



The Role of Blockchain Technology in the Future of Electricity

**Regional Conference on Fourth Industrial Revolution: New And
Emerging Technologies In Achieving Sustainable Development Goals**

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23 October 2018

What is a Blockchain?

- A blockchain is a tamper-proof, shared digital ledger that records transactions(history) that take place between the peers in a peer-to-peer network.

- All the confirmed and validated transaction blocks are linked and chained from the beginning of the chain to the most current block, hence the name **blockchain**.

BLOCK CHAIN

Definition N4

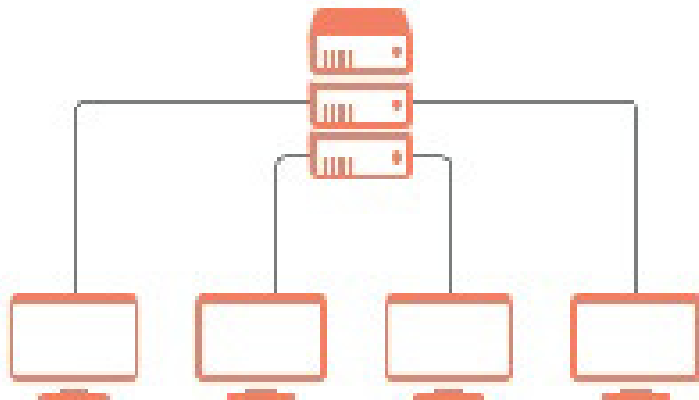


<https://www.slideshare.net/badros/blockchain-desmystification>

Conventional vs Blockchain Network Architecture

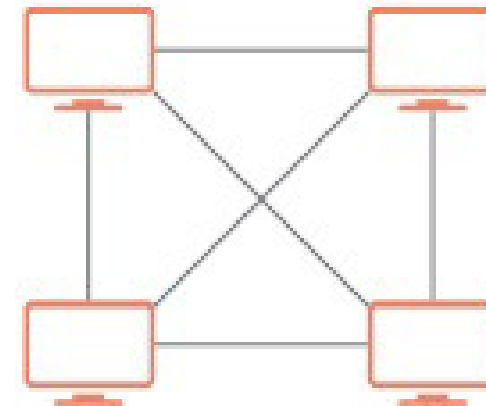
CLIENT/SERVER

Central Server



Clients

PEER TO PEER



Distributed Clients

Advantages of Blockchain

- High level of security
- Hacking threat reduced
- Transparency of transactions increased
- No payment for intermediaries' services
- Different levels of accessibility
- Faster transactions
- Automatic reconciliation of accounts



6D: The Future of Energy

Decarbonized

Deregulated

Decentralized

Democratized

Distributed



Digitized

Blockchain Energy

5Ds of Blockchain technology:
digitalized, deregulated,
decentralized, distributed, &
democratized.

Interestingly, the world's energy systems are also following the 5Ds of blockchain

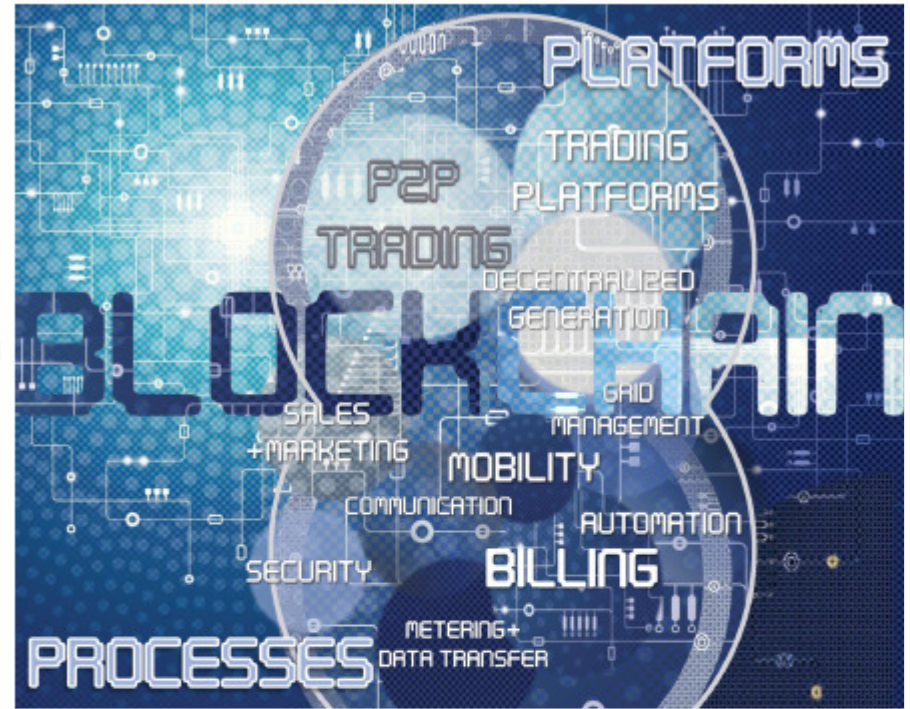
(<https://blogs.adb.org/blog/4-ways-blockchain-will-disrupt-energy-sector>)

Picture Credit: HanRiver Consulting

New & Emerging Markets



Established processes

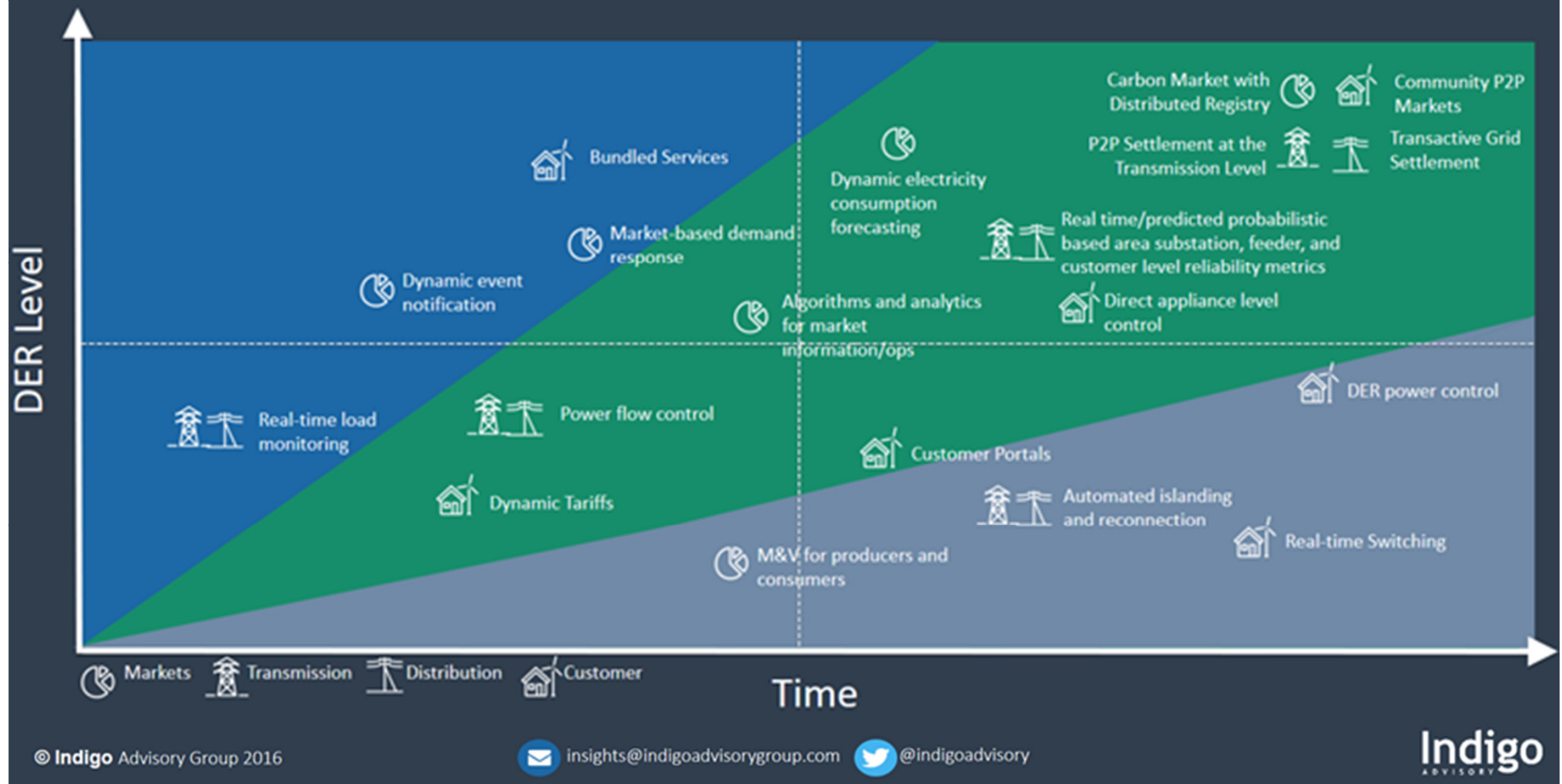


Blockchain in the energy transition.
A survey among decision-makers in the German energy industry

Dark colour: Game Changer
Paler shades: Insignificant

A Blockchain Enabled Transactive and Dynamic System

Developments in utility analytics, the proliferation of distributed energy resources and distributed intelligence may provide the perfect platform for multiple blockchain adoptions across the value chain



Source: [Utilities And Blockchain Pilots - A Global Snapshot](#)

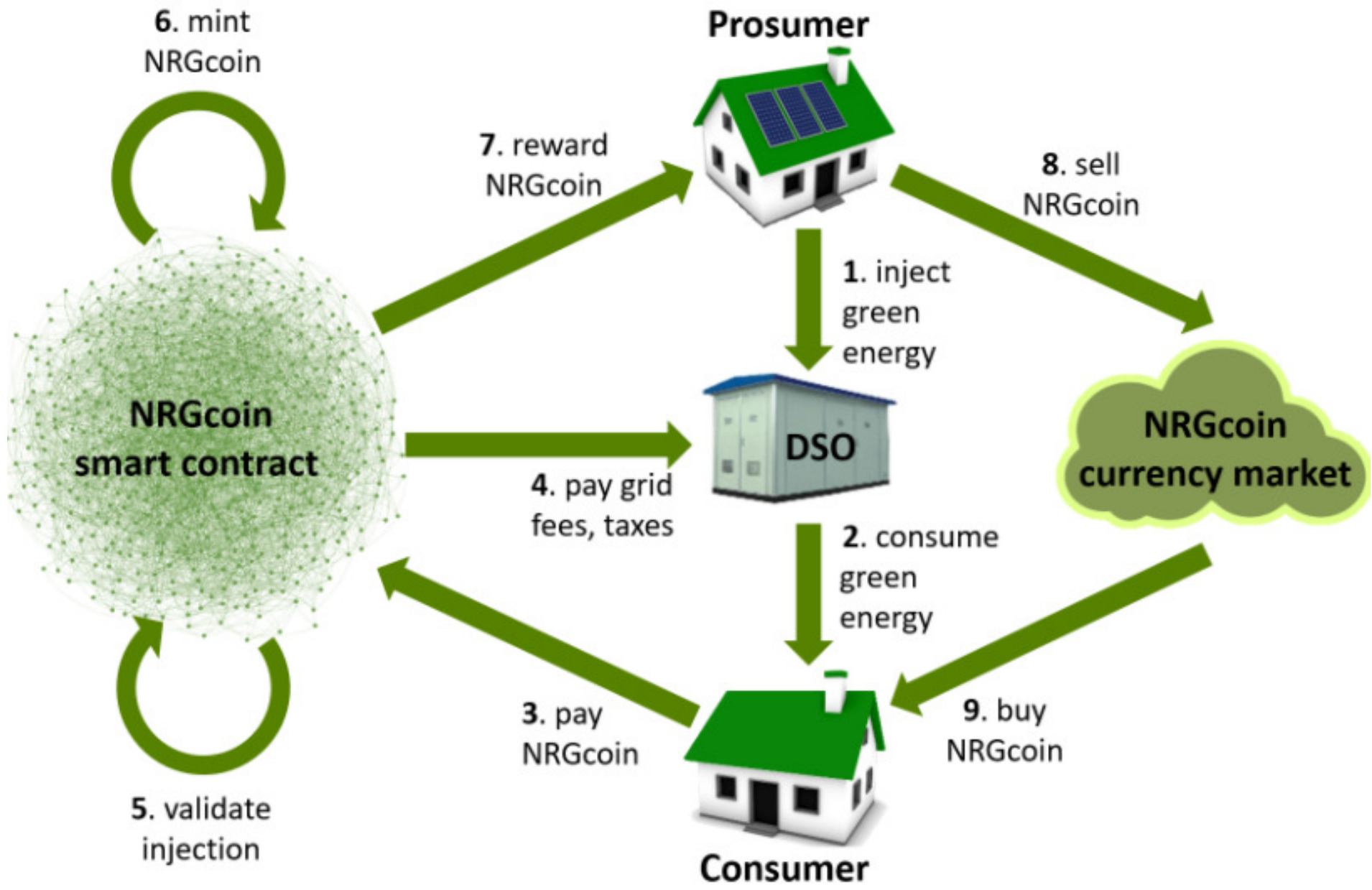
Smart Contracts – Definitely not a new concept but blockchain can catalyse smart contract implementation



SMART CONTRACT

“A smart contract is a program that runs on the blockchain and has its correct execution enforced by the consensus protocol”

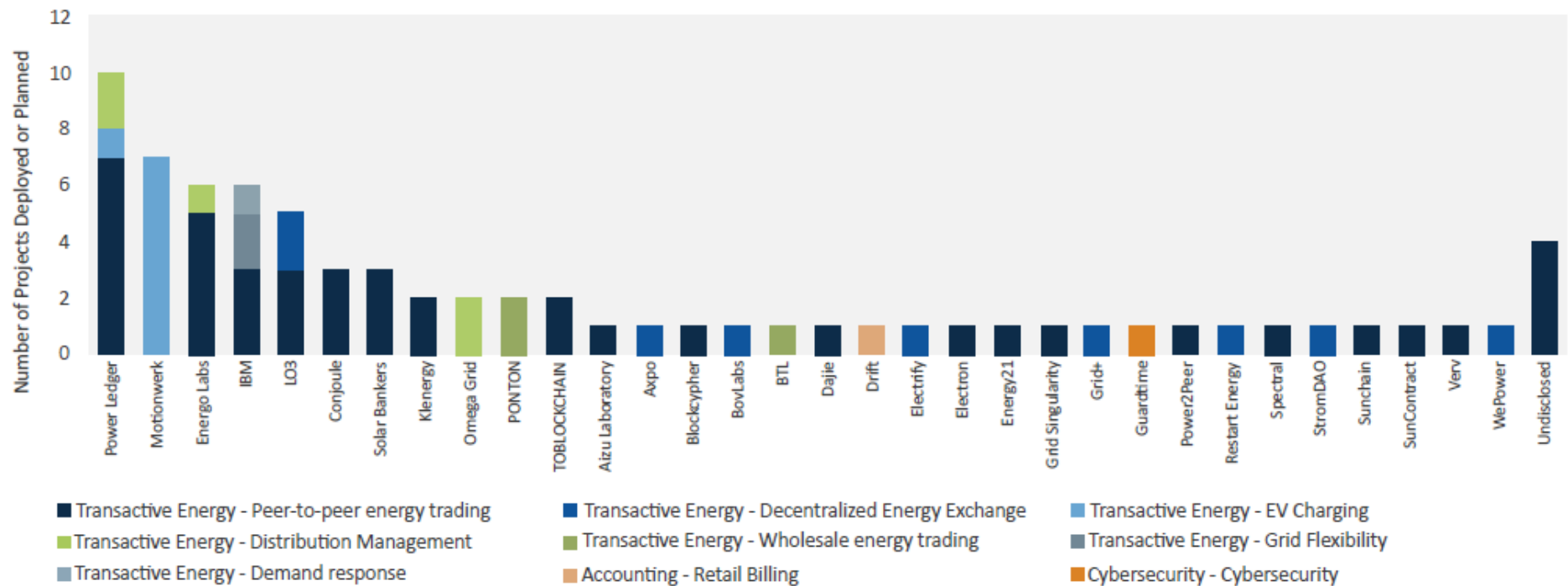
They enable **trustless** financial services like loans, micropayments, and more. Get rid of intermediaries and third parties



NRGcoin - <http://nrgcoin.org/>

Blockchain Start-Ups in Energy Sector

Projects Deployed and Announced, Q2 2016-Q4 2018



Source: GTM Research

Globally, Governments are warming up to Blockchain Technologies

1. **UK's** Food Standards Agency (FSA) completed a pilot using blockchain to track the distribution of meat in a cattle slaughterhouse;
2. The **European Union** Intellectual Property Office (EUIPO) is investigating how blockchain could combat counterfeiting;
3. **Estonia** - Blockchain connects government services in a single digital platform; integrates sensitive data from healthcare, the judiciary, legislature, security and commercial code registries;
4. **USA** – the Food and Drug Administration (FDA) explores using blockchain to securely share patient data. The Department of Homeland Security (DHS) to use blockchain to protect data collected by Border Patrol cameras and sensors;
5. **Denmark** - the Liberal Alliance became the first major political party in the world to vote using blockchain technology;
6. **Dubai** – By 2020, Dubai wants to become the first government in the world to conduct all of its transactions using blockchain;
7. **Swiss** city of Zug is one of Europe's leading supporters of blockchain. Zug already accepts cryptocurrency as payment for public services and completed an e-voting trial;
8. The **Isle of Man** is using blockchain to protect its thriving e-gaming sector from fraud
9. State of **Georgia**- government has experimented with blockchain in a land registry project developed with the Bitfury Group, dubbed the National Agency of Public Registry (NAPR).

ASEAN Neighbours: Thailand



- **Sukhumvit, Bangkok**
- 635 kWp solar capacity
- Shopping Mall (54 kWp)
School (413 kWp)
Condominium (168 kWp)

Source: Jason Chew,
CEO of Empower (Sept
2018)

Credits:
Power Ledger
The Nation, Thailand Portal

ASEAN Neighbours: Philippines



- **DLSU-D, Philippines**
- Energo Labs
- Qtum Blockchain
- POC Stage



De La Salle University
DASMARIÑAS

Source: Jason Chew, CEO of Empower (Sept 2018)

ELECTRIFY.ASIA Singapore

PARTNERS



DEPLOY SYNERGY
WITH TEC IN
KYUSHU, JAPAN

DEPLOY POWERPOD
ALONGSIDE NARADA'S
ENERGY STORAGE
PLATFORMS IN APAC

PROOF-OF-CONCEPT
OF SYNERGY WITH
TEPCO IN SINGAPORE

ENABLE DATA TRADING
FOR CUSTOMERS
THROUGH STREAMR'S
DATA MARKETPLACE

R&D ON PV-TECH AND
ENERGY MANAGEMENT
WITH SERIS IN SINGAPORE

https://christianott.co/energy_electrifyasia_en/

Aspirational RE Target by 2025

- New gov't has a target of 20% of RE in the national power mix by 2025 (excl large hydro);
- SEDA is developing the RE Outlook 2025 which will include enablers to meet the 20% RE target;
- At the recent IGEM 2018, the Minister announced several measures to meet the RE target;
- Of relevance to SEDA is the revert of NEM from net billing to net energy metering, the launch of our national PV monitoring system (IoT) and the support for emerging REC market.

National PV Monitoring System



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LOGIN

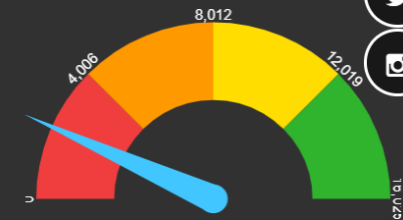
SIGN-UP

MALAYSIA'S LEADING PV MONITORING & PERFORMANCE DATABASE

Up-to-date information, real-time monitoring & reports about the solar photovoltaic in MALAYSIA. Harness & energize tomorrow's energy today!

09:53:57 MYT

Sun, 21 Oct 2018



Power Now
2,151 kW
Maximum Today 2,151 kW

LATEST NEWS



IGEM 2018 targets RM2.5 billion in business leads



PV NATIONWIDE OVERVIEW

Total Monitored Site(s): **120**
Capacity: **16,024.94 kWp**
Array Size: **98,777.07 m²**

TODAY'S PV SUMMARY

Accumulated Energy: **0.583 MWh**
CO₂ Avoidance: **0.52 Tonne**

THIS MONTH'S PV SUMMARY

Accumulated Energy: **111.211 MWh**
CO₂ Avoidance: **99.032 Tonne**

SEDA, country's first authorized verifier for TIGRs Registry

- 17 Oct 2018, SEDA signed an MoU with APX Inc to be the country's first Qualified Reporting Entity (QRE) for the TIGRs Registry.
- Tradeable Instrument for Global Renewables (TIGR) Registry is a Renewable Energy Certificate (REC) platform;
- A REC represents all environmental attributes of 1 MWh of renewable energy generated;
- REC market is another enabler to scale up domestic RE market;
- REC market in Malaysia is in infancy stage, in neighbouring countries such as Singapore, it is gaining traction;
- Issue with REC concerns tracking provenance and no double-counting.

SEDA: REC & Energy Trading Platforms

- Malaysia currently has a voluntary REC market;
- Moving forward, SEDA together with the MESTECC to explore creating a mandatory REC market;
- Will explore REC platform using blockchain technology to track provenance & double-counting;
- Additionally, SEDA is working with the PV industry to pilot energy trading among prosumers;
- Several gov't agencies supporting blockchain innovation e.g. MAGIC, BNM, MIGHT, ASM.

Issues with Blockchain

Acceptance. It will take time before the public will be ready to entrust their data to this technology.

Regulations. The status of blockchain in government regulations remains unsettled.

High energy consumption. The numerous attempts to verify transactions demand significant computing power (PoW).

Cost. The technology offers huge savings in costs and time of blockchain transactions, but the initial integration cost can be a deterrent.

Integration. The creation of blockchain applications requires significant changes or the complete replacement of existing systems.

Scalability: most projects under pilot run and yet to have full scale applications.



Thank you

WELCOME TO THE BLOCKCHAIN & THE INFINITE POSSIBILITIES

Source: www.the-blockchain.com

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