SolarPACES
Solar Power & Chemical Energy Systems

MOSAICO and SFERA III PROJECTS

EVORA 24th October 2023

◆ The PROTEAS Facility Cyprus Institute (CYI)

Dr. Marios C Georgiou
The Cyprus Institute
m.c.georgiou@cyi.ac.cy
www.energy.cyi.ac.cy

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

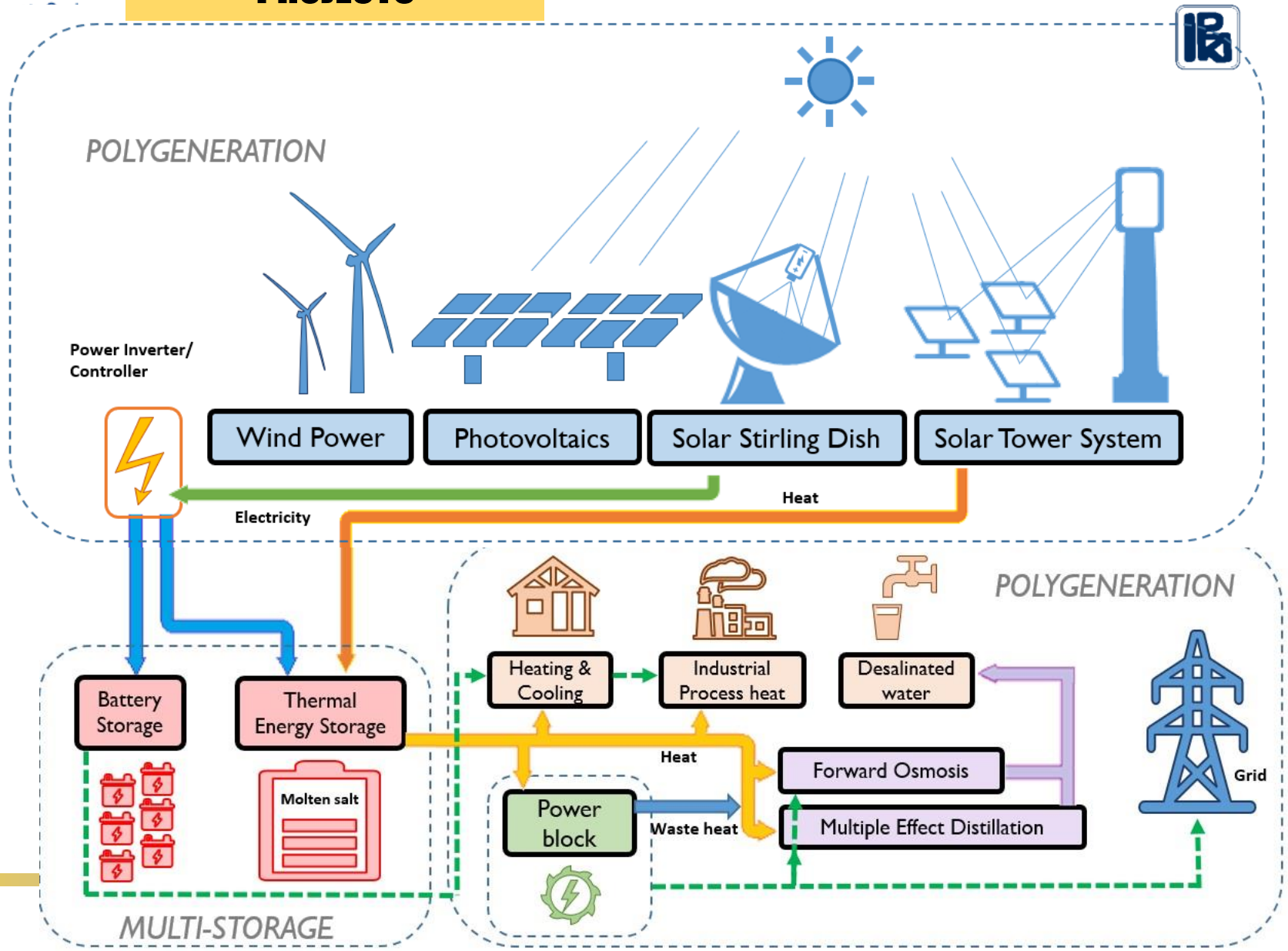
2019 — CSP-DSW Concept Demonstrated

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

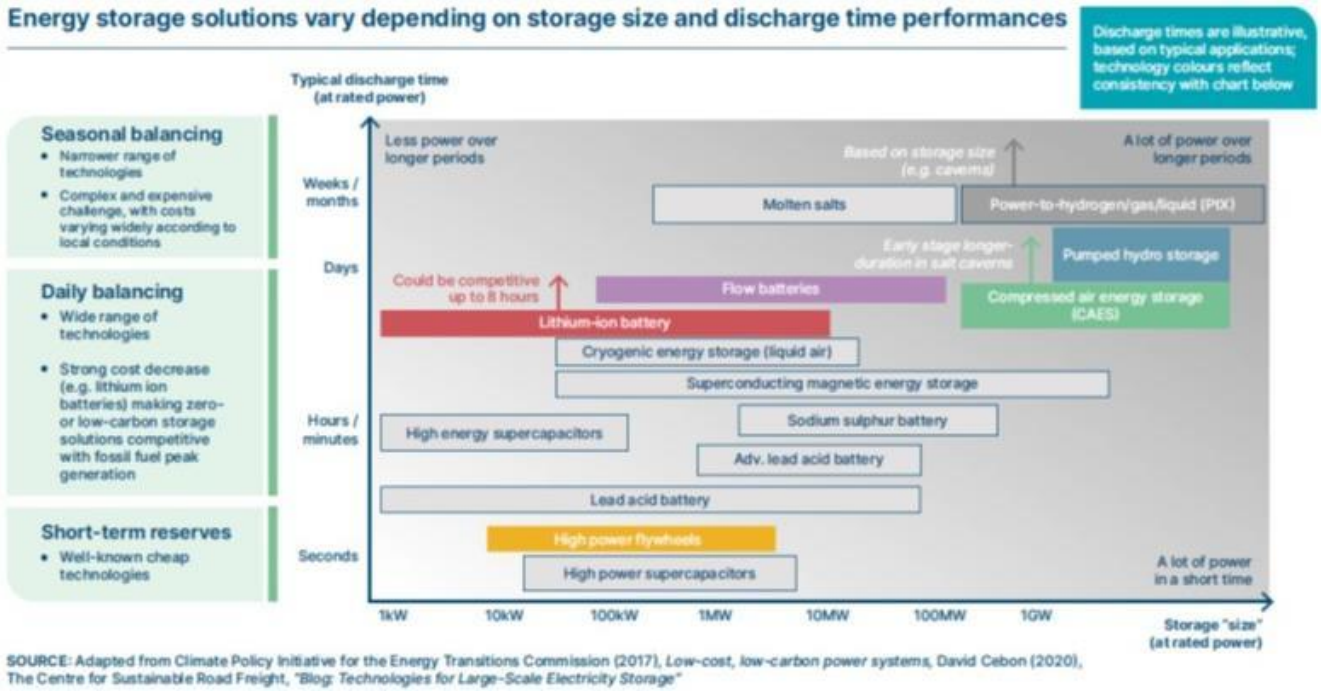
•Seasonal Storage

•Desalination

•Renewable Desalination

•Brine Management

•Recovery of Selective valuable minerals

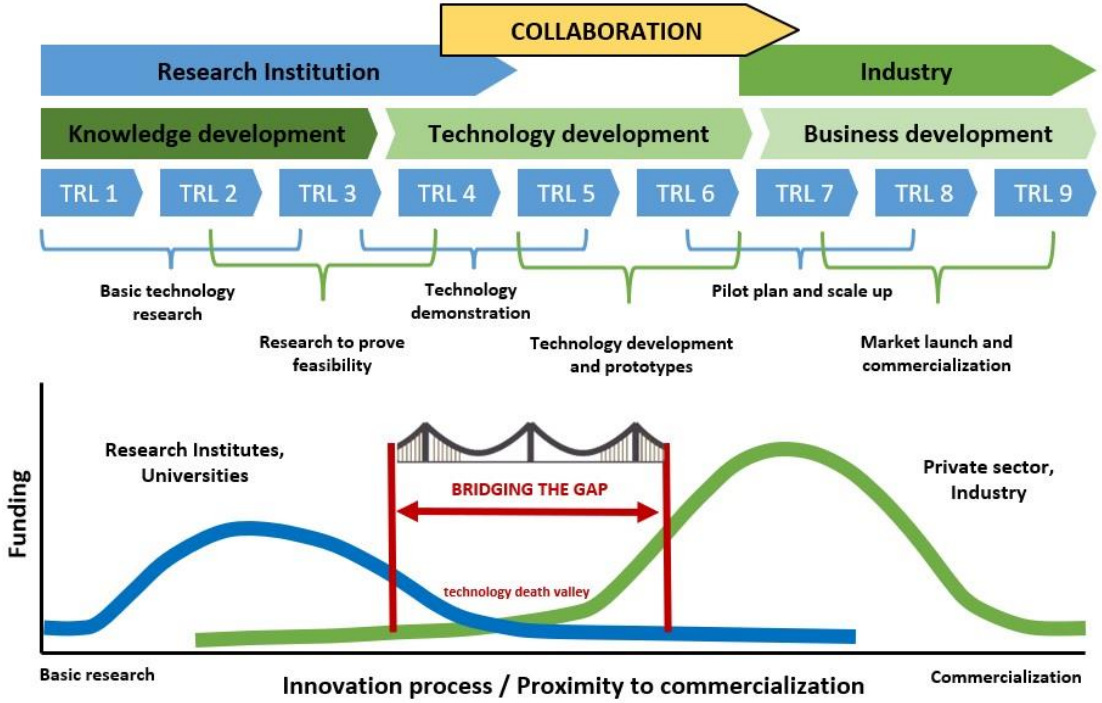


SOURCE: Adapted from Climate Policy Initiative for the Energy Transitions Commission (2017), *Low-cost, low-carbon power systems*, David Cebon (2020), The Centre for Sustainable Road Freight, "Blog: *Technologies for Large-Scale Electricity Storage*"

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*

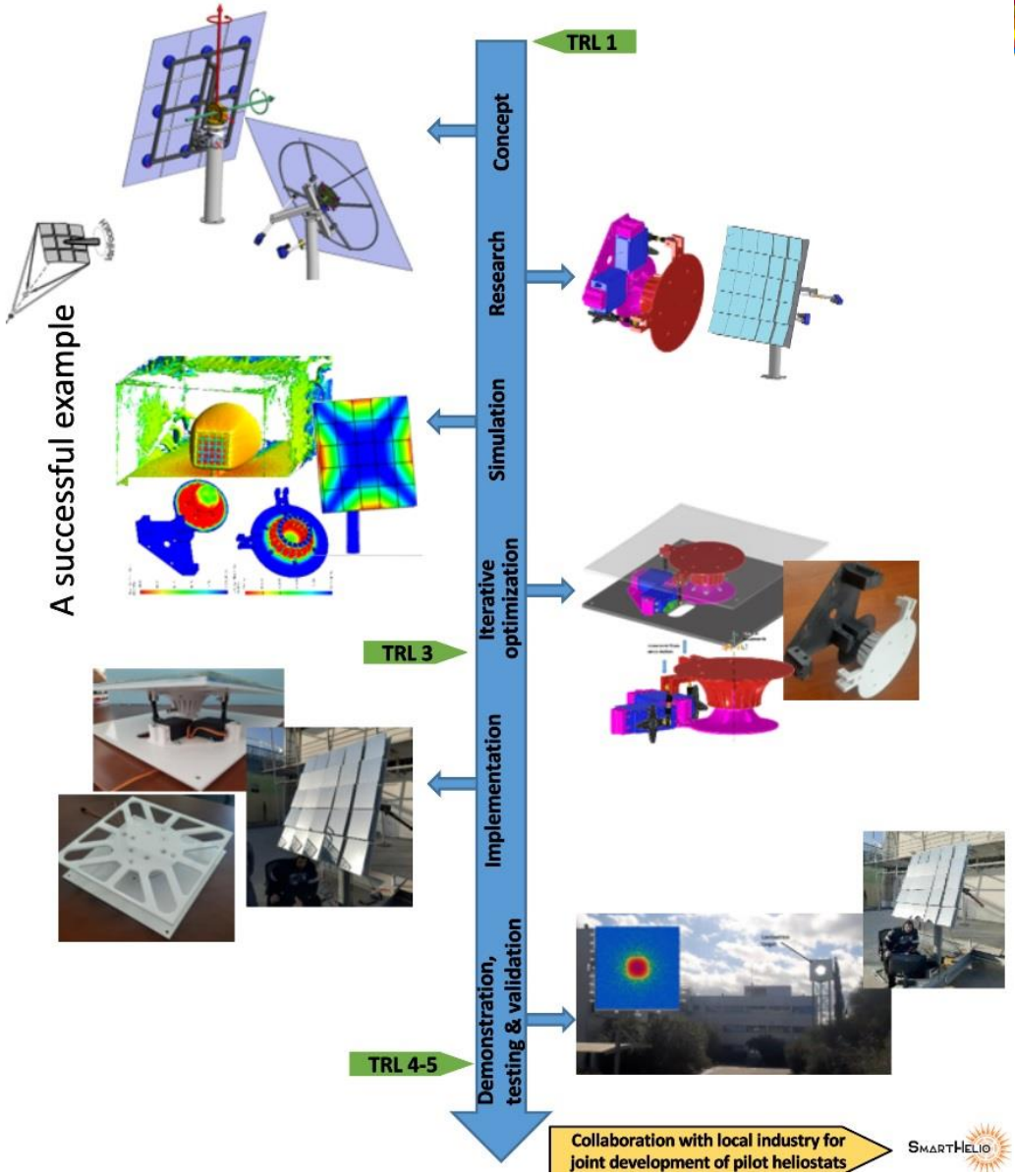
- **Heliostats**

•*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

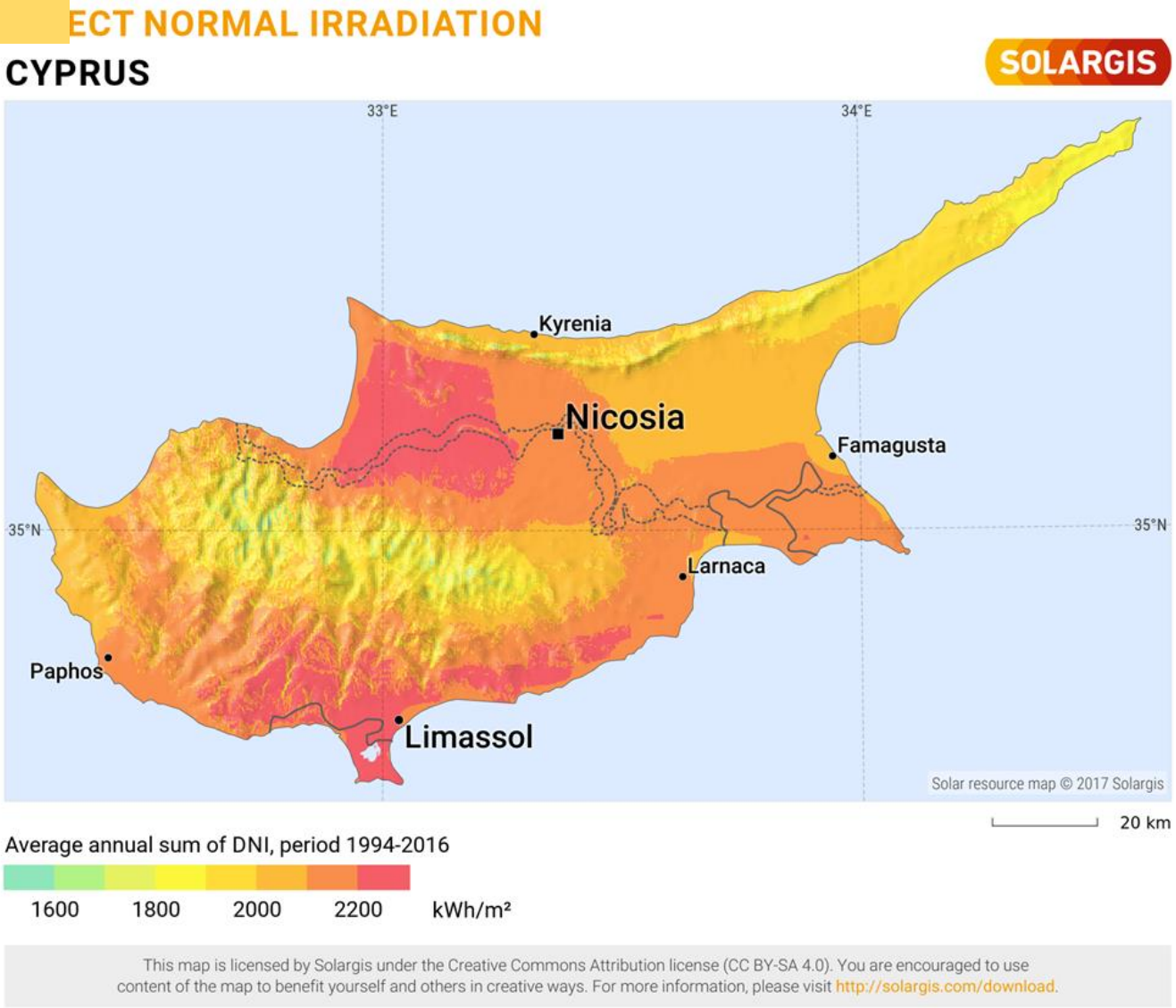
- Hybrid systems Optimization (PK)

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

◆ THANK YOU!

Dr. Marios C Georgiou
The Cyprus Institute
m.c.georgiou@cyi.ac.cy
www.energy.cyi.ac.cy