



Incentive Structure Alternatives

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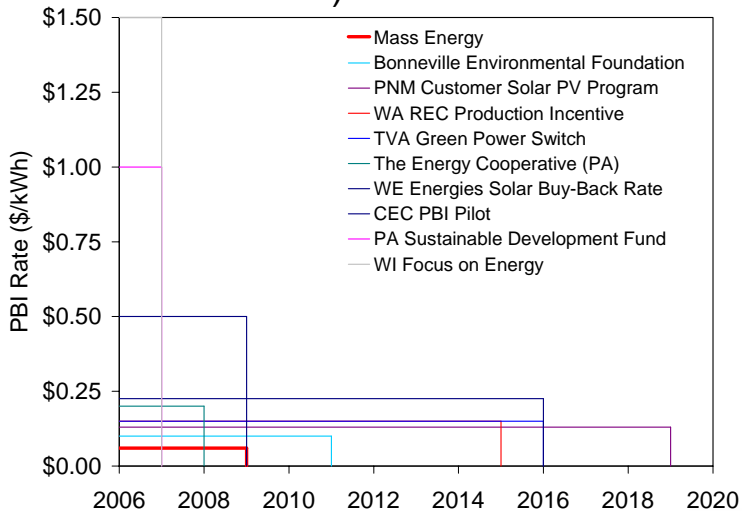
Objective

- Structures available to PV incentive programs
- Key concerns from various perspectives
- Discussion of PBI vs. EPBB
- Implementation

Questions to Answer

- What type of incentive structure should a program use
 - Capacity based buydown (CBB)
 - Performance based incentive (PBI)
 - What should the PBI rate and duration be?
 - Should structure be constant or variable? Etc.
 - Expected performance based buydown (EPBB)
 - Hybrid structure
 - What fraction should be PBI and what fraction upfront payment?

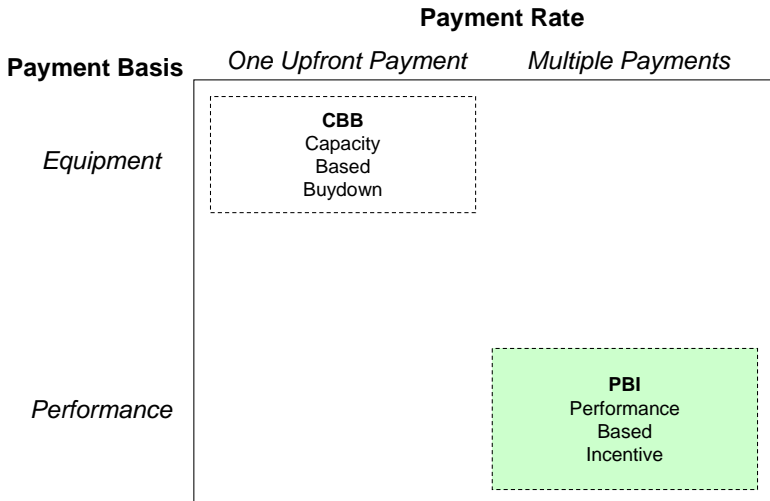
There is a Wide Variety of Existing PBI Programs (Both Rate & Duration)



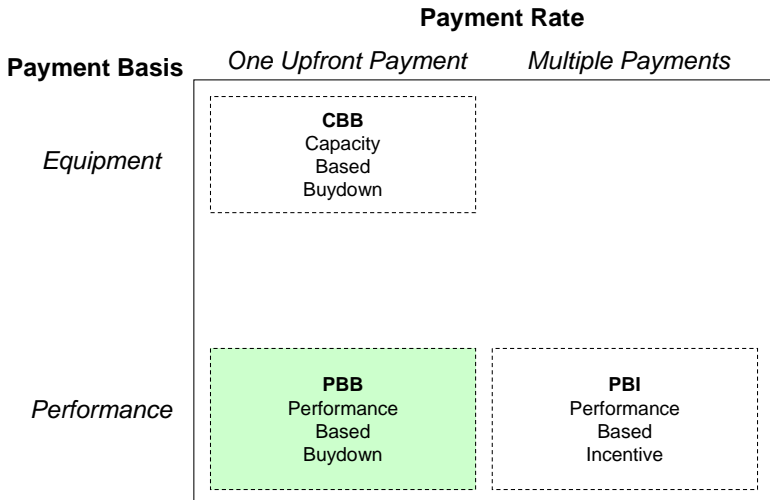
Most PV Incentive Programs are Capacity Based

Payment Basis	Payment Rate	
	<i>One Upfront Payment</i>	<i>Multiple Payments</i>
<i>Equipment</i>	CBB Capacity Based Buydown	
<i>Performance</i>		

Performance Based Incentives (PBI) Protect Against Poor Design, Installation & Performance



Performance Based Buydown (PBB) Pays Upfront with an Adjustment Made Over Time



Capacity Based Incentive Is Paid Over Time

		Payment Rate	
Payment Basis		<i>One Upfront Payment</i>	<i>Multiple Payments</i>
<i>Equipment</i>		CBB Capacity Based Buydown	CBI Capacity Based Incentive
	<i>Performance</i>	PBB Performance Based Buydown	PBI Performance Based Incentive

Expand Framework

Payment Basis	Payment Rate	
	<i>One Upfront Payment</i>	<i>Multiple Payments</i>
<i>Equipment</i>	CBB Capacity Based Buydown	CBI Capacity Based Incentive
<i>Design & Installation</i>		
<i>Performance</i>	PBB Performance Based Buydown	PBI Performance Based Incentive

Expected Performance Based Buydown (EPBB) Pays Based on Expected Performance

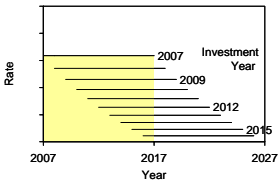
Payment Basis	Payment Rate	
	<i>One Upfront Payment</i>	<i>Multiple Payments</i>
<i>Equipment</i>	CBB Capacity Based Buydown	CBI Capacity Based Incentive
<i>Design & Installation</i>	EPBB Expected Performance Based Buydown	
<i>Performance</i>	PBB Performance Based Buydown	PBI Performance Based Incentive

There are Various Types of PBI Structures

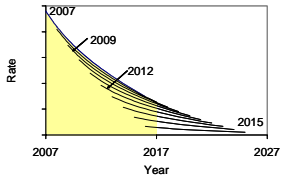
Payment Basis	Payment Rate							
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<i>Design & Installation</i>	EPBB Expected Performance Based Buydown							
<i>Performance</i>	PBB Performance Based Buydown	<table border="1"> <tr> <td>Variable Duration & Fixed Rate</td> <td>PBI</td> <td>Fixed Duration & Fixed Rate</td> </tr> <tr> <td>Variable Duration & Variable Rate</td> <td></td> <td>Fixed Duration & Variable Rate</td> </tr> </table>	Variable Duration & Fixed Rate	PBI	Fixed Duration & Fixed Rate	Variable Duration & Variable Rate		Fixed Duration & Variable Rate
Variable Duration & Fixed Rate	PBI	Fixed Duration & Fixed Rate						
Variable Duration & Variable Rate		Fixed Duration & Variable Rate						

Variations on PBI Structure

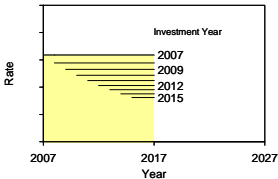
Fixed Duration, Fixed Rate



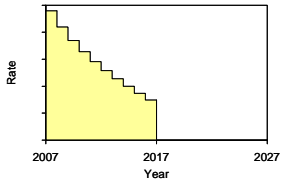
Fixed Duration, Variable Rate



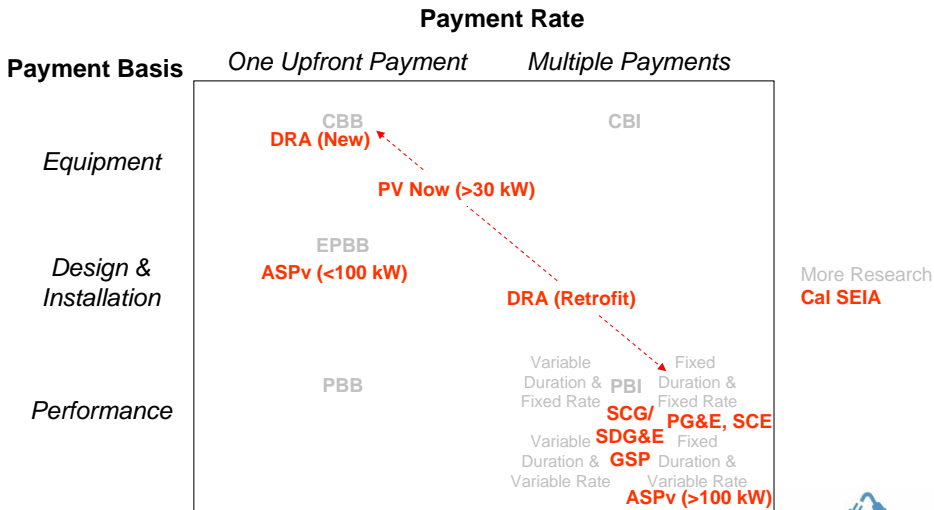
Variable Duration, Fixed Rate



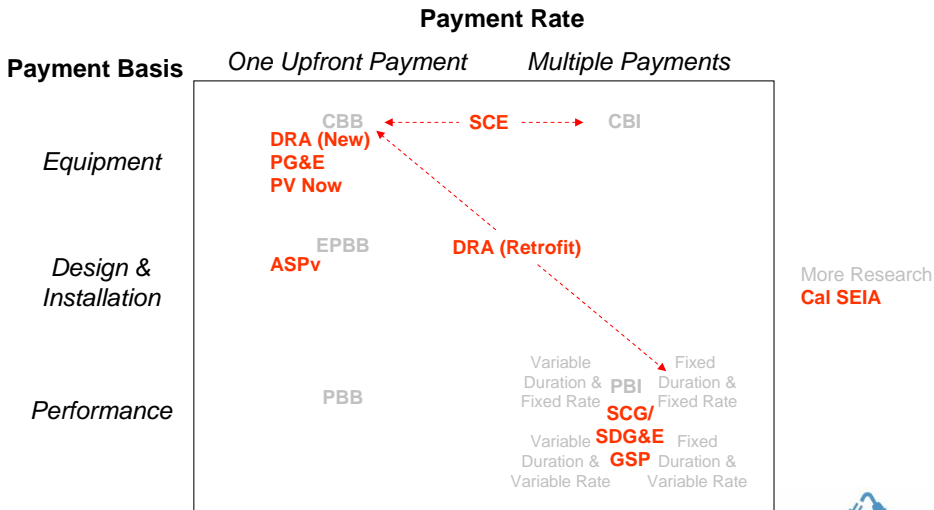
Variable Duration, Variable Rate



CSI Proposals for Non-Residential Customers Favor Structure that Reflects Performance



CSI Proposals for Non-Residential Customers Don't



Primary Concerns from Various Perspectives

- Incentive Agency or Utility
 - Use of ratepayer funds (program cost vs. energy production)
 - Annual budget effects
- Manufacturer & System Reseller
 - Product sale
 - Product innovation
- Customer
 - Economic feasibility

PBI & EPBB

- PBI is only structure that provides agency with a complete guarantee that it will only pay for energy if it is generated
- There is a strong interest, however, in EPBB
- What level of guarantee can EPBB provide compared to PBI?

Performance Issues Mitigated by PBI

What are the performance issues that a PBI can account for that a capacity based buydown does not?

Performance Factor	Performance Issue	Factor Purpose
Rating Factor	One-time	Corrects for divergent rating conventions, promotes quality in system installation, and promotes product innovation by manufacturers
Design Factor	One time	Promotes optimal system orientation with minimal shading
Location Factor	One-time	Promotes installations in areas with high solar availability
Availability Factor	Recurring	Promotes maintenance by system owner and longer lasting equipment by manufacturers
Weather Factor	Recurring	Transfers risk of weather variability to system owner

Performance Issues Mitigated by EPBB

- Rating
 - Adjust for accurate system rating by using a verified system AC rating (rather than nameplate or estimated rating based only on system components)
- Design
 - Adjust for system orientation (azimuth and tilt) and system shading due to obstructions using simulated data
- Location
 - Adjust for system location using simulated data

Performance Issues Not Mitigated by EPBB

- Weather
 - How important is this risk?
 - Should customers should bear weather risk?
- Availability
 - This is probably the strongest reason to select PBI over EPBB
 - How much of a concern is this for various customer types?
 - Will this structure have substantially different effect on innovation that improves product lifetime?

How to Calculate EPBB (Reservation)

On reservation submission, calculate

$$\begin{aligned} \text{Reserved EPBB} &= \text{EPBB Rate } (\$/\text{kW}_{AC}) \\ &\quad \times \text{Estimated Rating } (\text{kW}_{AC}) \\ &\quad \times \text{Design Factor} \end{aligned}$$

How to Calculate EPBB (Payment)

After installation, verify & calculate

$$\begin{aligned} \text{Final EPBB} &= \text{EPBB Rate } (\$/\text{kW}_{AC}) \\ &\quad \times \text{Verified Rating } (\text{kW}_{AC}) \\ &\quad \times \text{Design Factor} \end{aligned}$$

Program Implementation (CBB, EPBB, or PBI)

