

#### Trends and Practical Applications of Energy Storage Solutions in the Military

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#### **THERESAN MILITARY- ACADEMIC FORUM 2025**

Wiener Neustadt, May 6-7, 2025



# The Plan

- · Why?
- · What?
- How?
- · Who?
- · So What?
- Building bridges for the future research



#### WHY? The Need for Energy Storage Solutions

- "Energy is the mother of all businesses and operations."
- Energy as a Strategic Enabler
- Energy Resilience and the Changing

**Operational Environment** 



#### **WHY? The Need for Energy Storage Solutions**

- Types of Energy Storage Solutions
- Focus on Operational Energy
- Current BESS Applications
- The Shift from Energy Efficiency to Resilience





#### **The Shift from Energy Efficiency to Energy Resilience**



events.

extended periods.

Energy Resilient Buildings & Communities: A Practical Guide/ Brian Levite and Alexander Rakow, The Fairmount Press, Inc., 2015.



#### WHY? The Need for Energy Storage Solutions

- Key Drivers of BESS in the Military
- Domain Specific Applications



### Domain - specific applications: Soldier-Centric Energy Needs

- Key needs
- Portable Power Requirements
- Energy Storage Advancements
- Battery Weight
- Power Management
- Integrated Battery Solutions
- Smart Battery Management
- Alternative Energy Generation



#### Small scale hybrid power generation solutions





### Domain - specific applications: Energy for Land Platforms

- Military Land Platforms
- Operational Demands
- Electrification Trends
- Hybrid Tactical Vehicles
- Stealth Benefits



Domain - specific applications: Energy for Forward Operating Bases (FOBs)

- FOB Energy Needs
- Current Supply Systems
- Small-Scale Outposts
- Fuel Efficiency with BESS
- Reduced Generator Usage
- Resilience and Security



#### Fictitious energy generation profile



An example of HPGS evaluated load and power generation profile in 24 hrs period (PFISTERER, 2015)



# Testing the solutions: Lithuania: gensets, BESS, solar, wind





**Existing and Emerging Military BESS Technologies** 

- Current Technologies
- Battery Innovation Trends
- End-of-Life Battery Management



**Existing and Emerging Military BESS Technologies** 

- Lithium-Ion Batteries
- Solid-State Batteries (SSBs)
- Flow Batteries
- Metal-Air Batteries
- Other Innovations



# **Discussion and Conclusions**

- Growing Demand
- Strategic Requirements
- Enhanced Resilience
- Policy Integration
- The role of defence capability planners



## Thank you very much! Your questions, please!

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