



The REbus™ DC Microgrid: the power of 380VDC (or “Cost Effective Power Electronics”)



Joshua Kaufman
(207) 939-4839

joshua@pika-energy.com



Requirements of new RE electrical architecture

- Low cost electronics
- High efficiency conversions & transmission
- High reliability
 - Nothing too fancy (e.g. grid-tie inverters) at the tower top
 - No wireless comms at tower top
- Safety
 - Ground fault detection
 - Extremely high potentials
- Cheap solar -> easily integrate with PV
- Integration with storage (e.g. batteries, utility grid)
- Advanced sensing & control -> advanced comms
- (Nice to have) Integration with DC loads

Cost effective power electronics for low volume production

- Voltage/Current ratio ~ 10
- Highly integrated b/c large fixed cost to PCBs
- As much SMT as possible
- Tap into high-volume industries (e.g. PV components)
- Thermal management and enclosures are disproportionate fraction of cost

But the hardware is often not the most expensive part...

- Short development time
- Easy installation – plug and play configuration
- Don't take shortcuts – cost effectiveness has to include warranty costs!

Features of REbus

REbus™ Features	Advantages
380VDC differential bus (+/-190VDC)	High-efficiency distribution/conversion
Resistive center ground	Improved safety, fault detection, rapid shutdown
Multi-step bus voltage signaling	Automated load management
Integrated PLC communication	Monitoring, control, remote update
Plug-and-Play connectivity	Flexible system integration
Bi-directional converters	Easily integrate storage, grid
Growing product family, software control libraries	Faster time to market, design flexibility

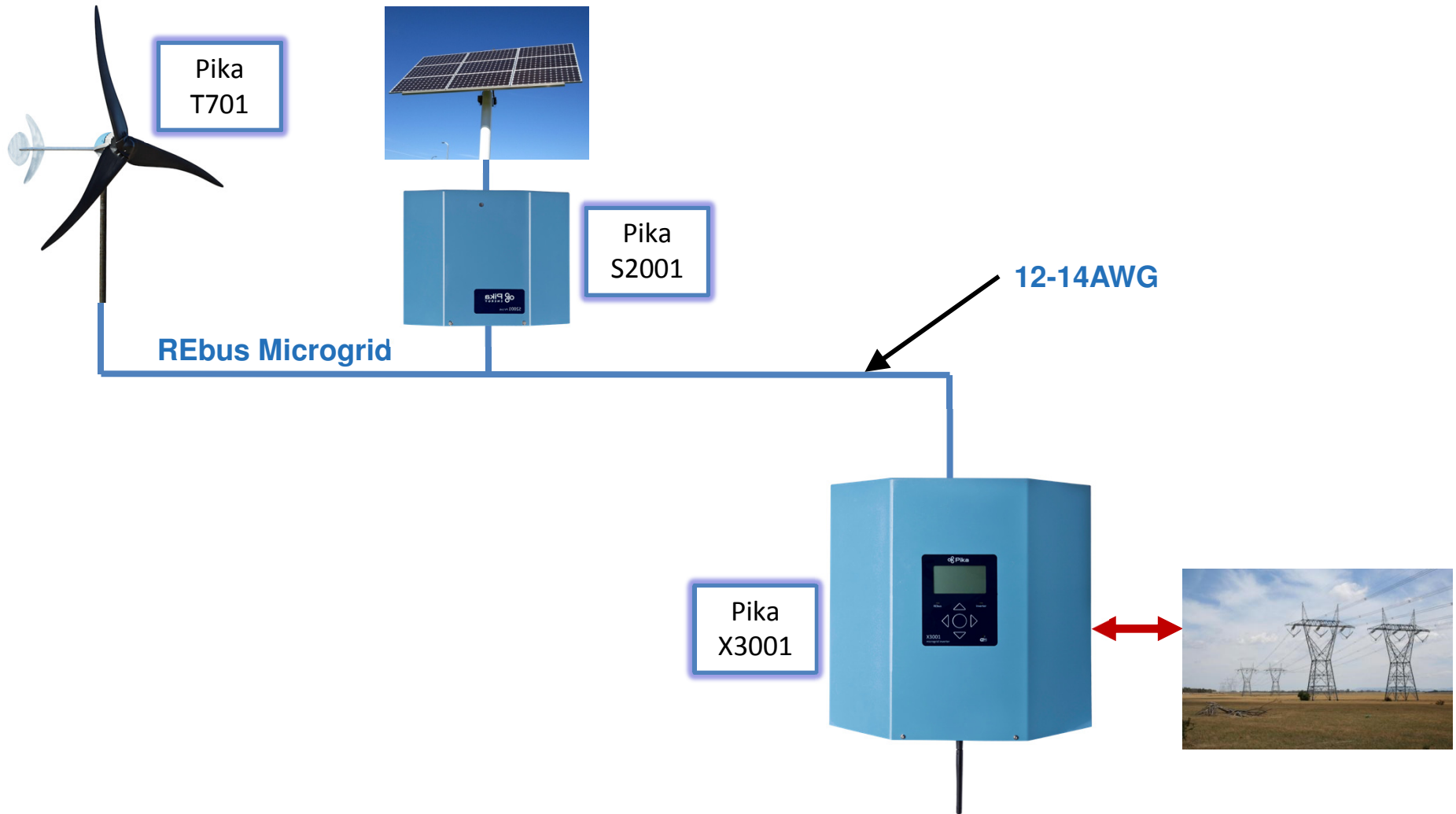
Specific advantages

- Efficient, inexpensive DC/DC conversion with 600V transistors and 450V caps
- High transmission efficiency (1/4 mile with 12 AWG wire)
- Very reliable, inexpensive communications with no extra wiring
- Safe – no ground current
- Easy integration with multiple turbines, solar, storage, even DC loads

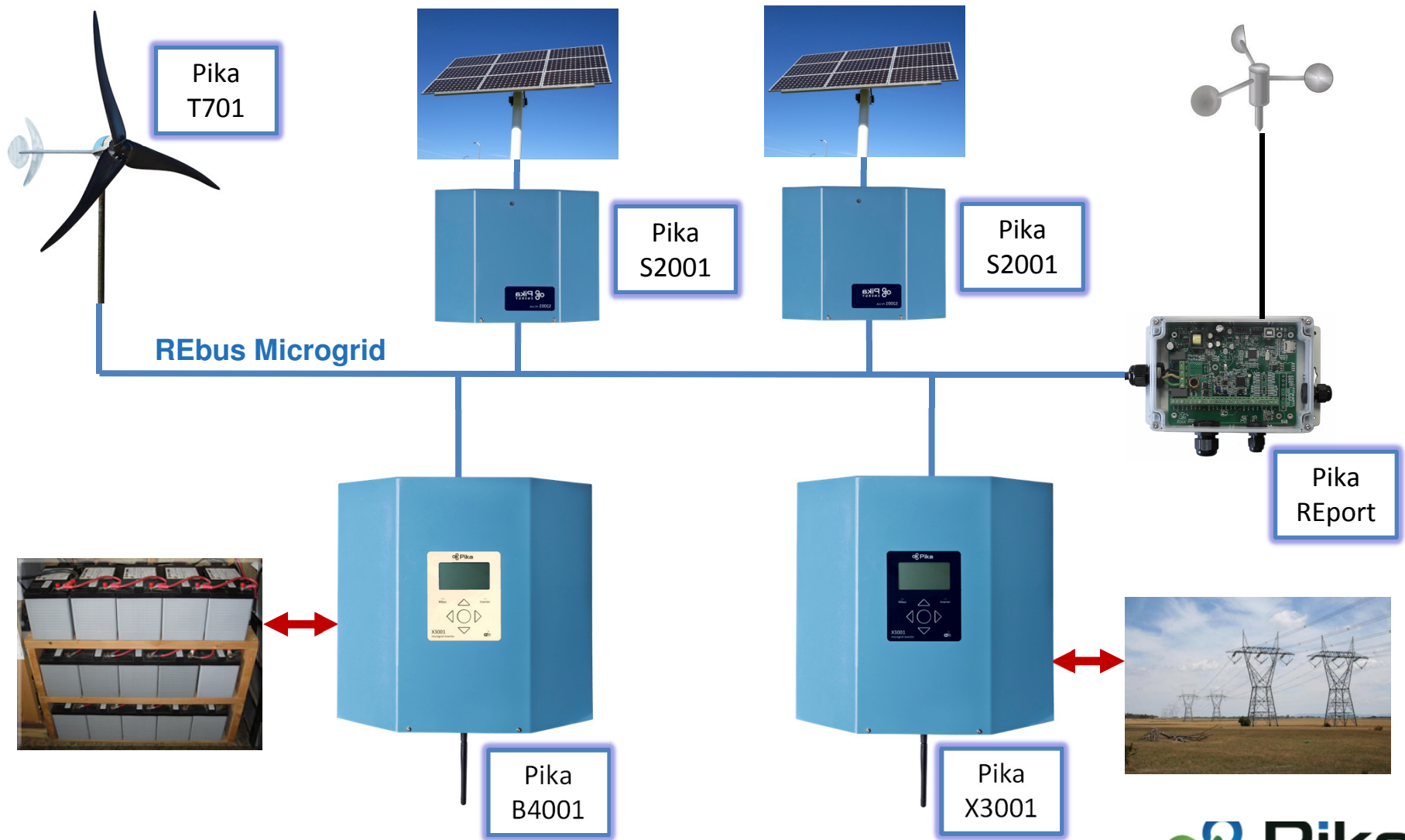
Other advantages

- Modularity - ability to same equipment on different systems
- Reduced part numbers / inventory for us and installers
- Reduced new product development barriers
- Reduced certification barriers
- Growing community of 380VDC components and opportunities




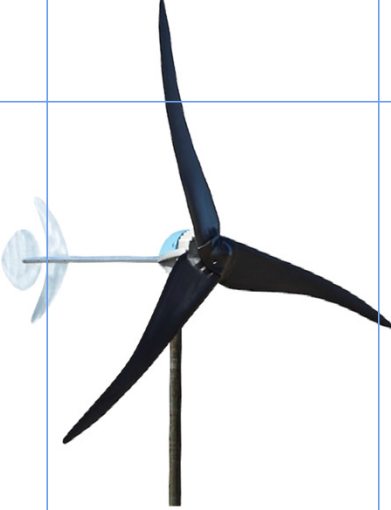

Basic wind-solar hybrid



Imagine the possibilities



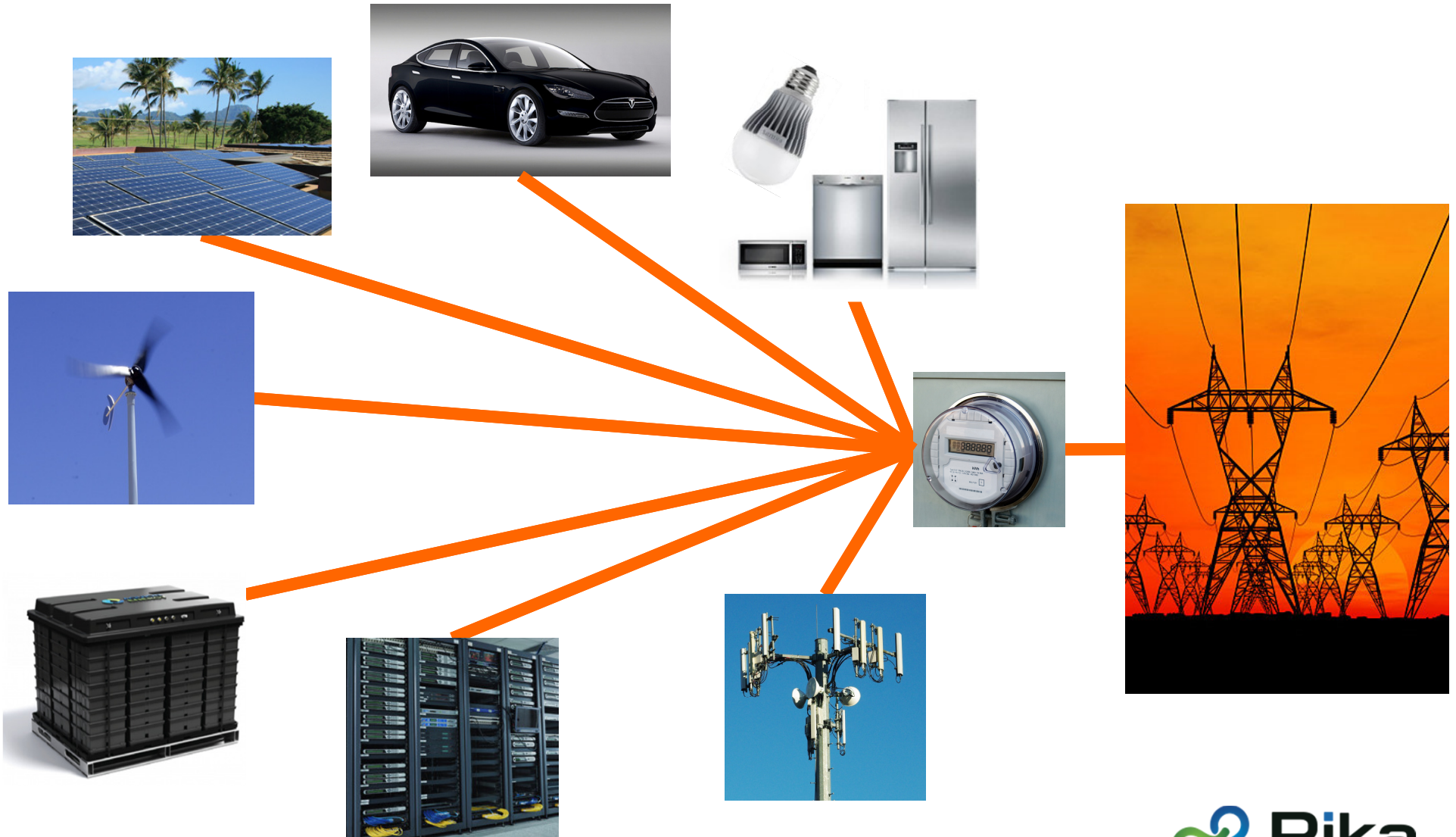
REbus products 2014

3kW bi-directional grid-tie inverter	80A bi- directional charge controller	PV Link 2kW 380VDC MPPT	1.7kW 380VDC wind turbine	380VDC Data logger/ weather station
				

NEW in 2015:

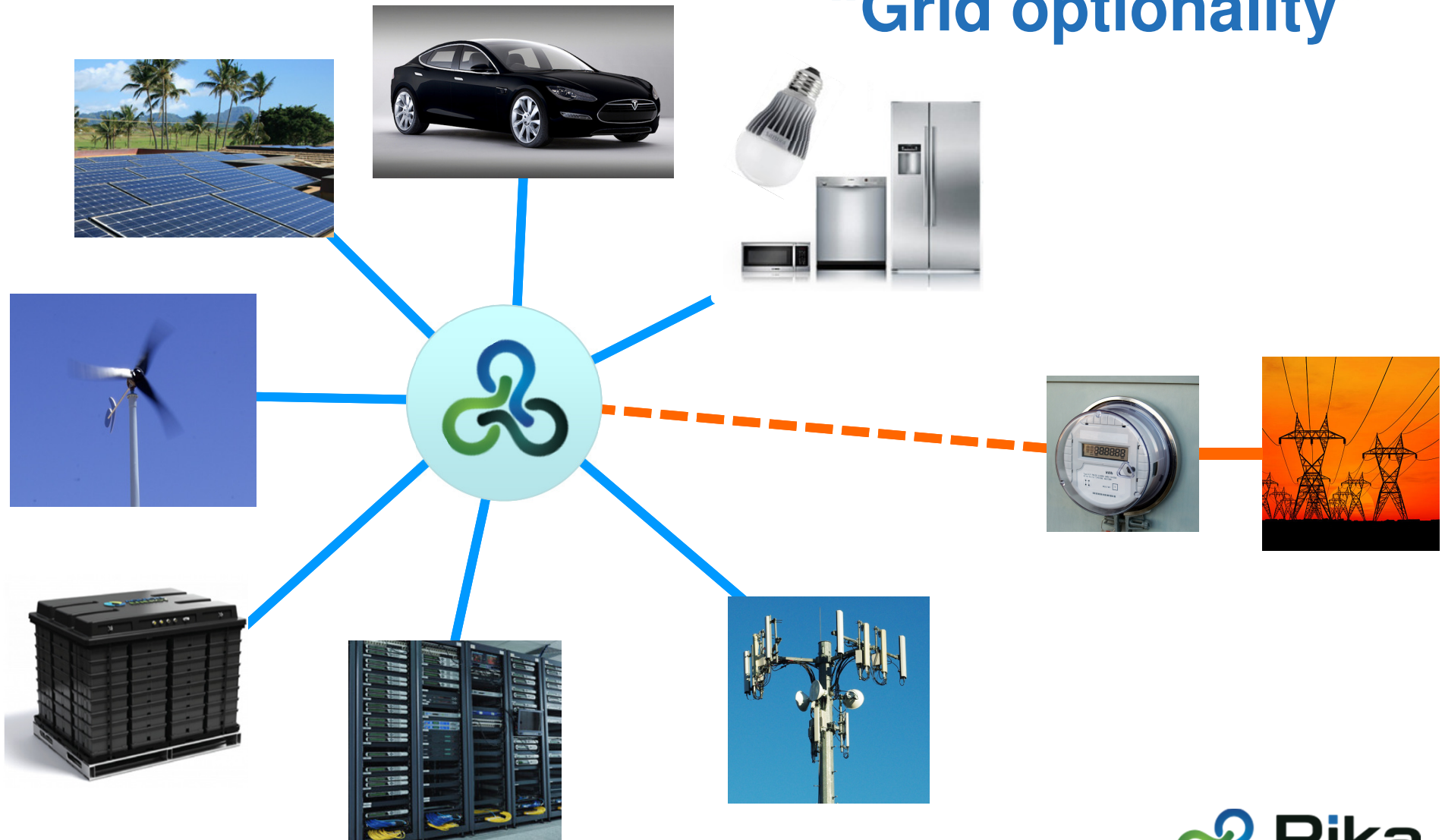
- High-efficiency LED lighting controller
- Higher power everything

Dominated by the Grid



Microgrids: savings and security

“Grid optionality”



Pika Energy

