ApolloChain

"Blockchains" New Energy Era

A smart contract-based disintermediary energy trading platform

ApolloChain™

BUSINESS WHITEPAPER

VERSION 1.5.5 (17/04/2018)

ABSTRACT

Blockchain is a digital ledger in which transactions made in cryptocurrency can be recorded chronologically and publicly. Blockchain has been widely studied for its applications in the energy field. It provides an innovative solution for data interaction, information security, and creates the possibility of deploying such technology in an energy trading platform. Blockchain is well suited to facilitate peer to peer energy traidng in decentralised markets.

Blockchain gives reliable identification capability to each electricity transaction, reduces credit cost, enables swift automatic settlements between entrusted parties, substantially lowers transaction cost, and effectively improves efficiency.

This **Business White Paper** (hereinafter referred to as "the paper") provides an overview of the economic characteristics of the power of some major markets in the world; then the paper outlines Apollochain's core business, future development, and technology base; and finally, the paper reveals the current operational structure, and management model of the Appollochain project.

TABLE OF CONTENT

1 POWER INDUSTRY OVERVIEW

1.1 Economic Characters of Power Industry

The power industry has enjoyed a natural monopoly since the industrial revolution with profound influence on the economy. Countries rich in coal and gas like Australia have been able to enjoy low cost thermal power. Much of the generation was built by the Government near the source of its fuel and most of Australia's population lives on the coast. Accordingly, an expensive transmission and distribution network was established to transport power from generator to consumer. The modern market has changed. Affordable micro-generation is now available to households who can bypass large power transportation costs. The opportunity exists in Australia and other deregulated markets for prosumers of electricity to trade bilaterally.

Approximately 35 nations which account for 44% of the generated power in the world have already deregulated (or made significant progress towards deregulation) in their energy markets. The figure 1.1 below presents the allocation of all the 35 nations. Areas in dark blue are partially deregulated markets and grey areas are fully regulated markets.[1] :

[1] Deregulated Energy Markets Around the World; https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018

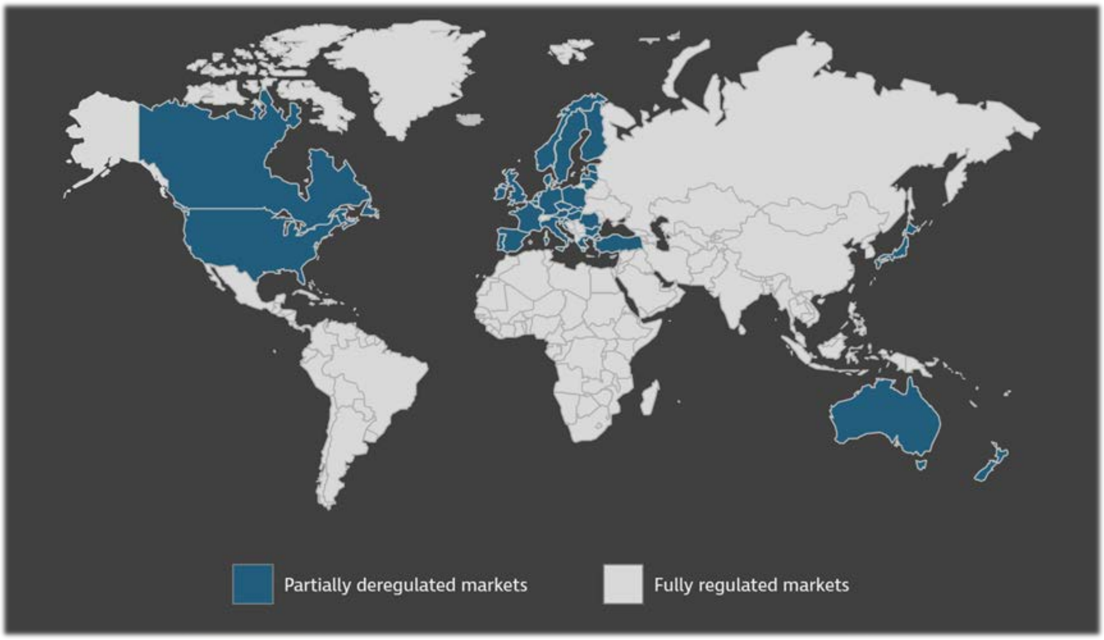


Figure 1.1 Deregulated Energy Markets around the World

Source: https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018

1.1.1 North America

The Figure 1.2 below gives a high-level look at the North American market..

In the late 1990s, North America carried out a series of deregulation activities to reduce power cost to electricity consumers. Unfortunately, mistakes were made in several markets, most notably California with the infamous Enron scandal. As a result of these issues, although some states fully adopted energy deregulation, other states have remained hesitant to deregulate.

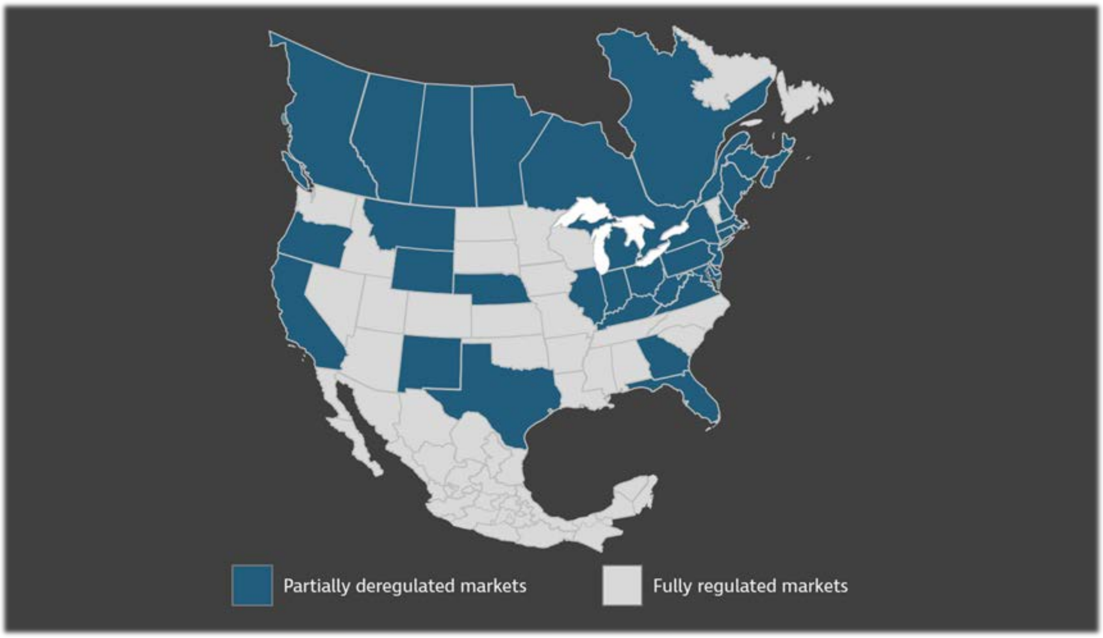


Figure 1.2 Deregulated Energy Markets in North America

Source: https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018

1.1.2 Europe

The European Union (EU) has been working to create a large, unified energy market across the continent. Currently, the EU and other European countries are moving towards energy deregulation to varying degrees. In most countries, all residential and commercial customers can look to source their electricity and natural gas from a variety of providers, but many exceptions remain。

The Figure 1.3 below gives a high-level look at which market has begun to deregulate.

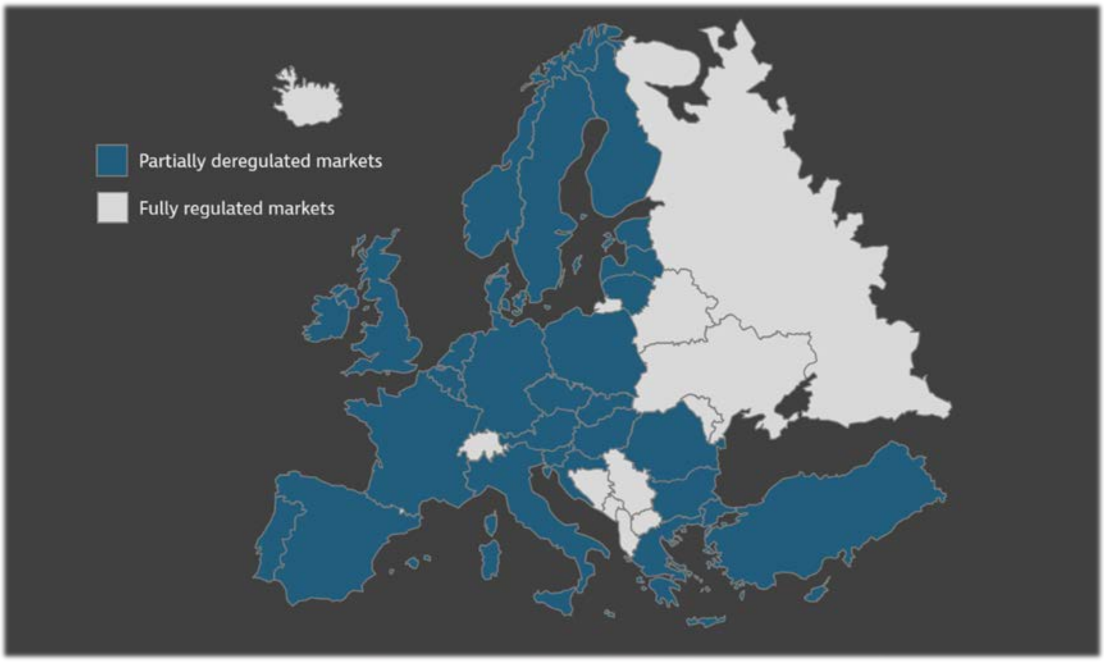


Figure 1.3 Deregulated Energy Markets in Europe

Source: https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018

1.1.3 Pacific Region

Australia and New Zealand were the first countries to completely deregulated their markets. In these countries, all residential and commercial customers can source their electricity and natural gas from a variety of providers. Australia is often recognised as one of the most open, efficient and successful deregulated energy markets in the world. It is a mature market that enjoys a significant level of competition.

Japan is deregulating its energy market. Large businesses are able to source their electricity and natural gas from a variety of different companies. Full retail competition for residential and small business consumers is expected by 2020.

Various other Asian countries, including South Korea and Singapore, are looking at the potential to deregulate their energy markets. Although they currently remain far from deregulation, the first tentative steps have been made.

The Figure 1.4 below gives a high-level look at which markets has begun to deregulate.

Figure 1.4 Deregulated Energy Markets in Pacific Region

Source: https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018

1.2 Electric Power Reform

Electricity market worldwide in general has 4 operation modes: monopoly, power-buying, wholesale competition, and retail competition[2]. At this moment, electricity markets in most countries are still in monopoly and power-buying mode. Below we illustrate each mode in detail via structure diagrams.

1.2.1 Monopoly Mode

The very first operation mode of the electricity market is monopoly in 2 forms: vertical integration (meaning generation, transmission, distribution and supply are all monopolised) and separating distribution. Figure 1.5 below presents its detailed structure:

[2] Kirschen D S, Strbac G. Fundamentals of power system economics[M]. John Wiley & Sons, 2010.

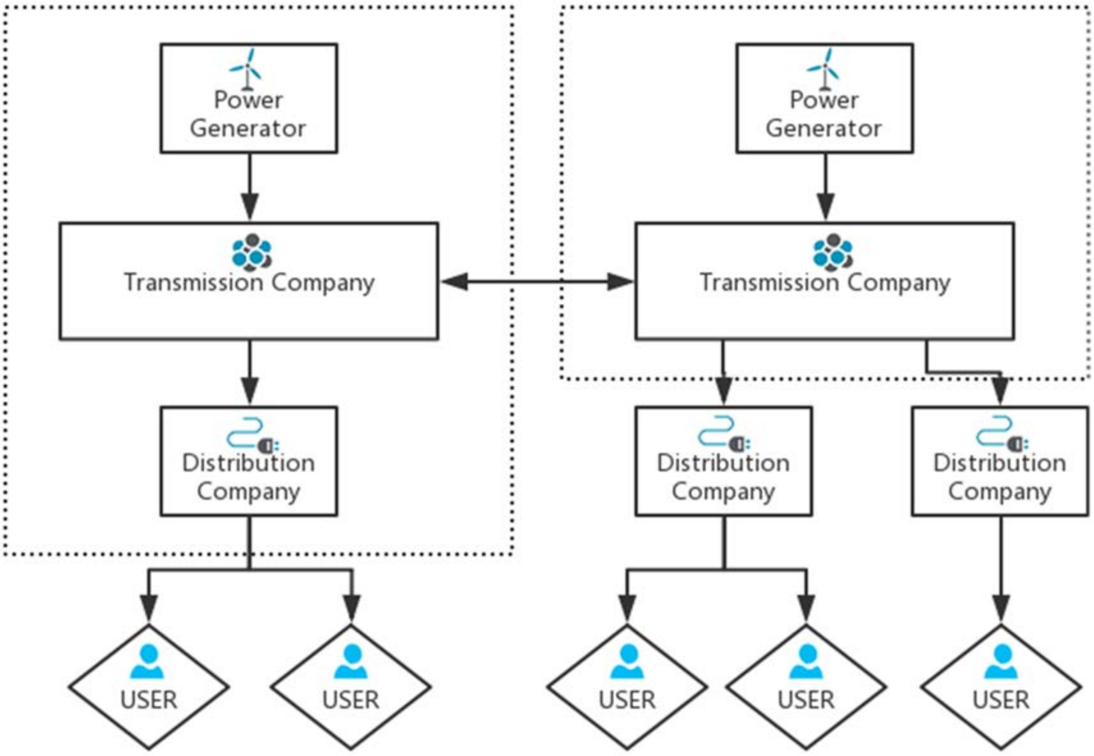


Figure 1.5 Monopoly Mode in the Electricity Market

Source: organised from cases studied by Kirschen & Strbac (2010)

1.2.2 Power-Buying Mode

In this mode, monopoly is partially cracked down, and individual power generator starts accessing this market, but the organisation in which has electricity wholesale dominates the power grid thereby power generators are not capable to directly sell electricity to end users. A detailed demonstration can be found in Figure 1.6:

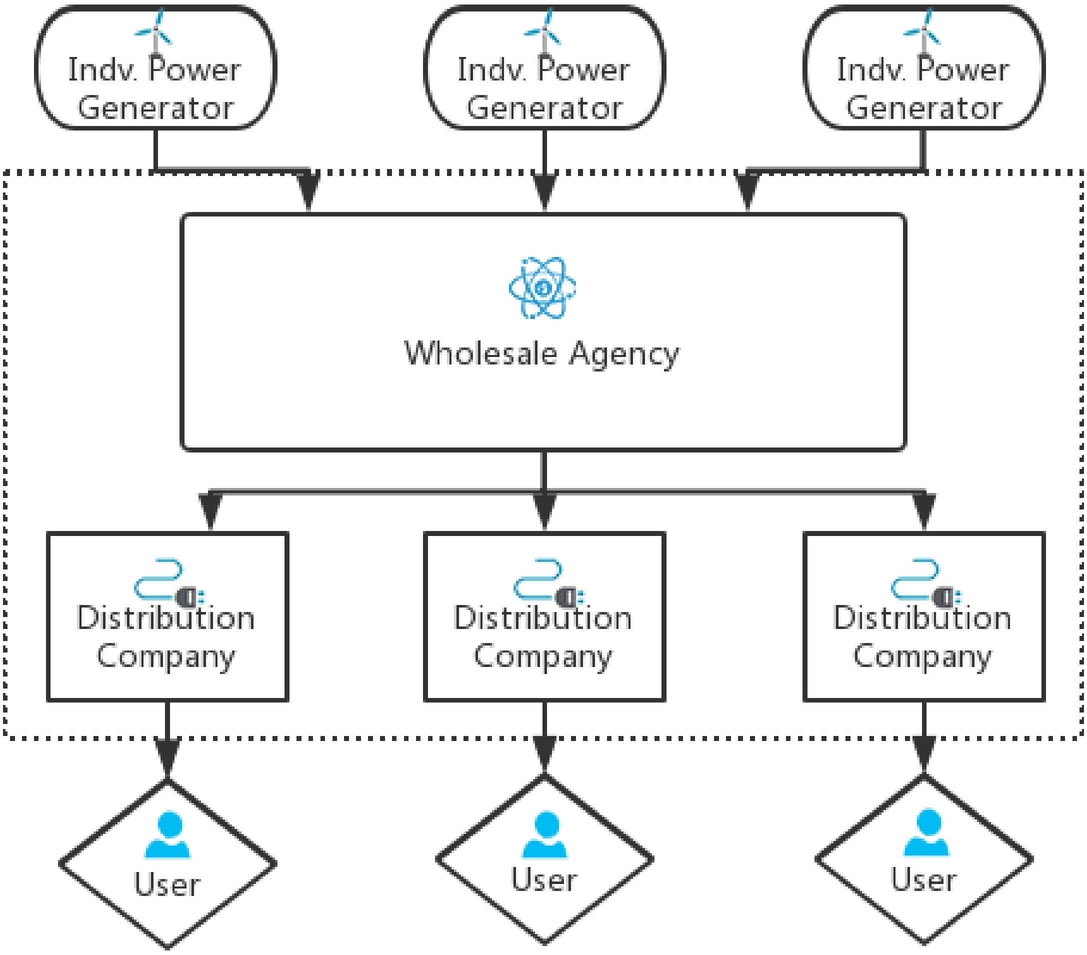


Figure 1.6 Power-Buying Mode in the Electricity Market

Source: organised from cases studied by Kirschen & Strbac（2010)

1.2.3 Wholesale Competition Mode

Power grid is no longer monopolised by a specific electricity wholesale party but brings other providers into the competition under this mode, therefore no more centralised public power provider that used to exist. The structure is shown in Figure 1.7:

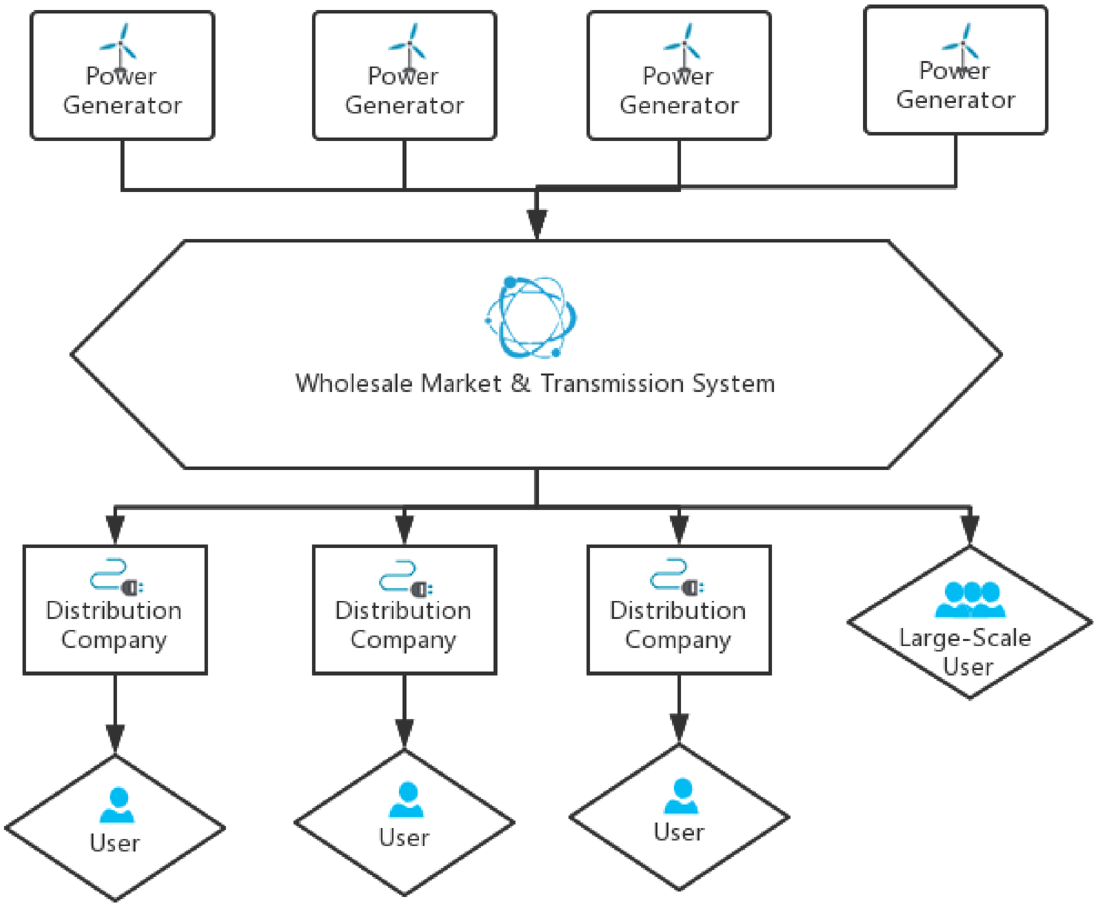


Figure 1.7 Wholesale Competition Mode in the Electricity Market

Source: organised from cases studied by Kirschen & Strbac（2010）

1.2.4 Retail Competition Mode

This is the most open mode where all the electricity users can actively choose their own power provider, thus it is also known as direct-selling or competition mode; which is shown in Figure 1.8:

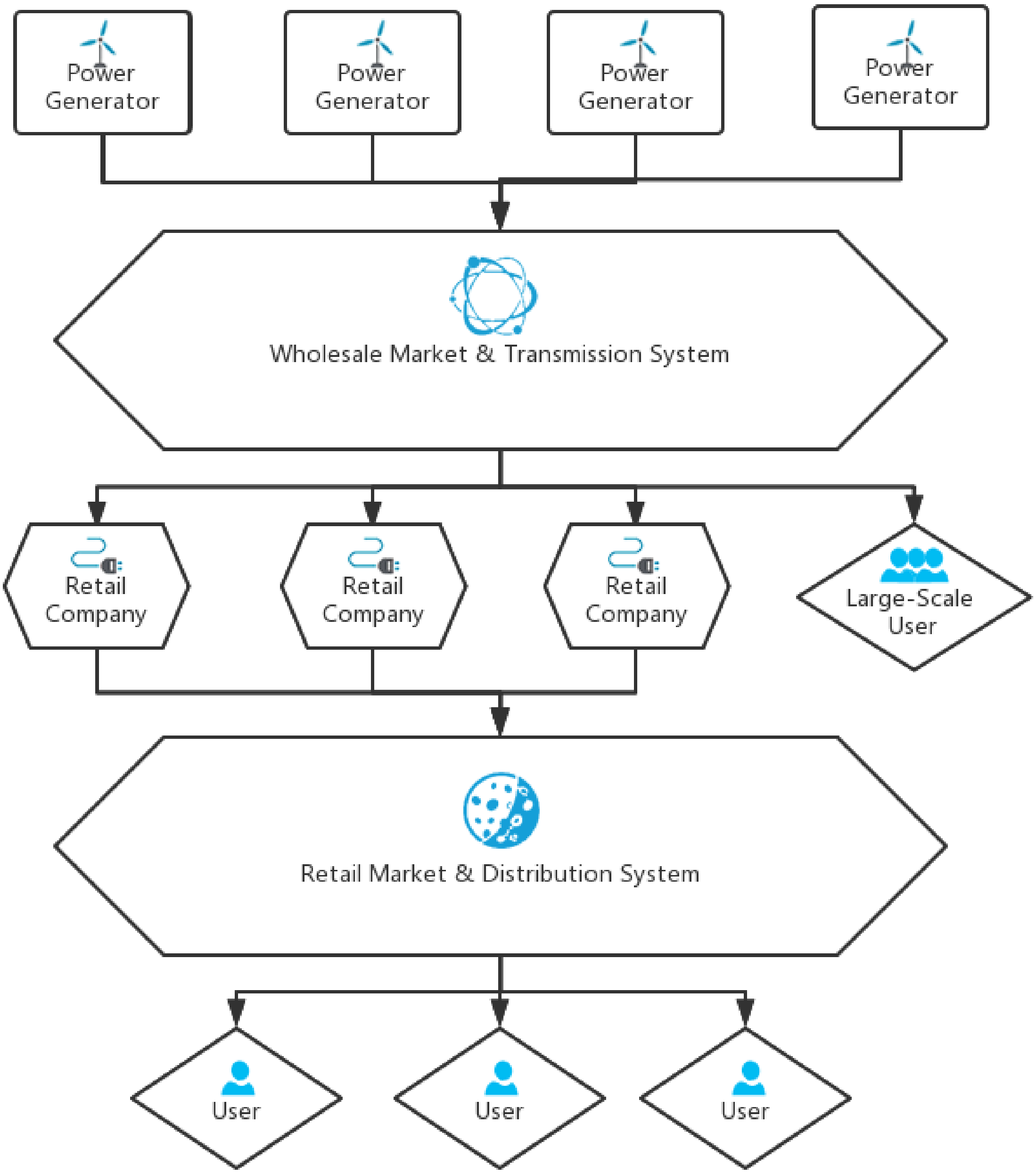


Figure 1.8 Retail Competition Mode in the Electricity Market

Source: organised from cases studied by Kirschen & Strbac (2010)

The deregulated electricity market, allows consumers to choose who they purchase their electricity from. A deregulated market increases economic efficiencies and can benefit the entire economy through lower energy costs and appropriate pricing signals to encourage the right type of generation at the right locations.

2 DESIGN PHILOSOPHY OF APOLLOCHAIN

2.1 Why New Energy

Renewable generation is one of the fastest growing industries in the world.

In 2016, the total installed capacity of photovoltaic (PV) power station worldwide exceeds 65GW with 32% growth, while the accumulated installed capacity is approaching 300GW with 35% increase. As two main players in the solar industry, the US solar market has 78% year-on-year capacity growth, and China identically experiences solar industry boom by reaching approximately 30GW installed capacity.

In the meantime, the solar power generating cost has a further decline due to the competition amongst equipment manufacturers: 18% reduction on global levelised cost of energy (LCOE) was realised in 2016 over 2015 and ultimately maintained at $100/MWh.

The following Table 2.1 lists the newly increased installed capacity of all the main countries through the world in the past 10 years.[3]

Table 2.1 2006—2016 Newly Installed Capacity of Main Countries

Unite: MW

Year / C.try	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
China	10	20	40	160	486	2568	3630	12920	10600	15000	30000
Japan	287	211	226	484	992	1296	2464	7092	10481	12100	10500
USA	98	167	297	438	929	1934	3311	4621	6312	8200	13000
UK	3	4	4	4	38	920	771	1082	2162	3300	1800
Germany	854	1274	1956	3802	7199	7485	7604	3304	1927	1800	1050

Source: Bloomberg Energy Finance

The future of new energy market is also promising. According to KPMG's forecast and British Petroleum (BP)'s research:

[3] Finance B N E. New energy outlook 2016[J]. Global overview, 2015: 13.

1. New energy has the fastest growth with annual increase of 6.6%, and the total installed capacity will be double in 2020. Figure 2.1 shows the consumption portion forecast of new energy worldwide in 2030[4]:

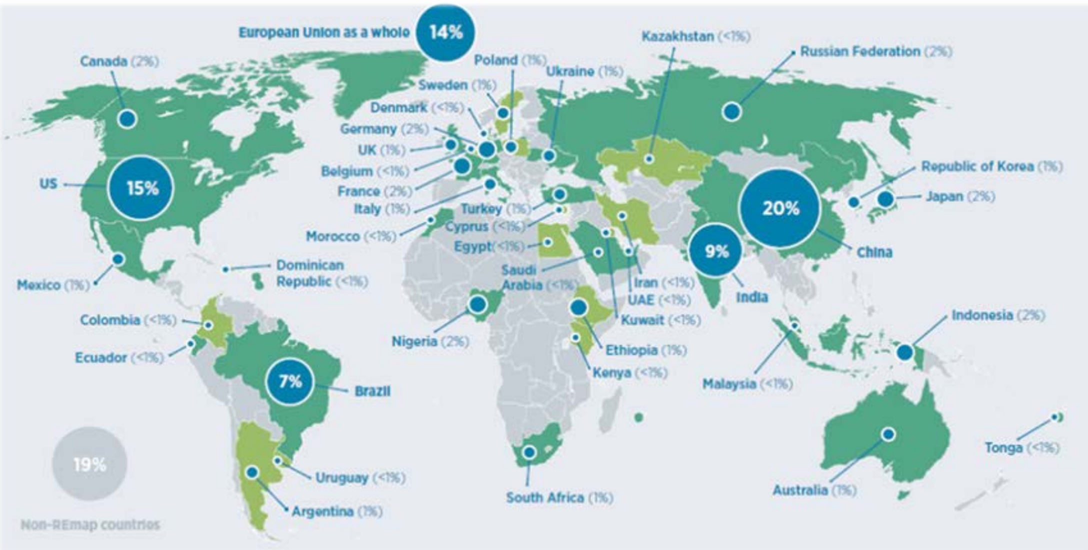
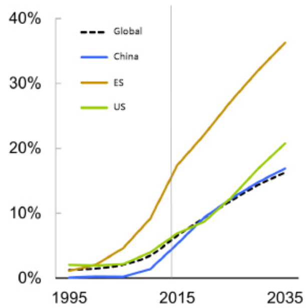


Figure 2.1 New Energy Consumption Portion of Each Country in 2030

Source: KPMG, Global Trends in Renewable Energy – KPMG; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf; Downloaded on 13 March 2018

2. As shown in Figure 2.2, EU in particular will continue leading the new energy use. Until 2035, over 1/3 electricity generation in EU will be powered by the new energy[5]:



[4] KPMG, Global Trends in Renewable Energy - KPMG ; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf, Downloaded on 13 March 2018

[5] BP – Word Energy Outlook 2016, https://www.bp.com/zh_cn/china/reports-and-publications/_bp_2017-_.html; Downloaded on 13 March 2018

Figure 2.2 New Energy Electricity Generation Proportion in 2035

Data Source: BP – Word Energy Outlook 2016, https://www.bp.com/zh_cn/china/reports-and-publications/_bp_2017-_.html; Downloaded on 13 March 2018

While in the solar energy filed, according to KPMG's research, newly increased capacity of PV power station is and will be expanding with significantly 330% growth from 111.68GW in 2012 to 3695.64GW by 2040, which is shown in the Figure 2.3[6]:

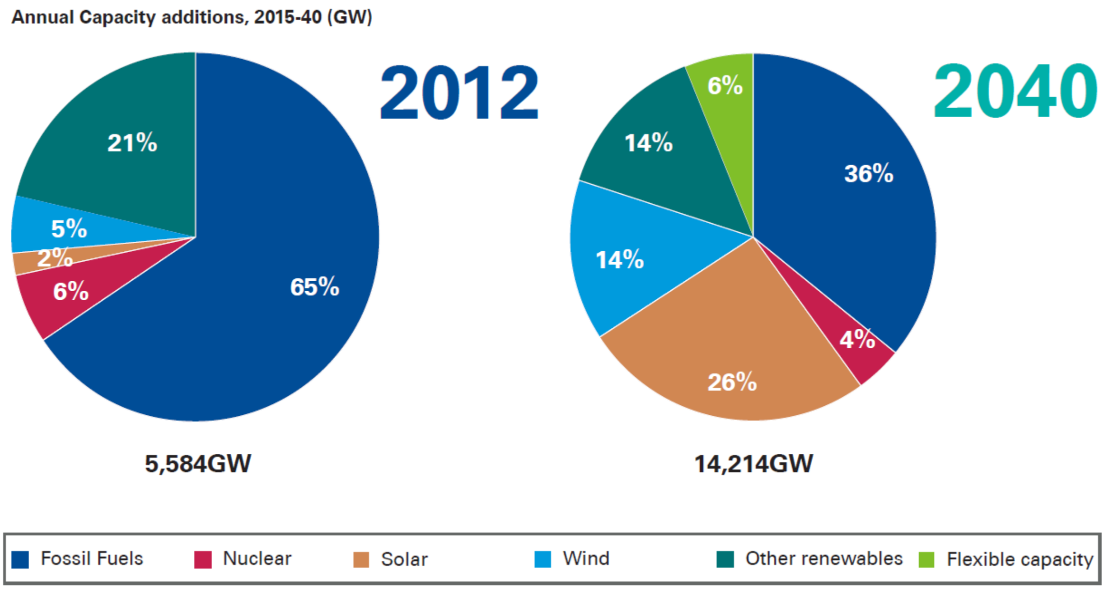


Figure 2.3 Installed Capacity Forecast of Energy

Source: KPMG, Global Trends in Renewable Energy - KPMG ; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf, Downloaded on 13 March 2018

[6] KPMG， Global Trends in Renewable Energy - KPMG ; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf, Downloaded on 13 March 2018

3 APOLLOCHAIN ECOSYSTEM INTRODUCTION

3.1 Conventional Energy Trading Mode

Electricity, as a commodity, is generally referred as electric power, which is a secondary energy generated by coal, petroleum, gas, water, nuclear, wind, solar, etc. for mankind use[7]. The power sector consists of generation, transmission, distribution, and retail sectors (Figure 3.1)[8].

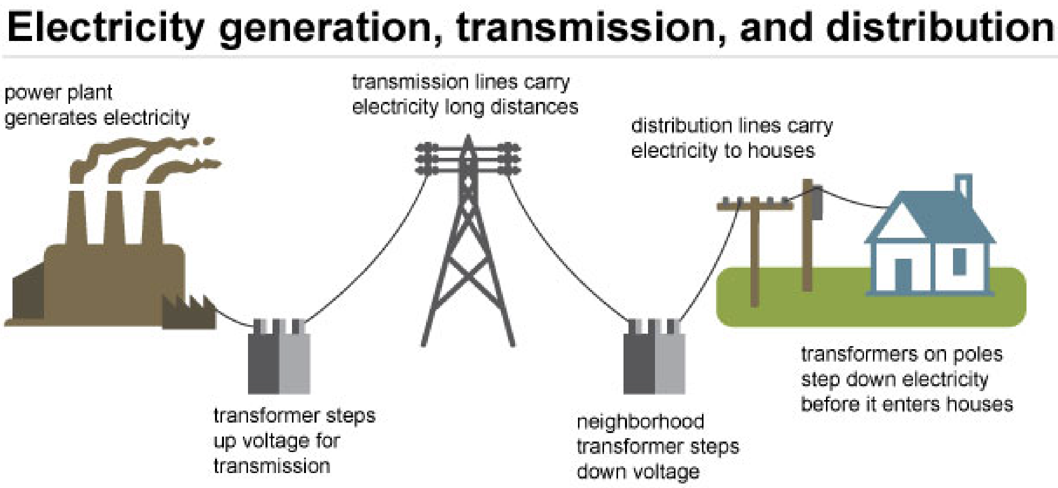


Figure 3.1 Power Generation, Transmission, and Distribution Sectors (without Retail)

Source: Adapted from National energy education development project (public domain); https://www.eia.gov/energyexplained/index.cfm?page=electricity_delivery, Downloaded on 13 March 2018

Operated and managed by a centralised transaction institution is the most common practice of current energy trading. Apart from sustaining its dynamic equilibrium, a large number of third-party institutions (e.g. insurance, credit, finance lease, rating, etc.) are involved in the energy trading system for insuring the transaction safety. Such overloaded transaction processes and establishments, from the cost and security

[7] China Electric Power Encyclopedia (3rd) [G]. China Electric Power Press.2014(08)

[8] Adapted from National energy education development project(public domain)；https://www.eia.gov/energyexplained/index.cfm?page=electricity_delivery, Downloaded on 13 March 2018

perspective, stand for enormous maintenance cost, expensive third-party fees, and dramatically being prone to defaults of data loss and tampering

3.2 Apollochain New Energy Trading Platform

As an innovative tool, blockchain technology intrinsically matches distributed energy within a deregulated energy market. Following the progressing power reform and the growingly opened power retail market, distributed generation, as a fast developing sector, makes the demand side users possess both generator and consumer identities with deep engagement in this industrial reform.

Figure 3.2 reveals the basic structure of Apollochain trading platform that contains transaction layer, extended layer and blockchain layer. Renewable energy system is the principle of the transaction layer, while the trading parties contain power generators, power grid, distributed power station, “smart home” (household users as well as energy generator) and other renewable energy holders. Each party initiates and terminates its energy transactions at this layer, then all the relative data is delivered to the extended layer forming smart contracts and eventually being stored in the blockchain layer.

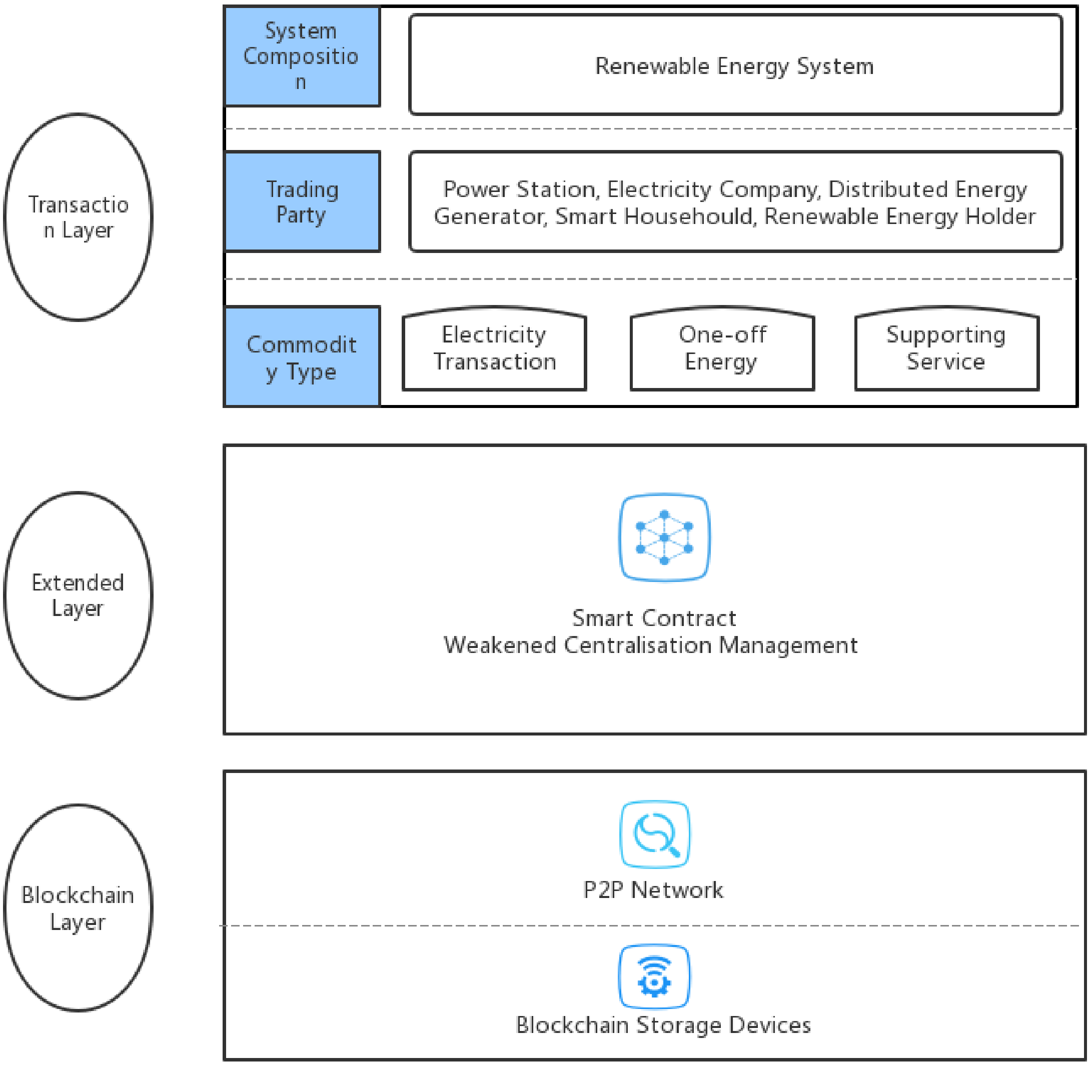


Figure 3.2 Apollochain Energy Trading System

Above all, Apollochain deploys Blockchain 3.0 technology to set up its trading platform. Aiming at all the deregulated and retail-oriented energy markets all over the world, Apollochain can be rooted in those countries and regions via current connections and resources to establish fundamental users who could be generators, wholesalers, institutional or individual electricity consumers, to realise direct transactions between parties, weaken centralised trading cost, and avoid losses on government pricing. In this case, **a smart grid with IoT (Internet of Things), AI (Artificial Intelligence) and Blockchain technology becomes the critical physical basis of achieving all the above targets (together “The Energy Internet”).**

Smart grid allow for demand side management, and it either can be involved in a centralised grid network or create micro-grids by connecting the end-users who are geographically close to each other. Also, another device of significance in smart grid, is an intelligent electric meter (or known as Smart Meter). It requires a wide range of installation for obtaining users' power consumption data and consumption/production behaviours. Based on this data, the smart grid, by carrying out electricity cost notification, real-time pricing, power-cut scheme, etc., is able to reduce scheduling cost and instruct power consumers to have a more rational electricity use. Figure 3.3 summarised an overview of smart grid:

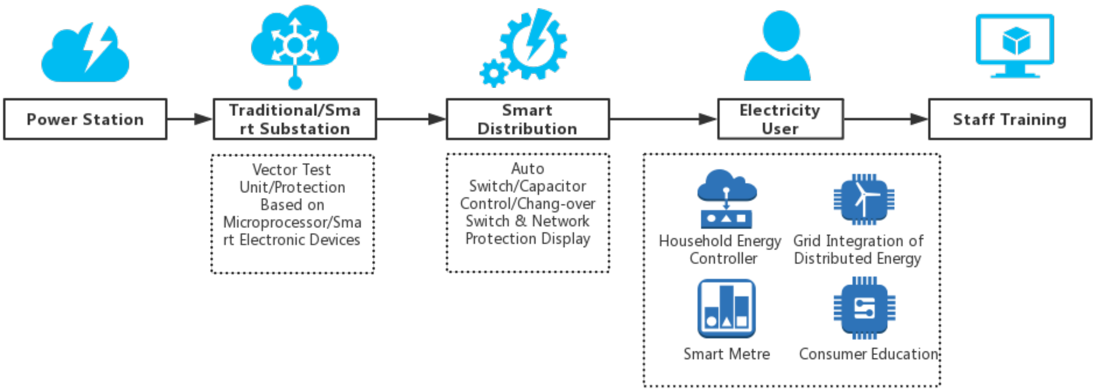


Figure 3.3 Smart Grid Overview

However, as a core device, smart meter itself can suffer more risks in a centralised grid. Large damages could happen if one single smart meter was subjected to issues of malicious software, being imitated, physical hazard, or even manipulation or losing private key, as the entire grid is under a centralised management thereby attacking just one spot of the grid can bring serious economic and production loss.

Apollochain on the contrary can avoid and in control of the above risks, insuring minimum loss and danger on the grid by distributing metering and deploying peer to peer verification of data accuracy. Blockchain's tamper-resistant features ensure a safe and transparent energy trading process. It also enables a secure and efficient operation on micro-grid in a decentralised market and supports real-time peer to peer energy trading.

3.3 Electricity Real-Time Trade, Crowd-Funding, and Pre-sale

3.3.1 Electricity Real-Time Trade

Apollochain provides real-time electricity trade through one of the three primary approaches: matchmaking trade-off, time-sharing collective trade-off, and auction.

Figure 3.4 gives a detailed process of real-time trade. Smart grid directionally dispatches electricity after completing the transaction, and smart meter in the mean time calculates the charging and discharging amount of electricity, so that a full transaction loop of real-time trade can be created.

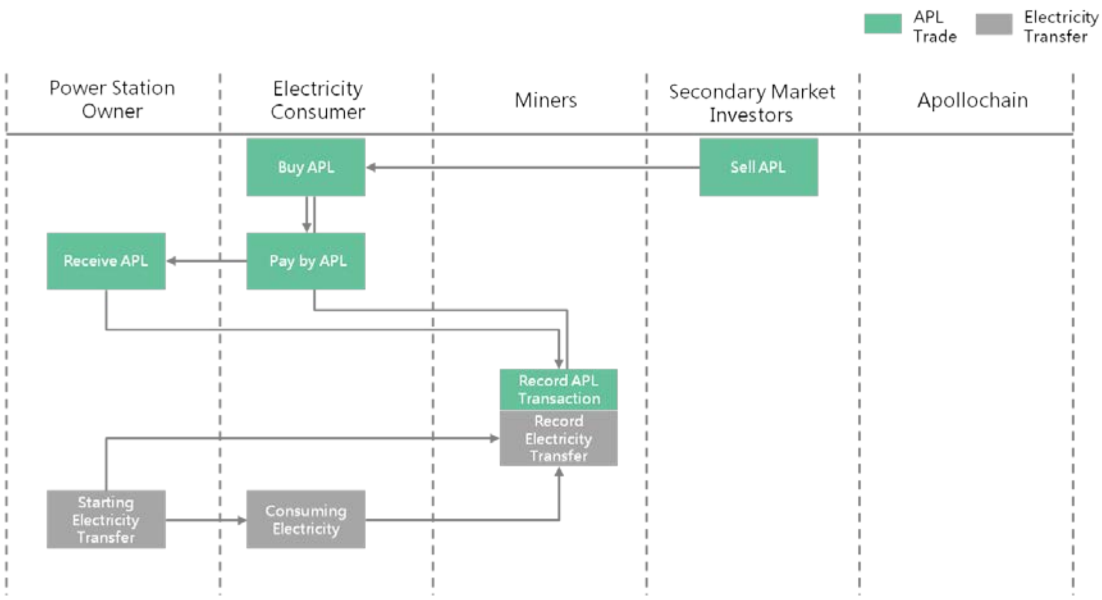


Figure 3.4 Apollochain – Electricity Real-Time Trade

3.3.2 Electricity Crowd-Funding

Apollochain enables electricity crowd-funding to users as well: a power station's owner can obtain funding liquidity ahead by means of Apollochain before the construction work is done.

Figure 3.5 gives an overview of the crowd-funding process. The construction side can initiate crowd-funding project via uploading documentations of construction permission and periodically publishing construction progress to Apollochain. Electricity subscribed from crowd-funding will be locked down by a smart meter and cannot be consumed or traded any more. Furthermore, the electricity quantity of crowd-funding cannot exceed the expected power generation of the power station.

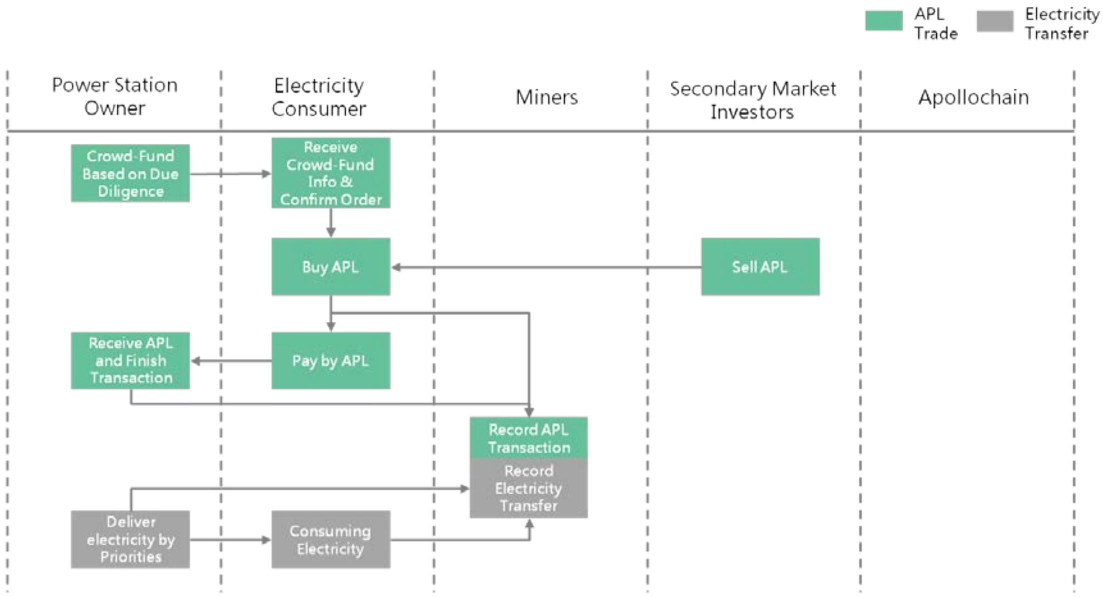


Figure 3.5 Apollochain – Electricity Crowd-Funding

3.3.3 Electricity Pre-sale

Apollochain also offers electricity pre-sale: a power station can sign a pre-sale contract with a specific electricity consumer and freeze corresponding electricity generated in a period of time, then directionally transmit it to the consumer in due time. Such approach enables power station collecting utility bills in advance so as to increase its funding liquidity and evade transaction loss due to electricity usage fluctuation.

Figure 3.6 gives a detailed process of pre-sale. Electricity sold through pre-sale will be locked down by a smart meter and not allowed to be traded or consumed. Electricity quantity for pre-sales cannot exceed the power station's average generated amount in the past.

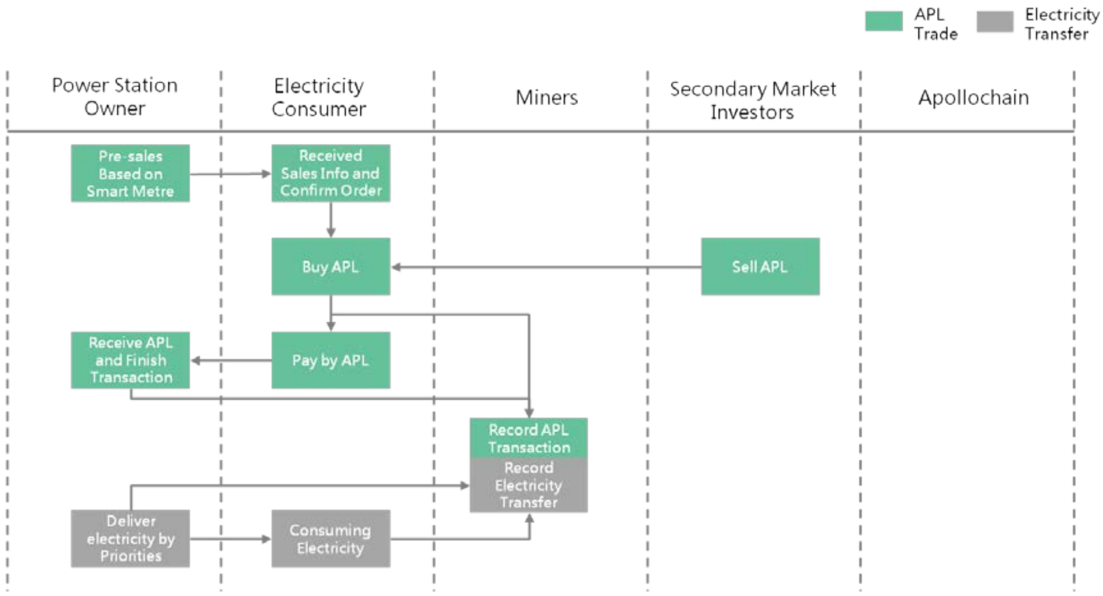


Figure 3.6 Apollochain – Electricity Pre-sales

3.4 Future Development Layout

Under the support of initiatives, like Apollochain; clean energy in 2025 is expected to account for 52.13% of the energy market. East coast of the US, the entire Australia, most European countries, and Yangtze River Delta & Pearl River Delta in China, in the future are all going to replace traditional energy with clean ones, which will effectively reduce carbon emission and prevent global warming from temperature rising of 2℃.

In addition, PV generation is expected to have higher proportion in clean energy from 35.7% in 2017 to 62.5%, and individual investors in need for household PV units will sharply increase from 1.3% to 35.7%, thanks to increased performance and reducing costs of producing solar panels, development of energy storage, as well as Apollochain's innovative power reform.

Subsequently, PV power station investors can benefit from exchanging and trading their electricity surplus, but they are also going to trigger a huge market with a booming increase from energy storage, Electric Vehicles, UAV (Unmanned Aerial Vehicle) charging station, and so on.

Table 3.1 below exhibits Apollochain's future business layout, and Figure 3.1 demonstrates a complete ecosystem of Apollochain.

Table 3.1 Apollochain Future Development Layout

Participate in Power Reform with Governments	Carbon Trading Platform	Power Station Financing Platform
Shared Charging Pile for Electronic Vehicles (EV)	Shared UAV Charging Station	Investment Fund for New Energy Industry

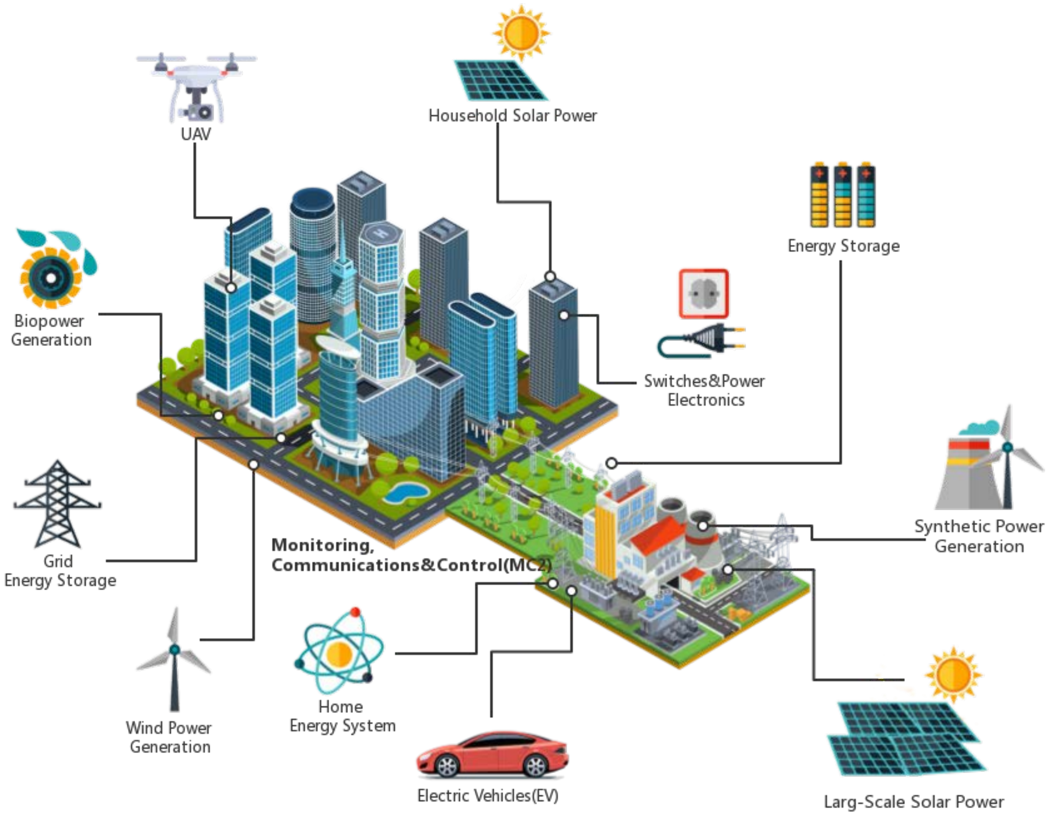


Figure 3.7 Apollochain Complete Ecosystem

Apollochain is expected to assist in the transformation of the power industry and build a super application scenario in Figure 3.7.

For example, consider that "Jeff" is living at the east coast of the US, and his family is going to have a great vacation in Europe. Before leaving, they set their house into "vacation" mode in which the PV power station will distribute sustainable energy to keep the entire house in good condition (such as having robot cleaner and security system in operation), meanwhile it continues feeding the vehicle charging pile and UAV charging station that Jeff invested. In this case, all the EVs passing by and nearby UAVs can refresh themselves via Jeff's charging devices and finish their payments by the built-in smart contracts. For Jeff who stays abroad, Apollochain's mobile application enables him not only checking his earnings at all times, but also acquiring electricity prices information around his house, buy low and sell high through his charging devices and earn more benefits. All of these turn power consumption into a flexible, diverse, and amusing activity.

Figure 3.8 The Solar Settlement, a sustainable housing community project in Freiburg, Germany

Figure 3.9 Schneider Electric's Solar Power Car Ports

3.5 TOKEN: APL

3.5.1 TOKEN（APL）Design Philosophy

Apollochain has its own token **Apollo Coin**（APL）as the electronic proof of electricity transactions. Its circulation quantity has positive correlation with electricity quantity that is available for trade.

Therefore, the issuance logic of APL is: once Apollochain's power generating capacity (power station installed capacity) reaches a certain level, new APL will be putting into circulation for meeting transaction demand. In other words, APL is going to be gradually unlocked and put in circulation with the increasing installed capacity.

APL moreover has designed a mechanism to buffer and reverse its depreciation in the secondary market: in addition to trade on the Exchange, APL can also be traded on Apollochain for making electricity spot & forward transactions. When price drop on the secondary market, Apollochain's electricity buyers will be inclined to obtain and hold APL in exchange of electricity at lower price, especially when APL's price is even lower than the electricity price of public grid thus an evident space for arbitrage exits. Accordingly, electricity buyers will not only raise APL's purchase demand on the Exchange, but they will hold their APL until the best time of buying electricity, which diminishes APL's supply in the secondary market and stables its price.

3.5.2 Release, Reward, and Unlock

100,000,000 APL tokens have been created and the total amount of tokens will be allocated as follows:

1. **40%** tokens distributed to bring in private funds or ICO, and secondary financing will be considered if the 1st round did not reach the target;
2. **5%** tokens for rewarding community:
    a. release 3% in the first 5 years while 2% in the latter 5 years to the contributors who keep perfecting Apollochain's underlying technologies;
    b. monthly release in equal amount and will be allocated by contribution;
3. **5%** tokens distributed to miners maintain Apollo system:
    a. daily release in equal amount within 20 years
    b. will be allocated by contributions;
4. **15%** tokens to PR & Marketing for promoting Apollochain:
    a. gradually put in circulation within next 5 – 10 years;
    b. monthly released amount cannot exceeds 2% of the total circulation;
5. **30%** tokens to the founding team and based on installed capacity growth；
6. Once the installed capacity of power station reaches 40% of the estimated maximum capacity:
    a. founding team (with 30% APL being locked) can trigger the condition of unlocking;

b. every 20% raise on the total installed capacity enables the founding team to unlock 20% APL of the total circulation;
c. the founding team can decide whether putting the unlocked APL into circulation and shall announce the "Release Plan" (percentage, duration, approach, etc.) on Apollochain.io; each release shall not be earlier than the day after the announcement on Apollochain.io (Greenwich time) and needs to be slow and rational;
d. the condition of unlocking APL will be valid until all the APL owned by the founding team are unlocked, which shall be announced on Apollochain.io no later than 3 working days (Greenwich time) before the condition terminates.

7. **The last 5%** tokens distributed to operate Apollo Foundation.

3.6 Profit Model

Apollochain's profit model is a source of revenue presented in Table 3.2. Specifically, the "revenue" here means a variety of fees that will be collected by Apollochain for electricity buying & selling parties on the platform. However, **based on Apollochain's development and business demand at different stage, the platform's charge model would employ but not limited to the following models in due course**:

Table 3.2 Apollochain's Profit Model

Charge Model	Description
Membership Fee	One-off fee for platform users
License Fee	Users are authorised to use the platform in a certain period of time
Pay-Per-Use	Free to use the platform but pay by the volume of transactions
Matchmaking Fee	Free to use the platform but pay by the value of transactions
Added-Value Service Fee	Free to use the platform and no transaction fee, but pay for comfort (such

	as AdBlock or privileges)
Third-Party Revenue	Free to use the platform but advertisers will be introduced and have earnings from advertising injection
Consulting Service Revenue	With solid project experience, Apollochain's team is capable to deploy consulting service to companies that have micro-grid or smart grid projects

4 APOLLOCHAIN TECHNOLOGY OVERVIEW

4.1 Design Philosophy

The core team has significant energy and blockchain market experience. Apollochain technology scenario contains 3 layers: application service layer, platform components layer, and Apollo's underlying platform.

Specifically, the underlying platform offers basic blockchain functions to serve the upper-layer applications but also takes its transferability into account, in order to be adapted to the rapid developing blockchain technology.

The middle-layer with platform components generates a service platform providing available service components. The earliest integration includes digital ledger, digital asset, certificating service and so forth ensures the upper-layer's operation in the energy industry.

The top layer is the energy application service layer, offering user-friendly, trustworthy, fun and convenient blockchain applications to trading entities and end-users.

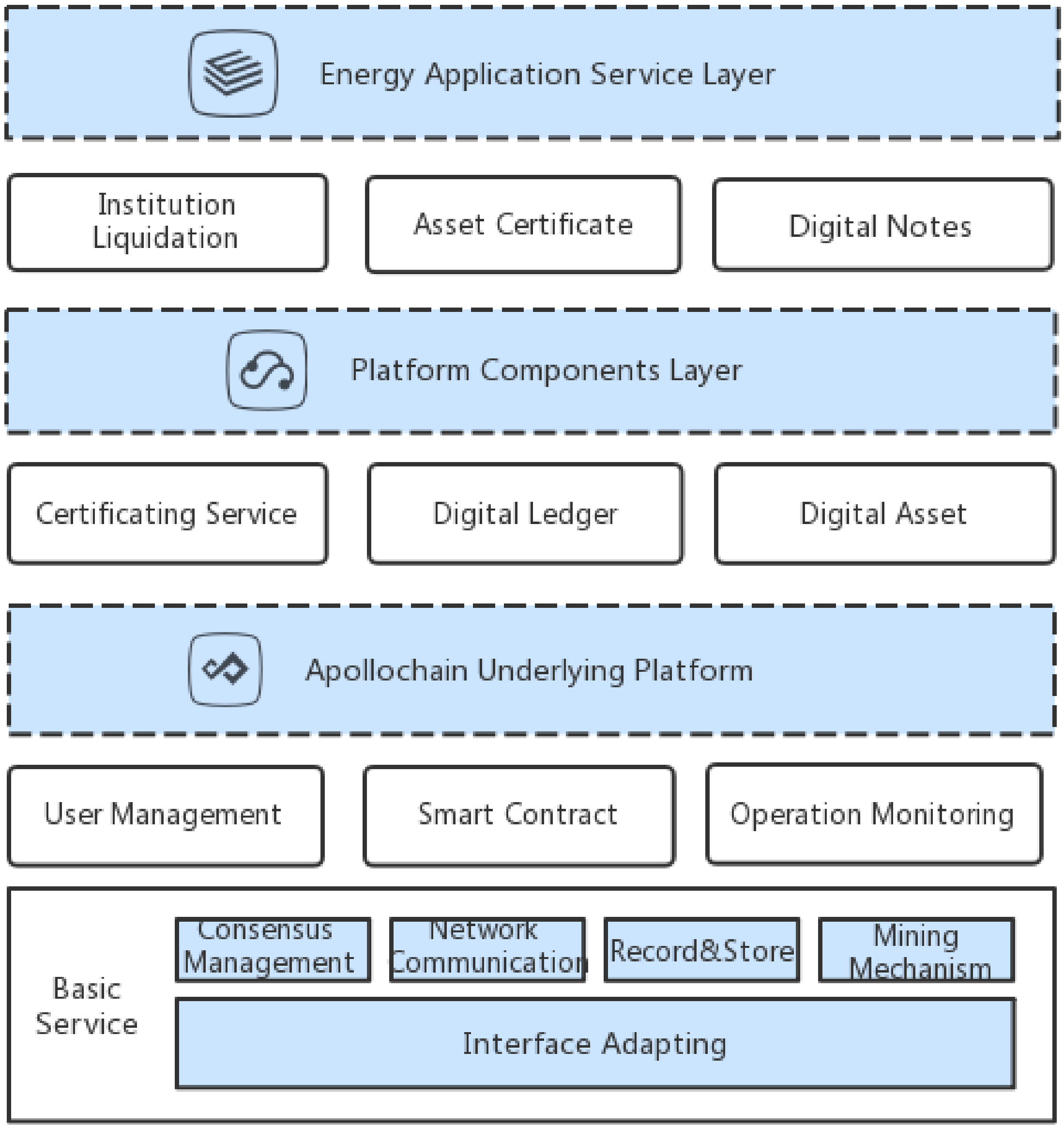


Figure 4.1 Apollochain Foundation Framework Diagram

4.2 Apollochain Side Ecology

4.2.1 Smart Meter

Smart Meter is the intelligent terminal to the power generator and consumer within micro-grids. Besides basic functions like electricity measuring, it can also achieve bi-directional measuring, platform networking access, user-visit access, and data communication. For securely uploading data, the smart meter itself also possesses tamper-resistant feature. All in all, it is an indispensable device to Apollochain.

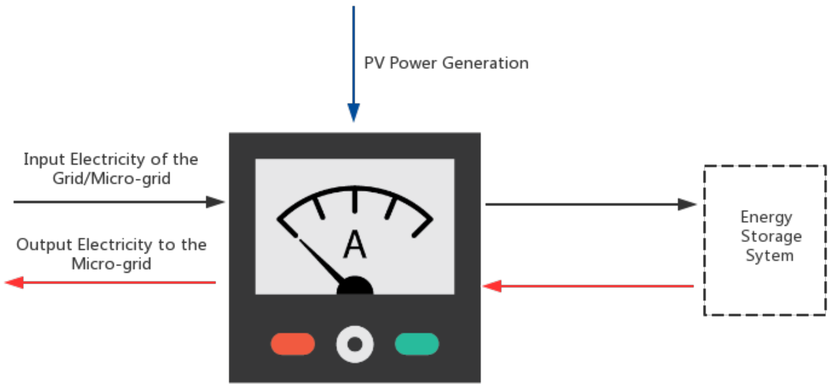


Figure 4.2 Apollochain Smart Meter Prototype

Figure 4.2 shows the prototype of Apollochain's smart meter with its application scene when it connects to the public grid. **Red part** indicates the energy consuming behaviour: the quantity of input electricity is measured by the smart meter and informed to Apollo platform via data communication; **blue part** represents energy production and the output electricity used by other consumers: with the household energy storage system or PV power station, the stored or generated electricity accessing to the micro-grid is measured by the smart meter and informed to Apollo platform via data communication.

In micro-grids however, the input and output of electricity does not go through the public grid but interact only within the micro-grids. The smart meter in this case employs NB-IoT technology to communicate with Apollochain platform and its user terminals (such as Apollo APP Client).

4.2.2 Apollochain Smart Energy Storage System (SESS)

The SESS is the core to PV power stations within a micro-grid consists of families and communities. The storage battery interacts between power generation and storage while plays a crucial rule in the safe and reliable system operation. In addition to providing functions of conventional energy storage, it also furnishes data safeguard and transmission by which the device itself so that energy flow can be recorded in Apollochain.

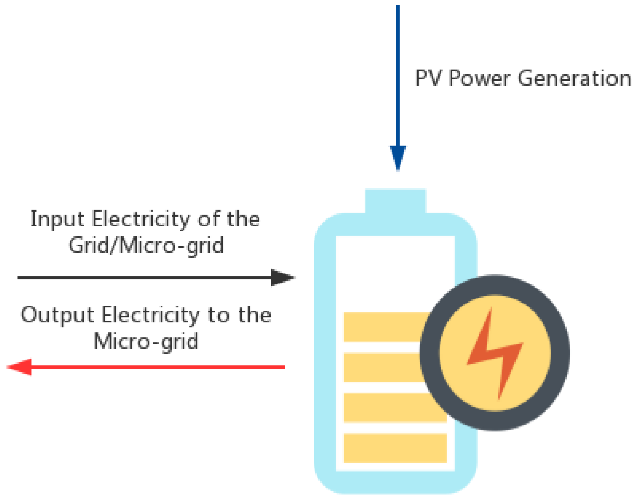
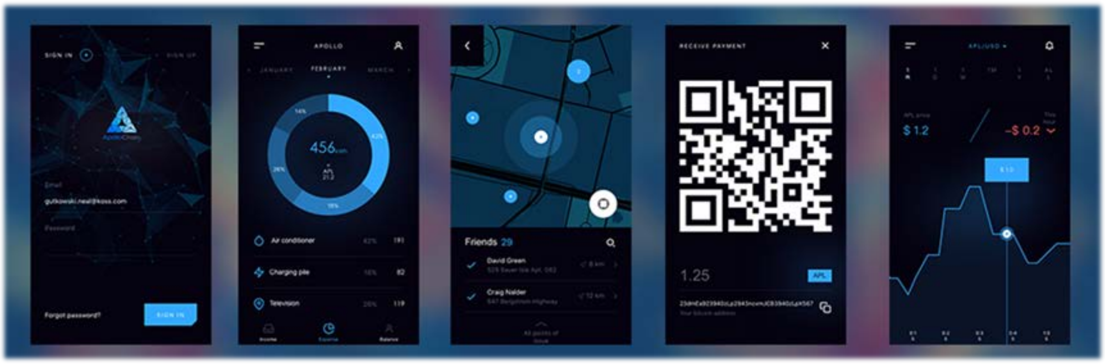


Figure 4.3 Smart Energy Storage System

Figure 4.3 illustrates the prototype of Apollochain's energy storage system with its application scene when it is installed in a household equipped with PV power station. Generally speaking, once the SESS connects to smart meters, the electricity resource can be either input electricity from the gird, or the electricity generated by the PV power station; the consumption side can be someone who applies trading electricity or directly consumed by the household. The SESS in this case employs NB-IoT technology to communicate with Apollochain platform and its user terminals (such as Apollo APP Client), it also offers smart transformation plan at the same time to the existing energy storage systems.

4.2.3 Apollochain APP

Apollochain develops its own APP for end users and can be used for daily energy sharing and trading, as long as within the Apollochain's network. Meanwhile, the APP can communicate with smart meters and SESS so that to calculate and analysis the data from power generation end and power consumption end.



5 DEVELOPING PLAN

Apollochain's development is divided into 3 stages:

5.1 Stage One

- Finish smart meter engineering
- Launch the 1st micro-grid project
- Access PV power station data and start mobile application testing
- APP upgrading and improvement

5.2 Stage Two

- Pilot installation of smart meter
- Transaction tests for the micro-grid project
- Launch Apollo Energy Trading Platform (Solar Unit) and accomplish the 1st electricity transaction on main-net between PV power station owner and electricity consumer
- API expansion and developing
- Energy Retailer Business unit online
- Start carbon trading pilot projects

5.3 Stage Three

- Smart meter mass production and widely promote micro-grid project
- Globally constructing retail electricity network
- Governmental cooperation on electricity demand-side-management in the regions where Apollo has presence and operations
- Achieve real-time electricity transaction settlement in the global wholesale market
- Develop supply chain financing business under blockchain technology

6 MANAGEMENT & PHILOSOPHY

Apollochain in due time will set up its own foundation in a specific region or country in compliance with the local policy. The foundation dedicates to project development and pushing transparent management work. Facilitating sound and harmony grow in Apollochain's OSS (Open Source Software) community is also a critical target for the foundation establishment. Apollochain's team will keep updating project progress and this white paper in time, as well as gradually publishing our latest progresses on the foundation setup, management principle, organisation structure, HR management, risk evaluation & decision-making mechanism, fund flow & financial plan, legal & compliance, etc.

7 CORE TEAM MEMBERS

Craig Nalder, CEO

Over 20yrs experience in the Energy industry as an entrepreneur, power developer, energy trader, economist and commercial advisor. He has held senior roles in the fields of energy trading, investment banking, power station development, regulation, solar energy, distributed generation and environmental markets. He has played a key role in the negotiation, structuring and financing of over $1.5bn in power generation projects in Australia/Asia, and is also the co-founder of a PV installation company in 2009 with revenues >$55M in the first year of operation. With extensive start-up experience, he has established and managed several generation, retail and proprietary trading desks as well as companies in Australia, India and the Philippines.

Peter Turnbull, Technology Partner

As a skilled engineering director, Peter's 20 years' experience ranges from project strategy, pre-contracts negotiations and design, to the project level where he offers highly-relevant and extensive experience. He has the competencies and qualifications to provide cost conscious solutions to various projects from building design to large scale solar and HV electrical systems.

Charles Allen, Principle Technology Consultant

With over 25 years of experience in the construction, communications and electricity industries in Australia. He is also an experienced strategic consultant with international experience over various markets including energy, utility, resources and infrastructure sectors.

Roman Voloshin, Sales Director

More than 10 years of experience in solar PV company incorporation, highly skilled in managing technical staff in identifying and analysing energy efficiency and renewable energy opportunities in Agri-Business, Gov., commercial & industrial sectors-Business etc.

Advisors

Synth

Founder of the Skycoin. One of the earliest contributors behind Bitcoin, started Skycoin 8 years ago with a vision of creating a new, decentralized Internet. He sits on the advisory boards of several cryptocurrency projects. Synth has a background in mathematics, distributed systems, and symbolic logic and in collaboration with Apollochain on the R&D work of Smart Meter.

Kaicheng WU

Graduated from the University of Cambridge, CFA, listed company sponsor deputy candidate. Worked as Senior Consultant in EY and Vice President of Haitong Securities Investment Banking Dept. Involved and leaded many M&A and internal restructure cases in the energy industry, skilled in capital operation, company finance, and risk management.

REFERENCES

[1] Mill J S. Principles of political economy[M]. Рипол Классик, 1973.

[2] Posner R A. Natural monopoly and its regulation[J]. Stan. L. Rev., 1968, 21: 548.9

[3] Wangxiangyi, Japan electrical power system reform research [D], Academy of Social Science, 2016.

[4] Deregulated Energy Markets Around the World; https://www.en-powered.com/Support/world-deregulated-energy-markets; Downloaded on 12 March 2018.

[5] California electricity crisis; https://en.wikipedia.org/wiki/California_electricity_crisis; Downloaded on 13 March 2018.

[6] Kirschen D S, Strbac G. Fundamentals of power system economics[M]. John Wiley & Sons, 2010.

[7] Finance B N E. New energy outlook 2016[J]. Global overview, 2015: 13.

[8] KPMG, Global Trends in Renewable Energy - KPMG ; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf; Downloaded on 13 March 2018.

[9] BP: Word Energy Outlook, https://www.bp.com/zh_cn/china/reports-and-publications/_bp_2017-_.html ; Downloaded on 13 March 2018.

[10] KPMG, Global Trends in Renewable Energy - KPMG ; https://home.kpmg.com/content/dam/kpmg/sg/pdf/2016/11/Global-Trends-in-Renewable-Energy.pdf; Downloaded on 13 March 2018.

[11] China Electric Power Encyclopedia (3rd) [G]. China Electric Power Press.2014(08).

[12] Adapted from National energy education development project(public domain) ; https://www.eia.gov/energyexplained/index.cfm?page=electricity_delivery; Downloaded on 13 March 2018.