Business Models: A new thinking, a new approach to business models in the EDI – A high level perspective

Presented by

Vally Padayachee,

AMEU Strategic Adviser & PIESA Executive Officer

24 June 2021

Virtual presentation outline (1)

1. Who is PIESA /
2. What is a business model
3. What are the essentials that make up a business model
4. What is a typical power Dx utility business model ?
5. Scene Setter – Typical Electricity Value Chain
6. Current approaches to dealing with increasing VRE
7. Eskom as a “back stop”
8. Anticipated market evolution
9. What would consumers want from utilities in the future?
10. Various business models
11. Enabling technologies
12. City Power JHB case study contribution
13. City of Cape town case study contribution

Who is PIESA ?

1. The Power Institute for East and Southern Africa **("PIESA")** is a voluntary regional power utility association established on 28 February 1998.
2. The PIESA aims to improve electrification in East and Southern Africa through sharing information, research, technology, skills and experiences for the benefit of customers and suppliers in the electricity distribution industry.
3. The main focus is on technical rationalisation to achieve economies of scale with local manufacturers in an effort to enhance electrification in the region.
4. The PIESA's core activities are conducted through its four Advisory Committees:
    a) Electrification
    b) Non-Technical Loss Reduction
    c) Environmental and Safety Management
    d) Standardization
    e) Infrastructure asset management
5. PIESA's membership includes power utilities and affiliates from the said countries
6. Both the AMEU and Eskom are members of PIESA
7. Please refer to www.piesa.com for further details on PIESA

What is a business model(1)

What is a business model?

- A business model is an outline of how a company plans to make money with its product and customer base in a specific market. At its core, a business model explains four things:
  - What product or service a company will sell.
  - How it intends to market that product or service.
  - What kind of expenses it will face.
  - How it expects to turn a profit.

[What Is a Business Model? by **Randa Kriss; Oct 30, 2020; NerdWallet]**

- According to the **Cambridge Dictionary**, a business model is:

  "a description of the different parts of a business or organization showing how they will work together successfully to make money"

- A business model "describes the rationale of how an organization creates, delivers, and captures value."

  [Alexander Osterwalder, creator of the Business Model Canvas]

What are the essentials that make up a business model

- **Value proposition**: A feature that makes your product attractive to customers.
- **Target market**: A specific group of consumers who would be interested in the product.
- **Competitive advantage**: A unique feature of your product or service that can't easily be copied by competitors.
- **Cost structure**: A list of the fixed and variable expenses your business requires to function, and how these affect pricing.
- **Key metrics**: The ways your company measures success.
- **Resources**: The physical, financial, and intellectual assets of your company.
- **Problem and solution**: Your target customers' pain points, and how your company intends to meet them.
- **Revenue model**: A framework that identifies viable income sources to pursue.
- **Revenue streams**: The multiple ways your company can generate income.
- **Profit margin**: The amount your revenue exceeds business costs.

["What Is a Business Model? "by **Randa Kriss; Oct 30, 2020; NerdWallet]**

Scene Setter – Typical Electricity Value Chain

National Energy Regulator of SA (NERSA)

Generation | Transmission | Distribution

Eskom

re

Kelvin P/S

City Power Johannesburg

Power Utilities are primarily in the business of buying electricity from a source and selling it to electricity customers, making a profit/surplus from this

What is a typical power Dx utility business model ?

1. The busines model for a power Dx utility is typically **regulated** (e.g. by NERSA)
2. Hence a the busines model for a power Dx utility is generally requires/expects the utility to deliver **a top class service** to all its end use customers by inter alia in a **safe manner.**
3. The utility is also required/ expected to **procure and deliver** the electricity in **cost effective** manner to all its end use customers

The aforementioned service delivery mandate seems paradoxical viz the need to deliver a top class service delivery BUT essentially at the least possible cost

Presentation scene setter or context (1)

1. Electricity is the only known product manufactured that cannot be stored cost effectively in bulk….. at least for now….but this situation may change as the economics of storing in bulk changes
2. Hence when electricity is generated it needs to be utilised almost instantaneously…..hence capacity determination, security of supply, SHER aspects tariff setting for example can get complex.
3. The System Operator **("SO")** has to virtually dynamically balance the SUPPLY and DEMAND requirements that gets imposed on the grid by generators and consumers/loads respectively
4. In essence the SO has to maintain the frequency of the electricity generated and utilised at 50Hz or 60HZ frequency
5. To achieve this 50 Hz or 60 Hz frequency on the grid involves as we are aware a number of actions both on the supply side and on the demand side.
6. The electric grid though it is considered as the **"largest machine"** it is very inefficient eg on the generation coal fired power stations reflect at maximum around 45% efficiency, some gas turbines operate at around 60%.

Current approaches to dealing with increasing VRE(1)

Potential new opportunities for energy utilities include:

1. Utilities transitioning to become 'comprehensive energy solution providers' ***(Klose et al., 2010Toward a Distributed-power World: Renewables and Smart Grids Will Reshape the Energy Sector. The Boston Consulting Group ; Duncan, R., 2010. Renewable energy and the utility: the next 20 years. Renew. Energy World)***.
2. The provision of additional services to customers beyond energy sales i.e. consulting, installation, financing, operation, maintenance and warranties of electricity generation and heating/cooling systems for a fee.
3. This could provide revenue to offset volatile electricity sales prices, and allow for utilities to benefit from the demand for installation of VRE capacity
4. Shifting from **commodity-driven unit sales** to **'energy as a service'** ***[Frantzis, L., Graham, S., Katofsky, R., Sawyer, H., 2008. Photovoltaic Business Models. National Renewable Energy Laboratory, Golden: CO.]***
5. Utilities could offer a monthly flat- fee service contract where a customer receives all the power they required, within a certain predetermined range, with the comfort of no spiking power bills.
6. Building out a 'platform/virtual utility model' to connect distributed generators with demand ***[Zarakas, W.P., 2017. Two-sided markets and the utility of the future: how services and transactions can shape the utility platform. Electr. J.]***
7. For a service change, or percentage fee, utilities could develop platforms to connect distributed generators with customers, to ensure they are not completely cut out of the customer relationship by increase home-owned VRE installations (*Tayal, 2017).*

Current approaches to dealing with increasing VRE(2)

Potential new opportunities for energy utilities include:

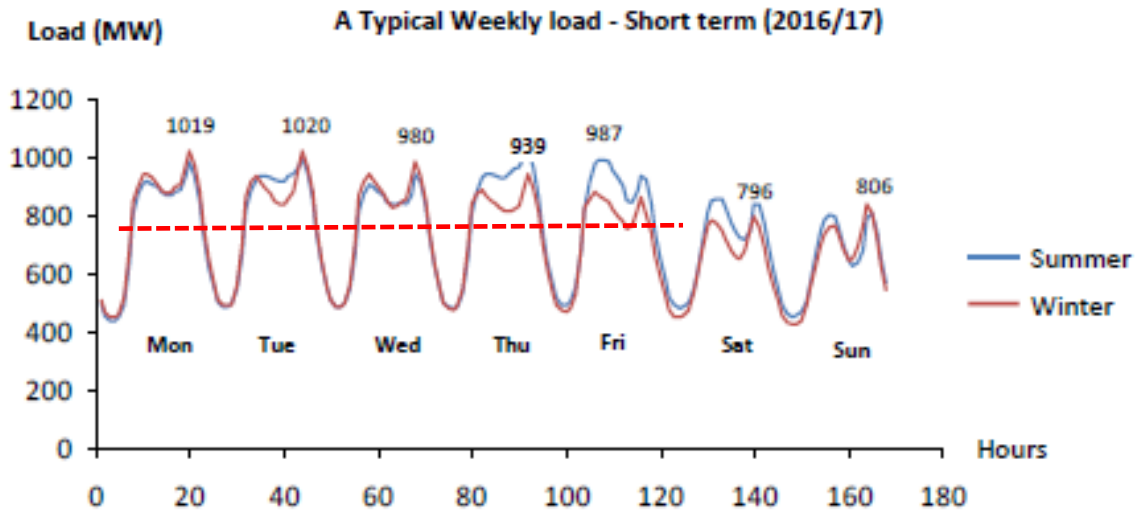
8. Reduced cost of energy provision due to 'technology experience effects' ***[Nillessen, P., Pollitt, M., 2016. Chapter 15 e new business models for utilities to meet the challenge of the energy transition. In: Sioshansi, F.P. (Ed.), Future of Utilities, Utilities of the Future. Elsevier, Walnut Creek, CA,]***
9. Utilities can improve their electricity unit sales margin, despite increasingly volatile prices due to VRE, by taking advantage of the reinforcing mechanism of price reduction via technology experience effects which brings down distributed VRE costs as more VRE capacity is installed.
10. Develop **'alternative customer engagement routes'.**
11. Utilities can look to exploit 'big data' within their large customers bases to provide value-add products beyond electricity, such as media and entertainment, home automation, building security, energy saving, and data aggregation **(Nillessen and Pollitt, 2016**).
12. Additional revenue via **'demand response and balancing' [*Zame, K.K., Brehm, C.A., Nitica, A.T., Richard, C.L., Schweitzer, G.D., 2018. Smart grid and energy storage: policy recommendations].***
13. Smart aggregation of customer capacity, combined with battery storage could allow utilities to provide services to grid operators, and reduce revenue dependence from unit electricity sales.
14. **Capacity payments' *[Zame, K.K., Brehm, C.A., Nitica, A.T., Richard, C.L., Schweitzer, G.D., 2018. Smart grid and energy storage: policy recommendations].***
15. Despite competition from increasing levels of low-cost, distributed VRE, utilities could aim to generate value by providing grid operators with assurance of large-generation-capacity availability, to ensure grid stability and supply-capabilities.

The electricity business of tomorrow – is being built on the business of today.

- While improving and using the same grid, we are moving away from the exclusive kWh business towards more of a network services-based business model
- Hence, we had better keep the network in tip-top condition

We still expect Eskom will be our 'Backstop', so -

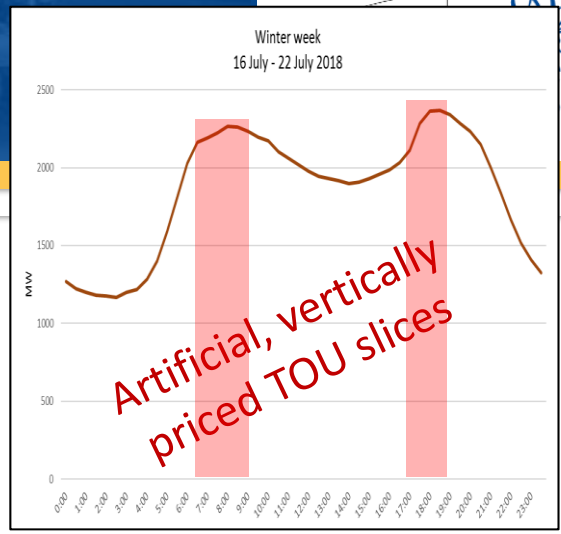
- Our 'Backstop' supplier will be Eskom (or the future ISMO) – they will be the price setter, and the price for capacity will most likely become more and more costly over time, particularly for peaky load.
- Peaky load already incurs high costs from this supplier
- As a grid operator, we too benefit from the diversity that the community connected to our own grids demand.
- We need to grow this diversity, both in load and new distributed energy resources
- Whatever can be done to remove the kinks in the load curve presented to Eskom, will reduce costs of both peak energy and capacity charges

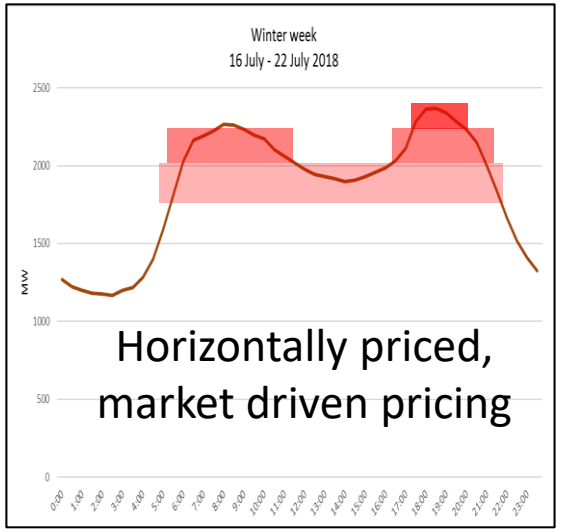


- **The ideal and cheapest load to procure from Eskom – a flat line – is a constant demand and a predictable quantity of energy to be delivered**

Anticipated Market Evolution

- Part of the unbundling of Eskom will mean evolving from the current artificially priced Eskom tariffs to a competitive Electricity Market
- In the short to medium term, it is likely that bulk supply from Eskom will only be made available on a TOU basis. (First indicated two years ago, the Muniflex tariff)
- For new energy alternatives, the trick will be to avoid long term price lock-in and to maintain future competitiveness
- It is most likely that Eskom will fairly quickly restructure tariffs to place much more emphasis on capacity charges, leading to new capacity market options
- Market dynamics – this is a fast changing environment and new technological developments will require continuous review of the generation plan
- The second part of unbundling will also mean restructure of the distribution industry, with possible creation of a trading and retail industry





2020/2021 275 kV Network Charges:
Tx R 10,87 per kVA/m
LV Subsidy R 15,48 per kVA/m
Total : R 26,35 per kVA/m

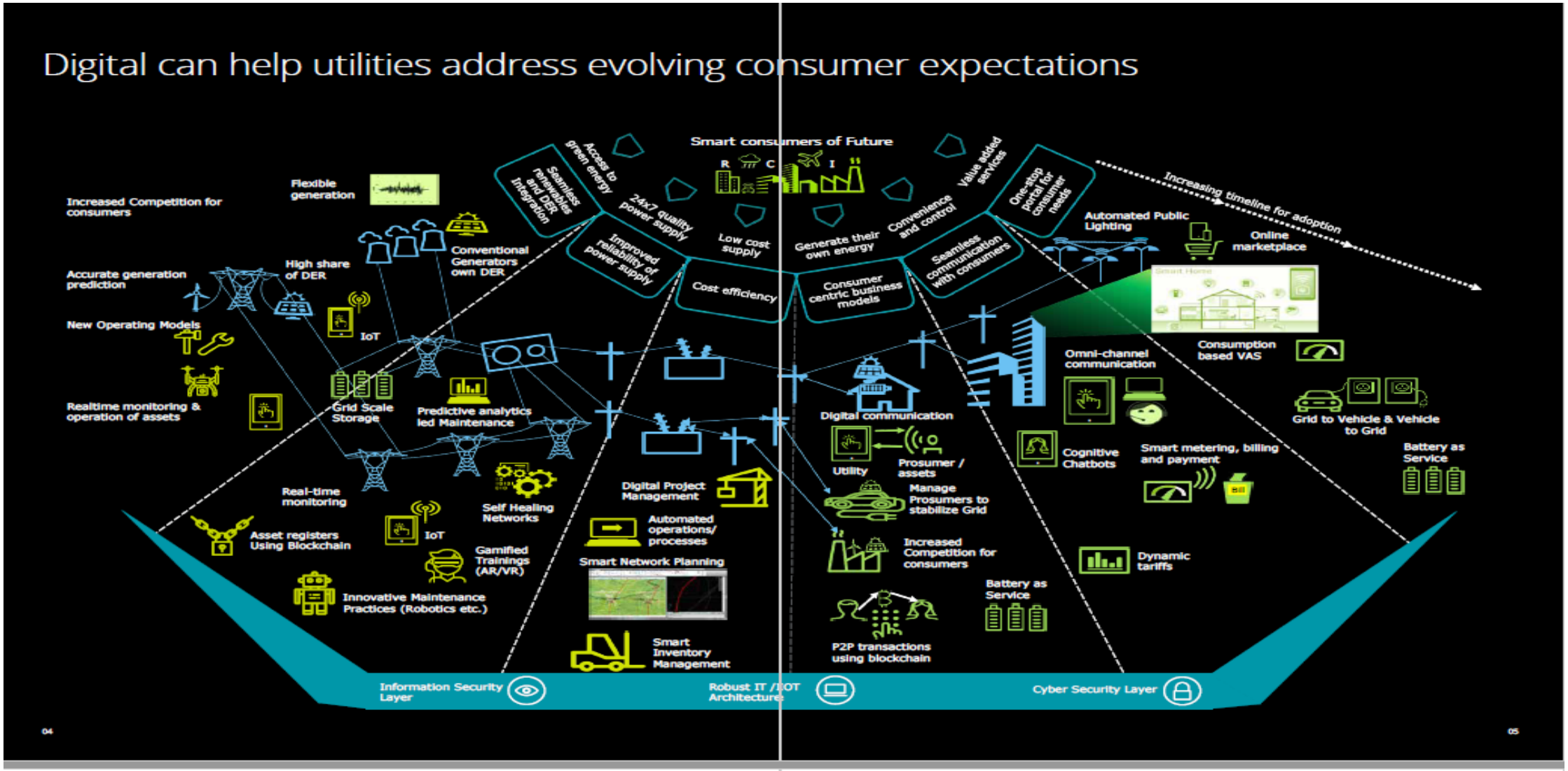
2020/2021 275 kV Network Charges:
Tx R 11,62 per kVA/m
LV Subsidy R 16,55 per kVA/m
Total : R 28,17 per kVA/m

Increases are likely to accelerate over the next 5 years

What would consumers want from power Dx utilities in the future?

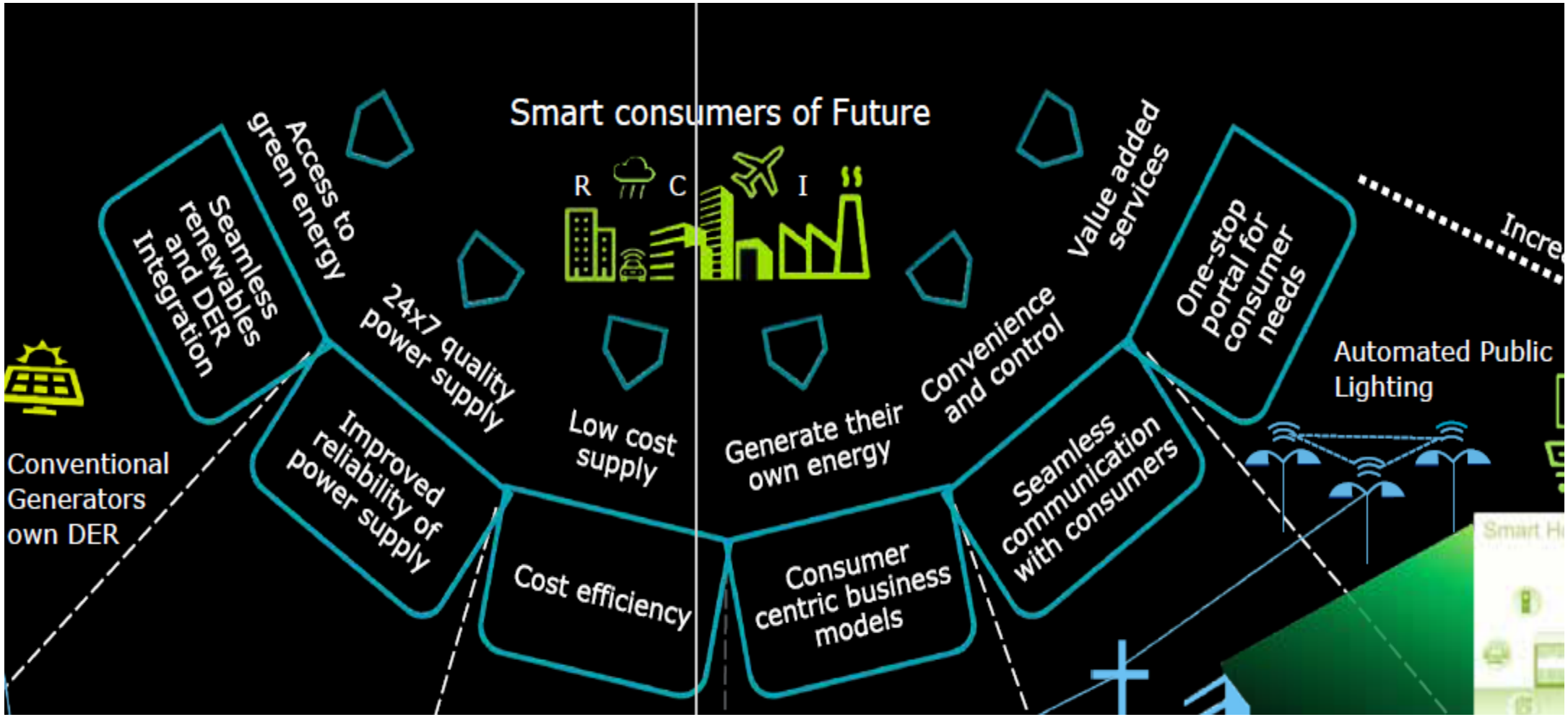
1. As consumers gain significant bargaining power in the coming years, they are likely to become the focal point of the power value chain.
2. Utilities need to realign their future business models in order to meet the heightened consumer expectations, to remain relevant and to create value.
3. It is therefore important to start by understanding the needs of the consumers of tomorrow.
4. In order to meet the expectations of consumers of the future, power utilities will have to adapt and make changes to the entire utility ecosystem, accordingly.
5. Future power utilities would have to
   a) seamlessly manage the integration of DER into the grid,
   b) provide reliable power supply of excellent quality,
   c) be cost efficient themselves in order to provide cheap power supply,
   d) regard consumers as partners in the journey,
   e) provide impeccable customer service, and
   f) be the one-stop portal for all energy needs of consumers.

[“Utility of the future” - Deloitte]



- ***Impact of the 4 D's – Decentralisation, Digitisation, Decarbonisation and Disruption***
- ***2 way flow of electrons***
- ***Customers now have move choices***
- ***Increasing ingress of renewables, etc***

["Utility of the future" - Deloitte]



["Utility of the future" - Deloitte]

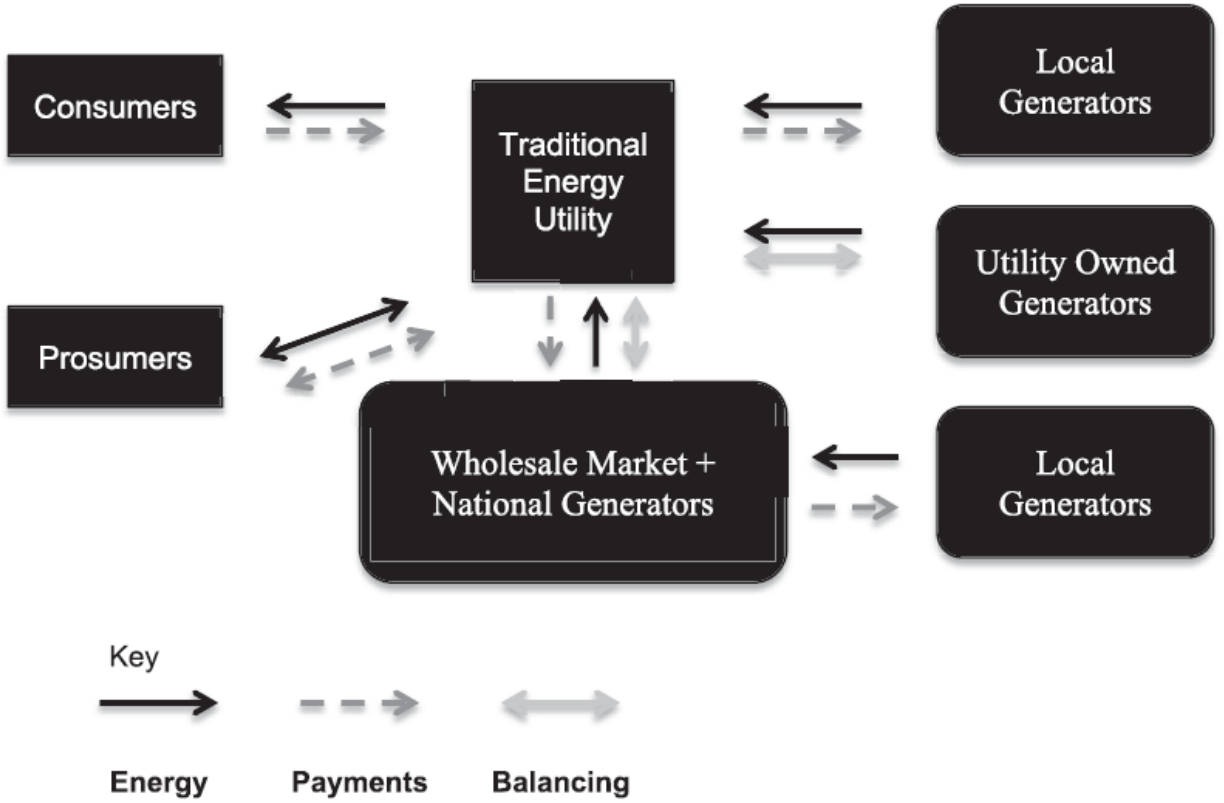
Traditional electricity energy utility business model (1)

1. The traditional energy utility business model focuses on generating energy via (or sourcing energy from) large-scale projects, typically at the scale of 100s-1000s of megawatts (MW), using a variety of technologies: wind, solar PV, solar thermal, biomass, nuclear, coal, gas ***[Hall, S., Roelich, K., 2016. Business model innovation in electricity supply markets the role of complex value in the United Kingdom. Energy Pol. 92]***
2. The value proposition at the centre of this business model is the bulk generation of electricity (and in some cases heat***) [J., Taylor, M., 2008. Utility Solar Business Models: Emerging Utility]***
3. ***Strategies & Innovation. Solar Electric Power Association (SEPA)].***
4. Customers are supplied with the electricity via the grid, as part of the utility value chain depicted in Fig. 1, and pay on a per-unit consumed basis (e.g. residential households) or via a power purchase agreement (e.g. energy intensive businesses) **(Hall and Roelich, 2016).**

The traditional energy utility value chain

[adapted from Richter, M., 2012. Utilities' business models for renewable energy: a review. Renew. Sustain. Energy Rev. 16 (5),].

Traditional electricity energy utility business model (2)

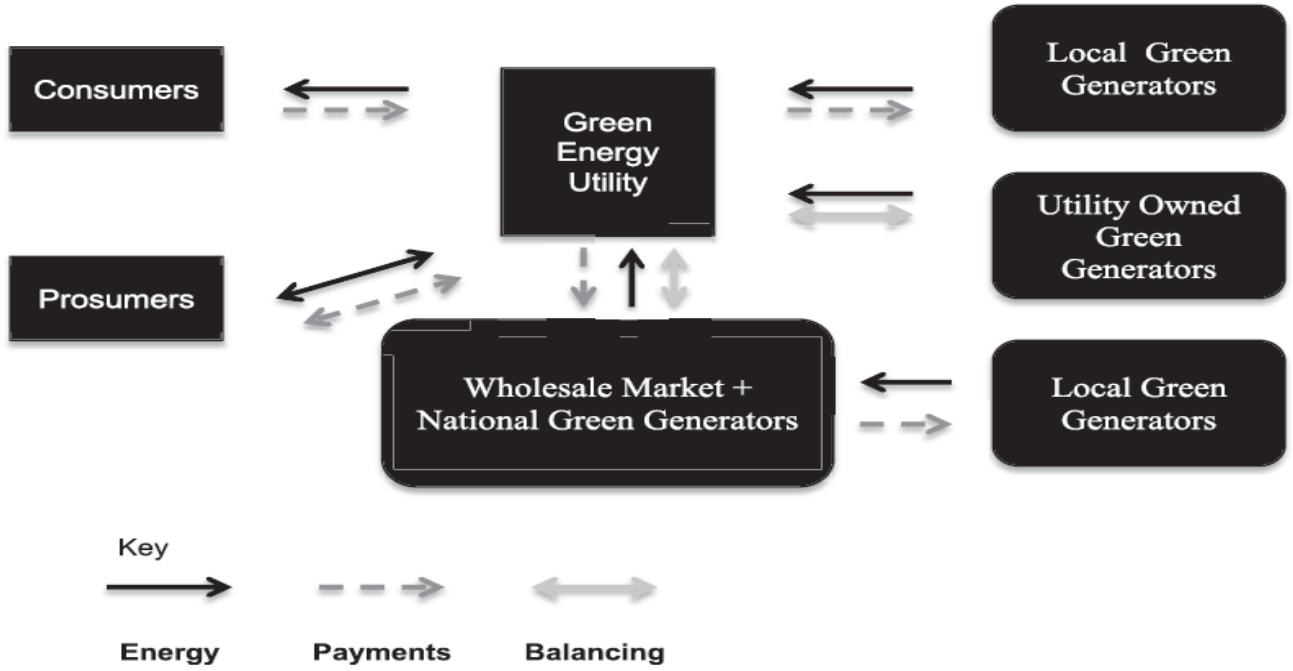


The traditional energy utility business model

(adapted Hall, S., Roelich, K., 2016. Business model innovation in electricity supply markets: the role of complex value in the United Kingdom. Energy Pol. 92,]

Green Energy Utility Business Model (similar to the Power-to-X busines model)

1. The Green Energy Utility typology represents a very similar business model to that of the traditional utility
2. The cost structure and revenue streams for Green Energy Utilities are based on the sale of commodities i.e. units of electricity, heat and gas, but with a focus on ensuring these units are from “green” sources



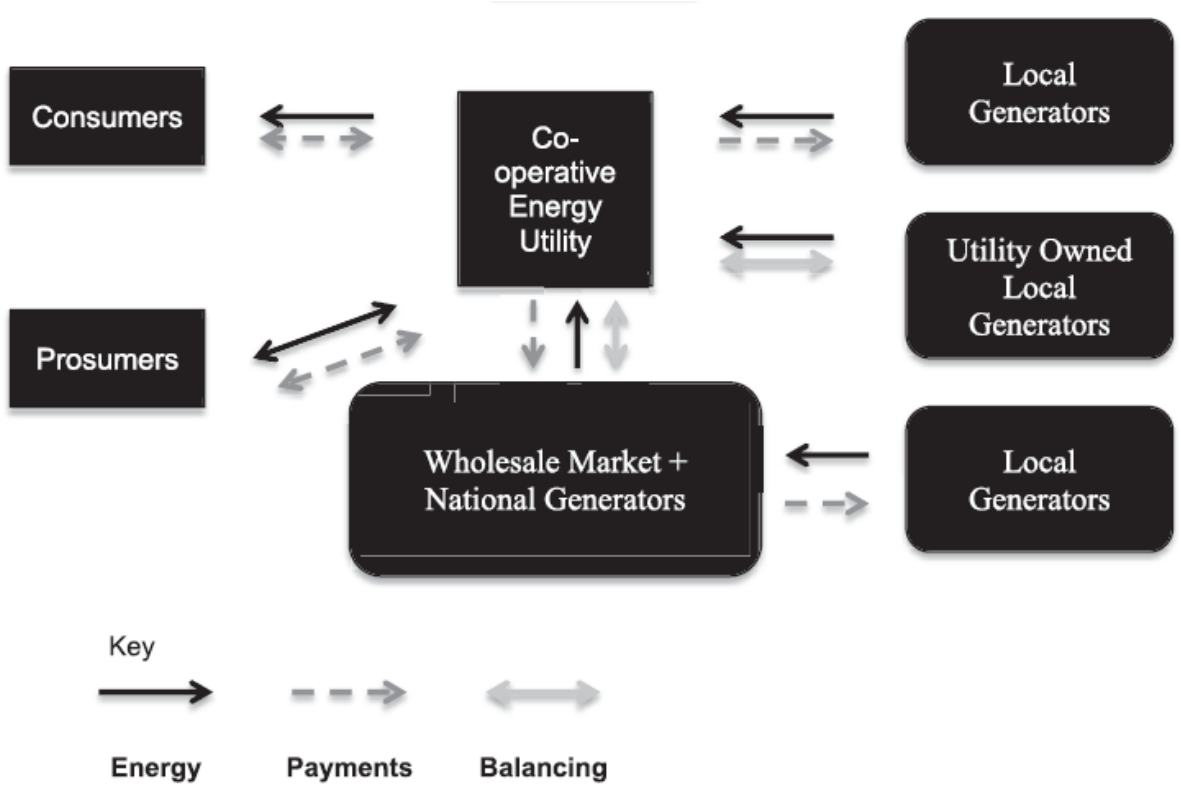
The green energy utility business model

[acknowledgement: The typologies of power: Energy utility business models in an increasingly renewable sector Scott T. Bryant, Karla Straker, Cara Wrigley,]

.

The Cooperative Energy Utility Business Model

1. The Cooperative Utility typically has a small customer-base with little customer churn, but also tends to own only a small number of generation assets, due to their regional focus



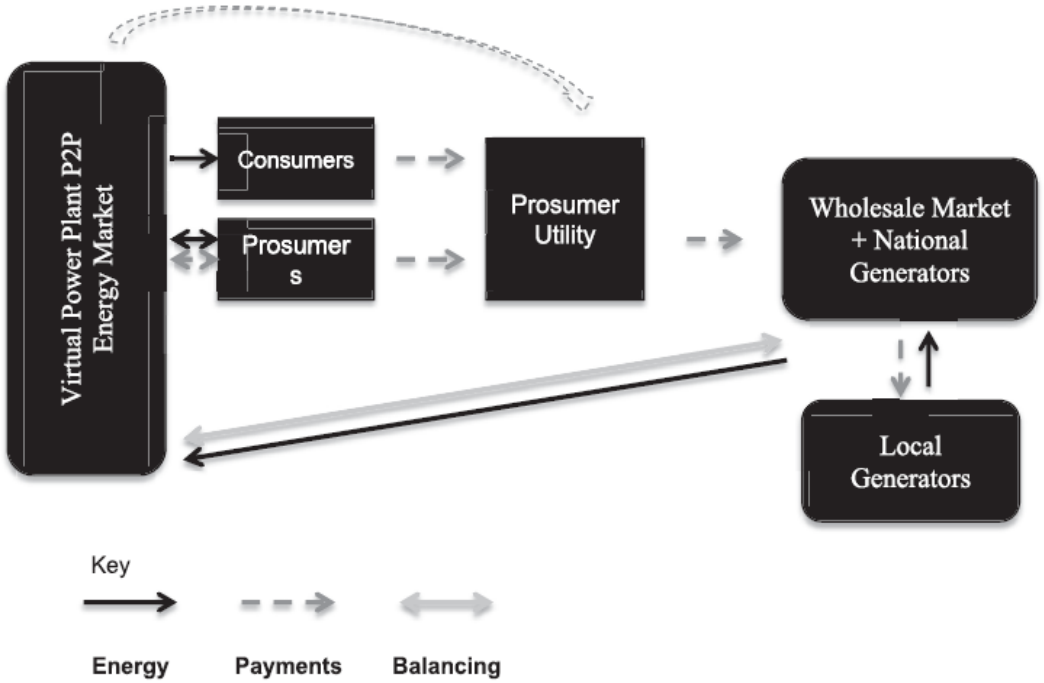
The cooperative energy utility business model

[acknowledgement: The typologies of power: Energy utility business models in an increasingly renewable sector Scott T. Bryant, Karla Straker, Cara Wrigley,]

.

The Prosumer Utility Business Model

1. Businesses operating under the Prosumer Utility typology offer customers the prospect of green, local, self-produced electricity, whilst seeking to maximise customers' ability to utilise their own (owned/leased) self-generation assets (i.e. rooftop solar PV).



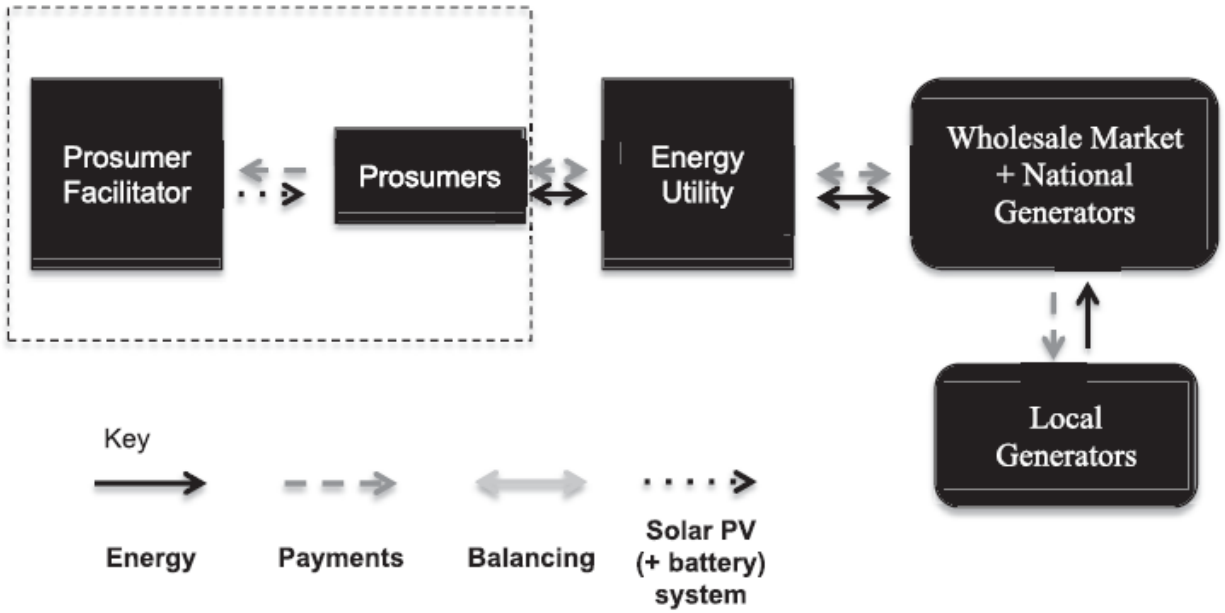
The prosumer utility business model

[acknowledgement: The typologies of power: Energy utility business models in an increasingly renewable sector Scott T. Bryant, Karla Straker, Cara Wrigley,]

.

The Prosumer Facilitator Utility Business Model

1. The Prosumer Facilitator energy utility typology represents the most distinctive value proposition of the five typologies identified. Its focus is on helping customers reduce their dependence (partially or entirely) on grid-supplied energy, whilst reducing their cost of energy in the process.



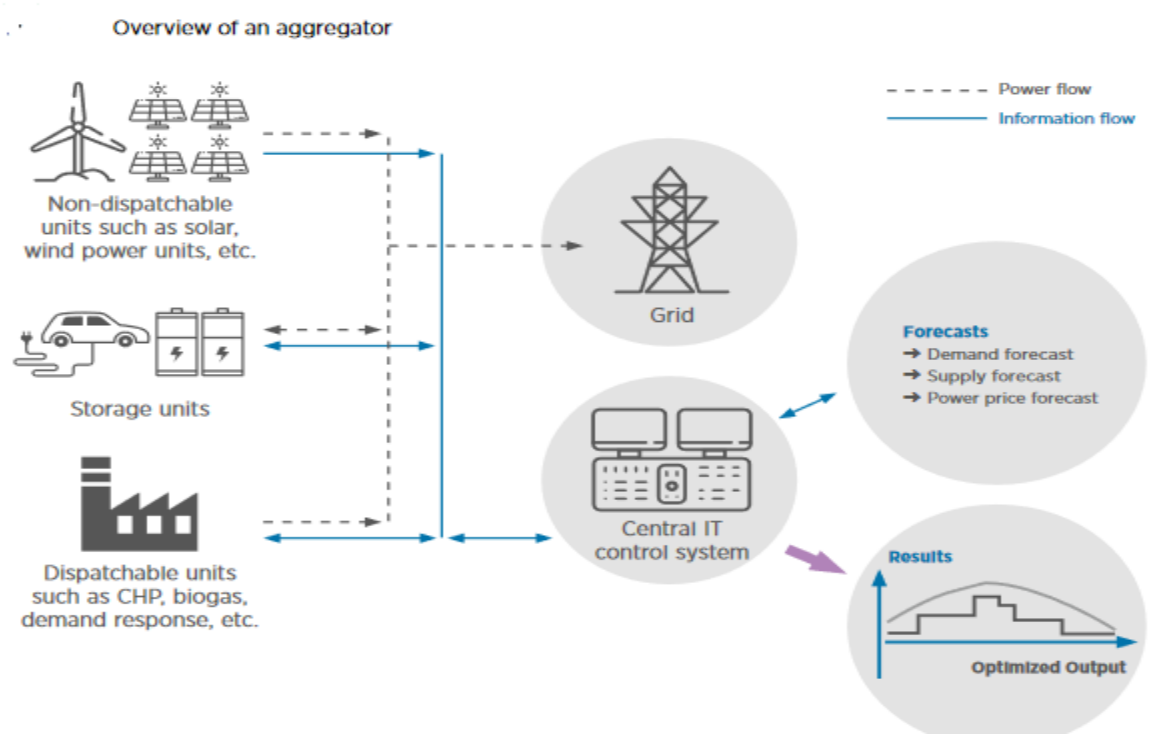
The prosumer facilitator business model

[acknowledgement: The typologies of power: Energy utility business models in an increasingly renewable sector Scott T. Bryant, Karla Straker, Cara Wrigley,]

.

Aggregator business model

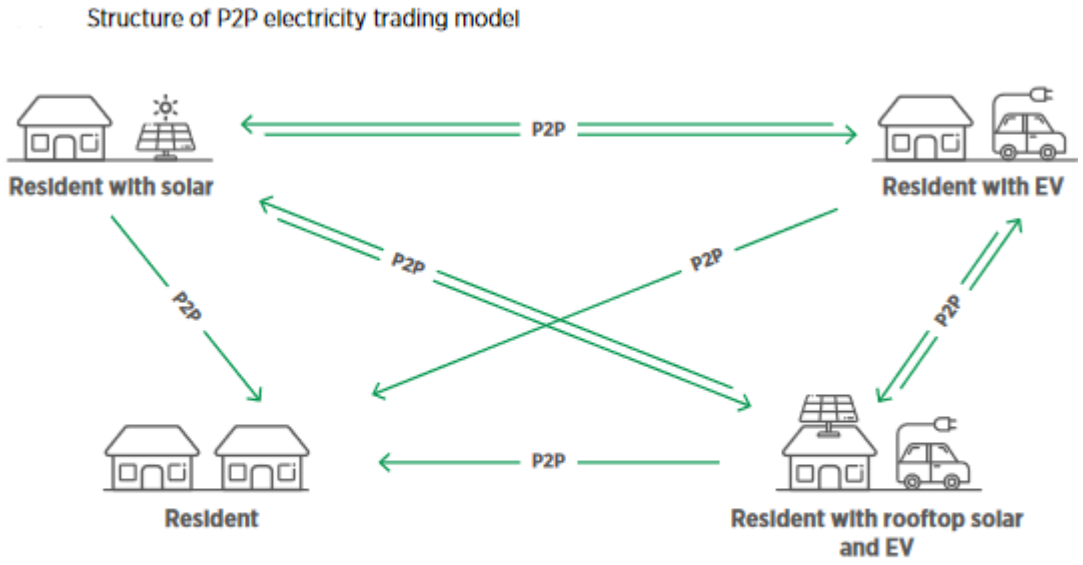
1. An aggregator can operate many distributed energy resources (DERs) together, creating a sizeable capacity similar to that of a conventional generator.
2. This aggregation also can be called a “virtual power plant”.
3. Aggregators can then sell electricity or ancillary services via an electricity exchange, in the wholesale market, or through procurement by the system operator.



[“Business Models”: IRENA]

Peer-to-Peer (P2P) electricity trading business model

1. Peer-to-peer (P2P) electricity trading is a business model, based on an interconnected platform, that serves as an online marketplace where consumers and producers "meet" to trade electricity directly, without the need for an intermediary.
2. P2P electricity trading is also known as **the "Uber" or "Airbnb" of energy**, as it is a platform that allows local distributed energy generators to sell their electricity at the desired price to consumers willing to pay that price.
3. This electricity is usually transacted between users (buyers/sellers) of the platform that also become members of the platform, for example by paying a pre-determined monthly subscription fee.

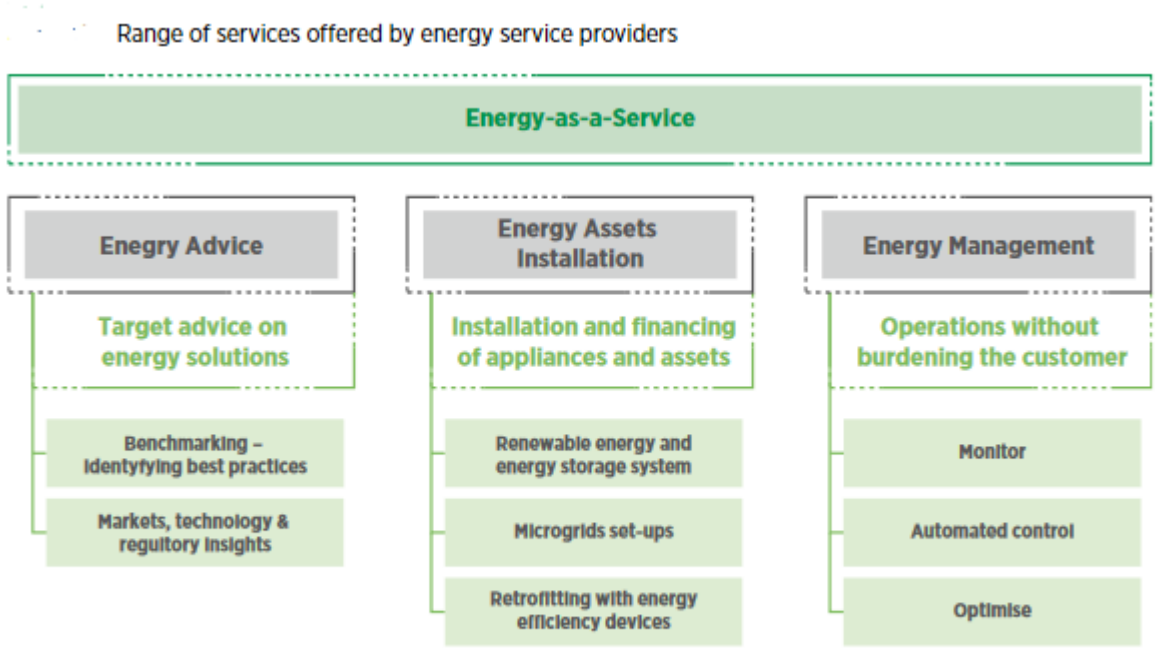


Source: Liu *et al.*, 2019
Note: The direction of the arrow indicates the accounting and transactions flow directions.

["Business Models": IRENA]

Energy-as-a-Service business model

1. Digitalisation is essentially converting energy-related data into value for the power system.
2. Electricity providers can assume a new role as an energy service provider (ESP), monetising the value created by the digitalisation of the power sector.
3. This new role of energy providers has led to the development of innovative and customer-centric business models by both conventional companies from the energy sector and new actors entering the sector, such as information technology (IT) companies

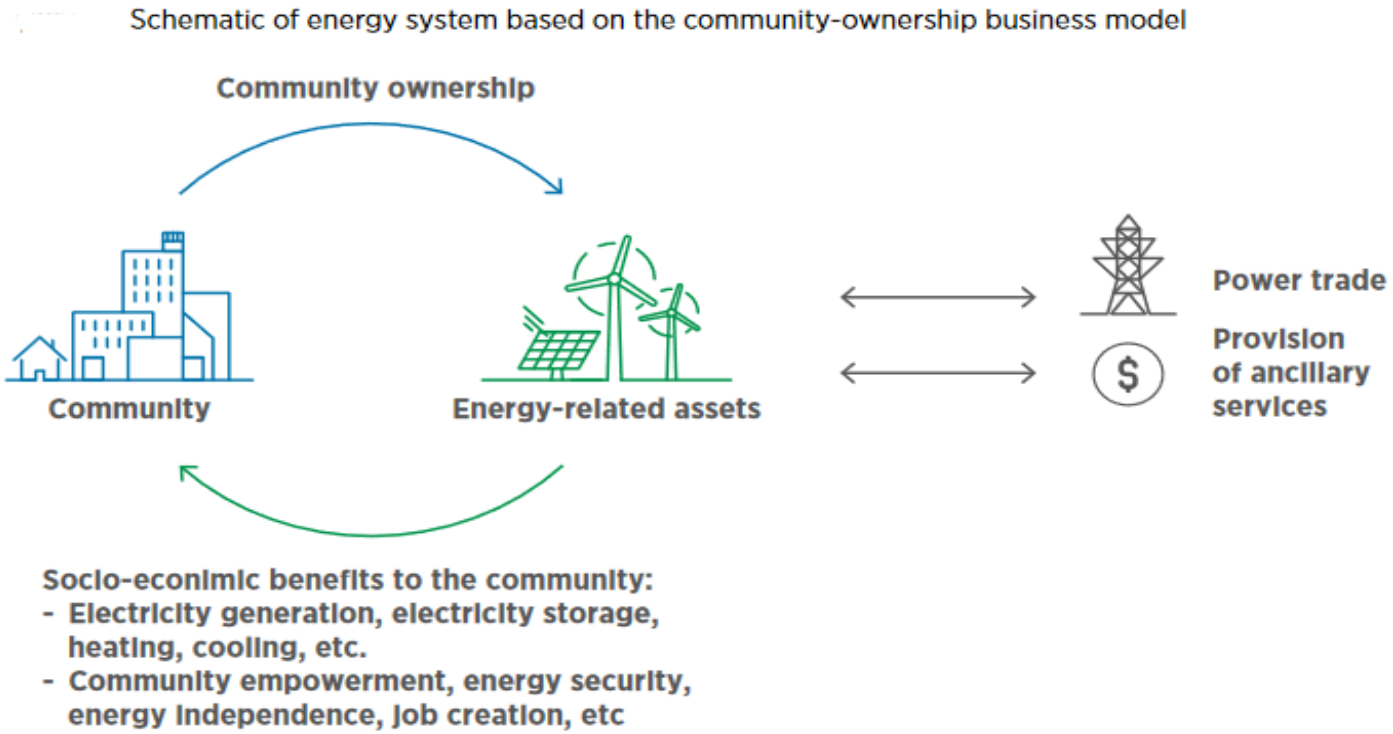


Source: Adapted from Edison Energy, 2016; Eneco, 2019

["Business Models": IRENA]

Community ownership business model

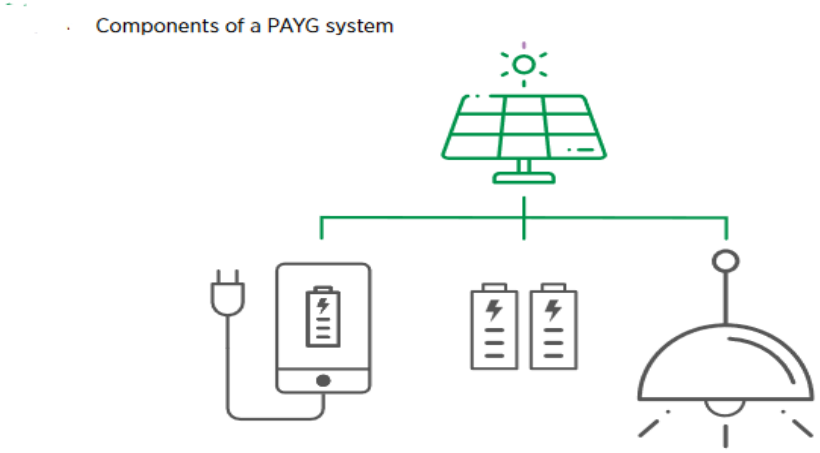
1. Community-ownership structures, in the context of the global energy transition and the decentralisation of power systems, refer to the collective ownership and management of energy-related assets, usually distributed energy resources (DERs).
2. Through cost-sharing, community-ownership models enable individual participants to own assets with lower levels of investment.
3. Community-ownership projects vary in size but are often between 5 kilowatts (kW) and 5 megawatts (MW) in size, depending on where they are being implemented



["Business Models": IRENA]

Pay-As-You-Go (PAYG) business model

1. Nearly 840million people worldwide do not have access to electricity, and over 1billion people are connected to an unreliable grid (Lighting Global, GOGLA and ESMAP, 2020).
2. As the unserved population is not connected to the main grid, extending the grid is an integral part of providing those populations with energy access.
3. However, extending the grid involves significant capital outlay and long lead times for the construction of new infrastructure.
4. An alternative to grid extension is power from distributed solar photovoltaic (PV) systems.
5. The decreasing costs of such systems represent an opportunity for these communities to gain electricity access without the need for grid extension.
6. The PAYG business model is an innovation that emerged to address the energy access challenge and to provide electricity generated from renewable energy sources at affordable prices, with payments facilitated by technologies available in these areas



["Business Models": IRENA]

Enabling technologies

Some enabling technologies for these business models

1. Utility scale batteries
2. Behind-the-meter batteries
3. Electric-vehicle smart charging
4. Renewable power-to-heat
5. Renewable power-to-hydrogen
6. Internet of Things
7. Artificial intelligence and big data
8. Blockchain
9. Renewable mini-grids
10. Supergrids
11. Flexibility in conventional power plants

PIESA
THE POWER INSTITUTE FOR EAST & SOUTHERN AFRICA

Thank you