



Colorado State University
Extension



PARTNERS IN ENERGY
An Xcel Energy Community Collaboration



Renewable Energy 101

June 13, 2019



Agenda



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Time	Topic
7:00 – 7:10	Welcome and Overview of Partners in Energy
7:10 – 7:40	Renewable Energy Basics & Xcel Energy Opportunities
7:40 – 8:10	Know Before You Go Solar – CSU Extension
8:10 – 8:30	Q&A

Introductions

- Wyatt Peterson – City of Centennial
- Tim Aston – CSU Extension
- Cary Weiner – CSU Extension
- Kristin Gaspar– Xcel Energy, Solar*Rewards Associate Program Manager
- Melody Redburn – Xcel Energy Partners in Energy

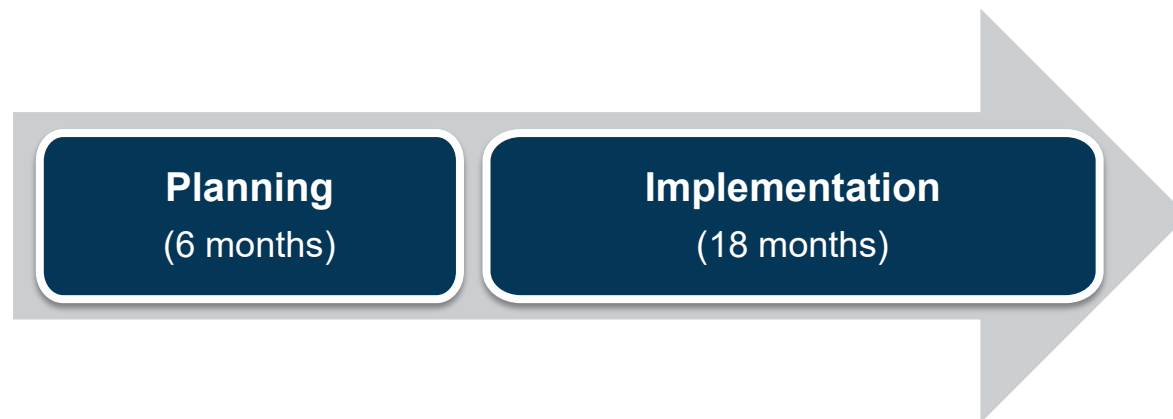


Xcel Energy Partners in Energy



What is Partners in Energy?

- Partners in Energy is a *2-year* collaboration with Xcel Energy to develop and implement your community's energy goals
- Xcel Energy provides tools and resources to enable community-driven energy planning and implementation





Energy Action Team



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Energy Action Plan

Vision

The City of Centennial will create a resilient future for its residents and businesses through improved energy efficiency, enhanced connectivity, education, and cost savings.

Goals

- Help residents **save money** through energy efficiency programs and rebates.
- Connect businesses with **free and low-cost** energy efficiency programs.
- Ensure community facilities are **running efficiently** and taking advantage of rebate opportunities.





Residents

Strategies

- Host educational workshops
- Attend community events
- Share information online and via social media

Benefits

- Improve knowledge about energy topics, rebates, and programs
- Connect with programs that can save you time and money at home
- Reduce your energy bills
- Share your energy story with others in the community



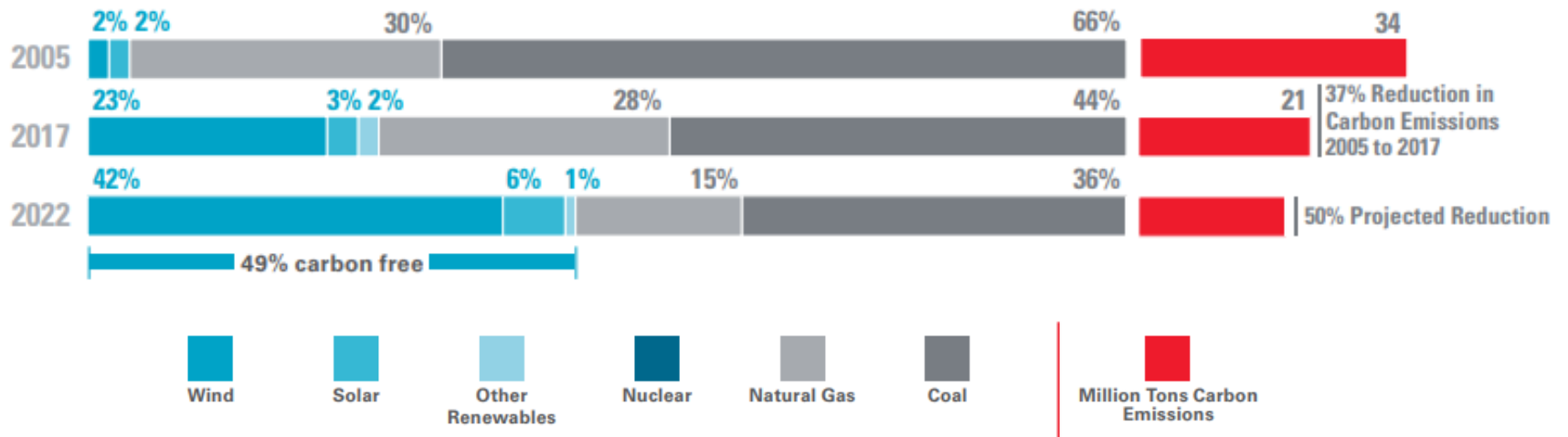
Efforts to Date

- Electric Vehicles 101 Workshop
 - January 23rd
 - 85 attendees
- Community Meetings
 - Walnut Hills HOA
 - District Meeting
- 550 Flyers & LED lights distributed at 3 events
- Monthly social media campaign on Twitter & Facebook
- City energy website: www.centennialco.gov/energy

Setting the Stage: Basics & Xcel Energy's Goals

Colorado's Energy Mix - 2017

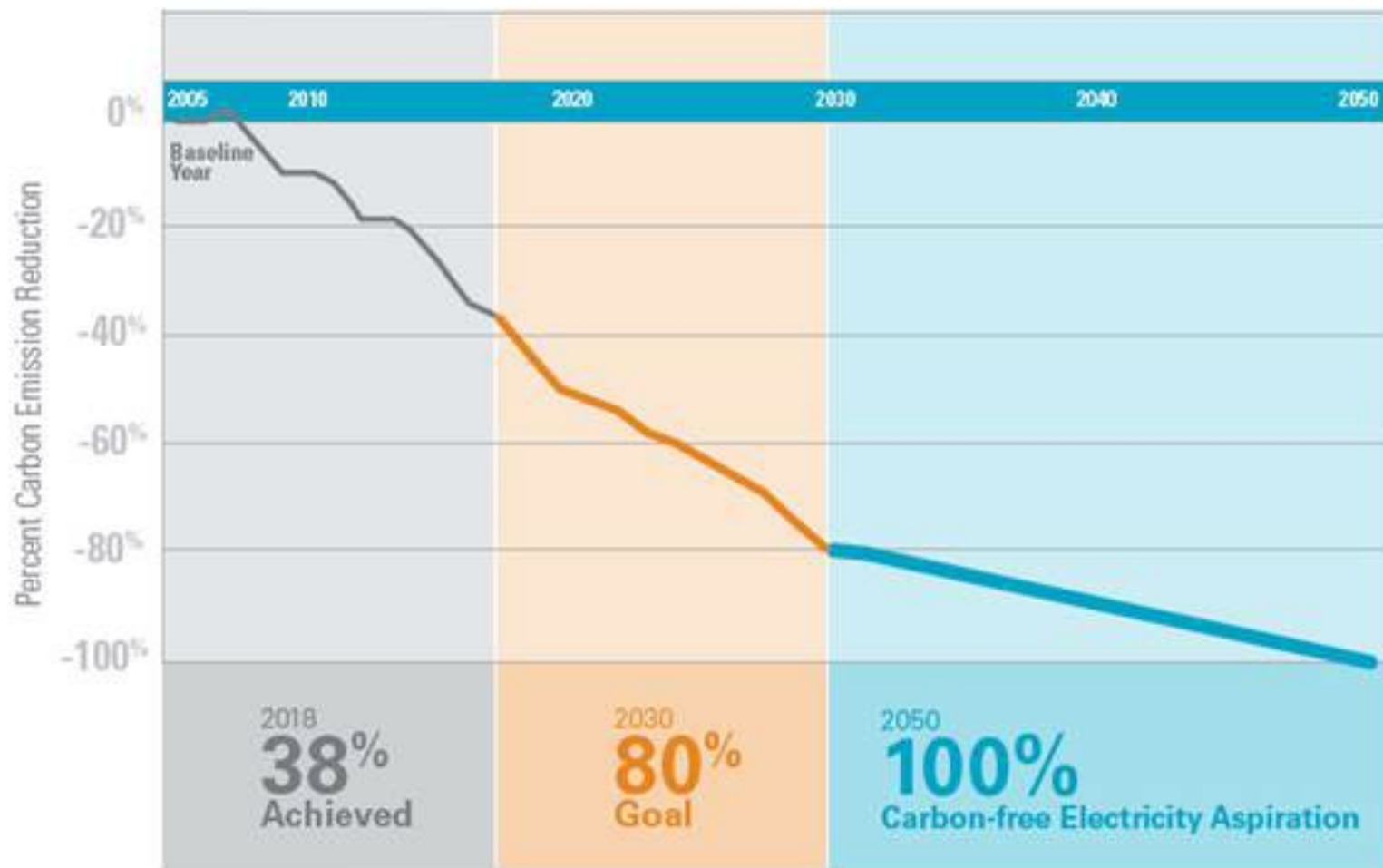
Colorado



Xcel Energy Carbon Reduction Trajectory



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Renewable Energy Handout

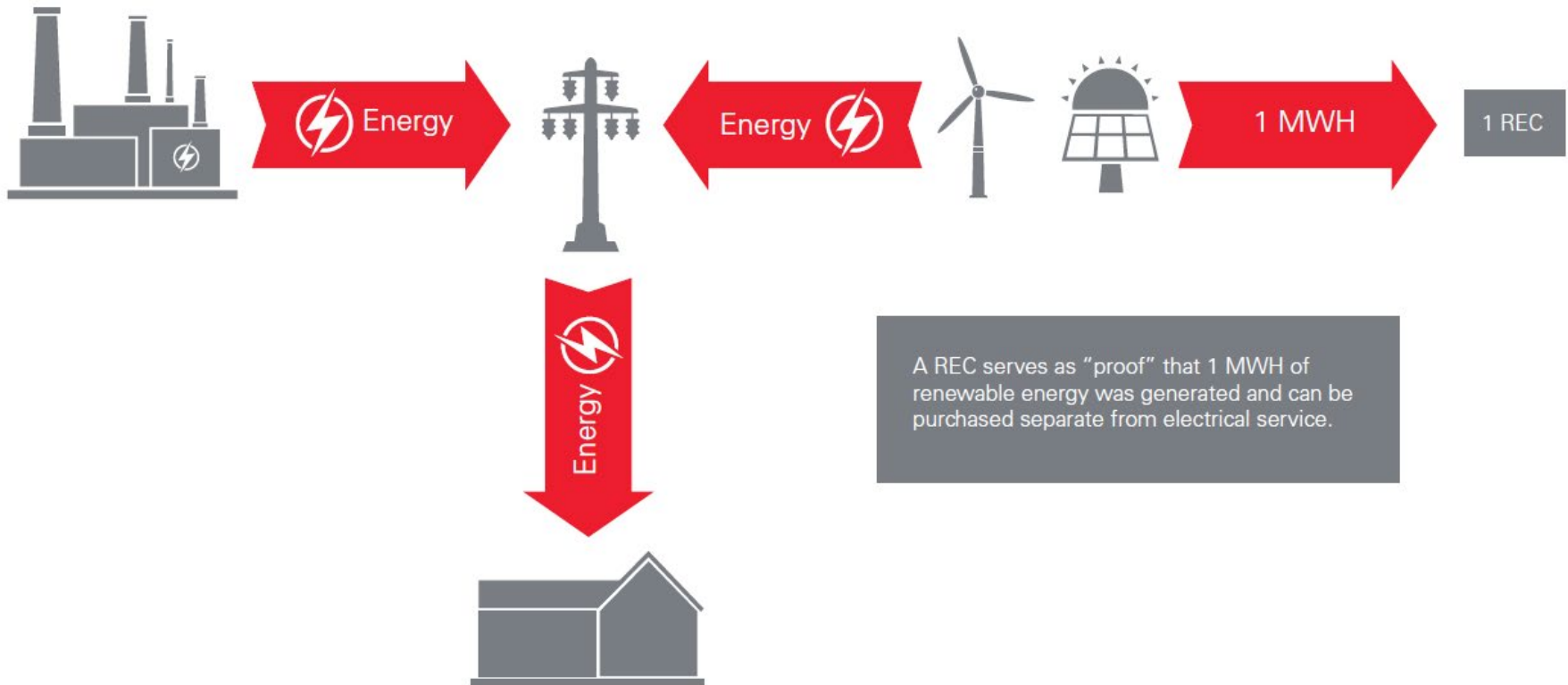
Acronyms & Terms

- EIA
- Energy/Fuel Mix
- Ground-Mount Solar
- MIRR
- Net Metering
- NPV
- PUC
- RECs
- Roof-top solar
- Solar garden
- Solar PV
- Subscription
- Third-party producer
- Utility-scale solar

Xcel Energy Programs

- Solar*Rewards
- Net Metering
- Solar*Rewards Community
- Windsource[®]
- Renewable*Connect[®]

Renewable Energy Credits



A REC serves as "proof" that 1 MWH of renewable energy was generated and can be purchased separate from electrical service.

Source: Intermountain Rural Electric Association
<https://www.irea.coop/customer-tools/recs/>

Xcel Energy Programs & the PUC

- Public Utilities Commission
 - Regulates Investor Owned Utilities (like Xcel Energy)
- Xcel Energy requires approval for:
 - Rate changes
 - Program changes
 - New programs (such as Renewable*Connect)
 - Resource plans
 - Colorado Energy Plan

Xcel Energy Opportunities



Renewable Options

On-Site

- Net Metering
- Solar*Rewards

Subscription

- Windsource
- Solar*Rewards Community
- Renewable*Connect

On-Site Options

Solar*Rewards

- Xcel Energy buys the REC by paying a monthly incentive
 - Small program (up to 25kW) - \$0.005/kWh
 - Medium program (25 -500kW) - \$0.0375/kWh
 - Large program (>500kW)
- Monthly use is offset
- Must use new equipment
- System can be sized up to 120% of customers history usage
- 20 year contract term

Net Metering

- Customer keeps the REC
- Monthly use is offset
- Can use existing/used equipment
- System can be sized up to 120% of customers history usage
- Open enrollment: no application expiration



Subscription Options

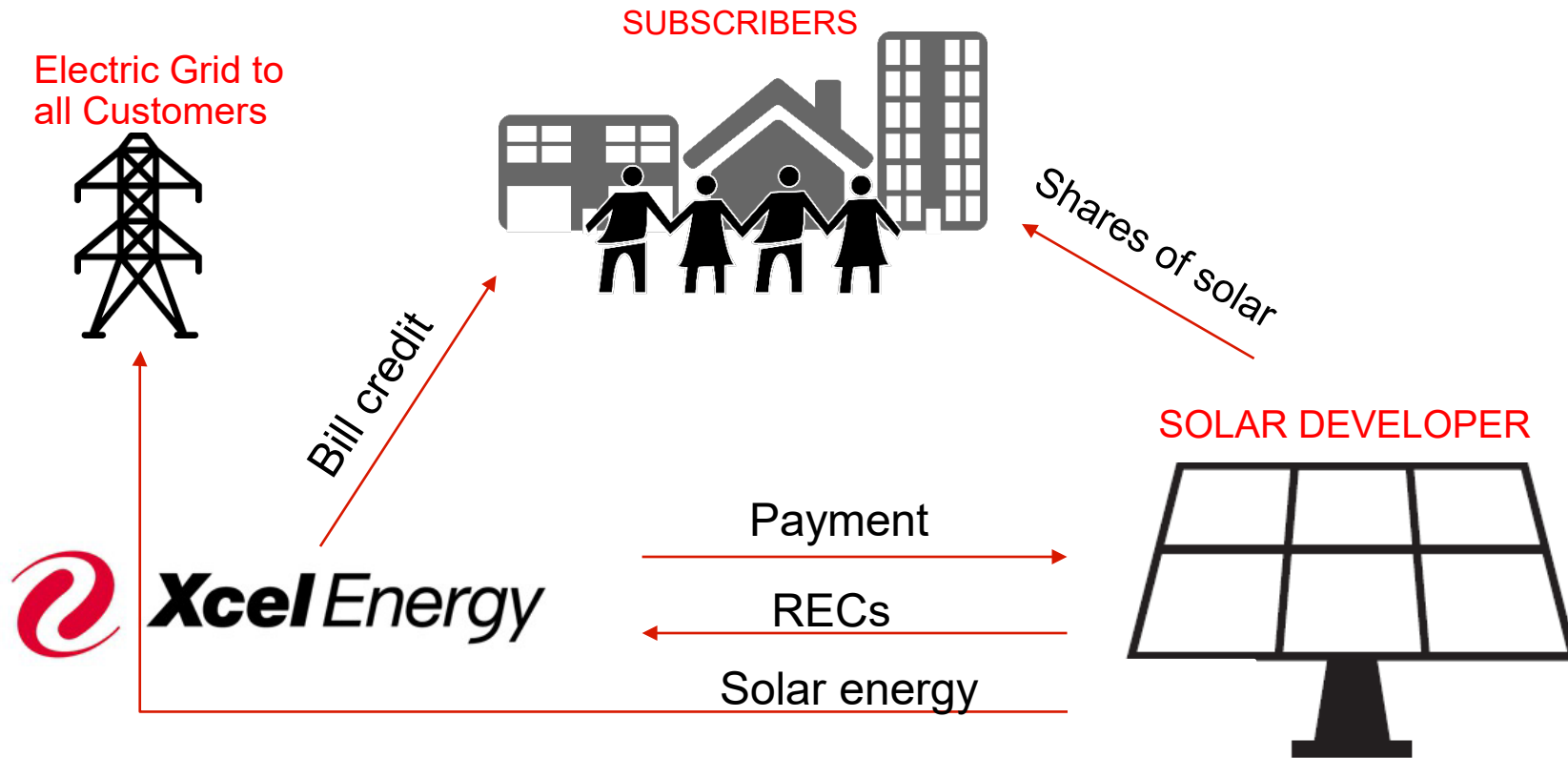
Solar*Rewards Community[®]

- 3rd party subscriptions
 - Gardens are owned and maintained by private companies
- Xcel Energy retains the RECs
- Monetary bill credit on Xcel Energy bill
- Subscribe up to 120% of historic usage

Windsorce[®]

- 100% local wind to offset your energy use
- Sold in 100 kWh blocks
- Customer keeps the REC
- Up to 100% of energy use
- Net cost = 1.5¢ / kWh

Solar*Rewards Community





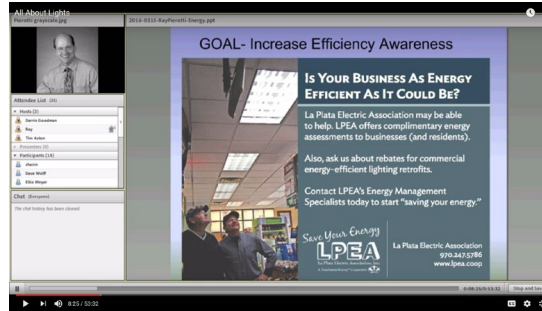
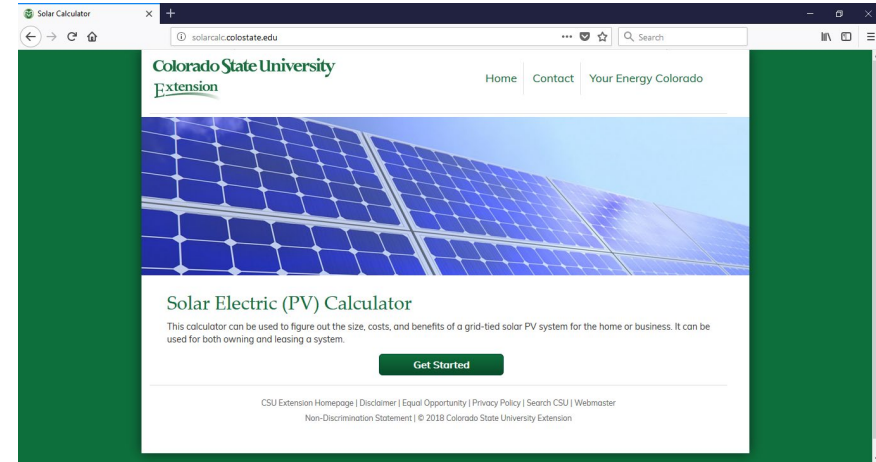
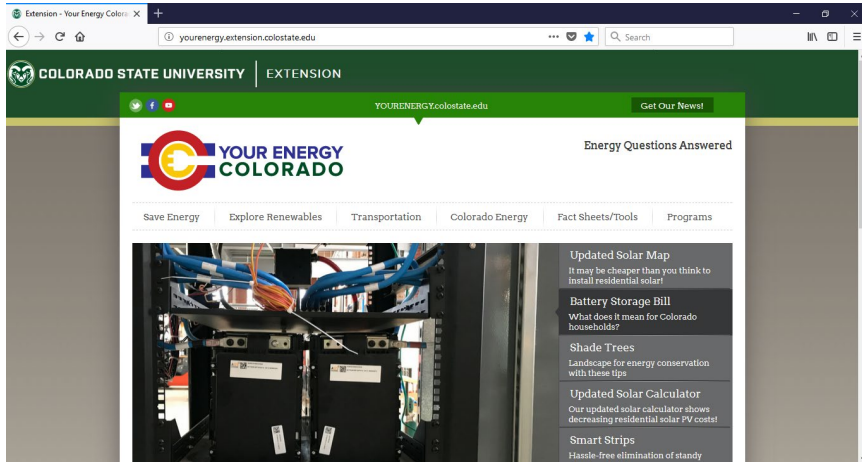
Know Before You Go Solar

Cary Weiner

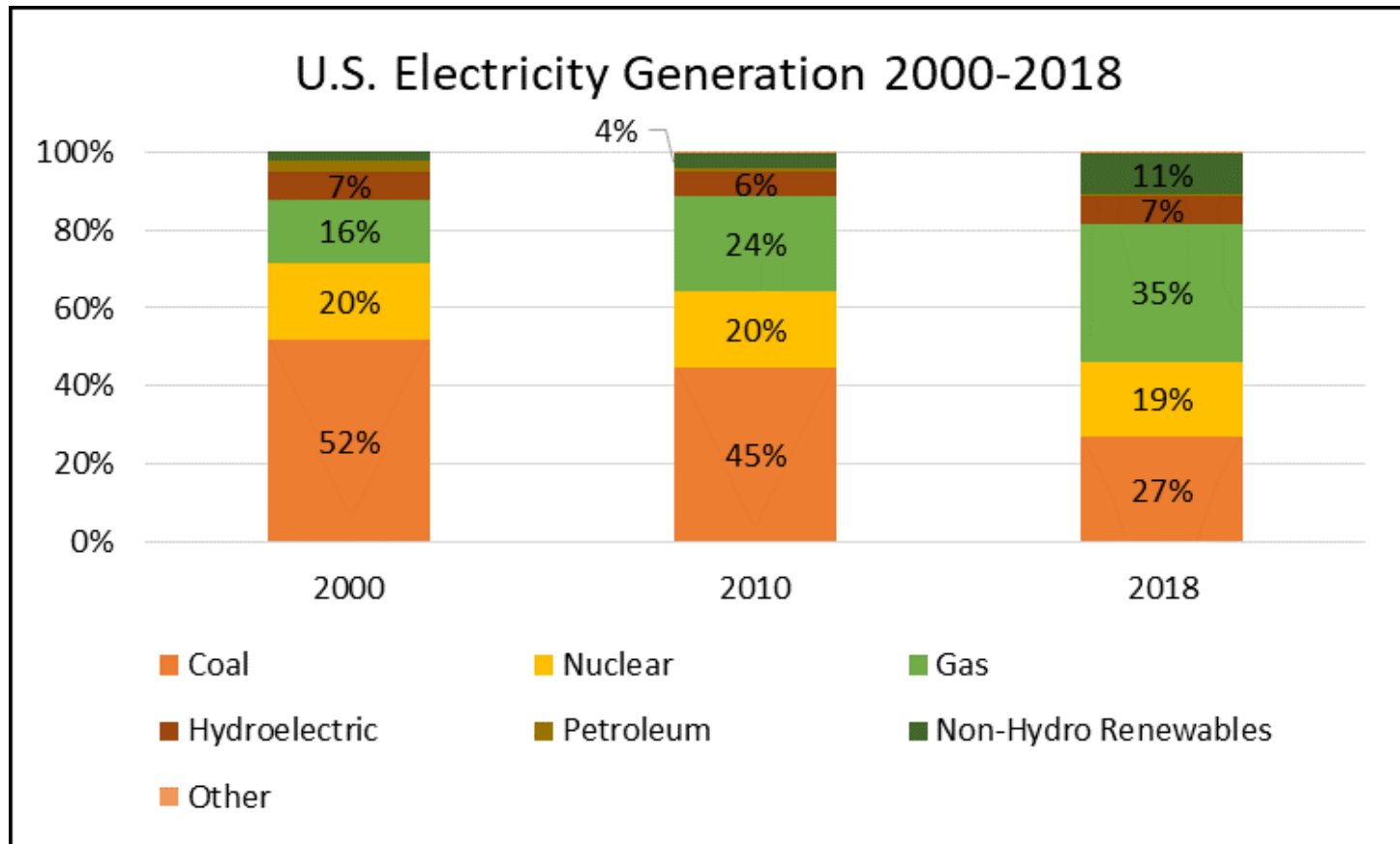
The Plan

- ▶ Solar in the bigger picture
- ▶ Owning vs. gardening
- ▶ Financial analysis
- ▶ Resources

Mission: Empowerment



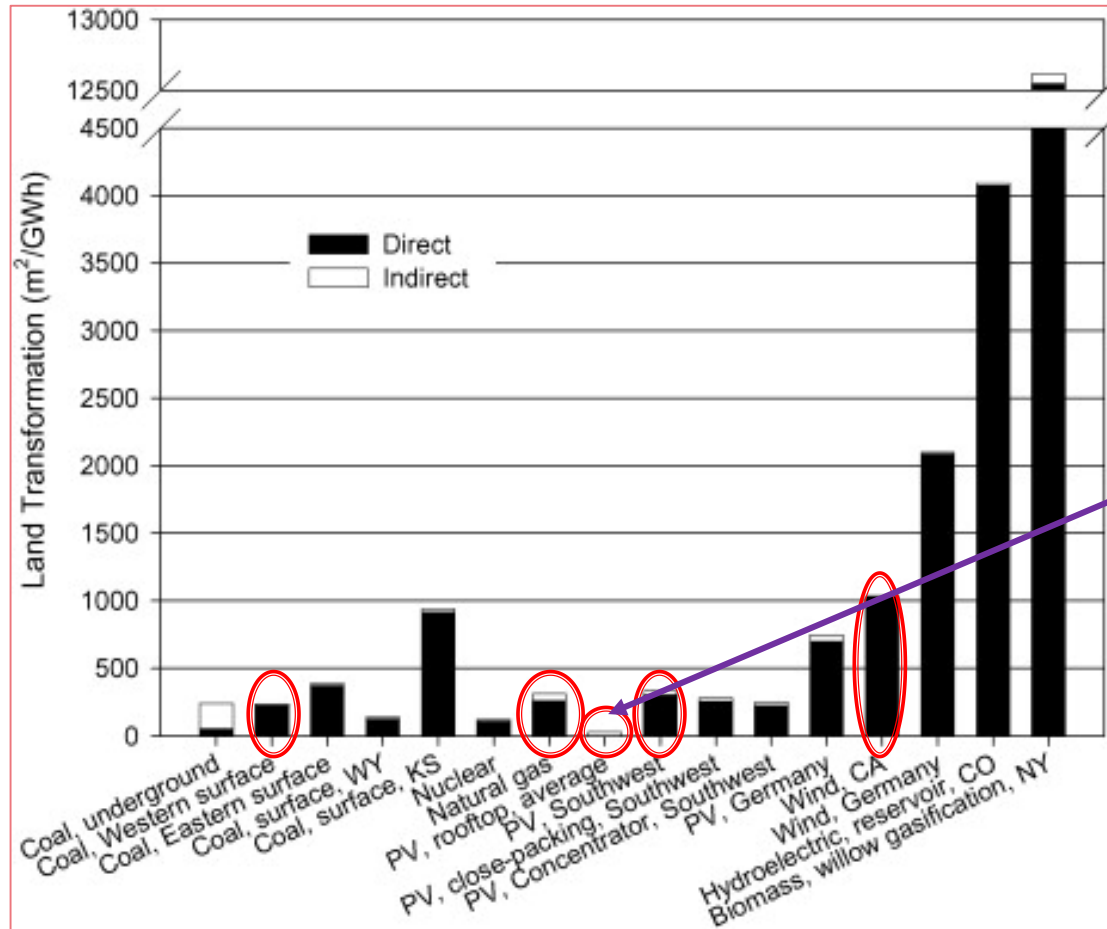
Fueling the Grid



2019 Clean Energy Legislation Highlights

- ▶ Carbon reduction: 50% by 2030, 90% by 2040
- ▶ Codified Xcel's 100% by 2050 goal
- ▶ PUC regulates Tri-State G&T
- ▶ Consider social cost of carbon (\$50/ton)
- ▶ Just Transitions
- ▶ Utilities can recover costs for EV stations
- ▶ Extended EV tax credits to 2025
- ▶ Modernize building codes

Rooftop vs. utility-scale land use



*Depending on the resource availability and terrain, wind turbines use only 1-10% of the wind farm areas.

Solar PV: The “What”



~15% premium for Tesla solar roof;
next gen solar shingles



Buy vs. Garden

	BUY	GARDEN
Upfront cost	\$0 possible	Some pay-as-you-go
Tax credit?	Yes	Probably not
Savings	Rate dependent	Can be rate independent
Insurance	Needed	Not needed
O&M	Inverter	None
Resale value	~\$2k per kW (Denver)*	No impact
Resale logistics	Simple	Responsible for transfer
Scalability	Can upsize with prep	Typically scalable
Other	Can add storage	If site not appropriate or if solar not desirable

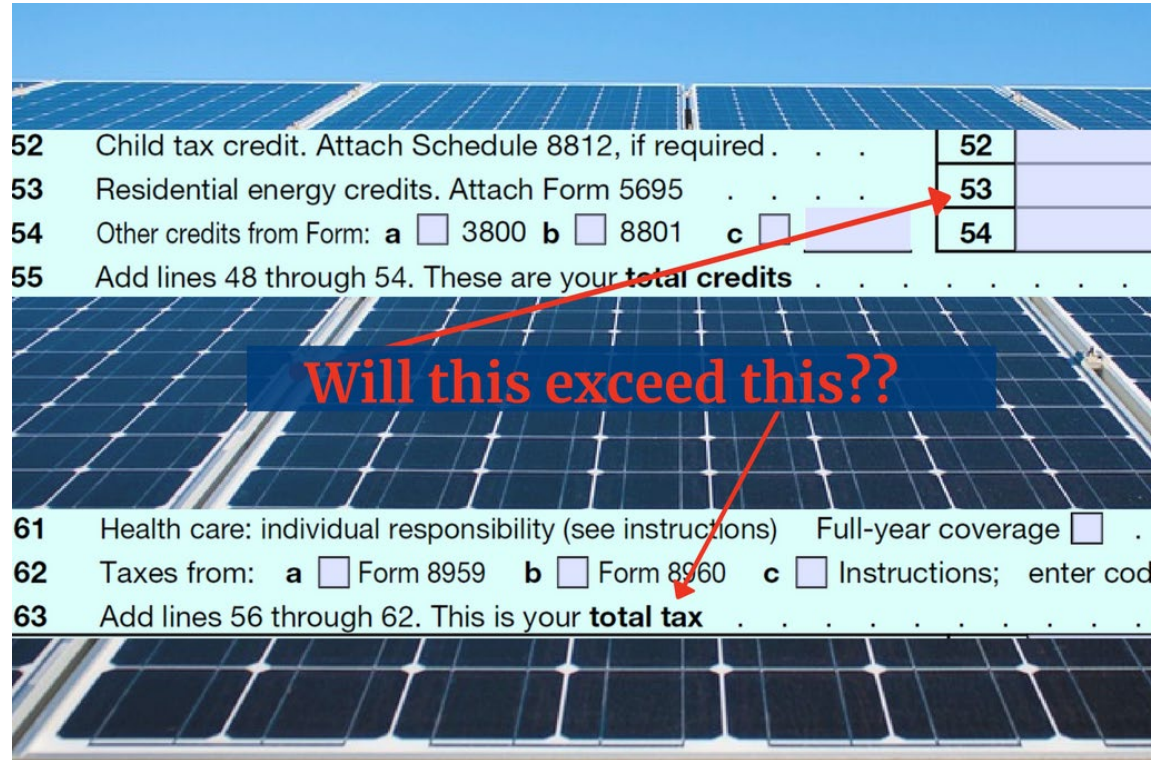
Bing “Xcel community solar gardens Colorado” for full list

HB 19-1003:
No longer need to be in county/adjacent county

*The Impact of PV Systems on Market Value and Marketability (2013)

Solar Investment Tax Credit

Year	Credit
2019	30%
2020	26%
2021	22%
Beyond	0 res; 10% comm



RENU Loans

- ▶ Statewide program – Elevations Credit Union
- ▶ For energy efficiency and renewable energy
- ▶ Can finance up to 100% of project cost
- ▶ Rates from 2.75% – 8.125%
- ▶ 36–180 month terms
- ▶ Loans from \$500 – \$35,000
- ▶ List of approved contractors

<https://www.colorado.gov/pacific/energyoffice/colorado-renu-loan>

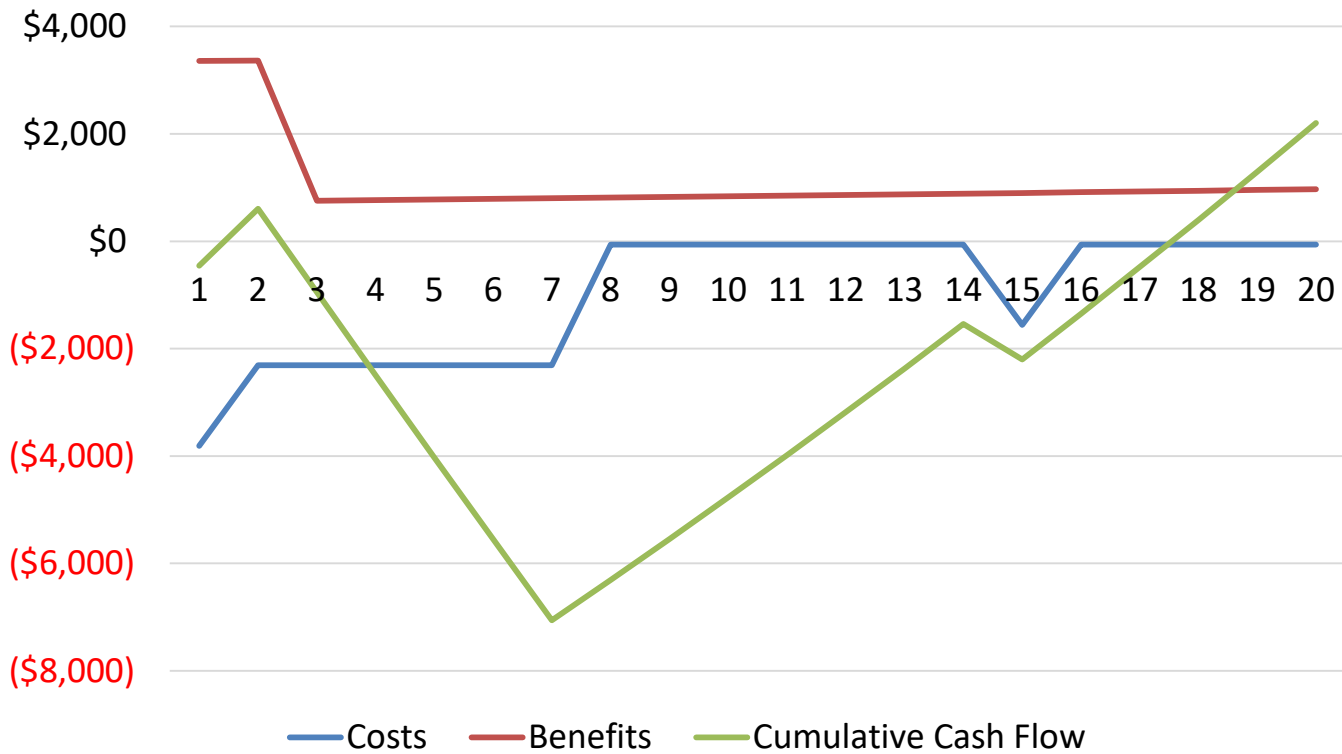
Net metering example

Month	Consumption	Generation	Net Generation	Net Consumption	Running Net
August	500	600	100	0	100
September	500	550	50	0	150
October	600	500	(100)	0	50
November	650	450	(200)	150	0
December	300	450	150	0	150

Sample Xcel Cash Flow: 5kW for \$16,250, 10% down, 4.5% loan (4.0% ROI)

Year	Down	Loan	Insurance	O&M	Tax credit	Savings	PBI	Net	Running net
1	(\$1,625)	(\$2,437)	(\$60)		\$2,625	\$823	\$39	(\$634)	(\$634)
2		(\$2,437)	(\$60)		\$2,625	\$835	\$39	\$1,003	\$369
3		(\$2,437)	(\$60)			\$848	\$39	(\$1,610)	(\$1,241)
4		(\$2,437)	(\$60)			\$861	\$39	(\$1,598)	(\$2,839)
5		(\$2,437)	(\$60)			\$873	\$38	(\$1,585)	(\$4,424)
6		(\$2,437)	(\$60)			\$886	\$38	(\$1,572)	(\$5,996)
7		(\$2,437)	(\$60)			\$900	\$38	(\$1,559)	(\$7,555)
8		\$0	(\$60)			\$913	\$38	\$891	(\$6,664)
9		\$0	(\$60)			\$927	\$38	\$904	(\$5,760)
10		\$0	(\$60)			\$940	\$37	\$918	(\$4,842)
11		\$0	(\$60)			\$954	\$0	\$894	(\$3,947)
12		\$0	(\$60)			\$969	\$0	\$909	(\$3,039)
13		\$0	(\$60)			\$983	\$0	\$923	(\$2,116)
14		\$0	(\$60)			\$998	\$0	\$938	(\$1,178)
15		\$0	(\$60)	(\$1,500)		\$1,013	\$0	(\$547)	(\$1,725)
16		\$0	(\$60)			\$1,028	\$0	\$968	(\$758)
17		\$0	(\$60)			\$1,043	\$0	\$983	\$225
18		\$0	(\$60)			\$1,059	\$0	\$999	\$1,224
19		\$0	(\$60)			\$1,074	\$0	\$1,014	\$2,238
20		\$0	(\$60)			\$1,090	\$0	\$1,030	\$3,268

20-Year Cash Flow of Solar PV Investment



Sample Xcel GARDEN Cash Flow: 5kW for **\$6,850**, 100% cash, \$0.073/kWh credit (6.0% ROI)*

Year	Down	Loan	Insurance	O&M	Tax credit	Savings	PBI	Net	Running net
1	(\$6,850)	\$0				\$574	\$0	(\$6,276)	(\$6,276)
2	\$0	\$0				\$583	\$0	\$583	(\$5,693)
3	\$0	\$0				\$591	\$0	\$591	(\$5,102)
4	\$0	\$0				\$600	\$0	\$600	(\$4,502)
5	\$0	\$0				\$609	\$0	\$609	(\$3,893)
6	\$0	\$0				\$618	\$0	\$618	(\$3,275)
7	\$0	\$0				\$627	\$0	\$627	(\$2,648)
8	\$0	\$0				\$637	\$0	\$637	(\$2,011)
9	\$0	\$0				\$646	\$0	\$646	(\$1,365)
10	\$0	\$0				\$656	\$0	\$656	(\$709)
11	\$0	\$0				\$666	\$0	\$666	(\$44)
12	\$0	\$0				\$675	\$0	\$675	\$632
13	\$0	\$0				\$686	\$0	\$686	\$1,317
14	\$0	\$0				\$696	\$0	\$696	\$2,013
15	\$0	\$0				\$706	\$0	\$706	\$2,719
16	\$0	\$0				\$717	\$0	\$717	\$3,436
17	\$0	\$0				\$727	\$0	\$727	\$4,163
18	\$0	\$0				\$738	\$0	\$738	\$4,901
19	\$0	\$0				\$749	\$0	\$749	\$5,650
20	\$0	\$0				\$760	\$0	\$760	\$6,411

Costs
courtesy
Clean Energy
Collective

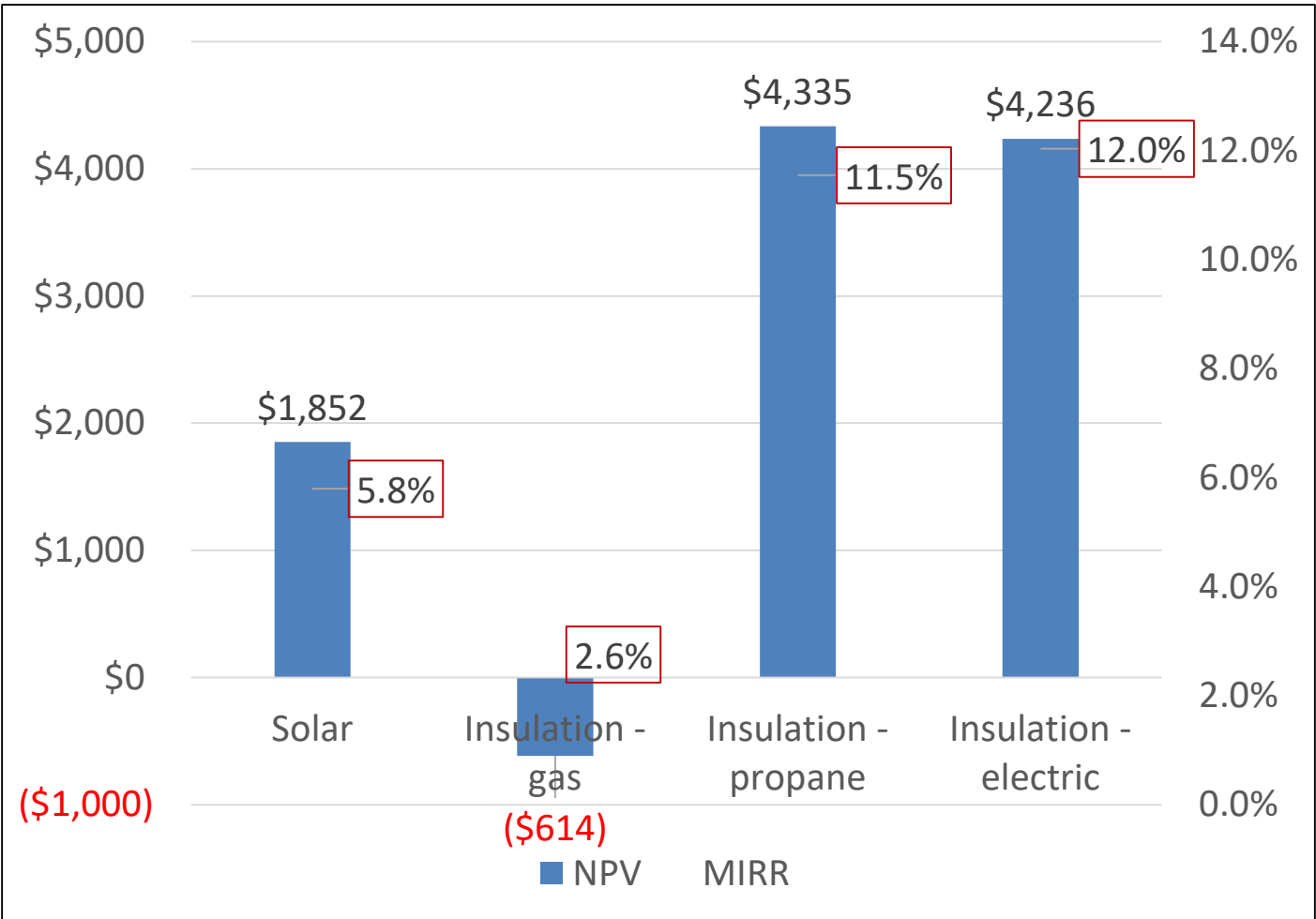
RE AND EE

- ▶ (25) 60W bulbs
 - ▶ 2,000 kWh/year
 - ▶ \$200/year
 - ▶ 5 kW PV system
 - ▶ \$16,250 upfront
- ▶ (25) 9.5W bulbs
 - ▶ 350 kWh/year
 - ▶ \$35/year
 - ▶ 4 kW PV system
 - ▶ \$13,000 upfront

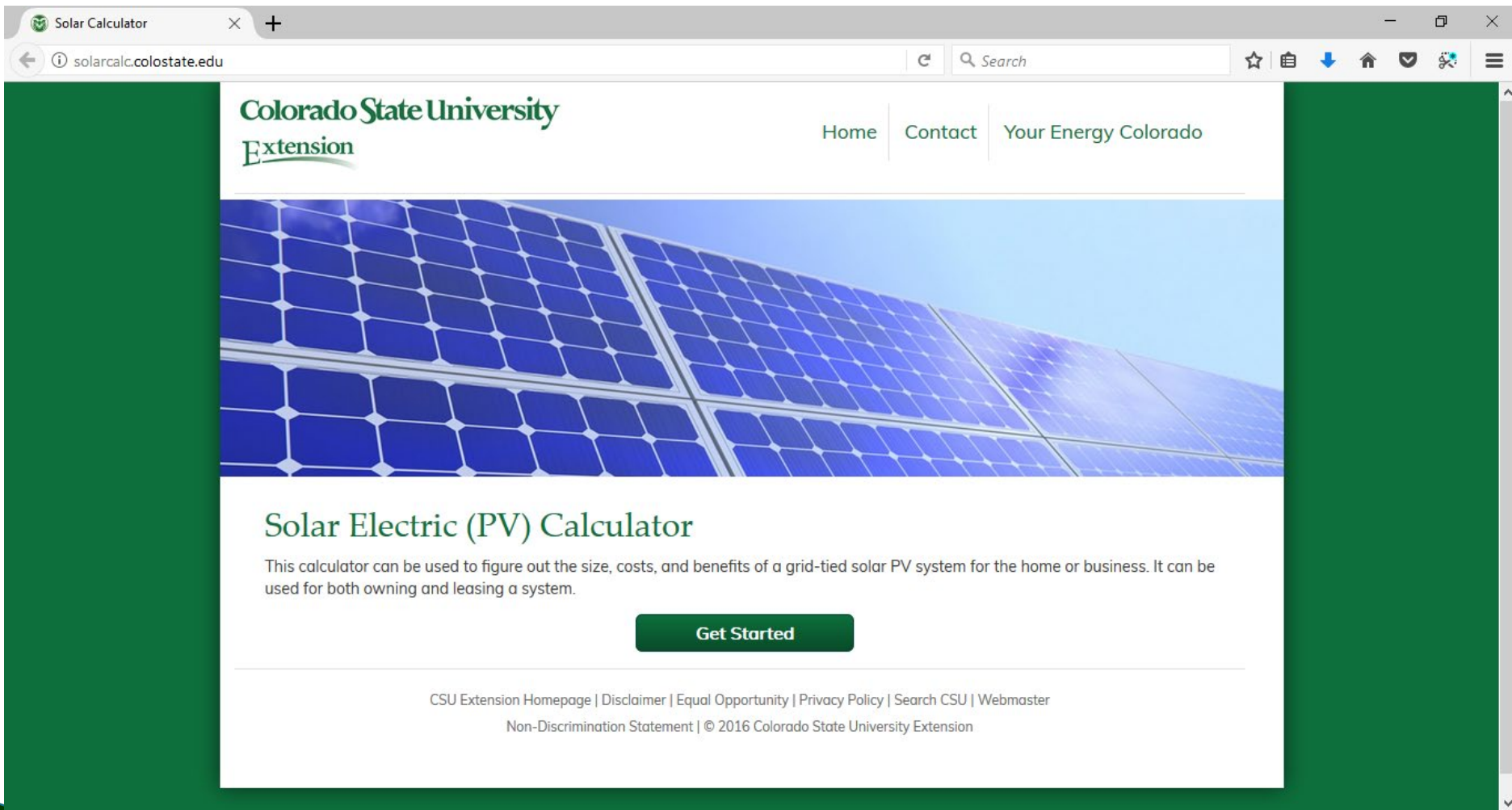
Pre-lighting retrofit

Post-lighting retrofit

RE VS. EE



Solar Calculator



The screenshot shows a web browser window with the address bar displaying "solarcalc.colostate.edu". The page header includes the "Colorado State University Extension" logo on the left and navigation links for "Home", "Contact", and "Your Energy Colorado" on the right. A large banner image of solar panels is positioned below the header. The main content area features the title "Solar Electric (PV) Calculator" and a descriptive paragraph: "This calculator can be used to figure out the size, costs, and benefits of a grid-tied solar PV system for the home or business. It can be used for both owning and leasing a system." A green "Get Started" button is centered below the text. At the bottom of the page, there is a footer with links for "CSU Extension Homepage", "Disclaimer", "Equal Opportunity", "Privacy Policy", "Search CSU", and "Webmaster", along with a "Non-Discrimination Statement" and the copyright notice "© 2016 Colorado State University Extension".

<http://solarcalc.colostate.edu>



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Questions & Comments

Before you go...

- Please fill out a survey so we can better serve you!
- Take a **FREE conservation kit**. Included:
 - Various types of LED lights
 - Cell phone solar charger
 - Informational flyer on contents



For More Information

Centennial's Energy Website



<https://centennialco.gov/energy>

Xcel Energy Renewable Energy Programs



XcelEnergy.com/Renewables



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