



Accelerating Corporate Renewable Energy Engagement in China

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ON THE COVER

The Donghai Bridge Wind Farm, Shanghai
Photo by Chuyuss

Abstract

Over the past decade, voluntary renewable energy markets, in which businesses and individuals purchase renewable energy beyond government requirements, have become a significant driver of growth in renewable energy deployment. Multinational corporations in particular have markedly increased purchases of renewable electricity to access competitive electricity prices and distinguish their brands through environmental leadership. China has become a major focus in this area, as companies seek to increase the amount of renewable energy sourced for their own operations as well as Chinese-based manufacturers in their product supply chains.

New and existing mechanisms in China are enabling corporations operating in the country to access renewable energy. Yet the Chinese voluntary renewable energy market is still in a nascent state of development, and more can be done to create the market conditions that could enable a significant scale-up of private renewable energy investment and transactions.

This article assesses the current procurement options in the Chinese voluntary renewable energy market and presents how each option differentially interacts with China's renewable energy policies. We conclude with recommendations for how the market might be strengthened to boost voluntary procurement of renewable energy.

1.0 Introduction

With growing corporate renewable energy commitments and decreasing renewable energy costs, many multinational corporations with operations in China are actively seeking ways to increase the use of renewable energy for their facilities and throughout their manufacturing supply chains. China has introduced mechanisms and market reforms that expand renewable energy access, but there are still significant barriers to renewable energy procurement for both foreign and domestic corporations operating in China that seek to adhere to global best practices for procurement while minimizing costs.

China's electricity market has undergone significant reform over the past decade, and its electricity sector is leading the world in new renewable energy development.¹ Recent reforms have enabled large end users to purchase power directly through bilateral contracts and allowed retail providers to sell electricity to small-load energy users. These and other contractual mechanisms to source renewable energy have recently emerged, however it is too early to gauge market response as implementation details are being resolved. In addition, the systems for making corporate environmental claims and demonstrating ownership of renewable attributes (also known as energy attribute certificates) remain problematic for many corporations. Further transparency on environmental attribute ownership is required to provide market assurances for credible renewable energy usage and environmental claims, and enable broader uptake in voluntary renewable participation.

While the current Chinese voluntary renewable energy market can support some degree of renewable energy development and emissions reductions, there is potential for the market to grow significantly if key implementation details and policy interactions are addressed.

This paper, relying on qualitative data from dozens of interviews, primary sources such as local rules, regulations and legislation, and prior research, assesses the existing and emerging mechanisms for engaging corporates in renewable energy activities in China, such as green energy certificates (GECs), onsite renewables, direct investment, direct power purchasing, retail green power, coal swaps, and I-RECs. The paper explores corporate renewable energy opportunities and challenges in China's renewable energy market and presents recommendations for policy and market design reforms to accelerate its growth.

1.1 BACKGROUND ON CHINA'S ELECTRICITY SECTOR

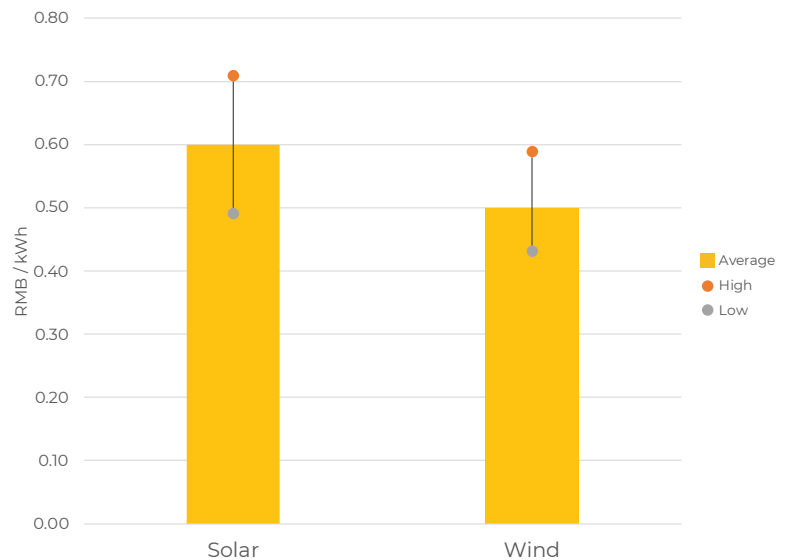
China is the world's largest electricity market² and accounts for the highest annual emissions of CO₂e. The electricity sector is managed by state-owned entities, including generation, transmission, distribution, and retail delivery. China's central government has been investigating enhanced market transformation and power sector reform for many years.^{3,4} More recent reforms have focused on introducing competition to improve market efficiency and reduce costs.⁵ Currently, there are two main grid companies—State Grid serves the majority of China, and Southern Grid serves southern provinces. Historically, electricity prices

have not been market-driven but rather determined by government agencies. Decisions for dispatching power to the grid are made by provincial authorities and do not follow an economic dispatch model wherein lowest cost resources are deployed first. Typically, provincial governments give electricity generators a set number of hours to operate, with fossil fuel generation given priority in many locations. This approach often results in the curtailment of renewable energy generation—the intentional reduction in output of a facility.⁶ Curtailment has reduced national wind generation by as much as 16% and resulted in a lost opportunity cost of over \$1B between 2011–2017. Due to the deprioritization of renewable energy, in certain provinces curtailment can reach levels as high as 43%.^{7,8}

China has the highest installed renewable energy capacity in the world and the sector is growing at a rapid pace.⁹ Since 2005, a number of policies have been introduced to increase installed renewable energy capacity and generation, reduce greenhouse gas (GHG) emissions, reduce renewable energy curtailment, and lower government subsidies. These policies include feed-in tariffs (FITs), a renewable energy quota policy and an emission trading scheme (ETS).

Feed-in Tariff. A Feed-in Tariff is a policy in which renewable generators are offered a guaranteed predetermined price per kilowatt hour (kWh) for a specified number of years. Since the intention of the policy is to increase the capacity of renewable energy for the benefit of all consumers, no one entity or corporation can solely claim the environmental benefits or attributes of the renewable generation. In

Figure 1. 2018 Feed-in Tariff Prices



Average price displayed is derived from FIT prices offered across zones/geographies and do not necessarily correlate to volumes of MWh that receive the FIT.^{11,12}

other words, no single entity can explicitly own the energy attribute certificates (EACs) associated with FIT projects.

In 2009, China implemented a FIT for wind power generation based on operational lifespan of a facility (typically 20 years), sending a strong long-term financial incentive to investors and project developers.¹⁰ As a result, wind capacity in China increased from 17,599 MW in 2009 to 184,665 MW in 2018. In 2011, China also implemented a solar FIT to help stimulate new solar development, with capacity increasing from 3,113 MW in 2009 to 175,030 MW in 2018. While both feed-in tariffs have helped to spur the renewable energy industry in China, there have been some key challenges to date, including generation that is regularly curtailed and slow repayment times for developers.

Renewable Energy Quota Policy. China finalized its new renewable energy quota policy in May 2019, which is anticipated to

take effect beginning in 2020. The quota system will set annual province-specific renewable energy requirements and designate the grid companies, retailers, power purchasers contracting on the wholesale market, and captive power plant owners as the parties obligated to purchase a certain percentage of their electricity from renewable energy sources. Implementation details will be finalized during 2019, with the possibility of the introduction of a separate renewable energy attribute certificate system dedicated to tracking compliance with the new quotas.¹³

Emission trading system (ETS). China's national emissions trading system (ETS) was announced at the end of 2017. Pilot projects have been underway in several provinces and cities since 2013, and implementation of the national ETS is expected to occur in 2020 or later.^{14,15} The ETS will initially cover the power sector and will likely expand to other sectors over time. One of the key features that distinguishes China's ETS from other programs around the world is that it is intended to be a rate-based instead of a mass-based obligation.¹⁶ In rate-based plans, carbon intensity is measured and regulated (generally in metric tons CO₂ per MWh of electricity generated) rather than the total number of emissions (e.g. total metric tons CO₂) in a mass-based plan. In either system, voluntary customers can only make a credible carbon reduction claim associated with their renewable energy usage if an accounting mechanism is implemented.

1.2. VOLUNTARY RENEWABLE ENERGY MARKETS

Voluntary renewable energy markets comprise renewable energy purchases and actions that go above and beyond the requirements of government mandates ("compliance" markets). Voluntary markets are intended to encourage renewable energy deployment that would not have happened otherwise and contribute significantly to the growth of regional renewable energy capacity.

Voluntary renewable energy purchases have sharply increased recently,^{17,18} driven by corporate greenhouse gas reductions, social-responsibility goals, and the continually improving economics of renewable energy. According to a survey by the International Renewable Energy Agency (IRENA) of over 2,400 large corporate entities headquartered in more than 40 countries, roughly one in five corporations has committed to renewable energy targets.¹⁹ While most corporate purchasing is concentrated in the United States and European countries, interest has grown in other geographies as well, with corporate sourcing of renewable energy occurring in 75 countries.²⁰

Voluntary renewable energy purchasing can take different forms, including purchases of renewable electricity through power purchase agreements (PPAs), on-site generation, purchases of EACs, utility green power programs, or direct investment in renewable energy projects, among others.

For voluntary markets to be effective at reducing GHGs while accelerating renewable energy development and creating

value for buyers, there are three key attributes that they need:^{21, 22}

1. **Legal basis for usage claims and attribute transfer.** Clear ownership and government recognition of EACs provides a basis for buyer rights and claims. While non-power attributes such as usage claims or emissions avoidance can be transferred by supply contracts, it is best practice to legally define and serialize these attributes into EACs and use electronic

tracking systems or registries to facilitate transfer of ownership.

2. **Regulatory surplus.** Effective voluntary market activities are additional to and separate from any government mandate or legal settlement. EACs that are retired by a utility to meet a quota or other requirements should not also be available for use in voluntary markets to be claimed by another entity—a practice known as “double counting” that is not allowed under global reporting standards. As

Table 1. Common Global Voluntary Market Renewable Energy Products for Corporations

VOLUNTARY MARKET RENEWABLE ENERGY PRODUCTS	DESCRIPTION
On-Site Renewables	Production for self-consumption
Power Purchase Agreement	Direct agreement between a generator and corporation to purchase power
Unbundled Energy Attribute Certificates	EACs that are tracked and traded separately from the underlying electricity
Direct investment	Invest capital in a renewable energy project
Competitive Electricity Product	Purchase renewable energy through an electric retail provider
Utility Green Pricing Program	Monthly subscription to purchase renewable energy from a regulated/monopoly utility
Utility Green Tariff	Utility tariff that simulates a bilateral contract between a corporation and renewable energy generator(s), where tariff characteristics are typically tailored to meet large customer requirements
Virtual Power Purchase Agreement	Corporations offer renewable energy generators reduced wholesale price risk (e.g, fixed price or contract for differences) for the energy while not taking physical delivery, but retaining the EACs. Requires wholesale electricity markets

part of achieving regulatory surplus, it is important to demonstrate that there is no double counting or double claiming within or between compliance and voluntary markets.

3. **Attractive prices and/or high impact.** Voluntary market customers differ in their expectations and requirements for voluntary renewable energy products. While some purchasers are driven by sustainability or climate goals, others are driven primarily by the financial benefits (including cost savings and long-term fixed prices). Effective markets can address the various needs of customers through different procurement options. Compatibility with the existing regulatory structure (e.g. carbon or energy policy) is important to ensure that voluntary activity creates real impact, and buyers are able to realize the full environmental, social, and economic benefit of their voluntary market purchases.

2.0 Voluntary Renewable Energy Activities and Purchasing Mechanisms in China

Encouraged by the success of voluntary markets in the U.S. and EU, many companies are now prioritizing renewable energy procurement in China. The global initiative RE100²³ reports that member organizations are sourcing over 970,000 MWh in renewable energy from China annually for their own operations.²⁴ The interest in voluntary activities and renewable energy procurement in China is driven by factors including the increasing number of corporate renewable energy commitments that cover global operations, increasing corporate interest and

ENERGY ATTRIBUTE CERTIFICATES (EACs)

Energy attributes typically include the physical characteristics and environmental benefits of renewable electricity generation. These environmental benefits are also known as environmental attributes, which can be serialized and tracked using EACs. In successful voluntary markets, EACs are used to verify and substantiate renewable energy usage claims by the purchaser of renewable energy, regardless of the type of product procured. EACs typically represent 1 megawatt hour (MWh) of electricity generation from an electricity generator, and embody the non-power attributes of that generation. EACs, which include North American renewable energy certificates (RECs) and European Guarantees of Origin (GOs), are widely used internationally to document renewable energy transactions for both voluntary activities and mandated renewable energy quota systems. EACs can be procured separately from the underlying renewable electricity (“unbundled EACs”) or in conjunction with renewable electricity purchased directly through products such as PPAs or via a utility program, such as a green tariff or utility green pricing program.

commitments in addressing the environmental and carbon impacts of their supply chain, and the large number of corporate supply chain partners based in China. While many of these corporations with global renewable energy commitments have owned and operated facilities in China, the electricity footprint of their Chinese suppliers is typically far greater than that of their own operations.

Currently in China there are a number of existing and emerging mechanisms to support corporate and supplier commitments to use greater amounts of renewable energy. However, one of the most significant hurdles for companies procuring renewable energy in China is the lack of products that meet the key attributes and criteria for voluntary market customers: exclusive ownership of usage claims and environmental attributes, regulatory surplus, attractive prices, and market impact. The following sections provide an overview of the drivers for each market tool and the primary barriers to each

existing and emerging mechanism in China's voluntary renewable market.

2.1 EXISTING MECHANISMS

2.1.1 Green Energy Certificates (GECs)

In the summer of 2017, China launched an EAC system, the Green Energy Certificate (GEC). The GEC was designed and is maintained by the China Renewable Energy Engineering Institute (CREEI), and current eligible projects include onshore wind and solar PV (excluding distributed generation). While EACs are traditionally designed as an accounting mechanism to show proof of generation and use of renewable energy, the Chinese GEC instrument was developed primarily as a way to reduce FIT subsidies. Renewable energy generators that are approved to receive the FIT can choose to instead be issued GECs on CREEI's exchange platform and sell the certificates to customers wishing to make a renewable energy claim on their operations. When a GEC is sold to a customer, the generator foregoes the FIT

Table 2. Existing and Emerging Voluntary Market Renewable Energy Products for Corporations in China

EXISTING MECHANISMS	EMERGING MECHANISMS
Green Energy Certificates (GECs) ²⁵ On-site Renewables Direct Investment	Direct Power Purchase <ul style="list-style-type: none"> · Bilateral Contracts · Centralized Bidding · Listed Transactions · Distributed Market Transactions Electric Retail Providers Other Voluntary Options <ul style="list-style-type: none"> · Coal Swaps · I-RECs

Figure 2. Framework for Evaluation of Voluntary Renewable Energy Market Options in China^{26, 27, 28, 29}



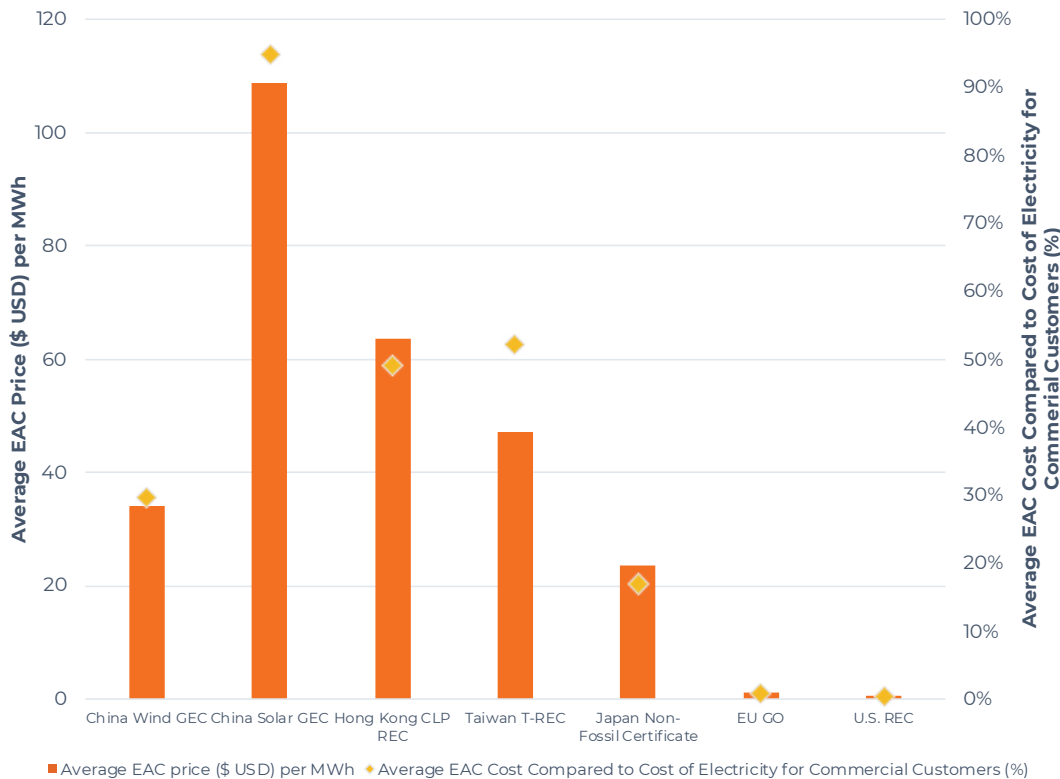
subsidy for the corresponding MWh of electricity. If the GEC is not sold, the corresponding MWh is still eligible to receive the FIT. In addition, GECs are not allowed to be resold and therefore are not available for retailers to procure and sell to their customers.

Some organizations, such as Mobike³⁰ and Rocky Mountain Institute,³¹ have purchased GECs. Although there is considerable supply, demand for GECs has been low. To date, CREEI has issued roughly 24 million GECs, with only 33,000 GECs^{32,33} purchased—a stark contrast to mature markets in the U.S.³⁴ and EU.³⁵ There are two main reasons for this:

1. GEC prices track closely with the FIT subsidy and represent a significant premium for corporate customers

compared to conventional electricity. Prices for GECs are capped at a level equivalent to the subsidy payment. In March 2019 GECs ranged from ¥137–300 RMB (approx. \$20–45 USD) for onshore wind to ¥300–700 RMB (\$45–104 USD) for solar.³⁶ For FIT-eligible generators, the subsidy represents a 20-year guaranteed income stream from the government, though some generators have experienced a significant (over two-year) delay in receiving payments.³⁷ Some generators may view the more immediate revenue from GECs as more attractive. While some foreign multinationals with operations in China may be willing to pay a premium for renewable energy through GEC purchases, there has been little to suggest the

Figure 3: Energy Attribute Certificate Costs for Corporate Customers by Region



Average EAC prices^{39,40,41,42,43} and comparison to electricity prices^{44, 45, 46, 47, 48, 49} are for voluntary market corporate participants only.

same willingness to pay above current commercial electricity rates for environmental attributes or renewable energy from domestic Chinese companies.³⁸

2. Market stakeholders have mixed perceptions and reactions to GECs. While some market participants believe that GECs convey environmental attributes and the ability to make renewable energy usage claims, many corporates recognize that the primary purpose of the GEC program is to lower subsidy payments from the government and ultimately shift that cost to GEC buyers. As such, GECs are viewed by some as an unnecessary self-tax for generation that would have been paid for by public funds regardless of market-participant actions. Other international organizations have also yet to formally recognize the GEC. CDP, the leading international voluntary carbon reporting platform used by hundreds of companies with operations in China, has not yet provided guidance on the GEC as a recommended instrument for reducing emissions associated with electricity procurement.

In a favorable development, a new policy released in early 2019 allows projects not receiving the FIT to issue GECs.⁵⁰ This policy will provide more opportunity for large purchasers to support projects that would otherwise not receive any government subsidies. This recent change to the availability of GECs, along with planned reduction in FIT subsidies over the coming years, suggests that the voluntary market may provide additional revenue to

generators and support greater deployment of renewable energy in the country.

2.1.2 On-Site Renewables

Corporations can invest in on-site renewables by constructing the projects themselves or with third-party developers. Cost savings is a common reason for installation, and on-site renewable energy is currently the most mature purchasing mechanism in China.⁵¹ For example, AB InBev announced plans in June 2018 to install a 15 MW on-site solar project in Fujian province,⁵² and IKEA currently has on-site solar installations for their stores in China.⁵³

Distributed PV is available throughout the country. Electricity consumption that occurs behind the meter may be claimed by the generation owner, but no certificates may be issued as documentation for these claims. However, almost all project owners choose to receive the FIT subsidy⁵⁴ for economic reasons, which removes their right to claim the environmental attributes associated with the generation from the project.

2.1.3 Direct Investment in Renewable Energy Projects

While not necessarily representing a renewable energy usage claim, another option for corporations is direct investment in renewable energy projects—providing capital for the development of a renewable energy project that is typically utility-scale and offsite. Apple Inc., for example, launched the Supplier Clean Energy Program in 2015⁵⁵ and now has 44 manufacturing partners,⁵⁶ including Foxconn, Corning Inc, and Solvay, that

have committed to powering all of their Apple-specific production with 100% clean energy. The company's China Clean Energy Fund will jointly raise over \$300 million USD to build over 1 GW of new renewable energy capacity.⁵⁷

This example notwithstanding, overall procurement in China through direct investment by corporations has been limited. Similar to on-site renewables, most direct investment projects receive the FIT subsidy, and the environmental attributes and benefits of the renewable electricity generation are not available to the investor. As implementation of the new renewable energy quota policy is rolled out, the rights to these attributes may be further clarified. Other barriers include the large amount of capital typically needed for investment and uncertain economics for projects built in provinces with high levels of curtailment.⁵⁸

2.2 EMERGING MECHANISMS

2.2.1 Direct Power Purchases

In 2015, China's National Energy Administration (NEA) released "Basic Rules for Electricity Market Operations," a guidance document that calls for the expansion of markets to allow for monthly or annual direct power purchases between generators and either retail companies or large end-users, typically defined as electricity consumption over 100 million kWh per year.^{59,60} Prior to the change in regulations, some companies worked directly with the grid companies. For example, Procter & Gamble⁶¹ and L'Oréal⁶² signed direct deals to procure renewable energy in Jiangsu Province. Newer mechanisms aimed at lowering costs and increasing

power market options are emerging, such as bilateral contracts, centralized bidding, listed transactions, and distributed market transactions.

Bilateral Contracts

Currently, bilateral contracts in China are possible for larger electricity consumers through open access, direct procurement. This process requires administrative approval from provincial power exchanges, negotiations with the grid companies, and approvals from a local generator and Local Economic and Information Technology Bureau. Each approval can prove challenging to navigate even for companies with significant experience in the Chinese electricity sector. While electricity load thresholds for buyer participation in open access markets continue to fall across the country, bilateral procurement remains challenging to accomplish in practice for a number of key reasons:⁶³

1. Provincial governments, power exchanges and other local departments responsible for approving bilateral trades currently do not prioritize working with voluntary or corporate purchasers to help facilitate renewable energy transactions (except in regions with significant curtailment—see #6).
2. Corporations frequently encounter provincial power exchanges with differing rules, administrative procedures, and engagement pathways for open access transactions.
3. There is no clear link between bilateral contracts for renewable energy and GECs, leaving little opportunity to

demonstrate exclusive ownership or traceability of energy attributes.

4. Chinese market rules currently restrict interprovincial procurement through the open access market in select regions. For many companies, this means that renewable energy generators must be located within the province of the customer's electricity load. This is not ideal, as much of China's most economically efficient renewable energy production occurs in the north and west of the country, away from the largest population centers.⁶⁴
5. Guaranteed purchase hours for renewable energy generators in select provinces result in generators having little incentive to directly contract with voluntary off-takers.
6. Chinese government agencies encourage bilateral deals only in regions experiencing significant curtailment. However, most corporate demand is not located in heavily curtailed regions.⁶⁵

There has been some indication from National Energy Administration (NEA) that renewable energy that does not receive the FIT can be registered as a "grid-parity project" with the province in which it is developed⁶⁶ and may be eligible to receive the GECs and transfer them to electricity customers.⁶⁷ However, currently there is no guarantee that the attributes or claims associated with the generation in a bilateral contract will be conferred to the purchaser.

Centralized Bidding

In this electricity purchasing mechanism, buyers and sellers can transact on a power exchange in certain provinces. Buyers and sellers submit their desired prices and volumes to the trading center, and then buyers pay a clearing price. Approximately 19% of all direct power purchases (including fossil generation) are done through centralized bidding, and many renewable energy generators have participated in the process.^{68, 69} The main challenge for corporate buyers is that the transaction cannot currently be traced to specific renewable energy generators and therefore is difficult to assess the exclusivity of claims or information about the generation that might render it unsuitable for the voluntary market.⁷⁰ Rules also vary by province and it can also be difficult and expensive for newcomers to transact.⁷¹

Listed Transactions

Similar to centralized bidding, listed transactions allow an electricity generator to offer their desired price and volume on a power exchange on a monthly basis. Buyers can submit an application to the power exchange to accept the offer. A very small percentage of all direct power purchases (including fossil generation) currently use listed transactions as the procurement mechanism,⁷² and some pilot transactions for renewable energy have been completed in Zhangjiakou.⁷³ The main challenges for this purchasing mechanism are high prices and the inability to enter long-term deals.⁷⁴

Distributed Market Transactions

In this purchasing mechanism, companies buy excess power from neighboring

renewable energy projects through the distribution (rather than higher voltage transmission) system. No distributed market transactions have happened in China yet, but industrial park pilots are encouraged by national government policies.⁷⁵ These types of transactions require provincial approval, and pilot projects are still awaiting approval.⁷⁶ Similar to on-site renewables, it will be challenging for the scale of the available projects to meet the electric load of large corporations or manufacturers. Further, the grid companies are reluctant to participate in these transactions as it reduces their income.⁷⁷

2.2.2 Retail Electric Providers

The ability to buy power through a retail electric provider is relatively new in China. Beginning in 2015, China's National Development and Reform Commission (NDRC) released guidance for emerging retail electricity markets.⁷⁸ This guidance is focused on enabling retail access to all types of power, not just renewables. Retail providers in certain provinces are now permitted to sell electricity to commercial and industrial customers, trading directly with generation companies on behalf of electricity purchasers.^{79,80} Pilot projects commenced in Guangdong Province and Chongqing Municipality in 2017, and while thousands of entities have registered as retail providers, the vast majority are not yet operational or approved.^{81,82} Many recently registered retail electricity companies lack power sector experience.⁸³ The pilot project in Guangdong Province has been relatively successful and retailers achieved 40% market share, but the pilot project does not yet include renewable energy.^{84,85}

The presence of a competitive retail market should help facilitate additional renewable energy procurement options for the voluntary market in the future. These new options can potentially help meet consumer preferences, particularly for small to medium enterprises. However, a number of key challenges remain, including the lack of availability of active and credible retail providers, green power products, provincial approval, and traceable accounting systems to ensure renewable energy claims can be appropriately transferred to the end consumer.

2.2.3 Other Voluntary Options

Coal Swaps

In addition to the procurement options listed above, there are additional pathways that companies may employ in order to claim they have positively affected the grid regions in which they operate. Although not considered a renewable energy procurement strategy, coal swaps may be an effective tool to reduce the dispatch of coal on the grid. As discussed earlier, renewable energy curtailment is a major concern in China. Coal swaps are one option in which a coal generator is paid to transfer their allocated hours or rights to dispatch to the grid. For renewable energy generators that would otherwise not have access to the grid, this represents a potentially useful mechanism to increase production hours, while reducing curtailment, and ultimately avoiding emissions.

I-RECs

Over the past few years, other unbundled EACs have also been traded in China,

including international renewable energy certificates (I-RECs). These EACs trade at a premium and are generated from existing renewable energy facilities. Many I-RECs receive the FIT and/or carbon off-sets, leaving some purchasers exposed to potential issues of double claims or lack of regulatory surplus.⁸⁶ With the central government’s development of the GEC, it is not clear there is governmental recognition or market support for the I-REC to be used more broadly or incorporated into other renewable energy procurement models.

3.0 Recommendations

As China’s renewable energy markets evolve, there are many opportunities for strengthening the options available to corporations while protecting market integrity. This section presents recommendations for GECs, emerging procurement mechanisms, policy and market interactions, and market development tools.

3.1 GREEN ENERGY CERTIFICATE

Corporates engaging in renewable energy project development and procurement typically demand exclusive ownership of the environmental attributes associated with their transactions. With exclusive ownership of the environmental attributes, corporates are able to make claims that their activities have reduced the company’s environmental footprint and positively affected the grid regions of operation. In other words, corporate demand for GECs in China is limited largely because the GEC system is perceived as a subsidy for FIT projects instead of the sole mechanism to make credible renewable energy usage claims. Additional clarity on the role of GECs for usage claims would be helpful for market participants.

One strategy to encourage broader adoption of GECs in China might be to expand usage of GECs into a bundled renewable electricity procurement option wherein a corporate can opt to enter into a direct purchase agreement for a non-FIT project *and* own the corresponding

Table 3. Green Energy Certificate Recommendations

RECOMMENDATION	INTENDED OUTCOME
Continue to expand GECs eligibility for use with non-FIT projects	Allow corporates buying from or installing non-FIT projects to make clear, verifiable renewable energy usage claims. Reduce the perception that GECs are an unnecessary “self tax” for FIT projects
Explicitly define GECs as representing all renewable and environmental attributes, and as the only mechanism for substantiation of renewable energy usage claims	Clarity for market participants about allowable and credible renewable energy claims
GEC pricing should be determined by the market and not explicitly tied to the Feed-in Tariff subsidy	Lower prices and increase demand
Allow the GEC to be traded more than once in anticipation of its inclusion in retail and other voluntary market offerings	Increase liquidity in the market

GECs. This would help ensure credibility associated with renewable energy usage claims and reduce the perception of the GEC as an unnecessary “self tax” for FIT projects. Allowing for market-driven pricing and multiple trades of GECs will lower prices and increase demand. Table 3 summarizes recommendations for GECs and the intended outcomes of those recommendations.

3.2 EMERGING PROCUREMENT MECHANISMS

Many barriers exist for emerging procurement options. Streamlining and standardizing transactions will help accelerate corporate procurement, as will providing certainty about ownership of environmental attributes. Table 4 summarizes recommendations for these mechanisms.

Table 4. Emerging Procurement Options Recommendations

RECOMMENDATION	INTENDED OUTCOME
Facilitate, streamline, and prioritize bilateral contracts for interprovincial and intraprovincial renewable energy through the existing open access regulations and coordinated through the power exchanges	Accelerate corporate procurement of renewable energy, increase demand for renewable energy, reduce curtailment, and streamline transactions
Standardize provincial power exchange rules, procedures, terms and contractual documentation required for direct renewable energy procurement	Streamline transactions, reduce costs, and increase demand for voluntary market participation
Provide certainty that the attributes of renewable energy transacted through provincial power exchanges and retail providers are conveyed fully to purchasers, through the expanded application of the GEC or alternative mechanism	Ability for market participants to make credible claims for renewable energy transacted or facilitated through power exchanges or retail providers
Additional resources, support, or requirements could be given to power retailers to include renewable energy in their product offerings	New offerings by electric power retailers for green power
Allow otherwise curtailed renewable energy to be purchased by private companies	Reduce renewable energy curtailment and reduce dispatch of coal generation on the grid

3.3 POLICY AND MARKET INTERACTIONS

The renewable energy quota being implemented in China is a major new policy, similar to renewable portfolio standards in the U.S. but at a larger scale. In any voluntary market, it is essential that demand from the voluntary market is surplus to regulation. Further, for corporates to make credible claims, assurances must be provided that no double counting of EACs can occur. As implementation details for the quota system are rolled out, it is possible that a separate compliance certificate system could be created. Unless potential double counting between the systems is appropriately addressed, corporate renewable claims could be adversely impacted.

As China’s implements its Emission Trading System (ETS), the rules and regulations should also take voluntary markets into consideration. It will be important to address GHG accounting issues as related to renewable energy and voluntary

purchaser claims, and it is recommended to implement an accounting mechanism to allow voluntary renewable energy purchases to help reduce the carbon emissions. This accounting mechanism will be particularly important, as China’s ETS is expected to cover both direct emissions and indirect emissions.⁸⁷

Table 5 summarizes recommendations and intended outcomes for these policy and market interactions.

3.4 MARKET-DEVELOPMENT TOOLS

Additional market development tools can be deployed to encourage new demand for renewables. In particular, there is an opportunity to further engage Chinese businesses in renewable energy, since premium renewable energy products currently carry very little tangible benefit to these companies. The following market development tools would be useful for China’s emerging voluntary market, and Table 6 summarizes recommendations and the intended outcomes.

Table 5. Policy and Market Interactions Recommendations

RECOMMENDATION	INTENDED OUTCOME
Use one certificate tracking system for the renewable energy quota and voluntary markets in China. This could happen by expanding the use of the existing GEC tracking system	Avoid double counting
If a separate certificate system is introduced to track compliance with the quota obligation, there should be coordination with the GEC system	Avoid double counting; voluntary or corporate purchasers can buy GECs with the assurance that the underlying generation is also not counted toward any compliance obligation
Include an accounting mechanism in the ETS to allow for voluntary procurement of renewable energy to retain the benefits of reducing carbon emissions	Corporations would be able to make credible avoided GHG emissions claims associated with their renewable energy procurement strategies. Accelerate the reduction of GHGs in China

- Purchaser Incentives.** Purchaser recognition programs led by government agencies or NGOs have been successful in incentivizing corporate engagement in renewable energy internationally.^{88,89} These programs are successful in helping corporations make the case for—and enhance the value of—renewable energy procurement through public recognition.
- Supply Chain Education and Requirements.** Leading multinational corporations, such as Apple Inc.⁹⁰ and Walmart,⁹¹ are asking their supply chain partners to make renewable energy commitments. Creating new platforms or recognizing corporations that make supply chain commitments or goals may also help to foster additional interest by China-based manufacturers and service providers.
- Certification and Verification.** Another important market development tool is a credible certification program for renewable energy. For example, Center for Resource Solutions administers the Green-e[®] certification program in the U.S., Canada, Singapore, and Chile.⁹² The protections and assurances offered through a high-quality certification program allow buyers to have confidence in their purchases and provide long-term market support. Similar programs are available in other developed markets and would be useful in China.

Table 6. Market Development Recommendations

RECOMMENDATION	INTENDED OUTCOME
Issue requirements for government vendors for procurement and/or encourage civil sector initiatives to reward companies for their actions. For example, renewable energy requirements in certification standards or requirements for renewable energy commitment and purchasing by supply chain partners	Increased participation in renewable energy procurement by Chinese corporations
Additional resources, support, or requirements could be given to power retailers to include renewable energy in their product offerings	New offerings by electric power retailers for green power
Offer high-quality certification programs for voluntary renewable energy market purchases	Increased confidence in procurement options and credible renewable usage claims. Recognition of high-quality, certified corporate renewable energy procurement options by CDP
Government and NGO programs can encourage or recognize renewable energy procurement	Increased participation in renewable energy procurement by Chinese corporations

4.0 Conclusion

China's electricity market has undergone significant reform over the last few decades, and accelerating renewable energy development has become an increasing priority. To help achieve China's goals of lowering emissions, growing renewable energy, and reducing curtailment while lowering government subsidies, China will need to use multiple policy tools and market mechanisms. Voluntary procurement of renewable energy by commercial and industrial customers can provide a complementary tool and further expand renewable energy development beyond existing policy mechanisms such as quota systems and emissions trading schemes.

A growing number of multinational corporations and Chinese companies are pursuing renewable energy projects in China to meet sustainability commitments for their own operations, and increasingly those of their suppliers. In addition to on-site renewables, direct investment, and GECs, new opportunities for corporates to find favorable renewable energy procurement pathways are emerging such as bilateral contracts, centralized bidding, listed transactions, distributed market transactions, and coal swaps.

Increasing corporate investment and participation in voluntary renewable energy transactions requires support from market and transaction options that meet global best practices and customer needs with regards to prices, accounting, and impact. Allowing transactions that are surplus to regulation and preventing double counting are key to successful

voluntary activity. As an accounting mechanism, the GEC could be further expanded for utilization with all types of voluntary renewable energy transactions and de-coupled from only FIT-eligible projects to help ensure more competitive pricing. Standardization and simplification of interprovincial and intraprovincial transaction mechanisms, rules, and procedures will help facilitate the growth of direct power purchases.

The potential for private-sector-driven renewable energy demand is significant, and can contribute to national emissions reductions and a shift to cleaner electricity production. Providing the right enabling framework for voluntary markets will allow commercial and industrial demand to accelerate renewable energy and complement existing government capacity targets or mandates. •

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