Technical Note

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Project title	Eastern Creek Energy from Waste Facility	Job number	239880-03
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Subject	EIS Review - Key Technical Queries		

The Next Generation NSW Pty Ltd ('the Proponent') submitted an amended Environmental Impact Statement (EIS) in November 2016 for their proposed Energy from Waste Facility at Eastern Creek ('the proposed facility').

Arup have undertaken a review of the amended EIS ('the EIS'). The purpose of this review is to assess the adequacy of the EIS in light of the three Arup reviews previously undertaken of the application documentation provided by the Proponent. The previous reviews

- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS – Merit Review, 3 August, 2015, Arup.
- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS – Response to Agency and Company Submission, Urbis, November 2015 and Additional Urbis Submission of 22 February - Arup review.
- The Next Generation (NSW) Energy from Waste Facility, Eastern Creek EIS - EIS Additional Information Gap Review, 14 June, 2016, Arup

The review of the amended EIS submitted in November 2016, has raised **ten essential key queries** which need to be addressed as a priority as they are fundamental to assessing how the proposed facility meets the requirements of the NSW Energy from Waste Policy Statement and the Terms of Reference of for the EIS[1].

The queries raised can be grouped under four main headings:

- The need to demonstrate the technology being used is proven, well understood and capable of handling the expected variability and type of waste feedstock

[1] Director-General's Environmental Assessment Requirements Application number SSD 6236

- Material availability throughout the life of the project in accordance with the EfW Policy criteria
- Material composition
- Proof of Performance

It should be noted that the key queries detailed here are not presented as an exhaustive list of queries raised during the review process, however these queries relate directly to the adequacy of the proposed facility and are presented as the most fundamental that need to be addressed by the Proponent.

Reference facilities

NSW Energy from Waste Policy statement policy requires proponents to demonstrate that the technology being used is proven, well understood and capable of handling the waste feedstock proposed stating:
'Energy recovery facilities must use technologies that are proven, well understood and capable of handling the expected variability and type of waste feedstock. This must be demonstrated through reference to fully operational plants using the same technologies and treating like waste streams in other similar jurisdictions'.
This is a key requirement of the EfW Policy and underscores the criteria philosophy of the Agency. Therefore, the inability to provide a clearly defined demonstration facility treating like waste streams in a similar jurisdiction means that the proponent needs to consider carefully the composition and characteristics of the waste streams it is proposing to accept and how they compare to the waste streams being accepted in comparable overseas facilities.

The EIS acknowledges that the design fuel mix comprises 28.69% C&D waste and 23.27% chute waste i.e. approx. 50% C&D waste in total (figure 24 of the EIS). The EIS references the Ramboll Memo dated 26 October 2016 (Appendix DD.1). The EIS acknowledges (Section 4.4.1) that there is no reference plant accepting approx. 50% C&D waste. The EIS then continues to make the argument that there is potential uncertainty to the composition of feedstock being received in European facilities due to material being pre-processed prior to acceptance at the EfW facility: The EIS states:
'European experience with EfW has been that pre-processed waste materials received from external sources has been sorted prior to arriving at the facility and information relating to its waste declaration/identification is "lost" and cannot be tracked back to its origin.'

This statement implies there is uncertainty relating to the type and source of waste treated at the reference facilities stated (that are all in Europe), and that therefore reference facilities could be treating less or more C&D waste than stated potentially casting doubt on the data presented.

However, referring to the United Kingdom as an example, classifying waste with a List of Waste code / European Waste Catalogue code is a legal requirement under Duty of Care (i.e. chain of custody), and each batch of a particular waste requires a description, LoW/EWC code as well as a quantity on the waste transfer note that accompanies its transfer. Businesses are required to keep waste transfer notes for two years. Therefore, an EfW facility receiving pre-processed waste directly from a UK waste processing facility will know the EWC code and description for each

delivery of waste / RDF it receives. There are LoW/EWC codes specifically for C&D waste (the ‘17s’).
Arup acknowledge that waste that is processed through a RDF or recovery facility, may be reclassified under different LoW/EWC codes e.g. ’19.12.XX’ (waste / RDF from waste management facilities) and therefore at face value the information on the original source of the waste would appear to be ‘lost’. However, the RDF or recovery facility will still be required to hold information on where waste was sourced from. Therefore by following the chain of the custody it is possible to obtain information relating to waste origin – furthermore this should provide a more robust evidence base against which to compare the proposed facility.

Regardless, Arup are in agreement that there is no known comparable facility treating approx.50% C&D waste. There is insufficient explanation on how the proposed facility will cope with processing this high percentage of C&D waste in the absence of a fully operational reference facility.

Query 1: There is insufficient evidence that the proposed technology can operate successfully given the proposed levels (approx. 50%) of C&D feedstock waste. If a representative facility cannot be established, the proponent needs to clearly define and articulate the differences the proposed feedstock will cause in both process and emissions and demonstrate that any difficulties can be mitigated to ensure successful operation of the proposed facility.

Of note - Section 4 of Appendix J states ‘*no two EfW plants would have “identical feedstock” as the feedstock always depends on the region and the waste fractions delivered to the plant’*. The EIS goes on to state that that the comparison with reference facilities in terms of operation of emission behaviour is largely consistent irrespective of location and feedstock. This statement could be considered to be misleading at the emission behaviour of EfW plants is primarily driven by the requirement to meet the IED emission limits.

Material Availability

Construction and Demolition (C&D) residual waste

A methodology is presented for how composition of C&D residual waste has been derived in Section 4.1 of Appendix J (waste management report). This methodology states that ‘appropriate resource recovery’ rates likely to be achieved for each waste stream via a C&D recovery facility or via source separation at C&D sites have been defined, but it fails to state what these rates are or how they have been included in the composition calculation. In addition, Section 4.1 references the Hyder C&D report, which does contain composition data on C&D waste (table 3-1). It is unclear how this composition has been ‘recalculated’ based on remaining residual material. There are also inconsistences in the data, for example, Table 7 in Appendix J shows 43.9% wood, whereas wood is not included in the Hyder C&D composition.

In addition, C&D waste composition has a high proportion of ‘other’ waste (20.75% from figure 24 in the EIS) which is not defined.

Query 2: A detailed, evidenced-based, fully transparent explanation of how C&D residual waste composition has been calculated, including the recovery rates used, should be provided.

An evidence based description on what 'other' waste comprises of is required.

Section 10.4.3.2 of the EIS and Appendix J, Section 7.2, states there is 1,112,150 tpa of C&D waste potentially available as a fuel source for EfW in the Sydney Metropolitan Area (SMA). This is based on the National Waste Report, 2013 (based on 2011 data) and the assumption that SMA is 65% of the NSW total population. It appears that these figures for C&D do not take into account waste materials that are not suitable for incineration (asbestos, hazardous waste etc.).

There is not a robust consideration of the potential feedstock in relation to the proposed facility size. It is not appropriate to suggest that all residual C&D waste is potential feedstock as this does not take into account the composition of the overall waste stream which includes potentially unsuitable material. There is no acknowledgement that certain fractions of the waste will not be suitable to be used as a feedstock.

Query 3: An evidence-based, transparent explanation on the actual available C&D waste tonnages suitable as feedstock that are available in the SMA area is required.

Commercial and Industrial (C&I) residual waste

Similarly, a methodology is presented for how composition of C&I residual waste (16.84% of total waste, or 93,041 tpa) has been derived in Section 4.2 of Appendix J but resource recovery rates are not stated.

In addition, C&I waste composition has a high proportion of 'other' waste (14.44% from figure 24 in the EIS) which is not defined.

Query 4: A detailed, evidenced-based, fully transparent explanation of how C&I residual waste composition has been calculated, including the recovery rates used, should be provided. An evidence-based description of what 'other' waste comprises of is required.

Section 10.4.3.2 of the EIS and Appendix J, Section 7.2, states there is 1,430,000 tpa of C&I waste potentially available as a fuel source for EfW in the SMA. This is based on the same assumptions used for C&D waste.

There is not a robust consideration of the potential feedstock in relation to the proposed facility size. It is not appropriate to suggest that all residual C&I waste is potential feedstock as this does not take into account the composition of the overall waste stream which includes potentially unsuitable material. There is no acknowledgement that certain fractions of the waste will not be suitable to be used as a feedstock.

Query 5: An evidence-based, transparent explanation on the actual available C&I waste tonnages suitable as feedstock that are available in the SMA area is required.

Waste growth

It was previously raised that the Proponent should consider if assuming a positive waste growth rate is reasonable. There is current evidence (including recent data received by Arup from the NSW EPA) that indicates waste generation of C&D and C&I waste may reducing year on year.

The evidence provided in Section 7.4 of Appendix J states that the waste generation growth rate (2006/07 to 2010) is 12% The EIS makes reference to this same statistic in Section 10.4.3.2 The EIS is silent on more recent waste generation statistics that suggests annual waste generation may be decreasing. There doesn't appear to be any acknowledgement that annual waste generation may be decreasing (although it is acknowledged that recycling rates are increasing). Best practice would be to demonstrate the available feedstock would be to provide a detailed waste forecast model for the planned operational period of the proposed facility.

Query 6: An evidence-based justification needs to be given why the Proponent is assuming a waste growth rate from data that is over seven years old. The implications of a waste reduction rate needs to be fully considered with regard to long term waste availability. This could be demonstrated through a waste forecast model, which would estimate predicted waste tonnages over the planned operational period of the proposed facility.

Material Composition

Chute Residual Waste (CRW)

No explanation is given for how the composition of CRW waste has been derived. It comprises 58.20% wood (Figure 24 in the EIS), no breakdown of the types of wood are provided in particular with regard to Treated Wood Waste (refer to Query 7).

Query 7: A detailed, evidence-based and fully transparent explanation of how CRW composition has been calculated, including the recovery rates used, is required.

A detailed compositional breakdown of wood waste is required.

Shredder floc waste

Appendix DD.6 to the EIS includes an estimation of shredder floc composition. This is based on the assumption that 75% of an End of Life Vehicle (ELV) by weight is recovered metal, which would appear reasonable. The remaining shredder floc is estimated to comprise plastics (10.5%), rubber (3.8%), metals (2.5%), textiles (2.9%), fines (3.8%), and fluids (1.6%). Fluids comprises of operational oils/fluids and water.

No detailed chemical analysis suite is provided for floc waste. 'Overall' levels of hydrocarbons are stated as 2.99%. PCB is quoted as 120mg/kg (0.012% by weight) and Bromine as 0.02g/100g (0.02% by weight). No analysis for heavy metals is presented.

Appendix CC to the EIS (project definition brief) presents a chemical analysis of European floc waste in table 3, and a compositional analysis of floc waste likely to be processed at the proposed facility. Chloride concentration is quoted as 0.6 % for the proposed facility compared to 1.8% for

Europe, and Bromine 0.01% for the proposed facility compared to 0.02% for Europe (by weight). Total PAH is stated at 20 mg/kg and total PCB at 14 mg/kg (dry basis).

Appendix CC also includes a composition in figure 3 of shredder floc based on 17 samples, although no specific source for location, date, source, and the types of vehicle the floc is generated from is provided. This composition is different to the estimated composition in Appendix DD.6. A different Net Calorific Value (NCV) is also presented to the NCV in the EIS (Figure 24). 11.6MJ/kg is stated in Appendix CC and 12.59 MJ/kg is stated in the EIS.

Section 4.4.2.1 of the EIS states that *'in general floc processing in Australia is comparable to that undertaken in Europe'*. The EIS also states that (*floc waste in Australia is typically) 'brought to landfill for disposal as limited further resource recovery is possible from this shredded material. The metal industry has successfully secured landfill levy exemptions to assist with the costs of disposing of this difficult waste stream'*.
Specific reference facilities processing floc waste through EfW facilities in Europe has not been provided. If floc waste is processed through EfW facilities in Europe, and as floc waste is landfilled in Australia the assertion that floc waste processing in Australia is comparable to that undertaken in Australia is unfounded.

Query 8: Robust, evidence-based data is required to give a definitive detailed floc waste composition for Australia to allow for a comprehensive comparison to European floc waste.

A detailed comparison of the process used in Australia and Europe to treat ELV is required including clear identification of any differences and the impact this may have on the generated floc.

Identification of EfW facilities in Europe processing floc waste is needed, including composition, quantity and percentage floc waste in the overall waste stream. Consideration of any special operational or handling procedures employed at facilities accepting floc waste should also be articulated.

Treated Wood Waste (TWW)

Wood can be treated with a number of compounds including PCB (Polychlroinated biphenyls), CCA (Copper Chromated Arsenate), paints, and fire retardants. Therefore TWW is a potential source of contaminants of concern for EfW plants. The NSW Energy from Waste Policy statement requires a temperature of 1,100 °C for two seconds if waste has a content of more than 1% of halogenated organic substances, expressed as chlorine.

In addition, The PAS 111:2012 Specification for the requirements and test methods for processing waste wood, Annex A (Grades of recycled wood) indicates TWW (Grade 4 waste) must be processed as hazardous waste. The specification states that waste wood containing CCA preservation treatments and creosote, which is typically fencing, transmission poles railway sleepers, "requires disposal in a process as a hazardous waste incinerator". CCA treated TWW must therefore be treated with the increase temperature of 1100 °C for two seconds. It is common practise in the UK and other EU Countries for CCA TWW to be handled as hazardous waste and treated in an a hazardous waste incinerator.

Appendix DD.5 to the EIS includes a calculation that concludes for a given size of wood treated with PCB (Polychlorinated biphenyl) containing varnish, the chlorine concentration would be less than 0.01% by weight. Therefore the EIS states that there is no need for an increased combustion temperature of 1,100 °C for two seconds from the processing of TWW.

However, the design fuel mix (figure 24 in the EIS) states 0.88% of the design fuel will be Cl. This could include dense plastic such as PVC (Polyvinyl Chloride), and could increase the potential for the formation of dioxins. 0.88% is close to 1% Cl limit in the policy, and any fluctuations in input waste fuel could result in higher concentrations despite proposed mixing of waste in the feed hopper. Section 2.3.1 of Appendix CC (project definition brief) cites that waste mixing will overcome this, however this is stated as being done during 'low delivery' inferring it may not be done all the time. A guarantee of continual thorough waste mixing as a minimum would be required.

Regarding timber treated with Copper Chrome Arsenic (CCA), there does not appear to be any specific assurances there will procedures and processes in place to specifically ensure removal of CCA treated materials. In addition the calculation in Appendix DD.5 only focuses on PCB containing varnish and CCA is not given consideration.

Section and 4.9.2 and 5.4.1 of Appendix J (waste management report) to the EIS states that all treated timber will be monitored from general screening, waste composition audits and analytical analysis of ash residue. It is questionable how effective these measures will be at preventing treated timber from being burned in the facility, as the general screening is not adequately detailed for those waste streams (C&D, C&I) not originating from the Genesis MPC, and waste composition audits and analytical analysis are retroactive measures.

Given that a clear argument has not been provided that can justify that all TWW will be removed from the incoming waste streams, provision of an increased combustion temperature of 1,100 °C for two seconds should further be considered and justification of the proponents preferred position based on scientific modelling or evidence to reference facilities is required. Scenario modelling of varying concentrations of TWW should be undertaken to demonstrate if TWW does enter the feedstock the threshold levels it will not have a significant negative impact in accordance with the EfW Policy.

Query 9: A definitive, evidence-based estimation of the percentage of different types of TWW in the waste feedstock is required.

Detailed acceptance procedures that will be employed at the facility to remove TWW from all waste sources that will be accepted are required.

If adequate removal of TWW cannot be guaranteed, provision of a combustion temperature of 1,100 °C for two seconds operation needs be re-considered.

Scenario modelling of varying concentrations of TWW should be undertaken to demonstrate if TWW does enter the feedstock the threshold levels it will not have a significant negative impact in accordance with the EfW Policy.

Proof of Performance

Appendix LL to the EIS details proof of performance tests and procedures. This includes a detailed methodology for performance guarantee testing etc. but it does not include training requirements of operational staff / competency and capabilities of operational staff. EfW on this scale is a new technology for Australia, and there needs to be assurance that staff will be trained by experienced operators in order to ensure successful operation after the commissioning period is over.

Query 10: Detailed procedures required on how the proposed facility will be run during commissioning and operational phases by operational staff, including training requirements and qualifications.

Conclusion

It is necessary for the Proponent to clearly address the queries raised, and provide evidence based responses. Without the ability to demonstrate the performance of the technology through reference plants treating a similar design fuel mix, assertions made by the proponent about the functionality and performance of their plant and process, cannot be validated. The Proponent needs to provide more detail on the composition of the proposed waste streams and specifically assess and articulate how these waste streams will be processed through the facility and how they will impact the performance of the facility.

The Proponent also needs to give further consideration to the availability of suitable material based on composition and compliance with the EfW Policy, in the Greater Sydney Area which could be utilised as fuel for the facility.

DOCUMENT CHECKING (not mandatory for File Note)

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