Dr. Nabiha Ben Sedrine
R&D Research Scientist
Castros S.A.

Lighting Design - main activity

UK | LONDON

NICE | FRANCE

PARIS | FRANCE

CANNES | FRANCE

PORTUGAL

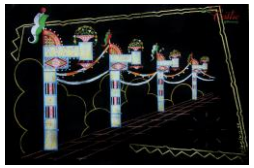
ABIDJAN | IVORY COAST

DUBAI | UNITED ARAB EMIRATES

PORTO | PORTUGAL

R&D Innovative solutions

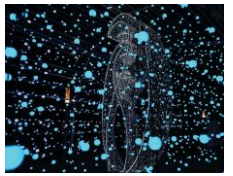
100% approval of submitted projects
1 pending patent
Over 10 national projects
Pioneering work in UV-C air and surface disinfection, with 3 prototypes http://i3uvc.com/
Several oral and poster presentations in national and international conferences
Scientific peer-review and open science publications
Several awards and distinctions







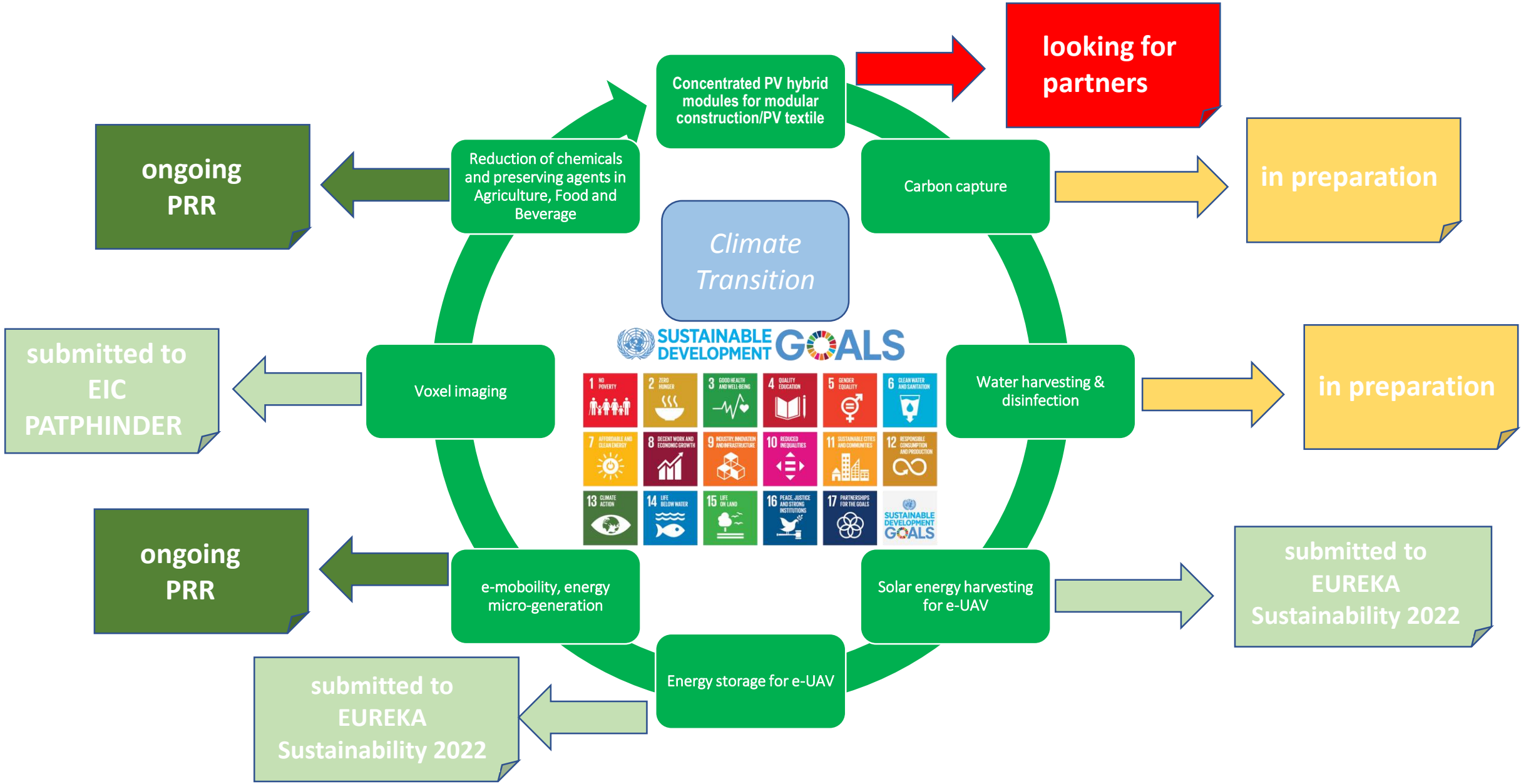





1921 1950 1960 1980 1990 2000 2010 2020 2021 2022

Co-financed:

R&D Roadmap for Climate Transition



R&D Collaborators, Partners and Clusters

Challenge 1

Eurogia2030 challenges:
Decarbonization/Solar technology challenge/Solar PV/ PV systems
Digitalization/IoT/device-level visibility and advanced control solutions

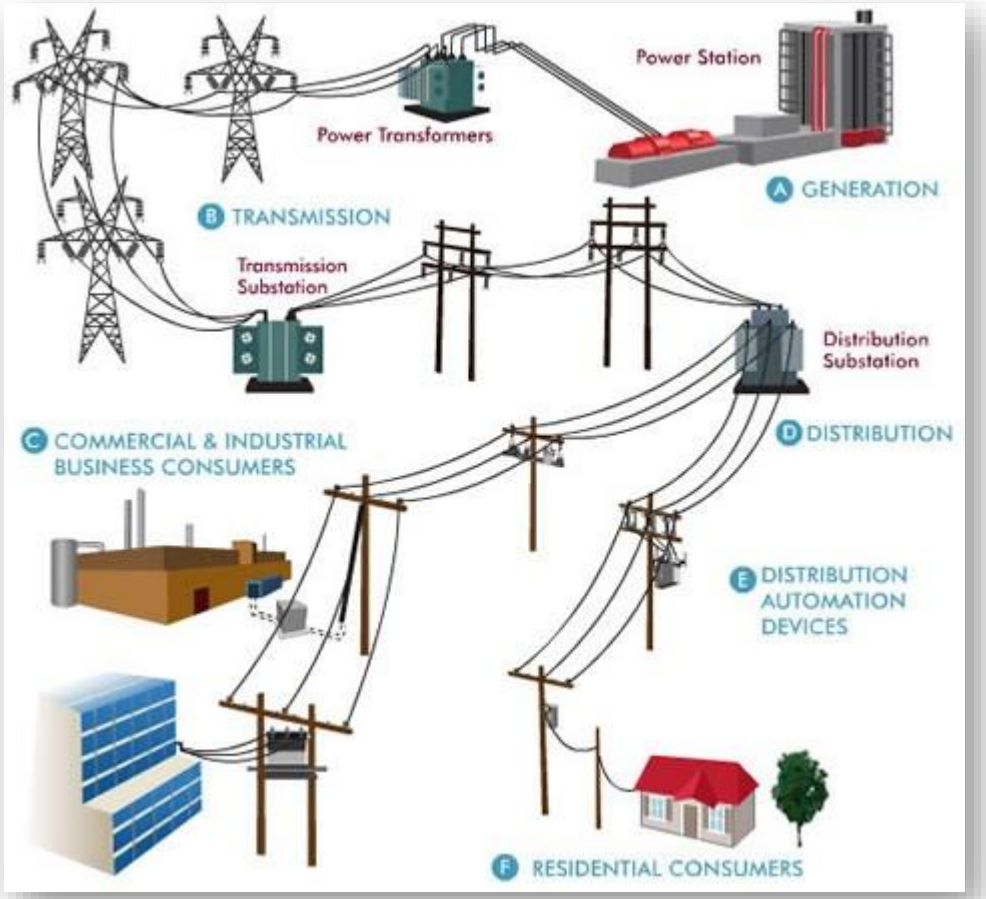
eurogia2030

A EUREKA initiative

For Low Carbon Energy Technologies

SINCE 1921 castros

Problem



Traditional grid system

- **Centralized power generation**
- Necessity of **energy transport** from power plants to end-users causing **high losses and high costs**, with small or no gain to end-users
- PV installed in forests or agriculture lands **affecting the natural ecosystem**
- Common PV plant use 1st generation PV, with **limited efficiency**

https://doi.org/10.36785/BUITEMS.JAES.290
https://observador.pt/2021/06/25/associacao-portuguesa-do-ambiente-aprova-central-fotovoltaica-na-herdade-da-torre-bela/

Solution: "Smart and integrable concentrated hybrid PV module for building facade"

Develop **innovative concentrated PV hybrid (CPVH) modules** based on:

- **high efficieny solar cell technologies**
- **solar concentrators**
- **IoE for system monitoring**

to reduce the need for energy transport and favor the creation of local micro-grids with **lower energy costs and reduced environmental footprint**

Expertise of involved partners:

* Thermal fluids: Technology, Simulation, Manufacturing processes
* IoE – hardware /software
* System integration, Design and structure dimension, Manufacturing
* Construction module – manufacturing process, sustainable materials
* Materials development for optical layers (micro/nano solar concentrators), including all optics characterization
* R2R lamination equipment for lamination of the optical layers
* High-TRL temperature and humidity printed sensors available for further integration into textile structures
* Hardware/firmware/software and AI/ML

Challenge 1

Looking for:

- Solar concentrator: Materials, Manufacturing processes, Wave and geometric optics.
- PV cells: Most efficient technology for a specific range (second and third-generation solar cells), and for different ranges, Manufacturing processes
- End-users (construction sector)

Challenge 2

Eurogia2030 challenges:
Decarbonization/Solar technology challenge/Concentrated Solar/CS systems
Digitalization/IoT/device-level visibility and advanced control solutions

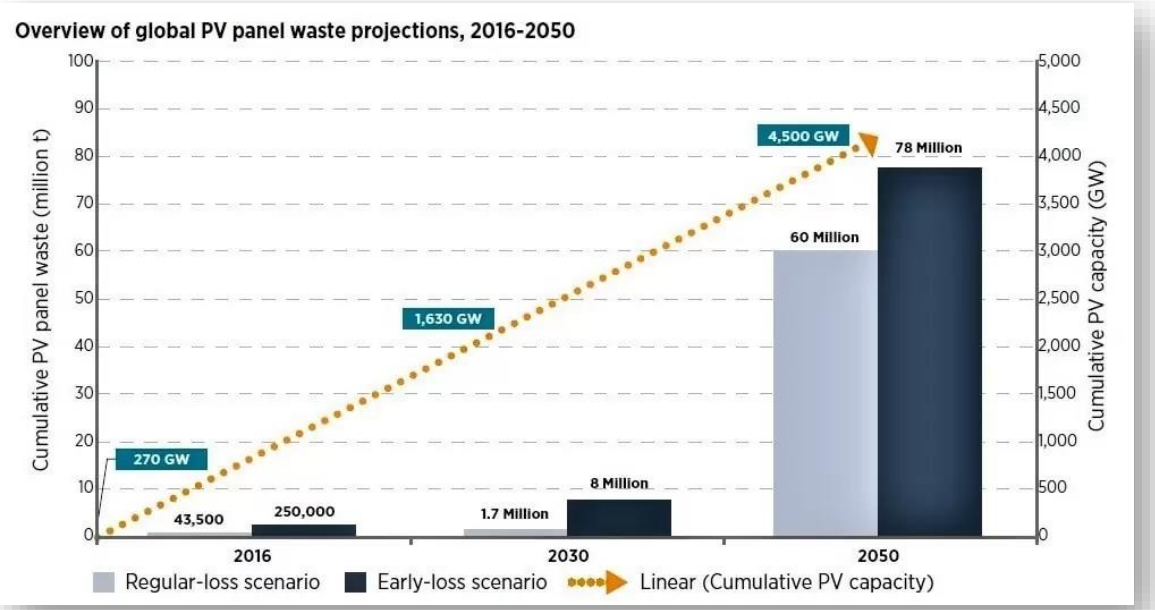
eurogia2030

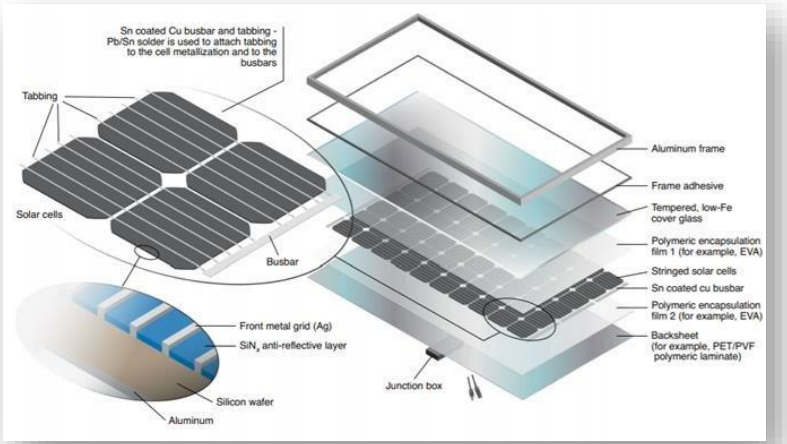
A EUREKA initiative

For Low Carbon Energy Technologies

SINCE 1921 castros

Problem





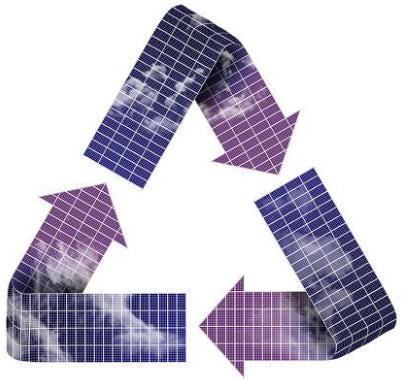
Conventional glass-fronted PV panels:

- 10% global electronic waste from rigid PV by 2050
- **rigid**, **heavy** and **with pre-defined shapes without freedom for design**
- production **has a lower cadence than roll to roll systems**
- **dust reduces the efficiency of the solar panel, cleaning the solar panels using water is not a sustainable solution**.

- Commercially available textile PV are **superficially attaching flexible solar panels onto the surface of a fabric**, with **very small areas**

https://avenston.com/en/articles/solar-second-life/
https://stopthesethings.com/2020/10/10/lingering-legacy-millions-of-toxic-solar-panels-that-cant-be-recycled-destined-for-landfills/
https://www.epa.gov/hw/solar-panel-recycling

Solution: “Innovative flexible solar photovoltaic systems: self-cleaning, lightweight and eco-friendly PV textiles“



Develop **innovative large area flexible solar photovoltaic** systems based on:

- **3rd generation solar cell technology**
- **large area, lightweight**, **free-form**, **eco-friendly**, **robust**, and **stable** textiles

as **alternative substrate** for photovoltaic solar cells, with the additional **self-cleaning** property.

Expertise of involved partners:

Looking for:

* Mechanical structure of support, develop the optimized Textile mesh, Simulation
* Textile materials/fibers: lightweight, eco-friendly, robust and stable
* IoE – hardware /software
* Design and structure dimension, Manufacturing
* System integration
* Development and characterization of different materials to be used as active layers on the different types of solar cells
* Lab-scale and large-scale Roll-to-roll (R2R) printing processes for flexible substrates (polymeric and textiles)
* R2R encapsulation and lamination processes for Printed solar cells
* R2R physical vapour deposition pilot scale equipment, compatible with flexible textiles structures, including a polymer multilayer technology to develop encapsulation layers for solar photovoltaics.
* Polymeric compound equipment can be used to produce tailor-made materials to be used in the production of fibres (including eco-friendly fibres)
* Tri-component extruder to produce the fibres combining up to three different materials, allowing further openness for further compatibility studies with printing or integration processes
* High-TRL temperature and humidity printed sensors available for further integration into textile structures.
* Hardware/firmware/software and AI/ML

Challenge 2 Looking for:

- PV cells: Third-generation solar cells
- Manufacturing processes
- End-users (conception sector)

Dr. Nabiha Ben Sedrine

Contact:

nabiha@castros.com.pt

(351) 227333220
436, Rua da Igreja Velha,
4410-160, São Felix da Marinha
Portugal
https://www.castros.com.pt/

SINCE 1921
castros