SolarPACES
Solar Power & Chemical Energy Systems

MOSAICO and SFERA III PROJECTS

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◆The PROTEAS Facility Cyprus Institute (CYI)

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MINISTERIO DE CIENCIA E INNOVACIÓN
Ciemat Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

◆Platform for Research and Technological Applications in Solar Energy

- PROTEAS is located in Pentakomo, near Governor's Beach
- Area : 20,000 m^2
- Inaugurated in 2015

◆PROTEAS Mission, Vision

- PROTEAS demonstrates innovative concepts and solutions applied to Cyprus and the region
- It addresses challenges such as low renewables penetration in the energy mix, pressure on freshwater resources, and climate change
- Established as a world-class, internationally recognized facility

History

2010 — Concept of solar driven cogeneration system

2011 — Concept scoped &thoroughly researched. (Funded by the Cy Government)

2012 — Experimental system finance secured (through INTERREG + own funds)

2015 — Inauguration of PROTEAS Field Facility

2017 — Enhancement of experimental Capabilities (Horizon 2020 European Research Area (ERA) Chair

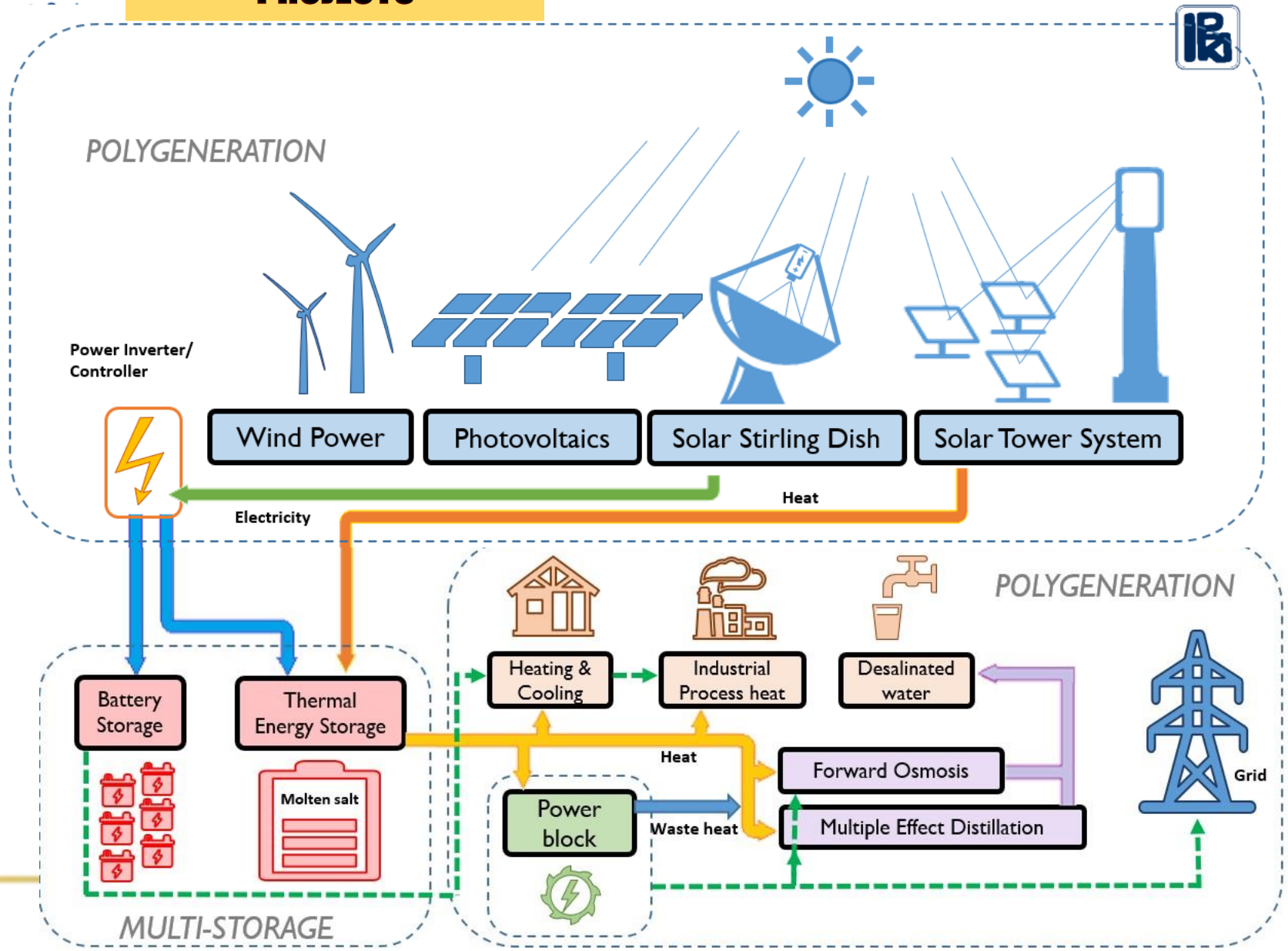
2019 — CSP-DSW Concept Demonstrated

2022 — Expansion to POLY-RES Concept

Location selection

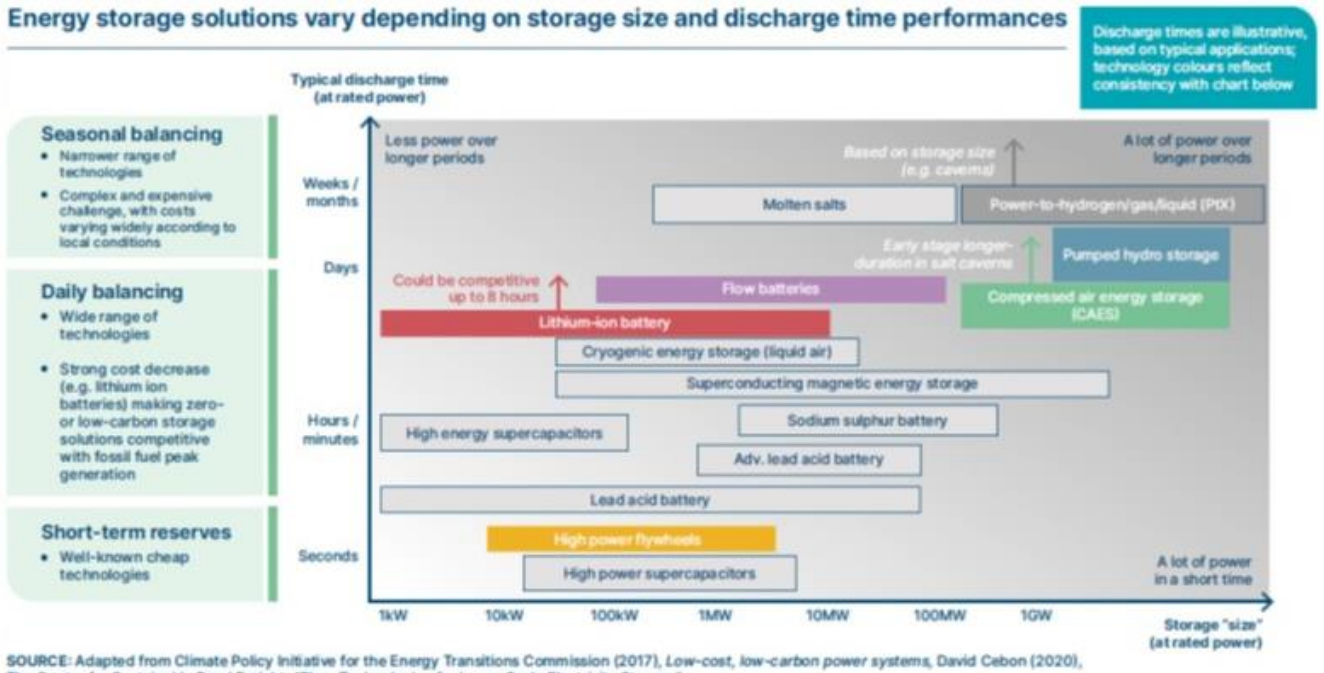
- Challenging location
- Hilly Rocky Terrain
- No electricity
- No water
- No mobile signal
- No internet

PROTEAS Concept



Main Research Areas

- **Renewable energy technologies**
- Concentrated Solar Thermal
- Energy Production Hybridization
- Modelling, Optimization
- **Energy Storage**
- Thermal and Chemical Storage
- Hybridization of Storage
- Seasonal Storage
- **Desalination**
- Renewable Desalination
- Brine Management
- Recovery of Selective valuable minerals

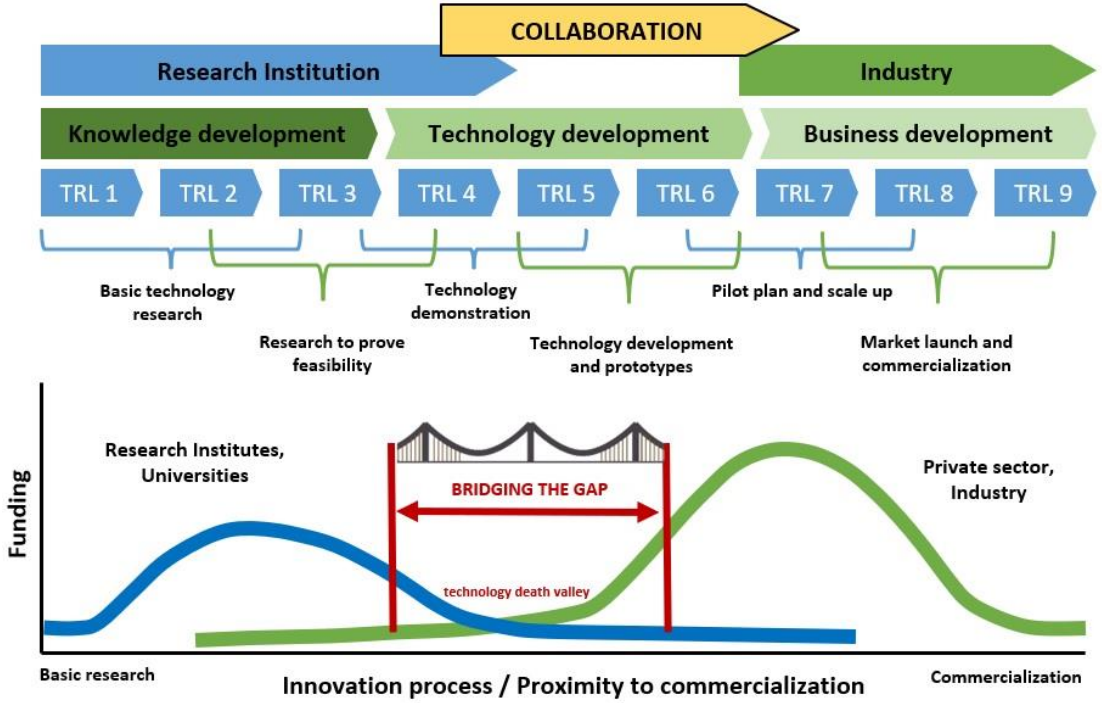


SOURCE: Adapted from Climate Policy Initiative for the Energy Transitions Commission (2017), *Low-cost, low-carbon power systems*, David Cebon (2020), The Centre for Sustainable Road Freight, "Blog: *Technologies for Large-Scale Electricity Storage*"

Innovation

Bridging the gap by:

- Collaborating with local industry for joint development of innovative concepts of systems/components relevant to our research lines and focus
- Collaborating with European and International companies for joint development of components and concepts
- Providing to relevant industry our scientific and engineering know-how through service contracts
- Providing access to our facilities to companies for component and/or system testing and validation



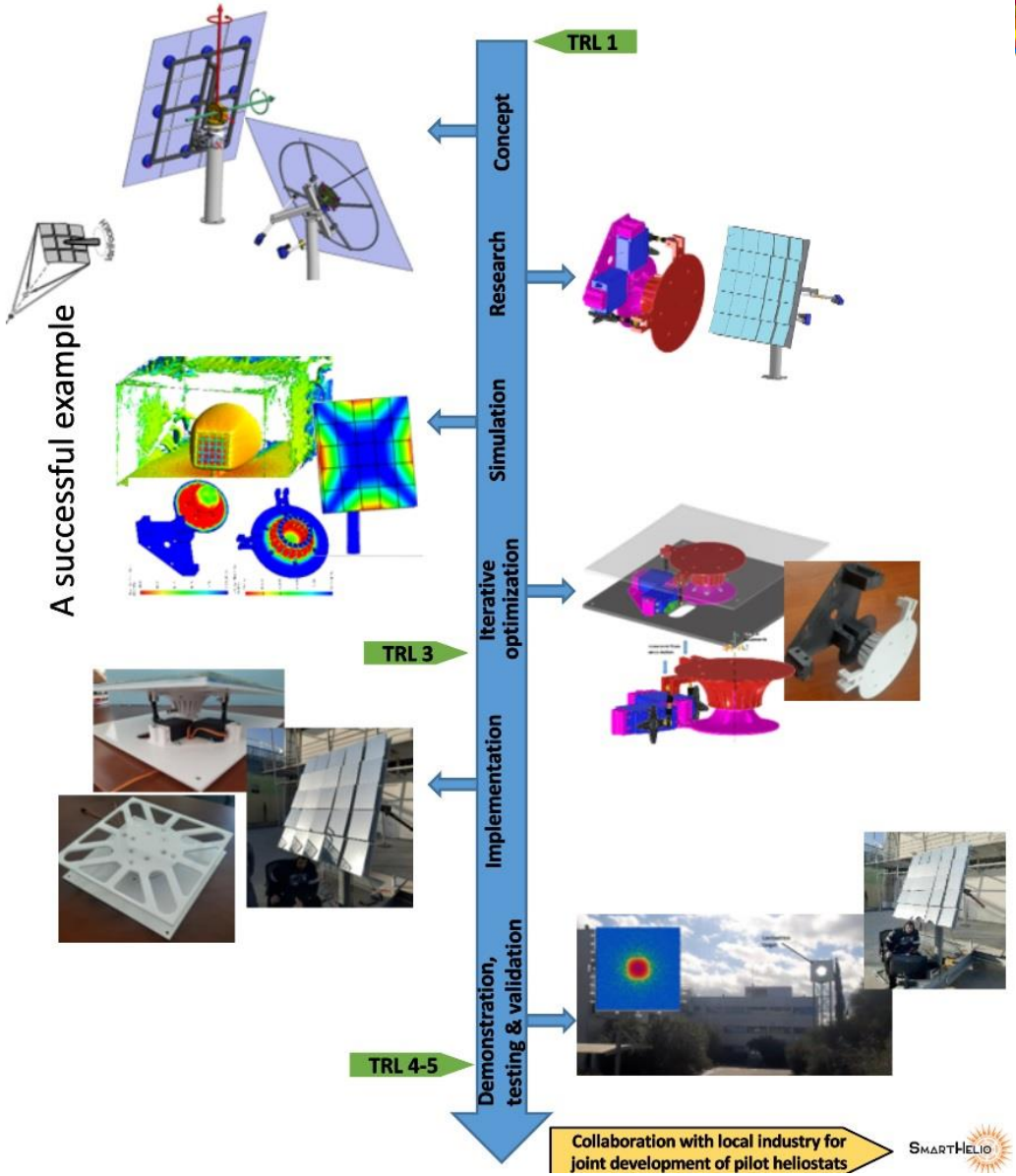
IPR, Patents

- **Receivers**
- *Integrated Solar Receiver-Thermal Storage System*

- **Heliostats**
- *UAV-based system and method for the characterization of the geometry of solar concentrating mirrors*

- *UAV-based system and method for the characterization of radiant field of reflective concentrating solar systems*

- **IPR Community Industrial Design**
- *Adaptive optics heliostat local control mechanism*



European Recognition

- Member of **EU-SOLARIS**, a European Research Infrastructure Consortium (ERIC) of European CSP/CST research infrastructures
- Member of European Strategy Forum on Research Infrastructures **(ESFRI) Landmark**
- Full member of the European Energy Research Alliance, Joint Program Concentrated Solar Power **(EERA JP CSP)**
- Providing access through a pan-EU project for Solar Facilities for the European Research Area **(SFERA)**

EU SOLARIS ERIC

EERA European Energy Research Alliance

Collaboration with European / International Industries

Concentrated Solar Technologies

- Sterling Dishes (CZ)
- Hybrid Heliostats (ES)
- Receivers (UK)

Modelling, Optimization

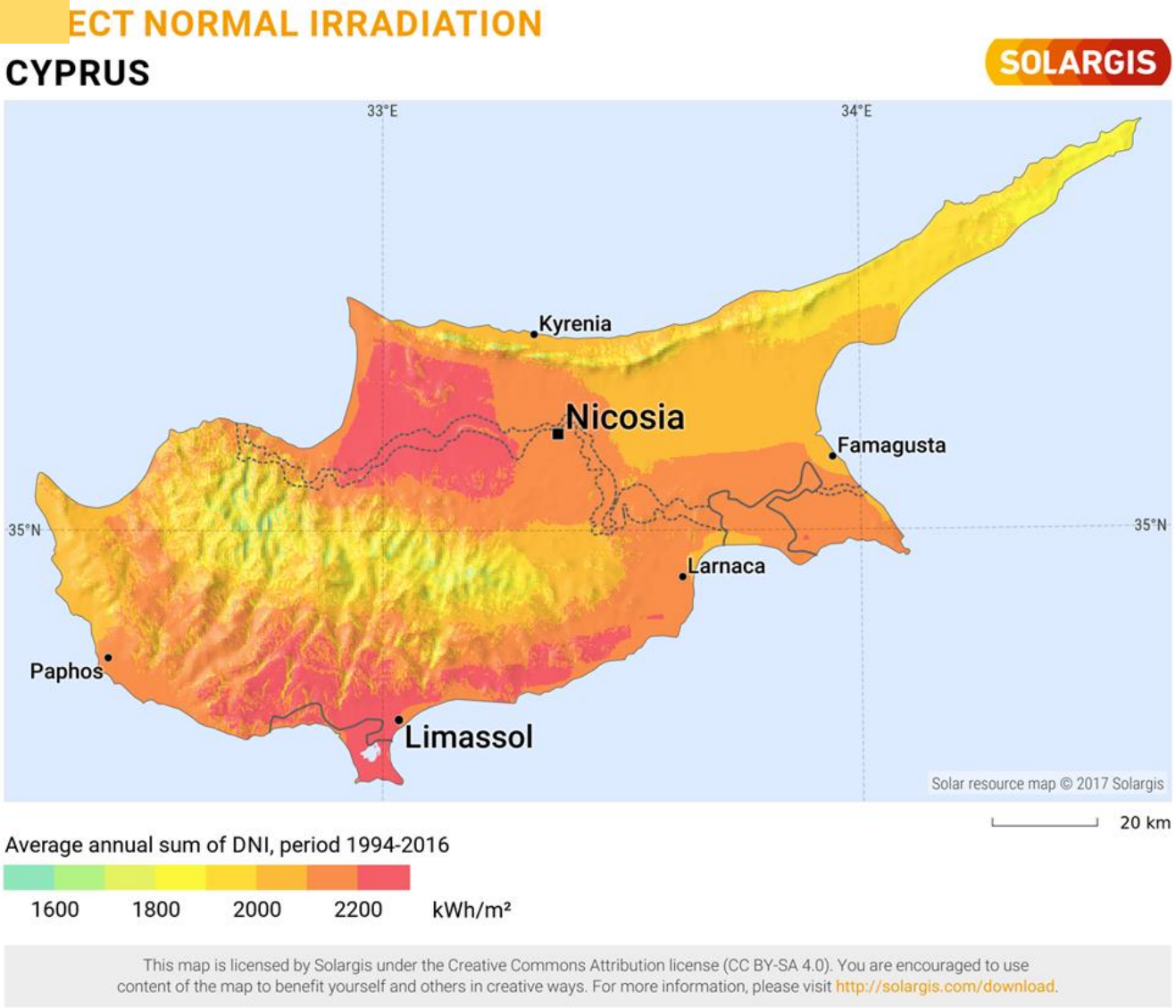
- Hybrid systems Optimization (PK)

Desalination

- Renewable Desalination (USA)
- Recovery of Selective valuable minerals (JP)

Why Cyprus?

- Isolated energy network, very high electricity demand seasonal variability, water scarcity
- Very ambitious goals for decarbonizing the energy mix (GreenDeal, Fit-for-55, REPowerEU)
- Only EU-country in the middle-East
- **Very high Solar Potential, ideal location to deploy next-gen energy solutions**



Why Now ???

- Cyprus and the region are in a climate "Hot spot"
- A yearly penalty must be paid for all excess ETS emissions (hundreds of €m for 2023!)
- Already saturated electricity capacity for RES (storage, interconnections, demand response the main options)
- Urgent need to move away from traditional model of centralized, fossil-fuel based generation

Take away message

- PROTEAS Facility is a unique infrastructure in the EU and EMME region
- PROTEAS applied research is aligned with global energy transition pillars
- PROTEAS develops novel renewable energy production technologies, uniquely relevant to isolated energy systems (like Cyprus)
- PROTEAS performs research on energy storage, essential in integrating RES into energy systems - one of the fundamental pillars of the energy transition
- PROTEAS also facilities research on optimisation, digitalisation and decentralisation of energy processes, equally essential for the energy systems of the future

14

◆THANK YOU!

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