

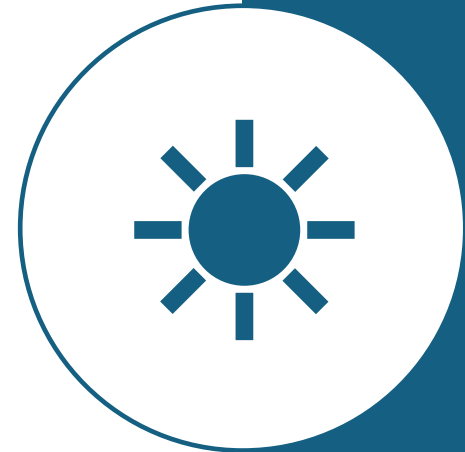
Navigating Solar Financing Incentives

Presented to
Ohio Association of Public Treasurers
by
Lian Niu, Eitri Foundry



Contents

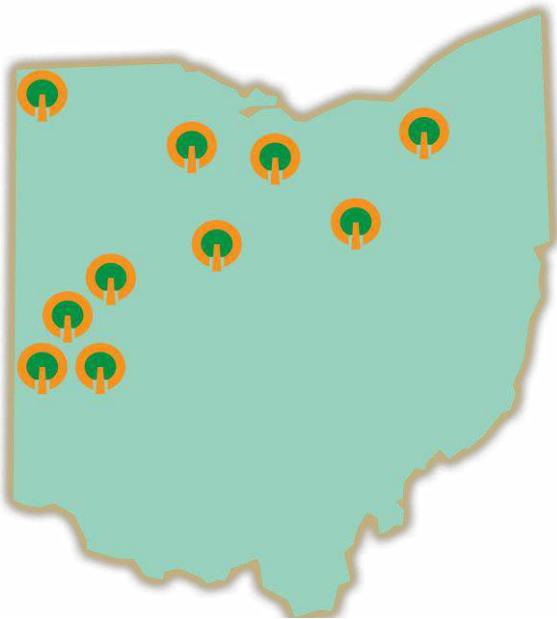
- Introduction to Eitri Foundry
- Overview of solar technology, benefits and incentives that lead to rapid growth
- Overview of financial incentives
- Planning for successful solar project
- Understanding value of energy vs power / demand
- Cash flow model example



Eitri Foundry



Eitri (pronounced "E-tree") Foundry is an employee-owned company that develops and builds solar projects. In Norse mythology, Eitri was the dwarf that forged Mjolnir- Thor's hammer that grants the ability to control lightning. Similarly, **our mission is to strengthen our neighbors** by giving communities the tools that grant control of energy generation.



Supporting our partners with 4E values

- Engineering
- Economic development
- Environment
- Education

Strengthening Ohio communities since 2017

- >\$42M of private capital deployed
- >\$17M spent with local Ohio vendors
- >\$200k of local taxes generated annually



Solar Core Components

Panels

- Technology enabled by silicon-based semiconductor technology
- Collect energy from photons to generate free electrons

Inverters

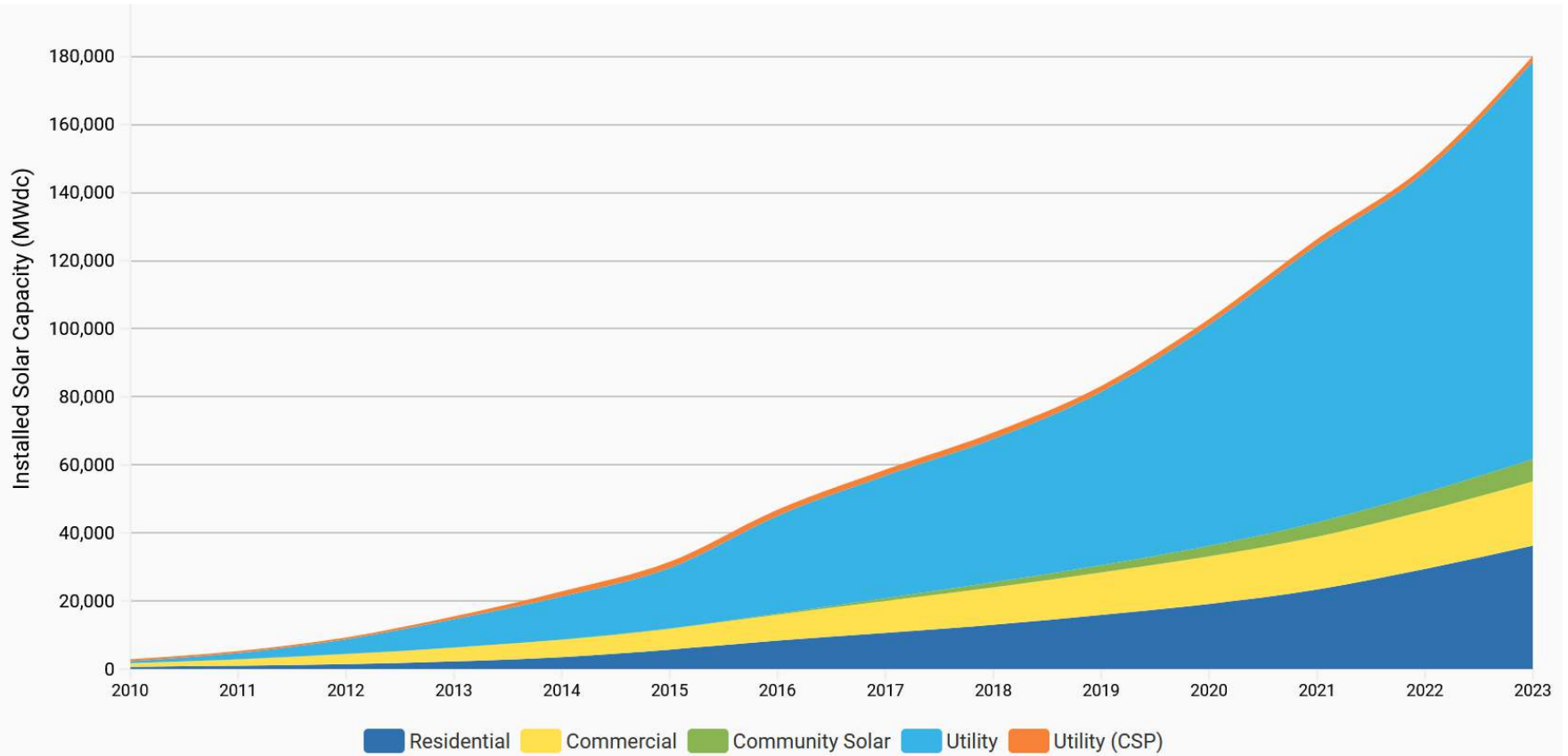
- Convert DC electricity to AC

Racking

- Can be roof mounted, fixed tilt or tracking on ground mounts

Transformers

- Shape electricity to match grid



Source: SEIA



Source: SEIA

179 GW installed nation-wide, with growth still accelerating

Rapid growth is result of many factors:

- decreasing costs to deploy, but susceptible to supply chain disruptions and inflation
- Demand for reliable long-term energy resources
- Lots of financial incentives (next slide)

Growth of Solar Industry

Benefits of Solar

- Save money on electric supply costs (power and/or energy)
- Effective economic development tool
 - Local jobs, incentives to support domestic manufacturing
 - Clean supply chain commitment from corporations
 - Compliance with Prevailing Wage and Apprenticeship Requirements (PWAR) to qualify for full tax credit value (>1MW)
- Many financial incentive programs for participation
 - Federal investment tax credit (ITC) with bonus credits under IRA
 - Direct Pay under Inflation Reduction Act (IRA) for nontaxable entities
 - Accelerated depreciation
 - Solar renewable energy credits (SRECS)
 - Agency, utility or state specific incentives

With so many improvements, when is the best time to go solar?

- Best way to “time the market” is make use of time in the present and not get analysis paralysis

Summary of Investment Tax Credit (ITC) and Production Tax Credit (PTC) Values Over Time

		Start of Construction							
		2006 to 2019	2020 to 2021	2022	2023 to 2033	The later of 2034 (or two years after applicable year ^a)	The later of 2035 (or three years after applicable year ^a)	The later of 2036 (or four years after applicable year ^a)	
ITC	Full rate (if project meets labor requirements ^b)	Base Credit	30%	26%	30%	30%	22.5%	15%	0%
		Domestic Content Bonus				10%	7.5%	5%	0%
		Energy Community Bonus				10%	7.5%	5%	0%
	Base rate (if project does not meet labor requirements ^b)	Base Credit	30%	26%	6%	6%	4.5%	3%	0%
		Domestic Content Bonus				2%	1.5%	1%	0%
		Energy Community Bonus				2%	1.5%	1%	0%
	Low-income bonus (1.8 GW/yr cap)	<5 MW projects in LMI communities or Indian land				10%	10%	10%	10%
		Qualified low-income residential building project / Qualified low-income economic benefit project				20%	20%	20%	20%
	PTC for 10 years (\$2022)	Full rate (if project meets labor requirements ^b)	Base Credit			2.75 ¢	2.75 ¢	2.0 ¢	1.3 ¢
Domestic Content Bonus						0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
Energy Community Bonus						0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
Base rate (if project does not meet labor requirements ^b)		Base Credit			0.55 ¢	0.55 ¢	0.4 ¢	0.3 ¢	0.0 ¢
		Domestic Content Bonus				0.1 ¢	0.0 ¢	0.0 ¢	0.0 ¢
		Energy Community Bonus				0.1 ¢	0.0 ¢	0.1 ¢	0.0 ¢

a “Applicable year” is defined as the later of (i) 2032 or (ii) the year the Treasury Secretary determines that there has been a 75% or more reduction in annual greenhouse gas emissions from the production of electricity in the United States as compared to the calendar year 2022.

b “Labor requirements” entail certain prevailing wage and apprenticeship conditions being met.

Source: EERE (Federal Energy Efficiency and Renewable Energy) Office. Learn more at www.energy.gov



Solar Project Planning

Aside from equipment, projects will require:

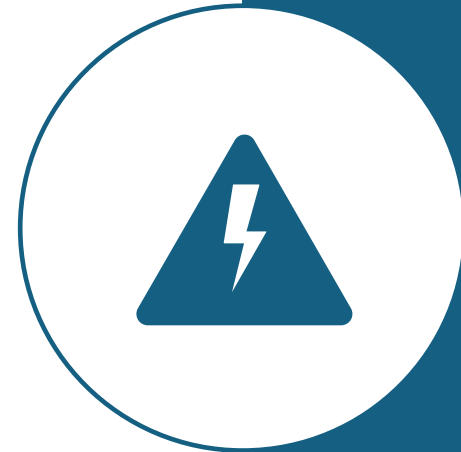
- Site
 - Roof, ground or parking structures
- Interconnection
 - Ability to tie to grid
- Revenue and/or savings generation
 - PPA or net metering agreement
- Permitting and approvals
 - All entitlements, title search, environmental approvals, etc

Timeline for effective project

- Feasibility (<1 years)
- Development (6 months – several years)
- Construction (few months – 2 years)

Value of Energy and Power

- Electrical bills have an energy (kWh) and power / demand (kW) component
 - Solar can easily offset energy component,
 - Demand component offset determined by billing structure
- Value of solar energy is more than just PPA rate or net metered credit
 - Challenges occur when PPA rate exceeds value of solar energy



Self Ownership Vs Third Party Finance (PPA)

Direct Pay

- Self owned projects receives value of energy and power when consumed
- Non-taxable entities are eligible to receive value of project ITC in form of cash rebate
- All financing requirements fall on system owner
- Depreciation benefits are foregone
- Must qualify as domestic content
- Long term management, O&M duties fall on system owner

Power Purchase Agreement

- Project host pays contracted value for energy generated by solar
- System financier receives ITC **and** depreciation benefits
- All costs are financier responsibilities
- O&M duties are financier responsibility. Decreased system performance means less revenue for financier

Frontier Associates Simple Cash Flow Model

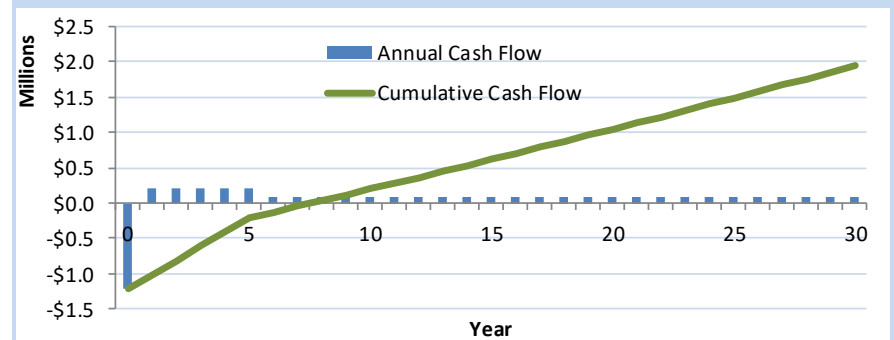
A. Model Inputs

Category	Item	Value	Unit
System Summary	PV System Size	1,200	kWdc
Costs	PV System Cost	\$1,740,000	\$
Incentives	Incentives and Grants	\$0	\$
	Federal ITC Value %	30%	%
	Does ITC apply?	Yes	"Yes" or "No"
PV Specs	Annual PV Production (yr 1)	1,740,000	kWh (from PVWatts)
	Annual PV Degradation Rate	0.70%	%
	PV Outflow/Total Production Ratio	100%	%
	PV Demand Savings Factor	0%	%
Retail Billing Details	Credit value for reduced inflows	\$0.070	\$/kWh
	Credit value for outflows	\$0.070	\$/kWh
	Demand charge?	No	"Yes"/"No"
	Demand charge savings value	\$5.00	\$/kW
	Energy/demand value escalator	1.5%	%
REC Value	REC value	\$0	\$/REC, yr 1-5
Operating Costs	PV O&M costs	\$19.93	\$/kW (from JEDI)
	O+M cost escalator	1.5%	%/yr
	Inverter life	10	yrs
	Inverter cost reduction	-3.0%	%/yr
Depreciation	Depreciation method	MACRS	"None", "MACRS"
	Depreciation basis	\$1,479,000	\$
Tax Rate	Marginal tax rate	21%	%
	Is Net Income taxable?	yes	"Yes"/"No"
Discount Rate	Discount rate for NPV calc.	4%	%
PVWatts	Month	AC Energy	
	Annual	1,740,000	kWh

B. Model Outputs

Category	Item	Value	Unit
Direct Financial Benefits and Costs			
Direct	IRR	10.3%	%
Financial	Simple Payback Years	8	years
Metrics	NPV	\$743,290	\$
	Benefit/Cost Ratio	1.6	

Annual and Cumulative Cash Flows



Jobs and economic development impacts (see notes on Instructions worksheet)

(from NREL JEDI model)

During construction period	Jobs	3.7	
	Earnings	\$250.392	\$000 2016
	Output	\$531.059	\$000 2016
During operating years (annual)	Jobs	0.1	
	Earnings	\$3.451	\$000 2016
	Output	\$5.700	\$000 2016

Annual avoided emissions impacts (see notes on Instructions worksheet)

(from EPA EGRID Power Profiler)

Average avoided monthly kWh	145,000	kWh/month
Annual Avoided Emissions	Nitrogen Oxides	195 pounds/yr
	Sulfur Dioxide	618 pounds/yr
	Carbon Dioxide	367,003 pounds/yr

Annual avoided emissions equivalencies (see notes on Instructions worksheet)

(from EPA Greenhouse Gas Equivalencies calculator)

Avoided emissions equivalencies	CO ₂ avoidance	398,971	average passenger vehicle miles
	CO ₂ emissions	24.6	average home's annual electricity use
	Carbon sequestered by	4,314	tree seedlings grown for 10 years

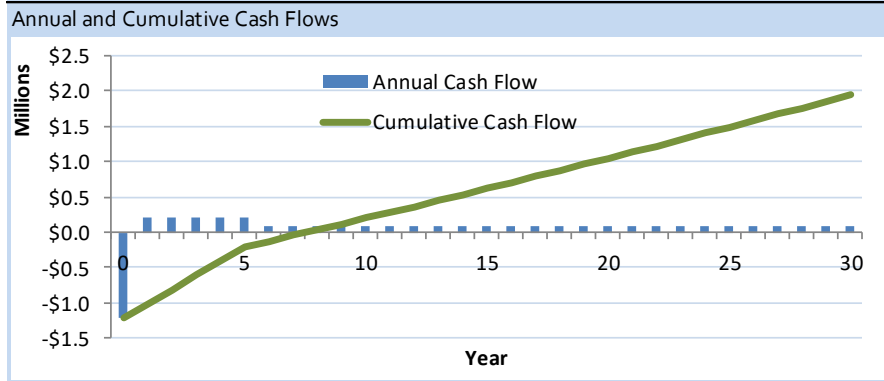
Model available upon request. Email lniu@eitrfoundry.com for an editable copy.

Frontier Associates

Simple Cash Flow Model

Model available upon request. Email lniu@eitrifoundry.com for an editable copy.

Direct Financial Benefits and Costs		
Direct	IRR	10.3% %
Financial	Simple Payback Years	8 years
Metrics	NPV	\$743,290 \$
	Benefit/Cost Ratio	1.6



		-----> start of system operation								
	0	1	2	3	4	5	10	15	20	30
PV Energy Production		1,740,000	1,727,820	1,715,725	1,703,715	1,691,789	1,633,400	1,577,026	1,522,597	1,419,311
Reduced inflows		0	0	0	0	0	0	0	0	0
Outflows		1,740,000	1,727,820	1,715,725	1,703,715	1,691,789	1,633,400	1,577,026	1,522,597	1,419,311
Capital Costs	-\$1,740,000									
- Federal Tax Credit	\$522,000	\$0								
Sum of Capital Costs	-\$1,218,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Benefits/Income										
PV Energy Value		\$121,800	\$122,762	\$123,731	\$124,708	\$125,692	\$130,733	\$135,976	\$141,429	\$153,000
REC Value		\$17,400	\$17,278	\$17,157	\$17,037	\$16,918	\$0	\$0	\$0	\$0
Sum of Benefits/Income		\$139,200	\$140,040	\$140,888	\$141,745	\$142,610	\$130,733	\$135,976	\$141,429	\$153,000
Operating Costs										
- Annual scheduled O+M		\$23,916	\$24,275	\$24,639	\$25,008	\$25,384	\$27,345	\$29,459	\$31,735	\$36,830
- Depreciation		-\$62,118	-\$62,118	-\$62,118	-\$62,118	-\$62,118	\$0	\$0	\$0	\$0
Total Operating Costs		\$38,202	\$37,843	\$37,479	\$37,110	\$36,734	-\$27,345	-\$29,459	-\$31,735	-\$36,830
Net Income		\$177,402	\$177,883	\$178,367	\$178,854	\$179,345	\$103,388	\$106,517	\$109,693	\$116,170
- Tax		-\$37,254	-\$37,355	-\$37,457	-\$37,559	-\$37,662	-\$21,711	-\$22,369	-\$23,036	-\$24,396
Net Income after Taxes		\$140,148	\$140,528	\$140,910	\$141,295	\$141,682	\$81,676	\$84,148	\$86,658	\$91,774
+ Depreciation		\$62,118	\$62,118	\$62,118	\$62,118	\$62,118	\$0	\$0	\$0	\$0
- Principal pymts		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Annual Cash Flow	-\$1,218,000	\$202,266	\$202,646	\$203,028	\$203,413	\$203,800	\$81,676	\$84,148	\$86,658	\$91,774
Cumulative Cash Flow	-\$1,218,000	-\$1,015,734	-\$813,088	-\$610,060	-\$406,647	-\$202,847	\$200,653	\$616,435	\$1,044,691	\$1,939,309