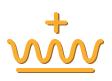


# **KEY QUESTIONS FROM HOMEOWNER**



- What are the Limitations of Existing Leading Brands?
- What Features Should Homeowners Demand and Watch For?
- Why Specifically Ask for Sparq Products?

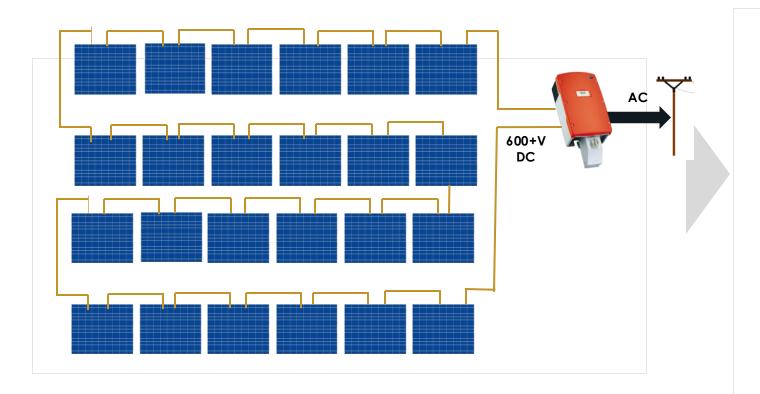
# WHAT ARE THE LIMITATIONS OF EXISTING LEADING BRANDS?



# TRADITIONAL STRING INVERTERS



# Traditional String Inverter: Many Panels In Series and One Central DC-AC Inverter



Multiple series Panels + One HV Central Inverter

Cheap, But...

### Reliability

- Design life of 10 years → requires replacement
- Single point of failure

### **Productivity**

Module mismatch, shading, soiling, "Christmas light" effect

### **Design & installation**

- Requires specialized design and installation
- Requires expensive Balance of System

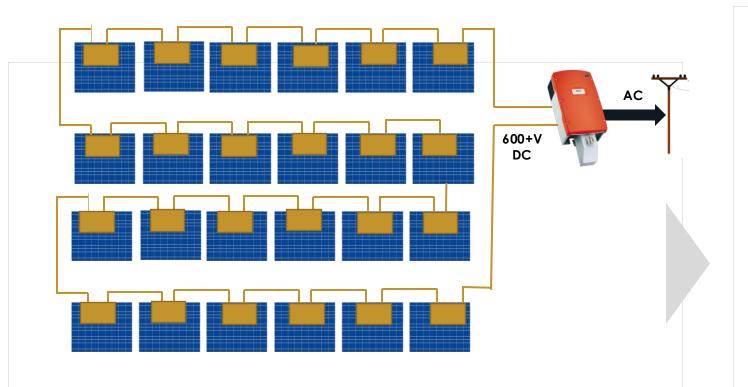
### Safety

- High voltage (600V+) arc faults → leading cause of fires of PV installations
  Always live; no module level
- Always live; no module level disconnect/shut-off

# **MANY OPTIMIZERS + STRING INVERTER**



# SolarEdge: One Optimizer/Panel + Many Panels In Series + HV DC-AC Inverter



One Optimizer Per Panel

+ HV Central Inverter Medium Cost Safety Risk

### Reliability

- Design life of 12 years → requires costly replacement
- Single point of failure

### **Productivity**

5-20% more energy as a result of individual Maximum Power Point Tracking (MPPT)

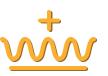
### **Design & installation**

 String sizing required – difficult to design, install, maintain and repair

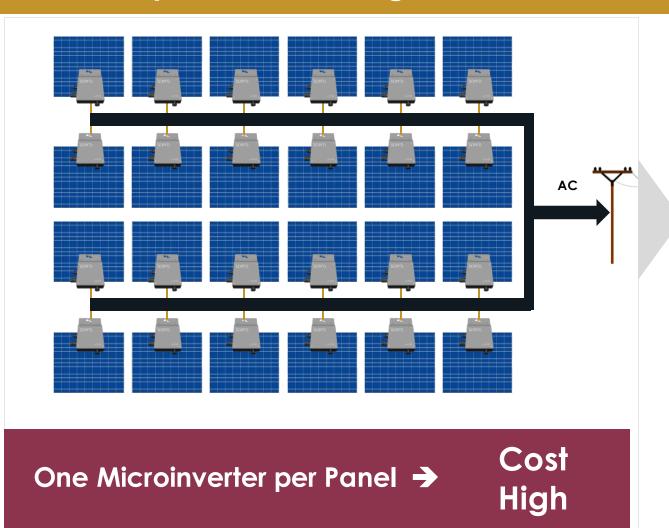
### Safety

- High voltage (600V+) arc faults → leading cause of fires in PV installations, electirck shock hazard

# SINGLE-CHANNEL MICROINVERTERS



# Enphase: One Single-Channel Microinverter with MPPT per Panel



### Reliability

- No single point of failure
- Design life of 12 years (Electrolytic Capacitor)

### Productivity

5-20% more energy as a result of individual Maximum Power Point Tracking (MPPT)

### Design & installation

- No risky high voltage DC simplifies design and installation
- High overall life-cycle cost (manufacture, install and repair after 12 years

### Safety

"All Alternating Current (AC)" solution at low voltage eliminates arc foults

# LIMITATIONS OF LEADING BRAND PV SYSTEMS



### SolarEdge String Inverters

- X Safety risk due to high voltage DC and arcing
- X Conventional power electronics and timeaveraged liner control method
- X Require large electrolytic capacitors
- X No galvanic isolation
- X Low MTBF, poor system availability and reliability
- X Multiple Single point failures in the system
- X Low energy harvesting without optimizers
- X Optimizers, an after thought for shading and MPPT
- X Require excessive power quality and EMI fi
- X Excessive volume, weight and cost penalty
- X Low energy harvesting due to power clipping at high ambient temperatures
- X Inefficient supply chain, tedious to install & repair

# **Enphase Single-Channel Microinverters**

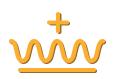
- X Conventional Flyback boost Converters
- X Conventional power electronics and timeaveraged liner control method
- X Mainly H/W based with simplified control methods using averaged models
- X Require huge electrolytic capacitors
- X Low MTBF and poor reliability
- X Require excessive power quality and EMI due to high Total Harmonic Distortion
- X Excessive volume, weight and cost penalty
- X Low energy harvesting due to power clipping at high end of the normal operational ambient temperatures
- X Inefficient supply chain, tedious to install & repair

Competing microinverters suffer from poor performance and reliability due to use of conventional H/W based technologies with linear control techniques.

# WHAT HOMEOWNERS SHOULD DEMAND AND WATCH FOR?



# WHAT HOMEOWNERS SHOULD DEMAND AND WATCH FOR?



# Ask for Your Options and Side-by-Side Comparison of Features!

### **Performance**

- √ High Frequency, soft-switching power electronics
- √ Advanced real-time control
- ✓ Individual MPPT for each panel
- √ No HV DC cabling on the roof
- ✓ Lowest weight of microinverters on the roof
- √ Maximum Energy Harvesting
- ✓ Dual Mode Operation (On-grid & Off-grid);
- ✓ Grid-Resilience,
- √ Grid independence
- √ energy self-sufficiency
- √ Future ready for being flexible and scalable
- ✓ Robust IOT gateway for health monitoring & control
- ✓ Web monitoring with Intuitive displays
- ✓ User-Friendly mobile app
- ✓ Accessible and expert technical support

### Safety & Reliability

- √ No Electrolytic Capacitor
- ✓ No other low-life components Safe,
- ✓ All-AC cabling with inherent Rapid-Shut-Down (RSD) compliance
- √ No risk of HV DC arcing
- ✓ No Risk of HV electric shock hazard for first responders
- √ High reliability
- √ High system availability
- √ No PV system single point failure
- ✓ Minimize number of system components to install and maintain results for high MTBF
- ✓ Longlisting
- √ Comprehensive warranty

#### **Cost-Effectiveness**

- ✓ Quad Architecture
- √ Reduced manufacturing BOM
- ✓ Reduced Balance of System (cabling, grounding, junction boxes etc)
- √ Reduced manufacturing cost
- ✓ Reduced installation cost
- √ Maintenance-free
- ✓ Lowest cycle-life-cost
- ✓ Outlier on Performance-Cost Curve

Do Your Homework. Ensure You Sign-up A Certified Installer. Buy Best-in-Class Products.

# WHY SPECIFICALLY ASK FOR SPARQ PRODUCTS?

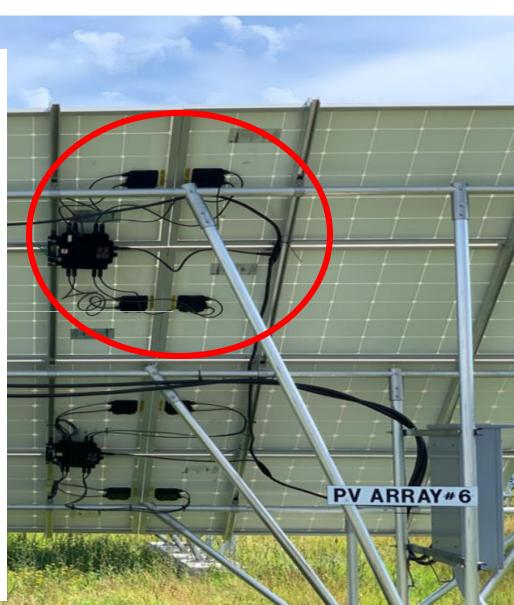


# SPARQ QUAD ARCHITECTURE ADVANTAGE!





- ✓ 1 Microinverter per 4 Panels
- ✓ Safe. Reliable. Long lasting
- ✓ All AC Cabling. Inherent RSD
- ✓ Lowest weight, volume &cost
- ✓ Less Parts to Carry & Install.
- ✓ Less Time on the Roof.
- Easy to Install
- ✓ Maintenance-free
- ✓ No More Truck Rolls!
- ✓ Higher Profit Margin
- ✓ User-Friendly App
- ✓ Expert 24/7 Support



# STANDARD Q2000 PRODUCT FAMILY OFFERING



# Best-in-Class Single and Three Phase Microinverters, Battery Storage and Energy Management

Q2000 1-Phase Dual mode



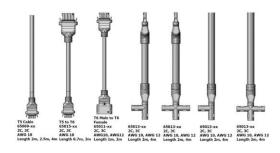
SparqLinq Gateway



Q2000 3-Phase Solar water Pump



**AC Cabling** 



Q2000 Energy Storage

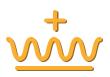


SparqVu Web Monitoring

SparqSync Mobile App

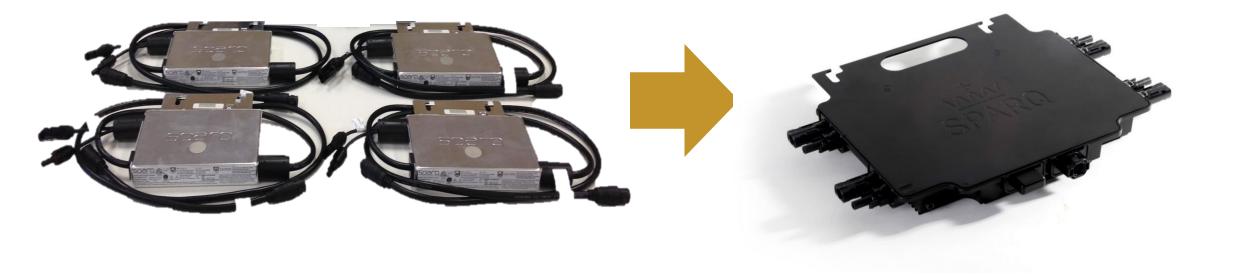


# **SPARQ QUAD MICROINVERTERS**



**Best-Selling Microinverter** 

**Sparq Quad Microinverter** 

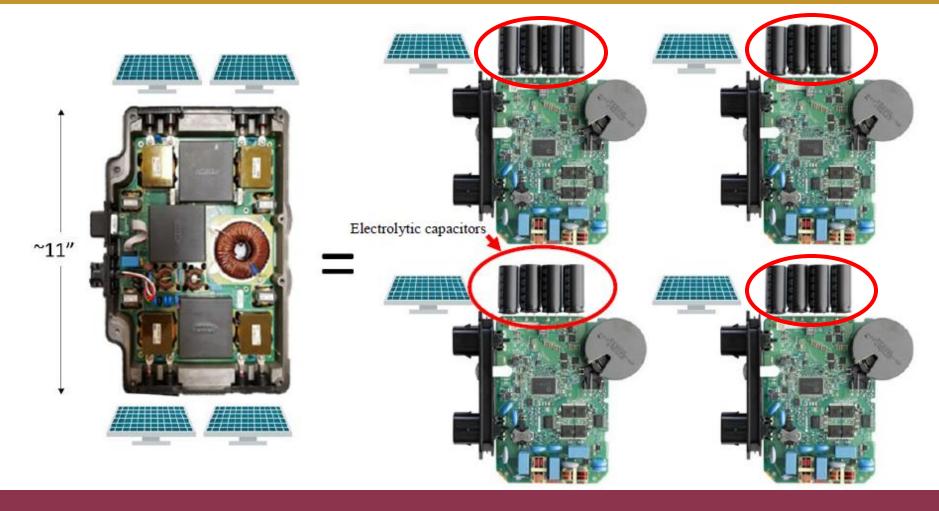


SPARQ's Quad Architecture Integrates FOUR Microinverters in ONE Enclosure.

# SPARQ MICROINVERTER VS. LEADING BRAND

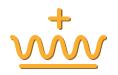


Improving Reliability and Reducing Cost of Supply-Chain, Manufacturing and Installation



SPARQ Microinverters Eliminates Electrolytic-Caps and All Other Low-Reliability Parts

# **SPARQ PRODUCTS VALUE PROPOSITION**



# Best-in-Class Microinverters Disrupting the PV Industry!

### Performance

- √ Software centric flexible Power Electronics with accurate real-time nonlinear control
- ✓ Ultra high frequency, soft switching topology
- ✓ Individual MPPT for each panel
- ✓ No risk of HV DC arcing or personnel electric shock
- ✓ Lowest weight, highest weight density (W/kg)
- √ Lowest volume, highest power density (W/ in³)
- ✓ Maximum Energy Harvesting
- ✓ Dual Mode Operation (On-grid & Off-grid)
- √ Grid-Resilience without energy storage
- ✓ Grid independence and energy self-sufficiency
- √ Future ready for being flexible and scalable
- ✓ SparqLing: advanced gateway to rule them all
- ✓ SparqVu: Web monitoring with Intuitive displays
- √ SparqSync: user-Friendly mobile app

### Safety & Reliability

- √ No Electrolytic Capacitor
- ✓ Other low-life components eliminated
- ✓ Safe, all-AC cabling with inherent
  Rapid-Shut-Down (RSD) compliance
- √ No risk of HV DC arcing
- ✓ No Risk of HV electric shock hazard for 1<sup>st</sup> responders
- √ High reliability
- √ High system availability
- √ No PV system single point failure
- ✓ Fewer system components to install and maintain results in high MTBF
- √ Best-in-class Longevity

### **Cost-Effectiveness**

- ✓ Quad Architecture
- √ Reduced manufacturing BOM
- ✓ Reduced Balance of System (cabling, grounding, junction boxes etc)
- √ Reduced manufacturing cost
- √ Reduced installation cost
- √ Maintenance-free
- ✓ Lowest cycle-life-cost
- ✓ Outlier on Performance-Cost Curve

Highest Performance, Safe and Most Reliable, Lowest weight, Volume and Cost.





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