government could coordinate the installation and maintenance of meters, however customers will have the option of opting out and installing their own meters. The costs would be recovered from users over time through prices or other charges determined by IPART.

Alternatively, a mixed model may be that large users own their own meters and government coordinates the installation and maintenance for smaller users.

The benefits of mixed ownership are:

- **Greater flexibility**—water users would have greater flexibility to tailor their meters to their individual business requirements
- **Efficiency of scale**—this option may allow for efficiencies of scale with government coordinating meter installation (depending on the uptake).

Potential disadvantages of mixed ownership include:

- **Complex pricing**—a mixed ownership model may complicate the meter ownership arrangement in NSW and the ability to recover costs through IPART water pricing determinations.

Consultation questions

- Should meters be owned by government, licence holders, or both?
- Is the market likely to respond with creative solutions to the increased demand for meters?

Water take not covered by this paper

This paper is focused on how best to implement the 'no meter, no pump' objectives identified in both the Matthews Report and the MDB Compliance Review.

With this focus in mind, the options in this paper apply to water which is taken from regulated rivers, unregulated rivers and groundwater systems under a licence and can be measured with a meter

This paper does not apply to circumstances which are already captured through other regulatory processes or are being considered as part of other consultation processes, which includes:

1. Water taken under **Basic Landholder Rights**

- Basic landholder rights allows water to be taken for stock and domestic purposes, harvestable rights (water that runs off a property and is stored in a dam) and water taken as part of an individual's Native Title Rights.
- Sections 52 to 55 of the *Water Management Act 2000* exempt water users from the need to hold certain licences or approvals for water taken under some Basic Landholder Rights.
- Reasonable Use Guidelines will be developed to provide guidance on how much water can reasonably be taken under basic landholder rights. We intend to talk to stakeholders about these guidelines in 2019.

2. Water taken from internal infrastructure within **irrigation corporations, private irrigation districts, trusts and urban water supply systems**

- This water take is already metered at the point where the water enters the corporation/district/trust or urban water support system.

3. Water taken from a water source under a **floodplain harvesting** access licence

- Floodplain harvesting measurement and monitoring is being consulted on as part of the Implementing the NSW Floodplain harvesting policy.

4. **Environmental water, unless it is taken via a pump**

- Because of the way in which environmental water is used (for example, allowing water to flow through the system to improve whole-of-river connectivity), it is generally not extracted from a single point that could be metered.
- This paper will apply to environmental water which can be measured 'conventionally' using a pump and meter.

5. **Some State Significant Development (SSD) and mining and gas activities**

- This paper will not apply to instances where water take cannot be measured through a meter, and needs to be estimated. For example, in sand quarries or mining activities the amount of water taken is estimated based on a number of sources of information. This includes evaporation rates, comparing the weight of wet and dry sand, and groundwater monitoring and modelling plans. Metering will not apply to these circumstances.
- SSD activities are primarily governed by the *Environmental Planning & Assessment Act 1979* which sets out a rigorous regulatory framework for approving and licensing these activities.
- This paper may apply to SSD, mining and gas activities where the water taken as part of these activities can be measured 'conventionally' using a pump and meter.

Have your say

The community is encouraged to provide feedback. These responses will be due by 11.59 pm on 15 April 2018 and can be submitted in a number of ways, including:

Online: www.haveyoursay.nsw.gov.au

Email: water.reform@industry.nsw.gov.au

Website: www.industry.nsw.gov.au/water-reform/consultation

Post: Water Renewal Task Force, Department of Industry, GPO Box 5477, Sydney NSW 2001

Next steps

This consultation paper is the start of a conversation the NSW Department of Industry is having with the community on the development of water reforms in the area of water take measurement and metering.

Community submissions will be a critical element to inform the next steps in determining solutions to introduce best practice water management to NSW.

A summary of all community feedback provided as part of the consultation and submission process will be released by the NSW Government in the months that follow the close of the consultation period at 11.59 pm on 15 April 2018.

The NSW Government is committed to ongoing engagement with the community and business on the proposed water reform changes and to ensuring that water users and stakeholders understand the changes being proposed and their potential impacts.

This submission process will inform the legislation to be brought to the Parliament by mid-2018. This legislation will allow the NSW Government to implement key elements of water reform required to address the recommendations of the Matthews Report.

Where actions to deliver on water reform will be implemented by regulation, consultation will be undertaken.

Attachment A—Background on meters

Water-sharing rules and metering

Water-sharing plans have been progressively implemented in NSW since 2001. Water-sharing plans establish rules for sharing water between different types of water users, and provide a framework for trading water.

Metering requirements within water-sharing plans vary considerably depending on the water source, age of the plan and individual water licence conditions.

Where metering rules are in place, they outline metering equipment requirements to ensure installed meters are pattern approved with data logging capability and are compliant with Australian Standards.

Water sharing rules may also outline logbook reporting requirements which include specific time and event information, such as the volume taken, duration of the pump and purpose of the take. This information must be kept for five years. Where a meter is installed and a data logger is used, logbook reporting requirements are exempt.

Metering standards

National metering requirements

In 2009, in response to the National Water Initiative, nationally consistent non-urban water meter standards were introduced in Australia to enable water used in riverine and groundwater systems around Australia to be measured more accurately. More accurate measurement assists water managers and users to identify areas where efficiency can be improved, and minimise water lost through delivery systems.

The 2009 National Framework for Non-urban Water Metering sets out the National Water Meter Standard for metering in Australia. A key requirement is that meters must be pattern approved by the National Measurement Institute, and installed in accordance with Australian Standard 4747 Meters for Non-urban Water Supply (AS4747). The National Framework specifies that:

- all non-urban meters shall comply with the national metering standards by 1 July 2020, unless otherwise exempted by the relevant jurisdictional government department or agency
- any meter installed after 30 June 2010 must comply with the national metering standards
- any meter installed prior to 1 July 2010 shall be replaced with a compliant meter by 1 July 2020. Replacement shall be undertaken at the earliest opportunity, such as when major maintenance is required on the non-compliant meter.

State metering requirements

In 2009, NSW Interim Water Meter Standards were developed to cover new meters installed in NSW prior to the effective operation of the National Water Meter Standards on 1 July 2020. This included grandfathering arrangements for existing meters to transition to meet the National Standard by 1 July 2020.

Currently, in NSW meters are required to be within 5% accuracy (in-situ), be pattern approved and installed in accordance with Australian Standard 4747 Meters for Non-urban Water Supply, by a duly qualified person. Where installed, a pattern approved meter must be constructed so as to allow the incorporation or connection of data logging equipment.

Data loggers allow for meters to capture the time and date the water was taken including instantaneous flow rate, flow totals, status and error messages.

How do meters work?

Water meters record the volumetric flow of water through a conveying work. A conveying work is generally an enclosed pipe, but may also include open channel type structures.



Water meter types

Water meters are generally broken into three types: mechanical, ultrasonic and electromagnetic flow.

Mechanical meters:

- Mechanical meters use a rotating turbine, paddle wheel or propeller to measure the amount of water flowing through a pipe.
- Mechanical meters generally only record the cumulative total and do not record the time or date. They are manually read.
- Some mechanical meters can have a reed switch fitted, which allows a data logger to be connected and telemetry to be used. This is not a common install, however if used, the volume, date and time information is able to be recorded and transmitted remotely.
- Mechanical meters are generally the cheapest meter on the market, but require higher maintenance to maintain accuracy and are easy to tamper if tamper proof fittings were not attached originally.



Ultrasonic meters

- Ultrasonic meters use sound waves to measure water flowing through a pipe.
- Ultrasonic meters generally have the capacity to record the time and date, flow rate, velocity and cumulative total.
- The data can be transferred to a computer.
- The meter itself can be tampered with - however this is not as easy to do as the seal on the meter probe can easily detect interference. The data from the meter is protected through data protocol transfers.
- Tamper proof fittings can be attached to the meters.
- Telemetry can be installed on these meters
- Ultrasonic meters are generally available in three forms:
 - Clamp on: removable transmitter/receiver pairs are clamped to the outside of a pipe and positioned to measure water velocity across the whole pipe.
 - Inline: the sensor is fixed to the inside bottom of the pipe.
 - Insertion: a probe is inserted into the centre of the pipe and measures the velocity at a particular point in the pipe. To operate effectively, these meters typically require bubbles or particles in the water.



Ultrasonic meters

Electromagnetic flow meters

- Electromagnetic flow meters use electricity to measure the amount of water passing through a pipe.
- Piped water is exposed to a magnetic field which creates an electric field in the flowing water as it moves through the pipe. The meter measures the electric field strength.
- The meters have inbuilt data loggers that measure the time and date and total volume of water taken.
- The meters are generally available as an insertion (a probe installed in the pipe), or full bore.
- Telemetry can be installed on these meters.
- The meter itself it not easy to tamper with and the data from the meter is protected through data protocol transfers. Tamper proof seals are used to detect any outside interference.



Ancillary metering equipment

Data loggers

Data loggers allow for meters to capture the time and date the water was taken including instantaneous flow rate, flow totals, status and error messages. They may have an internal modem to communicate data out, or may be used in tandem with telemetry.

Telemetry

Telemetry allows for data from meters to be remotely communicated to a central location, without a physical meter reading.

Telemetry is typically a digital data radio, which gives the data logger the ability to send its information to a centralised control centre. Information can be communicated by radio, mobile or satellite networks or using a combined approach, directed to a point that is connected to the internet.



Telemetry

Remote meter reading

Meters with data loggers and telemetry allow for remote meter reading.

Attachment B—Description of preliminary risk assessment for surface water

Surface water

A high level risk assessment was undertaken for regulated and unregulated rivers. The assessment examined risks in terms of competition between users, or between users and the environment (scarcity of supply, which increases the chance of over-extraction) and ecological and production value (consequence of over-extraction) in the different types of water sources. The table below describes the risk indicators for each type of water source.

Table 4. Surface water

Rational for indicator	Likelihood of competition <i>This indicator is a social measure of need for metering. It reflects the likelihood that water users have low levels of water availability.</i>	Risk to riverine ecology <i>This indicator is an environmental measure of need for metering. It reflects the risk to riverine ecological values.</i>	Compliance risk <i>This indicator is an economic measure of need for metering. It reflects the compliance risk based on competition for water and production value.</i>
Regulated rivers	<p>The indicator is an estimate of the likelihood of low levels of water being available in the regulated river, termed the regulated Drought Security Index (DSI). The regulated DSI is the modelled frequency of water allocation announcements above 80%.</p> <p><i>Where competition for water is high the dam is drawn down more often and water allocations will be lower, and vice versa.</i></p>	<p>The indicator combines the likelihood that key ecosystem functions (KEF) will be impacted by changes in river flows, and the ecological value of aquatic ecosystems. The likelihood of impacts is estimated by the level of hydrologic alteration. The ecological value is rated on ecological parameters: degree of naturalness; the river's distinctiveness, the level of biodiversity and vital life cycle processes (HEVAE framework).</p> <p><i>Where the likelihood of impact is high and the ecological value is high the risk is high, and vice versa.</i></p>	<p>The indicator combines the likelihood of low levels of water availability (DSI) and the value of irrigation production. The regulated DSI is the modelled frequency of water allocation announcements above 80%. Irrigation production is from ABS estimates of irrigated production value in each region for the 2014-15 and 2015-16 financial years.</p> <p><i>Where the likelihood of lack of water is high and the production value is high the compliance risk is high, and vice versa.</i></p>
Inland Unregulated rivers	<p>The indicator is an estimate of the likelihood of low levels of water being available in the unregulated river. For inland unregulated rivers this likelihood is reflected in hydrologic alteration metrics (i.e. KEF metrics), as flows are significantly reduce due to the high demand for watering crops in low flow periods.</p>	<p>The indicator is developed in the same way as the risk to ecology indicator for regulated rivers.</p> <p><i>Where the likelihood of impact is high and the ecological value is high the risk is high, and vice versa.</i></p>	<p>The indicator combines the likelihood of low levels of water being available and the level of irrigation entitlement. For inland unregulated rivers this likelihood is reflected in hydrologic alteration metrics (i.e. KEF metrics). The level of irrigation (production) is indicated by the level of water entitlement (in the absence of suitable data on production</p>

Rational for indicator	Likelihood of competition	Risk to riverine ecology	Compliance risk
	<p><i>This indicator is a social measure of need for metering. It reflects the likelihood that water users have low levels of water availability.</i></p>	<p><i>This indicator is an environmental measure of need for metering. It reflects the risk to riverine ecological values.</i></p>	<p><i>This indicator is an economic measure of need for metering. It reflects the compliance risk based on competition for water and production value.</i></p>
<p>Coastal Unregulated rivers</p>	<p>The indicator is an estimate of the likelihood of low levels of water being available in the unregulated river, termed the unregulated Drought Security Index (DSI). For coastal unregulated rivers the unregulated DSI is the ratio of water available for irrigation during the peak demand months and the amount of water entitlement along the river.</p> <p><i>Where the entitlement is high compared to the available water, competition for water is high, and vice versa.</i></p>	<p>The indicator combines the likelihood that extraction will reduce low river flows, and the ecological value of aquatic ecosystems. Where expected demand for irrigation water is high compared to the 80th percentile river flow, more frequent periods of very low or zero flow are likely. Where data on reduction in low flows was not available (40% of sources), the Unregulated DSI was used to estimate chance of low flows. The ecological value is assessed using the HEVAE framework.</p> <p><i>Where the likelihood of impact is high and the ecological value is high the risk is high, and vice versa.</i></p>	<p>value).</p> <p><i>Where the likelihood of lack of water is high and the water entitlement is high the risk is high, and vice versa.</i></p> <p>The indicator combines the likelihood of low levels of water availability (DSI) and the level of irrigation entitlement. The unregulated DSI is the ratio of water available for irrigation during the peak demand months and the amount of water entitlement along the river. The level of irrigation (production) is indicated by the level of water entitlement (in the absence of suitable data on production value).</p> <p><i>Where the likelihood of lack of water is high and the water entitlement is high the risk is high, and vice versa.</i></p>

Groundwater

The preliminary risk assessment for inland groundwater was based on the five year rolling average of water extraction compared to the long term average annual extraction limit. This is an indicator of the extraction risk for each of the water sources.

The high risk groundwater sources are those where the five-year rolling average extraction is above 80% of the long term average annual extraction limit in water-sharing plans.

There is limited data available for water extraction from coastal groundwater sources, although it is likely that extraction in a number of these sources is close to capacity.

Next steps

Further work will be undertaken to refine the risk assessments to inform the final metering policy.

Attachment C—Summary of metering ownership

	Electricity metering NSW	Electricity metering Victoria	Gas metering NSW	Non-urban water metering in Queensland (unsupplemented systems)	Non-urban water metering South Australia	Non-urban water metering Victoria	Metropolitan water metering NSW
Ownership of meters	<p>The ownership of meters is mixed. Meters are now contestable. Energy retailers can own the meters and arrange installation for residential users and small businesses. Prior to 1 December 2017 meters were owned and installed by energy distributors.</p> <p>Large businesses may own their own meters. In NSW the threshold for large businesses is energy use of >100,000 kWh pa</p>	<p>Smart meters are owned and installed by Victoria's five electricity distributors. Distributors own and manage the poles and wires</p> <p>Large businesses may own their own meters. In Victoria the threshold for large businesses is energy use of >160,000 kWh pa</p>	<p>Distributors own meters.</p> <p>Distributors are responsible for service line and meter installations. Gas plumbers are responsible for meter only installations. Customers are responsible for finding a gas plumber to install a meter</p>	<p>The water entitlement holder is responsible for purchasing a meter, arranging for its installation and certification, and arranging for maintenance of the meter.</p> <p>Ownership of meters is negotiated between water supply authorities and users for supplemented systems (owned by a water provider)</p>	<p>All meters are privately owned (or leased) and licensed water holders are responsible for ensuring that meters are installed according to manufacturer's specification and minimum standards in the South Australian licensed water use specification.</p> <p>Any existing Government meters are offered to users at no cost</p>	<p>Meters are owned by the Rural Water Corporations – Melbourne Water, Coliban Water and Lower Murray Water.</p>	<p>Utilities own meters – measurement of use is critical to supply-demand balance (water planning) and revenue</p> <p>Water authorities arrange (and pay for) installment of meters up to 40mm. For larger meters, customers are responsible for ensuring they are installed by a licensed plumber</p>
Payment	Users pay for meters through retail	Users pay through retail	For basic connections and	Users pays up-front for meters	Owners are responsible for	Users pay through water	Meters are owned by the

	Electricity metering NSW	Electricity metering Victoria	Gas metering NSW	Non-urban water metering in Queensland (unsupplemented systems)	Non-urban water metering South Australia	Non-urban water metering Victoria	Metropolitan water metering NSW
model	<p>electricity prices</p> <p>Prices charged by the distribution businesses for metering services are regulated by the Australian Energy Regulator (AER). These prices are passed through to retail prices.</p> <p>Customers can shop around for different metering packages from their retailer – could be combined meter and tariff package, or separate</p>	<p>electricity prices</p> <p>During the mandatory roll-out of smart meters (2.75 million meters) the cost of installing meters was charged separately to network charges determined by the AER.</p> <p>Flexible pricing plans are available through retailers</p>	<p>meters, the cost is incorporated into gas prices</p> <p>Usage and supply charges are charged by the retailer to recover costs</p>	<p>and associated costs as well as ongoing maintenance and replacement</p>	<p>installation and maintenance costs</p>	<p>prices as established by the Essential Services Commission.</p> <p>Rural Water Corporations decide how they recover costs of metering</p>	<p>utility companies. Costs are recovered from users through water prices.</p>