Financing: Leveraging Capital Markets to Scale Building Energy Efficiency in China

Presented by Carolyn Szum, China Energy Group, Lawrence Berkeley National Laboratory
Discussion Topics

1. Global Context
2. Key Terms and Definitions
3. Barriers
4. Exploratory Solutions
5. Key Components to Scale
The 2015 Paris Agreement aims to keep global surface temperature rise well below 2°Celsius (C) above pre-industrial levels by the end of the 21st Century (UNFCCC 2017).

A critical component of achieving mitigation goals is to reduce energy usage in buildings, which account for over one-third of final global energy consumption (IEA 2013).

The International Energy Agency (IEA) estimates that limiting global temperature rise to 2 °C will require an estimated 77% reduction in total CO₂ emissions in buildings by 2050 compared to a baseline of 2012 (IEA 2013).
What’s the Problem?

◆ According to IEA, cumulative global investments in building EE must reach $13.4 trillion by 2035 to keep global surface temperature rise below 2°C Celsius (C) (Rugova 2016).

◆ This scale exceeds the capacity of public funding and mobilization of private capital is necessary (IPEEC 2016).

◆ However, few structures exist in the market today for institutional investors to deploy capital, resulting in the absence of EE as an asset class (EEFIG 2015).

◆ In other words, EE projects are not “developed, delivered, maintained, verified, and measured in a consistent manner” (Investor Confidence Project 2017).
What is China’s Opportunity?

◆ China requires between **US$330 and US$460 billion annually** for investment in EE and other clean energy solutions (IPEEC 2016).

◆ Approximately **80% of the required investment** must come from non-government sources (IPEEC 2016).

◆ Traditionally, **China has relied heavily on grants and subsidies** to advance its energy goals.

◆ **Innovative business models and financing mechanisms** to leverage primary and secondary market capital in China are needed.
Key Terms and Definitions

◆ **Capital Market**: serves as a conduit for demand and supply of debt and equity capital. It allocates funds between lenders and borrowers through financial instruments (e.g., bonds, notes) (Goldman Sachs 2014).

◆ **Primary Market**: The initial financing of a loan between a lender and a borrower.

◆ **Secondary Market**: The resale of one or more loans to a new (secondary) investor. Often involve highly standardized products and the bundling of numerous loans into tradable instruments. An asset-backed security (ABS), which is a bond backed by assets (i.e., auto loan) that provide a regular income stream, is an example.

◆ **Host or Customer**: The property upon which measures are being implemented (may also refer to owner of said property).

◆ **Energy Service Company (ESCO)**: The company responsible for implementing the measures, that in some case takes performance risk through a guarantee.
## EE: State of the Market

<table>
<thead>
<tr>
<th>Indicator</th>
<th>China</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE investments 2011</td>
<td>$6.38 billion</td>
<td>$6.32 billion</td>
</tr>
<tr>
<td>EE investments 2013</td>
<td>$11.98 billion (delivered by 4,852 ESCOs in China)</td>
<td>$7.62 billion</td>
</tr>
<tr>
<td>Dominant market segment (% share) in 2013</td>
<td>Industry (72%) Buildings (21%) Transport (7%)</td>
<td>Government and institutional (84%)</td>
</tr>
<tr>
<td>Typical project size</td>
<td>$100,000-$1 million (2007-09)</td>
<td>$2 million-$15 million</td>
</tr>
<tr>
<td>Number of measures involved in EE project, typically</td>
<td>Selected and specialized, less integrated</td>
<td>Multiple and integrated</td>
</tr>
<tr>
<td>Typical contract term</td>
<td>4-8 years</td>
<td>10-20 years</td>
</tr>
</tbody>
</table>

Despite the rapid growth of China’s ESCO industry, access to third-party finance is still constrained. While the dominant form of financing is bank debt financing, in 2011, **only 18% of ESCOs had access to bank loans**. Thus, approximately **82% of ESCOs funded their own EE projects using working capital**.
Barriers to EE Lending in China

1. Technical Barriers
   - Lack of information/asymmetric information.
   - Lack of standardized protocols and tools for originating EE projects.
   - Lack of technical capacity for EE.

2. Credit/Market Barriers
   - Balance sheet prioritization (self-finance thresholds).
   - Loan not secured by property or equipment.
   - Inability to “lock-box” or “escrow” future streams of cost-savings.
   - Quality/availability of host credit information.
   - Disconnect between occupancy time horizon in property and contract tenor.
   - Split incentive (landlord/tenant).

3. Impact
   - Three-quarters of Chinese EE project hosts have encountered EE financing difficulty (IFC and EMCA, 98).
Credit/Market Barriers

2. Loan not secured by property or equipment

3. Inability to lock-box or escrow

4. Credit quality and availability

5. Occupancy time horizon

6. Tenant pays utility costs?

Utility Cost

X x Y = Total Costs (Z)

Year

Objective

◆ Facilitate large-scale financing by non-government financial institutions (i.e., banks, private equity firms, pension funds) in EE projects for buildings/facilities by addressing the technical and credit/market barriers to EE lending in China.
Exploratory Solutions to Technical Barriers

- Advancing **data transparency** to expand the market for EE.
- Developing open-source **virtual assessment tools** to target cost-effective EE opportunities.
- Developing **standardized procedures for originating EE projects** which mitigate risk.

1. Processes building and weather data using Python code.

2. Automatically generates five coefficients of building performance with physical meaning.

3. Working with Johnson Controls Inc. (JCI) to augment Python code to identify building technology and performance upgrades and estimate associated cost savings.

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**Diagram:**
- **Baseline** and **Savings Projections**
- **Design, Construction, Commissioning**
- **Operations, Maintenance, Monitoring**
- **Measurement & Verification (M&V)**
Exploratory Solutions to Credit/Market Barriers

◆ Systematically **analyzing the risk profile** of EE loans.
◆ Partnering with banks to develop and scale **innovative EE financial products**.
◆ Working with institutions to create **next-generation credit information products**.

April 2018 Launch: Innovative Green Financial Product

- **Green mortgage product**: MRCB and LANDSEA proposing low interest rate mortgage product for green homes and apartments (3-Star or LEED certified).
- **Green building product**: MRCB proposing a derivative product for non-residential green buildings and mid-size corporate energy efficiency upgrades.
Leveraging Secondary Market Capital

Meeting the requirements of capital markets:

◆ Sufficient scale.
◆ Standardization.
◆ Ability to efficiently understand credit quality in many market segments.

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Sector</th>
<th>Type</th>
<th>Credit</th>
<th>Size</th>
<th>Aggregation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware Energy</td>
<td>MUSH</td>
<td>Bond</td>
<td>Public Investment-Grade</td>
<td>$72.5mm</td>
<td>State properties; Multi-agency</td>
</tr>
<tr>
<td>Unilever</td>
<td>Corporate</td>
<td>Bond</td>
<td>Corporate Investment-Grade</td>
<td>$324mm</td>
<td>Corporate facilities; international</td>
</tr>
<tr>
<td>RENOVATE AMERICA</td>
<td>Single-Family</td>
<td>PACE ABS</td>
<td>Tax lien</td>
<td>$232mm (10) $2+b total</td>
<td>Pool</td>
</tr>
<tr>
<td>RENEW WHEEL</td>
<td>Single-Family</td>
<td>Unsecured ABS</td>
<td>Unsecured</td>
<td>$12.5mm</td>
<td>Pool</td>
</tr>
<tr>
<td>Fortune 100 + METRUS ENERGY</td>
<td>Commercial</td>
<td>Efficiency Services Agreement</td>
<td>Two Factor Backstop?</td>
<td>$14mm</td>
<td>Property Management</td>
</tr>
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Secondary Market Examples in the United States (Citi 2017)
Thank You!

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