



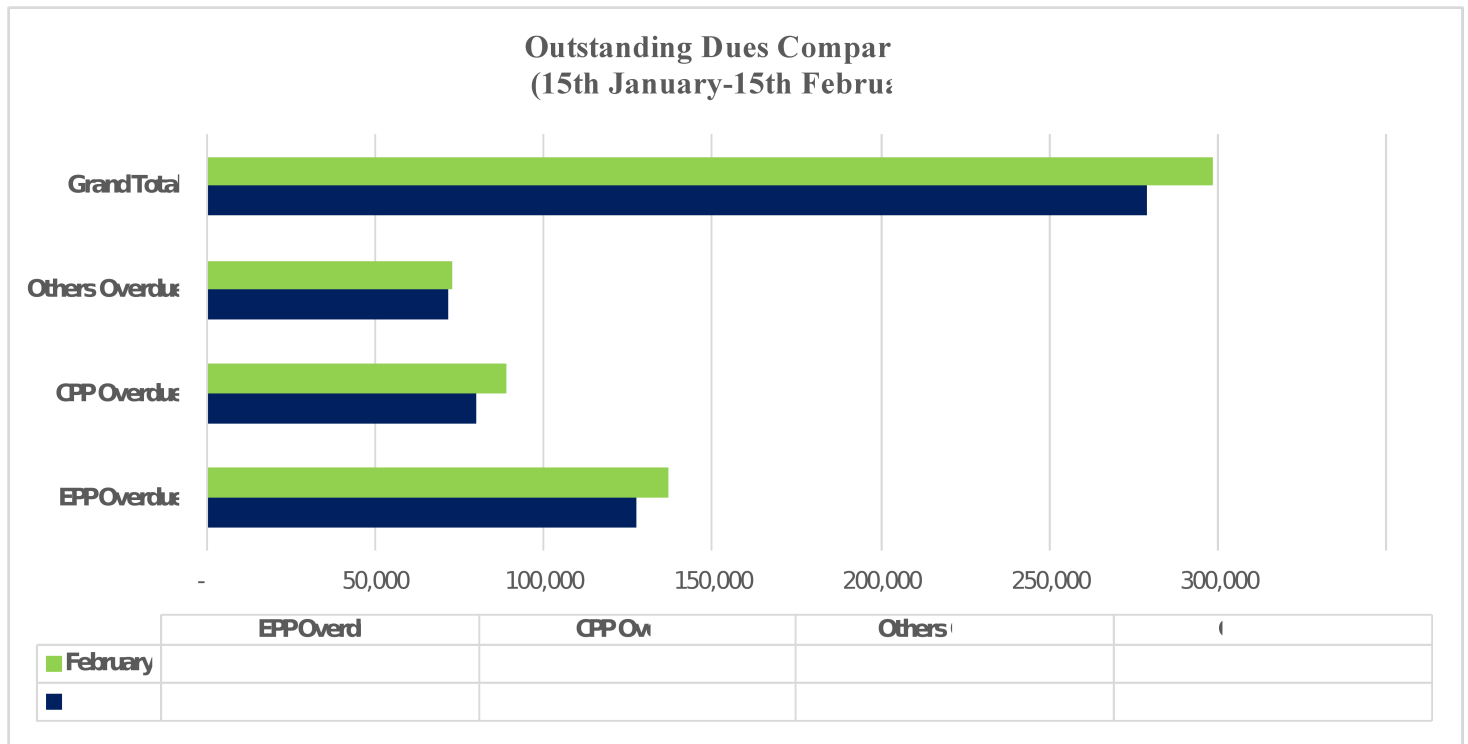
INDEPENDENT POWER PRODUCERS ASSOCIATION

MONTHLY NEWSLETTER

Welcome to the twenty-fourth edition of Independent Power Producers Association (IPPA) Newsletter. The newsletter is published on a monthly basis to ensure regular dissemination of information to Member IPPs and other stakeholders, and also to provide a platform to discuss issues pertinent to the energy sector of Pakistan. We would like you to send us your feedback and comments on how to improve the monthly newsletter.

Monthly Infographics

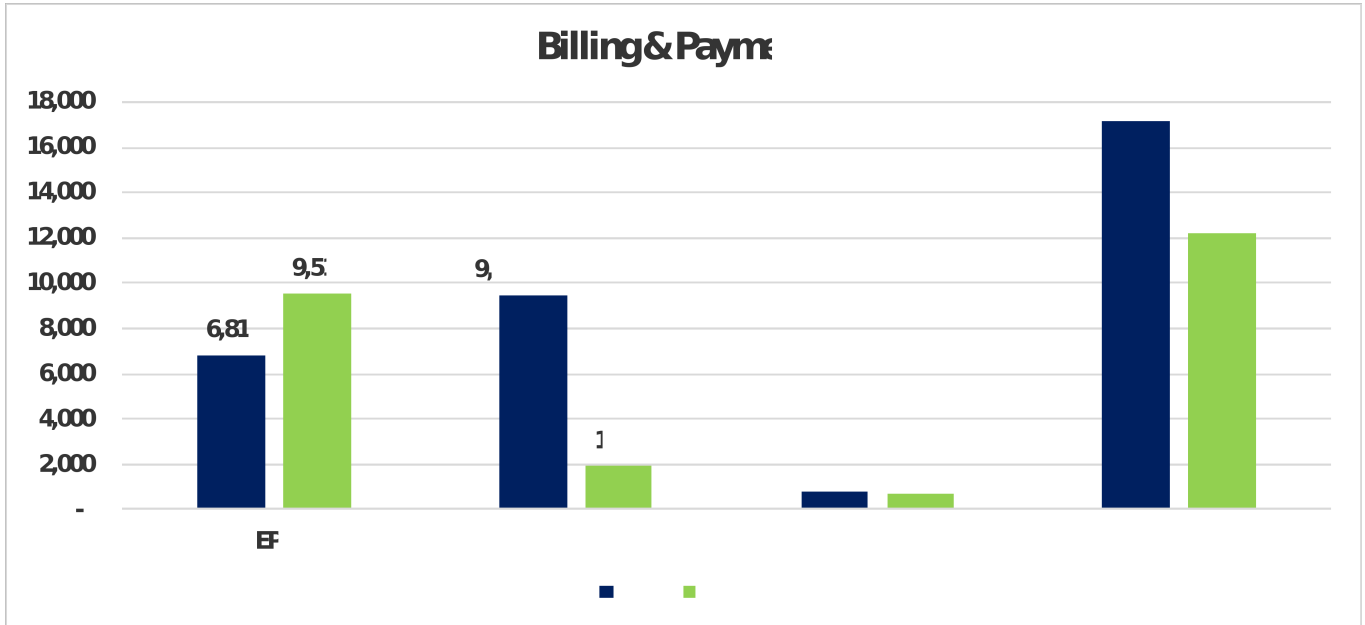
Outstanding Dues as of 15th February, 2019 in PKR Millions



Source: Member and Subsidiary IPPs

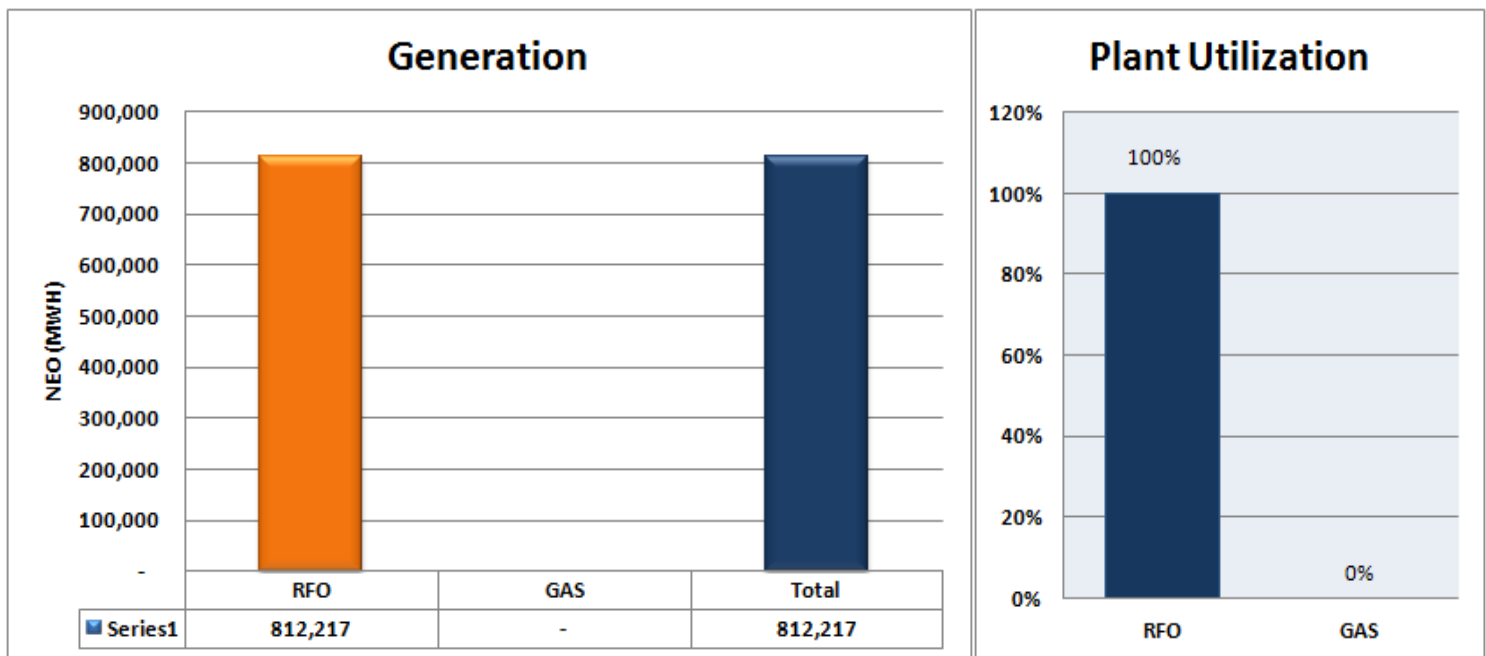
Monthly Infographics

Billing and Payments in February 2019 in PKR Millions



Source: Member and Subsidiary IPPs

Net Generation and Plant Utilization in February 2019



Source: Member and Subsidiary IPPs

Pakistan Eyes Green Ambitions

ISLAMABAD: Minister for Energy (Power Division), Minister Omer Ayub, revealed government's plan to double renewable energy's share by 2030. Currently, around 30 percent of the energy is produced from renewable sources. The government aims to increase green energy's share to 60% by 2030. Such a move will help reduce carbon emissions per megawatt of production in Pakistan.

Minister for Energy also presented the country's low per capita energy consumption as an opportunity to invest in transmission, distribution and generation. Pakistan's power consumption per capita stands at around 500KV per person. The regional per-capita-consumption is 700 KV higher.

Source: Pakistan Today, Dawn, The News

Elimination of Power Theft Still a Priority

ISLAMABAD: Minister for Energy (Power Division), Minister Omer Ayub Khan, reiterated his resolve to contain power theft in the country's grid. In that vein, the minister highlighted Power Division's efforts to improve the national grid (NG). NG improvement included investments as well management improvement. The investment efforts included installation of 10 new feeders in Haripur. Furthermore, a 220V Hattar grid station will be constructed at a cost of Rs 8.5 billion.

To improve management, the Minister has been paying surprise visits to the various Distribution Companies (DISCOS) in Sind, Punjab and Khyber Pakhtunkhwa. All these efforts have reduced power theft to 5.6 percent in January 2019. All these efforts

have also reduced the negative impact of power theft by a whopping Rs 10 billion.

Source: Pakistan Today, Dawn, The News

Pakistan's First Private HVDC Transmission Line completes its Financial Close

ISLAMABAD: The managing director for Private Power and Infrastructure Board (PPIB), Shah Jahan Mirza and CEO of Pak Matiari – Lahore Transmission Company Private Limited (PMLTC) signed the financial close document for the 878 km long transmission line project. The signing ceremony was conducted at the Power Division. Attendees of the ceremony included senior officers from PPIB and Power Division. This transmission project comes under CPEC.

MLTL is a commercial and technological innovation in the country's power transmission sector. Technologically, this is the first time that HVDC is being used to transmit power. Commercially, MLTL is pioneer in private construction of power transmission lines. Such projects may raise hope for further private investment into the transmission sector.

The bi-pole HVDC lines will have DC to AC converters at each end. The converters will convert up to 4000 MW of electricity at 660 KV voltage. The project will also have three repeater stations in addition to two grounding electrode stations. The total cost of the project stands at approximately \$1.658 billion.

The financial close is the culmination of a long list of approvals. PPIB gave its Letter of Support (LOS) to PMLTC in August of 2017. Then NEPRA issued a Transmission License in Feb 2018. After a long list of

approvals, the path towards financial-close was finally achieved.

This land mark project will start commercial operations by March 2021 on build-own-operate-transfer (BOOT) basis. NTDC will take ownership of the project after 25 years. MLTL will reduce national reliance on imported fuels by transmitting energy from the Thar coal fired power plant.

Source: Pakistan Today, Dawn, The News

Transmission Simulator Inaugurated at NTDC

ISLAMABAD: Minister for Energy (Power Division), Mr. Omar Ayub Khan, inaugurated the Technical Services Group (TSG) Training Simulator Headquarters of National Transmission and Dispatch Company (NTDC). The Deputy Chief of Japanese Mission Yusuke Shindo was also one of inaugurators of the TSC training simulator. The Rs 1 billion project was completed with the cooperation of Japan International Cooperation Agency (JICA). It is pertinent to mention that JICA also has provided assistance in improving DISCOS.

Source: Pakistan Today, Dawn, The News

Electrons Start flowing from Thar to the National Grid

ISLAMABAD: Engro Powergen Thar (Private) Limited (EPTL) supplied the first electron to the national grid. The 660MW facility was testing its first unit of 330 MW. This generation facility is located in Thar Block II. The Engineering, Procurement and Construction for the project was done by China Machinery Engineering Corporation (CMEC). This project can become a

watershed moment in Pakistan's ability to use indigenous fuel sources.

Thar coal is a very good source of indigenous fuel as it is regarded as the seventh biggest coal reserve in the world. Using Thar coal reserve will save precious foreign reserves and generate mining jobs in Sindh. EPTL comes under the umbrella of CPEC. Every year, The Thar project will use 3.8 million tons of coal to supply the national grid with electricity.

EPTL will save the nation \$1.6 billion per annum of foreign reserves, every year. The 660 MW power plant will use Circulating Fluidized Bed (CFB) technology to maximize the use of the calorific value within that coal. The power of the plant will be transmitted through a 500 KV double circuit quad-bundle transmission line from the plant to Matiari. From there on, it will be connected to the national grid via a HVDC line.

Source: Pakistan Today, Dawn, The News

Pakistan Turkmenistan Transmission Line in the works

ISLAMABAD: Pakistan and Turkmenistan representatives have agreed to establish a Joint Working Group (JWG) to finalize negotiations for a transmission line between the two countries. The transmission line will connect the grids of Turkmenistan and Pakistan via Afghanistan. The Pakistani side is being headed by Minister for Energy (Power Division) Minister, Mr. Omer Ayub Khan. On the other hand, the Turkmenistan side was represented by their Foreign and Energy Ministers. Mr. Omar Ayub highlighted the potential of this project in synergizing the electric grids of the two countries. For now, the Central Asian State hopes to export 1000 MW of electricity to Pakistan. The transmission line can be the beginning of a long journey towards an interconnected Asian grid.

Source: D&D Central Asia

Mini-Nuclear Reactors Come out of the Womb for the Military

WASHINGTON: The US military aims to start using mini-nuclear reactors for power generation purposes. Fuel supply can be a major issue in a war scenario. Apart from limiting operational capability, fuel supplies also cost lives. According to the US Army, every 100 convoys cost four lives. Similarly around half of US casualties in Iraq War and anti-ISIS operations were the result of attacks on convoys. As a result, the US armed forces are considering development of on-site Nuclear Power generation. Such plants will seek to generate up to 10 MW of power for forward bases and weapons. It is pertinent to mention that very small modular nuclear reactors (vSMRs) will use low enriched uranium known as High Assay Low Enriched Uranium (HALEU). HALEU requires non-weapons grade enrichment and cannot be used for dirty bombs. Therefore, use of these reactors is consistent with the global nuclear non-proliferation goals. Like many technologies, it is hoped that the military's efforts will help future civil energy generation projects.

Source: Forbes

Cold Winds in the Turbine Generation Sector

BERLIN: The winds of green energy boom are blowing hard at Gas turbine manufactures. According to Barkley ltd a group of three manufacturers, of comprising General Electric, Siemens and Mitsubishi Hitachi Power Systems, controls 89% of the power turbine power market. With a falling market size, consolidation becomes a natural outcome. Therefore the investors were not surprised at a rumored joint venture between Siemens and Mitsubishi. A spokesperson for Siemens commented that:

“The global fossil fuel technology market remains unchanged and Siemens has already begun to adapt to these challenges in the spring of 2015. Please understand that we cannot comment on speculation and rumor”.

However, the reality has been at odds with this statement. Siemens saw its profits fall from \$1.8 billion in 2017 to \$0.42 billion in 2018. Such falls don't seem to be temporary. The company has announced layoffs for 6,900 of its workforce. The fact that Germany has pioneered phasing out of coal powered generation does not help the company's cause either. In order to stay relevant Siemens has announced a reorientation towards servicification in the power sector. Its servicification efforts include increased focus on factory software and energy distribution. The future is green and Siemens is making every effort to join the future.

Source: MDPI

Major finish Hydropower Producer was affected by a Cyber-Attack.

OSLO: A cyber-attack affected the operations of Norsk Hydro (NH). NH is a major aluminum producer that also operates more than 20 hydropower operations in Telemark, Roldal-Suldal, Sogn, and Vennesla. The attacks forced the firm to change many of its operations to manual mode with some of the plants suffering shut downs. Under normal circumstances, NH generates 10 TWh of electricity in a year. According to POWER

magazine, the Finish power producer's operations were hit with a ransom ware. Luckily, no safety related incidents happened because of the cyber-attack. Yet the attack underscores a number a few important points. The first is the ability of a company to work with manual operations. In an age of ever increasing digitization, companies will have to invest in backup manual operations to maintain resiliency against cyber-attacks. Furthermore, the attack also demonstrates the potency of cyber warfare in the 21st century.

Source: POWERMAG

India in talks with US for Nuclear Power Plant Construction

NEW-DELHI: Andrea Thompson, the U.S. undersecretary of state for arms control and international security met with the foreign secretary of India (Vijay Gokhale) in order to discuss the construction of nuclear plants in the South Asian country. The two countries signed a Civil Nuclear Agreement in 2008. Since then, India has shown interest in installing six plants using the AP 1000 design.

Currently, India has 6.78 GW of nuclear generation capacity. This capacity comes from twenty two nuclear reactors which are located at seven nuclear plants. India hopes to increase this capacity by three times to 22.5 GW. Talks with the US form an important part of that expansion plan.

Source: World Nuclear News

Development towards single-buyer model plus model is an important step in making the power sector more efficient. This section of the IPPA news will cover any developments within Pakistani Power Sector that will move the market towards a single-buyer plus model. This will include efforts from the various stakeholders within the Pakistani power market.

Pakistan's first private transmission line achieves its financial close

Pakistan's first private transmission line has achieved financial close. The 878 km long transmission line will transmit power, in direct current (DC) form, from Matiari to Lahore. Upon reaching Lahore, it will be converted back to alternating current. PPIB has played an active part in ensuring the financial close of this \$1.658 billion project.

This project will help advance the dream of single-buyer plus model in many ways. First, according to single-buyer plus model, buyers and sellers can sign bilateral contracts for sale and purchase of electricity. Private transmission lines would help ensure that potential transactions can be executed after paying a minor wheeling charge to the transmission company. Second, this project will groom PPIB towards dealing with private transmission companies. Finally, the project sponsor will train engineers in construction of DC lines, which will help reduce T&D losses in the long run¹. Therefore, this project will have knock-on effects for all future transmission projects in the country.

¹ DC lines

TRANSACTIONAL ENERGY- DECENTRALIZED ENERGY MANAGEMENT SOLUTION

Recent History of energy management can be assessed in three phases namely deregulation –separation of generation from Distribution and Transmission –in 1990s to increased consumer control in the form of home energy management systems in 2000s. This decade, however, is experiencing the advent and proliferation of DERs (Distributed Energy Resources) and IOTs (Internet of Things) -ramping supply/demand up or down given the cost signals. Transactional energy has become the hush word in the aware sections of the globe whether it be policy circles or startups. **Demand response programs** are a good start to understand this sweeping phenomenon. **These** programs incentivize consumers to align their demand with power supply conditions, enhancing power system reliability and economic operation. However, Transactional energy is the next step in terms of opportunity and efficiency –and a big one at that.

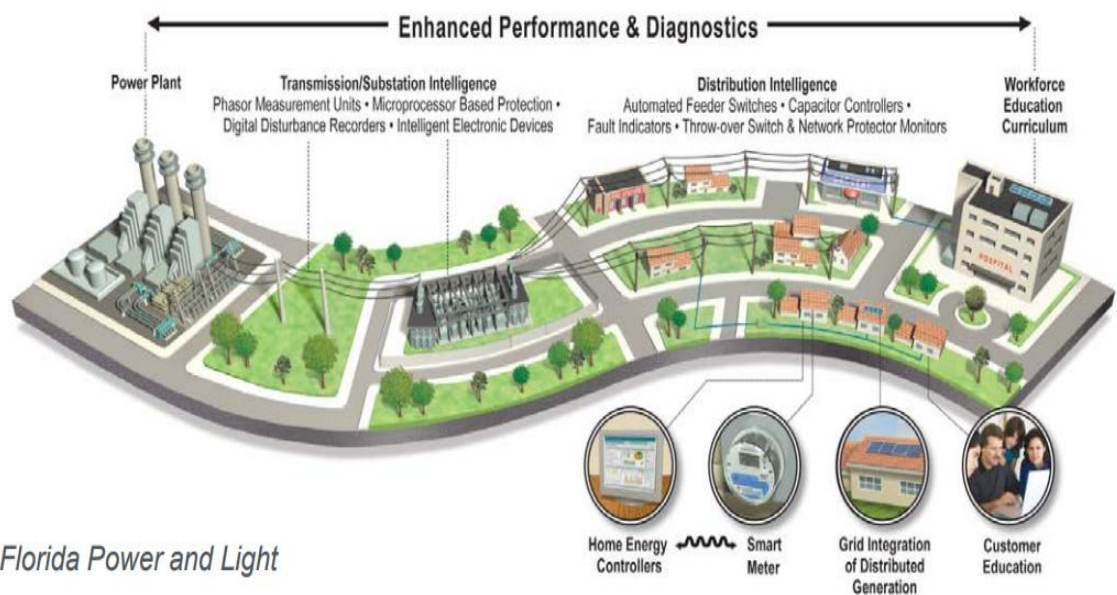
Crunched Concept

By “Monetizing the value of energy products through a market approach” energy providers (Prosumers – consumers who also generate energy e.g. via solar panels) and users can agree on the value of electricity at a certain point in time and place i.e. neighborhoods forming local mini-grids and trading energy amongst themselves. Transactional energy utilizes the flexibility of various generation/load resources to maintain a dynamic balance of supply and demand. These distributed resources/ DERs are controlled by their owners, whilst the design of transaction mechanisms (**Blockchain** in most cases) aligns the individual behaviors with the interests of the entire system. It features real-time, autonomous, and decentralized decision making. Transactional Energy¹ can be defined as

“A system of economic and control mechanisms that allows the dynamic balance of supply and demand across the entire electrical infrastructure using value as a key operational parameter.”

The Visualized Grid will look something like following;

Smart Grid requires seamless, SECURE communications across multiple interconnected domains and platforms

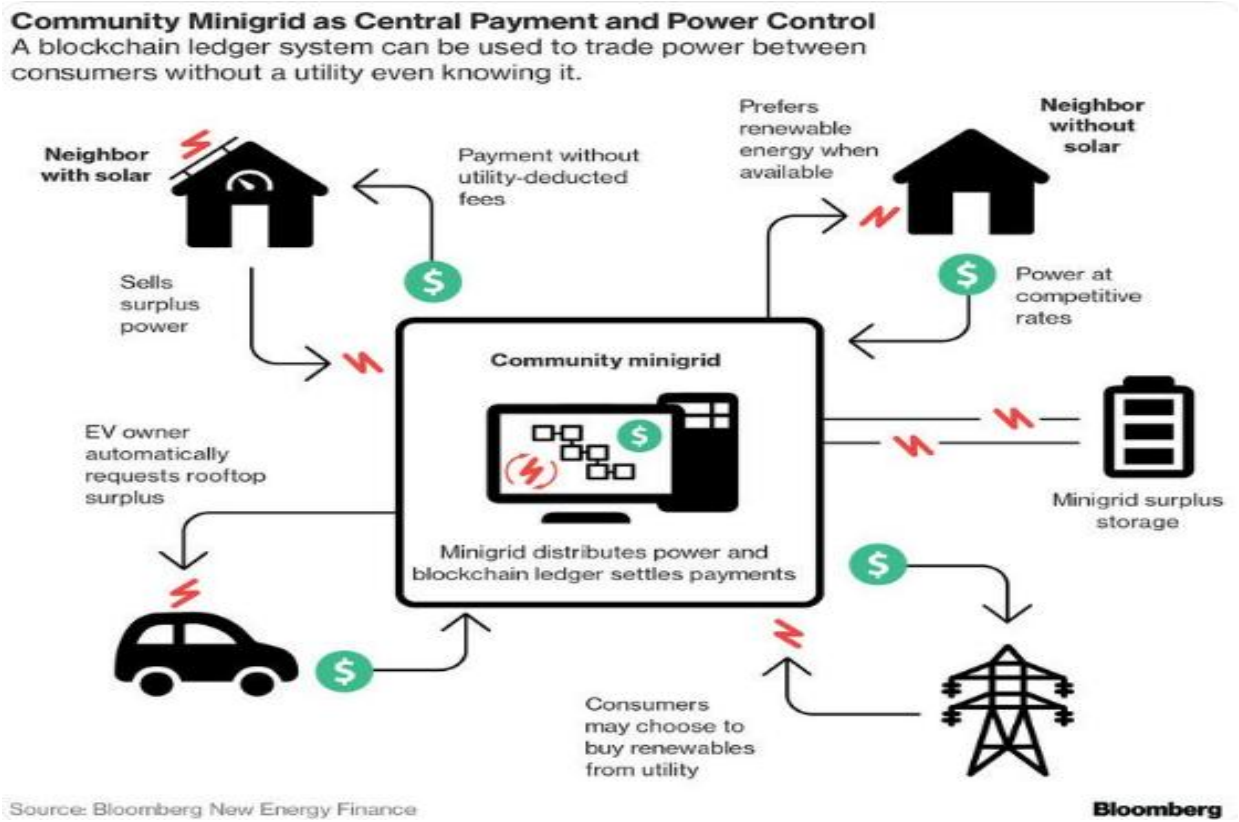


Courtesy of Florida Power and Light

Source: gridwiseac.org (U.S Dept. of Energy)

¹ <https://www.nist.gov/engineering-laboratory/smart-grid/transactional-energy-overview>

Where Community Mini-grids will be central to the entire process as depicted below;



The idea can be further understood via upcoming case studies of its practical demonstrations.

Global Gait

State regulatory agencies in New York, California, Hawaii etc. in U.S (U.S consumer preference already at 69%, facing exponential changes in terms of batteries, solar panel usage, smart devices) and Other countries, including Australia and the Netherlands are instigating changes to grid market structures with use cases like **Peer to Peer energy market, Localized Demand Response and Location-based Pricing.**

Impressive Smart Grid and Transactive Energy Control (TEC) pilot projects designed by Battelle Pacific Northwest National Laboratories in the U.S., and Dutch energy-research Company TNO's successful Power Matcher pilot projects throughout Europe, are successful examples of this technology. Power Matcher is a market-ready open-source tool, dominating the green European energy marketplace. Grid congestion relief, lower energy bills and more efficient use of variable generating resources are the observed outcomes. Germany is what can be called “**canary in the coal mine**”, where negative wholesale prices affected value of utilities. This realization of ripple effect of going renewable and its unforeseen damages motivated the innovation towards Transactive Energy Framework.

Just the use of Blockchain –essentially “distributed databases” – in energy management systems across the globe depicts the practical leaps and bounds being made.

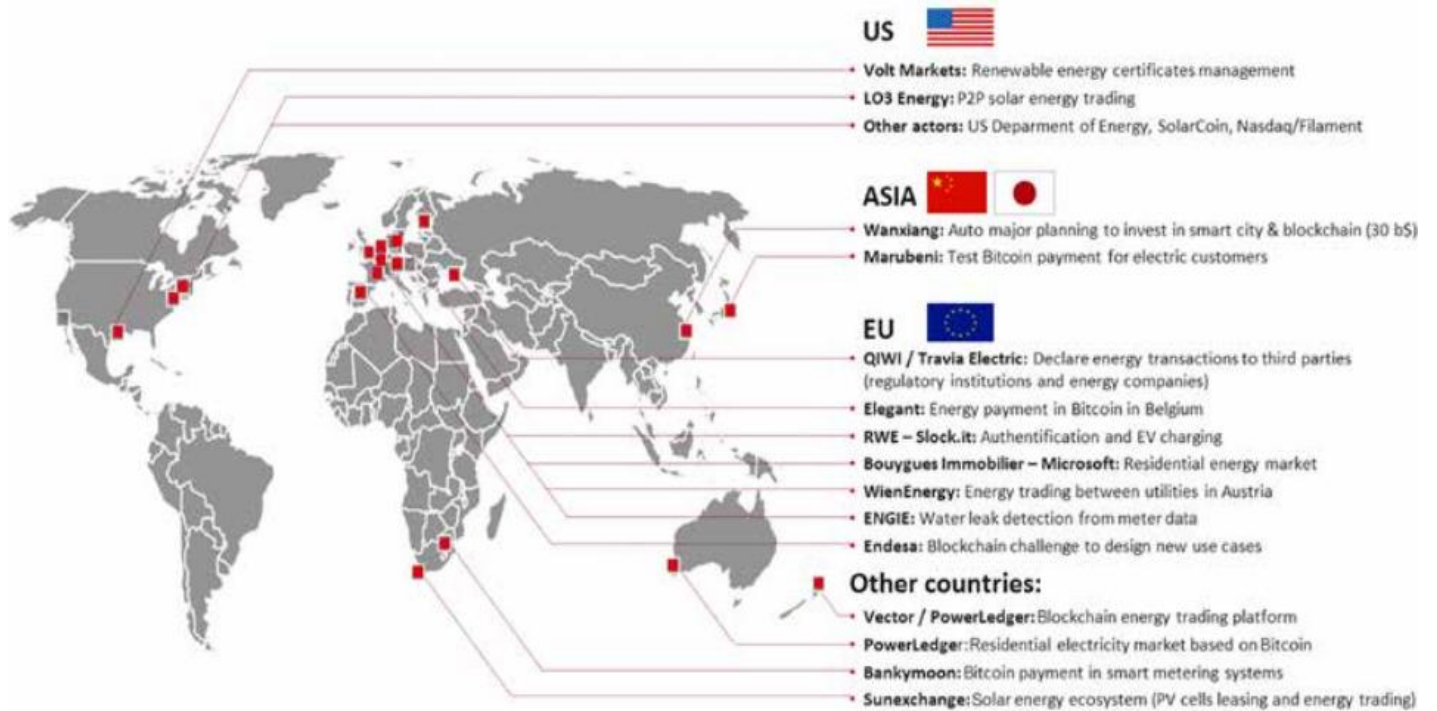


Figure 1: Blockchain use in Energy management (Source: CGI Business Consulting)

Given the Profit-generating potential of this framework, many companies are making inroads along different spokes of this vast umbrella. Agencies such as Fortum, Innolgy, Slock.it, Gem, Factom, RSK etc. are apart from a few below.

A plethora of use cases...



The Why?

Transactive Energy is the latest answer for the case of infamous ‘Duck curve’ i.e. belly of Price decrease during day-time energy consumption. It’s particularly hurtful for **IPPs** worldwide in terms of negative pricing and on top of that being charged for getting their product in the grid.

Utilities will have the opportunity to create that mini-grid platform given their position by dint of expertise. Rather than going **against**, they can get **behind** its propulsion –charging fee for those services. It will no longer be Facebook of energy where data traffic is one way. All producers and consumers will be on the grid.

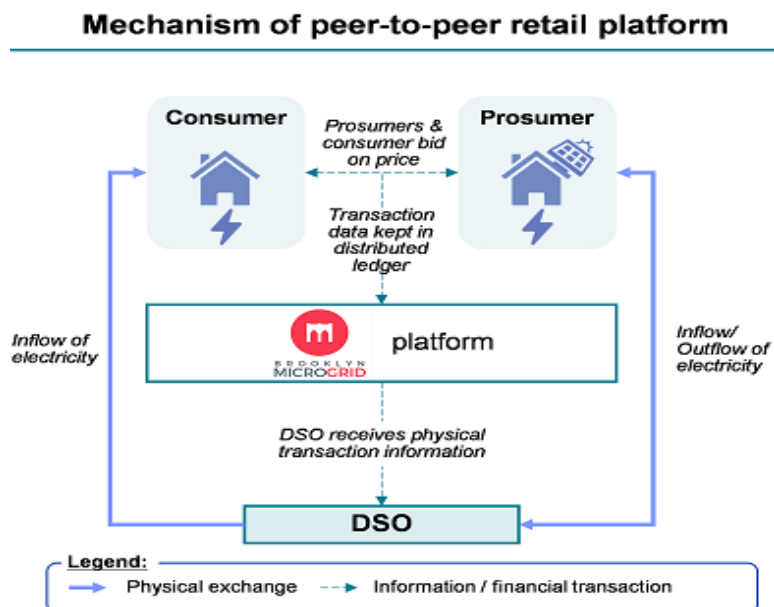
Lo3 Energy

LO3 Energy is at the forefront of Transactive Energy with renowned success of its Brooklyn based microgrid. Lo3 develops blockchain based innovations to revolutionize how energy can be generated, stored, bought, sold and used, all at the local level. Its crown jewel Exergy, a permissioned data platform that creates localized energy marketplaces for transacting energy across existing grid infrastructure, is applicable across several tailored use cases; some of which are as follows.

Use Cases

- **Peer to Peer energy market**

It’s the most common form implemented across the globe. **Emerton.co** has presented this concept in an easy way, as presented in the figure. Any infrastructure utilizing energy is part of the grid. Settlement process using method of Auction and Bidding by individual users across energy grid, dictates market mechanism of energy trading. Mobile apps are used to facilitate real time transactions and those who win the bids get renewable energy that is locally produced. Others continue to obtain it from the utility grid. It is founded on existing wires and infrastructure, hence no need for a complete overhaul. The system is operated via **Transactive grid elements** i.e. smart meters which are one simple addition to housing/industrial utility meters. These act as virtual machines that measure energy, talk to each other, and make decisions on the basis of changing information to make the optimum decision. It’s compatible with Protocols such as Zigbee, Z- wave, Wifi etc.



- **Localized Demand Response**

This instance of Transactive energy implementation considers a Sub-station at risk of overloading when connected to multiple grid points. Through Grid-edge knowledge, some consumers might be willing to curb their usage i.e. Nega-watts whilst others may have idle supply available such as industrial units; hence transferring it to the grid point most in need. This ingrains energy supply and demand response into the exact same market.

- **Location- based Pricing**

Transmission costs. Even if Energy produced is green, there are Transmission losses over long distance. What is physically efficient must be economically efficient as well. This provides an opportunity for utilities to charge on location-based pricing standards, given the consumer's preference of using green energy is there.

Tokenization is the currency mechanism being used in initiatives by Lo3 in partnership with "Consensys". It involves creation and destruction of energy tokens, generated by energy meters. It works essentially like an Oracle. This creates a sort of Circular economy –keeping money in the community.

Benefits

Benefits in terms of efficiency and economic opportunity are undeniable. From a policy perspective, few significant advantages are increased resilience to energy disruptions, increased energy independence, major increment in economic productivity with new products and services, reduced emissions from the electric utility sector, reduced requirements for capacities and spinning reserves to address generation/load uncertainties etc. It is crucial to note that there is no displacement of utilities rather building on top of the existing infrastructure is the hallmark of this phenomenon.

Challenges

Stakeholders in transactive energy should anticipate dealing with the following challenges, as Mr. **Ching Liu** from 'springeropen' puts it:

(a) Technology. What is the current level of automation for energy management devices and appliances? Are they ready for deployment, reliable and affordable?

(b) Scalability. Can a distributed platform function well when the number of smart devices in the distribution system increases significantly?

(c) System management. As a highly centralized control system moves toward a more decentralized system, what is the mechanism for oversight and governance of such a platform? The emerging technology of block chain is perceived as a promising platform for transactive energy due to its decentralization, cyber security, and transparency. Can a block chain platform manage problems such as congestion, power quality, and reliability (which, as indicated in the case studies globally, it did)

(d) Consumer behavior. Is transactive energy empowering consumers or making their lives more complicated? How can one prepare consumers for this new concept? How can consumers derive values from this platform so they are willing to participate? All these questions are crucial for the transition from conventional demand response to transactive energy. The primary challenge stands in front of grid operators and the considerations they will need to have to carry the brunt of this innovation.

Our Members

	Member IPPs	Primary Fuel	Alternate Fuel	Gross Capacity (MW)	Net Capacity (MW)
1	The Hub Power Company (Tehsil Hub)	RFO	HSD	1292	1200
2	Pakgen Private Limited	RFO	-	365	350
3	Lalpir Private Limited	RFO	-	362	350
4	Kohinoor Energy Limited	RFO	-	131	126
5	TNB Liberty Power Limited	GAS	HSD	235	211
6	Uch Power (Private) Limited	GAS	-	586	551
7	Rousch (Pakistan) Power Limited	GAS	HSD	412	395
8	Habibullah Coastal Power (Pvt.) Co.	GAS	HSD	140	126
9	Attock Gen Limited	RFO	HSD	165	156
10	Atlas Power Limited	RFO	HSD	225	214
11	Nishat Power Limited	RFO	HSD	200	195
12	Nishat Chunain Limited	RFO	HSD	200	195.6
13	Liberty Power Tech. Limited	RFO	HSD	200	195
14	Orient Power Company Limited	GAS	HSD	229	213
15	Saif Power Limited	GAS	HSD	229	209
16	Sapphire Electric Company Limited	GAS	HSD	225	209
17	Halmore Power Generation Co. Ltd.	GAS	HSD	225	209
18	Engro Powergen Qadirpur Limited	GAS	HSD	227	217
Subsidiary IPPs					
19	Hub Power Company Ltd (Narowal)	RFO	-	220	214
20	Uch-II Power (Pvt) Ltd	GAS	-	404	375.2
21	Saba Power Company (Private) Limited	RFO	-	134	125.5



Established in 2010, IPPA serves as an advisory body for Independent Power Producers (IPPs) in Pakistan. IPPA liaises with the government and related departments such as NEPRA, SECP, WAPDA, CPPA-G, NTDC and PPIB and also serves as a facilitator between various IPPs and stakeholders within the power sector.

If you have any suggestions or feedback, kindly write to us at feedback@ippa.com.pk