ECOSAFEFARMING

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Water JPI
WaterWorks2015 Cofunded Call
6 April 2017, Stockholm

OUTLINE

- Motivation
- Objectives
- Consortium Description
- Detailed Work Package Objectives
- Expected Impacts of the Project
- How will our project target to following aims of the call

Source: http://www.hydro-terra.com/sustainable-water-reuse-programs-can-boost-water-sustainability/

MOTIVATION

- Severe water scarcity around the world
- Great potential of urban wastewater (UWW) utilization
- UWW in agriculture and hydrogen production support:
  - (i) better efficiency
  - (ii) better cost effectiveness
  - (iii) better resources use
  - (iv) better design and analysis
  - (v) better energy security
  - (vi) better environment

Source: http://www.asiaoutlookmag.com/news/singapore-takes-lead-in-asias-water-sustainability-development

MOTIVATION

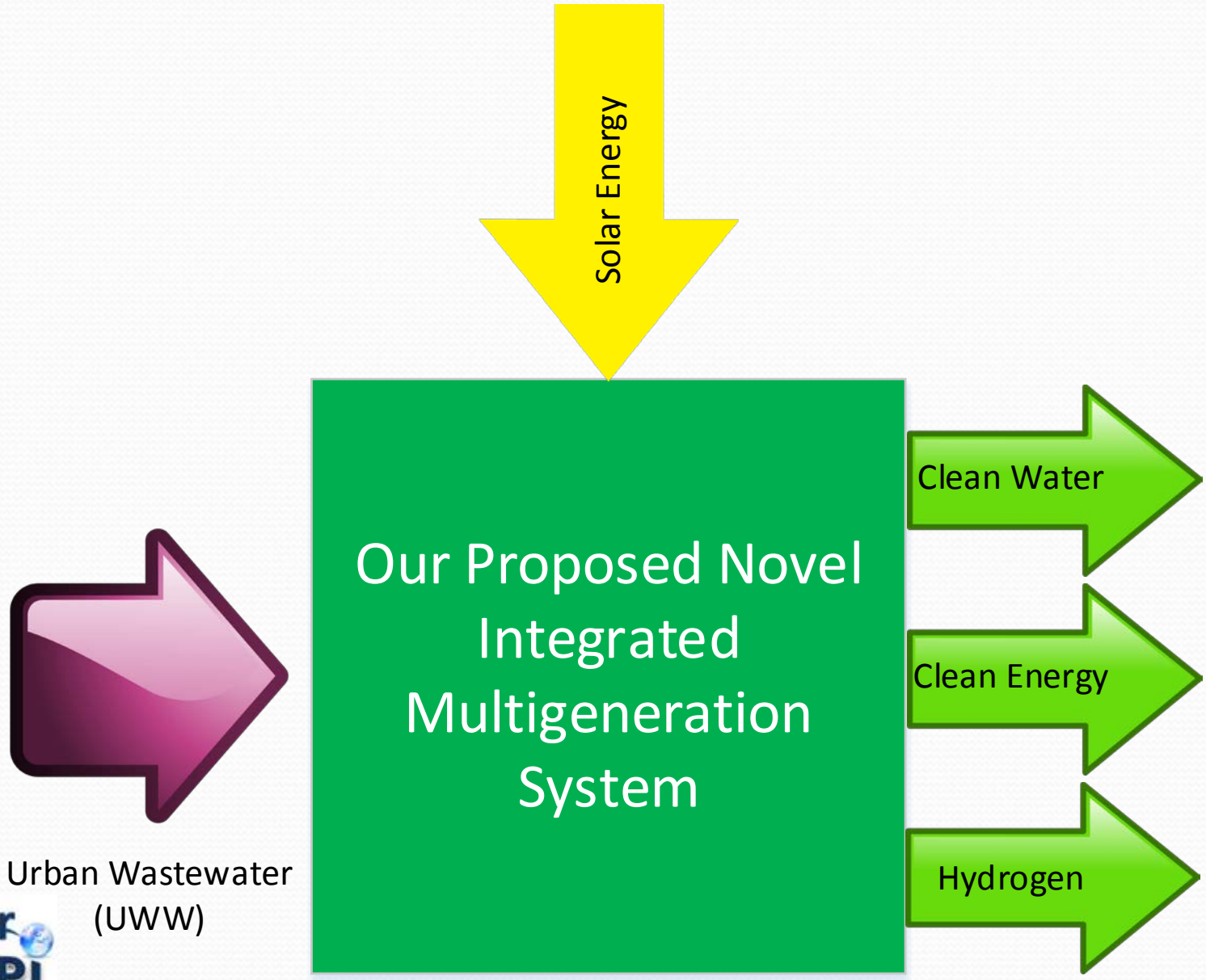
- Advantages of our proposed system:
  - *reduced overall energy demand*
  - *lower system cost and emissions*
  - *significantly enhancement of overall efficiencies*
  - *considerable increase in output generation rates*

Source: http://statii.info/wp-content/uploads/2014/05/chistavoda.jpg

- **Aim:** to bring a solution to water and energy issues and provide safe food and clean energy

- **Novelty:** implementation of photoactive membrane electrode systems for clean and nutritious irrigation water and hydrogen production from UWW

OUR PROJECT


Solar Energy
Our Proposed Novel Integrated Multigeneration System
Clean Water
Clean Energy
Hydrogen
Urban Wastewater (UWW)

OBJECTIVES

- To enable reuse of UWW for agricultural irrigation
- To address issues related to safe food production
- To develop new photocatalytic reactors using local resources
- To design an integrated desalination process (PCED reactor)
- To produce clean water and hydrogen from wastewater
- To evaluate different configurations of reactors
- To scale up the most efficient PCED systems pilot applications
- To conduct quantitative health risk assessment

CONSORTIUM DESCRIPTION

- Istanbul University: PCED for solar wastewater reuse and hydrogen production
- University of Ontario Institute of Technology (UOIT): home of the CERL and research on novel multigeneration systems in both small and large scales
- Centro de Investigaciones Energéticas, Medioambientales Tecnológicas – Solar Platform of Almería (CIEMAT-PSA): leadership in solar reactors and AOPs for wastewater treatment
- Brandenburg University of Technology (BUT): interdisciplinary research, innovative teaching, knowledge and technology transfer

WP1

Project Management and Coordination

Objectives

- To initiate the process and kick of the research activities
- To assign detailed roles and responsibilities to each party
- To develop a detailed plan to ensure close collaboration

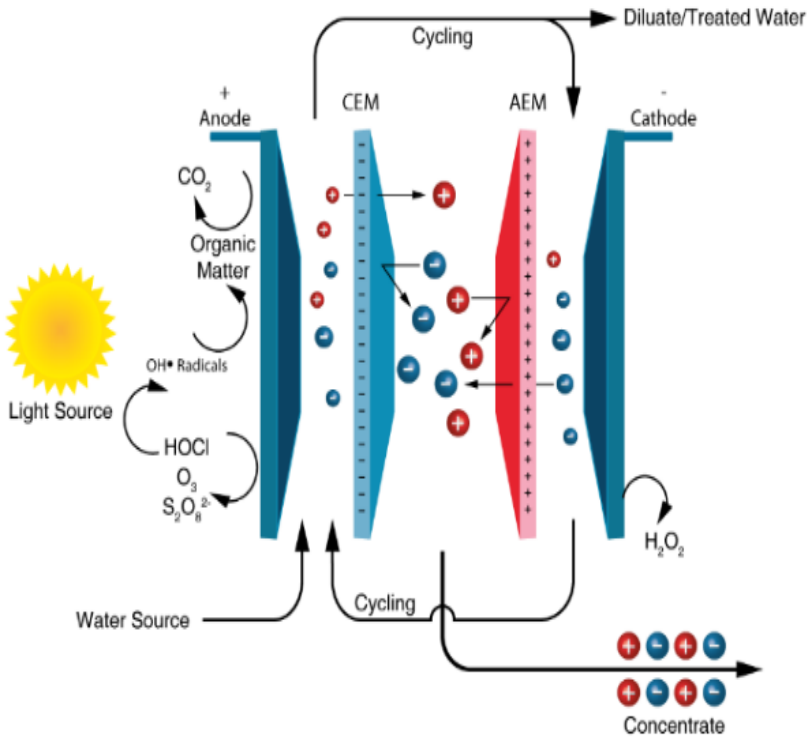
To prepare a detailed risk assessment and plan

WP2

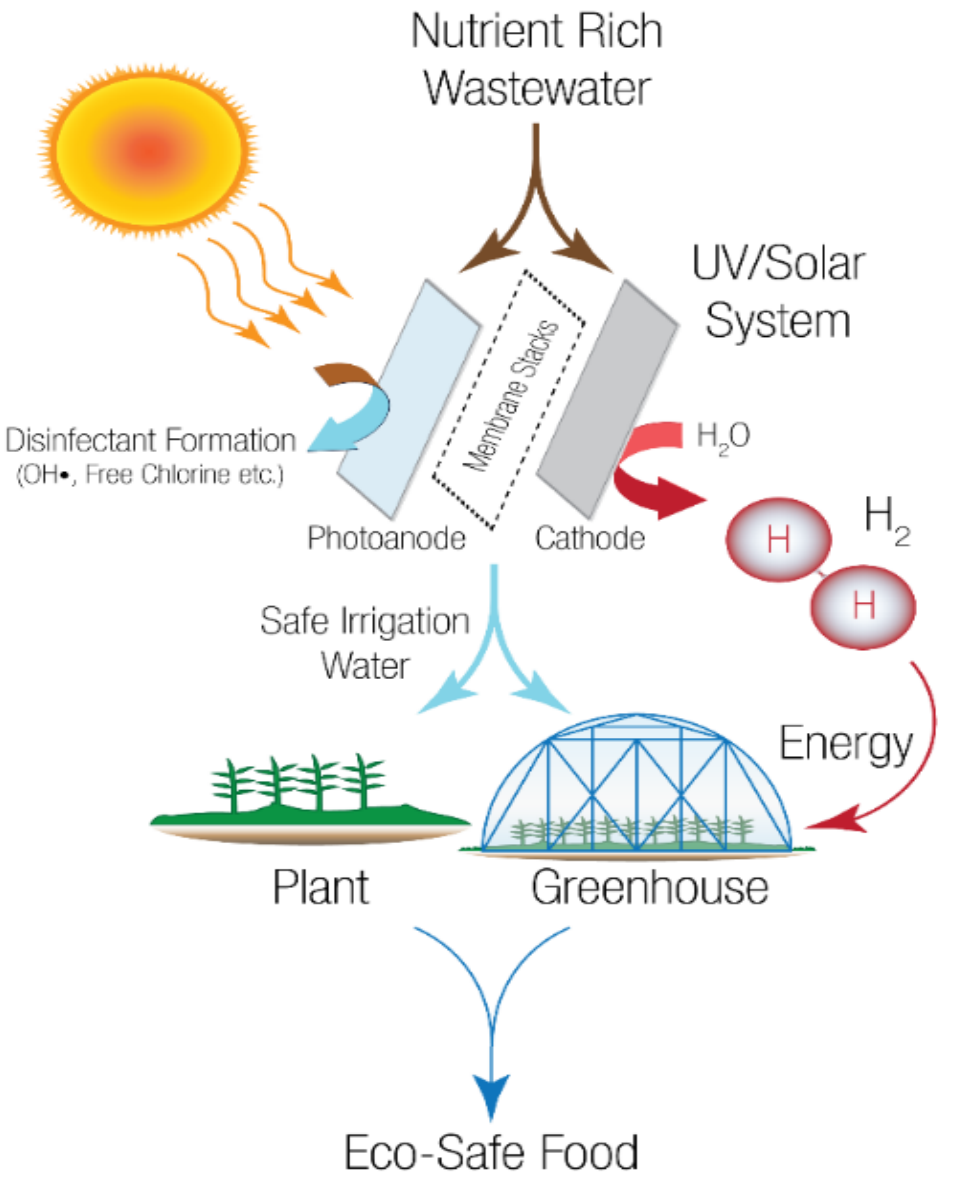
Lab-Scale Development, Optimization and Implementation of the Reactor

Objectives

- To design the lab scale reactor
- To develop the optimized reactor
- To build the reactor
- To implement the reactor to the integrated system



Schematic representation of the proposed PCED system



New wastewater reuse approach for sustainable agricultural activity

WP3

Prototype Design and Production of Novel Reactor

Objectives

- To design and build the lab-scale PCED configurations
- To investigate each reactor under different conditions
- To test different reactor configurations

WP4

Case Studies for Agricultural Reuse

Objectives

- To scale up the reactors for agricultural applications
- To evaluate the performance of each system
- To evaluate the efficiency of the new solar prototypes
- To use treated UWW for irrigation pilot systems

WP5

Monitoring and Evaluation of Wastewater Reuse, Impact on Plant and Soil

Objectives

- To assess the process efficiencies
- To achieve the target pollutant value per unit volume

WP6

Risk Assessments of Solar Reuse System

Objectives

- To evaluate the health risk and energy efficiency
- To conduct Quantitative Microbial Risk on the product
- To develop UWW reuse strategies for agriculture
- To perform techno-economic analysis on the system
- To determine the possible impacts for market applications

WP7

Dissemination of Findings

Objectives

- To bring all the results together
- To finalize all dissemination activities
- To conduct reporting, publishing, patenting etc.

Expected Impacts of the Project

- Reduction or elimination of fertiliser applications
- Valuable tool for sustainable water supply in agriculture
- Social benefits:
  - (i) public health and better nutrition
  - (ii) food safety and security in local and global markets
  - (iii) sustainable agriculture
  - (iv) increased employment
- Environmental and technological benefits:
  - i) sustainable development for countries
  - ii) best environmental practices and technologies
  - iii) energy efficiency and applicability in food production
  - iv) UWW treatment technologies with **renewable energy**

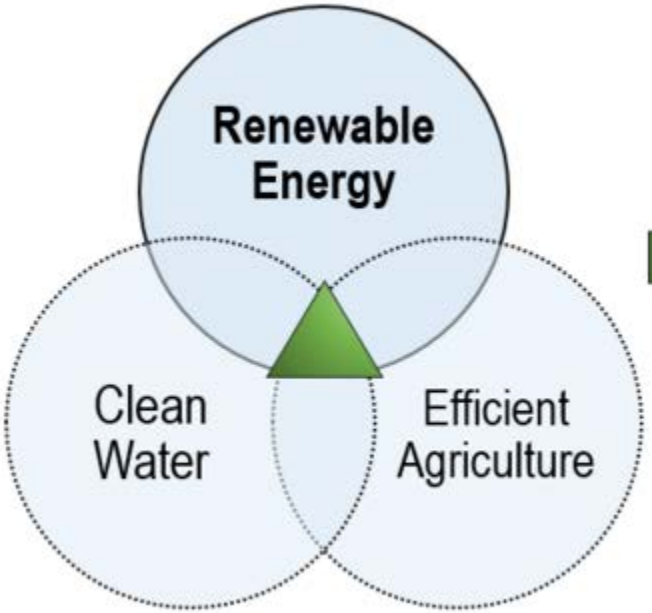
How will *our project* target to following aims of the call

- *to promote multi-disciplinary work*
  - Global collaboration of involved parties from diverse backgrounds

- *to encourage proposals with fundamental and/or applied approaches*
  - Development of novel membrane systems for water treatment and hydrogen production

How will *our project* target to following aims of the call

- *to stimulate mobility of researchers within the Consortium*
  - Strong collaboration and close work among the researchers
- *to enhance collaborative research and innovation during the project life and beyond*
  - Strengthening the existing ties and continuation of collaboration



FOR YOUR ATTENTION