

REMM™ Expeditionary Power Operational Energy System Solution

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JOINT SERVICE POWER EXPO – MAY 2011

REMM™ Expeditionary Power

Mobile & Renewable Operational Energy

Presentation Outline

- DoD “Capability Gap” Challenge
- REMM™ System Inspiration
 - HEMTT A3 Heavy Tactical Vehicle
 - 100 kW Export Power
 - C130 / C17 Aircraft Compatible
 - Enhanced Load Handling System (ELHS)
 - Folding Blade Wind Turbine Innovation
- REMM™ Expeditionary Power Module
 - Design Configuration
 - Specifications / System Performance
 - Product Attributes / Discriminators
- Operational Demonstration Opportunities



REMM™ EXPEDITIONARY POWER



CAPABILITY GAP CHALLENGE

- Power and Energy Innovation Workshop – July 2009
 - Army Requirement & Development Commands
 - TRADOC / ARCIC / RDECOM / TARDEC
 - All DoD Services represented
 - National Labs & Academia
 - Industry Experts
- Expeditionary Energy Surety “Help Needed”
 - Support and sustain operations in forward, austere locations
 - Operate with only what you carry in for an extended time period
 - Readily transported within existing military logistics infrastructure
 - Eliminate need for fossil fuel or greatly extend time for fuel resupply



REMM™ EXPEDITIONARY POWER



Diesel Electric HEMTT A3

Exports 100 kW of Mil-Spec A/C Power

- Exportable A/C Power
 - 100kW @ 480V or 240V 60Hz
 - 86kW @ 416V or 208V 50Hz
 - 86kW @ 120V 50Hz or 60Hz



Wittman Field: Simulated Disaster
Oshkosh, WI – Sept 2001



Katrina Support: Charity Hospital
New Orleans – Sept 2005

Oshkosh Co. Purchasing Office
Power Outage – June 2008



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HEMTT A3 + ELHS = Logistics Enabler Enhanced Load Handling System (ELHS)

- Transports 13-Ton Payload
 - 20' Standard or CROP style Flatrack
- Loads/Unloads 13-Ton Cargo
 - Ground ↔ Truck
 - Truck ↔ Trailer
 - C130 ↔ Truck
- HEMTT A3 is C130 / C17 Transportable



REMM™ - Folding Turbine & Mobile System Concepts

- Natural Power Concepts
 - Technology Incubator Co.
 - John Pitre: Inventor & Founder
 - Multiple Patents Pending
- Technology Licensed to Oshkosh Defense



Under license from Natural Power Concepts, LLC

Patents Pending



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Proof of Concept Folding Blade Turbine

- NPC / John Pitre Invention
 - Quarter scale working turbine
 - Initial testing in Hawaii
 - Energy production
 - Power conversion efficiency



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Power Concepts, LLC*

Patents Pending



REMM™ EXPEDITIONARY POWER



REMM™ Expeditionary Energy - Concept Video

GVSETS / AUSA 2009

HEMTT A3 & PLS Trailer Transporting REMM™ Modules



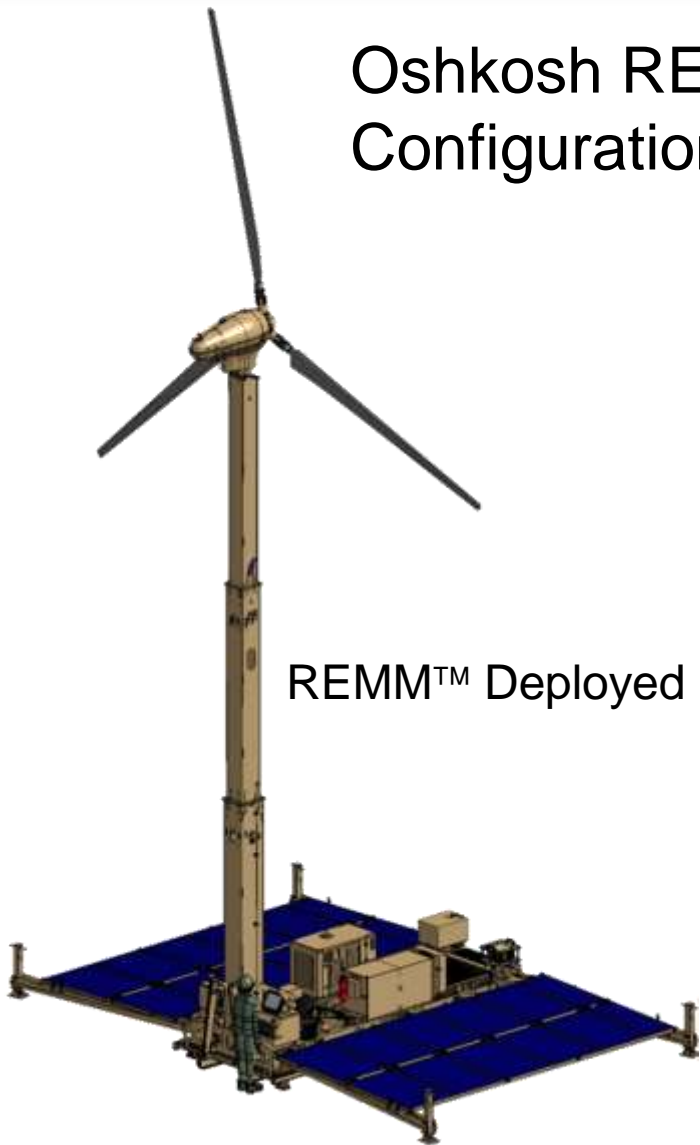
REMM™ EXPEDITIONARY POWER



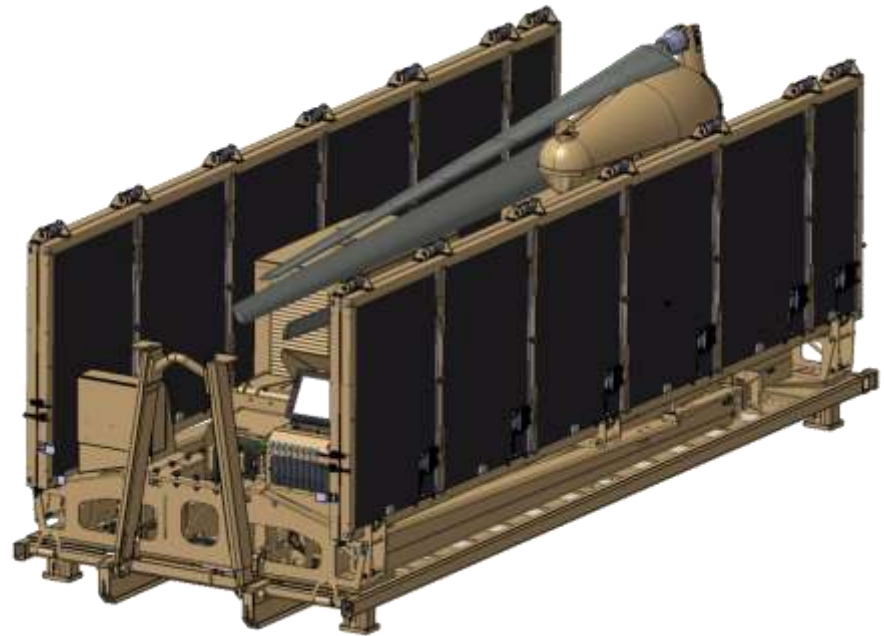
Oshkosh REMM™ Expeditionary Power Module Configuration – May 2011

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Patents Pending



REMME™ Deployed



REMME™ Stowed for Transport



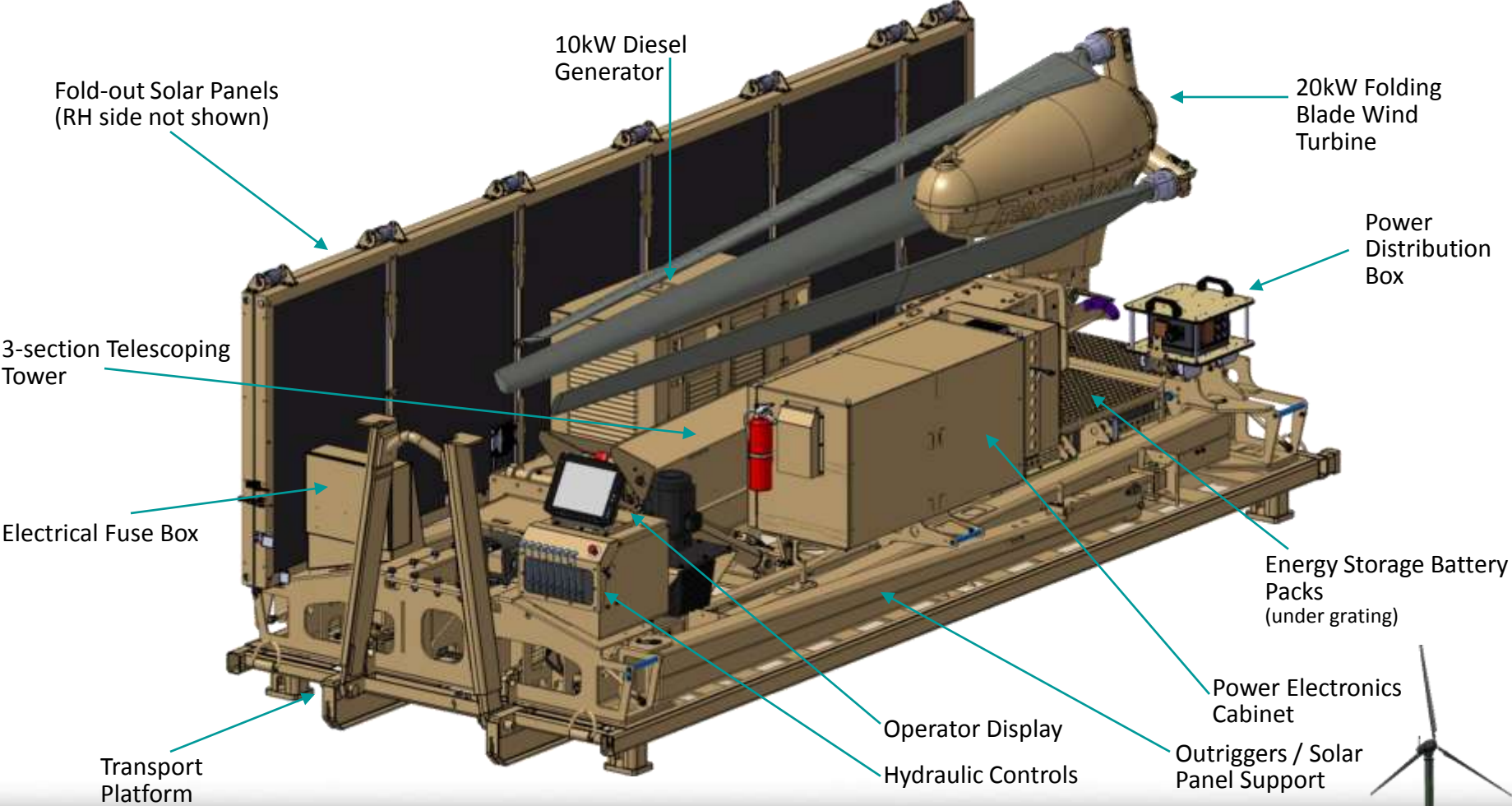
REMME™ EXPEDITIONARY POWER



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REMM™ in Transport Configuration



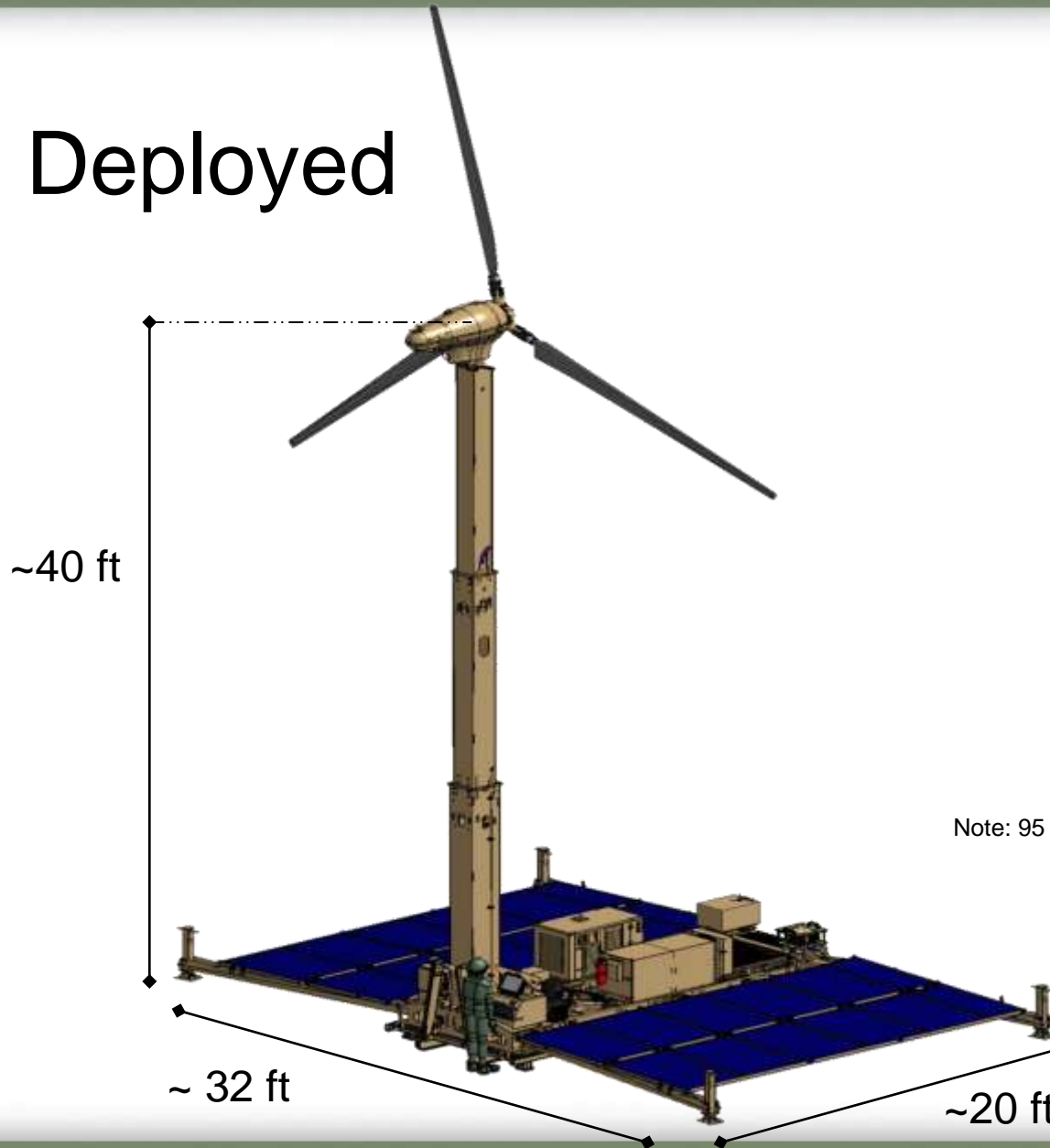
REMM™ EXPEDITIONARY POWER



REMM™ Deployed

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Note: 95 percentile soldier shown



REMM™ EXPEDITIONARY POWER

REMM™ Deployment Process

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REMM™ EXPEDITIONARY POWER

REMM™ Technical Demonstrator Specifications

- ISO container with REMM weighs \leq 13 Tons
- REMM system output rating
 - Continuous output = 10kW
 - Peak output = 20 kW
- Wind turbine energy production
 - \geq 2.0 kW @ 10 mph wind
 - \geq 5.0 kW @ 14 mph wind
 - = 20.0 kW ~ 25 mph wind
- Solar energy production
 - \geq 4.5 kW



REMM™ Technical Demonstrator Specifications (cont'd)

- Energy storage system features:
 - Two light weight Li-Ion battery packs
 - 4 hours of 10kW continuous output
- 10kW on-board backup generator
 - Needed to guarantee a 24 / 7 output system rating
 - DF2 / JP8 fueled with 24 hour fuel capacity
 - Automatically activated on demand
- Export power off-grid electrical distribution box
 - 120 V, Single-Phase A/C @ 60 Hz
 - 208 V, Three-Phase A/C @ 60 Hz



REMM™ System Attributes

- Renewable energy / transportable micro-grid solution
- For remote, austere locations / expeditionary or humanitarian missions
- 34' or 38' diameter blade sweep options
- Wind turbine designed to maximize energy conversion in low winds
- Folds for transport on 20 ft LHS transportable platform
- Slides inside a standard 8' x 8.5' x 20 ISO container
- Transports on a C-130 cargo aircraft
- Drive on/off C-17 aircraft capability on HEMTT A3 or PLS Trailer
- Operates as a stand-alone “off-grid” system
- Options for “grid-tied” REMM
- Automated, self-contained, self-managed control system
- Wireless remote system monitoring capability



REMM™ EXPEDITIONARY POWER



REMM™ Product Discriminators

- Folding blade invention enables largest transportable wind turbine
 - Size matters: Blade swept area impacts wind energy production
 - Larger wind column = Greater wind energy conversion
- Designed around existing military transport logistics
 - 13-Ton LHS equipped Tactical Wheeled Vehicles (TWV)
 - C-130 and C-17 cargo air planes
 - Standard ISO container compatible
- Rolling micro-grid solution
 - Convenient set up, takedown, and redeployment
 - Options for off-grid / grid-tied solutions
 - Standalone micro-grid or micro-grid power source
 - Fully automated control with remote monitoring capability



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Operational Demonstrations Oshkosh Defense Planning in Process



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REMM™ EXPEDITIONARY POWER MODULE