



INDY

Energy Independent
Energy Efficient
Deployable Military Camps



Funded by
the European Union

INDY EDF-2021 PROJECT

DUETECH-2024

5 March 2024 – Grenoble - France

ENERGY EFFICIENT MILITARY CAMPS AND OPERATIONS

Bernard THONON
CEA



Funded by the European Union | Project No.: 101103388. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them".

THE PROBLEMATIC

■ Energy Context

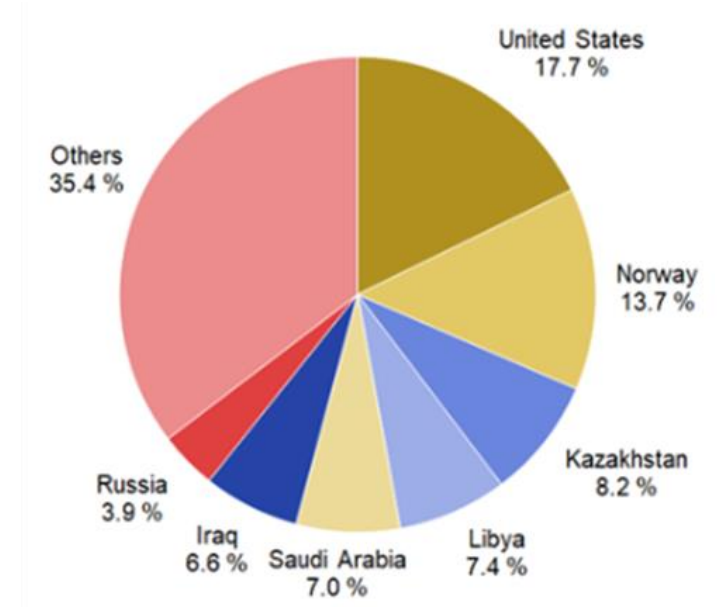
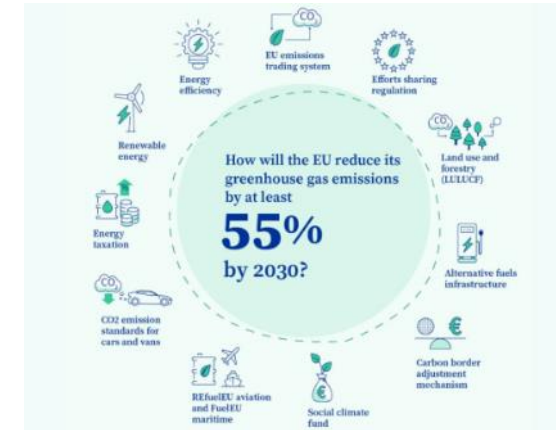
- Vulnerability of the energy supply chain and infrastructures to climate change and political instabilities
- High EU dependency on imported fossil fuel

■ EU Strategy

- Technology independency
- Global energy strategy towards Net Zero GHG emissions in 2050 (EU-Green Deal and FIT for 55)

■ Defence priorities





- Critical infrastructure protection and energy security
- Maintain the operational capacities
- An expected growing demand of energy in the future operational environment
- An integrated vision of energy including stationary and mobile systems



EU imports of petroleum oils by partner December 2023

THE OBJECTIVES

- **Energy Efficient Military Camps**
 - Reduce fossil usage and fuel logistic
 - Improve energy efficiency
 - Promote local energy production (PV, wind...)
 - Electrify the usage
- **Low CO₂ Land and Naval Transport**
 - Shift from fossil fuel to low carbon and synthetic fuels (including H₂)
 - Improve energy efficiency and new conversion technologies
 - Electrification of the propulsion
 - Flexible and multi-energy systems

OBJECTIVE	2030	2050
 FOSSIL FUEL for the camp & operations	40% reduction	100% reduction
 Energy EFFICIENCY	20% primary energy saving	30% primary energy saving
 ENERGY AUTONOMY of the camp	35%	70%
 ENERGY AUTONOMY of the operations	10%	30%
 FUEL LOGISTIC for the camp	35% reduction	70% reduction
 FUEL LOGISTIC for operations	10% reduction	30% reduction

INDY Roadmap for EEMC

What are the specific needs of the EU defence sector in term of Energy Technologies and Solutions?

EDA statement: *“the total energy consumption of Member States’ armed forces equals that of a smaller EU country”*

THE ROLE OF TECHNOLOGY IN ENERGY TRANSITION

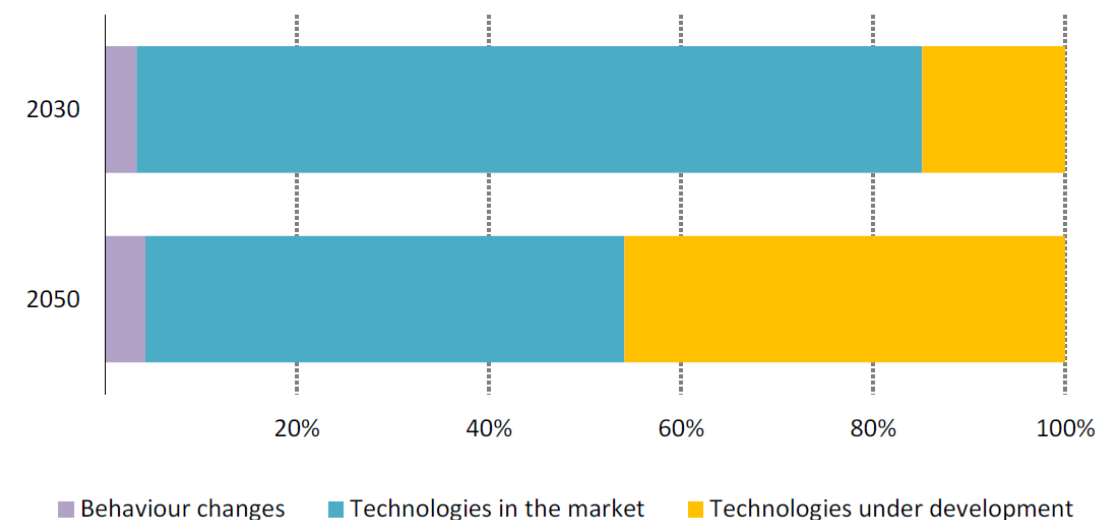
■ 2030

- 80% of the solutions are available in the market
- 15% of the solutions are under development

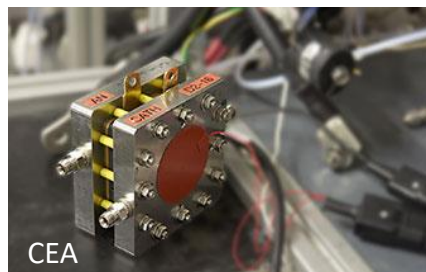
■ 2050

- 50% of the solutions are available in the market
- 45% of the solutions are under development

Annual CO₂ emissions savings in the net zero pathway, relative to 2020



Ref. IEA, "Net Zero by 2050"



TECHNOLOGIES AND INNOVATION PROCESS

- **Dual Usage Energy Technologies**
 - Civil driven energy technology innovation
 - Promote collaborations between civil and defence sector (spin-in concept)
 - Technology and knowledge transfer
 - Adapt technologies to defence requirements
 - Develop specific integration solutions

- **Demonstrate the reliability in defence environment**
 - Characterise technology performances in representative environment
 - Integrate solutions at system level and qualify in real military environment



THE DIGITALISATION OF ENERGY INFRASTRUCTURES

- **Design and evaluation of component and systems**
 - Numerical representation of the physical system
 - Hardware in the loop approach (semi virtual representation)
- **Plan and optimise operation**
 - Forecast the usage
 - Evaluate energy architecture
 - Select component and optimal control
- **Exploit and maintain in operative conditions**
 - Connection to the real system
 - Real time simulation
 - Detect defaults



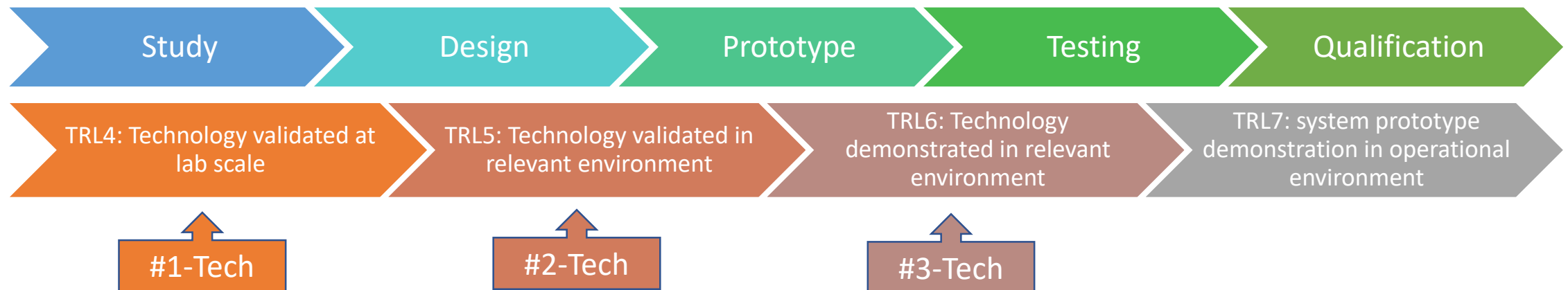
Toward an Energy Digital Twin

TECHNOLOGY DEVELOPMENT METHODOLOGY

■ Technology priority

- #1-Tech: Technologies which are market driven by military applications (Military Technologies)
- #2-Tech: Technologies which are developed for civil market and adapted to military requirements (Dual Usage Technologies)
- #3-Tech: Technologies which are developed for civil market and taken « off the shell » for military applications (Civil Technologies)

■ Technology Development and Technology Readiness Level



REFERENCES

- INDY web page: <https://www.indycamp.eu/>
- EU-JRC, “*Impacts of climate change on defence-related critical energy infrastructure*”: <https://publications.jrc.ec.europa.eu/repository/handle/JRC130884>
- EDA News, “*How is the EDA contributing to the energy transition and circular models in defence?*”: <https://eda.europa.eu/news-and-events/spotlight/spotlight-of-the-month/how-is-the-eda-contributing-to-the-energy-transition-and-circular-models-in-defence>
- EUROSTAR, “*EU imports of energy products - latest developments*”: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_imports_of_energy_products_recent_developments&oldid=554503#Main_suppliers_of_petroleum_oils.2C_natural_gas_and_coal_to_the_EU
- EU FIT for 55, <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>
- IEA, “*Net Zero by 2050*”: <https://www.iea.org/reports/net-zero-by-2050>
- CSIC, “*European Warfighting Resilience and NATO Race of Logistics*”, <https://www.csis.org/analysis/european-warfighting-resilience-and-nato-race-logistics-ensuring-europe-has-fuel-it-needs>
- NATO, “*Operational Energy Concept*”, https://www.act.nato.int/wp-content/uploads/2023/05/2023_Fact_Sheet_EiE_STJU23_Energy.pdf
- National Academy Press, “*Powering the U.S. Army of the Future*”, <https://nap.nationalacademies.org/read/26052/chapter/1>

DUETECH-2024: Technology Pitch

- 4 mn to convince
- 16 presentations





INDY

Energy Independent
Energy Efficient
Deployable Military Camps

Thank you!



Funded by
the European Union

Funded by the European Union | Project No.: 101103388. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.