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Lessons from Europe, North America, and Asia: Financing Models that are Facilitating Building Energy Efficiency at Scale

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Agenda

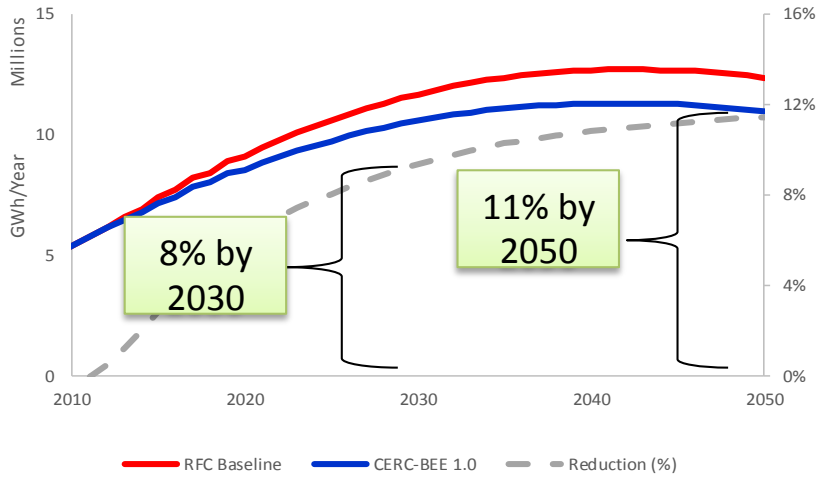
- Background
- Research Objective and Methodology
- Key Barriers to Energy Efficiency Financing
- Successful Case Studies
- Recommended Policy Solutions

Background on US-China Clean Energy Research Center Building Energy Efficiency (CERC-BEE)

- Initiated at the presidential level in 2009 (CERC 1.0), renewed in 2014 (CERC 2.0).
- Vision: Achieve large scale adoption of very low energy buildings in the U.S. and China.
- CERC 1.0 (2010-2021): $100M+, ten-year program with shared investment from government and industry.

CERC Annual Steering Committee Meeting, Beijing, China July 2016.

Annual Energy Savings of CERC-BEE 1.0 Technologies Against BAU*



Signing of CERC-BEE 2.0 US-China Joint Work Plan, Beijing, China July 2016.

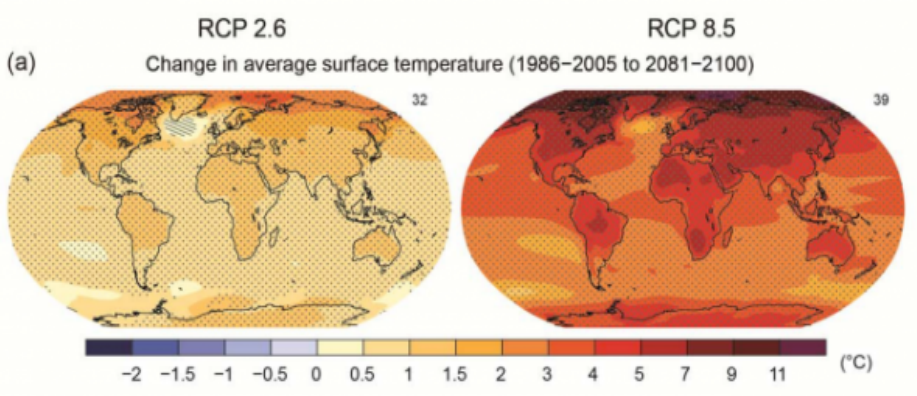
*Nachtrieb et al. "CERC-BEE Impact Model." Unpublished report, last modified December 9, 2016. Adobe PDF file.

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).

- **Energy efficiency (EE) delivers about 50%** of the reduction in pre-2035 global greenhouse gas (GHG) emissions needed to achieve this target (IPEEC 2016).

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



What's the Problem?

- Cumulative global investments in building EE **must reach €3.6 trillion by 2035** to keep global surface temperature rise below 2°Celsius (C) (Rugova 2016)

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

- Few structures exist in the market today for investors to deploy capital, **resulting in the absence of EE as an asset class** (EEFIG 2015).

- According to the Energy Efficiency Financing Institutions Group (EEFIG), **piloting innovative financing mechanisms is among the top four market actions** required by the European Union to grow EE in buildings (EEFIG 2015).

Research Objective and Methodology

- **Objective:** Identify innovative financing mechanisms and policies that facilitate large-scale investment by non-government financial institutions (i.e., banks, private equity firms, pension funds) in EE projects for commercial buildings.
- **Methodology:**
  - Assess barriers to capital market engagement in building EE lending through desk research and stakeholder engagement:

  - Identify recent example of success accessing private capital for building EE in Europe, China, and the United States.
  - Recommend policy actions to overcome barriers to building EE lending.

Key Barriers to EE Lending

1. Technical Barriers (mostly in China)

- Lack of information on building energy performance
- Lack of measurement and verification (M&V) standards and tools
- Lack of technical capacity

2. Market Barriers

- The EE industry is still fragmented in Europe, China, and the United States, and, as a result, EE activity typically does not meet capital markets requirements.
  - Sufficient scale
  - Standardization
  - Ability to efficiently understand credit quality

Scale

Scale points to the interconnectedness of other factors in scaling EE, **namely the ability for developers or sponsors to aggregate sufficient activity or demand.**

It is important for the following reasons:

1. Costs of executing a capital market transaction (legal, rating agency and other fees) must be borne by the monetary size of the transaction; and
2. Institutional investors have minimum investment thresholds, compounded by the condition that they may not be allowed to be the sole investor in a deal.

Standardization

Standardization speaks to a number of factors including **measures, contracts, and underlying credit of the host**.

1. Measures and their performance must be defined and well-understood.
2. The agreements that dictate how cash flows, responsibilities of parties, warranties, etc. must all be uniform.

Ability to Sufficiently Understand Credit Quality

Finally, “like credits” or property types must be grouped together, such that uniform credit risk analysis can be applied.

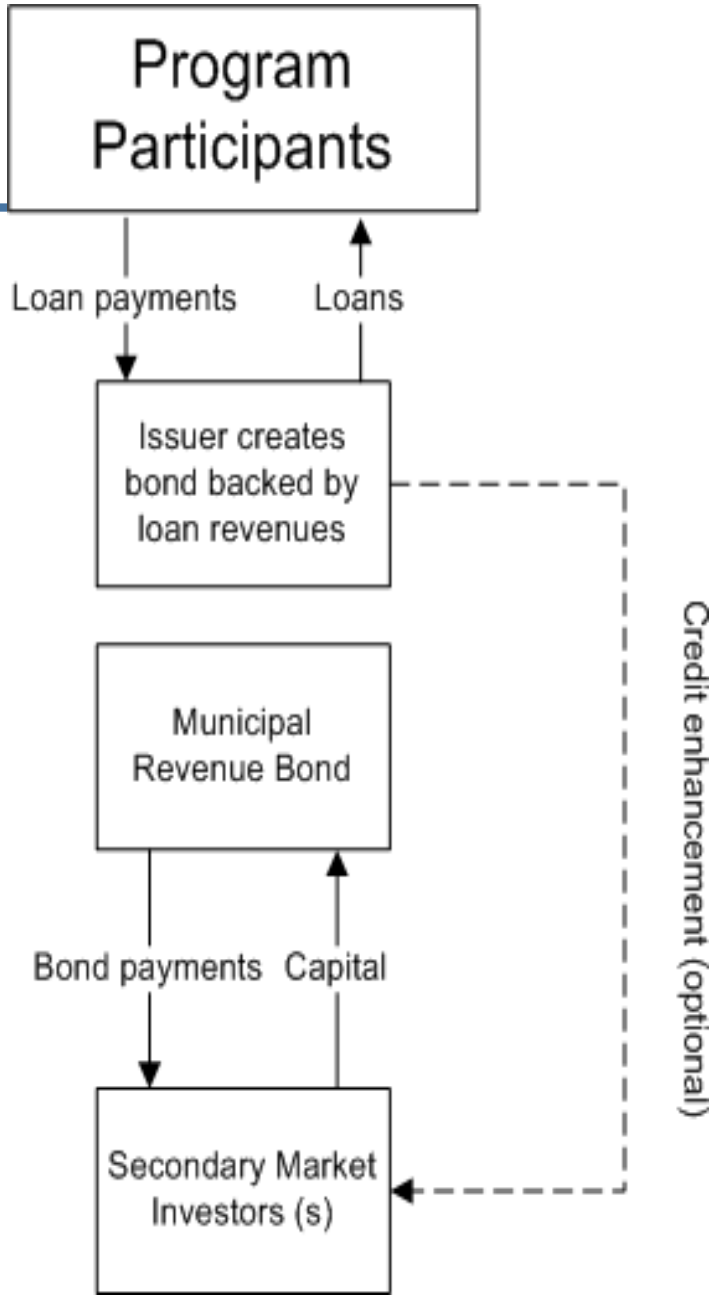
- Since no two projects or contracts are alike, if you were to identify 1,000 EE projects, underwriters would have to evaluate documentation for 1,000 hosts to assess the risks, and this is not practical or possible (Clark 2015).

Overcoming Market Barriers

	PROPERTY TYPE / SECTOR					
PRODUCT / SOLUTION	**MUSH**	**Federal/DOD**	**Single Family**	**Multifamily**	**Commercial**	**Corporate**
Large Single Project	**Yes** Detroit SL	**Yes**	N/A	**Yes**	**Yes**	**Yes**
Pooled Asset Deal	**Yes** Green Campus	**Yes**	**Yes** WHEEL; Spruce	Difficult HPET	Difficult	**Yes** SEFF
ESCO/ESA Two Factor	**Yes** Bulgarian EESF	**Yes**	N/A	Difficult	Difficult	**Yes** Citi London
PACE	**Yes**	N/A	**Yes** Subordinated?	**Yes**	**Yes**	**Yes**
On-Bill (OBR)	**Yes** Hawaii GEMS	N/A	**Yes** NYSERDA	**Yes**	**Yes**	**Yes**
Stranded Cost Tariff	**Yes**	N/A	**Yes**	**Yes**	**Yes**	**Yes**
Green Bond	**Yes** Massachusetts	N/A	N/A	N/A	N/A	**Yes** Unilever
Sustainable Energy Utility	**Yes** Delaware SEU	N/A	N/A	N/A	N/A	N/A
Microfinance	N/A	N/A	**Yes**	N/A	**Yes** BlocPower	N/A

Delaware Sustainable Energy Utility (SEU)

- The Delaware SEU is a non-profit agency set up to coordinate and promote use of sustainable energy.
- In 2011, it issued €68 million in tax-exempt municipal bonds.
- Proceeds from bond sale supported EE projects across multiple state entities (e.g., university, government office).
- Projects were implemented by ESCOs.
- ***Type:*** State general revenue bond issuance;
- ***Credit Risk:*** State credit quality and appropriations support;
- ***Performance Risk:*** ESCO guaranteed savings; and
- ***Aggregation:*** State aggregator

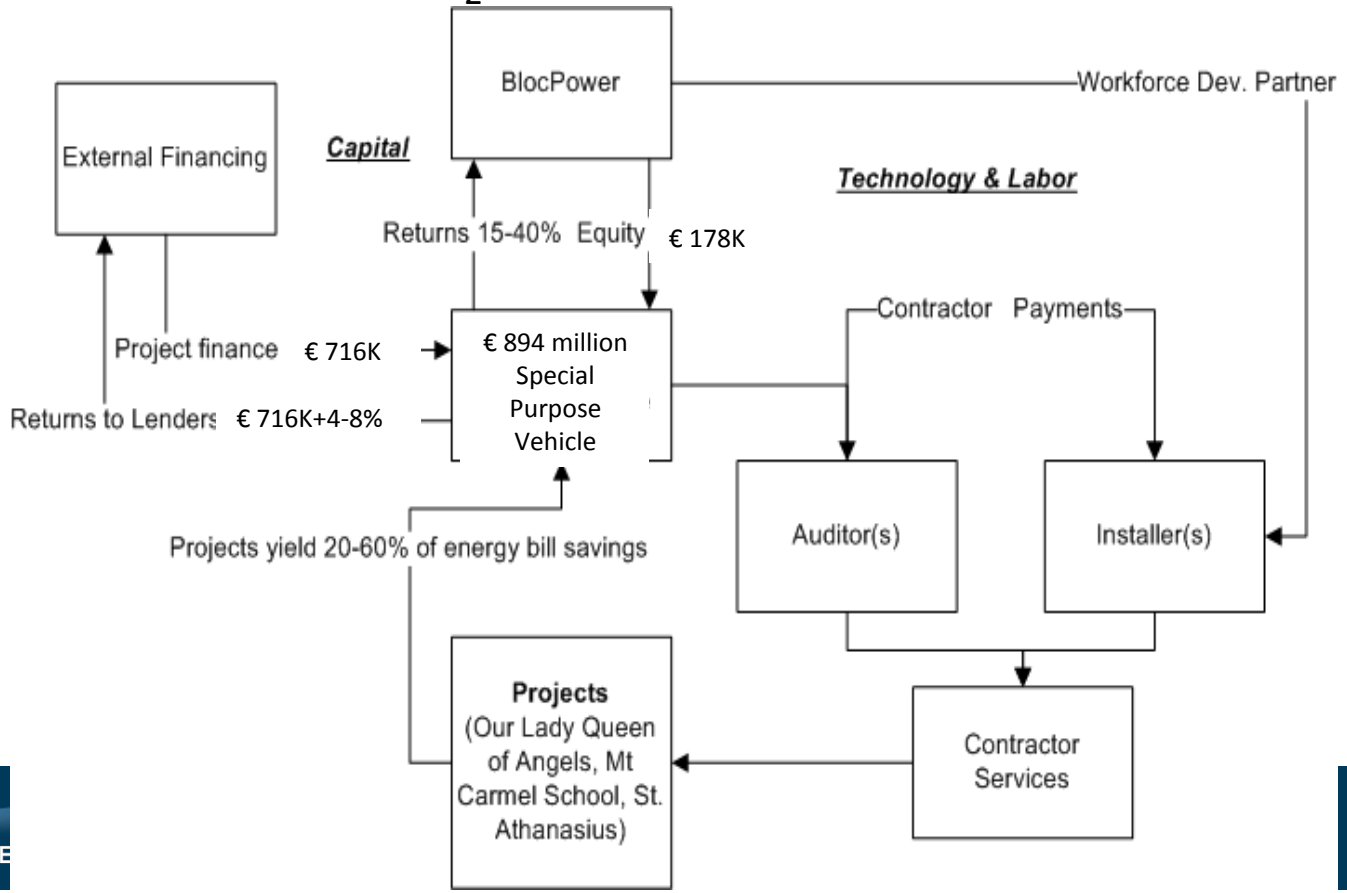


BlocPower: Crowdsourced Microfinance for EE

- ***Crowdsourcing:*** mobilizes individuals to invest small amounts of money in a project and receive compensation (interest payment, equity in enterprise, etc.).
- ***BlocPower Goal*:** Market, finance, and install EE retrofits in 100 <5,000 m^2 properties in low-income communities in New York.
- ***Challenges Addressed:***
  - (1) Inability of traditional public EE and clean energy programs to access a €40 billion market for EE in financially underserved communities;
  - (2) the inability of 60 million Americans to invest in EE.

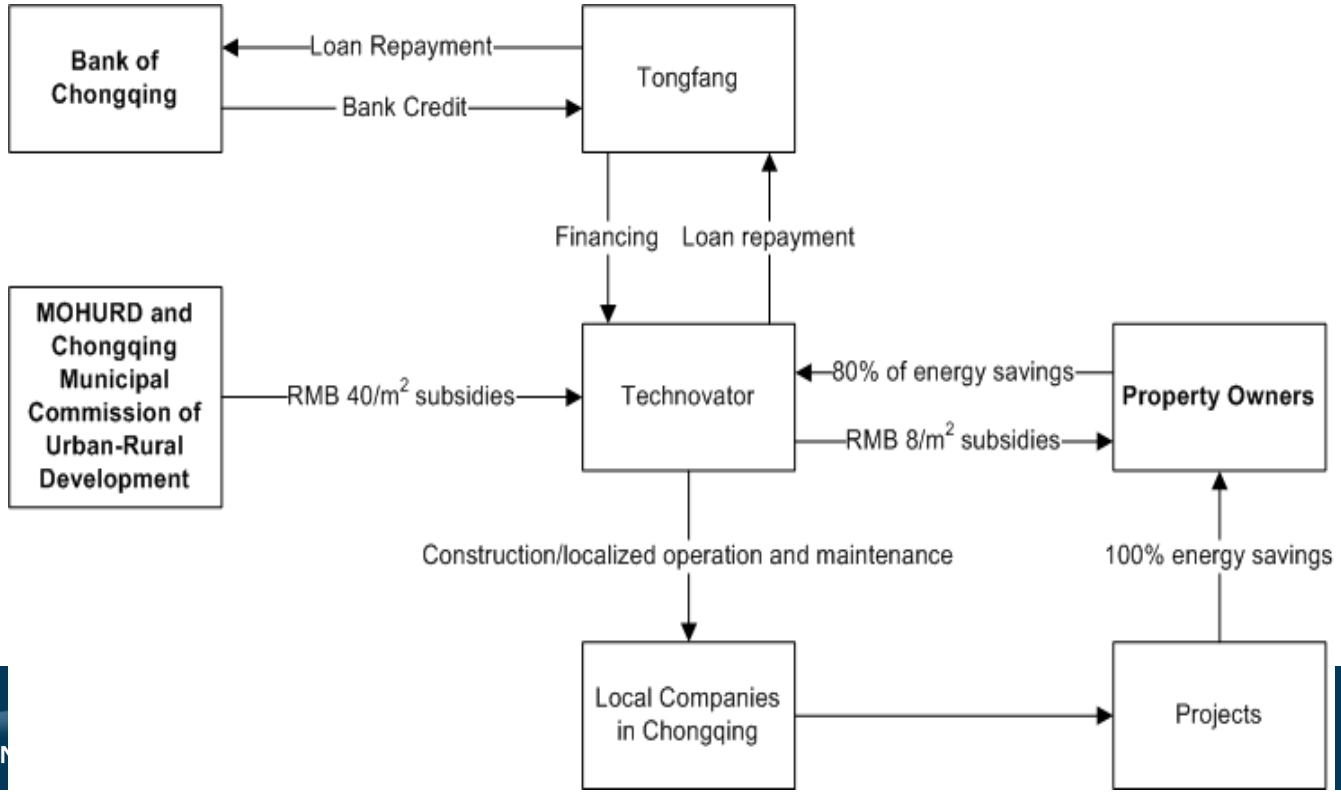
BlocPower

- ***Type:*** crowdsourcing; ***Credit Risk:*** on-bill repayment (OBR) and equity credit enhancement; ***Performance Risk:*** ESCO guarantees; ***Aggregation:*** partnerships and institutional networks.
- ***Outcome***: Deployment of €94 million , resulting in €94 million in energy cost savings, 200,000 tons of CO_2 emissions avoided, and 50 new jobs created.



Chongqing Commercial Building Retrofit

- ***Goal***: Retrofit 4 million m^2 of public buildings; reduce energy use intensity by 20%.
- ***Type:*** Government contract and subsidy*;* ***Credit Risk:*** ESCO (Tongfang Co. Ltd.)*;* ***Performance Risk:*** ESCO; ***Aggregation:*** Contract for bulk (m^2) in multiple properties.
- ***Outcome:*** 107 public buildings (4 million m^2) retrofitted. Targeting 3.5 million m^2 more.
- ***Innovation***: Tongfang's subsidiary, Technovator Ltd., subcontracted the retrofit projects to 30 start-ups and provided technology and capacity building (with the hope of acquisition later). The ESCO also shared 20% of the profit with building owners.



Exploratory Solutions for Market Barriers

- **Create a standardized EPC at the local or national level** to facilitate scale-up of secondary capital market financing transactions for building EE projects.
  - In addition to the FICO score, standardized contracts for renewable energy credits (REC) facilitated the rapid scale-up of secondary capital market financing transactions for solar in the US and similar potential may exist for building EE.

- Create **next-generation credit information products** that will provide lenders with necessary information on building EE project owner credit risk.
  - It was the FICO score which spurred rapid uptake of solar photovoltaic (PV) installations in the single family residential market segment in the US, and similar potential may exist for building EE in underserved market segments.

Continued Research

- **Identification of promising market segments (particularly in emerging markets)** based on access to stakeholder credit ratings, credit enhancement options, scale potential, etc.
- **Review and sharing of EE financing case studies.** There is an emerging spectrum of traditional and specialized EE financing products now available.
- **New financial products** need to be developed and piloted in promising market segments.

Exploratory Solutions to Address Technical Barriers

- Building energy data transparency policies.
- Standardized M&V protocols.
- Public-access, building/enterprise energy performance rating and M&V tool

Overview:

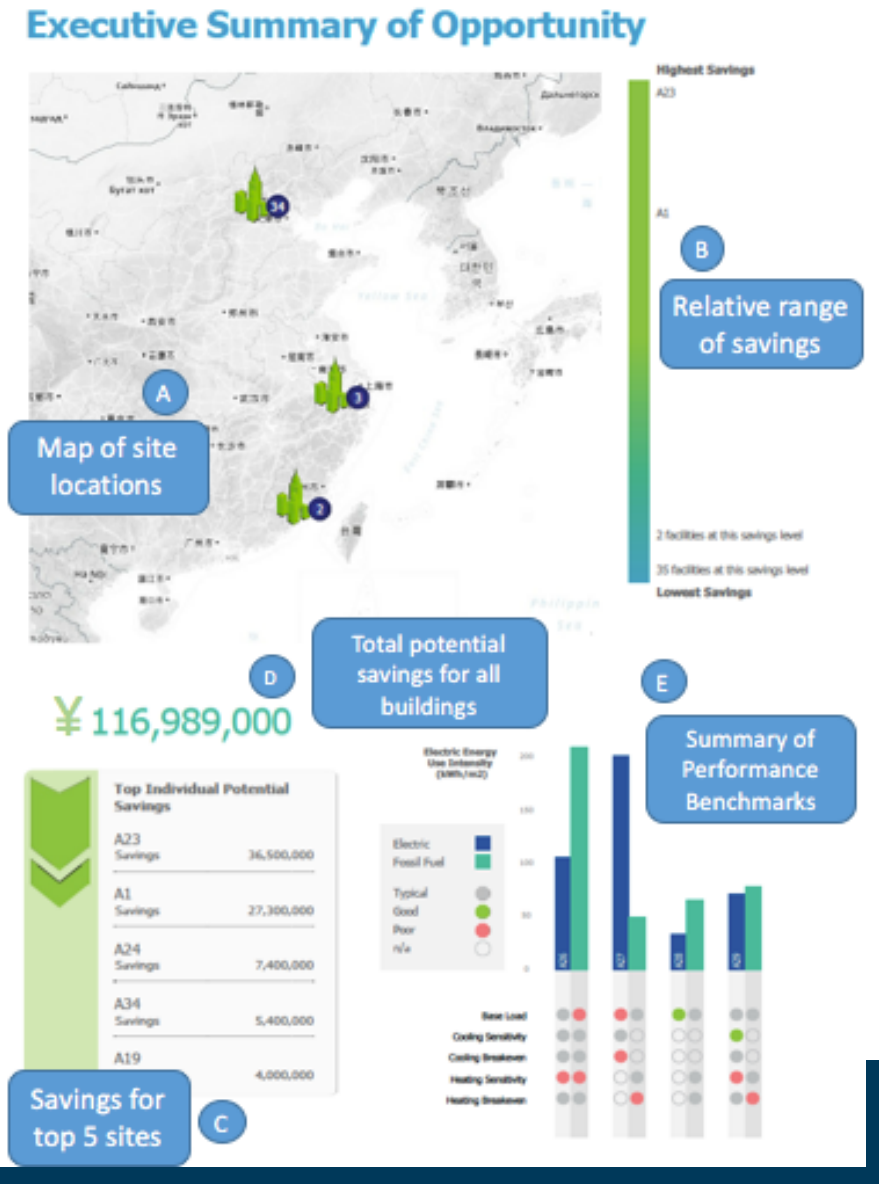
- Pre-audit tool to target and screen for energy and cost saving opportunities.
- M&V tool that tracks EE savings against baseline.
- Uses empirical data and inverse regression modeling techniques.
- Identifies ***both*** building equipment and operational opportunities.

Inputs:

- 2+ years' monthly energy usage (all fuels)
- Building size and location

Outputs:

- Benchmark score for different weather metrics
- Energy savings
- Energy cost savings
- Energy conservation measures



Acknowledgments and Contact Information

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Key Terms and Definitions

- **Capital Markets**

The capital market, broadly defined, 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) and is comprised of the stock market, bond market, and money market (Goldman Sachs 2014).

- *Primary Capital Market*

The initial financing of a loan between a lender and a borrower.

- *Secondary Capital Market*

The resale of one or more loans to a new (secondary) investor.

An asset-backed security (ABS), which is a bond backed by assets that provide a regular income stream, is an example of a secondary market product.

Key Terms and Definitions

- **Traditional Financing**

  Conventional financing options such as credit cards, lines of credit, or unsecured loans.

- **Specialized Financing**

  Loans or other financing products specifically designed to fund EE projects; often have unique features such as extended repayment terms or ability to remit payment via utility bill.

  An example in the United States is property-assessed clean energy (PACE) financing which allows residential homeowners to finance EE improvements through their property tax bill (Campbell 2016).

Typology of Market Segments

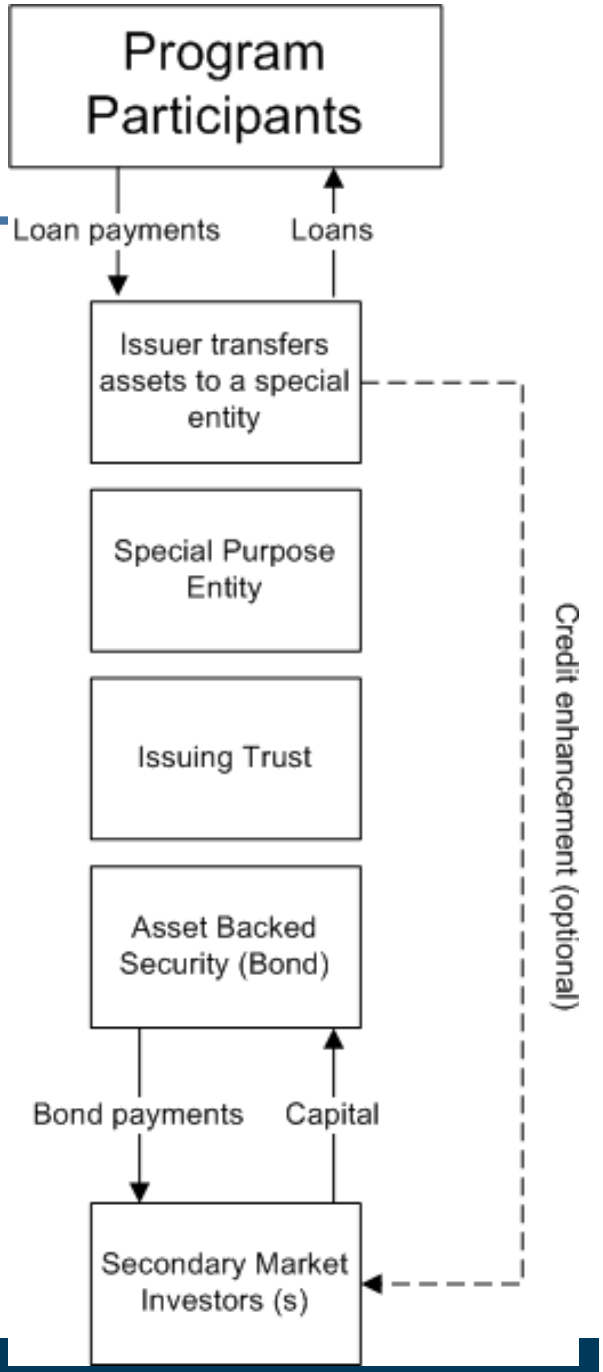
Market Segment	Definition
MUSH	Municipal and state government; university and college; school; and hospital buildings.
Federal	Federal government buildings housing agencies and offices.
Single Family	Detached residential home occupied by a single family.
Multifamily	Building containing multiple separate housing units, such as an apartment building or condominium.
Commercial	Non-residential buildings used for commercial purposes, such as hotels, commercial offices, or shopping malls.
Corporate	Building owned and occupied by a single corporation (e.g., corporate headquarters).

Technical Terms and Definitions

Technical Term	Definition
Host	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.
Lender	The financial institution that provides debt for a project, and in so doing takes credit, and in some constructs, performance risk

Warehouse for Energy Efficiency Loans with Renewable Funding (WHEEL)

- WHEEL facilitates secondary market transactions by buying unsecured residential EE loans that originated in state and local programs.
- The loans are bundled and transferred to a warehouse facility, where they are held until the aggregate amount is large enough to back a bond sale to institutional investors.
- Proceeds from the note sales are then used to recapitalize WHEEL, allowing the program to keep purchasing loans for further rounds of bond sales.
- ***Type:*** Warehouse facility and asset-backed securitization (ABS); ***Credit Risk:*** Host credit quality; ***Performance Risk:*** N/A; ***Aggregation:*** Platform for multiple state programs



WHEEL Success

- In the US, WHEEL successfully completed its first securitization in June 2015:
  - $12.58 million in green bonds backed by almost $16 million in EE loans.
  - This initial WHEEL program benefitted 2,079 homes and has saved an estimated 3,467 metric tons of greenhouse gas (GHG) emissions.

(ClimateWorks Foundation 2017)

"[WHEEL] will allow better access to capital, so states won't have to worry about where the capital will come from," says Peter Krajsa, chairman and CEO of AFC First. "That's always been a barrier: How do you tap into the broader capital markets and make cheap financing available to consumers?"

(Institutional Investor 2015)