



# Modeling Financial Incentives in SAM

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August 13, 2024

# Webinars

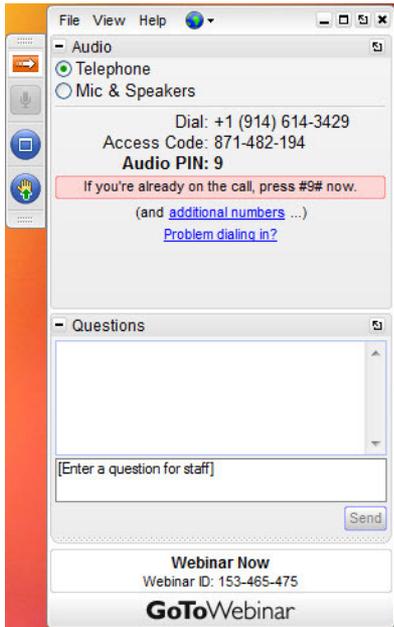
- Modeling PV Uncertainty in SAM - July 30
- **Modeling Financial Incentives in SAM – August 13**
- Modeling Hybrid Power Systems in SAM – August 27

\*All webinars start at 1 PM MDT

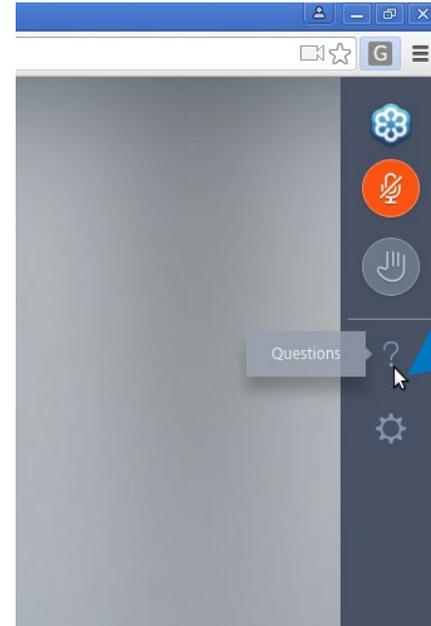
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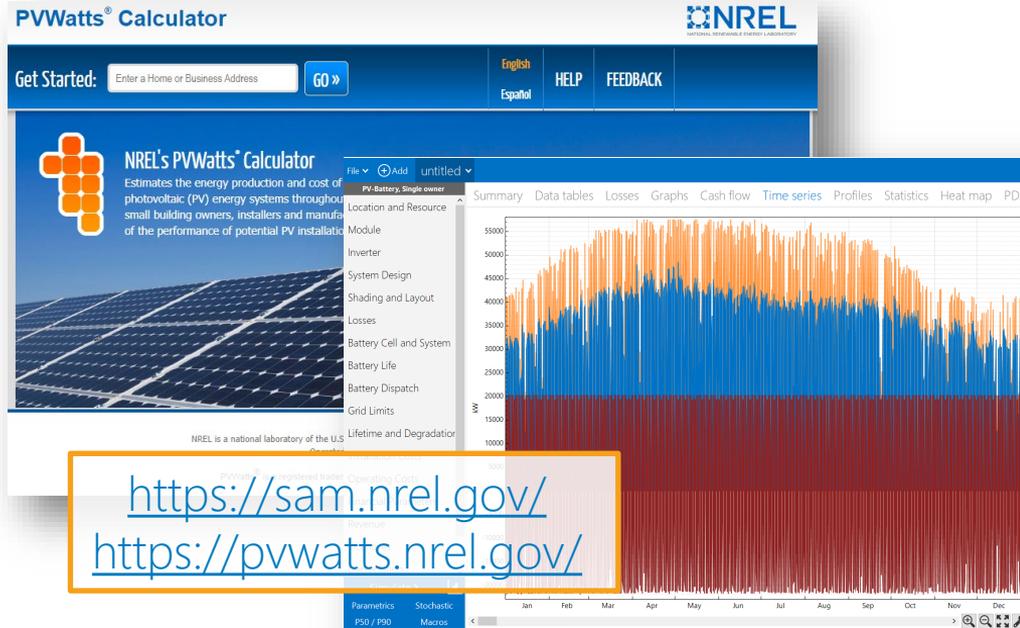
We will either type an answer to your question or answer it at the end of the presentation.

# Agenda

1. Introduction to SAM
2. Overview of financial incentives
3. Incentive inputs and outputs in SAM
4. Plans for future development
5. Q&A

# System Advisor Model (SAM) & PVWatts

Free software that enable detailed performance and financial analysis for renewable energy systems



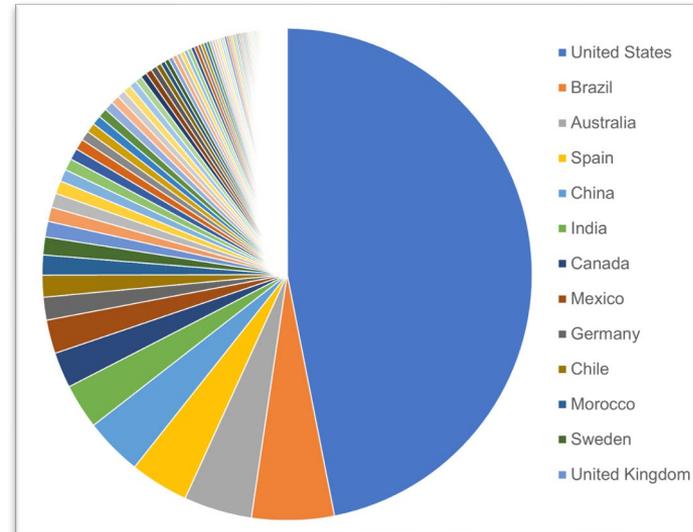
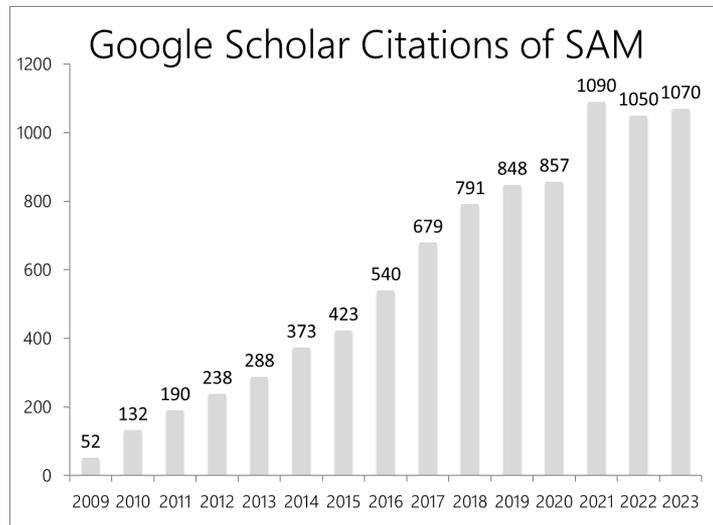
<https://sam.nrel.gov/>  
<https://pwwatts.nrel.gov/>

- ✓ Desktop application
- ✓ PVWatts web tool & API
- ✓ Software development kit
- ✓ PySAM Python package
- ✓ Open source code
- ✓ Extensive documentation
- ✓ User support

# SAM Users

SAM is started **once every 1.4 minutes**  
PVWatts receives over **17.5 million hits per month**  
Over **200,000** users in 190+ countries  
120+ webinars with **over 280,000 views**

Users include Sunrun, Enphase, AEP, Southern Company, EPRI, & more



# Incentives Overview

SAM can model three types of incentives

- Tax credits
- Depreciation (tax deduction)
- Cash payments

Incentives may be provided by different institutions

- Federal government
- State and local government
- Utilities
- Other

Rules for incentives depend on who provides them. SAM is general enough to model most types of incentives. *It does not automatically choose options based on the provider of the incentive.*

Some features are U.S.-specific but can be turned off.

# Tax credits reduce project owner's tax liability

Investment tax credit (ITC) applies in Year 1

- Usually calculated as a percentage of qualifying costs
- In the U.S., the federal ITC reduces the tax depreciation basis by 50% of the ITC amount

Production tax credit (PTC) applies in Years 1 up to a specified number of years with optional annual escalation

- Calculated in \$ per kWh of electricity

SAM offers options for flexibility:

- ITC and PTC can be specified by year
- ITC effect on depreciation basis can be turned off or on
- ITC can be specified as a dollar amount

# Depreciation

Depreciation is a tax deduction of some number of years for the cost of an asset

Different types of property qualify for different classes of depreciation

In the U.S., renewable energy equipment qualifies for depreciation under Modified Accelerated Cost Recovery System (MACRS), see IRS Publication 946 for details

Depreciable basis is the cost of qualifying property less credits and deductions

SAM assumes project owner earns sufficient income to fully use tax credits and depreciation benefits.

- Use SAM's Partnership Flip and Sale Leaseback models for tax equity financing

# A cash incentives is a grant, rebate, renewable energy credit, or other payment to the project

Investment-based incentive (IBI) applies in Year 0

- May be a fixed dollar amount or a percentage of total installed cost with an optional maximum

Capacity-based incentive (CBI) applies in Year 0

- Specified in dollars per Watt of installed capacity with an optional maximum

Production-based incentive (PBI) applies in Year 1 up to specified number of years

- Specified in dollars per kWh of electricity with an optional escalation rate

Options available for cash payments:

- IBI, CBI, and PBI may be taxable (federal and state)
- IBI and CBI may reduce ITC and depreciation basis
- PBI may be available for debt service

*SAM does not automatically choose options.* For example, a utility rebate may not be taxable but reduce the ITC basis.

# Incentives Input Page

Tax credits



**Investment Tax Credit (ITC)**

	Amount (\$)		Reduces Depreciation Basis	
	Federal	State	Federal	State
Federal	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
State	0		<input type="checkbox"/>	<input type="checkbox"/>

	Percentage (%)		Maximum (\$)	
	Federal	State	Federal	State
Federal	30		1e+38	<input checked="" type="checkbox"/>
State	0		1e+38	<input type="checkbox"/>

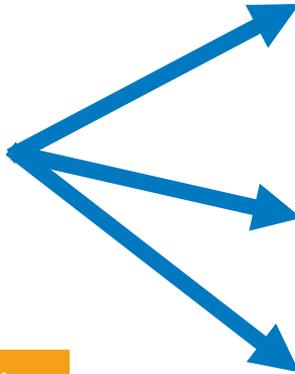
  

**Production Tax Credit (PTC)**

	Amount (\$/kWh)	Term (years)	Escalation (%/yr)
	Federal	0	10
State	0	10	0.00

Inflation does not apply to the PTC amount. In Schedule mode, use nominal (current) dollar values. See Help for details.

Cash incentives



**Investment Based Incentive (IBI)**

	Amount (\$)		Taxable Incentive		Reduces Depreciation and ITC Bases	
	Federal	State	Federal	State	Federal	State
Federal	0.00		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State	0.00		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utility	0.00		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	0.00		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Percentage (%)		Maximum (\$)	
	Federal	State	Federal	State
Federal	0		1e+38	<input checked="" type="checkbox"/>
State	0		1e+38	<input checked="" type="checkbox"/>
Utility	0		1e+38	<input checked="" type="checkbox"/>
Other	0		1e+38	<input checked="" type="checkbox"/>

**Capacity Based Incentive (CBI)**

	Amount (\$/W*)		Taxable Incentive		Reduces Depreciation and ITC Bases	
	Federal	State	Federal	State	Federal	State
Federal	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
State	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utility	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*Capacity is Wdc for PV systems, and Wac for CSP, wind and other systems.

**Production Based Incentive (PBI)**

	Amount (\$/kWhac)	Term (years)	Escalation (%/yr)	Taxable Incentive		PBI available for debt service
	Federal	State	Federal	State	Federal	State
Federal	0	10	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
State	0	10	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Utility	0	10	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other	0	10	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Inflation does not apply to the PBI amount. In Schedule mode, use nominal (current) dollar values. See Help for details.

ITC qualification is on the Depreciation page.

# Depreciation Input Page

## Depreciation

Classes	Allocations	Bonus Depreciation		ITC Qualification	
		Federal	State	Federal	State
5-yr MACRS	<input type="text" value="90 %"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15-yr MACRS	<input type="text" value="1.5 %"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-yr Straight Line	<input type="text" value="0 %"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15-yr Straight Line	<input type="text" value="2.5 %"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20-yr Straight Line	<input type="text" value="3 %"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39-yr Straight Line	<input type="text" value="0 %"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Custom <input type="button" value="Edit..."/>	<input type="text" value="0 %"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-depreciable assets	<input type="text" value="3 %"/>	Bonus:	<input type="text" value="0 %"/>	<input type="text" value="0 %"/>	

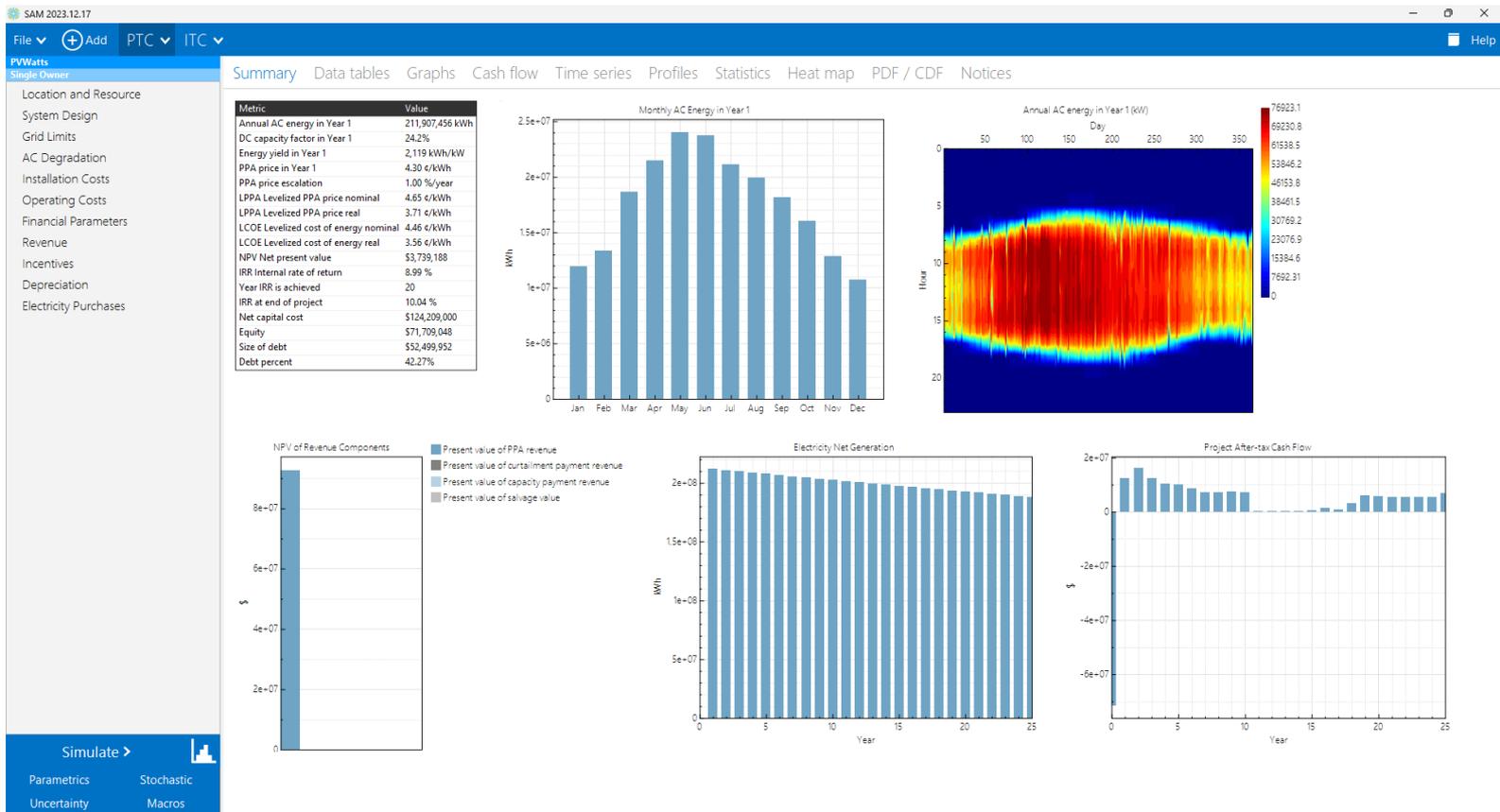
The allocation for each depreciation class is a percentage of the total capital cost. Allocations apply to both state depreciation and federal depreciation.

Total capital cost includes the total installed cost from the Installation Costs page and other financial costs and fees from the Financial Parameters page. SAM displays the value in the Metrics table on the Results page.

Check the box for each asset class that qualifies for federal or state bonus depreciation, and enter the bonus amount as a percentage of the total qualifying allocations.

Check the box for each asset class that qualifies for the investment tax credit (ITC). This determines the basis used to calculate the ITC amount.

# Incentives in SAM



# Update for SAM 2023.12.17 Revision 2

New output variable shows ITC basis and depreciation basis.

Summary Data tables Graphs Cash flow Time series Profiles Statistics Heat map

Copy to clipboard Save as CSV... Send to Excel Clear all

Q Search

Single Values x

- Total IBI income (\$)
- Total ITC basis prior to qualification (\$)
- Total ITC income (\$)
- Total depreciation ITC basis disallowance from federal fixed amount (\$)
- Total depreciation ITC basis disallowance from federal percentage (\$)
- Total depreciation ITC basis disallowance from state fixed amount (\$)
- Total depreciation ITC basis disallowance from state percentage (\$)
- Total depreciation ITC basis from federal fixed amount (\$)
- Total depreciation ITC basis from federal percentage (\$)
- Total depreciation ITC basis from state fixed amount (\$)
- Total depreciation ITC basis from state percentage (\$)
- Total depreciation basis prior to allocation (\$)
- Total depreciation federal and federal allocation (\$)
- Total federal CBI reduction (\$)

Total ITC basis prior to qualification (\$)	1.24209e+08
Total depreciation basis prior to allocation (\$)	1.24209e+08

	A	B	C
1	<b>Single Owner Cash Flow</b>		
2	Operating Year	0	1
237	Federal Tax Rate (%/year)	0	21
238	Federal Tax Benefit/(Liability)		3,642,794
239			
240	<b>Depreciation and ITC Basis Calculations</b>		
241	<b>Basis for State and Federal Depreciation</b>		
242	Financing costs		
243	Debt closing cost	0	
244	Debt up-front fee	1,443,750	
245	Financing cost	0	
246	Construction financing	3,055,360	
247	Debt service reserve funding	2,565,400	
248	Working capital reserve funding	750,000	
249	Receivables reserve funding	0	
250	Total financing costs	7,814,510	
251	Total installed cost	116,394,500	
252	Total basis prior to allocation	124,209,010	
253			
254	<b>State Depreciation &amp; ITC</b>		
255	Summary table		
		% of Total Depreciable Basis	Gross Amount Allocated
256			
257	5-yr MACRS	92.78	111,788,109
258	15-yr MACRS	1.55	1,863,135
259	5-yr SL	0.00	0
260	15-yr SL	2.58	3,105,225
261	20-yr SL	3.09	3,726,270
262	39-yr SL	0.00	0
263	Custom	0.00	0
264	Total	100.00	120,482,740
265			
266	Depreciable Basis Incentive Reductions		
267	Investment Based Incentive (IBI)		
268	As fixed amount		

In SAM for Windows, from Results page Cash Flow tab, click **Send-to-Excel with Equations** to see basis calculation.

# Plans for Fall 2024 version

When ITC and IBI are combined, subtract 100% of IBI from the ITC basis instead of according to depreciation class allocations.

Improve modeling of tax implications of debt upfront fees.

Improve default depreciation allocations for hybrid power systems.

Remove reserve account funding and financing fees from depreciation and ITC basis.

# Thank you! Questions?

Contact: Paul Gilman  
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