

# 'Smart' thinking quality control system a first for Australian electricity industry.

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## Controlling Meter Rollout Risks

A scientific approach to auditing its 1.2 million Smart Meter roll out has paid huge dividends for major utility provider CitiPower and Powercor in an industry first.

CitiPower and Powercor, in conjunction with quality and risk management consultants, Compliance Master International, has developed a world-best-practice scientific auditing software system that has enabled it to control the quality level of Smart Meters accepted into service from external contractors.

For the first time this objective, scientific approach to quality control has also enabled CitiPower and Powercor to tie contractor payments to agreed, enforceable quality targets over the course of a project while at the same allowing it to strike the optimum balance between its auditing costs and non-compliance risks.

The result has been a significant improvement in CitiPower and Powercor's capacity to control safety hazards, customer complaints, rework and maintenance costs within acceptable limits, while at the same time achieving an 11.5 per cent reduction in auditing costs compared to industry standard non-scientific methods.

## THE SMART METER CHALLENGE

In 2007, the State government of Victoria, Australia, announced the rollout of new Smart Meters for all Victorian electricity customers over a 5 year period. CitiPower and Powercor had the task of installing 1.2 million meters, over half the total.

It was a massive undertaking, made harder by the new technology, tight regulatory deadlines and the high level of public interest in the program.

One of the major concerns for CitiPower and Powercor was ensuring its Smart Meters were installed in accordance with prescribed technical standards. Safety is paramount, and compliance with these standards ensures minimal risk to the public and to installation personnel. There would also be the added costs and customer disruption associated with having to attend and correct these non-compliant installations at some point in the future.

Ideally, CitiPower and Powercor would have carried out quality inspection on all Smart Meter installations before accepting them into service but the sheer volume, not to mention the cost, of this approach meant it was not practical. A rigorous more practical quality control solution was required.

## Developing a successful, scientific approach

Given the scale of the project, CitiPower and Powercor needed to ensure effective resource allocation and achieve best value for money. The industry standard approach is to audit a fixed per centage of installations but this would not give CitiPower and Powercor the information they needed to assess whether Smart Meters installed by contractors should be accepted into service. It also did not provide a basis from which to make decisions regarding the extent of remedial action required following non-compliances found during the audit process.

To develop a quality control system incorporating the above requirements, CitiPower and Powercor turned to quality and risk management experts Compliance Master International, which developed a software solution based on internationally recognised Acceptance Sampling by Attributes methods outlined in Australian standard (AS1199.1-2003).

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# THE SMART METER CHALLENGE

Two key benefits of using this standard as the basis of a compliance auditing and control system for the Smart Meter project was the robust nature of its audit outcomes and the simplicity of its “go”, “no-go” assessment process - which could be used to reject batches of Smart Meter Installations that failed to achieve specified compliance targets.

Another major reason for selecting the standard was its ability to optimise the Smart Meter auditing process by ensuring CitiPower and Powercor’s auditing resources were always allocated to assessing those compliance requirements that represented the

biggest risk to the project, i.e. Risk Based Auditing.

Standard risk assessment methods (AS 31000) were then used to categorise compliance requirements as “Critical”, “High” or “Moderate” according to their non-compliance risk.

Internal and external Subject Matter Experts were then consulted to develop a suitable Acceptance Quality Limit (AQL) for each risk category; i.e. the AQL representing the maximum number of non-compliances tolerated for each 100 Smart Meters installed. The AQL for “Critical” risks was set at zero in accordance with the standard.

## Example of Smart Meter Risk Categories

Job Type	Specified Compliance Attributes	Risk Category	AQL
Slab Heating Instructions: Replace “Polyphase” meter with smart-meter	No live metal parts	Critical	0.00
	No exposed cables	High	1.00
	Site left in tidy condition	Moderate	6.50

The final system used this information to calculate the optimal number of Smart Meter installations to be randomly audited. It then compared the total number of non-compliances found for each risk category with a predetermined Acceptance Number to determine whether the specified AQL had been exceeded. Only those batches assessed under the specified AQLs were “Accepted” into service by the software, while all other batches were “Rejected”.

Another optimisation feature of the system was its ability to automatically switch individual contractors between three levels of inspection severity to reflect changes in their compliance performance.

i. Normal – no evidence the compliance performance of the contractor is better or poorer than the selected AQL

- ii. Tightened – there is evidence that the compliance performance of the contractor is consistently poorer than the selected AQL
- iii. Reduced – there is evidence that the compliance performance of the contractor is consistently better than the specified AQL

By incorporating this capability into the compliance auditing system, CitiPower and Powercor could be assured that the correct inspection severity was always applied to each audit. Furthermore, substantial reductions in inspection costs of up to 60 per cent could be achieved if a contractor was switched to a “reduced” inspection severity.



## Objective contractor management

One reason why many non-scientific auditing systems fail to operate at optimal efficiency is that organisations lack the statistical tools and expertise needed to accurately measure and assess quality performance. Unfortunately, “what doesn’t get measured doesn’t get controlled.”

Consequently important contract performance requirements are often omitted from contract terms, simply because they cannot be enforced or, they are linked to controls that do not come into effect until something serious goes wrong - at which point it is usually too late to take corrective action.

With the availability of a scientific-based auditing and control solution, CitiPower and Powercor was able to incorporate a series of standardised performance requirements into its service provider contracts to a level higher than was previously available.

Identifying non-compliances from an audit was one thing, but being able to develop a series of standardised quality control actions based on the outcomes of an objective compliance assessment process was another.

The audit severity switching component of the software solution provided CitiPower and Powercor another objective way to monitor contractor performance. In addition to the control mechanisms above, when the system determined a contractor needed to have the severity of its audits altered, it triggered a management opportunity for CitiPower and Powercor to take further action to control compliance levels.

For example, if audit levels have been tightened it highlights underperformance and resulted in a penalty. If the severity level is relaxed, it shows good performance which could lead to incentive payments.



# OBJECTIVE CONTRACTOR MANAGEMENT

## CitiPower and Powercor Software Outputs vs Standardised Compliance Controls

Software Output	Standardised Compliance Controls (Smart Meter Contract)
Critical non-compliance detected	<ul style="list-style-type: none"> <li>Service-provider suspension until full root-cause analysis carried out and cause(s) of non-compliance corrected to the satisfaction of CitiPower and Powercor.</li> </ul>
One or more AQL exceeded. (i.e. Batch Rejected)	<ul style="list-style-type: none"> <li>Service-provider immediately advised submitted batch has been rejected because it has exceeded one or more agreed AQLs.</li> <li>Payment of the rejected batch to be withheld until all non-compliances are corrected in accordance with specified requirements and batch passes a reinspection.</li> </ul>
One or more non-compliant Attributes identified.	<ul style="list-style-type: none"> <li>Details of non-compliance to be forwarded to responsible contractor for evaluation, rectification and continuous improvement.</li> </ul>

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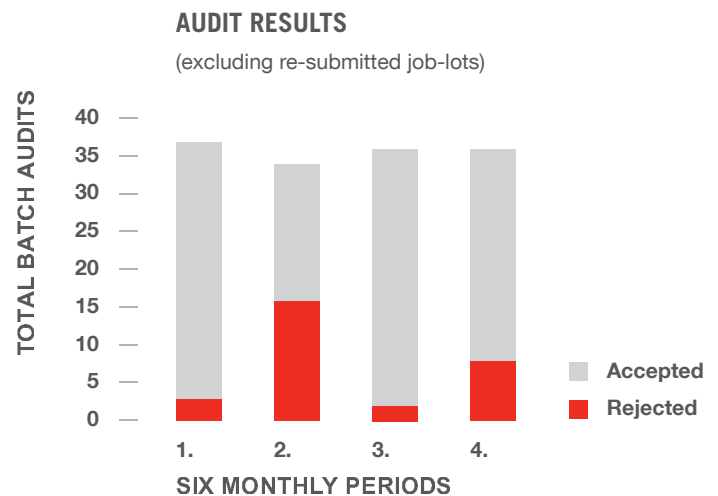
## OUTCOMES IN PRACTICE

### SYSTEM EFFECTIVENESS

During the first two years of the Smart Meter project, approximately 21,400 audits had been carried out by CitiPower and Powercor and monitored using its compliance auditing and control software. As a result of these audits approximately 29 batches (around 20 per cent) were assessed as exceeding one or more risk category AQLs and were consequently "Rejected".

As outlined above there were two clear spikes in batch rejection rates in Periods 2 and 4. Further analysis showed that the rise in Period 2 was due to continuity problems experienced when an influx of newly trained and less experienced contract personnel came on line just prior to a major holiday break.

Period 4's spike was due to a regulatory investigation into a number of Smart Meter failures caused by loose cable



connections. This resulted in a re-evaluation of this compliance attribute to a "critical" risk rating (with full agreement from the contractors). Following this adjustment a series of loose connections were discovered in sample audits which resulted in a complete rejection of the associated batches. Although not indicated by the graph, there has once again been a sharp reduction in number of batch rejections after Period 4.

# OUTCOMES IN PRACTICE

## SYSTEM EFFECTIVENESS

Drilling down further into the auditing data, all the batch rejections in Periods 1, 2 and 3 occurred as a result of only the “High” risk AQL being exceeded. This has caused CitiPower and

Powercor to consider a tightening of the AQL for “Moderate” risk attributes going forward to further improve quality.

The fact that there were a large number of lot rejections in Periods 2 and 4 demonstrates the system’s capability to control Smart Meter non-compliance risks by rejecting batches that failed to achieved the prescribed quality targets.

## SYSTEM EFFICIENCY

To judge the efficiency of CitiPower and Powercor’s scientific quality auditing and control system the Comparison of Sampling Methods graph compares the total number of audits conducted over Periods 1 to 4 of the project with what

would have been required if the standard industry flat 5 per cent non-scientific sampling approach had been applied.

The scientific-based system led to a reduction in audit requirements of 11.5 per cent whilst simultaneously improving the robustness of the data and quality control effectiveness.

### COMPARISON SAMPLING METHODS

Scientific (AS1199.1) vs Non-Scientific (Flat 5%)



## Conclusion

The relevance of this new ‘Smart’ approach to quality auditing and control for the Australian electricity industry is that it demonstrates that a carefully designed Acceptance Sampling by Attributes system based on AS1199.1 methods can provide much better results for the clearing of installations than traditional non-scientific methods and in some circumstances at a much lower cost.

Previous implementations of this methodology have required a large investment of resources in establishing and running projects. While care has to be taken to ensure the correct set up of the project, the software driven approach developed by Compliance Master International makes Acceptance Sampling by Attributes a far more achievable and robust solution for organisations.

There are clear efficiencies and effectiveness gains in knowing the correct number of audits is taking place and that they control the most relevant areas of risk. The compliance methodology itself gives organisations far more robust and defensible quality control outcomes.

When applied to contractor quality control an organisation can develop a prescribed set of corrective actions based on certain probabilistic outcomes. This makes their responses to observed non-compliances more efficient and less prone to variation and error.

With the increasing use of outsourced providers to carry out major projects for organisations, the traditional sampling and auditing approaches provide little value in helping objectively manage and reward, or penalise, contract performance. Taking the scientific approach delivered far more certainty to CitiPower and Powercor around contract delivery and took away the guesswork of how performance targets were being met.

# COMPLIANCE MASTER INTERNATIONAL

Compliance Master International provides compliance assessment and control software solutions and consulting services to organisations worldwide. Its core product is a scientific compliance, risk and auditing control system that enables organisations to more effectively manage their quality and compliance processes. The company operates internationally from its based in Melbourne, Australia.

[www.compliance-master.com](http://www.compliance-master.com)



# CITIPOWER & POWERCOR

CitiPower and Powercor Australia are two of Victoria's five privately owned electricity distribution businesses. CitiPower and Powercor Australia are owned by Cheung Kong Group and Spark Infrastructure.

CitiPower supplies electricity to more than 310,000 distribution customers in Melbourne's CBD and inner suburbs. The company's primary role is the management of its 'poles and wires' network, and proudly operates among the most reliable urban and rural electricity networks in Australia.

Powercor Australia is Victoria's largest electricity distributor, which supplies electricity to regional and rural centres in central and western Victoria, and Melbourne's outer western suburbs. Powercor services approximately 700,000 distribution customers, and operates successful non-regulated businesses.

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