



Energy Efficiency Grant Call for Power Generation Companies

SECOND CALL FOR PROPOSALS

Closing date for submission of proposals:

30 Sep 2021, 5pm

11 JAN 2021

ENERGY MARKET AUTHORITY
991G Alexandra Road
#02-29 Singapore 119975
www.ema.gov.sg

Please direct any enquiries to: ***EMA_Enterprise_Development@ema.gov.sg***

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ENERGY EFFICIENCY GRANT CALL FOR POWER GENERATION COMPANIES – SECOND CALL FOR PROPOSALS

1. BACKGROUND

Over the years, the power sector has made significant efforts to manage our greenhouse gas emissions. This includes the switch from using petroleum products to natural gas as the main energy source for electricity generation, as well as investments in new and efficient Combined-Cycle Gas Turbines (“CCGTs”). Today, about 95% of Singapore's electricity is generated using natural gas, which will continue to be a dominant fuel for Singapore in the near future.

It is important that power generation companies continue to improve their energy efficiency to adapt to an increasingly carbon-constrained future¹. To support this effort, the Energy Market Authority (“EMA”) is launching a second Energy Efficiency Grant Call for Power Generation Companies (“Genco EE Grant Call”)² to continue supporting Gencos in improving their heat rate and energy efficiency, and further reducing carbon emissions.

Gencos can engage their preferred original equipment manufacturers or vendors to conduct the energy efficiency projects. Gencos are also encouraged to tap on the second Genco EE Grant Call early to invest in energy-efficient equipment or technologies to improve their competitiveness and maximise the accrued benefits.

2. OBJECTIVE OF SECOND GENCO EE GRANT CALL

The objective of the Grant Call is to encourage Gencos to invest in energy efficient equipment or technologies that can improve the overall heat rate³ of their existing CCGTs and reduce the carbon emissions for each unit of electricity generated.

¹ To this end, EMA had consulted industry on a Heat Rate Standard (“HRS”, measured in GJ/MWh) for all new, repowered and life-extended fossil fuel power plants in May 2020.

² EMA launched the first Genco EE Grant Call in 2018 to co-fund the implementation of energy efficiency improvement projects proposed by the Gencos

³ Heat rate refers to the total fuel input on a higher heating value (“HHV”) basis in GJ, divided by the total net electricity generation in MWh.

3. GRANT QUANTUM AND SUPPORT RATE

The total amount of grant support will correspond to the extent of improvement to the heat rate and the total amount of carbon abated. More energy efficient facilities or projects that achieve significant heat rate reduction and abatement levels may be eligible for more support, subject to a cap of 50 per cent of the qualifying costs.

All grant disbursements will be made on a reimbursement basis, based on the achievement of appropriate project milestones, and the submission of relevant invoices and proof of payment. Each claim will be paid up to 70%, with the final 30% being disbursed upon EMA's acceptance of the Final Report stating the achievement of the project's heat rate and carbon abatement target.

4. QUALIFYING COSTS

The qualifying costs include the following:

- Equipment
- Materials and consumables
- Technical software
- Professional services (e.g. consultancy (including measurement and verification), subcontracting, testing and certification approval)

Refer to Annex A for more details of the qualifying costs. All taxes, including but not limited to Singapore GST and withholding taxes, are excluded.

5. QUALIFYING PERIOD

Project must be completed within 36 months from the project commencement date, which will be mutually agreed upon between the Genco and EMA and stated in the Letter of Award. Projects should commence no later than 31 December 2025 to qualify.

6. ELIGIBILITY CRITERIA

Company

- Genco must be operating CCGTs in Singapore.
- Genco's CCGT to undergo energy-efficient project must be sited and operating in Singapore.
- This initiative applies to EE improvements for CCGTs which improve heat rate and achieve carbon abatement, and excludes embedded generation facilities.

Project

To qualify for the Second Genco EE Grant Call, the proposed energy efficiency project must meet the following criteria:

- The project must involve the installation and use of energy-efficient equipment or technologies. These must improve overall heat rate and achieve carbon abatement, preferably with a proven track record. These new energy-efficient equipment or technologies must not be part of the Gencos' business-as-usual activities, such as replacement of parts or systems which have reached their end of life and do not improve their heat rate.
- The project must result in measurable and verifiable carbon abatement of at least 0.5 kilo-tonnes of carbon dioxide-equivalent abatement per annum ("ktpa").
- The project must not have commenced at the time of application.

Examples of projects that qualify for the grant include, but are not limited to:

- Improved efficiency for auxiliary systems (e.g. gas compressor)
- Retrofits for CCGTs (e.g. Variable Speed Drives/Variable Frequency Drives for pumps/fans, integration of Energy Storage Systems)

Projects that reduce cost, but do not demonstrate measurable and verifiable improvement in heat rate and carbon abatement from the CCGTs, are not eligible. Examples of such projects include, but are not limited to:

- Energy efficiency solutions for plant systems not involved in the electricity generation process (e.g. retrofitting utilities for office/admin buildings, or lighting systems)
- Black box solutions (e.g. software or hardware devices whose functioning cannot be explained by applying mainstream engineering knowledge and theories, and where the heat rate improvement is not and/or cannot be established by objective measurement)
- Other project measures that are not permanently installed (e.g. plug-in equipment/components that are not essential for the CCGT to function) or projects that result in negative environmental or health effects

7. MEASUREMENT AND VERIFICATION REQUIREMENT

Gencos interested to apply for the grant must also include, as part of their proposal, a measurement and verification ("M&V") plan. The M&V plan must state the method to measure, verify and compute improvements in heat rate and carbon abatement. A baseline M&V report stating the baseline measurement results must be submitted to EMA before the implementation of the Genco's proposal (i.e. the dismantling of existing equipment and/or systems which requires CCGT downtime). A post-implementation M&V report stating the post-implementation measurement results must be submitted after completion

of the project. Specifically, for heat rate measurements, Gencos are required to conduct at least one one-hour test, for each generation plant involved in the project, to assess the heat rate of the plant at 75% part load. During the test, cogeneration plants will be required to generate only electricity to ensure consistency in the calculation of heat rate across different plants.

The M&V plan and the results from the baseline and post-implementation measurements must be in accordance with the International Performance Measurement & Verification Protocol (“IPMVP”) or other equivalent international guidelines and codes. The M&V plan, baseline M&V report and post-implementation M&V report must each be endorsed by an independent third party⁴ who is a Professional Engineer (“PE”), NEA-accredited Energy Efficiency Opportunities (“EEO”) Assessor and/or Qualified Energy Services Specialist (“QuESS”), and the Genco.

Both the baseline measurement and post-implementation measurements must be witnessed by an independent third party, who must not be involved in the project. The measurement data must be secured by the independent third party who must also report to EMA on how the baseline data was secured. The independent third party must ensure that the baseline and post-implementation measurements and M&V reports are in accordance with the project’s approved M&V plan.

8. EVALUATION CRITERIA

The energy efficiency proposals will be evaluated based on the following areas. Cost-effective proposals (lower cost per unit of abatement) are encouraged.

a. Potential Gains in Heat Rate and Carbon Abatement

- i) Improvement to heat rate (GJ/MWh) based on 75% part load. Gencos will be required to compute the heat rate before and after project completion, and submit relevant data (i.e. fuel consumption, gross electricity output and auxiliary consumption) used in the heat rate computation.
- ii) Stretched and yet realistic carbon abatement targets, including the tonnes of carbon dioxide-equivalent abatement (“tCO₂e”) per year (i.e. ktpa) and total projected tCO₂e achievable throughout the remaining economic lifespan of the CCGT.

b. Feasibility of Implementation

- i) Detailed implementation proposal and timeline.

⁴ Each plan/report need not be endorsed by the same independent third party.

- ii) Track record of the proposed equipment and/or technologies in achieving the project's heat rate and abatement targets in a low cost and low risk manner.
- iii) Rigorous M&V plans that are in accordance to international protocols and standards as per Section 7.
- iv) Comprehensive assessment of risk and mitigation measures (e.g. downtime of CCGTs).

c. Project Cost

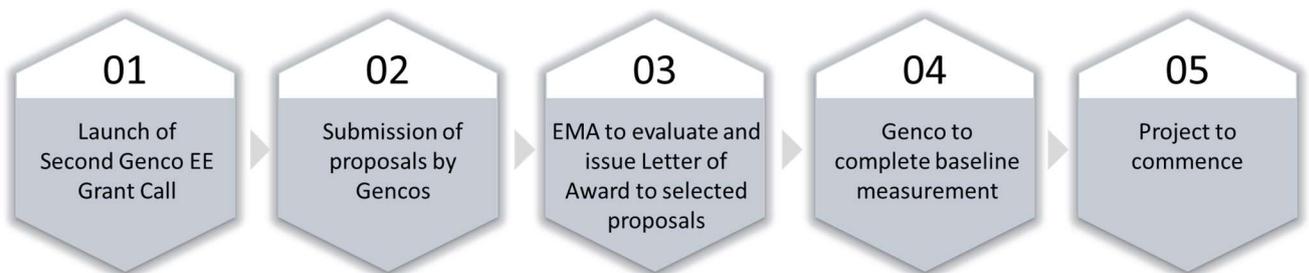
- i) Detailed cost breakdown and funding requirement.
- ii) Assessment of the project payback period, before and after inclusion of requested grant amount.

9. APPLICATION

EMA invites Gencos to submit proposals on implementing energy efficiency measures for co-funding support. The application window for the Second Genco EE Grant Call takes immediate effect until 30 September 2021.

EMA will evaluate the proposals based on the Eligibility and Evaluation Criteria stated above. Successful proposals which are accepted and approved by EMA can expect notification by Q2 2022. Awarded projects will commence thereafter.

A summary of the grant call process is shown below.



10. SUBMISSION

Proposals should reach EMA by **5pm on 30 September 2021**. Please refer to Annex B for the project proposal template.

Proposals may be submitted via email to:
 EMA_Enterprise_Development@ema.gov.sg

Annex A – Details of Qualifying Cost

1. General Policy

No cost item should be treated as qualifying unless it has been expressly provided as such in the grant approved and awarded by EMA. The procurement of such cost items must be made according to the formal established and consistently applied policies of the Genco.

With the exception of post-implementation M&V costs, the invoices for all claims must be dated before the end of the qualifying period.

Non-supportable items include:

- Internal manpower cost, i.e. salary of Genco staff involved in the project;
- All cost items that are not used exclusively for the project, unless the qualifying cost for that item is suitably pro-rated;
- All cost items that have already been supported by another grant awarded by a Singapore government agency; and
- Payments to a related party⁵ for used equipment, used materials and consumables, used technical software, and professional services.

1.1 Equipment

Qualifying Cost Items

The qualifying costs for equipment refer to the purchase price of the equipment, principal repayments for equipment bought on hire purchase, or lease payments incurred for the period of use of the equipment for the project during the qualifying period, and any direct costs attributed to bringing the equipment to working condition.

Deposits paid prior to the start of the qualifying period to secure equipment for the project are claimable⁶, as long as the equipment is incurred and commissioned/delivered within the qualifying period.

⁵ A related party is determined with reference to Financial Reporting Standards 24.

⁶ For projects which are eventually approved and awarded. Gencos should be prepared to bear the full cost of payments made under any deposits/contracts committed to before grant award.

Non-Supportable Items	<p>Non-supportable items include maintenance costs, any financing interest for equipment that is leased or bought on hire purchase, cost of capital works, general infrastructure, general purpose IT and communication equipment, office equipment, and furniture and fittings, unless specifically provided for in the grant and approved by EMA.</p> <p>Examples of such costs are computers, office productivity software, PDAs, mobile phones, photocopier machines, workstations, printers, etc.</p>
1.2 Materials and Consumables	
Qualifying Cost Items	The qualifying costs for materials and consumables refer to the purchase price of materials and consumables used in the project.
Non-Supportable Items	Overhead expenses are non-supportable. These include rentals of business/operating premises, electricity/utility costs, facilities management, telephone charges, internet charges, etc.
1.3 Technical Software	
Qualifying Cost Items	The qualifying costs for technical software refer to the purchase price, lease payments or licensing fees incurred for the period of use of the technical software for the project during the qualifying period.
Non-Supportable Items	Non-supportable items include any financing interest for technical software that is leased.
1.4 Professional Services	
Qualifying Cost Items	<p>The qualifying costs for professional services refer to costs incurred for consultancy (including M&V), subcontracting, and testing and certification approval services that are necessary for the project, performed in Singapore by Singapore-based service providers.</p> <p>Consultancy costs incurred no more than one year prior to the start of the qualifying period, for the purpose of baseline measurement only, may be supported.</p> <p>Consultancy costs incurred up to six months after the end of the qualifying period, for the purpose of post-implementation M&V only, may be supported.</p>

Non-Supportable Items	<ul style="list-style-type: none">• Entertainment & refreshment• Fines and penalties• Legal fees• Costs incurred in relation to internal/external audit of claims or project milestone achievements• Patent application. This includes patent application, registration, filing, maintenance and other related cost.• Permanent equipment installed and used for M&V, which do not contribute to improving heat rate and/or carbon abatement, cannot be claimed under M&V costs
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Annex B – Project Proposal Template

Project Title	
Project Description	<p><u>Details of existing system</u></p> <ul style="list-style-type: none"> - Specify the technical specifications of the CCGT and/or relevant supporting equipment (including capacity of CCGT and/or equipment, age, remaining economic lifespan) before project implementation - Specify the CCGT’s usual operating conditions (e.g. average load factor, gross and net heat rate and efficiency on a HHV basis, amount of fuel used per year, plant emission factor (tCO₂/MWh) etc.) - Provide schematic of the existing system <p><u>Details of the proposed system</u></p> <ul style="list-style-type: none"> - Specify the technical specification of the CCGT and relevant supporting infrastructure (including age, size of system) after project implementation - Specify the projected CCGT’s new operating conditions (e.g. load factor, improved heat rate and efficiency (gross and net HHV basis), amount of fuel used per year, plant emission factor (tCO₂/MWh) etc.) - Specify the change in estimated lifespan of the proposed equipment/system (where applicable) - Explain how the proposed project works, and how it improves the heat rate of the existing CCGT - Provide relevant study report if feasibility study was carried out on the proposed project - Specify the targeted heat rate (GJ/MWh), efficiency (%) of the CCGT and carbon abatement per annum (ktpa) after project implementation, including breakdown of efficiency at component level (if applicable) - Provide schematic of the proposed system

Project Timeline and Milestones	Provide <u>timeline of the key milestones</u> of the project including but not limited to the following: <ul style="list-style-type: none"> - Project commencement date - Baseline measurement - Installation/commission of equipment/technologies (if any) - Post-implementation measurement and verification - Project completion and submission of Final Report
Projected annual cost savings and carbon abatement from project	Provide <u>estimated annual (i) cost savings and (ii) carbon abatement</u> associated with the project <ul style="list-style-type: none"> - Provide <u>step-by-step</u> calculations on the annual cost savings and carbon abatement achievable from the project. - For the annual cost savings, savings from fuel cost and reduction in carbon tax (\$5/tCO_{2e}) should be included. - List down all assumptions made in the above computation, including but not limited to: <ul style="list-style-type: none"> o Estimated fuel cost and energy price o Remaining economic lifespan of CCGT
Project Costs	Provide <u>detailed cost breakdown</u> of the following including <u>supporting quotations</u> for all cost components: <ul style="list-style-type: none"> - Equipment - Materials and consumables - Technical software - Professional services (including details of professional's designation, experiences, manhours and unit costs)⁷
Payback period	Genco should compute the payback period <u>before and after</u> receiving requested grant quantum using the formula: <ul style="list-style-type: none"> - Payback period (before Grant) = Project costs / Annual projected cost savings - Payback period (after Grant) = (Project costs – Grants to be received based on 50% of qualifying costs) / Annual projected cost savings

⁷ Details should be provided in the following format:

Designation	Experience	Man-hours	Unit cost (\$/hour)	Total cost (\$)
e.g. Professional Engineer	e.g. 10 years	e.g. 50	e.g. 100	e.g. 5,000

Risk Assessment and Mitigation Plan	Provide detailed project risk assessment and mitigation plans to reduce CCGT outage. Provide annual overhaul plans for all generation plants for the year of project implementation.
Measurement and Verification Plans	Refer to Section 7 on the requirements for measurement and verification.
Project Leader/ Point-of Contact	Provide contact details of Project Leader/ Point-of Contact managing the project.
Summary of Project Proposal	Provide a <u>summary of the proposed project</u> using the template provided in the <u>Appendix to Annex B</u>.

Appendix to Annex B – Summary of Project Proposal

This section should not exceed 2 pages, with the prescribed format (i.e. font in black) to be strictly adhered to. Font in red italics (including this heading) are to be deleted and replaced with the necessary information.

Project Description

- *X*

Please provide a brief summary (in point form and not more than 200 words) of the proposed equipment and/or technologies to be implemented.

Project Timeline and Milestones

- Qualifying Period: *Commencement date to End date (X years)*
- Baseline Measurement: *Estimated date e.g. Aug 2022*
- Implementation Period: *Estimated date e.g. Q4 2022 or Sep 2022*
- Post-Implementation Measurement: *Estimated date e.g. Oct 2022*
- Payment Milestone 1 (X%): *Estimated date (description of milestone)*
- Payment Milestone 2 (X%): *Estimated date (description of milestone)*
- Payment Milestone X (X%): *Estimated date (description of milestone)*

Please add more milestones as necessary, up to a maximum of 6 milestones. X% refers to the percentage of total grant tied to that payment milestone.

Projected annual cost savings, heat rate improvement and carbon abatement from Project

- Projected annual cost savings: $\$X = \$X \text{ of fuel/electricity cost} + \$X \text{ of carbon tax}$
- Projected improvement in heat rate: $X \text{ GJ/MWh}$, from $X \text{ GJ/MWh}$ currently to $X \text{ GJ/MWh}$ post-implementation (at 75% part load, net HHV)
- Projected annual carbon abatement: $X \text{ ktpa} = \textit{either} X \text{ GJ/year of fuel savings} \times 56.152 \text{ kgCO}_2\text{e/GJ}$ *or* $X \text{ MWh/year of electricity savings} \times X \text{ tCO}_2\text{/MWh (site/plant emission factor)}$ (~~*delete whichever is not applicable*~~)

Project Costs

- Equipment: $\$X$
- Materials and consumables: $\$X$
- Technical software: $\$X$
- Professional services: $\$X$
- Total: $\$X$

Payback period (before Grant)

- $X \text{ years} = \textit{Total project cost} \div \textit{Projected annual cost savings}$

Risk Assessment and Mitigation Plan

- *X*

Please provide a brief summary (in point form and not more than 100 words) of the project risk assessment and mitigation plans to reduce CCGT outage.

Measurement and Verification Plans

- *Name of independent third party (and his/her company, if any).*
- *Brief summary (in point form and not more than 100 words) of the proposed M&V methodology, including whether it is in accordance with the IPMVP.*

Total projected tCO_{2e} achievable throughout the lifespan of the CCGT

- *X tCO_{2e} = Projected annual carbon abatement × remaining economic lifespan of CCGT*

Projected improvement in CCGT efficiency

- *X% absolute, from X% to X%*
- Please provide the basis for the current and post-implementation efficiency.*