ENERGY DEVELOPMENT COUNCIL

Energy Communique

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Editorial

Dear Reader,

Today I would like to shed a light on one of the least talked about energy source, albeit possessing a great potential for country like Nepal- ***Biomass****. Biomass represents a renewable source of energy which is abundantly available. It has the potential to have a direct impact on climate change, offsetting fossil fuel emissions in any developed or developing nations like ours.*

Awareness is a key factor for the promotion of renewable biomass energy in a developing country like ours. Consumers are not aware of the various types of briquettes for the use of heating and cooking. With the recent fuel crisis people have started to use electric source for cooking as well. Thus, the available product in the market is yet unknown to the consumers.

The use of proper technology is required to make biomass solutions possible. When the technology does not match the environment then the solution fails miserably. Looking throughout the history, there has been failure of biomass industry in the past due to this. Nepal has a long history of manufacturing rice husk extruder type briquettes since the 1980s yet the success story remains few and far between.

Mr. Prachin Lal Shrestha
CEO/Founder of Shubha Biomass Briquette Pvt.Ltd
(Guest Column)

Policies and Programs brought about through the government also play a major role in the use of biomass renewable energy. The use of biomass briquettes in large government institution such as army and police should be implemented – making the government leaders in converting waste to energy. Instead of using several cylinders of Liquid Petroleum Gas (LPG) or depleting our forest resources, would it not be ideal to use briquettes? We would be avoiding the use of imported fuel, while using disposed unwanted waste. This is a simple example of biomass being used for cooking.

Encouragement towards establishing small scale industries that utilizes waste to energy should be promoted defining the right technology and the market. And current industry should be encouraged to use cleaner fuel by providing them proper incentive towards being more proactive. Also, proper forest management policies that to address the regeneration of biomass resources also is a key factor. This should be done by implementing programs to plant more trees for each tree that are felled.

Awareness, use of appropriate technology to match the environment and favorable policies and programs are the three major factors that need to be studied. Based on the challenges, we should be able to come up with solutions that would overcome this challenge. So, it is about time for every individual to step up to see the potential of biomass in the cooking and heating sector. Thus, the challenge is not to be dependent on imported fossil fuels, but to manage our own biomass resources taking into consideration the unreliability of imported fossil fuel.

In this Issue

EDC Activities

On-grid Solar Project Workshop

"In 15th July 2016, Energy Development Council organized a half-day workshop on "On-grid solar projects in Nepal: Challenges & Opportunities", at DECC Hall, United World Trade Center, Tripureshwor, Kathmandu.

Main objective of this workshop was to bring all the possible stakeholders in one room, discuss the topic jointly and identify potential challenges that might hinder the implementation of on-grid solar projects and provide recommendations to the government for successfully implementing the plan of integrating renewable energy into the national grid.

Mr Pushkar Manandhar from the Asian Development Bank Nepal Resident Mission (ADB) and Mr Surendra Rajbhandari from Nepal Electricity Authority (NEA) were invited to share their respective organisation's imminent plans for on-grid solar projects in Nepal. The workshop started with a welcome remark from the EDC chairperson Mr Sujit Acharya. It was then followed by a presentation from Mr Manandhar, who shared the Bank's plan for on-grid project in Nepal, through its South Asia Subregional Economic Cooperation (SASEC) project. He told that ADB has allocated around $18.5 million of immediate grant fund to NEA to use for on-grid solar projects. While, Mr Rajbhandari orally shed light on NEA's plan of calling a Request For Proposal (RFP) to buy solar power from independent power producers. He told that, in the first phase, NEA would allocate limited number of substations of size 66kVA and 132kVA, only in certain locations, for off-taking the solar power to its grid. These substations would be determined based on the grid impact study report that they have recently concluded. At each substation, minimum size of a solar plant would be of 4MW and maximum up to 20MW. There will be a bidding process, where Independent Power Producers would have to propose two PPA tariff rates- first rate for up to June 2022, until the ADB funding period, and second rate to valid from 2022 till the rest of project period". Both speakers agreed that there are still many ambiguities and uncertainties regarding details of the upcoming project proposal, and thanked participants for their valuable queries and comments, which they felt were very useful for them to fine tune their plans. Prof. Dr. Amrit Nakarmi, advisor to EDC, concluded the program by presenting token of appreciation to both speakers. The event was conducted by Mr Kushal Gurung, an executive member of EDC."

Presentation done by ADB on during the workshop is available at:

http://edcnepal.org/wpcontent/uploads/2016/07/On-Grid-solar-Project-Workshop-in-Nepal-Challenges-and-Opportunities.pdf

Training Opportunities to EDC Members

Energy Development Council has nominated two participants from our members Mr. Kushal Gurung (Wind Power Nepal) and Mr. Komal Nath Atreya (Nepal Electricity Authority) to participate on the ongoing "Seminar On Solar Energy Applications for developing Countries" starting from 2016/7/29 to 2016/8/18 in China.

UNIDO- International SoLar Energy Centre

This is a 21 days seminar in Lanzhou, Gansu Province, China which is organized by Gansu Natural Energy Research Institute (GNERI).

With Director General, Professor Xi Wenhua of UNIDO International solar Energy Centre, Lanzhou, China with our two participants Mr. Kushal Gurung and Mr. Komal Nath Atreya

Other Videos Regarding Nepal Power Investment Summit 2016.

Here are some remaining videos from Nepal Power Investment Summit held on Hotel Yak and yeti from 31May-1st June organized by Energy Development Council.

https://www.youtube.com/watch?v=BkCxeCLzSeo (part2)

https://www.youtube.com/watch?v=8h4baFtJxmQ(part3)

https://www.youtube.com/watch?v=XNcXAsZA4PE(part4)

https://www.youtube.com/watch?v=9vjMVHQ24hY(part5)

https://www.youtube.com/watch?v=-eHBwzPxBLM(part6)

Media Coverage

Decade of development

Can line ministries coordinate with each other to harness 10,000 MW in the next 10 years?

-Saroj Dhakal CEO of 8848Inc'

Jul 8, 2016- Earlier this year in February, Nepal's Ministry of Energy moved forward with an action plan on National Energy Crisis Prevention and Electricity Development Decade, 2016 (NECPEDD 2016). This 92-step strategy passed by the Cabinet provides comprehensive steps to increase our electricity production to 10,000MW in the next decade. This document could be vital for the much awaited and needed reform in the energy market of Nepal to take the country into an era of prosperity and low carbon development. Likewise, the Energy Development Council (EDC), the umbrella association for Nepal's energy sector, in partnership with a company from Shanghai, Neo Ventures, provided a new platform at the 'Nepal Power Investment Summit 2016' conducted from May 31 to June 3 in Kathmandu to spark a boom in the energy market.

This full article is available at the link: ***http://kathmandupost.ekantipur.com/news/2016-07-08/decade-of-development.html*** published on July8, 2016.

24th meeting of IBN concludes

The 24th meeting of Investment Board Nepal has decided to endorse the 'National Energy Demand and Supply Study' and decided to direct the National Planning Commission through the Office of the Prime Minister and Council of Ministers (OPMCM) to make necessary policies, plans and programmes by incorporating the recommendations of the study.

According to the study, the country's energy demand would hover around 10,000 megawatts by 2030.

The current per capita electricity consumption is 132 kWh per year, which is much lower compared to other South Asian countries. At present, only around 58 per cent of the total population in the country has access to electricity.

The Nepal Power Investment Summit 2016, which was held last month, had declared that Nepal requires $20 billion to generate 10,000 MW on grid hydropower projects in the next 10 years. The summit had also declared that the country would need investment of $5 billion for high voltage transmission line projects to be completed within 2035.

Nepal is eyeing generation of 13,700 MW of hydroelectricity within 2025 and 44,000 MW of electricity within 2035.

Of this quantum of hydroelectricity, 12,000 MW can be exported within 2025 and 24,000 MW can be exported within 2035.

According to Nepal Electricity Authority, the current energy deficit stands at 45 per cent.

At present, the total 829 MW installed capacity includes 776 MW of hydro-electricity and 53 MW through thermal plants, which is connected to the National Grid System. But only around 300 MW is generated during the winter season against the demand of around 1,292 MW.

Moreover, today's IBN meeting, which was chaired by Prime Minister KP Sharma Oli has also decided to request concerned ministries to fast-track the environmental impact assessment (EIA) of projects that are in the implementation phase through IBN and to simultaneously take forward the EIA and the process for use of forest land.

The IBN meeting today also made various other decisions, including endorsing the study to set up security printing plant and its operational modality.

This article is derived from the link: ***https://thehimalayantimes.com/business/24th-meeting-investment-board-nepal-ibn-concludes/*** published on July 23, 2016

Article from EDC Member

Wind-diesel hybrid system for rural electrification

WORD hybrid is defined as a combination of two elements that produce a same or complementary results. In a rapidly advancing technology world we live in today, it is a strategic merger in order to achieve more effective solutions. In case of energy sector, hybrid systems have made significant innovative progressions over the past few decades.

Diesel generators are usually used to provide electricity in remote areas with secluded grids. As this method of energy generation is very expensive, we have to turn the alternate solutions. The answer could very well be blowing in the wind. One of the most widely knowledgeable concerns with wind energy is its sporadic nature which is primarily influenced by geographical diversity. It is for the reason that wind hybrid power systems exist and have been utilized worldwide for years. Wind-Diesel Hybrid(WDH) systems are fascinating alternatives for self-reliant power supply for remote locations or areas not connected to the public power grid. If the wind conditions are favourable. These systems allow provision of electricity at considerably lowered costs. Could this be implemented in Nepal, a country where plentiful regions have no transmission lines to bring grid electricity to communities?

WDH power systems generally comprise of diesel generators and wind turbines in conjunction with secondary modules such as control components, energy storage mechanisms, power converters,etc. Like other renewable energy systems, WDH systems can be either grid-tied-meaning that they draw and feed supply into the electricity grid –or-off-grid in which they have no association with the grid at all. In Nepal's case, and particularly in urban areas, where the public power grid faces regular power-cuts due to load shedding, consumers are gradually resorting to their own power backup solutions.

Like in any other energy systems, a large portion of the system costs are determined by the cost of energy storage, which is usually achieved through the use of batteries. Battery-less off-grid WDH power systems can be seen as a solution to establish lower costing power generation units guaranteeing accurate allocation of intermittent wind energy and manageable diesel generation to meet demands of the frequently inconstant load. These systems have less expensive than battery- based system. A battery-less system for example, would not require batteries, a charge controller, interconnecting cabling from battery to inverter, and enclosures for battery banks. With the omission of a battery bank in the system, the AC wiring is also simplified, in that no critical load subpanel or inverter bypass switch need be installed.

The diesel generator set in the off-grid battery-less system would essentially replace the electricity grid in the sense that it would be the majority power supply into the overall system. The setup of such a system is by no means that straight forward. Special 'grid-tie' inverters may be required in order to allow electricity flow from the turbine, This type of inverter converts direct current(DC) electricity into alternating current(AC) with the additional capability to power generation system be it solar or wind, without extensive wiring and more importantly, without batteries. If the alternative power being produced is insufficient, the difference will be attained from the diesel generator. This smart feature in these system would reduce fuel consumption and dependence from using solely diesel-based electricity generation methods.

Wind-Diesel penetration is a critical design factor that helps to define the level of system complexity. Average penetration is the ratio of wind energy produced (kWh) to primary energy demand(kWh). This is commonly calculated on a monthy or annual basis and is intended to find information on the loading on the diesel engines and Losses or efficiencies in the overall system. There are three different classes which should be measured individually due to their specific operating characteristics. These classes are low penetration, medium penetration, and high penetration systems and each have unique operating features.

Concerning low penetrating systems, wind acts as a negative load in that very little regulation or incorportation of Energy from the turbines into the power system is required. The diesel generator(s) runs full-time with wind power Reducing net load on the diesel power generation. The annual penetration in these systems is below20%. Diesel engines deliver all frequency, voltage, and reactive power control requirements in low penetration systems. An example of such system is present in Coqaique, Chilewith a large regional distribution system consisting of three 660kW wind turbines operating in conjunction with 4.6MW of mixed hydropower generation and 16.9 MW of diesel generation

Medium penetration systems incorporate wind energy components as a major part of the power system but the diesel engines are still majority providers of the power control. The diesel generator(s) runs full-time but at high wind power levels and secondary loads are transmitted to guarantee adequate diesel loading, or else wind power generation is reduced. During these high peak wind periods, primary diesel generators run at low loading and if there are secondary diesel generators present, they may shut off. Annual average penetration is between 20% – 50% in these systems. Such a system exists in *San Clemente Island, California* where a diesel powered grid is present with 775kW of power generated from the wind.

High penetration systems consist of completely integrated power systems with advanced 'smart' control. Diesel generator(s) completely shut down during high wind availability periods when they are not required to supply the system with power. There is limited operational control of the system by staff due to the integrated power with advanced control systems. Fuel consumption is greatly reduced due to the majority of power supply coming from the wind. The system controller constantly monitors the power system and there is a very technology dependent system architecture present contributing to a 'smart' hybrid power generation system. Conventionally, fail safe operation strategies are incorporated such that if there is a chance of wind component failure, the diesel engines are able to provide power. An example of this class of system exists is in *St. Paul, Alaska, USA* where one 225kW wind turbine has been used to operate in many cases with all diesel generators turned off.

The configuration and component size of hybrid power systems depend heavily on the load and resource available at site. WDH systems require generators that can be turned on with short notice as they are integral components in the overall system. Wind turbines for such hybrid systems can range in size from 300W to 750kW. Apart from these primary components in the system, other active power control mechanisms are also normally included. These components allow active control of the isolated grid stability and access to minor amounts of immediate power. Flywheels providing short term energy storage while smoothing out the fluctuations in the wind and load are used alongside low load diesel engines allowing operation to below 10% rated power while sustaining regulation over voltage and frequency.

System controllers are the main link between the two energy generating components, the wind turbines and the diesel generator. These operate at very high speeds to monitor system stability accurately and increases overall system performance. Monitoring and remote access mechanisms are also commonly built into the system to allow users an oversight of the system performance enabling real-time system troubleshooting in order to reduce maintenance and downtime.

The successful implementation of such systems must be carried out with the support of communities and as part of energy education/efficiency campaigns. Not only does the cost of imported fuels have to be considered, but also the transportation, maintenance, and potential environmental impacts such systems bear. In the case of Nepal, social sustainability issues will dominate technical ones and only once this is realised and acted upon, the introduction of such hybrid power systems using local renewable resources to reduce dependency on imported fuels for rural/off-grid electricity generation will be seen. The implementation of WDH systems in Nepal will significantly lower the overall diesel consumption for electricity generation. It is our responsibility to really consider these systems as a

possible alternative and only through gradually eliminating the dependency on fuels such as diesel can we dream of a cleaner and greener future.

This article is derived from the link ***:http://www.windpowernepal.com/wind-diesel-hybrid-system-rural-electrification/*** published on JULY 6, 2016.

Guest Corner

LONDON

Richard Branson: 'In 15 years, I suspect every car on the road will be electric'

Photos: The perfect formula?

London (CNN) A world in which all cars run on electricity is not such a distant reality, Virgin boss Richard Branson believes -- thanks to the work done by Formula E.

British entrepreneur Branson has been involved in the motorsport series from an early stage, with his DS Virgin Racing team competing in its first two seasons.

Formula E was introduced in 2014 to help attract a new audience to motorsport and to also help develop electric vehicle technology going forward -- an area in which Branson feels clear progress is being made.

"Formula E is pushing the boundaries forward into what will be the future," Branson told CNN's Supercharged show at the recent London ePrix in Battersea Park. "Fifteen years from now, I suspect every car on the road will be electric.

"What we're doing with these race cars is pushing the technology forward so that road cars one day will be able to go hundreds of miles without having to recharge their batteries."

While great strides are being taken -- cumulative sales of Electric Vehicles (EVs) passed one million last year -- the number of electric cars around the globe is still low, with the International Energy Agency calculating that they accounted for just 0.1% of the total number of passenger cars on the road worldwide in 2015, which was close to one billion.

The Electric Vehicles Initiative is targeting 20 million electric cars to be on the road by 2020, which would provide a global market share of 1.7%.

While Formula E is doing its bit to help bring about a cleaner future, Branson feels the onus is still on the world's political leaders.

"If governments set the ground rules -- and they sometimes have to be brave and set positive ground rules -- and for instance said, 'more than 50% of cars must be battery-driven in 10 years and 100% in 15 years,' we could make that happen," Branson said earlier in the day at an Innovation Summit.

"It will be great fun and really challenging to do. The cars would be much more efficient -- they're not going to keep on breaking down and battery technology will get better and better."

Branson has experience in the world of Formula One, as well as in Formula E, with his Virgin Group having owned the outfit currently known as Manor between 2010 and 2011.

The 65-year-old raised eyebrows last year when stating that he thought Formula E would become bigger than Formula One by 2020.

While he admits to not being so sure about that statement 12 months on, Branson feels introducing Formula E street-racing in major cities such as London will no doubt help its cause.

"Maybe," he said while laughing, when asked if he still stood by last year's prediction. "Formula E is going in the right direction -- the London Mayor's office is here talking about racing on the streets of London.

"If we could have these cars driving around Park Lane and around Hyde Park Corner it would be a real spectacle -- and a lot easier for people to get to than going out to Silverstone and listening to the noisy (F1) cars."

Space age

Branson first came to prominence in the business world after opening a chain of record stores, and after a long and varied career has more recently moved into the realm of space tourism.

He is looking at flying tourists into space with his Virgin Galactic company, where, much like with Formula E, cleaner energy dominates his thinking.

"We're using our 600 engineers who are building our space ships to innovate in a whole lot of other areas," he said.

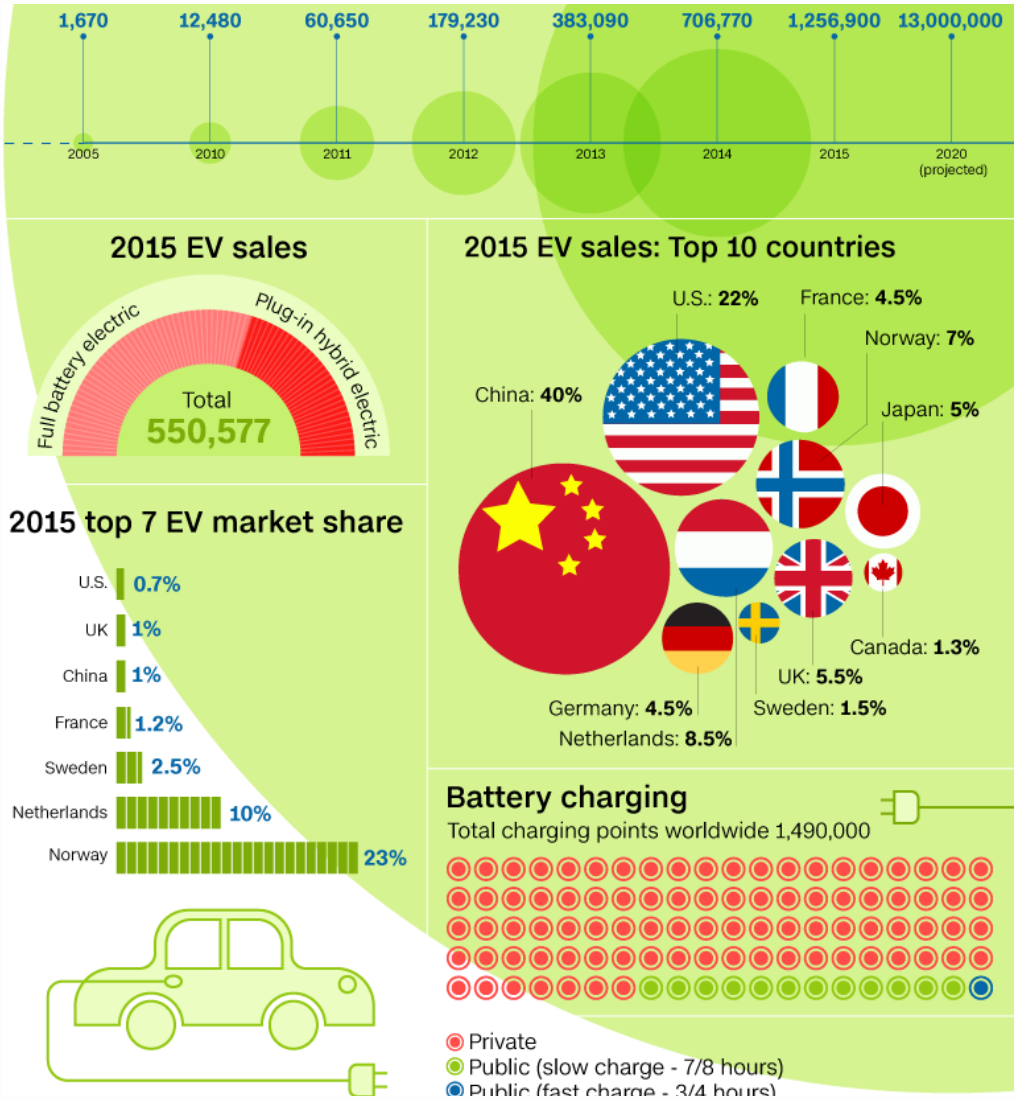
"We're trying to set themselves the challenge of it being 100% clean energy on that plane, with the idea that if they can have these breakthroughs then we can use it with commercial planes as well."

With the 2015-16 Formula E season finishing last weekend, as Renault eDams driver Sebastien Buemi clinched the world title, Branson will be turning his attention to the next campaign, which gets under way in October.

Branson's Virgin Racing will be hoping to improve on its third-place finish in the Constructors' Championship -- in which Renault eDams came out on top -- having placed fifth in the table the year before.

The new Formula E season, which starts on October 9 in Hong Kong and climaxes in New York on July 30, 2017, includes three other new cities -- Marrakech, Brussels and Montreal -- on its 14-race calendar.

Electric vehicle charge in the future
Cumulative number of Electric Vehicle (EVs) Worldwide



The link is derived from the link : ***http://edition.cnn.com/2016/07/08/motorsport/richard-branson-formula-e/index.html#*** published on July 8, 2016

6 Largest Rooftop PV Installations in the World

Many of all rooftop applications are done in small and medium-sized installations for consumption within the buildings that host the arrays. There are many large-scale installation projects which have been completed in the last decade and many are under construction or proposed.The following lists the 6 largest rooftop photovoltaic installation projects in the world.

1. 11.5MV rooftop solar plant at Beas Dera, India

The solar power plant spread over 42 acres on the Dera Baba was the world's largest single rooftop facility. The plant has the capacity to produce 11.5MW electricity, this will mean abating 4-lakh tons of CO2 in the next 25 years. The Centre has set a target of generating 40,000 MW of renewable energy by 2022.

2.6.4MW solar array on the rooftop of Mandalay Bay, US

The Mandalay Bay is covered with 26,000 solar PV panels, the 20 acre expanded solar array produces a combined 8.3 MW DC (6.4 MW AC) of electricity.At full production, the system supplies 25% of the power demand of the entire Mandalay Bay Resort & Casino campus. This will displace approximately 8,400 metric tons of CO_2 annually, the equivalent of taking more than 1,700 automobiles off the road. The electricity produced is also equivalent to the average annual usage of 1,340 U.S. homes.

3.5.38MW rooftop solar project of Toys "R" in US

The 5.38 megawatt on-site solar mechanism will occupy 869,294 square feet of space and is estimated to generate 72% of the distribution center's electricity.This solar power installation will cover nearly 70% of the distribution center's roof and consist of more than 37,000 solar panels.The system is expected to produce approximately 6.36 million KWh of electricity each year. This will displace approximately 4,387 metric tons of CO_2, the equivalent emissions from 860 passenger vehicles or that of the electricity used to power 532 homes annually.

4. 4.9MW rooftop solar project of IKEAin US

IKEA doubles the size of the rooftop solar array at their Perryville, totaling almost 5 MW in size. IKEA has now installed solar on 90% of its U.S. buildings.The 467,618-square-foot solar addition consists of a 2.2 MW system, built with 7,337 modules, and will produce 2,695,355 kWh of electricity annually. Including the existing system, this total 4.9 MW solar installation of 25,913 panels will generate 6,092,533 kWh of electricity yearly, the equivalent of preventing 4,299 tons of CO2 emissions.

5.2.9MW rooftop solar installation for Gerresheimer Glass in US

In 2012, Inovateus Solar finished construction of a 2.9MW rooftop solar installation in Vineland, New Jersey, for Gerresheimer Glass, an international manufacturer of glass and plastic products for the health and pharma industries. They refit a new system roof atop the building, and covered it with more than 11,100 Solar PV modules.

6. 2.7MW Rooftop Solar PV of Boeing 787, US

The installation boasts 18,095 individual panels made of thin-film photovoltaic solar laminate. Thin-film laminates weigh much less than traditional solar modules and because they adhere directly to the surface of the roof, they generate minimal lift under windy conditions. Boeing consumes 100% of the electricity generated on-site.

The article is derived from the link: ***http://www.ledpv.com/blog/6-largest-rooftop-pv-installations-in-the-world_b93*** published on July 8,2016.

AFRICA

Solar Power for Home Use and Micro-grids in Africa

We often report on enormous new solar power installations, facilities that generate megawatts of power. But solar can also bring important benefits to people even with just a few watts. To Africans who had no access to electricity from the grid, the city was dark after the sun went down, people were carried kerosene lamps at night. It's a great work to bring solar power to them to provide LED lighting and phone charging.

Today, the solar-powered micro-grids have served about 75% of sub-Saharan Africans who live off the grid. To date, Off-Grid solar home system has reached more than 100,000 households and hired 800 workers in Tanzania. This year, it's expanding to Rwanda. The goal is to reach 1 million homes in Africa by 2017.

When someone signs up for a system, they will install solar panels on the roof and a meter to monitor energy usage. The solar panels power LED lights, a radio, and a phone charger. Then customers pay about $6 a month to access the power they need. That's what they usually pay for kerosene for their lanterns. Those lanterns smell awful and contribute to respiratory illness when used indoors.

Off-Grid representatives don't ask people how many watts of electricity they want to purchase. It asks them which appliances they want to use, then designs a package based on their specific needs. If they need certain devices, Off-Grid can add those to the package, too.

For many of Off-Grid's clients, their No. 1 wish for electricity is to run a phone charger, so a USB cellphone charger is included in the entry-level package. Solar system with mobile phone charger is a crucial application. People can get by without lights, but not being able to charge their phone, there's no substitute for that.

One-stop solar products provider HELP Technology supply off grid solar power systems with solar panels, batteries, USB phone chargers,LED lights, DC fans, DC TV, DC iron, DC radio, DC water pumps, solar lanterns and more solar DC

products in high quality and good price. For example, the power of our solar home systems range from 30 W to 3000 W, you can always find a suitable model for you home use. Here are 2 models for example:

H80, 80W solar panel, 456 WH battery, it can works for a cell phone charger, 4 LED bulbs, a DC fan, and a DC TV when full charge by the sun in 5-6 hours.

H800, 800 W solar panel, 4800 WH battery, it can works for a cell phone charger, 6 LED bulbs, 2 DC fan, a DC TV, a water pump, and 2 tablets when full charge by the sun in 5-6 hours.

The article is derived from the link : ***http://www.ledpv.com/blog/solar-power-for-home-use-and-micro-grids-in-africa_b92*** published on July 7, 2016.

THE MATRIX OVERLOADED

Computers will use more electricity than the entire world can generate by 2040, tech experts claim

Nightmare scenario means humanity will be simply unable to power the systems which keep us alive

BY JASPER HAMILL

Modern humans depend on their computers to do everything from ordering food to finding a romantic partner.

But the current digital big bang could end with a disappointing whimper because humanity may be unable to produce enough power to keep computers running, experts have warned.

A leading technical l organized called the Semiconductor Industry Association has produced a study which said that computer-crazy society will be running short of electricity by 2040.

Will the world end up running out of power?

It wrote: “Computing will not be sustainable by 2040, when the energy required for computing will exceed the estimated world’s energy production.”

The Semiconductor Industry Association meets every year to discuss how electronic components called transistors – which power computer circuits – can be made ever smaller.

Now the organisation is conceding that they probably won’t get any tinier, heralding the end of an era where computers got faster and faster as transistors shrunk to every tinier sizes.

This means tech firms will have to think of new ways to make computers powerful enough to keep up with demands.

“Driverless cars and personalised medicine along with countless other applications of intelligent systems are on the horizon, the Semiconductor Industry Association added.

The year 2040 carries a huge resonance in the tech world, because some people believe that’s when artificial intelligence will become as clever as us humans – a moment known as the singularity.

This article is derived from the link : ***https://www.thesun.co.uk/news/1498750/computers-will-use-more-electricity-than-the-entire-world-can-generate-by--2040-tech-experts-claim/*** published on July 25, 2016.

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 Bhotekoshi Jalvidyut Company Ltd.	
5.	Rasuwagadhi Hydropower Company Ltd.	
6.	Sanjen Jalavidhyut Co. Ltd.	

S. No.	Name of the Organization	Organization logo
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.	Saral Urja Nepal	
19.	Rara Hydropower Development Co. P. Ltd	

S. No	Name of the Organization	Organization logo
20.	Wind Power Nepal	
21.	Gham Power Pvt. Ltd.	
22.	Lotus Energy Pvt. Ltd.	
23.	Sun Farmer Nepal Pvt. Ltd	

S. No	Name of the Organization	Organization logo
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	

S.No	Name of the organization	Organization logo
30.	Transweld Pvt. Ltd.	
31.	TSN Energy Pvt. Ltd.	
32.	Waiba Infratech Pvt. Ltd.	
33.	North Hydro & Engineering Pvt. Ltd	
34.	Nepal Hydro & Electric Ltd.	
35.	Nepal Hydropower Association	

S.No.	Name of the Organization	Organization logo
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	

ENERGY DEVELOPMENT COUNCIL

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