PENALTY FRAMEWORK FOR ELECTRICITY IMPORTS

CONSULTATION PAPER

Closing date for submission of comments and feedback:

18 Mar 2022, 4pm

25 Feb 2022

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TABLE OF CONTENT

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 intends to allow up to 4GW of total low-carbon electricity imports by 2035, which is expected to make up around 30% for Singapore's total supply by 2035. EMA has issued the first Request for Proposal (RFP1) on 12 November 2021, for the import of up to 1.2 GW of low-carbon electricity.

1.4. To ensure that electricity imports meet EMA's availability, delivery, reliability and sustainability needs, EMA is developing a penalty framework that will apply to electricity importers. This consultation paper seeks the industry's views on the penalty framework.

2. Developing the Penalty Framework for Electricity Imports

Methodology to Calibrate Penalty Framework for Electricity Imports

2.1. EMA has designed the penalty framework for electricity imports[1] 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

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

iii. Failure to prevent supply outages

iv. Failure to restore electricity supply in a timely manner

v. Failure to meet carbon emission requirement of 0.15tCO_2e/MWh within 5 years of commercial operations.

b) Calibrate the penalties for each penalisable contravention based on severity level. See Table 1 – Nature of Contraventions.

Table 1: Nature of Contravention

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

Supply before Commercial Operations

2.2. **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 a penalty for each month of delay, or part thereof.

Table 2: Financial Penalty for Delay in Imports Project Completion

Description	**Financial Penalty**		**Remarks**
Duration of delay in completion[2] of Electricity Imports Projects	For each month of delay, or part thereof	***$3m per 100MW***	*EMA and importers will agree on critical project milestones based on the importers' proposed schedule as submitted in its RFP proposal.* *If importers can catch up with the development/ construction schedule and complete on time for the overall schedule, EMA may decide to return the financial penalties incurred in part or in full.*
	Exceed 2 years	**Revoke licence**	EMA reserves the right to activate a reserve winner

Supply During Commercial Operations

2.3. **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.

[2] Defined as the project being incomplete by the due date for completion as approved by EMA for that project. For avoidance of doubt, the project is deemed completed with proof of certificate of handing over of commissioned equipment/cables to the Import Licensee by its contractor with indication of date of completion

Table 3: Financial Penalty for Failure to Meet Quarterly Load Factor of 75%

Aspects to Consider	**Nature of Contraventions and examples (examples are non exhaustive)**		**Maximum Financial Penalty per 100MW of Import Capacity**
Quarterly load factor must be >75% after five years of commercial operations	**Minor**	**First** incident in the last 365 days (1 year)[3]	**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 4: Worked Examples for Quarterly Load Factor Penalty

Quarterly Load Factor Penalty formula:

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)

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*

[3] 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 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*

2.4. **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, and for failure to restore supply within reasonable time. EMA notes that subsea cables can take up to 60 to 105 days[4] to repair. EMA will measure the frequency of supply outage incidents based on the last 730 days (2 years).

Table 5: Financial Penalty for Supply Outages and Failure to Restore Supply

Aspects to Consider	**Nature of Contraventions**		**Maximum Financial Penalty per 100MW of Import Capacity**
Total Supply outage	Minor	First incident in the last 730 days (2 years)[5]	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
	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

[4] 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

[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.

Partial Supply outages exceeding 50% loss in supply	Minor	First incident in the last 730 days (2 years)[6]	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 supply Time taken to restore electricity supply	Each and every incident where the restoration time exceeds 60 days but does not exceed 105 days[7] Each and every incident where the restoration duration exceeds 105 days		Up to **$5m per 100MW** or 5% of annual turnover, whichever is higher Up to **$10m per 100MW** or 10% of annual turnover, whichever is higher

2.5. **Failure to meet required Annual Carbon Emission** - 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,

[6] 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.

[7] 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

EMA 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.

2.6. 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.

Table 6: Financial Penalty for Failure to meet required Annual Carbon Emission

Aspects to Consider	**Nature of Contraventions and examples**	**Maximum Financial Penalty per 100MW of Import Capacity**
Carbon Emission Annual emission factor not higher than 0.15tCO_2e/MWh within five years of commercial operations	Penalty calibrated based on prevailing carbon tax, difference between the actual emissions factor of the offending importer and 0.15tCO_2e/MWh *= prevailing carbon tax x (actual carbon emission – 0.15tCO_2e/MWh) x 75% of import capacity*	Capped at the max penalty of $10m per 100MW, or 10% of annual turnover, whichever is higher

Table 7: Worked Examples for Carbon Emissions

Carbon Emission		**Financial Penalty to be imposed based on prevailing carbon tax** Assuming a carbon tax level of $$45/tCO$_2$e (2026 to 2027), that is announced at Budget 2022.
Assuming average grid emission factor in Singapore of **0.4080 tCO$_2$e/MWh**	Carbon emission for 100MW capacity for one year = 100MW x 365 days x 24 hours x 0.75 load factor x 0.4080tCO2/MWh = 268,056tCO$_2$e	A 100MW imports project with an emissions factor that is equivalent to SG's overall grid emissions factor in 2027 incurs penalty based on: *Penalty incurred = prevailing carbon tax x [actual carbon emission - min required carbon emission] = $45/tCO$_2$e x [*268,056tCO$_2$e - *98,550tCO$_2$e] =* ***$7,627,770 per 100MW***
Assuming min emission factor of **0.15 tCO$_2$e/MWh** **note: no penalty for meeting 0.15 tCO$_2$e/MWh**	Carbon emission for 100MW capacity for one year = 100MW x 365 days x 24 hours x 0.75 load factor x 0.15tCO$_2$e/MWh = 98,550tCO$_2$e	

Mitigating Factors

2.6 EMA may decide to impose a "lower than 100%" quantum for the penalties, depending on the adequacy and completeness of preventive measures that are put in place by importers to mitigate the impact, and whether there had been lack of due diligence by importers.

3. Request for Feedback

3.1. Table 8 summarises the indicative timeline of EMA's consultation for the Electricity Imports Penalty Framework

Table 8: Indicative Timeline[8]

Milestone	Date
Consultation Paper	25 Feb 2022
Deadline for Feedback on the Consultation Paper	18 Mar 2022
Final Determination Paper	1 May 2022

3.2. This paper seeks views/comments from the industry, including but not limited to the following:

a) Proposed Electricity Imports Penalty Framework, list of penalties and their penalty quantum

b) Any other suggestions and feedback on the Electricity Imports Penalty Framework

3.3. Please submit your written response via this survey or through the QR code link appended below by **4pm on 18 March 2022**. Anonymous submissions will not be considered.

https://go.gov.sg/imports-penalty

3.4. For clarifications, please contact EMA Energy Connections Office (ECO) at Samuel_Pang@EMA.gov.sg and/or Jansen_Toh@EMA.gov.sg

3.5. The EMA reserves the right to make public all or parts of any written submissions made in response to this consultation paper and to disclose the identity of the source. Any part of the submission, which is considered by respondents to be confidential, should be clearly marked. EMA will take it into account regarding the disclosure of the information submitted. EMA may also approach the respondents for clarification while the consultation is ongoing.

~ End ~

[8] EMA reserves the right to vary the dates as deemed appropriate.