“DER-Sales”

A New Business Model for Deploying Distributed Energy Resources in Rural Electric Cooperatives

Distributed Wind 2026
February 23, 2026

Mike Bergey
President & CEO

BERGEY WINDPOWER

Bergey Windpower Co.

A World Leader in Small Wind

- 49th Year – Oldest and most experienced manufacturer of small turbines in the world
- 1 – 15 kW for homes & farms
- Turbines have 2-3 moving parts
  - no scheduled maintenance
  - demonstrated 20+ years with 100% availability and zero O&M costs
  - 10 kW turbines operating for 43 years (so far)
- Over ~ 10,000 installations, covering all 50 States and over 100 countries

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MADE IN USA

Excel 15 - Advanced Technology

- State of the Art in blades, PM alternator, electronics, & controls
- 40% peak efficiency
- 2 Moving Parts (Rotor & Yaw)
- No scheduled maintenance
- 3 Year Inspection Interval
- 40 – 75 Year Predicted Operational Life
- PNNL: Best Seller
- Equal to 35 kW solar

Helical Anchors & Tilt-up 100’ SSL Tower – 2 Day Install

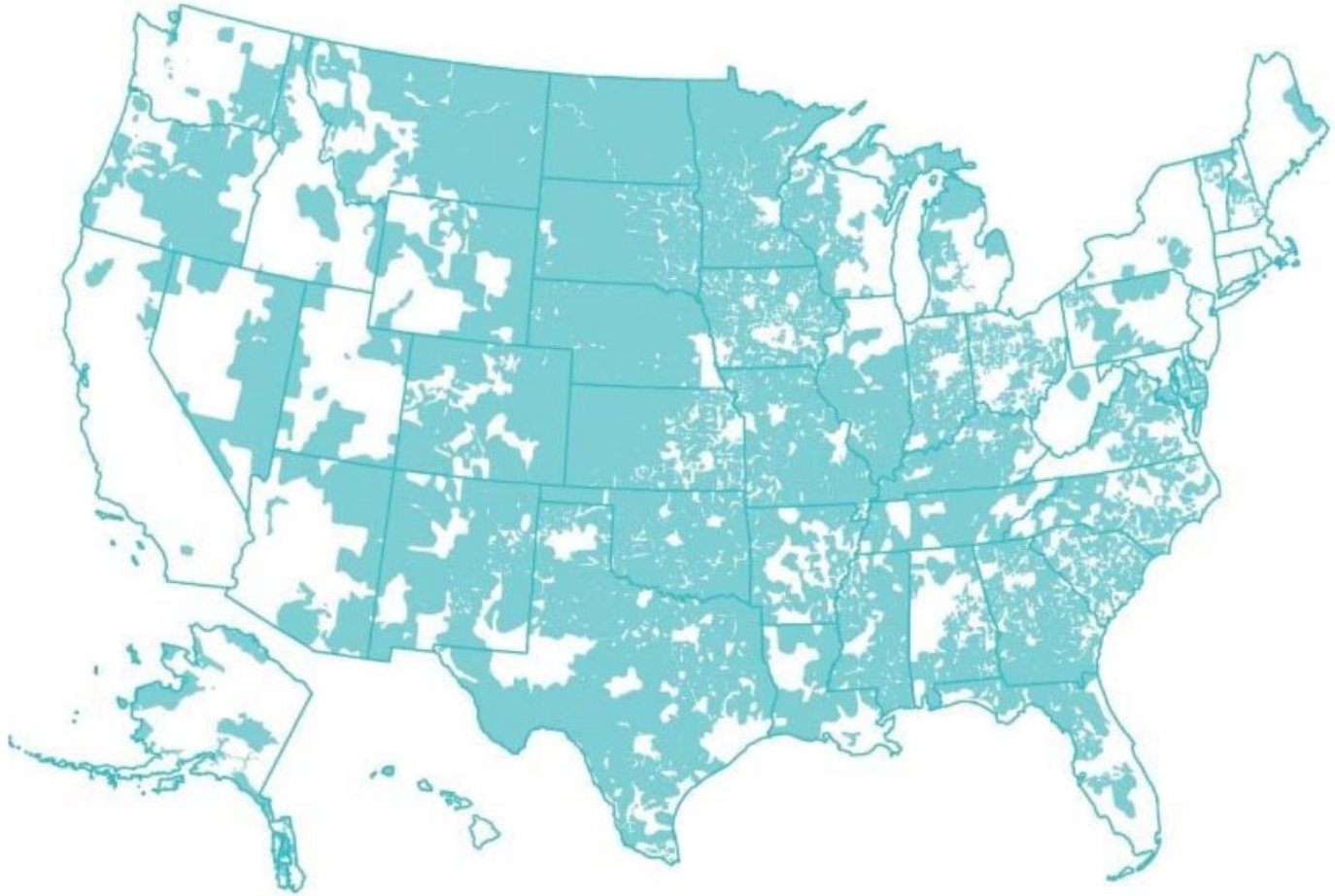
5 ½ “ Dia. x 8 ft. Helical Anchors

Tilt-up Tower on Helical Anchors

Skid-Steer with Helical Anchor Rig

R&D supported by US-DOE

Cooperatives power 56% of the American landscape.



830 Distribution Coop's - 42 million customers

“DER-Sales” Business Model

Original Concept

- REC’s have access to low cost capital and are non-profits
- REC sells and finances 25 kWp wind microgrid systems
- Members get long-term savings, plus high capacity/long duration “whole house” resiliency
- REC’s get peak-shaving, grid support and upgrade deferral

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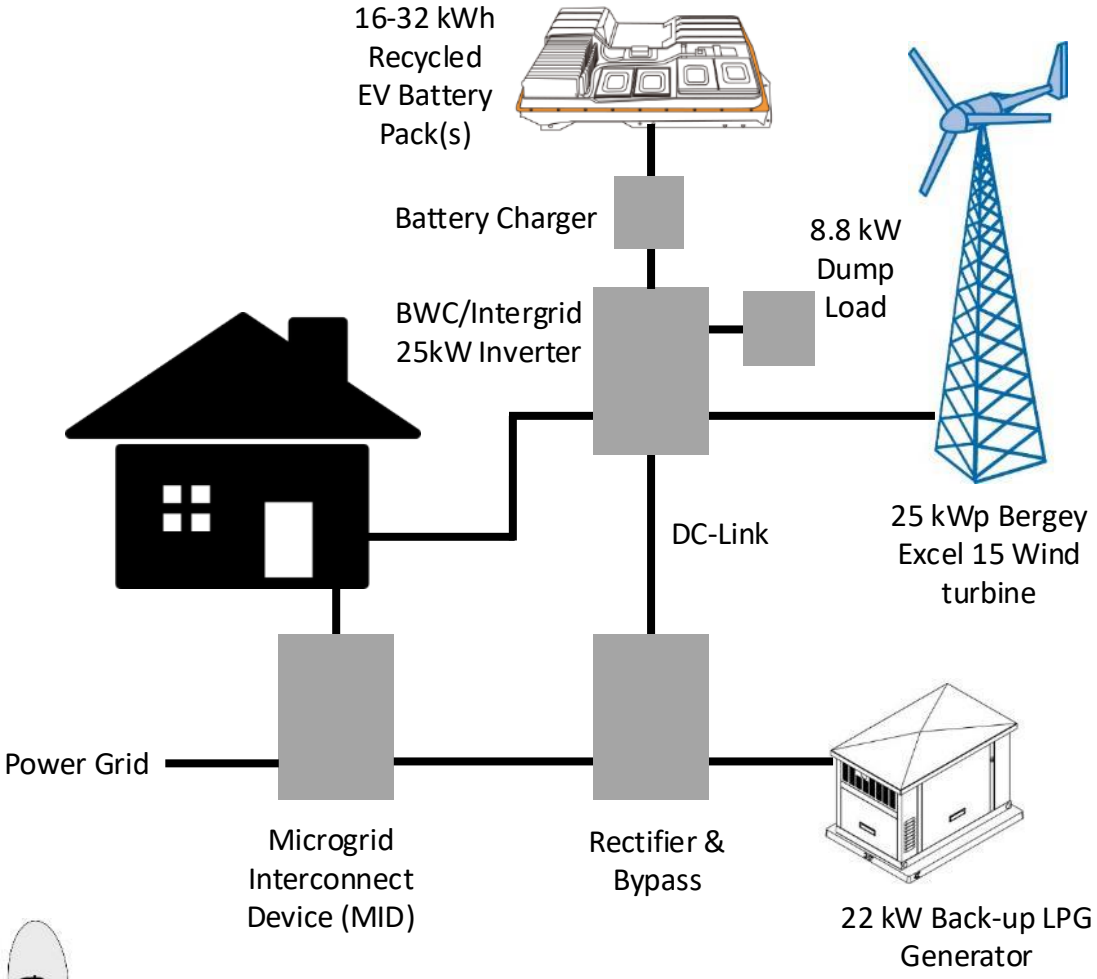
Excel 15 Home Microgrid System



Mode 1: Normal Operation

- Grid available
- MID connects to grid
- Generator off
- Inverter is grid-following
- Wind turbine reduces home's consumption of grid energy
- Excess energy maintains battery or exports to grid

Mode 2: Back-up (Grid Failure)

- MID isolates home
- Inverter switches to grid-forming
- Wind turbine & battery deliver power through inverter, with generator for back-up (providing extended-term power surety)

Mode 3: Peak Shaving/Voltage Support

- Utility dispatched (per EPA regulations)
- MID connects to grid
- Wind turbine & battery deliver constant power through inverter, with generator for back-up (providing firm dispatchability)

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Original Concept

DOE WIRED Project on DER-Sales Evaluation

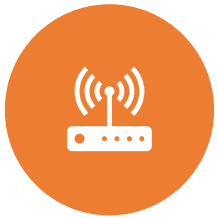
DETAILED PERFORMANCE & FINANCIAL MODELING

VALUATION OF PEAK SHAVING AND UPGRADE DEFERRAL

"FAIR" RATE STRUCTURES

SYSTEM CERTIFICATIONS

FIELD VERIFICATIONS



VPP: REMOTE DISPATCH & CYBER-SECURITY

PROJECT PLANNING

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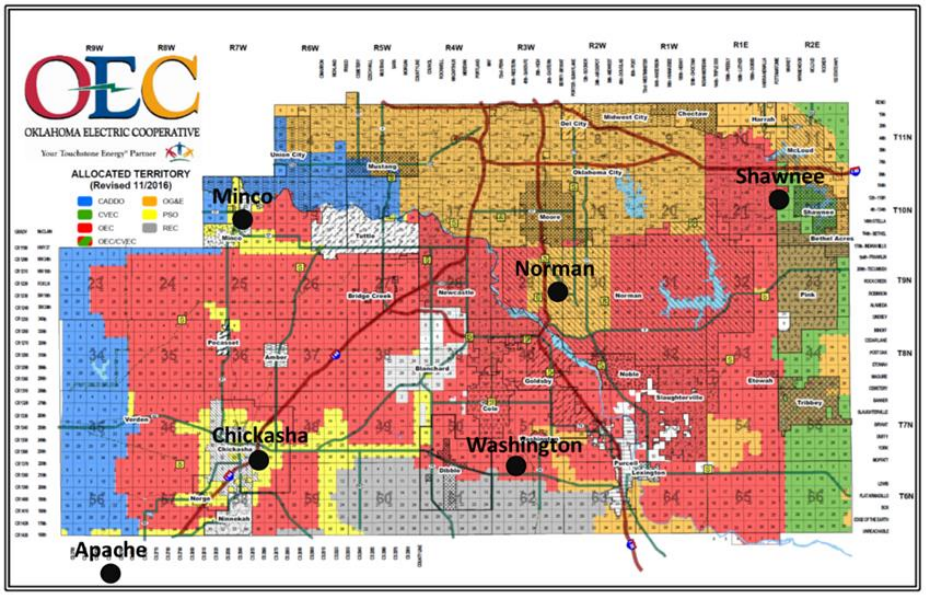
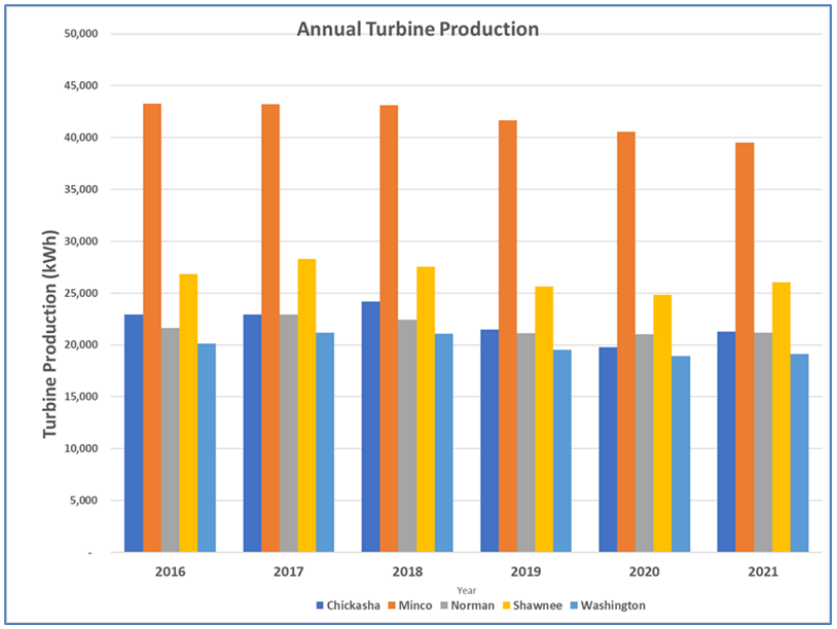
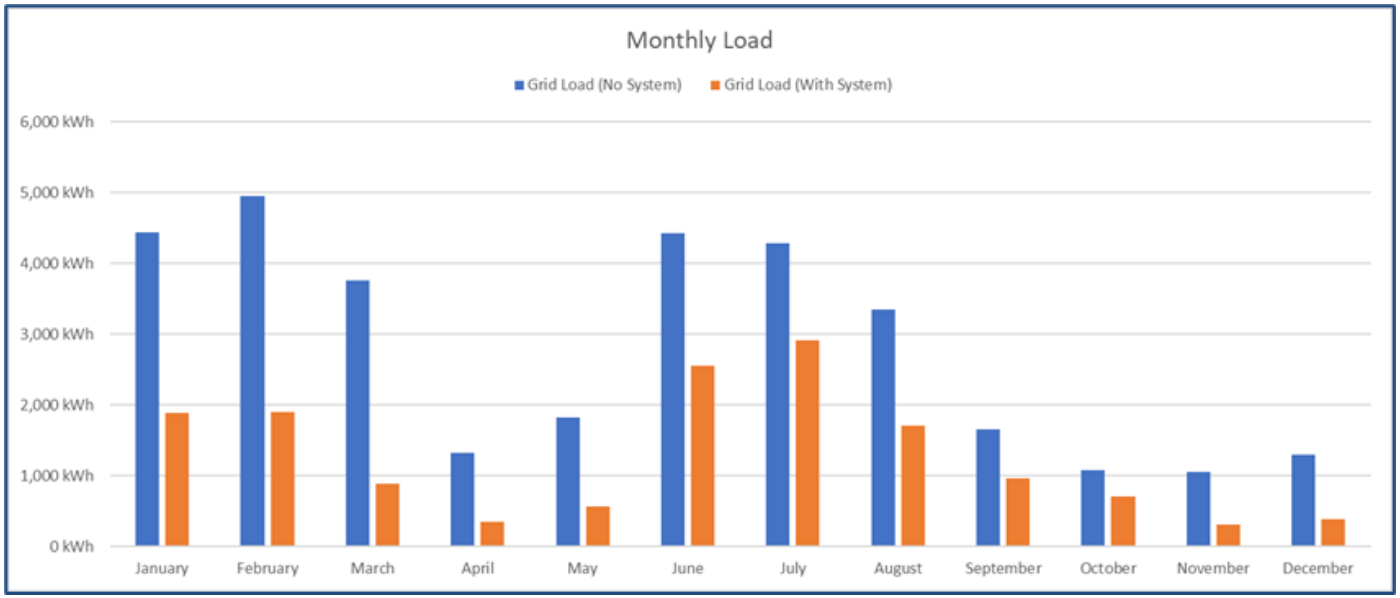
Wind Microgrid Modeling (Hindcast)

- Oklahoma Electric Cooperative – 55,000 meters
- Hourly OK Mesonet wind speed data for 5 sites over 6 years (2016 – 2021)
- Hourly residential load data for all-electric homes near the Mesonet stations, 2016 – 2021
- Built an elaborate Excel spreadsheet that modeled hourly wind energy, customer loads and TOU/seasonal utility rates, and incorporated variable battery storage with variable dispatch protocols





Wind Microgrid Modeling (Hindcast)



Minco

Minco Site Year	Turbine Energy Produced (kWh)	Home Energy Consumed (kWh)	Wind Energy Consumed (no storage)	Wind Energy Consumed (32 kWh Storage)	Annual Battery Cycles	Percentage of Battery Cycles of +/- 10% Depth
2016	43,247	17,532	26.7%	34.8%	1,187	54.7%
2017	43,246	22,226	31.3%	39.5%	1,163	52.9%
2018	43,123	30,179	41.6%	51.1%	1,169	48.5%
2019	41,658	25,929	37.3%	46.2%	1,147	51.4%
2020	40,573	29,114	40.9%	50.0%	1,081	51.9%
2021	39,527	33,894	44.3%	53.4%	1,123	52.9%

What Did the Modeling Teach Us?

- Annual energy output from the turbine can vary by a factor of two across a OEC service territory – West is better, though far East is good.
- Annual energy production can vary by as much as +/- 10% but is more consistently in the range of +/- 5%.
- When the annual turbine production is close to the annual home energy consumption ~ 45 – 50% of the wind turbine's production is consumed in the home and the rest is sold as excess.
- On-site consumption varied from 27% - 54%, depending on the ratio of energy production to demand.
- Adding 32 kWh of battery storage increases local consumption variation to 35% - 66%, depending on the ratio of energy production to demand.
- Adding storage more than doubles the effectiveness of peak shaving

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2023 Excel 15 Microgrid CAPEX

Grid-Following

Excel 15 - 30m (100') SSL Tower		
Item	Description	Price
1	EXCEL 15 Wind Turbine	$48,500
2	30m SSL Tower Tower	$21,600
3	Tower Wiring Kit	$1,750
4	Shipping & Delivery	$2,100
5	Foundations	$9,000
6	Wire Run (250 ft)	$4,100
7	Electrical Work	$2,200
8	Turbine Set-Up	$4,600
9	Misc. Costs	$1,500
10	Building Permits	$300
11	Sales Tax	$5,900
	Total:	$101,550

Grid-Forming

Excel 15 - Microgrid CAPEX Adder		
Item	Description	Price
1	Leaf Battery Packs, 2 units	$7,000
2	Battery Interface Units, 2 units	$4,000
3	Rectifier and Bypass Unit	$2,000
4	22 kW Standby Generator	$4,800
5	Microgrid Interface Device	$2,000
6	Battery & BIU Enclosure	$1,500
7	Shipping & Delivery	$900
8	Battery & Generator Pads	$1,500
9	Electrical Installation	$3,000
10	Misc. Costs	$500
11	Building Permits	$100
12	Sales Tax	$1,760
	Total:	$29,060

Home Microgrid CAPEX Total: $130,600

DER-Sales OEC “Net Income”

- OEC sells wind microgrid system, 20% margin
- OEC provides 100% financing, borrowing at 0% (USDA RESP) and on-lending, on bill, at 3% over 20 years
- OEC buys excess energy at 7.5¢ and sells it at 11.5¢
- OEC realizes energy cost savings from 3CP and 12CP peak shaving

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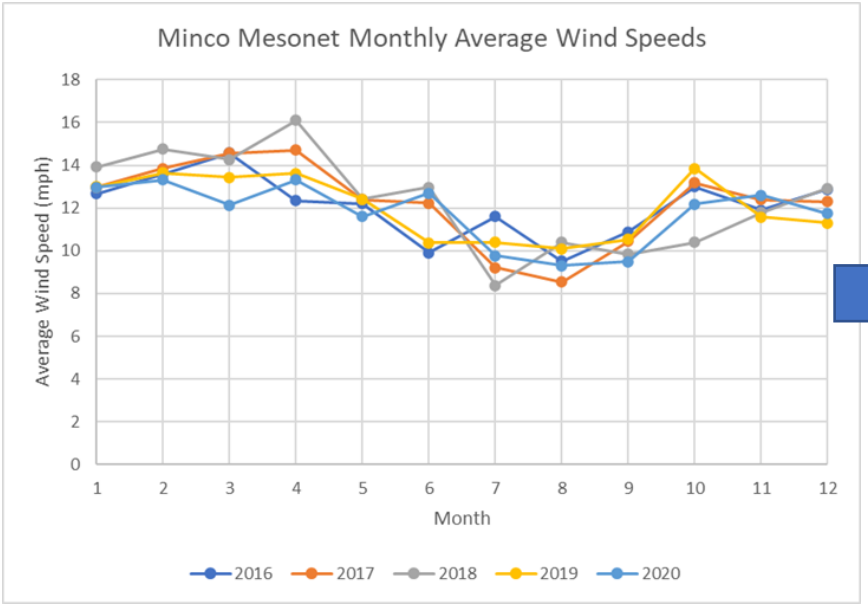
Determining Capacity Values (no storage)

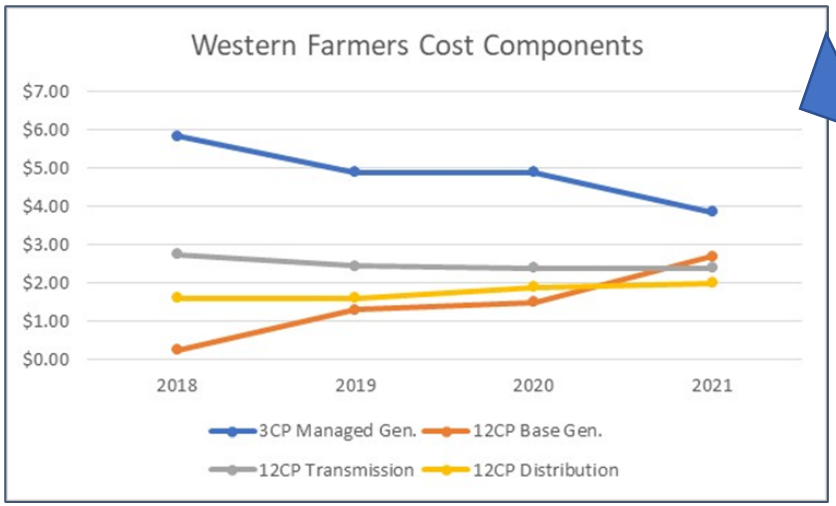


3CP - 2019		Minco Mesonet Average WS (mph)	Minco Mesonet Average WS (m/s)	Assumed Wind Shear Exponent	Hub Height WS (m/s)	Excel 15 Power Output (kW)
Date	Time					
8/7/2019	17:00	22	9.84	0.2	12.25	15.3
8/10/2019	18:00	24	10.73	0.2	13.37	16.7
8/12/2019	18:00	13	5.81	0.2	7.24	6.1

Ave. = 12.7 kW

3CP - 2020		Minco Mesonet Average WS (mph)	Minco Mesonet Average WS (m/s)	Assumed Wind Shear Exponent	Hub Height WS (m/s)	Excel 15 Power Output (kW)
Date	Time					
7/20/2018	18:00	15	6.71	0.2	8.35	8.2
7/19/2018	18:00	10	4.47	0.25	5.88	3.5
7/21/208	17:00	14	6.26	0.2	7.80	7.1

Ave. = 6.3 kW



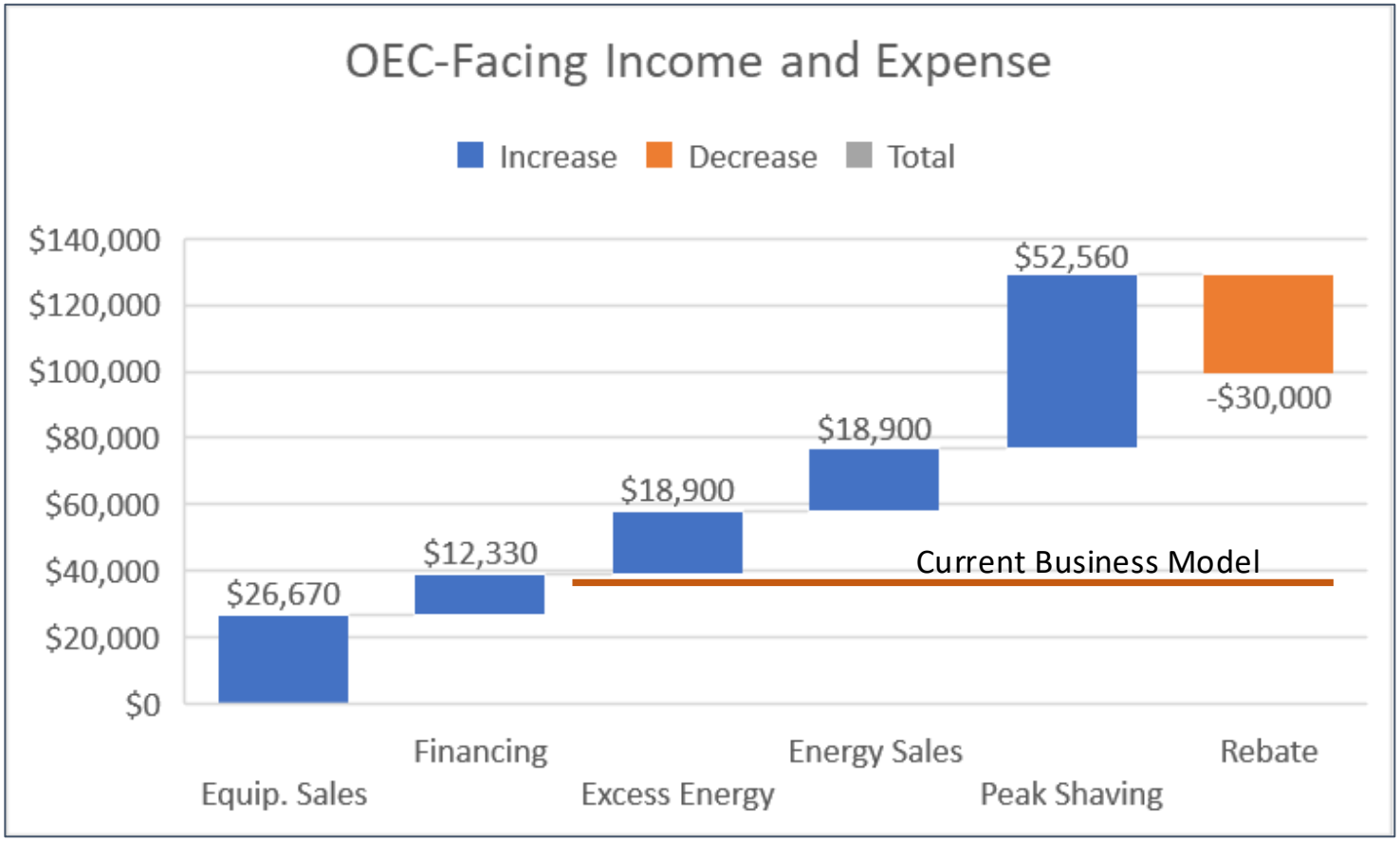
12CP - 2019		Minco Mesonet Average WS (mph)	Minco Mesonet Average WS (m/s)	Assumed Wind Shear Exponent	Hub Height WS (m/s)	Excel 15 Power Output (kW)
Date	Time					
1/29/2019	8:00	5	2.24	0.25	2.94	0.0
2/8/2019	8:00	17	7.60	0.2	9.47	10.8
3/4/2019	8:00	23	10.28	0.2	12.81	15.2
4/2/2019	8:00	9	4.02	0.25	5.30	2.6
5/23/2019	18:00	12	5.36	0.2	6.68	5.0
6/29/2019	18:00	8	3.58	0.25	4.71	1.8
7/16/2019	18:00	7	3.13	0.25	4.12	1.1
8/20/2019	18:00	10	4.47	0.25	5.88	3.5
9/7/2019	17:00	7	3.13	0.25	4.12	1.1
10/31/2019	8:00	18	8.05	0.2	10.02	10.9
11/12/2019	7:00	22	9.84	0.2	12.25	13.5
12/18/2019	8:00	8	3.58	0.25	4.71	1.8

Ave. = 5.6 kW

2019: $1,112

($2,693 w/storage)

20 Years DER-Sales OEC "Net Income"



DER-Sales Model Total Margin: $129,400

After Rebate: $99,400

Current Business Model: $37,800

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DER-Sales Homeowners Expense

- Buys and finances ($0 down) wind-microgrid at $130,600
- Receives $37,100 federal tax credit + $30,000 OEC rebate – net cost is $63,500
- 20-year non-recourse loan at 3%
- OEC buys excess energy at 7.5¢
- $410 monthly cost in Year 1 ($90 higher)
- $150 less in Year 20

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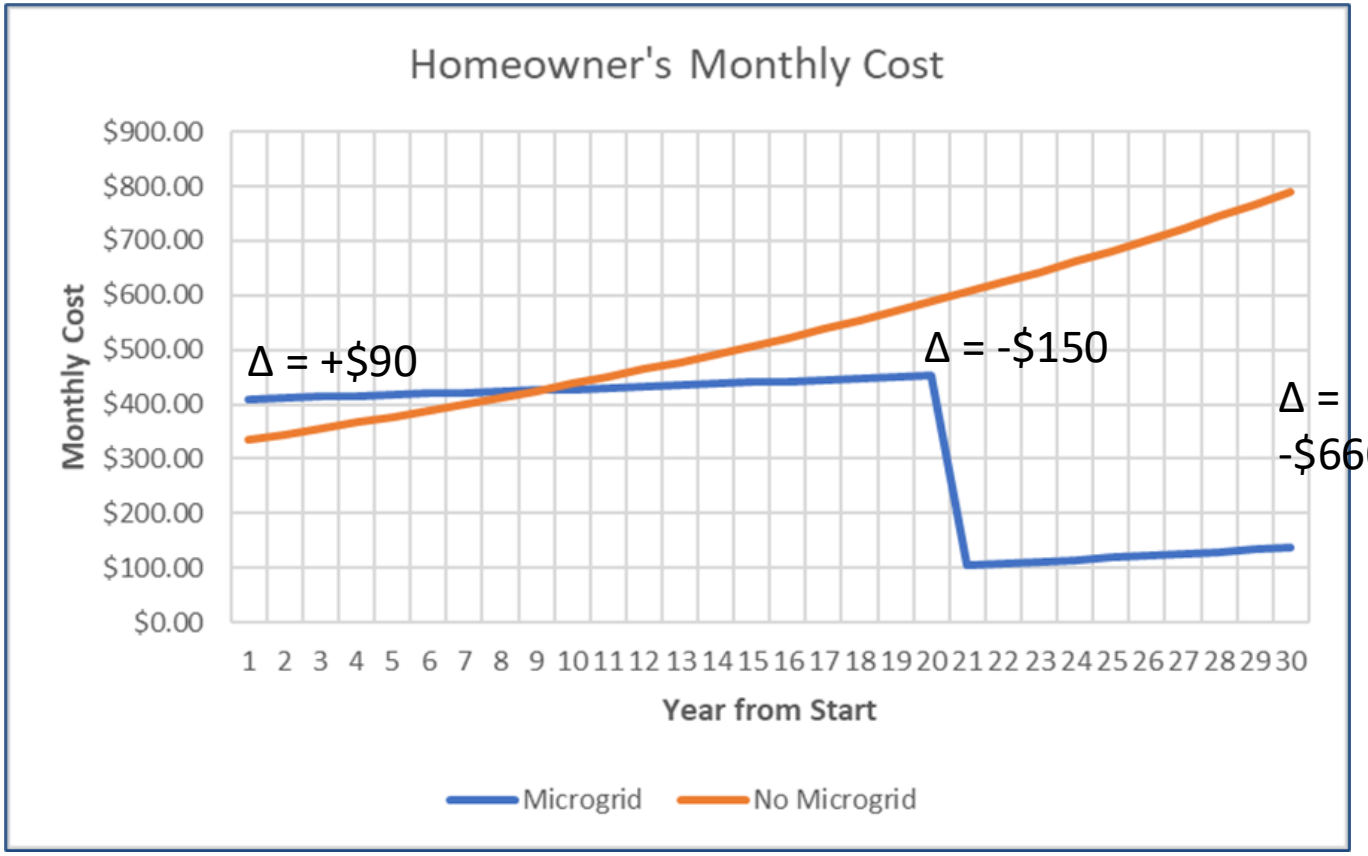
DER-Sales Homeowners Cash Flow



Monthly Cost Crossover in 9.5 Years

20 Year Loan and 30+ Year Operating Life

$50 - $80,000 Asset after 20 Years

Extended Period "Whole House" Back-up Power

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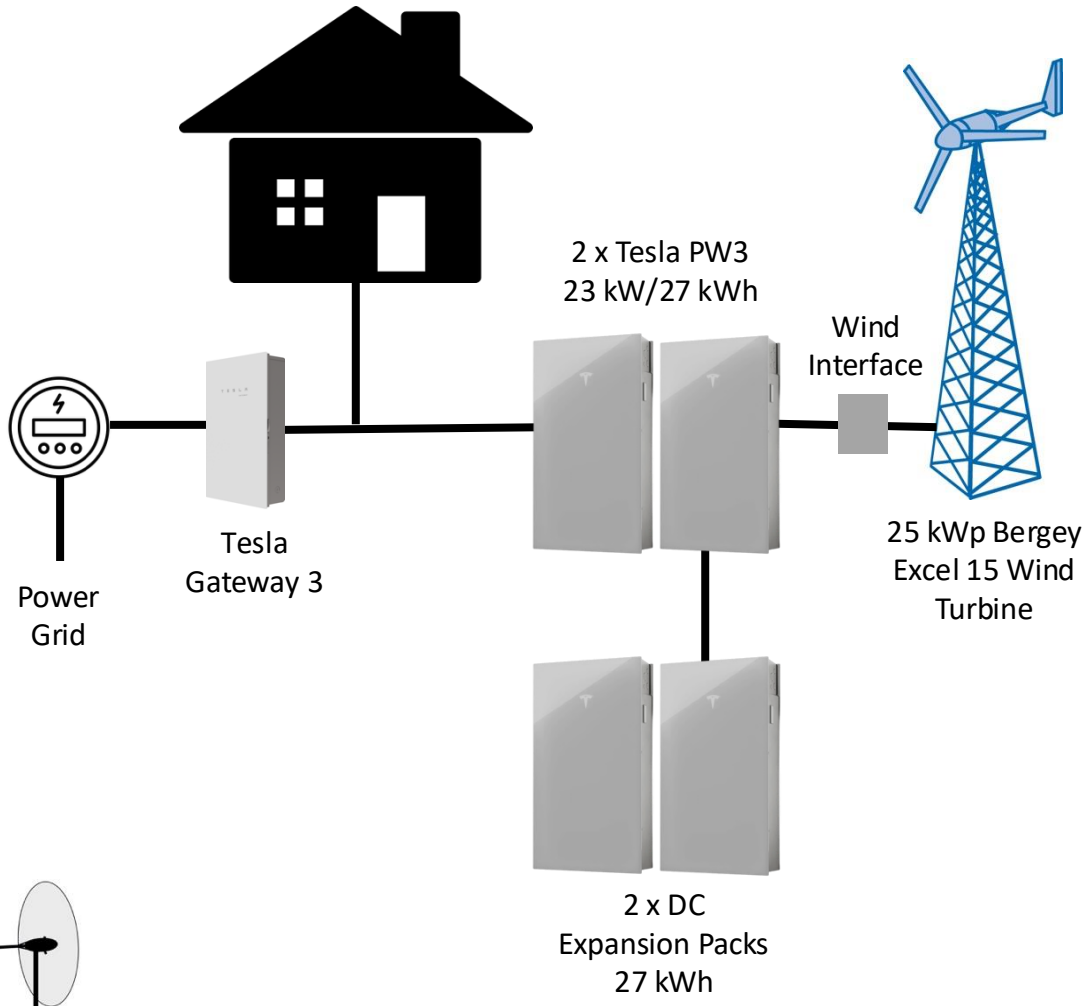
Proposed Excel 15/Tesla Powerwall 3 Microgrid System



- 120/240 VAC, 1-P
- 25 kWp Wind
- 27 kWp Grid Following/Forming Inverter
- 54 kWh Li-ion Battery
- Remote utility dispatch

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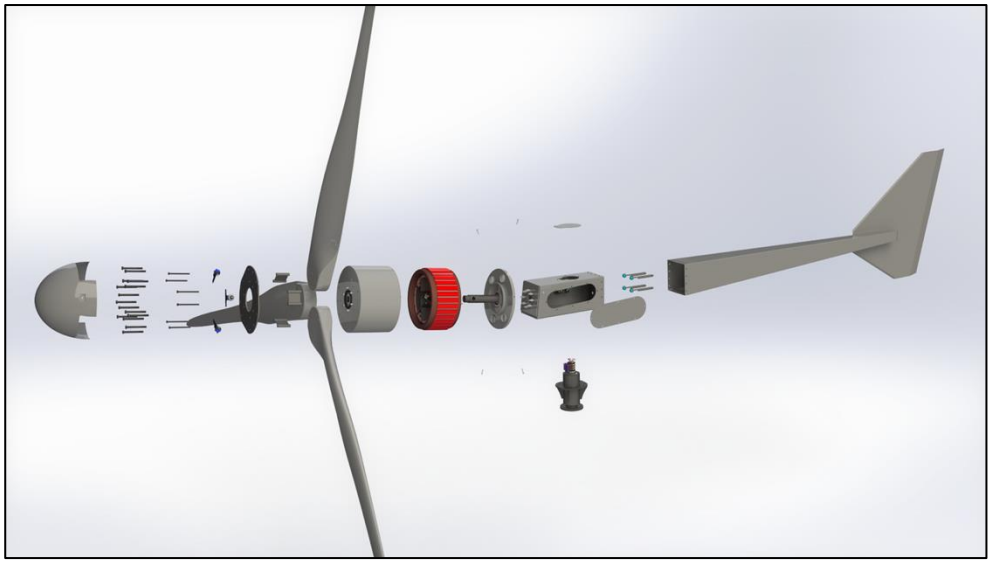
BWC's New Power Electronics Partnership

- **Tesla ultimately unwilling to make necessary software changes needed for wind turbine integration**
- **Sol-Ark is doing the work**

Distributed Manufacturing

- Turbines, towers & electronics built, installed & supported in REC territory
- BWC would build, own & operate wind turbine Micro-Factory
- Requires volume of 200/year (5 MWp) or more
- ~ 35 FTE's, including installation crews

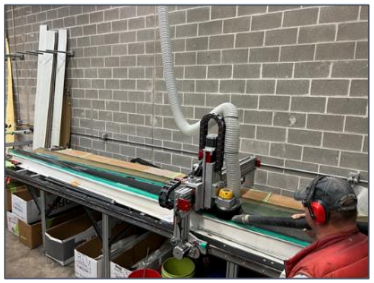


Excel 15 Blade Manufacturing Process

1. Mold Foam Blade Cores

2. Hand Fitting of Pre-Cut Reinforcements

3. Vacuum Infusion of Epoxy



4. Router Trimming Mold Flashing

5. Blade Finishing

6. Blade Painting

Thank You!

Mike Bergey
President & CEO

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