



**coalition for green capital**

# **CGC Goals, History & Strategy – Why we do what we do**

*Coalition for Green Capital*

*October 18, 2016*

# Table of Contents

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- CGC Mission & Rationale
- Green Bank Policy & Economic Fundamentals
- Strategy & Tactics

The Coalition for Green Capital's mission is to **accelerate the transition to the clean energy economy by establishing Green Banks** at the local, state, federal, and international levels to spur greater private investment in renewables, energy efficiency and clean transportation.

# Why Green Banks?

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Trillions of investment needed to pay for construction of new generation and efficiency installations

Clean power platform can be built with private capital, because projects pay for themselves

But private investors are not moving into this market quickly enough to avert climate disaster

So some public capital is needed to move private capital, but public capital is limited

Use public capital to provide financing (repaid) in ways that entices and support private investment

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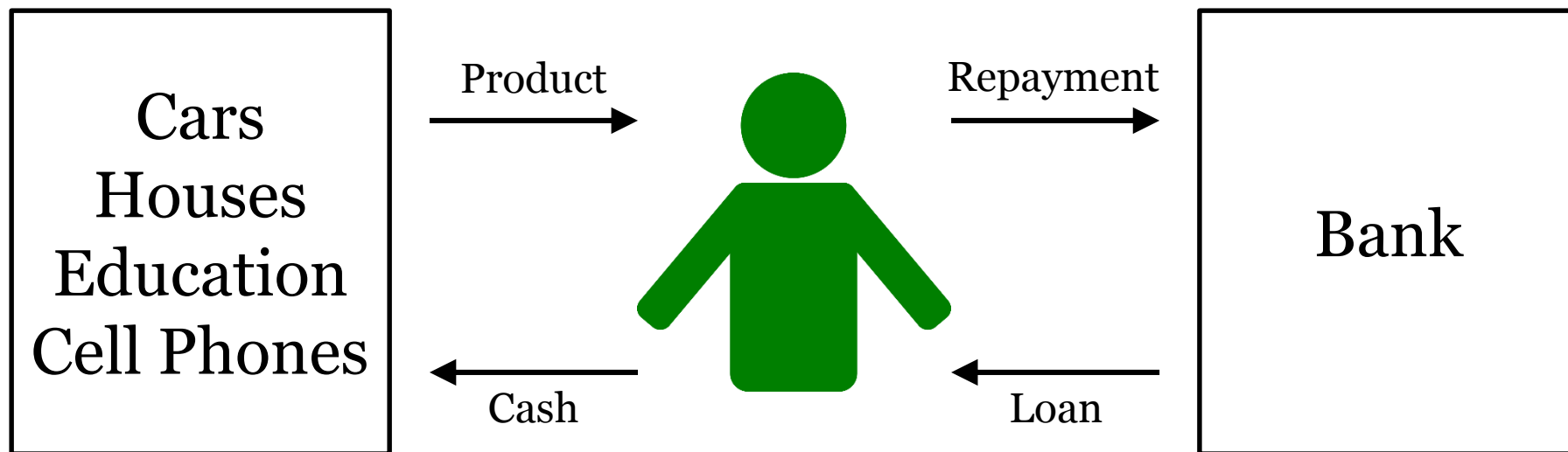
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With distributed clean energy, individual consumers become the borrowers – not utilities or IPPs

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## We Already Finance Everything



# Would you buy a house without financing?

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\$300,000

Mortgage

Down  
Payment

Price

Bank financing, aka Mortgage,  
eliminates 80% of upfront cost.

Down  
Payment

Upfront

Mortgage  
Payment

Year 1

...

Mortgage  
Payment

Year 30

# 85% of all vehicle purchases are financed with a loan or a lease

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\$25,000

Auto Loan

Down  
Payment

Price

Auto loans can eliminate 100% of  
upfront cost of a car.

Down  
Payment

Upfront

Loan  
Payment

Year 1

...

Loan  
Payment

Year 5



# But how do you get cleaner & cheaper energy without financing?

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\$30,000

Upfront Cost  
with no  
Financing

Price



Upfront

Without financing  
for clean energy, you  
have to pay the  
entire cost upfront!

# Government & utility grants can help, but still leave you with significant upfront costs.

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\$30,000

Grants

Upfront Cost  
with no  
Financing  
after Grants

Price



Upfront

Grants reduce the price, but still leave you with upfront costs w/o financing.

# Efficiency & DG not that different from other consumer financing

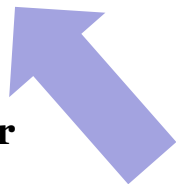
**INVESTORS**



Upfront  
Investment



Consumer  
Payment  
Provides Profit  
to Investors



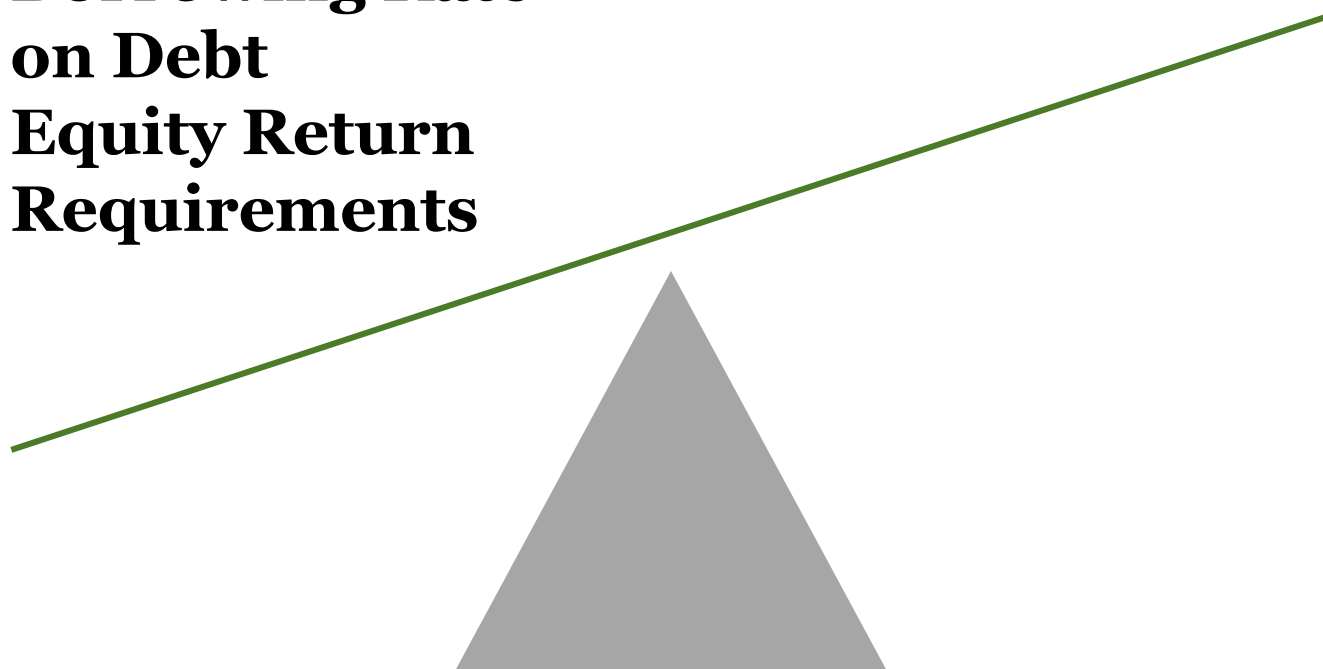
-Or- **SAVINGS**

High input costs will increase requisite electricity price that needs to be charged to meet those costs

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- **Technology Cost**
- **Fuel Cost**
- **Borrowing Rate on Debt**
- **Equity Return Requirements**

**Price of Electricity (LCOE) from a Project**



# Forms of Investment

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- **Capital** – Money, but specifically made used for investing
- **Equity** – An investment that gives the investor a piece of ownership in a project. There is no specified time frame or mechanism for an investor to get a return.
- **Debt** – A loan, where the lender (a bank) does not have ownership in a project, but does have a specified time frame and mechanism for repayment.
- **Cost of Capital** – Refers to the literal cost that a project must pay in exchange for receiving an equity/debt investment

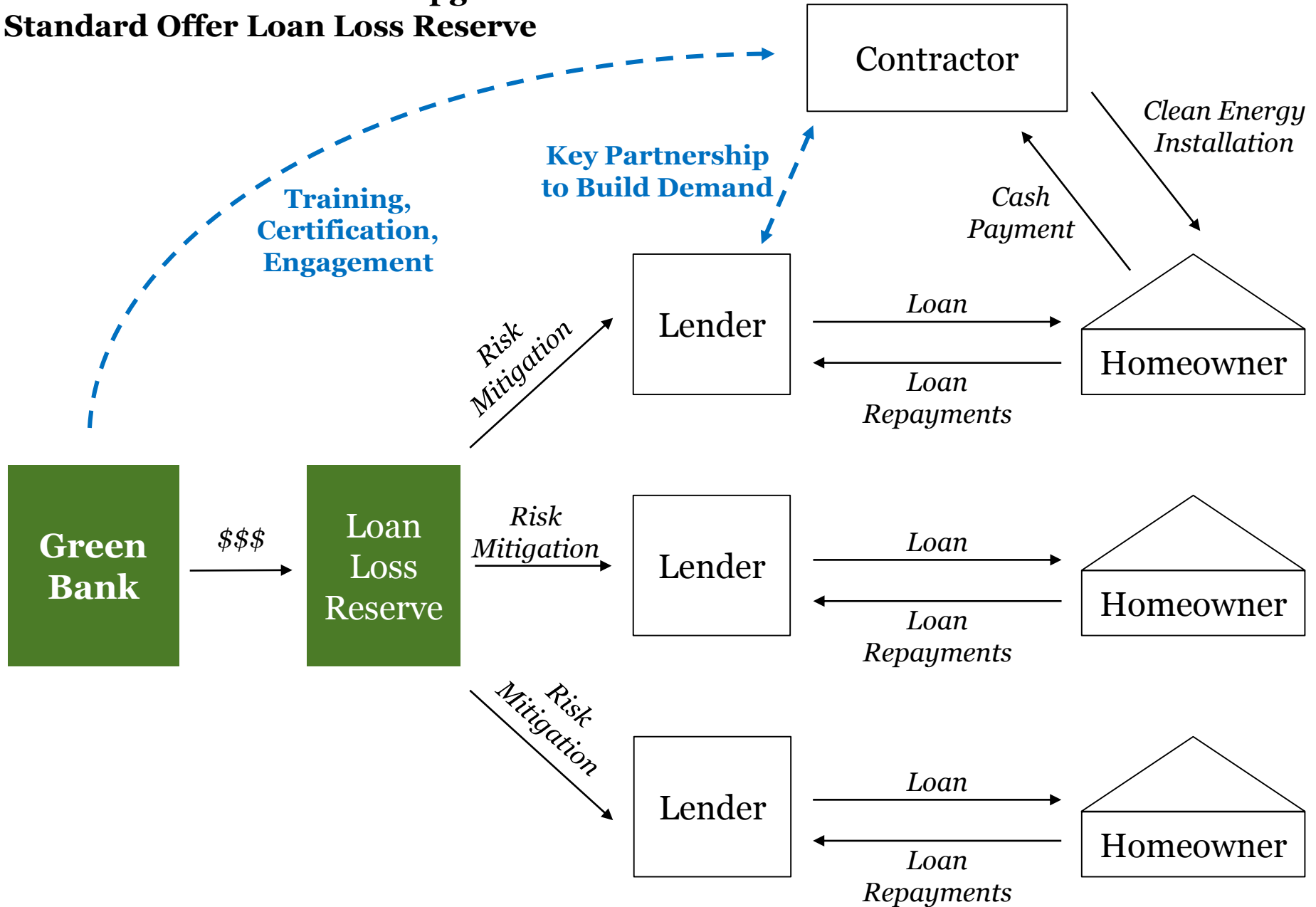
# The Lower the Cost of Capital, the lower the price of electricity from that project can be

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- Green Banks use a number of methods to do 3 things
  - 1. Increase the total amount of private investment**
  - 2. Lower the overall cost of capital offered into clean energy markets**
  - 3. Facilitate demand and market creation for clean energy adoption**

# GREEN BANK PLAY

## Residential Whole-Home Upgrade Standard Offer Loan Loss Reserve



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# CGC Strategy

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- **Mission** – Accelerate transition to clean energy platform
- **Strategy** – Create a network of Green Bank institutions around the world that finance cheap, clean energy
- ***Why is this our Strategy***
  - The financial system is vertical network of large global and small local capital providers. Green Banks must operate within and along all parts of this network
  - Clean energy investment is inherently local, no central GB can do it
  - Have to redirect massive investment flows from large institutional investors, but connect that money to small, distributed projects

# What Tactics Do We Use to Implement the Strategy?

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## **Thought Leadership**

- CGC internally develops new policy ideas, finance concepts, and implementation models for Green Banks & CE investing

## **Advocacy**

- CGC communicates out these policy/program ideas
- Engages with policymakers, industry stakeholders, partner organizations

## **Consulting**

- CGC partners directly with governments or location-based orgs to study, design and implement tailored GBs

# CGC Core Principles

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- Objective is for all energy (transpo, electric, thermal) to be 100% clean. Period.
- Energy should be cheap, clean and abundant
- Consumers should not be economically punished into choosing clean energy
- Consumer demand is a far better accelerator of clean energy adoption than top-down mandates/regulation
- Green Banks should only finance projects that make the end-user better off
- Private sector capital should be main source, but if public has to play a role, so be it. This is what govt is for!



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# Thank You & Appendix

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Twitter: @CGreenCapital

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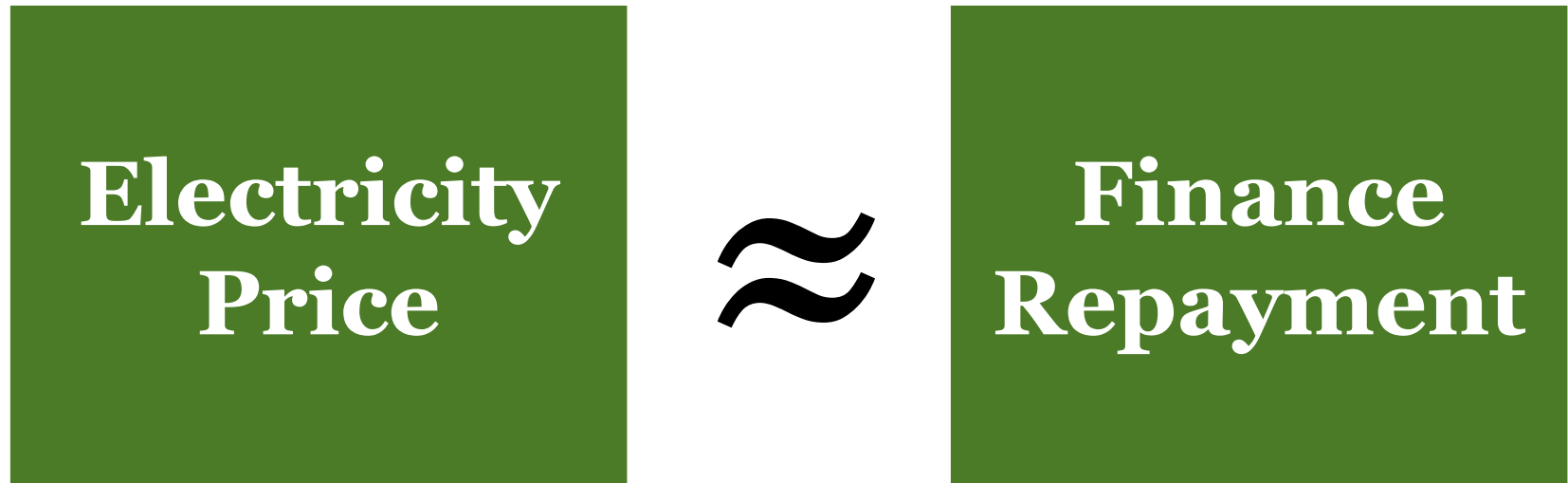
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- CPP & The Role of Finance
  - Current State of Clean Energy Finance Markets
  - Energy Finance 101
  - Clean Energy Finance Mechanisms
  - Barriers to Clean Energy Investment
  - Innovative Policy Solutions
  - Clean Energy Finance In SIPs

# Why care about energy finance?

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- Power plants (big or small) are expensive
- All electricity generation is financed - upfront cost is borrowed



- Owners must payback borrowed money with interest *and* earn their own return
- Owner needs steady cash flow to payback financing and get sufficient return

# If CPP involves construction of new generation or efficiency, then capital must be available for financing

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- State's relying on new clean energy sources for CPP compliance must consider who will finance construction
  - Who traditionally finances big, fossil-fuel power plants?
  - Will it be the same investors? Or are other investors better suited?
  - What will the cost of financing be?
  - What happens if not enough capital is available?
  - How will financing impact the state's electricity price?
- Does CPP automatically mean money will flow?
  - How does a mandate translate to clean energy investment?
  - Or a carbon tax? Or a cap-and-trade system?

# Existing RPS are good example of what happens when clean energy policy doesn't consider finance

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According to RPS,  
**Maryland Needs \$3B**  
in Solar Investment  
in 5 years

According to RPS,  
**DC Needs \$690M**  
in Solar Investment  
in 8 years

- Both states offer direct grants & high-priced SRECs, making solar electricity cheaper than grid power, but both states are behind targets
  - ***So why are they behind target?***
  - ***Where will all the investment capital come from?***



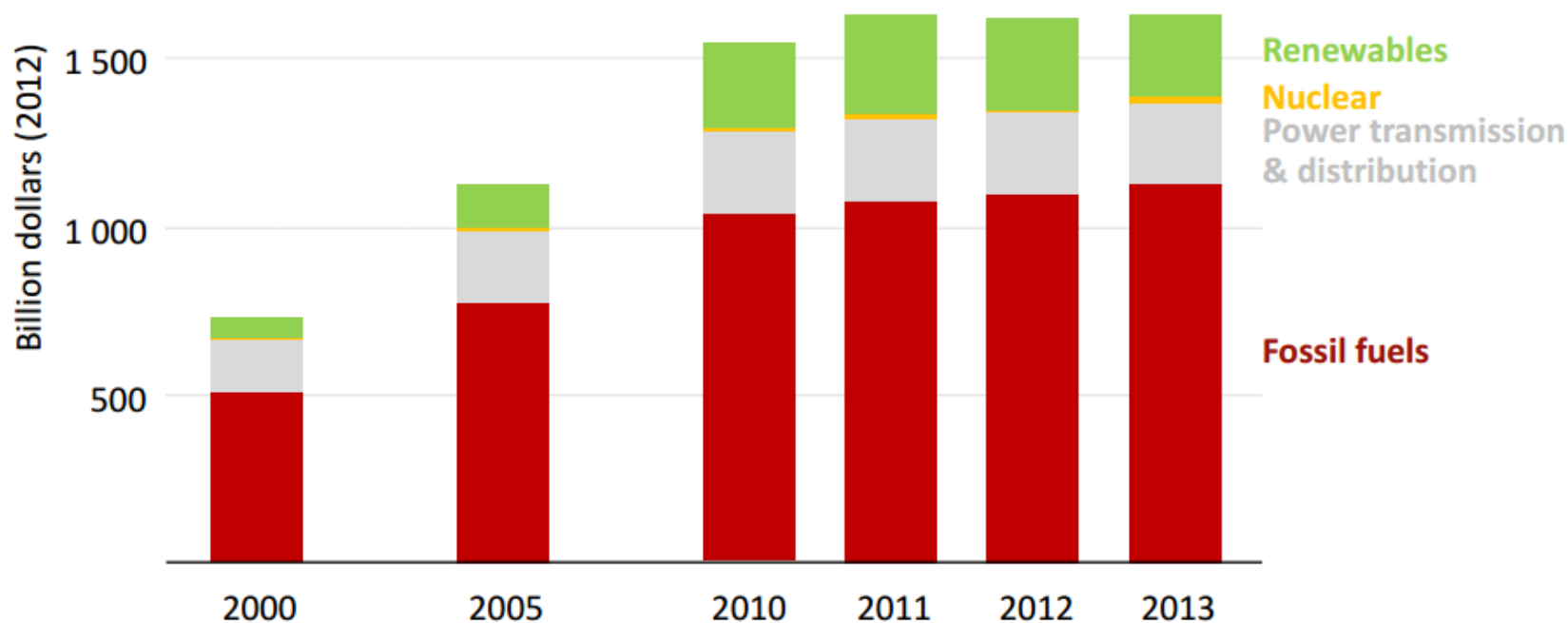
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# Global energy investment dominated by upstream fossil fuel extraction, renewables are tiny

Annual energy supply investment



**Investment in renewables rose from \$60 billion in 2000 to a high point approaching \$300 billion in 2011, stabilising at around that level since**

# U.S. renewable energy markets now attract large institutional investors & private equity

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**\$8.3 B**

2014 U.S. Wind  
Investment

**\$17.8 B**

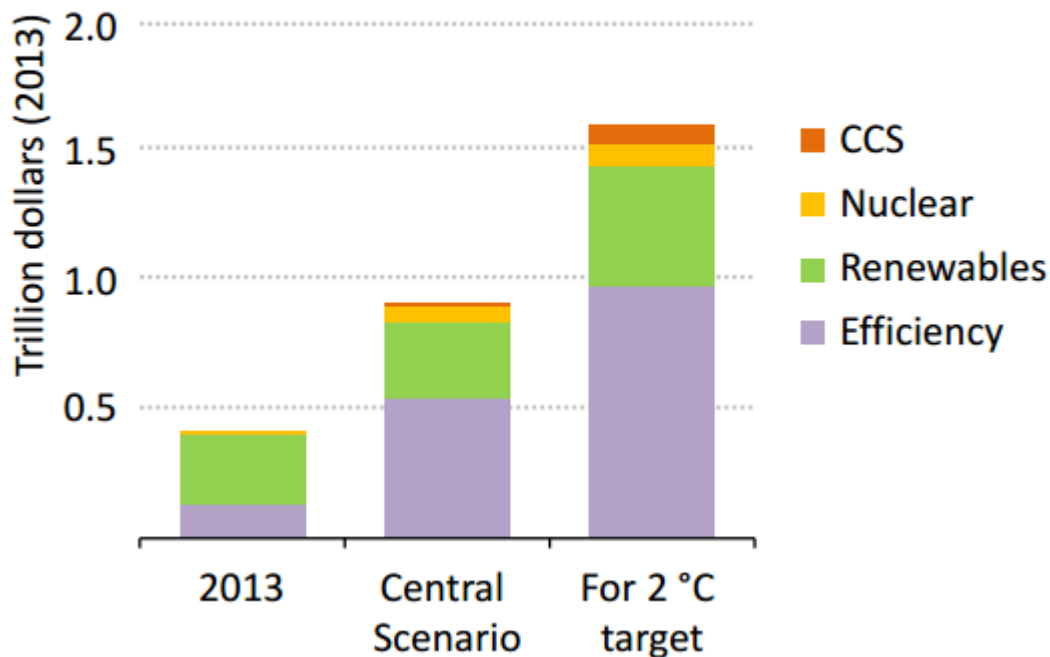
2014 U.S. Solar  
Investment



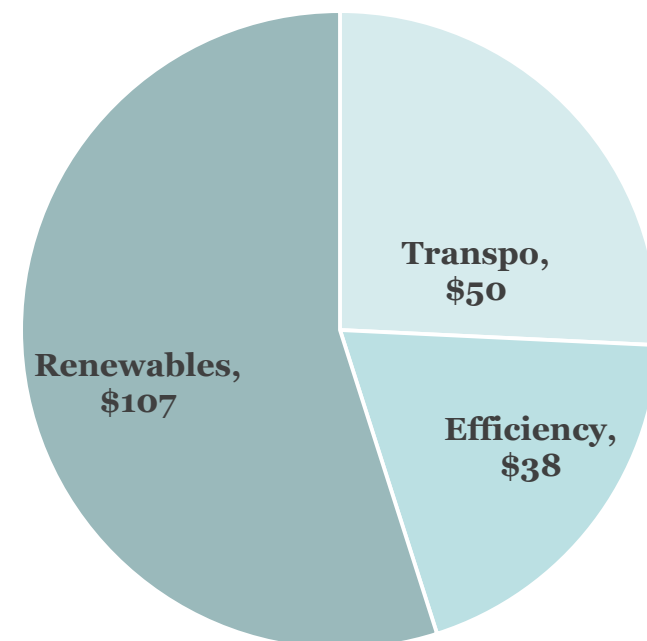
...but annual investment must increase massively, and stay at high levels for decades!

### Global Need – \$1.6T p.a.

Average annual low-carbon investment, 2014-2040



### U.S. Need – \$200B p.a.

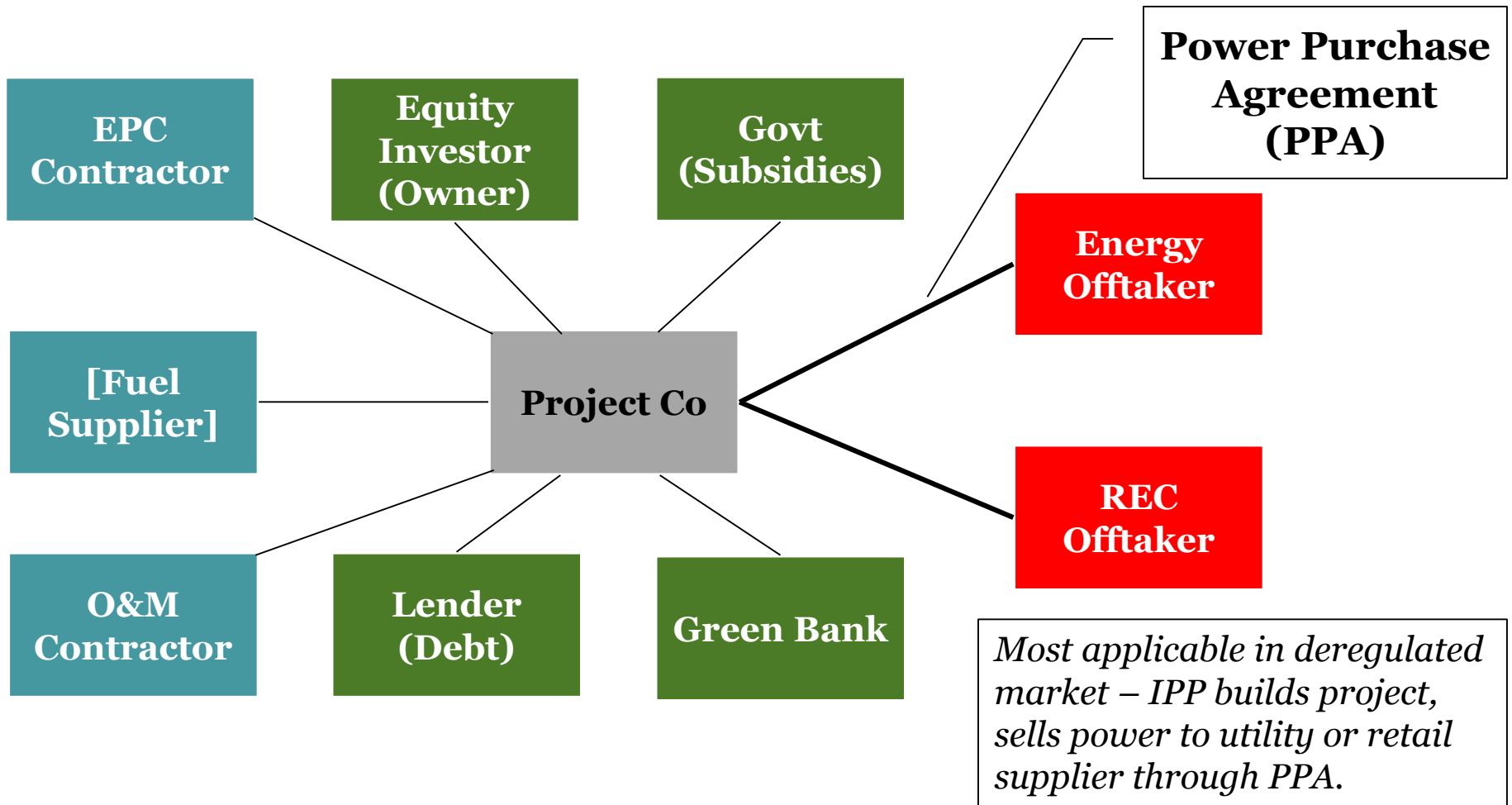


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# Energy projects financed through complex structure of investors, contracts and power purchasers

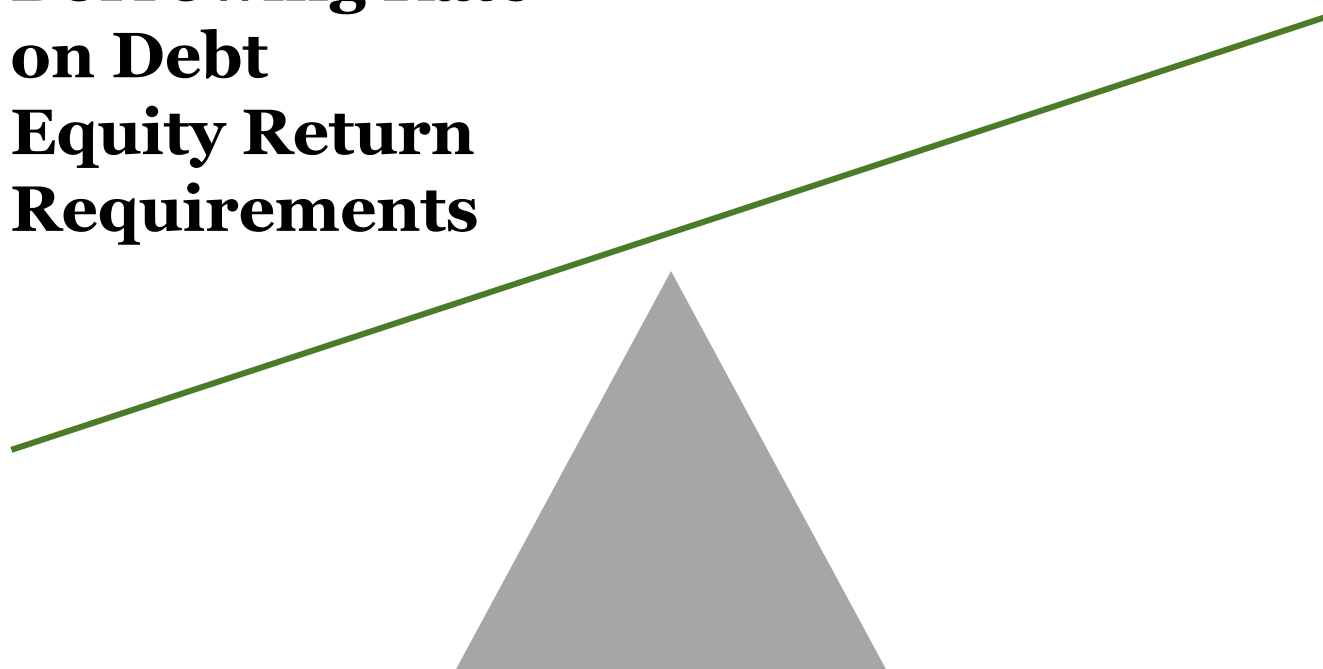


High input costs will increase requisite electricity price that needs to be charged to meet those costs

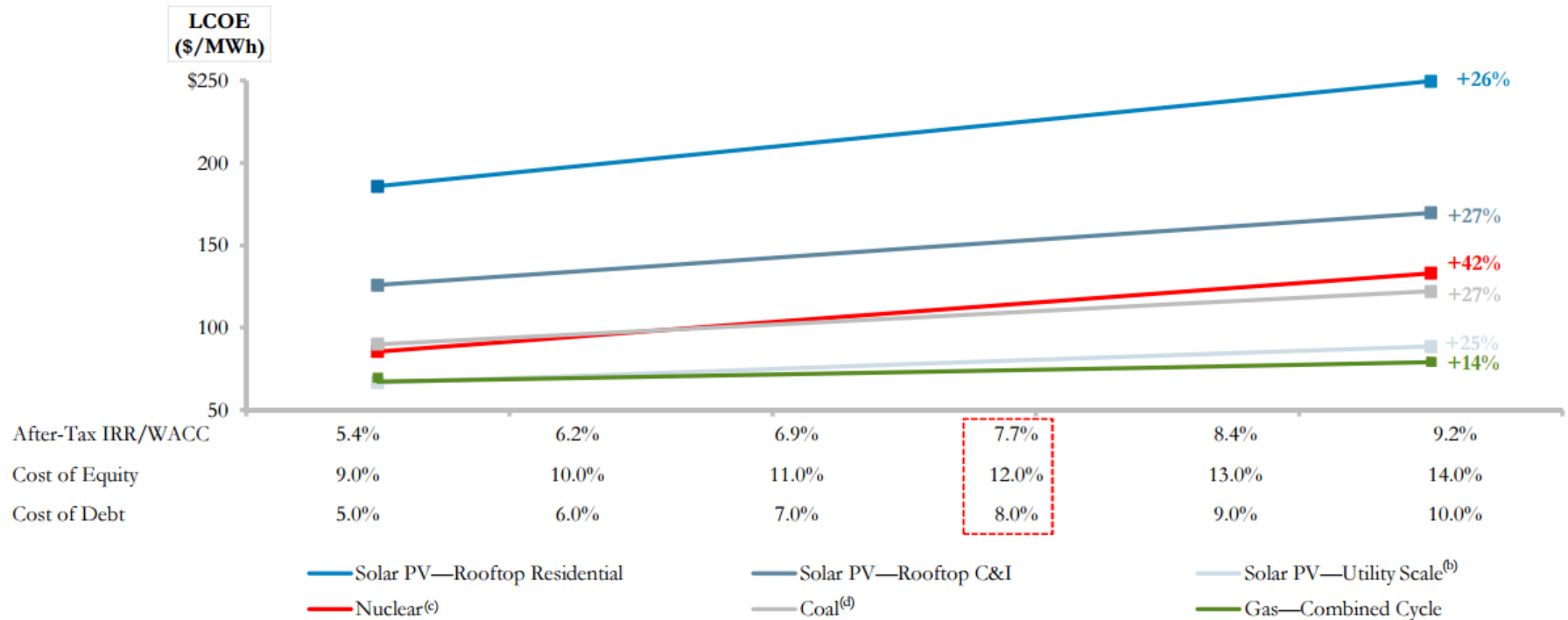
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- **Technology Cost**
- **Fuel Cost**
- **Borrowing Rate on Debt**
- **Equity Return Requirements**

**Price of Electricity (LCOE) from a Project**



# Cost of capital impact on LCOE means states should *really* care about availability & cost of financing





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# Efficiency & DG not that different from other consumer financing

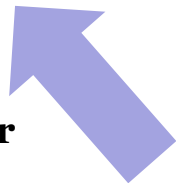
**INVESTORS**



Upfront  
Investment



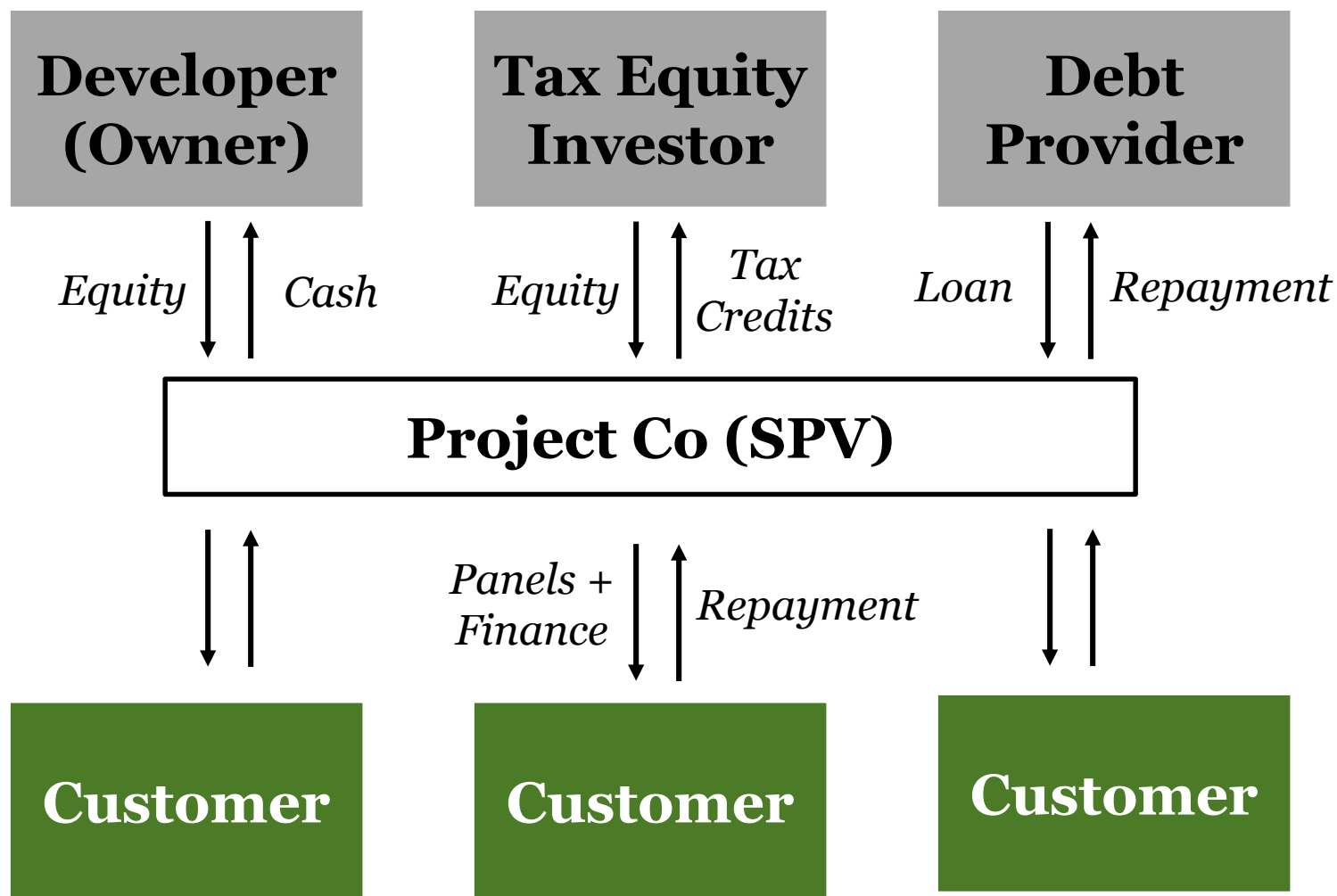
Consumer  
Payment  
Provides Profit  
to Investors



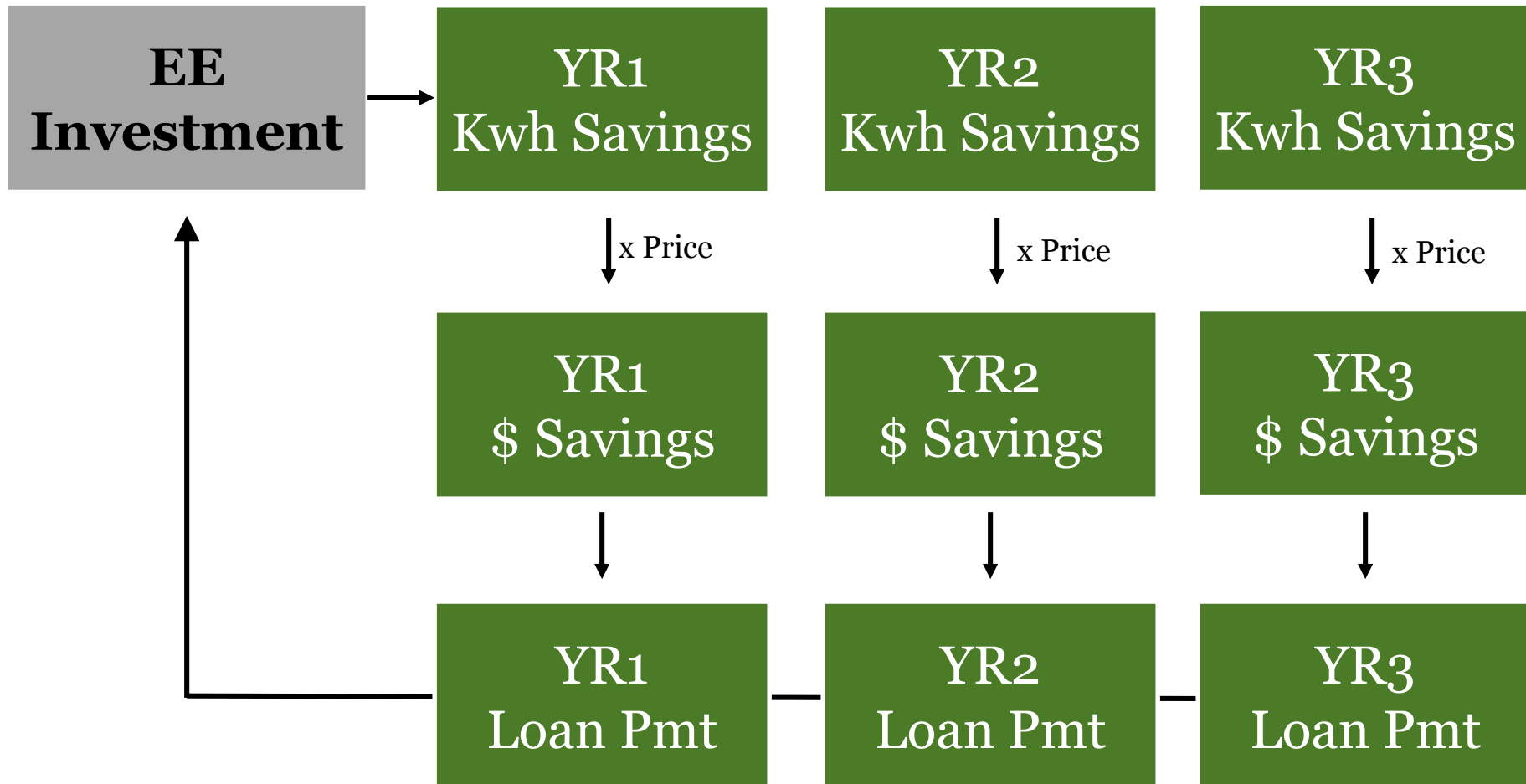
-Or- **SAVINGS**

# Most common financing model for distributed solar is the solar lease aka solar PPA – “third-party owned”

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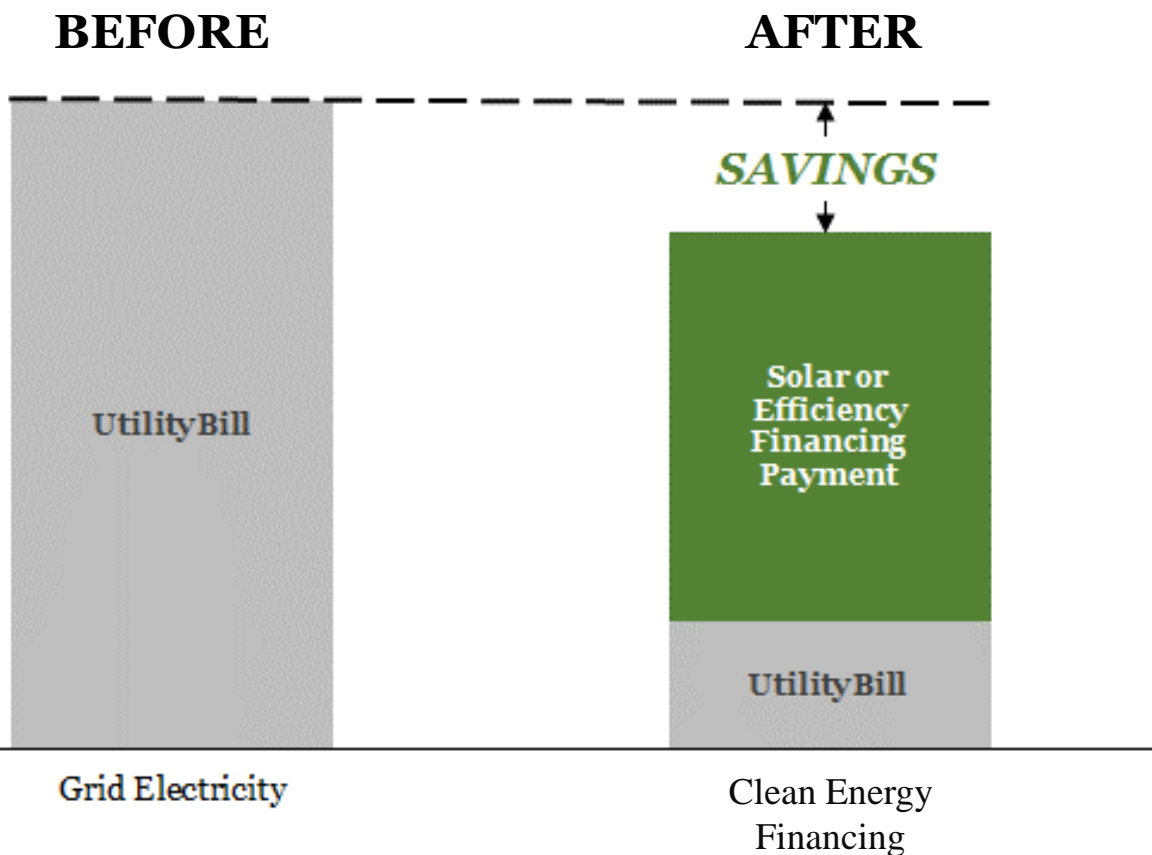


# Energy efficiency financing typically a direct loan, where lifetime savings exceed upfront investment



# Financing ideally structured so that repayment plus remaining utility bill are less than prior utility bill

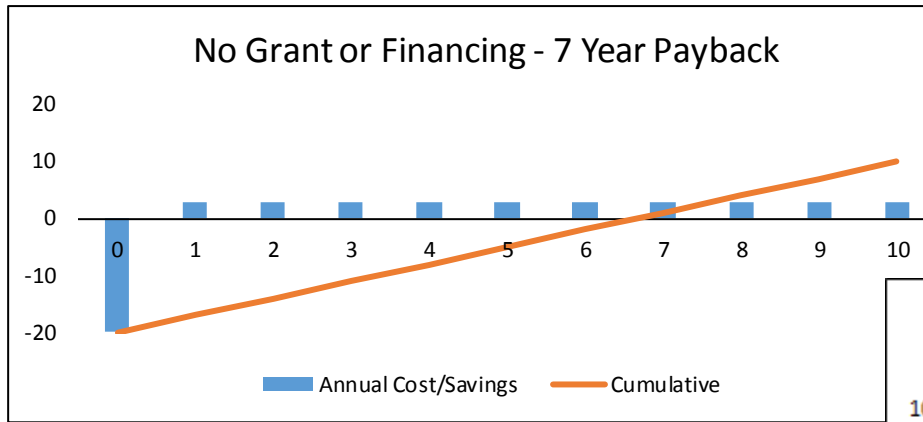
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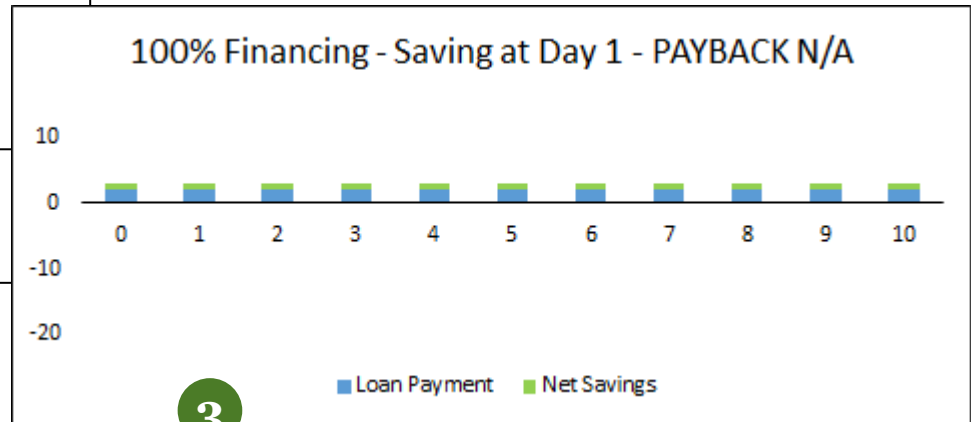
## Key Variables

- **Grid price**
- **Cost of technology**
- **Interest rate**
- **Financing term**

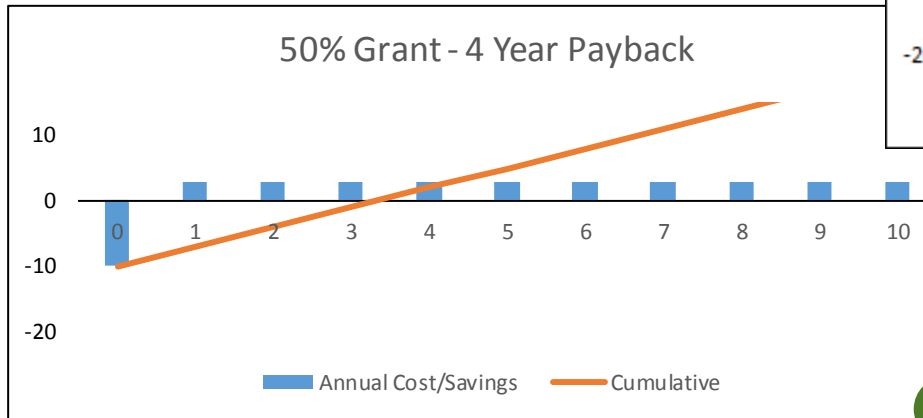
# Financing at appropriate term and rate means payback period no longer matters, all about cash flow



**1** A deep efficiency project has high upfront cost and long payback –barriers to adoption



**3** 100% financing eliminates these barriers – **NO UPFRONT COST, IMMEDIATE SAVINGS, NO PAYBACK PERIOD**



**2** Even a large grant covering 50% of the cost only reduces those barriers – doesn't eliminate them

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# Utility-scale projects look familiar to investors – but distributed projects are different

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## Centralized Projects

- Utility-scale
- Power directly to grid
- Strong credit
- Traditional project finance
- Relatively easy to finance

## Distributed Projects

- Smaller scale
- Scattered locations
- On-site energy use
- Varying credits
- Range of structures and approaches to finance



# Long list of reasons that a state cannot assume private capital will flow freely at good terms

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- Barriers to supply of financing
  - Don't trust savings/technology
  - We don't do unsecured loans
  - Underwriting is too complex & expensive
  - Can't figure out "who is the credit"
  - We don't lend longer than 8 years
  - We don't see any demand for this
- Customer Barriers
  - Don't trust savings/technology
  - Doesn't work for renters
  - Purchase process is too complicated
  - Will make it harder to sell my house
  - Won't live in this house very long
  - Don't think it will increase my property value
  - I don't want more debt on my balance sheet

As a result, most distributed clean energy markets suffer from expensive or lack of capital

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## Markets With Adequate Private Capital

- High-credit residential rooftop solar
- Credit-rated large commercial efficiency projects

## Markets With No or Expensive Private Capital

- Mid-and-low credit residential solar
- Group/community solar
- Non-rated commercial solar
- MUSH and non-profit rooftop solar
- Residential energy efficiency
- Non-rated commercial energy efficiency
- Grid storage and micro-grids
- Alternative fuel vehicles and infrastructure
- Biomass, biofuels, CHP and fuel cells

# Financing for utility-scale projects may soon become harder, too – not just a challenge for distributed

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- **Best sites for utility scale projects already taken**
  - A site with lower natural resource produces means lower return for investors or higher electricity price
  - Plus, best sites are often very far from load (people) – transmission adds cost and complexity
- **Federal tax credits may go away**
  - Will instantly raise the price of renewable electricity
  - May push some of the largest tax equity investors out of the market

*Cost & availability of capital will soon become a concern for all kinds of clean energy*

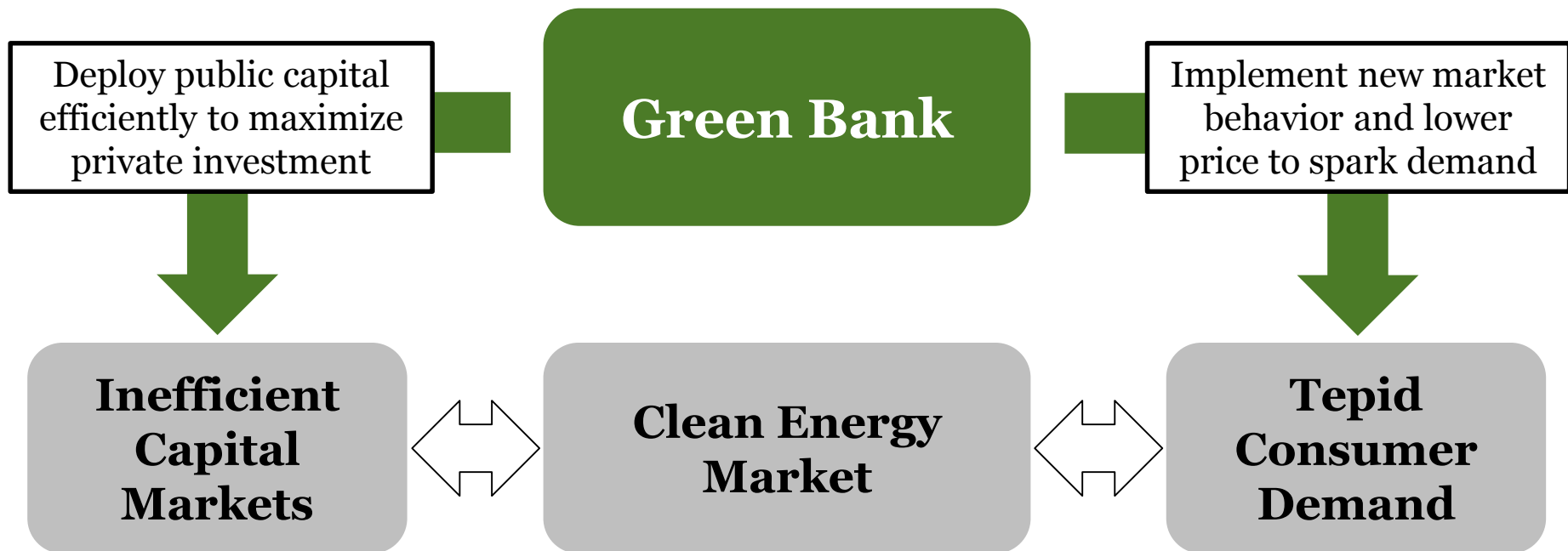
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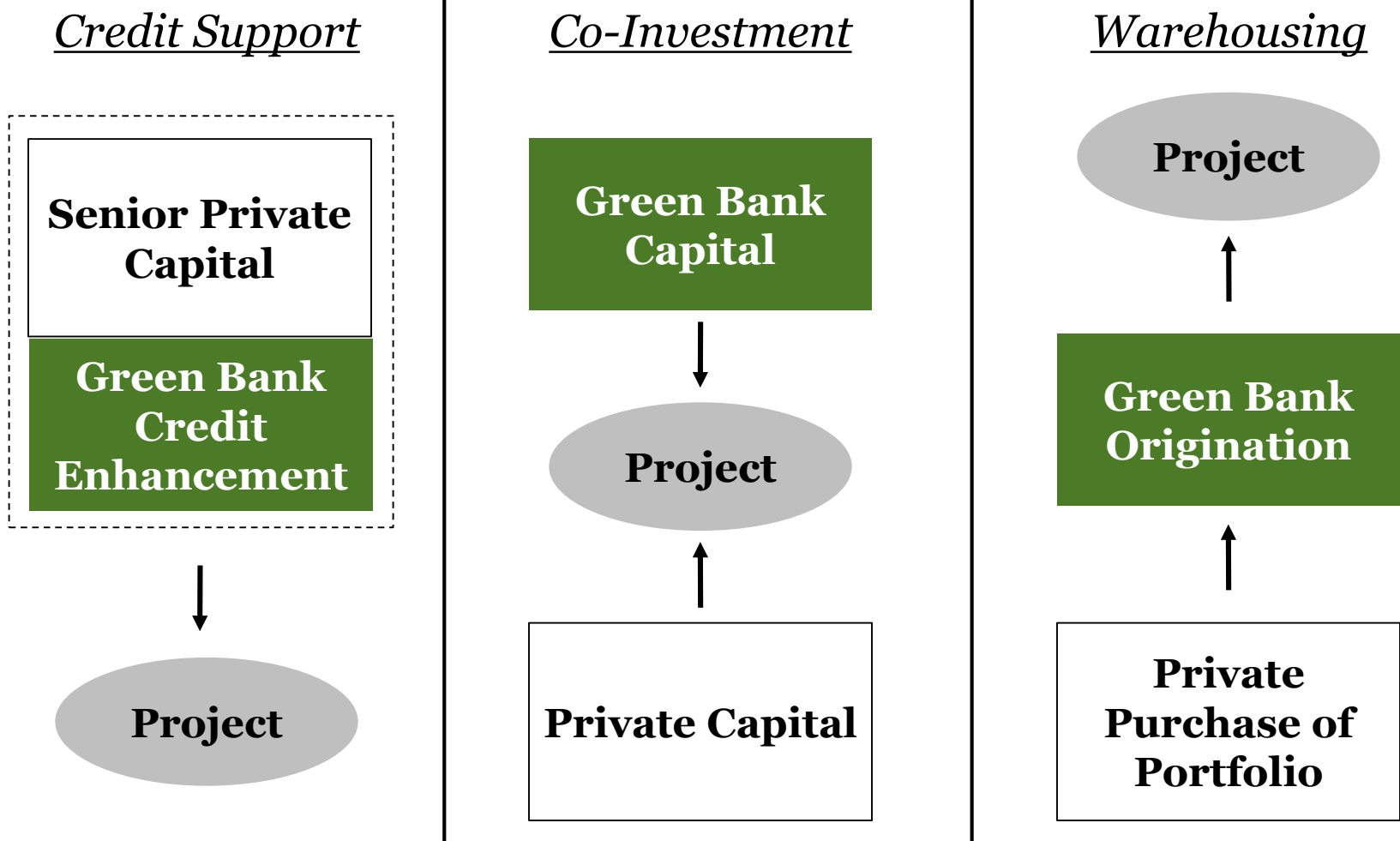
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# Green Banks fill the financing gap and draw in the capital needed to make clean energy markets grow

*A Green Bank is a public financing authority that leverages private capital with limited public dollars to accelerate the growth of clean energy markets*



# Green Banks use multiple structures to draw in more investment capital at better financing terms



# Green Bank capital lowers price of clean

## Price of Solar (cents/kwh) with Increasing Green Bank Capital

**% of Green Bank Capital in Structure**

Solar Install Cost (\$/Watt)	% of Green Bank Capital in Structure				
	0%	10%	20%	30%	40%
<b>\$4.50</b>	21.0	18.7	16.3	14.0	11.7
<b>\$4.00</b>	17.4	15.4	13.3	11.2	NA
<b>\$3.50</b>	13.9	12.1	10.3	8.5	NA
<b>\$3.00</b>	10.3	8.8	7.2	5.7	NA

  
**Green Bank Lowers Price!**

**Notes:** Based on Brattle Model built for Connecticut solar market. Assuming Green Bank offers 2% debt for 15 years. Assumes Developer equity return of 15%, Tax equity return of 12%, total leverage of 40%, a commercial debt rate of 6%, 15-yr REC price of \$0.030/kwh, and 6-yr incentive of \$0.225/kwh.

# Cheaper capital can also compensate for poor resource, preserve return to project owner

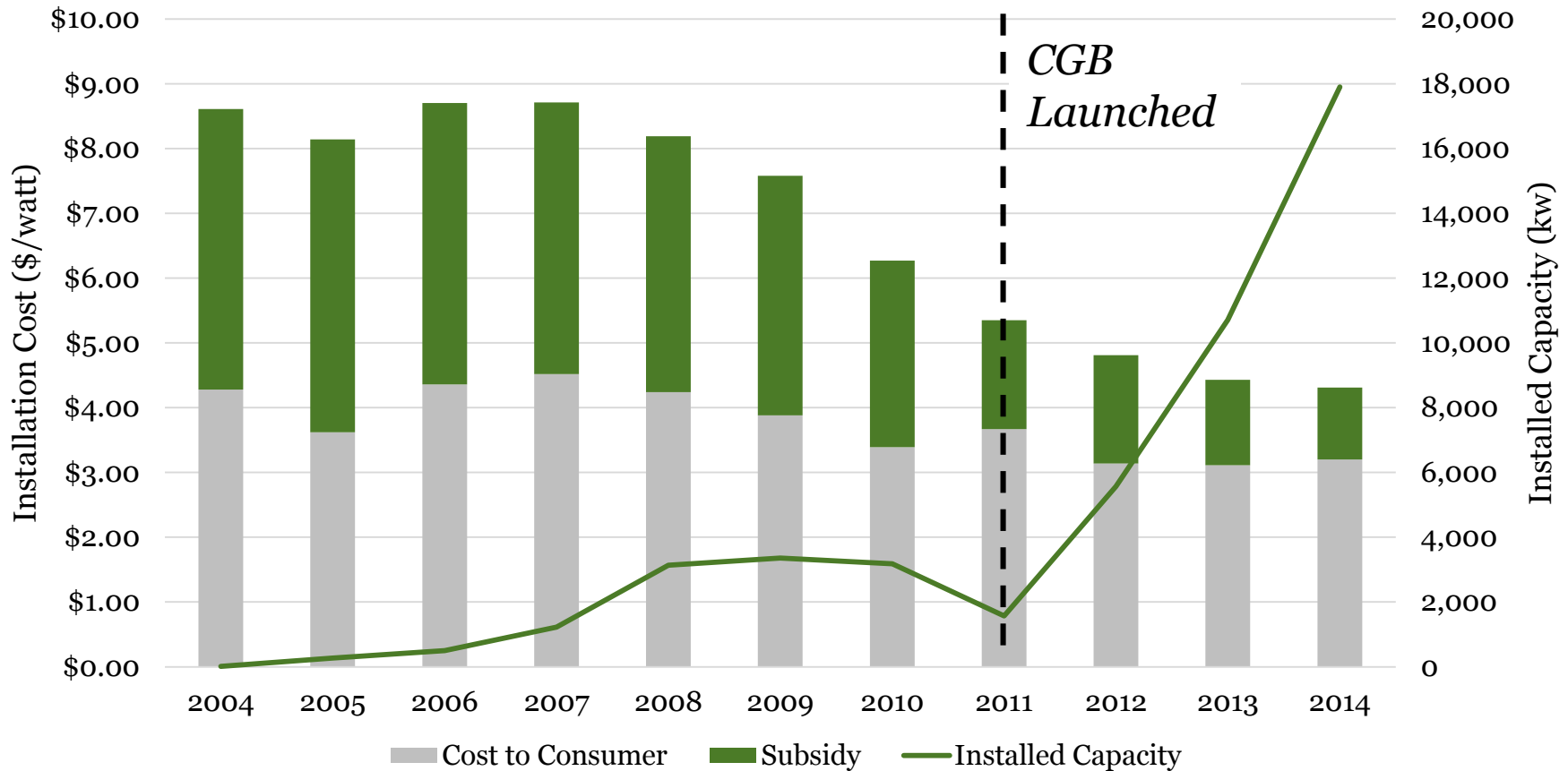
## Wind Project ROI with changing Windiness & Cost of Capital

		Wind Capacity Factor								
		50.0%	47.5%	45.0%	42.5%	40.0%	37.5%	35.0%	32.5%	30.0%
Cost of Capital	8.50%	30.2%	27.6%	25.1%	22.7%	20.3%	18.1%	15.9%	13.8%	11.7%
	8.00%	30.5%	27.9%	25.4%	22.9%	20.6%	18.3%	16.1%	13.9%	11.9%
	7.50%	30.9%	28.2%	25.7%	23.2%	20.8%	18.5%	16.3%	14.1%	12.0%
	7.00%	31.2%	28.5%	26.0%	23.5%	21.1%	18.7%	16.5%	14.3%	12.2%
	6.50%	31.5%	28.9%	26.3%	23.8%	21.3%	19.0%	16.7%	14.5%	12.3%
	6.00%	31.9%	29.2%	26.6%	24.0%	21.6%	19.2%	16.9%	14.7%	12.5%
	5.50%	32.2%	29.5%	26.9%	24.3%	21.8%	19.4%	17.1%	14.9%	12.7%
	5.00%	32.6%	29.9%	27.2%	24.6%	22.1%	19.7%	17.3%	15.1%	12.9%
	4.50%	33.0%	30.2%	27.5%	24.9%	22.4%	19.9%	17.5%	15.2%	13.0%
	4.00%	33.3%	30.6%	27.8%	25.2%	22.6%	20.2%	17.8%	15.4%	13.2%
	3.50%	33.7%	30.9%	28.2%	25.5%	22.9%	20.4%	18.0%	15.6%	13.4%
	3.00%	34.1%	31.3%	28.5%	25.8%	23.2%	20.7%	18.2%	15.9%	13.6%

*Lower Cost of Capital = Higher ROI*



# Example: Connecticut Green Bank changes grants to loans, and expands solar penetration



# Green Banks work!

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## Connecticut Grant-Making Authority versus Connecticut Green Bank

	FY 2000 – FY 2001 (CCEF)	FY 2012 – FY 2014 (CGB)	FY 2015 (CGB)
<b>Model</b>	Subsidy	Financing	Financing
<b>Years</b>	11	3	1
<b>Energy (MW)</b>	43.1	65.3	62.6
<b>Investment (\$MM)</b>	\$350	\$350	\$365
<b>Leverage Ratio</b>	1:1	5:1	5-10:1
<b>Investment % Loans</b>	9%	57%	77%

# Green Banks are quickly spreading across U.S.

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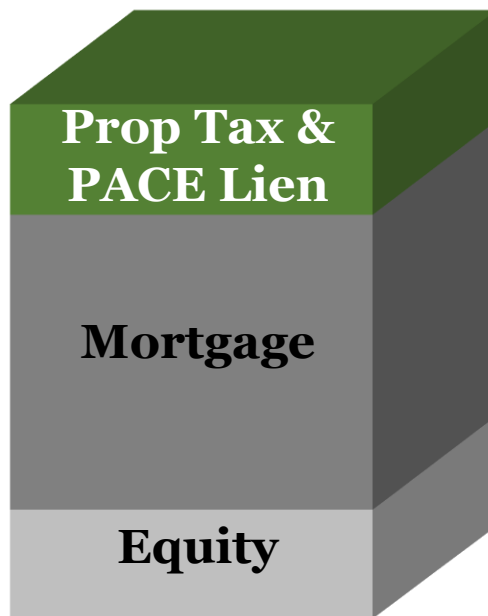
## *Green Banks Operating Or Under Development/Consideration*



# PACE financing is new construct designed to increase lending security, make building investments appealing

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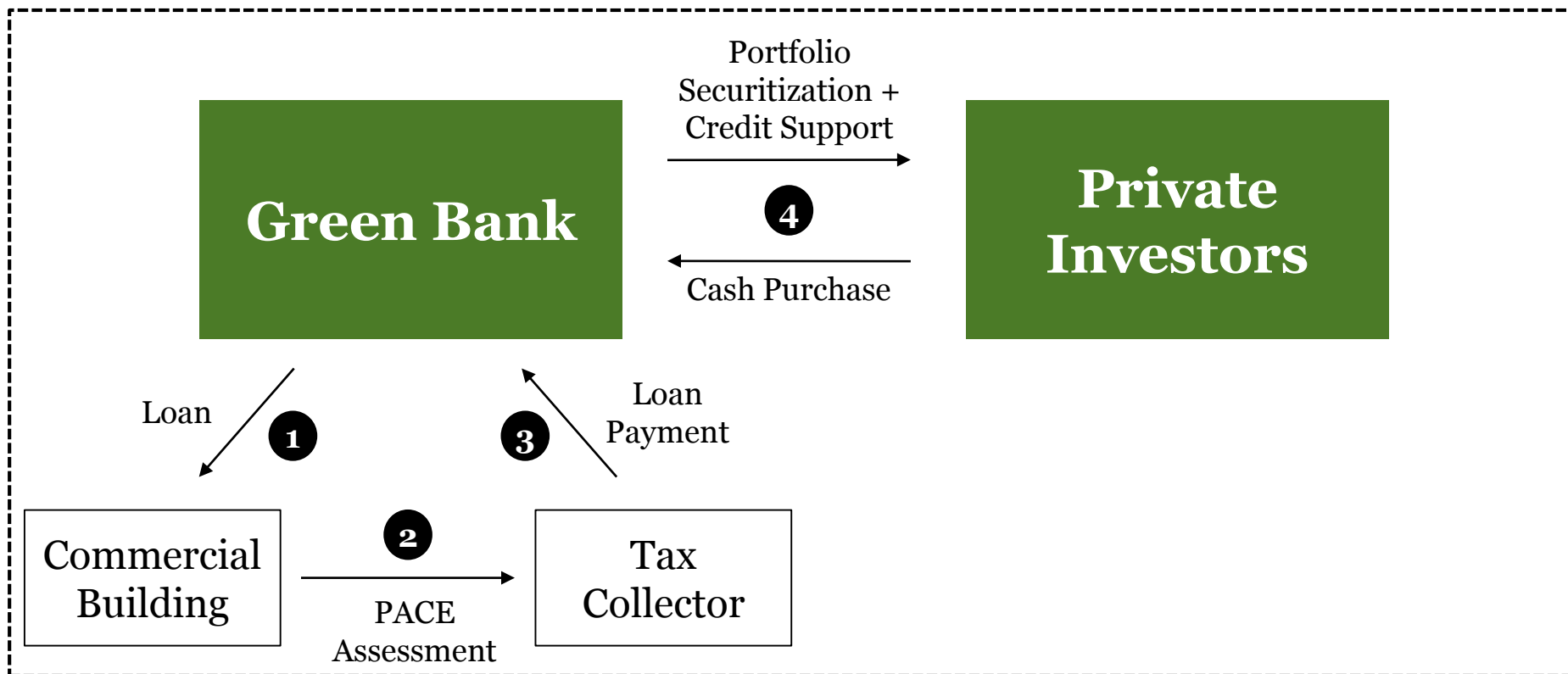
## *Commercial Building Capital Stack*



- PACE lien is new tax assessment
- PACE is lower cost, longer term than commercial loan
- PACE seniority secures repayment
- **PACE stays with property upon sale**

# Example: CGB's C-PACE enables secure efficiency investment at scale

## Centralized State-wide Green Bank Administration



# On-bill financing/repayment is similar to PACE, but payment through utility bill instead of property tax

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- **On-bill financing** (OBF) – utility provides loan capital
- **On-bill repayment** (OBR) – open platform that any capital provider can lend, utility only does collection
  
- **Benefits**
  - Lower default rate – people pay their electricity bills!
  - Overcomes principal-agent challenge – can be used by renters
  - **Loan can stay with the meter** – payment picked up by next occupant
- **Challenges**
  - May involve technical complexity to upgrade utility systems
  - Shut-off provisions?

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# To comply with CPP, state's may presume that it will be “expensive”

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- Expensive how?
  - Will electricity prices go up?
  - Will the public sector have to provide grants?
  - Will customers have to pay to construct new clean energy?
- With bad policy, the answer to every question is yes
  - Lack of capital & high cost of capital can make renewables pricey
  - States fall back on grants, expensive & often not necessary
  - With no state effort to increase financing, customers have to pay out of pocket to adopt clean energy
  - Loss of tax credits means financing for large projects dries up



# Typical policy tools can lower the *price* of clean energy, but don't directly target *financing*

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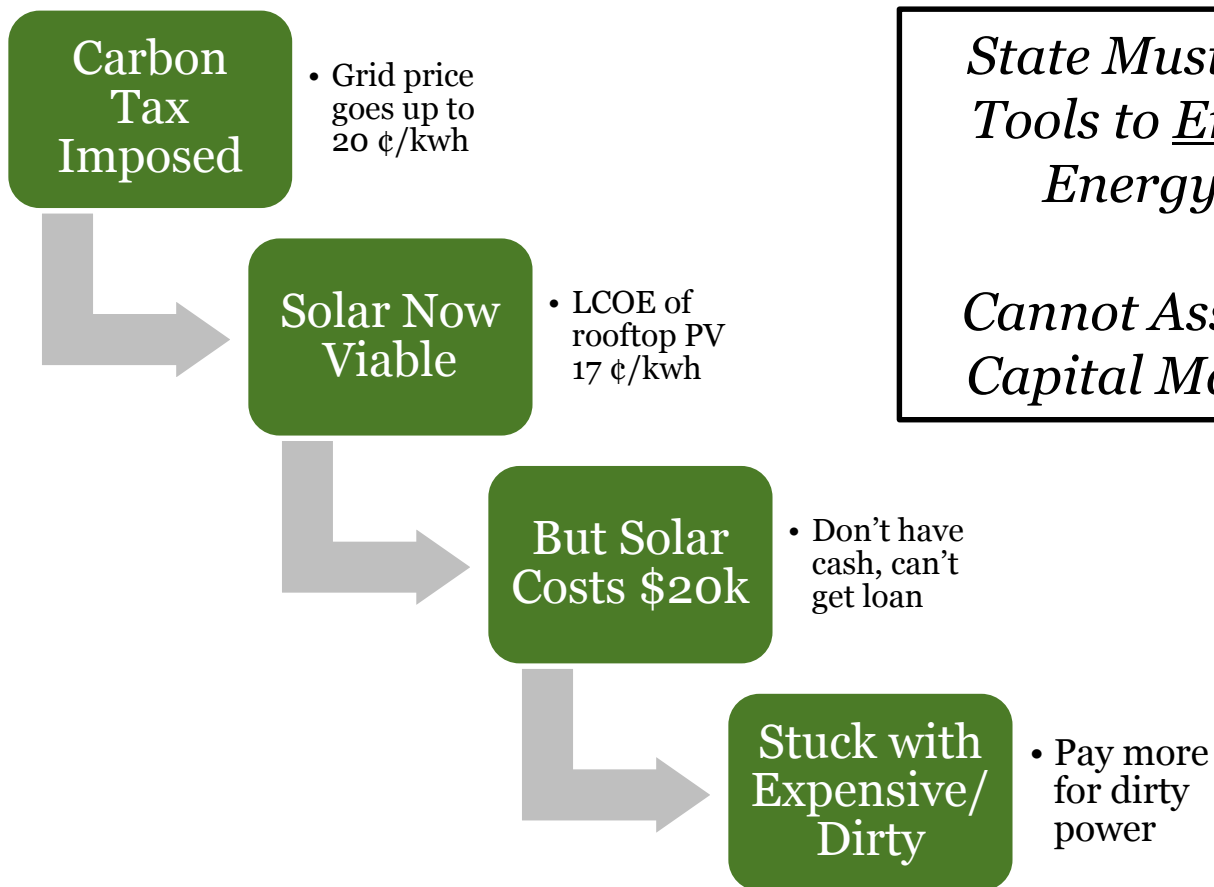
- Subsidies

- Direct cash grants → Reduce upfront cost, but still requires large cash outlay, must come from somewhere
- Tax credits → Like grant, added challenge of needing tax liability
- Performance based incentives → Stream of future benefits, not a source of upfront capital
- Feed-in tariffs → Very secure future stream of future benefits, but still not a source of upfront capital

- Credits

- Renewable energy credits → Future benefits at uncertain value, hard to monetize, not a source of upfront capital
- Carbon emission credits → ???

# A cap-and-trade system or carbon tax without ensuring available financing is incomplete policy



*State Must Provide Finance Tools to Enable A Switch in Energy Consumption*

*Cannot Assume that Private Capital Markets are Perfect*

# No matter specific framework of SIP, all states will need to consider how construction will be financed

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- Cannot deploy clean energy at scale w/o financing
  - Cost of capital directly impacts price of renewables
  - Cost & availability of capital drives demand for efficiency
- States concerned with compliance cost need to consider financing policies
  - Loss of PTC/ITC will increase LCOE of all renewables
  - Grants more expensive than loans, don't solve upfront cost problem
- Merely creating a credit trading system or making dirty electricity more expensive doesn't mean third-party capital will flow at good terms
  - Private investment capital does not automatically flood all viable clean energy project opportunities

# Different types of investment in energy projects have varying expectations of return, structure

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## Equity

- An equity investor owns the project
- Typically the project developer
- No certain flow of repayment
- Expectation that equity will appreciate, but ROI not fixed

## Debt

- Debt broadly means a loan
- Can be from a bank, institutional investor, others
- Repayment is required at regular intervals, set interest rate
- Debt investor wants certainty that project can repay loan

## Tax-Equity Investor

- Equity investor primarily seeking to extract tax benefits, not cash
- Technically a project owner, but only for limited period under specific conditions

# Any discussion of clean energy finance must address the federal tax benefits

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## Investment Tax Credit (ITC)

- 30% of the cost of the system
- Most frequently used for solar
- *Credit*, not a deduction – must have tax liability
- Scheduled to decline at end of 2016

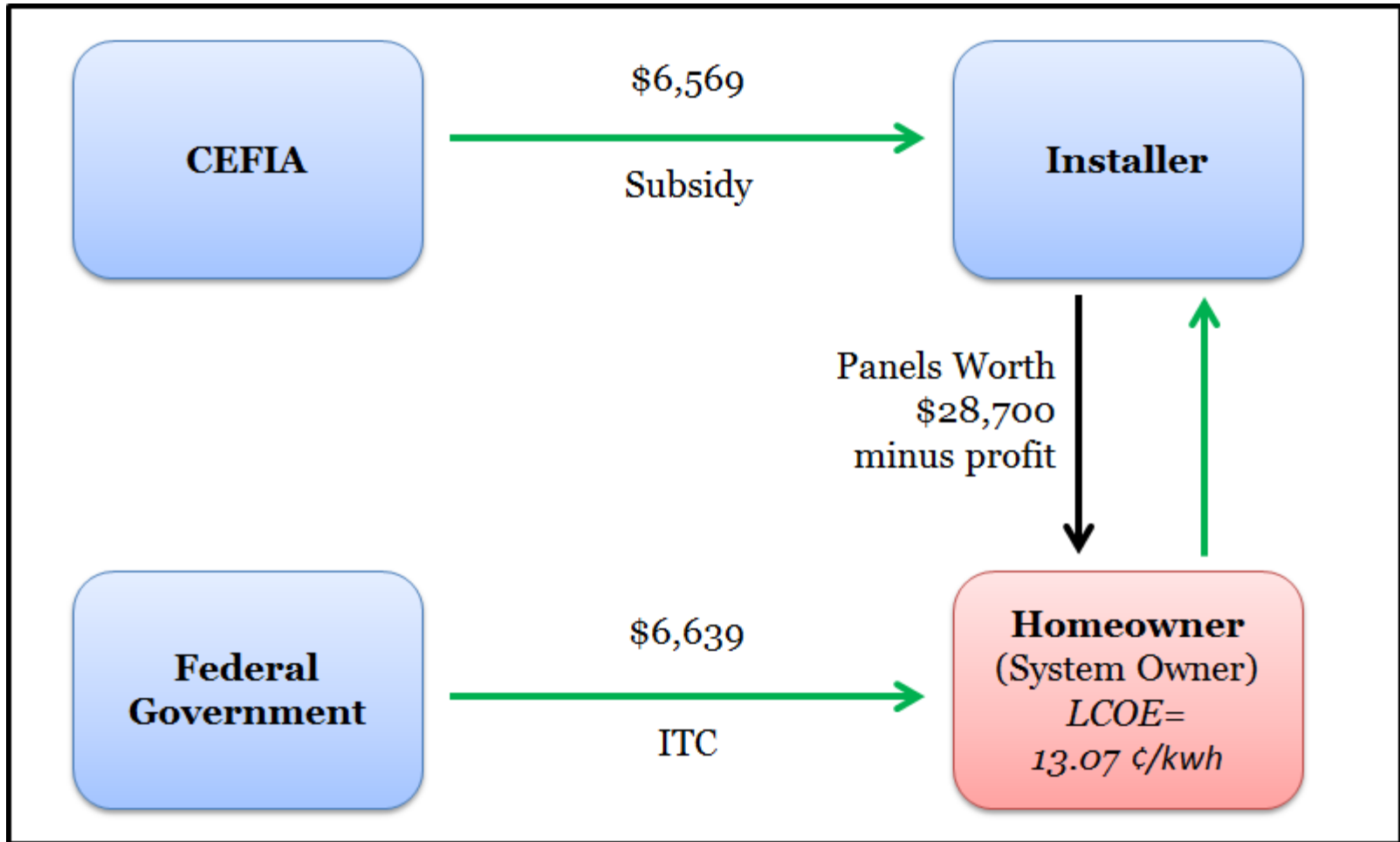
## Product Tax Credit (PTC)

- Performance-based incentive
- 2.3¢/kwh for 10 years of generation
- Also a credit, not a deduction – must have tax liability
- Technically expired, but not really – as long as “in construction”

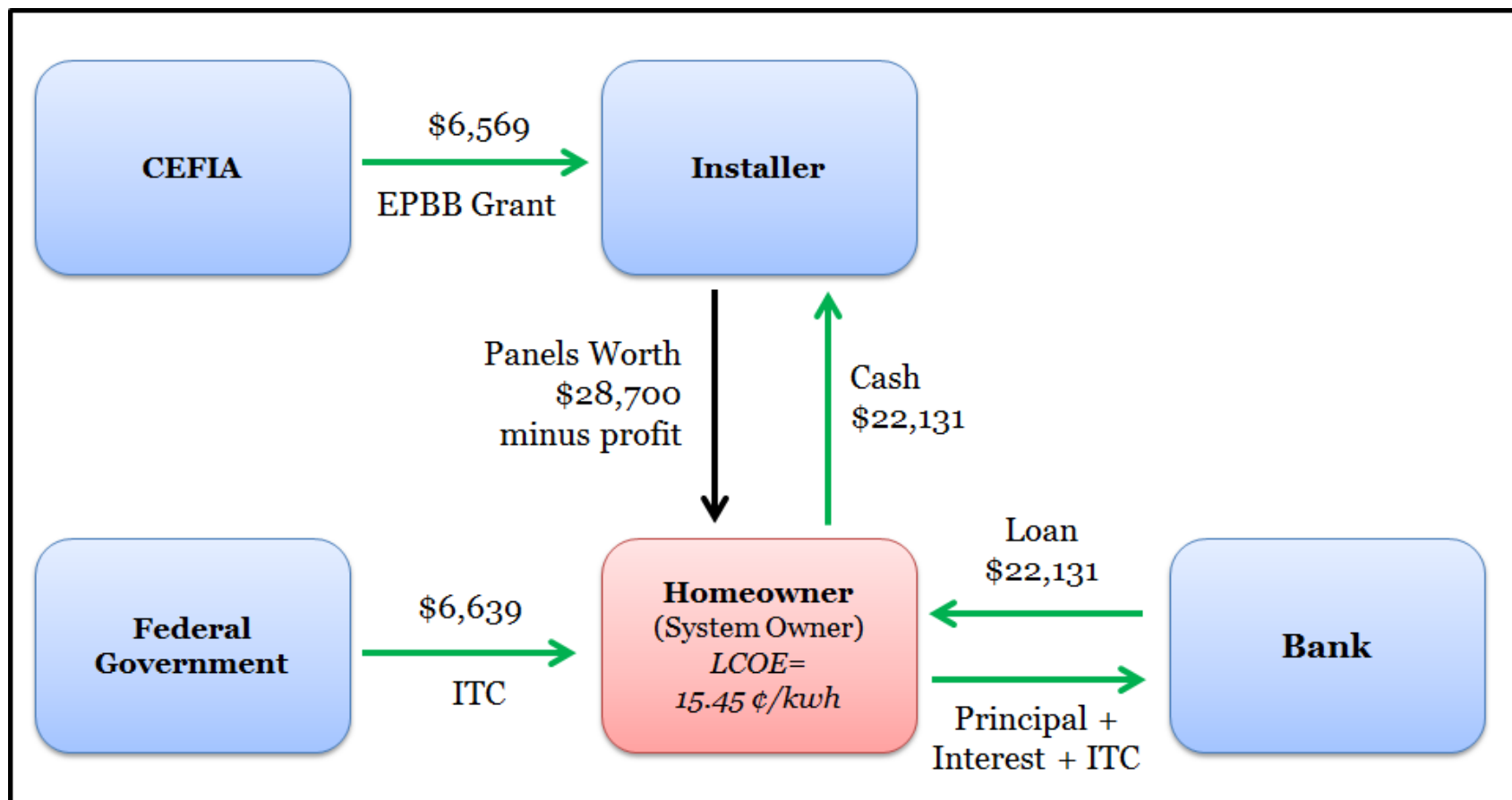
## Depreciation (MACRS)

- Renewable project owner can depreciated value over 5 years; accelerated schedule
- Creates a tax benefit roughly equal to 25% of system cost
- Must be a corporation to take benefit; individuals don't take depreciation

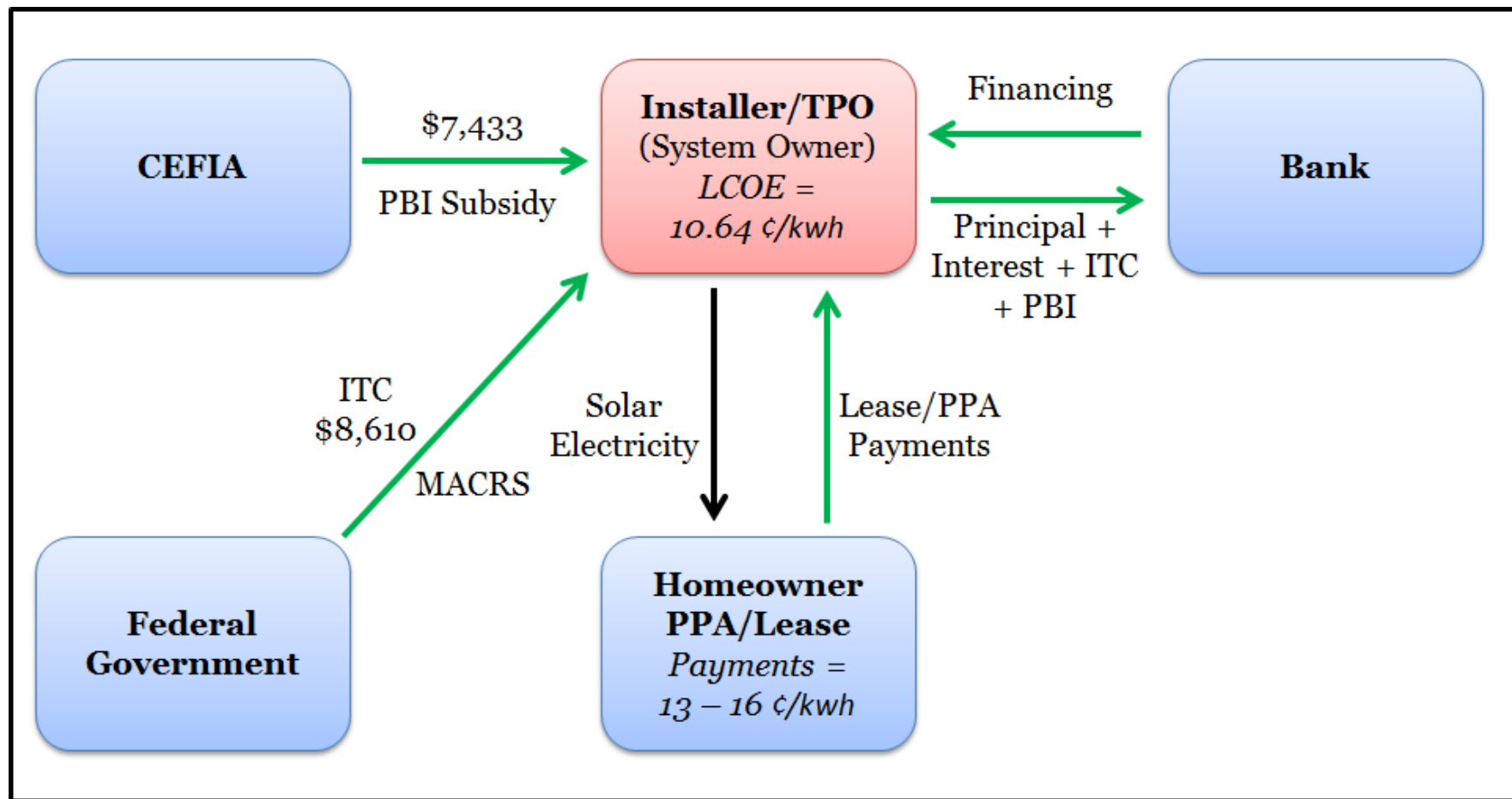
# EXAMPLE: Value flow of residential solar purchased with cash by homeowner in CT



# EXAMPLE: Value flow of residential solar purchased with loan by homeowner in CT

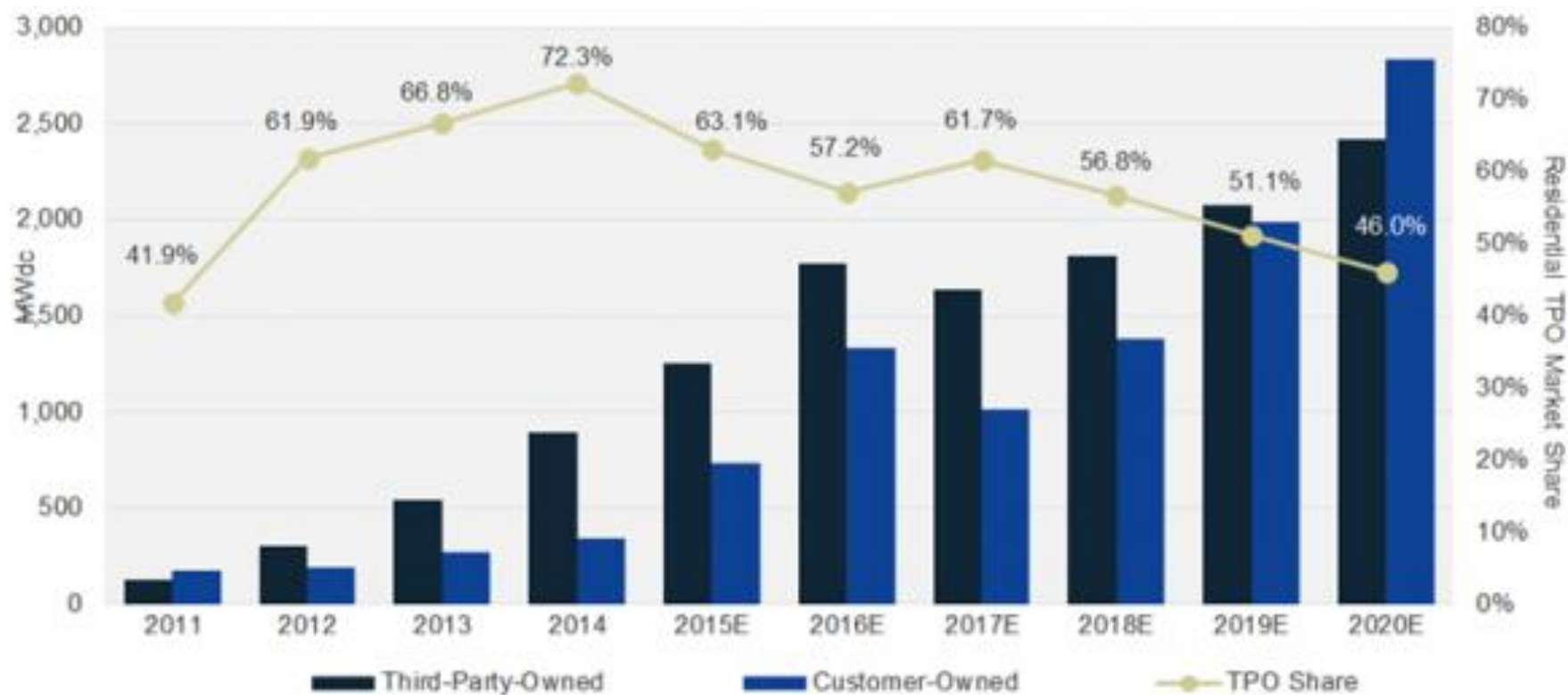


# EXAMPLE: Value flow of residential solar electricity consumed by homeowner via TPO lease/PPA in CT

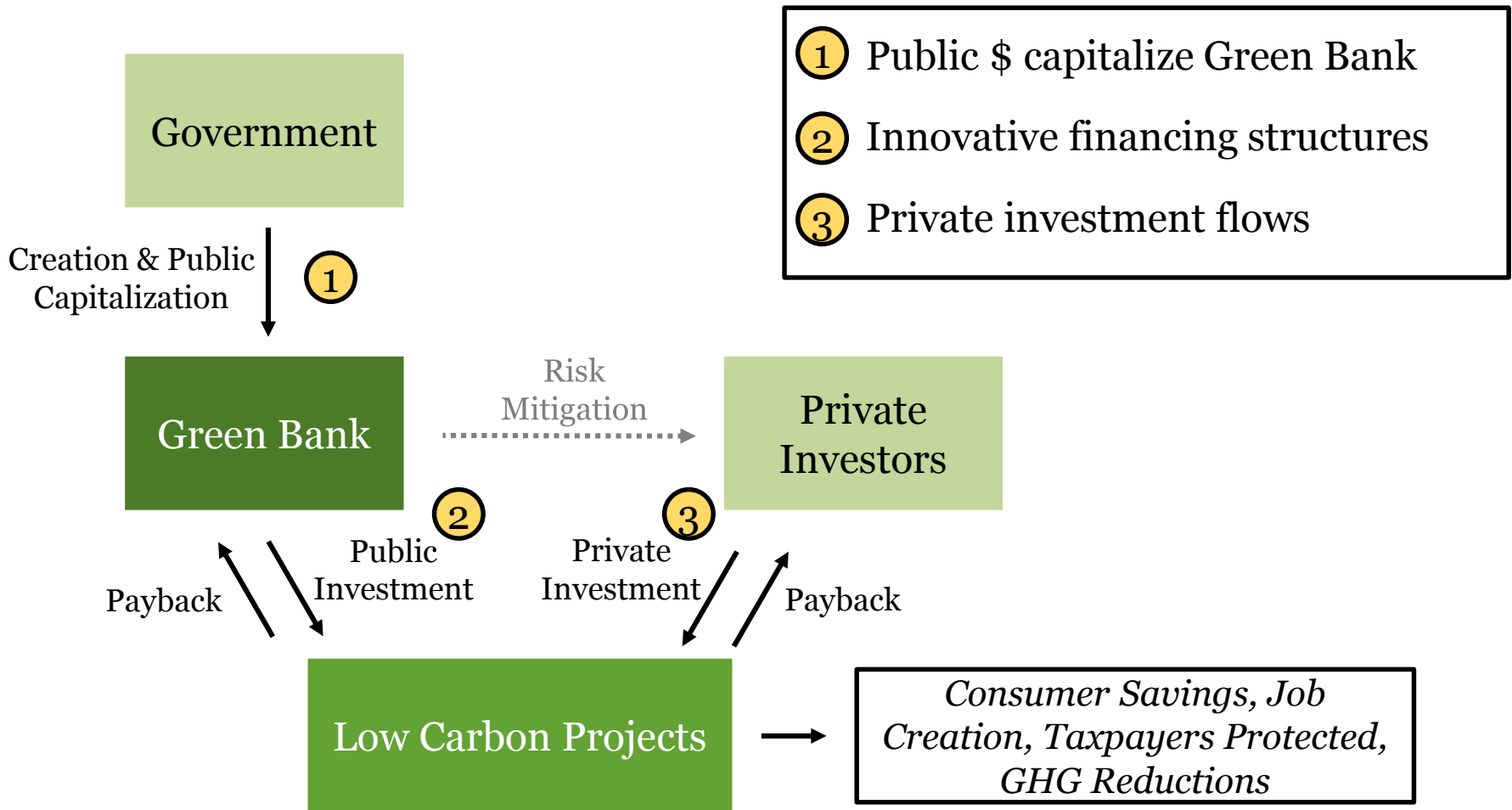




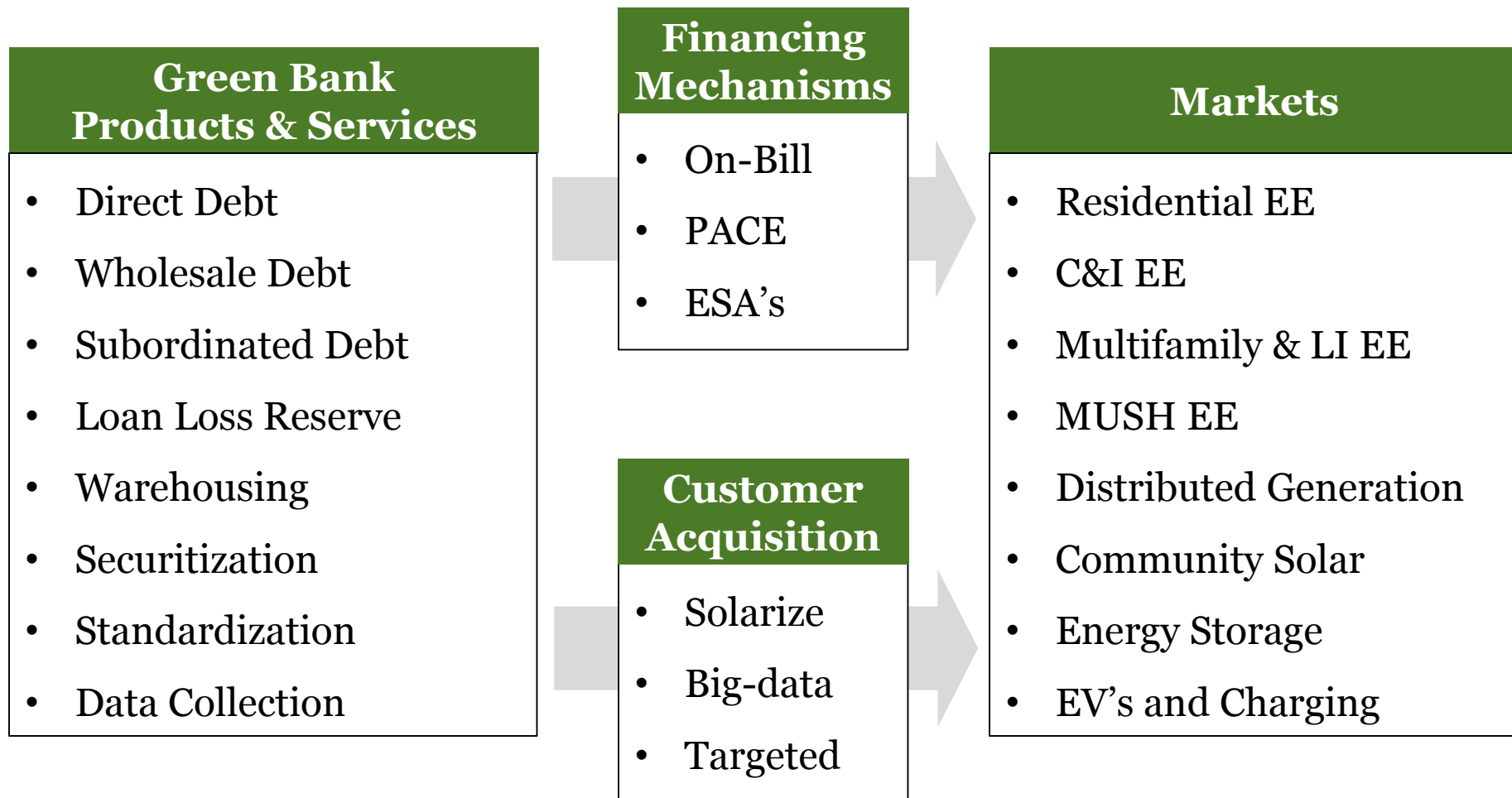
# Market is starting to transition away from complex TPO lease structure and toward traditional loans



# Green Bank is a public institution that channels public and private investment

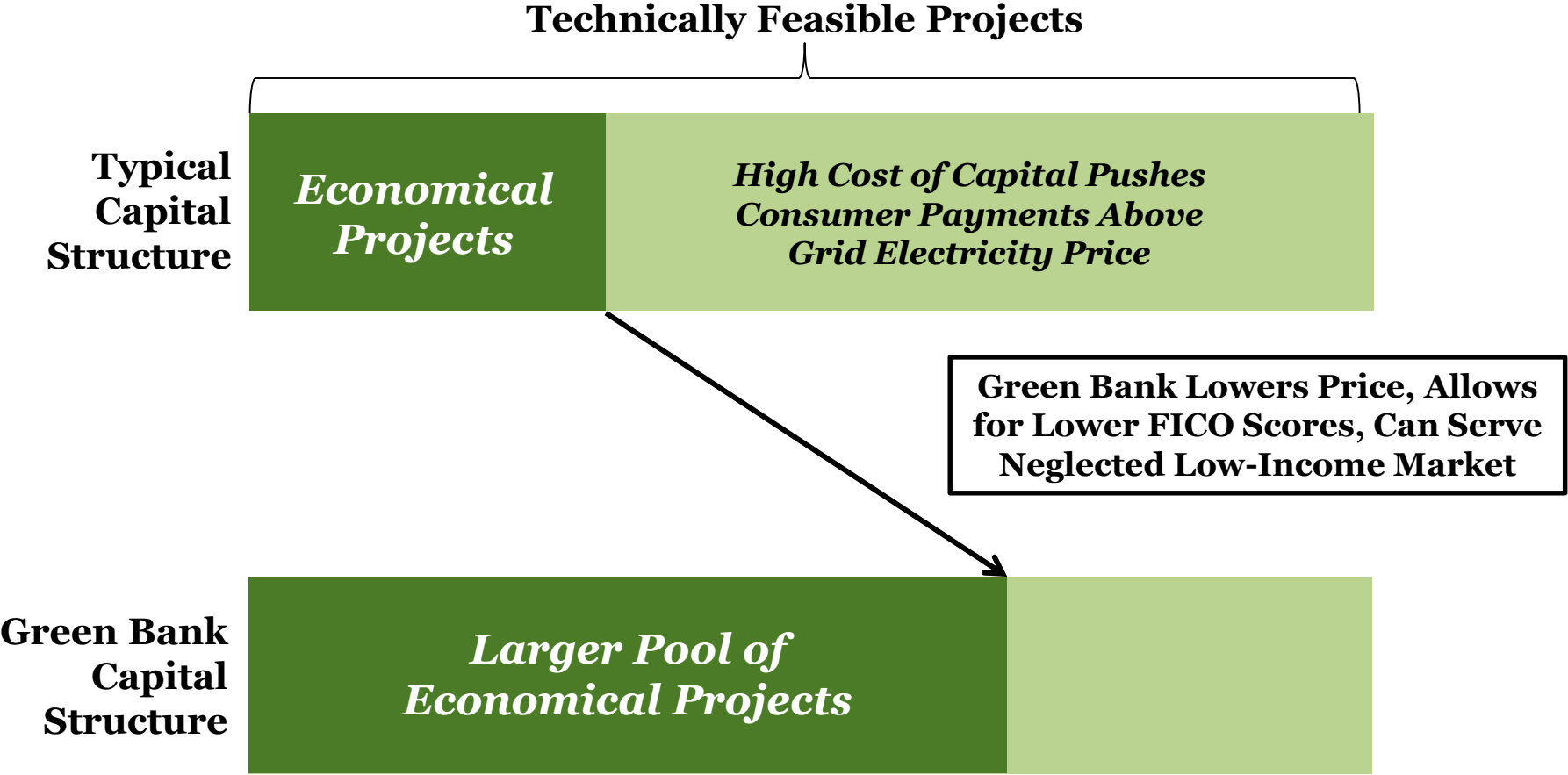


# Range of Green Bank financial tools, applied to prioritized markets, through innovative structures



# Green Banks expand pool of viable projects with lower price and credit enhancements

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# Example: CGB's Residential Solar Tax Equity Fund expands customer access to rooftop solar

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- CGB created unique public-private financing platform
- Product enables local developers to offer financing to customers who otherwise would have to pay all upfront

