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Haifeng Deng

Green Energy Transition in China

Legal Challenges and Responses to the New Power System and Energy Internet

Springer

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Preface

After years of industrialization and economic growth at the expense of the environment, China has identified green energy transition as the essential path to achieving high-quality and low-carbon development in the future. In the process of green energy transition, the power system, serving as a fundamental carrier of secondary energy, plays a pivotal role. It is not only one of the core infrastructures of modern society but also a significant bottleneck in China's pursuit of achieving its "dual carbon" goals. Therefore, the green upgrade of the power system to a new energy system and the transition from traditional grid companies to Energy Internet companies have become key for China to fulfill its international commitments to climate change and to realize sustainable economic and social development. Based on this context, this book is intended to offer insights into the academic debates and legal issues that China may face in the process of green energy transition. It focuses on exploring the key legal challenges and potential solutions for the electricity sector, grid companies, and various stakeholders involved in the construction of new power systems and the development of the Energy Internet. The publication of this book is anticipated to positively contribute to the international discourse by presenting China's endeavors to tackle climate change and progress toward green energy transition through scholarly theoretical perspectives.

This book can be logically divided into theoretical and practical sections. The theoretical section focuses on macro-level fields such as the "Energy Internet" transition, "new power system" upgrades, and the "market-oriented regulation" of the electricity industry in the context of green energy transition. The Energy Internet is a new form of energy industry development that deeply integrates the Internet with energy production, transmission, storage, consumption, and the energy market. Built on electricity and prioritizing renewable energy sources, the Energy Internet optimizes the allocation of material, energy, information, business, and capital flows through multi-energy collaboration, supply and consumption collaboration, and centralized and distributed collaboration. In the development of the Energy Internet, the following legal risks need to be addressed: First, the development of Energy Internet companies relies on platforms, and in the process of transitioning to platform-based models, legal risks related to market access, unfair competition, and intellectual property protection

must be considered. Second, in the era of information technology, the application of data as an empowering field for the development of the Energy Internet faces multiple challenges due to unclearly defined rules, necessitating the establishment of fundamental rules regarding data ownership, circulation, and transactions. Third, as grid companies are among the targets of mixed-ownership reform, it is necessary to clarify their functional positioning, that is, to define the industrial sectors that are wholly state-owned, the sectors where mixed ownership is implemented, and the scope for the entry of private capital.

The practical section aims to provide path selection and institutional support for the green and low-carbon transition of China's power system by identifying legal risks in the key operational aspects of new power systems and the Energy Internet, and through specific case studies. The construction of a new type of power system involves the construction and operation of new energy sources, the development and application of related technologies, the diversification of market trading varieties, the exploration of multiple trading rules, and the compliant operation of various market entities. The compliant operation of these scenarios requires a systematic and rigorous legal and regulatory framework for protection. To address this, the book selects three representative legal issues in the construction of new power systems for interpretation: legal issues related to long-term management of the new power system, electricity demand-side management, and energy storage construction.

As an emerging field, energy law research in China is still in its infancy. Therefore, there are relatively few legislative and academic research achievements related to power and energy transition, which poses a significant challenge for the writing of this book. The motivation for writing this book stems from the academic researches on the State Grid Corporation of China (SGCC) in 2019. I would like to extend my heartfelt gratitude to SGCC, State Grid Zhejiang Electric Power Co., Ltd., and the Konrad Adenauer Foundation of Germany for their generous support and the numerous conveniences they provided, which greatly facilitated the writing of this book. I would like to thank Konrad Adenauer Stiftung (KAS), Rule of Law Programme Asia for supporting the translation of the book and KAS will not receive any form of royalties out from the sale of the book. I would also like to express my heartfelt appreciation to Springer Nature for their selfless assistance in the publication of academic works. It is with the sincere help of institutions like yours, possessing a sense of social responsibility and academic dedication, that this work has been successfully published.

I look forward to my work providing some information and assistance to the academic and practical communities both in China and abroad in understanding the progress of China's green energy transition. I am eager to join colleagues from around the world in our joint efforts to contribute to the sustainable development of our planet.

Beijing, China Haifeng Deng
March 2024

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Declaration of Competing Interests

The author declared no potential conflicts of interest or personal relationships that could have appeared to influence the research or publication of this book.

About This Book

As an advanced form of energy system development, the Energy Internet is crucial to promoting China's energy transition and building a clean, low-carbon, safe, and efficient energy system. In September 2020, President Xi Jinping proposed the goal of having CO_2 emissions peak before 2030 and achieving carbon neutrality before 2060 at the general debate of the United Nations General Assembly. See Xinhua News Agency (2020). In March 2021, General Secretary Xi Jinping reiterated the objective of carbon neutrality at the ninth meeting of the Central Financial and Economic Affairs Commission. The "3060 Goal" represents a broad and profound systemic transformation of the economic and social system, which is related to the sustainable development of the Chinese nation and the construction of a community with a shared future for humanity. The "14th Five-Year Plan" period is a critical time for achieving CO_2 emissions peak. During this crucial period, building a clean, low-carbon, safe, and efficient energy system, improving energy efficiency, accelerating energy transition, and constructing a new type of power system with new energy as the main body are both the development goals of the Energy Internet platform and a lofty historical mission. See Xinhua News Agency (2021).

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Contents

Abbreviations

Administrative Compulsion Law	Administrative Compulsion Law of the People's Republic of China
AGC	Automatic Generation Control
Amendment (IX) to the Criminal Law	Amendment (IX) to the Criminal Law of the People's Republic of China
Anti-Monopoly Law	Anti-Monopoly Law of the People's Republic of China
Anti-Unfair Competition Law	Anti-Unfair Competition Law of the People's Republic of China
AVC	Automatic Voltage Control
BIS	Bank for International Settlements
CAISO	California Independent System Operator
CCCPC	Central Committee of the Communist Party of China
CCHP	Combined Cooling, Heat and Power
CCPA	US California Consumer Privacy Act
CFIUS	Committee on Foreign Investment in the United States
CHP	Combined Heat and Power
Civil Code	Civil Code of the People's Republic of China
CLOUD Act	Clarifying Lawful Overseas Use of Data Act
CNIL	Commission on Informatics and Liberty

Criminal Law	Criminal Law of the People's Republic of China
Cybersecurity Law	Cybersecurity Law of the People's Republic of China
Data Security Law	Data Security Law of the People's Republic of China
DSM	Demand-Side Management
EEA	European Economic Area
EGN	Energy Global Network
ELAN	Energy Local Area Network
Electric Power Law	Electric Power Law of the People's Republic of China
EMC	Energy Management Contracts
EMCA	ESCO Committee of China Energy Conservation Association
Energy Law (Draft for Comments)	Energy Law of the People's Republic of China (Draft for Comments)
Environment Impact Assessment Law	Law of the People's Republic of China on Environment Impact Assessment
EVs	Electric Vehicles
EWAN	Energy Wide Area Network
FERC	Federal Energy Regulatory Commission
Fire Protection Law	Fire Protection Law of the People's Republic of China
Flood Control Law (2016)	Flood Control Law of the People's Republic of China (Revised in 2016)
FREEDM	Future Renewable Electric Energy Delivery and Management
GAQSIQ	General Administration of Quality Supervision, Inspection, and Quarantine of the People's Republic of China
GDPR	General Data Protection Regulation
General Principles of the Civil Law	General Principles of the Civil Law of the People's Republic of China
GIS	Geographic Information System
ICANN	The Internet Corporation for Assigned Names and Numbers

ICO	Information Commissioner's Office
IES	Integrated Energy System
Insurance Law	Insurance Law of the People's Republic of China
IoT	Internet of Things
IoV	Internet of Vehicle
IPOs	Initial Public Offerings
IPPs	Independent Power Producers
IRENA	The International Renewable Energy Agency
ISO	The Independent System Operator
KAS	Konrad Adenauer Stiftung
LA	Load Aggregator
Labor Contract Law	Labor Contract Law of the People's Republic of China
LGPD	Brazil's General Data Protection Regulation
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MEE	Ministry of Ecology and Environment
MEM	Ministry of Emergency Management
MHURD	Ministry of Housing and Urban-Rural Development of the People's Republic of China
MIIT	Ministry of Industry and Information Technology
MLPS 2.0	Multi-Level Protection Scheme 2.0
NCCPC	National Congress of the Communist Party of China
NDRC	National Development and Reform Commission of China
NEA	National Energy Administration of China
P2G	Power-to-Gas
PbD	Privacy by Design
Platform Economy Anti-Monopoly Guidelines	Guidelines of the Anti-monopoly Commission of the State Council for Anti-monopoly in the Field of Platform Economy
PPP	Public-Private Partnership

PV	Photovoltaic
QQIR	Quality, Quantity, Innovation, Risk
RAA	Registrar Authorization Agreement
Renewable Energy Law	Renewable Energy Law of the People's Republic of China
RTOs	Regional Transmission Organizations
SAMR	State Administration for Market Regulation
SASAC	State-owned Assets Supervision and Administration Commission of the State Council
Securities Law	Securities Law of the People's Republic of China
SERC	State Electricity Regulatory Commission
SGCC	State Grid Corporation of China
Shenzhen Data Regulations	Regulations of Shenzhen Special Economic Zone on Data
STA	State Taxation Administration of China
UHV	Ultra-High Voltage
V2G	Vehicle-to-Grid
VAT	Value-Added Tax
VPP	Virtual Power Plant
Water Law (2016)	Water Law of the People's Republic of China (Revised in 2016)
Work Safety Law	Work Safety Law of the People's Republic of China

Chapter 1
Overview of Energy Internet

Definitions of Energy Internet

Foreign Definitions of Energy Internet

In the 1970s, the concept of Energy Internet began to emerge. In 1986, Peter Meisen founded the Global Energy Network Institute, aiming to fully utilize renewable resources on a global scale through power transmission lines between countries. In 2004, The *Economist* first proposed the construction of an intelligent, automated, and self-healing Energy Internet based on the characteristics and technology of the Internet, marking the beginning of modern Energy Internet research.[1]

Countries began to put Energy Internet projects into practice. In 2008, Germany launched the E-Energy project to realize the intelligence of the entire chain of energy production, transmission, conversion, application, and storage through information and communication technology, becoming the first country to practice the Energy Internet. In 2008, the United States initiated the "Future Renewable Electric Energy Delivery and Management Systems" (hereinafter referred to as the "FREEDM Systems") project, researching efficient and intelligent distribution systems to support the integration of distributed renewable energy sources and the grid connection of distributed energy storage. In 2010, Japan implemented the "Digital Grid" plan, where various devices in the energy network would use IP to realize the transmission of information and energy.[2]

Perceptions of the Energy Internet vary in different countries/regions in their research and application of the Energy Internet, encompassing four variants: First, Energy Internet. This variant prioritizes the structure of the energy network, particularly the power grid. By drawing on the principles of openness and peer-to-peer of the Internet, it creates a new energy network through large-scale grids, microgrids,

[1] See Gao et al. (2018).

[2] Same as above.

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and other forms of interconnected networks, with a key emphasis on developing a distributed energy network architecture that integrates information and communication systems. Second, Internet of Energy. This variant prioritizes the information Internet and uses the Internet to collect, analyze, and make decisions to guide the operation of the energy network. Third, Intenergy. This variant emphasizes the deep integration of Internet technology and energy networks, facilitating two-way communication between energy and information, with the information support system guiding energy dispatch and energy flows directing user decisions to efficiently utilize renewable energy. Fourth, Multi-Energy Internet. This variant focuses on the joint transmission and optimized use of multiple energy sources.[3]

China's Definition of Energy Internet

"Built on a robust and intelligent power grid platform, Energy Internet is a smart power-centered energy system that deeply integrates and applies advanced communication technology, control technology and advanced energy technology to support the clean and low-carbon transition of energy and power, optimize the comprehensive utilization efficiency of energy, and facilitate flexible and convenient access for multiple entities. It is clean and low-carbon, safe and reliable, ubiquitously connected, efficient and interactive, and intelligent and open."[4] The Energy Internet is a developing concept with rich connotation and extension and strong inclusiveness. It represents a higher stage in the development of energy and power systems. Technically, the Energy Internet accelerates the realization of technological progress and integrated development. Advanced information and communication technologies such as "big data, cloud computing, the Internet of Things (IoT), mobile Internet, and blockchain" are widely and deeply applied in energy and power systems. Energy Internet technologies such as multi-energy conversion technology, coordinated operation technology, and user interaction technology are comprehensively upgraded, making the system characterized by digitalization, automation, and intelligence. Structurally, the Energy Internet has a strong and widespread network framework. Centralized energy systems, distributed energy systems, various energy storage facilities, and all types of users are interconnected in a user-friendly manner. Different energy systems are interconnected and support each other, and they develop in integration with social systems. Functionally, the Energy Internet has powerful resource allocation and service support capabilities. It effectively supports the large-scale development and utilization of renewable energy and the "plug and play" of various energy facilities. It achieves coordinated interaction between "source, grid, load, and storage," ensuring personalized, integrated, and intelligent service demands, and promotes the development of new energy business forms and models.[5]

[3] See Ma et al. (2015).

[4] Zhu and Zhi (2020, November 11).

[5] See Yang (2020, May 12).

The functional architecture of the Energy Internet has three layers, namely the physical foundation layer, the information application layer, and the market transaction layer. The physical foundation layer refers to a multi-energy collaborative energy network that integrates the power network with gas networks, heat networks, cooling networks, and other energy networks to facilitate the conversion and storage between various types of energy including electricity, gas, heat, and cooling, thereby improving the flexibility of user-side energy consumption. The information application layer refers to the cyber-physical energy system that utilizes massive information collection technology, energy information transmission technology, and the integration technology of information and physical energy systems to tap into the immense value of information data in the energy sector. The market transaction layer involves innovating energy operation models by leveraging the Internet and prioritizing user needs to enhance value creation. This layer fosters the development of various business models on commercial Internet platforms, including B2C, B2B, C2C, O2O, and P2P.[6]

The physical form of the Energy Internet is divided into three levels: Energy Local Area Network (ELAN), Energy Wide Area Network (EWAN), and Energy Global Network (EGN). ELAN is also known as the distributed integrated energy system (IES). Based on microgrids, ELAN integrates various networks such as heat, cooling, water, and gas to use local clean energy resources first while also considering purchased energy. EWAN utilizes ELANs as its foundational nodes, linking them through power grid, pipeline network, and transportation infrastructure to create a wide area interconnection across these nodes. EGN is achieved through the integration of multiple networks, including energy networks (transnational power grids, oil and gas pipelines), information networks (the Internet, private networks), and transportation networks (transnational highways, railways, waterways, etc.), to optimize the allocation of material, energy, information, business, and capital flows on a global scale.[7]

Characteristics of the Energy Internet

According to the "Guiding Opinions on Promoting Internet Plus Smart Energy Development" (Fa Gai Neng Yuan [2016] No. 392) issued by China in 2016, the Internet Plus smart energy, also known as the Energy Internet, is a new form of energy industry development that deeply integrates the Internet with energy production, transmission, storage, consumption, and the energy market. It is characterized by intelligent equipment, multi-energy coordination, information symmetry, decentralized supply and demand, a flat system structure, and open trading. Since electricity occupies an important position in the current energy system and China has formed a large-scale electric power transmission network, the power system has evolved to exhibit characteristics

[6] See Gao et al. (2018).

[7] Same as above.

akin to those of the Internet. Therefore, the Energy Internet is based on electricity and prioritizes renewable energy, aiming to optimize the allocation of material, energy, information, business, and capital flows through multi-energy collaboration, supply and consumption collaboration, and centralized and distributed collaboration. The power grid becomes the core platform for energy transition and utilization and serves as the key physical foundation for the Energy Internet.[8]

The Energy Internet is characterized by being clean and low-carbon, safe and reliable, ubiquitously connected, efficient and interactive, and intelligent and open. Clean and low-carbon: Green and environmentally friendly practices in all aspects of energy production, transmission, and consumption, adapting to a high proportion of clean energy integration, and achieving full absorption of clean energy. Safe and reliable: The energy grid structure is robust, with secure information networks and data operations, strong capabilities for accident risk prevention and self-healing, ensuring stable and reliable energy supply. Ubiquitous connected: Energy networks are widely distributed, with various centralized and distributed facilities and entities widely accessed. Cross-region and cross-energy systems are interconnected and support each other, and they develop in integration with information systems and social systems. Efficient and interactive: High efficiency in energy allocation and comprehensive utilization, good economic benefits, multi-energy complementation, source-grid-load-storage coordination, and friendly interaction among various entities. Intelligent and open: The Energy Internet possesses capabilities such as sensitive perception, intelligent decision-making, and precise control. It has a high level of digitalization and intelligence. Various facilities are "plug and play," serving the diverse needs of users, promoting market openness, and creating a win–win ecosystem.[9]

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[8] Same as above.

[9] See Yang (2020, May 12).

Chapter 2
Business Models of Energy Internet Companies

Energy Internet companies typically use three business models: "IoT+", "Internet+" and "Energy+". The "IoT+" business model is often used in the new energy industry, energy storage industry, electric vehicle industry, power equipment industry, energy-saving products, and the research and development of intelligent devices. The "Internet+" business model combines energy development with Internet technology, resulting in new models that include electric power services, digital power, data services, information integration, and financial services. The "Energy+" business model mainly focuses on three modules: the power trading industry module, the intelligent microgrid industry module, and the Virtual Power Plant (VPP) module. The power trading industry module takes power trading as its core and adopts market competition for energy supply and demand. The intelligent microgrid industry module centers on energy management, with main business models including microgrid planning and construction, operational management, energy services, value-added services, etc. The VPP module aims to smooth the load curve on the demand side, increase the load factor, and enhance energy utilization.[1]

The VPP Business Model

The VPP is a new generation of intelligent control technology and interactive business model that aggregates and optimizes the clean development of "source-grid-load-storage." Based on the traditional power grid physical structure, this technical model uses the Internet and modern information and communication technologies to aggregate various resources in the power grid, such as distributed power supplies, energy storage, and loads, for coordinated optimization of operational control and market transactions. It enables multi-energy complementarity on the supply side and

[1] Yu et al. (2019).

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flexible interaction on the load side and provides the grid with ancillary services such as peak shaving, frequency regulation, and standby, offering a viable solution for the efficient utilization of distributed clean energy sources.[2]

Grid companies carry out commercial operations of VPPs with a "one platform + multiple applications" architecture and aggregate a variety of adjustable resources, including thermal storage electric boilers, smart buildings, smart homes, user-side energy storage, adjustable industrial and commercial loads, and distributed PV in various pilot areas. Through this approach, grid companies establish a business model that involves multiple market participants, including integrated energy service providers, ancillary service suppliers, energy aggregators, and electricity sales companies and further create a VPP ecosystem. This unleashes new vitality in the energy economy on the user side, integrating a broad range of adjustable resources into the grid's optimized scheduling and real-time closed-loop control, thereby enhancing the grid's flexible adjustment capabilities, and promoting the consumption of new energy.

The Energy Big Data Business Model

"In the era of Energy Internet, energy systems are constantly generating, collecting, storing, and processing massive amounts of data. Big data follows the new Moore's Law and shows exponential explosive growth. People have begun to value data, and data-centric business models will play an important role in the Energy Internet, providing innovative services through the added value of information."[3] For example, a grid company carries out data value-added services based on energy big data to drive the digital transformation of the grid and the company, comprehensively improve the company's data management and value service capabilities, and build an integrated "source-grid-load-storage-use" energy data chain with the grid as the hub.[4]

The energy big data product and service models of Energy Internet companies can be roughly divided into five categories: basic data, decision support, platform application, solution, and win–win cooperation (ecological co-construction). Basic data services gather data such as company user energy consumption data, system operation data, and equipment and environmental monitoring data and use them to create basic data products through cleaning, clustering, desensitization, and other data analysis processing. These services also provide data APIs for users to directly query and download related basic data. Decision support services analyze data market demand and potential by taking into consideration the source channels and value segmentations of Energy Internet companies' power big data to form a series of non-targeted analytical reports and special reports. The analytical reports are mainly aimed at the general public, focusing on the patterns of energy and power development, analysis

[2] See State Grid Corporation of China (2018).

[3] Lv (2017).

[4] Wang et al. (2020), pp. 90–92.

of societal electricity consumption, analysis, and prediction of household electricity usage behaviors, etc. The special reports are mainly aimed at companies and government users, focusing on the analysis of energy consumption data of industries, fields, and regions that are of interest to the customers. Platform operation services identify the unique market value data (such as user product categories, behavioral characteristics, and product preferences) by analyzing companies' power big data and build service platforms to facilitate smooth connections between various product suppliers and between suppliers and consumers, creating value channels and providing users with precision marketing, information services, advertising services, and more. Solution services offer tailed solutions to cater specifically to the customized needs of government and company users based on companies' data asset value characteristics and generate revenue. Win–win cooperation services aim to deeply collaborate with data supply units, industrial Internet-related units, consumer Internet-related units, and public utilities to form a collection of datasets including energy consumption, geography, business, transportation, finance, and medical treatment. By deeply utilizing internal and external data, they accurately portray target users in multiple dimensions, and serve government and enterprise customers with desensitized data.[5]

New Energy and Energy Internet Energy-Saving Management Model

There are five major types of new energy sources: Firstly, wind power generation, for which China has introduced a range of supportive policies, with offshore wind power expected to become a future development trend. Secondly, solar PV power generation, which currently includes two main types of domestic PV power stations: ground-mounted stations and distributed PV stations. Thirdly, biomass power generation, where technology is continuously maturing and trends toward diversification, direct combustion, co-firing, and gasification are evident. Fourthly, nuclear energy, which mainly uses nuclear fission to release massive amounts of energy for power generation, with significant potential for future nuclear power development. Lastly, new energy for vehicles, referring to the power sources used in new energy vehicles, including power lithium batteries, nickel-metal hydride batteries, hydrogen fuel cells, and supercapacitors. New energy vehicles will become a crucial gateway for the integration of the Energy Internet with new energy sources. Firstly, during the charging process, electric vehicles need to exchange information with the charging station to control the charging current, which allows for the collection of data from the electric vehicles. Secondly, electric vehicles act both as a load on the power system and as an external device for energy storage and distributed power sources, connecting the power system with distributed energy storage devices or power sources.

Energy-saving management services for Energy Internet companies are part of the energy service industry. They involve the establishment of energy monitoring and

[5] See Wang et al. (2021).

control platforms and the use of sampling monitoring technology, communication technology, and computer software and hardware technology to monitor and manage the consumption of resources such as water, electricity, heat, and gas. Their service targets include industrial energy-saving systems and home energy-saving systems. The management of the industrial energy-saving systems involves real-time collection, computational analysis, and centralized dispatch of energy used in production, so as to meet the requirements of supply–demand balance and energy-saving and environmental protection. The management of home energy-saving systems involves real-time monitoring, data collection, statistical analysis, and other steps to achieve refined management of energy consumption and provide energy-saving solutions. Energy-saving management services will also provide data support for the development of industries such as equipment preparation and energy-saving renovation.[6]

Energy Storage Services

In 2017, the National Development and Reform Commission, the National Energy Administration, and three other authorities jointly issued the "Guiding Opinions on Promoting the Development of Energy Storage Technology and Industry," which calls for the exploration of several replicable business models, the cultivation of a number of competitive market entities, and the promotion of the energy storage industry to the initial commercialization stage.

Energy storage systems can participate in frequency regulation ancillary services by working with thermal power units. Power plants collaborate with energy storage companies in the business model of energy performance contracting, where the power plants provide the site, access for energy storage, and the qualifications for participating in the frequency regulation market, while the energy storage companies are responsible for investment, design, construction, operation, and maintenance. The incremental revenue from frequency regulation is shared between both parties.[7] Energy storage systems can also participate in peak-shaving ancillary services, which is particularly beneficial in the "Three North" regions of China—areas known for difficulties in integrating new energy sources and a lack of peak load regulation capabilities. Energy storage users can either partner with thermal, wind, or solar power plants for joint peak-shaving efforts or operate independently as market participants to offer peak-shaving services directly to the power grid. Energy storage users participating in peak shaving can bid for ancillary service transactions on the peak-shaving ancillary service platform. The compensation for peak-shaving is shared among thermal power plants, wind farms, PV power stations, and hydroelectric plants in accordance with policy requirements.[8]

[6] Hua (2015).

[7] See Zhang et al. (2018).

[8] See Peng (2018).

China is currently vigorously developing the new energy electric vehicle industry, which inevitably requires a significant enhancement of the charging service capabilities supporting electric vehicles. The large-scale construction of new charging piles will impose a heavy burden on conventional transformers and transmission and distribution lines. Therefore, it is necessary to build a certain amount of energy storage devices at charging stations to reduce the need for transformer capacity expansion and delay the need for upgrading transmission and distribution. Constructing energy storage stations at charging stations can also play a role in peak shaving and valley filling.

Power Trading Platforms

Energy-trading platforms offer wholesale and retail of electricity, VPPs, gas sales, heating services, purchasing and reselling of electricity for electric vehicles, etc. Energy-trading platforms provide not only spot trading but also forward contracts, futures contracts, and options contracts, creating a diversified financial trading environment. Over 30 power trading organizations have been set up throughout China at both the national and provincial levels. Among these, there are two national power trading organizations, one of which is the Beijing Power Trading Center established based on the State Grid.

In 2015, China issued the "Implementation Opinions on the Establishment and Standardized Operation of Power Trading Organizations," which clearly defines the functional positioning of power trading platforms: to provide standardized, open, and transparent power trading services for market entities under government regulation without the purpose of profit. The trading organizations are responsible for the construction, operation and management of the market trading platform, organization of market transactions, provision of settlement basis and related services, collection of bilateral contracts independently signed by power users and power generators, registration and management of market entities, disclosure, and release of market information, etc. Power generators, power sellers, and power users that are approved by competent governments register and trade on the platforms. Grid companies are shareholders of the trading platforms, but the operation of these platforms must be independent of the grid companies. Grid companies can also trade on the trading platforms.[9] The "Implementation Opinions on Promoting the Reform of the Power Selling Side" specify three types of power sellers, with the first type being grid companies. As the hubs of China's power transmission and distribution systems, grid companies shall ensure the security of power transactions. This includes

[9] National Development and Reform Commission, & National Energy Administration. Notice on Issuing Supporting Documents for the Power System Reform (Fa Gai Jing Ti [2015] No. 2752), Annex 3, Implementation Opinions on the Establishment and Standardized Operation of Power Trading Organizations.

providing non-discriminatory power supply services to market entities, offering guaranteed power supply services, ensuring the fair, non-discriminatory, and open grid, and shifting from provision of the fair, non-discriminatory, and open grid for power generators to provision of such a grid to power sellers and their proprietary users.[10]

Integrated Energy Services

Integrated energy services refer to both the integration of various types of energy (including electricity, gas, etc.) and the integration of services (including engineering services, investment services, operation services, etc.). The core of integrated energy services is network collaboration and data intelligence. Network collaboration requires an open, multilateral, complex market to form a multi-dimensional open ecosystem, while data intelligence needs to utilize big data technology to provide services with data collection and analysis. In 2019, China's first national integrated energy service online platform—Jiangsu Energy Cloud Network Platform—was officially launched. The platform gathers capital, technology, channels and talents from various fields, as well as energy users, energy suppliers and service providers, government agencies, universities and scientific research institutions, offering open and shared integrated energy services to all sectors of society.[11]

The integrated energy services platform includes Smart Energy Usage, Expert Services, Alliance Channel, Industry Information, Cloud Network Marketplace, and other sections. In the Smart Energy Usage section, energy customers can query real-time information on electricity load, consumption, and costs, receive customized power outage notifications, and access information on market-based electricity sales, demand response, distributed energy, energy storage, and more. This section also provides customized energy efficiency evaluation reports and improvement solutions for customers in different industries and regularly pushes energy efficiency diagnosis reports to these customers. The Expert Services section gathers energy service experts to provide instant and accurate professional consultation for the personalized issues of energy customers, helping them to analyze and solve problems. The Industry Information section provides the latest policies, technologies and other information in the integrated energy field as well as expert analysis, serving as a resource for various entities to learn advanced technologies and the latest policies.[12]

[10] National Development and Reform Commission, & National Energy Administration. Notice on Issuing Supporting Documents for the Power System Reform (Fa Gai Jing Ti [2015] No. 2752), Annex 5, Implementation Opinions on Promoting the Reform of the Power Selling Side.

[11] See Huang et al. (2019).

[12] Same as above.

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Chapter 3
Researches on Legal Risks and Regulatory Policies for the Platform-Based Transformation of Energy Internet Companies

Regulatory Laws and Policies for the Transformation of Platform-Based Energy Internet Companies

The legal risks associated with the transformation of platform-based Energy Internet companies mainly pertain to the market access of such enterprises, energy-saving management for new and existing Energy Internet companies, regulation of energy storage, construction of power trading platforms, the establishment of integrated energy service platforms, etc. In order to sort out the legal risks associated with the platform-based transformation of Energy Internet companies, it is necessary to analyze and organize the current laws, regulations, and policies on the development of platform-based Energy Internet companies at home and abroad. In view of this, this section will first sort out China's regulatory laws and policies for Energy Internet companies, including the negative list system for market access, non-discriminatory access to the energy industry, the fair, non-discriminatory, open grid, etc. Secondly, this section will analyze the regulatory laws and policies for energy-saving management models of renewable energy and Energy Internet companies, including the regulatory laws and policies related to the grid-connected operation of renewable energy, energy-saving management business, energy storage services, power trading platforms, electric vehicle charging stations, integrated energy service platforms, as well as deepening the reform of the investment and financing system in the energy sector. Finally, this section will analyze the Energy Internet business models and regulatory laws and policies of Germany, the United States, and Japan from the perspective of comparative law.

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