MythBusters for Community Solar & Microgrids

Introductions

Dan Whisler, Moderator
- Director of Buildings & Grounds, River Trails SD 26

Becky Thompson, CEP; Speaker
- Sr. Energy Advisor, Nania Energy Advisors

Aaron Raftery, Speaker
- Solar & Efficiency Advisor, Nania Energy Advisors

Katy Glynn, Speaker
- Account Executive, Siemens

Rick Avila, Speaker
- Sr. Solutions Consultant, Allied Facility Partners

Community Solar

How does Community Solar work?

1. Residential and commercial customers subscribe to a share of a solar farm
2. Customers earn utility bill credits once the farm is built & connected to the grid
3. Subscribers purchase these energy credits at a discount of up to 20%
4. Customers save on electricity costs every month

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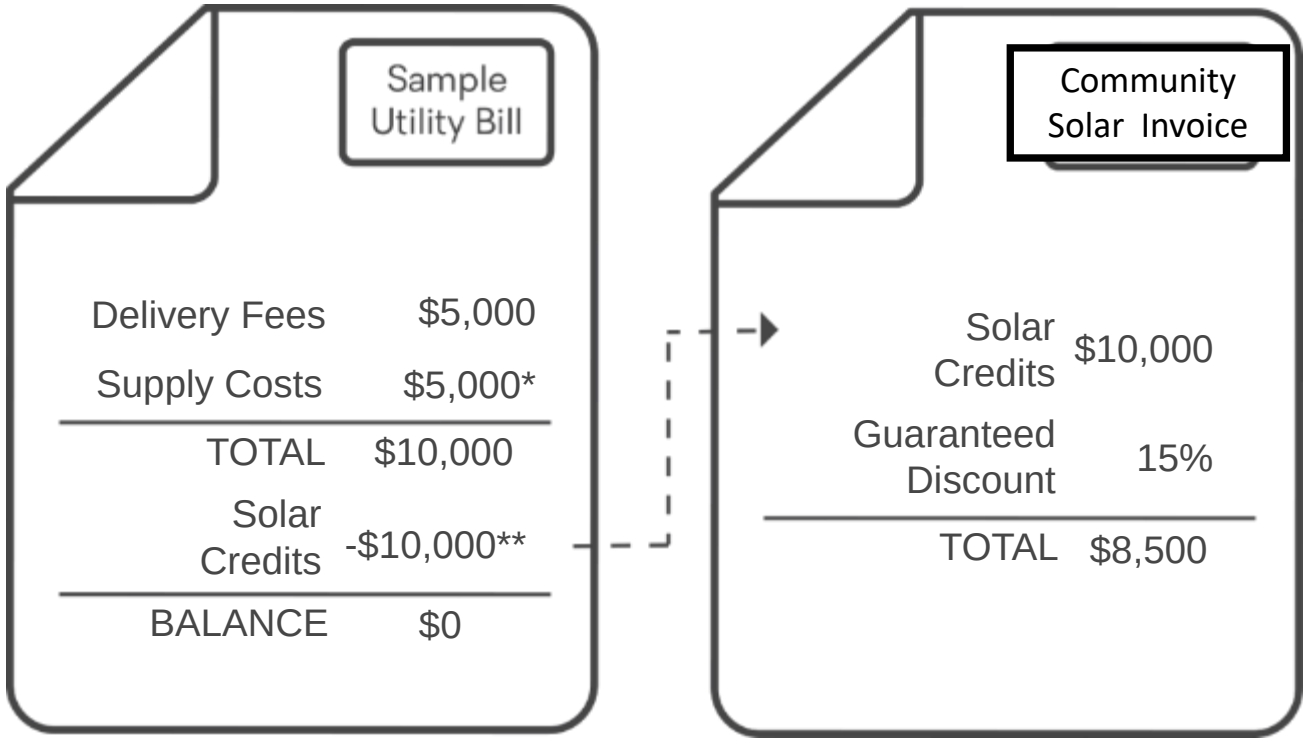
INVEST IN YOURSELF IGNITE OTHERS

Sample Billing Credits



Savings: In this example, the customer saved $1,500 this month

	kWh Produced Annually	Expected Credit Rate ($/kWh)	Bill Credit Value	Fixed Discount	Credit Purchase Price	Savings	Cumulative Savings
1	2,328,005	$0.09800	$228,145	15.0%	$193,923	$34,222	$34,222
2	2,317,529	$0.09996	$231,660	15.0%	$196,911	$34,749	$68,971
3	2,307,100	$0.10196	$235,230	15.0%	$199,946	$35,285	$104,255
4	2,296,718	$0.10400	$238,855	15.0%	$203,027	$35,828	$140,083
5	2,286,383	$0.10608	$242,536	15.0%	$206,155	$36,380	$176,464
6	2,276,094	$0.10820	$246,273	15.0%	$209,332	$36,941	$213,405
7	2,265,852	$0.11036	$250,068	15.0%	$212,558	$37,510	$250,915
8	2,255,656	$0.11257	$253,922	15.0%	$215,834	$38,088	$289,003
9	2,245,505	$0.11482	$257,835	15.0%	$219,160	$38,675	$327,679
10	2,235,400	$0.11712	$261,808	15.0%	$222,537	$39,271	$366,950
11	2,225,341	$0.11946	$265,842	15.0%	$225,966	$39,876	$406,826
12	2,215,327	$0.12185	$269,939	15.0%	$229,448	$40,491	$447,317
13	2,205,358	$0.12429	$274,099	15.0%	$232,984	$41,115	$488,432
14	2,195,434	$0.12677	$278,323	15.0%	$236,574	$41,748	$530,180
15	2,185,555	$0.12931	$282,612	15.0%	$240,220	$42,392	$572,572
16	2,175,720	$0.13190	$286,967	15.0%	$243,922	$43,045	$615,617
17	2,165,929	$0.13453	$291,389	15.0%	$247,681	$43,708	$659,325
18	2,156,182	$0.13722	$295,879	15.0%	$251,497	$44,382	$703,707
19	2,146,479	$0.13997	$300,439	15.0%	$255,373	$45,066	$748,773
20	2,136,820	$0.14277	$305,068	15.0%	$259,308	$45,760	$794,533
			20-Year Savings	$794,533			

Example Solar Farms

Hosting Option

- Consider hosting community solar on district-owned land
- Solar provider constructs, owns and operates system
- Land lease payments for 20-30 years
- Ideal size: 10-30 acres
- Include decommissioning bond
- Lease option ($/yr) during project due diligence

Community Solar Myths

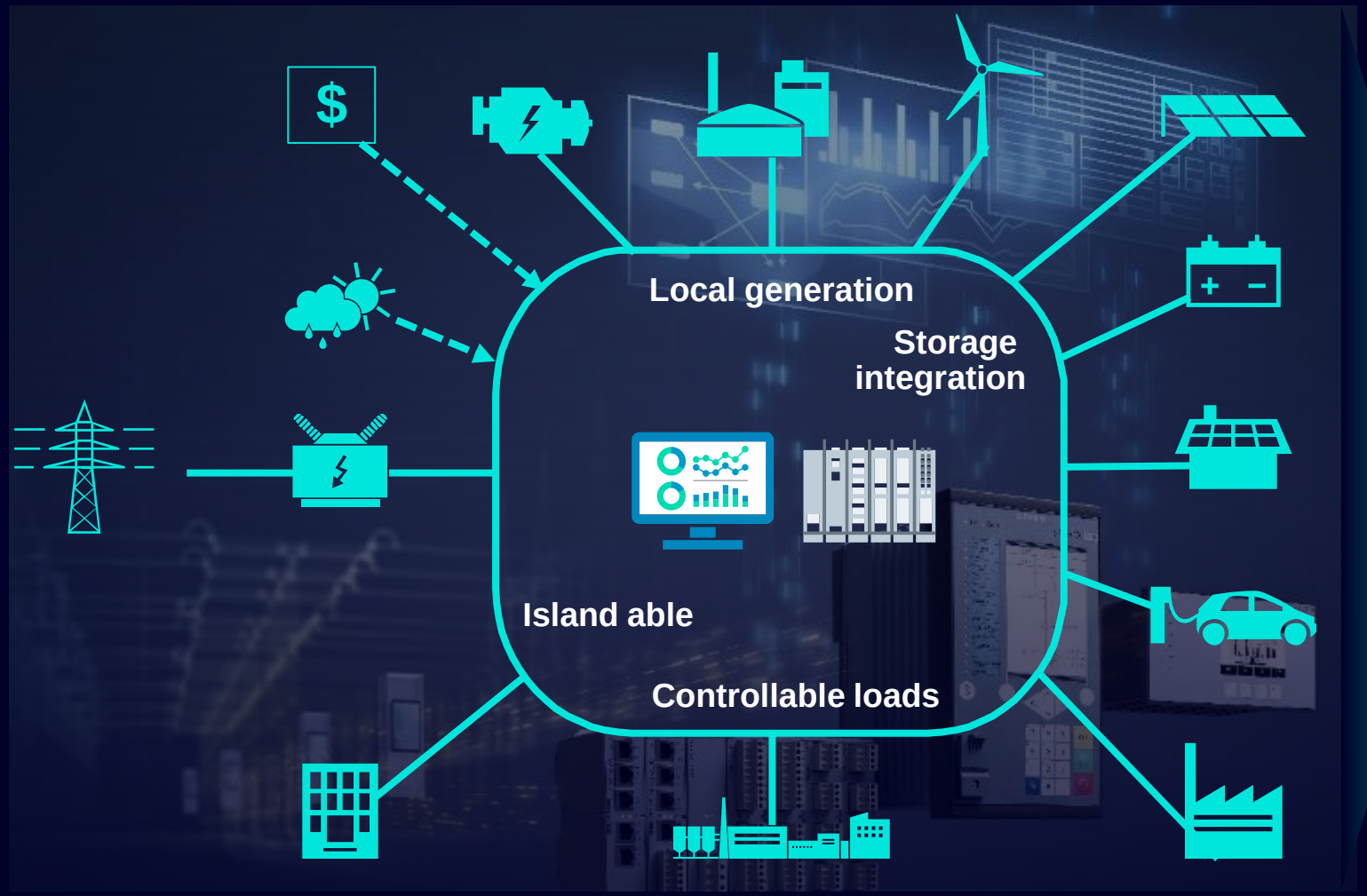
1. Subscribers must be in the community
2. Only available to residential subscribers
3. Too good to be true…
4. Requires on-site construction, bid process
5. Community solar vs on-site solar are either/or
6. Solar farms only, cannot be rooftop

Microgrid Mythbusters

Microgrid Mythbusters

#1 Microgrids turn on when the power goes off.

Microgrids Continually Manage & Optimize Your Energy Assets



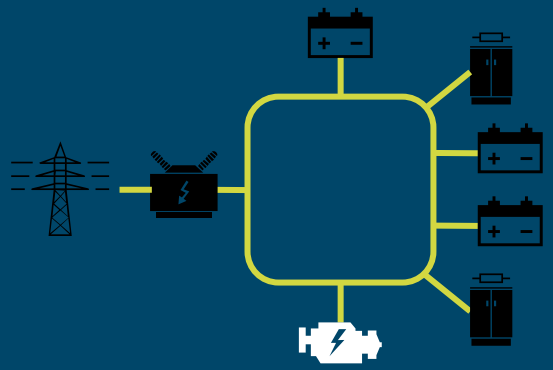
Cost Savings & energy efficiency
- Peak shaving
- Demand charge reduction
- OPEX optimization

Resiliency & reliability
- Blackout detection and black start
- Generation, storage &load control
- Day ahead optimization
- Grid synchronization

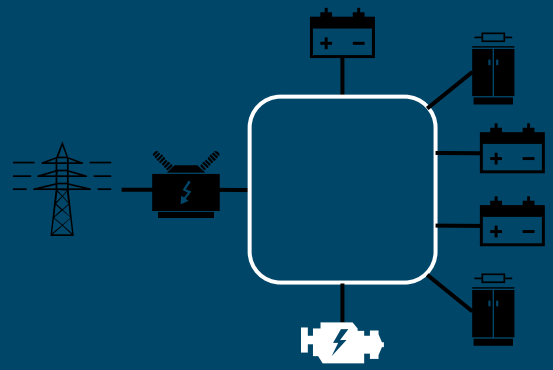
Sustainability
- Renewable integration
- Dispatch based on CO_2
- Generation and load forecast

Microgrids Provide Resiliency When the Grid Fails

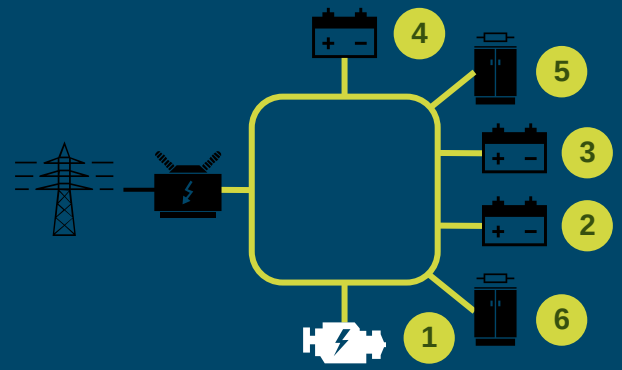
1. Grid connected operation



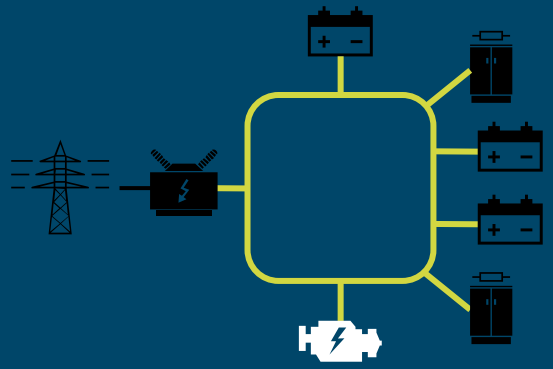
2. Blackout detection



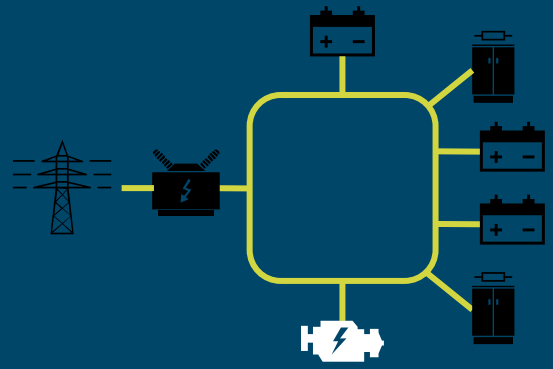
3. Black start sequence



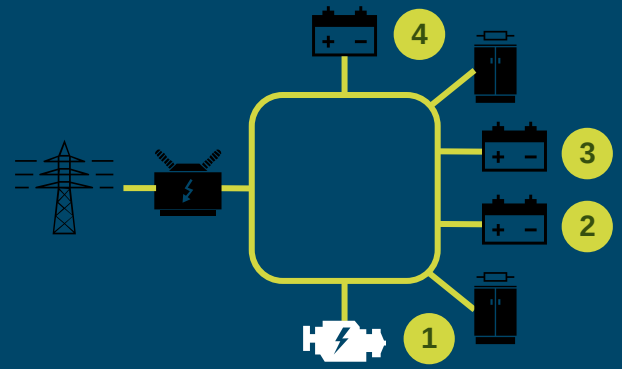
4. Off-grid operation



5. Synchronization



6. Grid connected operation



Microgrid Mythbusters

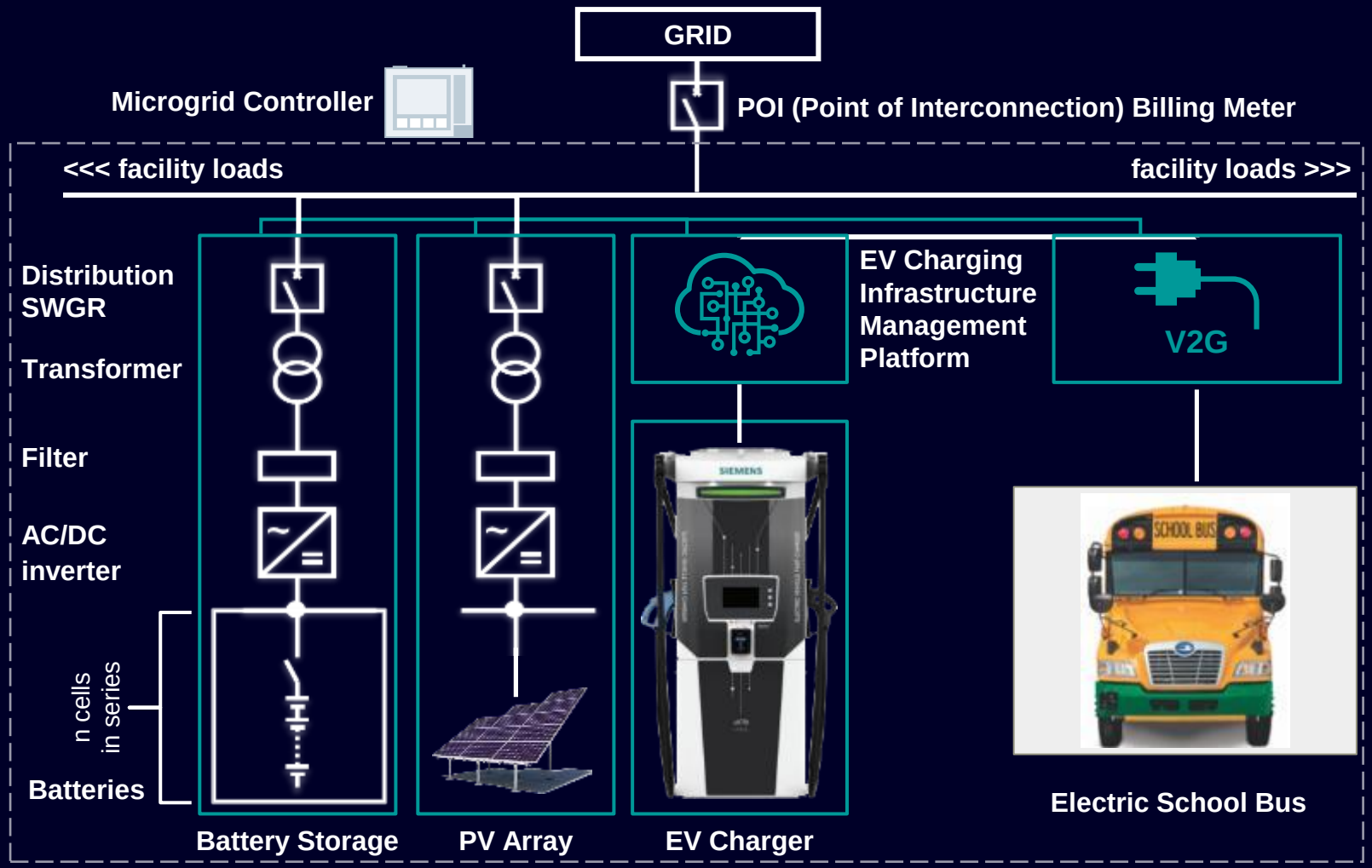
#2 Microgrids are too big to fit in my school.

Microgrid Controllers are Small

Microgrid Mythbusters

#3 Microgrids are not needed in K-12.

Microgrids Charge Electric Transportation



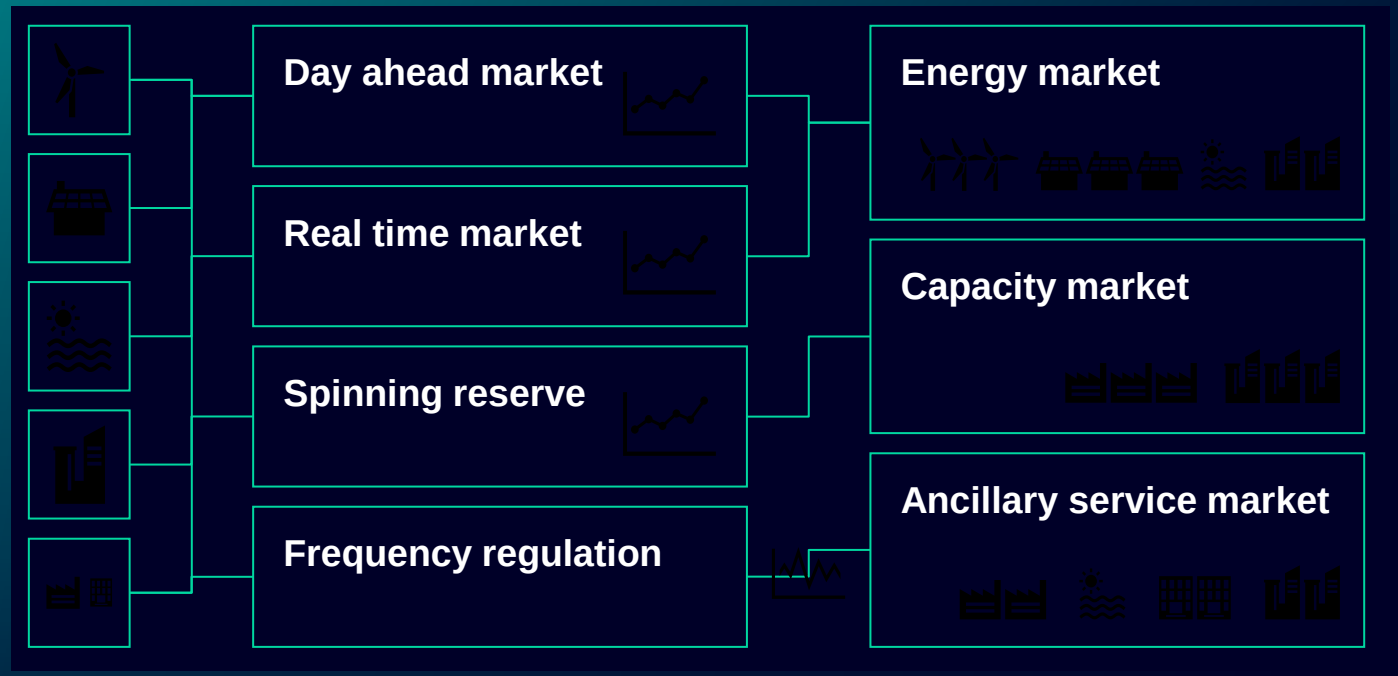
Microgrid Mythbusters

#4 Microgrids are too expensive.

Microgrids Drive Cost Savings

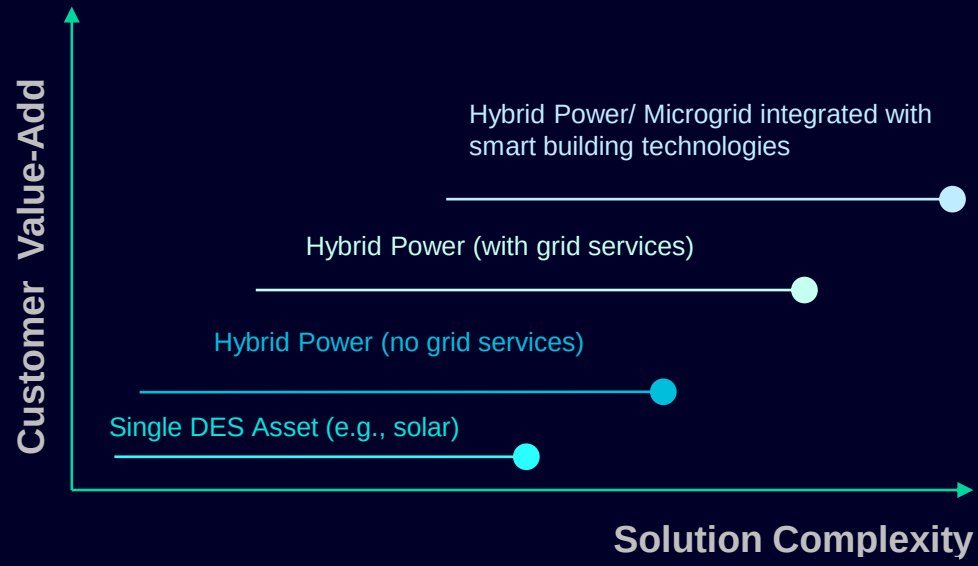
Reduce energy costs, generate revenue and increase independence from the grid

Through value stacking we can unlock the potential of hybrid systems



Trends and Drivers:

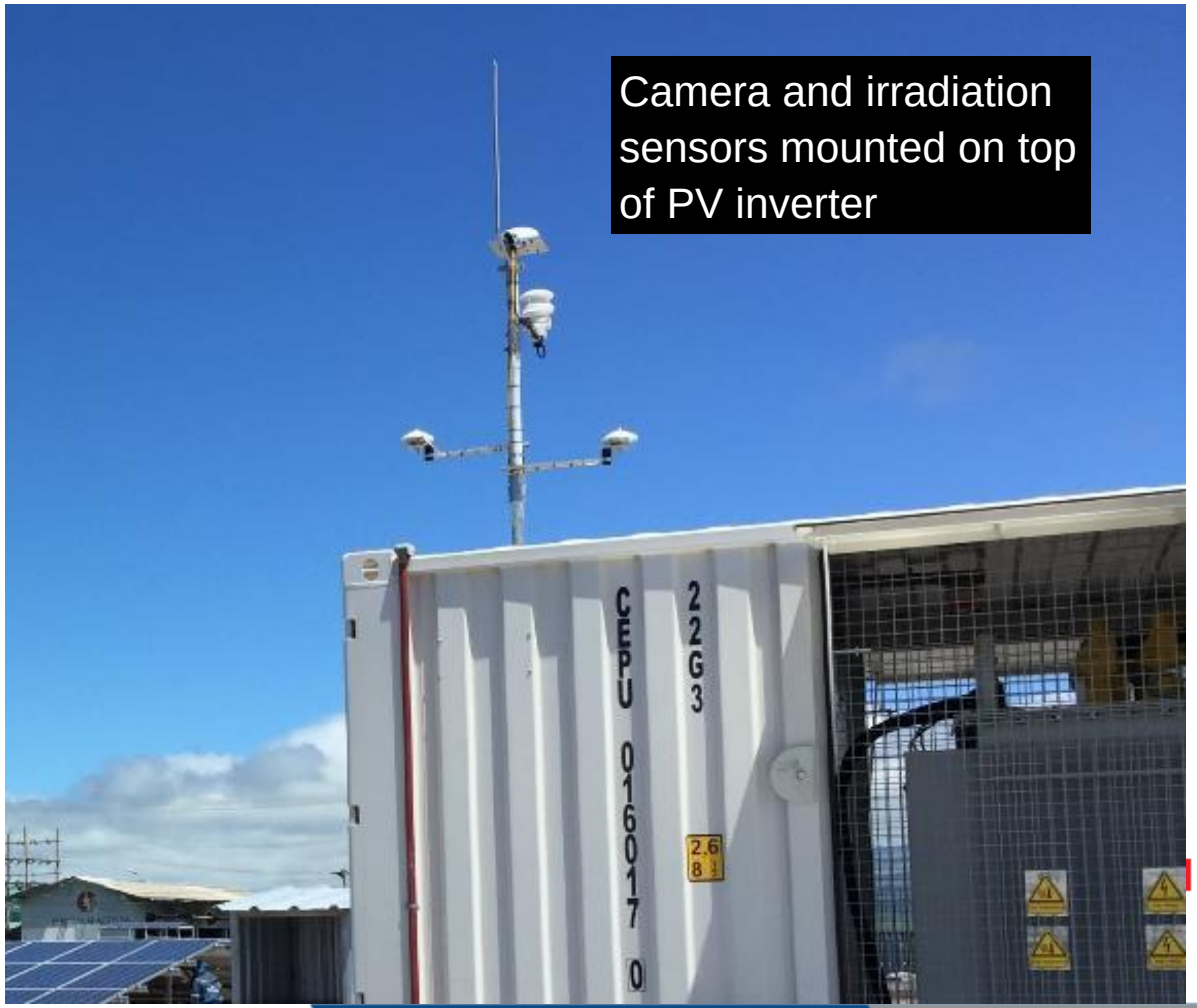
- The energy transition is creating new market opportunities and incentive programs for hybrid power systems.
- Intelligent management of energy demand, generation and storage by dispatching available resources in a prescribed manner
- Tax rebates and incentives help pay for these projects.



Microgrid Mythbusters

#5 Microgrids are risky to install.

Microgrid digital twins minimizes risk and optimizes design before construction begins



PSS®DE digital twin enables ongoing performance assessment and optimization (comparison between real data vs simulated)

Power plant digital twin

Customer benefits

- Ongoing optimization of overall performance
  - Fine tuning of dispatch
  - Short term weather forecast
- Reduction of operational costs
- Enhancement of lifetime of assets

Microgrid **Mythbusters**

Microgrids are too complex to explain to my School Board.

Microgrids Save Lives

Blue Lake Rancheria,
Campus, USA

When public safety power shutoffs left the surrounding community in darkness, Blue Lake Rancheria's systems were up and running."

"When you control your energy, you control your future."

– Jana Ganion
Sustainability and Government Affairs Director,
Blue Lake Rancheria

Mythbusters of Electric Buses and EV Charging Infrastructure

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Myth:

Electric Buses have limited range and cannot handle our district's route (mileage) requirements.

MythBuster:

- **Average on-market E-Bus range = 100 miles.**
- **On-site electric charging stations enable E-buses to charge during downtime and overnight.**

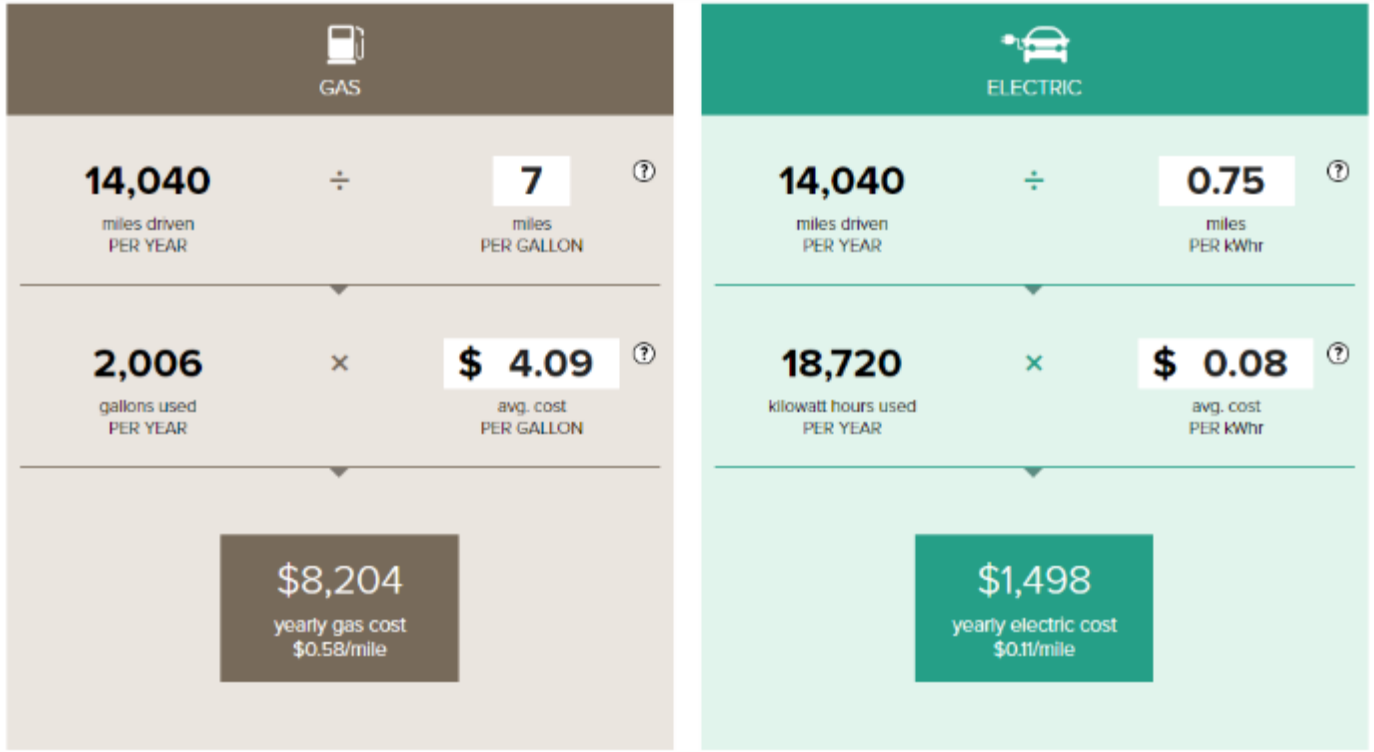
EV Charging Infrastructure Mythbusters

Myth:

Electric charging is too expensive compared to diesel gas.

MythBuster:

Electric buses lower annual operating costs.



Assumptions:

- E-Bus = Average 0.75 miles/kWh
- Diesel Bus = Average 7 miles per gallon
- Average Cost per kWh = $0.08
- Average Cost per gallon of diesel fuel = $4.09
- Average Annual School Bus Mileage = 14,000 miles

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Determining Charging Needs:

Route & Mileage Requirements

Number of E-Buses

Future Expansion

Determining Charging Needs: *Vehicle range and miles per kWh.*

OEM	Model	Max Seating	Estimated Range (max mi)	Estimated Battery (kWh)	Estimated Efficiency (mi/kWh)
Blue Bird	All American RE	84	120	160	0.75
	Micro Bird G5	30	100	88	1.14
	Vision	77	120	160	0.75
Motiv Power Systems Collins Bus Corp.	Epic E-450 Chassis, Type A	16/ 24	105	150	0.70
Phoenix Motorcars Starcraft Quest body	Zeus 600 (Ford E-450 base)	16/ 24	150	127	1.10
Motiv Power Systems Trans Tech	Epic E-450 Chassis, Type A	16/ 24	105	150	0.70
GreenPower	BEAST	90	140	150	0.93
Lion Electric	LIONA	26	150	129	1.16
	LIONC	72	155	Up to 220	0.70
	LIOND	84	155	220	0.70
Thomas Built Proterra electric drive*	Saf-T-Liner C2 'Jouley'	81	120	155	0.77
IC Bus	CE Series Electric (pilot)	29 - 78	70, 135, 200	105-315	0.67

Charging Levels

Charging Level	Charging Power	Light-Duty Vehicle Charging Rates	Electric School Bus Charging Rate*	Connector Type	Primary Use
Level 1	1.9 kW (120 V x 16 A)	2-5 miles of range per hour	1 mile of range per hour	J1772 (SAE) 	Residential
Level 2	7-19 kW (240 V x 80 A)	10-20 miles of range per hour (7 kW)	11 miles of Range per hour (19 kW)	J1772 (SAE) 	Residential Commercial School Bus Fleet
DC Fast	50 kW+ (requires 3-phase power)	60-80+ miles of range per 20 min.	40+ miles of range per hour	CCS (SAE) 	Commercial Public
				CHAdeMO (Charin) 	
				Tesla 	

* Assumes Bus Efficiency of 1.75 kWh/mile

Site Layout:

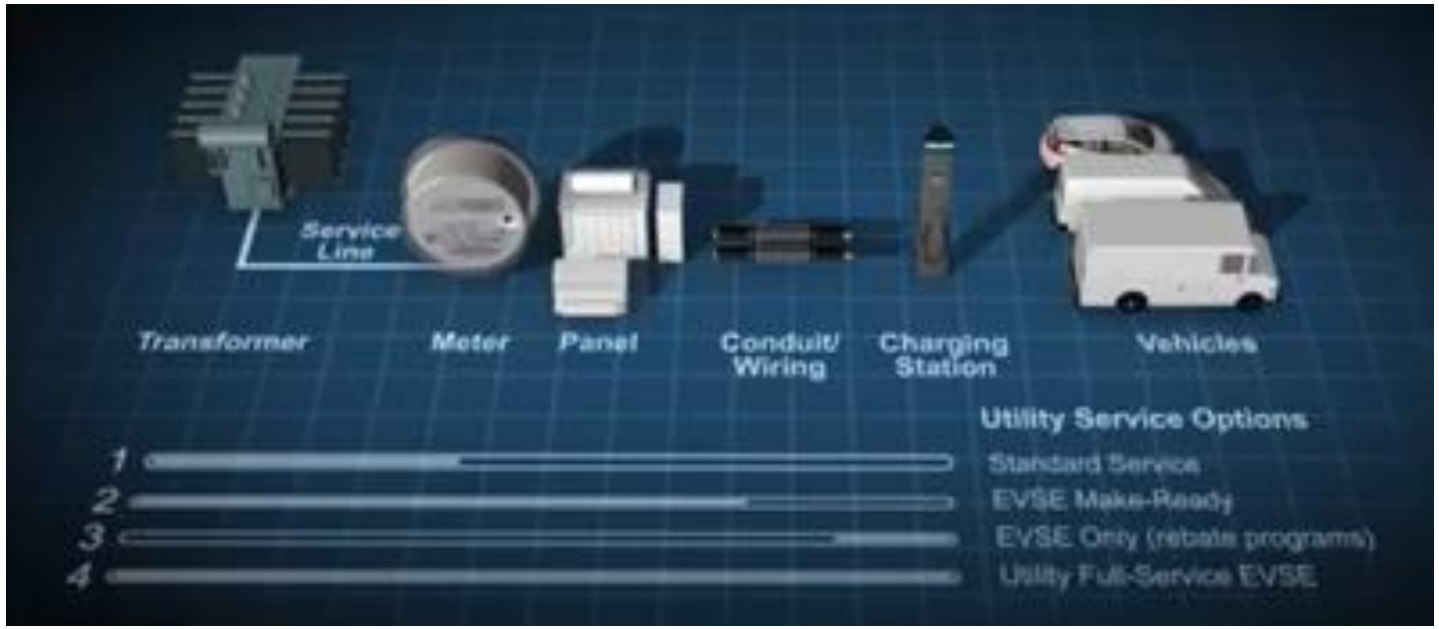
- Determine location of bus parking, charging stations, electrical service panel, and transformer (if necessary).
- Determine number of charging stations.
- Minimize distance from service panel to charging stations.
- Consider future expansion needs.

Mythbusters – *EV Charging Infrastructure*

Electric Service Equipment:

Level 2 Chargers will require a service panel modification or upgrade. Each new station requires dedicated circuit/breaker.

Level 3 Chargers may require new service line and distribution transformer upgrade. Coordination with local utility needed.



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Questions and Answers

We thank you for your time!

Presenters:

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