CURTIN UNIVERSITY

PROJECT DELIVERY GUIDELINES

SERVICES METERING GUIDELINES

000346

Curtin University

	Details of revisions		
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Contents

1 OVERVIEW

1.1 GENERAL

The purpose of this Project Delivery Guidelines document is to set out the minimum requirements for Utility (electrical, gas, water, thermal) metering and energy device monitoring (UPS, Generators, Circuit Breakers). This document is not intended to be all encompassing and is provided to assist consultants and contractors to develop metering strategies for Curtin University campuses and buildings. This guideline does not outline all technical requirements needed to achieve a complete metering system and consultants/contractors are required to ensure such technical requirements are addressed in accordance to best practice industry standards and legislation.

This document should be read in conjunction with the supporting documents and checklists detailed in Section 6.

The Project Delivery Guidelines have been prepared in consultation with Curtin University subject matter experts and stakeholders. It is recognized that the subject matter of the Guidelines will not always be suitable for all project elements and departures from the Guidelines may be required or desirable.

Departures from Guidelines must be endorsed by the Infrastructure Manager for the service for technical capability and approved by Operational Technology for compatibility with the Curtin metering network standards. Curtin representatives commit to providing a response to a departure request within 10 business days.

Departures must be recorded in a project register and recorded and reviewed in the Project Control Group meeting minutes under its own meeting agenda item "Project Delivery Guideline Departures". Where the University subject matter expert identifies that a departure adds ongoing value to the University, the subject matter expert will consult with the Document Owner to update the relevant Guideline.

1.2 DOCUMENT OWNER & REVIEW

This document is owned by the Operational Technology Department who are responsible for the ongoing accessibility, availability, and accuracy of metering data across Curtin University and will be reviewed on an annual basis in line with technology developments and updates.

1.3 METERING OBJECTIVES

Outcomes expected by the University include:

- Improved campus-wide resource management

- Metering accuracy and granularity commensurate with the intended use of the data

- Improved energy and water monitoring and reporting

- Clarity and uniformity of data and graphics displays across all services

- Appropriate connectivity to all metering devices to facilitate interconnectivity of existing and future systems requiring access to the data

- Simple and secure data access across all approved stakeholder groups including but not limited to:

  - o Infrastructure & Planning Teams

  - o Operations & Maintenance Teams

  - o Sustainability Teams

  - o Finance and Utilities Teams

  - o Industry Partners/Research Groups and Students

  - o Tenants

1.4 PRE-QUALIFIED SERVICE PROVIDERS

Pre-Qualified service providers for each of the relevant metering services can be found in the appropriate Interface Requirements Document **REF: InterfaceRequirements.xlsx.**

It is the Consultants' responsibility to obtain the required details and to engage with the University Infrastructure Managers and Operational Technology to ensure that the requirements for the systems are fully understood.

2 GENERAL REQUIREMENTS

2.1 SERVICES TO BE METERED

The following services shall be metered. Sub-metering beyond the list below may be required and must be determined in consultation with Curtin University.

- Electrical
    - o Authority Feeds
    - o Building Main Switch Boards
    - o Sub Feeds incl Power, Lighting, Lifts, Mechanical (Mechanical metering to be discussed with infrastructure managers and operational technology to ensure best solution), External Supplies, etc
    - o Mechanical switchboard internal submetering according to the load and grouping of equipment
    - o Tenancies

- Gas
    - o Authority Feeds
    - o Building Incomer
    - o Mechanical Plantrooms (per boiler)
    - o Lab gas supply (incoming supply)
    - o Tenancies

- Thermal
    - o Mechanical Plantroom - Energy meters for the chilled and heating hot water
    - o Steam system
    - o Building Incomer (Consumption)
    - o Tenancies

- Water
    - o Authority Feeds
    - o Building Incomer
    - o Mechanical Plantrooms make up and cooling tower supplies, expansion system water supply
    - o Tenancies

All data collection shall be undertaken in line with Curtin's Metering Data Requirements which can be found **REF: InterfaceRequirements.xlsx**.

Data should be stored for at least 36 months to account for any changes to the system e.g. a controls upgrade, added gross floor area. After 36 months the data shall be archived in accordance with existing procedures.

2.2   ACCEPTABLE METERS

The selection and installation of metering equipment on the site must comply with the National Construction Code, Australian and international standards, and with the requirements described in this document in order to successfully integrate with the existing site-wide meter monitoring systems.

Key factors for meter selection include:

- compliance to applicable standards
- accuracy class
- networking and communications capability
- NMI approval for billing purposes
- availability of product and technical support within Western Australia.

Key factors for meter installation include:

- compliance to applicable standards, codes and legislation
- consistent installation methodology
- correct and consistent commissioning and verification procedure
- consistent documentation and record keeping.

Examples of pre-approved meters and ancillary equipment are included **REF: InterfaceRequirements.xlsx**.

2.2.1   VIRTUAL METERS

Virtual meters occur when a software-created addition or subtraction of meters is required to obtain the metered values.

The use of Virtual meters shall be avoided where possible due to the potential risk of increased inaccuracy. Correctly designed water, gas, waste drains, irrigation, wet fire, chilled and heating water piping and electrical arrangements must negate the necessity for virtual metering.

Proposed virtual metering workarounds include the use of power tags on electrical metering details of which can be found **REF: InterfaceRequirements.xlsx**. Where a virtual meter is unavoidable for determining a full picture of consumption, the approach must be endorsed by the Infrastructure Manager and approved by Operational Technology.

The consultant is responsible for ensuring that the virtual meter data/calculated values are available and consistent across all necessary data platforms and any changes to virtual meter calculations as a result of upgrade works are clearly communicated through the specification.

2.3   COMMUNICATIONS PROTOCOLS & GATEWAYS

The selection and installation of communications and network interfacing equipment on the site must comply with the National Construction Code, Australian and international standards, and with the requirements described in this document in order to successfully integrate with the existing site-wide meter monitoring systems.

Key factors for equipment selection include:

- compliance to applicable standards

- networking and communications capability in line with Curtin University standards

- availability of product and technical support within Western Australia

Examples of pre-approved meters and ancillary equipment are included **REF: InterfaceRequirements.xlsx**.

2.4 ALTERNATIVE PRODUCTS

Alternative products may be proposed in lieu of those designated, but they must be comparable with an acceptable device. Details of the proposed device, detailing all relevant technical compliance parameters must be submitted to the Curtin University Infrastructure Manager, via the Consultant(s), for approval before being used on the site.

The Meter Product Departure Approval Form can be found **here.**

Curtin University will determine whether the product is an acceptable alternative and is not obliged to accept any proposed alternative. It shall be the responsibility of the Curtin University Operational Technology team to approve alternative products within 10 business days.

3   DELIVERY PROCESS & RESPONSIBILITIES

Curtin University has prepared a Metering Onboarding Compliance Checklist that outlines the key requirements at each phase of the project to ensure that any newly installed meter is available in an accurate and timely manner for all relevant stakeholders. This checklist can be found **REF: ProjectChecklists.xlsx.**

3.1   DESIGN & TENDER

It will be each service consultant's responsibility to design their respective metering system.

Consultants are expected to coordinate and develop integrated metering systems that are interfaced to the relevant software platforms as per the approved meters and protocols listed in **REF: InterfaceRequirements.xlsx**. The design team, at its discretion, may appoint one consultant to manage the coordination.

Refer to the **'Design & Tender Checklist'** tab in **REF: ProjectChecklists.xlsx** for minimum requirements.

3.2   PRE-CONSTRUCTION

The contractor is responsible for following the appropriate Asset Management and Operational Technology processes to allocate, retire and update records for active equipment installed across the University.

Refer to the **'Pre-Construction Checklist'** tab in **REF: ProjectChecklists.xlsx** for minimum requirements and processes.

The Contractor is responsible for obtaining the information early in planning and construction as labelling is required to be present on shop drawings, as-constructed drawings, as-constructed records, and physically on metering devices, in addition to the network hardware impacting the active ICT equipment requirements for the delivery.

Curtin are responsible for responding to requests within 10 business days and will provide the contractor with all required network programming instructions for the nominated device.

3.3   METER INSTALLATION

It shall be the responsibility of the meter installation Contractor to select the correct meter type and sensing size, the range and capacity of associated meter ancillaries to ensure their suitability for purpose.

The Contractor's meter technician shall be responsible for the installation, configuration and commissioning of meters, data loggers and IP network gateway devices and to confirm that meter data is accurate and is being transmitted correctly through the IP network gateway devices to the site meter monitoring system.

It shall be the responsibility of the Contractor to liaise and work together to initially commission and verify the meters and to then validate the readings in associated platforms after a nominal period of time has transpired.

The Contractor is responsible for employing the services of a Curtin approved Meter integration

specialist to on-board and update all relevant information on the various Curtin Systems.

It shall be the responsibility of the contractor to update all information in the relevant systems including when an existing meter is moved from one location to another. The range of information that needs to be updated in the relevant systems includes but is not limited to the relevant meter trees, floor plans, single line diagrams etc. The contractor is also responsible for conducting a full revalidation of the meter post relocation.

Refer to the **'Meter Installation'** tab in **REF: ProjectChecklists.xlsx** for minimum requirements.

3.4 COMMISSIONING, VALIDATION AND VERIFICATION

The contractor is responsible for ensuring that all reasonable measures have been taken to ensure full and complete commissioning, verification and validation of all installed metering on site including the remediation of defects identified as part of the verification or validation process.

The Consultant is required to ensure all control and reporting software systems are correctly capturing the metering and review commissioning and As Constructed records, and operation and maintenance manuals for compliance to Curtin requirements.

Refer to the **'Meter Onboarding'** and **'Meter Commissioning'** tabs in **REF: ProjectChecklists.xlsx** for minimum requirements.

3.5 DECOMMISSIONING OF OBSELETE METERS

The contractor is responsible for ensuring that all reasonable measures have been taken to ensure full decommissioning of all obsolete metering devices, gateways, and loggers. It shall be the responsibility of the contractor to employ the services of a Curtin approved metering integrator to update all information on the relevant systems including but not limited to the relevant meter trees, floor plans, single line diagrams etc.

Refer to the **'Meter Off-boarding'** and **'Meter Decommissioning'** tabs in **REF: ProjectChecklists.xlsx** for minimum requirements

3.6 USER INTERFACES

A number of different graphical and reporting systems are in use at Curtin University.

It shall be the responsibility of the Consultant to define the appropriate reporting and visualization requirements for the metering being installed to ensure all stakeholders have appropriate levels of visibility and access.

It shall be the responsibility of the Contractor to ensure the graphics, alarms and reports have been delivered in accordance with the project specific requirements and that data is consistent across the interfaces.

Refer to the **'Meter Commissioning'** tab in **REF: ProjectChecklists.xlsx** for minimum requirements.

3.7 RECORDS METER INSTALLATION AND COMMISSIONING

Curtin retains master Operations and Maintenance manuals and Asset registers for metering, managed by Building and Services Data Management (Drawing Services).

The Consultant and Contractor shall consult and meet with Building and Services Data Management (Drawing Services) to determine the update process, if any

Refer to the **'Records Checklist'** tab in **REF: ProjectChecklists.xlsx** for minimum requirements.

Contractor shall submit the as constructed metering schematic with identification of each meter interface

4 APPLICABLE STANDARDS

The meters, ancillaries, cabling and installation provided shall comply with the following standards including all current amendments.

Service	Reference	Application
ALL	AS/ACIF S009	Installation Requirements for Customer Cabling (Wiring Rules)
ALL	AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
ALL	AS/NZS 3080	Telecommunications installations - Generic cabling for commercial premises (ISO/IEC 11801:2002, MOD)
ALL	EN 13757-2 physical and link layer,	M-Bus (Meter-Bus) is a European standard for the remote reading of water meter, gas or electricity meters.
ALL	EN 13757-3 application layer	
ALL	Modbus Application Standard V1.1b	
ALL	Industrial Communication Network Profiles IEC 61784	Group of standards governing the Modbus Protocol
ALL	Fieldbus IEC 61784	
ALL	EIA-485	Communication standard for RS-485 installation
Electrical	IEC 62053-21	Electricity Metering Equipment Particular Requirements
Electrical	AS60044.1	Instrument transformers – Current transformers
Electrical	AS60044.2	Instrument transformers – Voltage transformers
Thermal, Water	OIML R 49-1	Water Meters Metrological and Technical Requirements
Thermal, Water	AS/NZS 3500	Plumbing Code
Gas	OIML R 49-1	Gas Meters Metrological and Technical Requirements
Gas	Gas Code	Gas Code
Gas	Gas Supply Authority	Gas Supply Authority
ALL	000313 PDG Data Communications Cabling Requirements	Data Communication Cabling Standards and Specifications Here

5 ABBREVIATIONS

Abbreviation	Meaning
BMS	Building Management System: One of two mechanical building management systems (BMS) on Curtin campuses and one electrical building management system, managed by Pre-Qualified service providers, whose responsibilities relate to interfacing to the metering via the Curtin network through to BMS graphics, fault management, programming and data storage, to suit specific services requirements. The BMS is not the reporting software system.
CHW	chilled water
CU	Curtin University
DTS	Curtin University Digital & Technology Solutions
FOBOT	Fiber Optic Break Out Terminal/tray
HLI	high level interface
HV	High voltage
IM	Curtin University infrastructure manager for the specific discipline under consideration which may include electrical, mechanical, hydraulic and irrigation
IP	Internet Protocol
LV	Low voltage
LoRa	Long Range – LoRa devices and wireless radio frequency technology is a long-range, low-power wireless platform
MSTP	Master/Slave Token Passing protocol
NMIA	National Measurement Institute of Australia
NSX	type of circuit-breaker
OT	Operational Technology
PME	Power Monitoring Expert

Abbreviation	Meaning
RCM	Regulatory Compliance Mark
SLD	Single Line Diagram
TO	Telecommunications Outlet
UPS	uninterruptible power supply

6 REFERENCES

The following reference documents can be found within the Project Delivery Guidelines listings on the Guidelines page of the Properties, Facilities & Development website at:

https://properties.curtin.edu.au/workingwithus/guidelines.cfm

- *000089 Documentation Deliverables Guidelines*
- *000313 PDG Data Communications Cabling Requirements* *Here*
- *000312 PDG Electrical Services Guidelines* *Here*
- *000311 PDG Mechanical Services Guidelines* *Here*
- *000326 PDG Hydraulic Services Design Guidelines* *Here*
- Appendix Reference Documents
  - AssetRegisterInterface.xlsx
  - InterfaceRequirements.xlsx
  - ProjectChecklists.xlsx
  - ProFormaTemplates.xlsx