



**Better  
Buildings**  
U.S. DEPARTMENT OF ENERGY

## **Recent Innovations in the Use of Bonds and Power Purchase Agreements for Clean Energy Initiatives**

*Chris Jedd, Denver Housing Authority*

*Steve Pearlman, Pearlman & Miranda, LLC*

*Moderator: Molly Lunn, U.S. DOE*

*Eric Friedman, Massachusetts*

*Bruce Schlein, Citi*

# Power Purchase Agreements for Multi-Family Housing

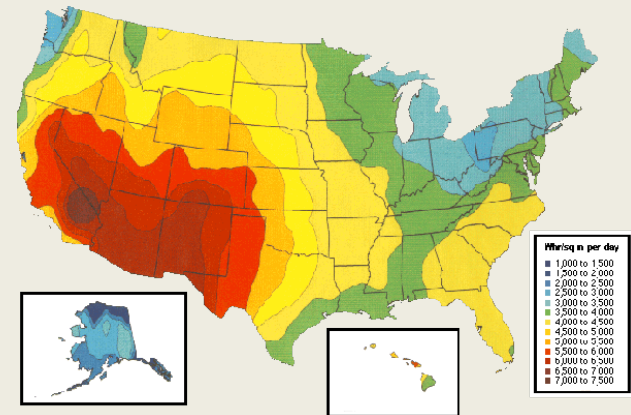
Chris Jedd – LEED AP BD+C  
Portfolio Energy Manager – Denver Housing Authority



# Why a PPA for DHA ?



- Continual expansion of DHA's renewable energy portfolio
- Long-term predictable energy costs for DHA
- Supports HUD's interest in sustainability
- Payments from site license agreement
- Minimal upfront costs
- Availability of sunlight



# Power Purchase Agreement Overview

## Project Facts

- 2.5 Megawatts
- 666 roof tops
- 10,471 panels
- Single family & row homes
- CO2 reduction of 3,500 tons
- Generates 3.4 million kilowatt hours annually

## Project Partners



Site Host



Project Developer



Financer & Owner



Designer & Installer

# Phase 1: Request for Proposals



*“The Housing Authority of the City and County of Denver invites responses from qualified entities to provide cost effective solar photovoltaic generating systems at multiple DHA sites by providing all design, construction, operation, application and financing services necessary to the successful installation and operation of said systems.”*



# Phase 2: Project Design



- Minimum of 2.5 Megawatts
- Housing portfolio of over 4,000 homes
- East and South facing roofs only
- Average system size is 4.7 KWs
- Estimated effective useful life of roofs
- Considered DHA's long range demolition and rehab plans



# Phase 3: Project Financing



- Third party owns and operates panels on DHA's buildings and sells DHA electricity at a discount
- \$10 million investment (Non DHA Money)
- No (or minimal) upfront costs to DHA
- DHA receives payment of site license agreement (roof Lease)
- 20 year contract
- Option to purchase panels at 75% discount in 6 years

# Phase 4: Construction



- New roofs
- 11 month schedule
- Namaste Solar
- 9 crews
- 2 days per installation





# Phase 5: Operations & Maintenance



**Impact on DHA operations**

**Maintenance staff training**

**Resident education**

**Tree maintenance**



# PV Install at North Lincoln Homes



**114 Homes \* 357 KW**



# Questions?



**Chris Jedd, LEED AP BD+C**  
**Portfolio Energy Manager, Denver Housing Authority**  
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# RECENT INNOVATIONS IN THE USE OF BONDS AND POWER PURCHASE AGREEMENTS FOR CLEAN ENERGY INITIATIVES



**May 8, 2014**

**U.S. Department of Energy  
Better Buildings Summit – Washington Hilton  
Washington, DC**

# SOLAR POWER PURCHASE AGREEMENT (PPA)

- **Advantages:**

- Turnkey, private solar developer
- Includes Financing and O&M
- Developer tax incentives embedded in PPA Price.

- **Disadvantages:**

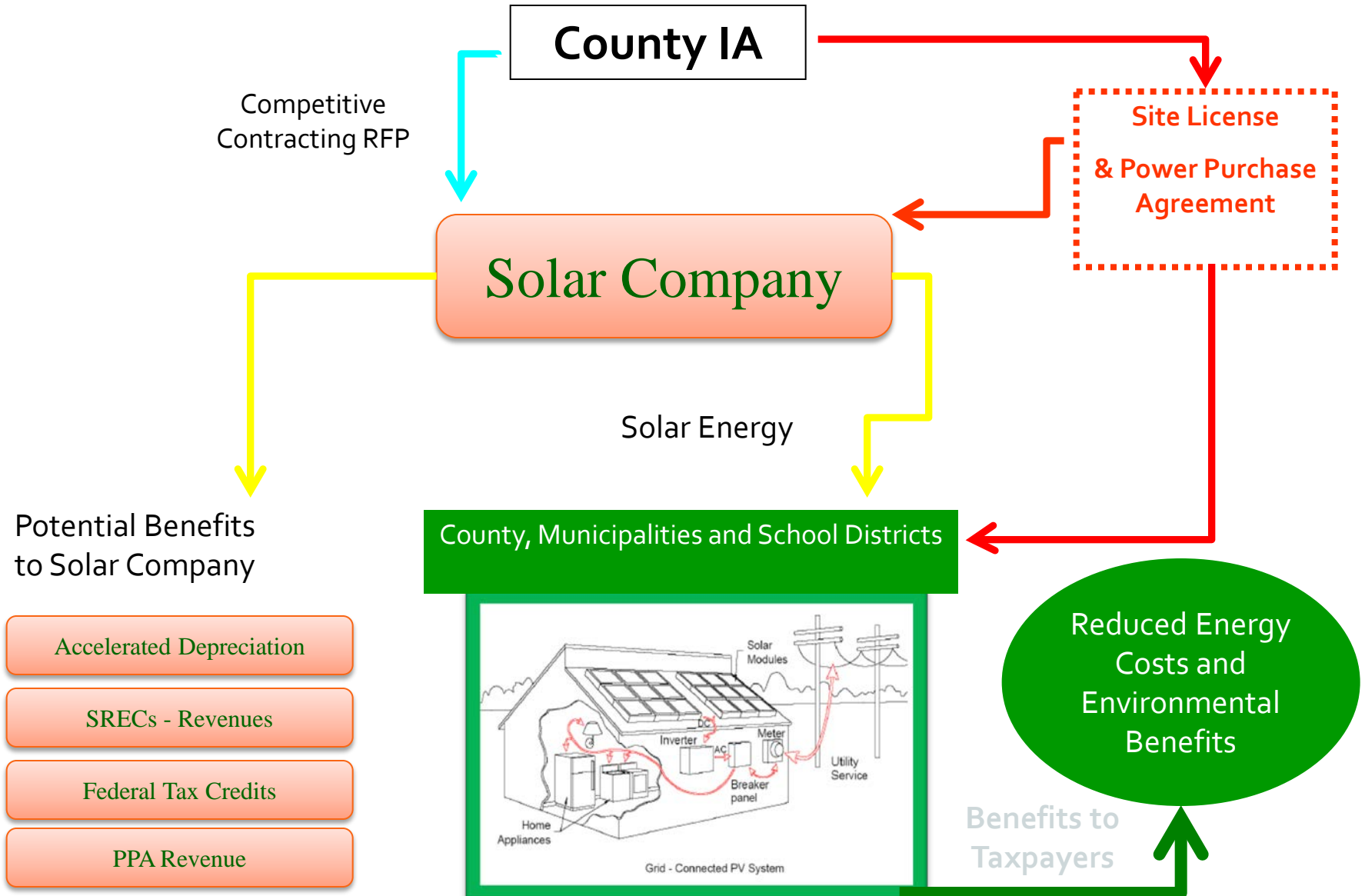
- PPA pricing sub-optimal (most financing benefits to developer)
- Potential Risks in PPA (due to gov't action / inaction)
- FMV purchase at end of term, if term < useful life (not nominal, due to tax law)

# PPA RISKS

- Downtime (*lost PPA price + SRECs + Profit, regardless of fault*)
- Security obligation on Government
- Performance Guaranty from Solar Developer?
- Higher Rated Government Payment Guaranty?
- Limitation on Real Property Options (*mortgaging, lease, disposition*)
- Early Termination Penalties (*benefit of bargain*)

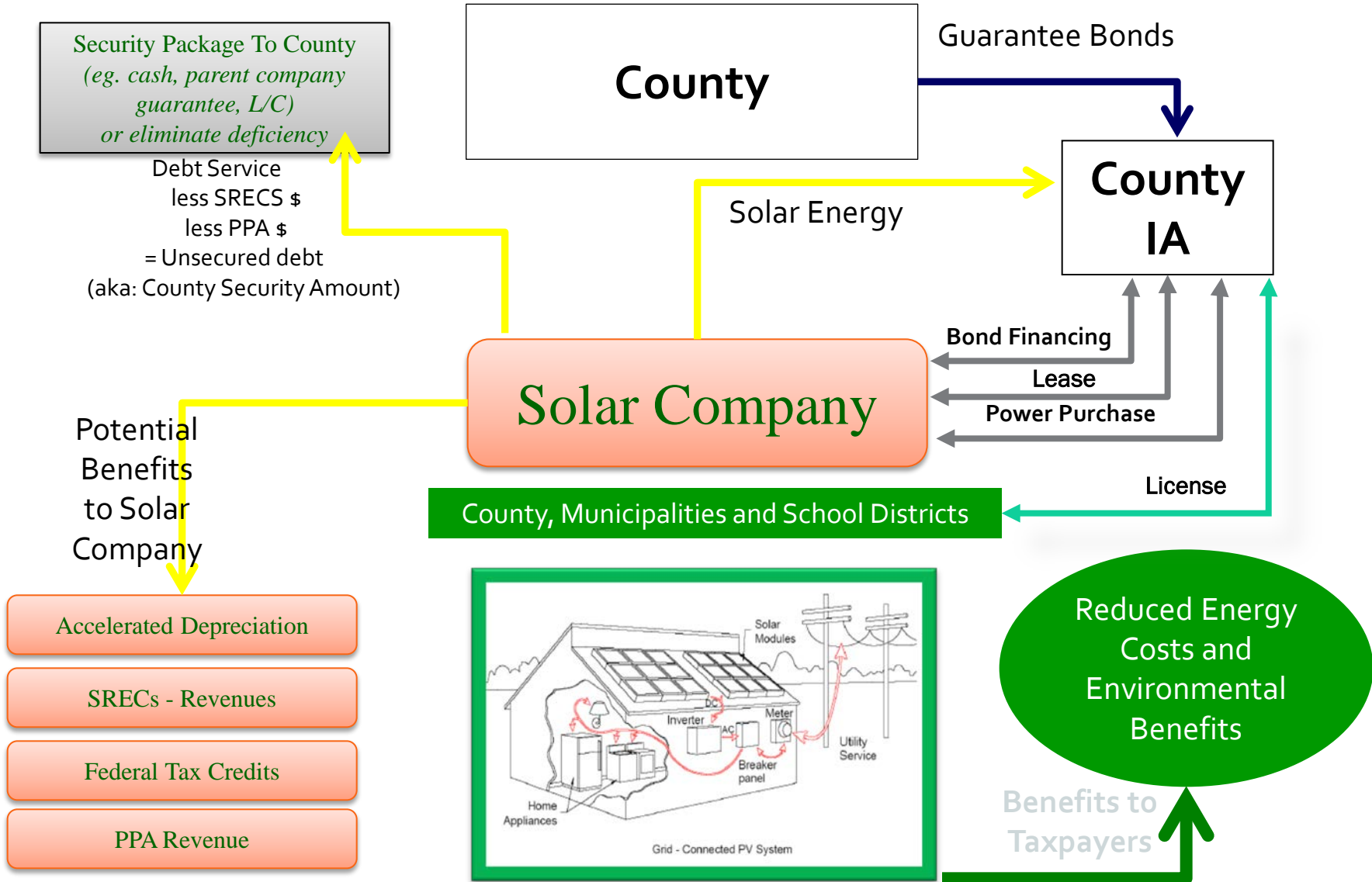
# HOW DOES THE PROGRAM WORK ?

## OPTION 1 – PPA MODEL



# HOW DOES THE PROGRAM WORK ?

## OPTIONS 2 HYBRID STRUCTURE





# **SAMPLE SOLAR DEVELOPER PROCUREMENT CRITERIA**

- PPA Price – Economic Benefit
- Developer Approach to Comply with RFP Requirements, including Technical Specs
- Developer Ability to Deliver Turnkey Project, including O&M
- Experience – Contracts of Similar Size and Scope
- Management – Key Personnel and Knowledge of Applicable Laws/Regs
- Logistics of Implementing Plan (1 year construction – multiple sites)
- Financial Strength (single purpose entity – guarantor)
- Construction Security (amount and strength)
- Funding of Deficiency (Developer default, left w/ PPA and SREC – amount and strength)
- Material Changes to Posted Documents Proposed?
- Other Economic Benefits Proposed?
- Restoration Security Included? (option to guaranty roofs restored at end)

# BENEFITS OF HYBRID – REGIONAL APPROACH

Benefits of these Solar Renewable Energy Programs

- No cost of solar feasibility study to local units
- Lower cost of project installation through aggregated county-wide RFP
- Better pricing of the PPA
- Ability for smaller facilities to take part in a PPA
- Budget certainty
- Compliance with local procurement regulations

# CASE STUDY – PILOT

MORRIS COUNTY IMPROVEMENT AUTHORITY

SOLAR RENEWABLE ENERGY PROGRAM – CLOSED ON FEBRUARY 18, 2010

- 3.2 MW from 19 facilities for 7 local unit governments
- Bond Pricing with AAA County Guaranty, 4.46%
- PPA Pricing: \$0.106 / kWh the first year
- 3% escalation, PPA Price in year 15 = \$0.16 / kWh (approximately today's market price!)
- 15 year PPA
- Sharing of 35% of SRECs if value over \$200 / SREC in years 11-15
- Market Price of SRECs today over \$600 / SREC in spot market
- 35% Average Savings / Local Unit

# CASE STUDY

SOMERSET COUNTY IMPROVEMENT AUTHORITY

SOLAR RENEWABLE ENERGY PROGRAM – CLOSED NOVEMBER 2010

- 7.6 MW from 31 facilities for 15 local unit governments
- Low Cost Financing Bond Pricing with AAA County Guaranty,
- 3.9%, 15 year maturity
- PPA Price: \$0.048 cents/kWh
- 2.75% escalation, PPA Price in year 15 = ~ \$0.07(half of present rate)
- 15 year PPA
- 60% savings off of 15/16 cent/kWh utility rate

# CASE STUDY

SOMERSET COUNTY IMPROVEMENT AUTHORITY

TRANCHE II SOLAR RENEWABLE ENERGY PROGRAM – CLOSED AUGUST 25, 2011

- 7.056 MW from 35 facilities for 18 local unit governments
- Bond Pricing with AAA County Guaranty, 4.02%
- PPA Pricing: \$0.041/kWh the first year
- 3% escalation, PPA Price in year 15 = \$0.10/kWh (lower than today's market price!)
- 15 year PPA
- Estimated Savings Over 15 Years = \$12.5M
- 23% Average Electric Savings for those facilities that participated
- Par Amount of Bonds: \$23,980,000
- Equity contribution of roughly 1/3 of total project cost eliminates CDA

# CASE STUDY

MORRIS COUNTY IMPROVEMENT AUTHORITY

TRANCHE II SOLAR RENEWABLE ENERGY PROGRAM – CLOSED DECEMBER 8, 2011

- 8.598 MW from 24 facilities for 10 local unit governments
- PPA Pricing: \$0.075 cents/kWh the first year
- 3% escalation, PPA Price in year 15 = \$0.113/kWh (lower than today's market PPA!)
- 15 year PPA
- Estimated Savings Over 15 Years = \$7.9M
- 35% Average Electric Savings for those facilities that participated
- Equity contribution of roughly 1/3 of total project cost eliminates CDA

# CASE STUDY

MORRIS COUNTY IMPROVEMENT AUTHORITY – SUSSEX COUNTY  
SOLAR RENEWABLE ENERGY PROGRAM – CLOSED DECEMBER 2011

- 6.9 MW from 20 facilities for 12 local unit governments
- PPA Pricing: \$0.0935 cents/kWh the first year
- 3% escalation, PPA Price in year 15 = \$0.15/kWh (lower than today's market PPA!)
- 15 year PPA
- Estimated Savings Over 15 Years = \$5.5M
- 32% Average Electric Savings for those facilities that participated
- Equity contribution of roughly 1/3 of total project cost eliminates CDA

# LESSONS LEARNED

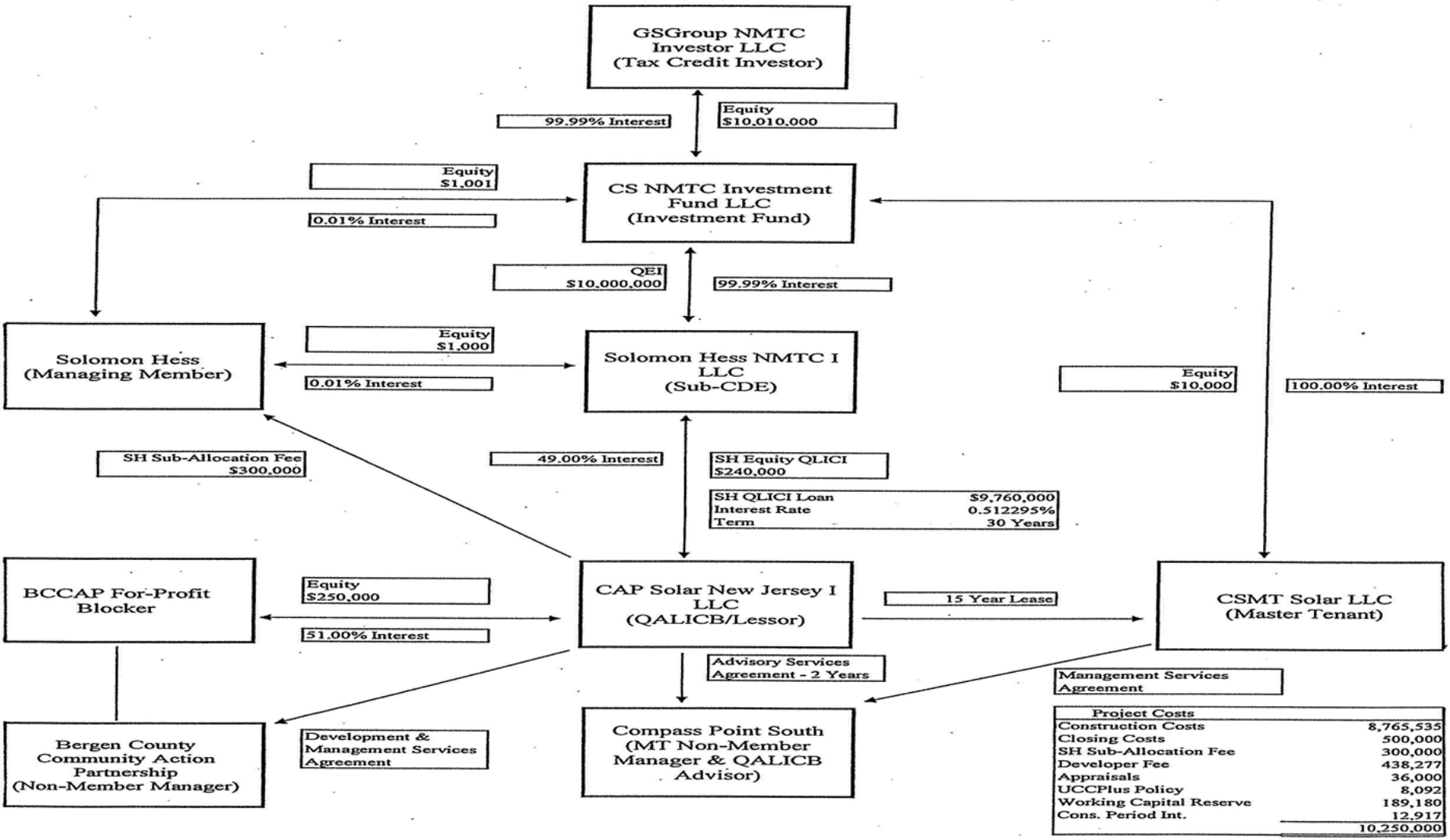
- Local Unit Commitment at all Steps
- Potential Closing of Local Unit Facilities in the Future
- Roof Warranties
- System Size & Regionality
- Solar Developer Experience and Balance Sheet
- Balance Maximum Savings with Minimal County Risk
- Building Inspectors and DOE Long Range Plan Updates
- Monitor SREC benefits



# HYBRID MODEL – OTHER STATES?

- **4 Essential Laws Required**
  - Energy Law (sufficient RPS – in NJ, SRECs can be 40% of subsidy)
  - Bond Law (streamlined approval v. voter requirement)
  - Local Public Contracts Law (multi-year contracting for 15 or more years of PPA)
  - Procurement Law (competitive process v. low bid v. negotiation)
- **Regional Approach**
  - State or County
  - Group purchasing power and amortize soft costs
- **Deep Pocket Required**
  - Conduit Issuer and General Obligation Guarantor
  - Dedicated Revenue Stream (e.g. sales tax)

# BCCAP / NEW MARKET TAX CREDIT MODEL



Project Costs	
Construction Costs	8,765,535
Closing Costs	500,000
SH Sub-Allocation Fee	300,000
Developer Fee	438,277
Appraisals	36,000
UCCPlus Policy	8,092
Working Capital Reserve	189,180
Cons. Period Int.	12,917
	<b>10,250,000</b>

# CONTACT INFORMATION

For any further questions, please contact:

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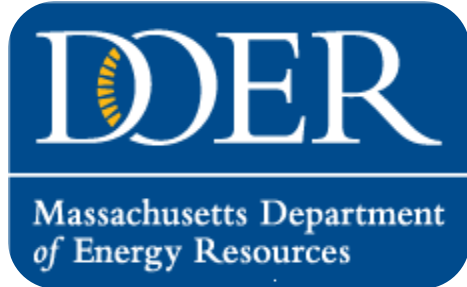
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# Summary and Questions

**Thank You!**

Pearlman & Miranda, LLC



# **Bond Financing for Energy Efficiency Projects at State Buildings:**

## **The Massachusetts Clean Energy Investment Program**

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Leading by Example Program  
Dept. of Energy Resources  
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[Eric.friedman@state.ma.us](mailto:Eric.friedman@state.ma.us)**

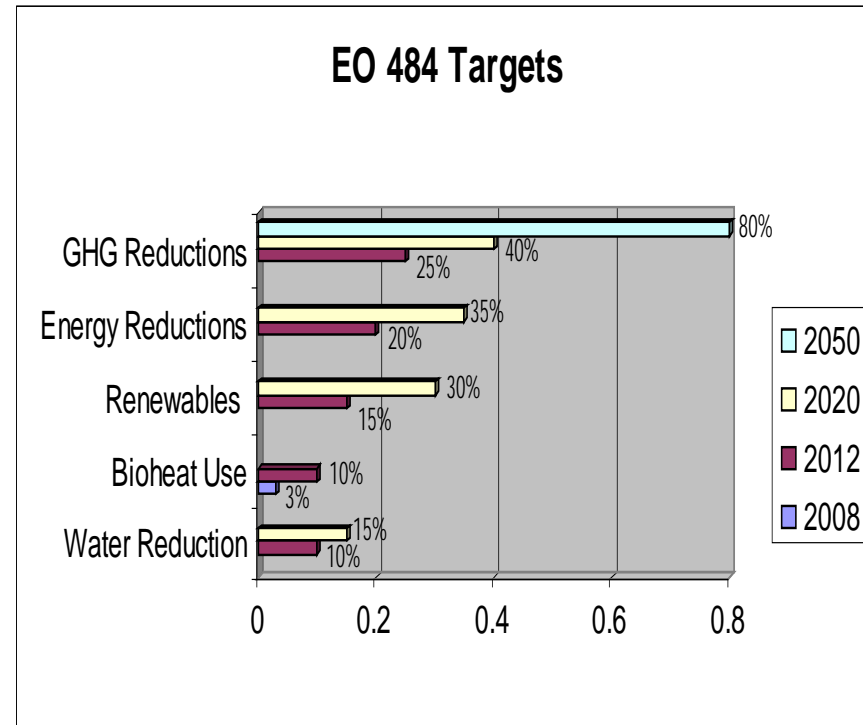
# Topics

- Leading by Example Goals
- State Facility Investment Needs and Challenges
- Green Bonds
- Clean Energy Investment Program



# MA Leading by Example Program

- 29 College and University Campuses
- Office complexes, 18 prisons, hospitals, parks and highway depots, 50+ courthouses
- 80 million SF of buildings
- 3,000 light duty vehicles
- 50,000+ computers
- 000's of utility accounts
- 87,000 employees
- Consume over 1 billion kWh
- 1 million + tons of GHG emissions



# Rationale for New Financing Program



2009-2010 -- **\$3.8 million in ARRA funds**  
*Fund additional staff to implement increased number of energy projects at state buildings*



2012-2014 -- **Accelerated Energy Program**  
*To implement efficiency projects at all remaining state buildings*



2009 – Current -- **Financing Needs**  
*80 million sq. ft. of buildings*  
*Over \$500 million investment required*



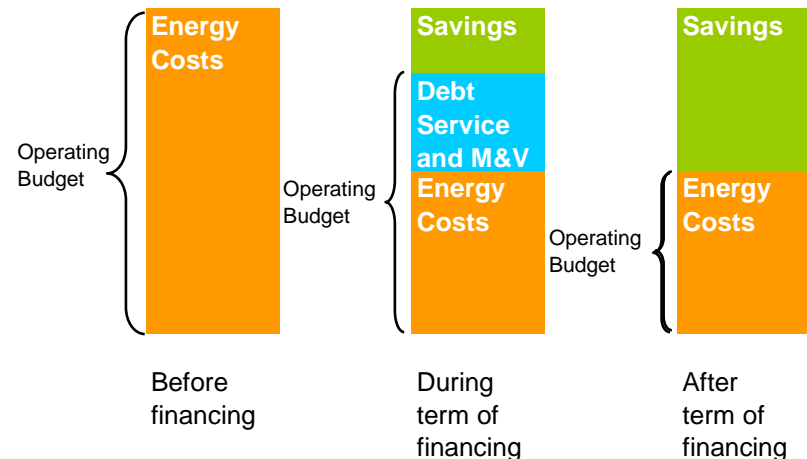
# The Financing Problem 2008-2009

- Private financing Options & Challenges
  - Tax-Exempt Lease Payments (TELPs)
    - No vendors willing to provide financing on acceptable terms
  - Energy Service Companies (ESCOs)
    - More costly alternative
    - Private lending difficulties
- Public Financing Options & Challenges
  - State Capital Funds
    - No appetite in difficult budget situation
  - ARRA, QECCBs, CREBs
    - Funding not sufficient for entire pipeline of projects

# Clean Energy Investment Program (CEIP)

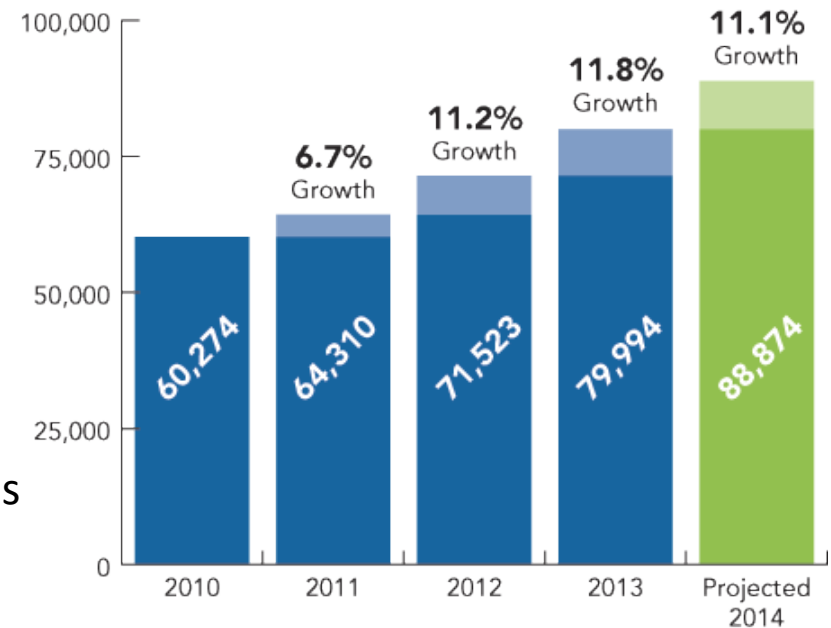
Innovative low-cost financing mechanism for funding energy efficiency projects at state facilities

- Uses bonds to finance capital projects
- Uses project savings to repay debt service
- Allows debt service to be “non-bond cap”
- Required ratio for savings vs. costs



# Benefits of CEIP

- Low cost financing
  - Lower cost of capital
  - Allows for more investment in energy efficiency
  - State retains greater savings
- Off-cap designation
  - No impact on bond rating
  - Not subject to spending cap
- Environmental Stewardship
  - Supports Leading by Example goals
- Promotes Economic Development
  - Job Creation
  - Frees up capital funds for other projects that do not generate savings



# Bond Financing – Fiscal Benefits

	Private Financing - ESCO	Public Financing – CEIP
Project Cost	\$ 10 million	\$10 million
Annual Interest	7%	4%
Total Payments (20 Yrs)	\$18,878,585	\$14,716,350
Total Interest Payments	\$8,878,585	\$4,716,350
<b>20 Year Savings</b>		<b>\$4.16 million</b>

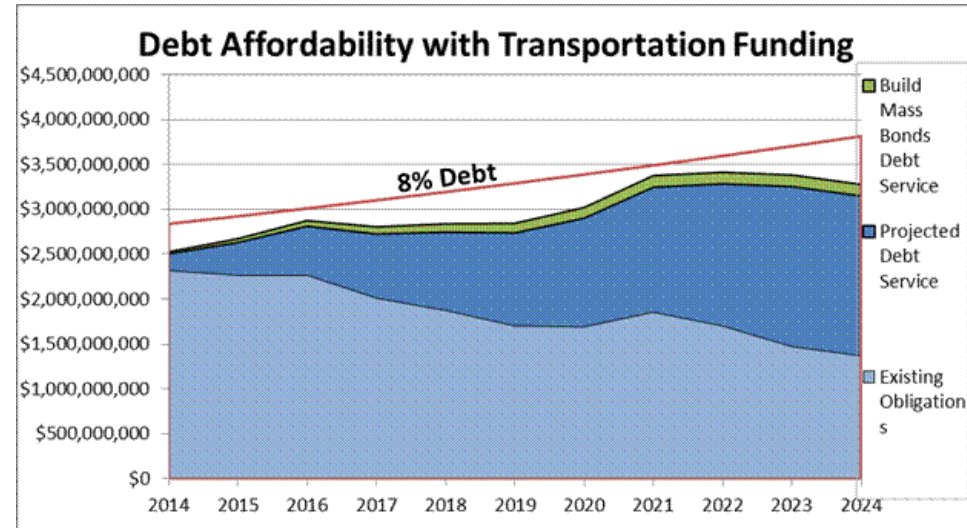
10 Year Savings: \$1.9 million



Massachusetts Department  
of Energy Resources

# Capital Budget and Off-Bond Cap

- Upper limit to MA’s capital spending set by a “statutory debt limit”
- Administration also sets an annual borrowing limit – or “administrative bond cap” – not to exceed 8% of annual revenues.



- Administration publishes annually “Debt Affordability Analysis” with capital investment plan
- Exceptions to plan identified – where a debt-financed project generates new state revenue or budgetary savings that is targeted to the payment of such debt

# Capital Budgeting & Off Bond Cap Projects

Existing Debt Obligations as Percentage of Budgeted Revenue (\$000s)					
Fiscal Year	Direct Debt Service	Contract Assistance	Total Existing Obligations	Proj. Budgeted Revenue	Debt Service (% of Revenue)
2013	2,121,240	198,142	2,319,382	33,755,800	6.87%
2014	2,130,409	196,955	2,327,364	35,334,290	6.59%
2015	2,089,565	195,133	2,284,698	36,476,307	6.26%

Self-Supporting Project Financings (\$000s)					
Fiscal Year	Infrastructure Devlpmt. Projects	DFS Insurance Assessments	En. Eff. Projects	IT ROI Projects	Total Self-Supporting Debt
2013	1,977	2,986	3,579	0	8,542
2014	2,615	3,130	1,102	1,832	8,679
2015	7,211	3,302	6,027	8,194	24,734



# Green Bonds

Tax-exempt investment option for environmental infrastructure

- First in nation to offer
  - \$100 million of Green Bonds issued June 2013
- Appeal to wider range of bidders
  - Investors seeking Environmental investments
  - Institutional investors required to dedicate portion of holdings to green initiatives
- Proceeds used to finance projects:
  - Clean water/drinking water
  - **Energy efficiency & conservation in state buildings**
  - Land acquisition, open space protection and environmental remediation
  - River revitalization and habitat restoration
- Commonwealth to track and publish results
  - Effects on competition
  - New bidders
  - Impact on interest rates



Massachusetts Department  
of Energy Resources

# How CEIP Works

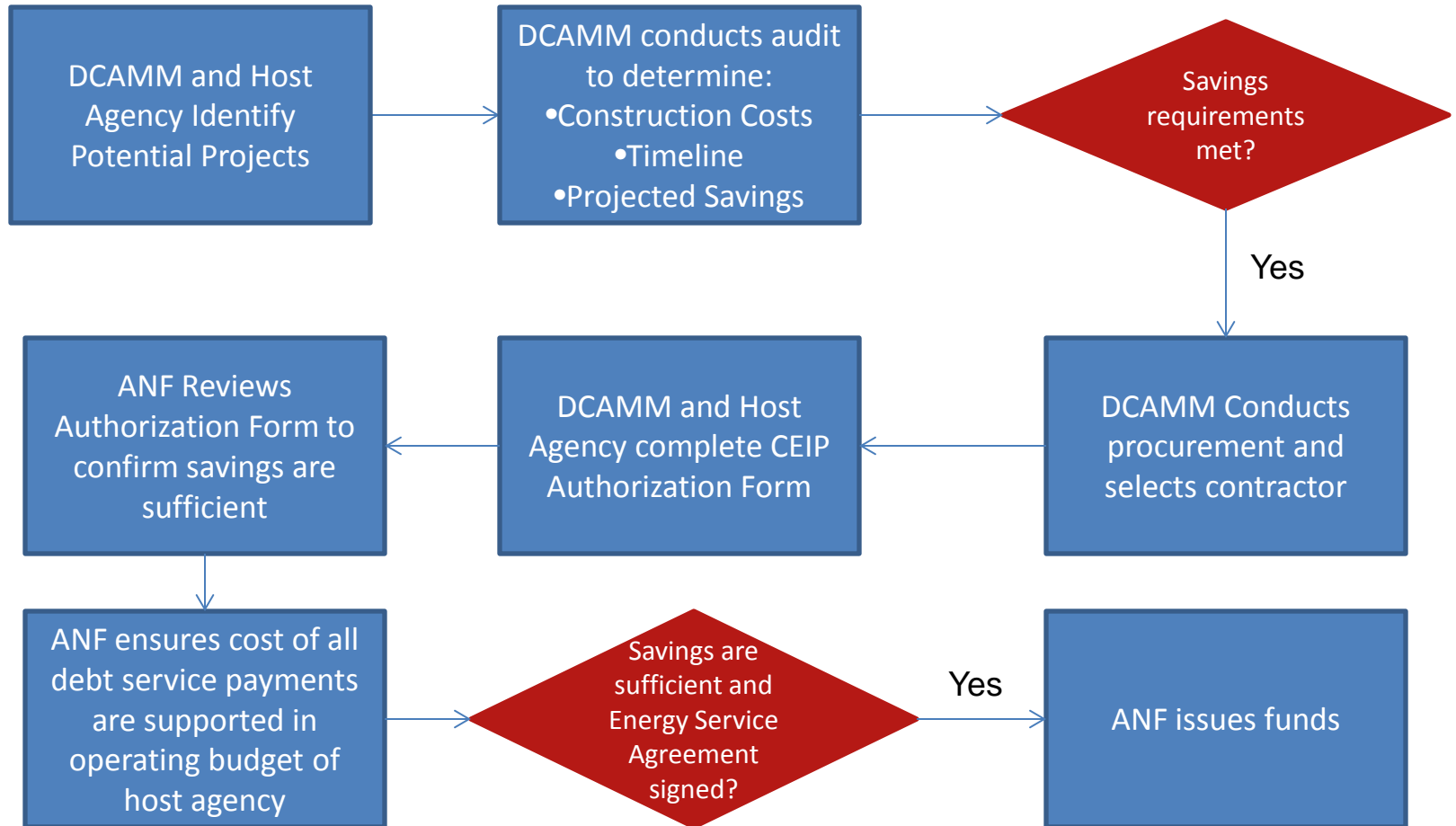
Eligible Participants	Any state agency incurring energy costs in normal operations
Eligible Projects	Projects must contribute to achieving energy goals
Term	Term must be less than or equal to useful life of equipment/installations, and in no event exceed 30 years, typically 10 or 20
Savings	Annual savings must be greater than or equal to 1.1x the required debt service
Accounting	<ul style="list-style-type: none"><li>-Stand alone object class created for debt service</li><li>-Funds allocated to account and moved annually to treasurer's "CEIP chargeback"</li></ul>



# How CEIP Works

<p><b>Host Agency</b></p>	<ul style="list-style-type: none"> <li>• Agree to energy measures and manage project over lifetime</li> <li>• Commit to annually appropriate funds sufficient to cover bond repayment and other project costs</li> </ul>
<p><b>Division of Capital Asset Management and Maintenance (DCAMM)</b></p>	<ul style="list-style-type: none"> <li>• Conduct audits and analysis to ensure ECMs are sufficient to cover bonds and debt, managers procurement, construction, and other services</li> <li>• Provide or secure M&amp;V services to independently verify annual savings</li> <li>• Works with Comptroller to ensure agency obligations are made pursuant to contracts</li> <li>• Procure Contractor to conduct energy work</li> </ul>
<p><b>Executive Office for Administration and Finance (ANF)</b></p>	<ul style="list-style-type: none"> <li>• Approve CEIP bond requests</li> <li>• Determine annual debt service obligations</li> <li>• Works with Legislature to support appropriate funding for bond repayment</li> </ul>

# How CEIP Works – Process Flow



# CEIP Authorization Form

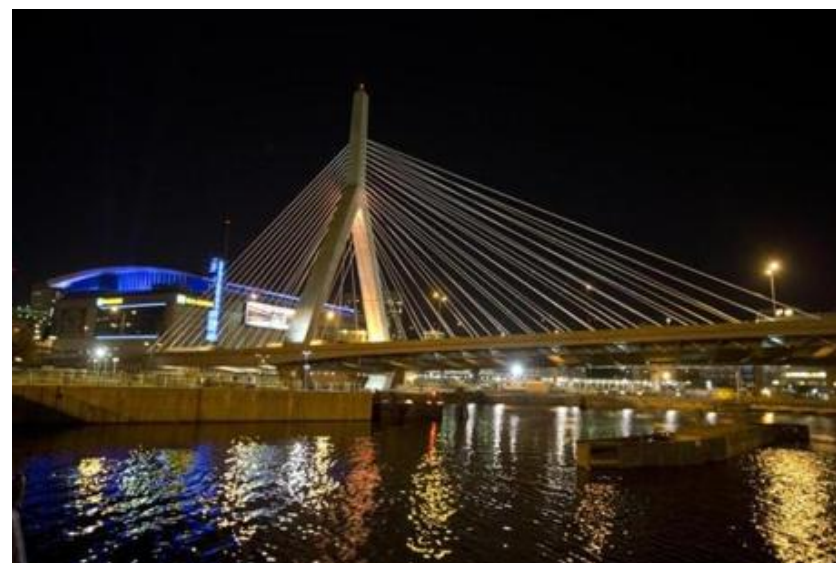
- Payment schedule
- Project description
- Useful life
- Project budget
- Sources and uses of funds
- Construction draw schedule
- Estimated annual savings

Clean Energy Investment Program (CEIP) Authorization Form (v 10/2011)																																			
<b>1.0 Tracking</b>																																			
	Date Submitted To DCAM by Department																																		
	Date Submitted to A&F by DCAM																																		
	Date Returned to DCAM and Department																																		
<i>A&amp;F will return decision with 10 business days after receiving completed form</i>																																			
<hr/>																																			
2.0	Host Agency																																		
2.1	Contact																																		
2.2	Project Location																																		
3.0	Name and Brief Description of Project																																		
3.1	Unique Project Identifying #																																		
3.2	DCAM Project #																																		
4.0	Useful life (yrs)																																		
5.0	Phasing	<i>This project is a phased project</i>																																	
		<i>If no, please go to 6.0, if yes, please complete below</i>																																	
	Phase #		Final Request? <input type="checkbox"/>																																
	\$ Amount of Previous Requests		(Attach detail)																																
6.0	Project Budget	<table border="1"> <thead> <tr> <th colspan="2">Sources of Funds</th> </tr> </thead> <tbody> <tr><td>CEIP Cost*</td><td></td></tr> <tr><td>Cont. (G.O. Bond)</td><td></td></tr> <tr><td>Grant (specify)</td><td></td></tr> <tr><td>CREBS</td><td></td></tr> <tr><td>Bonds (Specify)</td><td></td></tr> <tr><td>Incentives (Specify)</td><td></td></tr> <tr><td>Other (Specify)</td><td></td></tr> <tr><td>Total Sources</td><td></td></tr> </tbody> </table>	Sources of Funds		CEIP Cost*		Cont. (G.O. Bond)		Grant (specify)		CREBS		Bonds (Specify)		Incentives (Specify)		Other (Specify)		Total Sources		<table border="1"> <thead> <tr> <th colspan="2">Uses of Funds</th> </tr> </thead> <tbody> <tr><td>Project Cost</td><td></td></tr> <tr><td>Contingency</td><td></td></tr> <tr><td>Maintenance</td><td></td></tr> <tr><td>M&amp;V</td><td></td></tr> <tr><td>Other</td><td></td></tr> <tr><td>Total Uses</td><td></td></tr> </tbody> </table>	Uses of Funds		Project Cost		Contingency		Maintenance		M&V		Other		Total Uses	
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<i>Notes:</i>																																			



# CEIP Expansion

- Based on success of CEIP, new FY14-17 Capital budget includes new \$15 million energy efficiency allocation
- Targets energy efficiency at non-building applications
  - Tunnels
  - Dams
  - Street lights
- Uses same principles – off-bond cap paid for from savings



[www.bostonglobe.com](http://www.bostonglobe.com)

**DER**

Massachusetts Department  
of Energy Resources

# Contact Info

## Department of Energy Resources

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Massachusetts Department  
of Energy Resources

Thank You!  
Questions?

# Bruce Schlein

- Director of Corporate Sustainability, Citi
- Citi recently worked with consortium of investment banks to establish “Green Bond Principles”
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**Questions?**