OFF-GRID & UNBROKEN

Survivalists of Sweetwater 307 (SOS 307)
Power Resilience & Energy Preparedness
Green River, Wyoming
Train Hard. Stay Ready. Stay Unbroken.

SECTION 1 – SURVIVAL ENERGY MINDSET

Backup power is not about comfort.
In Wyoming, it protects:

- Water systems
- Heating systems
- Food storage
- Medical equipment

Rule #1: If your heat depends on electricity, you are not off-grid.

SECTION 2 – LOAD IDENTIFICATION

<u>Step 1: Separate Needs from Wants</u>

Tier 1 – Must Stay Alive

- Well pump
- Furnace blower
- Boiler controls
- Refrigerator
- Medical devices

Tier 2 – Operate Safely

- Freezer
- Lighting
- Router/Comms

Tier 3 – Comfort

- Microwave
- TV
- Coffee maker

Appliance Table

Appliance		Running Watts		Surge Watts		Running Hours
Well pump		1000-1500		3000-4000		0.5-1 hours
Deep well pump		1500-2200		4500-6000		0.5-1 hours
Furnace Blower		400-800		1200		4-8 hours
Boiler Pump		80-200		400		6-10 hours
Fridge		100-200		600		8 hours
Chest Freezer		150-300		700		6-8 hours
LED Light		8-12 watts				4-6 hours
Router		10-20 watts				24 hour
Coffee Maker		800-1200				.25 hours
Microwave		1000 watts		1000 watts		0.2 hours

Voltage Conversion

Voltage Conversion Reference

To convert Watt-Hours to Amp-Hours:

Wh ÷ System Voltage = Ah

System Voltage

Formula

- 12V

  Wh ÷ 12

- 24V

  Wh ÷ 24

- 48V

  Wh ÷ 48

Example:

- 7,560 Wh ÷ 48V = 157.5 Ah per day

WORKSHEET 1 – LOAD INVENTORY

Watts × Hours = Watt-Hours
Total Daily Wh = 7482.5
Add 20% buffer: Total × 1.2= 8979

Appliance		Watts		Hours Used		Daily need
Toaster		1650		.25		412.5
Fridge		310		10		3100
Coffee Maker		1350		1		1350
Lights x 2		8-12		12		120
Microwave		1250		2		2500

SECTION 3 – BATTERY SIZING

Step 1: Wh ÷ System Voltage = Ah per day

Example: 8979 Wh ÷ 48V = 187.06 Ah/day

Step 2: 2-Day Wyoming Winter Autonomy

187.06 Ah × 2 = 374.12 Ah

Step 3: Lithium 80% usable

374.12÷ 0.8 = 467.65Ah required

WORKSHEET 2 – BATTERY BANK

Daily Wh: 8979
System Voltage: 48
Ah per Day: 187.06
Autonomy Days: 2
Battery Chemistry: Lithium 80 % Usable
Final Bank Size: 467.65

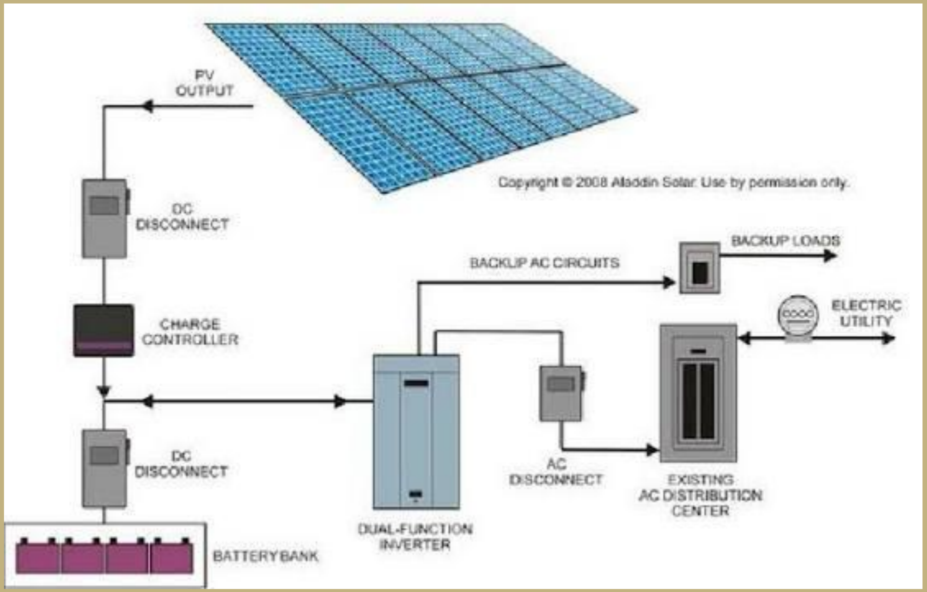
Battery Back-up with Solar

How It Works
(Energy Flow)Grid → Main Panel → Transfer Switch → Inverter/Charger → Battery Bank → Critical Loads Panel

Core Components:
1. Utility Meter
2. Main Service Panel
3. Automatic Transfer Switch (ATS) or
4. Manual Transfer Switch Hybrid Inverter / Inverter-Charger Battery Bank (12V / 24V / 48V)
5. Critical Loads Subpanel

What Happens During Outage:
- Grid drops ATS switches to inverter
- Battery bank powers critical loads

<u>Optional generator input can charge batteries</u>



Best Used When:
You want quiet, instant backup, Critical loads only (well pump, furnace blower, fridge)Short- to medium-duration outages

Not Ideal When: Whole-house heavy loads (electric heat, dryers)Long-term outage without solar/generator support

SECTION 4 – GENERATOR STRATEGY

Generators are recovery tools:
- Battery chargers
- Surge load handlers
- Emergency recovery systems

Continuous Load Example:

Well Pump: 1000 Watts
Furnace: 600 Watts
Fridge: 200 Watts

Example Continuous Load = 1,800W
Minimum 3,000W generator

GENERATOR FUEL PLANNING

0.75 gallons/hour
2 hours/day = 1.5 gallons/day
7 days = 10.5 gallons
Plan 2× → 21 gallons minimum

WORKSHEET 3 – GENERATOR PLAN

Continuous Load:1800 W
Surge Load: 1200   W
Generator Size: 3000 W
Fuel Use Per Hour: .75 gallons/hour
Hours Per Day: 2 hours per day
7-Day Fuel Needed: 10.5 gallons
Plan excess x2: 21 gallons minimum

Generator Operation

How It Works (Energy Flow)

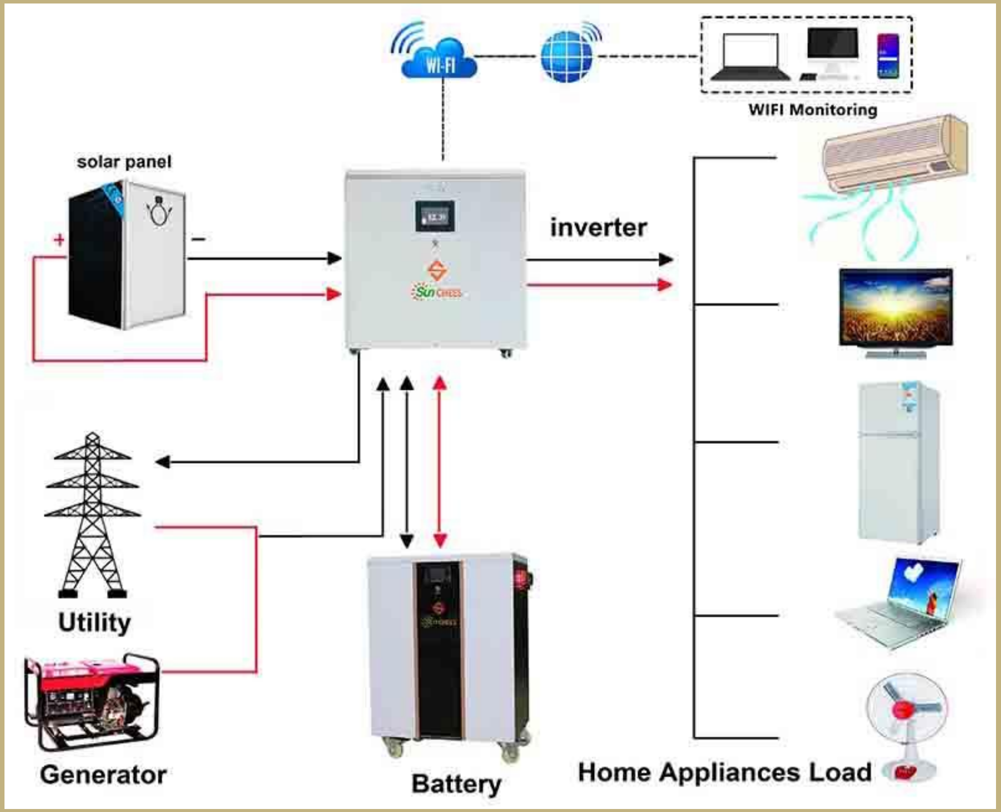
Generator → Transfer Switch → Inverter/Charger → Battery Bank → Loads

Generator can:
•Power house directly
•Charge battery bank simultaneously
•Shut off once batteries are full

Core Components:
•Standby or Portable Generator
•Transfer Switch (ATS preferred)
•Inverter/Charger
•Battery Bank
•Critical Loads Panel or Whole House Panel

Best Used When:
•You want fuel-based reliability
•You want to reduce generator runtime
•You need high surge capability (well pumps, HVAC)

Not Ideal When:
•Fuel storage is limited
•Noise restrictions
•Long-term fuel resupply is uncertain



SECTION 5 – SOLAR & WIND STRATEGY

Solar: Required Wh ÷ 4 winter sun hours

Example: 8979 ÷ 4 = 2,244W
Add inefficiency → 2,544W–2,744W

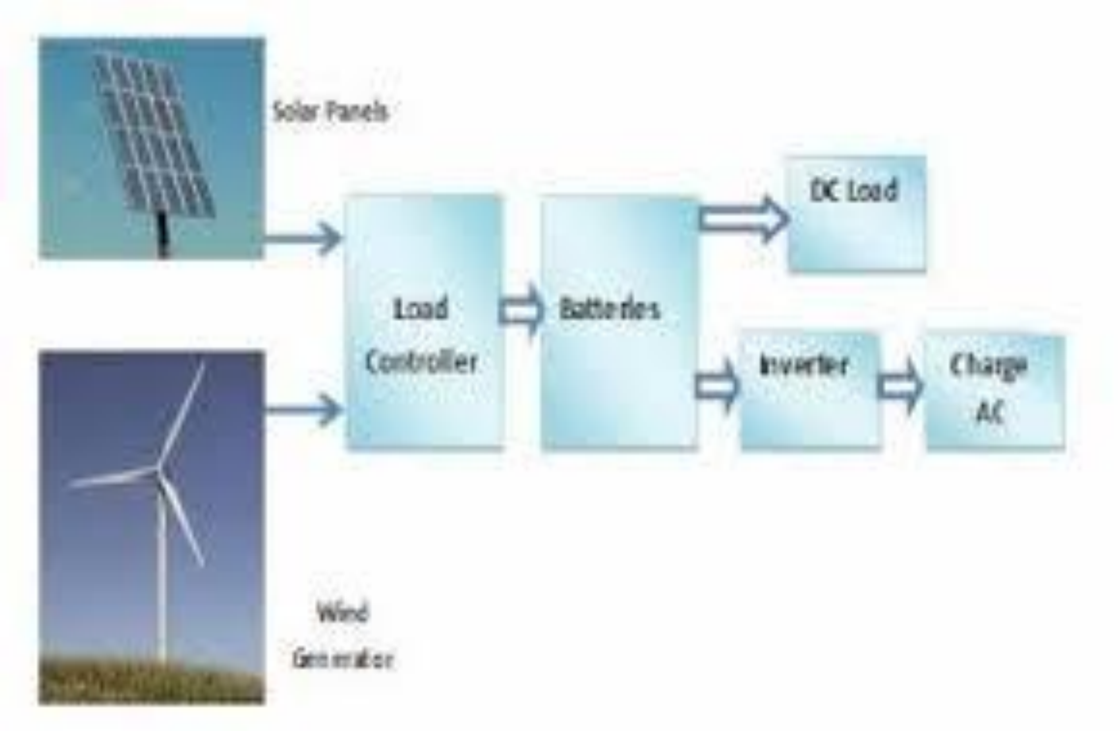
Wind Advantage in Wyoming:
- Works at night
- Works during storms
- Hybrid reduces generator dependence

Solar and Wind Operation

How It Works (Energy Flow)

Solar Panels → Charge Controller → Battery Bank
Wind Turbine → Wind Charge Controller → Battery Bank
Battery Bank → Hybrid Inverter → Critical Loads Panel
Grid (optional) → Hybrid Inverter (backup or sell-back)

Core Components:
- Solar Array
- MPPT Solar Charge Controller
- Wind Turbine
- Wind Diversion Controller
- Battery Bank (preferably 48V for efficiency)
- Hybrid Inverter
- Critical Loads Panel
- AC Disconnects + DC Breakers



Best Used When:
- Rural Wyoming properties
- Long-term resilience
- Redundant charging sources
- Off-grid cabins or homesteads

Not Ideal When:
- No wind resource
- Heavy shading
- Low-budget entry system

SECTION 6 – LOAD SHEDDING STRATEGY

Battery at 50%:

- Shut freezer
- Reduce lighting
- Delay water pumping

Battery at 30%:

- Essential loads only
- Start generator cycle

FAILURE SCENARIO DISCUSSION

3 cloudy days, no wind, 20°F
Battery at 35%
What shuts off first?

FINAL WORKSHEET – PERSONAL SYSTEM PLAN

My Daily Wh Need: 8979 WH
Battery Bank Size: 467.65 AH
Solar Array Target: 2744 Watts
Generator Size: 3000 Watts
Fuel Stored: 21 gallons
Backup Heat Source: Propane Heater like MR. Buddy heater with propper ventilation

CLASS TAKEAWAYS

You should now know:

- Their daily energy needs
- Their battery requirement
- Their generator size
- Their fuel plan
- Their load-shedding protocol

Not theory. Numbers.