

CMP375/315

30 June 2022

Online Meeting via Teams

WELCOME

A wide-angle landscape photograph featuring a valley with a winding river and several bright, glowing orange-yellow lines that curve across the terrain, suggesting energy or data flow. In the background, large, rugged mountains are partially covered in snow under a dramatic, cloudy sky with sunlight breaking through.

nationalgridESO

The slide features several decorative yellow lines. In the top left, there are several thin, curved lines that sweep across the upper portion of the slide. In the bottom right, there are several thick, parallel diagonal lines that extend from the bottom left towards the top right, creating a sense of movement and direction.

Objectives and Timeline

Paul Mullen— National Grid ESO Code Administrator

CMP375 (and CMP315) Proposed Timeline as at 25 May 2022

Milestone	Date	Milestone	Date
Modification presented to Panel	25 June 2021	CMP375/CMP315 Workgroup 13 – finalise Workgroup Report, agree Terms of Reference have been met and Workgroup Vote	8 September 2022
Workgroup Nominations (15 Working days)	1 July 2021– 5pm on 22 July 2021	Workgroup report issued to Panel	22 September 2022
CMP375/CMP315 Workgroups 1 to 7	10 August 2021, 1 and 13 September 2021, 15 November 2021, 12 January 2022, 9 and 29 March 2022	Workgroup report presented to Panel	30 September 2022
CMP375/CMP315 Workgroup 7 (Finalise Workgroup Consultation)	29 March 2022	Code Administrator Consultation (15 working days)	4 October 2022 to 25 October 2022 (5pm)
CMP375/CMP315 Workgroup Consultation (20 working days as Easter)	14 April 2022 to 17 May 2022 (5pm)	Draft Final Modification Report (DFMR) issued to Panel	17 November 2022
CMP375/CMP315 Workgroup 8 – review Workgroup Consultation responses and agree next steps	25 May 2022	Panel undertake DFMR recommendation vote	25 November 2022
CMP375/CMP315 Workgroup 9 – understanding of methodology for CMP315, CMP375 and LCP Approach	14 June 2022	Final Modification Report issued to Panel to check votes recorded correctly (5 working days)	28 November 2022
CMP375/CMP315 Workgroup 10 – review ESO's analysis	30 June 2022	Final Modification Report issued to Ofgem	6 December 2022
CMP375/CMP315 Workgroup 11 and 12 – finalise analysis, finalise solutions, discuss and finalise alternatives including alternative vote and finalise legal text	18 July 2022 and 17 August 2022	Implementation Date	TBC

NOTE: 3 previous Workgroups for CMP315

The background features several thick, flowing yellow lines that sweep across the slide. Some lines are curved and loop around the top left, while others are more linear and extend towards the bottom right, creating a sense of movement and energy.

ESO Analysis

Grahame Neale and Matt Wootton

Analysis aims, assumptions and limits

- The analysis aims to determine 'how' (i.e. the formula) the EC is calculated – not what this EC value represents.
- Determining the effect of different scopes of work on the final EC value with actual data.
- Test workgroup's previous (theoretical) thinking with actual data. Is expanding the scope of works in the EC calculation sufficient? What works in/out of scope? Etc.
- Doesn't challenge the accuracy, completeness or appropriateness of the data inputs i.e. How to calculate 'x' ($a + b = x$), not;
 - What does 'x' represent – forward looking, long or short run, marginal or average cost etc.
 - Is 'a' and 'b' accurate and complete – no independent way to validate/challenge TO's data.
 - Should 'a' and/or 'b' be based on historic or forecast data sources. This is for each modification (and any alternatives) to justify an approach.
- Assumptions
 1. Current approaches to voltage increases can be applied.
 2. Same method can be applied to calculate EFs
 3. No change in calculation if 'forecast' data was used (instead of 'actual' data)

Summary of TO data received

Voltage	Circuit Projects		Substation Projects		Total (Count)
	New	Reinforced	New	Reinforced	
400kV	3	15	8	0	26
275kV	1	0	0	2	3
<275kV	4	3	0	1	8
Total	8	18	8	3	37

- Data from all 3 TOs included.
- Only 400kV data used in the analysis – focussing on Expansion Constant & largest dataset.
- Data from each TO is equivalent and comparable – **this is a big assumption!** 400kV (unannuitised) stats are;
 - 400kV circuit data: Min = £0.54/MW/km, Mean = £334.14/MW/km, Max = £2,603.70/MW/km.
 - Substation data: Min = £44,732/MW, Mean = £118,966/MW, Max = £234,354/MW
- No TOs provided information on current age and expected asset life, therefore have assumed;
 - New assets:- 0 years old and 50 years expected life
 - Reinforced:- 30 years old and 70 years expected age (i.e. expected age increased by 20 years)
- All TOs only provided a 'new' circuit length. So assuming no change in length for reinforcements.
- WACC (pre-tax 3.5%), Annuity Factor (4.2%) and Overhead Factor (1.5%) used for all TOs

How the calculations were done & outstanding questions

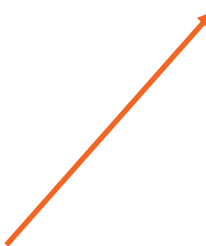
- Calculated using the same method as documented in the ‘EC example of options’ spreadsheet circulated on 15th June. This file shows the calculations with dummy data.



- Have a assumed a straight ‘carry across’ in calculation between circuit and non-circuit works. Creator of each approach may not envisage this in their final solution.

Outstanding Questions

- 1 TO to confirm if no reinforcement works completed (data only provided for new build).
- 1 TO to confirm driver for the works (i.e. why were the works done).
- Understand what was included/excluded from the £ value figures. 1 TOs provided a breakdown, others didn’t.
- All TOs to confirm asset age and expected life for their data
- All TOs to confirm no change in circuit length for their data.



SUMMARY	
Exclude	Design Verification & Drawings
Exclude	Liaison with third parties
Include	Site Establishment
Exclude	Site Access Roadway
Exclude	Metal Roadway
Exclude	Scaffolding
Include	Steelwork Supply
Include	AC Conductor Supply
Include	HVDC Conductor Supply
Include	Fittings Supply
Include	Tower Site Preparation
Include	Tower Foundation Works
Include	Steelwork Erection & Associated Items
Include	Conductor Erection
Include	SGT/GT Supply
Include	Switchgear Supply
Include	Substation Site Preparation
Include	Substation Foundation Works
Include	Substation Erection
Include	Converter Station Supply
Include	Dismantling
Include	NSI 4 Earthing
Exclude	Diversion & Temporary Masts
Exclude	Wrapped Earthwire Works
Exclude	Thermal Uprating Works
Include	Accommodation & Site Repairs
Exclude	Traffic Management
Exclude	Project/Programme Risk
Include	Contractor Fee
Exclude	General Overhead

Analysis results

* These values are **NOT** directly comparable due to different data provided by TOs. When the same data is used, the results are very similar.

	Scope of Works	CMP315	CMP375	Paul Jones' method
1a	None (CUSC baseline – index linked)	£15.462801/MWkm - April 2022 value shown, assumes all options rejected by Ofgem		
1b	None (Estimate for RIIO2 from CMP353)	£27.38*		
2	New Circuits only	£11.08322	£14.81794*	£11.08322
3	New circuits & circuit reinforcement	Unable to calculate as TO data not separated by driver – see row 6 for approx.		
4	New circuits & circuit life extensions	Unable to calculate as TO data not separated by driver – see row 6 for approx.		
5	New circuits & New non-circuit build	£116.38102	£155.59796	£116.38102
6	All circuit works (New circuits, reinforcement & life extension)	£8.20233	£9.85413	£9.40627
7	New & 'load' works (circuit and non-circuit)	Unable to calculate as TO circuit data not separated by driver – see row 9 for approx.		
8	New & 'non-load' works (circuit and non-circuit)	Unable to calculate as TO circuit data not separated by driver– see row 9 for approx.		
9	All works	£34.97557	£45.65503	£36.17315

- Rows 2-9 not directly comparable with Row 1 (see outstanding questions on data) but should be 'close enough' to show general themes.
- Data suggests reinforcement generally cheaper than new build.
- Substation data substantially different to circuit data.

Sensitivity Analysis – Global Factors

WACC (pre-tax 3.5%), Annuity Factor (4.2%) and Overhead Factor (1.5%) – Base case

	Scope of Works	CMP315	CMP375	Paul Jones' method
2	New Circuits only	£11.08322	£14.81794	£11.08322
5	New circuits & New non-circuit build	£116.38102	£155.59796	£116.38102
6	All circuit works (New circuits, reinforcement & life extension)	£8.20233	£9.85413	£9.40627
9	All works	£34.97557	£45.65503	£36.17315

WACC (pre-tax 7%), Annuity Factor (4.2%) and Overhead Factor (1.5%)

	Scope of Works	CMP315	CMP375	Paul Jones' method
2	New Circuits only	£18.83694 (+70%)	£14.81794 (0%)	£18.83694 (+70%)
5	New circuits & New non-circuit build	£197.80009 (+70%)	£155.59796 (0%)	£197.80009 (+70%)
6	All circuit works (New circuits, reinforcement & life extension)	£12.71777 (+55%)	£9.85413 (0%)	£15.23688 (+62%)
9	All works	£58.22778 (+66%)	£45.65503 (0%)	£60.73357 (+68%)

WACC (pre-tax 3.5%), Annuity Factor (8.4%) and Factor Overhead (3.0%)

	Scope of Works	CMP315	CMP375	Paul Jones' method
2	New Circuits only	£11.08322 (0%)	£29.63587 (+100%)	£11.08322 (0%)
5	New circuits & New non-circuit build	£116.38102 (0%)	£311.19592 (+100%)	£116.38102 (0%)
6	All circuit works (New circuits, reinforcement & life extension)	£8.20233 (0%)	£19.70826 (+100%)	£9.40627 (0%)
9	All works	£34.97557 (0%)	£91.31007 (+100%)	£36.17315 (0%)

Sensitivity Analysis – Data Size & Cost

Base case

	Scope of Works	CMP315	CMP375	Paul Jones' method	No. Applicable Projects
2	New Circuits only	£11.08322	£14.81794	£11.08322	3
5	New circuits & New non-circuit build	£116.38102	£155.59796	£116.38102	11
6	All circuit works (New circuits, reinforcement & life extension)	£8.20233	£9.85413	£9.40627	18
9	All works	£34.97557	£45.65503	£36.17315	26

1 extra New Build Circuit (100km, £100m, 2000MW) @ £500/MW/km

	Scope of Works	CMP315	CMP375	Paul Jones' method	No. Applicable Projects
2	New Circuits only	£13.23089 (+19.4%)	£17.68930 (+19.4%)	£13.23089 (+19.4%)	4
5	New circuits & New non-circuit build	£96.75994 (-16.9%)	£129.36515 (-16.9%)	£96.75994 (-16.9%)	12
6	All circuit works (New circuits, reinforcement & life extension)	£10.86706 (+32.5%)	£11.01581 (+11.8%)	£10.52555 (+11.9%)	19
9	All works	£35.96732 (+2.8%)	£44.59154 (-2.3%)	£35.62751 (-1.5%)	27

1 extra New Build Circuit (100km, £120m, 2000MW) @ £600/MW/km

	Scope of Works	CMP315	CMP375	Paul Jones' method	No. Applicable Projects
2	New Circuits only	£14.12561 (+27.5%)	£18.88553 (+27.5%)	£14.12561 (+27.5%)	4
5	New circuits & New non-circuit build	£97.63989 (-16.1%)	£130.54162 (-16.1%)	£97.63989 (-16.1%)	12
6	All circuit works (New circuits, reinforcement & life extension)	£11.46799 (+39.8%)	£11.37093 (+15.4%)	£10.94832 (+16.4%)	19
9	All works	£36.56528 (+4.5%)	£44.94490 (-1.6%)	£36.04818 (-0.3%)	27

Topics to discuss and questions to answer

- Should any works be removed from the calculation or use a different calculation – specifically substations?
- Is the sample size big enough to perform the calculation?
 - What about 275kV (3 data items) – is this enough to calculate a Expansion Factor?
 - NOA 2021 data - Appendix A (<https://www.nationalgrideso.com/document/232461/download>). Roughly 37 projects ('Proceed' 21/22 recommendation and thermal driven, inc HVDC) to 2037. So similar volume of data to historic data.
 - If not, what are the options?
- What other options are the Workgroup considering for the EC calculation?
- What are the next steps to progress?
 1. Test that voltage upgrades work for each method.
 2. Test that the Expansion Factors can be calculated for each method.
 3. Demonstrate tariff impact for each method.

Next Steps

Paul Mullen – National Grid ESO Code Administrator