



Smart Energy, Sustainable Future

DEVELOPING PENALTY FRAMEWORK FOR ELECTRICITY IMPORTS

FINAL DETERMINATION PAPER

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TABLE OF CONTENT

1.	Background	2
2.	Methodology of the Penalty Framework.....	2
3.	Public Consultation Paper for the Penalty Framework.....	3
4.	EMA's Final Determination	5
5.	Treatment for Third Party and/or Shared Interconnectors	10

1. Background

- 1.1 Singapore's Energy Story was announced in October 2019. Singapore's Energy Story will harness "4 Switches" to guide and transform Singapore's energy supply, supported by greater efforts in energy efficiency. Regional Power Grids is one of the switches, where Singapore will explore ways to tap on regional grids through bilateral cooperation or regional initiatives.
- 1.2 Importing electricity allows Singapore to further diversify our energy mix. This will help reduce carbon emissions from the power sector, as it allows Singapore to overcome land constraints and tap on clean energy resources outside Singapore's borders.
- 1.3 EMA plans to import up to 4GW of low-carbon electricity by 2035, or around 30% of our electricity supply in 2030, as part of our effort to decarbonise our power sector and enhance energy security by diversifying our energy sources.
- 1.4 To ensure that electricity imports meet EMA's availability, delivery, reliability and sustainability needs, EMA has consulted the industry on the proposed penalty framework between Feb and Mar 2022. EMA has considered the feedback received from the industry carefully, and has prepared a final determination paper for the penalty framework that will apply to electricity importers.

2. Methodology of the Penalty Framework

- 2.1 EMA has designed the penalty framework for electricity imports¹ using the following methodology:
 - a) Determine the list of penalisable contraventions, based on the key performance characteristics that are sought from importers as stated in the Request for Proposal (RFP) requirements to appoint Licensed Electricity Importers (www.ema.gov.sg/electricity-imports.aspx). The list is stated below:
 - i. Delay in completion of electricity imports project or meeting of critical milestones during the construction/development period
 - ii. Failure to meet quarterly 75% load factor after 5 years of commercial operation
 - iii. Failure to prevent supply outages

¹ The proposed penalty framework does not apply to imports trials and pilots as determined by EMA.

- iv. Failure to restore electricity supply in a timely manner
 - v. Failure to meet carbon emission requirement of 0.15tCO₂e/MWh within 5 years of commercial operations.
- b) Calibrate the penalties for each penalisable contravention based on severity level. See Table 1 below.

Table 1: Nature of contravention

S/N	Nature of Contravention	Definition
1	Minor	Contraventions that occur for the 1 st time and have minor adverse impact to the availability, delivery, reliability and sustainability of imported electricity supply
2	Moderate	Contraventions that have significant adverse impact to the availability, delivery, reliability and sustainability of imported electricity supply, or 2 nd incident
3	Severe	Contraventions that have a severe and/or prolonged impact to the availability, reliability and sustainability of imported electricity supply, or 3 rd and subsequent incident

3. Public Consultation Paper for the Penalty Framework

3.1 The EMA has published a public consultation paper on 25 Feb 2022 to seek feedback on the proposed penalty framework for electricity imports. The consultation closed on 18 Mar 2022 and a total of 14 companies responded to the consultation paper.

3.2 A summary of respondents' key feedback is provided below:

- a. Penalties should be excluded for all force majeure events.
- b. Penalties should only be imposed if the final completion date is missed, and not during interim project milestones.
- c. Penalties for failure to meet quarterly load factor are not required, as importers are naturally incentivised to meet 75% load factor to supply.
- d. Penalties are not needed as importers are already paying backup cost.

- e. Penalties quantum to be reduced, or aligned with local generation (e.g. local thermal generators), as the penalties create additional commercial and financing risks for importers.

3.3 EMA has considered the feedback carefully and our positions are summarised in Table 2 below.

Table 2: EMA’s positions on feedback provided by respondents

Feedback received	Position
To impose penalties on projects only if they miss their final delivery date. Missed interim milestones are not penalised by default	EMA accepts this feedback and will revise the penalty to align with the practice in the construction industry. Hence importers would not be automatically penalised for failing to meet each project milestone. Notwithstanding, EMA will still reserve the right to impose penalties if importers are unable to comply with EMA’s specific direction to catch up on any delayed milestones, on a case-by-case basis.
To categorically exclude penalties for all force majeure (FM) events	EMA will review force majeure events on a case-by-case basis, given that the threshold for FM depends not only on the event itself, but also whether importers had observed a standard of conduct that is consistent with being reasonable.
To remove double penalisation	EMA will review every contravention on a case-by-case basis. While it is possible that an importer may be penalised twice from a single event, there could also be instances where multiple contraventions are imposed for mutually exclusive events. In circumstances where double penalisation is a valid concern, EMA will reserve the right to review whether penalties should be moderated, on a case-by-case basis.
To reduce penalty quantum	Given the high failure impact for electricity imports, penalties need to be set high enough to deter non-performance. However, EMA will reserve the right to review whether penalties should be moderated, on a case-by-case basis.

To remove and/or review the proposed 60-105 days benchmark for restoration period	The proposed benchmarks are based on CIGRE publications, which covers an extensive number of actual subsea cable projects globally. Setting a high-performance standard of 60-105 days restoration duration is required to safeguard reliability. However, given feedback raised by respondents, EMA will reserve the right to review whether penalties could be moderated, on a case-by-case basis.
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4. EMA’s Final Determination

Supply before Commercial Operations

4.1 **Delay in Imports Project Completion** - As electricity imports will help meet Singapore’s future energy demand, a delay in the completion of electricity imports project could result in insufficient energy supply to Singapore. To ensure the timely delivery of imports, EMA intends to impose penalties when importers fail to meet their commercial operations date. (Table 3 for details)

Table 3: Financial penalty for delay in imports project completion

Contravention	Description	Financial Penalty
Delay in completion of electricity imports projects	Penalties will be imposed if importers fail to meet their commercial operations date. EMA reserves the right to impose penalties if importers fail to comply with EMA’s direction to catch up any delayed milestones during the construction stage.	Up to \$3m per 100MW, <u>for each month of delay or part thereof</u>
	Delay exceeds 2 years	Revoke licence. EMA reserves the right to activate a reserve winner

Supply During Commercial Operations

4.2 **Failure to meet quarterly load factor of 75% after 5 years of commercial operation** - To ensure a consistent supply of imported low-carbon electricity, EMA intends to impose penalties for failure to achieve a quarterly load factor of 75%.

EMA also notes that during initial years, the cost of generation and storage technology may make it too costly for project from low-carbon sources to produce electricity on a constant basis. Hence, EMA will require projects to achieve the quarterly 75% load factor 5 years after commencement of commercial operations. Maximum penalties will apply when the quarterly load factor is at 50% or less. (Tables 4 & 5 for details)

Table 4: Financial penalty for failure to meet quarterly load factor of 75%

Contravention	Description		Financial Penalty
Quarterly load factor Failure to meet >75% quarterly load factor after five years of commercial operations <i>Note: Penalties imposed every quarter by calendar year</i>	Minor	First incident in the last 365 days (1 year) ²	Up to \$1m per 100MW or 1% of annual turnover, whichever is higher
	Moderate	Second incident in the last 365 days (1 year) ³	Up to \$5m per 100MW or 5% of annual turnover, whichever is higher
	Severe	Third and subsequent incident in the last 365 days (1 year) ³	Up to \$10m per 100MW or 10% of annual turnover, whichever is higher

Table 5: Worked examples for quarterly load factor penalty

<p><u>Quarterly load factor penalty formula:</u></p> <p>Maximum penalty amount = (Max penalty based on incidence rate) x [max(scaling factor due to % energy shortfall compared to target capped at 50%,1)] x (adjustment arising from licensed capacity of importer)</p>
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² This is a rolling 1-year penalty, i.e. the penalty amount will only be reset when there is no non-compliance over a period of 365 days.

Example 1: Assume a 600MW importer that contravenes for the first time in the last 365 days, only achieving a 70% quarterly load factor

Maximum penalty formula = \$1m [max penalty for 1st instance] x ((75% - 70%)/(75%-50%)) [scaling factor] x 600MW/100MW [adjust for importer size]= \$1.2m, or 1% of turnover, whichever is higher

Example 2: Assume a 600MW importer that contravenes for the third time in the last 365 days, only achieving a 60% quarterly load factor

Maximum penalty formula = \$10m [max penalty for 3rd instance] x ((75% - 60%)/(75%-50%)) [scaling factor] x 600MW/100MW [adjust for importer size]= \$36m, or 10% of turnover, whichever is higher

4.3 Supply outages attributable to import and restoration of supply - Supply outages and prolonged restoration time have a significant impact to the supply of low-carbon electricity to Singapore. EMA intends to impose penalties for supply outages that lead to at least 50% loss in supply, and for failure to restore supply within reasonable time. EMA notes that subsea cables can take up to 60 to 105 days³ to repair. EMA will measure the frequency of supply outage incidents based on the last 730 days (2 years). (Tables 6 & 7 for details)

Table 6: Financial penalty for supply outages and failure to restore supply

Contravention	Description		Financial Penalty
Supply outages (100% loss in supply)	Minor	First incident in the last 730 days (2 years) ⁴	Up to \$1m per 100MW or 1% of annual turnover, whichever is higher
	Moderate	Second incident in last 730 days (2 years) ⁵	Up to \$5m per 100MW or 5% of annual turnover, whichever is higher

³ The durations of 60 days and 105 days are based on CIGRE TB 379 and CIGRE TB 815 respectively - the mean time to repair (MTTR) of subsea cables

⁴ This is a rolling 2-year penalty, i.e. the penalty amount will only be reset when there is no non-compliance over a period of 730 days.

	Severe	Third and subsequent incident in the last 730 days (2 years) ⁵	Up to \$10m per 100MW or 10% of annual turnover, whichever is higher
Partial Supply outages exceeding 50% loss in supply	Minor	First incident in the last 730 days (2 years) ⁵	Up to \$0.5m per 100MW or 0.5% of annual turnover, whichever is higher
	Moderate	Second incident in last 730 days (2 years) ⁶	Up to \$2.5m per 100MW or 2.5% of annual turnover, whichever is higher
	Severe	Third and subsequent incident in the last 730 days (2 years) ⁶	Up to \$5m per 100MW or 5% of annual turnover, whichever is higher
Restoration of supply⁶	Each and every incident where the restoration time exceeds 60 days but does not exceed 105 days ⁷		Up to \$5m per 100MW or 5% of annual turnover, whichever is higher
	Each and every incident where the restoration duration exceeds 105 days		Up to \$10m per 100MW or 10% of annual turnover, whichever is higher

4.4 Failure to meet required carbon emissions factor - EMA notes that during the initial years, importers may need to rely on carbon-emitting technology to complement the generation of low-carbon electricity, to provide reliable and competitive supply to Singapore. As EMA's longer-term vision is for electricity imports to only come from low-carbon sources, imports projects are expected eventually to fully come from low-carbon sources. In the RFP requirements, EMA

⁵ This is a rolling 2-year penalty, i.e. the penalty amount will only be reset when there is no non-compliance over a period of 730 days.

⁶ Penalties will only apply if importers are penalised for supply outages exceeding 50% loss in supply

⁷ The durations of 60 days and 105 days are based on CIGRE TB 379 and CIGRE TB 815 respectively.

has also required projects to minimally achieve an annual emission factor that is no higher than 0.15tCO_{2e}/MWh after five years of commercial operations.

4.5 As low-carbon electricity imports is a key mitigation measure that contributes to Singapore’s climate ambition and goals, EMA intends to set a penalty for failure to achieve the required emission, based on the prevailing carbon tax level in Singapore, multiplied by the difference between the actual emissions factor of the offending importer and our acceptable zone of 0.15tCO_{2e}/MWh, and the required load factor (Tables 7 & 8 for details)

Table 7: Financial penalty for failure to meet required carbon emissions factor

Contravention	Description	Financial Penalty
<p>Carbon Emission Factor</p> <p>Annual emission factor higher than 0.15tCO_{2e}/MWh after five years of commercial operations</p>	<p>Penalty calibrated based on prevailing carbon tax, difference between the actual emissions factor of the offending importer and 0.15tCO_{2e}/MWh</p> <p>= <i>prevailing carbon tax x (actual carbon emission – 0.15tCO_{2e}/MWh) x 75% of import capacity</i></p>	<p>Capped at the max penalty of \$10m per 100MW, or 10% of annual turnover, whichever is higher</p>

Table 8: Worked example for carbon emissions factor penalty

<p><u>Penalty formula for failure to meet required carbon emissions factor:</u></p> <p><i>Example 1: Assuming a carbon tax level of \$45/tCO_{2e} (2026 to 2027), that is announced at Budget 2022, and a 100MW imports project with an emissions factor of 0.3tCO_{2e}/MWh</i></p> <p>Carbon emission for 100MW capacity for one year = 100MW x 365 days x 24 hours x 0.75 load factor x 0.3tCO_{2e}/MWh = 197,100tCO_{2e}</p> <p>Carbon emission for 100MW capacity for one year to meet carbon requirements = 100MW x 365 days x 24 hours x 0.75 load factor x 0.15tCO_{2e}/MWh = 98,550tCO_{2e}</p>

A 100MW imports project with incurs a penalty of:

*Penalty incurred = prevailing carbon tax x [actual carbon emissions factor - min required carbon emission factor] = \$45/tCO_{2e} x [197,100 – 98,550tCO_{2e}] = \$4,434,750 per 100MW, or **\$4.43m per 100MW***

Maximum penalties under the Electricity Act

4.6 For avoidance of doubt, the penalty amount that will be imposed on importers (on a per incident basis) will be subject to provisions under Section 14 of the Electricity Act, where the EMA will “*require the electricity licensee to pay a financial penalty of an amount not exceeding 10% of the annual turnover of that part of the licensee’s business in respect of which the licensee holds a licence, ascertained from the licensee’s latest audited accounts, or an amount not exceeding S\$1 million, whichever is **higher***”

5. Treatment for Third Party and/or Shared Interconnectors

5.1 The penalty framework would also cover how penalties would be applied under a shared interconnector outcome, where an interconnector could be built and operated either by a single importer, or by Singapore Power as the grid operator/electricity transmission licensee, and shared by multiple importers to flow the imported electricity. Under a shared interconnector arrangement, penalties will also be imposed based on **importers’ supply performance in relation to their licensed import capacity**.

5.2 Should a failure to perform be due to an interconnector failure that affects one or more importers leasing the interconnector capacity, EMA will penalise the non-performing importer based on its **licensed import capacity**⁸. Such importers may in turn seek recourse or redress vis-à-vis their relevant counterparties (for example, the interconnector operators or owners responsible for the failure) as and to the extent provided in their contracts with their relevant counterparties.

~ End ~

⁸ When computing financial penalties, EMA would account for planned maintenance/outages as part of an importer’s licensed capacity.