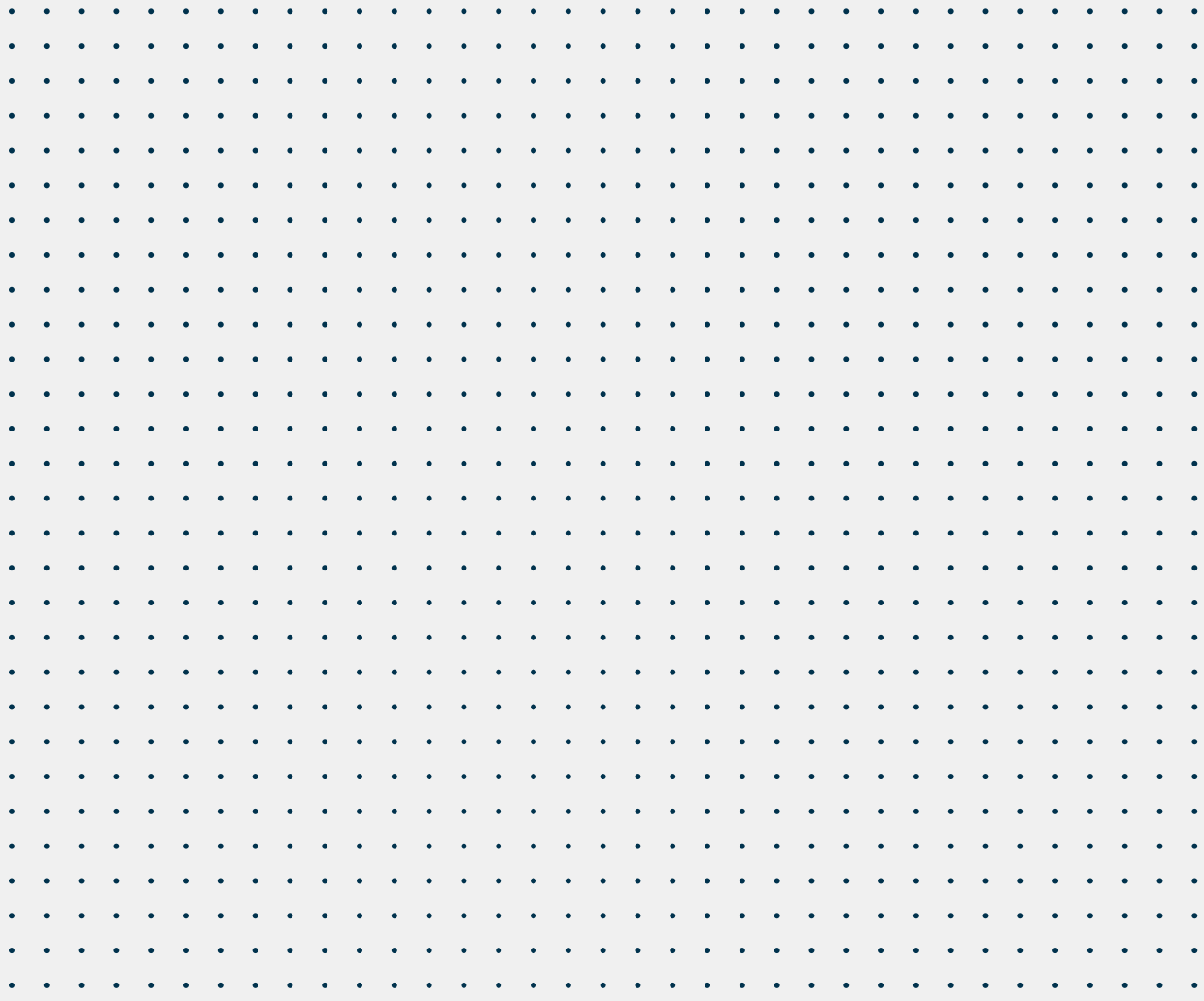


Guide to the NSW Energy from Waste framework

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The NSW Environment Protection Authority has made available on its website the 'Guide to the NSW Energy from Waste Framework' (the Guide), as a summary of the assessment requirements and regulatory processes for proposed energy from waste projects in New South Wales. The Guide forms part of the Report of the NSW Chief Scientist and Engineer on energy from waste (finalised in November 2020), which was prepared with inter-agency input including representatives of the NSW EPA, NSW Health and the NSW Department of Planning, Industry and Environment.

The Guide is intended to provide general guidance on the regulatory and policy frameworks for energy from waste projects. It is not intended to constitute, and should not be relied on as, legal or regulatory advice. Nor is the Guide determinative of whether an energy from waste project proposal will be approved.

The information in the Guide is current as at November 2020. Legal requirements, regulatory processes and policy positions may be subject to change without notice. While we will endeavour to ensure that information is updated as requirements, policy and processes change, we recommend you independently verify and check the specific requirements that apply to your particular circumstances. The NSW Environment Protection Authority accepts no responsibility for errors or omissions in the Guide and will not be liable for any damage, loss, or expense which may occur to any person or organisation taking action or not on the basis of the Guide. Readers should seek appropriate, independent advice when applying the information in the Guide to their specific needs.

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Guide to the NSW Energy from Waste framework



The NSW Energy from Waste (EFW) framework provides a summary of the requirements and regulatory assessment process for proposed EFW plants in NSW. This is presented at Figure 2. This framework only applies where EFW facilities may be established under the **NSW Energy from Waste Infrastructure Plan 2041**.

The framework was developed as part of a review of EFW undertaken by the NSW Chief Scientist and Engineer (CSE) at the request of the Minister for Energy and Environment, the Hon Matt Kean MP. A cross-agency working group was established to provide advice on environmental protection standards and frameworks to ensure that proposed EFW facilities in NSW undertake robust assessments and adopt international best-practice standards and controls to ensure human health and the environment are protected.

Numerous statutes, regulations, policies, plans and other documents underpin the assessment and approval process for any major development. The framework was developed to capture the complete process and requirements for proposed EFW plants in NSW. It assisted the working group to assess and make comparisons with requirements in other jurisdictions, both in Australia and internationally. It also provides a tool for stakeholders to understand the entirety of requirements. This Guide was developed to orient the reader to the framework and to highlight major elements of the process.

Figure 2 includes hyperlinks to relevant policies and guidelines for each topic area. When multiple documents are involved, these links take the reader to a landing page with information and further links. In addition to requirements, the documents include details of modelling and risk assessment processes that the applicant must follow as part of their application.

An overview of the planning assessment process for EFW plants appears on the left side of Figure 2. It is anticipated that EFW plants will generally be categorised as State significant developments (SSD). Developments are categorised as SSD due to their size, economic value or potential impacts. Information about how SSDs are assessed can be found **here**. This webpage in turn links to the **major projects website**, which contains information and reports about all SSD applications, including proposed EFW plants.

Under the **NSW Energy from Waste Policy Statement** (EFW policy), proposals must:

- meet current international best-practice techniques, including emissions controls
- use technologies that are proven, well understood and capable of handling the waste inputs. This must be demonstrated through reference to fully operational plants using the same technologies and treating similar waste streams to the proposed plant
- meet technical, thermal efficiency and resource recovery criteria
- undertake monitoring with real-time feedback.

The centre and right side of Figure 2 sets out technical requirements relating to allowable waste inputs, plant technology, air emissions and waste treatment and disposal. The upper right corner of Figure 2 includes best-practice air emissions limits for EFW plants. These limits are the maximum emissions for different pollutant types permitted for any approved EFW plants. The limits were developed by the NSW Environment Protection Authority (EPA) and reviewed by an independent expert commissioned by the CSE. The limits as they appear reflect the advice from this expert review.

The lower right quadrant of Figure 2 sets out the impact and risk assessments that must be undertaken. These assessments must include detailed consideration and account for all parts of the proposed plant, technology and practices from the point of design to the build and operations. The suitability of models used to assess local and regional air quality impacts must be demonstrated. All assessments, including a human health risk assessment, must be undertaken in accordance with the methods specified in the Planning Secretary's Environmental Assessment Requirements for the SSD project.

As a result of the various assessments, the design, scale or other elements of the proposal may need to be revised to achieve compliance with all requirements (lower centre quadrant of Figure 2). Applicants must also develop risk assessment, action and response plans to manage any variability in waste inputs and to appropriately manage water and solid waste outputs.

1. The planning process – how EFW proposals are assessed

Applicants must meet with NSW planning officials before any proposals are lodged. This is to ensure there is a complete understanding of the entirety of all requirements and processes. In addition to technical matters, the proposed location of the site and consistency with the EFW policy are discussed. Other matters discussed include:

- a description and justification for the scope of the proposal, the waste inputs and volumes, the type of plant and its expected operational performance
- an overview of identified stakeholders and proposed community engagement activities
- likely risk assessments that will be required to understand possible environmental and human health impacts based on the plant, waste inputs and local environmental and community conditions.

Following the initial meeting(s) with planning officials, and once the scope and design of the proposed plant have been established and described in a scoping report, a formal statement of requirements is issued – called the Secretary’s Environmental Assessment Requirements (SEARs). The SEARs set out all the issues that must be addressed and studies undertaken for the proposal to be considered. The SEARs are developed in consultation with and on advice from stakeholders including local councils and state government agencies.

Applicants are required to prepare an Environmental Impact Statement (EIS) addressing all requirements included in the SEARs. Once a development application is lodged, the EIS is put on public display for a minimum period of 28 days. Nearby residents and businesses are notified of the proposal; and submissions are invited from the community, local council and government agencies. The applicant then prepares a response to issues raised.

The assessment by planning officials considers all relevant law, policy and plans; specialist advice from government agencies or other technical experts; feedback and submissions made by stakeholders; and the applicant’s response. A report on the assessment of key potential impacts and a recommendation is prepared by planning officials.

If approved, the planning consent and Environment Protection Licence (EPL) set out the conditions for operation, monitoring and reporting. The EPL can require additional studies or programs of work be undertaken.

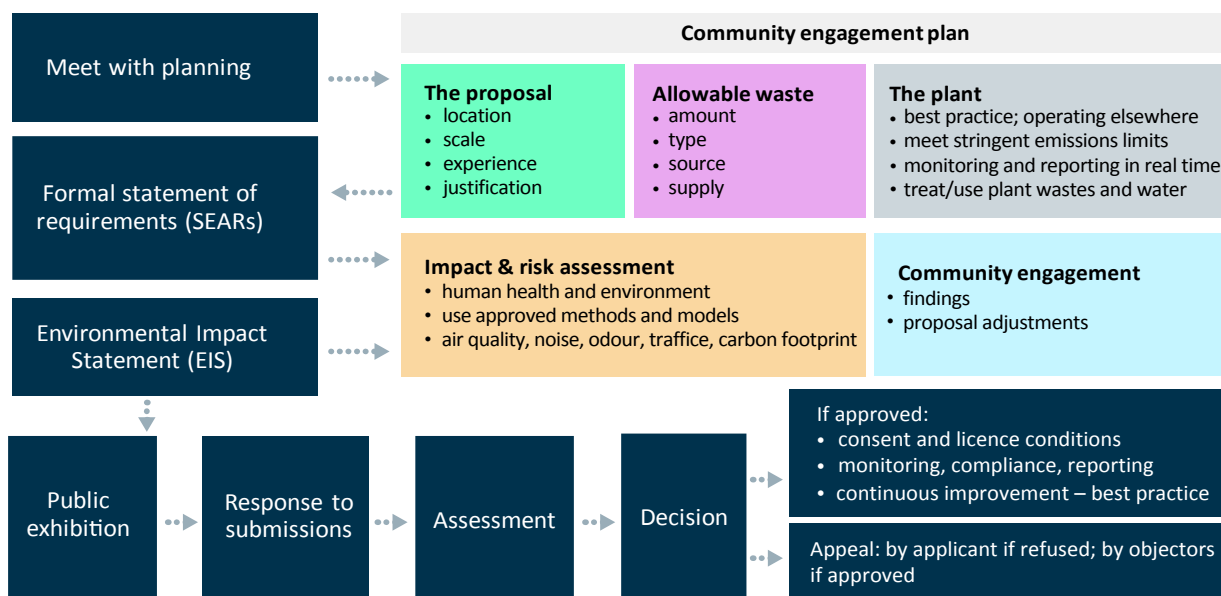


Figure 1: Process and requirements overview

2. What is an EFW plant?

EFW plants thermally treat certain types of waste materials for the purposes of energy recovery. The EFW policy requires that a minimum amount of energy generated (25%) is captured as electricity, or an equivalent amount of heat is recovered. This requirement is to ensure waste isn't simply burned. Thermal treatment includes combustion, thermal oxidation, gasification and pyrolysis.

There are strict limits about what waste can be used in NSW EFW plants. Hazardous wastes are not allowed – they require special treatment. There are also limits about the amount (proportion) of different waste types that can be used. These limits are designed to align with the waste hierarchy and to encourage recycling and reuse.

The CSE review mapped fuel types and facilities that are included (or excluded) from the EFW policy requirements. This is provided at Figure 3.

Included in Figure 3 is the type of feedstock that EFW facilities are permitted to receive under the EFW policy; the proportion of each waste stream allowed for energy recovery; and requirements about where waste can be sourced from.

It is expected that the amount and type of waste produced will change over time. This will be influenced by development of new materials and expected changes in patterns of recycling, reprocessing and re-use. Proposals must demonstrate that the plant can accommodate these changes and that it has both a primary and a secondary source of supply.

The EFW policy requires waste inputs be characterised. The CSE review made recommendations to reinforce oversight of waste inputs and to ensure proposals are consistent with the waste hierarchy and NSW policies relating to sustainability, circular economy and net-zero emissions. These include that:

- work is undertaken to understand the mix of incentives that influence consumer and industry behaviours to promote adherence to the waste hierarchy. This includes the impact of gate fees at landfill sites and EFW facilities
- proposals are required to develop a sampling and reporting program for waste inputs
- a life cycle assessment (LCA) is required and the findings considered in the regulatory assessment process.

3. Use of best-practice technology and requirement for a reference plant

The EFW policy requires projects to use international best-practice techniques, including in:

- process design and control
- emission control equipment
- emissions monitoring
- receipt and management of waste
- management of residues.

To provide confidence in the ability of the proposed plant to operate at known and acceptable standards, particularly in relation to air emissions, an established reference facility is required (Figure 2).

A recognised challenge is that waste inputs are never identical and may vary within and across jurisdictions as well as over time. This variation could potentially affect plant performance and therefore the type and level of air emissions or residual waste streams. Therefore, each proposal requires careful assessment on a case-by-case basis, taking into account expected performance under local conditions, including efficiency and ability to manage the proposed waste stream.

Under the EFW policy, applicants are required to outline residual risks and provide plans to manage variability of waste inputs outside expected and acceptable bandwidths. It is also expected that applicants commit to continual improvement of technology and emission controls in line with international best practice.

While adherence to the framework presented at Figure 2 does not guarantee approval, closer alignment between the proposed waste inputs and the reference technology provides greater confidence in the expected performance of the proposed plant. Likewise, increasing deviation from the type or uniformity of inputs will require a proportional increase in data and information about (1) the reason for doing so, and (2) how the difference will be managed.

Having reviewed the requirements and process, the CSE review concluded that the framework for assessing proposed EFW facilities appears sufficiently flexible in its ability to adapt to emerging best practice.

4. Emissions limits

NSW regulations and policies set maximum air pollutant emission limits and monitoring standards that industry must comply with. The EFW policy states that the process and air emissions from the facility must satisfy, at a minimum, the requirements of the requirements of Group 6 Limits under the **Protection of the Environment Operations (Clean Air) Regulation 2010** (the Clean Air Regulation).

The NSW EFW policy also requires that facilities demonstrate that they will be using current international best-practice control equipment. Consequently, the emissions limits set for EFW facilities in Environment Protection Licences (EPLs) are likely to be more stringent than 'Group 6' emissions.

Section 45 of the **Protection of the Environment Operations Act 1997** (POEO Act) sets out matters regulators are required to take into account when exercising licensing functions. This includes environmental protection policies; the pollution likely to be caused by the activities; and practical measures that can be taken to prevent, control or mitigate pollution and protect the environment from harm. These statutory requirements, together with the principles and requirements described in the **Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2016** (Approved Methods for Modelling) are applied by the EPA when setting emissions limits for industrial activities. This includes the best-practice air emission limits for EFW facilities (best-practice limits) set out in the top right corner of Figure 2.

The principles applied by the EPA include setting emission limits that:

- reflect reasonably available control technology and good environmental practice
- reflect proper and efficient operation
- protect the health and amenity of the surrounding community
- are consistent with minimising toxic air pollutants to the maximum extent achievable through the application of best-practice process design and/or emission controls.

Information considered when emission limits are set in NSW includes:

- emission control performance information available from other jurisdictions such as the European Union
- knowledge and information gained from assessments included in recent EFW development applications in NSW and elsewhere in Australia
- air quality impact assessments.

This approach is consistent with ongoing policy and technology reviews undertaken in comparable jurisdictions, including for example, the **USA** and **EU**.

In NSW, a local air quality impact assessment of emissions from the proposed plant must be undertaken as part of the Environmental Impact Statement (EIS). Assessment and modelling must be undertaken in accordance with the statutory methods set out in the Approved Methods for Modelling. This includes preparation of an emissions inventory, use of meteorological data and technical requirements for the air quality impact assessment. These include how background concentrations of pollutants are accounted for; how the chemical transformation of pollutants is modelled; methods for modelling dispersion of emissions; how dispersion modelling results are interpreted; and impact assessment criteria for specific pollutants.

The expert review recommended that the best-practice air emission limits are reviewed within three years. The EPA advise the review will consider emissions data obtained for any established EFW facilities and that the EFW policy will be reviewed at the same time.

5. Monitoring

Methods for both periodic and continuous emissions monitoring to demonstrate compliance with air emission limits are set out in the **Approved Methods for sampling and analysis of air pollutants in New South Wales** (2007). These methods are currently being reviewed, including an assessment of advances in plant emissions control and monitoring technologies.

Where technology permits reliable measurement, continuous monitoring is required. The NSW EFW policy requires continuous, real-time measurements of nitrous oxide (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), total particles, total organic carbon (TOC), hydrochloric acid (HCl) and fluorhydric acid (HF). The EPA also required periodic measurement of other pollutants such as metals and dioxins.

For any approved facility, the EPA will require operators to undertake proof-of-performance campaign monitoring after construction has been completed. This is to demonstrate compliance with air emissions standards. Monitoring requirements set out in Environment Protection Licences are tailored to each project. The licences detail pollutants to be monitored, monitoring methods, monitoring frequency and reporting requirements. Licence reviews consider improvements in monitoring technologies, individual project risk factors identified during the planning process, and the plant's operating and compliance history over time.

6. Human Health Risk Assessment (HHRA)

Applicants are required to prepare and submit a detailed Human Health Risk Assessment (HHRA). The HHRA must be undertaken in accordance with the **Guidelines for assessing human health risks from environmental hazards** (enHealth, 2012). The HHRA is reviewed by technical experts in NSW Government agencies. Independent external experts may also be engaged to assess complex proposals such as EFW plants.

The enHealth guidance provides a nationally consistent approach to environmental health assessment. Emphasis is given to appropriate scoping in the design phase of risk assessment and consultation with all stakeholders and decision-makers to ensure the conceptual models and methodologies used are adequate.

The general methodology of a HHRA involves issue identification, hazard identification and dose-responses assessment, exposure assessment and risk characterisation. This information is considered in the context of available literature from laboratory, animal and human health studies about exposure to and impacts of pollutants on human health. Actual and derived (modelled) data as well as expert opinion is used. More specific information – e.g. the location of the proposed plant, atmospheric and geographic conditions that will influence the dispersal of any emissions and population demographics, including vulnerable groups – is included in the assessment.

An important input to the HHRA is the air quality impact assessment. This assessment, as well as performance data from the reference plant, helps to identify pollutants of concern and potential exposure levels. This information helps to ensure the HHRA focuses on the main contributors to health risk. Potential exposure pathways for these pollutants are considered, including inhalation, contact with soil, contact and ingestion of groundwater, drinking water (water from rainwater tanks or water reservoirs) or ingestion of home-grown food. Risks from multiple exposure pathways are also assessed. For each pollutant, both acute and chronic exposure is assessed. Safety margins are usually applied to threshold values to ensure those most sensitive are protected.

It is important to recognise that the exposure risks in the HHRA are associated with ambient air quality as it relates to whole populations and not the individual. Currently, there is no means of assessing the impact that a single source of emissions (e.g. a specific plant) will have on an individual.

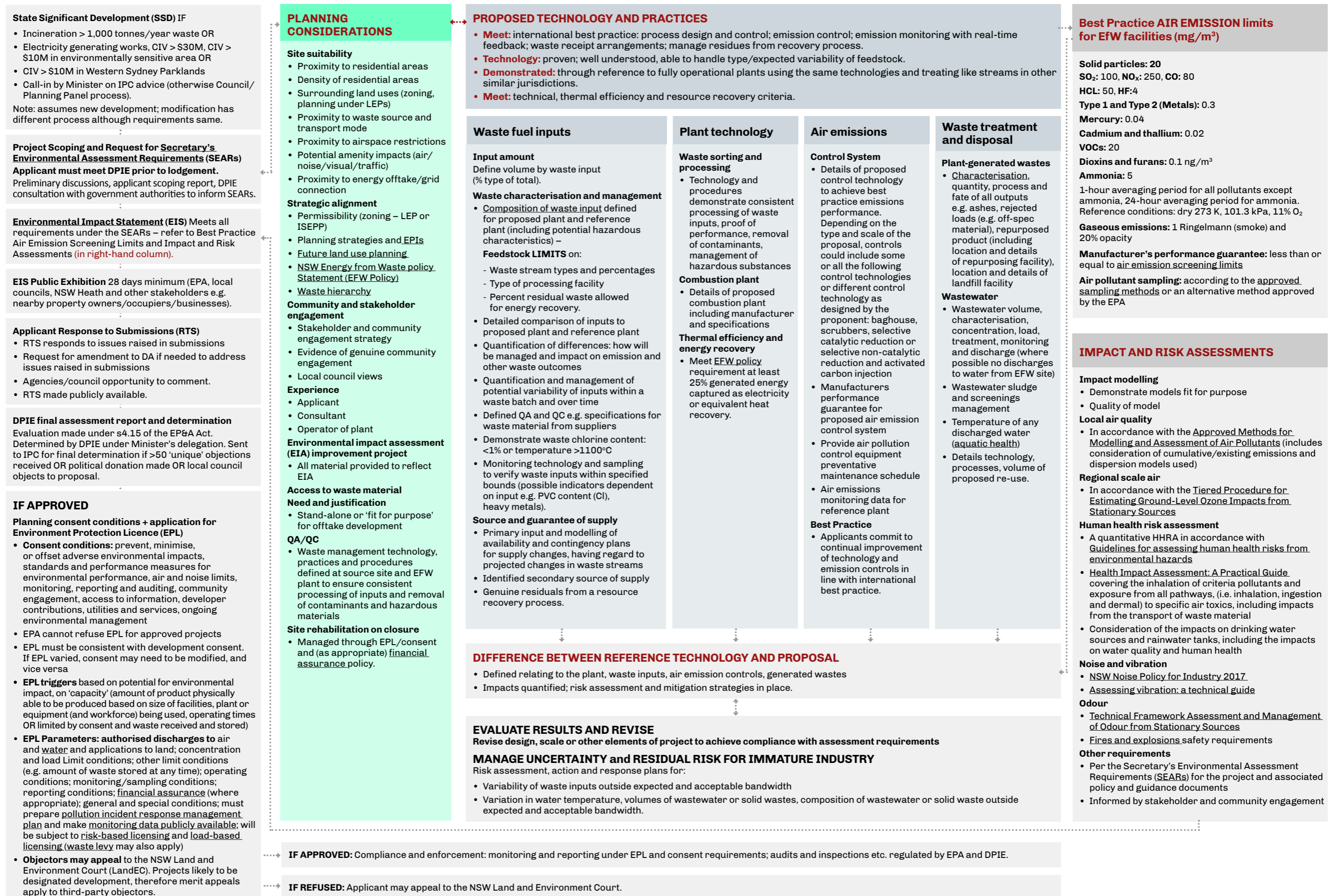


Figure 2: Assessment requirements and regulatory process for Energy from Waste projects in NSW

LEGISLATIVE FRAMEWORK

Protection of the Environment Operations Act 1997 (POEO Act)

- [Protection of the Environment Operations \(Waste\) Regulation 2014](#)
- [Protection of the Environment Operations \(Clean Air\) Regulation 2010 \(POEO \(Clean Air\) Regulation Regulation of air emissions, including maximum industrial source emissions\)](#)
- [Protection of the Environment Operations \(General\) Regulation 2009 Schedule 1 – scheduled activities that are subject to load-based licensing and relevant assessable pollutants](#)
- [Waste Avoidance and Resource Recovery Act 2001 \(WaRR Act\) Hierarchy for resource management \(avoid, recover, dispose\); EPA role in developing, monitoring waste strategies; extended producer responsibility schemes](#)

ENERGY FROM WASTE POLICY STATEMENT

Objectives

- Protect human and health and environment (POEO Act)
- Meet resource management hierarchy (WaRR Act)
 - (1) avoid unnecessary consumption
 - (2) recover (re-use, reprocess, recycle, recover energy)
 - (3) dispose of

ELIGIBLE WASTE FUELS MUST MEET OTHER REQUIREMENTS

Eligible Waste Fuels (EWF)

- Are waste/waste derived materials posing low risk of harm to the environment and human health when used as a fuel due to origin, low level of contaminants, consistency over time?
- Include biomass from agriculture; forestry and sawmill residue; uncontaminated wood waste; recovered waste oil; organic residues from virgin paper pulp activities; landfill gas and biogas e.g. anaerobic digester.
- Eligible waste fuels meeting the definition of a **standard fuel** defined under the POEO (Clean Air) Regulation which meet emissions criteria still require approval for use.
- Standard Fuel is any unused and uncontaminated solid, liquid or gaseous fuel that is: (a) coal or coal-derived fuel (other than any tar or tar residues), or (b) liquid or gaseous petroleum-derived fuel, or (c) wood or wood-derived fuel, or (d) bagasse.

Requirements for Eligible Waste Fuels

- May be thermally treated using a range of treatment technologies, provided a resource recovery order and exemption has been granted by the EPA.
- Resource recovery orders and exemptions are issued by the EPA under Part 9 of the Protection of the Environment Operations (Waste) Regulation 2014 and exempt a person from the various waste regulatory requirements that apply to the use of a waste fuel (e.g. waste disposal licensing, levy payments, etc.). The exemptions apply to waste fuels determined by the EPA to be fit-for-purpose, bona-fide energy recovery opportunities.
- The origin, composition and consistency of these wastes must ensure that emissions from thermal treatment will be known and consistent over time. Facilities proposing to use eligible waste fuels must meet the following criteria:
 - ability to demonstrate to the EPA that the proposed waste consistently meets the definition of an EPA-approved eligible waste fuel
 - confirm there are no practical, higher order re-use opportunities for the waste
 - fully characterise the waste and/or undertake proof of performance
 - meet the relevant emission standards as set out in the Protection of the Environment Operations (Clean Air) Regulation 2010.

FACILITIES WITH THERMAL TREATMENT EXCLUDED

Other regulatory frameworks already apply:

- thermal processes where there is no change in the chemical composition of the waste
- transport fuels produced from waste
- autoclaving processes
- biological processes, such as anaerobic digestion and composting of waste.

Not regarded as undertaking genuine energy recovery:

- for the destruction of waste
- for the thermal treatment of contaminated soil
- proposing the thermal treatment of unprocessed mixed waste streams
- proposing the thermal treatment of waste that has been exhumed from landfills
- proposing the thermal treatment of hazardous waste materials.

ALL OTHER WASTES MUST MEET ENERGY RECOVERY FACILITY REQUIREMENTS IN EFW POLICY STATEMENT

Wastes

- **Combination eligible and non-eligible wastes:** If the facility is proposing to thermally treat (defined in POEO Act) a combination of eligible and other waste fuels, it will be subject to the requirements of an energy recovery facility.
- **Non eligible waste:** Facilities proposing to thermally treat any waste or waste-derived materials (as defined in Sch. 1 POEO Act) that are not listed as an eligible waste fuel must meet the requirements of an energy recovery facility.

Facilities

- Thermally treat waste (defined in Sch. 1 POEO Act) or waste-derived materials for the recovery of energy. Thermal treatment means the processing of wastes by combustion, thermal oxidation, thermal or plasma gasification, pyrolysis and torrefaction or other thermal treatment processes.
- Where a thermal process, such as pyrolysis or gasification, produces a gas for subsequent combustion (for example, a syngas), the facility where that gas is combusted.

Feedstock

Energy recovery facilities may only receive feedstock from waste processing facilities or collection systems that meet the criteria.

Waste stream	Processing Facility	% residual waste allowed for energy recovery
Mixed wastes		
Municipal solid waste (MSW)	LGA has separate collection for dry recyclables and food and garden waste	No limit by weight
	LGA has separate collection for dry recyclables and garden waste	Up to 40% by weight received at the processing facility
	LGA has separate collection for dry recyclables	Up to 25% by weight of waste received at the processing facility
Commercial and industrial (C&I)		Up to 50% by weight of waste received at the processing facility
	Mixed C&I where business has separate collection for all relevant waste streams	No limit by weight
Construction and demolition (C&D)		Up to 25% by weight of waste received at the processing facility
Residuals from source-separated materials		
Source-separated recyclables from MSW		Up to 10% by weight of waste received at the processing facility
Source-separated garden waste		Up to 5% by weight of waste received at the processing facility
Source-separated food +/- garden waste		Up to 10% by weight of waste received at the processing facility
Separated waste streams		
Waste stream	Feedstock able to be used at an energy recovery facility	
Waste wood	Residual wood waste sources directly from a waste generator e.g. manufacturing facility	
Textiles	Residuals textiles sourced directly from a waste generator	
Waste tyres	End-of-life tyres	
Biosolids	Used only in a process to produce a char for land application	
Source-separated food and garden organics	Used only in a process to produce a char for land application	

Figure 3: Waste fuels and facilities