



ENERGY™
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ENERGY COMMUNIQUE

EDITORIAL ON-GRID ALTERNATIVE ENERGY

It is a welcoming news that the Ministry of Energy has finally launched an official policy for grid-connected alternative energy, thus paving way for the utility to buy electricity from Solar, Wind and Bioenergy. However, this new policy has also come up with a new power purchase rate of Rs 7.30 per kwh, which is 24% less than the benchmark tariff of Rs 9.61 per kwh that was earlier proposed by the government through its National Energy Crisis Alleviation Plan released in February 2016. The Ministry has stated that they came to this new value based on the cumulative tariff of a run of the river hydro-project after eight times of 3% annual escalation. From the utility's perspective and the consumers' view, it is obviously better to have cheaper power purchase rate. However, the question is now-

is it financially viable to develop solar, wind or bioenergy project at such rate?

There is already an ongoing conflict between some solar developers and NEA, regarding the latter's refusal to sign power purchase agreements for the request for proposal that was issued two years back. At that time, the benchmark tariff was at Rs 9.61/kwh, and most of the bidders proposed rate was even lower, up to Rs 8.34/kwh. NEA seemed to be overjoyed by the rate offered by the developers back then and was ready to sign the agreement with the winners. However, somehow the process got delayed and the agreement didn't move ahead. And now with the new rate issued by the Ministry of Energy, NEA is not in the mood to sign the contract, unless the developers agree to sell at the new rate of Rs 7.30/kwh.



Mr. Kushal Gurung
CEO
Wind Power Nepal Pvt. Ltd.
An EDC Member Organization

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Cost of solar PV has gone down sharply, and as per an IRENA report, it has slashed by 73% since 2010. Likewise, the solar PV tariff is also going record low. In May 2017, a 500MW Solar PPA tender in India saw the winning bid as low as INR 2.44/kwh (i.e Rs 3.90/kwh). Now, when a solar project in a neighbouring country could fetch such a low price, it is still not sure if the new rate of Rs 7.30/kwh is financially viable in Nepal, even when the rate is already twice more than that of India.

When it comes to solar PV projects, India have multiple advantages compare to Nepal- economy of scale, access to finance, tax exemption, vast and cheap land, better road access and transmission line, among others. Furthermore, they are also providing big market opportunity (100,000MW by 2022) to attract foreign solar PV manufacturers to set up manufacturing plant in India, which also helps to drive down

the cost. Whereas, Nepal being a hilly terrain, land is a scarce resource. Furthermore our population is densely settled in the valley and plains, while our barren lands with high solar irradiance, such as Dolpa and Mustang, are in the remote mountainous area. We also have very poor transmission line network and road connectivity. Hence, our best chances are to promote rooftops and small 1-10MW projects in 11kv or 33kv substations. As such, our cost of production is definitely going to be higher than in India. But at the same time, being a next door neighbour to India, with some adjustment in policies and incentives, we could drive down our costs. Incentives such as attracting foreign solar PV companies to build PV manufacturing plant in Nepal, providing production tax credits for solar projects, reducing import duties and taxes on solar accessories - not just the solar PV panels, could definitely help to cut the cost

down. Moreover, it is time for the Provincial Government to be proactive and try to exploit its solar and wind resources, especially by Province No 4, 5 and 6, where they have barren land with good wind profile and solar irradiance. These Provinces could set up Industrial estates with captive wind and solar plant to power them, and thus attract industries with cheap electricity and land lease, which in turn could help to generate revenue and create jobs.

In overall, the new government policy for on-grid alternative energy project is a positive move, and though the new proposed power purchase rate of Rs 7.30/kwh could be a bummer for time being, but with projection of average global solar PPA at US\$ 3 cent per kwh by 2020, the future does look bright and sunny!

EDC ACTIVITIES

INAUGURAL REMARKS BY RT. HONORABLE PRESIDENT OF NEPAL IN NEPAL POWER INVESTMENT SUMMIT 2018



Organizers of the Summit,

Hon. Deputy Prime Minister and Minister for Energy, Excellencies and diplomats, Members of Energy Development Council, Local and foreign delegates, Energy sector related experts, Civil servants, Ladies and gentlemen

I would like to welcome all the local and foreign delegates who have come here to participate in the Nepal Power Investment Summit aimed at providing key role in the development of power sector in our country, and take this opportunity to wish you all a very happy New Year 2018. As the issues of energy development, supply and crisis have become a matter of global concern, I would like to thank and also extend my best wishes to the organisers for bringing potential investors and experts and organising this summit.

In the wake of major political change in the country, our main goal is to achieve rapid economic growth. We need to develop infrastructure to promote our economic development. Harnessing hydro power is an infrastructure development and also constitutes a base for prosperity.

In the current scenario, environment-friendly energy development generally means hydropower, solar energy, wind energy and waste-to-energy. Rapid development of renewable energy sources also requires our due attention in the context of negative consequences for environment posed by impact of climate change and excessive use of fossil fuels. We, therefore, need to study, research, find out and develop all these sources. In our country, while talking about energy development, hydropower is the renewable, green and environment-friendly, predominant and sustainable source of energy. Hydro resource is a valuable gift of nature for us.

EDC ACTIVITIES

Nepal is endowed with a large number of high mountains with plenty of glaciers leading to flow of more than 6000 rivers. I feel that we should give proper attention to the fact that our topography is also suitable for harnessing wind energy. It is, therefore, our onerous responsibility to utilize these multipurpose invaluable resources.

On one hand, our enormous natural resource is not being utilized, while on the other, majority of our population is deprived of access to even minimum electricity facility. I would like all the participants, who are keen to invest in Nepal, to imagine how a country, where it was explored decades ago that we have a hydro potential of 83000MW, has just a meagre production capacity of around 1000MW. With increasing infrastructure development and use of new technology, our actual potential could be lot more now. I believe it is a good thing for you to get an opportunity to invest in such a fertile sector. Hence, I would like to call upon both local and foreign investors to actively get involved in utilising our enormous hydropower resources.

Through this forum, I would like to assure you all that the government is committed to create a congenial atmosphere for investment by taking due consideration of the investors' interest and real needs. Similarly, I am confident that the summit will promote energy related new technology, skills, knowledge and help in creating investor-friendly environment. We need capital, technology, market feasibility and development of cross-border transmission line for implementation of large scale projects. The government will accord top priority to attract foreign investment in hydropower.

Everyday there is growing demand for electricity worldwide, however, the supply is not sufficient. On top of that, in Nepal and South Asia, where rapid development is being expected, demand for electricity is soaring. Hence, I reckon there is a good opportunity to invest in hydropower sector. I believe the development of hydropower in Nepal would benefit the neighbouring countries as well and would eventually contribute to economic development of the region. Hence, there is no doubt that the hydropower development is crucial in Nepal for meeting internal demand for household and industrial use as well for exporting surplus power to meet the demand of neighbouring countries.

Finally, I thank Energy Development Council for organising such an important summit and I would again like to extend my best wishes for the success of the summit. I am confident that interactions during the summit would provide substantial recommendations to the government for developing and facilitating realistic and effective strategy for sustainable development of energy in the country.

Thank You.

EDC ACTIVITIES

CLOSING REMARKS BY THE THEN FORMER PRIME MINISTER OF NEPAL IN NEPAL POWER INVESTMENT SUMMIT 2018



Distinguished guests, delegates participating in the summit, ladies and gentlemen.

I am very pleased to be with you all this evening. First of all, let me take this opportunity to warmly welcome you to Nepal and congratulate the organizers for successfully commencing this grand power investment summit. This event is very timely for the reason that Nepal has completed its political transition process and is entering to a new era of political stability, high and sustainable economic growth with social justice, and prosperity shared by all the citizens of the nation.

In the path towards economic progress and social transformation, Nepal needs to develop its abundant natural resources and fulfil the infrastructure gap, mainly in the areas of energy, water, transportation and tourism. We all agree that utilization of Nepal's main natural resources for rapid and sustainable development implies harnessing of its clean energy potential. This clean energy potential includes hydropower, solar energy, geothermal, wind energy, waste to energy and other untapped renewable sources.

More than 11500 pristine rivers flow from the Himalayas bestowing us with clean renewable energy which we require to develop our nation. It also presents to all of you herewith a solid business opportunity to transform such resources into the most respectable return you will hardly find anywhere within South Asia. Similarly, the sun shines bright in our country, producing 5.5 hours of daily sunshine and 300 days of annual sunshine, making Nepal one of the best regions in the world to harness quality and reliable solar power. Abundant geothermal and waste to energy resources are waiting to be explored by investors like yourselves.

EDC ACTIVITIES

Nepal is the fountain of clean energy resources for the entire South Asia as nearly 70 per cent of the dry season flow and 40 percent of the annual flow of Ganga River, one of the biggest river in South Asia, is fed by rivers flowing from Nepal. To harness our abundant clean energy potential and transform our infrastructure into a domestically consumable electricity based one, large scale investments are required. The requirement of such large scale investments means an opportunity for both the local and foreign investors like yourselves. Let me mention here that IFC in its recent report has stated that Nepal will have a clean energy investment opportunity of US\$46 billion in the short term. Nepal government has also estimated the energy investment requirement of US\$ 31 billion from 2017 through 2030 to meet the target for energy for all and achieve high and sustainable development.

Distinguished participants,

We know that renewable, modern and affordable energy for all is one of the 17 goals of 2030 Agenda for Sustainable Development which Nepal is also committed to achieve. The SDG 7 on energy commits to (a) ensure access to affordable, reliable, sustainable and modern energy for all, (b) increase substantially the share of renewable energy source in global energy mix, and (c) double the global rate of improvement in energy efficiency. Achieving SDG7 will help achieve several other goals including end of extreme poverty, hunger, ill-health, gender balancing, water and sanitation and industrialization.

Modern energy is transformative as it (i) changes production relations, (ii) changes household activities and women's work burdens by means of providing machine supported food processing, grinding, cooking and preserving technologies, (iii) shifts business models, it changes industrial structure from traditional to modern and to power intensive ones, (iv) it changes transportation system, (v) protects the environment and reduces the use of conventional fuels, and (vi) it has a lot of implication for health, education and human development outcomes. Nepal aspires to be part of the sustainable development process by focusing on renewable energy. And to meet the target of SDG in our part and to go ahead, my slogan for our development is faster and sustainable development.

In this twenty first century, traditional fuel wood covers three fourth of energy demand in Nepal. Industrial, commercial and transport energy are mostly fossil fuel based. Current energy consumption at 140 kWh is very low compared with South Asian average of more than 700 kWh. Nepal intends to increase the consumption to 1500 kWh in 15 years which calls for rapid growth in electricity generation.

EDC ACTIVITIES

Our Party CPN (UML) aims to increase power generation to 15000 MW in 10 years with an energy mix of hydro, solar, wind, geothermal and other alternative energy sources. As per our Left Coalition Election Manifesto, we intend to increase installed capacity of electricity to 15000 MW in 10 years. This includes about 12000 MW of hydro, 2000 MW of Solar and 1000 MW of wind and other energy sources. To meet the peaking energy demand, we have to develop at least 5000 MW worth of storage and pondage type hydro projects and stop importing electricity within a few years. As one of the key development strategies, our party intends to ensure energy security to our citizens along with other securities such as food security.

Four Myths (illusions) about energy in Nepal as mentioned below must be understood. First myth is about demand for hydroelectricity to grow by a linear path of 10 or 12 per cent per annum. In fact, economic transformation and development of energy substitution technology in transportation, industry, business and household consumption will create demand for geometrical growth in power consumption.

The second myth is on hydropower as the only source of renewable energy. This myth is challenged by (i) long run implication on the hydrology of water sources and particularly for the distinct future of run of the river hydro projects, (ii) innovations and technological shift in solar and wind power, and (iii) growing installation of bio energy plants for household consumption.

The third myth is on Nepal's enough financial resources to harness water resources for hydropower generation. This myth can be questioned on account of our financial, technical and human resources available for energy. If we have to generate 5000 MW worth of power in five years, we need Rs 1000 billion or at least Rs 200 billion every year whereas total national savings are just Rs 300 Billion a year.

The fourth myth on power trading. Many of us think that we should never export electricity even when we have met our domestic demand. We know that we have been rather importing the same to meet our dire need for power. Electricity is of course a tradable good, and is heavily traded globally. But the same is considered a sin for some of us. Our demand for electricity for domestic consumption for an economic growth rate of 8 to 9 per cent can be met with hydropower installed capacity of only 15 thousand MW. But we are talking about producing 15 thousand MW in 10 years, and 25 thousand MW in 25 years. This only calls for cross border and regional trade in electricity and creating institutions and infrastructure for the same.

EDC ACTIVITIES

Regional cooperation in energy is also about energy trading in South Asia and we should create environment for energy trade also under the spirit of SAFTA and create regional energy infrastructure to facilitate the power trade. This is also necessary in the context of seasonality of power production and consumption, energy mix, cost effectiveness in transmission and distribution, substitution of energy demand by clean and renewable energy than fossil fuel based ones.

Creation of higher power demand at home calls for restructuring our transportation, industrial and business systems. We need to create new electric infrastructure by building electric trains, electric metros, electric vehicles and electricity based cooking. The result of such will be replacing of imported fossil fuels which in turn preserves the environment of Nepal and provides pollution free future for all our citizens. It will also result in reducing the trade deficit of Nepal caused by excessive imports and transform the nation from an import based economy to a domestic production and consumption based economy.

Our party CPN (UML) had in the past taken several initiatives for hydropower development which include the development of Karnali-Chisapani as tripartite project, many big projects under joint venture, transmission and distribution system upgradation, construction of cross border transmission lines, establishment of grid company, simplification of generation procedures, removal of obstructions in the projects sites, construction of road and other infrastructure, and strengthening of Investment Board of Nepal for developing projects and effective coordination at different levels.

We call upon all investors to come and invest in power sector in different capacity such as joint venture, BOOT, EPC, EPCF, or other models of participation. A summit like this is important to let the world know that Nepal's power sector is now an attractive destination for foreign investors to make infrastructure investments, particularly in power generation. I would like to urge all foreign investors to come and explore the opportunities Nepal offers to them and also to forge partnerships and life-long friendships with our citizens.

At the end, let me once again wish the summit a grand success in accomplishing the task of making the world aware of the opportunities in the power sector of Nepal and inviting them to be a stakeholder in the process. We look forward to working with you in coming days in power sector development for the country and the region as well.

Thank you very much.

EDC ACTIVITIES

German Minister invites EDC Chairman



On 2nd March, EDC Chairperson Mr. Sujit Acharya was invited for a luncheon meeting by H.E. Ms. Ricarda Redeker, Head of Inspection team of the German Federal Foreign Office at the Old House, Durbar Marg. The meeting led to discuss about EDC's initiative, "Assemble Electric in Nepal" and a possible collaboration to promote this initiative in Germany and in Europe as a whole. Her Excellency was very positive about the initiative.

EDC's prediction of producing 40,000 MW in 10 years is close to WECS recent study

EDC had made the prediction of generating 40,000 MW power in 10 years and had announced on January at the Nepal Power Investment Summit 2018. Recently, Water and Energy Commission Secretariat (WECS) has said that around 29,000 MW hydropower projects are under construction in its study report. This 29000 MW from hydropower projects certainly supports the prediction made by EDC, the rest of the power generation is from other renewables. Generation of 40,000 MW power in 10 years is very much in track. (To view the full article available in Nepali version, please visit the link below.)■

Source: <http://uiyaaloonline.com/news/94372/hydropower-in-nepal/>

EDC ACTIVITIES

ANNOUNCEMENT FROM SARAL URJA NEPAL, AN EDC MEMBER ORGANISATION

Sarlahi DC Micro-Grid



B

ackground

Though a grid line passes right over their heads, 45 household in Kabilashi village of Sarlahi district were under darkness since their existence. They relied on Kerosene lamps for lighting. Due to lack of modern electricity, many aspects of these communities were affected including, health, education, safety and many more.

With the help of Renewable Energy for Rural Livelihood program Saral Urja Nepal developed a DC microgrid, first of its kind in Nepal. Through a centralized solar grid, electricity is supplied to 45 households. They have also been provided with led lights and DC fan. Now they have come face to face with modern

day electricity for the first time and distribution line. All the household by switching a button can access safe and efficient light as well as cool breeze from the fan for the harsh summer in that part of Nepal.

Load Details

The designed DC micro grid supplies power to 40-45 individual distributed households in Kabilasi Municipality-8, Sarlahi district. All the electrical appliances used in the system is DC such as 4W, DC LED bulb and 15W, DC FAN.

System Design Details

The system was designed based on the central solar charging station that charges all the batteries connected to DC distribution line. The DC distribution line length is around 450 meters. The UV 25 mm², 2 core cables are used as

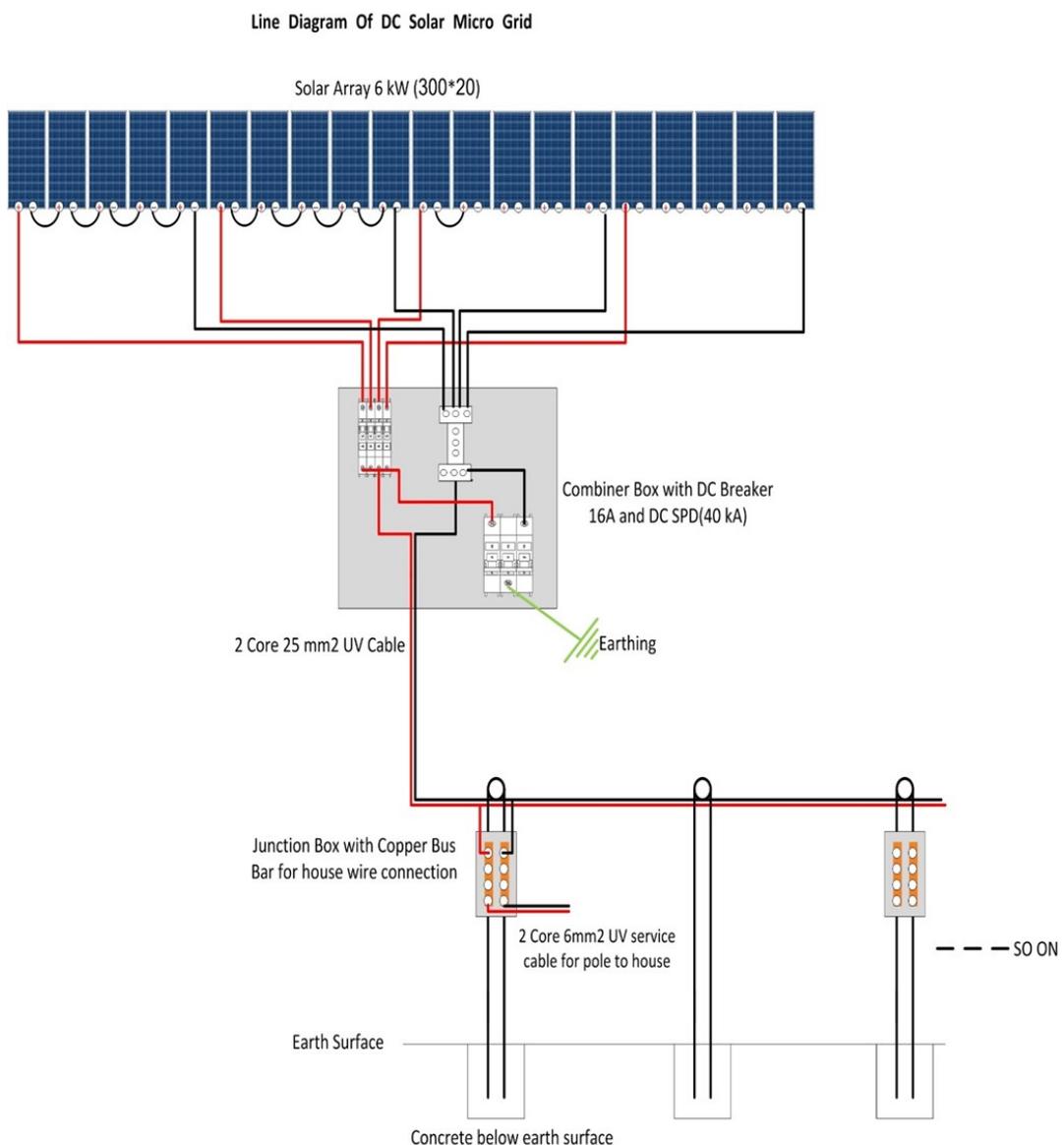
the copper bus bar junction box located at the top of the GI pole. Individual household has DC Breaker, Step down charge controller, Battery, DC LED Bulb and DC Fan. Wiring has been completed in all houses of that community. Two individual earthing have been done for the solar charging station. One for DC surge protection device while the other for the lightning arrester. Earthing chemical compound is used as a material that reduces the resistance of the earth where the copper plate is located inside the earth surface.

EDC ACTIVITIES

Wiring has been done inside the individual household with the help of copper wire. The wire is fixed on the wall of house with the help of telephone clip. Also, all the screw holders, switches and power socket are fixed with the help screw.

Electrical diagram of the installed system

The design of the installed system is presented in the figure below.



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System Components:

The Major components used in the system are listed below:

S.N.	Particulars	Rating	Quantity
1	Solar Panel (Top ray)	300 WP	20
2	Solar Battery (IVOLT)	12V,40 Ah	45
3	Step down charge controller (Schneider)	4A, 48V	60
4	PV mounting structure	N/A	1
5	DC Breakers with Box (C & S)	25A	45
6	GI Pole	2 inches	31
7	DC Surge Protection Device (Feeo)	40 kA	1
8	8 Way Box for solar plant (C & S)	N/A	1
9	Junction Box with Copper Box Bar	43A	17
10	DC Fan (Luminous)	15W	85
11	LED Bulb	4W	135
12	UV Cable Wires (in meters)- 2 Cores	6mm ²	626
13	UV Cable Wires (in meters) - 2 Cores	10mm ²	100
14	UV Cable Wires (in meters) - 2 Cores	25mm ²	450

Warranty and Maintenance

Warranty Terms:

- Solar Panels: 10 years physical; 25 years' performance
- Schneider Step Down charge controller, LED Bulb & DC Fan: 2 years' performance warranty
- IVOLT Batteries: 2 years' performance warranty

This warranty does not cover:

- Damage, fault or failure due alterations or repairs made by anyone other than Saral Urja technician or person authorized by Saral Urja.
- Damaged caused by negligence, spillage of foods/liquid, physical damage caused by accident or mishandling, theft, fire, lightning, natural calamities and damages or failures beyond our control.

Maintenance & Recommendation

The life and performance of the system depends on it proper maintenance and use as per its design. Solar panels must be cleaned once in every 15 days. Dust accumulation on panel surface blocks the sun radiation and decreases the efficiency of the module.

Battery must be regularly checked for water level. In general, distilled water needs to be refilled every 3 months or when water level decreases. It must be ensured that batteries are placed in well ventilated and dry room.

Once in 3 months, the all the system components including wires, breakers must be thoroughly checked.

EDC ACTIVITIES

The tender notice for the month of February

HARATI is an IT company, working in several technologies based products, services and provides online service portal (tendernotice.com.np). Following is a list of tender notice provided by HARATI for the month of February;

TenderNotice.com.np

Tender, Bids and Notices related to Hydro and Energy segments in Nepal
Date : February 2018

S.No.	Notice Publisher	Description	Published Date	Notice Category	Product Service
1	Hydropower Investment and Development Company Limited, Babarmahal, Kathmandu	Procurement of Color Printer	2/28/2018	Quotation	Electronics/ Electric Utilities
2	NEA Engineering Company Limited, Thapathali, Kathmandu	Drilling Works and Geological Investigation of Hydropower Project, Construction of Sediment Lab Building, Discharge Measurement Work, Construction of Support System and Installation of Automatic Gauging Station etc.	2/27/2018	Tender/ Quotation	Other Product/ Services
3	Raghuganga Hydropower Limited	Supply, Delivery and Installation of Deep Tube Well and Water Supply System	2/26/2018	Tender	Other Product/ Services
4	Upper Tamakoshi Hydropower Limited, Upper Tamakoshi Hydroelectric Project, Gyaneshwor, Kathmandu	Supply and Delivery of Ambulance	2/18/2018	Tender	Automotive/ Vehicles
5	Chillme Hydropower Company Limited, Kathmandu	Maintenance of Building and Construction of Foot Trail	2/13/2018	Tender	Construction/ Building
6	Swet Ganga Hydropower and Construction Limited, Kathmandu	Design, Supply, Installation, Testing and Commissioning of Hydro Mechanical Works	2/12/2018	Pre- Qualification	Other Product/ Services

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MEDIA COVERAGE



NEPAL EYES GENERATING 40,000 MW OF ELECTRICITY IN 10 YEARS

Nepal wants to generate 40,000 MW of electricity, mostly hydropower, in next 10 years as the country sought local and foreign investment at an international conference on January 27-29 in Kathmandu.

The country has so far been able to develop just around 1,000 MW of the electricity in more than a century despite having immense potential of generating 83,000 MW of electricity from its water resources.

Development of hydropower in Nepal is expected to benefit the neighboring countries as well and eventually contribute to economic development of the region.

Addressing the inaugural ceremony of the Nepal Power Investment Summit 2018, Nepali President Bidya Devi Bhandari said that hydropower development in the country is crucial for meeting Nepal's internal demand and ex-

porting the surplus energy to the neighboring countries.

"In Nepal and South Asia where rapid development is expected, demand for electricity is soaring," she said, urging domestic and foreign investors to inject their capital in hydropower to cash in on the immense opportunity provided by soaring demands of electricity in the South Asian region.

The three-day summit organized by Energy Development Council (EDC), a body representing Nepal's energy sector, has brought together Nepali policy makers, domestic power developers, multinational companies related to power sectors, international financiers and experts to discuss on investment opportunities in Nepal's power sector and find financiers for the "ready to go" projects.

Around 100 participants from 30 international companies and over

400 participants from Nepal including policymakers and the private sector attended the summit.

The event was featured by high-level delegates from SAARC and training programs by renowned international energy and financial organizations. Similarly, EDC also organized an energy mart during the summit to promote the country's energy sector. Along with hydropower, the event also promoted wind energy and solar energy in the country and showcased latest energy-related technologies.

President Bhandari assured that the government was committed to creating a favorable atmosphere for investment by taking due consideration of the investors' interest and real needs.

fossil fuels.

(To view the full article, please visit the link below.)■

MEDIA COVERAGE



INDIA SHOULD BE FLEXIBLE TO BOOST CROSS-BORDER ELECTRICITY TRADE



Sushil Pokharel, Executive Committee Member of Energy Development Council (EDC) at the Nepal Power Investment Summit in 2018

The sub-regional initiative of BBIN is very necessary to take the hydropower of Nepal to the next level and for common benefits. India, being the largest economy in the sub-region and SAARC, its role is very crucial in materializing the initiative and SAFTA's framework. India should be more flexible in terms of participation and in its policy, and play a pro-active and leading role to boost cross-border export of electricity from Nepal.

Sushil Pokharel, executive chairman, Sushmit Energy of Nepal, said this in an email interview with Energy & Power Editor Mollah Am-

zad Hossain.

Nepal wants to generate 40,000 MW of electricity, mostly hydropower, in next 10 years. What do you say about the high ambition?

If we look at the number of 40,000 MW and 10 years of period, it definitely sounds like a big ambition. But there are also some indicators that show, it is not at all an impossible dream.

The political factor was being a big hindrance in the development of hydropower project. Now, Nepal finally has a political stability. The new government has been elected with a clear majority which is a very good sign.

Economic growth finally back on the right track. The government has already introduced one door policy in order to reduce lengthy bureaucratic hassle and to attract FDI. The government has already allowed Power Purchase Agreement in major foreign currencies if the capacity of the project is above 100 MW.

Nepal authorities invited local and foreign investment to the tune of US\$80 billion to implement the plan. How much of the investment you think would be possible internally, mainly the country's public and private sources?

It is a very good sign that there are many institutional investors who have expressed interest to invest. Personally what I think more important is the participation of investment of local public. For example, Nepali migrant workers could be one segment to look at. By the help of co-operatives and community organizations, many other local people can also participate.

MEDIA COVERAGE

Put together in totality, this will be definitely a huge amount but I am not in the position to give you the exact percentage. If we can raise at least US\$ 10 billion of the investment from private and public sources, this will encourage potential foreign investors, and local people can also benefit directly. The government has also decided to issue power bond for the locals which will help increase the stake of the locals in the investment.

Do you think the present regulatory regime of Nepal suitable for attracting local private or foreign direct investment?

The government of Nepal is putting lot of effort to bring in FDI. However, some of the past experience has not been very pleasant. I am positive about the current regulator and the newly formed government will consider this as a priority issue for the economic growth of Nepal.

Nepal's power generation target is cross-border export to South Asian countries, after meeting the local demand. What do you sug-

gest about the possibility of joint venture initiatives among private and public sectors of the SAARC countries, particularly the BBIN countries?

Bangladesh along with other neighboring countries have shown interest in importing electricity from Nepal at various sub-regional BBIN meetings. Four countries have already signed an agreement to facilitate regional trade and business including exporting of the electricity.

I personally think that cross-border export to BBIN countries can take a momentum if we prioritize these countries for the hydropower investment. Bangladesh has been expressing interest to invest in hydropower since last few years and a minister level agreement has already been signed too to build hydroelectric plants.

Do you think it would help materialize the BBIN initiative in the energy sector?

I am optimistic. This sub-regional initiative is very necessary to take

the hydropower of Nepal to the next level and for common benefits.

What do you think about India's policy regime in the case of making the BBIN initiative or SAFTA framework successful?

India, being the largest economy in BBIN and SAARC, its role is very crucial in materializing the initiative and SAFTA's framework. India should be more flexible in terms of participation and in its policy, and play a pro-active and leading role to boost cross-border export of electricity from Nepal.

It was claimed at the recent summit that Nepal's power sector offers one of the highest returns on investment (ROI) in Asia – more than 25 percent return on investment over the holding period and four times the value of the investment on exit. Do you think it's enough to attract the huge amount of investment?

(To view the full article, please visit the link below.)■

NEPAL'S SCENARIO

Guidelines released on selling energy into grid



There is good news for homeowners who have installed solar panels on their roofs and have surplus energy to sell. The Energy Ministry has issued guidelines on the development of alternative sources of electricity which can be connected to the national grid.

As per the Guidelines for Development of Alternative Electricity Connected to Grid 2018, published on February 8, people can feed electricity generated from solar, wind and biogas plants into the national grid, and get paid a fixed amount

of money per kilowatt hour of energy.

The guidelines have given special priority to solar energy. Individuals and organizations producing electricity for personal use as well as commercial producers have been permitted to connect their solar panels to the national grid.

The ministry has classified solar plants into three categories based on their installed capacity. Stations producing 500 watts to 10 kilowatts are called domestic producers while plants producing 10

to 500 kilowatts are called organizational producers. Solar energy producers can supply surplus energy to the national grid which will be measured by a net energy meter installed by the Nepal Electricity Authority (NEA), the state-owned power utility.

Similarly, plants with a capacity of more than 500 kilowatts are called commercial projects. Producers have to file an application at the NEA to be permitted to link

up with the national grid, and they are required to obtain approval from the Department of Electricity Development before installing such stations, according to the guidelines.

“In case of solar plants with an installed capacity of 1 MW or above, producers have to get a survey licence from the department. They will get a year to complete the survey,” said the guidelines issued by the ministry. The guidelines contain a provision for extending the deadline for the sur-

vey by a year if it goes into extra time.

The Energy Ministry, for the first time, has considered connecting electricity produced by wind and biogas plants to the national grid. Electricity producers with wind or biogas plants with an installed capacity up to 1 MW have to file an application at the power utility to connect to the national grid. Owners of plants with an installed capacity of more than 1 MW have to obtain survey and generation li-

cences from the DoED.

The generation licence will have a validity of 25 years, and the NEA will pay producers Rs7.30 per unit. The purchase rate will remain unchanged for three years. After that period, the rate will be increased by 3 percent annually for eight years. Besides launching the new rules, the Energy Ministry has scrapped the Guideline on Grid-Connected Solar Energy Development issued last November.

Source: <http://kathmandupost.ekantipur.com/news/2018-02-20/guidelines-released-on-selling-energy-into-grid.html>

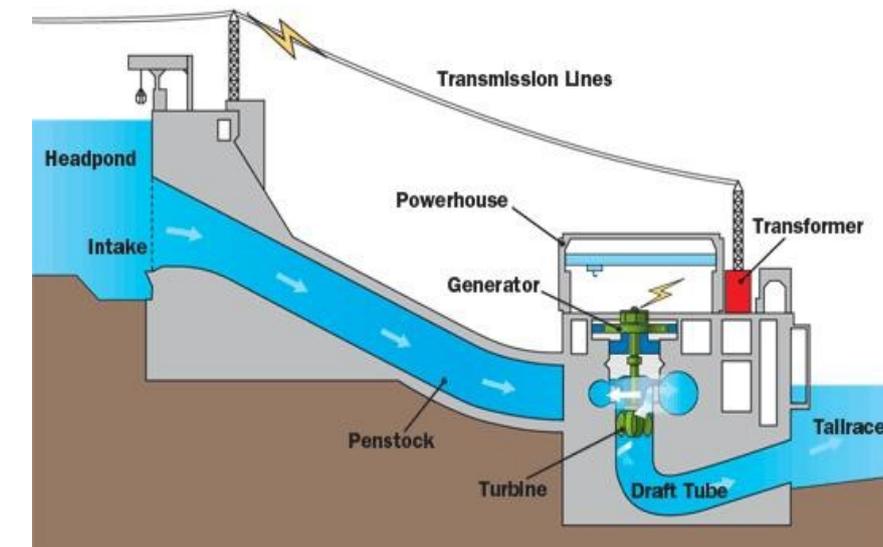
GLOBAL PERSPECTIVE

Hydro vs Wind vs Solar Power ?

Introduction

Electricity is energy produced by behavior of electrons and protons. Electrical energy or power is not actually or potentially supplied by nature; it has to be produced or generated by various secondary means, converting one form of energy into another. In the modern world, there is an unending need for energy to power electrical appliances, such as fans, lights, communication infrastructures, machines and computing systems, and other devices operated by electrical energy. Nowadays, power can be generated from several renewable and non-renewable energy sources, including fossil fuels, nuclear, geothermal, solar, wind, hydro, wood, biomass, and more.

All these energy sources have pros and cons, but renewable energy sources have comparatively less environmental impact. However, renewable sources, including hydro, solar, and wind, also have cer-



Hydro Power

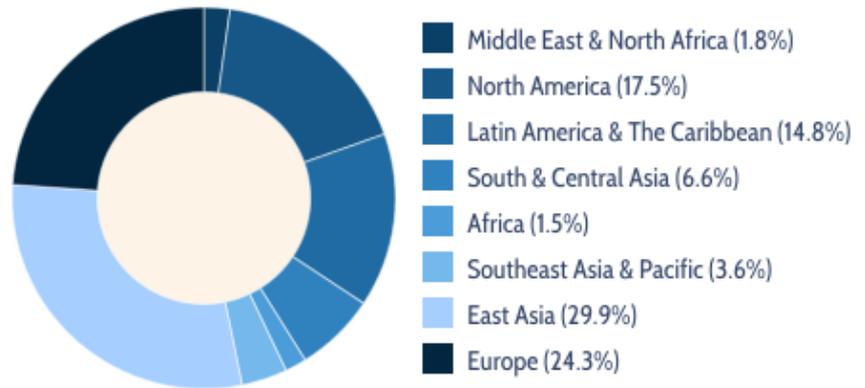
tain advantages and disadvantages, which make the decision, about how to produce the energy optimally, even more difficult. Therefore, the in-depth examination of these three renewable power sources will provide an idea about which source works best and in what situations. Though it largely depends on availability of renewable sources in a particular region, the comparison of these sources will give a description about which source is best needed by energy system, when factors like climate, security of supply, and environment are considered.

Hydro power is one of the ancient energy sources; it has been widely used for several hundred years. In ancient periods, energy was generated through water by building hydro wheels to run mills. With time and with technology, hydro power has developed vastly.

Modern age hydro power harnesses the energy of moving water to produce electricity. The electricity produced by hydro power refers to hydroelectricity.

It is generated in a hydro power plant, which uses the gravitational force of falling water from higher altitudes or potential energy of water flow in rivers and tidal basins to drive turbine blades. The turbines are further conjugated with huge magnets of an electric generator that produce electricity by converting mechanical energy into electrical energy. The major driving force behind hydro power is dams and water reservoirs (acting like a large battery) that create a large supply of water, used to regulate the energy extraction when needed. The power generated as an output from an electric generator is proportional to the volume and speed of the water falling on turbines. In most countries, electricity needs and demands are moderately fulfilled by hydroelectric power generation. In 2006, nearly 20% of the global electricity consumption was fulfilled with hydro power, making it the most consumed renewable energy source in the world (Maehlum, 2014). It is, by far, the leading renewable source of energy in most countries. As of 2011, over 160 countries were using hydro power capacity, with 11000 hydro power stations having a total global installed capacity of approx. 936 GW.

Hydropower installed capacity by region



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China is the leading hydro power generating country, followed by Canada, USA, and Brazil (World Energy Sources: 2013 Survey, 2016).

Pros

- Hydro power plants are utilized to produce base-load electricity and balancing electricity, which can meet the fluctuations in demand.
- Hydro electric generators can instantly switch on and off; therefore, they are one of the most responsive energy sources during varying energy demands, especially in peak seasons.
- A significant quality of hydro power is it produces a great amount of electricity, without relying much on climatic conditions, air current flow, and

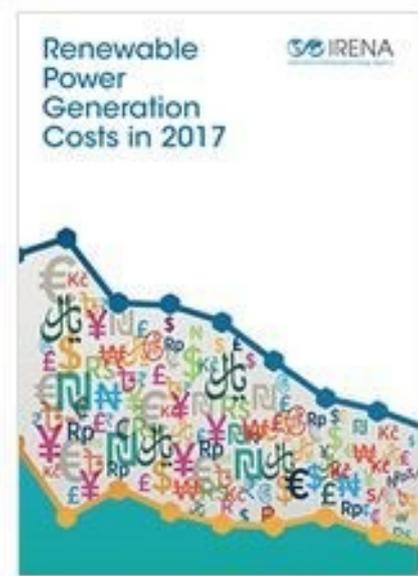
complex start-up processes.

- Besides reliability and large power output, hydro power sources are flexible, because they are subjected to easy adjustments of water flow and electricity output (Kadar, 2014).
- The operating costs and maintenance costs are typically low, as they are almost entirely automated and have no fuel requirement.
- Hydro power can provide start-up power, control frequency, and follow load, which assists in protecting against system wide failure that could lead to equipment damage (Hydroelectric Power, 2005).

(To view the full article, please visit the link below.)■

Source: <https://www.linkedin.com/pulse/hydro-vs-wind-solar-power-sharibkhan-maradukhel/>

Hydropower remains the lowest-cost source of electricity globally



At US\$0.05/kWh, hydroelectricity remains the lowest-cost source of electricity worldwide, according to a recent report by the International Renewable Energy Agency, entitled Renewable Power Generation Costs in 2017.

The global weighted average levelized cost of electricity from new projects commissioned in 2017 was US\$0.05/kWh from hydropower, compared with US\$0.06 for onshore wind, \$0.07 for bioenergy and geothermal projects and \$0.10 for utility-scale solar photovoltaic. Hydro's LCOE varies regionally, with 2016-2017 values being \$0.04/kWh in Asia, \$0.05 in South America, \$0.06 in North America, \$0.07 in Africa,

Eurasia and the Middle East, \$0.10 in Central America and the Caribbean and \$0.12 in Europe.

Although electricity from hydropower is already cheaper than fossil fuels, the report indicates costs for other renewables should drop, as technology improves. "Electricity from renewables will soon be consistently cheaper than from fossil fuels," the report says. "By 2020, all the power generation technologies that are now in commercial use will fall within the fossil fuel-fired cost range, with most at the lower end or even undercutting fossil fuels."

Despite its positive benefits, hydropower development activity lags that of other renewables, the report says. New capacity additions of renewables in 2016 was 162 GW, coming from solar photovoltaic (71 GW), wind (51 GW), hydropower (36 GW), bioenergy (9 GW) and concentrating solar, geothermal and marine (1 GW).

Additionally, hydropower "is the largest source of renewable electricity generation today," at 3,996 TWh in 2015. However, its share

has been declining over time, IRENA, says, with hydro capacity accounting for about 75% of the world's total renewable capacity in 2010 but only about 50% in 2016. In terms of electricity production, hydro accounted for 81% of all electricity from renewables in 2010 but 70% in 2016.

An entire section of the report goes into greater detail on hydropower, with additional analysis of its benefits and attributes. It does recognize the value pumped storage hydro provides for energy storage, with more than 96% of the total energy storage capacity globally provided by pumped storage. "For now, pumped hydro is still the only technology offering economically viable large-scale storage," the report says. "The importance of pumped hydro storage, and indeed reservoir hydropower, is likely to grow over time as the shift to a truly sustainable electricity sector accelerates, not just for the low-cost storage it provides, but for the flexibility it brings to integrate high levels of variable renewables at minimal cost."

IRENA is an intergovernmental organization that promotes the widespread adoption and sustainable use of all forms of renewable energy, including

bioenergy, geothermal, hydropower, ocean, solar and wind.

(To view the full article, please [click here.](#))■

Source: <http://www.hydropworld.com/articles/2018/02/hydropower-remains-the-lowest-cost-source-of-electricity-globally.html>

Hydropower is still the cheapest source of electricity

Despite the wide adoption of other renewable energy sources such as solar and wind, hydroelectricity maintains its position as the cheapest source of electricity globally at a cost of US\$0.05/kWh.

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dropower, is likely to grow over time as the shift to a truly sustainable electricity sector accelerates, not just for the low-cost storage it provides, but for the flexibility it brings to integrate high levels of variable renewables at minimal cost.”

Although a new concept in the GCC, Dubai Electricity and Water

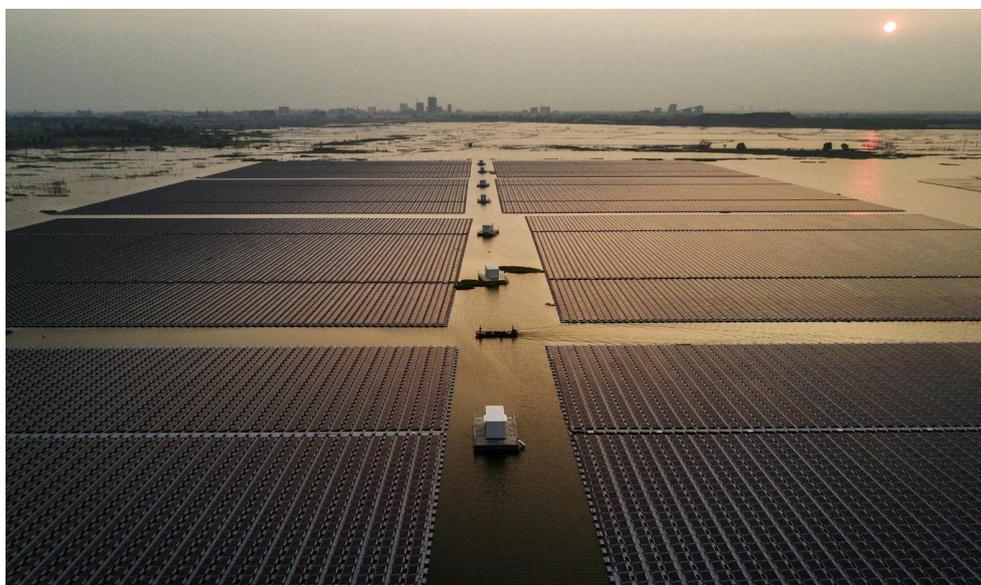
Authority (DEWA) is already exploring the possibility of pumped hydro storage.

The utility is planning to build a 400MW pumped hydro storage island that will add to existing efforts towards diversification of its electric power generation.

Source: <http://www.utilities-me.com/article-5282-hydropower-is-still-the-cheapest-source-of-electricity/#.WoB98vfA67N>

Why countries with biggest renewable reserves will become superpowers of tomorrow

The fossil fuel era won't last forever – when it finally comes to an end a new set of countries will find their reserves of lithium, copper and rare metals are in high demand



Imagine a world where every country has not only complied with the Paris climate agreement but

has moved away from fossil fuels entirely. How would such a change affect global politics?

The 20th century was dominated

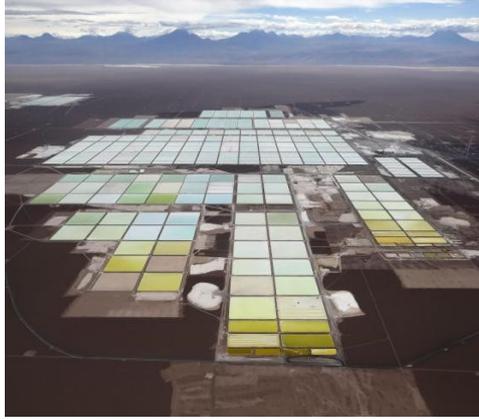
by coal, oil and natural gas, but a shift to zero-emission energy generation and transport means a new set of elements will become key.

Solar energy, for instance, still primarily uses silicon technology, for which the major raw material is the rock quartzite. Lithium represents the key limiting resource for most batteries – while rare earth metals, in particular “lanthanides” such as neodymium, are required for the magnets in wind turbine generators. Copper is the conductor of choice for wind power, being used in the generator windings, power cables, transformers and inverters.

In considering this future it is necessary to understand who wins and loses by a switch from carbon to silicon, copper, lithium and rare earth metals.

The list of countries that would become the new “renewables superpowers” contains some familiar names, but also a few wild cards. The largest reserves of quartzite (for silicon production) are found in China, the US and Russia – but also Brazil and Norway. The US and China are also major sources of copper, although their reserves are decreasing, which has pushed Chile, Peru, Congo and Indonesia to the fore.

Chile also has, by far, the largest reserves of lithium, ahead of China, Argentina and Australia. Factoring in lower-grade “resources” –



which can't yet be extracted – bumps Bolivia and the US onto the list. Finally, rare earth resources are greatest in China, Russia, Brazil – and Vietnam.

Of all the fossil fuel producing countries, it is the US, China, Russia and Canada that could most easily transition to green energy resources. In fact it is ironic that the US, perhaps the country most politically resistant to change, might be the least affected as far as raw materials are concerned. But it is important to note that a completely new set of countries will also find their natural resources are in high demand.

An Opec for renewables

The organisation of the Petroleum Exporting Countries (Opec) is a group of 14 nations that together contain almost half the world's oil production and most of its reserves. It is possible that a related group could be created for the major producers of renewable energy raw materials, shifting power away from the Middle East and towards central Africa and, especially, South America.

This is unlikely to happen peacefully. Control of oil fields was a driver behind many 20th-century conflicts and, going back further, European colonisation was driven by a desire for new sources of food, raw materials, minerals and – later – oil. The switch to renewable energy may cause something similar. As a new group of elements become valuable for turbines, solar panels or batteries, rich countries may ensure they have secure supplies through a new era of colonisation.

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