

# Australian Greenhouse Office

## PROGRAM GUIDELINES

### GENERATOR EFFICIENCY STANDARDS

A program to encourage businesses using fossil fuels  
for power generation to achieve best practice in generating power  
and reduce greenhouse emissions

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AUSTRALIAN  
Greenhouse  
Office

The lead Commonwealth agency on  
greenhouse matters

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## INTRODUCTION

In November 1997 the Prime Minister announced a package of measures to reduce greenhouse gas emissions in his climate change statement, *Safeguarding the Future*. One of the key energy measures is Efficiency Standards for Power Generation. This measure has subsequently been incorporated into the National Greenhouse Strategy (NGS) that was endorsed by the Council of Australian Governments in 1998.

The objective of the Efficiency Standards for Power Generation measure - now known as the Generator Efficiency Standards program (GES) - is to:

- achieve movement towards best practice in the efficiency of electricity generation using fossil fuels; and
- deliver reductions in the greenhouse gas intensity of energy supply.

The Commonwealth will enter into legally binding agreements with businesses affected by the measure to achieve movement towards best practice power generation in Australia. Standards will apply to new electricity generation, significant refurbishments and existing generation.

Based on initial estimates from independent experts, the program is projected to save about 4Mt per annum at a cost of up to \$10/tonne carbon dioxide equivalent. These savings are additional to any commitments businesses may have made under the Greenhouse Challenge. Annual reporting from businesses affected by the measure will provide a clear picture of progress towards these greenhouse savings.

Guidelines for the implementation of the measure have been developed following extensive consultation with industry, electricity users and the wider community. This first in a set of two guidelines outlines the key parameters for GES. It is complemented by a second set of guidelines that deal with the more technical aspects of the program.

## KEY PARAMETERS

### Coverage

#### *Who is affected by the program?*

The program applies to all business with generation plant above the minimum thresholds that use fossil fuels, whether they are grid connected or self-generators.

The measure covers power generating plant that meet all of the following criteria:

- 30 MW electrical capacity or above; AND
- 50 GWh per annum electrical output; AND
- a capacity factor of 5% or more in each of the last three years.

In the case of multi-fuel plants (such as sugar mills or pulp and paper manufacturers) that use both renewable and fossil fuels, the threshold will be measured according to the fossil fuel content (ie electricity produced from renewable fuels may be netted off).

#### *Which greenhouse gases are covered?*

In principle, businesses must report against all internationally recognised greenhouse gases to ensure that the measure is in line with internationally agreed greenhouse accounting methodologies, namely:

- carbon dioxide (CO<sub>2</sub>);
- methane (CH<sub>4</sub>);
- nitrous oxide (N<sub>2</sub>O);
- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs); and
- sulphurhexafluoride (SF<sub>6</sub>).

This methodology also provides a complete picture of the greenhouse performance of a business' plant.

In practice, businesses are likely to only have to report against carbon dioxide, methane and nitrous oxide as these are the greenhouse gases that arise in the combustion process.

## BEST PRACTICE

Best practice in any particular situation will be determined by a range of factors, including:

- the **fuel source(s)** to be used (and hence the technologies available to combust fuel);
- plant specific **technical factors**, such as age and size of plant, ambient temperature, duty cycle, the particular industry application and local pollution requirements; and
- **commercial factors** such as relative fuel and equipment costs, expected rate of return and the availability of backup power.

The first two of these elements alone could determine technical best practice, while including the third moves to commercial best practice. The standards are flexible enough to take these key variables into account in a transparent, equitable and systematic way.

In the case of existing plant, a best practice emissions standard is set on a plant by plant basis using a methodology that is to be found in the second set of guidelines dealing with technical aspects of the measure.

In the case of new plant, best practice targets have been established for each fossil fuel class (black coal, brown coal, natural gas, oil and other fuels). In applying the best practice standards for new plant, actual performance targets will be set on a plant by plant basis. Project proponents are required to demonstrate how closely they can mirror the best practice target using commercially available technology.

The best practice performance targets for new plant in thermal efficiency (sent out) terms are:

- **Black coal plant - 42% Higher heating value (HHV);**
- **Brown coal plant - 31% HHV, and**
- **Natural gas combined cycle - 52% HHV.**

The performance of cogeneration plants depends largely on the industrial application and the steam host's requirements.

The technical guidelines were developed by independent technical experts in consultation with industry, government and the wider community. The guidelines have also been tested in the field.

## **MEASURING GREENHOUSE PERFORMANCE**

Although thermal efficiency standards would give a clear indication of any increase or decrease in thermal efficiency, GES have adopted emission-based standards. This accurately reflects the greenhouse performance of generation businesses and allows greater flexibility in achieving greenhouse reductions, for example through fuel switching or blending.

## PROCESS FLOW CHART

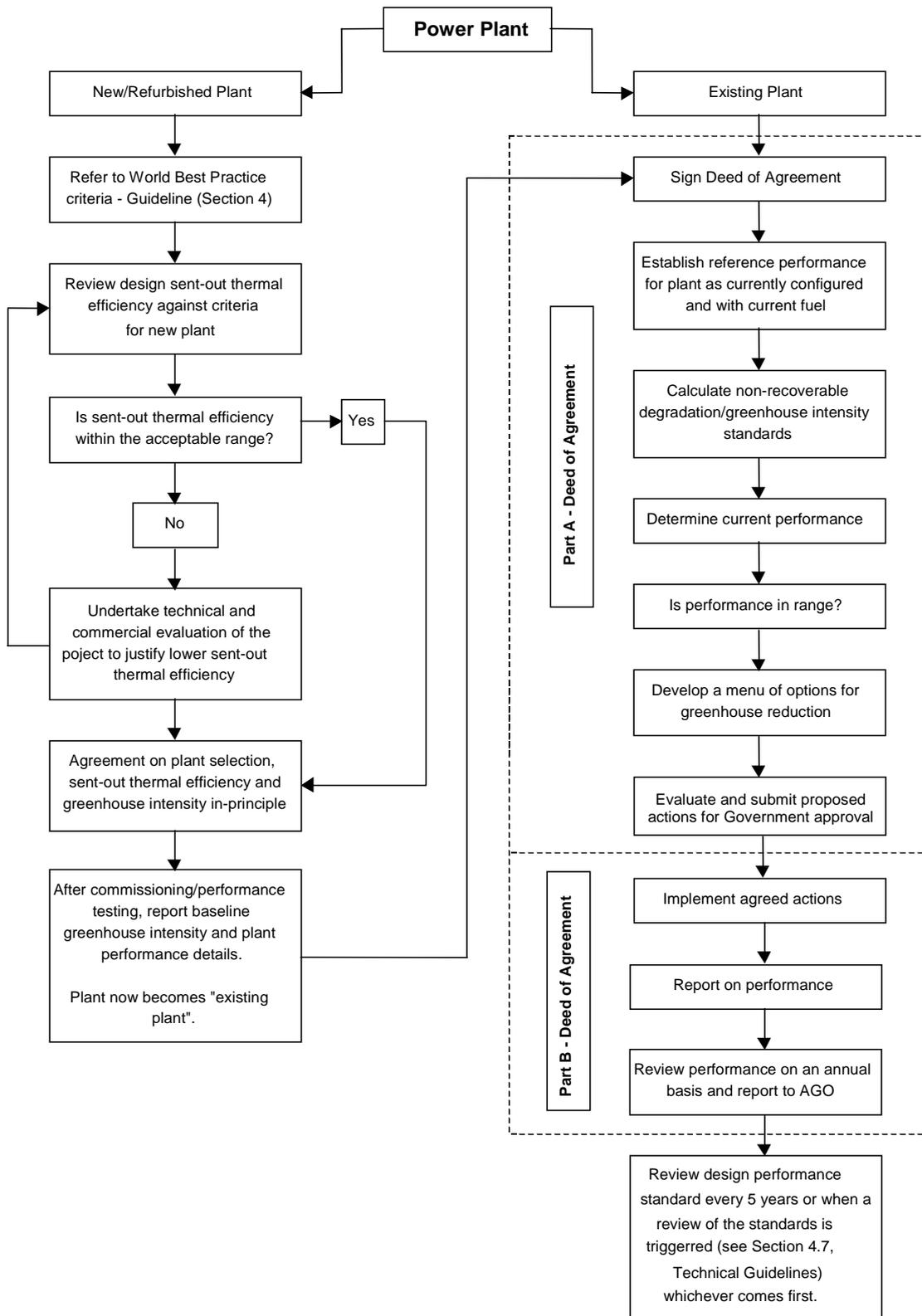


Figure 1 – Process Flowchart for power plant Generator Efficiency Standards

Greenhouse performance is being measured according to tonnes of carbon dioxide equivalent per Megawatt hour (tCO<sub>2</sub>eq/MWh).

Cogenerators will be able to include both useful heat and electricity in calculating greenhouse intensity.

## PROCESS

### ***How does the Generator Efficiency Standards program work?***

The flow chart on page 6 outlines the process involved in participating in the GES.

### ***What businesses will do***

#### **New/Refurbished Plant**

If project developers are designing a new plant (or major refurbishment) they should:

- refer to the Best Practice Criteria of the technical section of the guidelines (section 4);
- review the design thermal efficiency (sent out -  $\eta_{SO}$ ) against the criteria for new plant;
- reach in-principle agreement on plant selection and greenhouse efficiency if the  $\eta_{SO}$  is within the acceptable range;
- undertake a technical and commercial evaluation of the power project to justify a lower  $\eta_{SO}$  (eg lack of access to water) if the  $\eta_{SO}$  is not within the acceptable range; and
- after commissioning/performance testing, report baseline greenhouse efficiency and performance test details to the Government. For the purposes of the program, at this stage the plant now becomes an “existing plant”.

*Please note: to avoid unnecessary duplication and minimise costs to project proponents, this process will be undertaken as part of the normal State or Territory impact assessment process or other equivalent, recognised process.*

## Deed of Agreement

### ***Existing Plant***

Businesses will sign a 5 year Deed of Agreement with the Commonwealth to:

- if at best practice – improve within best practice performance band; or

- if below best practice - achieve movement towards best practice performance for each individual plant.

In signing an agreement, businesses agree to commit to the objective of achieving specific, agreed greenhouse savings through application of the standards. The Deed of Agreement includes two parts.

## **Part A**

After signing the Agreement, businesses will in the first 6 months establish the best practice performance band and current performance of the plant using the technical guidelines. This involves:

- establishing design performance for plant as configured using its current fossil fuel (in accordance with the guidelines);
- calculating the non-recoverable degradation of the plant and greenhouse efficiency standards;
- determining the current performance of the plant and whether it is in the best practice performance band;
- developing a menu of potential options to improve its greenhouse performance; and
- undertaking feasibility studies based on the menu of potential options and, within 21 months of signing of the Agreement, submitting a list of proposed actions to the Government to be evaluated and approved.

## **Part B**

After the list of proposed actions has been approved by the Government, businesses will:

- implement the agreed actions within the 5 year timeframe of the Agreement; and
- report on progress of agreed actions on an annual basis as well as against key performance indicators.

## ***What Government will do***

In implementing Generator Efficiency Standards, the Government will:

- publish appropriate best practice standards in consultation with State and Territory Governments, independent experts, industry and the wider community;

- provide clear guidelines on what is expected of businesses, including technical guidelines that set out an appropriate methodology;
- negotiate with businesses on a plant by plant basis to set appropriate best practice standards for existing, refurbished and new plant;
- develop appropriate performance indicators for the program;
- audit businesses participating in the program on a regular basis (expected to be once within the life of each Agreement). Meet costs associated with the audit;
- disseminate non-confidential information on best practice where available;
- report publicly on the overall progress of the program on an annual basis;
- evaluate the program within three years of the program being launched;
- review the standards for new, refurbished and existing plant on a 5 yearly basis; and
- ensure that commercially sensitive information provided by businesses is protected.

## REPORTING

Regular reporting will ensure that the Government and wider community is aware of the commitment of generators affected by the program to:

- achieve movement towards, or maintain, best practice performance; and
- reduce greenhouse emissions.

### *What should be reported?*

Businesses need to provide details of actions undertaken and other options as well reporting against the following *key performance indicators* in their annual reports:

- type of fuel (black coal, brown coal, gas, oil, other);
- greenhouse intensity;
- capacity;
- capacity factor;
- output factor;

- tonnes of fuel used;
- thermal efficiency; and
- greenhouse target.

Capacity, greenhouse intensity and percentage of actual carbon intensity to upper bound benchmark carbon intensity for that plant at the relevant capacity factor and greenhouse target are to be made publicly available. Actual capacity factor for each plant will not be publicly reported, although businesses will be required to submit this information to the Government.

The Commonwealth will develop an appropriate format for businesses to submit their annual reports.

### ***How often should reports be made?***

Reports should be made on an annual basis.

## **VERIFICATION**

To maintain the credibility of the program, businesses agree to be audited at least once during the life of each Deed. The audit will be undertaken by a mutually agreed independent auditor. The Commonwealth will meet the costs associated with the independent auditor. Commercially sensitive information will be protected as required.

## **REVIEWS**

To maintain the currency of the standards, standards for both new and existing plants will be reviewed every five years.

The effectiveness of the program will be reviewed every 3 years.