ENERGY DEVELOPMENT COUNCIL

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Editorial

Dear readers,

Mr. Bishal Thapa
Vice Chairperson, EDC

These days I can't go out without everyone feeling sorry for me. You see, I work in the solar business and life has not been good ever since Kulman Ghising (Managing Director, Nepal Electricity Authority) ended load shedding (forced blackouts).

Over the last few years, sales of 'solar package,' the typical combination solar panels, inverter and batteries, dominated the market. Alternative Energy Promotion Centre (AEPC) actively promoted such sales, offering subsidies and grants. Many solar companies, thus, reoriented from rural (which were about energy access) to urban (which were about electric reliability) markets. New large firms joined, emerging as stockists, wholesalers and retailers.

There was little innovation in product design or deployment models.

But business was good. In Kathmandu alone, approximately 100,000 households have installed such system, totaling an estimated 20 MW. The market potential was easily in the hundreds of MWs. It was said that when mothers looked for husbands for their daughters, they wanted doctors, engineers or guys in the solar business.

Then Ghising arrived and ended load shedding. And all hell broke loose.

An estimated NPR 150 crores of solar equipments currently lying idle in warehouses across Nepal. Companies are struggling to avoid bankruptcies. In these hard times for the solar business, I'm just glad that I am already married because I probably would not be able to find a bride now.

The sudden challenge to the solar business (or for that matter, distributed renewable energy) isn't because Ghising ended load shedding. Instead, it represents a colossal failure of Nepal's distributed renewable energy policy.

A correction first: it is wrong to say "a colossal failure of Nepal's distributed renewable energy policy." Nepal has never had a distributed renewable energy policy – it has only had a subsidy distribution policy.
Nepal's entire approach to renewable energy is around subsidy distribution. The subsidy distribution processes have created an eco-system that has favored retail and trading, killing innovation in technology adoption, deployment, financing and business models. The most worrisome part is that the distributed renewable energy sector in Nepal has degenerated into a complex web of political interference, patronage, corruption, deceit and conspiracy.

The tragedy in all this is that Nepali's have been robbed of two decades of the most promising innovations in distributed renewable energy technologies from around the world. We have a lot to catch up on.
The end of load shedding offers Nepal a second chance. We shouldn't squander this new chance like we did the last one.

With the end of load shedding and more reliable electricity supply, the best time for solar is finally here. No country has been able to rapidly grow its solar (or distributed renewable energy) portfolio without reliable electricity on the grid. Nepal will be no exception.

Thus far, we have been solving the grid supply problem. We haven't really had a distributed renewable energy expansion strategy. Now, with reliable grid electricity we finally have the environment for rapid expansion of distributed renewable energy.

We should use this opportunity to explore grid connected distributed renewable energy, particularly roof-top solar. We can't just fixate on net metering – we also need to explore other innovative methods for integrating distributed renewable energy sources within the energy mix.

We should use this opportunity to explore distributed micro-grid systems that not only offer local supply but also supplement and make the grid more robust.

We should shift our focus from piloting technology to piloting implementation approaches, particularly around financing and business models.

We should require AEPC to change from being a Santa Claus that happily hands out subsidies to being an enabler and manager of a truly distributed renewable energy market.

Ghising may have announced that he ended load shedding in some places. But with distributed renewable energy, he could really end load shedding all over Nepal.

For that, Nepal's distributed renewable energy sector needs to step up and lead the way.

In this Issue

EDC Activities

Ambassador of Bangladesh visits EDC

Ambassador of Bangladesh Mrs. Mashfee Binte Shams visited EDC office on January 9, 2017. EDC Chairperson alongside side EDC members attended the meeting to discuss the possiblity of power trade between Nepal and Bangladesh.

Addressing interaction program at Energy Development Council (EDC) Ambassador of Bangladesh said that the growth rate of Bangladesh is 7.1% and is a power hungry country and the current installed capacity is 15000 MW but still is not enough.

The chairperson of EDC, Sujit Acharya welcomed the interest of Bangladesh in energy sector of Nepal and expressed that the Council will put its effort in bridging the gaps among the concerned authorities.

Increased Usage of Petroleum Products dangerous to Nepal's National Security and cause of Public Health Emergency

Interview of Mr. Sujit Acharya, Chairperson of EDC and Honorable Minister of Environment Mr. Jay Dev Joshi

The full interview is available at the link: ***https://www.youtube.com/watch?v=Yfe-4s4DTpo&t=497s***

Brainstorming Program on challenges for developing renewable energy projects

EDC conducted a brainstorming program at EDC office on 17th February, 2017. The meeting discussed about various challenges to develop renewable energy mini-grids using ESCO models, developing renewable energy on-grid projects, as the energy crises alleviation 10 year plans recommend to have at leat 10% solar and wind in the grid and various challenges faced by investor to make investment on the sector.

The outcome of the program were as follows:

1. There need to be change in attitude among policy makers to think of renewable energy as off-grid power only. We need to run campaigns to make it as an on-grid solution too.
2. Current benchmark rate of Rs 9.61/unit for wind and solar might not be feasible for NEA, and hence there need to be a provision for reverse auctioning to make it more competitive.
3. NEA needs to start some pilot projects to test and demonstrate renewable energy system into the grid
4. There need to be one-door-policy for power projects
5. We need to redefine the definition of "Renewable Energy" in Nepal. Such as, all hydro projects less 10MW in size need to be considered as renewable energy.
6. Govt should implement net metering and FiT at least in the cities
7. Introducing net metering and FiT would be the best policy change that could mainstream renewable energy from off-grid to on-grid.

Media Coverage

Bangladesh mulling importing electricity from Nepal

KATHMANDU: A meeting organised by the Energy Development Council (EDC) with the Ambassador of Bangladesh Mashfee Binte Shams, was held on January 9, to discuss the possibility of power trade between Nepal and Bangladesh. Along with the Ambassador, members of EDC were in attendance. Sujit Acharya, Chairperson of EDC said, "We wanted to discuss the possibilities of energy cooperation between Nepal and Bangladesh. We hear that Bangladesh is trying to secure the right of way from India to import electricity from Nepal. If that is true then it is going to be a big milestone for the two countries." Shams informed that Bangladesh is one of the fastest growing economies in South Asia. She said, "Last year our growth was 7.11 per cent. This growing economy needs a lot of power and right now our installed capacity is more than 15,000 MW, but it is still not enough. By 2021 our demand for power is projected to be 20,000 MW and by 2030 it's expected to grow up to 34,000 MW." She further said, "We are already purchasing 500 MW from India and we are also talking to Bhutan about the possibility of purchasing power from Bhutanese power projects.

The government of Bangladesh is looking into investing $1 billion in Nepal to purchase power. Apart from that there are various private sector players who are interested to invest in Nepal." She stressed that any power trade agreement drawn between the two countries must be mutually beneficial and on a benefit sharing basis. "We are studying the probability to import power from Nepal. During the summer season in Bangladesh, which is monsoons for Nepal, we have a huge demand for electricity, whereas Nepal often can produce surplus during that season." She said, "In 2009, Bangladesh suffered from major power crisis. Now with our economy growing at a fast pace, the demand for power will only increase."

Acharya said, "Nepal has more than 11,640 rivers and Nepal has only 0.45 per cent of landmass. And we haven't even been able to get to about 700 MW of hydro power. Nepal is the second earliest country in Asia to generate electricity and it's been about 103 years since our first power plant was built. We could use our resources and our expertise to produce more power in the future." Acharya informed about the Second Power Investment Summit to be held in September 2017. He said, "There's going to be about 100 PPA ready power projects that will be showcased.

At this Summit, investors can talk with developers and make deals then and there. We'd like to see if there can be some collaboration from various actors in Bangladesh to come and be a part of this Summit." This Summit, according to Acharya, would play a vital role in introducing the current status of power and boost the trade process between Nepal and Bangladesh. Collaboration with Bangladesh is a key omponent to ensure a diversified portfolio for Nepal of energy mix and energy trade, Acharya believes, he said, "To have a strategic tie with Bangladesh strengthens our national sovereignty.

(The full article is available at the link: ***http://edcnepal.org/wp-content/uploads/2017/02/page-5-feb-12.pdf*** published February 12, 2017.)

Bangladesh willing to invest $1 billion in Nepal's power sector

Bangladesh has shown a keen interest to invest in Nepal's hydropower sector.

According to Mashfee Binte Shams, the ambassador of Bangladesh to Nepal, Bangladesh is ready to invest US$ 1 billion in Nepal. "Bangladesh is open to pursue every possible collaboration in the power sector, be it investment or power trade between the two countries," she said at an interaction organized by Energy Development Council (EDC), in Kathmandu, on Friday.

As the economy of Bangladesh is growing at the rate of over 7 percent, it is a power hungry country, the ambassador said, adding that the current installed capacity of Bangladesh is 15,000 MW but 'still it is not enough'.

Bangladesh has projected its electricity demand to reach 20,000 MW in 2021 and 34,000 MW in 2030, according to the envoy. The Bangladesh government has already proposed to sign an umbrella Memorandum of Understanding (MoU) with Nepal. "Bangladesh is waiting for the positive response from the Nepal government," she added.

Shams also informed that private companies of Bangladesh are also interested in investing in Nepal's hydropower sector. "Bangladesh, with its huge electricity deficit, is actively exploring to generate electricity from wind, solar and other renewable sources," she said, adding that Bangladesh has been importing electricity from India as it has friendly relationship with New Delhi.

If Nepal has to export electricity to Bangladesh, the transmission line has to go through India, as a small section of India lies in between Nepal and Bangladesh. "India will have no problem, if Bangladesh imports electricity from Nepal," she added.

Recently, India has also said that it will have no problem, if Bangladesh imports electricity through its territory. Though, there has been cross border electricity trade -- between Nepal-India, Bhutan-India and India-Bangladesh -- the beginning of power trade with Bangladesh will materialize power trade in the South Asia region as a whole as the regional forum has been continuously discussing on regional power trade.

Despite relatively large energy resource endowed, comprising of hydropower potential of 294,330 MW; coal reserves of 108,961 million tons and 95 Trillion Cubic Feet of natural gas and a large renewable energy resource base; South Asian Association for Regional Cooperation (SAARC) region is facing acute power shortages, leading to frequent and long power outages.

The spread of these resources as well as the demand pattern are highly skewed across the region, according to a study of the Japan-ADB and SAARC. "While the resource base in some countries far exceeds their projected demand, other countries do not enjoy this luxury," it reads, adding that this scenario provides a perfect environment for the development of these resources to meet the in-country demand as well as for cross border electricity trade within and with neighboring regions.

Many hydropower projects, including mega projects like Upper Karnali, Arun III and West Seti, are being developed by India and China. If things go as planned, Bangladesh will be the second South Asian country to invest in Nepal's hydropower sector.

Speaking on the occasion, Sujit Acharya, the chairperson of EDC, welcomed the interest of Bangladesh in Nepal's energy sector. He said that the council will put its effort in bridging the gaps among the authorities concerned.

Power investment summit in September

Chairperson of Energy Development Council (EDC) Sujit Acharya also announced that EDC was organizing Power Investment Summit in September.

Around 100 investment-ready projects will be showcased in the summit, Acharya said, adding that deals will be made on the sport as the summit will see high-level delegates' participation.

On the occasion, Ambassador Shams said that Bangladesh was willing to participate in the Summit. "Our Energy Minister would be delighted to come for the summit," she added.

(The article is available at the link: ***http://www.myrepublica.com/news/14791*** published on February 13, 2017.)

Encourage Distributed Power Generation

-By Zubin Shrestha

As we tread toward the driest months, many of us must be crossing fingers hoping that there will be no loadshedding as have been promised by our NEA MD and the Energy Minister. And as of now it looks like loadshedding is becoming a history soon! And perhaps this might means that it is time for NEA to focus on improving distribution system and more importantly implementing Feed-in-Tariff system to encourage distributed power generation to further strengthen the power supply source.

Many countries have implemented Feed-in Tariffs (FiTs) into their energy development plans, which are policy instruments designed to promote rapid deployment of renewable energy (RE) technologies by rewarding energy providers. Though these tariffs are not anything new or cutting-edge, they have proven to accelerate investment in RE technologies through the offering of long-term contracts to RE producers.

FiTs are applicable for a range of beneficiaries including households, enterprises, landlords, farmers, and even organizations such as hospitals, shopping malls and schools. Eligible energy providers are rewarded through payment of a cost-based price for any electricity they supply into the main grid using renewable technologies. The main purpose of the tariffs is to offer compensation to RE producers, providing price certainty and financial assistance for their RE investments. FiTs offer the energy producers guaranteed grid access, long-term contract security, and cost-based purchase prices. Implementation of these tariffs is very financially beneficial with energy producers being paid for all the energy produced including the amount that is used by themselves, bonus payments for exported electricity fed into the grid, and a significant reduction on conventional electricity bills.

FiTs provide investors with a reasonable return on their renewable energy financings with policies been sanctioned in over 50 countries around the world, including Germany, India, Australia, China, Iran, Kenya, Thailand, and the United Kingdom.
Germany was the first country to introduce FiTs for RE electricity generation to encourage the utilization of novel energy technologies such as wind power, solar photovoltaics, biomass, and geothermal power.

For FiTs to be implemented in Nepal, the government must explore an alternative funding mechanism to meet the additional costs of generation

The motivation behind this decision was to meet the country's aim of having 40-45% of the electricity consumption provided from renewable sources by 2025 and 55-60% by 2035, whilst encouraging the development of RE technologies securing the nation's energy supply. Purchase prices of electricity are based on generation costs specific to varying RE technologies and their size capacities. The rates are also designed in a structure to decline annually based on expected cost reductions, which is known as 'tariff degression'.

In Germany, long-term contracts are tendered to all RE producers in an unbiased manner, and effectively run RE generation projects generate an acceptable rate of return in between 5-10%. This has resulted in the rapid advancements in RE technology and their deployment throughout the nation.

Likewise, our neighbour India too has decided to implement a methodical system of FiTs into its renewable energy market. In 2009, India's Central Electricity Regulatory Commission (CERC) announced new regulations initiating a FiT system for renewable energy including wind and solar energy technologies. Currently, CERC denotes the tariffs before tax varying the tariffs based on renewable resource intensity, i.e. low power yield sites get higher tariff. The current Indian program includes all renewables and the tariffs are based on cost of energy generation plus profit (19% Return on Equity). The contract terms for solar PV generation and hydropower (<3MW) are 25 years and 35 years respectively, with the tariff for wind power generation based on resource intensity as mentioned. The FiTs offered set to cover a number of fixed-cost components such as return on equity, depreciation, interest on loan capital, and any operation and maintenance expenses.

In countries where electricity generation from RE technologies is much more expensive than conventional methods, distribution companies are permitted to pass on additional costs to the consumers. In Nepal's case, this is a major obstacle as affordability of consumers may restrict the transfer and payment of these costs. From observing the implementation and operation of policy mechanism in various countries around the world, FiTs can be a means for Nepal to promote an interconnection of renewables to the grid.

In order to determine and regulate the tariffs in a systematic and efficient manner, it will be necessary for energy producers to have priority access to the grid. Private producers will be able to establish their energy investments to sell unused capacities to Nepal Electricity Authority (NEA), thus expanding use of renewable technologies around the country. However, for small energy generation projects, with current tariff NEA are offering, grid connection is not seen as a feasible proposal. For FiTs to be implemented in Nepal, the government must explore an alternative funding mechanism to meet the additional costs of generation as it would not be moral to burden the utility or increase consumer electricity bills to make up for the additional costs. A possible option to reduce the cost of generation could be the provision of subsidies on the grid interconnection equipment costs which are relatively expensive and primarily imported. With support from the government and FiTs in place, grid connected distribution will be possible, which in turn will reduce presently experienced line losses, as the electricity will be generated locally without having to be supplied over long distances from a centralized system.

The author is Renewable Energy Officer of Wind Power Nepal, an EDC member organisation

(The article is available at the link: ***http://edcnepal.org/wp-content/uploads/2017/02/page-6-feb-12.pdf*** published on February 12, 2017.)

Nepal's Scenario Page

'We shall phase out LPG'

Energy Minister Mr Janardan Sharma restates the same thing EDC has been talking about replacing the LPG gas with electric cooking induction stoves. This along with the domestically assembled electric vehicles and microgrids can easily replace the petroleum products which is the largest import in Nepal. Hence, making our country economically independent and vastly reducing our trade deficit. And thus, ultimately investing the national budget in the one and only crucial developmental sector i.e. energy.

The opinion of Minister Sharma is published in Annapurna Post. The English version is translated by EDC which is summarised in the paragraph below:

Kathmandu: Energy Minister Mr Janardan Sharma has recently announced the phasing out of Liquid Petroleum Gas (LPG) and formulation of a governmental policy that prioritises domestic energy to meet demands within the next two years.

Minister Sharma outlined working to replace LPG with electricity within the next two yearson 'National Energy Crises and Development Decade 2072 and Jantako Pani Janta ko Lagani', an interaction programhosted by Water Resources & Energy Journalists Society Nepal (WAREJ)in the capital on Wednesday.

Currently, Nepal imports 65.0 billionNPR (608 million USD) worth of LPG annually. Dr. Amrit Man Nakarmi, Professor at the Institute of Engineering, Tribhuvan University ascertained that in order for electricity to displace LPG, Nepal needs to add around 600 MW to the national grid. Even though Minister Sharma did not elaborate further on the plan to replace LPG with electricity, he mentioned that the government has been working fully on the project to add not 10,000 MW but 20,000 MW to the national grid. Minister Sharma stated that he expressed prioritising meeting Nepal's energy needs during his meeting with the President of Asian Infrastructure Investment Bank (AIIB) Mr Jin Liqun in the Ministry on Wednesday. Expressing interest on Nepal's various projects, Mr. Jun Liqun stated that after meeting one's energy needs, Nepal could sell any surplus electricity to neighbouring countries such as India, China and Bangladesh.

Minister Sharma stated that the government has moved forward 'Nepal ko Pani, Janata ko Lagani' with a vision of entitling Hydropower shares to each Nepali household and has collected more than seven billion NPR in investment commitment to the same. Construction of East-West 765 kV Transmission Line,River basin-based different high voltage transmission lines and substations have been boosted by the ministry, stated Minister Sharma. 'There is no need to that the generated electricity would be lost, as 10,000 MW electricity would be readily consumed.'

'We have been working fully on replacing cooking gas with electricity within the next two years." – Energy Minister Janardan Sharma

Mr Dinesh Kumar Ghimire, Joint Secretary of the Energy Ministry stated that the success in reducing load-shedding can be credited to the collaboration of all the concerned stakeholders in the energy sector. He further stated that the ministry looks forward to deploy a 37-point program to implement the Energy Crisis plan put forward by the government last year.

Joint Secretary of the Ministry Mr Chiranjibi Chataut, who presented the plan and project declared by the ministry, announced its gradual implementation. On the topic of its implementation in the coming days, he mentioned the task force assembled for its implementation, the report that has been prepared and the discourse relating to its progress.

Managing Director of Nepal Electricity Authority (NEA) Mr Kul Man Ghising reiterated on the success of ending load-shedding in the capital and all the other major cities of Nepal and stated prioritising curbing energy leakage on the coming days. He stated that NEA in the past six months has averted the loss of 250 million NPR (2.34 million USD) worth of electricity by curbing energy leakage. He further stated that NEA plans to avert the loss of 2.50 billion NPR (23.4 million USD) worth of electricity by curbing energy leakage within the next one year.

President of Independent Power Producers' Association, Nepal (IPPAN) Mr Shailendra Guragain suggested the Energy Minister and the Managing Director that the focus should be on the growth of electricity consumption in the coming days.

The article is available on the link: ***http://www.annapurnapost.com/news/65618*** on Nepali version published on 2 March, 2017.

Kathmandu ranked as the seventh worst-polluted city in the world

The latest international report has ranked Kathmandu as the seventh worst place among 290 cities in the world in terms of severity of pollution.

In the analysis 'Pollution Index 2017' by Serbia-based research company Numbeo, Kathmandu performed even worse than Beijing of China and New Delhi of India, which rank 14th and 16th places respectively in the most-polluted cities index of the world. Kathmandu, with a pollution index of 95.73, is comfortably above Beijing and Delhi which have the pollution index of 93.38 and 92.61 respectively.

Kathmandu slightly avoided being ranked as the sixth worst-polluted city, which is taken by Dhaka of Bangladesh with its pollution index of 95.91. After Kathmandu, Ulaanbaatar of Mongolia ranks in the eighth place, followed by Karachi of Pakistan.

Pollution Index published by Numbeo is an estimation of the overall pollution in the cities. According to the firm, the biggest weight is given to air pollution and then to water pollution/accessibility, the two main pollution factors. Likewise, small weight is given to other pollutants.

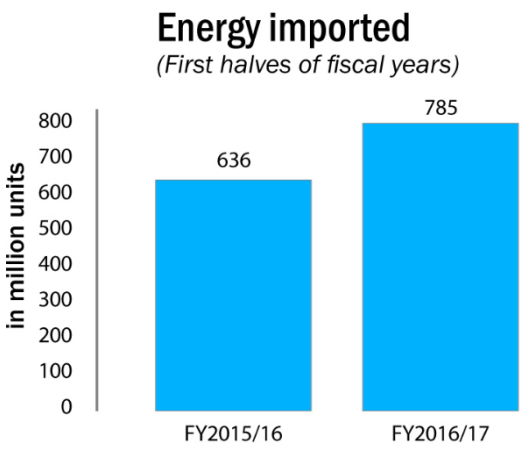
Numbeo had previously ranked Kathmandu in the third place in 2016, with pollution index of 96.66 back then. Kathmandu was also ranked in the third place in the mid-2015 by the firm.

According to Numbeo's Pollution Index 2017, Kabul of Afghanistan is the most polluted city, followed by Accra of Ghana and Tetovo of Macedonia. On the other hand, the least polluted city in the ranking is Trondheim of Norway, followed by Wellington of New Zealand and Reykjavik of Iceland.

(The article is available at the link: ***http://www.myrepublica.com/news/14403*** published on February 6, 2017.)

Electricity imports up by 23 percent

KATHMANDU, Feb 27: Electricity imports increased by 23 percent to 785 million units over the first half of the current fiscal year compared to the corresponding period of the last fiscal year.



Import bill, however, grew by only about 12 percent to Rs 6.05 billion in the review period, according to statistics prepared by the Nepal Electricity Authority (NEA).

Prabal Adhikari, the spokesperson for the NEA, said electricity import is inevitable until domestic generation increases. “But our import bill has grown by slower rate as NEA has prioritized cheaper energy imported via Dhalkebar-Muzaffarpur Transmission Line,” said Adhikari.

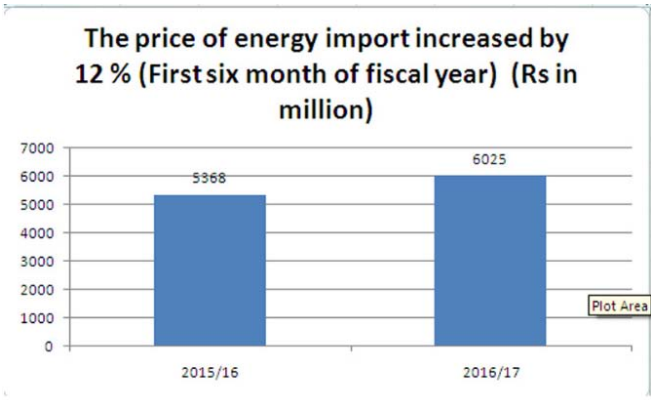
The price of energy imported via this line is IRs 3.60 per unit. Nepal has been as high as IRs 6.08 per unit for electricity imported from India.

“We may be able to reverse the trend once supply in wet season improves in the coming years,” added Adhikari.

Energy import from India has enabled the NEA to eliminate power cut. But critics say there is no reason to be happy as electricity import has been rising.

Adhikari suggests one and all to take a practical approach while questioning the rationale of energy imports. “Demand side management was important in efficient management of available electricity,” said Adhikari.

A preliminary report prepared by NEA shows that the utility has manage to slash slashed system loss by 4 percentage point to 22 percent in the first five months of the current fiscal year.



Electricity import had increased by 28 percent to 1,758 GWh in the last fiscal year. It is said to be one of the reasons behind loss of a whopping Rs 11 billion that NEA faced last year.

At present, Nepal can import a maximum of 375 MW. But import has been mostly focused on managing peak hour demand, which is close to 1300 MW, NEA officials say.

NEA's plants have been generating a combined 307 MW at present, while plants of independent producers are generating 150 MW. This means NEA is facing shortfall of 385 MW in its system.

The new management of NEA led by Kulman Ghising has received accolades for eliminating power cut. Generation of 105 MW this year helped the new management to some extent. Similarly, 45 MW generated by NEA's plants are expected to be linked to the national grid by mid-July this year. Another 200 MW is expected to be connected to the grid in the next fiscal year.

Meanwhile, NEA's revenue increased by 32 percent to Rs 18.28 billion in the first half of 2016/17 compared to the corresponding period of last fiscal year.

(The article is available at the link: ***http://www.myrepublica.com/news/15557*** published on February 27, 2017)

‘Air pollution killing double of what tobacco kills in Kathmandu’

Sustainable transport system a must to minimize air pollution in the Valley

A medical doctor and epidemiologist (MD-PhD) by training, Dr Carlos Dora, has a distinguished career in public health and environmental issues. At the World Health Organization (WHO), he is the coordinator of the unit ‘Interventions for Healthy Environments’ which is a part of the Department of Public Health and Environment. In this capacity, he has spearheaded efforts to bring together various types of Health Impact Assessment (HIA) at the global level.

He was recently in Kathmandu to hold meetings with the concerned stakeholders to implement a new project concerning the minimization of air pollution. Republica briefly caught up Dr Carlos at the sideline of his meeting with the office bearers of Nepal Medical Association (NMA) last Friday to talk about his works and air pollution in Kathmandu. Excerpts:

What brings you in Kathmandu this time?

We are starting a project to help develop healthy Kathmandu. We are going to do this in the next year or two. We are articulating and doing analysis of the local data, looking for local policy options to create

scenario I described here. We will work with the local institutions. Because air pollution is a big issue globally. We are currently working in this area.

In this project, we will work with cities. What a city can do or what health sector can do to provide the cities with information they need are good solutions in terms of reducing air pollution. So what we do is analyze the level of pollution, sources of pollution, and we talk to people who can do something about them.

How did you find the condition of air pollution in Kathmandu?

I think Kathmandu is not amongst the worse cities in the world and it is not nearly amongst the best. So you are among the middle. What is noticeable about air pollution in Kathmandu is that there are many sources which could be easily resolved. For example, the whole amount of waste burning. That's something seen everywhere in other parts of the world. There is relatively simple solution to this. When I was here in December we went to a rural area which shares the same thing. There was a lot of solid fuel burning.

There was a lot of smoke inside home and near the homes for cooking for animals. This could affect even Kathmandu because it is nearby. So, burning is a big problem. The indoor air pollution is a very big problem even if it is not inside the city. Then the traffic in the road sector is very noticeable. Obviously, there are a lot of problems. Some are very polluting and some are very clean.

You have some electric vehicles which is very positive. But I think what is important is you really need to think about your environment and how it can become pollution-free, dust-free and healthy.

What are the implications of air pollution for public health?

It has a great implication for public health. In Nepal, the number of deaths caused by air pollution -indoor and outdoor- is 30,000 a year. This is twice as much as the number of deaths caused by tobacco. Tobacco kills 16,000 people in Kathmandu.

Traffic injury is 5,000. So you have really many more deaths from air pollution. That means there is a great opportunity. Resolving this will not only help to have a better city but a pleasant city to walk or cycle. You would also have health benefits as well.

What do you think all concerned stakeholders should be doing to address this problem?

The government has some roles to play and the private sector has other roles. So, if you talk about transportation and urban environment, many people who own land and those who run the public transport system, also have some roles.

The role of the health sector is to clarify one of the options that exist in urban environment regarding public transport in Kathmandu. We can then provide details of different scenarios. This is to empower or clarify different policy options. We are all in charge of our health. This is important for our health.

What do you think the government in particular should be doing in this regard?

I think the role of the government is to monitor or carry out good monitoring, and disseminate information widely so that everybody could use them. But there is also a role for the citizens' side. You can do this. Your monitors go out in the streets. We know that these monitors are less reliable.

They need 150,000 dollar machine that measures very precisely. We understand that. What you need to do is calibrate your machine against the big equipment in a regular basis because that improves the quality of your measures. So you should be doing that regularly. But I think there is a role for the citizens' side. We have satellite information at the WHO. Look at our map. We use the best information we can from satellite map, air traffic model, from inventory, and from monitoring stations, and we employ the best people who can synthesize these information.

Do you have any specific recommendations for the government to minimize air pollution?

We publish lots of documents in WHO about good practices. One of the policies is to improve health. If you go to our website we have books and enormous amount of information on transport and health, energy and health, and transport, and household energy. I think our recommendations are same for all the governments around the world which are in our guidelines. Sustainable transport is one.

If you go to the WHO website, we have mentioned about the transport system that is good for health. It is public transport of high quality and cycling route that is safe are some things that we say very clearly to everybody. This is the way to go forward if you want to have healthy transport. That is the general recommendation just because there is lower rate of accidents, lower pollution, less noise and more physical exercises. So the great solution for public health is sustainable transport system.

Finally, do you have anything to say to our readers?

I want to say that Kathmandu is a great city, very attractive one. Everybody loves to come here to breathe well, to breathe freely and to enjoy the city. The way land is being used in Kathmandu stops people to enjoy this because of the safety risk and because of the pollution. So outsiders like I would like to come here with my children. But there are some impediments. Maybe backpackers are more risk takers. Middle aged men like I want little more comfort.

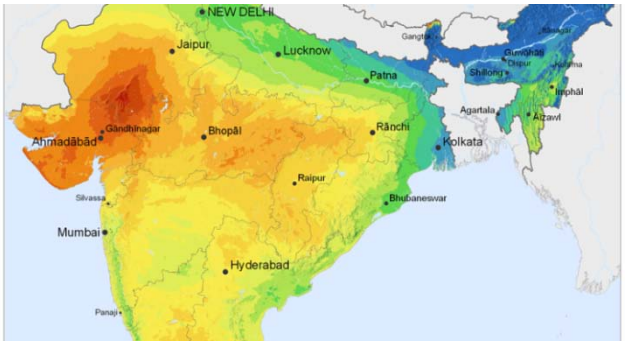
I think many people in Kathmandu want to see Kathmandu with more trees, more space for pedestrians to walk on the streets, more safety on the road. I think those issues, as coming from outside, are what strike first. Being a tourist city, being a city with UNESCO Heritage Sites, I want to see these spaces much more usable in the future.

(The article is available at the link: ***http://www.myrepublica.com/news/14417*** published on February 6, 2017).

Guest Corner

Solar Power Pricing Vietnam v India

-Gavin Smith



Solar panel costs have dropped significantly in the last 12 months in Asia. Tariffs in competitive markets with open auctioning processes have also fallen rapidly.

But why would the price of solar energy be 2.42 cents/kWh in UAE, 7.8 cents in Brazil and 4.94 cents in India?

The simple proposition to policy makers in SE Asia is that they need to address the following market issues before they can enjoy abundant low cost solar energy. And it does require a pragmatic and fact based analysis to set the right starting point for the FIT within the current market context. Here are some comparative facts to consider:

1. The solar radiation varies widely in each country. From IEA statistics of the best generally available solar resource:

India - 2000 kWh/m2 abundant energy falls for free from the sky every day.

and **Vietnam** - 1400 kWh/m2

So roughly 42% more energy can be generated from the same m2 of solar panels in India than in Vietnam. (Brazil - 1900 kWh/m2)

2. The comparative risks (off-taker risk for example) solar track record and level of competition affect pricing and experienced developer's level of interest

3. Are there efficiencies of scale and a good supply chain/finance in place?

India Tariff 4.94 Cents Tariff/ kWh v Vietnam XX Cents

Solar Radiation - India Excellent 2000 kWh is a great resource/ v Vietnam is only Moderate at 1400 kWh/m2

Risk - India Low its a well-developed market (11% from RE) with track record of success for investors and banks v Vietnam High risk off-taker, 90% monopolised generation market, RE is barely 1% of energy.

Finance Cost - India Very Low driven to the minimum possible margins v Vietnam - No competitive market for project finance, off-take risk deters banks entry

Competition - India Maximum (developers are bidding under cost to get market share and even to the point of bankruptcy - Chapter 11 for Sun Edison) v Vietnam No established developers in the market, the state dominates energy generation with donor financing. No real competition and high cost projects are selectively awarded preferential higher PPAs than the rest of the market on an opaque basis.

Efficiencies of Scale - India Maximum Solar is huge 9200mw in 2016 and growing fast (3000mw more in 2017) v Vietnam No Efficiencies of Scale - 4 mw of solar is the total market installed, all off-grid rooftop

So market barriers need to be removed and a high initial FIT is not the only measure that is needed to stimulate the journey to low cost solar energy in Vietnam. Programmes like US AID's clean energy development could provide valuable advice and assistance to energy policy makers on how to replicate the market conditions of India..... in Vietnam. Making more sunshine is not an option and there are no short cuts to a functioning solar market place!

(The article is available at the link: ***https://www.linkedin.com/pulse/solar-power-pricing-vietnam-v-india-gavin-smith?trk=hp-feed-article-title-publish*** published on February 14, 2017.)

CHINA

What 4 Million Solar Panels Look Like from Space

The largest solar farm in the world, in China, generates almost as much electricity as a large nuclear power plant

By January 5, 2017, solar panels covered 27 square kilometers (10 square miles) of Qinghai province. *Credit: NASA Earth Observatory*

On the Tibetan Plateau in eastern China, 4 million solar panels silently soak up the sun as part of the Longyangxia Dam Solar Park. It's the largest solar farm in the world, spreading over 10 square miles of the high desert landscape.

The complex sprung into existence in 2013 and has been rapidly expanding ever since. Satellite imagery curated by NASA's Earth Observatory chronicles its growth from a cluster of panels to a sprawling solar farm that looks like a giant, angular thought bubble as of January 2017.

Unlike the world's largest ball of twine, it's more than just a roadside attraction. The installation currently has the capacity to generate 850 megawatts of electricity, or enough to power roughly 140,000 U.S. homes. The Longyangxia Dam Solar Park is one piece of the massive renewable energy revolution taking place in China. The country invested $103 billion into renewables in 2015, the last year with data available. That helped the world set a renewable investment high water mark of $286 billion.

According to Greenpeace'sEnergydesk, preliminary 2016 data show China installed the equivalent of one and a half soccer fields of solar panels every hour. That puts the country on track to meet its 2020 renewable goals sometime in 2018.

The renewables targets line up with China's international climate commitments. The government previously announced it would lower the carbon intensity of its economy 40-45 percent below 2005 levels. Under the Paris Agreement, China has pledged to peak its carbon dioxide emissions by 2030.

Looking ahead, the government announced in early January that it plans to spend $361 billion on renewable power generation from now through 2020. The influx of cash is expected to help China produce a total of 110 gigawatts of solar power and 210 gigawatts of wind power by 2020.

The increase in investment coincides with a 40 percent drop in the cost of installing utility-scale solar in China since 2010. Solar is expected to become even cheaper in the coming years, further creating more bang for China's buck (or yuan as the case may be).

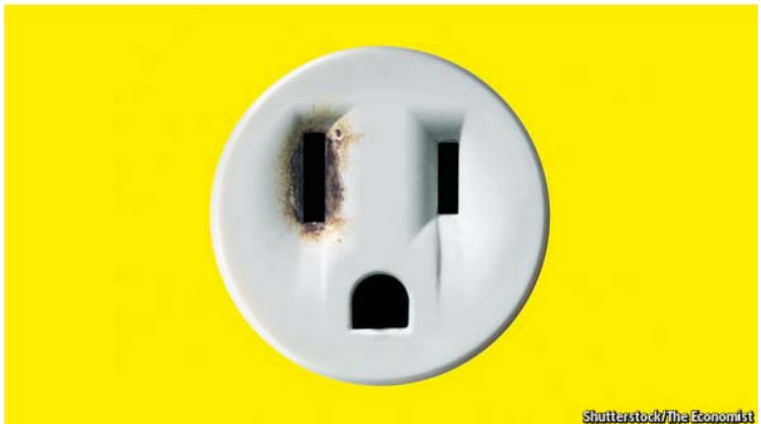
Despite the growth in capacity, China has struggled to balance demand and production. An economic slowdown has caused some solar and wind farms to sit idle or produce energy that can't be used. Local governments and strong coal interests also present obstacles to China's transition from the world's biggest carbon polluter to an economy largely powered by clean energy.

China continues to see its emissions rise due largely to heavy coal use, which will increase the risks associated with climate change. The Longyangxia Dam Solar Park is a step toward ensuring China has the capacity to change that.

(The article is available at the link: ***http://www.climatecentral.org/news/china-solar-farm-satellite-21182*** published on February 22, 2017)

Wind and solar power are disrupting electricity systems

But that's no reason for governments to stop supporting them



ALMOST 150 years after photovoltaic cells and wind turbines were invented, they still generate only 7% of the world's electricity. Yet something remarkable is happening. From being peripheral to the energy system just over a decade ago, they are now growing faster than any other energy source and their falling costs are making them competitive with fossil fuels. BP, an oil firm, expects renewables to account for half of the growth in global energy supply over the next 20 years. It is no longer far-fetched to think that the world is entering an era of clean, unlimited and cheap power. About time, too.

There is a $20trn hitch, though. To get from here to there requires huge amounts of investment over the next few decades, to replace old smog-belching power plants and to upgrade the pylons and wires that bring electricity to consumers. Normally investors like putting their money into electricity because it offers reliable returns. Yet green energy has a dirty secret. The more it is deployed, the more it lowers the price of power from any source. That makes it hard to manage the transition to a carbon-free future, during which

many generating technologies, clean and dirty, need to remain profitable if the lights are to stay on. Unless the market is fixed, subsidies to the industry will only grow.

Policymakers are already seeing this inconvenient truth as a reason to put the brakes on renewable energy. In parts of Europe and China, investment in renewables is slowing as subsidies are cut back. However, the solution is not less wind and solar. It is to rethink how the world prices clean energy in order to make better use of it.

Shock to the system

At its heart, the problem is that government-supported renewable energy has been imposed on a market designed in a different era. For much of the 20th century, electricity was made and moved by vertically integrated, state-controlled monopolies. From the 1980s onwards, many of these were broken up, privatised and liberalised, so that market forces could determine where best to invest. Today only about 6% of electricity users get their power from monopolies. Yet everywhere the pressure to decarbonise power supply has brought the state creeping back into markets. This is disruptive for three reasons. The first is the subsidy system itself. The other two are inherent to the nature of wind and solar: their intermittency and their very low running costs. All three help explain why power prices are low and public subsidies are addictive.

First, the splurge of public subsidy, of about $800bn since 2008, has distorted the market. It came about for noble reasons—to counter climate change and prime the pump for new, costly technologies, including wind turbines and solar panels. But subsidies hit just as electricity consumption in the rich world was stagnating because of growing energy efficiency and the financial crisis. The result was a glut of power-generating capacity that has slashed the revenues utilities earn from wholesale power markets and hence deterred investment.

Second, green power is intermittent. The vagaries of wind and sun—especially in countries without favourable weather—mean that turbines and solar panels generate electricity only part of the time. To keep power flowing, the system relies on conventional power plants, such as coal, gas or nuclear, to kick in when renewables falter. But because they are idle for long periods, they find it harder to attract private investors. So, to keep the lights on, they require public funds.

Everyone is affected by a third factor: renewable energy has negligible or zero marginal running costs—because the wind and the sun are free. In a market that prefers energy produced at the lowest short-term cost, wind and solar take business from providers that are more expensive to run, such as coal plants, depressing power prices, and hence revenues for all.

Get smart

The higher the penetration of renewables, the worse these problems get—especially in saturated markets. In Europe, which was first to feel the effects, utilities have suffered a “lost decade” of falling returns, stranded assets and corporate disruption. Last year, Germany’s two biggest electricity providers, E.ON and RWE, both split in two. In renewable-rich parts of America power providers struggle to find investors for new plants. Places with an abundance of wind, such as China, are curtailing wind farms to keep coal plants in business.

The corollary is that the electricity system is being re-regulated as investment goes chiefly to areas that benefit from public support. Paradoxically, that means the more states support renewables, the more they pay for conventional power plants, too, using “capacity payments” to alleviate intermittency. In effect, politicians rather than markets are once again deciding how to avoid blackouts. They often make mistakes: Germany’s support for cheap, dirty lignite caused emissions to rise, notwithstanding huge subsidies for renewables. Without a new approach the renewables revolution will stall.

The good news is that new technology can help fix the problem .Digitalisation, smart meters and batteries are enabling companies and households to smooth out their demand—by doing some energy-intensive work at night, for example. This helps to cope with intermittent supply. Small, modular power plants, which are easy to flex up or down, are becoming more popular, as are high-voltage grids that can move excess power around the network more efficiently.

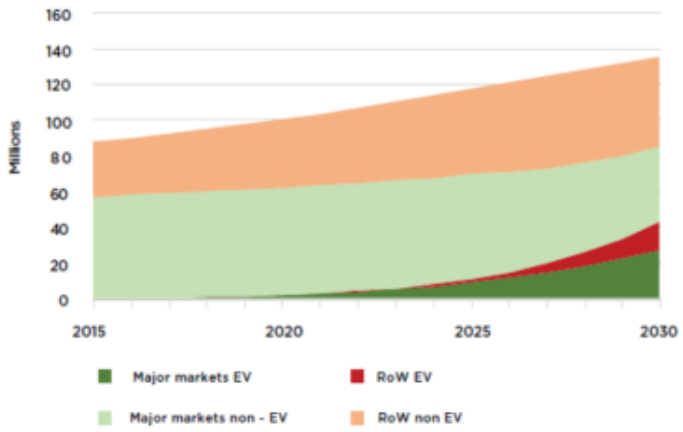
The bigger task is to redesign power markets to reflect the new need for flexible supply and demand. They should adjust prices more frequently, to reflect the fluctuations of the weather. At times of extreme scarcity, a high fixed price could kick in to prevent blackouts. Markets should reward those willing to use less electricity to balance the grid, just as they reward those who generate more of it. Bills could be structured to be higher or lower depending how strongly a customer wanted guaranteed power all the time—a bit like an insurance policy. In short, policymakers should be clear they have a problem and that the cause is not renewable energy, but the out-of-date system of electricity pricing. Then they should fix it.

The article is available at the link: ***http://www.economist.com/news/leaders/21717371-thats-no-reason-governments-stop-supporting-them-wind-and-solar-power-are-disrupting*** published on February 25, 2017.)

ENABLING VARIABLE RENEWABLES AND DRIVING DOWN EMISSIONS, WITH ELECTRIC VEHICLES

At a media frenzied event last March, electric car manufacturer, Tesla, unveiled its Model 3. Priced to compete with conventional fossil-fuelled vehicles, it attracted over 325,000 reservations within a week. The hype built around this vehicle, and several other fast and slick electric cars, is but a symptom of a much larger and growing movement across the motor vehicle industry, to cut the transport sector's oil addiction and switch to electric power.

Projections of electric vehicle sales required to meet IRENA estimates, shown with the global passenger car sales by market, 2015-2030



Source: Base LDV sales projections from IEA ETP 2015, with EV projections developed for this technology brief.

RoW= Rest of World.

Globally the stock of electric vehicles is on the rise, and in 2015 more than one million electric vehicles were on the road. That number grew to more than two million in 2016, with China, the US, and several European countries leading the way in uptake.

"There are many factors that have led to this surge in uptake. Strong technological progress, the implementation of policies, and cost reductions, particularly in batteries, have all played a part," says Dolf Gielen, Director of IRENA's Innovation and Technology Centre. "Despite on-going battery performance improvements and cost reductions, electric vehicles still face obstacles, and overcoming them will be key to getting electric vehicle adoption to move forward."

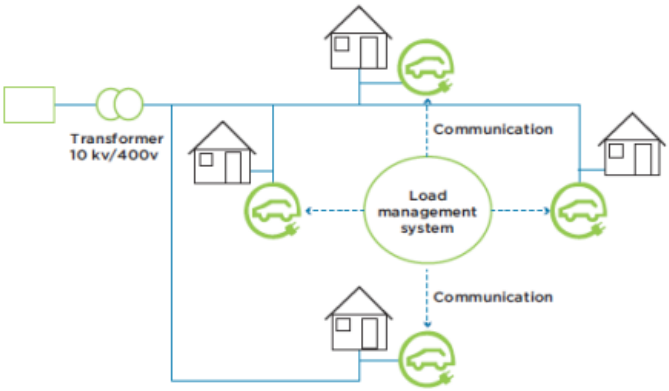
Moving forward

IRENA's newly released technology brief on the state of *Electric Vehicles*, suggests four concurrent general strategies to maximise their benefits. These strategies include increasing electric vehicle deployment; providing sufficient charging equipment for more electric vehicles; decarbonising electricity generation with more renewable energy; and integrating electric vehicles into renewable energy-powered grids.
"The public already perceives electric vehicles as providing an excellent driving experience, and new models being introduced this year and next, will have much greater driving range than most of today's. But finding ways to encourage people to switch to electric, is still necessary," says IRENA analyst Francisco Boshell. "Strong policies to reduce the cost of electric vehicles, provide driving and parking advantages, and ensure sufficient recharging infrastructure, will likely be needed for at least another five to ten years, to have a chance for rapid sales growth and to achieve target stock levels by 2030."

In IRENA's renewable energy transport roadmap, *The Renewable Route to Sustainable Transport*, the Agency estimates that there could be as many as 160 million electric vehicles on the road by 2030 (about 10% of the passenger car fleet). They would not just serve to lower levels of air pollution in cities, but also provide significant battery capacity in some markets to support variable renewable energy — like wind and solar — at significantly larger scale.
"Electric vehicles create a paradigm shift for both the transport and power sectors," explains Boshell. "They can support variable renewable power growth through optimised charging schemes such as time-variable smart charging, and vehicle to grid electricity supply."

Electric Benefit

Replacing conventional vehicles with electric ones comes with many benefits, including reduced noise pollution, and zero tailpipe emissions — meaningless local air pollution. Depending on the power generation of the city or region, electric vehicles can also lower carbon dioxide emissions and so play a role in averting climate change.



"Governments should also consider promoting electric two-wheelers and electric buses as a way of reducing pollution and noise in populated and urban regions," says Nicholas Wagner, coordinator of IRENA's transport analysis. Worldwide, the external costs of air pollution relating to the use of fuels in the transport sector were in the range of USD 460-2,400 billion in 2010, and this could increase 40 per cent by 2030.

Connecting electric vehicles to the grid expands 'demand side management' options — using smart grids to give customers control and make well-informed decisions on their consumption of electricity — that can help customers shift their electricity loads during peak periods. For residential consumers, demand side management enables them to be informed about when they can cheaply consume electricity, saving both energy and money.

For this reason, some countries are taking steps to increase the number of charging stations in their territory. In 2016, over 8,000 public and private charging stations were installed in Beijing, China. The city has plans to install 435,000 more by 2020.

Source: Adapted from Probst et al, (2011)

Developing the methods and understanding for how to best charge, aggregate and control electric vehicle load on the grid, is still a fundamental and on-going issue, according to the report. But eventually smart-charging will be able to support distribution and grid management, and ultimately improve the operation of electric vehicles.

The article is available at the link : ***https://irenanewsroom.org/2017/02/26/enabling-variable-renewables-and-driving-down-emissions-with-electric-vehicles/*** published on February 26, 2017.

Welcoming New Member

Liberty Energy Company Ltd.
लिवर्टी ईनर्जी कम्पनी लि.

The company was established in 2066 BS with the sole aim of harnessing hydropower potential of the country in order to contribute for the development of the country. This company has been promoted by national level leading businessmen, hydropower developers and hydropower professionals. Currently, the company is promoting Upper Dordi 'A' Hydroelectric Project, 25 MW; located in Lamjung district of Gandaki Zone.

List of EDC members

S. No.	Name of the Organization	Organization logo
1.	Nepal Electricity Authority	
2.	Alternative Energy Promotion Center	
3.	Chilime Hydropower Company Ltd.	
4.	Madhya BhotekoshiJalvidyut Company Ltd.	
5.	Rasuwagadhi Hydropower Company Ltd.	
6.	SanjenJalavidhyut Co. Ltd.	
7.	Butwal Power Company Ltd.	
8.	Hydroelecticity Investment and Development Company Ltd.	
9.	IDS Energy Pvt. Ltd.	
10.	Arun Valley Hydropower Development Co. Ltd	
11.	Dantakali Hydropower Pvt. Ltd.	
12.	Reliable Hydropower Pvt. Ltd.	
13.	Himalayan Infrastructure Fund	
14.	Sanvi Energy Pvt. Ltd.	
15.	Dibyashwari Hydropower Ltd.	
16.	Shiva Shree Hydropower Co. Ltd	
17.	Chhyandi Hydropower Ltd	
18.	SaralUrja Nepal	
19.	Rara Hydropower Development Co. P. Ltd	

20.	Wind Power Nepal	
21.	Gham Power Pvt. Ltd.	
22.	Lotus Energy Pvt. Ltd.	
23.	Sun Farmer Nepal Pvt. Ltd	
24.	CEDB Hydro Fund	
25.	Nabil Bank Limited	
26.	NMB Bank Limited	
27.	Global IME Bank Limited	
28.	Prime Commercial Bank Ltd.	
29.	Century Bank Limited	
30.	Transweld Pvt. Ltd.	
31.	TSN Energy Pvt. Ltd.	
32.	WaibaInfratech Pvt. Ltd.	
33.	North Hydro & Engineering Pvt. Ltd	
34.	Nepal Hydro & Electric Ltd.	
35.	Nepal Hydropower Association	
36.	National Association of Community Electricity Users Nepal	
37.	Dudhkoshi Power Pvt. Co. Ltd	
38.	ICTC Energy Pvt. Ltd	
39.	High Himalayan Hydro Construction Pvt. Ltd	
40.	Himalayan Bank	
41.	Ankhukhola Hydropower Pvt Ltd	
42.	Comtronics Pvt.Ltd	

43.	United Modi Hydropower	
44.	Source and Solutions Private Limited	
45.	Everest Equity	
46.	Hira Ratna Hydropower	
47.	SM Everest Electric Pvt. Ltd	
48.	Liberty Energy Power Company Ltd.	

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Energy Development Council

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