Common Network Asset Indices Methodology Report

Information Gathering Plan

September 2016

RIIO ED1

Executive Summary

Licence Condition 51 part E instructs Distribution Network Operators (DNOs) to submit and 'Information Gathering Plan' no later than 12 weeks after the Authority's approval of the Common Network Asset Indices Methodology (CNAIM). This report fulfils the requirements as set out in SLC 51E for SP Energy Networks.

A table has been provided for each reportable asset category detailed in the CNAIM, each table indicates if the information is currently captured, the frequency of capture and the data store in which the data is mastered. A narrative is also provided for each asset outlining our data capture strategy.

The Information Gathering Plan will be reviewed on an annual basis or at the direction of the Authority.

Contents

Chapter 1

Data and Corporate Systems

1.1 Corporate Systems

SP Energy Networks consider four of our IT tools to be 'Corporate Systems' which are the preferred data stores for the purposes of reporting, both internally and externally. Our Corporate Systems are outlined below:-

- SAP – Is our primary financial data platform and also contains the master data for our static assets e.g. Switchgear and Transformers. SAP also contains the maintenance schedules for our assets and any defect information.
- ESRi – Is our primary Geographical Information System (GIS) and holds the master data for our linear assets e.g. cables and overhead lines. ESRi also holds additional geospatial information through a series of mapping layers
- PowerOn – Is our real time control system which utilises both the static information from SAP and/or ESRi and also real time signalling information to determine the current network status. This platform also allows for real time control of the network through remotely operable assets.
- Plant Information (PI) – Is the principal store for our analogue network monitoring data. This includes live substation loading information and power flows. PI provides real time information to PowerOn.

Both CBRM and the CNAIM aligned CBRM output are cable of utilising data from a variety of sources in order to provide the Secondary Deliverables reporting requirements. We plan to complement our Corporate Systems with a number of internal databases and spreadsheets to provide a richer view of asset risk. It is however our long term IT strategy to transition the information stored in these databases to the appropriate Corporate System; this transition will take time and must be carried out in a controlled manner in order to maintain data integrity.

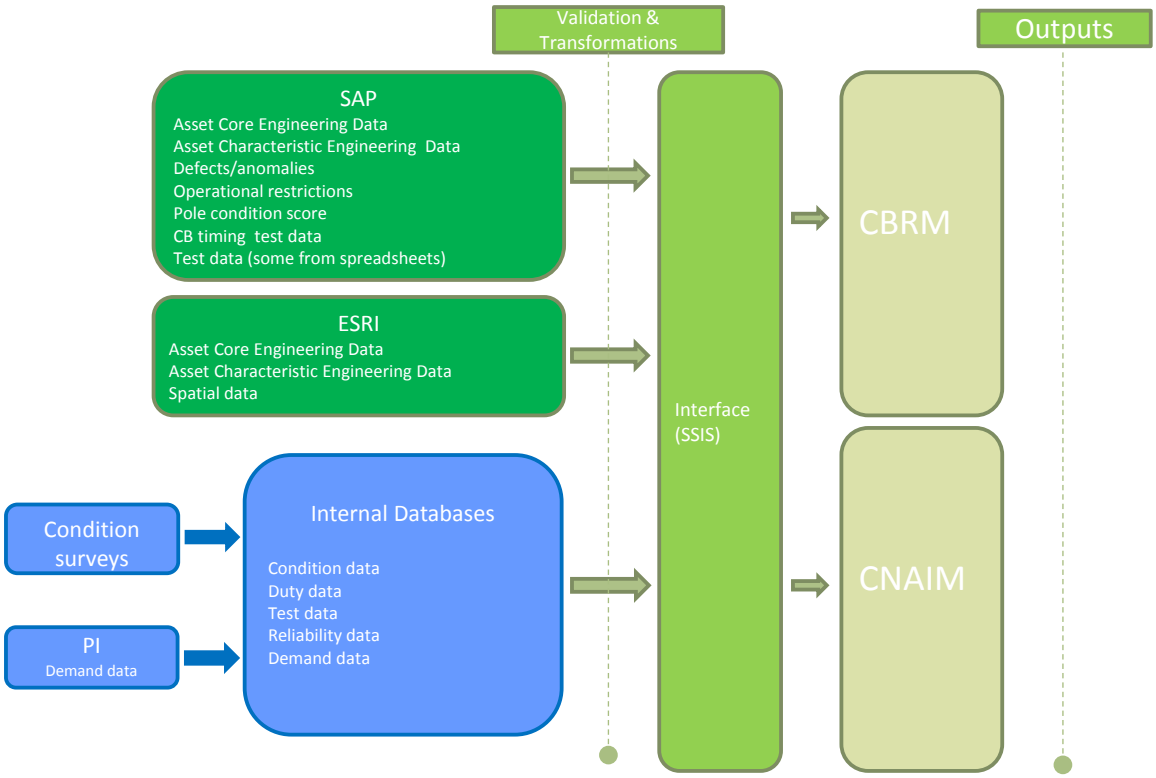
We currently collect asset inspection data using mobile technology which downloads into our corporate system. We capture new asset data using data input forms that are passed to our Data Management group for loading into our corporate system.

We plan to collect new asset condition data and we have outlined our timeline for this in our attached tables. Any proposed new data collection would require a business case which would consider the cost/benefit of any new data. In most cases any additional data would be a refinement to our existing processes.

1.2 Interface with CBRM and Common Methodology

To transfer the required information into CBRM in the correct format we have created an SQL Server Integration Services (SSIS) solution which sources data from our Corporate Systems and internal databases. This SSIS layer also carries out a number of data transformation and data validation processes.

Shown below is a functional diagram outlining the linkage between our systems and the CBRM and CNAIM EA technology products:-



SP Energy Networks CBRM and CNAIM data structure functional diagram

Chapter 2

Data Capture for CNAIM Reportable Assets

The assets covered in our Information Gathering Plan are outlined in the table shown below:-

Asset Type	CNAIM Reportable Assets
Transformer	Grid Transformer
	EHV Transformer
	HV Transformer (GM)
Switchgear	LV Underground Board
	LV Switchgear and Other
	HV Switchgear (GM)-Distribution
	HV Switchgear (GM) - Primary
	EHV Switchgear (GM)
	132 kV CBs
Cable	EHV UG Cable (Gas)
	EHV UG Cable (Non Pressurised)
	EHV UG Cable (Oil)
	Submarine cables
	132 kV UG Cable (Gas)
	132 kV UG Cable (Non Pressurised)
	132 kV UG Cable (Oil)
Overhead Lines	LV OHL Support
	HV OHL Support - Poles
	EHV OHL Support - Poles
	EHV OHL Fittings
	EHV OHL Conductor (Tower Lines)
	EHV OHL Support - Towers
	132 kV OHL Fittings
	132 kV OHL Conductor (Tower Lines)
	132 kV OHL Support - Tower

2.1 Interpreting Our Plan

For each asset category we have outlined the key data points, which system they are captured in and the frequency of data capture. If that data point in not captured in a Corporate System we have also provided a timeline for transition to a Corporate System. A brief commentary has also been provided for each asset outlining our data capture plans.

In general it is our strategy to capture information in line with our existing maintenance and inspection regimes. Where new information is required this will be added to our inspection question sets and captured over an asset inspection or maintenance cycle. This approach is the most effective and efficient means of capturing new information. One possible exception to this approach would be when a new risk or failure mode is identified, requiring more urgent intervention.

2.2 Criticality Information

The commentary for each asset focuses on capture of condition information; this is because we have largely been able to source the Criticality information from our existing Corporate Systems, e.g. proximity to watercourses, connected customers. The only outstanding data that requires on site information is the land usage and proximity to public which will be identified through our routine inspections.

The frequency of data capture is dependent upon the type of information. In the case of HV transformers we use ‘number of customers’ which is driven from our live systems. In the case of EHV transformers we use ‘max demand’ figures which are derived on an annual basis.

2.3 Grid Transformers

Our Grid Transformers are:-

- inspected visually every month
- oil sampled and pre winter annually
- Tap changer/selector maintained every 3 or 6 years depending on the duty

We plan to introduce HI condition style indicator question sets which will better reflect the external condition of the transformer. In addition we are introducing internal condition indicator question sets to more accurately gauge the internal condition of the equipment during intrusive maintenance.

We expect to introduce these question sets within two years. The data return for visual inspections will be complete after 1 year, and the internal after intrusive maintenance which may be 6 years after implementing.

Please refer to the attached appendix 1, tab 'Grid Transformer CM', for a listing of information captured and the frequency of capture.

2.4 EHV Transformers

Our EHV Transformers are:-

- inspected twice per year
- oil sampled every second year / pre winter annually
- Tap changer/selector maintained every 3 or 6 years depending on the duty

We plan to introduce HI condition style indicator question sets which will better reflect the external condition of the transformer. In addition we are introducing internal condition indicator question sets to more accurately gauge the internal condition of the equipment during intrusive maintenance.

We expect to introduce these question sets within two years. The data return for visual inspections will be complete after 1 year, and the internal after intrusive maintenance will take 6 years to obtain a complete dataset.

Please refer to the attached appendix 1, tab 'EHV Transformer CM', for a listing of information captured and the frequency of capture.

2.5 HV Transformer (GM)

Our HV Transformers (GM) are:-

- inspected annually as a minimum
- oil sampled during the main plant maintenance (12 or 18 years)

We plan to introduce HI condition style indicator question sets which will better reflect the external condition of the transformer. We expect to introduce these question sets within two years and the data return for visual inspections will be complete 1 year after commencement.

Please refer to the attached appendix 1, tab 'HV Transformer (GM) CM', for a listing of information captured and the frequency of capture.

2.6 LV Underground Board

Our LV Underground Boards are:-

- inspected externally every 3 years and internally every 6 years

We have recently deployed enhanced condition based question sets for UGLB which was introduced in 2016 in conjunction with our policy change to inspect link box internally every 6 years. The question sets deployed aligns with the inputs to the common methodology.

The intrusive inspection data will be complete after 6 years (2022).

Please refer to the attached appendix 1, tab 'LV UGB CM', for a listing of information captured and the frequency of capture.

2.7 LV Switchgear and Other LV Plant

Our LV Switchgear other LV Plant is:-

- inspected externally annually or every six month in high risk locations
- inspected at the main plant maintenance which can be every 12 or 18 years

We currently collect a number of condition points under our periodic inspections of defects and hazards e.g. phase barriers missing, insulation condition and compound leaks. These are more granular than the requirements of the CNAIM and will be rolled up to provide a condition input.

We expect to introduce these question sets within two years. The data return for visual inspections will be complete after the planned inspection.

Please refer to the attached appendix 1, tabs 'LV Circuit Breaker CM', ‘LV Board (WM) CM’ and ‘LV Pillar CM’, for a listing of information captured and the frequency of capture.

2.8 HV Switchgear (GM)-Distribution

Our HV Switchgear (GM) – Distribution assets are:-

- inspected externally annually as a minimum
- maintained every 3, 6, 12 or 18 years depending on the asset

We currently collect a number of condition points under our periodic inspections of defects and hazards e.g. oil leaks, gas pressure and corrosion. These are more granular than the requirements of the CNAIM and will be rolled up to provide an external condition input. Ductor, Insulation Resistance (IR) and Oil tests are carried out and will be transitioned to our corporate systems by 2018.

We are in the process of introducing a full condition indicator question set which will better reflect the internal and external condition of the plant, these question sets will be in place within two years. The data return for visual inspections will be complete after the planned inspection. The internal asset condition will be identified following an internal inspection.

Please refer to the attached appendix 1, tab 'HV Switchgear (GM) - Distrib CM', for a listing of information captured and the frequency of capture.

2.9 HV Switchgear (GM)-Primary

Our HV Switchgear (GM) – Primary assets are:-

- inspected externally annually as a minimum
- maintained every 3, 6,12 or 18 years depending on the asset
- maintained following the operation of the asset after a fault event

To prepare for the ED1 price control we carried out an extensive condition surveys of Primary and Grid sites, therefore we have extensive external condition data available for this asset population in

excel format. This is further supplemented by our defect and hazard reporting process and annual inspections.

We currently collect a number of condition points under our periodic inspections of defects and hazards e.g. oil leaks, gas pressure and corrosion. These are more granular than the requirements of the CNAIM and will be rolled up to provide an external condition input. Ductor, Insulation Resistance (IR) and Oil tests are carried out and will be transitioned to our corporate systems by 2018.

We are in the process of introducing a full condition indicator question set which will better reflect the internal and external condition of the plant, these question sets will be in place within two years. The data return for visual inspections will be complete after the planned inspection. The internal asset condition will be identified following an internal inspection.

Please refer to the attached appendix 1, tab 'HV Switchgear (GM) - Primary CM', for a listing of information captured and the frequency of capture.

2.10 EHV Switchgear (GM)

Our EHV Switchgear (GM) assets are:-

- inspected externally quarterly as a minimum
- maintained every 3 6 12 or 18 years depending on the asset
- maintained after post fault event

To prepare for the ED1 price control we carried out an extensive condition surveys of Primary and Grid sites, therefore we have extensive external condition data available for this asset population in excel format. This is further supplemented by our defect and hazard reporting process and annual inspections.

We currently collect a number of condition points under our periodic inspections of defects and hazards e.g. oil leaks, gas pressure and corrosion. These are more granular than the requirements of the CNAIM and will be rolled up to provide an external condition input. Ductor, Insulation Resistance (IR) and Oil tests are carried out and will be transitioned to our corporate systems by 2018.

We are in the process of introducing a full condition indicator question set which will better reflect the internal and external condition of the plant, these question sets will be in place within two years. The data return for visual inspections will be complete after the planned inspection. The internal asset condition will be identified following an internal inspection.

Please refer to the attached appendix 1, tab 'EHV Switchgear CM', for a listing of information captured and the frequency of capture.

2.11 132 kV CBs

Our 132kV CB assets are:-

- inspected externally monthly as a minimum
- maintained every 3, 6, 12 years depending on the asset

To prepare for the ED1 price control we carried out an extensive condition surveys of Primary and Grid sites, therefore we have extensive external condition data available for this asset population in excel format. This is further supplemented by our defect and hazard reporting process and annual inspections.

We currently collect a number of condition points under our periodic inspections of defects and hazards e.g. oil leaks, gas pressure and corrosion. These are more granular than the requirements of the CNAIM and will be rolled up to provide an external condition input. Ductor, Insulation Resistance (IR) and Oil tests are carried out and will be transitioned to our corporate systems by 2018.

We are in the process of introducing a full condition indicator question set which will better reflect the internal and external condition of the plant, these question sets will be in place within two years. The data return for visual inspections will be complete after the planned inspection. The internal asset condition will be identified following an internal inspection.

Please refer to the attached appendix 1, tab '132kV CBs CM', for a listing of information captured and the frequency of capture.

2.12 EHV UG Cable (Gas)

We do not inspect our EHV UG Cables (Gas insulated), however we do inspect the gas tanks and ancillary equipment every two years. We also monitor the gas leakage rates for our cables on an annual basis.

Please refer to the attached appendix 1, tab 'EHV UG Cable (Gas) CM', for a listing of information captured and the frequency of capture.

2.13 EHV UG Cable (Non Pressurised)

We do not inspect our EHV UG Cables (Non Pressurised), we monitor the failure rate of these cables on an annual basis. We intend to introduce alternative methods of monitoring cable condition (e.g. sheath testing and partial discharge testing) however we are still investigating the accuracy of these techniques. The output of these tests will be captured in our corporate systems by 2018.

Please refer to the attached appendix 1, tab 'EHV UG Cable (Non-press) CM', for a listing of information captured and the frequency of capture.

2.14 EHV UG Cable (Oil)

We do not inspect our EHV UG Cables (Oil insulated), however we do inspect the oil tanks and ancillary equipment every two years. We also monitor the oil leakage rates for our cables on an annual basis.

Please refer to the attached appendix 1, tab 'EHV UG Cable (Oil) CM', for a listing of information captured and the frequency of capture.

2.15 Submarine cables

On our submarine cable assets we carry out cable armour inspections on an annual basis.

We have no current plans to extend our data capture process for our submarine cable assets. After we are confident in the cable condition assessment techniques that we seek to apply to our UG Cables (Non Pressurised) assets we will investigate the applicability to Submarine cables.

Please refer to the attached appendix 1, tabs 'Submarine Cables >=33kV CM' and ‘Submarine Cables <=11kV CM’, for a listing of information captured and the frequency of capture.

2.16 132 kV UG Cable (Gas)

We do not inspect our 132kV UG Cables (Gas insulated), however we do inspect the gas tanks and ancillary equipment annually. We also monitor the gas leakage rates for our cables on an annual basis.

Please refer to the attached appendix 1, tab '132kV UG Cable (Gas) CM', for a listing of information captured and the frequency of capture.

2.17 132 kV UG Cable (Non Pressurised)

We do not inspect our 132kV UG Cables (Non Pressurised), we monitor the failure rate of these cables on an annual basis. We intend to introduce alternative methods of monitoring cable condition (e.g. sheath testing and partial discharge testing) however we are still investigating the accuracy of these techniques. The output of these tests will be captured in our corporate systems by 2018.

Please refer to the attached appendix 1, tab '132kV UG Cable (Non-press) CM', for a listing of information captured and the frequency of capture.

2.18 132 kV UG Cable (Oil)

We do not inspect our 132kV UG Cables (Oil insulated), however we do inspect the oil tanks and ancillary equipment every two years. We also monitor the oil leakage rates for our cables on an annual basis.

Please refer to the attached appendix 1, tab '132kV UG Cable (Oil) CM', for a listing of information captured and the frequency of capture.

2.19 LV OHL Support

Our LV OHL Support assets are:-

- inspected every 6 years
- refurbished every 12 years

We currently collect on-site condition information e.g. pole rot, pole leaning and animal damage. This is further supplemented by our defect information. We plan to investigate additional pole condition assessment techniques over the next two years to identify potential means of improving our condition assessment. In addition we are in the process of implementing Virtual World Asset Management (VWAMs) techniques to provide a 3 Dimensional geographical model of our overhead line network.

Please refer to the attached appendix 1, tab 'LV Poles CM', for a listing of information captured and the frequency of capture.

2.20 HV OHL Support - Poles

Our HV OHL Support assets are:-

- inspected every 6 years
- refurbished every 12 years

We currently collect on-site condition information e.g. pole rot, pole leaning and animal damage. This is further supplemented by our defect information. We plan to investigate additional pole condition assessment techniques over the next two years to identify potential means of improving our condition assessment. In addition we are in the process of implementing Virtual World Asset Management (VWAMs) techniques to provide a 3 Dimensional geographical model of our overhead line network.

Please refer to the attached appendix 1, tab 'HV Poles CM', for a listing of information captured and the frequency of capture.

2.21 EHV OHL Support - Poles

Our EHV OHL Support assets are:-

- inspected every 6 years
- refurbished every 12 years

We currently collect on-site condition information e.g. pole rot, pole leaning and animal damage. This is further supplemented by our defect information. We plan to investigate additional pole condition assessment techniques over the next two years to identify potential means of improving our condition assessment. In addition we are in the process of implementing Virtual World Asset Management (VWAMs) techniques to provide a 3 Dimensional geographical model of our overhead line network.

Please refer to the attached appendix 1, tab 'EHV Poles CM', for a listing of information captured and the frequency of capture.

2.22 EHV OHL Fittings

Our EHV OHL Fittings assets are inspected every 6 years.

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

Please refer to the attached appendix 1, tab 'EHV Tower Fittings CM', for a listing of information captured and the frequency of capture.

2.23 EHV OHL Conductor (Tower Lines)

Our EHV OHL Conductor (Tower Line) assets are:-

- inspected every 6 years
- maintained when required

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

Please refer to the attached appendix 1, tab 'EHV Tower Conductor CM', for a listing of information captured and the frequency of capture.

2.24 EHV OHL Support - Towers

Our EHV OHL Support – Tower assets are inspected every 6 years.

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

Please refer to the attached appendix 1, tab 'EHV Towers CM', for a listing of information captured and the frequency of capture.

2.25 132 kV OHL Fittings

Our 132kV OHL Fittings assets are:-

- inspected every 2 years
- maintained every 2 years

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

We also carry out thermovision studies of our 132kV overhead tower assets to identify hot spots and potential points of failure.

Please refer to the attached appendix 1, tab '132kV Tower Fittings CM', for a listing of information captured and the frequency of capture.

2.26 132 kV OHL Conductor (Tower Lines)

Our 132kV OHL Conductor (Tower Line) assets are:-

- inspected every 2 years
- maintained when required

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information

is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

We also carry out conductor sampling on our 132kV overhead steel tower conductor to better understand conductor condition. This will be done as part of our maintenance cycle.

Please refer to the attached appendix 1, tab '132kV Tower Conductor CM', for a listing of information captured and the frequency of capture.

2.27 132 kV OHL Support – Tower

Our 132kV OHL Support – Tower assets are inspected every 2 years.

As part of our RIIO ED1 plans we carried out extensive condition assessments of our Steel Tower overhead line assets at both 33kV and 132kV with the assistance of EA Technology. This information is captured in database format and we plan to transition this into our Corporate Systems over the next two years.

We also carry out conductor sampling on our 132kV overhead steel tower conductor to better understand conductor condition. This will be done as part of our maintenance cycle.

Please refer to the attached appendix 1, tab '132kV Towers CM', for a listing of information captured and the frequency of capture.