CONNECTICUT
GREEN BANK

Connecticut Green Bank

Incentivizing Private Investment In Clean Energy, Energy Efficiency & Resiliency with Public Capital

The Alaska State Legislature

House Energy Committee

28 March 2017

Agenda

- **What is the Connecticut Green Bank**
- **Green Bank Basics**
- **Green Bank Benefits / Impacts**
- **Project / Program Examples**
- **Foundations & Green Bonds**
- **Green Bank Movement**

Connecticut Green Bank

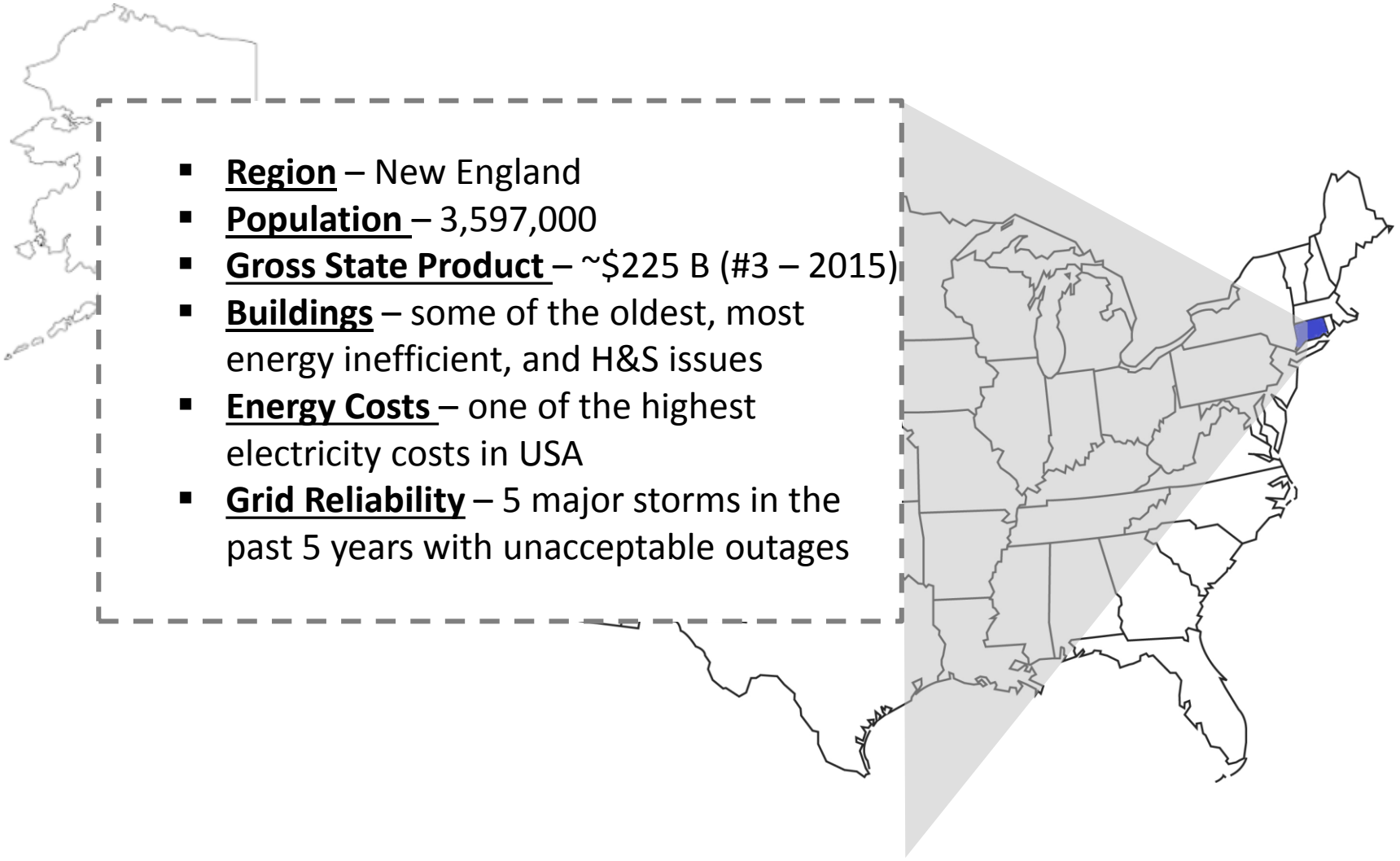
About Us

- **Quasi-public organization** – created 2011 and succeeded the Connecticut Clean Energy Fund (1999-2011) … with **~$60 MM**
- **Focus** – finance clean energy (i.e. renewable energy, energy efficiency, and alternative fuel vehicles and infrastructure)
- **Balance Sheet** – approximately **$175 MM** in assets **(growing)**
- **Support** – supported by
  - a $0.001/kWh surcharge on electric bills (~ $10 per household / year) … approximately **$27-30 MM / year (stable)**
  - A "CO^2 Cap & Trade" … approximately **$5 MM / year (stable)**
  - Portfolio Income … approximately **$2 - $3 MM / year (growing)**
  - Private capital, foundations, US Govt (i.e. SunShot & ARRA) – **(varies)**

Connecticut

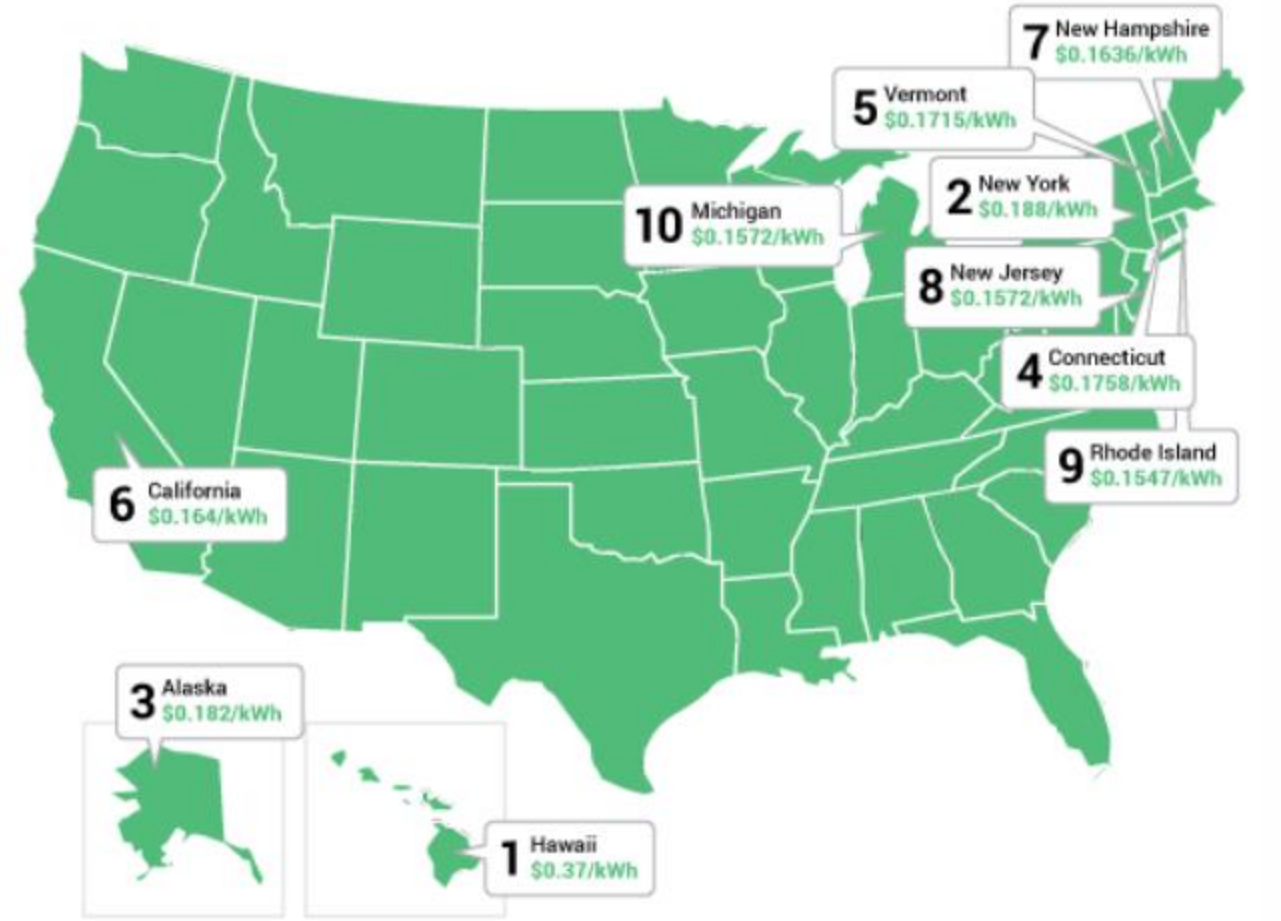
Microcosm of the United States

- **Region** – New England
- **Population** – 3,597,000
- **Gross State Product** – ~$225 B (#3 – 2015)
- **Buildings** – some of the oldest, most energy inefficient, and H&S issues
- **Energy Costs** – one of the highest electricity costs in USA
- **Grid Reliability** – 5 major storms in the past 5 years with unacceptable outages



Connecticut & Alaska

2 of the “Top 10 Most Expensive States for Electricity”



Five Macro Energy Challenges

Connecticut

High Energy Costs

CT has one of the highest cost for electricity in USA

Old, Energy Inefficient Building Stock

CT has some of the oldest and most energy inefficient building stock

Need for "Cleaner / Cheaper" Energy Sources

Programs that will diversify our energy mix into renewable/clean power

Grid Reliability

5 major storms in recent years with unacceptable outages

Government Spending Constrained

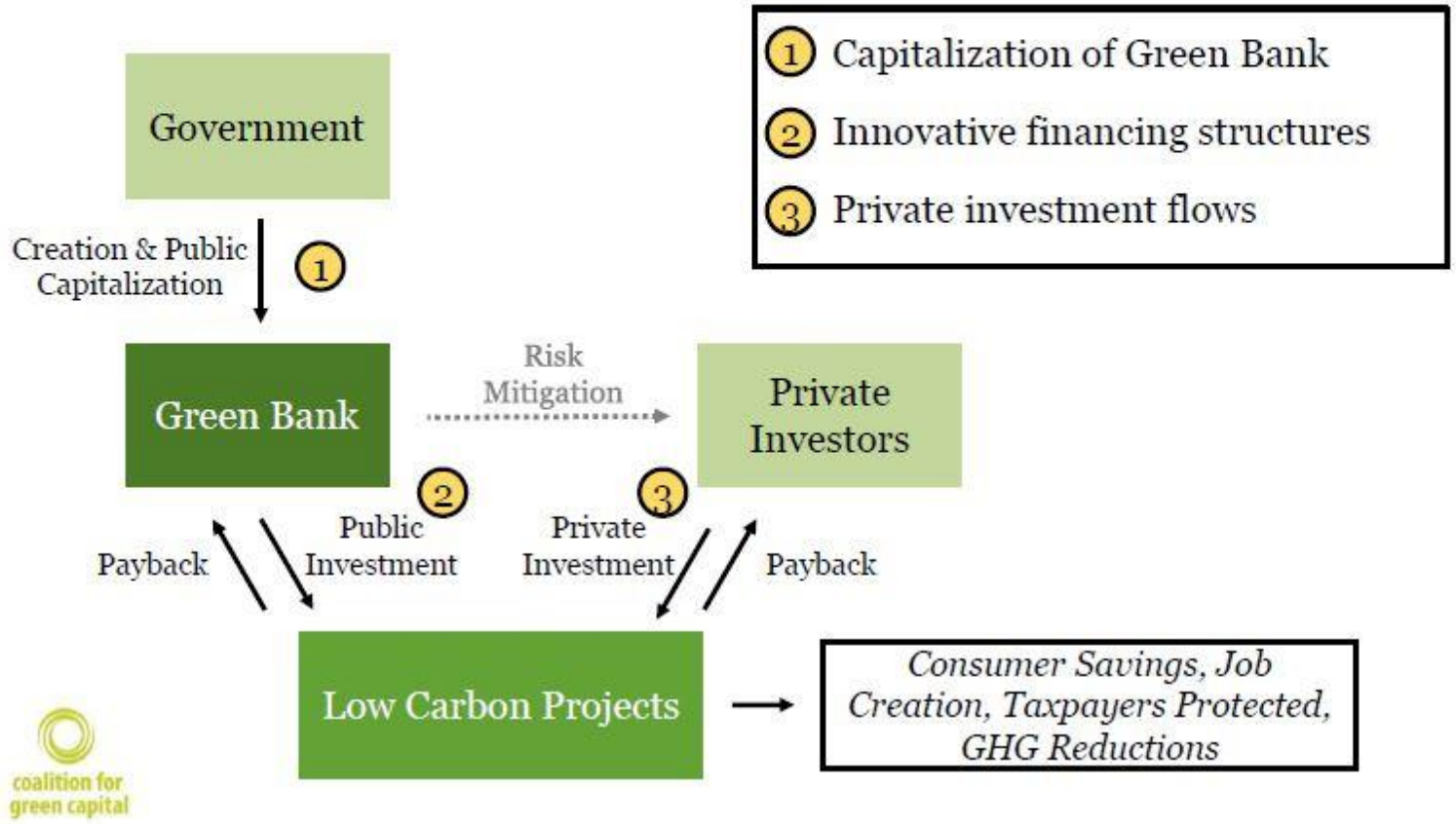
Federal $$s greatly diminished … Large State Budget Deficits

Green Bank Basics

CONNECTICUT GREEN BANK

Basic Green Bank Model

Create New Public Institution to Channel Public & Private Investment



How Green Bank's Leverage Public Capital with More Private Capital

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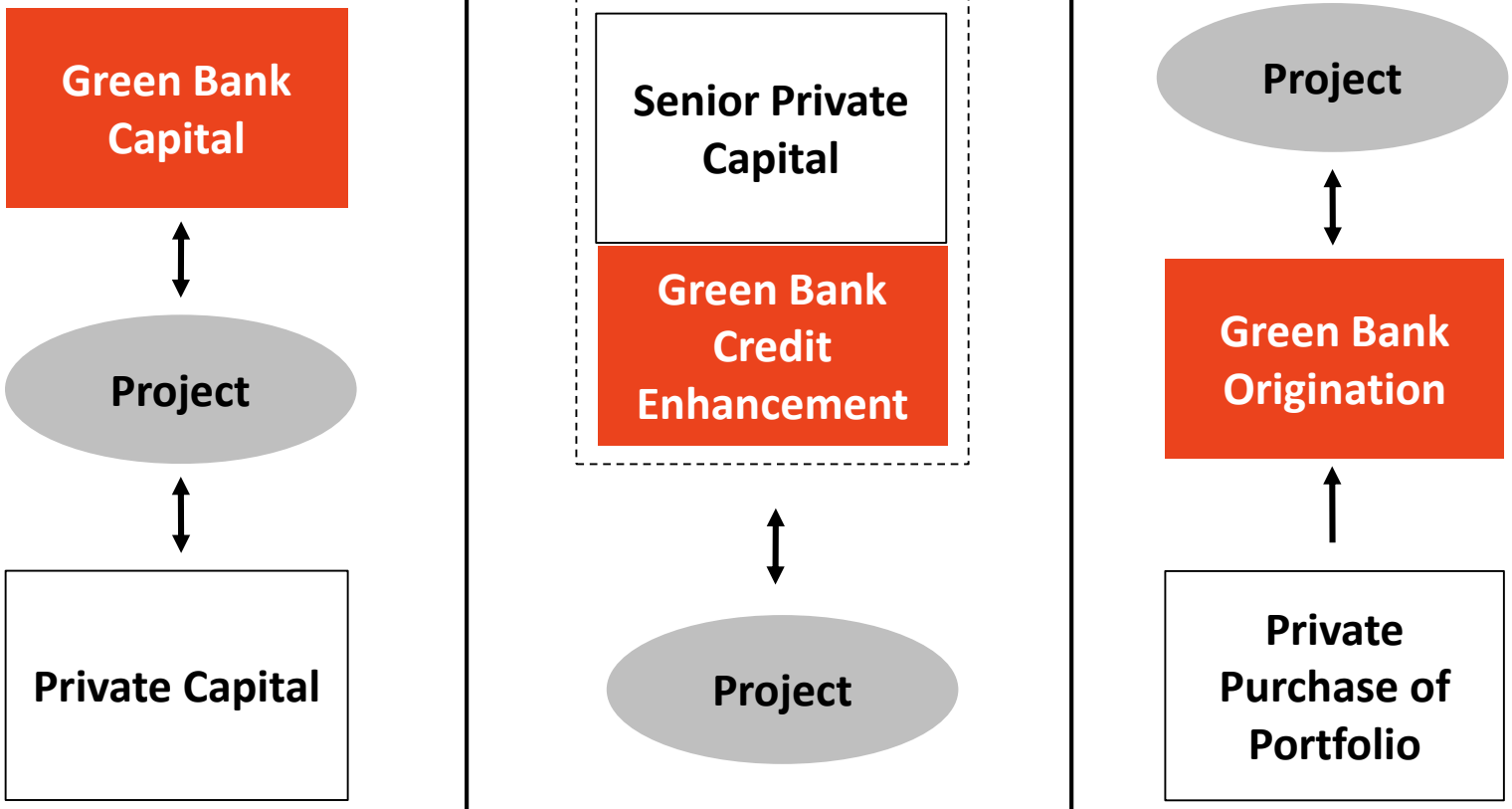


What Impacts are Being Achieved through the Connecticut Green Bank?

Connecticut Green Bank

Accelerate Green Energy Deployment

	FY 2000- FY 2011 (CCEF)	FY 2012- FY 2016+ (CGB) [1]
Model	VC and Subsidy	Financing
Years	11.00	5.25
Energy (MW)	43.1	208.2
Investment ($MM)	$349.2	***$1 Billion***
Leverage Ratio	1:1	3:1 to ***11:1***
% of Funds as Loans	10%	50%

Deploying **more** green energy at a **faster** pace while using ratepayer-taxpayer resources **responsibly**

REFERENCES

1. Approved, closed, and completed transactions

Connecticut Green Bank

Accelerate Green Energy Deployment

Table 10. Project Performance – Clean Energy Approved, Closed, and Completed Projects in Connecticut (FY 2012-2016)

	# Projects	Investment (Project Cost)	Investment /Capita*	MW	Watts /Capita*	Annual MMBTU)	Total Job Years	Lifetime CO2 Emissions (tons)
Not Distressed	14,039	$816,511,153	$528.15	135.1	115.8	863,166	7,933	1,573,531
Distressed	4,728	$298,095,849	$123.86	57.0	23.7	1,089,678	3,655	809,933
Unknown	4	$1,221,600	-	0.2	-	609	5	2,315
Total	18,771	$915,828,602	$255.90	192.3	53.8	1,953,454	11,594	2,185,779
% Distressed	25%	33%		30%				

* Calculated using the 2016 distressed community designations

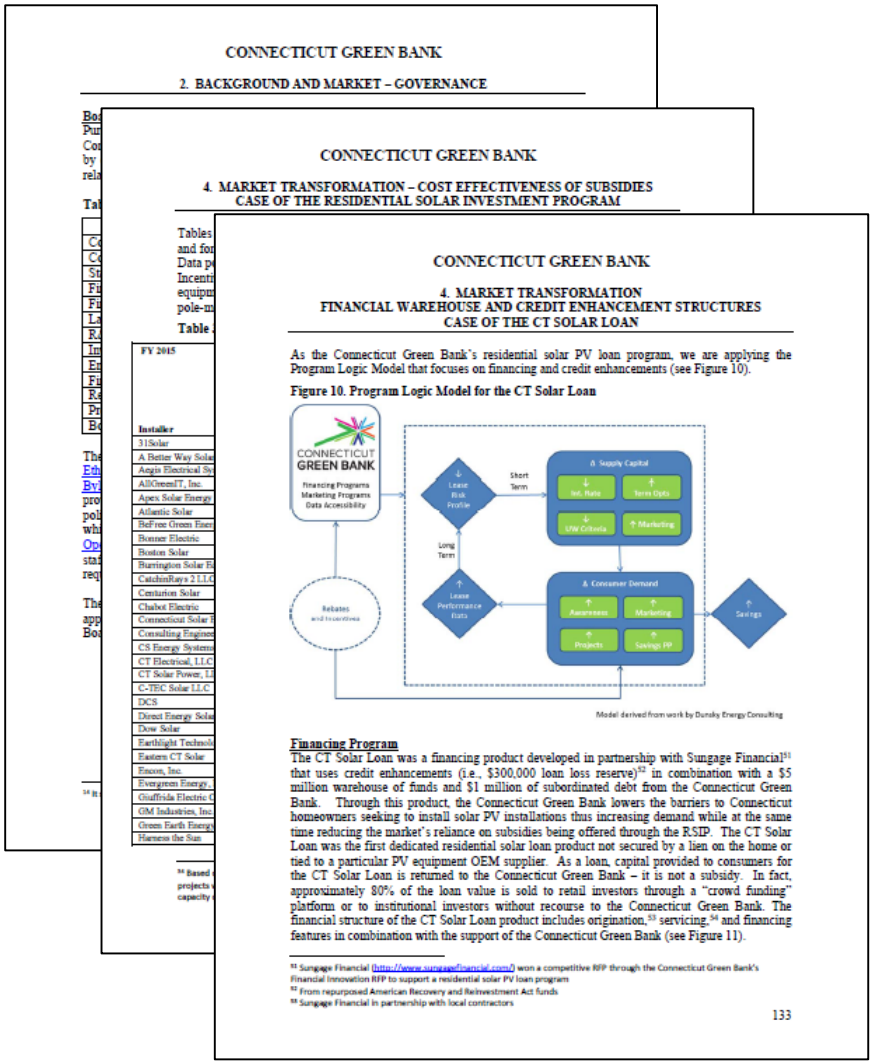
Deploying **more** green energy at a **faster** pace while using ratepayer-taxpayer resources **responsibly**

REFERENCES
1. Approved, closed, and completed transactions

Gold Standard in Reporting

Comprehensive Annual Financial Report

- **FY 2015** – filed 1st Comprehensive Annual Financial Report (CAFR) to Government Finance Officers Association (GFOA)
- **Financial Statistics** – audited financial statements for the organization
- **Non-Financial Statistics** – public benefit outputs and outcomes from the organization's activities



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2. BACKGROUND AND MARKET – GOVERNANCE

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4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES
CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

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4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE CT SOLAR LOAN

As the Connecticut Green Bank's residential solar PV loan program, we are applying the Program Logic Model that focuses on financing and credit enhancements (see Figure 10).

Figure 10. Program Logic Model for the CT Solar Loan

Model derived from work by Dunsky Energy Consulting

Financing Program

The CT Solar Loan was a financing product developed in partnership with Sungage Financial[51] that uses credit enhancements (i.e., $300,000 loan loss reserve)[52] in combination with a $5 million warehouse of funds and $1 million of subordinated debt from the Connecticut Green Bank. Through this product, the Connecticut Green Bank lowers the barriers to Connecticut homeowners seeking to install solar PV installations thus increasing demand while at the same time reducing the market's reliance on subsidies being offered through the RSIP. The CT Solar Loan was the first dedicated residential solar loan product not secured by a lien on the home or tied to a particular PV equipment OEM supplier. As a loan, capital provided to consumers for the CT Solar Loan is returned to the Connecticut Green Bank – it is not a subsidy. In fact, approximately 80% of the loan value is sold to retail investors through a "crowd funding" platform or to institutional investors without recourse to the Connecticut Green Bank. The financial structure of the CT Solar Loan product includes origination,[53] servicing,[54] and financing features in combination with the support of the Connecticut Green Bank (see Figure 11).

[51] Sungage Financial (http://www.sungagefinancial.com/) won a competitive RFP through the Connecticut Green Bank's Financial Innovation RFP to support a residential solar PV loan program
[52] From repurposed American Recovery and Reinvestment Act funds
[54] Sungage Financial in partnership with local contractors

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IMPACT! Public-Private Partnerships

Investment Transactions

$65 MM
CLOSED
10:1
FuelCell Energy
Dominion
Grid-Tied

$6 MM
CLOSED
6:1
Sungage Financial
Residential Solar

$75 MM
CLOSED
7.5:1
usbank
KeyBank
Webster Bank
Residential Solar
Commercial Solar

$30 MM
CLOSED
4:1
CLEANFUND Commercial PACE Capital
C-PACE

$30 MM
OPEN
10:1[1]
smart-e loan
energize CONNECTICUT
Residential Energy

$20 MM
OPEN
4:1
PosiGen Solar Solutions
usbank
EnhancedCapital
Residential Solar &
Energy Efficiency

$50-100 MM
OPEN
9:1
HANNON ARMSTRONG
FINANCING THE FUTURE OF ENERGY
C-PACE

$5 MM
OPEN
100%[2]
MacArthur Foundation
CAPITAL FOR CHANGE
Multifamily Energy

$60+ MM
OPEN
6:1[3]
ONYX
Commercial Solar

$3 MM
TERM SHEET
100%[4]
THE KRESGE FOUNDATION
Residential Storage
Commercial Storage

$10 MM
TERM SHEET
100%[4]
Bank of America
Connecticut
Green Bank

$75 MM
IN PROCESS
>20:1
J.P.Morgan
EVERSOURCE ENERGY
AVANGRID
Small Business
Energy Advantage

REFERENCES

1. LLR yields high leverage – and it is 2nd loss and thus with no to low defaults, we haven't used to date. IRB's not considered in the leverage ratio.
2. Foundation PRI is to HDF, guaranteed by the CGB in the case of MacArthur Foundation.
3. Onyx Partnership has no upper limit and CGB currently has authorization to commit up to $15mm. The team expects to commit $5mm for the first $60-70mm.
4. Foundation PRI and commercial loan are backed by CGB balance sheet in the case of the Kresge Foundation and Bank of America respectively.

IMPACT! Connecticut Green Bank

Delivering Results for Connecticut

- **Investment** – mobilized over $1 billion of investment into Connecticut's clean energy economy so far
- **Jobs** – created 4,710 direct jobs and up to an estimated 12,500 total jobs, translating to an estimated 7.5% to 20% of total job creation in CT over the Green Bank's first 5 years.*
- **Energy Burden** – reduced the energy burden on over 20,000 households and businesses
- **Clean Energy** – deployed more than 200 MW of clean renewable energy helping to reduce 2.5 million tons of greenhouse gas emissions that cause climate change

REFERENCES

*62,500 private non-farm jobs created in the state over 5 years since Green Bank creation mid-2011. Green Bank statistics are in job-years; "total jobs" include direct, indirect and induced. CT DOL statistics are aggregated from monthly point-in-time estimates. CT Department of Labor - http://www1.ctdol.state.ct.us/lmi/privatesectoremployment.asp

Project / Program Examples

Support for Homeowners

Smart-E Loan
PosiGen Solar Lease and Efficiency Bundle

Smart-E Loan

smart-e loan
energize CONNECTICUT
CONNECTICUT GREEN BANK

- Residential, **1-4 unit** loan product for homeowners
- **Low-interest** financing with **flexible terms**
  - 5, 7, 10 and 12 year terms
  - Rates range from **2.99%** to 6.99%
- **40+** energy improvements can be financed
  - Boilers, Furnaces, Heat Pumps, Central Air, Insulation, Solar, EV Chargers and more!
- **Easy** application through eleven **local lenders**
- Borrow from $500 up to **$40,000**

www.energizect.com/smarte

Smart-E Loan (Credit Support)

$28 MM Loan Capital Available

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COREPLUS CREDIT UNION cpcu Smart Banking. Community Trusted.

ion BANK

eastern savings bank Because it matters.

nutmeg state financial CREDIT UNION

Thomaston Savings Bank

Patriot Bank

WORKERS' FEDERAL Credit Union Serving the Community For Over 75 Years.

Union Savings Bank

- **Credit Support** – $2.5 MM "2nd loss" loan loss reserve attracts $28 MM of loan capital

Smart-E Loan
"Bundle" Special Offer

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smart-e loan

energize CONNECTICUT

- **Smart-E Bundle** **2.99%** interest rate at **5**, **7 or 10** years for qualifying projects with **multiple measures**

  - ✓ **Solar + Insulation**
  - ✓ **Solar + Energy Efficient Windows**
  - ✓ **Solar + EV Charger**
  - ✓ **Solar + High Efficiency HVAC (Any fuel type or heat pumps)**
  - ✓ **Insulation + Windows**

- "Credit" given for an eligible measure installed in last 5 years, with proof

- **www.energizect.com/SmartEBundle**

Smart-E Gas Conversion and Heat Pump 2.99% Special Offers

Convert to natural gas & install high-efficiency equipment for 2.99% at a 5, 7 or 10-year term

Install high efficiency heat pump equipment and get 2.99% at 5, 7 or 10 year term

Residential 1-4 Owner Occupied
Low Income Portfolio

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goSolarCT

PosiGen Solar Solutions

smart-e loan
CAPITAL FOR CHANGE

- Residential Solar Investment Program
- Low-to-Moderate Income Performance Based Incentive for Third Party Owners
- More than double Step 9 incentive
- Income screen of 100% AMI or lower

- $27 MM Solar for All campaign
- Solar Lease and Energy Efficiency Energy Services Agreement
- HES or HES-IE (direct install EE) leveraged
- Alternative underwrite
- Community partnerships

- Low interest
- Unsecured loan
- 40+ measures (EE and RE)
- 580+ FICO, 50% DTI (waived for 680% FICO, offered through CDFI)
- 25% of loan for health and safety upgrades

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PosiGen Solar Solutions

- **Solar PV Progress** – 835 installations in 17 months for 5.8 MW of solar PV deployment
  - ✓ $55-$100 solar PV lease payment/month for 20 years
  - ✓ 71% of contracts are LMI*
  - ✓ 62% of customers move forward (suitable)
- **Energy Efficiency Progress**
  - ✓ 99.9 % of households installing solar PV undertake Direct Install EE measures
  - ✓ 66% of households also undertake "deeper" energy efficiency projects * (e.g., insulation, thermostats, etc.) through $10 ESA payment/month for 20 years
- **Community Campaigns** – in Bridgeport, Hartford, New Haven, New London
- **Jobs** – 62 current CT based Employees

Solar PV Lease and EE ESA

PosiGen

Home
(New Haven – Oil Heat)

$59,250 HHI
High Energy Costs

High Energy Burden

+

Solar PV (Lease)

$55 to $100/month Lease
Net $ Savings - Solar

Moderate Energy Burden

+

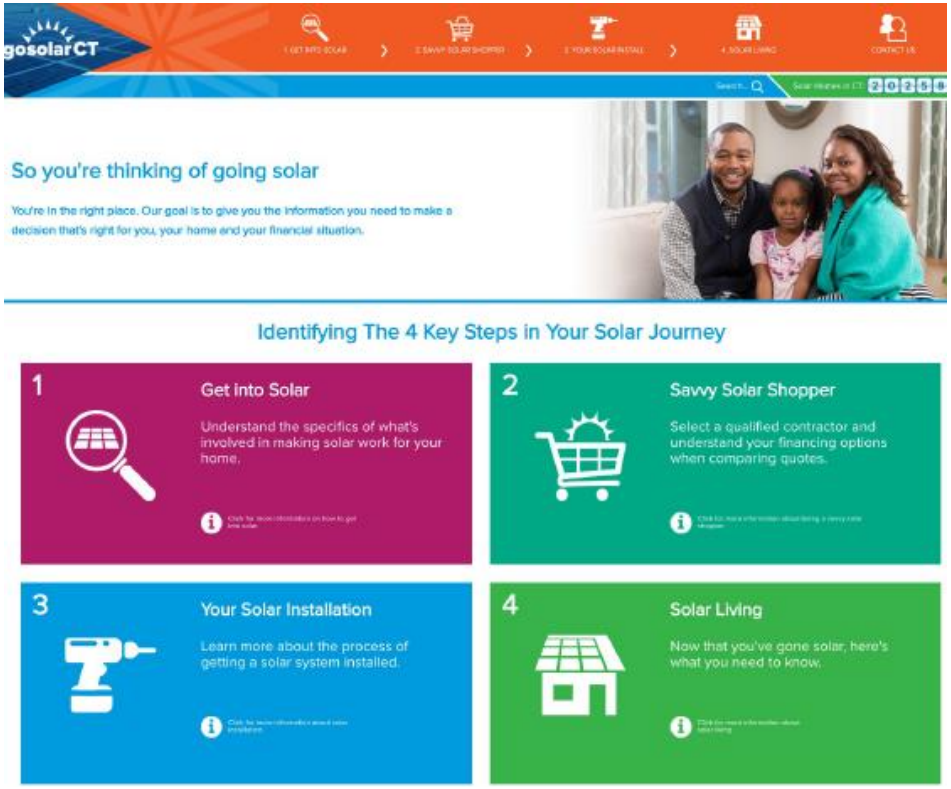
Energy Efficiency (ESA)

$10/month ESA
<<Additional Savings>>
Net $ Savings – Solar + EE

Reasonable Energy Burden

GoSolarCT

Resources for CT Homeowners



- **GoSolarCT.com** is an informational resource that provides unbiased guidance for Connecticut residents throughout their solar journey – before, during and after installation.

- **Solar Market Spotlight** is a quarterly snapshot of the residential solar market in Connecticut.

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Support for Multifamily Property Owners

Technical Assistance

Pre-Development Loans

Project Financing

Multifamily Programs - What we do

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We help multifamily housing building owners:

- Save money on energy
- Increase property value
- Improve occupancy rates
- Improve comfort and safety

Resources to Get You Started on the Right Path

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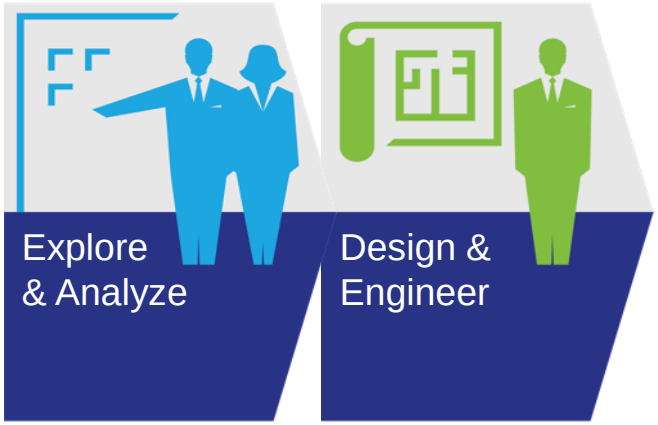
Pre-Development Resources



Benchmark CT
- Free energy benchmarking resource

Sherpa Loan
- Designated service provider
- Standardized process & fee schedule

Navigator Loan
- Client managed contractor(s)
- Customized technical services

www.ctgreenbank.com/multifamily

Energy Upgrade Financing

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Project Financing

LIME
- Low Income Multifamily Energy
- Affordable
- Unsecured

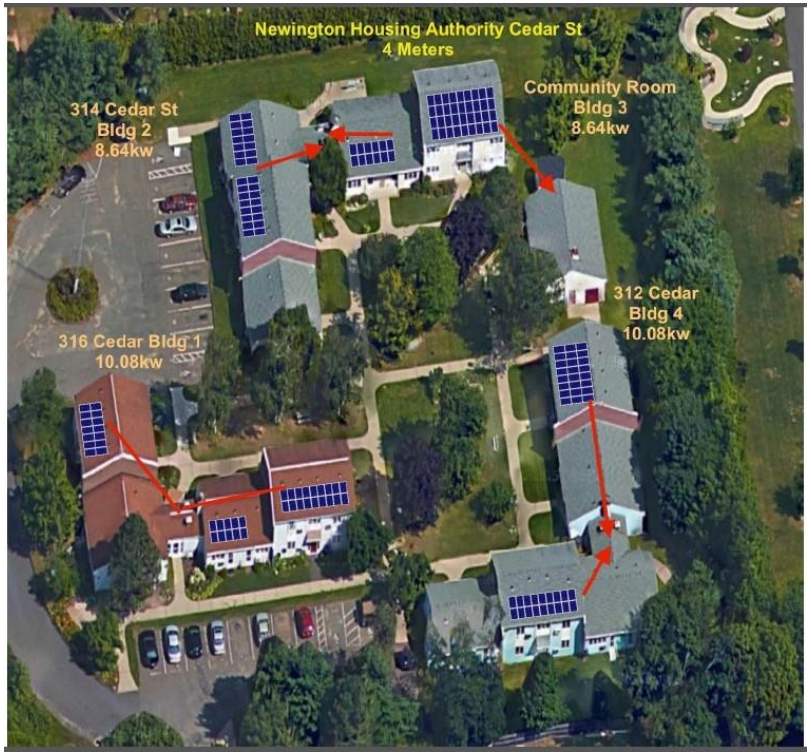
Solar
- Solar projects only
- Commercial solar lease

C-PACE
- Commercial Property Assessed Clean Energy

Gap Financing
- Flexible low-cost financing
- Energy & health/safety

www.ctgreenbank.com/multifamily

Affordable Multifamily Impact to Date



Partnership with CHFA – solar on 10 housing authorities supporting 1,300 rental units:

- Bristol, Brookfield, Colchester, Gales Ferry, Manchester, Middlefield, Newington, Trumbull, Wethersfield, Windsor Locks

Partnership with Capital for Change on LIME loan – 18 efficiency and solar projects supporting 1,292 affordable rental units

- Bridgeport, Chester, East Hartford, East Windsor, Farmington, Granby, Hartford, Manchester, Middletown, Milford, New Haven, Stamford, Thompson, Waterbury, West Hartford, West Haven

Partnership Approach

Don't Go It Alone!

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We work with state and federal agencies to align policies, programs, standards:

CONNECTICUT Department of Housing

CONNECTICUT HOUSING FINANCE AUTHORITY
The Key To Affordable Housing

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Connecticut Department of ENERGY & ENVIRONMENTAL PROTECTION

DPH Connecticut Department of Public Health
Healthy Homes Initiative
Good Health Begins at Home

We work with utilities and CT Energy Efficiency Fund to align incentives for energy upgrades:

energize CONNECTICUT

CT

EVERSOURCE ENERGY

UI

We pilot strategies to provide technical assistance and drive demand for affordable multifamily upgrades:

NEI NEW ECOLOGY INC.

Connecticut Housing Coalition

Solarize CONNECTICUT

We work with a range of partners to provide low-cost financing solutions for key low income market segments with appropriate credit policies:

PosiGen

cpace

MacArthur Foundation

hdf

CAPITAL FOR CHANGE

CONNECTICUT GREEN BANK

Support for Business Owners, Not-For-Profits, Municipalities & Schools

C-PACE

& Solar Lease Program

What is C-PACE?

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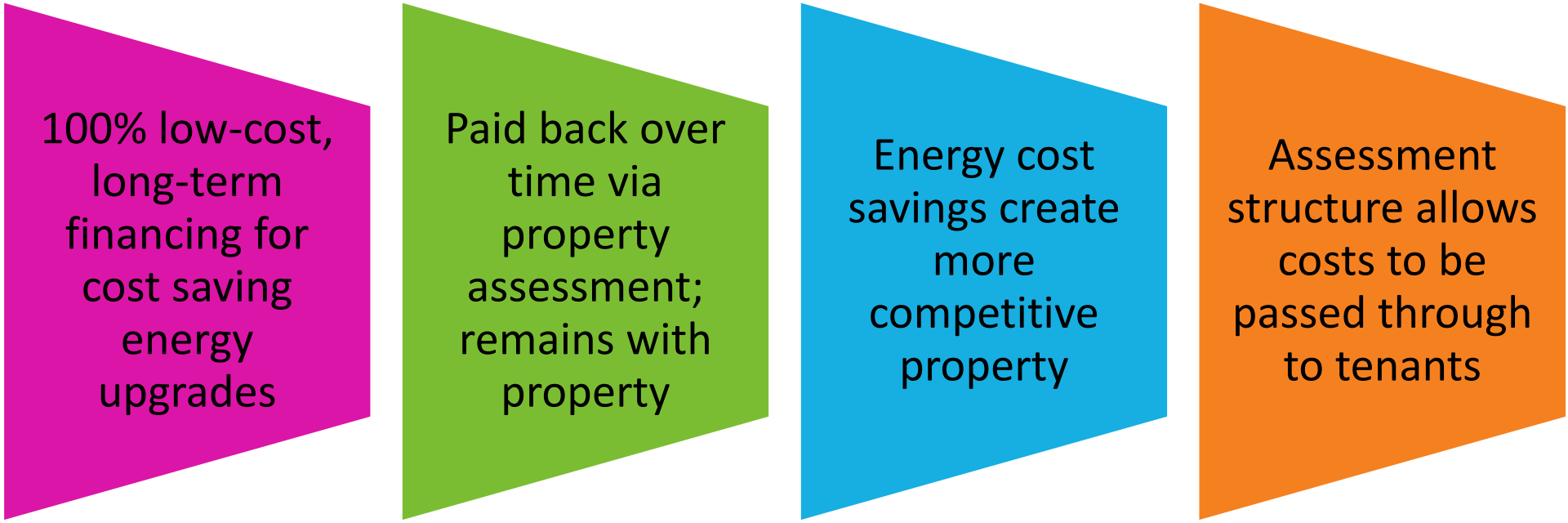


C-PACE provides building owners with:

1. Confidence
2. Control *and*
3. Comfort

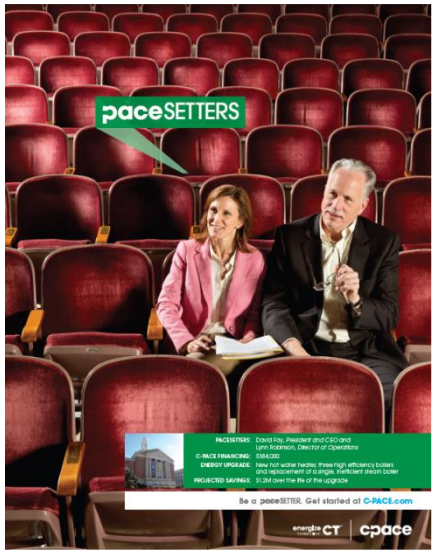
C-PACE Addresses Key Barriers

Lack of funding?	**100% financing up to 25 years**
Near term plan to sell?	**Repayment obligation transfers at sale**
Insufficient payback/"return on investment?	**Positive cash flow in year 1**
Split incentives?	**Costs and savings pass to tenants**
Uncertain savings/technical expertise?	**Technical underwriting / "savings-to-investment ratio" > 1**

Almost all facilities can use an energy upgrade

example: old gas boiler to new high efficiency boiler system

Commercial-PACE
DEEP Retrofits



- 82 cities and towns and opted into the program – over 85% of the market
- 200+ contractors trained
- 20 qualified capital providers
- 17 mortgage lenders have provided consent
- $40 million warehouse – $25 million in deals approved
- 33 transactions approved ($700 K average size) – saving between 40-50% energy consumption
- **Sold $30 million – first securitization of commercial energy efficiency projects**

CT Solar Lease 2

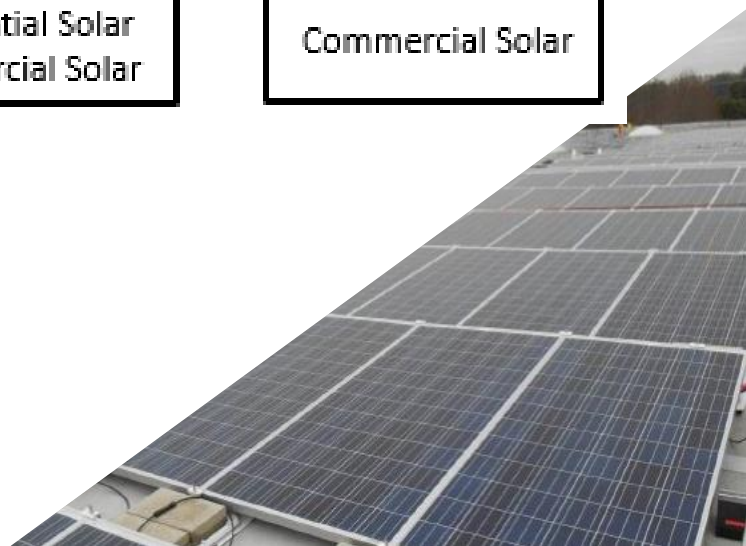
CT Solar Lease 1 – nation's first residential PV financing program to combine ratepayer funds with private capital to leverage federal incentives

CT Solar Lease 2 ("SL2")

- Residential
- Commercial:
  - Municipalities & Public Schools
  - Non-profit organizations*
    - Community Centers / YM-YWCAs
    - Private / Charter Schools
    - Houses of Worship
  - "Mid-market" commercial entities*
    - CRE: Office buildings, shopping centers / retail
    - Heavy to light industrial
    - Etc!!

$75 MM
CLOSED
7.5:1
U.S. Bank
KeyBank
Webster Bank
Residential Solar
Commercial Solar

$60+ MM
OPEN
6:1[3]
ONYX
Commercial Solar



SBEA Program Funding Structure
(Small Business Energy Advantage)

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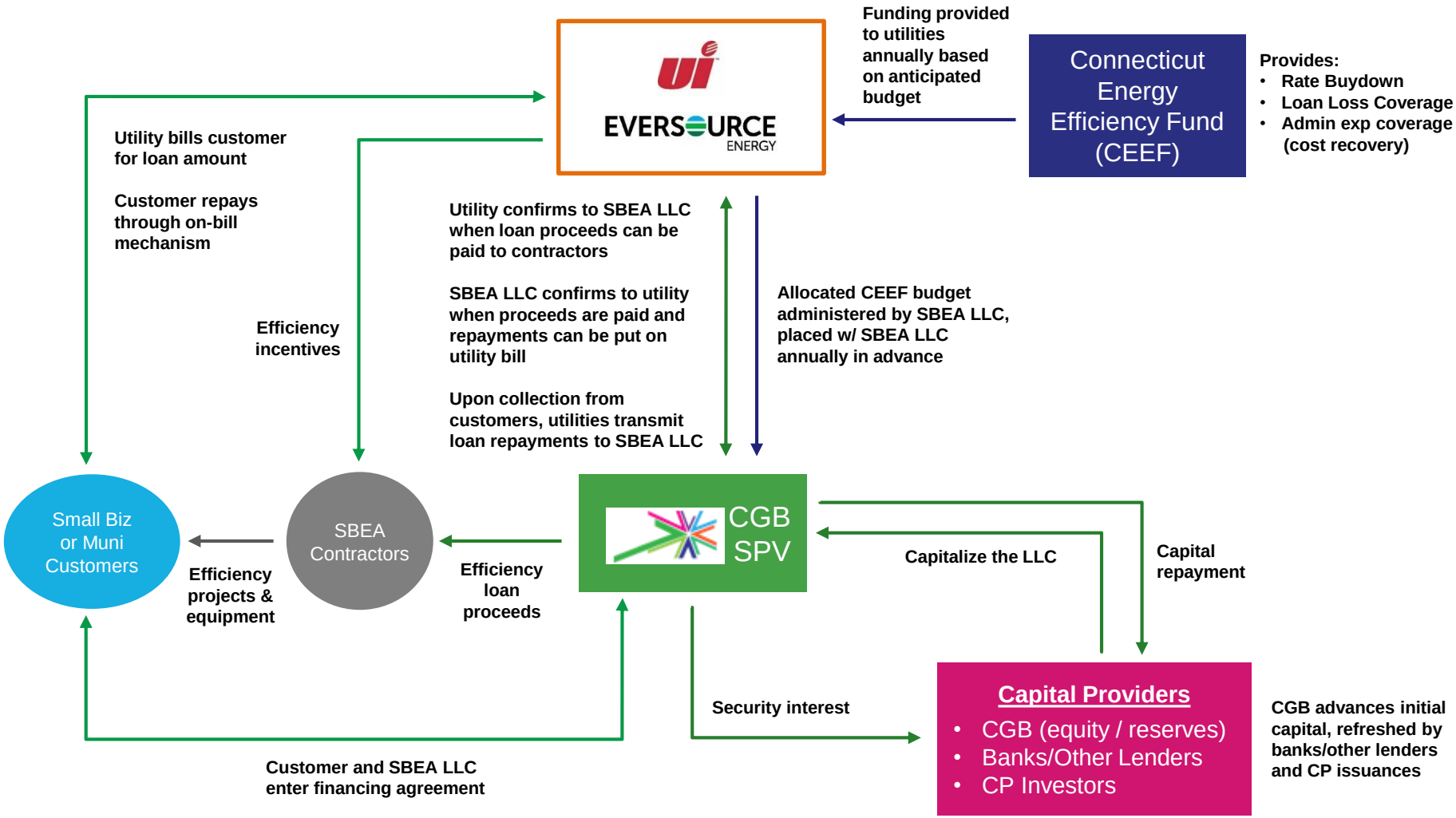


Lead by Example

Energy Savings for State Facilities

Opportunity

- State owns or leases nearly 4,000 buildings – at least 1,100 state buildings are sizeable and use significant amounts of energy
- An estimate of annual energy consumption in state buildings placed it at $200 million annually and 4.1 trillion BTUs
- Energy savings could reach $40 to $60 million in annual savings on energy costs

Details

- DEEP developed standardized energy savings performance contract program – which municipalities can use as well – 13 qualified ESCO's and technical and financial support
- $83 million of projects identified – CVH ($33 MM – GO Bonds), DMV ($5 MM – GO Bonds), and DOC ($45 MM – CGB Green Bonds)

Bridgeport Fuel Cell Park

Utility-Scale Clean Energy Projects

- $125 million 15-MW project
- Created nearly 140 jobs – construction, manufacturing and servicing
- Rehabilitated a former brownfield producing tax revenue for the city
- Distressed municipality
- Technology manufactured in Connecticut
- 2nd largest fuel cell power plant in the world
- Reduce over 85,000 tons of CO2 emissions
- **CTGB provided "back levered" financing to developer to attract buyer for the project (buyer demanded a cash reserve fund for O&M)**

CHP Projects
Micro Grids

- Section 103 of PA 11-80 (grants, loans, or PPAs)
- Several CHP projects in development – Norwalk Hospital, Wesleyan University, and Brown's Farm (Stamford)
- System efficiency > 50%
- Produce onsite clean energy – electricity and heat
- Long-term PPA's, virtual net metering, and other policies
- **CTGB to provide subordinated debt to attract equity, tax equity, and senior lenders**

Anaerobic Digester Projects
Waste Water Sewage Sludge and Food Waste

- Section 103 of PA 11-80 (grants that we tuned into loans)
- Section PA 11-127 (allies to large producers of organics)
- Several AD projects in development
- Address food waste and waste water sludge
- Produce onsite clean energy from use of methane gas – electricity and heat
- Long-term PPA's & virtual net metering policies
- **CTGB to provide subordinated debt to attract equity, tax equity, and senior lenders**

Wind Projects
Colebrook Wind South

- Public Policy – EDCs to procure 30 MW of grid-tied renewable energy systems
- Project is a 5 MW wind project
- Two 2.5 MW GE turbines
- Project was past recipient of $500,000 in CCEF loans
- 20-year PPA with EDC
- **CTGB investment of $2.8M in total would leverage 7x in private capital (Sr debt, tax equity, developer equity)**

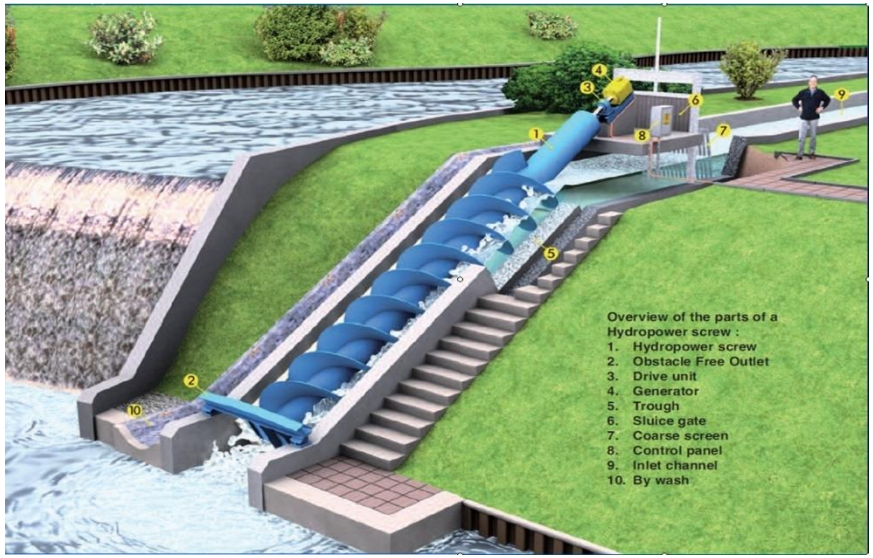
New England Hydropower
Run of the River Hydro

Overview – Meriden, CT

1. Unlock potential for small hydro in CT
2. Using established technology widely deployed in Europe (Archimedes Screw Generator)
3. Discounted electricity for the City while using VNM credits and ZREC

Details

- From Operational Demonstration (2011) to project finance with CREBs – working capital (Webster Bank), construction financing (First Niagara), and Green Bonds (Bank of America)
- 193 kW hydro-electric facility, producing about 1,000 MWh (equal to 115 homes)
- 30-year PPA with option to extend 10 additional years
- Ability to replicate throughout New England



Foundations and use of Green Bonds

MacArthur Foundation
Affordable Multifamily PRI

- **Green Bank has partnered with the Housing Development Fund to win a $5 million MacArthur Foundation Program Related Investment for Connecticut to support (at least) three new lending programs focused on affordable multifamily energy upgrades, including:**
  - *Energy Opportunity Assessment Loan Fund – pre-development costs*
  - *Healthy Homes Loan Fund – health & safety measures*
  - *Finish Line Loan Fund – gap financing*
- **Through HDF, that funding is immediately available for pre-development purposes**
  - *Flexible underwriting for low-cost, minimal-risk loans to assist property owners in exploring energy upgrade opportunities*
  - *See www.ctgreenbank.com/multifamily to learn more*

Connecticut Green Bank

Green Bonds

- **C-PACE** – bonds backed by a pool of C-PACE assessments
  - 2014/15 purchased by Clean Fund via PFA as conduit issuer
  - $100 Million facility w/Hannon Armstrong (potential securitization)
    - *CarbonCount™* certification – "Green Bond Ready"
- **QECBs** – bonds backed by PPAs to State Housing Projects ($2 Mil)
  - State Housing Finance Authority & QECB Buyer (B of A)
- **New CREBs** – bonds backed by PPA & ZREC revenue
  - 2016: 193 kW Archimedean hydro screw generator ($3 Mil – B of A)
  - 2017+: State agency / DOT / municipal solar projects ($25+ Mil ???)
- **SHRECs** – Solar Home Renewable Energy Credits
  - Securitize annual tranches of SHRECs sold to CT IOUs
  - Circa $125 Mil (5 year program) … starting late 2016 … ???
- **SBEA** – Small Business Energy Advantage
  - Securitize pools of energy loans to small businesses

Grid of the Future

Cleaner, Cheaper and More Reliable

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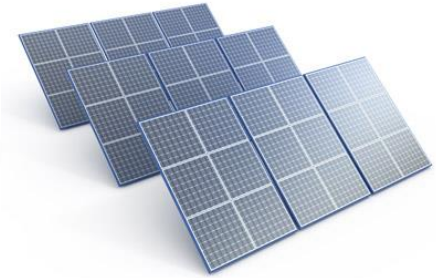
Identify Improvement Location

Individual Home Energy Score Assessment

Individual Solar PV Remote Assessment

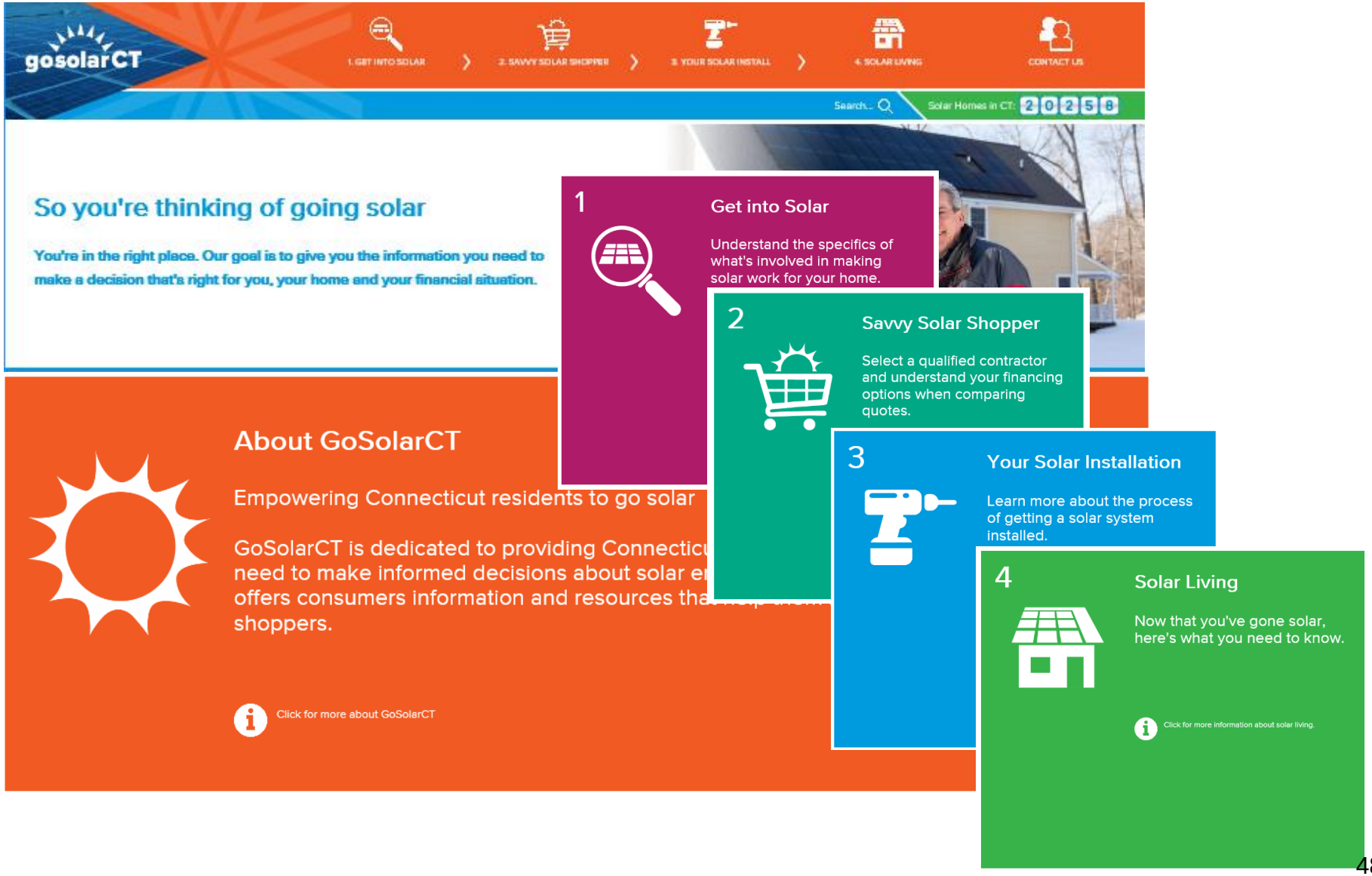
DER System Planning



EE **RE** **DR/RTT** **Storage/EV**

GoSolarCT

Trusted Source of Information



Green Bank Movement

Green Bank Movement

CT Leadership Nationally and Globally

CONNECTICUT GREEN BANK

MOTHERBOARD VICE

How Green Banks Could Save the World

By Meredith Rutland Bauer
November 28, 2016

With environmental groups worried that a Donald Trump presidency could slow the implementation of renewable energy in the US, some clean energy advocates are turning to green banks for funding.

GREEN BANK NETWORK

NRDC NATURAL RESOURCES DEFENSE COUNCIL

coalition for green capital



GREEN BANK ACT OF 2016

S 3382

HR 5802

Trump Infrastructure Plan

Working with ACORE, CDFA and others

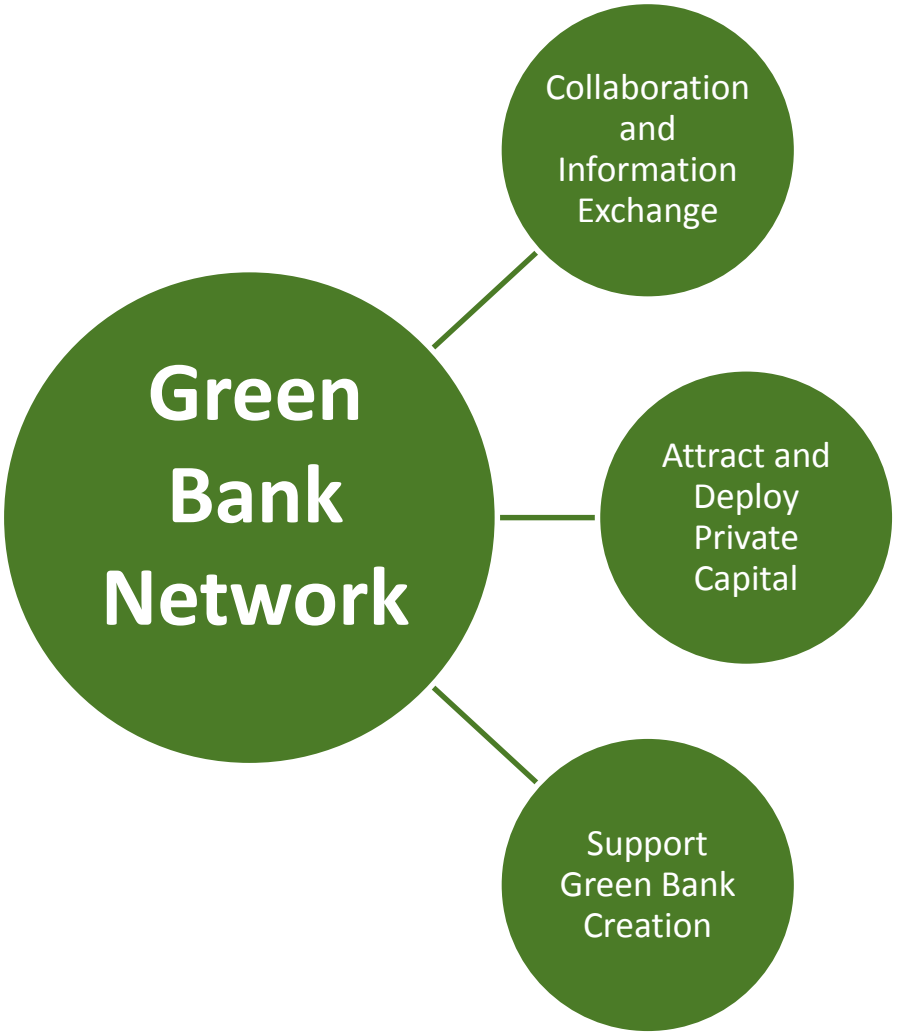
Include clean energy transmission, distribution, and generation as infrastructure and grid modernization is key

Advocate for inclusion of an infrastructure green bank patterned after Green Bank-style financing (i.e., financing that leverages public resources to mobilize private investment in infrastructure)

Public Private Partnerships

Green Bank Network

Join the Green Bank Network



Japanese Green Finance Organisation

REFERENCE

Information provided by the Coalition for Green Capital

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Thank you!

Questions?

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