CURRENT NEWS

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IMPORTANCE OF POWER FACTOR IMPROVEMENT IN MSMES

B. KIRUBAKARAN

Electricity Tariff Structure for MSMEs in Tamilnadu:

The applicable tariff structure for Micro, Small and Medium Enterprises (MSMEs), in Low Tension category, excluding power looms, are as follows, based on the TNERC Tariff Order "Determination of Tariff for Distribution for FY 2024-25" dated 15.07.2024

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No	Tariff Category	Description	Tariff for FY 2024 - 2025	
			Fixed charges (₹/ month)	Energy Charges (₹/ kWh)
1	LT III-A (1) Cottage and micro Industries with Contracted load less than 12 kW	0 to 250 kWh / month	75	4.80
		> 250 kWh / month		6.95
2	LT III-B Industries and IT Services with contracted load more than 12 kW	0 to 50 kW	81	8.00
		50 kW to 112 kW	160	
		Above 112 kW	589	

Power Factor Penalty

In case of LT Tariff III-B category consumers, all service connections should maintain a power factor of not less than 0.85. When power factor is less than 0.85 for these service connections, the following compensation charges or penalty will be levied.

Power Factor	Power Factor Compensation / Penalty
Below 0.85 and up to 0.75	1% of the current consumption charges for every reduction of 0.01 in power factor from 0.85
Below 0.75	1.5% of the current consumption charges for every reduction of 0.01 in power factor from 0.85

What is the Power Factor ?

Power factor is a measure of how efficiently electrical power is being used. Power Factor (PF) is a dimensionless quantity that measures the phase difference between the voltage and current in an AC circuit. It is defined as the cosine of the angle between the voltage and current phasors.

A PF of 1 indicates that the voltage and current are in phase, the electrons flow in the same direction as the voltage and the power delivered to the load is purely active power and it is fully used for doing useful work.

A PF less than 1 indicates that there is a phase difference between the voltage and current, caused due to the presence of Inductors (coils) in the circuit, the electrons experience a phase shift relative to voltage, this phase shift results in a portion of the current flowing back and forth between the source and the load, not performing any useful work. This results in reactive power being delivered to the load. Reactive power does not perform any useful work but circulates back and forth between the source and the load.

Power factor is a crucial factor that often goes overlooked by consumers, especially MSMEs. A recent newspaper article reported that a unit near Ondipudur, Coimbatore, was facing a ₹12,000 penalty for low power factor, potentially consuming their entire monthly earnings. MSMEs are often disproportionately affected by power factor penalties, due to their limited resources and smaller scale operations. There could also be a lack of awareness among micro unit owners about power factor correction and its benefits. Importantly, penalties such as these can significantly increase their electricity costs, eroding their profit margins and hindering their growth.

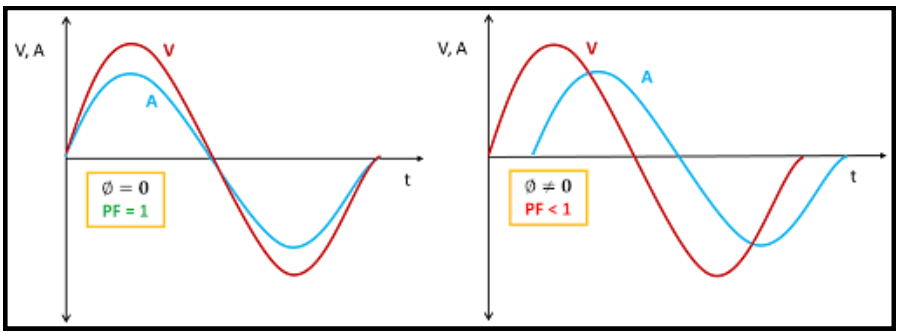


Fig 1 : Image depicting Power Factor | CAG

Why is Power Factor Important?

A low power factor can have several adverse effects:

- Increased line losses: When the power factor is low, more current needs to flow through the wires to deliver the same amount of power. This increased current can lead to higher line losses, resulting in wasted energy.
- Reduced voltage: Low power factor can also cause voltage drops in the electrical system, affecting the performance of appliances and equipment.
- Increased electricity bills: Higher line losses and reduced voltage can lead to increased electricity bills.

Why DISCOMs impose penalties for poor Power Factor?

- Increased line losses: A low power factor means a larger apparent power for a given active power. This results in higher current flow, leading to increased losses in the transmission and distribution lines due to the I^2R effect (where I is current, R is resistance). These losses are borne by the DISCOM.
- Reduced capacity utilization: A low power factor reduces the effective capacity of the grid. This means that the grid cannot deliver as much active power as it could have, if the power factor were higher. This can lead to supply shortages and voltage drops.
- Investment in reactive power compensation: DISCOMs have to invest in devices like capacitors to improve the power factor. These investments add to their operational costs.

Improving Power Factor

In most MSMEs, motors are the primary electricity consumers, serving as the industry's workhorses, powering machines used for a wide range of industrial applications.The inductive nature of motor windings often leads to a current lag behind the voltage, resulting in a low power factor.

There are several ways to improve the power factor in an electrical system:

- Capacitor installation: Capacitors can be installed to counteract the inductive effects of motors and other equipment, thereby improving the power factor.
- Automatic Power Factor Correction (APFC) Systems: APFC systems can automatically adjust the capacitance to maintain a desired power factor.
- Load balancing: Balancing the loads on different phases of the electrical system can help to improve the power factor.
- Energy-efficient equipment: Using energy-efficient appliances and equipment can reduce the overall reactive power demand, improving the power factor.

Cost of the Power factor improvement systems:

For a 5 HP motor operating at 440 volts, a capacitor of approximately 100 to 150 microfarads (µF) might be sufficient to improve the power factor to a reasonable level. However, it's recommended to consult the motor manufacturer's data sheet or an electrical engineer for the exact capacitor size.

The cost of a capacitor can vary depending on its size, quality, and brand. Generally, a 100-150 µF capacitor for a 5 HP motor would cost around ₹ 1,000 to 2,000 in India.

Automatic Power Factor Correction (APFC) Systems can be used to automate the power factor correction process.These systems typically consist of a bank of capacitors that are automatically switched in and out based on the load conditions. The cost of an APFC system for a 5 HP motor would be around ₹ 5,000 to 10,000.

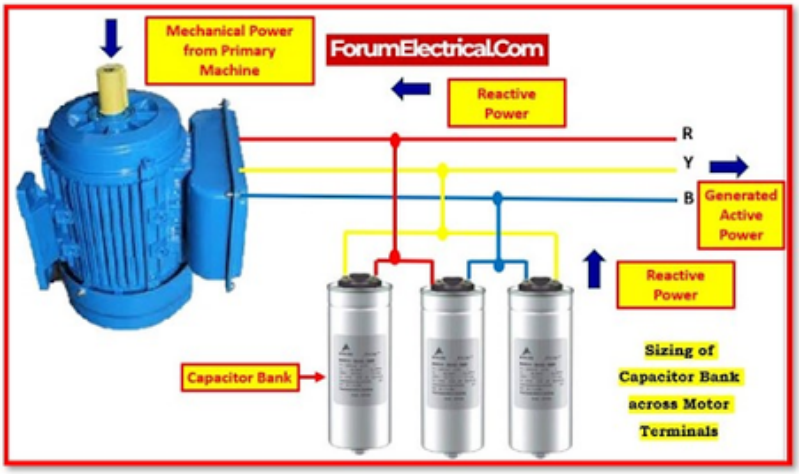


Fig 2 : Installation of Capacitor Banks across motor to improve PF Forumelectrical.com

Fig 3 : 100 kVAr Automatic Power Factor Correction (APFC) system | Fastronelectronics.com

Benefits of Power Factor Improvement

Improving the power factor can lead to several benefits, including:

- Reduced Electricity Bills: Lower line losses and improved voltage can result in significant savings on electricity bills.
- Improved Equipment Performance: A higher power factor can improve the performance and efficiency of electrical equipment.
- Reduced Grid Strain: A higher power factor can reduce the strain on the electrical grid, leading to more reliable power supply.

In a conversation that this author had with a small MSME owner in Coimbatore who was facing a penalty of Rs. 4,500 for low power factor (0.74) due to two 5 HP blower motors installed in their Sewage Treatment Plant, it was determined that by installing 2 kVAr capacitors (at a cost of less than ₹ 1000), the power factor could be improved to 0.95, eliminating the penalty and reducing the burden on the distribution transformer.

Conclusion

By understanding the importance of power factor and taking steps to improve it, MSMEs can reduce their electricity costs, improve their equipment performance, and enhance their overall competitiveness. It is essential for both consumers and policymakers to recognize the burden of power factor penalties on MSMEs and work together to promote awareness and adoption of power factor improvement measures.

FACTORS INFLUENCING ELECTRICITY PRICES IN TAMIL NADU - (PART 2)

MANIKANDAN.M

In continuation of Part 1, looking at factors influencing electricity price, this article discusses how electricity demand impacts the tariff structure in Tamil Nadu.

What is Electricity Demand?

Electricity demand is defined as the amount of power (i.e: kW) being consumed at a specific time period. In contrast, electricity consumption is defined as the total amount of units (i.e: 1 Unit = 1 kWh) consumed over a period.

For Example :
If one 50 W light is run for 20 hours, it will consume 1000 Wh or 1 kWh or 1 Unit of Electricity. In case you run five 50 W lights for 20 hours, each light will consume the same 50 W.
However, the demand (50 W x 5 = 250 W) for electricity will increase in those operating hours of lights.

About Excess Power Purchase

In Tamil Nadu the peak power demand months are March to July, as the summer months create a need for more-than-usual power demand. To meet this surge in demand, TANGEDCO procures excess power through short term agreements in addition to any exsisting power purchase agreements.

For example:
During the summer seasons (March to May) of this year, TANGEDCO had purchased 3286 Million units of power at the cost of ₹2755 crores through a short term agreement to tackle the excess demand. In this regard, the peak hour power rate fixed by TANGEDCO was ₹ 9.99 per unit of electricity over these months.

Tamil Nadu has been facing a deficit of 4000 MW during evening peak hours of the summer months, as the power demand has constantly exceeded 16000 MW. To tackle this, TANGEDCO has been purchasing power through the procedure of Day Ahead Market (DAM) concept. [This is the purchase of power one day before the requirement at a higher rate of ₹ 14 to ₹ 20 per kWh of electricity). Because of this DAM purchase procedure, the financial burden both on consumers as well as the utility increased.

In order to reduce the financial burden, TNERC directed TANGEDCO to procure excess power through a mid term power purchase agreement (starting September 1, 2024). Thus, TANGEDCO will procure 1000 MW more power to meet the evening demand, through a mid term power purchase agreement (for a period of 5 years) instead of the usual DAM purchase procedure. Moreover, in the context of optimizing the demand of electricity by consumers, TANGEDCO implemented various strategies for effective Demand Side Management (DSM) as discussed in the following section. DSM is a strategy to control electricity demand by incentivizing customers to alter their energy consumption pattern during peak hours.

Time of Day (TOD)

TOD is a tariff mechanism that adjusts the cost of electricity based on the time of consumption by the consumers. As per Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO), TOD tariff consists of different time period of the day as follows,

- Peak Hours (Morning) - 06.00 AM to 10.00 AM (4 hrs)
- Peak Hours (Evening) - 18.00 PM to 22.00 PM (4 hrs)
- Off-Peak Hours (Night) - 22.00 PM to 05.00 AM (7 hrs)
- Normal Hours (Rest of the day) - 05.00 AM to 6.00 AM; and 10.00 AM to 18.00 PM (9 hrs)

Presently in Tamil Nadu, some Low Tension (LT) supply category consumers without TOD meters are billed at 25% extra on the energy charges for the energy recorded during peak hours, with a 5% reduction on the energy charges for the consumption recorded during off- peak hours, as an incentive. The list of TOD tariffs applicable to LT category as follows,

- LT Tariff II-B(1) [Government educational institutions, its hostels, govt. hospitals, other hospitals rendering totally free services]
- LT Tariff II-B(2) [Private educational institutions/hostel, segregated private medical college]
- LT Tariff III-B [Industries, Information Technology services]
- LT Tariff V [Miscellaneous/general purpose]

Similarly, the majority of High Tension (HT) cosumers in Tami Nadu are billed at 25% extra on their energy charges recorded during the peak hours with a reduction of 5% on the energy charges for the consumption recorded during off-peak hours consumption. The excluded HT consumers from TOD tariff are HT-II A [Lift Irrigation], HT-IV and HT-V [E-vehicle Public Charging Station].

Moreover, for any consumer who expresses a willingness to install a TOD meter for exact computing of extra peak hour charges at their permises, TANGEDCO will either fix the meter within 15 days or permit them to procure the meter on their own.

Excess Demand Charges

1. For all HT consumer categories, excess demand is charged at double the normal rate. The maximum demand charges for any month shall be based on the KVA demand recorded in that month at the point of supply.
2. The excess demand charges are not applicable, for Domestic and Agricultural category of service (LT supply). Also, for other categories of LT services with contracted demand equal to or less than 18.6 KW, the excess demand charges shall not be applicable where the connected load is equal to or less than the contracted demand.
3. For the remaining LT services, when the contracted demand is in excess of 18.6KW and for those consumers whose contracted demand is less than 18.6 KW but who have opted for meters with demand recording facility, the excess demand charges are applicable. When the recorded demand exceeds 112KW, for every KW in excess of sanctioned demand, the following excess demand charges are applicable,

- At the rate of 1% of the charges for electricity supplied upto 112 kW
- For the first two occurrences the excess demand charge is levied at the rate of 1.5% for every KW or part thereof over and above 112KW
- For the third occurrences the excess demand charge is levied at the rate of 3% for every KW or part thereof over and above 112KW
- Fourth and subsequent occurrences the excess demand charge is levied at the rate of 10% for every KW or part thereof over and above 112KW

(To be continued)

CONSUMER FOCUS

Under the PM Suryaghar Yojna, the petitioner submitted an application for a rooftop solar installation with a capacity of 3 kW in February 2024 for his domestic service. According to the scheme, while he was eligible for a subsidy of Rs. 78,000/-, this applies only if he has a sanctioned load of 3 kW.

TANGEDCO identified that the petitioner only had a sanctioned load of 2 kW, which did not satisfy the requirements necessary for solar installation under the scheme. Consequently, TANGEDCO advised the petitioner to apply for an increase of 1 kW in the sanctioned load. Acting promptly on this recommendation, the petitioner submitted a request to TANGEDCO for the additional 1 kW load in March 2024. After paying the required charges, the sanctioned load was increased to 3 kW. As a result, the petitioner was granted the solar service connection without delay.

After securing the solar service connection, the petitioner registered a complaint to the Assistant Engineer (AE) about discrepancies in the sanctioned load. The petitioner stated that back in 2006, he had applied for a new electricity service connection, specifically requesting a three-phase supply with a connected load of 3 kW. After paying the required charges for the new service connection, TANGEDCO granted the connection with a sanctioned load of only 2 kW. Therefore, the petitioner contended that the load should have been provided at 3 kW, citing "Clause 26 of the TNE Supply Code 2004," which states that a three-phase supply is expected to support a maximum demand not exceeding 3000 watts.

Further, the petitioner stated that TANGEDCO had collected all the necessary charges for a 3 kW service connection but had effected only 2 kW as sanctioned load. Based on the complaint, the Assistant Engineer stated that the consumer ledger (log of entries explaining the history of the consumer's electricity consumption and its bills) indicates a sanctioned load of 2 kW from the time the service connection was established. Therefore, the AE informed the petitioner that the details were deemed to be correct.

To address this issue, the petitioner complained to the Consumer Grievance Redressal Forum (CGRF), seeking to correct the error and obtain a refund for the additional load payment made. During the CGRF hearing, the petitioner pointed out a discrepancy in the computer records (specifically in the consumer ledger), where the maximum demand is incorrectly listed as 2kW instead of the required 3kW for a three-phase connection at that time.

After going through the petitioner's consumer ledger, the sanctioned load of 2kW provided was established as based on the application and the CGRF ruled that there were no discrepancies. The petitioner's claim of clerical errors was found lacking in evidence as he could not provide any evidence of having paid for a 3 kW connection.

Therefore, CGRF ordered that the refund for the additional load can not be provided because TANGEDCO had followed all regulations in providing the electricity service connection. Dissatisfied with the CGRF's decision, the petitioner filed an appeal with the Electricity Ombudsman.

During the Electricity Ombudsman's hearing, the ombudsman observed that the petitioner had misinterpreted the regulations provided in 2006 for the category of new supply.

As per Regulation 26 of TN Electricity Distribution Code, 2004 which was in force at the time of effecting supply in 2006:

26. Categories of Supply: Supply of electricity shall be made available to the consumer under the following categories :
a. Single-phase 2 wire 240 volts between phase and neutral for supply to a total connected load not exceeding 4000 watts (including power loads).
b. Three-phase 4 wire 415 volts between phases and 240 volts between a phase and neutral for supply to a total connected load exceeding 4000 watts but not exceeding a demand of 112 KW. The consumer may elect to avail supply under any one of the above categories where the connected load does not exceed 4000 watts
c. Three-phase 3 wire, 11,000 volts and above between phases for power installation exceeding a demand of 112 KW, the minimum demand however being 63 KVA d. The consumer shall avail supply at 33 kV and above when the demand is 5 MVA and above.

The Ombudsman clarified that "a consumer may choose to receive supply under either single-phase or three-phase categories as long as their connected load doesn't exceed 4000 watts." Thus, the petitioner had misinterpreted the regulations. The petitioner assumed that applying for a three-phase connection automatically meant paying for a sanctioned load of 4kW. However, the actual sanctioned load for a consumer is determined by the total connected load of the appliances in their home. During the application process, the petitioner would have paid for a 2kW load, not a 3kW.

The Ombudsman's findings are as follows:

1. Until securing a solar service connection for 3KW in February 2024, the petitioner had never raised any concerns about being allocated 2KW instead of the 3KW he initially requested in 2006. He was unaware of the connected or sanctioned load provisions until he applied for the solar connection.
2. Since the petitioner did not provide proof of payment for a sanctioned load of 3KW in 2006, TANGEDCO's records confirming a sanctioned load of 2KW are deemed accurate.

Based on the investigation, the Electricity Ombudsman determined that the petitioner's request for a refund of charges related to the additional load was denied as it lacked merit.

SOURCE: OMBUDSMAN CASE

NEWS FROM TAMIL NADU

Now, you can buy your own electricity meters

People can now buy their own electricity meters instead of waiting for Tangedco to provide them for fresh connections or replace defective ones. Tangedco has published a list of manufacturers from whom consumers can buy the meters. All consumers -- be it industries, institutions, shops or households - must then submit the meters to Tangedco. The meters will be made tamper-proof and then installed. Tangedco field officials will install the meters on a 'first come first served' basis. Until now, Tangedco procured the meters in bulk and dispatched them to different section offices after testing and sealing them. "There are complaints of prolonged wait for meters by consumers. So Tangedco has instructed empanelled meter manufacturers to sell them directly to consumers through dealers or shops," said a senior official.

Records show a demand for 1.5 lakh LT single-phase meters and 50,000 threephase meters every month. Activists, however, argued that the move will burden consumers and Tangedco field workers further. Neelakanta Pillai, a retired Tangedco officer and consumer activist, said the move will only make consumers run from pillar to post to get things done. "The circular says the consumers can purchase outside if there is scarcity. How will the consumer know if there is a shortage? There are just two shops in one region," he said. Now, the manufacturers themselves deliver the meter to Tangedco. Tangedco has conveniently washed its hands off performing its duties. TNERC should take up the matter suo motu for consumers' benefit," he said. However, Tangedco officials said meters would be made available at section offices as well. "We would continue to procure meters from manufacturers and supply them to consumers. This is only an additional window for consumers."

SOURCE: TIMESOFINDIA, SEPTEMBER 15,2024

NEWS FROM ACROSS THE COUNTRY

Renewable energy sector to provide momentum to Indian economy: Pralhad Joshi

Union Minister Pralhad Joshi on Thursday said the rapidly growing renewable energy sector will provide momentum to the Indian economy in the years to come. Addressing the BNEF Summit here, the New & Renewable Energy Minister highlighted the steps being taken by the Modi government to romote the renewable sector. "A sector growing so rapidly will definitely provide momentum to India's growing economy. India has created a competitive industry structure in renewables," the minister said. He noted that the cost of solar power in India is among the cheapest in the world, saying that this is also because we get a good number of sunny days.

The key to the decarbonisation of India's electricity sector lies in being able to meet all incremental demand from non-fossil fuel sources. For this to happen, success in creating large-scale grid storage is essential, he pointed out. A policy to promote pumped storage projects in India is being planned to store excess electricity, facilitate the integration of renewable energy into India's energy mix, and accelerate the development of PSP projects. "We are also implementing a PLI Scheme for High-Eff iciency Solar PVModules with an outlay of Rs 24,000 crore," he said. Also, scheme guidelines for implementation of the Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme were issued and the Request for Selection was floated. This will help in creating 4.5 lakh MTPA of Green Hydrogen production capacity in the country. A similar Request for selection was issued for green ammonia, he stated.

SOURCE: THE ECONOMIC TIMES, SEPTEMBER 05, 2024

WORLD NEWS

Southeast Asia's bright gas demand outlook may disappoint: Maguire

Southeast Asia is fast becoming a key growth market for natural gas, and on paper has an aggressive development pipeline for gas-fired power stations that if completed would ensure the region would be a major gas consumer for decades. Southeast Asia is also one of the fastest growing destinations for shipments of liquefied natural gas (LNG). Total LNG volumes to the region have more than doubled since 2019, outpacing all other key markets, according to Kpler.

But gas bulls should be wary about how much of Southeast Asia's proposed gas power development pipeline remains stuck in the planned phase, as only around 6% of the region's announced power projects are currently under construction.

The remainder are still only planned on paper, and so remain at risk of potential delay or cancellation if power sector or government priorities switch to alternate power sources.

And the risk of deep cuts to gas-fired capacity plans is high, as clean energy capacity development has grown at three times the pace of gas-fired capacity since 2018, and has recently exceeded regional gas capacity for the first time.

Steadily rising clean generation capacity is in turn forcing energy system planners to assess the generation requirements from remaining system components, placing potentially costly and long-duration development projects in jeopardy.

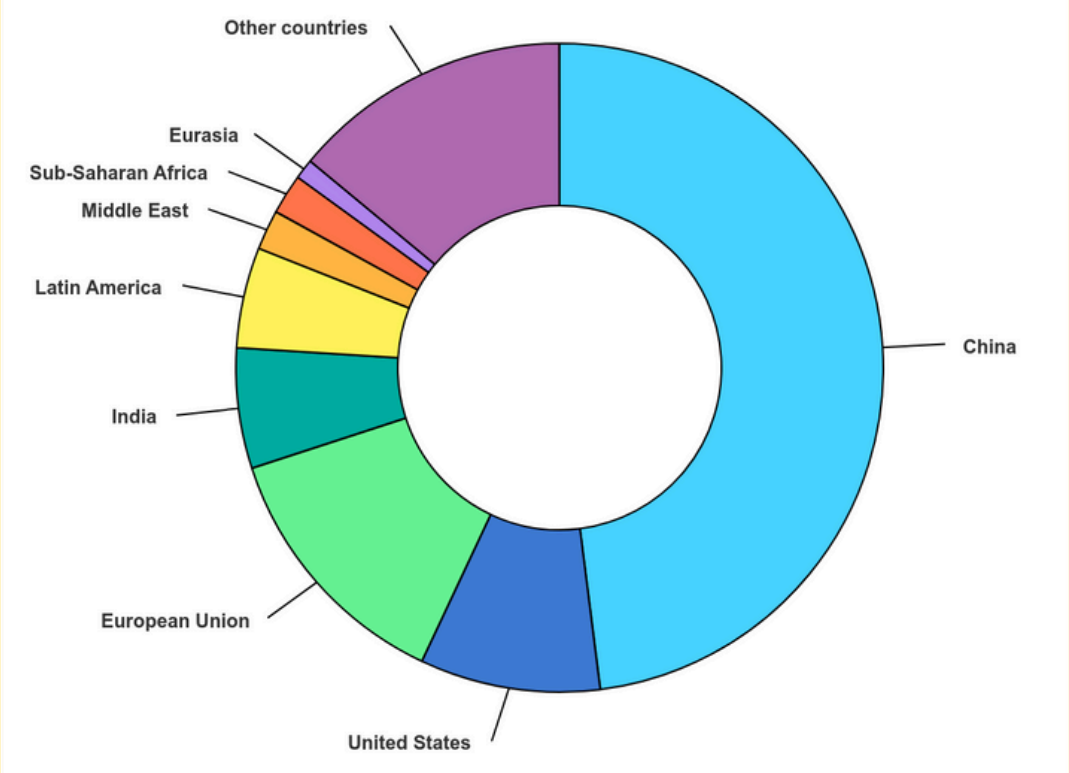
That means regional clean capacity was already greater than regional gas capacity last year, and keeps growing as more solar and wind energy projects come online at a much faster clip than new gas-fired capacity.

SOURCE: REUTERS, SEPTEMBER 25, 2024

PUBLICATIONS

- Guidelines for Installation and Operation of Electric Vehicle Charging Infrastructure-2024, MoP
- Designing an Energy Statistics Roadmap, September 2024, IEA
- Solar PV supply chains: Technical and ESG standards for market integration, September 2024, IRENA
- Scheme Guidelines for implementation of "VGF Scheme for Offshore Wind Energy Projects", MNRE

CUMULATIVE RENEWABLE CAPACITY IN THE ACCELERATED CASE BY COUNTRY OR REGION, 2030



SOURCE:IEA

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