

# 数字经济发展助力能源转型

## Digital Economy Development and Its Role in Driving Energy Transformation

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## 全球数字经济发展趋势

### Development Trends of Global Digital Economy

- 全球数字经济领域存在众多分歧，内涵界定、新型基础设施投入、数据流通规则不一、数字鸿沟的拉大趋势、数字治理多元化要求等挑战，都有待统一认识。

A wide range of issues in the field of global digital economy are in dispute without a common understanding, including definitions, new infrastructure investment, different data flow rules, widening digital divides, and requirement for diverse digital governance.

- 中国和美国是当前数字经济领域的两大巨头，近年来随着信息技术和互联网发展，数字经济在加速发展。As two giants in this field, China and the US have seen their digital economy thrive faster in recent years backed by the development of information technology and internet.

- 如何联合和带动发展中国家和欠发展国家在数字经济领域的共同发展，让数字经济造福多数人，是当前中美等数字经济主要国家的重要使命。How to join hands with other developing and underdeveloped countries to seek collective progress in digital economy and make it benefit the people is an important mission for major digital economies leaders including China and the US.

	国家 (或地区)	数字 基础设施	数字 资源共享	数字 资源使用	数字 安全保障	数字 经济发展	数字 服务民生	数字 国际贸易	数字 驱动创新	数字 服务管理	数字 市场环境	具体 类型
◆	美国											
◆	中国											
◆	韩国											
◆	新加坡											
◆	日本											
◆	英国											
◆	德国											
◆	瑞典											
◆	法国											
◆	挪威											
◆	瑞士											
◆	澳大利亚											

	Country (region)	Digital infrastructure	Digital resource sharing	Digital resource usage	Digital security	Digital economy development	Digital livelihoods for people	Digital international trade	Digital innovation	Digital service management	Digital market environment	Specific type
◆	US											
◆	China											
◆	ROK											
◆	Singapore											
◆	Japan											
◆	UK											
◆	Germany											
◆	Sweden											
◆	France											
◆	Norway											
◆	Switzerland											
◆	Australia											

2019 主要国家和地区国家数字竞争力排名2019

Ranking of national digital competitiveness among main countries and regions

来源：《国家数字竞争力报告2019》，腾讯研究院

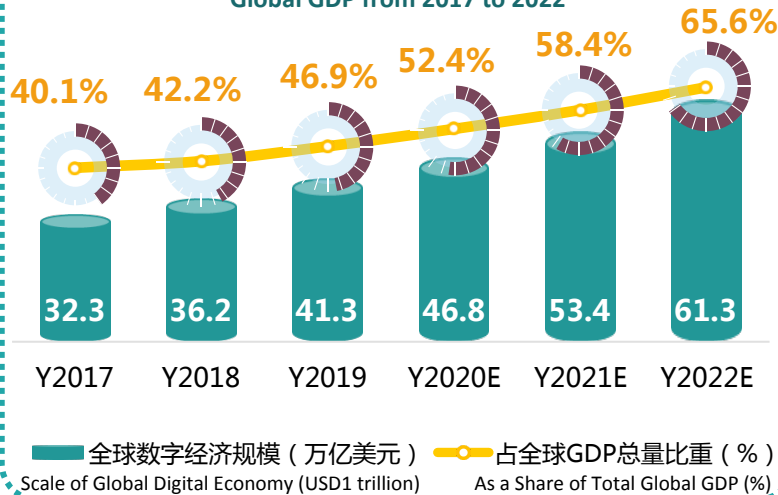
Source: National Digital Competitiveness Index Research Report 2019, Tencent Research Institute

# 全球数字经济继续保持稳健增长，中国数字经济将步入快速成长期

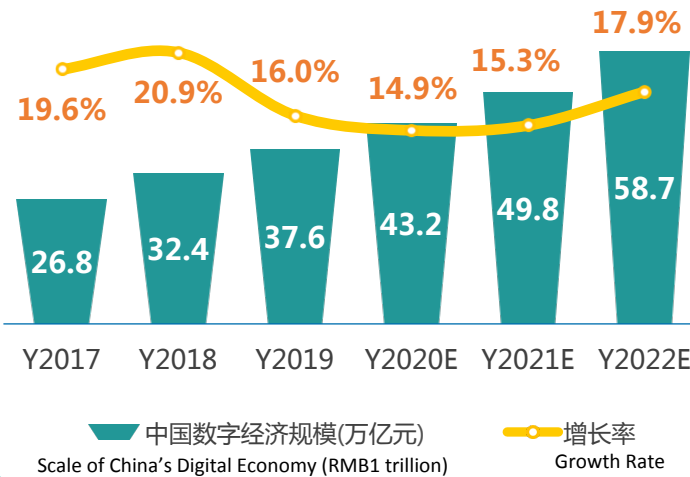
## China's Digital Economy is on Track to Grow Fast as Global Digital Economy Keeps a Steady Pace

- ◆ **全球**：根据联合国《2019年数字经济报告》，数字经济规模约占GDP的**4.5%-15.5%**。根据赛迪研究，数字经济规模在40万亿美元，约占46.9%。2015年至2018年间，全球数字设备数量从**155亿台**增加至**200亿台**，年均增幅约**8%**，远高于人口（**1.1%**）和经济增速（**3.5%**）。**Global**: UNCTAD's *Digital Economy Report 2019* showed digital economy accounts for about 4.5%-15.5% of GDP. CCID research pointed to a scale of USD40 trillion in digital economy, representing some 46.9%. From 2015 to 2018, the number of global digital devices increased from **15.5 billion** to **20 billion**, with an annual average growth rate of around **8%**, far above that of population (**1.1%**) and economy (**3.5%**).
- ◆ **中国**：2018年，中国数字经济规模**32.4万亿元**，占GDP比重**34.8%**，增长20.9%，高于同期GDP名义增速**11.2个百分点**；数字经济领域就业岗位为1.91亿个，占当年总就业人数的24.6%，同比增长11.5%。**China**: In 2018, China's digital economy expanded to **RMB32.4 trillion**, contributing to **34.8%** of its GDP and growing by 20.9%, **11.2 pp** higher than nominal growth of GDP during the same period; the field created 191 million jobs, or 24.6% of the total employed population in 2018, up 11.5% year-on-year.
- ◆ 随着2020年各地两会的陆续闭幕，“数字经济”在各省、自治区、直辖市的政府工作报告中频频出现。国家发展改革委联合工业和信息化部等16个部门，通过线上方式共同启动“**数字化转型伙伴行动（2020）**”，加快构建数字化产业链，为培育数字经济新业态提供支撑。As the 2020 “two sessions” close in succession across China, “digital economy” becomes a buzzword in the government work reports of the provinces, autonomous regions and municipalities directly under the central government. The National Development and Reform Commission, together with 16 other authorities including the Ministry of Industry and Information Technology, launched “**Digital Transformation Partnership Action (2020)**” online to accelerate the creation of digital industrial chains and support the cultivation of new business models in digital economy.

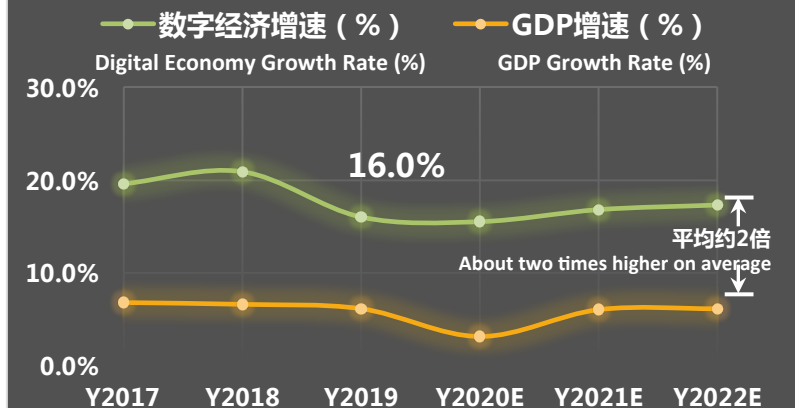
2017-2022年全球数字经济规模及所占全球GDP总量比重  
Scale of Global Digital Economy and Its Share in Total Global GDP from 2017 to 2022



2017-2022年中国数字经济规模及增长  
Scale and Growth of China's Digital Economy from 2017 to 2022



中国数字经济增速明显高于同期GDP增速  
China's Digital Economy Grows Much Faster than GDP



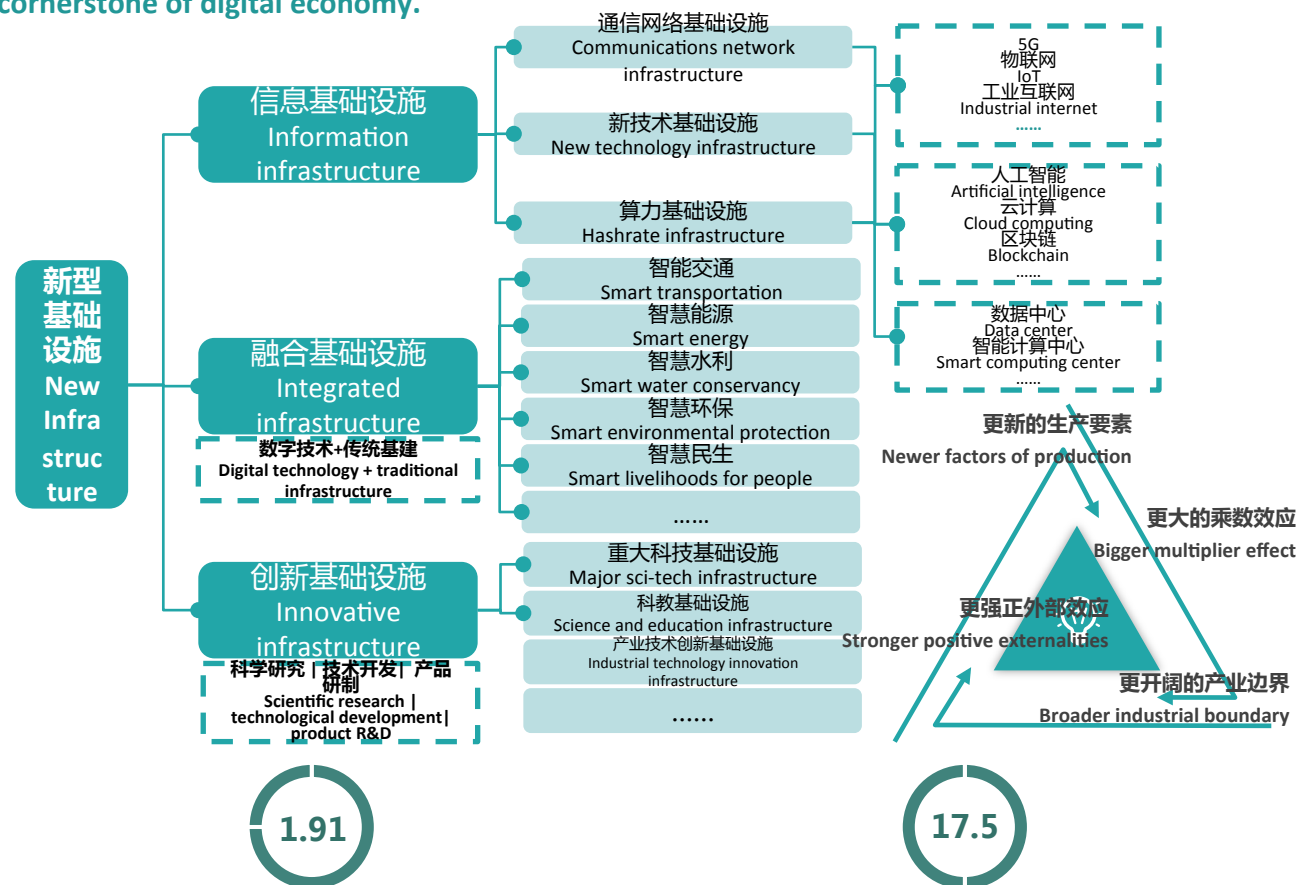
来源：赛迪顾问测算（广义数字经济测算，包括信息产业和信息通信技术对其他产业融合渗透带来产出增加） Source: CCID consultant's estimates (Estimates of digital economy in a broad sense, including increased output resulting from integrating information industry and information communications technology into other industries)

# “新基建” 按下数字经济加速键，全面赋能经济增长

## “New Infrastructure” Fast-Track Digital Economy to Fully Catalyze Economic Growth

“新基建”——以数字基建为主的基础设施建设，是数字经济发展的底层基石。

“New infrastructure” – Infrastructure construction dominated by digital infrastructure, is the cornerstone of digital economy.



2018年中国数字经济领域就业岗位为1.91亿个。China's digital economy supported 191 million jobs in 2018.

2025年，每增加1美元ICT投资，将额外获得5美元的GDP增长，有望拉动全球GDP累加实现17.5万亿美元额外增长。By 2025, an increase of per USD1 in ICT investment will add USD5 to GDP, hopefully pushing global GDP to increase by USD17.5 trillion cumulatively.

根据赛迪预测，中国未来“新基建”带动间接投资逾十万亿级，成为经济复苏新动力。CCID forecast shows China's "new infrastructure" will bring indirect investments exceeding RMB10 trillion and become a new driver of economic revitalization.

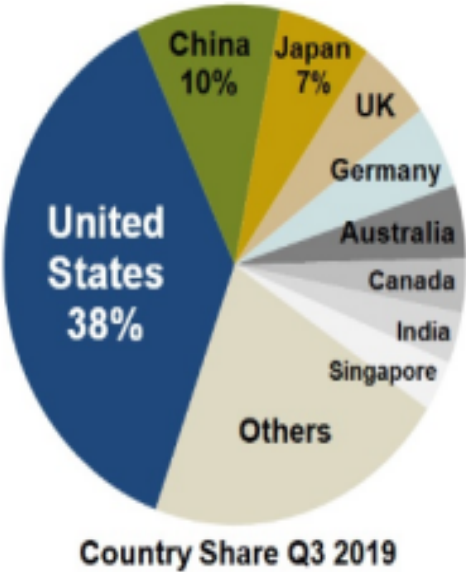
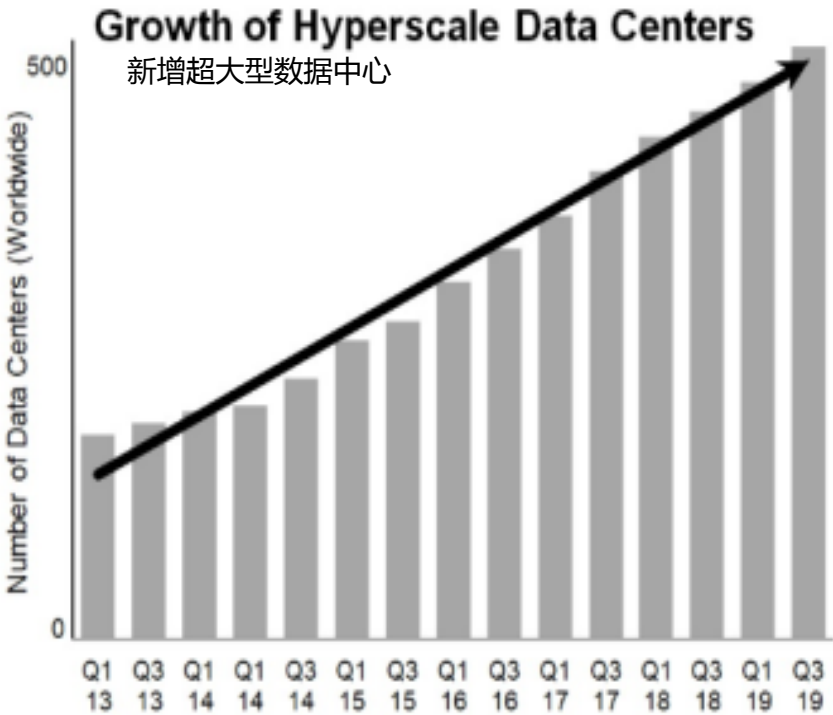
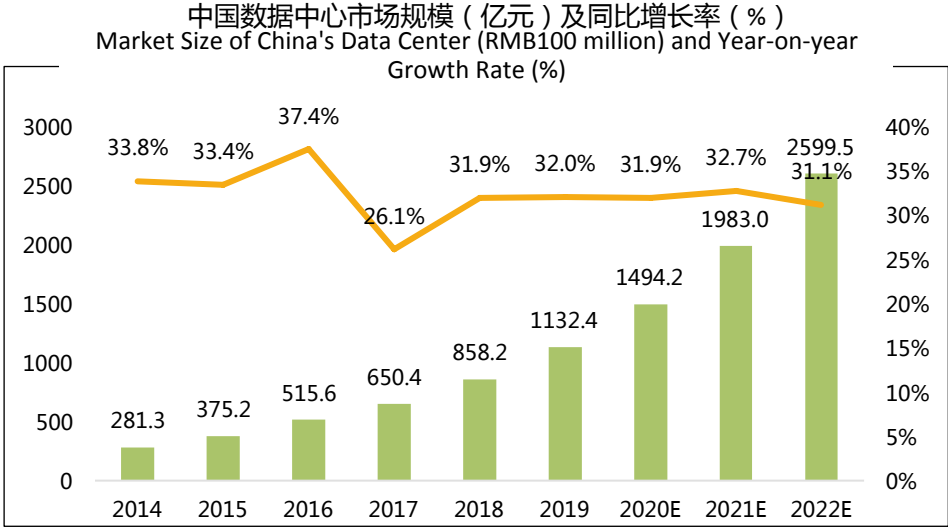
领域 Field	直接投资 Direct Investment	带动投资 Indirect Investment
5G	预计2025年5G基站建设数量约为500万座，直接投资将达2.5万亿元。Some 5 million 5G base stations are expected to be built by 2025, backed by direct investment of RMB2.5 trillion.	带动终端、高清视频等行业快速发展，到2025年5G全产业链相关投资累计超5万亿元。This will boost rapid growth in industries such as terminal and HD video. Accumulated investments in entire 5G industry chain will surpass RMB5 trillion by 2025.
新能源充电桩 New energy charging piles	2020年1月，公共充电桩累计53.1万台。年增长15万台；私人按照充电桩年增长30万台；2025年投资规模将达到1000亿元。By January 2020, public charging piles totaled 531,000 in number, with an annual increase of 150,000. Together with an annual increase of 300,000 in the number of private charging piles, the investment scale will reach RMB100 billion by 2025.	预计2025年，带动相关投资累计超2700亿元。It is expected to encourage related investments worth over RMB270 billion by 2025.
大数据 Big Data	中国数据中心机架年增速超过30%。预计2022年将新增220万机架，新增投资1.5万亿元。With annual growth rate exceeding 30%, the number of data center racks in China is expected to rise 2.2 million by 2022 through new investment of RMB1.5 trillion.	带动云计算、物联网产业发展，2022年带动相关投资超3.5万亿元。This will fuel the development of cloud computing and IoT industries, bringing over RMB3.5 trillion in investment by 2022.
人工智能 AI	中国AI芯片市场45%的平均增速，预计2025年，人工智能基础设施建设新增投资约2200亿元。An average growth rate of 45% in China's AI chip market is estimated to translate into around RMB220 billion new investments in AI infrastructure construction by 2025.	带动计算机视觉、语言处理等技术进步，促进智慧医疗、智慧交通、智慧金融等产业快速发展。预计2025年人工智能核心产业规模超过4000亿元。This will facilitate technological progress in computer vision, language processing and the like, and robust growth of such industries as smart healthcare, smart transportation and smart finance. The scale of core AI industries will be expectedly surpass RMB400 billion by 2025.
工业互联网 Industrial Internet	2019年工业互联网6110亿；13.3%年均复合增速，预计至2025年新增投资超6500亿元。The scale of industrial internet amounted to RMB611 billion in 2019, with a compound annual average growth rate of 13.3%. Over RMB650 billion in new investment is expected by 2025.	赋能传统工业向智能制造转型，预计2025年带动相关投资超万亿元。A transition from traditional industry to smart manufacturing will be accompanied by expected investments more than RMB1 trillion by 2025.
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# 数据中心建设——能耗快速增长

## Development of Data Centers -- Rapid Growth in Energy Consumption

2015-2019年期间全球互联网流量已增加了两倍。根据美国环境保护署报告，数据中心的能源消耗每五年翻一番。  
IEA《能源效率2019》：全球数字设备、网络和服务器年耗电已达到**8000亿kwh**（800TWh），技术提升效率降低对全球能源需的影响。  
Worldwide, internet traffic grew up by a factor of 3 from 2015 to 2019. Report from the United States Environmental Protection Agency shows that energy consumption of data centers doubles every five years.  
Energy Efficiency 2019 of IEA: the annual power consumption of digital equipment, internet and servers in the world reached **800 billion kWh** (800TWh), and technology enhanced efficiency and reduced the impact on global energy demands.



Source: Synergy Research Group

数据中心整个运营周期：能耗占比超过**50%**，降低用电能效值（PUE）一直是数据中心建设与设计需要考虑的关键。

Entire operating cycle of data centers: energy consumption accounted for more than **50%**. Reducing PUE remains as the key which needs to be considered in the development and design of data centers.

2022年，中国新建大型、超大型数据中心的电能使用效率值达到**PUE1.4以下**。  
In 2022, the **PUE** of newly-built large and hyperscale data centers in China would be **less than 1.4**.

数据来源：IDC,《2019中国企业绿色计算与可持续发展研究报告》Source: IDC, Research Report on Green Calculation and Sustainable Development of Chinese Enterprises 2019



# 智慧能源管理系统——实现能耗降低的有效途径

## Smart Energy Management System -- An Effective Way for Energy Consumption Reduction

**能源系统智能管理**——基于云计算、移动互联网、大数据等先进技术,通过采集大数据中心各类能耗监测点的用能数据,对能源生产使用实现全面数字化,辅以智能决策优化能源使用,降低能耗。  
**Smart management of the energy system** -- realize the all-round digitization of energy production and usage by collecting energy use data of various energy consumption monitoring points of big data centers based on cloud computing, mobile internet, big data and other advanced technologies, and reduce energy consumption energy usage optimization supplemented by smart decision-making.

**生产系统智能化改造**——智能制造在2014-2030年期间将节省15艾焦(150万亿焦耳)能源,远超德国一次能源需求总量(IEA《能源效率2019》)

**Intellectualized reform of the production system** -- smart manufacturing would save 15 exa Joule (150 trillion Joule) energy from 2014 to 2030, far beyond Germany's total demands of primary energy (*Energy Efficiency 2019* of IEA).

### 人工智能和云计算改变系统运行和控制方式

Artificial intelligence and cloud computing change the operation and control mode of the system.

**机器学习**等实现能源流的智能分析与管理; **云计算**则提供实时在线监控和动态优化与匹配,将对未来能源系统运行控制方式和运营模式带来颠覆性影响。

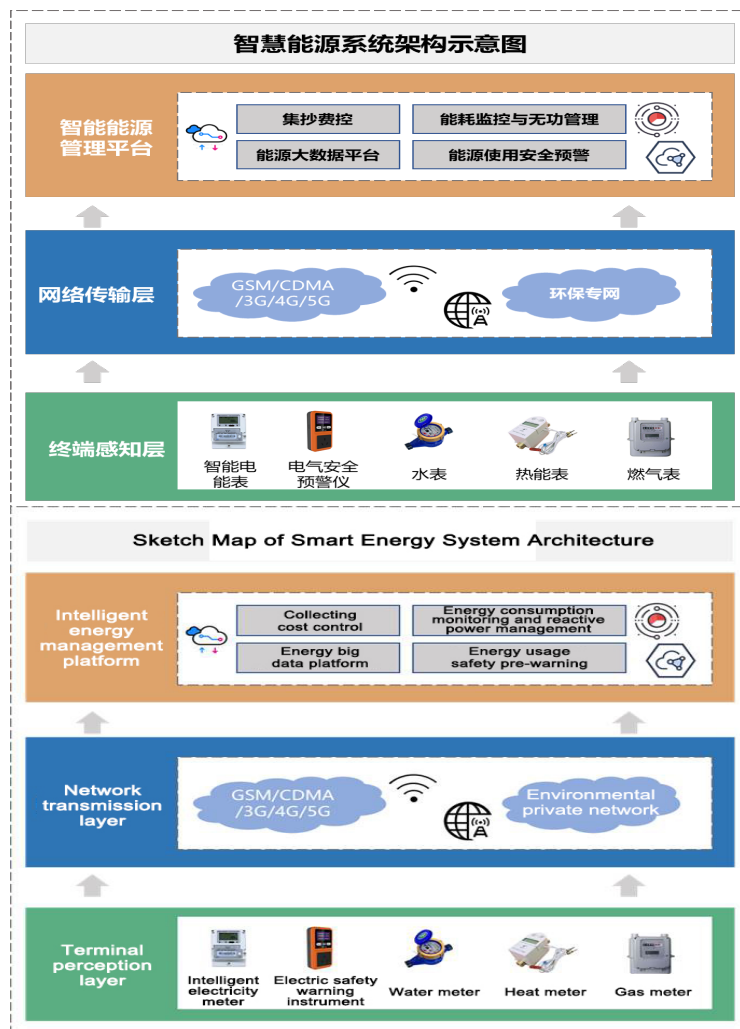
**Machine learning** and the like realize the smart analysis and management of energy flow, while **cloud computing** provides real-time online monitoring and dynamic optimization and matching, and will bring explosive impact on the operation and control mode and operation pattern of the energy system in the future.

### 区块链技术将改变能源生产、交易、消费模式

Blockchain technology will transform the modes of energy production, transaction and consumption.

能源交易主体可以点对点实现能源产品生产、交易、能源基础设施共享,未来将延伸至**微电网、能源交易与结算、能源金融、碳排放及V2G(电动汽车入网)**等互联场景。

Energy transaction entities can realize point-to-point sharing of the production, transaction of energy products and energy infrastructure, and will extend to **micro power grid, energy transaction and settlement, energy finance, carbon emission and V2G (grid connection of electric automobiles)** and other internet scenarios.



### 5G技术改变能源生产和传输模式。

5G technology transforms energy production and transmission mode.

5G和新型储能的融合应用,有助于解决分散式可再生发电发展,更将促进**分布式电网、微网、虚拟电厂**等在更大范围的发展。  
The integrated application of 5G and new-type energy storage helps tackle the development of distributed renewable energy, and will even more promote the development of **distributed power grid, micro grid, virtual power plant** and the like at a larger scope.

### 大数据和物联网成为核心基础设施

Big data and IoT become core infrastructure.

**能源大数据和智能互联的物联网**,作为能源行业新的基础设施,将为新一代能源系统控制及运行等技术突破,为横向多能互补与纵向“源网荷储用”优化组合的实现等提供重要支撑。

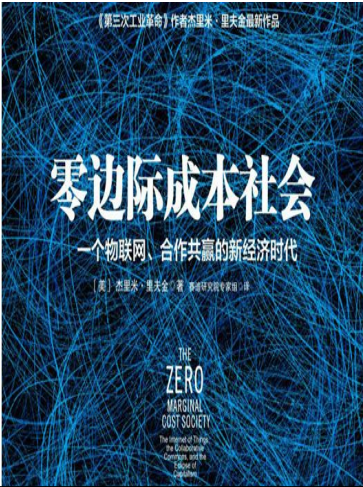
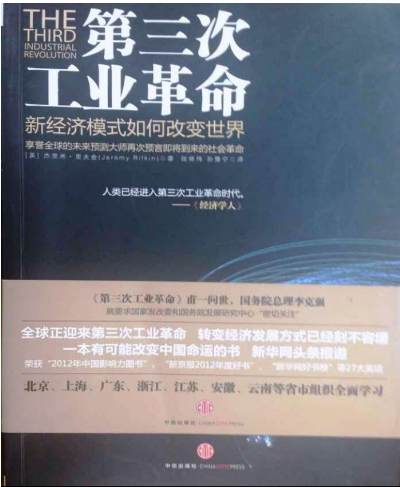
As the new infrastructure of the energy industry, **energy big data and the smart and interconnected IoT** will provide an important support for technological breakthrough in the control and operation of the new-generation energy system, and for the realization of horizontal multi-energy complementation and vertical optimization of "Generation-Grid-Load-Storage-Usage".



# 数字经济加速新经济发展模式

## Digital Economy Speeds up the New Economic Development Mode

- 数字技术加速**信息互联网、能源互联网、物联网**“三网”融合，最终将会让我们的商业模式和社会模式发生翻天覆地的变化。Digital technology accelerates the integration of "three internets", including **information internet, energy internet and IoT**, and will finally lead to the earth-shaking changes in our business mode and social mode.
- 信息互联网系统的广泛建立，能源互联网络的初具雏形，加上智能交通物流网络的构建，很快就会发展形成一个以数据为基础的三网融合新的技术平台，构成了新工业发展的基础平台。The extensive establishment of information internet systems, the initial rudiment of the energy internet, and the construction of the smart transportation and logistics network will rapidly develop into a new data-based technology platform for the integration of three internets, making up the fundamental platform for new industrial development.
- 里夫金——第三次工业革命的五大支柱包括可再生能源、分布式能源结构、储能设备、能源互联网、智能交通运输转型。Rifkin -- five pillars of the Third Industrial Revolution include renewable energy, distributed energy structure, energy storage device, energy internet, and smart transportation transformation.
- 数字技术加速发展、智能制造成为趋势、新能源比重不断提升、储能技术方兴未艾、汽车电动化智能化不断加速。Digital technology develops rapidly, smart manufacturing becomes the trend, the share of new energy increases constantly, energy storage technology is in the ascendant, and automobile electrification and intellectualization pick up speed.
- 新经济模式的发展远景：每个人既是生产者又是消费者，可更直接地在物联网上生产并相互分享能源和实物，边际成本接近于零。Development vision of the new economic mode: everybody is not only the producer, but also the consumer, and can produce and share energy and material objects on IoT in a more direct way, and the marginal cost is near to zero.
- 能源效率提升：突破20%的极限Energy efficiency improvement: exceed the limitation of 20%.



	2000	2005	2008	2010	2011	2012
1、开采效率	33.0	33.3	35.0	35.9	35.9	36.0
2、中间环节效率	68.5	70.8	69.9	70.6	70.7	70.0
3、终端利用效率						
农业	32.0	33.0	33.0	34.0	35.0	36.0
工业	46.0	47.3	49.3	50.5	51.2	52.5
交通	28.9	29.2	28.8	29.1	29.2	30.9
运输						
民用	66.0	68.4	71.2	74.2	75.4	76.1
和商业						
合计	46.7	48.3	50.0	51.0	51.6	52.8
4、能源效率（2×3）	32.0	34.2	35.0	36.0	36.5	37.0
5、能源系统总效率（1×4）	10.6	11.4	12.3	12.9	13.1	13.3

	2000	2005	2008	2010	2011	2012
1. Extraction efficiency	33.0	33.3	35.0	35.9	35.9	36.0
2. Efficiency of intermediate link	68.5	70.8	69.9	70.6	70.7	70.0
3. Terminal utilization efficiency						
Agriculture	32.0	33.0	33.0	34.0	35.0	36.0
Industrial use	46.0	47.3	49.3	50.5	51.2	52.5
Transportation	28.9	29.2	28.8	29.1	29.2	30.9
Civil use and commercial use	66.0	68.4	71.2	74.2	75.4	76.1
Total	46.7	48.3	50.0	51.0	51.6	52.8
4. Energy efficiency (2×3)	32.0	34.2	35.0	36.0	36.5	37.0
5. Gross efficiency of the energy system (1×4)	10.6	11.4	12.3	12.9	13.1	13.3



# 赛迪建议

## Suggestions of CCID



**高度关注数字经济发展带来的ICT能耗快速增长问题** Pay high attention to the rapid growth in ICT energy consumption brought about by the development of digital economy.

持续推动数据中心、互联网以及信息基础设施、终端 快速增长的能耗问题，努力提升5G基站、数据中心能效。Continue to promote the tackling of the fast-growing energy consumption of data centers, internet and information infrastructure, and terminals, and try to enhance the energy efficiency of 5G base stations and data centers.

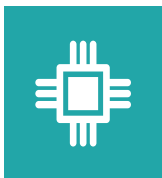


**从智慧能源系统到能源互联网建设** From smart energy system to energy internet development

智能电网仅仅是电网管理模式上的革新，根本的出路在于把互联网技术与可再生能源相结合，在能源开采、配送、利用上从石油世纪的集中式变为智能化分散式，将全球的电网变成能源共享网络。

Smart power grid is merely the innovation in the management mode of the power grid, and the fundamental ways out lie in the combination of internet technology and renewable energy, the shift from the concentrated energy exploitation, distribution and utilization in the oil century to intelligentized and dispersive modes, and the change of the global power grid to the energy sharing network.

持续推动智慧电厂、能源互联网、泛在电力物联网、加强智能电网等智慧能源基础设施建设。Continue to push the construction of smart power plant, energy internet, ubiquitous electricity IoT, smart power grid and other smart energy infrastructural facilities.



**加强数字能源系统核心技术创新** Enhance core technological innovation of the digital energy system

持续深化对人工智能、量子计算、区块链等数字核心技术在能源系统的创新发展方面的研究和跟踪。Continue to deepen studies and follow-up on artificial intelligence, quantum computing, blockchain and other core digital technologies in the innovative development of the energy system.



**高度关注智能交通数字化转型** Pay high attention to the digital transition of smart transportation

汽车的电动化、智能化趋势加速，对能源系统的影响。新能源动力、互联网以及无人驾驶汽车协调融合将会构成一个新的平台，加速发展互联网协调的无人驾驶汽车的智能交通网络，从而对能源环境的巨大影响。Impact of accelerated automobile electrification and intelligentization on the energy system. The coordination and integration of power from new energy, internet and pilotless automobile will constitute a new platform, and speed up the development of smart transportation network of pilotless automobile coordinated via the internet, thus exerting great impacts on the energy environment.



# 跨越数字鸿沟 缩小发展差距

## Span Digital Divide, Narrow Development Divide

17年前的非典，成就了阿里巴巴和淘宝。

The SARS outbreak 17 years ago made Alibaba and Taobao.com a success.

当前全球面临新冠肺炎疫情严峻挑战，新的数字经济巨头已经在酝酿之中。

As the world is fighting against the daunting challenge of COVID-19, new digital economy giants are in the making.

未来十年，智能联网设备急剧增长，交流方式和获取信息途径飞速发展，数字化正在改变我们的生产制造、医疗、出行、教育、娱乐等生产生活方式，数字经济也必然将助力全球能源系统加速转型！

The coming decade will witness the sharp growth of smart networking device, and the fast-growing communication mode and way of information acquisition. As digitalization is transforming our production and lifestyle, such as manufacturing, medical treatment, mobility, education and entertainment, digital economy will surely facilitate the rapid transition of the global energy system!

**THANK YOU**  
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