



EU GREEN DEAL

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REAL**

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**#EUGREENWEEK**  
**30 MAY – 5 JUNE 2022**



**A digital marketplace  
to boost solutions  
uptake for water-  
smart circular  
economy**



**Prof. Christos Makropoulos**  
National Technical University of Athens  
KWR Water Research Institute

**NEXT  
GEN  
EU**



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**ULTIMATE**

**ZerOPM**

**PROMISCES**

# Development context



Long-term, high-value Marketplace for the CE (Water, Energy, Material) that is not dependent on external funding cycles

Towards a next generation of water systems and services for the circular economy (2018-2022)



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# Key Stakeholders

- **Problem owners**

- Utilities, or industries, seeking to find solutions to turn their linear processes into circular ones
- Potential buyers of a product with specific characteristics (price, quantity, quality, etc.)

- **Solution providers**

- Entities (companies, SMEs, institutes etc) that provide a technology or a service as part of a *CE enabling* portfolio
- Sellers of reusable resources, that under certain conditions can be used in the circular economy

- **Investors**, seeking opportunities to maximize investment revenues

- **Others**: Regulatory bodies, NGOs, Academics etc.



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# Goals of the Marketplace



**Explore** available technologies, tools, products and services and use targeted search capabilities



**Showcase success:** Case studies with successful CE projects

- Conditions, lessons learnt, limitations, transferrable technologies, georeferencing, etc.



**Boost networking**

- Bring together potential partners with common interests
- Supporting face-to-face or online meetings
- Supporting the organisation of events



**Provide personalised and to the point information**

- Provide recommendations based on user preferences and interests
- Machine learning capabilities tracking user behaviour within the MP



**Encourage and fund innovation**

- Support promotional activities, support funding of startups etc.



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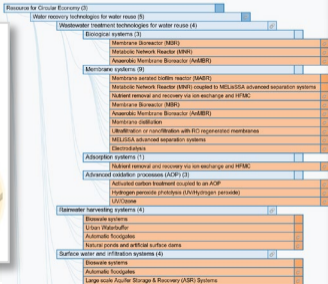
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# Technologies (1/3)

- Classification system of innovative technologies supporting the Circular Economy in the domains **Water**, **Energy** and **Nutrients/Materials**
- Taxonomy of technologies



## Technologies

Discover technologies of the Circular Economy

## Case studies

Discover concrete solutions to real-life problems

## Products

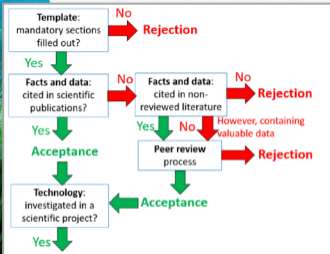
Products, Tools and Services related to the Circular Economy

## Networking

Connect with other stakeholders, find partners, clients and investors

# Technologies (2/3)

- Classification system of innovative technologies supporting the Circular Economy in the domains **Water**, **Energy** and **Nutrients/Materials**
- Taxonomy of technologies
- Methodology for approving new technologies



## Technologies

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## Case studies

Discover concrete solutions to real-life problems



## Products

Products, Tools and Services related to the Circular Economy



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Connect with other stakeholders, find partners, clients and investors



# Technologies (3/3)

- Classification system of innovative technologies supporting the Circular Economy in the domains **Water, Energy and Nutrients/Materials**
- Taxonomy of technologies
- Methodology for approving new technologies
- Detailed technology factsheets

The screenshot shows the 'nextGen' platform interface. At the top, there's a search bar and navigation options. A central circular diagram labeled 'WATER' is surrounded by various technology icons. Below this, there's a section titled 'Water recovery technologies for water reuse' with a list of sub-technologies. A grid of technology cards is visible, with one card highlighted and expanded into a larger factsheet on the right.

**nextGen Factsheet wastewater reuse & biogas production**

## Anaerobic Membrane Bioreactor (AnMBR)

**Unique selling points**

- ✓ No external energy for removal of chemical and biological oxygen demand
- ✓ Low energy production and associated methane effluent
- ✓ Chemical free process to remove methane from liquid
- ✓ Up to 80% methane recovered from the dissolved fraction
- ✓ Antifouling and solids free effluent which can be re-used in a number of applications (e.g. farming and industrial use)
- ✓ Compact equipment with low footprint – low operation costs

**Description of the technology**

Anaerobic membrane bioreactor (AnMBR) combines an upflow anaerobic sludge blanket reactor (UASB) with physical separation membranes, ultrafiltration (UF) for solid-liquid separation and membrane filtration for gas-liquid separation. As shown in the flow scheme of the technology, the UF membrane system is integrated with an upflow anaerobic sludge blanket reactor (UASB) in a side-stream configuration. This results in organic contained removal from wastewater and biogas production for energy recovery.

Furthermore, a membrane cartridge with MECU has become reliable and efficient for recovering dissolved gases such as methane (CH<sub>4</sub>) from AnMBR effluents. This methane can be used as an energy source. MECU employs a micro porous hollow fibre membrane, which is the most cost-effective option for MECU due to its high gas-liquid separation efficiency and very high surface area as compared to flat sheet membranes. In the process, water passes through the outside (shell side) of the hollow fibre as while a sweep gas (or vacuum) is applied to the

**UPD**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 4717634.

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# Case studies

- Best practices, application of technologies, requirements and conditions, transferable methodology, synergistic benefits, costs, etc.

Water Europe

Search for anything. Any type

Case studies

Altenrhein, Switzerland

Water Europe

nextGen

Contact data

Contact person

Christoph G. ...

nextGen

Products, Tools and Services related to the Circular Economy

## Technologies

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Products, Tools and Services related to the Circular Economy

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# Products (1/2)

- Registered users can promote their products (tools, services) on the Marketplace
- A small annual fee will be requested ensuring the viability of the Marketplace
- Early adopters can upload their products for free
- Users are responsible for the content of their product

## MobileAR solution for citizen engagement towards CE approach

Instructions and FAQ on how to fill in this form

Which of the following statements describe best your product?

A software supporting the Circular Economy

A hardware product or a technological device around the Circular Economy


A service, offered as part of a Circular Economy enabling portfolio

A methodology or a process related with the Circular Economy

More than one answer selection are permitted

**Image**

Image of the product. The file must not exceed the size of 5MB and must have a general format (e.g. jpg, png)



Remove image

**Basic information**

Name \*

Address \*

Contact

Target audience

Technology Readiness Level

Costs


URL

**Description \***

General information on the product, its components and the scope of application

**Product** 4 users are interested in this product

### CircuAR - MobileAR solution for citizen engagement towards CE approach ✓



[Back to all products](#)

**Product type**

- A software supporting the Circular Economy

**Technology Readiness Level**

Level 6

See options: 2023-03-28

**Related tags**

- Innovation of Practice
- engagement
- innovation
- interdisciplinary
- path to quality approaches
- network

**Description**

The AR application (CircuAR) used in this study is developed in the NextGen project's framework (PG202) to improve citizen awareness and engagement towards CE principles. CircuAR is compatible with Android smartphones and requires Global Positioning System (GPS) tracking as it supports both marker and location-based applications to overlay the digital data. The digital data consist of single image and video visual, image gallery and multiple videos, and static three-dimensional (3D) models. The mobile application user can use finger gestures for object manipulation (both rotation and positioning) on their smartphone's touch-based display. A virtual assistant guides the user, and gamification and learning elements ensure a captivating and fun yet educative and engaging experience. Surveys and quiz questions embedded in the AR experiences challenge the user's understanding and provide feedback to enhance the process learning effectiveness.

**Target audience**

Researchers, students

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# Products (2/2)

## Promotion of products through the Marketplace

- Through associations with other items (technologies, tags, organisations etc.)
- Through search possibilities
- On the dashboard of users
- Product of the month
- Other promotional means (newsletters, emails, etc.)



A screenshot of a search results page for 'wastewater'. The search bar at the top shows 'wastewater' and 'Any type'. Below the search bar, it displays '81 search results for "wastewater"'. There are five filter buttons: 'Products (2)', 'Technologies (2)', 'Case studies (6)', 'Publications (26)', and 'Organisations (32)'. Below the filters, there are two featured product cards: 'NextGen Serious Game on circular economy for water' and 'Urban Water Optioneering Tool'.

### Broader domain

- Resources for Circular Economy
- Overview of Technologies

### Related products

- Nessie platform
- MobileAR solution for citizen engagement towards CE approach
- ARQUES QMRA tool for water reuse scenarios
- Digital Enabler



### Activated carbon treatment coupled to an AOP

Activated carbon is frequently used as a post-treatment process to refine water quality, i.e. to diminish the quantity ...



### Automatic floodgates

Automatic floodgates are drainage clothes with an excess of things/technology. Often collect and damage rain...



A screenshot of a user dashboard for 'George'. It features a search bar at the top with 'Search for anything...' and 'Any type'. Below the search bar, it says 'Welcome back George' and 'Here are some products we think you might like.' There are four product cards: 'MobileAR solution for citizen engagement towards CE approach', 'Urban Water Optioneering Tool', 'Nessie platform', and 'Digital Enabler'. At the bottom, it says 'Help us optimise the recommendations for you by rating the listed products.'

A screenshot of a mobile application interface. The app is titled 'CirculAR' and is described as a 'MobileAR solution for citizen engagement towards CE approach. Improve citizens awareness and engagement towards CE principles.' There is a 'Learn more' button and a smartphone displaying the app's interface.

# Networking (1/2)

- Search
  - Get informed
- Connect
  - Follow - Send message

**User profile**  
**Archontia Lykou**

Home / Networking / User profile

**Institute of Communication and Computer Systems (ICCS)**  
Senior expert, Greece

Products (1) Technologies (1) Case studies (3)

**Venice, Italy**  
In the Venice Living Lab the application of resource recovery and circular economy in the field of water, especially...

**Alicante, Spain**  
The Alicante Living Lab aims to exploit 100% of the reuse potential in the region and to promote circular economy st...

**East Frisia, Germany**  
Oldenburgach-Ostfriesischer Wasserverband (OOV) is one of the largest water services providers in Germany, with an...

**Reasons of interest in the CE**

- Solution provider
- Other

**Main keywords of interest**

**Following**

12 Users

Name

Part of the first or last name of the user you are following

17 of interest

	<b>George Karavokiros</b> Senior researcher Senior researcher	Institute of Communication and Computer Systems (ICCS) National Technical University of Athens (NTUA)
	<b>Anne Kleyböcker</b> Senior researcher	Kompetenzzentrum Wasser Berlin GmbH
	<b>Archontia Lykou</b> Senior expert	Institute of Communication and Computer Systems (ICCS)
	<b>Tina Kotlika</b> Senior researcher	Institute of Communication and Computer Systems (ICCS)
	<b>Jordi Cros Herrero</b> CIO	ADASA SISTEMAS
	<b>Iñaki Borrodo Benito</b> Senior expert	ADASA SISTEMAS
	<b>Malte Zamzow</b> Junior researcher	Kompetenzzentrum Wasser Berlin GmbH
	<b>Panagiotis Kossieris</b> Senior researcher	National Technical University of Athens (NTUA)

TA  
ICA  
RCHE

**water Europe**  
Technology & Innovation

**IWA**  
The International Water Association

**ZerO<sup>2</sup>PM**

## Technologies

Discover technologies of the Circular Economy

## Case studies

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Products, Tools and Services related to the Circular Economy

## Networking

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# Networking (2/2)

- Search
  - Get informed
- Connect
  - Follow - Send message
- Be visible
  - Declare your affiliations and preferences
  - Update your profile and products
- Stay informed
  - Receive newsletters - Login regularly

## Affiliations

### Organisation

Select your affiliated organisation from the list. [Let us know](#) if it is not listed.

\* Institute of Communication and Computer Systems (ICS)

\* National Technical University of Athens (NTUA)

### Position

Your position in the organisation.

Senior researcher ▾

## Preferences and Interests

### Reasons of interest

Select one or several reasons for your interest in the Circular Economy.

- Problem owner
- Solution provider
- Investor
- Stakeholder
- Other

### Tags

Tags of interest in the Circular Economy.

\* groundwater recharging

\* innovations

\* interdisciplinary

+11

### Technologies

Domains and Technologies of interest. Examine the [Overview of Technologies](#)

\* Groundwater systems

\* Water recovery technologies for water reuse



## Technologies

Discover technologies of the Circular Economy



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## Products

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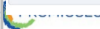


## Networking

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# Recommender System

Advanced algorithm which determines when and where you and your products are shown on the dashboard of a specific user

## Criteria:

- Stakeholder category
- Common interests in technologies, products and keywords
- Browsing behaviour

## Recommended users



### George Karavokiros

Senior researcher at National Technical University of Athens (NTUA),  
Senior researcher at Institute of Communication and Computer Systems (ICCS)



### Anne Kleyböcker

Senior researcher at Kompetenzzentrum Wasser Berlin GmbH



### Archontia Lykou

Senior expert at Institute of Communication and Computer Systems

## Welcome back George

Here are some products we think you might like.



MobileAR solution for citizen engagement towards CE approach



Urban W Optionee

Is this product relevant to you?



Why is your opinion important?



Nessie platform



Digital Enabler

Help us optimise the recommendations for you by rating the listed products.

## Criteria:

- Direct declared interest in a product
- Indirect expression of interests
- Browsing behaviour

# The marketplace is live:

<https://mp.watereurope.eu/>

The screenshot displays the homepage of the Water Europe Marketplace. At the top left is the Water Europe logo. A search bar with the placeholder text "Search for anything... Any type" is located at the top center. On the top right, there are "Login" and "Sign up" buttons. A left-hand navigation menu includes links for "About the Marketplace", "Technologies", "Products", "Case studies", "Marketplace", "Events", and "Networking". A central banner features the text "Welcome to the Water Europe Marketplace" and "A marketplace for problem owners, solution providers, investors and other stakeholders in the Circular Economy". Below the banner are four main content blocks: "Technologies" (Discover technologies of the Circular Economy), "Products" (Products, Tools and Services related to the Circular Economy), "Case studies" (Discover concrete solutions to real life problems), and "Networking" (Connect with other stakeholders, find partners, clients and investors). A blue call-to-action box on the right says "Unlock the full potential of the Knowledge portal. Personalise your experience and submit your products, meet problem owners and solution providers and join events all over Europe and beyond." Below this is a "Log In or Register" button. At the bottom left, a button says "Unlock the full potential of the marketplace" with "Login / register" below it. The footer contains the Water Europe logo, social media icons for LinkedIn, Facebook, and YouTube, and the text "WE Marketplace". A section titled "To whom it is intended for" is partially visible at the bottom. A "Show details" button is in the bottom right corner.