Distributed Generation Owner/Operator Forum

Bristol, 9 October 2018

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

regen

transforming energy

Future forum dates and key events

Future Forums (Bristol)
31 January 2019
25 April 2019
18 July 2019

27 Nov 2018 - **Renewable Futures and Green Energy Awards** Bath

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Forum webpage

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Home | Power cuts | Connections | Services | About us | Safety & education | Contact us | Careers | Innovation

Connections

New connections

Generation

- > G59 Applications
- > G59 Fast track applications
- > G83 Applications
- > Energy Storage
- > Generator application / commissioning forms
- > Study and offer quote
- > Community Energy Schemes
- > Payments for generated energy
- > Generation Infrastructure Schemes
- > Facilitating sharing of information for potential generation connections consortiums

Distribution Generation owner/operator forum

We have set up a forum in partnership with Regen aimed at owners and operators of MW scale renewables connected to a WPD network to provide an opportunity for WPD and Distributed Generation (DG) owners/operators to improve communication on issues including:

- WPD work to address grid constraints;
- Improving communication with generators on outages and constraints;
- Potential approaches for forecasting and mitigating outages.

The next meetings of the forum will take place on:

26 April 2018
19 July 2018

Meeting notes from previous events:

25 January 2018
15 July 2016
28 Sept 2016
24 Jan 2017
27 April 2017 Power factor and maintenance frequency slides
11 Jul 2017
20 Sept 2017

If you or a colleague would like to join the forum then please contact Olly at Regen on ofrankland@regensw.co.uk for further details.

Contact us

Emergency information
0800 6783 105

General contact enquiries
0800 096 3080

www.westernpower.co.uk/Connections/Generation/Distribution-Generation-owner-operator-forum.aspx

Generation portal

Log in

You are being granted access to Western Power Distribution's Generation Portal. You understand that your access to this website is subject to the website's **Terms of Use** and **Privacy Policy**.

User name:

Password:

PLEASE NOTE, THESE TERMS AND CONDITIONS GOVERN THE USE OF OUR GENERATOR PORTAL. BY CLICKING ON THE "ACCEPT" BUTTON BELOW OR USING THE GENERATOR PORTAL, YOU AGREE TO THESE TERMS AND CONDITIONS, WHICH WILL BIND YOU. IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, YOU MAY NOT USE THE GENERATOR PORTAL AND YOU AGREE THAT YOU WILL CEASE TO DO SO IMMEDIATELY.

https://generation.westernpower.co.uk/

WPD ICE plan 2018/19

Section 2 – Availability of information

Initiative		Initiative description
2.1*	Provide historic and forecast outage information and improved curtailment information for DG EHV connections at the point of issue of the connection offer	Develop systems and processes to provide better historical and forecast outage information, for a proposed DG EHV connection at the point of issue of the connection offer. Where the connection offer is for an alternative connection, we will also undertake developments to provide improved curtailment information. This improved information is intended to provide clarity on the likelihood of the level of curtailment
2.2	Further develop the WPD DGOO	Continue to develop the WPD DG Owner Operator Forum, developing an action plan with members to deliver further improvements to outage information provision. Host 4 forums including a visit to a WPD Control Centre providing further insight to members.
2.3	Continuing 2017/18 initiative: report on lost generation due to outages	Continuing 2017/18 initiative: Publish the report developed with the DGOO, on the quantity of generation loss (in MWh) caused due to WPD and National Grid system outages (132kV, 66kV & 33kV only) by generation technology type.
2.4	Further develop the report on lost generation due to outages	Further develop the report on lost generation due to outages to include an estimation of the £ value lost due to outages in the published report.
2.5	Report on reduced DG losses avoided during outages	Develop a report on the amount of DG losses avoided with the processes and procedures which have been developed to reduce the impacts of outages on DG. Develop ways of both quantifying reduced losses and of reporting case studies.
2.6	DG Constraints information leaflet	Produce a leaflet which will provide guidance to DG customers on how outages and constraints on the distribution system may effect their connections.

* Initiative shared between Control and Connections Policy

WPD ICE plan 2018/19

Section 2 – Availability of information

Initiative		Initiative description
2.7	Pro-active fault explanation email	In conjunction with the WPD DGOO, develop a pro-active email notification process to provide DG customers with explanations regarding faults on the distribution system which may have effected their connection.
2.8	Contacts for assistance with DG portal	Provide contact details for users to obtain assistance with the WPD DG portal.
2.9	Present to the WPD DGOO on ANM	Present to the WPD DGOO forum on Active Network Management connections and their bearing on outages and constraints.
2.10	Present to the WPD DGOO on operational best practice	Present to the WPD DGOO forum on operational best practice, raising awareness with stakeholders regarding the operation of their connections assets, in particular around outages and constraints.
2.11	Continuing 2017/18 initiative: DNO best practice on outages and constraints	Continuing 2017/18 initiative: WPD to work with Distributed Generation stakeholders to establish DNO industry good practice initiatives with regard to the management & notification of Network outages and generation constraints.

Agenda

13.30 **Arrival, registration and buffet lunch**

14.00 **Introduction, action review and objective setting from the chair and WPD**

14.10 **Outage impact assessment update**

14.30 **Cost of lost generation due to outages – methodology peer review**
Ray Arrell, senior project manager, Regen

15.00 Improving industry and WPD communication to address outages/constraints
- Forum member feedback on communication
- Report back from single point of contact
- Progress on updating outage portal

15.30 **Active Network Management connections and constraints update**
Will Topping, primary system design engineer, WPD

16.00 AOB

16.30 **Networking and close**

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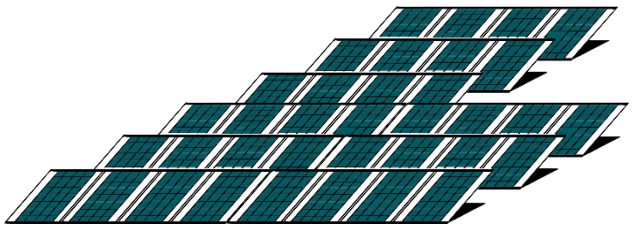
Estimating the lost income from generation from network outages

Owner/operator forum, Bristol, October 2018

Ray Arrell – Senior Project Manager, Regen



Topics to cover

1) Lost income estimation – scope, assumptions and expectations

2) Lost generation model – output data used to drive lost income

3) Methodology for lost income modelling:
    a) Input data from lost generation model
    b) Core income streams identified
    c) Categorisation using key site characteristics
    d) Income stream calculation method and sources
    e) Anonymous worked examples for each income stream

4) Lost income model - limitations and caveats

5) Some questions to you and feedback

Lost income modelling - scope

1) The output of the lost income model is an indicative ballpark for lost income on individual sites, aggregated to be an estimation of lost income at licence area level
It is not a definitive calculation of actual lost income for individual sites

2) The model identifies some of the key income streams likely accessed by large standalone (i.e. exporting) solar and wind generation projects
It does not account for every revenue stream and source of income that each project may secure from time-to-time. Nor does it make any estimates for volumes of energy that is fed via private wire to any offtakers or self-supplied to onsite demand

3) The model sources readily available/published subsidy tariff rates, network charges and average electricity market price data – which can be updated on a rolling basis
It does not account for site-specific subsidy accreditation timelines or PPA/export contractual arrangements. Nor does it account for 'price spike' events within outages

4) The model takes into account some site-specific characteristics
It does not treat each sites individually or account for 'on the ground' conditions or site-specific circumstances (more applicable to the lost generation model)

Lost generation model - overview

Data input	Half-hourly GSP generation	Outages data	Sites data

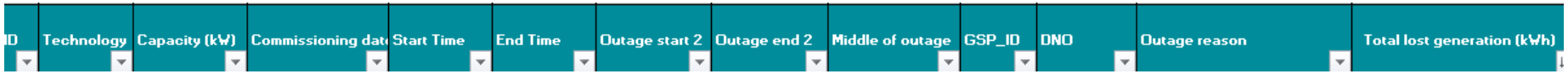
Data processing	Sort the outages data to link an outage start and end time Evaluate the amount of capacity behind each half-hour generation figure Create half-hourly generation profiles for each GSP and technology Match sites information against sites experiencing outages Evaluate the outage's lost generation based on the generation profile Total lost generation and categorise

Results	Present results by licence area, outage reason and technology

Data taken from lost generation model

Site-by-site data from lost generation model, transcribed over to lost income model:

- Generation technology type
- Capacity (kW)
- Commissioning date
- Licence Area
- Total lost generation (kWh)



Core income streams

Income Stream	Description
Subsidy income	Income secured from a generation station that is accredited for either the Feed-in Tariff (**FIT**) or the Renewables Obligation (**RO**) subsidy programme.
Export PPA income	Income secured from the sale of power to the network, through either fixed arrangement (**FIT export**) or a more dynamic arrangement through Power Purchase Agreements (**PPA**), reflecting electricity market average reference prices
Generation Network Charge Credits (G-Duos)	Income secured from intermittent generation Distribution Use of System (**GDUoS**) credit payments.

Subsidy income - method

Subsidy Income Factor	How defined	Source / Basis
Subsidy accreditation date	Set to be 150 days prior to the Commissioning Date	Analysis of FIT + RO accredited MW scale projects (average gap)
Subsidy regime: FIT or RO	Set based on capacity (MW) >5MW = RO <5MW = FIT	>5MW not permitted in FIT and FIT more lucrative for <5MW sites that RO?
If RO: Number of ROCs per MWh	Set based on: • Accreditation date • Technology	Ofgem published ROC technology tables
Applicable subsidy rate (£/MWh)	If FIT, set based on: • Accreditation date • Technology	Register of Ofgem published historic and latest FIT rate tables, by technology band
	If RO, set based on: • Number of ROCs per MWh	Ofgem published RO buy-out price + an assumed 10% recycled payment

Subsidy income – worked examples

Dummy data from lost generation model (single outages):

Site	Technology	Capacity (kW)	Commissioning date	Licence area	Lost generation (MWh)
Site XXXX	Photovoltaic	8,500	08/12/2015	South West	25.02
Site YYYY	Onshore wind	2,500	01/08/2016	South West	2.47

Worked examples of lost subsidy income:

Subsidy Regime	Accreditation date	No certificates (per MWh)	Applicable subsidy Rate (£/MWh)	Lost subsidy income during outage (£)
>5MW, so: **ROC**	150 days before commissioning, so: **11/07/2015**	RO, Solar, Dec 15, so: **1.3**	RO, so £45.58 + £4.60: **£50.14 per MWh**	25.02 x 1.3 x £50.14 = **£1,631**
<5MW, so: **FIT**	150 days before commissioning, so: **04/03/2016**	FIT, so: **1**	Wind, 2.5MW, Mar16, so: **£8.80 per MWh**	2.4 x 1 x £8.80 = **£22**

Export income - method

Export Income Factor	How defined	Source / Basis
FIT export Y/N	Set based on FIT or RO subsidy	Likely to sign up to FIT export if FIT accredited
Applicable export rate (£/MWh)	If FIT export Y – FIT export price	Ofgem published latest FIT tariff tables - export
	If FIT export N – Average electricity market export price	EMR Settlement published Intermittent Market Reference Price (IMPR) data, used for CfR. Average price for lost gen modelling month
PPA offtaker margin	If FIT export Y – Zero If FIT export N – 5% of average monthly IMRP price	Consultation with PPA contract expert, indicative margin for PPA offtaker

Export income – worked examples

Dummy data from lost generation model (single outages):

Site	Technology	Capacity (kW)	Commissioning date	Licence area	Lost generation (MWh)
Site XXXX	Photovoltaic	8,500	08/12/2015	South West	25.02
Site YYYY	Onshore wind	2,500	01/08/2016	South West	2.47

Worked examples of lost export income:

Subsidy Regime	Applicable Export Rate (£/MWh)	Export income margin (%)	Lost export income during outage (£):
>5MW, so: **ROC**	Average of IMRP data for example month **£48.60**	>5MW, not FIT export, so: **5%**	25.02 x £48.6 x 95% = **£1,155**
<5MW, so: **FIT**	FIT export tariff (at time of modelling): **£52.40**	<5MW, FIT export, so: **0%**	2.47 x £52.4 = **£130**

Generation DUoS income - method

G-DUoS Factor	How defined	Source / Basis
G-DUoS Rate	Set based on licence area	WPD Schedule of Charges for each licence area: SW, EMid, WMid, SWales HV Generation Intermittent credit charge (£/MWh)

Dummy data from lost generation model (single outages):

Site	Technology	Capacity (kW)	Commissioning date	Licence area	Lost generation (MWh)
Site XXXX	Photovoltaic	8,500	08/12/2015	South West	25.02
Site ZZZZ	Photovoltaic	3,500	01/04/2017	South Wales	7.69

Worked examples of lost G-DUoS credits:

Applicable G-DUoS Charge (£/MWh)	Lost G-DUoS credits during outage (£):
South West, so **£5.24**	25.02 x £4.00 = **£100**
Wales, so **£4.00**	7.69 x £5.24 = **£40**

Limitations and Caveats - 1

Accreditation date
Assumption: Currently assumed to be 150 days before commissioning
Limitation: This may vary by technology, construction year or subsidy regime
Conclusion: Open for discussion with stakeholders…

RO income – recycled payment
Assumption: Currently estimated to be 10% of published ROC buy-out price
Limitation: Doesn't account for actual recycled payment (if any)
Conclusion: Actual recycled value is published by Ofgem at a later date, so monthly outage lost income modelling could be re-run once the recycled rate is published

RO offtaker margins
Assumption: Currently not included a margin for selling ROCs to offtaker
Limitation: There may be enough evidence to suggest that offtaker margin needs to be deducted, if model is targeting lost generation to generator
Conclusion: A variable has been included in the model, defaults to 0%

The value of REGOs
Assumption: Currently not included any financial value for trading of REGOs
Limitation: There is some market activity around trading REGOs, so not accounted for?
Conclusion: Likely to remain low value (50p/MWh?). Not a core income stream for most generators, so difficult to generally include across a portfolio of sites.

Limitations and Caveats - 2

IMRP to set export rates

Assumption: EMR Delivery Body uses IMRP for intermittent generators as the basis for CfD programme. Data is a firm monthly average price, based on N2EX and EPEX-SPOT market indexes.

Limitation: IMRP may be too high level average price if PPA market is much more fluid

Conclusion: Comparison of sample half-hour market price data was undertaken, total variance in income was negligible (<5% overall)

Export PPA offtaker margin of 5%

Assumption: Consultation with energy contract expert discussed range of 92% to 97% of export sales retained by generator. Thus 5% offtaker margin was chosen as a midpoint.

Limitation: Unsure if this margin is reflective.

Conclusion: Variable in income model, set to 5%, but can be changed – open to discussion

Non-FIT export PPA arrangements

Assumption: We have assumed all RO accredited sites will be selling their power based on IMRP average pricing.

Limitation: It is understood that not all generators will be floated on the wholesale market and some generators will have more bespoke arrangements – private wire PPA, short term export contracts, sleeving arrangements if prosumer etc.

Conclusion: Model needs to find balance between generalisation of portfolio of sites and reflecting market activity

Limitations and Caveats - 3

Penalties associated with outages

Assumption: The model does not account for any penalties associated with the generator not notifying their offtaker (within sufficient notice) of an outage.

Limitation: This may not account for potential financial risk

Conclusion: It is difficult to generalise this risk, as penalty structure will be specific to the site and contractual arrangement. Propose to not include in model.

Additional income streams

Assumption: The majority of income is from subsidy, export sales and GDUoS.

Limitation: The model doesn't account for other sources of income such as:

> National Balancing Services (STOR, FFR etc.)
> Capacity Market
> Balancing Mechanism
> Local DNO-driven flexibility markets (i.e. WPD Flexible Power)

Conclusion: Whilst some policy proposals around RE in Capacity Market, likely to affect wind more than solar or would require co-located energy storage. Also many of these are dependent on 'events' (system stress, STOR call, system imbalance) or specific locations. Propose to not include highly unpredictable income in model.

In summary - key questions

1) Accreditation vs commissioning 150 day average – too flat? Solar preliminary accreditation in RO much lower?

2) Subsidy income method – appropriate?

3) FIT export and IMRP rates used – reflective for an estimate?

4) Offtaker margins – appropriate?

5) Additional income streams not included – unpredictable?

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Active Network Management (ANM)

October 2018

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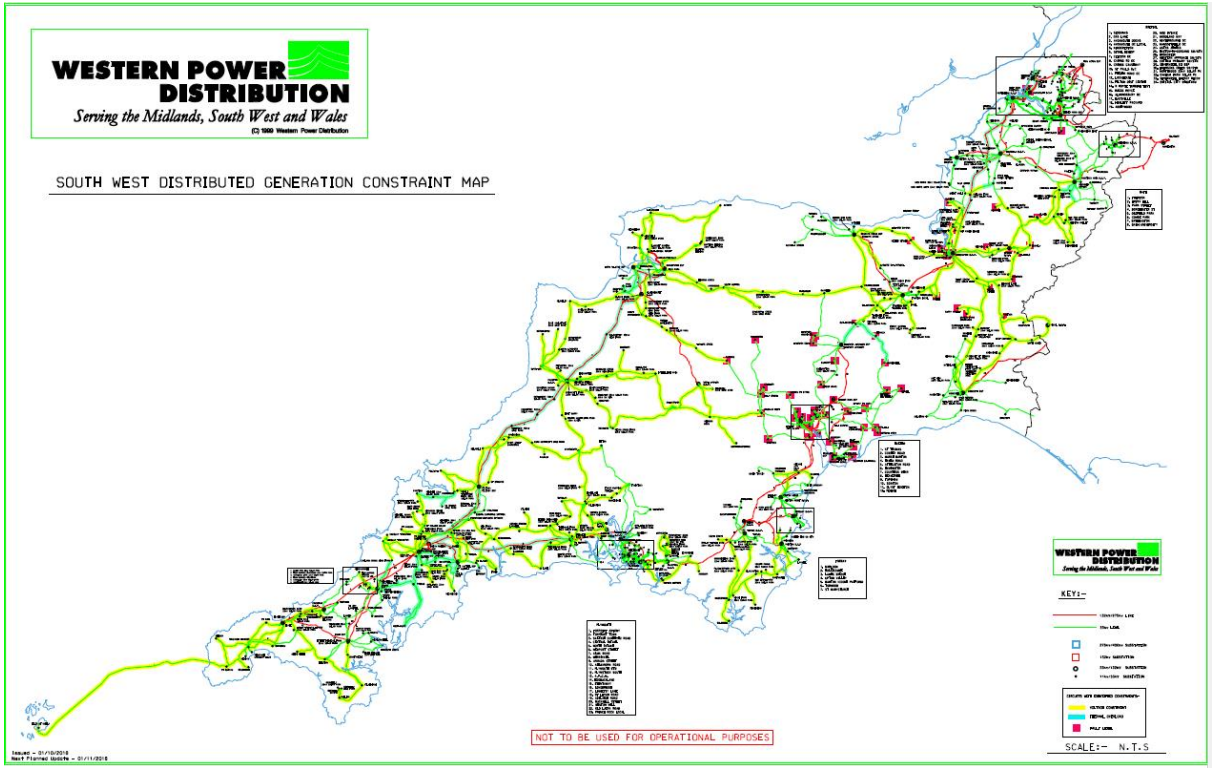
Requirement for ANM

- Avoid high costs of reinforcement
- Permit quicker connections



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Aims of ANM

- Maximise capacity of network
- Avoid overly onerous long term constraints
- Control connections to within network limits
- Protect the electrical network against subsequent network events

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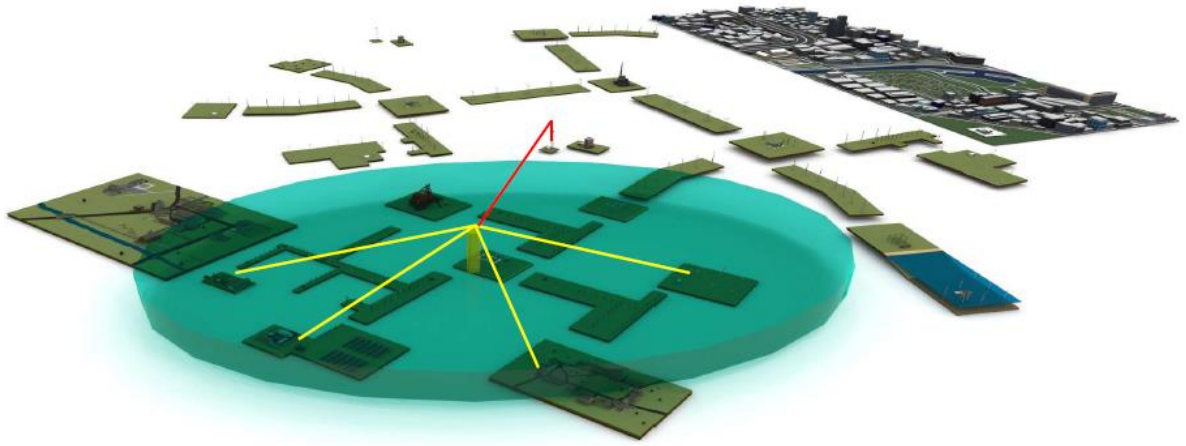
How ANM works

- Monitors circuits/transformers etc.
- Compares against limits
- Calculates set points using LIFO stack
- Communicates set points



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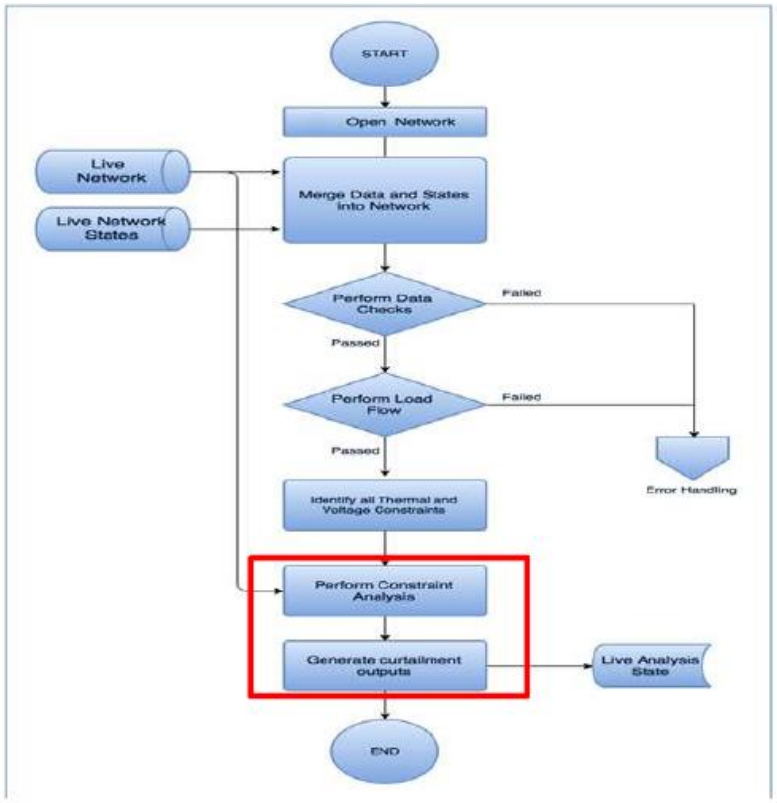
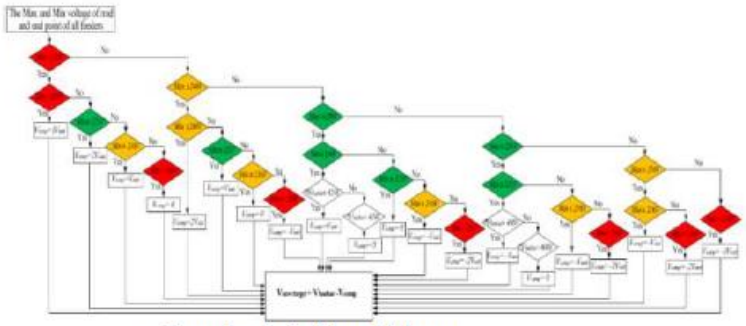
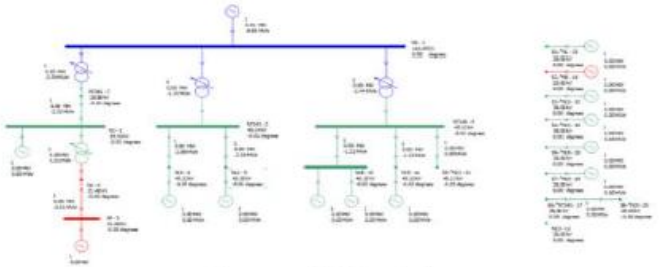
How ANM works





Constraint Algorithm



Network Model

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Curtailment Report

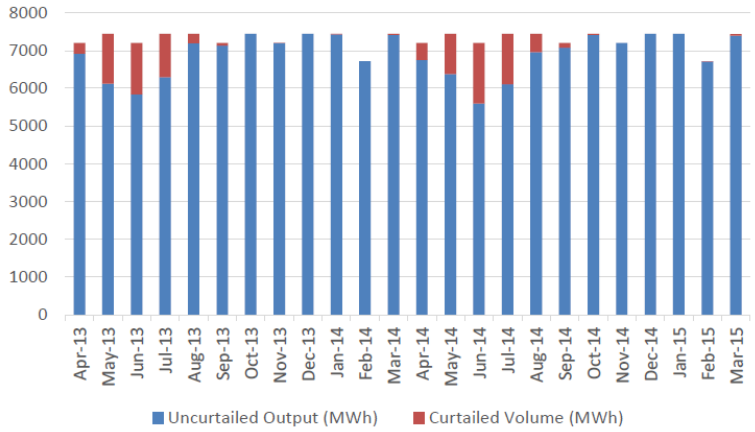

Figure 2 – Calculated Curtailed Volumes by Month Graph

smarter grid solutions

DCAT© Software report
Version 1.0.0

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WPD ANM Roll out

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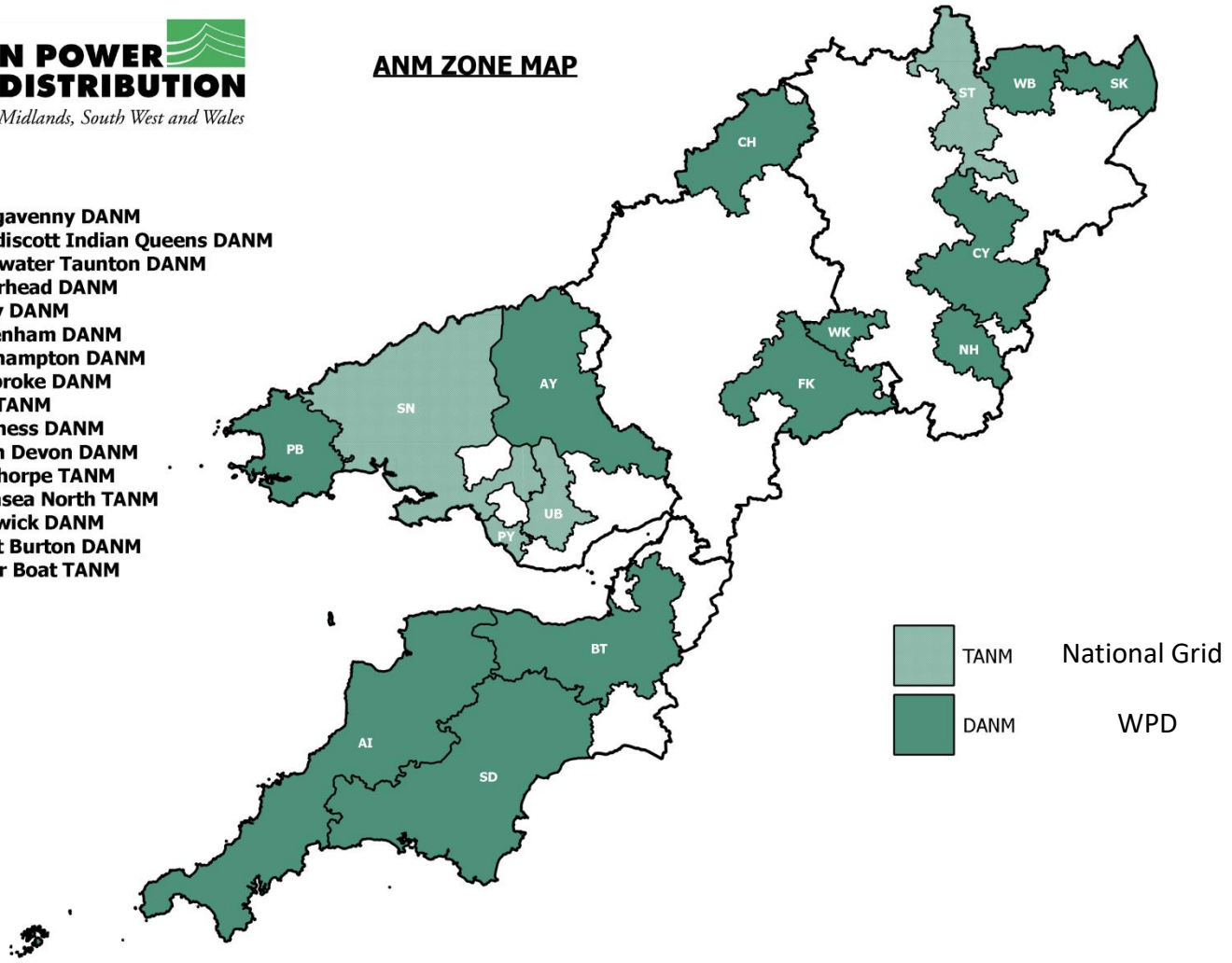
ANM ZONE MAP

AY - Abergavenny DANM
AI - Alverdiscott Indian Queens DANM
BT - Bridgwater Taunton DANM
CH - Cellarhead DANM
CY - Corby DANM
FK - Feckenham DANM
NH - Northampton DANM
PB - Pembroke DANM
PY - Pyle TANM
SK - Skegness DANM
SD - South Devon DANM
ST - Staythorpe TANM
SN - Swansea North TANM
WK - Warwick DANM
WB - West Burton DANM
UB - Upper Boat TANM



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