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## No. S 177

### ENERGY CONSERVATION ACT 2012

#### ENERGY CONSERVATION (ENERGY MANAGEMENT PRACTICES) (AMENDMENT) REGULATIONS 2023

In exercise of the powers conferred by section 78(1) of the Energy Conservation Act 2012, the Minister for Sustainability and the Environment makes the following Regulations:

#### **Citation and commencement**

1. These Regulations are the Energy Conservation (Energy Management Practices) (Amendment) Regulations 2023 and come into operation on 1 April 2023.

#### **New Division 1 of Part IV**

2. In the Energy Conservation (Energy Management Practices) Regulations 2013 (G.N. No. S 246/2013) (called in these Regulations the principal Regulations), in Part IV, after the Part heading, insert —

*“Division 1 — General*

#### **Definition of this Part**

**11P.** In this Part, “specified power generation activity” means a relevant business activity to which Division 3 applies.

#### **Prescribed business activity**

**11Q.** Every relevant business activity is a prescribed business activity for the purposes of section 27B of the Act.”

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**New Division heading of Part IV**

3. In the principal Regulations, before regulation 12, insert —
- “Division 2 — Energy efficiency opportunities assessments for relevant business activities other than specified power generation activities”.*

**Amendment of regulation 12**

4. In the principal Regulations, in regulation 12 —
- (a) in the regulation heading, replace “**Part**” with “**Division**”;  
and
- (b) in paragraphs (1) and (2), replace “Part” with “Division”.

**Amendment of regulation 13**

5. In the principal Regulations, in regulation 13 —
- (a) in the regulation heading, replace “**Part**” with “**Division**”;
- (b) in paragraphs (1) and (2), replace “Part” with “Division”;  
and
- (c) in paragraph (1), replace “except the generation, transmission or distribution of electricity involving the operation of at least one gas turbine, steam turbine or unit containing one or more gas turbines and steam turbines, that has a designed power output of more than 10 megawatts” with “except a specified power generation activity”.

**Amendment of regulation 23**

6. In the principal Regulations, in regulation 23, in the regulation heading, replace “**Part**” with “**Division**”.

**New Division 3 of Part IV**

7. In the principal Regulations, after regulation 23, insert —

*“Division 3 — Energy efficiency opportunities assessments  
for specified power generation activities*

*Subdivision (1) — General*

**Definitions of this Division**

24.—(1) In this Division, unless the context otherwise requires —

“assessable generating unit” means a gas or steam driven generating unit that must be covered in an energy efficiency opportunities assessment for an assessment period under regulation 27(2);

“assessment period” means the first assessment period or a subsequent assessment period;

“energy efficiency opportunities assessment report” means a report mentioned in regulation 33;

“energy performance indicator” means a measure or unit of energy performance or a metric that demonstrates energy performance improvement;

“first assessment period” means the assessment period mentioned in regulation 26(2);

“gas or steam driven generating unit” means any generating unit that uses one or more gas turbines or steam turbines or a combination of any number of gas turbines and steam turbines for, or for purposes connected with, the production of electricity;

“generating unit” has the meaning given by section 2(1) of the Electricity Act 2001;

“monitoring parameter” means any variable that can affect the value of an energy performance indicator;

“principal activity”, in relation to a business activity, means the activity that —

- (a) results in the production of a product or service that is produced for sale on the market; and

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(b) produces the most value for the business activity out of any of the activities forming part of the business activity;

“specified component”, in relation to a gas or steam driven generating unit, means any of the following that is a component of the generating unit:

- (a) gas turbine;
- (b) heat recovery steam generator;
- (c) boiler;
- (d) steam turbine;
- (e) condenser;

“subsequent assessment period” means any assessment period mentioned in regulation 26(3);

“thermodynamic model”, in relation to a gas or steam driven generating unit, means a model or set of mathematical equations, that, upon the imputing of a set of parameters, is capable of —

- (a) simulating the operating conditions and energy performance of the generating unit and the components within the generating unit; and
- (b) quantifying the difference between the actual energy performance and the best possible energy performance of the generating unit and the components within the generating unit;

“top management” means the individual or individuals in a registered corporation principally responsible for the management and conduct of a specified power generation activity, and may include any of the following:

- (a) the chief executive officer or equivalent;
- (b) the president or vice-president or equivalent;

(c) the general manager of the specified power generation activity or equivalent;

“validation report” means a report mentioned in regulation 30.

(2) In this Division, the total energy consumed by a specified power generation activity —

(a) must be derived from all fuel and energy commodities used to provide or produce the energy consumed; but

(b) excludes energy produced from any fuel or energy commodity that is already accounted for in the total figure.

### **Application of this Division**

**25.** This Division applies in relation to any relevant business activity carried out by a registered corporation the principal activity of which —

(a) is the generation, transmission or distribution of electricity; and

(b) involves the operation of at least one gas or steam driven generating unit that has a designed power output of more than 10 megawatts.

### **Assessment periods**

**26.—(1)** This regulation provides for the determination of the first assessment period and the subsequent assessment periods of a specified power generation activity that is under the operational control of a registered corporation, in respect of which energy efficiency opportunities assessments must be conducted.

(2) The first assessment period is —

(a) where regulation 31(1) applies — the year 2024; and

(b) where regulation 31(2) applies — the year described as year  $X + 1$  in that provision.

- (3) The subsequent assessment periods are —
- (a) the year starting immediately after the end of the first assessment period; and
  - (b) each consecutive year after that.

*Subdivision (2) — Prescribed requirements for energy efficiency opportunities assessment*

**Requirements of energy efficiency opportunities assessment**

27.—(1) This regulation sets out the requirements of the energy efficiency opportunities assessments that must be conducted by a registered corporation for a specified power generation activity under the operational control of the registered corporation.

(2) Subject to paragraph (3), the registered corporation must conduct an energy efficiency opportunities assessment for each assessment period of the specified power generation activity that covers every gas or steam driven generating unit used in the specified power generation activity in that assessment period that has a designed power output of more than 10 megawatts.

(3) If the generating units mentioned in paragraph (2) would, in the assessment period, have in aggregate an energy consumption accounting for more than 80% of the total energy consumption of the specified power generation activity in the assessment period, then the energy efficiency opportunities assessment for the assessment period need only cover such of those generating units as would have in aggregate an energy consumption accounting for at least 80% of the total energy consumption of the specified power generation activity in the assessment period.

(4) Where, in any assessment period for a specified power generation activity, for purposes of the specified power generation activity, a registered corporation begins commercial operation of a gas or steam driven generating unit

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that has a designed power output of more than 10 megawatts, then —

- (a) despite paragraph (2), the energy efficiency opportunities assessment for the specified power generation activity for the assessment period need not cover any such generating unit; and
- (b) for the purposes of paragraph (3), the energy consumed by any such generating unit may be excluded in computing the total energy consumption of the specified power generation activity in the assessment period.

(5) The energy efficiency opportunities assessment for an assessment period must comprise —

- (a) quarterly reviews of the energy performance of each assessable generating unit and its specified components; and
- (b) at least one review a year of the quarterly reviews mentioned in sub-paragraph (a), by the top management of the registered corporation, in accordance with regulation 32.

(6) The energy efficiency opportunities assessment need not be conducted for an assessment period if —

- (a) the registered corporation ceases to have operational control of the specified power generation activity in the assessment period; or
- (b) the registration of the registered corporation is cancelled under section 25(2) of the Act in the assessment period.

### **Requirements of quarterly reviews of energy performance**

**28.**—(1) In order to conduct the quarterly reviews of the energy performance of an assessable generating unit and its specified components mentioned in regulation 27(5)(a), the registered corporation must develop a thermodynamic model for the assessable generating unit.

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(2) In a quarterly review mentioned in paragraph (1), the registered corporation must, in relation to the period covered by the quarterly review, use information from the thermodynamic model to —

- (a) calculate the average, over each month, of all the values of all energy performance indicators of the assessable generating unit and its specified components (each called an average monthly EnPI value);
- (b) identify the following trends:
  - (i) the values of all the monitoring parameters that the registered corporation considers significant against —
    - (A) time; and
    - (B) any other values of monitoring parameters that the registered corporation considers significant;
  - (ii) significant deviations in the average monthly EnPI values from the best possible energy performance on a monthly basis;
- (c) evaluate and explain the impact of any trends identified in sub-paragraph (b) on the energy performance of the assessable generating unit and its specified components;
- (d) for each significant deviation from the best possible energy performance identified for the purpose of sub-paragraph (b), identify the energy and cost savings achievable if there were no deviation;
- (e) carry out an investigation using all the monitoring parameters that the registered corporation considers relevant to determine the cause or causes of any deviation mentioned in sub-paragraph (d); and
- (f) identify the steps to be taken to address the cause or causes identified in sub-paragraph (e) with the aim of



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identifying practices that will improve the energy performance of the assessable generating unit and its specified components.

(3) For the purpose of any quarterly review mentioned in paragraph (1), the registered corporation must use normalised data that is comparable to and representative of the typical operating conditions of the assessable generating unit and its specified components.

### **Requirements of thermodynamic model**

**29.**—(1) For the purposes of regulation 28(1), a thermodynamic model for an assessable generating unit must be able to —

- (a) perform mass and energy balance calculations for the assessable generating unit and its specified components;
- (b) determine the actual and best possible energy performance of the assessable generating unit and each of its specified components, across different operating conditions;
- (c) estimate energy savings from the implementation of any energy efficiency opportunity in relation to the assessable generating unit and its specified components;
- (d) estimate the impact of implementing any energy efficiency opportunities on the energy performance of the assessable generating unit and its specified components;
- (e) use the value of one or more monitoring parameters that is or are measured directly to determine the value of an energy performance indicator; and
- (f) compute energy performance indicator values or monitoring parameter values at intervals of not more than 15 minutes.

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(2) Subject to paragraph (3), the thermodynamic model for an assessable generating unit must —

- (a) for the assessable generating unit — incorporate at least one energy performance indicator specified in the second column of the Third Schedule opposite the assessable generating unit; and
- (b) for each specified component of the assessable generating unit — incorporate at least one energy performance indicator specified in the second column of the Third Schedule opposite the specified component.

(3) A registered corporation may, with the approval of the Director-General, in the thermodynamic model for an assessable generating unit —

- (a) for the assessable generating unit — incorporate any energy performance indicator not specified in the second column of the Third Schedule opposite the assessable generating unit, without incorporating any of the energy performance indicators so specified; and
- (b) for any of its specified components — incorporate any energy performance indicator not specified in the second column of the Third Schedule opposite that specified component, without incorporating any of the energy performance indicators so specified.

(4) To avoid doubt —

- (a) a registered corporation may, in the thermodynamic model for an assessable generating unit, incorporate an energy performance indicator that is not specified in the second column of the Third Schedule opposite the assessable generating unit or specified component (as the case may be) in addition to the incorporation of any energy performance indicator so specified; and
- (b) the approval of the Director-General is not required for the incorporation of the energy performance indicator not so specified.

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**Requirements of validation report**

**30.** A registered corporation must submit a validation report for each thermodynamic model developed in accordance with regulation 29, containing the following information:

- (a) a description of the thermodynamic model developed and methodology used for developing the model for the assessable generating unit and its specified components to which the thermodynamic model relates;
- (b) supporting evidence that the thermodynamic model is accurate, and justification of the methodology used to validate the accuracy of the thermodynamic model;
- (c) a list of all the energy performance indicators incorporated for the assessable generating unit and its specified components to which the thermodynamic model relates;
- (d) the methodology and all directly measured monitoring parameters that will be used to determine the value of each energy performance indicator mentioned in paragraph (c);
- (e) a list of all monitoring parameters (other than monitoring parameters mentioned in paragraph (d)) that may be imputed in the thermodynamic model;
- (f) a list of all energy efficiency opportunities identified, if any;
- (g) in the case where the thermodynamic model incorporates for the assessable generating unit to which it relates, or for any of the specified components of the assessable generating unit, any energy performance indicator that is not specified in the second column of the Third Schedule opposite the assessable generating unit or such specified component (as the case may be) — justification for incorporating that energy performance indicator;

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- (h) without affecting paragraph (g), in the case where no energy performance indicator specified in the second column of the Third Schedule opposite the assessable generating unit or specified component (as the case may be) has been incorporated in the thermodynamic model — the reason for the exclusion.

**Time for completion of development of thermodynamic model and submission of validation report**

**31.—(1)** A registered corporation that has operational control over a specified power generation activity at any time in the year 2023 must —

- (a) on or before 31 December 2023 — develop a thermodynamic model mentioned in regulation 29 for each assessable generating unit to be used in the first assessment period for the specified power generation activity; and
- (b) on or before 30 June 2024 — submit to the Director-General a validation report that satisfies the requirements under regulation 30.
- (2) If, in any year (*X*) subsequent to the year 2023 —
- (a) a registered corporation is registered as such and has operational control over a specified power generation activity;
- (b) a specified power generation activity comes under the operational control of a registered corporation; or
- (c) a business activity over which a registered corporation has operational control and that satisfies all of the following requirements attains the prescribed energy use threshold and becomes a specified power generation activity:
- (i) the principal activity of the business activity is the generation, transmission or distribution of electricity;

- (ii) the principal activity of the business activity involves the operation of at least one gas or steam driven generating unit that has a designed power output of more than 10 megawatts,

then the registered corporation must —

- (d) on or before 31 December of the year  $X$  — develop a thermodynamic model mentioned in regulation 29 for each assessable generating unit to be used in the first assessment period for the specified power generation activity; and
  - (e) on or before 30 June of the year  $X + 1$  — submit to the Director-General a validation report that satisfies the requirements under regulation 30.
- (3) For the purposes of paragraph (2) —
- (a) a business activity attains the prescribed energy use threshold in any year if the business activity attained the prescribed energy use threshold in at least 2 out of the 3 preceding years; and
  - (b) the prescribed energy use threshold in any year is as prescribed pursuant to paragraph 3(2) of the Energy Conservation (Registrable Corporations) Order 2013 (G.N. No. S 248/2013) for that year.
- (4) Where in any year ( $Y$ ) —
- (a) for the purposes of a specified power generation activity, a registered corporation begins commercial operation of a gas or steam driven generating unit that has a designed power output of more than 10 megawatts; and
  - (b) any such generating unit will be an assessable generating unit in the assessment period for the year  $Y + 1$ ,

the registered corporation must —

- (c) on or before 31 December of the year  $Y$  — complete the development of the thermodynamic model

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mentioned in regulation 29 for any such generating unit; and

- (d) on or before 30 June of the year  $Y + 1$  — submit to the Director-General a validation report in respect of any such generating unit that satisfies the requirements under regulation 30.

(5) The Director-General may extend the period provided in paragraph (1)(a) or (b), (2)(d) or (e) or (4)(c) or (d) on any terms that the Director-General thinks fit, if the Director-General is satisfied, on a written application by the registered corporation accompanied by supporting documents —

- (a) that the registered corporation is unable to comply with the requirement due to circumstances beyond the registered corporation's reasonable control; or
- (b) that an extension of any such time would be otherwise appropriate having regard to the circumstances of the case.

(6) Paragraphs (1)(a) and (b), (2)(d) and (e) and (4)(c) and (d) do not apply if —

- (a) the registered corporation ceases to have operational control of the specified power generation activity; or
- (b) the registration of the registered corporation is cancelled under section 25(2) of the Act,

at any time on or before —

- (c) where paragraph (1)(a) applies — 31 December 2023;
- (d) where paragraph (1)(b) applies — 30 June 2024;
- (e) where paragraph (2)(d) applies — 31 December of the year  $X$ ;
- (f) where paragraph (2)(e) applies — 30 June of the year  $X + 1$ ;
- (g) where paragraph (4)(c) applies — 31 December of the year  $Y$ ; and

- (h) where paragraph (4)(d) applies — 30 June of the year  $Y + 1$ .

### **Requirements for top management review**

**32.** The top management of a registered corporation must review the quarterly reviews mentioned in regulation 27(5)(a) at least once a year for the purpose of —

- (a) assessing the suitability and adequacy of the energy efficiency opportunities identified from the quarterly reviews in improving the energy performance of every assessable generating unit and its specified components, and the cost-effectiveness of such energy efficiency opportunities; and
- (b) taking all steps that are necessary and reasonable, upon the completion of each such review, to improve the energy performance of every assessable generating unit and its specified components.

*Subdivision (3) — Energy efficiency opportunities assessment report and validation report*

### **Requirements of energy efficiency opportunities assessment report**

**33.** A registered corporation must submit an energy efficiency opportunities assessment report for each assessment period of a specified power generation activity under its operational control, which must contain all of the following information in respect of every quarterly review conducted in the assessment period:

- (a) a record of all the trends mentioned in regulation 28(2)(b) that were identified;
- (b) a description of the evaluation and explanations mentioned in regulation 28(2)(c);
- (c) a description of all the significant deviations from the best possible energy performance that were identified for the purpose of regulation 28(2)(b), and in respect of each deviation, the energy and cost savings

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achievable that were identified, if there were no deviation, mentioned in regulation 28(2)(d);

- (d) a description of all investigations mentioned in regulation 28(2)(e) that were carried out;
- (e) a description of all the steps mentioned in regulation 28(2)(f) that were identified to be taken.

### **Time of submitting energy efficiency opportunities assessment reports**

**34.**—(1) A registered corporation must submit the energy efficiency opportunities assessment report for an assessment period on or before 30 June of the year immediately after the end of the assessment period.

(2) The Director-General may extend the time prescribed to comply with paragraph (1) on any terms that the Director-General thinks fit, if the Director-General is satisfied, on a written application by the registered corporation accompanied by supporting documents —

- (a) that the registered corporation is unable to comply with paragraph (1) due to circumstances beyond the registered corporation's reasonable control; or
- (b) that an extension of any such time would be otherwise appropriate having regard to the circumstances of the case.

(3) Paragraph (1) does not apply if —

- (a) the registered corporation ceases to have operational control of the specified power generation activity; or
- (b) the registration of the registered corporation is cancelled under section 25(2) of the Act,

at any time on or before the last day of the period during which an energy efficiency opportunities assessment report must be submitted under this regulation.



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**Mode of submitting validation reports and energy efficiency opportunities assessment reports**

**35.** Every validation report and energy efficiency opportunities assessment report must be submitted by the energy manager of the registered corporation —

- (a) using the electronic service provided at <http://www.nea.gov.sg>; or
- (b) in any other manner allowed by the Director-General.

*Subdivision (4) — Miscellaneous*

**Application for waiver of application of section 27B of Act**

**36.** Every application by a registered corporation under section 31B(2) of the Act for waiver of the application of section 27B of the Act to the registered corporation in respect of a specified power generation activity must —

- (a) be in writing;
- (b) state the reasons for the inability of the registered corporation to comply with section 27B of the Act; and
- (c) be accompanied by supporting documents.

**Records to be kept for this Division**

**37.—(1)** A registered corporation must keep and maintain complete and accurate records of any information or records relied upon by the registered corporation in preparing a validation report or an energy efficiency opportunities assessment report for at least 5 years after the date the report to which the information or records relate is submitted to the Director-General.

(2) The records kept and maintained under this regulation may be kept and maintained in electronic form.”.

**New Third Schedule**

**8.** In the principal Regulations, after the Second Schedule, insert —

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“THIRD SCHEDULE

Regulations 29(2), (3) and (4) and  
30(g) and (h)

ENERGY PERFORMANCE INDICATORS FOR AN ASSESSABLE  
GENERATING UNIT AND ITS SPECIFIED COMPONENTS

| <i>First column</i>  | <i>Second column</i>   |
|--|--|
| <i>Assessable generating unit or<br/>specified component</i> | <i>Energy performance indicator</i>  |
| 1. Generating unit   | (a) Generating unit thermal efficiency<br><br>(b) Generating unit heat rate  |
| 2. Gas turbine   | (a) Gas turbine heat rate<br><br>(b) All of the following gas turbine component level indicators for every component in the gas turbine:<br><br>(i) inlet air filter pressure drop;<br><br>(ii) compressor isentropic efficiency;<br><br>(iii) turbine isentropic efficiency |
| 3. Heat recovery steam generator                             | (a) Efficiency of heat recovery<br><br>(b) Heat recovery steam generator section level efficiency  |
| 4. Boiler  | (a) Thermal efficiency;<br><br>(b) Boiler section level efficiency   |
| 5. Steam turbine   | (a) Steam turbine isentropic efficiency<br><br>(b) Steam turbine section level isentropic efficiency   |
| 6. Condenser   | (a) Condenser pressure”.   |

*[G.N. Nos. S 752/2017; S 605/2018; S 898/2019;  
S 972/2020; S 960/2021; S 619/2022]*

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STANLEY LOH KA LEUNG  
*Permanent Secretary,  
Ministry of Sustainability and  
the Environment,  
Singapore.*

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AG/LEGIS/SL/92C/2020/4 Vol. 2]