CURRENT NEWS

மின் செய்திகள்

VOLUME IX, ISSUE 11 • NOVEMBER 2024

A publication from

CAG

Citizen consumer and civic Action Group

ENERGY LABELING AND STAR RATING FOR SOLAR ENERGY INFRASTRUCTURE AND SOLAR- OPERATED APPLIANCES

B.KIRUBAKARAN

The Bureau of Energy Efficiency (BEE) provides energy labeling and star rating systems to guide consumers in selecting energy-efficient and high-performance appliances. These ratings help reduce energy bills and promote cost savings, thereby encouraging sustainable energy usage.

TABLE OF CONTENTS

Energy labeling and star rating are mandated for major domestic appliances such as refrigerators, air conditioners, color televisions, LED lamps, ceiling fans, washing machines, and electric water heaters. For certain other appliances, including computers, industrial motors, submersible pumps, inverters, solar PV panels, and solar water heaters, energy labeling and star rating are voluntary.

Mandatory Scheme	Voluntary Scheme
• Refrigerators (Frost Free, Direct cool, Deep Freezers) • Stationary Storage Type Electric Water Heater • Television (Colour TV, Ultra-High Definition TV) • Washing Machine • Lamps (Tubular fluorescent, LED) • Chillers • Room Air Conditioners (Fixed speed, Variable speed, Light Commercial type, Cassette, Ceiling, Corner AC) • Distribution Transformer	• General purpose Industrial motor • Submersible pump set • Domestic Gas Stove • Computer • Ballast • Solid state inverter • Diesel Generator Set • Microwave Oven • Solar Water Heater • Air Compressors • High Energy Li-Battery • Tyres • Multi Door Refrigerator • Pedestal Fan, Table Fan • Induction Hob • Solar Photovoltaic Module • Packaged Boiler • Commercial Beverage Coolers • Grid Connected Solar Inverters

Accelerating Clean Energy Transition in India and Importance of Energy Labeling and Star Rating for Solar Appliances

India has set an ambitious target of installing 500 GW of renewable energy capacity by 2030, with rooftop solar PV systems contributing 100 GW. The country's installed rooftop solar capacity grew by 2.99 GW in 2023-2024, reaching a total of 11.87 GW as of March 31, 2024. The recently approved PM Surya Ghar: Muft Bijli Yojana aims to further promote solar adoption, targeting one crore households to install rooftop solars by March 2027. Under this scheme, households can avail of subsidies of up to 60% for rooftop solar installations. By December 2024, 6.3 lakh installations had been completed, with over 1.45 crore registrations and 26.38 lakh applications recorded on the national portal. Educating consumers on choosing efficient solar PV systems ensures better utilization of both government subsidies and consumer investments.

Key components of rooftop solar systems include:

- **Solar Photovoltaic (PV) Modules** : Convert sunlight into electricity.
- **Grid-Connected Inverters** : Convert Direct Current (DC) from solar panels to Alternating Current (AC).

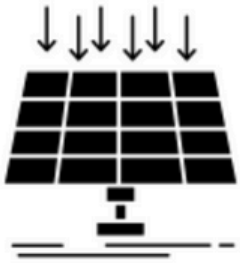
The Voluntary star rating scheme currently applies to solar PV modules. However, for grid connected solar inverters, Energy Labeling scheme is only applicable.

Solar PV modules

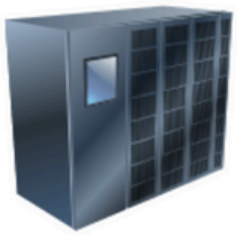
For solar PV modules, the star rating is based on the effective efficiency (eff) of the module. Usually the performance of the solar PV module is measured on the basis of PV module efficiency, which is the ratio of electric power generated by a PV module to its incident irradiance measured under Standard Test Conditions (S T C). Temperature impacts the module efficiency. Different types of module materials (mono-crystalline, multi-crystalline, thin film, etc) have different temperature coefficients of power. Therefore, temperature impact is selected as the major criteria and effective efficiency eff = STC [1 + γ (Tm - 25)] is used as a single parameter to give star labels to the module.

Solar Water Heater

Solar PV module



Grid Connected Solar Inverter



Where :

STC = Efficiency at STC

γ = Temperature coefficient of power

Tm = Module temperature

There is a pre-qualification criteria to participate in the star rating and labeling program. The performance of the solar PV module must not degrade beyond 3% after subjecting it to the design qualification tests conducted in accordance with the IEC 61215 : 2005 for crystalline silicon PV modules and IEC 61646 : 2008 for thin film PV modules.

The validity for the star rating will be for two years (1st January 2024 to 31st December 2025). The values will be updated for next upcoming years.

Grid connected solar inverters

Another important component in a rooftop solar PV system is grid connected solar inverters. For grid connected solar inverters (without storage systems and capacity less than 100 kW) the energy labeling will be provided based on the overall energy conversion efficiency (t) of the inverter.

Overall energy conversion efficiency = Efficiency of MPPT x Energy conversion efficiency of the inverter.

Only BIS certified solar inverters complied with IS 16221-2:2015 are eligible to take part in the BEE Standards and Labeling program.

Solar water heaters

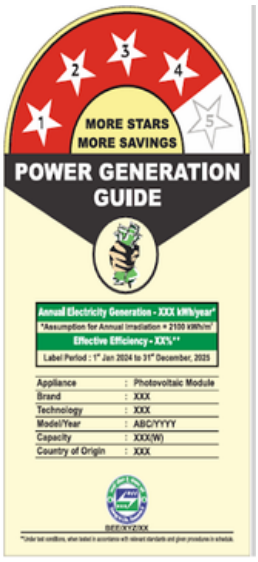
In addition to solar PV panels, solar water heaters—including thermosyphon-based flat plate and evacuated tube collectors in various capacities—are widely used for domestic and commercial hot water applications. These systems also have a star rating.

For solar water heaters with up to 500 liters of storage capacity, the star rating is based on the system's average daily efficiency (sys) tested according to the IS 16368 : 2015 test procedure for thermosyphon type domestic solar hot water heating systems. This efficiency depends on the thermal properties of the materials used in the collector, pipes, and storage tank insulation. To qualify for a star rating, the hot water storage tanks used must also comply with the minimum technical requirements laid down by the MNRE (Ministry of New and Renewable Energy).

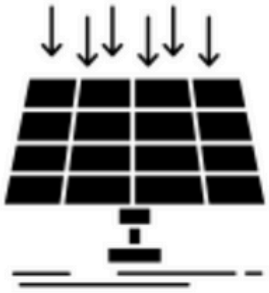
Solar Water Heater

Star Rating
Based on System Efficiency

Star Level	System Efficiency	
	Minimum	Maximum
1 Star	40	45
2 Star	> 45	50
3 Star	> 50	55
4 Star	> 55	65
5 Star	> 65	



Solar PV module



Star Rating
Based on Effective Energy Conversion Efficiency of the module

Star Level	System Efficiency
1 Star	⩾ 17 %& ⩽ 18 %
2 Star	> 18 %& ⩽ 19 %
3 Star	> 19 %& ⩽ 20 %
4 Star	> 20 %& ⩽ 21 %
5 Star	> 21 %

Grid Connected Solar Inverter

Energy Labeling
Based on Overall Efficiency

Rated Power (kW)	Minimum Overall Efficiency Requirement
< 1 kW	92 %
1 ⩽ & < 3	93 %
3 ⩽ & < 5	95 %
5 ⩽ & < 10	96 %
10 ⩽ & < 20	97 %
⩾ 20	98 %

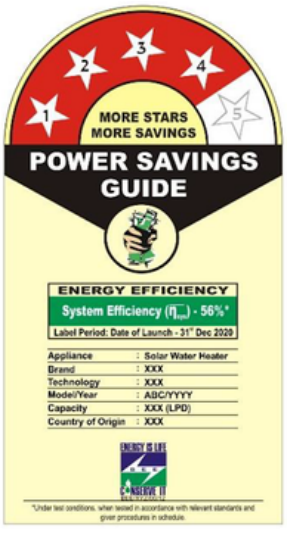


Figure : Star rating and Energy Labeling for Solar Energy operated appliances | CAG | BEE

Conclusion

Energy labeling and star rating for solar operated appliances play a crucial role in advancing India's clean energy goals and awareness about energy efficient solar appliances will be vital. By enabling consumers to choose efficient systems, these programs ensure better performance, cost savings and optimal utilization of resources.

FACTORS INFLUENCING ELECTRICITY PRICES IN TAMIL NADU - (PART 4)

MANIKANDAN.M

The Tamil Nadu Electricity Regulatory Commission (TNERC) ensures fair electricity prices, while also supporting the state's power generation infrastructure. This article explains how the power generation sector impacts electricity prices.

Fixed Cost for Generation

According to Regulation 36 of the TNERC, Regulations 2005, the tariff for sale of power by the generating sectors shall be of two parts, namely fixed cost and variable cost.
Fixed cost consists of the following elements:
(a) Interest on Loan Capital
(b) Depreciation
(c) Return on Equity;
(d) Interest on Working Capital
(e) Operation and Maintenance expenses
The above, with regards to transmission equipment and infrastructure, were covered in the previous part of the article. In this section, we will look at cost implications to the consumer from aspects such as investment, maintenance etc towards power generation infrastructure.

Debt-equity (70:30) ratio

Debt (70%) is money that TANGEDCO borrows from banks, financial institutions, or through bonds, and it needs to be repaid with interest. Equity (30%) is money that comes from the government (TANGEDCO), and it represents ownership of the company. Equity is therefore money that does not need to be paid back. This ratio allows TANGEDCO to take on big projects without relying entirely on its own money. TANGEDCO can spread out the repayment over time, which helps them handle expensive projects without raising electricity tariffs right away. It also helps avoid frequent changes in electricity prices which might happen if projects were funded only by equity. By using loans with good terms, TANGEDCO can spread costs over several years, making tariff adjustments gradual and less burdensome for consumers. TNERC follows the Central Electricity Regulatory Commission (CERC) guidelines, which recommend this ratio for setting tariffs.

Interest on Loan Capital

Interest on loan for TANGEDCO means the additional money the company has to pay to banks for borrowing funds to manage daily operations or finance large projects like building power plants, buying equipment, or upgrading infrastructure. The interest rate is generally linked to the current rates set by RBI guidelines. TNERC approves a reasonable rate based on actual loan agreements or a standard rate. For example: In their order dated 13.08.2024, the interest rate was 9.98%, amounting to a total amount of ₹ 9041 crore for the financial year 2022-23. When calculating interest, the repayment schedule of loans is considered, and is usually aligned with the asset's useful life. If actual loan details are not available, a standard loan structure is used, based on a debt-equity ratio (usually 70:30 for projects). TNERC may adjust annual fixed costs during periodic reviews to ensure only reasonable costs are passed to consumers, as shown in the table below.

Particulars	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27
Submitted by TANGEDCO	9,446.75	9,752.24	9938.03	10,218.81	10,666.86	10,726.28
Approved by TNERC	8,162.39	8,218.88	8,361.46	8,565.33	8,818.09	8,859.82
Percentage increase in fixed cost compared to FY 21-22	-	0.69 %	2.43 %	4.94%	8.04%	8.54%
Percentage Reduction by TNERC prior to approval, considering the tariff regulations	13.60 %	15.70 %	15.86 %	16.18 %	17.34 %	17.41 %

Table: Overview of generation fixed cost (in Crores) approved by TNERC

Depreciation on Generation

Depreciation in the context of TANGEDCO means that the value of its physical assets, like power plants, machinery, equipment, and infrastructure, goes down over time because of use, aging, and wear and tear. It's like acknowledging that these assets don't last forever and their value drops a bit each year. Depreciation is calculated based on how long an asset is expected to be useful. For most generation assets, this period is 25 years or as specified by the commission. Depreciation is usually calculated using the straight-line method (SLM), which spreads the cost evenly over the asset's useful life.

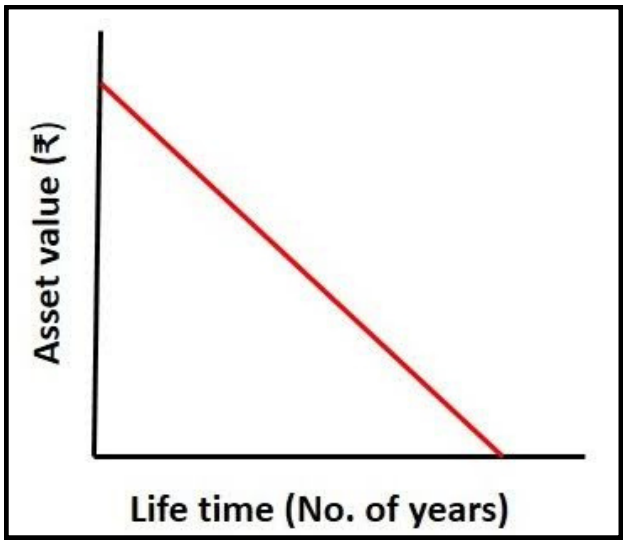


Illustration of SLM method
Image: CAG

With SLM, the asset's value decreases uniformly each period until it reaches its salvage value. For example, the actual depreciation for the generating sectors in FY 2022-23, as approved by TNERC, was ₹ 1565.46 crores.

Return on Equity of Generation

Return on Equity (RoE) for TANGEDCO is a way to see how much profit the company makes from the money invested by the government. It shows how well TANGEDCO uses its own funds to make money. Return on Equity (RoE) of a power generation company affects the electricity tariffs consumers pay. TNERC lets power generation companies earn a fixed RoE as part of their revenue. This RoE is added to the generation costs and passed on to consumers through tariffs. If the RoE is high, the company's revenue requirement goes up, leading to higher electricity costs for consumers. On the other hand, a lower RoE means lower tariffs. Regulators try to balance giving companies a fair return to encourage investment in infrastructure and reliable power supply while keeping electricity affordable for consumers. The rate of return on equity is 14%, as specified in the Tariff Regulations, and is applied to the average equity balance of each power generation station. For example, in the financial year 2022-23, TANGEDCO claimed a RoE of ₹ 550.69 crores for generation, but TNERC did not approve this because the capital expenditure was funded entirely through loans.

Interest on Working Capital

Interest on working capital for TANGEDCO is the interest that the company pays to banks for short-term loans used to cover daily operations, such as paying employee salaries, buying fuel, or maintaining power stations. This interest is usually calculated at a set rate approved by the regulatory commission, TNERC. These costs are included when setting electricity tariffs, so TANGEDCO can recover these expenses from consumers. Managing working capital efficiently is essential for the financial health of the utility.

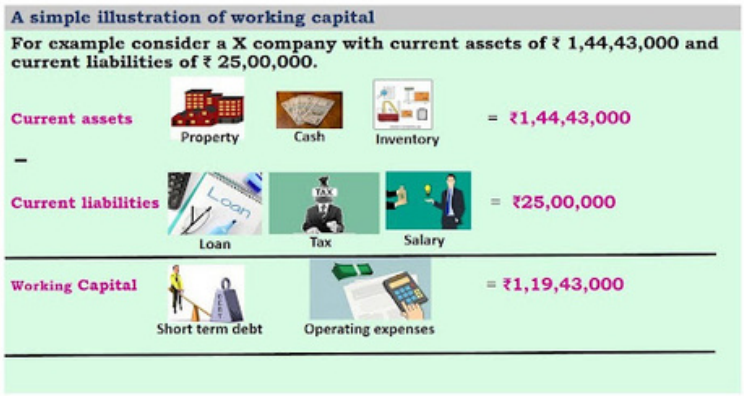


Illustration of working capital | Image: CAG

Operation and Maintenance expenses

Operation & Maintenance (O&M) expenses for TANGEDCO are the costs of keeping their power plants, equipment, and systems in good working order. These are the everyday expenses needed to generate and supply electricity to consumers. As per TNERC regulation 2005, the norms to determine O&M expenses includes i) the operation and maintenance expenses to be derived on the basis of actual operation and maintenance expenses for the past five years previous to current year based on the audited annual accounts; ii) the average of such normative operation and maintenance expenses after prudence checks shall be escalated at the rate of 5.72% per annum to arrive at operation and maintenance expenses for current year and iii) the base operation and maintenance expenses so determined shall be escalated further at the rate of 5.72% per annum to arrive at permissible operation and maintenance expenses for the relevant years of tariff period. For example, TANGEDCO reported that its net O&M expenses for generation, according to audited accounts, were ₹2,966.78 crores for the financial year 2022-23. However, TNERC approved net O&M Expenses at ₹2,606.97 Crore, taking into account the actual costs for the financial year and annual escalation rates of 5.72% for R&M and A&G expenses.

Conclusion

In conclusion, covering fixed costs through tariffs is crucial for the financial stability of utility services. Fixed costs, such as infrastructure and maintenance, require consistent income to ensure reliable and long-term service. A balanced tariff structure ensures fixed costs are met, leading to fairness and efficiency.

CONSUMER FOCUS

A petitioner, a farmer, had an aquaculture farm that relied heavily on electricity to sustain operations. His farming operations were such that from January to June, his farming activities consumed significant electricity to power aerators and pumps. However, during the off-peak months from July to September, there was minimal use of electricity, often using only lighting.

In June 2019, the petitioner discovered that his electricity meter had burned out. He promptly informed TANGEDCO to replace the defective meter at the earliest. Also, he requested that minimal charges be collected during the off-peak time. Despite his continuous requests, there were delays, and the new meter was only installed in October 2019.

In November 2019, the petitioner received a hefty bill of Rs.4,62,401, calculated based on his peak-season consumption. The petitioner paid Rs.2,52,490 under protest to avoid disconnection. He explained to TANGEDCO'S officials that the farm works on a seasonal basis. Hence, he contested the charges claiming they were unfair during a non-productive period. He also highlighted the delay in replacing the defective meter, which added to the unjust financial burden.

TANGEDCO informed the petitioner that the meter had burned out because of excessive load, and the calculations were based on the consumption patterns observed over the past two years. The petitioner was not satisfied with TANGEDCO's reply and registered a complaint with the Consumer Grievance Redressal Forum (CGRF).

CGRF, after hearing both sides, stated that there was no evidence for saying that the farm only had low activity over the disputed period. Hence, they ordered the petitioner to pay the remaining amount and rejected his petition.

Dissatisfied with the CGRF's order, the petitioner submitted his appeal to the Electricity Ombudsman. During the Electricity Ombudsman hearing, three main issues were raised:

1. Was the petitioner's meter defective during the period in question?
2. What is the regulatory directive of TNERC for calculating consumption during the meter defective period?
3. Is the petitioner's claim that he should not be charged for the defective meter period (which is a non-productive season) tenable?

The findings for this case by the Electricity Ombudsman are as follows:

- The petitioner's consumer ledger had that the meter assessment entries during 07/2019, 08/2019 and 09/2019 were recorded as defective and replaced with a healthy meter on 15.10.2019. The meter was diagnosed by the per Meter Relay Test (MRT) wing as 'burnt' and the data could not be downloaded via CMRI because the meter's display had failed. During the hearing, the Appellant also accepted that the meter was defective. Therefore, it is concluded that the meter was indeed defective during the disputed period July 2019 to September 2019.
- Regulations 11(2), 11(4), 11(5), and 11(6) of the TNERC Supply Code 2004, prescribes the procedures for computing the average consumption during the period of meter defect. Since no data was recovered from the MRT report, TANGEDCO adopted the provision of Regulation 11(2) in this case.

11. Assessment of billing in cases where there is no meter or meter is defective :

(1) Where supply to the consumer is given without a meter or where the meter fixed is found defective or to have ceased to function and no theft of energy or violation is suspected, the quantity of electricity supplied during the period when the meter was not installed or the meter installed was defective, shall be assessed as mentioned hereunder.

(2)The quantity of electricity, supplied during the period in question shall be determined by taking the average of the electricity supplied during the preceding four months in respect of both High Tension service connections and Low Tension service connections provided that the conditions in regard to use of electricity during the said four months were not different from those which prevailed during the period in question.

(4) Where the meter becomes defective immediately after the service connection is effected, the quantum of electricity supplied during the period in question is to be determined by taking the average of the electricity supplied during the succeeding four months periods after installation of a correct meter, provided the conditions in regard to the use of electricity in respect of such Low Tension service connections are not different. The consumer shall be charged monthly minimum provisionally for defective period and after assessment the actual charges will be recovered after adjusting the amount collected provisionally.

(5) If the conditions in regard to use of electricity during the periods as mentioned above were different, assessment shall be made on the basis of any consecutive four months period during the preceding twelve months when the conditions of working were similar to those in the period covered by the billing.

(6) Where it is not possible to select a set of four months, the quantity of electricity supplied will be assessed in the case oaf Low Tension service connections by the Engineer in charge of the distribution and in the case of High Tension service connections by the next higher level officer on the basis of the connected load and the hours of usage of electricity by the consumer.

- Based on the finding on the second issue, the bill received by the petitioner worked out by TANGEDCO is correct as per Regulation 11(2) of Tamil Nadu Electricity Supply Code for the defective period found. The petitioner's argument that he should not be billed for the period during which the meter was defective—considered a non-productive season cannot be taken into account.

Based on the finding, the Electricity Ombudsman cited that TANGEDCO followed the regulatory provisions for calculating the average bill during defective meter periods. Therefore, the petitioner's appeal was rejected.

SOURCE: OMBUDSMAN CASE

NEWS FROM TAMIL NADU

Tamil Nadu to introduce Battery Energy Storage Systems to boost green energy infrastructure

In a major step towards strengthening renewable energy infrastructure, Tamil Nadu Green Energy Corporation Limited (TNGEC) is set to introduce Battery Energy Storage Systems (BESS) for the first time in the state. Under the central government's Viability Gap Funding (VGF) Scheme, 30% of the capital cost for BESS, or `27 crore per MW, whichever is lower, will be provided as financial support. Tamil Nadu is among the six renewable energy-rich states that was allocated BESS capacities under the initiative alongside Gujarat, Karnataka, Rajasthan, Telangana, and Maharashtra. A senior official told TNIE, "The Ministry of Power has issued operational guidelines for the state component of the VGF Scheme to promote BESS. With over 70% of renewable energy capacity connected to interstate transmission systems (InSTS), there is a critical need to support state utilities in developing InSTS-connected BESS, especially in states with high solar energy generation."

The BESS installations are planned at Tangedco and Tantransco substations to enhance energy storage and distribution. "Currently, Tamil Nadu Electricity Board (TNEB) is conducting a detailed feasibility study across its 1,091 substations, including 765 kV, 400 kV, and 230 kV facilities. Setting up 1 MW of BESS requires 4 to 5 acres of land, and suitable locations are being inspected," another official said. The process of identifying feasible sites is ongoing, after which tenders will be floated for bidders, the official added. The Central Electricity Authority's recent National Electricity Plan has also highlighted the growing need for energy storage systems as renewable energy integration increases. "To ensure grid stability and manage peak loads, adopting BESS is essential.

SOURCE: THENEWINDIANEXPRESS, NOVEMBER 21,2024

NEWS FROM ACROSS THE COUNTRY

India to spend over Rs 9 trn on power transmission infra by 2032: Govt

A total expenditure of Rs 9.12 lakh crore has been planned to augment power transmission infrastructure capacity in the country by 2032, according to Union Minister Shripad Yesso Naik. The National Electricity Plan (Transmission) covers the transmission plan till 2031-32, said Minister of State for Power Shripad Yesso Naik in a written reply to the Rajya Sabha on Monday. As per the Plan, 1,91,474 circuit kilometres (ckm) of transmission lines and 1274 Giga Volt Ampere (GVA) of transformation capacity would be added (at 220 kV and above voltage level) in the 10-year period from 2022-23 to 2031-32. In addition, he stated that 33.25 GW of High Voltage Direct Current (HVDC) bi-pole links are also planned. The inter-regional transmission capacity is planned to increase to 143 GW by 2026-27 and further to 168 GW by 2031-32, from the present level of 119 GW.

The Plan also highlights new technology options in transmission, cross-border interconnections and private sector participation in transmission. He informed the House that total expenditure likely to be incurred on this plan is about Rs 9,16,142 crore. The Transmission Plan provides visibility to the Electricity Generators, Equipment Manufacturers, Transmission Service Providers (TSP) and investors for the growth opportunities in Transmission Sector. The National Electricity Plan (Transmission), inter-alia covers the existing, under implementation, and planned interconnections with neighbouring countries like Nepal, Bhutan, Myanmar, Bangladesh and Sri Lanka. In another written reply, Naik said currently, 28 hydroelectric projects (HEP) aggregating to 13,997.5 MW and five Pumped Storage Projects (PSPs) aggregating to 6,050 MW are under construction in the country.

SOURCE: BUSINESS STANDARDS,NOVEMBER 04, 2024

WORLD NEWS

UK is developing Solar Energy and Wind Farms in the Philippines

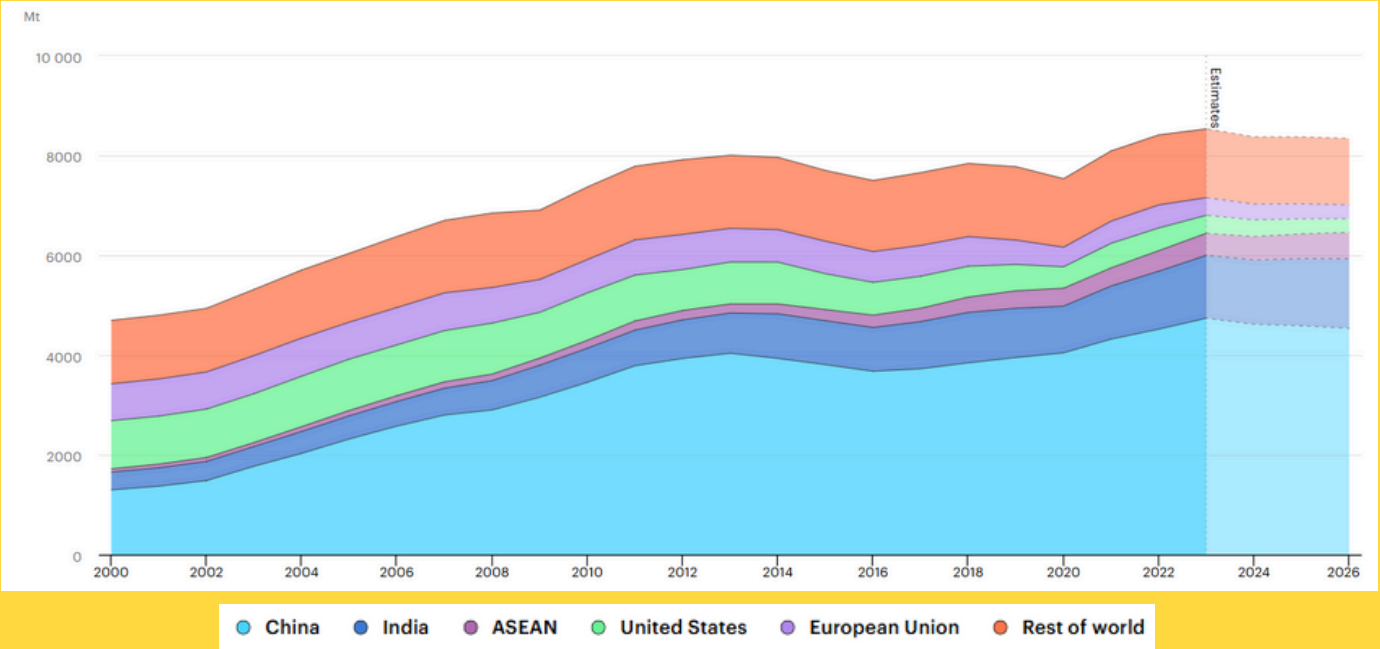
The British Embassy in Manila is delighted to celebrate two major milestones in UK-Philippines renewable energy collaboration. Over two consecutive events, the Embassy underscored the United Kingdom's commitment to driving sustainable energy solutions in the Philippines and supporting its transition to cleaner, greener power sources. On November 20, the Embassy hosted a celebratory dinner reception to highlight the partnership between Citicore Renewable Energy Corporation and Actis, a UK-based infrastructure investment company through its Southeast Asia renewable energy platform. This dynamic collaboration involves the development of four new wind farms across Luzon and Visayas, with a total capacity of 380 megawatts. Backed by an equity investment of $150 million, this partnership marks a significant step forward in expanding the Philippines' renewable energy capacity. The projects, which secured offtake agreements through the Department of Energy's Green Energy Auction Program (GEAP), exemplify the potential of partnerships to advance clean energy initiatives. The following day, on November 21, Actis celebrated the groundbreaking of the Terra Solar Project in Nueva Ecija, which is set to become the largest solar energy project in the Philippines. This project, developed by Solar Philippines New Energy Corporation, is supported by Actis' monumental USD 600 million equity investment. The Terra Solar Project will provide affordable, reliable, and sustainable power to millions of Filipinos, reinforcing the UK's role as a key partner in the Philippines' renewable energy transition. The groundbreaking ceremony highlighted Actis' long-term commitment to sustainable infrastructure and clean energy in the Philippines.

SOURCE: GOV.UK, NOVEMBER 27, 2024

PUBLICATIONS

- **Climate Action Support 2024, IRENA**
- **Energy Efficiency 2024, IEA**
- **Scheme to support Pilot Projects on New and Innovative production techniques and applications of Green Hydrogen, MNRE**
- **Mission-Oriented Innovation Policies for Net Zero, OECD**
- **National Electricity Plan Volume II – Transmission, CEA**

GLOBAL COAL CONSUMPTION, 2000-2026



SOURCE: IEA

THANK YOU FOR BEING PART OF OUR WORK!

HAVE ELECTRICITY RELATED QUESTIONS? DON'T FORGET TO CHECK OUT OUR

CHATBOT ON WWW.CAG.ORG.IN

WE ARE ON

@CAGChennai

GET IN TOUCH

+91(44) 2435 4458 | 2435 0387

helpdesk@cag.org.on

No.103 (First Floor), Eldams Road, Teynampet, Chennai-18