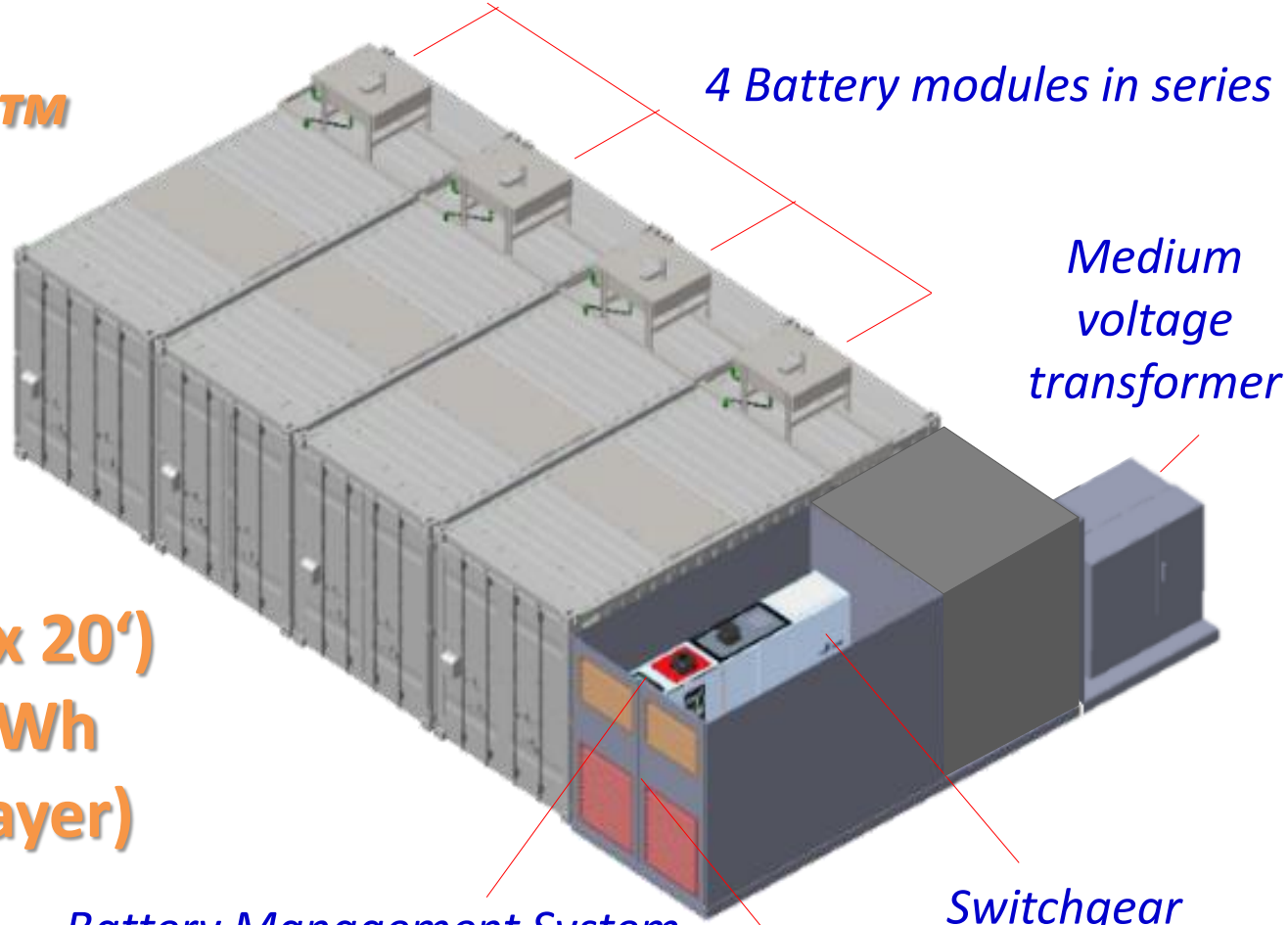
THE ONLY MEGAWATT-SCALE

CONTAINERIZED FLOW BATTERY

NW Power and Conservation Council - October 11, 2016

First-of-its-Kind Containerization

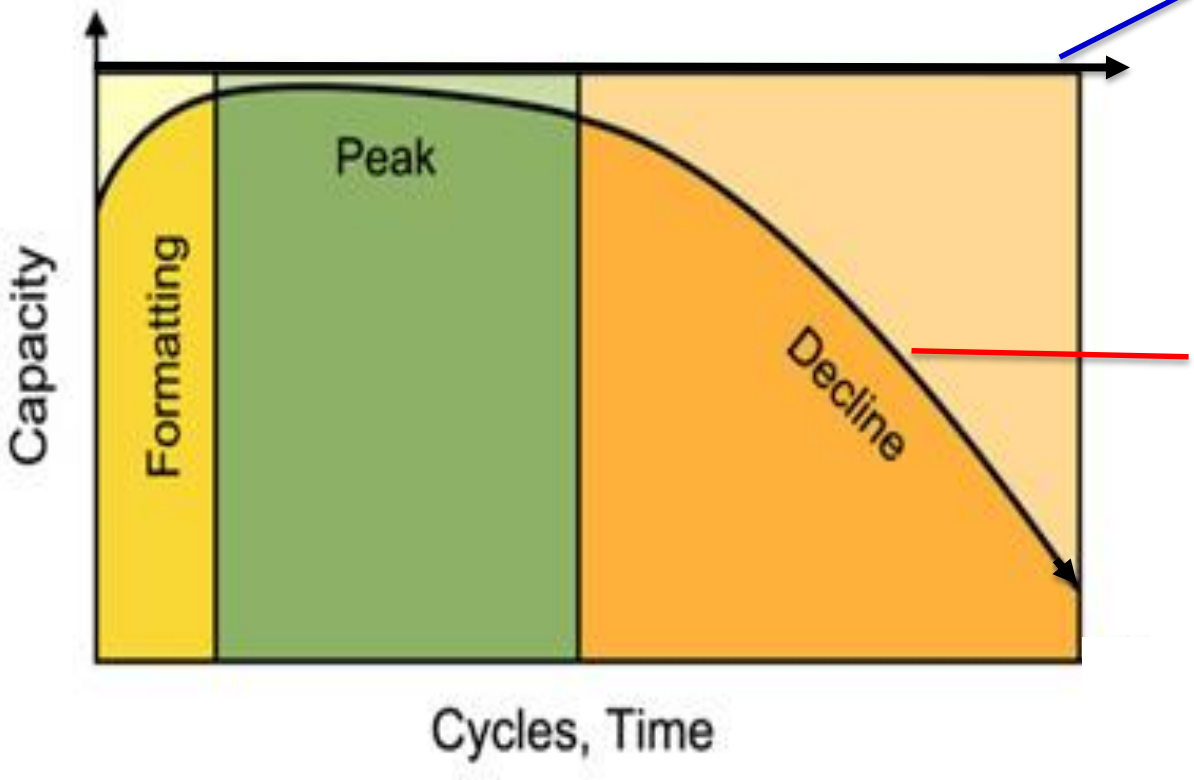
Uni.System™



Only 820 sq ft (41’ x 20‘)
For 1/2MW / 2MWh
(single container layer)

No Degradation Unlike Solid Batteries

such as lithium and lead acid



UET Advanced Vanadium Flow Battery

20+ Years Life

Solid Batteries (lithium, lead acid, others)

UET Power and Energy Ratings Do Not Degrade

Non-Flammable Unlike Solid Batteries

such as lithium and lead acid

UET Advanced Vanadium Flow Battery

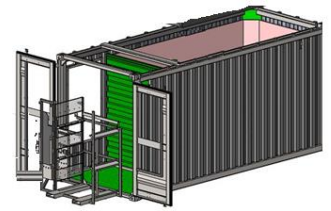
Solid Battery Example: Lithium cobalt oxide

*** Hazardous Materials Identification System (HMIS) ratings**

UET Systems Have Zero Flammability

Recyclable Unlike Lithium Batteries

>30% UET capital cost is reusable vanadium

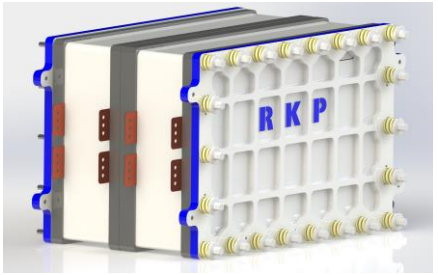


<u>Vanadium Electrolyte</u> (no decay)
(2 options)

1. 100% reusable for future UET systems
2. 100% usable for other purposes

<u>Container & Balance of Plant</u>

- ISO Container
- Metal Skid
- Pumps
- Air Handler
- Electronics



<u>Stack</u>

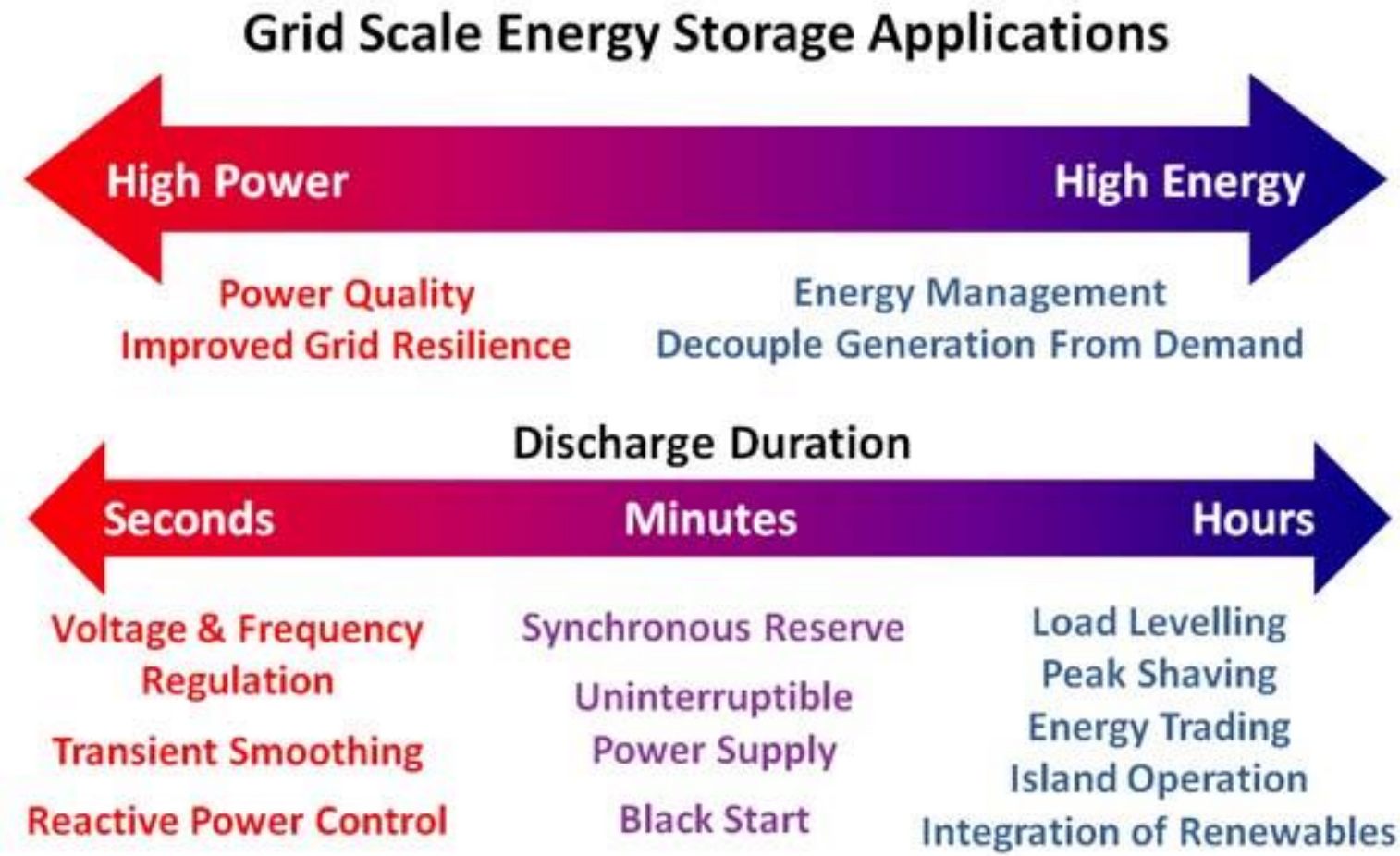
- Steel & Cooper
- Plastics
- Carbon

<u>Plastics</u>

- Tanks
- Piping
- Other

UET Systems >95% Recyclable

Full Range of Power & Energy Applications



UET's Systems Provide All of the Above

Total Cost of Ownership (TCO)

$$\frac{\text{CAPEX + OPEX (time value)}}{\text{ENERGY DISCHARGED BACK}}$$

= $.__ / kWh

Over Life Required by Customer!

Total Cost of Ownership (TCO)

DENOMINATOR OF "ENERGY DISCHARGED BACK" accounts for

1) NUMBER OF CYCLES (LIFE)
2) USABLE ENERGY
3) EFFICIENCY (ALL IN!)
4) UP TIME
5) DEGRADATION

UET Deployment Schedule Through Q1 2017

- *5 MW / 20 MWh in total*

1) Harbour Pointe Energy Storage Project (near Seattle, WA) May 2014 COD

   - 500kW/2MWh Uni.System™, demonstrating fully commercialized system with >300MWh discharged to Snohomish PUD grid and providing voltage support to distribution circuit

2) Bosch/BWP Braderup-Tinningstedt Citizens Wind Park (Braderup, Germany) Sept 2014 COD

   - 250kW/1MWh, exceeding performance requirements (tested over 1.25MWh) and buffering intermittency of wind generation, shifting energy, and providing park power & voltage support

3) Avista Energy Storage Project (Pullman, WA) April 2015 COD

   - 1MW/4MWh Uni.System, the largest capacity containerized flow battery in the world, grid-connected supporting distribution circuit and also customer-side islanding, black start, and seamless switching protecting Schweitzer Engineering Lab electronics manufacturing

4) Terna Energy Storage Project (Italy) Q4 2016 COD

   - 500kW/2MWh Uni.System™, part of phase 1 of "Storage Lab" program leading to phase 2 procurement of 24MW to provide solar integration, voltage support, and other utility applications

(continued)

UET Deployment Schedule Through Q1 2017

- *5 MW / 20 MWh in total*

(continued)

5) Snohomish PUD Energy Storage Project (Everett, WA) Q4 2016 COD

- 2MW/8MWh Uni.System at Everett Substation, providing balancing of wind procured as part of fossil-free policy in conjunction with hydro, supporting distribution circuit, and preparing for growth of rooftop solar & EV charging

6) City of New York Department of Citywide Administrative Services (NY, NY) Q4 2016 COD

- 100kW/400kWh ReFlex™ system at Bronx hospital, providing peak-shaving, energy savings, and back-up power

7) Electricity Power Board (EPB) of Chattanooga (TN) Q4 2016 COD

- 100kW/500kWh ReFlex™ system, part of US DOE Grid Modernization program (GMLC) program, including operational and control optimization and value analysis

8) Mission Produce (Oxnard, CA) Q1 2017 COD

- 500kW/2MWh Uni.System at packing & ripening center, providing peak-shaving, energy savings, and back-up power without diesel generators, integrating 1MW solar array

9) More coming ….

Current Portfolio of Systems Deployed / Ordered / Awarded

Site#	Year	Projects	Applications	Power	Energy
1	2008	China Electric Power Res. Inst.	Distributed energy storage	100kW	200kWh
2	2008	Tibet Electric Energy Res. Inst.	PV integration	5kW	50kWh
3	2009	Green Residential House	Off grid storage	3.5kW	50kWh
4	2010	Green Office Building	Off grid storage	60kW	300kWh
5	2010	EV Charging Station	Peaking capacity, power quality	60kW	600kWh
6	2010	Telecom Station	Remote Area Power Supply	3.5kW	54kWh
7	2011	Island Keeper House	Off grid storage	10kW	200kWh
8	2011	Telecom Station	Remote Area Power Supply	3.5kW	48kWh
9	2011	Ningxia Electric Power Group	Off grid storage	3.5kW	14kWh
10	2012	Wind Turbine Supplier	Smart microgrid storage	200kW	800kWh
11	2013	Wind Farm near Shenyang	Wind smoothing	5MW	10MWh
12	2013	Wind Farm in Liaoning province	Wind smoothing	3MW	6MWh
13	2014	Wind Farm in Liaoning province	Wind smoothing	2MW	4MWh
14	2014	Wind Farm, Germany	Wind smoothing	250kW	1MWh
15	2014	Voltage Stability; 3rd party test, WA	Volt Stability; 3rd party test	0.5MW	2MWh
16	2015	Utility Substation, Washington	Grid Flex; microgrid	1MW	4MWh
17	4Q16*	Terna Utility Site, Sicily, Italy	Various energy & power apps	0.5MW	2MWh
18	4Q16*	Utility Substation, Washington	Grid Flex; efficiency; microgrid	2MW	8MWh
19	4Q16*	Hospital Compound, NYCAS	Demand reduction; resiliency	100kW	400kWh
20	4Q16*	Utility Solar Microgrid, Tennessee	Demand reduction; stability; microgrid	100 kW	500 kWh
21	1Q17*	Industrial Facility Microgrid, CA	Demand reduction; solar; microgrid	0.5MW	2MWh
22	2017**	Military Solar Microgrid, California	Solar integration; energy security	4.5MW	18MWh
23	2017-2018**	IPP Solar+Storage Facility, Europe	Solar integration; regulation services	10MW	40MWh
24	2017-2018**	Utility Solar+Storage, Microgrids, Islands, Washington State	Solar integration; demand reduction; resiliency; transmission deferral	2.1MW	8.4MWh
			TOTAL:	**32.1MW**	**109MWh**

***By Group*: UET, Rongke & Vanadis**

plus Rongke's 200MW/800MWh Dalian project

* Ordered/under construction
** Awarded

THE UET DIFFERENCE:
Only Megawatt-Scale, Containerized Flow Battery

1MW/4MWh

Harbour Pointe Distribution Circuit

Mukilteo, WA (near Seattle)

UET's advanced vanadium flow batteries operating at MW-scale for 2.5 years with >750MWh discharged