ELECTRICAL INSTALLATION ENGINEER NEWS LETTER

TAMILNADU ELECTRICAL INSTALLATION ENGINEERS' ASSOCIATION 'A' GRADE (Regn. No. 211/1992)
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EVENTS

Events Profile: Developing citizen friendly and economically viable cities is an urban initiative by the Government of India. Cities are engines of economic growth, and it is anticipated that 40% of India's population will live in cities by 2030. With the rapid rise in the proportion of people living in urban areas, there is an increasing requirement for sustainable cities. Recognizing smart cities as an important platform to drive progressive change, the 3rd Smart Cities India 2017 expo will be supported by 4 other co-located expos to create "One Mega Event".

Date: 10th – 12th May 2017

Venue: Pragati Maidan, New Delhi

Website: http://www.smartcitiesindia.com/expo-venue-pragati-maidan.aspx

Events Profile: LED Expo Thailand is a 3 day event being held from 11th May to the 13th May 2017 at the Impact Exhibition & Convention Center in Bangkok, Thailand. This event showcases products like high and low power LEDs, led lighting systems, led applications and services, led products, led lighting products and equipments, led displays, led decorative lighting services and solutions, led raw materials, led components and all other led correspondents etc. in the Electronics & Electrical Goods industry.

Date: 11th -13th May 2017

Venue: IMPACT Exhibition Center, Hall No. 4-8, Bangkok, Thailand

Website: http://www.ledexpothailand.com/

Events Profile: POWER-GEN India & Central Asia 2017 will bring together industry experts from across the globe to exchange knowledge and share their expertise, as well as showcase the latest power generation technology developments that will ultimately shape and strengthen the Indian power sector.

Date: 17th – 19th, May 2017

Venue: Pragathi Maiden, New Delhi

Website: http://www.power-genindia.com/index.html

Events Profile: This much-awaited International Industrial Trade Fair INTEC 2017 IS brought to you by CODISSIA – The Coimbatore District Small Industries Association, brings together the very best in technological advancement. INTEC is a congregation of various Industries exhibiting their finest innovations and services.

Date: 1st – 5th June 2017

Veneue: CODISSIA Trade Fair Complex, Coimbatore

Website: http://www.intec.codissia.com/

Events Profile: India's Largest Exhibition and Conference for the Solar Industry. It takes place again at the Bombay Exhibition Centre (BEC) in Mumbai from December 5-7, 2017. The event's exhibition and conference both focus on the areas of photovoltaics, PV production technologies, energy storage systems and solar thermal technologies. Since being founded, Intersolar has become the most important industry platform for manufacturers, suppliers, distributors, service providers and partners of the solar industry.

Date: 5th – 7th Dec 2017

Veneue: Bombay Convention & Exhibition Centre, Mumbai

Website: https://www.intersolar.in/en/home.html

MEMBERS DETAILS

S.No.	Company Name	District	Contact No.	License No.
226.	Ayya Vaikundar Minnakem	Kanyakumari	94435 80229	EA 2816
227.	Dhanya Electricals	Kanyakumari	04652-425168, 94439 94168	EA 2914
228.	Sreemathi Electricals	Kanyakumari	94435 79660	EA 2190
229.	Sri Balaji Electricals	Kanyakumari	99439 49882	EA 2669
230.	R.S. Windtech Engineers P. Ltd.	Kanyakumari	04652-262539, 94431 62703	EA 1889
231.	Chettinad Cement Corporation Ltd.	Karur	04324-251345, 97888 58022	EA 1460
232.	Sundhar Electricals Pvt. Ltd.	Karur	94425 17611, 93458 22136	ESA 408
233.	Apple Electricals	Karur	04324-232729, 81446 10710	EA 2922
234.	Prakash Power Planning Pvt. Ltd.	Krishnagiri	04344-242610, 98450 28108	ESA 292
235.	Bhabu Electricals	Kumbakonam	0435-2422311, 94431 06343	EA 2522
236.	Bestech Electrical Engineering	Madurai	0452-4352020, 98940 72020	EA 2636
237.	Hopes Engineering	Madurai	0452-2360407, 98421 41107	EA 1464
238.	J.R. Engineering	Madurai	99944 52092, 98436 89404	EA 2569
239.	P.M.K. Engineering Services	Madurai	0452–2670895, 90037 71969	EA 2717
240.	Ramani Engineering	Madurai	0452-2693444, 98430 42954	EA 2254

KNOW THY POWER NETWORK - 115

I would like to restart my topic with some useful information directly related to Electrical Energy Storage and indirectly or remotedly connected with our regular topic "Micro Grid". Solar, wind and other renewable energy sources are now being inexpensive or cheaper. Hence it is easily affordable to us. The only problem with those energy sources is that they are intermittent in nature and hence not sustainable and unreliable i.e. when there is no wind, there will be no power for us. Similarly if the sun hides itself in clouds, continuous electric power in the required quantity cannot be ensured. Electrical Energy Storage is one of the possible solutions to all these problems. When we have excess solar power or wind power, it can be stored in batteries; when need arises this extra electricity can be used to produce hydrogen which further enhances the "Energy Storage" facilities. Among the problems encountered with these measures are,

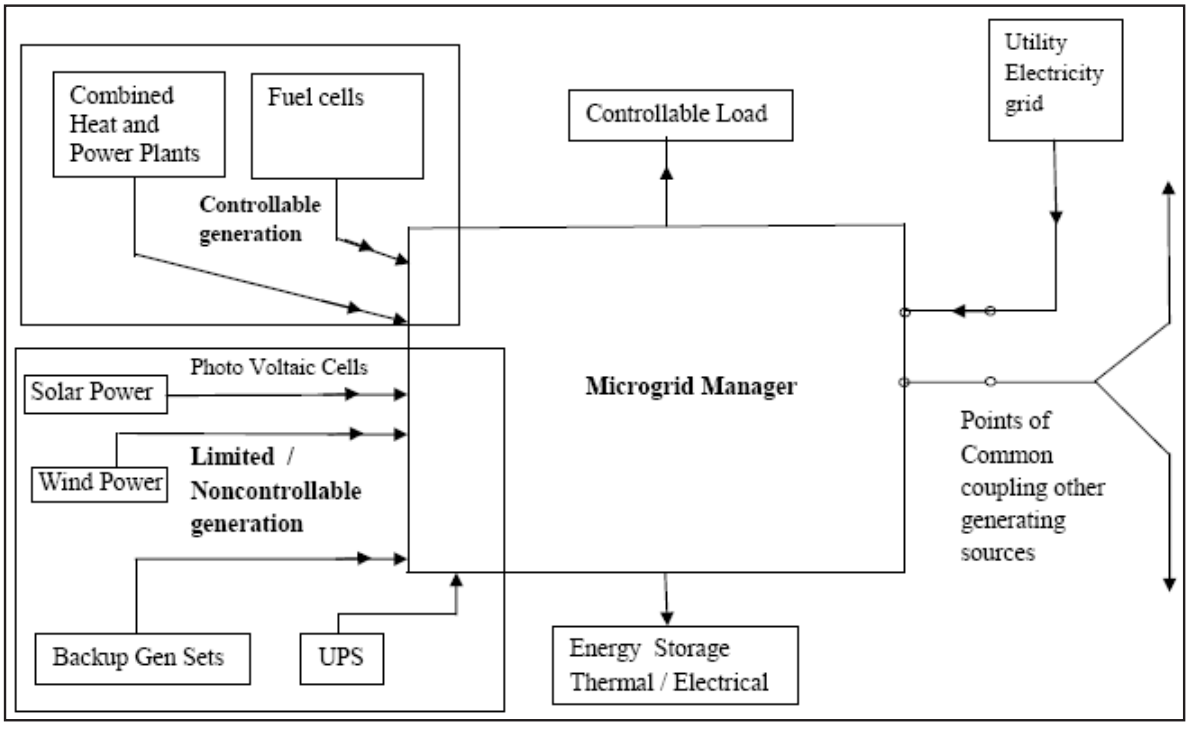
- Need for highly expensive batteries for Energy Storage
- Requirement of a good catalyst to ensure an effective and efficient water electrolysis.

This catalyst can speed up electro-chemical reactions in water splitting or metal air batteries.

In this regard the development of new nano fibre (about 20 nano meters diameter)– perovskite assumes significance. This nano fibre acts as an efficient catalyst and is helpful in ultra fast oxygen evolution reactions in hydrogen based energy sources and the newer metal air batteries. These Metal-air batteries are expected to power electric vehicles in the near future. They can store a lot of energy in much smaller space than the batteries currently in use. *The critical structure of the catalyst that is used to form the nano fibres is termed as* **"Perovskite"**. Thus this newly found nano fibres meets the need for the good catalyst to ensure the markedly enhanced oxygen evolution reaction capability and also in a way assist the development of an inexpensive battery for Energy Storage Purpose.

Now it is time for us to revert to our regular topic viz. Micro grid. To proceed further, let us have a brief look at micro grid i.e. how it looks like.

A Micro grid with a group of distributed generation with control device and device to facilitate connect / disconnect supply from nearby utility grid and localised loads.



A cursory glance at the above sketch will show that a micro grid generally consists of controllable generating sources like Co-generation plants, Diesel power plants, Fuel cells, Uncontrollable / limited control power stations like solar power plants, (photovoltaic cells) wind electric generators. Small hydel plants, Backup generator sets and UPS, A main centralized controller, Fast operating energy flow controllers / separation devices (Breakers), a high speed communication system, controllable local loads and two way net connected energy meters. The controller performs the nerve centre of the entire grid and they perform the function of the dynamic control of the system as a whole. As its functions are well defined, it takes the responsibility of regulating power production and consumption within the micro grid boundaries i.e. it performs the role of energy manager in the micro grid. In addition, it carries out the activities like grid synchronisation system protection, cyber security, load shedding, island forming and other ancillary services to the grid. The controller closely monitors the energy flow condition and when the situation warrants, it arranges for the seamless transition from the "Grid Mode" (parallel operation to the centralized electrical energy grid) to the "Island Mode". The distributed generation or generation side of the grid supplies the required electrical power to the connected loads. These generating sources range from fossil fuel operated sources like diesel and natural gas generators to renewable energy driven micro turbines, fuel cells, solar photovoltaic's cells and wind turbines.

The size of the load varies depending on the micro grid customers. Today its landscape is filled up with the players like Utilities Municipal power supplies, Independent power producers, Government undertaking and Independent transmission utilities. The driving force behind the fast formation of micro grids lies,

- Fuel cost saving
- Urgent need for the reduction in the caron foot prints
- Fuel independence
- Enormous losses brought by the extended unscheduled power outages of the centralised grid.

The main influencing factor is the high cost of unscheduled power interruptions which lies in the range of $150 billion in USA itself.

Added to this is the fact that 90 percent of the electrical outages generally occur on the power distribution networks. This point alone is strong enough to attract people towards the formation of micro grids. Continuous process industries, firms / industries connected with digital economy and essential services prefer micro grids because micro grids can provide relief by eliminating unscheduled outages and the consequential economic impact completely.

With This, let me sign off.

(To be continued…)

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WILL A RECORD-LOW WIND POWER TARIFF HURT ENERGY PRODUCERS' PROFITS?

Even as the recently concluded wind power auction has shifted the focus back to the sector, the jury is still out on the financial viability of the record low tariffs for power generating companies. Wind power prices crashed to a record low of Rs 3.46 a kWhr (kilo Watt-hour) on February 24 in the country's first-ever auction of producing 1 Giga Watt (GW) wind capacity conducted by Solar Energy Corporation of India.

The five companies which won the auction bid were: U.K.-based Mytrah Energy (India) Ltd., Singapore based Sembcorp Green Infra Wind Energy Ltd., Inox Wind Infrastructure Services Ltd., Ostro Kutch Wind Pvt. Ltd. and Adani Green Energy Ltd., according to a Bloomberg New Energy Finance (BNEF) report. The companies will set up wind power projects and sell energy to Power Trading Corporation of India Ltd. (PTC). The wind sector had been hit by inordinate delays in signing of power purchase agreements and untimely payments; distribution firms have shied away from procuring electricity generated by wind projects.

A high feed-in tariff had no buyers of power earlier, but now the contract winners will have a 25-year power purchase pact with PTC. Under a feed-in tariff, a renewable power generator is paid a cost plus return based price for the power it supplies. A record low tariff of Rs 3.46 per kWhr to supply power will become financially feasible for power generators if they adopt high efficiency turbines, reduce their capital expenditure, negotiate with suppliers and service providers, according to experts.

"The developers have to be very careful on execution. They have been given only 18 months for execution. As developers have to arrange land on their own and turbine procurement typically takes 6-12 months, execution on time and within budget will be a challenge.

"On the other hand, because of the auction based allocation, developers can choose the most cost efficient turbines rather than buy a package of land, machine and construction work at a premium from EPC (engineering, procurement, construction) contractors." Vinay Rustagi, managing director of Bridge to India, a renewable energy sector consultancy, told BloombergQuint.

What Works?

The wind power generation sector will witness a complete makeover, which earlier relied on feed-in tariffs. Earlier, feed-in tariffs for wind energy ranged from nearly Rs 3.80 to Rs 6.04 kilowatt-hour, the BNEF report said. Shantanu Jaiswal, an analyst at BNEF who authored the above quoted report, sees margins of power producers "squeezing", but expects the auctions to create new business opportunities, and promote innovation.

"Auctions are expected to squeeze margins for the entire value chain, but will also create new business opportunities and promote innovation to bring down the costs. Independent power producers who had been petitioning for increasing feed-in tariffs will now have a lot of explaining to do," said the BNEF report. The auction mechanism has successfully managed to reduce the price of renewable energy, in turn increasing the competitiveness of wind and solar against fossil fuel, it added. A solar auction conducted in early February this year also showed a record low bid of Rs 3.30 rupees a kilowatt-hour on for 750 megawatts of projects in Madhya Pradesh. The average tariff for coal-based power for nine-month period ending December, 2016 was Rs 3.28 per unit, as per NTPC Ltd.'s data. State-owned NTPC is the largest power producer in India with a generation capacity of 48 GW. The total installed capacity of power stations in India as on January 31, 2017 was 314.6 GW, according to data on Central Electricity Authority's website. Of this, wind-produced power's share is 28.7 GW.

Power produced by generators is carried through a transmission network into a grid. The power producers may not incur a loss in power as these projects will be connected to a high-voltage national grid, and will be selling power to PTC India. Usually, wind projects were connected with low-voltage state-grids which led to loss in power generated by these producers. "For developers, this means whatever power they produce, they can sell it. In state grids or low voltage grids…if the grid is unstable, then even if the project can produce power, the grid cannot take that power. So, ultimately the developer ends up losing that power," said Rustagi. Earlier, the wind power generation industry was lobbying to increase the feed-in tariff, but all players have bid aggressively in the recently concluded auctions. "There is a discrepancy on how wind projects are priced. Now, the project costs should fall as there will be strong negotiations between wind equipment manufacturers and IPPs (Independent Power Producers), and the regulatory body would now want to understand why there

was such a discrepancy in price. This would lead to some transparency in the system, which could in turn lead to drop in prices". These companies will have to reduce their borrowing cost, capital expenditure, and might need to tone down their equity return expectations, BNEF's Jaiswal said.

Prashant Khankhoje, an advisor at the Independent Power Producers Association of India concurs that a "drastic" reduction in installation cost and capital expenditure would help in making a low-tariff model sustainable. The companies should improve their technology for generation for new installed capacity.

What Doesn't Work?

Hero Future Energies Ltd., which was a participant in the wind power auction, did not bid in it, as the renewable energy major did not find the tariff attractive. "Companies have bid for a lower tariff and they would know what's best for them…for us those tariffs were not good, so I did not bid. People have taken a call that they can get 35-40 percent PLF (plant load factor) from new turbines…And believe that the plant load factor will go up significantly with new turbines," Sunil Jain, chief executive officer, Hero Future Energies told Bloomberg Quint. "Companies also think that turbine prices will fall 15-20 percent, so that is another view. A combination of all the factors will result in such lower tariffs. Only time will be able to tell whether these bids are financially viable or the returns are good," he added.

He said that companies also think that turbine prices will fall 15-20 percent, which would help them going ahead. An earlier version of this story had incorrectly mentioned in the introduction that experts are divided on the financial viability of the feed-in tariff instead of the tariff arrived at through the auction.

https://www.bloombergquint.com/business/2017/03/04/will-a-record-low-wind-power-tariff-hurt-energy-producers-profits.

Courtesy: Bloomberg Quint

INDIA'S 'FIRST' GRID-SCALE STORAGE SYSTEM AIDING ROOFTOP PV INTEGRATION IN DELHI

What is thought to be India's first grid-scale energy storage array will be developed and delivered by a joint partnership between system provider AES and Mitsubishi Corporation, it was announced today.

A 10MW system built on AES' lithium-ion battery-powered Advancion platform will be delivered to grid operator Tata Power Delhi Distribution (Tata Power DDL). One of the primary motivations for its deployment is to aid the penetration of rooftop solar.

The Advancion array, which AES has deployed in numerous locations around the world, will in this instance help manage peak loads, increase flexibility of the network and improve reliability of power supplies. It will be installed in Rohini, Delhi and is expected to be completed by the end of this year.

"For a rooftop solar program to be successful, it is important for the distribution network to integrate it with energy storage solutions to take care of power generation spikes and fluctuations, system stability, reactive power compensation and grid emergencies," Tata Power DDL's CEO and managing director Praveer Sinha said.

"This will prove to be an important learning for developing integrated rooftop solar and storage solutions for India."

AES and Japan's Mitsubishi Corporation signed an agreement to work together in February last year, to sell Advancion – which is now into its fourth generation – into markets including Asia, Australia and New Zealand.

India's renewable energy ambitions could drive storage demand

As frequently reported on sister site PV Tech, India's current Prime Minister Narendra Modi is keen to foster renewable energy development, leading to seemingly weekly announcements of vast solar PV projects. The country has a target of 100GW of solar by 2022. This has already led to a number of **Indian states tendering for solar projects paired with energy storage.**

An aspirant middle class which seeks more reliable energy supplies and several hundred million people in rural populations that want greater access to electricity mean that demand is expected to continue to grow. In a blog for this site in October last year, analyst Harsh Thacker of the India Energy Storage Alliance (IESA) talked of a potential **15GW of large-scale opportunities in India over the next seven years in energy storage.**

சென்னை காவல்துறை அறிவிப்பு

திருட்டை தடுக்க காவல் துறையின் சில ஆலோசனைகள்

1. இரவு நேரங்களில் கதவையும் ஜன்னல்களையும் திறந்து வைத்துவிட்டு தூங்குவதை தவிர்க்கவும். திருடர்கள் திறந்திருக்கும் வீட்டினுள் நுழைந்து படுத்திருக்கும் பெண்கள் கழுத்திலுள்ள செயினை அறுத்து சென்றுவிடுவார்கள்.
2. பொதுமக்கள் வீட்டை பூட்டிவிட்டு வெளியூர் சென்றால் காவல் துறைக்கு தகவல் தெரிவிக்கவும். முடிந்த மட்டும் வீட்டின் வழக்கமான இடங்களில் நகை, பணம் வைப்பதை தவிர்க்கவும். மேலும் வீட்டை பூட்டி செல்லும் போது நகை மற்றும் பணத்தை வீட்டில் வைக்காதீர்கள்.
3. வீடுகளில் இரவு நேரங்களில் முன் மற்றும் பின் பகுதியில் விளக்குகள் எரியவிடவும், வீட்டிலுள்ள அனைத்து கதவுகள் மற்றும் ஜன்னல்களை அதிக பாதுகாப்புடன் பூட்டவும்.
4. பகல் நேரங்களில் தண்ணீர் கேட்டாலோ, விசாரணை என்ற பெயரிலோ விற்பனையாளர்களாகவோ, பொருட்களை ரிப்பேர் செய்பவர்களாகவோ, வருபவர்களிடம் எச்சரிக்கையாக இருக்க வேண்டும்.
5. பகல் நேரங்களில் டி.வி. பார்க்கும்போது, சமைக்கும் போதும் வீட்டின் கதவு உட்பக்கம் எப்போதும் பூட்டியிருக்க வேண்டும்.
6. தெருக்களில் பெண்கள் தனியே செல்லும்போது சங்கிலி பறிப்பு திருடர்களிடம் கவனமாக இருக்க வேண்டும். முடிந்த வரையில் சங்கிலிகளை வெளியே தெரியாமலோ அல்லது புடவையில் பின் செய்து போட்டுக் கொள்ளவும்.
7. இரு, சக்கர வாகனங்களை வீட்டிற்கு வெளியே நிறுத்தி வைக்கக் கூடாது, மேலும் சைடு லாக் (Side Lock) போடாமல் நிறுத்தக் கூடாது.
8. உங்கள் தெரு, காலனி, அடுக்குமாடி குடியிருப்புகளுக்கு கூடுதல் பாதுகாப்புக்கு தனியாக பாதுகாவலர்களை நியமிக்கவும்.
9. உங்களை யாராவது தொலைபேசியில் தொடர்பு கொண்டு உங்கள் ஏ.டி.எம். கார்ட், கிரெடிட் கார்டு, வங்கி கணக்குகளின் விவரங்களை கேட்டால் சொல்ல வேண்டாம்.

பஸ் மற்றும் ஆட்டோவில் பயணம் செய்யும் போதும் மற்றும் பொது இடங்களுக்கு செல்லும் நபர்களின் கவனத்திற்கு

1. நீங்கள் பஸ் நிறுத்தத்தில் காத்திருக்கும்போதோ, பேருந்திலோ, ஆட்டோவிலோ பயணம் செய்யும் போது யாரேனும் கழுத்தில் உள்ள தங்க சங்கிலி அறுந்துள்ளது அல்லது கொக்கி கழன்றுள்ளது அதை பத்திரமாக கழற்றி வைக்கும்படி சொன்னாலோ, தங்க சங்கிலி அறுந்துள்ளதாக கூறி கழற்றி பையில் வைத்த தங்க சங்கிலியை கவனத்தை திசை திருப்பி திருடி சென்று விடுவார்கள். – **எச்சரிக்கை**

2. மூன்று**,** நான்கு பெண்கள் கும்பலாக, பேருந்திலோ, ஷேர் ஆட்டோவிலோ ஏறி அதில் ஒரு பெண் தானாக முன் வந்து பையையோ, குழந்தையையோ கொடுத்தும் மற்றவர்கள் நெறுக்கிக்கொண்டும் தங்களின் கவனத்தை திசை திருப்பி, நகைகளையோ, பணத்தையோ, செல்போனையோ திருடக்கூடும் - **எச்சரிக்கை**

3. உங்கள் கார் பஞ்சராகிவிட்டது கவனிக்கவில்லையா? என்று கூறி உங்கள் கவனத்தை திசை திருப்பி காரிலுள்ள உங்களது பணப்பையை பறித்து செல்லும் கும்பலிடமிருந்து – **உஷார்**

4.அரிப்பு பவுடரை உங்கள் மீது தூவி உங்களது கவனத்தை திசை திருப்பி நீங்கள் வைத்திருக்கும் உங்களது பணப்பையை பறித்து செல்லும் கும்பலிடமிருந்து - **உஷார் உஷார்**

5. உங்களிடம் அங்கே கலவரம் நடக்குது உங்களது செயினை கழற்றி பத்திரமாக வைத்து கொள்ளுங்கள் என்று கூறி உங்கள் கவனத்தை திசை திருப்பி செயினை பறித்து செல்லும் கும்பலிடமிருந்து எச்சரிக்கையாக இருந்து திருட்டை – **தவிர்ப்பீர்**

6. கீழே உங்களது பணம் விழுந்துவிட்டது அதை எடுத்துக்கொள்ளுங்கள் என்று கூறி உங்களது கவனத்தை திசை திருப்பி நீங்கள் பையில் எடுத்து செல்லும் பணத்தை திருடி செல்லும் கும்பலிடமிருந்து எச்சரிக்கையாக இருந்து திருட்டை - **தவிர்ப்பீர்**

7. காரின் பின்னே ஒருவர் கல் தூக்கி எறிவார். இன்னொருவர் உங்களது காரை யாரோ கல் எறிந்து சேதப்படுத்துவதாக நல்லவர்போல் கூறுவார். கவனம் சிதறி பின்னால் சென்று பார்ப்பதற்குள் காரில் கொள்ளையடித்து செல்வார் - **உஷார் உஷார்**

KUDANKULAM'S SECOND UNIT TO START COMMERCIAL OPERATIONS THIS FISCAL

The second 1,000 MW unit of the Kudankulam nuclear power plant is expected to start commercial operations this fiscal, government said today. The plant, located in Tamil Nadu, currently has an installed capacity of 1,000 MW. The second unit of the project was made critical in July 2016 and connected to the grid in August. Minister of State in the Prime Minister's Office Jitendra Singh said the unit power was raised in steps in line with the regulatory clearances and reached its full power of 1,000 MW on January 21 this year.

"The unit is presently under test operation at its rated power of 1,000 MW, generating infirm (non-commercial) power. The unit is expected to start commercial operation in the current financial year," he said during Question Hour in the LokSabha.

Asked whether the government has received any request from Tamil Nadu government for early commissioning of the second unit, he replied in the affirmative.According to him, there was no displacement of people due to the Kudankulam project."The setting up of the project provided employment opportunities for the local people in Nuclear Power Corporation of India Ltd (NPCIL)."About 97 per cent of the employees in Group B, C and erstwhile Group D at Kudankulam are from Tamil Nadu state. Large number of locals are employed with the contractors," he said.

The installed capacity of the project is 1,000 MW and since it has been connected to the grid, it has generated around 1,515 million units of electricity up to January 31 this year.

The Indian government has put renewed vigour into nuclear power plans as part of its infrastructure development programme, with negotiations on to unlock long-standing agreements with French, Russian and US companies, said a report released here today."Its overall goal is to have 14.5 GWe (Gigawatt or one billion watts of electricity power) of nuclear generating capacity online by 2024, compared to 6,219 MWe now," said the World Nuclear Performance Report 2016 released at the Singapore International Energy Week being held this week.The government gave in principle approval for new nuclear plants at 10 sites in nine states, according to the report by the World Nuclear Association.

Those for indigenous pressurised heavy water reactor are at Gorakhpur in Haryana's Fatehabad; Chutka and Bhimpur in Madhya Pradesh; Kaiga in Karnataka; and MahiBanswara in Rajasthan.

Those for plants with foreign cooperation are Kudankulam in Tamil Nadu; in Jaitapur in Maharashtra; ChhayaMithiVirdhi in Gujarat; Kovvada in Andhra Pradesh and Haripur in West Bengal, though this location has been in doubt.In addition, two 600 MWe fast breeder reactors are proposed at Kalpakkam.

A prototype fast breeder reactor is nearing completion at Kalpakkam, according to the report.The report also noted performances of the nuclear power plants which were commissioned in Rajasthan in 1973. The unit has had a mixed history with lengthy outages from 1982 to 1987 and 1994 to 1997. It has been put out of service since 2005.

The second unit of nuclear power plant in Rajasthan, which came into operation in 1981, performed more reliably, despite long outages between 1994 and 1998, and from 2007 to 2009. It achieved a lifetime capacity factor of 56 per cent. Rajasthan 3, starting in 2003, has managed a cumulative capacity factor of 76.5 percent.Altogether, the country has commissioned 18 Pressurised Heavy Water Reactors, two small BMRs - boiling water reactors - (in 1969) and two PWRs - pressurised water reactors - (at Kudankulam in 2014 and 2016, respectively), according to the report.A dip in the average capacity factor in 2008 and 2009 resulted from contemporaneous outages at Rajasthan 2, Kakrapar 1 and Narora units 1 and 2, it said.

The association noted challenges of providing electricity across the world's rural regions where people lack electricity. It has set a higher target for nuclear power - 25 per cent of electricity in 2050, which would require an estimated 1,000 GWe capacity.It said one possible pathway to this target would be to build 10 GWe a year between 2015 and 2020, step this up to 25 GWe per year to 2025, and then 33 GWe per year to 2050.

All power is within you;
you can do anything and everything.

- Swami Vivekananda

WHAT IS A BIOMIMETIC WIND TURBINE?

A New Responsible Model: Harnessing Energy Right in Your Own Backyard

Electrical needs are increasing everywhere in the world, creating tension between costs and new social inequalities. Those accelerated needs are coupled with the phenomenon of populations concentrating in urban centers, where the necessary wattage for this new urban consumption must be transported.

It seems only sensible to begin to harness that energy as close as possible to where it is to be consumed – to avoid line loss and connection costs, and deliver an immediate, durable electrical service.

Amassing lost energy sources is what energy harvesting is all about. Multiplying and combining micro power sources already present in the environment, accumulating watts one by one, modestly yet daily, to lower electrical bills and provide an autonomous energy service that will contribute to the preservation of our planet.

A Groundbreaking Innovation: Harnessing the Slightest Breeze

New Wind has developed a technology that is able to harvest wind turbulence. Turbulence is the average variation in the flow of air at any given point. Plentiful yet capricious, it floats over rootops, along highways, through city squares and across building façades. Four years of R&D was needed to model that airflow and tailor a micro turbine — known as the Aeroleaf® — to its movements.

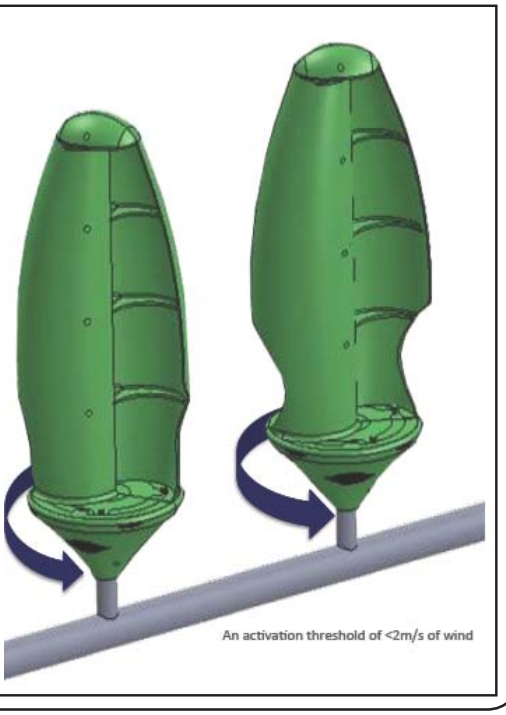
Especially conceived to harness and exploit the slightest airflow, the Aeroleaf® is triggered at 2 meters per second. These small modular units are installed in relation to the nature of the wind source and are adaptable to various electrical needs.

Perfectly silent, integrated into their surroundings and discreet, several units may be spread out over a beautifully designed, state of the art structure, like the Arbre à Vent®, which will be NewWind's first product to hit the market in 2016.

Design at the Heart of Innovation

Design plays an essential role in NewWind's energy solutions.

We rethink their forms, take technical constraints into consideration and improve functionality. NewWind has worked hand in glove with designer Claudio Colucci on the Arbre à Vent® from the very onset.



The Aeroleaf® - A Groundbreaking Technology

Innovative

A combination o0f micro electricity and multiple turbines that can harvest the smallest of winds and accumulate their individual

Effective

A lower activation threshold and an inertia rate close to zero, for increased production of ± 300 days per year

Intelligent

The electronic regulator in each leaf harvests the maximum amount of power every second

Silent

Its vertical axis turbine contributes to a perfectly unobtrusive presence

Reliable

A solidly built mechanism, devoid of belts or gears, for greater durability

Modular

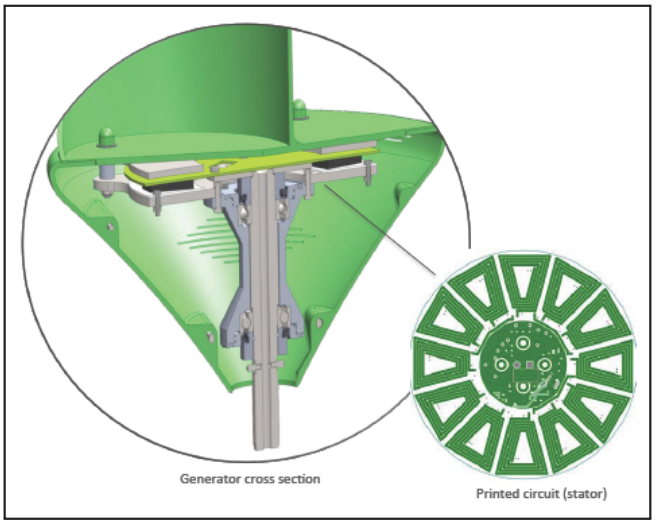
The number of units used is adaptable to the consumer's needs, anywhere from 500 W to 3kW

Simple

A Plug & Play system allows the consumer to change the individual Aeroleafs without risking any drop in tension

The Aeroleaf®

The **Aeroleaf**® is comprised of a vertical axis blade and a synchronous axial flux permanent magnet generator. Its printed circuit with internal regulator replaces the traditional copper coil inductor, making each leaf autonomous.



From Idea to Reality

It all began in 2011, when Jérôme Michaud Larivière hatched the idea of creating an Electrical power generating system in the form of a tree, with each leaf an actual mini wind turbine. Capturing low wind speeds and turbulence is at the crux of this novel approach, which can deliver power and autonomy simply through a proliferation of leaves.

Thus, **the Arbre à Vent®** was born out of a desire to create **the first human scale biomimetic**

Wind turbine capable of recreating a sympathetic bond between the consumer and his or her means of power generation.

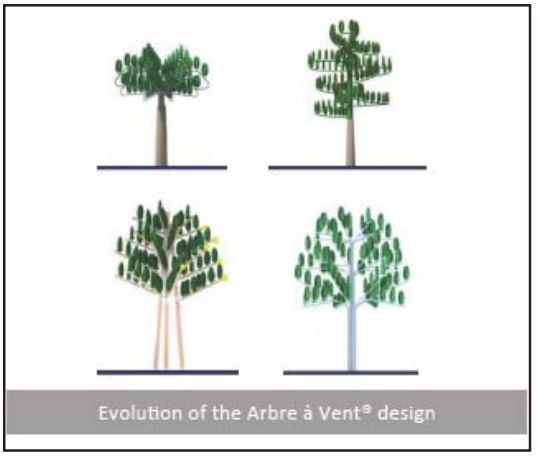
Claudio Colucci was entrusted with the design of the Arbre of Vent®. Combining elegance and

performance, he freed the tree from its central trunk and placed its leaves in a seemingly chaotic

manner so as to capture the maximum amount of air movement. Organic and curvilinear in form, the Arbre à Vent® turns our very notion of windmills on its head, obscuring cables, blades and generators within the guise of the tree.

Its groundbreaking Aeroleaf® technology is simultaneously rustic and sophisticated. A microprocessor in each leaf allows it to harvest maximum energy from the wind available at any given moment. It took three and a half years of R&D to latch onto the wind curve, without inertia, and attain energy efficiency.


Jérôme Michaud-Larivière & Claudio Colucci


Evolution of the Arbre à Vent® design

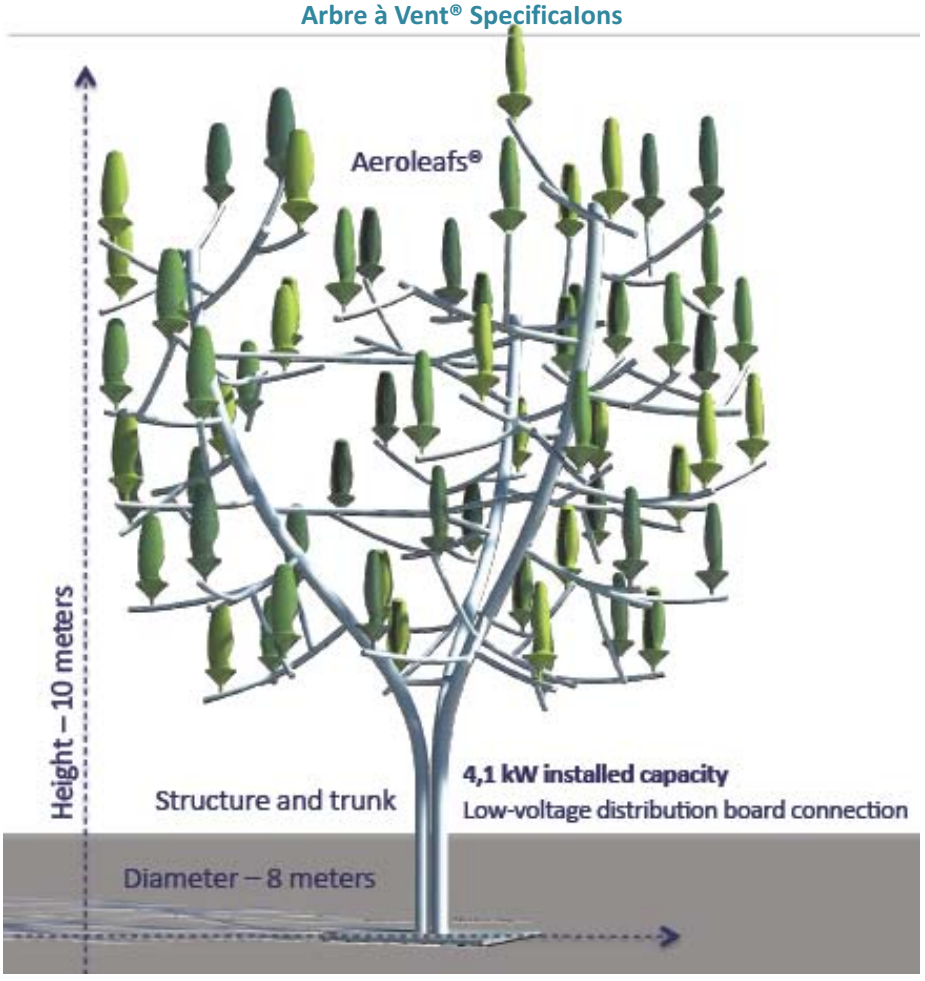
Welcome to the City of Tomorrow

What will make up the city of the future? By the end of 2015, the global urban population will have grown by 2%, or 70 million additional city dwellers. Such a demographic shift heralds deep cultural, social, economic and environmental changes. Responsible for more than 70% of Greenhouse gas emissions, cities must advocate an enthusiastic, positive response to climate change.

Facing up to those issues, some new ecological city models are now coming to light. Experiments conducted over the past several years, under Smart City standards, show that we can better manage water, energy, waste and even traffic.

The SmartCity concept is stimulating the imaginations of many architects, urban planners, thinkers, businessmen and engineers.

Arbre à Vent® Specificalons



Producing an average of 2400 kWh annually, depending upon its location:

Equivalence

Today, we are witnessing the emergence of the "startup" city, which is becoming the driving force of urban innovation. Transformed into open air laboratories, cities now compete with one another to be the most forward thinking in terms of urban experiments and installations.

A city's intelligence and innovation are, above all, meant to serve their inhabitants. People live their lives there and share in a community. Their relationship to the urban space has always created new options, and sometimes simply the best option. Sometimes technology must virtually disappear, in order to become more empathic and offer new experiences. That is NewWind's goal, with its Arbre à Vent® and other applications still to come.

ABB INDIA SURPASSES 4.5 GW RENEWABLE ENERGY PORTFOLIO

Power equipment company ABB India today said the company has surpassed a portfolio of 4.5 Gigawatt renewable capacity with delivery of over 2,000 units of power generators in the country.

The company said these generators for wind turbines are manufactured in a factory in city of Vadodara Gujarat, recognized as ABB's one of the most advanced facility globally and the fourth such facility in the group.

"As the price gap narrows between electricity generated from thermal, solar and wind projects, quality solutions to optimize and integrate wind projects assume paramount importance to create long term value," said Sanjeev Sharma, Chief Executive Officer and Managing Director, ABB India.

Currently, the country has a wind power installed capacity of nearly 28 GW. Around 10 per cent of this was installed in 2015. Several policy and regulatory incentives are accelerating the country's achievement of the 60 GW generation target by 2022.

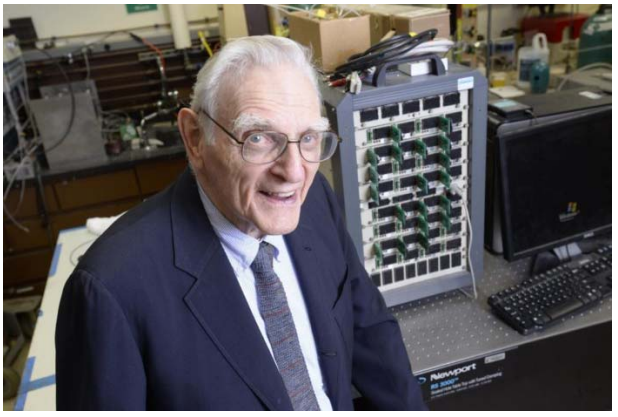
As per recent reports by the Indian Wind Turbine Manufacturers' Association the capacity addition for wind projects for the fiscal year ending March 31, 2017 is expected to be around 4 GW. ABB Group has supplied components for over 40,000 wind turbines across the world.

The Indian arm of Swiss power and automation group ABB posted biggest growth in orders in recent years with orders worth Rs 12,466 crore in 2016. In quarter ending December 2016, the company received orders worth Rs 5,628 crore.ABB India posted a revenue of Rs 2,492 crore for the quarter and Rs 8,648 crore for the full year.

ABB is working in sync with the government to realise its renewable energy vision and 24x7 reliable power for all. And new orders in UHVDC (ultra high voltage direct current) transmission technology projects pioneered by ABB, which reduces losses to transmit clean energy over long distances, would be key to realising this dream. In line with the government's 'Make in India' initiative, ABB India has been consistently investing to deepen footprint in the country, innovating and deploying global technology for domestic and international markets. The robust order backlog complements ABB India's proven execution ability to provide a strong foundation for profitable growth in the future.

"Our performance is built on deeper customer engagement, more value added offerings and the organization agility to adapt to changing global and local market demand cycles. Our focus on operational excellence with consistent work on cost and cash has ended the year with solid results," said Sanjeev Sharma, CEO and Managing Director, ABB India.

LITHIUM-ION BATTERY INVENTOR INTRODUCES NEW TECHNOLOGY FOR FAST-CHARGING, NONCOMBUSTIBLE BATTERIES



A team of engineers led by 94-year-old John Good enough, professor in the Cockrell School of Engineering at The University of Texas at Austin and co-inventor of the lithium-ion battery, has developed the first all-solid-state battery cells that could lead to safer, faster-charging, longer-lasting rechargeable batteries for handheld mobile devices, electric cars and stationary energy storage. Good enough's latest breakthrough, completed with Cockrell School senior research fellow Maria Helena Braga, is a low-cost all-solid-state **battery** that is noncombustible and has a long cycle life (battery life) with a high volumetric **energy density** and fast rates of charge and discharge. The engineers describe their new technology in a recent paper published in the journal *Energy & Environmental Science*.

"Cost, safety, energy density, rates of charge and discharge and cycle life are critical for battery-driven cars to be more widely adopted. We believe our discovery solves many of the problems that are inherent in today's batteries," Good enough said.

The researchers demonstrated that their new **battery cells** have at least three times as much energy density as today's lithium-ion batteries. A battery cell's energy density gives an electric vehicle its driving range, so a higher energy density means that a car can drive more miles between charges. The UT Austin battery formulation also allows for a greater number of charging and discharging cycles, which equates to longer-lasting batteries, as well as a faster rate of recharge (minutes rather than hours).

Today's lithium-ion batteries use liquid electrolytes to transport the lithium ions between the anode (the negative side of the battery) and the cathode (the positive side of the battery). If a battery cell is charged too quickly, it can cause dendrites or "metal whiskers" to form and cross through the liquid electrolytes, causing a short circuit that can lead to explosions and fires. Instead of liquid electrolytes, the researchers rely on glass electrolytes that enable the use of an alkali-metal anode without the formation of dendrites.

The use of an alkali-metal anode (lithium, sodium or potassium)—which isn't possible with conventional batteries—increases the energy density of a cathode and delivers a long cycle life. In experiments, the researchers' cells have demonstrated more than 1,200 cycles with low cell resistance.

Additionally, because the solid-glass electrolytes can operate, or have high conductivity, at -20 degrees Celsius, this type of battery in a car could perform well in subzero degree weather. This is the first all-solid-state battery cell that can operate under 60 degree Celsius.

Braga began developing solid-glass electrolytes with colleagues while she was at the University of Porto in Portugal. About two years ago, she began collaborating with Good enough and researcher Andrew J. Murchison at UT Austin. Braga said that Good enough brought an understanding of the composition and properties of the solid-glass electrolytes that resulted in a new version of the electrolytes that is now patented through the UT Austin Office of Technology Commercialization.

The engineers' glass electrolytes allow them to plate and strip alkali metals on both the cathode and the anode side without dendrites, which simplifies battery cell fabrication.

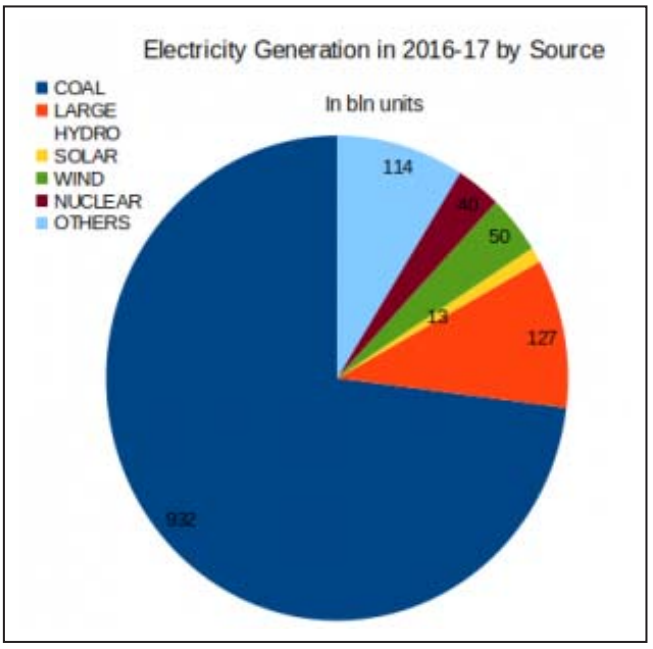
Another advantage is that the battery cells can be made from earth-friendly materials.

"The glass **electrolytes** allow for the substitution of low-cost sodium for lithium. Sodium is extracted from seawater that is widely available," Braga said.

Good enough and Braga are continuing to advance their battery-related research and are working on several patents. In the short term, they hope to work with battery makers to develop and test their new materials in electric vehicles and energy storage devices.

SOLAR POWER OUTPUT UP 75% THIS YEAR, BUT STILL ONLY 1% OF TOTAL

Production of electricity from solar power is all set to rise 75% this year, while that from wind is on track to rise 51%, according to the latest numbers available with the ministry of new and renewable resources, government of India.



Despite this, the two will only account for less than 5% of the total power produced.

The higher production figures for solar are largely in line with the growth in installed capacity.

Total grid-connected solar power generation capacity is set to rise from about 6 GW in March 2016 to about 10 to 11 GW at the end of March, though that is well below the target of 12.7 GW.

Together, the power production from alternate sources will go up by 28% in the ongoing financial year, going by the trends seen in the ten months from April 2016 to January 2017. The financial year is due to end this month.

The overall growth rate for power production from alternate energy would have been higher but for a steep fall in the production of power from the burning of sugarcane bagasse, which is considered a 'green' source as sugarcane sucks up more carbon dioxide that is released at the time of the combustion of the waste material.

STILL MINUSCULE

Despite the hype surrounding the increasing generation capacity of solar and wind, the absolute power generation figures are far more modest.

For example, against India's capacity to produce about 250 GW of power by burning coal, it has a capacity of about 28 GW of wind power and around 10 GW of grid-connected solar.

In other words, the wind capacity is equal to 11% of the total thermal capacity, while solar is 3.2%.

However, in actual production of electricity, both are even further behind.

For example, solar produced about 10.56 billion units (kWh) of electricity in India in the first ten months of this year and is likely to end up producing close to 13 billion units for the full year.

Assuming that the average capacity for the year is around 8.5 GW, this implies a production rate of about 1.52 billion units of power per GW. This also represents an efficiency (or load) of 17.5% — which is superior to the 14-15% seen in European countries.

However, these output numbers are dwarfed by the figures for coal-based powers.

The 250 GW of coal-power plants produced 827 billion units of electricity in the first 324 days of this year, implying that the are on track to outputting around 932 units for the full year.

In other words, though solar accounts for 3.2% of the capacity of thermal plants, the actual production this year is likely to be only 1.4% of their output.

This is because of the higher efficiency of coal plants, which can be run 24 hours a day. Per GW of capacity, coal plants are on track to produce 3.73 billion units compared to only 1.52 billion for solar and 1.79 for wind.

OVERALL ENERGY MIX

The numbers reveal that alternate sources of power are likely to contribute about 85 billion units out of the total 1276 billion units of power produced in India in 2016-17.

Within this, the share of solar will be a 1.02%, while wind will contribute 3.92%.

Large hydropower plants, which are also 'renewable' power, will contribute about 127 bln units or 10% of the total.

SEAWIND SYSTEMS AND DR. TECHN. OLAV OLSEN STRATEGIC ALLIANCE - 6.2MW DEMONSTRATOR PROJECT

Seawind Systems and Dr. Techn. Olav Olsen announced today that they have formalized a strategic alliance agreement to drive new business value by accelerating introduction of 2-bladed offshore wind energy systems using Olav Olsen designed concrete fixed and floating gravity based structures.

Offshore wind is a renewable energy source with tremendous potential, but significant roadblocks prevent it from becoming a self-sustaining industry. High current installation and maint enance costs make it unattractive for private sector investments and it is heavily reliant on on-going subsidies.

Olav Weider, Managing Director at Olav Olsen said: 'The Seawind team's life-long work has been to develop a commercially viable alternative to current 3-bladed turbines. The European Union recently awarded their efforts with a 'Seal of Excellence'. We are excited to participate in their 6,2MW Demonstrator project at the MetCentre demonstration facility in Karmøy.'

Martin Jakubowski, CEO of Seawind: 'The high cost of wind energy is due to the fact that current offshore models are modified versions of heavy, three-bladed onshore turbines, not made for offshore operations. Offshore wind energy is restricted to moderate climates, because current models cannot withstand harsher conditions, like hurricanes. Seawind will offer the first 6.2 MW two-bladed upwind energy turbine specifically designed for offshore. With its teetering hinge and yaw control, it is built for violent offshore conditions. It contains less material and fewer parts, has longer expected life and on board maintainability. We are very proud that we are able to work with the prestigious engineering company Olav Olsen on our first offshore Demonstrator'.

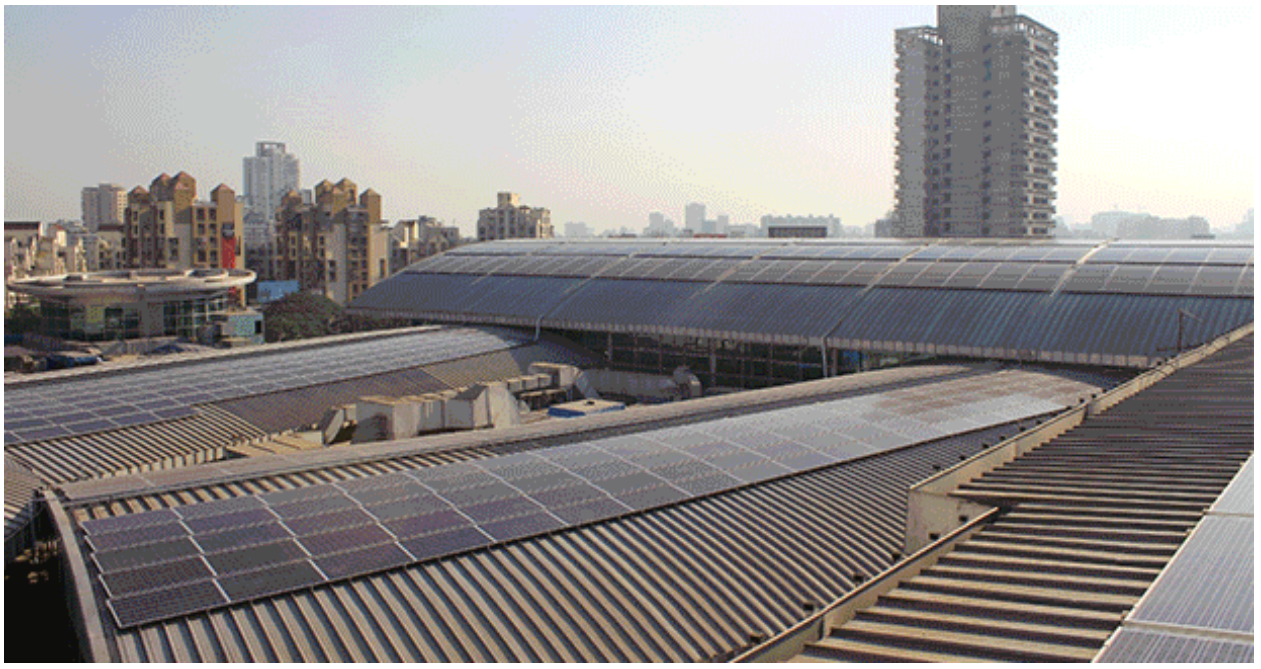
Seawind implements key enabling technology into rugged turbines, made to be installed and operated at sea. Even in storm-prone areas, like East Asia and the US. The turbine nacelle has a helipad that allows heavy helicopters to safely transport personnel and equipment. The LCOE will be significantly lower than for traditional offshore wind turbine systems.

Seawind and Olav Olsen have entered into a strategic alliance to build a first Demonstrator in 2018 of the Seawind 2-bladed turbine using an innovative Olav Olsen support structure. Olav Weider: 'Offshore concrete structures such as the Condeep platforms have been the company's trademark since the seventies. We have worked closely with the Seawind technical team to develop an specific design for their unique 2-bladed wind turbine'. Olav Olsen has a track record in installing highly innovative offshore structures.

Seawind Systems AS management has been working on offshore wind and renewable technologies for the past 20 years. The engineering branch of Seawind Systems AS, based in Genoa, is comprised of engineers well versed in the design of wind turbines. Seawind distinguishes itself from traditional wind turbine manufacturers as wind turbine engineering teams traditionally do not design both the support structures and installation methods at sea. The Seawind technology was originally developed for grid scale energy production in the United States using the most sophisticated simulation software for helicopter rotors coming out of Hamilton Standard and NASA fundamental research results. This made it possible to adapt most efficiently to any wind conditions with the highest tolerance, reliability and safety under all weather conditions, including cyclones.

Dr.techn.Olav Olsen AS is an independent structural and marine engineering company based in Lysaker, Norway. The core competence of the company is advanced structural engineering, the marine environment, concept development and project execution. Dr.techn.Olav Olsen was instrumental in the development of the Condeep concrete platform for the North Sea and has since then participated in the design of approximately 70% of the world's offshore concrete structures. Based on this world-leading expertise, the company is now involved in a broad range of projects for various industries such as Oil & Gas, Offshore wind and marine renewables, Coastal engineering, Transportation and Civil Construction.

MUMBAI'S VIVIANA MALL INSTALLS INDIA'S LARGEST ROOFTOP SOLAR PLANT



Viviana Mall in Mumbai has installed one of the largest single-site solar plants in India.

The mall, located in Thane, has constructed a 900,000 volt-ampere rooftop solar power plant, which the company said was the biggest in India.

900,000 volt-ampere refers to the peak capacity of the power plant. It implies that at full power (during noon on a sunny day for example), you can power 80,000 LED lamps using the electricity generated by the rooftop panels, or operate 9,000 LCD televisions.

The plant will be able to generate about 720 units of electricity per hour, or about 3,033 units in one day (panels are assumed to work only for about 4.2 hours a day due to limited sunlight availability).

A plant of that size can generate enough power to meet the entire electricity needs of 100-150 households.

The mall expects to save 30% of its electricity usage by using solar energy and aims to generate around 33 lakh unit of electricity in the next three years.

"This is in sync with the initiative of Prime Minister, NarendraModi's vision to raise renewable capacity to 175 gigawatts by 2022 from 45 gigawatts at present," said Sheth Corp, the company that owns the shopping destination.

Solar power is seen as the primary solution to the global warming crisis that is staring the world in its face. It is expected that if the world continues to use fossil fuels at the current rate, human life will become difficult on the planet in around 150 years or so.

"We believe solar is the power of our future. We as a part of the society are taking a small step towards saving energy by installing solar power plant in the mall. We received full co-operation, guidance and support from all concern government departments. We also aim to increase the power generation in coming years by 15 per cent and would want to be known as the greenest mall of India," said AshwinSheth, Chairman and Managing Director, Sheth Corp &Viviana Mall.

PLASTIC BAGS ARE NOT BIO-DEGRADABLE & DO NOT DECOMPOSE FULLY

Where as paper bags are Reusable & Bio-degradable. You have altered your House, your Car & Life style. But still you spread the Cause & Need to save your Environment. Promote & Make Use of Solar Energy for pollution free. ***Say no to Plastic bags.***

Ministry of New & Renewable Energy (MNRE) issued draft guidelines for development of onshore wind power projects in May 2016. After consultation with stakeholders MNRE issued final Guidelines on 22 October 2016. This was stated by Shri Piyush Goyal, Minister of State (IC) for Power, Coal, New & Renewable Energy and Mines in a written reply to a question in Rajya Sabha.

GUIDELINES FOR DEVELOPMENT OF ONSHORE WIND POWER PROJECTS

I. Introduction

To ensure healthy and orderly growth of wind power sector in the country, the Ministry of New & Renewable Energy issued guidelines for development of wind power projects in July 1995 and same were revised from time to time. In addition the Government has taken various initiatives to encourage wind power development in the country. All these *efforts have resulted in reaching 28.1GW of wind power installed capacity in the country at the end of September 2016* and now, **India is globally placed at 4th position in terms of wind power installed capacity.**

Most of the wind power development in India took place over the last 20 years and during this period the wind turbine technology has evolved from less efficient turbines with low capacity of 225kW to more efficient turbines with high capacity of 3MW being manufactured in India. Wind being intermittent in nature the large scale deployment of wind power has posed challenges on grid integration. The regulatory authorities have tightened regulations for grid integration of wind turbines.

Further, the *Government has set an ambitious target of reaching 60GW of wind power installed capacity in the country by 2022*. To achieve the target the current rate of deployment of wind power capacity is required to be more than doubled.

With the technology development, new regulations and requirement of accelerated growth of wind power sector, it is felt to issue comprehensive guidelines for development wind power projects in the country in consultation with various stakeholders.I

II. Objective

The objective of these guidelines is to facilitate the development of wind power projects in an efficient, cost effective and environmentally benign manner taking into account the requirements of project developers, State and national imperatives.

III. Site Selection and Feasibility

The process of wind power project development starts with site selection. Identification of suitable sites depends upon land use permission, availability of wind resource, technically and commercially feasible grid connectivity, transport logistics and environmental acceptability.

(a) Land Use Permission: The project developer should ensure that the land being selected for the wind power project can be legally used for the purpose and all regulations regarding land use/land cover are complied with.

In case of allotment of land or land use permission given by State Government for the purpose of development of wind power project, a maximum period of 4 years may be allowed for development and start of commissioning of the project after allotment / permission to use land given by the Government. If the project is not developed within the given time frame the land allotment / land use permission may be cancelled, however, extension may be granted for force majeure conditions.

For existing project developers, where land is already allotted or land use permission has been already given 18 months or higher, prior to issue of these guidelines may be given another 30 months subject to providing an undertaking that they are willing to develop and start commissioning of the project within stipulated period of 30 months.

(b) Availability of wind resource: The project developer is required to ensure the availability of wind resource at the site based on the various parameters measured for the purpose. The project developer is also required to ensure the quality of the data capture data particular site for the correct assessment of the wind resource potential, project viability and sustainability of the project over the designed life time of the project.

In order to facilitate the wind industry, academia and research institution to analyse the wind power potential, the time series data from all the wind masts installed by NIWE through financial assistance from Government of India will be made available by NIWE without charging any cost.

(c) Technically and commercially feasible grid connectivity: The project developer should ensure that grid connectivity is technically and commercially feasible at the site selected.

(d) Transport logistics: The project developer should ensure that components of the wind power project can be transported to the sites elected with existing infrastructure and in case any addition is required the same would be created without any legal issues.

(e) Environmental acceptability: If the site beings elected falls in the area of forest land or in the vicinity of habitat of migratory birds and their flight routes, civil aviation, defence and heritage establishments the project developer should ensure availability of necessary clearances from concerning authorities.

IV. Type certification and quality assurance

Type certification is to confirm that the wind turbine type is designed, documented and manufactured inconformity with design assumptions, specific standards and other technical requirements. For manufacturers of wind turbines and components, type and quality certification by an Internationally Accredited Certification Body shall be amendatory requirement. The wind turbine model shall possess a valid type certificate issued by any internationally accredited type certification body as per IEC/GL type certification scheme, along with certified power curve. The type certificate of the wind turbine model should mandatorily include Huband Nacelle assembly / manufacturing facility in India.

Now in turbine model shall be allowed for installation in the country until it has obtained type and quality certification as mentioned above. To facilitate SNAs, investors, lenders and developers, the Ministry of New and Renewable Energy will bring out the list of type and quality certified wind turbine models eligible for installation in the country. The list will be regularly updated by the MNRE through an online automated tracking and approval process.

V. Micrositing

Micrositing is the optimization of energy production through the correct placement of wind turbine generators in the wind farm area, considering all physical constraints of the area. The optimized location of wind turbine generators (WTGs) may be computed by running an appropriate wind flow modelling, optimisation tools (linear and Non-linear) and techniques in any terrain conditions. The criteria for Micrositing shall be based on an optimized output rather than a strict mandated minimum distance between wind turbines. Micrositing criteria are prescribed as under;

i. Developer(s) shall optimize the wind turbine locations within their land using appropriate wind flow modeling and optimization tools (linear and Non- linear) / techniques subject to site assessment as per

IEC 61400 – 1 standard for turbine safety considering extreme wind, flow inclination, vertical wind shear, and turbulence with added wake effects and corrections for terrain complexity etc.

ii. Developer(s) shall maintain a distance of 2xD (D-Rotor Diameter) distance perpendicular to the predominant wind direction and 3xD distance in the pre- dominant wind direction from the boundary line of each adjoining land of other developer(s) with appropriate off set.

iii. Developer(s) shall maintain a wake loss (in terms of energy) of 10% between wind turbines with appropriate off set for wind turbines sited on a foot print basis.

iv. Developer(s) shall maintain a distance HH+1/ 2 RD+ 5m (Hub Height + Half Rotor Diameter +5 meters) from Public Roads, railway tracks, highways, buildings, public institutions and EHV lines.

v. Developer(s) shall not site wind turbines within 500m of any dwelling for the mitigation of noise

The above mentioned Micrositing techniques will also assist in repowering & intercropping as the investors / developers will have no constraints with minimum distances within the available land ensuring optimized utilisation of the land with wind resource.

VI. Grid connectivity

For establishment of the evacuation arrangement and grid connectivity, the respective Electricity Regulatory Commission Order / Regulation shall be applicable.

VII. Compliance of Grid Regulations

Wind Turbine should be certified by an accredited certifying body for the compliance of the grid regulations including Active/Reactive power control, Low Voltage Ride Through (LVRT), power quality and other applicable requirements as per standards and regulations prescribed for the same by regulatory authorities.

VIII. Metering and Real Time Monitoring

It shall be necessary for the project developer to install Availability Based Tariff (ABT) compliant meter with telecommunication facility at the pooling station / sub-Station to enable implementation of forecasting and scheduling regulation. It shall also be mandatory to communicate vital grid parameters on real time basis to respective Regional / State Load Despatch Centre.

IX. Online Registry and Performance Reporting of Wind turbines

An on line registry of wind turbines installed in the country will be created by NIWE. The wind project developer shall upload monthly performance report of the wind turbine on the web- portal created by NIWE for this purpose.

X. Health & Safety

In order to ensure health and safety of people working/residing near the wind power installations the NIWE will prescribe criteria for noise and shadow flicker in consultation with stakeholders

XI. Hybridization

Wind being intermittent in nature and having low CUF in comparison to conventional power, its hybridisation with other renewable and storage technologies would result in reduced intermittency and efficient utilisation of transmission infrastructure. The project developer may prudently use hybrid technologies in line with Policy issued by the Central/State Governments for this purpose.

XII. Repowering

Based on the improved wind turbine technology available the project developer may opt for repowering of the wind turbine as per Repowering Policy of the Central/State Governments.

XIII. Decommissioning Plan

The proposal to establish wind power project should necessarily include decommissioning plan of the wind turbine after completion of its useful life. The NIWE will formulate guidelines for decommissioning of the wind turbines in consultation with stakeholders.

"Efficiency tends to deal with Things. #Effectiveness tends to deal with People. We manage things, we lead people."

ABB LAUNCHES WORLD'S FIRST DIGITAL DISTRIBUTION TRANSFORMER

ABB Ability™ based intelligent transformers to facilitate better asset management while enhancing reliability and optimizing costs

ABB today announced the launch of the world's first digital distribution transformer at its ABB Customer World event in Houston, Texas. Integrated sensing and monitoring technology in ABB's new TXpert™ transformer will provide intelligence to maximize reliability, optimize operating and maintenance costs and manage the asset more efficiently. This latest innovation builds on the ABB Ability™ digital offering that uses cloud computing and connected devices to generate actionable data for a broad range of customers.

The performance data collected from the sensors is stored and analyzed within the transformer, offering insights on how it is operating. This will provide utilities, industries and installations like data centers with vital information to make key decisions on the operation and maintenance of their transformers and support the management of the asset throughout its life cycle. This includes activities like scheduling of maintenance, optimizing system performance and planned asset replacement.

Power grids are undergoing an unprecedented transformation both on the supply and demand side. Many new and distributed sources of energy including the influx of renewables and new demand loads like datacenters and electric vehicles, call for a more flexible grid, driving the need for greater digitalization and automation. Intelligent products that can communicate are an essential component in the convergence of information and operational technologies.

"Distribution transformers are vital components in the electrical value chain. This latest innovation extends our digital portfolio and ABB Ability based offering, and reinforces our positon as the world's leading transformer manufacturer," said Claudio Facchin, President of ABB's Power Grids Division. "It also reiterates our Next Level strategic focus on enabling a stronger, smarter and greener grid."

TXpert™ is part of ABB's Transformer Intelligence™ portfolio that includes state-of-the-art sensors, monitoring platforms and software tools built upon ABB's deep domain knowledge and expertise. It will be a catalyst for enhancing distribution transformer performance, improving predictability and increasing reliability.

ABB (ABBN: SIX Swiss Ex) is a pioneering technology leader in electrification products, robotics and motion, industrial automation and power grids, serving customers in utilities, industry and transport & infrastructure globally. Continuing more than a 125-year history of innovation, ABB today is writing the future of industrial digitalization and driving the Energy and Fourth Industrial Revolutions. ABB operates in more than 100 countries with about 132,000 employees.

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ZURICH, SWITZERLAND, MARCH 14, 2017

TERI

TERI was formally established in 1974 with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to face within in the years ahead

- on account of the gradual depletion of the earth's finite energy resources which are largely non-renewable and
- on account of the existing methods of their use which are polluting

Over the years the Institute has developed a wider interpretation of this core purpose and its application. Consequently, TERI has created an environment that is enabling, dynamic and inspiring for the development of solutions to global problems in the fields of energy, environment and current patterns of development, which are largely unsustainable. The Institute has grown substantially over the years, particularly, since it launched its own research activities and established a base in New Delhi, its registered headquarters. The central element of TERI's philosophy has been its reliance on entrepreneurial skills to create benefits for society through the development and dissemination of intellectual property. The strength of the Institute lies in not only identifying and articulating intellectual challenges straddling a number of disciplines of knowledge but also in mounting research, training and demonstration projects leading to development of specific problem-based advanced technologies that help carry benefits to society at large.

The Institute's growth has been evolutionary, driven by a vision of the future and rooted in challenges looming today, based on an approach that looks beyond the present and across the globe. TERI has, therefore, grown to establish a presence not only in different corners and regions of India but is perhaps the only developing country institution to have established a presence in North America and Europe and on the Asian continent in Japan, Malaysia and the Gulf.

The global presence and reach attained by TERI are not only substantiated by its presence in different parts of the world, but also in terms of the wide geographical relevance of its activities. Symbolic of this fact is the annual Delhi Sustainable Development Summit (DSDS), a major event focusing on sustainable development, the pursuit of the Millennium Development Goals (MDGs) and assessment of worldwide progress in these critical areas. DSDS attracts the most prominent thinkers and practitioners in a range of fields that impinge on development. Since development worldwide is moving towards an architecture based on partnerships, the leaders who participate in DSDS come from government, business and industry, multilateral and bilateral organizations, research and academia and civil society. Encouraged by the success of DSDS, TERI has now established the World Sustainable Development Forum (WSDF), which is guided by the patronage of a group of select world leaders. WSDF would extend the experience of each DSDS to other parts of the world and carry out careful evaluation and monitoring of developments worldwide, particularly in meeting the MDGs.

The Institute established the TERI University in 1998. Initially set-up as the TERI School of Advanced Studies, it received the status of a deemed university in 1999. The University is a unique institution of higher learning exclusively for programmes leading to PhD and Masters level degrees. Its uniqueness lies in the wealth of research carried out within TERI as well as by its faculty and students making it a genuinely research based University.

TERI now has staff strength of over 900 dedicated employees, drawn from a range of disciplines and experience, supported by infrastructure and facilities, which are world class and distinctively state-of-the-art. The Institute continues to grow in size, spread and intensity of work undertaken.

In this world of increasing globalization and buoyed by optimism generated by the success of the Indian economy TERI moves forward to meet the challenges of the future through the pursuit of excellence embedded in its visionary charter.

Panoramic view from TERI's Himalayan Centre

TERI, Himalayan Centre, Mukteshwar

Overview

Nestled in Latey Bunga, Mukteshwar, 2300 metres above the sea level, stands TERI's Himalayan Centre. Blending the best that nature has to offer with the latest in

technological innovation, this green building is ideal for purposes off repose and research. In addition to a residential wing, this TERI Centre boasts a state-of-the-art conference hall, complete with a meeting area, rest rooms and Internet facility.

Architecture

The architecture of the building reflects the local style. Practical considerations of locale and availability of resources also determined its design. The result – a simple, yet aesthetically designed building, which can capture the interest and imagination of the beholder.

Landscaping and Lighting

In accordance with strategic landscaping principles, trees have been planted on the northern side of the building to provide a buffer against cold winds. The general orientation of the building is south-east, ensuring that all major openings are in line with the sun. This positioning allows for optimal use of daylight for purposes of lighting as well as heating. Furthermore, each suite comes attached with unique solar passive features known as 'sun-spaces'. These enhance heat gain by day and emit it by night, when it is required. Judiciously planned corridors in front of the habitable spaces dilute the glare of the sunlight, while trapping solar radiation to be emitted at night.

Sunlight spills into sun spaces, warming the indoor areas.

Renewable Energy Systems

Renewable energy systems in the form of photovoltaic solar panels have been integrated into the roof of the utility building and conference hall to meet a portion of the electrical requirements. An effective solar water heating system is in place to meet the hot water requirements of the building's inhabitants. In the absence of sufficient sunlight, battery banks provide a power back-up of three days. Fibre glass panels in the ceilings and walls act as insulators, preserving heat and improving acoustics.

Solar water heating system Photovoltaic solar panels for harnessing solar power

Solar water heating system

Photovoltaic solar panels for harnessing solar power

Water Management

Despite the ample rainfall in the area, it faces a severe shortage of potable water. As a result, innovatively designed, twin-chambered water tanks are deployed in the harvesting and subsequent filtering of rainwater for human consumption.

The Himalayan Centre was designed with the basic purpose of disseminating relevant technological information at the grassroots level. A purpose it adequately fulfills by training farmers and villagers as to the latest techniques in agriculture. It is proposed that the water harvesting system used here be popularized amongst the locals in order to facilitate the conservation of the precious resource of water.

Teri Ranked 7th amongst The Energy and Resource Policy Think Tank by University of Pennsylvania

New Delhi, 29thJan 2013: In a major announcement The Energy and Resources Institute (TERI) has been ranked 7th in the top 20 Energy and Resource Policy Think Tanks by the University of Pennsylvania's Think Tanks and Civil Society Program. Since its inception in 1974, The Energy and Resources Institute (TERI) has

evolved as an institution of excellence for its path breaking research on sustainable development, climate change, environment and energy

The Rankings' primary objective is to recognize some of the world's leading public policy think tanks and highlight the notable contributions these institutions are making to governments and civil societies worldwide. Over the past six years, the "Think Tank Index" has become the authoritative source for the top public policy institutions around the world. This year the report was launched at the United Nations University and at the World Bank in Washington, D.C. The Program's Rankings remain the first and most comprehensive ranking of the world's top think tanks, and are based on an annual global peer and expert survey of over 1950 scholars, policymakers, journalists, and regional and subject area experts. Given the rigor and scope of the process, the Rankings produced have been described as the insider's guide to the global marketplace of ideas. As part of the process, all 6,603 think tanks in the world were contacted and encouraged to participate in the nominations process as well as a group of over 9,000 journalists, policymakers, public and private donors, think tanks, and regional and subject area specialists. This group of peers and experts were surveyed to nominate and then rank public policy research centers of excellence for 2012. Additionally, the Program has assembled a set of Expert Panels, comprising over 750 expert members from around the world, spanning the political spectrum and drawing from a wide variety of disciplines and sectors, to help in the refining and validation of the lists generated. These experts were consulted at every stage in the process. The nominations and rankings were based on the detailed set of criteria that included the think tanks' production of rigorous and relevant research, publications, and programs in one or more substantive areas of research.

A newsletter published every two months, it highlights news and announcements of TERI and its research groups.

Visit: http://bookstore.teriin.org/index.php
Courtesy: http://www.teriin.org/index.php

SOLAR-POWERED TRAINS ARE CLOSER TO REALITY THAN WE MIGHT THINK

How can we connect solar photo voltaics (PV) directly to railways to power electric trains? That's the question my charity 10:10 and researchers at Imperial College's Energy Futures Lab are trying to answer. Electric trains are by far the best long distance transport mode when it comes to carbon emissions – at least when their electricity comes from renewable sources like solar or wind.But the UK's ageing power network poses a significant challenges to any bid to decarbonise road and rail that relies on the grid. There are now swathes of the British countryside where it is impossible to plug in any new solar, wind or hydropower without being hit with a whopping bill for the full costs of local network reinforcement.

Faced with this constraint, and squeezed by government subsidy cuts, UK solar developers have started to focus on ways to generate power directly for consumption, rather than exporting it to the grid. With the right customers, solar developers can offer lower tariffs than the grid, while still earning more for their power than they would get from exporting it.

Brighton gears up for new fleet of solar-powered buses.

Solar giant Lightsource, for example, recently signed a 25 year power purchase agreement (PPA) with Belfast airport that underwrote a neighbouring £5m solar farm, using a private wire to supply a quarter of the airport's electricity needs.

Why solar and trains are perfect match

As an industrial client with high on-site daytime energy use and a structural reason to stay put, Network Rail has all of the features needed to support this kind of approach.The UK's electrified rail routes have all of the features needed to support this kind of PPA-based renewable development, and more. Network Rail is the UK's single largest electricity consumer, with internal decarbonisation targets and a strong incentive to reduce operational energy costs. Alongside Transport for London (London's largest electricity consumer), these companies spend around £500m every year on traction power for their trains. There are already over 5,500km of electrified tracks in the UK, with a major electrification programme building or converting hundreds more over the coming decades.

Early indications suggest it should be possible to connect virtually anywhere on the approximately one-third of this network that uses the direct current (DC) traction power system, unlocking access to thousands of potential new sites that have previously been out of bounds to new renewables. What's more, the universe apparently wants this to happen: the standard operating voltage of the third and fourth rail DC routes is 630v-750v, while the standard output voltage of a solar PV array tends to be between 600v and 800v.This serendipity makes the engineering challenge of connecting the two look very manageable, and the likely cost of the power interface equipment competitive with typical grid connection costs. Conversion of renewable DC to grid alternating current (AC) results in something like 3% of the electricity being wasted, so supplying DC power direct to trains saves that loss too. Some of these DC routes already suffer from "under-powering", meaning train operators cannot add more passenger capacity to these routes because the grid cannot supply the extra electricity needed to power the trains. At scale, our innovation could solve this problem as well.

Solar Trains in India

While our project has been driven by the UK context, direct connection of solar to railways will be a world first that has far wider potential application. Globally, most city metros around the world run on rail systems at 750V. If connection to AC overhead lines also proves viable through our work, then the market potential goes well beyond city metros. For instance, analysts have identified inadequate distribution and transmission infrastructure as a key obstacle to realising India's aggressive target of 100GW of solar PV capacity by 2022. But India already has over 25,000km of electrified tracks, and an electrification target of 2,000km of new tracks every year. If our innovation means India can power its railways directly with trackside solar then we will have made a huge contribution to the global project to keep fossil fuels in the ground.

In the UK, if our feasibility study proves successful, the next step will be to prove the concept with a handful of real-world pilot projects. For this, we're working with members of the Community Energy South umbrella group of renewable energy co-operatives to identify promising sites where they could install a megawatt or two of trackside solar. Our vision here is to bring local people, commuters and rail employees together to crowd fund investment in these pioneering projects, sharing the financial rewards of progress in the low carbon transition as widely as possible.

THE ITAIPU DAM

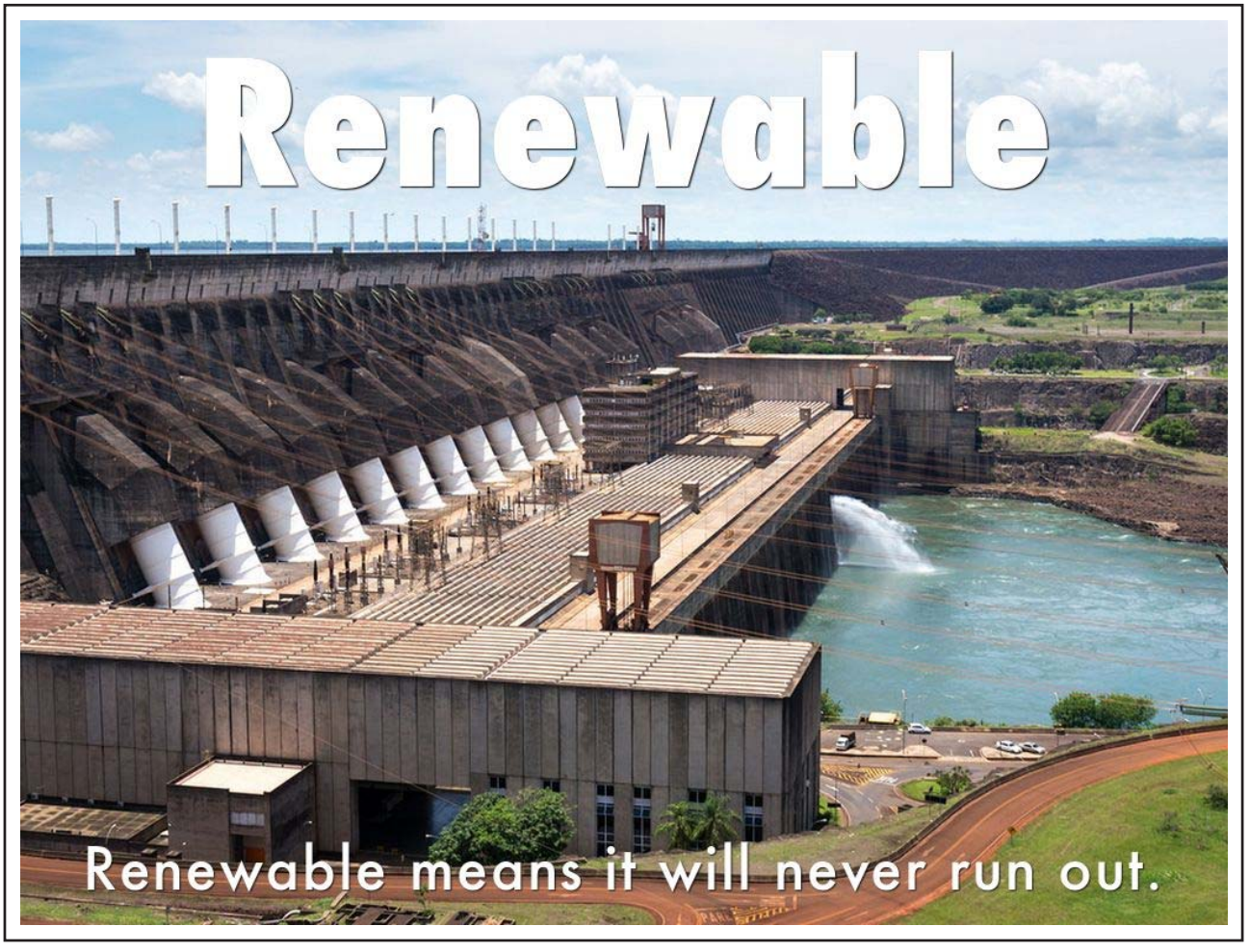
The Itaipu dam is known as one of the seven wonders of the modern world due to its sheer immensity. It spans the Parana River separating Paraguay and Brazil; each country owns half of the 14,000-megawatt output that the dam produces. To complete this project, approximately 50 million tons of earth were removed during construction, and 18 hydroelectric generators each spanning 53 feet were placed into the dam (2 more were added in an expansion in 2006 to bring the total to 20). As a result of their massive size, each generator is capable of handling 160 tons of water per second. Also, given the agreement of an equal split of the output energy between the two countries, Paraguay has been able to sell the excess electricity that they possess to Brazil and to other countries around the world.

The idea for the Itaipu dam began to take shape when the Ministers of Foreign Affairs of Brazil and Paraguay signed the Act of Iguacu in 1966. This Act resulted in the exploration of the Parana River as a potential energy source. In 1975, construction began on the dam; the 4.8 mile-long structure was completed in 1991, with an expansion completed in 2003 that resulted in an additional 1,400 megawatts of energy produced. It is a concrete gravity dam that has used enough iron and steel in its construction to build 380 Eiffel Towers and 15 Channel Tunnels between England and France. The reservoir feeding into the dam is 170 km in length and can hold approximately 29.54 billion tons of water. Given its magnitude, it is able to supply a huge amount of power and bring positive international attention to these two countries. However, there were some large consequences, both positive and negative of building this dam. While its completion provided a large new energy source for both countries, many families were displaced from their homes to accommodate the new man-made structure shifting the course of the seventh biggest river in the world, and an entire waterfall was lost in the process.

Impact of Construction

There were both positive and negative effects on the local surroundings and communities as a result of the building of the Itaipu dam. Initially, the project brought a boost to the economy of Paraguay and allowed the

development of an electricity market from which Paraguay and Brazil have both benefitted to varying degrees. However, the electricity generated initially did not help Paraguay's economy greatly, as the upper class prevented the move towards industrialization. Thus, the focus stayed on farming; as the dam was being completed, Paraguay's main crops plummeted in value worldwide, causing economic havoc. During the push towards democratization, the market somewhat recovered and this electricity was put into use to help develop industry in the country. However, there was also much controversy about Paraguay's selling of excess energy back to Brazil on the part of the Paraguayan people, worrying about the corruption of their government, but their voices were drowned out in their government's signing of the Itaipu Treaty of 1973. Another negative impact of dam construction was on the surrounding natural wildlife. Though natural protection projects were put into place throughout construction of the dam, large amounts of forest along the Paraguayan side of the river had been destroyed. Also, multiple waterfalls and dips have been overrun by the development of the reservoir, destroying some of the natural beauty of the region. However, much work has been done to save much of the wildlife and vegetation that had the potential to be destroyed by the creation of the dam, as programs put in place were able to save about 400 total species. One must also note that 59,000 people were displaced from their homes and forced to relocate as a result of the construction of the dam. This is a very large number, and a decision not to be made lightly. However, it was deemed appropriate by the directors of the project, as the net output of energy and benefit to Paraguay outweighed the inconvenience of this relocation.



Power Output and Comparisons

In 2006, the Itaipu dam expanded its capacity, generating 14,000 MW of electricity for use by both Paraguay and Brazil. As a basis for comparison, the Hoover Dam initially generated approximately 1,951 MW when it is running at full capacity, and the Three Gorges Dam in China has 26 power-generating units that together provide approximately 22,500 MW of electricity. The Three Gorges Dam is the most recently built dam of the

three, and provides energy to a rapidly expanding country that is consuming it in large proportions. Paraguay and Brazil have been able to benefit the most from the large energy output provided by the Itaipu dam, with Paraguay exporting most of this generated energy due to its lack of consumption, and Brazil benefiting by having first rights to buy the excess energy that Paraguay sells at a highly discounted price.

Conclusion

Both Paraguay and Brazil have gained much in the development and operation of the Itaipu dam. However, this benefit did not come without cost, as the displacement of such a large amount of people and the destruction of a natural monument are decisions not to be taken lightly. This source of hydroelectric energy has helped to reduce dependence on coal and oil in both countries and has also resulted in a more connected relationship between the two countries through their joint partnership. Though there were some heavy costs incurred, the Itaipu dam emerged as an environmental, fiscal and political success; the ability to generate such a large amount of hydroelectric energy has saved each country financially and has also been a small step in reducing the world's oil dependence.

Interesting Itaipu Dam Facts:

- Itaipu translates to mean 'the sounding stone'. It was named after a small island that was near the construction site of the dam.
- The deal between Paraguay and Brazil to build the dam was signed on July 22, 1966. Construction did not begin until 1971.
- Itaipu Dam is a series of dams that are 738 feet high and 4.8 miles long.
- Itaipu Dam is actually made up of four dams: a concrete wing dam, a main concrete dam, a rock-fill dam, and an earth-fill dam.
- To begin construction it was necessary to divert the flow of the Parana River. Parana River is one of the largest rivers in the world.
- More than 50 million tons of earth and rock had to be moved to create the channel to divert the water. This channel was 1.3 miles long, 300 feet deep and 490 feet wide.
- More than 10,000 families had to be relocated during construction to make way for the channel to divert the water.
- It took 12.3 million cubic meters of concrete to build the dam.
- To cure the concrete properly, they had to use large refrigeration units equal to 50,000 deep freezers.
- There was enough steel and iron used to build Itaipu Dam to build 380 copies of the Eiffel Tower.
- In the main concrete dam at Itaipu, there are 28 giant turbines in a half mile long power house. Each of these turbines weighs 800 pounds and is 53 feet across.
- Itaipu Dam generated 94,684 megawatts in 2008. This is the most power that has been produced by a single dam.
- This dam produces the same amount of energy as burning 434,000 of oil every day.
- It supplies Paraguay with approximately 78% of its energy needs.
- Guaira Falls, once considered the most spectacular water feature in the world, was submerged under the water when the reservoir was filled. The falls were also blown up by dynamite to make it safer to navigate the river.
- Guaira Falls was twice the height of Niagara Falls and twice as much water flow.
- Itaipu Dam produces six times as much power as the Hoover Dam and is 10 times as heavy and 18 times the size.
- Itaipu Dam is about the same height as a 65 story building.
- Itaipu Dam is one of the Seven Wonders of the Modern World.

"To increase your effectiveness, make your emotions subordinate to your commitments." - ***BRIAN KOSLOW***

COUNCIL ON ENERGY, ENVIRONMENT AND WATER

The Council on Energy, Environment and Water (http://ceew.in/) is one of South Asia's leading not-for-profit policy research institutions. CEEW addresses pressing global challenges through an integrated and internationally focused approach. It prides itself on the independence of its high quality research, develops partnerships with public and private institutions, and engages with wider public.

In 2016, CEEW was ranked the best in South Asia in two categories three years running (Global Go To Think Tank Index); among the top 100 out of 6846 think-tanks in nine categories. This included CEEW being featured on a prestigious list of 'Best Managed Think Tanks' and 'Best Independent Think Tanks'. In 2016, CEEW was also ranked 2nd in India, 4th outside Europe and North America, and 20th globally out of 240 think tanks as per the ICCG Climate Think Tank's standardised rankings. In 2013 and 2014, CEEW was rated as India's top climate change think-tank as per the ICCG standardised rankings.

In six years of operations,, CEEW has engaged in more than 130 research projects, published well over 70 peer-reviewed books, policy reports and papers, advised governments around the world over 260 times, engaged with industry to encourage investments in clean technologies and improve efficiency in resource use, promoted bilateral and multilateral initiatives between governments on more than 50 occasions, helped state governments with water and irrigation reforms, and organised more than 140 seminars and conferences.

CEEW's major projects on energy policy include India's largest energy access survey (ACCESS); the first independent assessment of India's solar mission; the Clean Energy Access Network (CLEAN) of hundreds of decentralised clean energy firms; India's green industrial policy; the $125 million India-U.S. Joint Clean Energy R&D Centers; developing the strategy for and supporting activities related to the International Solar Alliance; modelling long-term energy scenarios; energy subsidies reform; decentralised energy in India; energy storage technologies; India's 2030 renewable energy roadmap; solar roadmap for Indian Railways; clean energy subsidies (for the Rio+20 Summit); and renewable energy jobs, finance and skills.

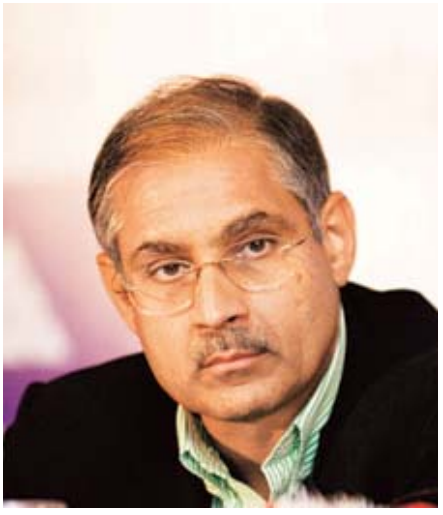
CEEW's major projects on climate, environment and resource security include advising and contributing to climate negotiations (COP-21) in Paris; assessing global climate risks; assessing India's adaptation gap; low-carbon rural development; environmental clearances; modelling HFC emissions; business case for phasing down HFCs; assessing India's critical mineral resources; geoengineering governance; climate finance; nuclear power and low-carbon pathways; electric rail transport; monitoring air quality; business case for energy efficiency and emissions reductions; India's first report on global governance, submitted to the National Security Adviser; foreign policy implications for resource security; India's power sector reforms; resource nexus, and strategic industries and technologies for India's National Security Advisory Board; Maharashtra-Guangdong partnership on sustainability; and building Sustainable Cities.

CEEW is a research and policy-focused institution and engages with stakeholders in academia, civil society, government and industry to pursue four main objectives:

1. To conduct high-quality interdisciplinary and cross-issue research on energy, environment and water.
2. To engage with the industry (in the private and public sector) to understand and influence factors affecting investments in sustainable infrastructure.
3. To partner with governments, at the central, state and local levels, to assist in developing integrated plans for energy, environment and water management.
4. To build a network of scholars, policymakers, political leaders, and civil society representatives – within and outside India – for regular debates and exchange of ideas.

CEEW's work profile covers all levels of governance:

1. At the *global/regional level*, these include climate finance, energy-trade-climate linkages, geoengineering governance, and bilateral collaborations with China, Israel, Pakistan, and the United States;
2. At the *national level*, it covers energy and resource efficiency and security, water resources management, renewable energy policies, India and global governance, and innovation strategies; and
3. At the *state/local level*, CEEW develops integrated energy,environment and water plans, and facilitates industry action to reduce emissions or increase R&D investments in clean technologies.



RAJIV SINGH, *Vice Chairman*
DLF

DLF
BUILDING INDIA

The head of india's largest realtor is known as a businessman who likes to cut his losses.

Rajiv Singh, vice Chairman, DLF, a third-generation family businessman, is a graduate of Massachusetts Institute of Technology (MIT), U.S.A and holds a degree in mechanical engineering. He is the son of Kushal Pal Singh Teotia who is an Indian real estate mogul and the Chairman and CEO of DLF Limited, India's largest real estate developer. It has an estimated land bank of 10,255 acres, with about 3,000 acres being in Gurgaon. Rajiv has over 30 years of professional experience. He directs the strategy and oversees the operations of the Company's residential, commercial, retail, infrastructure, hotels and SEZ business lines. In December 2005, Rajiv was awarded 'The Udyog Ratna Award' for 'valuable Contributions to Economic Development of Haryana'.

He has helped DLF group expand to 15 states and 24 cities, making it the country's largest real estate firm. DLF has given India its first private fire station at Cyber City, Gurgaon, and plans to start a private rapid metro rail in a few years. DLF was chosen as the leader in the 'Building & Construction - Real Estate' category in the 2nd NDTV Profit Business Leadership Awards held in New Delhi on July 27, 2007. This award reaffirms DLF's leadership position and underlines the contribution made by DLF in the real estate sector. With over six decades of excellence, DLF is a name synonymous with global standards, new generation workspaces and lifestyles.

It has pioneered the retail revolution in the country and brought about a paradigm shift in the industry by redefining shopping, recreation and leisure experiences with the launch of City Centre in Gurgaon. DLF's mission is to build a world-class real estate development company with the highest standards of professionalism, ethics and customer service and to thereby contribute to and benefit from the growth of the Indian economy. Singh say, "sometimes you have to take hard decisions because wealth is created through hard financial decisions rather than on notional values of market capitalization". On India Today's 50 Power List, High and Mighty, Rajiv has been ranked No 27.

HUMOUR

BIG, BEAUTIFUL AND SUSTAINABLE – 10 OF THE WORLD'S MOST ENERGY EFFICIENT OFFICES - 9

MANITOBA HYDRO PLACE, MANITOBA (CANADA)

A proud owner of the LEED Platinum Certification, Manitoba Hydro Place is considered to be the most energy efficient office tower in North America. Opened in 2009, the building saves 70% more energy than other large office towers due to its intelligent energy saving technologies. Complete with a 115m solar chimney that helps provide passive ventilation throughout the building, it also features a double skin facade with computer controlled motorized vents that reduces heating/ cooling loads by providing a tempered buffer to the extreme outdoor climate.

(To be continued...)

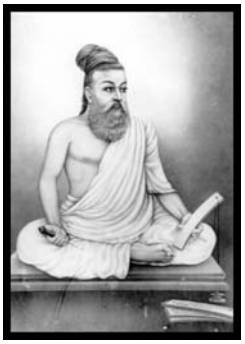
THE WORLDS TOP 10 MOST INNOVATIVE COMPANIES IN ENERGY - 9

CERES

For tinkering with plant genomes to make feed stocks more easily convertible to biofuels. One of the perennial challenges facing the biofuels industry is how to transform feed stocks (i.e., plants and organic matter) into fuel in a simple and cost-effective manner. You can change the fermentation processes or try to improve it with better catalysts. But what if you change the plant genome itself? That's been Ceres's recent strategy: They are trying to reduce the lignin in plant material so that its feed stocks are more easily—and more cheaply—converted to biofuels. It's a new and innovative strategy that promises to be transformative.

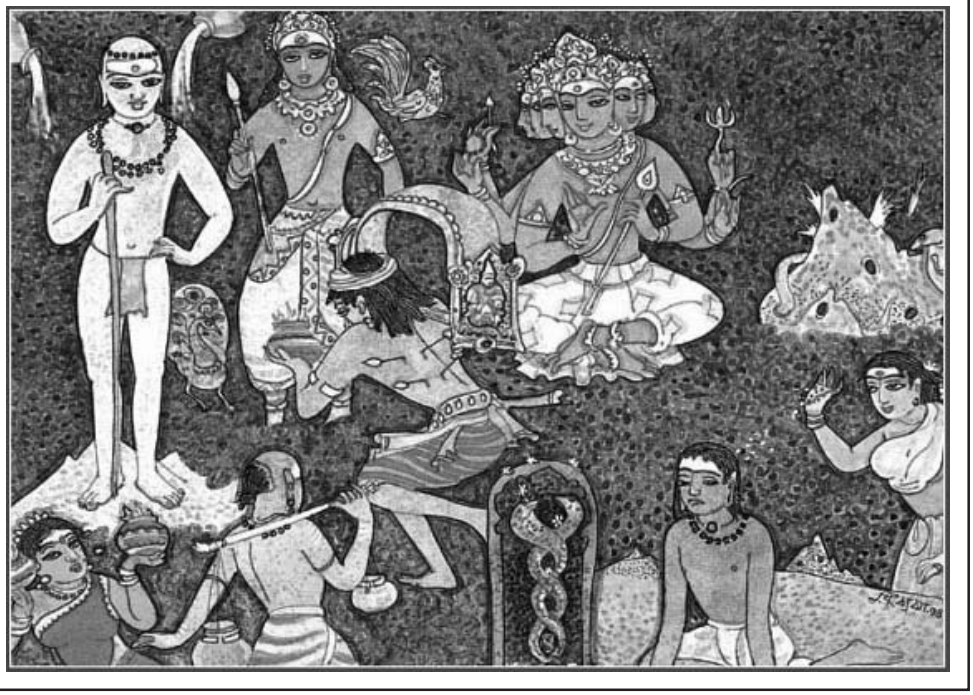
(To be continued...)

TIRUKKURAL AND MANAGEMENT IN A 'NUTSHELL' - 48



HOME FESTIVALS - 5

வைகாசி - Vaikasi (May/June)



This month is devoted to the worship of Lord Murugan, who is honored on Vaikasi Vishakham (above). He is shown at far left as Palani, the renunciate, dressed in loincloth, wearing a necklace of rudraksha beads, sacred ash covering His body and holding the sannyasin's staff. To the right He is shown as a prince, with His peacock, and farther to the right as the six-headed Arumugam. Devotees approach Him doing penance by piecing their bodies with small spears and carrying various offerings, including pots of milk and a *kavadi*, a kind of portable arched shrine. At lower right is depicted Naga Chathurthi, celebrating an ancient story in which a young boy bit by a cobra was saved from death when his sister's prayers caused the sands of the cobra's anthill to counteract the poison.

(To be continued)

ITALIAN VOLT

With a name that speaks for itself, startup Italian Volt has introduced its first electric motorcycle. With sportbike performance in mind, the Lacama is designed as a high-end creation that can be customized into whatever its owner wishes: roadster, scrambler, café racer, or even a personal theme.

Italian Volt was set up just last year in Milan, Italy, by three partners tightly connected with the motorcycle scene. Two of them, Nicola Colombo and Valerio Fumagalli, hold a Guinness world record to their names, for the longest distance travelled on an electric motorcycle. Their 2013 endeavour covered the 12,379 km (7,692 mi) route from Shanghai, China, to Milan in 44 days, solely on electric power.

Soon after, the dream of building their own electric motorcycle started taking shape with the invaluable contribution of Adriano Stellino. His designing background with Italian icons Lamborghini and Bertone, before moving to design motorcycles in Shanghai, would help transform the dream into designs on paper.

The Lacama is built around an in-house-designed aluminum frame, holding a cluster of li-ion battery cells for a total capacity of 15 kWh. This feeds an electric motor that transfers 94 hp (70 kW) to the back wheel via belt drive, producing a maximum torque of 208 Nm (153.45 lb-ft).

Top speed is limited to 180 km/h (112 mph), and the range of the Lacama can reach up to 180 km (112 mi). At 250 kg (551 lb) it isn't exactly a featherweight, a fact that probably justifies the 4.6 seconds it takes to accelerate from 0 to 100 km/h (60 mph) – but, at least, the 2.5 km/h (1.6 mph) park assistant seems like a very nice treat.

Besides the Italian Volt-designed frame and swing arm, the motorcycle's bodywork is also 3D printed in-house. Customers will be able to pre-order their individual motorcycles choosing from a variety of colors and shapes for the 12 pieces that make up the complete bodywork, with the possibility to even design their own hand-crafted parts. In this sense the Lacama can be ordered not only as a roadster, but as anything that can fit with the given geometry of the frame – so probably no chopper.

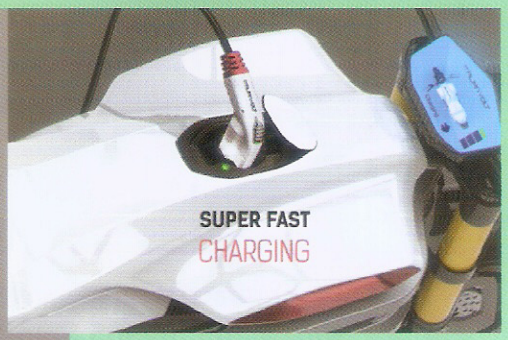
The motorcycle is furnished with a variety of high-end equipment, going for obvious sportbike standards like Öhlins suspension and Brembo brakes, while the 17-inch wheels can be ordered either in aluminum alloy or carbon fiber.

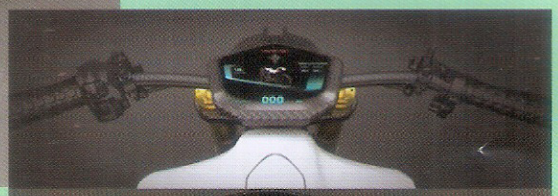
Italian Volt reveals also that the Lacama's electronics will include a TFT touchscreen with GPS and smartphone connectivity (both iOS and Android), allowing the rider to monitor the charging status, identify the bike's location, and select different performance profiles by altering parameters like torque and engine braking.

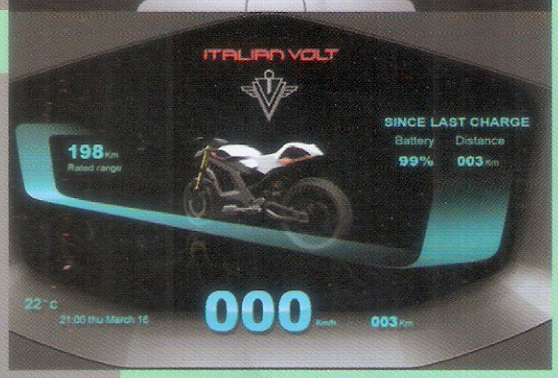
One very interesting feature is the addition of fast charging – just like Energica does with its naked and supersport models. On a standard supply, the batteries will need some three hours to fully charge, but a fast-charging outlet would need just 40 minutes to get the battery up to 80 percent.

Source: Italian Volt

ITALIAN VOLT



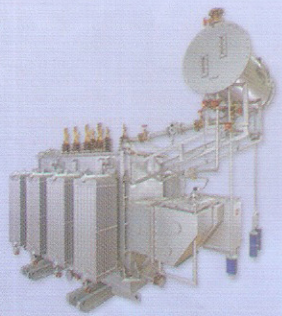




Energising The World

Responsibly

Wilson Power and Distribution Technologies –Part of Wilson Power Solutions Group Ltd, UK 's leading Transformer supplier and power solutions provider is now in India to cater Indian Industry and homes.



Power Transformer

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