China's Remarkable Success in ESCO Development - Current Status, Driving Policies, and Prospects

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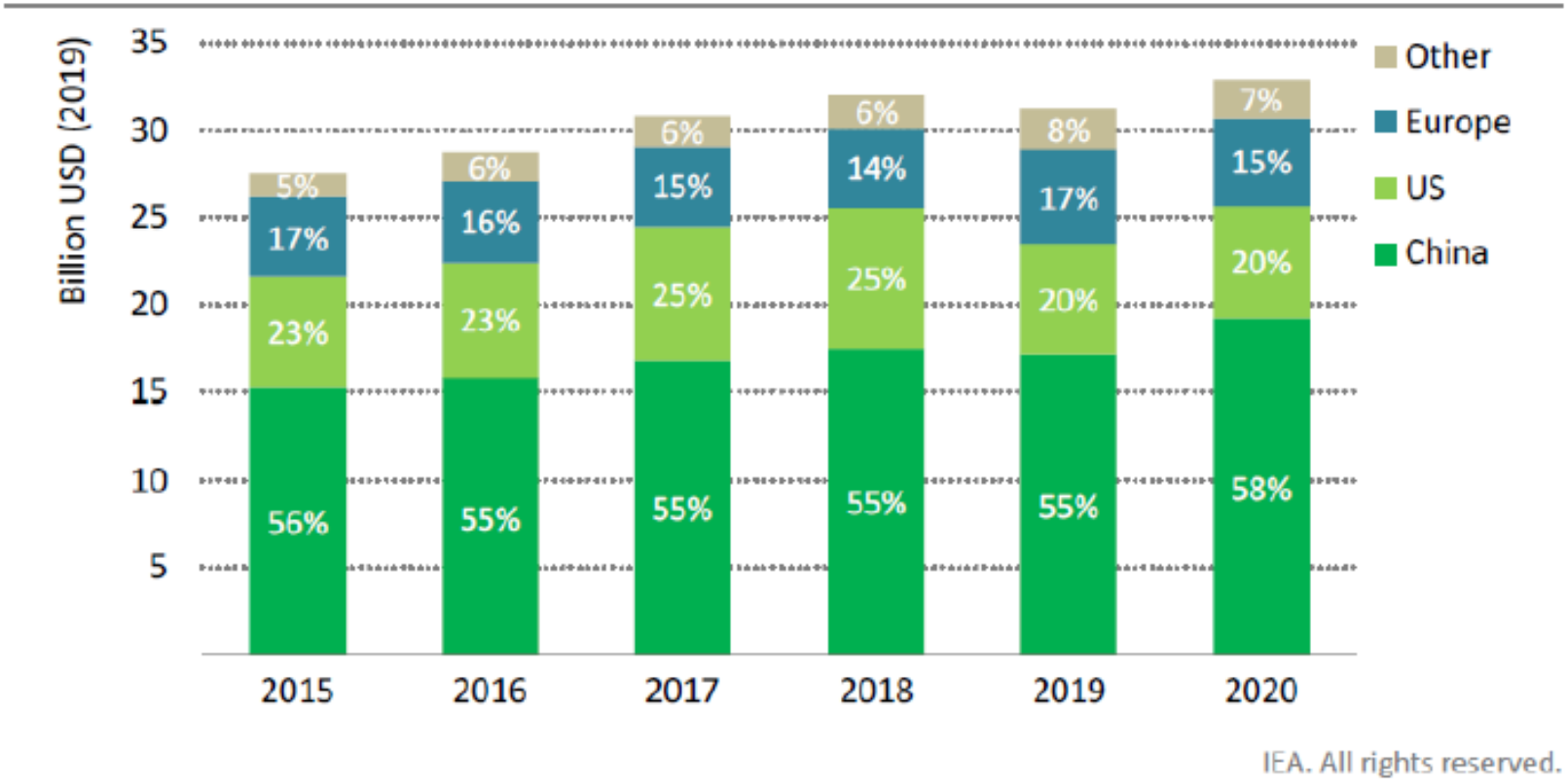
17 November 2021

Outline

- Current status and trends of ESCOs development in China
- Evolving Policies
- Remaining barriers to ESCO development and solutions
- Conclusions

Global ESCO Market: 2015-2020



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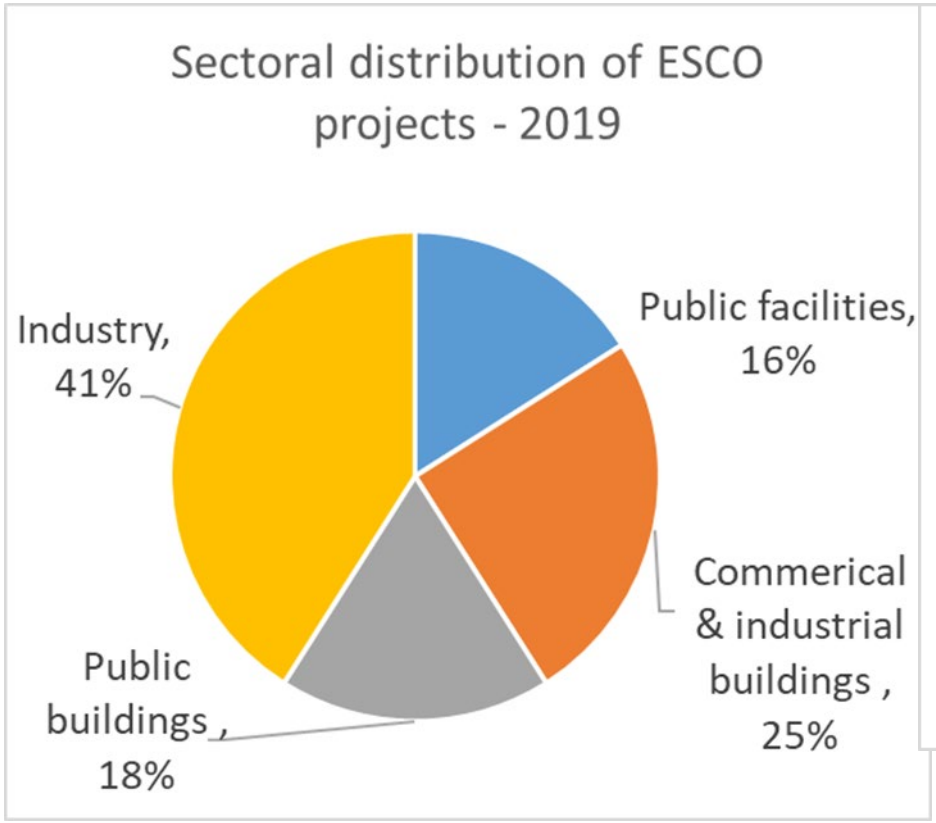
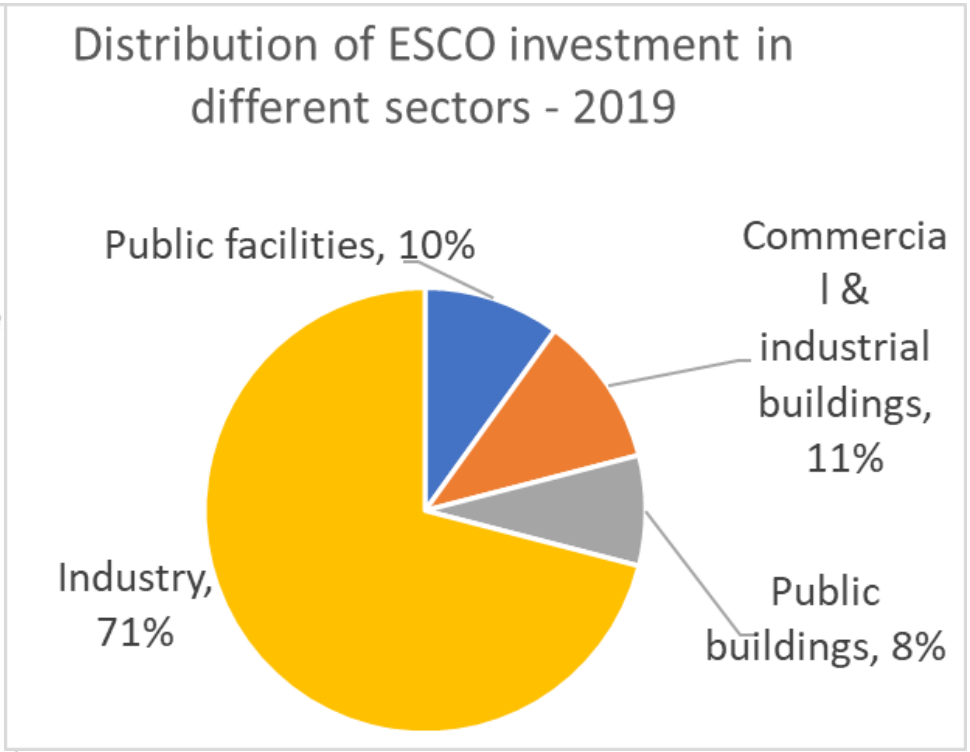
Current status

- China has the world's largest and fastest growing ESCO market.
- In 2020, the size of the global ESCO market increased by 6% to USD 33 billion, continuing steady growth since 2015.
- In 2020, China's total investment in ESCO projects grew 12.3% to USD 19.2 billion despite the COVID pandemic, making up 59% of the global ESCO market.
- In 2020, the number of ESCOs operating in China increased by 500 to about 7 000, hiring a total of 770 000 employees.

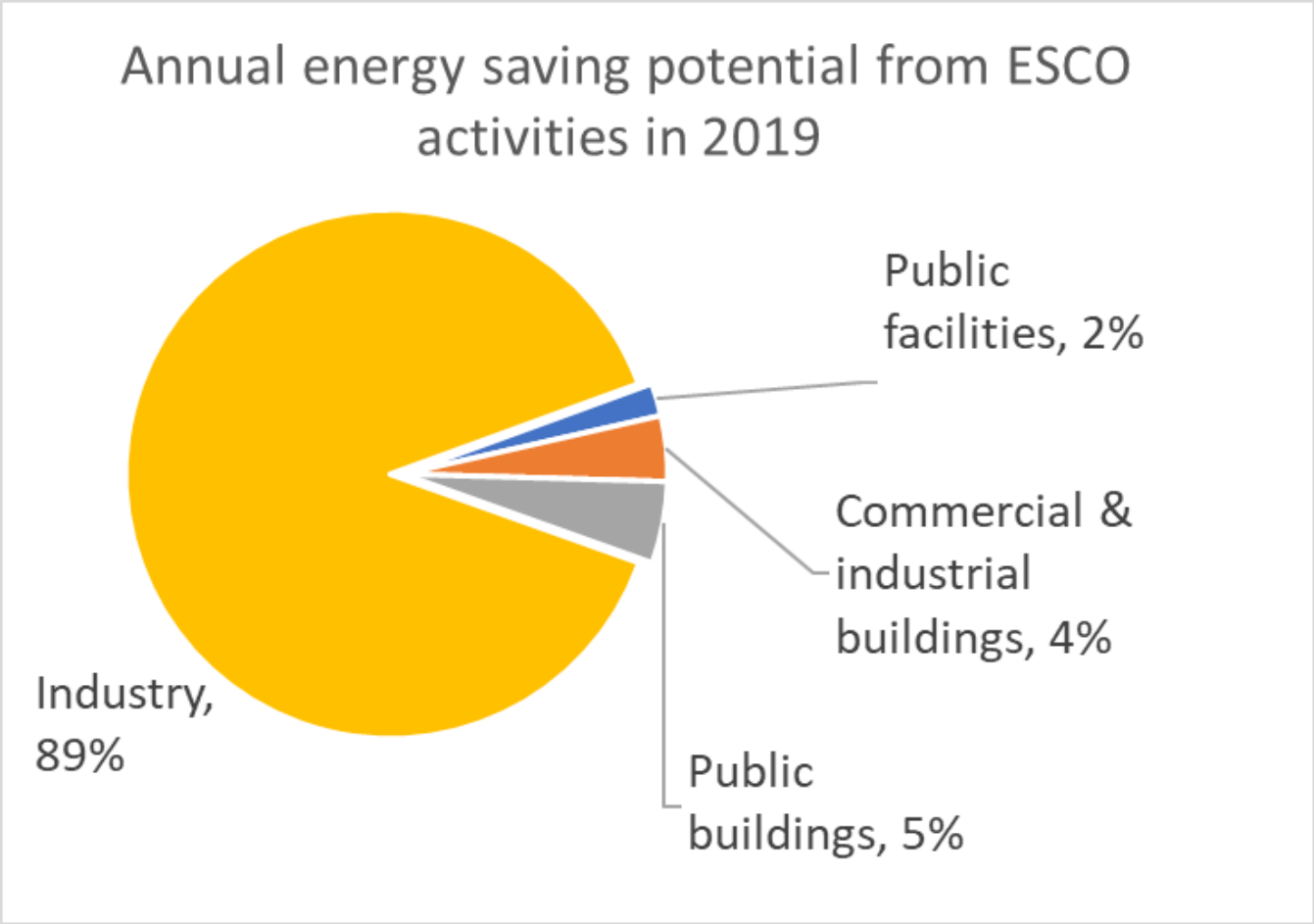
Current status of ESCO market in China





Source: ECMA

Current status of ESCO market in China



Development trends of the ESCO market in China

	2005	2010	2015	2017	2019
Number of ESCOs	80+	782	5426	6137	6547
Employment (Persons)	16,000	180,000	607,000	685,000	761,000
Revenue (bn RMB)	4.7	83.6	312.7	414.8	522.2
Investment (bn RMB)	1.3	28.8	104.0	111.3	114.1
Annual Energy saving capacity (million tCe)	0.6	13	33.5	38.1	38.0
GHG emission reduction ($MtCO_2$)			84	103	103

Source: 2005, 2010, and 2015 data from NDRC, and 2017 and 2019 data from EMCA.

The early days of China's ESCO market development

- ESCOs originated in the US in the 1970s
- The ESCO business model was introduced to China in the late 1990s with two World Bank technical support projects.
- The State Economic and Trade Commission, with support from the World Bank and funding from the GEF established the **China Energy Conservation Project**, which launched the first domestic ESCOs in 1998 and tested the feasibility of Energy Performance Contract in China;
- Building on these initial pilots, the World Bank provided additional funding to set up the China 2nd Energy Conservation Project from 2002 to 2010, which focused on addressing the barrier of limited access to capital, by establishing a loan guarantee programme for ESCOs. From 2004 to 2009, 42 ESCOs obtained loans through programme to roll out 148 projects.
- The Energy Management Companies (EMC) Development and Service Group was established in 2001, becoming the Energy Management Companies Association (EMCA) in 2003. Since that time, EMCA has played a critical role promoting ESCOs in China through knowledge sharing, research, and capacity building.

Development of ESCOs in China in the early days

- Some ESCOs that were founded by or affiliated with State-Owned Enterprises (SOEs), giving them easier access to clients through their parent SOEs' existing networks and additional capital, and enhanced financial creditability
- Technically, the ESCOs primarily focused on saving energy through equipment upgrades. This straightforward, easily replicable business model facilitated rapid escalation of ESCOs in the industrial sector.
- The 12th Five-Year Plan (2010-2015), the ESCO market saw accelerated due to supportive government policies:
  - Introducing a set of fiscal incentives, including business tax exemptions, VATs and tax reductions for energy savings-related expenses for ESCO clients.
  - Promoting ESCOs as a profitable business opportunity and encouraging provincial and local governments to proactively make use of the expanding ESCO market.
  - In 2011, at the start of the 12th Five-Year Plan, there were about 1 400 ESCOs with projects worth approximately USD 5.9 billion; in 2016, there were 5 800 ESCOs with projects worth approximately USD 15 billion.

Policy trends during the 13th Five-year period (2016-2020)

- Phasing-out subsidies and other energy savings incentives that had rewarded ESCOs and started strengthening energy efficiency and environmental targets.
- The 13th Five-Year Plan (2016-2020) introduced a 'double limitation' approach that restricted both energy intensity and total energy consumption levels.
- The TOP 10 000 programme that imposed mandatory energy efficiency targets on the country's top 10 000 most energy-intensive enterprises was upgraded to the TOP 100, 1000, 10 000 programme under the 13th Five Year Plan, boosting demand for ESCO services in the industry sector.
- Several major Chinese banks joined a global initiative under the G20 Energy Efficiency Finance Task Group. Other financial institutions, such as State-owned Leasing, followed and launched special green finance products that support ESCOs.

ESCO revenue based on end-use sectors - 2017

	Industry	Non-residential buildings	Residential buildings
China	55%	45%	
EU	20%	80%	
USA		90%	10%
Japan	30%	70%	
Canada		100%	
Korea	75%		25%
India	100%		
Thailand	60%	35%¤	5%
Mexico	70%	30%	

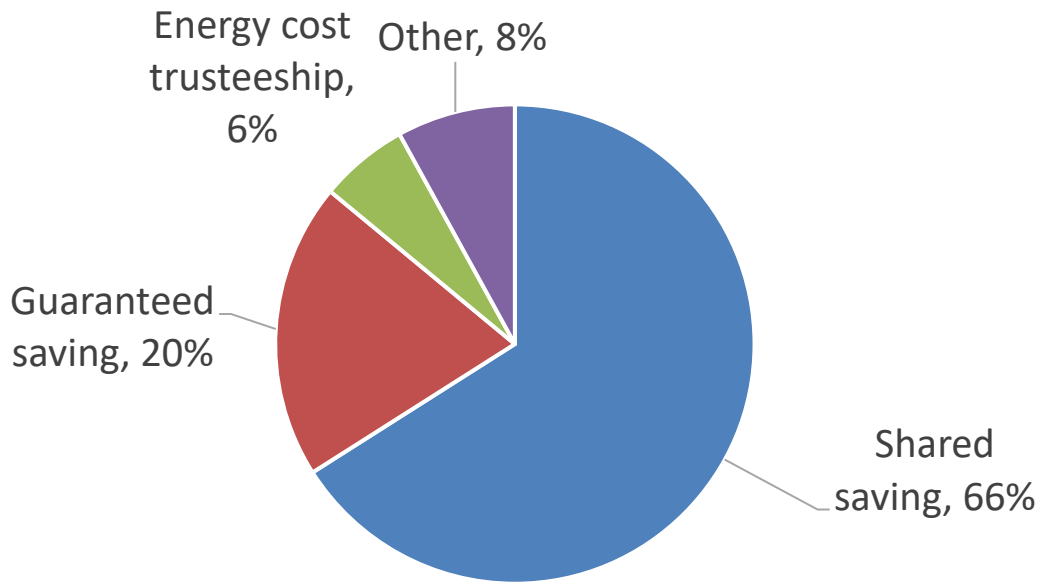
Source: IEA, 2018

ESCO revenues, public vs private sector, 2017

	Private sector	Public sector
China	90%	10%
Canada	10%	90%
EU	20%	80%
US	15%	85%
Japan	62%	38%
Korea	85%	15%
Mexico	80%	20%

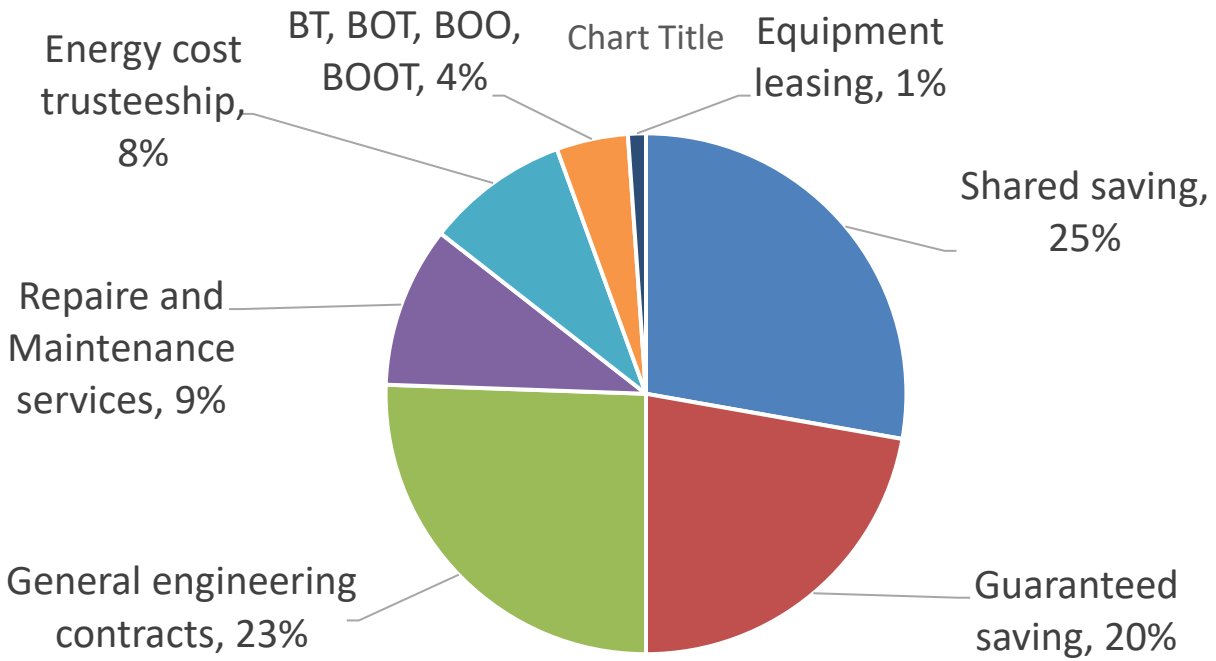
Source: IEA, 2018

Business models of ESCO Market in China, 2010-2011



Source: IFC & EMCA, 2012

Types of different energy performance service contracts by ESCOs, 2019



Source: EMCA, 2020

Note: BT: Build- transfer, BOT: Build-operate-transfer, BOO: Build-own-operate, BOOT: Build-own-operate-transfer

ESCO size, ownership, and types

Type of ESCOs	Share of ESCO Market revenue	
	2010	2019
Micro ESCOs (Annual revenue ≤5 m RMB)	39%	16%
Small ESCOs (5 m RMB <Annual revenue ≤ 20 m RMB)	39%	24%
Medium ESCOs (20 m RMB <Annual revenue ≤ 100 m RMB)	18%	51%
Large ESCOs (100 m RMB <annual revenue)	4%	9%

Source of data: 2010 data from IFC & EMCA, 2012; 2019 data from EMCA.

China's Main Policies on ESCOs and EPCs

Sub-category	Specific measures	Policy Documents
Abolishing the ESCO registration system	It is forbidden to restrict the business operations of ESCOs based on whether their qualification and registration.	"State Council's Notice on the Overall Plan for Energy Conservation and Emission Reduction during the 13th Five-Year Period" (2016)
Establishing a blacklist system	Establishing a blacklist system of defaulting ESCOs, energy users, and third party organizations, and list the defaulters on the national credit information sharing platform	"State Council's Overall Plan for Energy Saving and Emission Reduction during the 13th FYP" (State Council, 2016) The Action Plan for Energy Conservation by All during the 13th FYP (NDRC, 2016)
Establishing a registry and administration platform	The government establishes an online platform for EPC registry and encourages the energy users and ESCOs to register their EPCs in the registry.	The Action Plan for Energy Conservation by All during the 13th FYP (NDRC, 2016)

ESCO policies - legislation

Energy Conservation Law National People's Congress Original law: in 1997, amendments in 2007, 2016, and 2018	Contents on ESCOs: Article 22: "The state encourages the development of energy service organizations, supports them carry out consultation, designing, testing, auditing, and certification services on energy conservation." '"The State supports energy conservation organizations to carry out awareness raising, technology training, piloting, and other public services regarding energy conservation." Content on EPC: Article 66: "The state shall use fiscal, taxation, and price policies to support demand-side management, energy performance contracting, and voluntary energy saving agreements."	The most important amendment was the one in 2007, which extended the law from the original 50 articles to 87 articles. The other two amendments were minor.

Fiscal and taxation policies

- **Fiscal policies: Included in national budget.** EPC projects shall be included in the national investment budget and the support scope of the national budget of the special fund for energy conservation and emission reduction.
- **Corporate VAT exemption and reduction**: The business revenue ESCOs receive from their EPC projects will be exempted from paying VAT tax, and the assets created from EPC implementation and transferred for free to project owners are expected from paying VAT.
- **Tax exemption and reduction:** ESCOs' income from EPC projects, shall be exempted from paying corporate income tax during the first three years of receiving revenue and the tax rate is half the normal rates during the second three-year period
- **Accounting rules for equipment transfer:** Upon expiration of energy performance contracts, the equipment transfer from ESCO to the facility owner is treated as donations.

Financial support

- **Using expected income as collateral**: The state encourages banks and other financial institutions to accept the use of carbon emission right, pollution emission right, expected revenue from EPCs, and franchise revenue as collaterals for loans, and supports the leasing and other innovative financing services
- **Fixed asset as collateral**: ESCOs can use the fixed assets they invest in under EPCs as collaterals when applying for loans from banks
- **Risk sharing**: The government guides and supports various financial guarantee institutions to provide risk-sharing services.
- **Transaction platform**: Establishing an asset transaction platform based on EPC assets;
- **Investment fund**: The government encourages social capital to set up investment funds targeting at energy conservation service sector.
- **Green bonds, interest subsidies**: The government supports ESCOs to issue green bonds and the combination of investment, bond issuance, and loans to facilitate the development of EPCs
- **Insurance**: Explore the development of green insurance and innovate insurance products targeting at EPCs and third-party involvement in environmental pollution reduction.

Supportive policies for ESCO market among public institutions

- **Business model selection**: Public institutions should prioritize EPCs during their energy efficiency retrofitting; the government actively supports public procurement of EPC services and explore the business model of energy use and cost custody.
- Payments to EPCs treated as energy expenses in public spending: When government agencies EPC services for energy retrofitting, the payments to ESCOs under EPCs should be treated and reported as energy expenses in accounting
- **Public institutions may seek EPCs in energy conservation:** Public Institutions may adopt EPC and commission ESCOs to conduct energy conservation diagnosis, designing, financing, retrofitting, and operation management. During their EE retrofitting, public institutions should conduct an energy audit and cost-benefit analysis, specify the energy-saving targets, and check and assess whether the energy savings targets are achieved through measurement and data collection.
- **Public institutions can preserve part of their energy cost-saving and other incentives:** Improve the subsidy policies for EPCs by public institutions and the partial preservation of energy cost-saving, stimulate social investment in energy conservation projects in public institutions, and facilitate the development of the ESCO sector.

Policy drivers for ESCO market in the industrial sector

The major policies for industry include energy intensity targets for key industrial sectors, products, and processes, energy efficiency targets for large industrial energy users, using energy efficiency as a criterion for the approval of new investment in industrial projects.

Energy efficiency targets for big energy users

	Key programs for big energy users	GDP energy intensity decrease of the industrial sector	
	Big energy users	Target	Actual
11th FYP(2006-2010)	Top 1000 Programme	-20%	-19.1%
12th FYP (2011-2015)	Top 10,000 Programme	-16%	-18.4%
13th FYP (2016-2020)	Top 100, 1000, and 10,000 programme	-15%	

Policy drivers for ESCO market in the industrial sector

- The MIIT, as the governing authority of the industrial sector, has active engaged in standards setting for the estimation and calculation of energy saving in various industries, which can help avoid controversies in EPCs and other energy service contracts by ESCOs.
- In Aug. 2020, the MIIT published the guides for Industrial Energy Saving Diagnosis (IESD) services in six key industries, iron and steel, cement, electronics, textile, food, and paper
- The *National Promotion Catalogues for Key Energy Saving Technologies:* The first version of the catalogue was issued in 2008, and as of early 2020, the catalogue has been updated ten times. The NDRC makes the different versions of the catalogue available at its website, and various fiscal and taxation measures are linked to the adoption of the technologies in the catalogue

Policy drivers for ESCO market in the commercial sector - high energy prices

- In China, the energy prices are controlled by the government and the Price Department at the NDRC sets the benchmark prices, while local DRCs decide their local prices.
- Unlike in many other countries, in China the electricity, natural gas, heating prices for industries and commercial consumers are higher than those for households, giving additional motivation for businesses to take energy-saving actions.

Electricity rates for different consumer groups in Beijing

	Households	Ordinary industrial and commercial clients	Large industrial clients	Agricultural electricity use
Electricity (RMB/kKWh)	0.44-0.79 Median: 0.53	0.32-1.73 Median: 0.85	0.33-1.07 Median: 0.66	0.31-0.93 Median: 0.6

Policy drivers for ESCO market in public institutions

- In Oct. 2008, the State Council enacted an "*Energy Conservation Bylaw for Public Institutions*", that specifies the various measures public institutions should take to save energy and improve energy efficiency.
- The measures include using energy efficiency as a criterion in public procurement of products and services, establishing quotas for energy consumption and annual targets for energy conservation, carrying out energy audit and energy management, as well as collecting data and reporting energy use.
- The payments by government agencies and public institutions to ESCOs for EPCs are treated the same as energy expenses.
- The government has issued detailed technical guidance on the energy consumption monitoring, data collection and transmission, as well as metering equipment installation, building operation of hospitals, colleges and universities, government office buildings and large public buildings.
- In 2016, the Ministry of Housing and Urban-Rural Development (MOHURD) issued the Guidance for Energy Auditing for Public buildings.

China's voluntary ESCO certification system

Name	Criteria	Focus	Categories	Grading	Validity
ESCO Certification and Grading	Instructions on Promoting Energy Performance Contracting and Energy Service Sector Development (State Council, 2010) Regulations on ESCO Certification and Grading (amended in 2018)	Overall competence	Industry Building Public Facility	AAAAA AAAA AAA AA A	2 years
ESCO Credit certification and grading	Provisional Regulations on Credit Evaluation and Grading for Energy Conservation Sector (Enterprises) (China Energy Conservation Association, 20	Credit, operation	Production; Service	AAA, AA, A BBB, BB, B CCC, CC, C	3 years
Certification for the Qualification to Conduct EPC Services	Requirements for the Certification for Enterprises for Conducting EPC Services	Service quality, process control, service performance	Boilers (kilns), waste heat and waste pressure utilization, motor system energy saving, energy system optimization, building retrofitting, solar PV	AAAAA, AAAA, AAA, AA, A	3 years

National standards for ESCO services

- China has issued over 200 standards and guidance related to energy saving. These standards and guidance provide a solid technical basis for various aspects of ESCO services.
- The most important one is the *General Technical Rules for Energy Performance Contracting* issued by the Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) and the Standards Administration of China (SAC) in 2010, which only recognizes the shared savings contract model.
- In 2020, the document was updated and include all three models of ESCO services: shared saving, guaranteed saving, and services not linked to the results of energy saving.

China's National Standards on ESCO Services

	Year of issuance and amendment	Standard No.
General Technical Rules for Energy Performance Contracting	2010, 2020	GB/T 24915
General principles for the energy balance of equipment using energy	1981,2009	GB/T/2587
General principles for the calculation of overall energy consumption	1981, 1988, 2008	GB/T/2589
The General Principles for Energy Balance of Enterprise	1993, 2009	GB/T/3484
Determination of Energy Savings in Organizations	2009, 2018	GB/T/13234
General Principles for Monitoring and Testing of Energy Savings	1994, 2009	GB/T/15316
Technical guidance for energy auditing	1997, 2019	GB/T/17166
Requirements on Energy Management Systems	2009, 2012	GB/T23331
General Technical Rules for Measurement and Verification of Energy Saving	2012	GB/T 28750
Operation Guide for Energy Saving Measurement and Verification	2015	GB/T 30045

Remaining barriers to ESCO development and solutions - general ones

- Lack of financing: The Chinese ESCOs still mainly rely on their own equity funding as the main financing source, plus bank loans. Existing data indicate that in 2017, 65.2% of the ESCO funding was their equity fund, while 28.1% were from bank loans.
- Limited technical capacity and irregular market competition. The Chinese ESCO market is featured with the existence of many small ESCO companies, which lacks technical capacity and project experiences. The fierce market competition sometimes leads to price wars and poor services, which damage the clients' confidences in ESCO services.
- Continuity of the subsidies and the coordination of different incentive systems. The existing policy indicates that the subsidies for EPC projects will last until 2022, and the future of the policy will then be further decided.

Barriers to ESCO services in the residential building sector

Apart from the common issues of difficult coordination for residential buildings, ESCOs face some additional barriers for operating in the residential buildings market in China.

- Relatively new building stock: Residential buildings in Chinese cities are mainly high-rise apartments, and most of them were built after the housing reform in the late 1990s
- Central heating is considered a kind of social benefits provided by municipal governments.
- The majority of households pay for heating based on the size of their apartments, not based on metered usage of heating;
- the low energy prices for households mean longer payback period for energy efficiency investment
- The lack of properly enforced energy performance certification for buildings mean that even households with energy meters face the risks for unable to recover their investment in energy efficiency retrofitting when they sell their apartments

Possible solutions

- Residential building energy efficiency retrofitting needs effective enforcement of building energy efficiency certification and large investment in the heating pipe and meter retrofitting, changes in social attitudes about heating, from a public welfare service to market-based services, and energy prices, especially heating pricing reform for the residential sector
- Further technical qualification and financial capacity, as well as business performance accreditation, can further develop the market
- Regarding the financing barriers, the government needs to create innovative ways to further increase the role of ESCOs, like allowing large and successful ESCOs raising funding from listing on the stock market to issuing a green bond, as well as increasing government guarantees and national revolving fund for EPC projects.
- The government also needs to study the effects of its efforts to lower the energy prices for industries and commercial consumers on the profitability of energy efficiency projects and opportunities and find ways to avoid their negative impacts on energy efficiency actions.

Conclusions

- Since the ESCO and EPC concepts were introduced into China in 1998, in less than three decades, China has risen to become the biggest ESCO market in the world.
- China's experiences offer a valuable reference to other countries that seek to use ESCOs for achieving energy efficiency and emission reduction. The country's strong policies for energy efficiency improvement plays an important role in the process. Other factors include effective international support, and an industrial association that helps improve awareness and offer training.
- China has pledged to peak its carbon emissions by 2030 and to achieve carbon neutrality by 2060. In the country's efforts to build a resource-efficient and circular economy and improve its international competitiveness in green and efficient technologies, ESCOs have bright market prospects.

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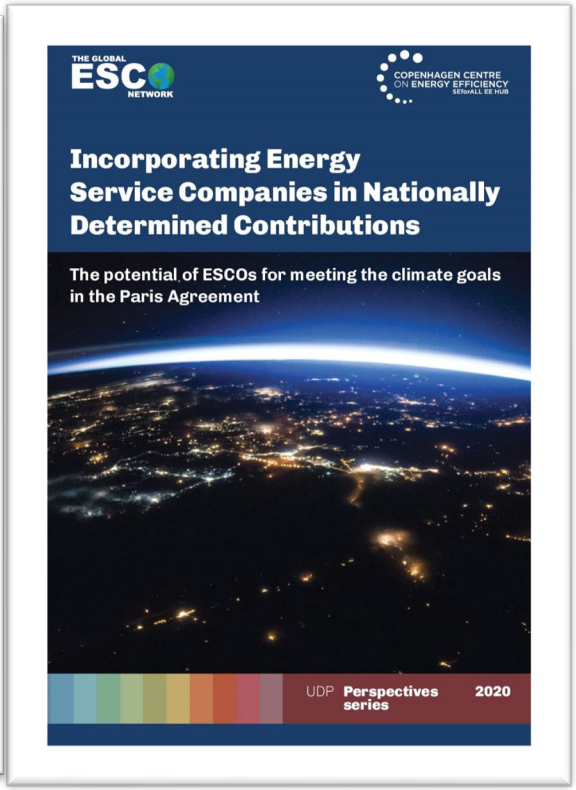

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