ANNEX 17
P80 Methodology

This Annex sets out a summary of the Board's understanding of the methodology used in the DWMP in order to calculate the P80 costing values for the End of Generation Target, as set out in the FAP.

1. Background

1.1 The End of Generation Target is comprised of four cost components:

(A) Costs of Decommissioning (including Pre-Closure Planning Costs);

(B) Costs of Spent Fuel Management;

(C) Costs of Spent Fuel Disposal; and

(D) Costs of ILW Disposal.

1.2 The selection of a suitable approach to modelling cost probabilities when calculating the End of Generation Target is an important component in assessing the overall prudency of the FDP.

1.3 P80 refers to a statistical measure of the likelihood that the final outturn costs will exceed the estimated costs. The P80 value represents the level at which there is an eighty per cent. (80%) probability the final cost will be equal to or less than the relevant estimated cost.

1.4 The Board considers that a statistically modelled P80 value would be an acceptable foundation for deriving a value for the costs set out in the DWMP for use in the FAP. However, the Board notes that the Operator has initially adopted a "hybrid" method for deriving a value deemed to correspond to a P80 for the DWMP (consistent with the method used for the initial HPC DWMP) for the majority of costs (other than the Costs of Spent Fuel Management) with a commitment to subsequently move to using a statistical model (which is the foundation of a customary P80 calculation) during the Operational Period.

1.5 As set out in paragraph 5 of Part B (*Life Cycle of the FAP)* of Annex 7 (*Funded Decommissioning Programme*), the End of Generation Target in the FAP is designed to respond to changes in decommissioning cost estimates over time through the Quinquennial Review process and will therefore adjust Contribution levels in response to changes in the P80 calculation process occurring prior to the final Quinquennial Review.

1.6 The P80 cost estimated in the DWMP has been calculated in 2022 money values. The End of Generation Target is calculated (and reviewed at Quinquennial Reviews) by applying forecast inflation to the P80 costs and discounting that forecast outturn cost back to the end of the Operational Period at a nominal discount rate (the Long Term Discount Rate). The assessment of forecast inflation takes account of the potential for nuclear decommissioning costs to change over time at a rate that differs from CPI. Under the FAP, no additional funding is provided following closure of the plant (and any recovery of the FDP Shortfall from consumers). Although the P80 value which the final End of Generation Target will be based on will include an element of contingency, no explicit provision is made for the risk that post-closure inflation differs from the rate projected at the final Quinquennial Review. Also, to the extent that the investment portfolio is considered to be hedged with or to correlate to CPI, no explicit provision is made for the risk that nuclear decommissioning costs turn out to inflate at a greater premium to CPI than projected at that time.

1.7 The Board has not reviewed the DWMP and has therefore relied solely on the NDA's analysis of the DWMP as set out in further detail in Annex 15 (*Decommissioning and Waste Management Plan (DWMP) Analysis*), as well as the Board's understanding of the HPC DWMP on which the Board understands the DWMP is predominantly based.

2. Derived P80

2.1 According to the HPC DWMP, the P80 value produced for HPC is a "derived P80 value" (i.e., it does not represent a statistical P80 value). However, the HPC Operator considers that it provides a robust and conservative estimate for this stage of the development of HPC.

2.2 The Board understands that the P value for the Sizewell C DWMP is a "derived" P80 value (rather than a statistical P80 value). As set out in Annex 15 (*Decommissioning and Waste Management Plan (DWMP) Analysis*), the NDA has reviewed the DWMP (including the P80 methodology) and, subject to certain qualifications and assumptions, concluded that the DWMP presents a clear narrative and understandable cost basis and is consistent with the requirements set out in the Guidance. The Board assumes that the Secretary of State will review and take note of the NDA's conclusions in relation to the DWMP.

2.3 In the case of a derived P80 value, this is arrived at by analysing the decommissioning cost data from existing comparable plants, primarily AGRs. This approach takes contingency data (such as scopes of work and cost estimates) from developed and audited decommissioning plans for operational AGRs, then transposes these across to comparable decommissioning activities for Sizewell C, with scaling modifications applied to reflect relevant differences with the EPR technology employed on Sizewell C.

2.4 In particular, the Board understands that the ratio of P80 cost to base cost for the cost estimates for comparable plant(s) is calculated and then a ratio of P80 to base cost for Sizewell C is determined by technical experts. Additional adjustments are also made to the overall contingency value where estimating uncertainty, probability and risks of Sizewell C are considered to differ from the comparable plant(s).

2.5 As referred to in paragraph 3 below, the "derived" approach differs from the statistical P80 value where the P80 value is calculated directly from the base data available for the specific facility of interest through application of appropriate probabilistic methods.

2.6 The description and rationale for this approach are also summarised in the following provisions of section 8.2.3.1 of the HPC DWMP:

"*In summary the interim hybrid process uses well developed scopes of work and cost estimates from decommissioning plans, of the existing NG fleet of AGR or PWR power stations, that have been analysed for risk and estimating uncertainty already, and have been subject to external audit. These cost estimates are then factored across to tasks with a similar scope of work for HPC. The ratio of the P80 cost to Base cost for the source cost estimates is calculated, and a risk workshop is held with subject matter experts to determine the appropriate ratio of P80 to base cost to be applied for the equivalent scope of work for HPC.*"

"*In theory, it would be possible to construct a statistical P80 value from the base HPC data. However, based on the currently available level of detail of information, NNB considers that this would require a large number of inevitably subjective assessments to be made. The Monte Carlo analysis performed on the existing HPC data, which is the basis of the statistical approach, would appear to present an accurate result from which a statistical P80 cost can be read, but the result would not be reliable and may result in understating or overstating the level of contingency, without this being apparent.*"

3. Statistical Approach

3.1 A fully statistical approach to P80 calculation for Sizewell C would involve consultation with the relevant technical and engineering experts to develop a risk register based on the site-specific systems and data, recording the probability of occurrence (as a percentage) and cost impact (as a triangular distribution) of the relevant decommissioning risks. Monte Carlo simulations would then be undertaken in order to model the distribution of scenarios and determine the cost estimate level equal to or greater than eighty per cent. (80%) of the projected scenarios.

3.2 However, the approach taken in the HPC DWMP (other than in respect of the Costs of Spent Fuel Management) was to use a "derived" P80 value (see paragraph 2 above) on the basis that a statistically based P80 was not possible at that point in time. This judgement was based on such considerations including as the HPC plant was not yet built, various engineering and other technical clarifications or changes throughout the construction process would materially alter the basis for a statistical P80 based on site-specific information. For example, paragraph 8.2.3.1 of the HPC DWMP provides that:

"*Determining levels of estimating uncertainty and project risk for a plant which has yet to be built is especially challenging. Without the detailed engineering input NNB GenCo information on the plant, it is particularly difficult to determine a cost estimate, and then bound this with the likely minimum and maximum values as required for the fully statistical analysis with a high degree of certainty.*"

3.3 The Operator acknowledged the need for a statistical P80 and the intention indicated in the HPC DWMP is that this will be performed following the completion of construction:

"*[t]he derived P80 value will be replaced with a statistical P80 value for the As-Built version of the DWMP and for future quinquennial reviews.*"

3.4 Sizewell C and HPC are based on the same EPR reactor technology, with known documented differences between the nuclear power plants. It should therefore be possible to implement statistical P80 modelling in the DWMP following the completion of construction on HPC. The FAP currently contemplates an unspecified revision to the P80 methodology around the time of First Criticality in the non-binding explanatory notes to schedule 9 (*Quinquennial Review Programme*) of the FAP.

3.5 Currently, the FAP requirements for Sizewell C oblige the use of a statistical approach to modelling from and including the first Quinquennial Review, as provided for in clause 20 (*Basis for Estimation*), whilst also noting that paragraph 1.5.4 (*Basis on which DTM Costs to be calculated in the Draft DWMP*) of schedule 9 (*Quinquennial Review Programme*) to the FAP leaves room for adopting another approach in line with best practice at the time.

3.6 An explanatory note immediately before clause 20 (*Basis of Estimation*) of the FAP evinces an intention to ensure that if the best practice with respect to deriving an appropriate P value changes in the future (for example, to something other than using a statistical model), Sizewell C and HPC will seek to align any changes or modifications to the approach to follow such best practice. This explanatory note provides as follows:

"Using a statistical model to produce a probability distribution from which an appropriate P value can be derived is the best practice basis of estimation for the foreseeable future. It also aligns with the proposed approach for Sizewell C's sister power station, Hinkley Point C. In the future, it is possible that best practice will change. In such case, the relevant Sizewell C and Hinkley Point C teams will discuss the matter and then each apply to the Secretary of State for any necessary modifications to their respective funded decommissioning programmes."

3.7 In addition, an explanatory note to paragraph 1.4 of schedule 9 (*Quinquennial Review Programme*) of the FAP provides that the "as built" DWMP will "review initial derived P80 value, and taking on board lessons from the Hinkley Point C 'as built' DWMP will revise the methodology used to calculate the P80 value based on industry best practice, along with the parameters determining how the P80 value would be set".

3.8 The Board has reviewed the language in the FAP and is satisfied that it reflects the currently intended approach to P80 calculation based on the available data for EPRs, which the NDA has considered is consistent with the Guidance.

3.9 The Board notes that the risk remains that the detailed basis on which a suitable statistical P80 should be calculated in the future remains unspecified in the FAP and may be subject to change over time, particularly closer to the commencement of the Decommissioning Period (with corresponding and currently unquantifiable impacts on decommissioning cost estimates). To the extent that the best practice position in relation to P80 calculation is adjusted after Plant closure, the FAP would also be unable to respond through further Quinquennial Reviews since Quinquennial Reviews post Plant closure will not adjust the End of Generation Target any further.