

CIRCULAR ECONOMY IN INDUSTRY

4.0 CONTEXT SCENARIO

ACTIVITY SUMMARY

The activity is conducted as a collaborative serious game in which participants design and optimize a circular economy strategy for end-of-life electric vehicle batteries. Working across three interconnected boards (Battery, Factory, and Management), teams analyse battery conditions, select the most appropriate circular strategy (remanufacturing, repurposing, or recycling), allocate industrial resources, and evaluate economic, environmental, and social impacts while making collective decisions under realistic industrial constraints.

TEACHING APPROACH



GAME BASED
LEARNING



PROBLEM BASED
LEARNING



CHALLENGE
BASED
LEARNING



INTERACTIVE
TEACHING

MATERIELS

SERIOUS BOARD GAME

GAME BOARDS, CARDS AND TOKENS

LEARNING OBJECTIVES

Knowledge

- Explain the principles of the circular economy and end-of-life battery management.
- Identify the characteristics of remanufacturing, repurposing, and recycling strategies.
- Understand the role of battery State of Health (SoH) in circular decision-making.

Technical skills

- Analyse battery profiles and select the most appropriate circular strategy.
- Design a circular battery process and organize the corresponding factory resources.
- Evaluate economic, environmental, and human impacts using performance indicators.

Interpersonal skills

- Collaborate effectively to achieve shared objectives in a multidisciplinary team.
- Develop decision-making and problem-solving skills under realistic constraints.
- Communicate and negotiate strategic choices throughout the game.
- Recognize the importance of sustainability and responsible industrial practices.

RESPONSABILITY

- The Circular Economy Engineer can take responsibility for selecting the most appropriate end-of-life strategy based on battery conditions and sustainability objectives.
- The Industrial Engineer can take responsibility for designing circular production processes and organizing the resources required for their implementation.
- The Sustainability Manager can take responsibility for evaluating environmental, economic, and social performance indicators to support decision-making.
- The Operations Manager can take responsibility for coordinating multidisciplinary teams and ensuring the successful implementation of circular economy strategies.

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SPECIFICATIONS OF THE ACTIVITY

AWAKEN TRAINEES CURIOSITY

Recommended duration : 20min

Introduce the challenges of the circular economy through the context of end-of-life electric vehicle batteries. Invite trainees to discuss current sustainability issues, resource scarcity, and possible strategies for extending battery life. Present the game scenario and encourage participants to predict which circular strategy would be the most appropriate.

RAISE AWARENESS OF THE IMPORTANCE OF CIRCULAR ECONOMY IN REDUCING ENVIRONMENTAL IMPACTS, PRESERVING RESOURCES, AND SUPPORTING SUSTAINABLE INDUSTRIAL DEVELOPMENT.

CONVEY THE FUNDAMENTAL KNOWLEDGE

Recommended duration : 30 min

Introduce the principles of the circular economy, the concept of State of Health (SoH), and the characteristics of remanufacturing, repurposing, and recycling. Explain the game rules, the interactions between the three boards, and the performance indicators used throughout the activity.

ENSURE THAT TRAINEES UNDERSTAND HOW TECHNICAL, ECONOMIC, ENVIRONMENTAL, AND HUMAN FACTORS INFLUENCE CIRCULAR DECISION-MAKING IN INDUSTRIAL SYSTEMS.

ENABLE TRAINEES TO APPLY THE KNOWLEDGE

Recommended duration : 60 min

Teams collaborate to design the most appropriate circular strategy for end-of-life batteries. Participants analyse battery profiles, organize industrial resources, respond to unexpected events, and continuously evaluate budget, environmental, and workforce indicators while adapting their decisions throughout the game.

ENCOURAGE COLLABORATIVE DECISION-MAKING, SYSTEMS THINKING, AND STRATEGIC PLANNING TO ACHIEVE THE BEST BALANCE BETWEEN SUSTAINABILITY AND INDUSTRIAL PERFORMANCE.

STIMULATE TRAINEES' REFLECTIONS ABOUT THE TRAINING, AND FOSTER LIFELONG LEARNING AND CONTINUOUS IMPROVEMENT

Recommended duration: 15 min

Conclude the activity with a collective debriefing. Invite trainees to reflect on their strategic decisions, teamwork, and the trade-offs between environmental, economic, and social objectives. Discuss how the acquired knowledge can be transferred to real industrial contexts and future professional practices.

HIGHLIGHT THE IMPORTANCE OF CONTINUOUS LEARNING, SUSTAINABILITY, AND COLLABORATIVE PROBLEM-SOLVING TO SUPPORT THE TRANSITION TOWARDS A CIRCULAR INDUSTRY.

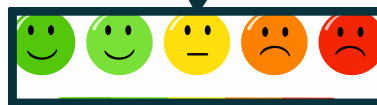
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EVALUATION

Knowledge assessment

- Assess trainees' understanding of circular economy principles and battery end-of-life strategies.
- Evaluate their ability to select and justify the most appropriate circular strategy.
- Measure their capacity to analyse trade-offs between economic, environmental, and social performance indicators.
- Assess problem-solving and decision-making skills in realistic industrial scenarios.



Perception assessment

- Gather trainees' feedback on the serious game methodology and learning experience.
- Evaluate the perceived usefulness of the game for understanding circular economy concepts.
- Assess participants' perceptions of collaboration, engagement, and interaction throughout the activity.
- Collect suggestions for improving the game and future training sessions.