Network Monitoring Devices Supporting Information

Introduction

New monitoring devices will installed at locations on the power distribution network in the Bracknell postcode (RG12) area to support a number of aspects of the Thames Valley project. Outputs from existing monitoring equipment may also be used to support the project, however for these devices data may be acquired via new/different communications platforms providing data at a different (reduced) latency.

The information provided by existing and new monitoring devices will provide inputs into system control devices (real time applications) and information to support planning and modelling applications (planning timescales).

The relevance to other workstreams is detailed in the table below:

Workstream	Use	Timescale Requirements	Comments
2. Integrated Operation	Provision of data to active Network Management Hub	Near real time	Interface with – WP2.1, WP2.2, WP2.3
3. Network Modelling and Planning	Provision of raw data to enable in depth network modelling and the development of new network planning tools	Planning timescales	Interface with – WP3.1, WP3.2, WP3.3, WP3.4, WP3.5, WP3.6, WP3.7
4A Network Monitoring Devices	See introduction	Near real time and planning timescales.	Is a fundamental element of the following work packages – WP4A.1, WP4A.2
4B. Network Automation, Management and Control	Provision of data to support automation, management and control either directly from s/s monitoring equipment or via a centralised system.	Near real time and planning timescales.	Is a fundamental element of the following work packages – WP4B.3, WP4B.4
5. Network Energy Storage and Generation	Provision of control information to other devices connected to	Near real time and planning timescales.	Interface with – WP5.1, WP5.2, WP5.3, WP5.4, WP5.6

	the distribution network		
6. End Point Monitoring	Monitoring system exit points, domestic, commercial and industrial (all sizes).	Near real time and planning timescales.	Interface with –WP6.1, WP6.2, WP6.3, WP6.4
7. Demand Response and Control	Data inputs into control system/hub, measure effect of actions taken	Near real time and planning timescales.	Interface with – WP7.1, WP7.2, WP7.5
8. Large Business Enterprises	Data inputs into control system/hub, measure effect of actions taken	Near real time and planning timescales.	Interface with – WP8.2, WP8.3, WP8.4, WP8.5
9. Learning and Dissemination	Data input into web portal to advise what is happening on the network	Planning timescales – perhaps more frequent, i.e. daily	Interface with WP9.1, WP9.2, WP9.4

Monitoring Equipment Requirements

Existing monitoring devices will be supplemented by new devices installed at the following locations:

Bracknell Primary s/s

- At the network exit point for all 11kV customers
- At the LV output from all 11/.433kV distribution transformers (all three phases)
- At each LV cable connection within all 11/.433kV distribution substations (all three phases)
- Along selected LV feeders at suitable locations (existing or new plant to be installed)
- At the network exit point for selected HH customers (> 100kVA authorised capacity)
- At the network exit point for selected NHH customers (< 100kVA authorised capacity)
- Smart Meters at approximately 1000 network exit points (spread across distribution substations)
- LV Smart Fuse carriers (miscellaneous ratings) as and when required to “fill gaps” in data/intelligence

Easthampstead Primary s/s

- At the network exit point for all 11kV customers on 4 selected 11kV feeders which back feed into Bracknell Primary s/s (the selected feeders are:- E1L5, E2L5, E4L5, E5L5)
- At the LV output from all 11/.433kV distribution transformers (all three phases) on the 4 selected 11kV feeders back feed into Bracknell Primary s/s
- At each LV cable connection within all 11/.433kV distribution substations (all three phases) on the 4 selected 11kV feeders which back feed into Bracknell Primary s/s
- At the network exit point for selected HH customers (> 100kVA authorised capacity) on the 4 Selected 11kV feeders
- At the network exit point for selected NHH customers (< 100kVA authorised capacity) on the 4 Selected 11kV feeders
- No Smart Meters unless a specific substation is chosen for demographic reasons
- LV Smart Fuse carriers (miscellaneous ratings) as and when required to "fill gaps" in data/intelligence

Warfield Primary s/s

- At the network exit point for selected 11kV customers on 3 selected 11kV feeders which back feed into Bracknell Primary s/s (the selected feeders are:- E3L5, E6L5, E7L5)
- At the LV output from all 11/.433kV distribution transformers (all three phases) on the 3 selected 11kV feeders which back feed into Bracknell Primary s/s
- At each LV cable connection within all 11/.433kV distribution substations (all three phases) on the 3 selected 11kV feeders which back feed into Bracknell Primary s/s
- At the network exit point for selected HH customers (> 100kVA authorised capacity) on the 3 Selected 11kV feeders
- At the network exit point for selected NHH customers (< 100kVA authorised capacity) on the 3 Selected 11kV feeders
- No Smart Meters unless a specific substation is chosen for demographic reasons
- LV Smart Fuse carriers (miscellaneous ratings) as and when required to "fill gaps" in data/intelligence

Monitoring device locations and uses are detailed in the table below:

Monitoring Device Information													
Location	Existing Devices			New Devices								Interfaces	Comments
	Measures	Device	Use	Measures	Device	Use	Supplier	Data Requirement	Number	Cost / Unit	Total Cost		
33kV -	Current	CT's	Protection	N/A	N/A	N/A	N/A	None	-	-	-	Existing	No intention to use

Primary s/s	Voltage	VT											data from existing 33kV devices
11kV at Primary s/s	Current Voltage Power	CT's VT	Protection AVC Metering	N/A	N/A	N/A	N/A	Existing May Change	-	-	-	Existing	Existing devices may be used to provide additional information/data
11kV Beyond Primary s/s	Current	CT's	Protection	N/A	N/A	N/A	N/A	Existing May Change	-	-	-	Existing	Existing devices may be used to provide additional information/data
11kV Customer Supply Point	Current Voltage Power Reactive Power Import / export	CT's VT	Protection Metering	Current, Voltage Power Reactive Power kWh kVArh	Sensor 11kV Cable End Box	Provision of HV consumer conect'n info	Power sense / other?	Real Time & Planning	Bracknell x 40 Easthampstead x 10 Warfield x 5 **Total 55 units**	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Could possibly use existing metering equipment depending upon interface burden not affecting meter accuracy
Dist s/s at TFR LV exit / links	Current	CT's	Maximum Demand Indication	Current, Voltage Power Reactive Power kWh, KVArh	Sensor LV busbars / links	Provision of LV substation data	Sentec / Nortech Current Group / Other?	Real Time & Planning	Bracknell x 210 Easthampstead x 60 Warfield x 55 **Total 325**	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Alternative to installation - Will be able to summate data from LV cable monitoring
Dist s/s at LV cable con	None	None	None	Current, Voltage Power Reactive Power kWh, KVArh	Sensor LV cable	Provision of LV cable data	Sentec / Nortech or Current Group	Real Time & Planning	Bracknell x 1200 Easthampstead x 325 Warfield x 265 **Total 1790**	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Monitor all phases + neutral of all LV cables
Along LV cable	None	None	None	Current, Voltage	Sensor LV cable	Provision of LV	Sentec / Nortech or	Real Time &	Selected locations	See costing	See costing	ANM Hub Modelling ,	Monitor all phases of all cables +

adjacent to point of possible constraint				Power Reactive Power kWh, KVArh		cable data	Current Group	Planning	in areas **Total 25**	sheet	sheet	Network Energy and Storage, End Point Monitoring, Demand Response	neutral on selected LV cables in Bracknell area (where Smart Meters are to be installed)
Customer Supply Point >70kVA (CT metered)	Current, Voltage Power Reactive Power Import / export	CT's LV Voltage Reference	Metering	Current, Voltage Power Reactive Power kWh, KVArh	Smart Meter (3ph), Sensor LV cable or Smart Fuse	Provision of LV consumer conect'n info	Sentec / Nortech or Current Group or Lucy	Real Time & Planning	Bracknell, max of 80 Easthampstead, max of 10 Warfield, max of 10 **Total Max 100**	TBC	TBC	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Could possibly use existing metering equipment depending upon interface burden not affecting meter accuracy. Alternative use existing metering data - longer timescales only
LV (3ph) Customer Supply Point <70kVA	kWh Import / Export	Dumb Whole Current Meter	Metering	Current, Voltage Power Reactive Power kWh, KVArh	Smart Meter (3ph)	Provision of LV consumer conect'n info	TBC (Energy Supplier)	Planning & as near real time as SM system enables	Bracknell x TBC Will be determined by network / location requirements	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Supplier responsibility
LV (1ph) Customer Supply Point domestic / small com	kWh Import / Export	Dumb Whole Current Meter	Metering	Current, Voltage Power Reactive Power kWh, KVArh	Smart Meter (1ph)	Provision of LV consumer conect'n info	TBC (Energy Supplier)	Planning & as near real time as SM system enables	Bracknell x 1000 **Total 1000**	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Supplier responsibility

Customer Supply Point domestic / small com (Smart Fuse)	kWh Import / Export	Dumb Whole Current Meter	Metering	Current, Voltage Power Reactive Power kWh, KVArh	Smart Fuse (1ph)	Provision of LV consumer conect'n info	Lucy or Sentec / Nortech or Other	Planning & as near real time as SF system enables	Bracknell up to 1000	See costing sheet	See costing sheet	ANM Hub Modelling , Network Energy and Storage, End Point Monitoring, Demand Response	Device development required outside LCNF. Lucy is interested. Fill in where SM not available
Street Lighting Supply Point (Smart Fuse)	kWh Import / Export	None – Use of Inventory Informatio n	Calculate Consumpt ion Data	Current, Voltage Power Reactive Power kWh, KVArh	Smart Fuse (1ph)	Provision of street lighting consumpti on	Lucy or Sentec / Nortech or Mayflower	Planning & as near real time as SF system enables	Bracknell number and scope TBC	See costing sheet	See costing sheet	ANM Hub Modelling , End Point Monitoring,	Device development required outside LCNF. Lucy is interested. For consideration only – may not be required.

Notes:

Measurement of Power Quality information will be desirable, this should include harmonic measurement and voltage flicker.

Other potential / additional monitoring could include:

- Distribution Substation / Transformer Temperature (possibly rate of change of temperature) and Humidity
- LV Cable temperature
- Wind speed and direction
- Solar radiation