



## Aris Energy Solutions

- Master Distributor role for SolidPower BlueGen Fuel Cell
- Management team combined experience includes 30+ years fuel cell experience and 100+ years in the energy industry.



## Aris Wind

- Remote Power Unit (RPU) product for off-grid street lighting and "Smart Cities" telecom apps
- 100+ RPU's in operation among about 25 clients



## DGC Capital Contracting

- Established mid size construction firm serving big retailers for 30+ years
- Co-Founded Aris Renewable Energy in 2013
- Shares Mt. Vernon NY offices and warehouse, business support, with Aris



## Introducing the BlueGen Fuel Cell for

- Resiliency
- Decarbonization      50% Reduction on Natural Gas NOW  
Further Reduction via H2NG Blend  
Zero Carbon on Green H2 and RNG
- User Economics      Spark Gap, Demand Charges  
CHP  
Gov't/Utility Incentives
- Modular and Scalable      Across multiple market segments  
Initially targetting 1-10kW markets



**“Resilient Carbon Cutter Today; Stepping Stone to Carbon Neutrality Tomorrow”**

# BlueGen History: Mature/Growing in Europe, Launching in US



## BlueGen European History:

- 1,600 mCHP BlueGen systems deployed
- 30 Million operating hours
- 10 year stack durability and O/M contracts
- Ongoing growth in the European “PACE” program (100’s of new units per year with substantial cost reduction over volume)

## BlueGen United States Launch:

- Aris Energy is integrator/master distributor of SolidPower fuel cells
- Early US users include progressive utilities, commercial and research end users
- Electric and Gas Utility Partnerships in development, starting with National Grid mCHP pilot, plus \$2.7 MM DoE Grant with NASA, NETL, WVU for resiliency demonstration
- Significant interest from electric and gas utilities motivated by either resiliency or grid demands
- End users motivated by spark gap, demand charge reductions, and resiliency

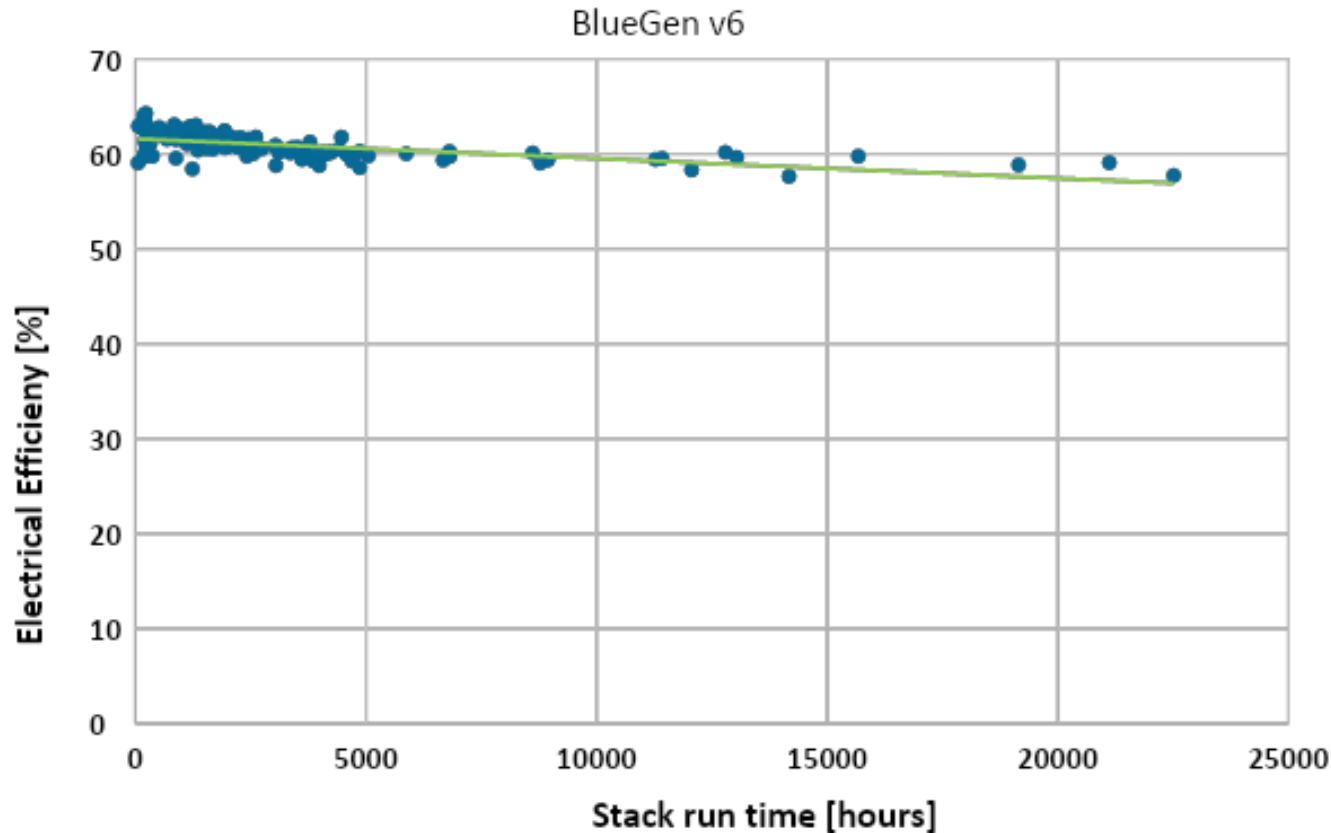
## Advantages

- High Efficiency - 57% electric, up to 90% total CHP efficiency
- Reduce carbon emissions today (~50%)
- “Hydrogen Ready” to step to zero emissions tomorrow
- **RESILIENT** – if grid goes down, fuel cell stays up
- Hi availability ~99% capacity factor
- Highly distributed, dispatchable behind the meter solution helps utility grid
- Can turn down production and load follow



*The BG-15 provides multiples of 1.5 kW of dependable, resilient power, plus by-product heat*

High efficiency , constant kW output, minimal degradation over time sets the foundation for performance and economics



This graph shows the consistency and resiliency of this fuel cell, which is one of its key advantages.

### TECHNICAL DATA

<b>Application</b>	Electrical power generator with heat recovery for commercial businesses, public buildings and private homes
<b>Use</b>	Large residential and commercial buildings
<b>Operation Mode</b>	Year-round (approx. 8,700 hours)
<b>Fuel Type</b>	Natural gas (biogas methane)
<b>Fuel cell technology</b>	Solid oxide fuel cell (SOFC)
<b>Fuel consumption<sup>1)</sup></b>	Approx. 2.7 kW (9.2 MBH)
<b>Power output</b>	Max. 1.5kW, min. 0.5 kW
<b>Electrical efficiency<sup>2)</sup></b>	Up to 57%
<b>Thermal output<sup>2)</sup></b>	Up to 0.85 kW
<b>Heat recovery</b>	Exhaust gas heat exchanger
<b>Overall efficiency<sup>2)</sup></b>	Up to 90%
<b>Electrical energy generated/year</b>	Up to 13,000 kWh
<b>Thermal energy generated/year</b>	Up to 7,395 kWh
<b>Operation</b>	Fully automated start/stop
<b>Carbon emissions</b>	0.5 pounds/kw-hr, 0.75 pounds per hour per unit
<b>Control</b>	24Hr remote monitoring by manufacturer, Internet/smartphone app control
<b>Weight</b>	551 lb
<b>Height x width x length</b>	47.25" x 21.75" x 31.5"
<b>Decibels</b>	< 47 db (A)
<b>Service interval<sup>3)</sup></b>	12 months
<b>Full maintenance service</b>	Yes (120 months)

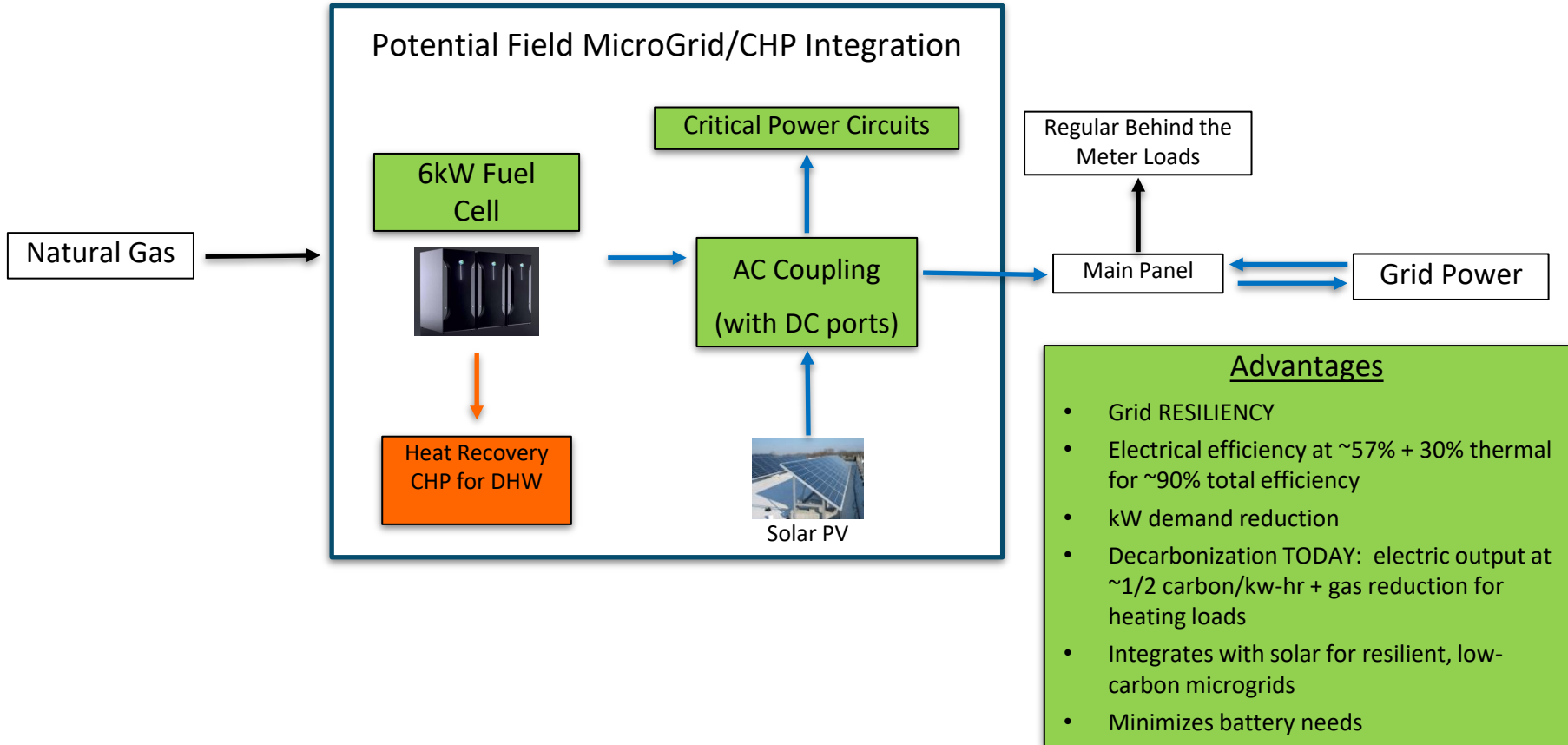


## Applications

- Single Family Residential
- Multi-Family Residential
- Small/Med Commercial
- Municipal/Institutional
- Data Centers/Critical Power

*Europe's broad deployment program ("PACE") installing 1000's of units in residential and small commercial sites, enabling volume based cost reduction*

# Resilient 6kW Fuel Cell System with CHP

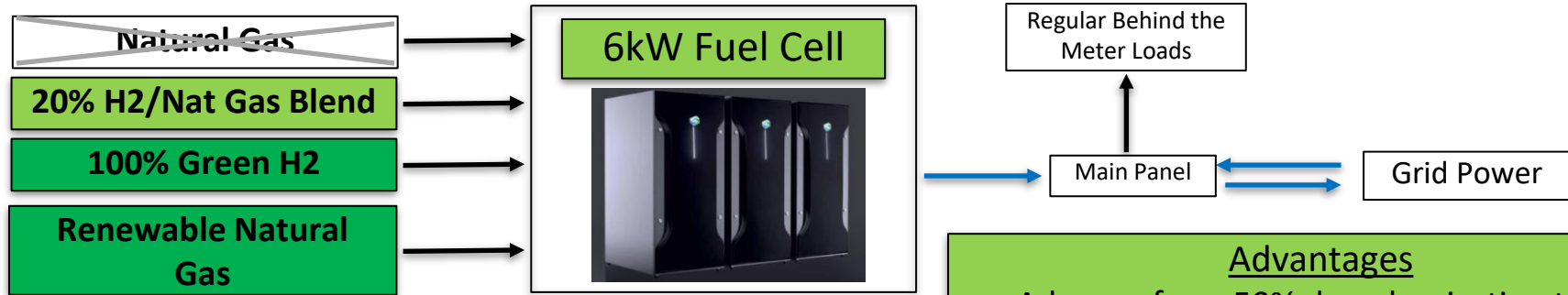




# Carbon Neutral 6kW Fuel Cell System



Start with 20% H<sub>2</sub>/NG Blend Demo's,  
Finish with 100% Green Hydrogen and Renewable Natural Gas Field Demo's



## Advantages

- Advance from 50% decarbonization today to proven carbon neutral systems  
Distributed power at high electrical efficiency and optional heat recovery for greater overall efficiency
- kW demand reduction
- Optional Resiliency feature (Proposal 1 work)

# Summary of Core BlueGen Attributes (1)



- **High electrical efficiency** (55-60% efficient net AC power )
- **Opportunity for CHP** at up to 25-30% thermal efficiency, providing up to 85% total efficiency
- **Resiliency** - When the grid goes down, the fuel cell stays up
- **Clean “Low carbon solution”** - ~50% reduction in GHG’s TODAY vs typical grid’s central plant with T&D losses
- **“Hydrogen Ready”** successfully tested with 20%+ H<sub>2</sub>/natural gas blend to further reduce GHG’s/kw-hr (-64%)
- **A ZERO CARBON FUTURE** - Operation on either “green hydrogen” (when available) or “renewable natural gas” (RNG) planned

# Summary of Core BlueGen Attributes (2)



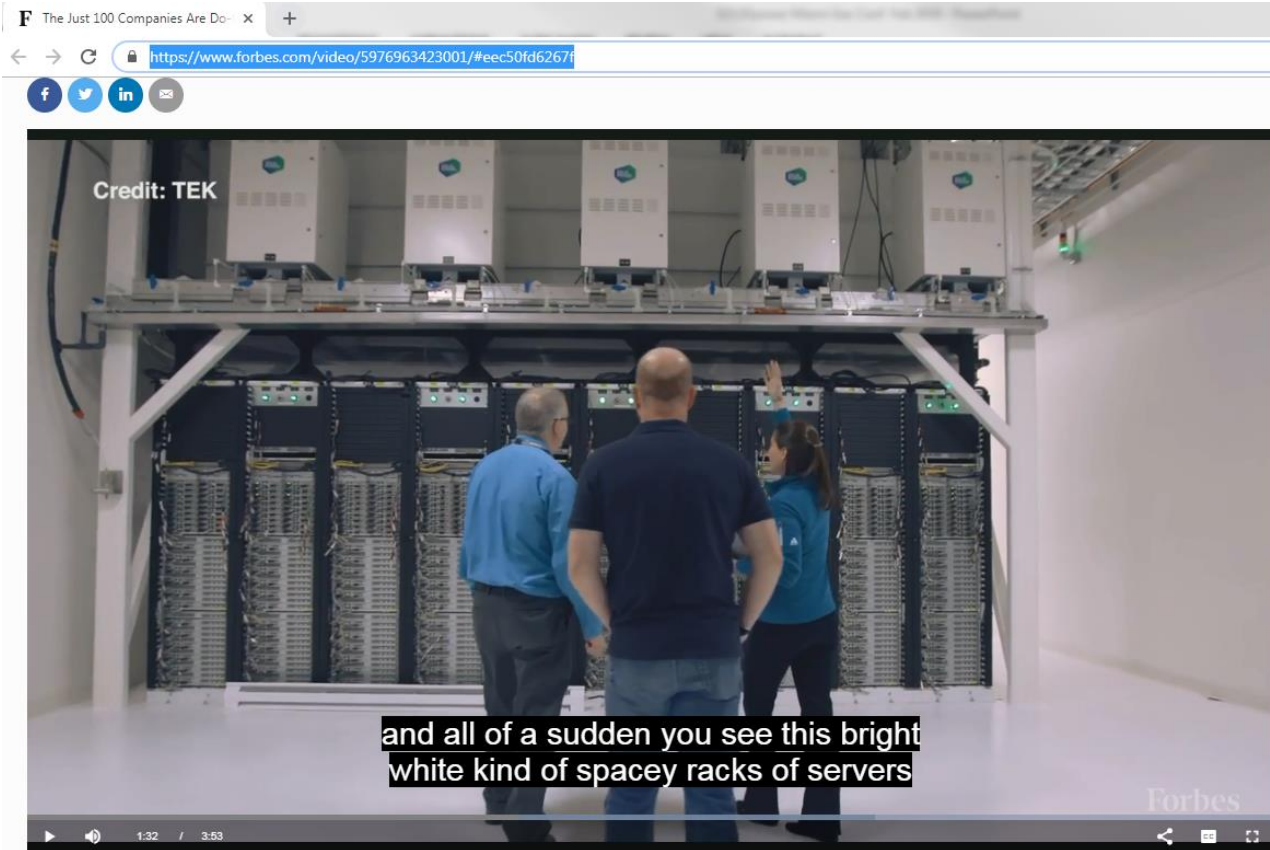
- **Reliable** - 99%+ uptime as demonstrated in over 1600 installations, 30 million operating hours in Europe
- **Flexible** - Can toggle off grid and load follow, even for many IT/datacenter type applications
- **Modular/Scalable** - addresses many different customer applications, providing these advantages to thousands of users in the smaller 1-10kw range.
- **Well matched for Microgrids** - size and function make the BlueGen a good match to be integrated with other systems, particularly microgrids and nanogrids.
- **Grid friendly** - the BlueGen's ability to provide highly distributed generation with steady power (unlike solar/wind) provides significant advantages for the utility, particularly in congested networks such as the BQDM.

# BlueGen – some history in critical power with Microsoft's “Stark Data Center” pilot



## Microsoft fuel cell story

- Chose fuel cells as key data center energy solution
- After ~4 years vetting, Microsoft selected SOLIDpower fuel cell technology
- Commercial partner motivated by decreased cost from increased demand/volume from other sectors

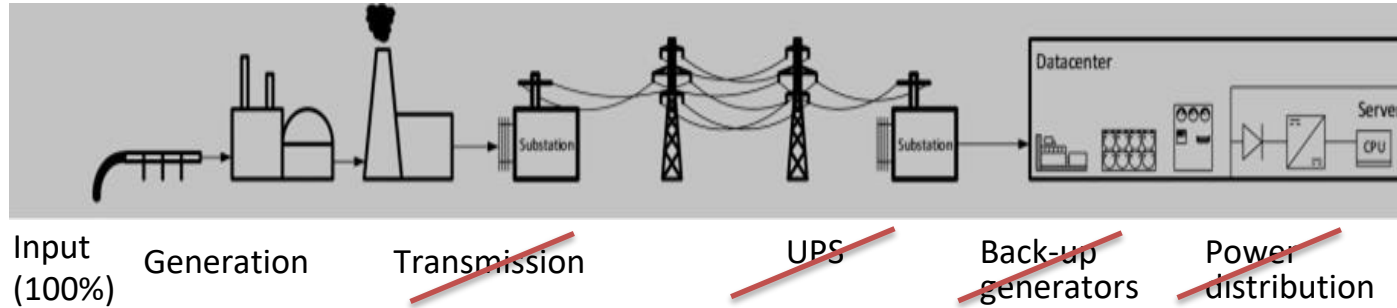


- See profile on Forbes at <https://www.linkedin.com/feed/update/urn:li:activity:6480882589212168192>
- And Microsoft video at <https://www.youtube.com/watch?v=8eLdL0CGeek>

# BlueGen – some history in critical power with Microsoft’s “Stark Data Center” pilot

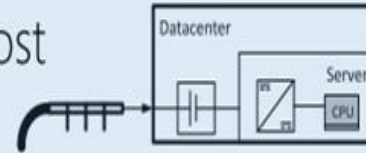


## A new data centre architecture: Distributed generation inside the Data Center



Efficiency to data center  
(≈18%)

Less Infrastructure + Less Complexity = Reduced Cost & Risk



Efficiency to data center  
(≈60%)