

## EDITORIAL

Dear Reader,  
The term, Gobar Gas, referring to biogas generated from cattle manure (Gobar) is not new in Nepal. Since the first biogas system was installed at St. Xavier's School in Godavari in 1955, biogas has been synonymous to cooking gas in rural part of Nepal. With support of various international donors and the private sectors, Alternative Energy Promotion Center (AEPCC) has been constantly working for the development of biogas sector in Nepal with over 300,000 installations. Although, biogas has found great popularity in rural areas, the urban centers are heavily dependent on Liquid Petroleum Gas (LPG) for cooking, and thus had to endure acute shortage during the economic blockade of India in September

2015. This blockade was an eye-opening moment for Nepalese people on how dependent we are on our southern neighbor for petroleum products to meet our energy demand. While it might not be possible for us to find alternatives of petrol and diesel in near future, Nepal can certainly try to reduce its dependency of LPG cylinders for daily cooking and heating by looking into an alternative fuel. One such potential substitute could be compressed biogas (CBG). The CBG is produced by the compression of biogas after purification and stored in suitable cylinders for distribution. Biogas, produced by decomposition of organic materials in absence of oxygen in a digester, consists of about 55-70% Methane (CH<sub>4</sub>), and remaining 30-



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45% consist of other gases like water vapor, Carbon dioxide (CO<sub>2</sub>), and hydrogen sulfide (H<sub>2</sub>S). Since Methane can be burned to generate energy, the biogas must undergo upgradation and purification to remove the impurities like watervapour, CO<sub>2</sub> and H<sub>2</sub>S and significantly increase the concentration of CH<sub>4</sub>. Owing to the constant advances and improvements in technology, it is now possible to enrich biogas with over 90 percent methane concentration. After purification, the enriched biogas undergoes multiple stages of compression and is stored in suitable cylinders and can be distributed to residential as well as industrial sectors, just like the LPGs. The CBG has energy content of 52.5 MJ/kg (Methane) compared to 49.58MJ/kg (Propane based LPG) can also find its application for electrification with suitable gas generator and also in the transportation sector.

Although the technology associated with the compressed biogas plant is fairly new in Nepal, the biogas plant have been effectively used for waste man-

agement throughout the world. An example of municipal waste management in Nepal can be seen in Kathmandu Metropolitan city, which piloted a waste to energy plant at Teku to produce 14KWs of electricity by processing 3 tonnes of organic solid waste each day. Thus, Nepal could certainly bring the proven technologies for setting up CBG plants through suitable technology providers from neighboring countries. Since the associated costs for developing CBG plants are significantly high, the government of Nepal should incentivize the businesses to install commercial CBG plants for effective waste management, for organic fertilizer production and also promote the use of CBG as substitute of LPG.

With the increasing number of commercial livestock farms to cater the need of meat and dairy products in Nepal, the businesses could look into installation of biogas plant as an effective way to manage their waste, more significantly the excreta of animals. The biogas

plant will not only help in waste management but also open avenues for economic development through the sales of CBG and organic fertilizer. However, since the CBG plants are capital intensive, it might not be economically feasible for small livestock farms to operate their own plants with purification and bottling system. Nevertheless, few farms can form a cluster and operate one CBG plant at a suitable location. Alternatively, the livestock farms can sell their substrate at a minimum cost to other commercial CBG plant operators.

Following the successful implementation of household biogas plants in the rural areas of Nepal, AEPC is now supporting the development of large scale commercial as well as municipal biogas plants. AEPC also provides subsidy to developers and businesses to set up biogas plant for effective management of solid wastes. In spite of the subsidy from AEPC, it is still difficult for the business to create a market for CBG. Even with a 20% reduction in cost of CBG

per kilogram compared to LPG, it could be difficult to penetrate the market due to exorbitant cost of CBG cylinders. An empty CBG cylinder capable of storing equivalent amount of LPG would cost about 10 times the cost of an empty LPG cylinder.

In addition to the effective and efficient solid waste management, the biogas plant produce CBGs and organic fertilizers as valued products and aid to the overall economic development of the nation. The CBGs can not only provide clean energy for cooking and heating in household and industries but also be

used for electrification. Thus, the government should bring in more supportive policies and regulations to promote the development of large scale commercial and municipal biogas plants. The successful implementation of policies like import duty and VAT exemption on imported technology and materials for biogas plant installation would certainly incentivize the developers and builders to construct biogas plants. Other schemes to subsidize CBG cylinders and tax relaxation to business using CBGs would certainly attract hotels, restaurants and industries, etc. to use CBGs

to meet their cooking and heating needs. With supporting policies and public private partnerships to install compressed biogas plants, Nepal could certainly one day be able to effectively manage the organic solid wastes and also reduce its dependency of LPG from neighboring countries to some extent, if not fully.■

## Seminar on Smart Grid Planning and Construction for Developing Countries



**E**nergy Development Council has been invited by the Chinese Embassy to Nepal to attend the Seminar on Smart Grid Planning and Construction to be hosted by Power China Zhongnan Engineering Corporation Limited in Changsha, Hunan Province, China from 23 June to May 12, 2017.

EDC has nominated six participants from its members for the seminar Mr. Mrigendra Bhurtel, Mr. Prabal Bhattarai, Mr. Jiwan Kumar Mallik, Ms. Dipti Rana Shah, Ms. Itnuma Subba. Mr. Sujit Acharya, Chairperson of the Council has led the delegation from Nepal .■

## MEDIA COVERAGE

### Power Generation Mix

The large scale deployment of Solar Photovoltaics is of rising interest both in the national and global context. In 2005, the global installed capacity of Solar PV was 5.1 GW, which increased by approximately 40 times at end of year 2015. Till 2015, the total global capacity of Solar PV was 227 GW out of which 50GW has been added last year only. Out of the total, China alone has approximately 45GW. Out of the total installed PV capacity followed by Germany of approximately 41 GW. This accelerated growth of grid connected solar PV system throughout the world.

In Nepal, there is no official date of the first installation of solar PV, however, it can be noted that Nepal is one of the first organization to install solar PV in the 1970's. After the establishment of Alternative Energy Promotion Center (AEPC) in 1996 with the main objective to promote alternative energy in Nepal, more than 700,000 off-grid solar home systems, approximately 1500 off-grid institutional solar PV systems mainly for schools, hospitals, FM stations et cetera have been installed till date. The initiative of small scale grid connected solar PV was initiated by SUPSI Project in Nepal mainly for research purpose.

The status of grid connection of Solar PV in Nepal Though commercial scale grid connected solar PV system in Nepal has been discussed by energy experts for the last couple of years, result oriented events including talks, seminars and workshops have been started after the government announced that it would build grid connected solar plants with cumulative capacity of 200MW within a year in fiscal year 2015/2016. Immediately after the announcement, Ministry of Energy has formed two committee for the study of Technical Feasibility of grid connected

#### The status of grid connection of Solar PV in Nepal

capacity of PV system which can be connected into Integrated Nepal Power System (INPS) is 15 percent of its total present generation capacity. The second committee has recommended maximum benchmark Power Purchase Agreement (PPA) rate would be NRs. 9.61 which is calculated on the basis of avoided cost. Avoided cost is the cost that the utility would have incurred if it has to be obtained from another source. A study conducted by National Renewable Energy Laboratory (NREL) of USA suggested that in general, maximum solar capacity of 10-15% of total grid capacity

wind/solar system and PPA rate for grid connected wind/solar system.

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DEPLOYMENT OF  
GRID-CONNECTED  
SOLAR  
PHOTOVOLTAICS

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ty can be connected to the grid. This study has been carried out by analyzing various technical matters.

Several studies have different recommendations about percentage of total generation capacity which would be technically feasible to connect to the grid. This causes a dilemma for policy makers, investors, market seekers and others associated stakeholders. Thus, it's high time for Nepal to initiate few MW scale grid connected solar projects rather than the authorities prolonging the argument about the percentage of solar capacity that can be connected to the grid. Considering the conclusions from the stud-

ies conducted in Nepal and other countries, it is believed that 10 per cent of present total connected capacity of INPS would be a good choice.

## Grid Connection Solar Power Is Good For Nepal

In many of the events, the prominent hydro developers have been anticipating that load shedding in Nepal will be eliminated in the next years. It is important to understand that most of the hydropower plants in Nepal are run-of-river hydroelectric Plants (HEP). These plants can only deliver about 40-50 per cent of their installed capacities during dry season (November to April). Thus, Ne-

pali's are forced to import large capacity of electricity from India during that time. Thus, even though there will be surplus generation in the wet season, there will be deficit in the dry season due to seasonal variation of water flow in river. In this context, the power generation mix from sources like Solar and Windplants can be alternative to the electricity import. If the added solar sources in the system lead to surplus during wet season, it can be exported or used in the other alternative purposes.■



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Source: <http://edcnepal.org/power-generation-mix/>

## NEPAL'S SCENARIO

### Transmission lines span a total of 3,205 km

The length of electricity transmission lines in the country has reached 3,205 circuit kilometres as of the first eight months of the fiscal year, the Economy Survey says.

There were 2,849 circuit kilometres of power lines till mid-March 2016, and another 355 circuit kilometres were added in the following year, according to the report presented to Parliament on Thursday.

The massive expansion of transmission lines was made possible due to the completion of the 35-km double circuit Damak-Godak and 75-km single circuit Khimti-Dhalkebar transmission lines besides the upgradation of the 208-km Butwal-Kohalpur transmission line from single circuit to double circuit.

Although the expansion of power lines by 355 km in one year looks impressive, the addition of 208 km was a result of upgradation.

“As most of the expansion is due to upgradation, it is not a

satisfactory result,” said Rajeev Sharma, head of the Transmission Line Department at the Nepal Electricity Authority (NEA).

“When upgrading from single circuit to double circuit, we don’t have to construct new towers or secure easement rights from private landowners. We only have to string electric cables on the existing towers.” Difficulties in securing easement rights have been one of the major hindrances to the development of transmission lines, according to Sharma.

An easement allows electricity companies to erect and maintain transmission lines on land belonging to property owners who still own it.

Currently, the construction of transmission lines like the 132 kV Thankot-Chapagaun, 220 kV Bharatpur-Bardaghat, 132 kV Kabeli Corridor, 132 kV second circuit of Middle and Lower Marshyangdi and 400 kV Tamakoshi-Kathmandu has stalled as the NEA has not been able to obtain utility easements to erect

towers and install power cables. Project developers generally pay 10 percent of the land’s value to owners for the right to run transmission lines through a portion of their property.

A majority of landowners hosting power lines have demanded that the compensation amount be raised to 50-90 percent of the land value. Some have even demanded complete transfer of land ownership and compensation amounting to 100 percent of the land value.

Although Nepal is on track to achieving energy sufficiency with the total installed capacity of its hydropower projects expected to exceed 2,000 MW in the next three years, lack of adequate transmission lines is likely to hinder evacuation and distribution of the generated electricity.

Despite unsatisfactory performance on the transmission line front, the installed capacity has increased, and 105.3 MW of electricity has been added to

the national grid as of the first eight months of the fiscal year. During the same period last year, hydropower projects with a total installed capacity of 18.5 MW were completed and connected to the national grid. ■

Source: <http://kathmandupost.ekantipur.com/news/2017-05-29/transmission-lines-span-a-total-of-3205-km.html>

## Nepal looking to launch grid-connection program for 25MW of solar



**T**he Nepal Electricity Authority is on the search for consulting services in preparation of the launch of the energy authority's Nepal Grid Solar and Energy Efficiency Project.

The project holds two goals — developing and installing 25MW of PV projects within Nepal in order to feed power directly to the NEA, as well as the develop-

ment of a Distribution Loss Reduction Master Plan that will look to improve upon the power losses within the grid.

The NEA announced the request for proposals in regards to consulting services in early May, with all proposals expected to be submitted no later than 5 June 2017. A pre-proposal conference is expected to be held on 22 May

2017 in Kathmandu.

The Grid Solar and Energy Efficiency Project is expected to help develop a framework grid designed to properly utilise the 25MW of initial solar generation capacity.

Back in December 2016, Nepal received a US\$20 million grant financed by the Scaling Up Renewable Energy in Low Income Countries Program (SREP) of the Climate Investment Funds (CIF) — which is administered by the Asian Development Bank (ADB).

The grant will feature “viability gap” funding that will finance the difference between the private-sector cost of producing utility-scale solar power and the minimum price that the NEA is willing to pay for the energy.



Aiming Zhou, senior energy specialist at ADB's South Asia regional department, said: "Providing some financial security to the private sector should draw more private investment into this critical sector in Nepal and, in doing so, reduce pressure on government finances. And once the private sector bet-

ter understands the Nepal solar 2022. Bidding for the projects was slated to begin in the first quarter of 2017 and is expected to last six to 12 months.■

The ADB noted that the funding under the grant will be payable on the first day of operation of a PV project up to the end June

Source: <http://www.nepalenergyforum.com/nepal-looking-to-launch-grid-connection-program-for-25mw-of-solar/>

## New guidelines on forest land clearance issued

**T**he government has issued new guidelines on forest land clearance making it easier for developers of large infrastructure projects to acquire wooded areas at their proposed construction sites.

The Cabinet's social committee on Wednesday approved the Forest Clearance Guidelines presented by the Forest Ministry which offers two options to acquire forest land for development projects.

A developer can acquire forest land by buying an equivalent area of forest land in a similar ecosystem elsewhere and creating a similar forest on it and

handing it over to the government.

Alternately, a developer can acquire wooded areas by paying a fee determined by the Forest Ministry. The payment made by the developer will be used to create a similar forest.

The new guidelines on forest clearance, according to the Prime Minister's Office (PMO), will go into effect after the Forest Ministry fixes the rates for different ecosystems.

"Once the ministry prepares an action plan and determines the rates for different types of land, the project developer can acquire forest land under the new

guidelines," said Kedar Bahadur Adhikari, secretary at the PMO.

The rule will make life easier for infrastructure project developers including the developers of the 900 MW Upper Karnali and 900 MW Arun-3 hydropower projects who have been hamstrung by forest land clearance hassles.

Earlier, the ministry had asked the developers to buy an equivalent area of forest land in a similar ecosystem, create a similar forest and hand it over to the government to acquire the forest land needed for their projects.

The two Indian developers complained that there was no such provision in the project development agreement (PDA) they signed with Investment Board Nepal (IBN).

Both developers have to complete financial closure of their projects by September 2017, and without getting forest clearance, probable lenders will not agree to finance their schemes.

The developer of the Arun-3 Hydropower Project has even

claimed compensation from the government under the 'change in law' provision in the PDA for its failure to provide the forest land required to develop the scheme.

The project needs to lease 125 hectares of forest land to build an access road and implement the civil works of the hydropower project. As per the laws prevailing at the time the PDA was signed, the project developer has to pay lease fees to the government and plant double the number of trees that

are cut down on the leased land.

After the Forest Ministry asked the developer to buy an equivalent amount of land and create a forest on it, the developer refused to do so. Instead of complying with the ministry's demand, the Indian developer dispatched a letter to IBN seeking compensation by invoking the 'change in law' clause in the PDA. ■

Source: <http://kathmandupost.ekantipur.com/news/2017-05-18/new-guidelines-on-forest-land-clearance-issued.html>

## Solar energy empowers villagers and saves wildlife in Nepal

This fall, rangers protecting rhinos, tigers and other endangered wildlife in Nepal's famous Chitwan National Park will get a solar energy system that will light and power an isolated ranger outpost deep in the jungle. At the same time, local women will get the training and tools they need to sell low-cost clean energy technologies to people living in the buffer zone that surrounds the park. This is all part



of continued collaboration in Nepal by Empowered by Light, which helps remote communities throughout the world develop renewable energy pro-

jects, and Empower Generation, which empowers women to become clean-energy entrepreneurs.

This project will continue the

This project will continue the organizations' efforts in Nepal, which are detailed in a fascinating 20-minute video, *Bufferzone*, that explores the unique challenges of living in a place where the wild animals that make the region unique—from tigers to sloth bears to elephants—can attract tourists, and can also attack villages and people. For a preview, see below.

"Remote communities around the world are embracing renewable energy because the benefits are real, immediate and life-changing," said Moira Hanes, Empowered by Light's co-founder and board chair. "In Nepal, renewable energy is providing these communities with steady, reliable access to electricity, in many cases for the first time, all while helping to support their critical efforts to protect endangered wildlife and create economic and job opportunities that

weren't there before."

To help rural communities thrive without draining the park's natural resources, this fall's effort will train 10 local women, whose economic opportunities have traditionally been limited, to sell a range of clean energy technologies such as solar home systems and improved cookstoves.

Inside the park, rangers working to prevent poaching rely on solar power to stay in touch with park authorities and power spotlights that help protect them at night. On a previous visit, Empowered by Light also helped install solar power at tourist towers that allow visitors to stay in the park overnight, generating income for conservation projects and for people-protection efforts designed to minimize conflicts between villagers and wildlife. Empowered by Light and Empower Generation are seeking to raise \$50,000 to help sup-

port the new project, which will assist hard-working people in Nepal in their efforts to:

Protect Chitwan National Park, an UNESCO World Heritage Site

Protect single-horned Asiatic rhinos and Bengal tigers from poachers

Train Nepali women, who have a particularly difficult time securing formal employment, to sell clean energy and start their own businesses

Reduce dependence on dirty and dangerous sources of energy, including diesel generators and kerosene burners that put the community's health and safety at risk

Kick-start eco-tourism in a place where economic development options are limited

To learn more, donate to the next project in Nepal and to see the *Bufferzone* trailer, please visit [Empowered by Light](#).■

Source: <http://www.pennenergy.com/articles/pennenergy/2017/06/solar-energy-empowers-villagers-and-saves-wildlife-in-nepal.html>

## GLOBAL PERSPECTIVE

## Dutch open 'world's largest offshore' wind farm



**D**utch officials on Monday opened what is being billed as one of the world's largest offshore wind farms, with 150 turbines spinning in action far out in the North Sea.

Over the next 15 years, the Gemini windpark, which lies some 85 kilometres (53 miles) off the northern coast of The

Netherlands, will meet the energy needs of about 1.5 million people.

At full winds the windpark has a generating capacity of some 600 megawatts, and will help supply some 785,000 Dutch households with renewable energy, the company said.

"We are now officially in the operational stage," the company's managing director Matthias

Haag told AFP, celebrating the completion of a project first conceived in 2010.

The 2.8-billion-euro (\$3 billion) project is a collaboration between the Canadian independent renewable energy company Northland Power, wind turbine manufacturer Siemens Wind Power, Dutch maritime contractor Van Oord and waste processing company HVC.

It has been "quite a complex" undertaking, Haag said, company says. The aim of being a carbon neutral by 2050.

"particularly as this windpark lies The Netherlands remains dependent on fossil fuels which still Gemini "is seen as a stepping relatively far offshore... so it took pendant on fossil fuels which still stone" in The Netherlands, and quite a lot of logistics". make up about 95 percent of its has "shown that a very large project can be built on time, and in Gemini will contribute about 13 energy supply, according to a 2016 report from the ministry of a very safe environment," Haag percent of the country's total renewable energy supply, and economics affairs. added.■

about 25 percent of its wind But the Dutch government has power, he added. committed to ensuring that some It will also help reduce emissions 14 percent of its energy comes of carbon-dioxide emissions, from renewable sources such as among the so-called greenhouse wind and solar power by 2020, gases blamed for global warming and 16 percent by 2023, with

Source: [http://www.winddaily.com/reports/Dutch\\_open\\_worlds\\_largest\\_offshore\\_wind\\_farm\\_999.html](http://www.winddaily.com/reports/Dutch_open_worlds_largest_offshore_wind_farm_999.html)

## The Age of Electric Aviation Is Just 30 Years Away

Every vision of the future of flight involves electric aircraft—air taxis hopping from one skyscraper to the next as airliners cruise silently over oceans. After all, what kind of future traveler would rely upon fossil fuels?

One who wants to go anywhere.

For all the hype electric aviation gets, the concepts put forth by aerospace companies and startups are just this side of impossible. Flying requires extraordinary amounts of energy, and doing so under electric

power requires at least one massive leap forward in battery tech. Or, as aviation expert Richard Aboulafia puts it when reviewing yet another flying car idea: "Insert miracle."

The problem is, batteries simply do not offer the power-to-weight ratio or cost needed to be feasible, and will not for some time. The technological advancements that allowed Tesla to squeeze 335 miles from the Model S and Chevrolet to get 200 out of the Bolt are not enough to power anything more than the smallest aircraft for the shortest dis-

tance.

The question, then: Just how big a miracle does this flying future need, and how likely is it to get it?

A terrestrial survey offers reason for optimism. Tesla's most robust Model S sedan will go 335 miles on a charge, though it'll cost you six figures. Chevrolet is now selling the Bolt EV, a \$30,000 compact car with 238 miles of range. This summer, Tesla should fire back with the Model 3, further solidifying the battery electric vehicle's status. Meanwhile, the gas-free aircraft closest to



takeoff are one- and two-seaters best used for training, so they don't even have to venture from one airport to another.

"I think everyone looked at electric cars and thought it would play out the same with electric airplanes," says Richard Pat Anderson, who runs the Flight Research Center at Embry-Riddle Aeronautical University. "But they have different requirements. Cars need batteries to be affordable and

compact, but with airplanes we don't care about cost as much, or even volume. It's weight that's critical."

#### Critical Density

The need to keep weight down without sacrificing range or power makes energy density the all-important figure. Right now, the specific energy of batteries is roughly 2 percent that of liquid fuel. Factor in the efficiency of electric powertrains compared to internal combustion engines, and yet get closer

to 7 percent—so 1,000 pounds of jet fuel yields about 14 times more energy than a 1,000-pound battery.

"There's already been a lot of progress," says Venkat Srinivasan, a battery scientist at Argonne National Lab in Chicago. Battery energy density is rising by a non-negligible 2 to 3 percent per year. Tesla's cars go farther with each iteration. "It's not the same ballpark as Moore's Law progress because it's chemistry, not electronics,

it's chemistry, not electronics, but it's still very good." Besides, batteries don't need to match liquid fuel pound for pound to catch on. If it can get to five times its current density—that would be 1,000 watt-hours per kilogram—it would work for small-scale commercial aviation, says Don Hillebrand, director of the Argonne's Center for Transportation Research. Estimated time of arrival: 2045.

"That 1000 watt-hours/kg number reflects the approximate equivalent of one third the energy density of gasoline,

but that's enough," Hillebrand says. "At our current pace of innovation, and factoring the relative differences in efficiency of the powertrains, that's when we can expect batteries to be good enough to power small aircraft for practical uses."

Others suggest a shortcut of sorts. "Electric propulsion permits new design architectures," says Venkat Viswanathan, a battery scientist at Carnegie Mellon University. "Future electric aircraft will look nothing like the aircraft of today, and they will be able to

fly with much less energy—as little as 400 watt-hours/kg—thanks to distributed motors and reduced drag. We'll redesign aircraft around electric motors." Faster said than done. Because aircraft development times are measured in decades, it's unlikely the planes Viswanathan imagines will arrive before those 1,000 watt-hours/kg batteries. ■

**To view the full article click the link below the article:**

Source: <https://www.wired.com/2017/05/electric-airplanes-2/>

## Tata Power Solar revenue more than doubles in 2 years

*Tata Power Solar, in its effort to encourage domestic manufacturing, made significant expansion and modernisation of its cell and module facility in Bengaluru, it said.*



**N**EW DELHI: Tata Power Solar today said its revenue has increased by more than 2.5 times in just two years to reach Rs 2,262 crore.

The company said it has ramped up the scale of business substantially by focusing on building state of art technology, engineering and strengthening on customer & employee satisfaction.

In a statement, it said the focus on efficiency and quality coupled with leveraging technology and innovation has helped the company implement several

challenging projects.

The company, with a view of long-term objective, has significantly increased focus on EPC, where it had built strong competencies.

Tata Power Solar has also been the biggest rooftop player for 3 years in a row, the statement said.

Tata Power Solar, in its effort to encourage domestic manufacturing, made significant expansion and modernization of its cell and module facility in Bengaluru, it said.

The second expansion within 2 years doubled the company's

module capacity to 400MW, and increased its cell manufacturing capacity by 65 per cent to 300MW, it added. Tata Power CEO & MD Anil Sardana said: "Considering the fact that solar EPC is extremely low margin and the pressures faced by the domestic manufacturing sector, the company has turned profitable within a short span, which is a remarkable achievement."

Tata Power Solar ED & CEO Ashish Khanna said that While there are some bottlenecks like decreasing unit cost driven by reverse bidding and influx of cheap and subsidized imported panels, solar sector continues to be a key sunrise sector.■



# EDC MEMBERS



# PARTNERSHIP



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Energy Development Council (EDC) is a non-profit umbrella organisation of the entire energy sector of Nepal established to ensure every Nepali has access to energy and energy security by promoting favourable policies and investments. EDC consists of Energy Developers, Energy Associations, Energy Consumers, Energy Financiers and other funds, Consumer Institutions, Energy Contractors from both private and government sectors involved in hydropower, solar, wind and other renewables, generating more than 80 per cent of the nation's total electricity.



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