Energy Technologies Area Lawrence Berkeley National Laboratory

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

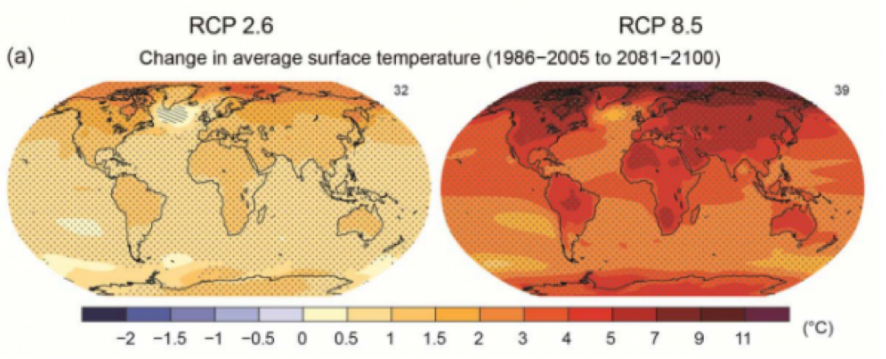
Global Context

- 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 CO_2 emissions in buildings by 2050** compared to a baseline of 2012 (IEA 2013).

Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) (Stocker et al. 2013)



Buildings Account for One-Third of Final Total Global Energy Use

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° 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.
- I**nnovative 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

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

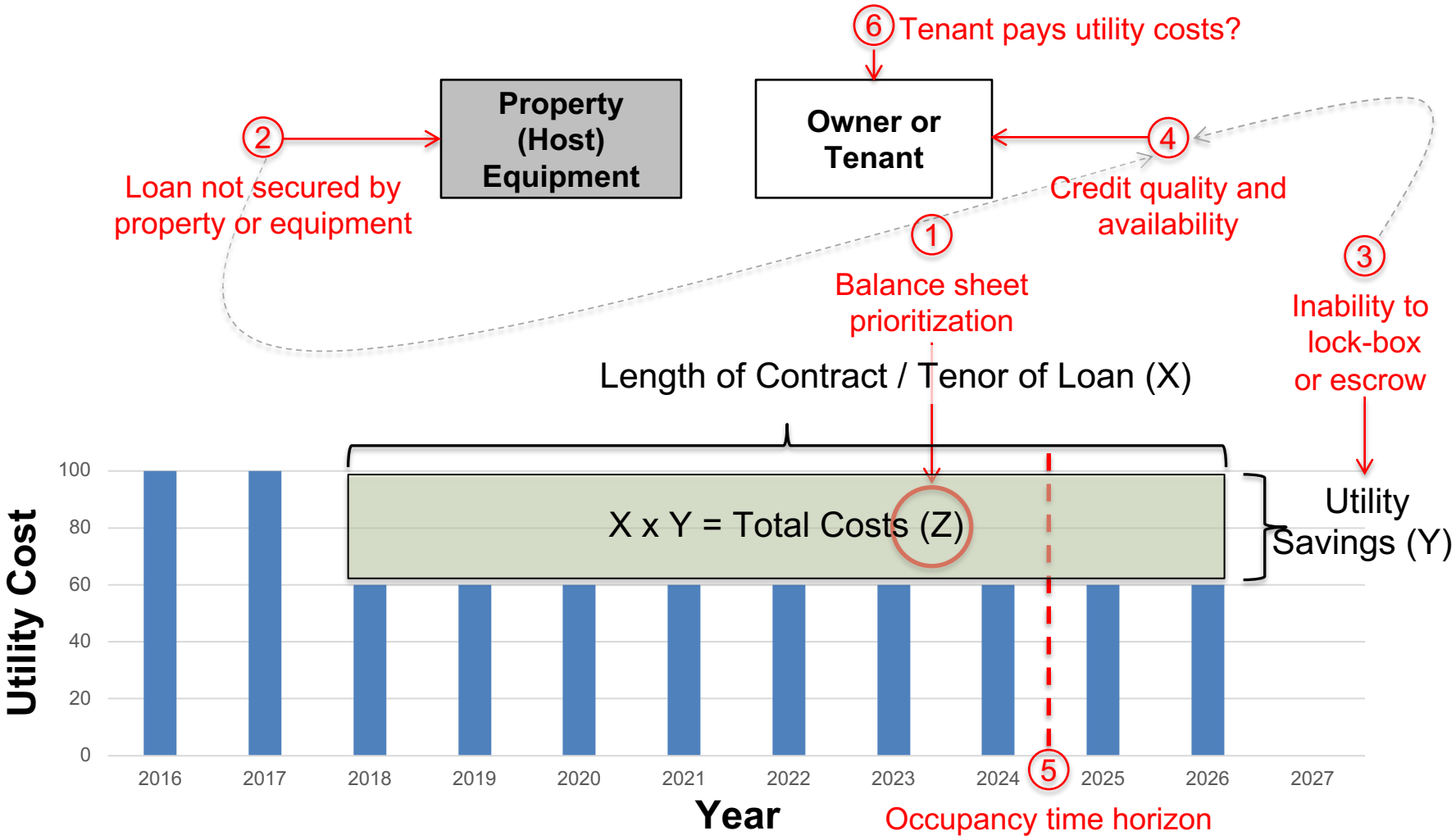
Despite the rapid growth of China's ESCO industry, access to third-party finance is still constrained. While the dominant form of financing is bank debt financing, in 2011, **only 18% of ESCOs had access to bank loans.** Thus, approximately **82% of ESCOs funded their own EE projects using working capital.**

Evans et al. 2015

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



Objective

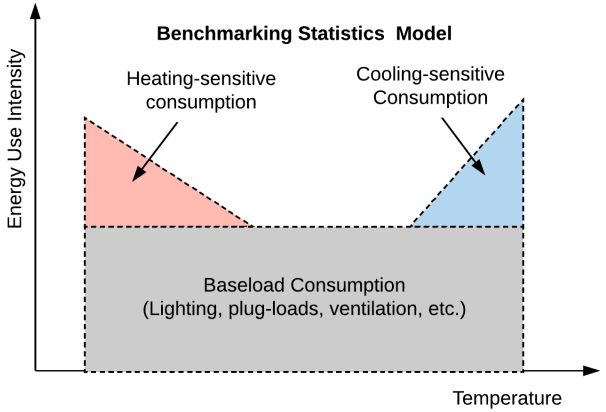
- Facilitate large-scale financing by non-government financial institutions (i.e., banks, private equity firms, pension funds) in EE projects for buildings/ facilities by addressing the technical and credit/market barriers to EE lending in China.

Exploratory Solutions to Technical Barriers

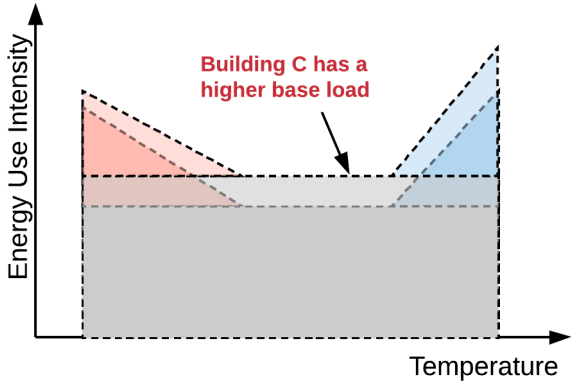
- Advancing **data transparency** to expand the market for EE.
- Developing open-source **virtual assessment tools** to target cost-effective EE opportunities.
- Developing **standardized procedures for originating EE projects** which mitigate risk.

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.



INVESTOR READY ENERGY EFFICIENCY
Energy Performance Protocol LARGE COMMERCIAL v1.2
INVESTOR CONFIDENCE PROJECT

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.

Transaction	Sector	Type	Credit	Size	Aggregation
Delaware Sustainable Energy Utility	MUSH	Bond	Public Investment-Grade	$72.5mm	State properties; Multi-agency
Unilever	Corporate	Bond	Corporate Investment-Grade	$324mm	Corporate facilities; international
RENOVATE AMERICA hero	Single-Family	PACE ABS	Tax lien	$232mm (10) $2+b total	Pool
RENEW FINANCIAL WHEEL	Single-Family	Unsecured ABS	Unsecured	$12.5mm	Pool
Fortune 100 + METRUS ENERGY	Commercial	Efficiency Services Agreement	Two Factor Backstop?	$14mm	Property Management

Secondary Market Examples in the United States (Citi 2017)

Thank You!

Contact information:

Carolyn Szum ccszum@lbl.gov

+1-510-486-4106

Our website: http://china.lbl.gov