European Innovation Council

# Backing visionary entrepreneurs

## Proposal for a Challenge in WP 2026

Programme Manager, EISMEA 01

11/02/2026

Title of the Challenge

**Pathfinder Challenge**

# Advanced Materials for Miniaturised Energy Harvesting Systems

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EIC Programme Managers on Advanced Materials for Energy and Environmental Sustainability

European Innovation Council

# Outline

- Challenge topic proposed – background
- Specific objectives of the Challenge
- Expected outcomes and impacts
- Portfolio approach (Pathfinder)
- Ecosystem maturity and TRL level
- Time to impact and primary target group

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# Challenge topic proposed – background (1)

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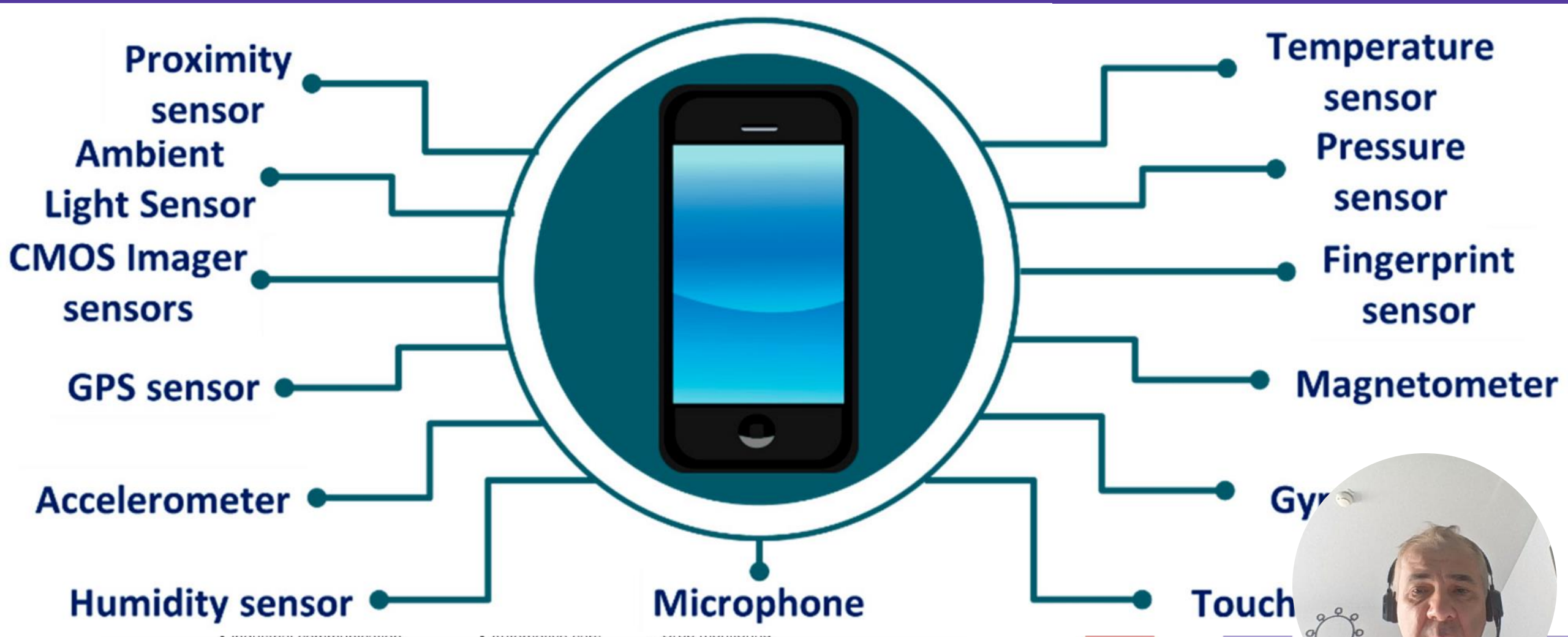
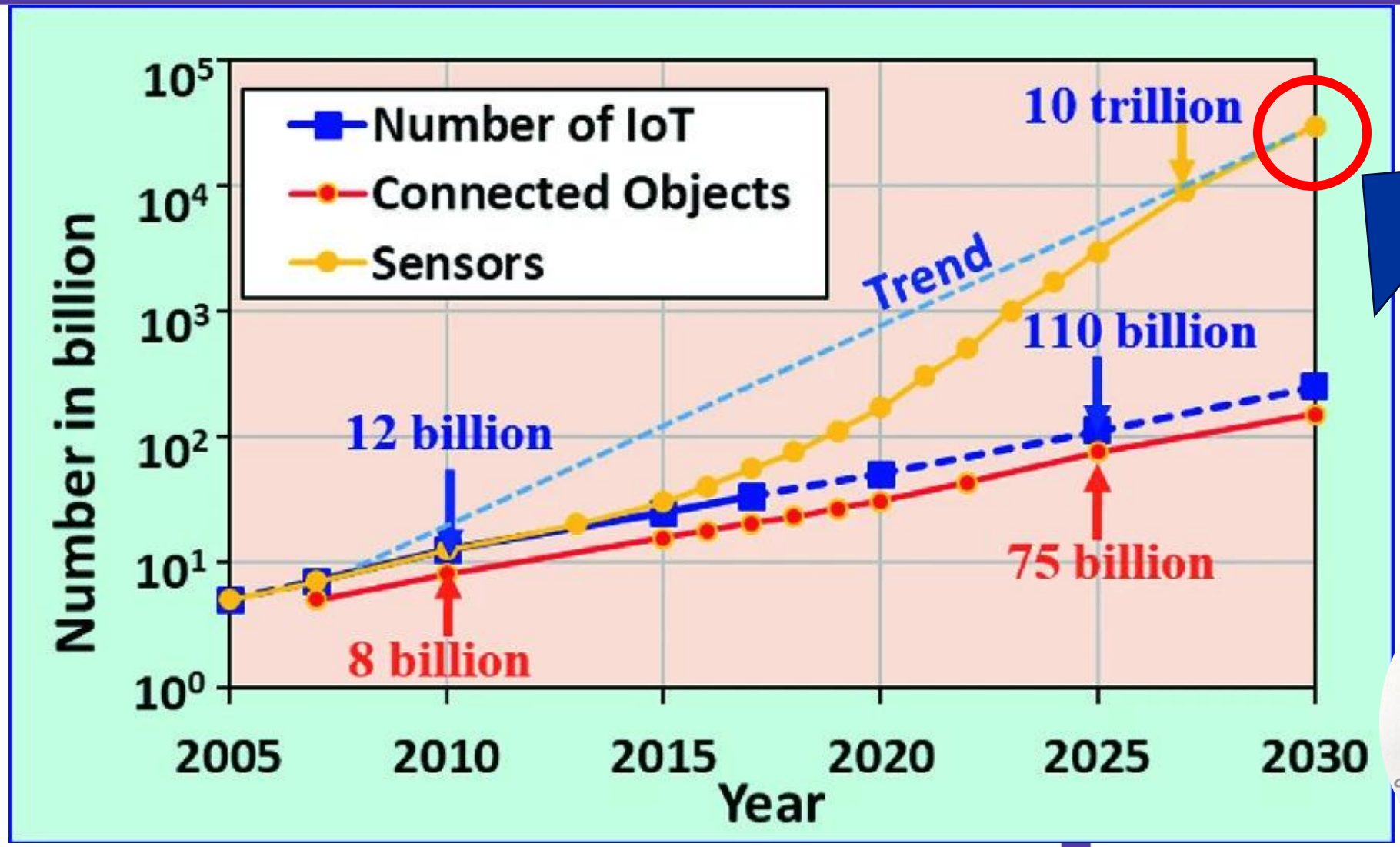


# Challenge topic proposed – background (2)




https://link.springer.com/chapter/10.1007/978-981-15-5584-8_3

# Challenge topic proposed – background (3)

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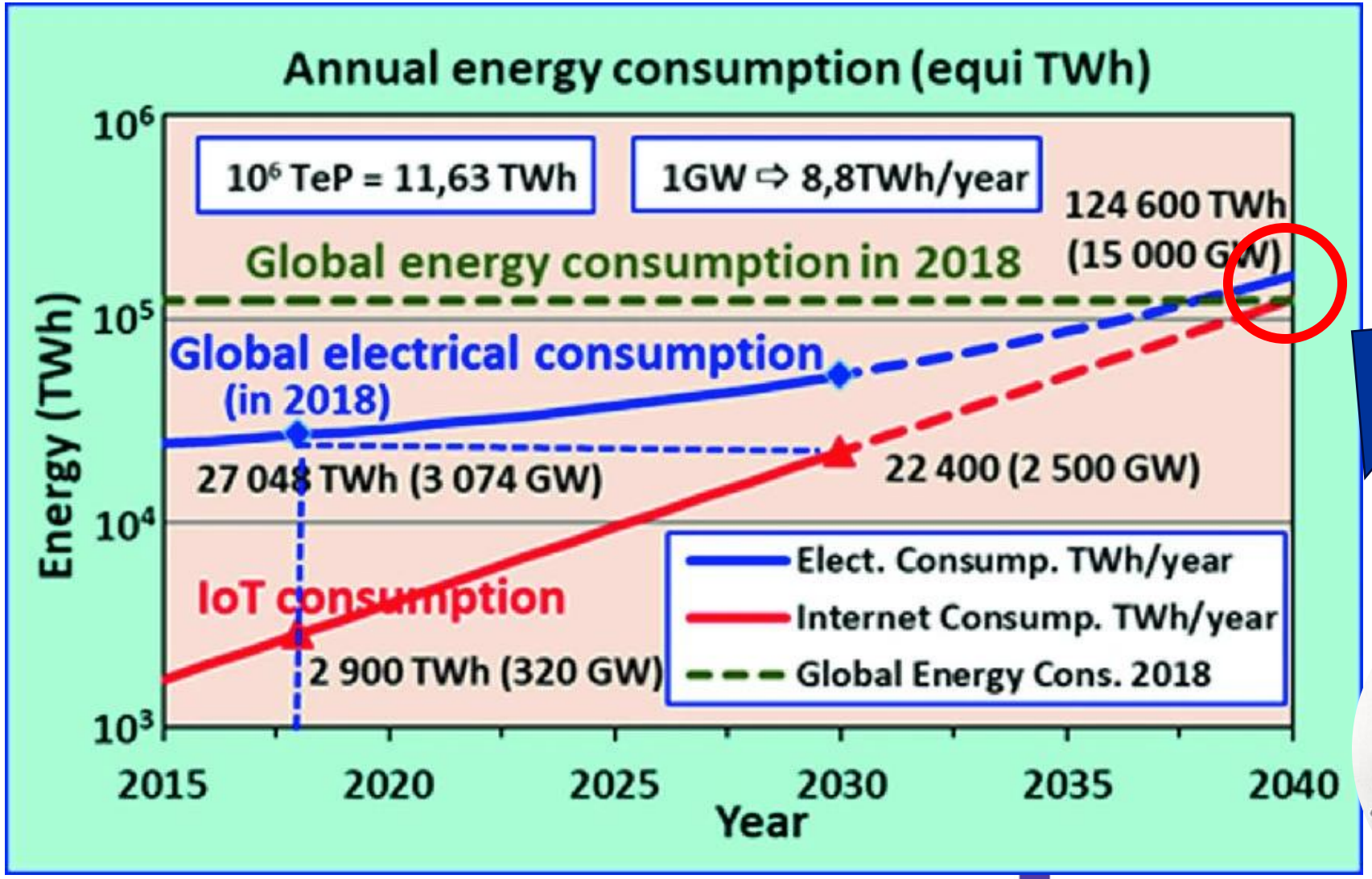


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# Challenge topic proposed – background (4)

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- **All the global electric energy consumption will be devoted to IoTs by 2030** with strong impact on energy production and CO2 emissions
- **<u>Strong impact on sustainability</u>:** to implement the WSN for IoTs if we use batteries, we need to change each day around **80 millions of batteries (10 trillions of sensors by 2027)**

**We need to find solutions to reduce energy consumption and improve sustainability developing new energetically autonomous sensors.**

**To do that we need a new generation of advanced mate**
**implement highly efficient miniaturized energy harvestin**
**with performances higher than the existing ones**

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# Specific objectives of the Challenge

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- **The identification and development of innovative advanced materials for energy harvesting, harnessing new physical/ chemical phenomena**, leading to a radical shift in application range and performance while reducing the reliance on Critical Raw Materials (CRMs)
- **The implementation of the advanced materials in a miniaturised energy harvesting module**, such as, but not limited to, miniaturised solar cells, thermoelectric generators (e.g. TEG), nanotribological/ piezoelectric devices, electromagnetic wave harvesting devices
- **Integration of the miniaturised energy harvesting modules in energetically autonomous systems (e.g. wireless integrated sensors)** and
- **Benchmarking the harvesting modules in a representative us laboratory environment (TRL 4)** with a view to demonstrating signif improvements, in terms of energy harvested, compared to the state of th

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# Expected out comes:

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- Identify a new generation of advanced materials for miniaturised energy harvesting modules
- Achieve TRL 4 for the resulting energetically autonomous systems.

# Expected outcomes and impacts

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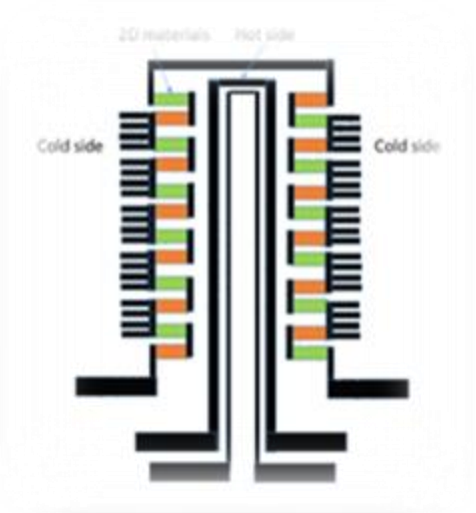
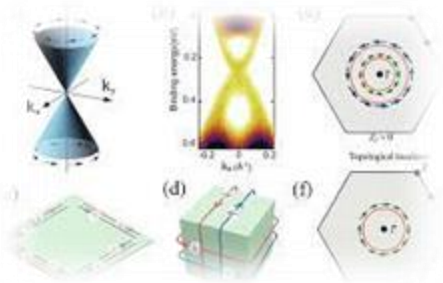
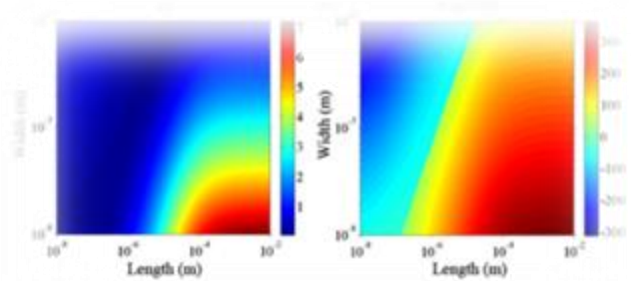
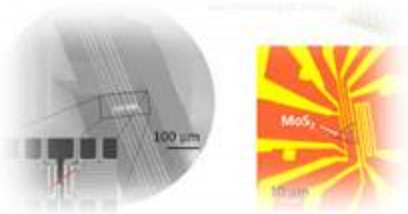
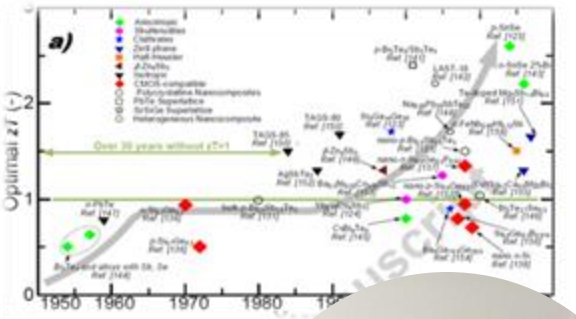
- **Scientific and technological impact**
  - To unveil new physics and potential paradigm shifts (game changer technology).
  - To foster the growth of a new generation of skilled young researchers in the field.
  - To give a strong push on technologies enhancing the performances exploiting breakthroughs.

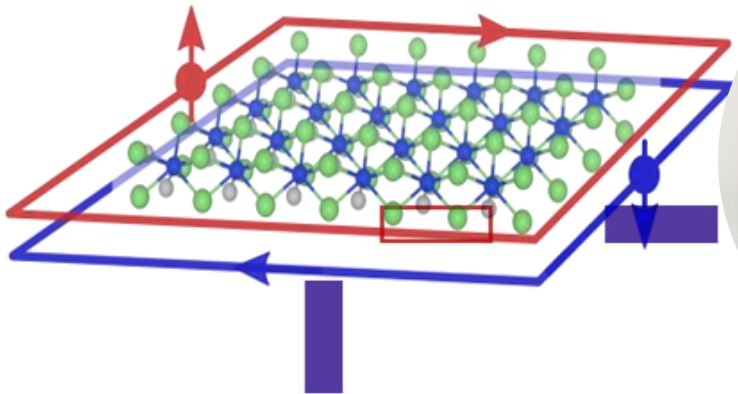




# Expected outcomes and impacts

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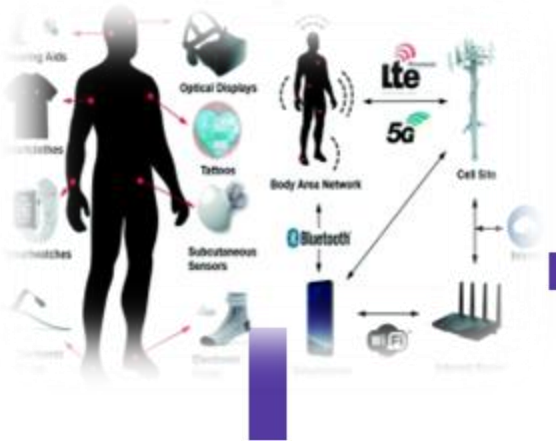
- **Societal Impact**
  - **New highly efficient advance materials for energy harvesting will become instrumental in fostering sustainability in energy consumption and production (RePowerEU, GreenDeal) and recycling.**
  - **New energetically autonomous systems based on new advanced materials will change the everyday life of Europeans citizens enabling new services (e.g. Point of care diagnostics, Smart Sustainable Cities, Smart management…)**
  - **Enhanced sustainability (e.g. 80 million of batteries to change each day by 2030) and reduced maintenance.**



# Expected outcomes and impacts

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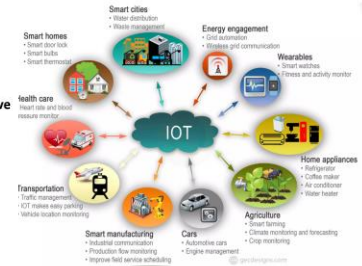
- **Economic impact**
  - **The demand for battery-free, ultralow-power devices is skyrocketing across various fields. Efficient autonomous devices exploiting a new generation of advanced materials for highly efficient energy harvesting can have a strong impact on a huge panel of applications and markets (Health, Mobility, Space, Avionics, Energy smart management, Agriculture and safety and security…).**

Intelligent aircraft health monitoring

Sensors for satellites prequalification phase

Energy smart management

Smart Manufacturing



Sensors for in orbit satellites/stations

Sensors for cars and for traffic management

Smart agriculture

Sensors for Safety (e.g gas sensing)

Wearable sensor health monitoring

# Expected outcomes and impacts

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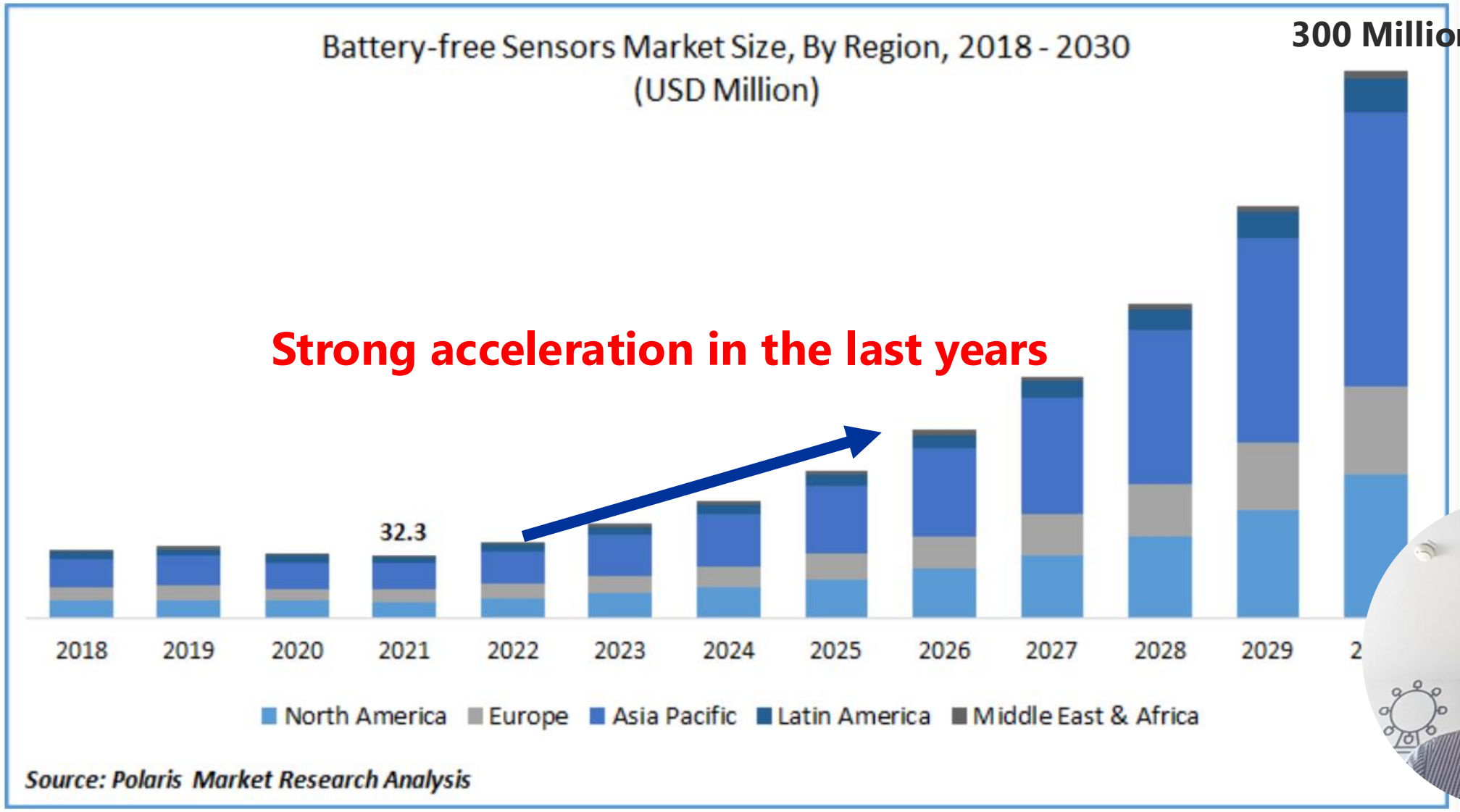

# The development of energetically autonomous sensors impacts directly the booming market of IoTs.

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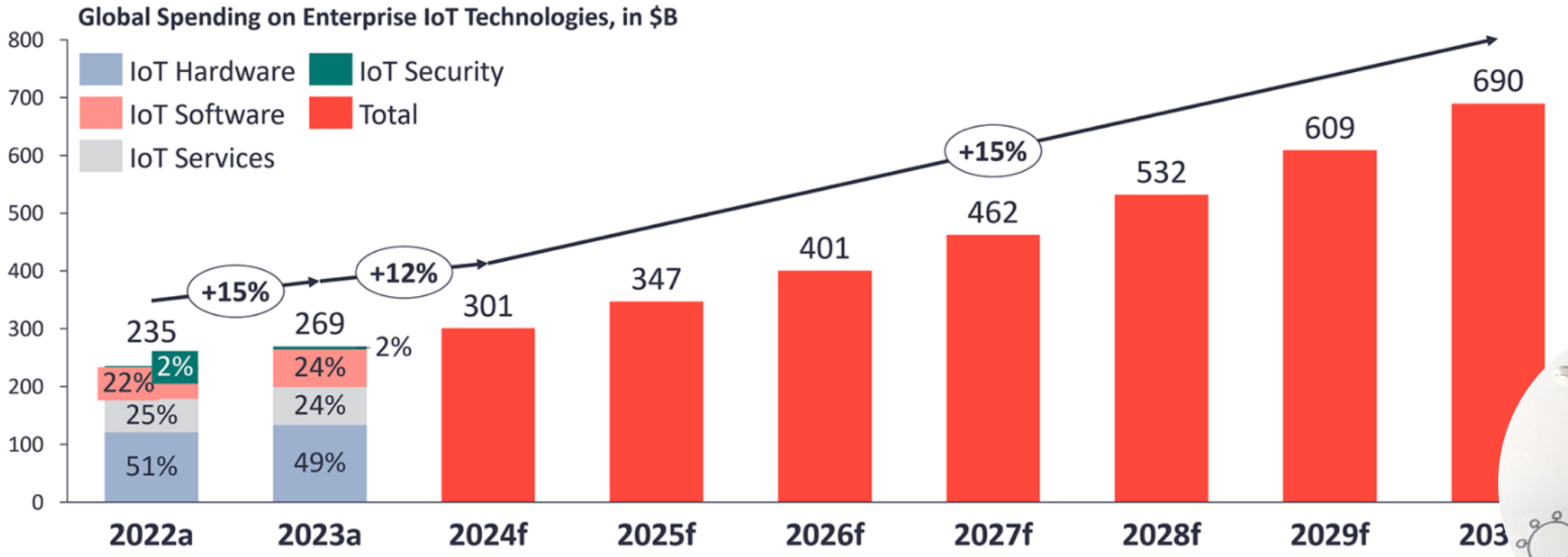
IOT ANALYTICS

July 2024

Your Global IoT Market Research Partner

## The enterprise IoT market by technology 2023–2030

Data as of June 2024



**Note:** IoT Analytics defines IoT as a network of internet-enabled physical objects. Objects that become internet-enabled (IoT devices) typically interact via embedded systems, some form of network communication, or a combination of edge and cloud computing. The data from IoT-connected devices is often used to create novel end-user applications. Connected personal computers, tablets, and smartphones are not considered IoT, although these may be part of the solution setup. Devices connected via extremely simple connectivity methods, such as radio frequency identification or quick response codes, are not considered IoT devices. Since the last update in 2023 our definition of the enterprise IoT tech stack slightly changed.
a: Actuals, f: Forecast
**Source:** IoT Analytics Research 2024 – Global IoT Enterprise Spending Dashboard (Q2/2024 update). We welcome republishing of images but ask for source citation with a link to the original post or company website.

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# Portfolio approach (Pathfinder)

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## Technologies benchmarking

- The Portfolio approach allow performing a **benchmarking of the different technologies, of their potential and maturity.**

## Enhancing the impact

- The different project can **share insights on integration steps** accelerating coupling energy harvesting module with electronic board for energy optimization and with energy storage devices and antennas for data transmission.
- For a large panel of applications, the combining of different technologies can be an extremely important option to be able to have the necessary amount of energy. **An integrated approach can allow integrating more functionalities.**

# Classification of the projects

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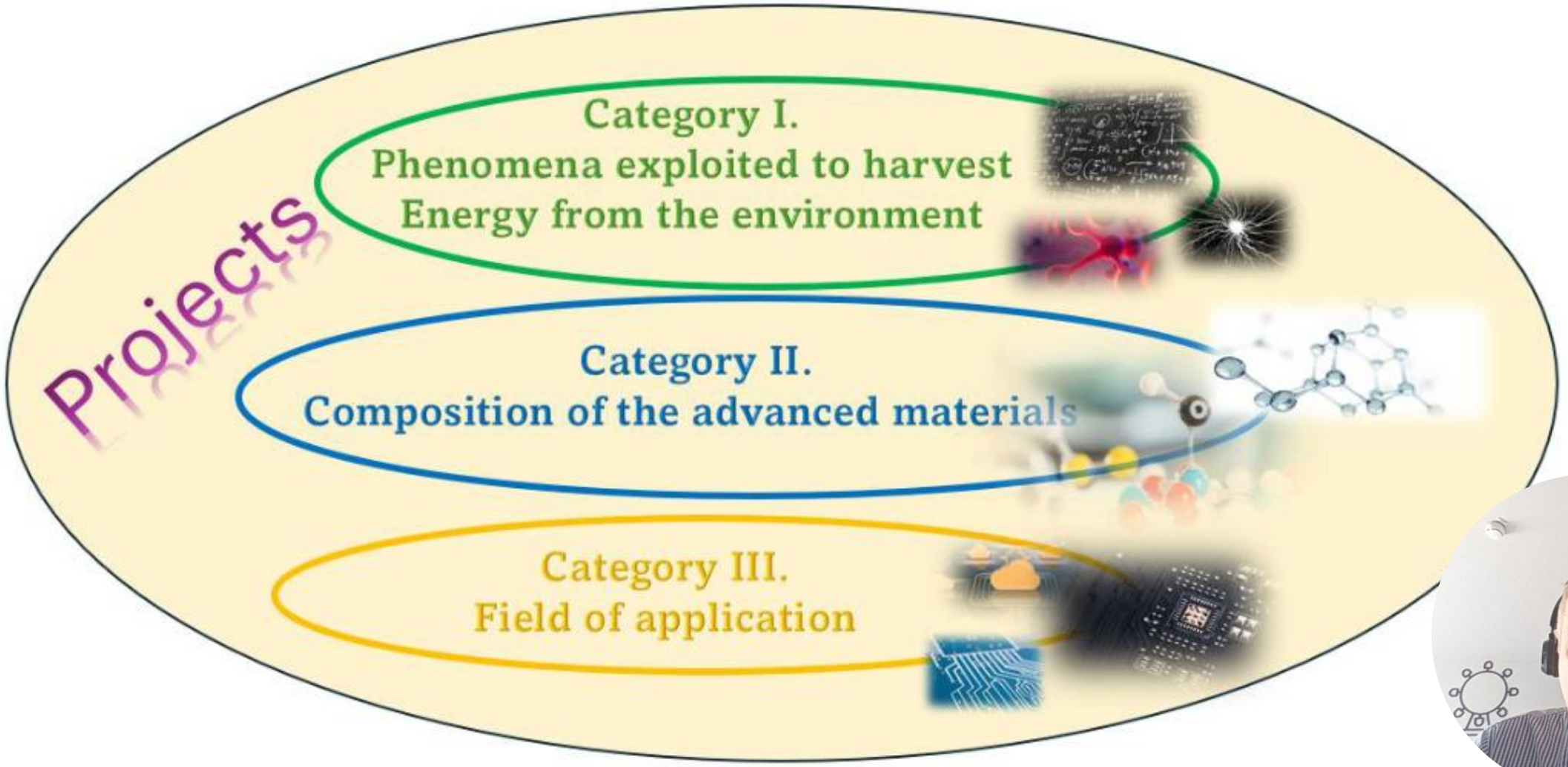

# Classification of the projects

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| | Categories | Subcategories |
|---|---|---|
| I. | Phenomena exploited for the harvesting of energy from environment | |
| II. | Advanced materials used | |
| III. | Field of application | |

# Working groupes

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## WG 1: Technology/Science

## WG 2: Regulatory issues

## WG 3: Transition of technology to innovation

## WG 4: Communication, dissemination and outreach activities

# Added value of the portfolio approach

Tools though which projects can receive additional supportProjects in the portfolio may be offered additional support, either individually or collectively, in orderto reinforce portfolio activities or explore the transition to innovation. Such additional supportincludes:

- **Booster grants of up to €50k (see Annex 5 of the EIC Work Programme).**

- **Access to additional EIC Business Acceleration Services** (seehttps://eic.ec.europa.eu/eic-funding-opportunities/business-acceleration-services_en)

- **Access to the Fast Track to the EIC Accelerator**, which would follow a project review (see Annex3 of the EIC Work Programme).

- **The possibility to apply for EIC Transition if your Pathfinder project** resulted in [illegible] proof of concept (TRL 3), or a technology validated in the lab (TRL 4)

- **Interactions with relevant projects and initiatives outside the portfolio**, including [illegible] initiatives as well as those supported by national, regional or other international bodies.

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# Ecosystem maturity and TRL level
# From computational materials science to advanced materials fabrication, SMEs companies working on micro-energy harvesting to end-users (spece, automotive, electronics, mobile phone, avionics, health…)

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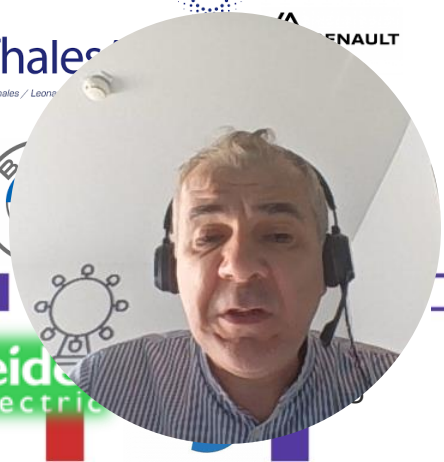
Advanced materials scientific community (working on new materials)

Theoretical physics/chemistry, computational materials scientific community

Innovative SME in the field of Energy Harvesting (new approach)

Large companies (End-users) defining precise use-cases



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# Time to impact and primary target group

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- **Target Group:** Universities, Research institutions involved in Energy Harvesting technologies collaborating with SMEs or Corporates.
- **Research activity**: applied
- **Interdependency:** The approach is to bring together the necessary skills to identify and fabricate advanced materials, to integrate them in energy harvesting systems and this following specifications provided by companies (e.g. SMEs or Corporates)
- **Time to impact**: 5-10 to years (2030-2045)

# The good project

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- Technology needs to constitute a tangible breakthrough
- Clear and concrete potential advantages compared to existing solutions (Positionning and bechmarking)
- Fundamental science is important but the innovation at the mid-long term needs to be pointed out and justified
- Aligned with a potential market (mid long term)

# The bad project

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- KPIs are not clearly identified
- The objectives are too broad
- The potential applications are not clear
- The implementation is not convincingly addressed
- The advantages compared to existing solutions are not clear (positionning)

# Deadline

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| Call | Who can apply | What for | Deadlines | Indicative Budget (EUR million) | EIC Challenge | Deadlines/ Cut-offs | Indicative Budget (EUR million) |
|---|---|---|---|---|---|---|---|
| **EIC Pathfinder** | Open call: only consortia can apply.<br>Challenges call: smaller consortia (at least two eligible entities) or single applicants as well as larger consortia. | Grants up to EUR 4 million.<br>Higher amounts if duly justified.<br>Projects to achieve the proof of principle and validate the scientific basis of breakthrough technologies (starting from early TRLs aiming at achieving TRL3 or 4) | 12/05/2026 | 166 | II.2.1 Advanced Materials for Miniaturised Energy Harvesting Systems<br>II.2.2 Biotechnology for Healthy Ageing<br>II.2.3 DeepRAP: Deep Reasoning, Abstraction & Planning towards trustworthy Cognitive AI Systems | 28/10/2026 | 96 |

**https://eic.ec.europa.eu/eic-funding-opportunities/eic-pathfinder/eic-pathfinder-challenges-2026_en**

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# Thank you!

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