



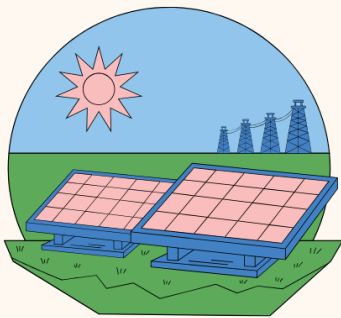
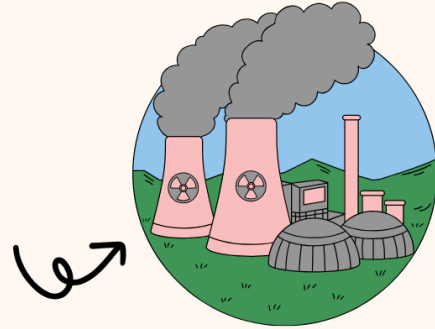
# **GLB 205 Projects**

## **Fall 2024/2025**

# INDUSTRY'S IMPACT ON CLIMATE CHANGE

## 1 PREDICTABLE SCENARIOS AND INDUSTRIAL DEVELOPMENTS

- Industrial growth is driven by population growth, urbanization, and energy demand. However, uncertainties like climate change and resource scarcity require flexible and sustainable strategies. Industry 4.0 technologies and collaboration offer solutions to these challenges.

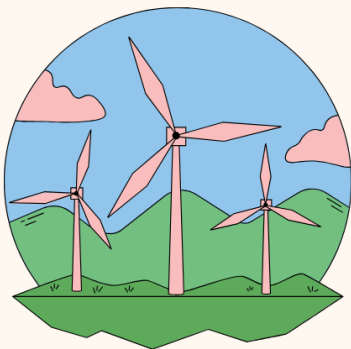
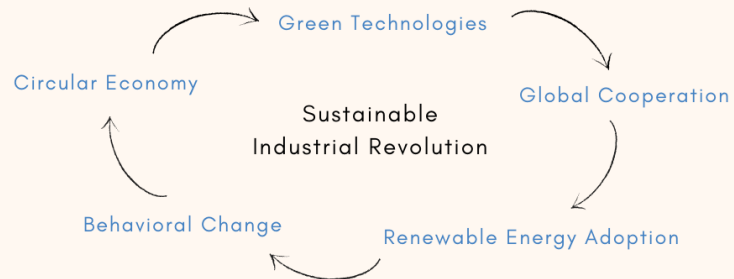


## 2 ALTERNATIVE SCENARIOS OF INDUSTRY CHANGES

- Transparent, data-driven policies ensure accountability and continuous improvement
- Accelerate the adoption of Industry 4.0 technologies to improve efficiency and environmental responsibility
- Adopt global strategies that prioritize sustainability and enhance resilience against environmental challenges.

## 3 ADAPTIVE MANAGEMENT PRACTICES

- Governments phase out fossil fuels, investing in renewables and storage technologies.
- A circular economy minimizes waste with recyclable products, while green technologies and carbon capture reduce emissions.
- Global agreements and AI-driven factories enhance efficiency, supporting vulnerable nations.
- These efforts limit warming to 1.5°C, stabilize CO<sub>2</sub> levels, preserve biodiversity, and improve public health.



## 4 VISIONS OF A SUSTAINABLE AND CLIMATE RESILIENT FUTURE

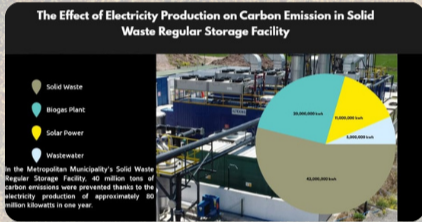
- Transitioning from fossil fuels to clean energy sources (solar, wind, etc.).
- Enhancing energy efficiency in production processes.
- Circular Economy Models:
- Minimizing waste by recycling and reusing materials.
- Reducing the extraction of raw resources through closed-loop systems.
- Implementing AI and IoT for real-time monitoring of environmental impacts.
- Developing green technologies to reduce carbon footprints.

# Sustainable Transportation Solutions and Climate Change in Kayseri



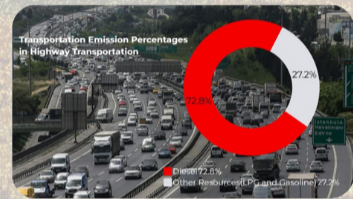
## Introduction

- **Kayseri and Climate Change:** As part of the arid Central Anatolia region, Kayseri is expected to face reduced rainfall and higher temperatures in the coming years.
- **The Role of Transportation:** The transportation sector is a significant contributor to greenhouse gas emissions, and sustainable transportation solutions are essential to mitigate these impacts.



## Proposed Sustainable Solutions

- **Development of Electric Vehicle Infrastructure:**
  - Install electric vehicle charging stations across the city.
  - Implement policies to incentivize electric vehicle purchases.
- **Strengthening Public Transportation:**
  - Extend tram networks and increase bus routes.
  - Introduce solar-powered public transport vehicles.
- **Smart Transportation Systems:**
  - Real-time traffic management systems to reduce congestion.
- **Designing a Bike and Pedestrian-Friendly City:**
  - Expand bike lanes and increase pedestrian-only zones.
- **Integrating Quantum Technologies in Transportation:**
  - Utilize quantum computing to optimize traffic flow and public transport schedules by analyzing complex data in real-time.
  - Employ quantum sensors for highly accurate vehicle navigation and efficient route planning.
  - Develop quantum-secure communication networks to ensure robust data protection for smart transportation systems.



DEVELOPMENT OF SOLUTION SUGGESTIONS ACCORDING TO TIME  
**In Short Term 0-5 (years)**  
**In Medium Term 5-15 (years)**  
**In Long term (15+)**

## Current Situation

- Kayseri's public transportation system relies heavily on trams and buses, yet car usage remains high.
- Infrastructure for electric vehicles is insufficient, and bike lanes are limited.
- Climate change, with increasing temperatures, may lead to damage to road infrastructure and reduce transportation efficiency.



(Transportation infrastructure map of Kayseri.)



## Policy Recommendations

- **Renewable Energy Usage:**
  - Power transportation systems using solar and wind energy.
- **Emission Limits:**
  - Set carbon emission limits for private vehicles.
- **Urban Transportation Incentives:**
  - Offer discounts on public transportation fares to encourage usage.



## Conclusion

- **Expected Outcomes:**
  - a.Reduction in carbon emissions in Kayseri.
  - b.Development of a more climate-resilient transportation infrastructure.
  - c.Increased adoption of sustainable transportation methods by the public.
- **Global Examples:** Germany, Sweden, Denmark

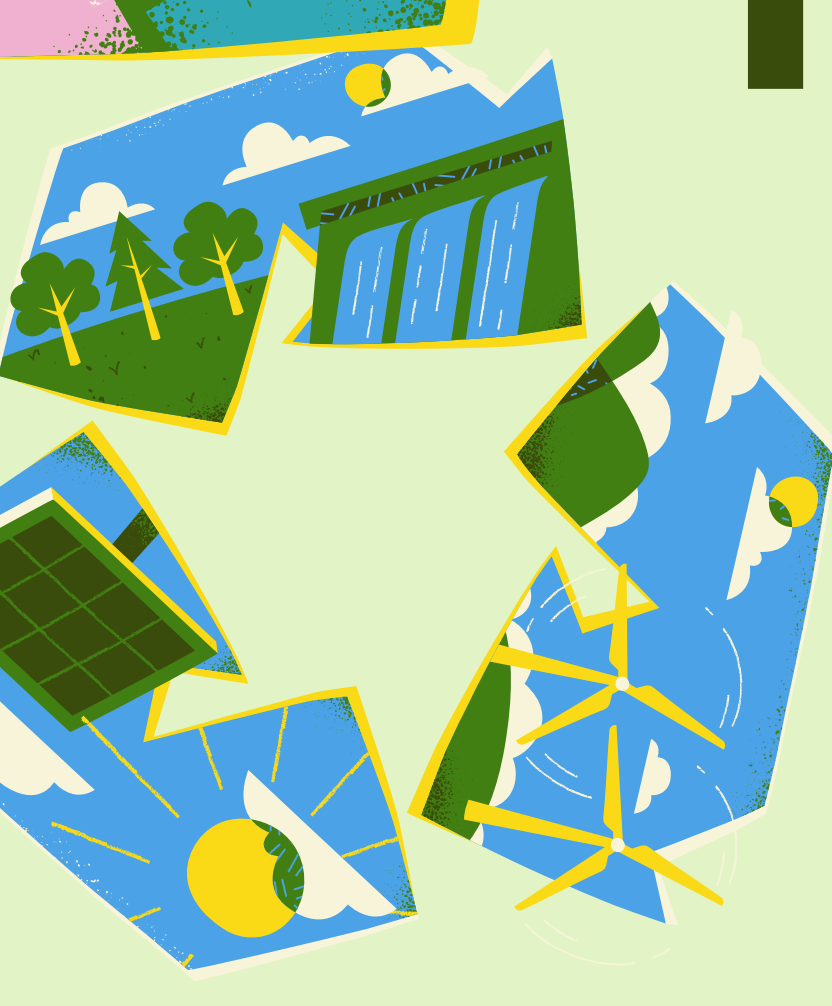


## Scenario Definition

- **Objective:** To establish a low-carbon, eco-friendly, and cost-effective transportation system in Kayseri.
- **Goals:**
  - a.Reduce the carbon footprint of public transportation.
  - b.Encourage the adoption of electric vehicles.
  - c.Expand bike lanes and promote alternative modes of transportation.



# 2050: THE ENERGY FUTURE OF KAYSERİ



The year is 2050. Hydroelectric power plants, which once made a significant contribution to meeting Kayseri's energy needs, can no longer produce enough energy.

### Problems

**Hydropower dependency and Water Loss:**  
Due to decrease in the Kızılırmak River, Yamula Dam is in a very poor condition.

**Socioeconomic Effects:**  
Significant impacts on daily life and industrial production. Such as hospital and transportation energy outages.

**Future Risks:**  
In case of drought, Kayseri is expected to face an energy crisis.

### Solutions

**Hybrid: Solar and Wind Hybrid Energy Systems:**  
Solar Energy: Maximum efficiency with perovskite, and bifacial panels.  
Wind Energy: Erciyes Mountain and the surrounding suitable areas have high potential.

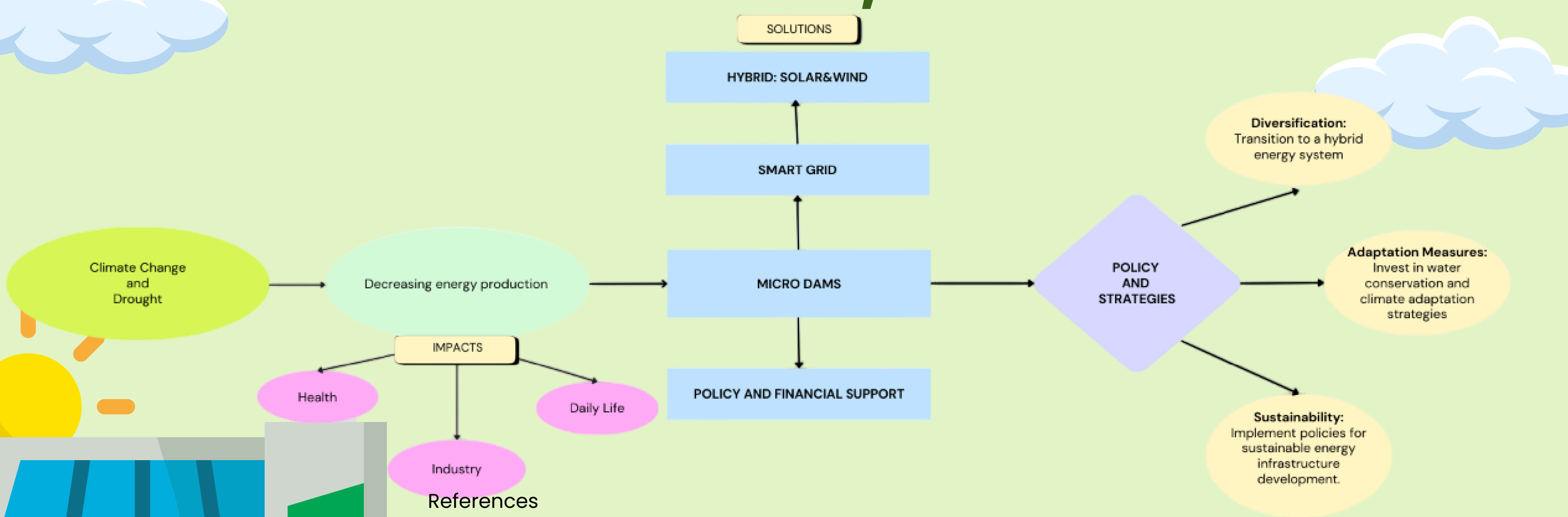
**Micro Dams:**  
It can be applied to the branches of the Kızılırmak River. It provides a local solution with less damage to the environment.

**Smart Grid:**  
Smart grids will be essential to Kayseri's energy because they will dynamically balance energy demand, minimize energy losses, and allow consumers to optimize their energy use.

**Policies and Financing:**

- Firms investing in renewable energy systems may receive tax reductions and exemptions.
- More favorable rates may be offered for loans taken for energy efficiency and renewable energy systems.
- Conversion to renewable energy systems and energy savings can be achieved in public building.

## SUSTAINABLE ENERGY, RESILIENT CITIES



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## WHISPERED THREATS OF CLIMATE CHANGE

### AN END OR A NEW BEGINNING FOR TOURISM OF KAYSERI?

#### Kayseri 2080 Possible Scenario

In Kayseri, climate change impacts such as reduced snow at Erciyes Ski Resort, drying of Sultan Marshes, and fires with biodiversity loss in Aladağlar National Park threaten tourism.



#### Possible Solutions

##### Artificial Snow but “Natural”

Some bacteria bind water regularly within their cell walls, allowing it to freeze into a natural ice crystal structure. This allows microbes such as *Pseudomonas syringae* to help form snow at high temperatures.



##### Disaster Tourism

Disaster tourism helps raise awareness by presenting disaster scenarios in specific regions. These areas, like Chernobyl in Ukraine, Hurricane Katrina sites in the USA, and Pompeii in Italy, serve as lessons for visitors about the impacts of natural and man-made disasters.



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# CLIMATE CHANGE AND EFFECTS ON AGRICULTURE AND LIVESTOCK IN KAYSERİ

Climate change poses significant threats to Kayseri's agriculture and livestock sectors through rising temperatures, water scarcity, and extreme weather events, endangering food security and traditional farming practices. This presentation will outline these challenges, envision Kayseri's future in 2080, and propose solutions to protect these vital sectors.

## 1 - PURPOSE

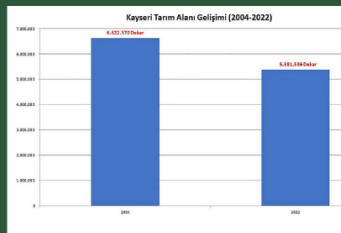
- Analyze climate change's impact on agriculture & livestock.
- Predict future risks for Kayseri.
- Offer sustainable solutions for resilience.

## 2 - SCOPE

- Focus on Kayseri's agriculture and livestock sectors.
- Assess economic and environmental challenges.
- Propose region-specific adaptation strategies.

## 3 - RESEARCH

- **Data Collection:** Field observations, case studies.
- **Analysis:** Expert reviews, climate models.
- **Solutions:** Best practices for sustainable farming.



## 4 - CHALLENGES

- **Agriculture:** Declining soil fertility, water scarcity, reduced yields.
- **Livestock:** Heat stress, feed shortages, disease risks.

## 5 - 2080

- **Agriculture:** Desertification, 50% crop yield loss.
- **Livestock:** 40% population decline, economic instability.

## 7 - DISCUSSION

- Immediate action is critical.
- Collaboration among farmers, governments, and organizations.
- Policies for funding sustainable practices.

## 6 - SOLUTIONS

For Agriculture:

1. Modern irrigation systems.
2. Water harvesting.
3. Soil health restoration.
4. Drought-resistant crops.
5. Promoting pollination.



For Livestock:

1. Heat-tolerant breeds.
2. Improved housing.
3. Disease management.
4. Secure feed supply.
5. Community support.

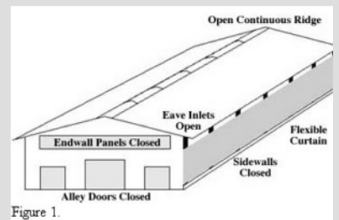


Figure 1.

## 8 - VISION

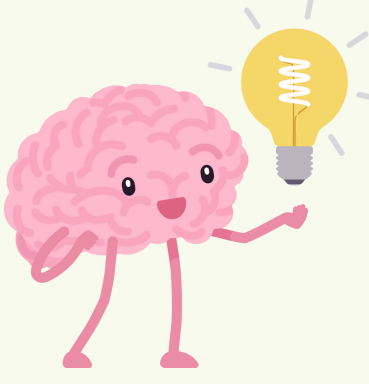
**A Resilient Future**

Through innovation, adaptation, and sustainable development, Kayseri can overcome climate challenges and secure its agricultural legacy.

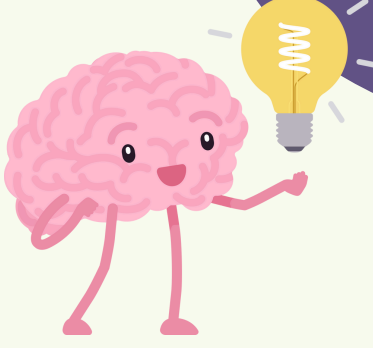
# GREEN TECHNICAL INFRASTRUCTURE



The project aims to reduce water pollution from agriculture, industry and residential areas in Kayseri.



To this end, it offers biotechnological solutions such as microorganism pumps and artificial ponds, contributing to the removal of heavy metals and toxic substances. Thus, it is planned to protect water resources and create a sustainable water management model.



1

## Water Pollution



## Cleaning of Land and Water with Microorganisms

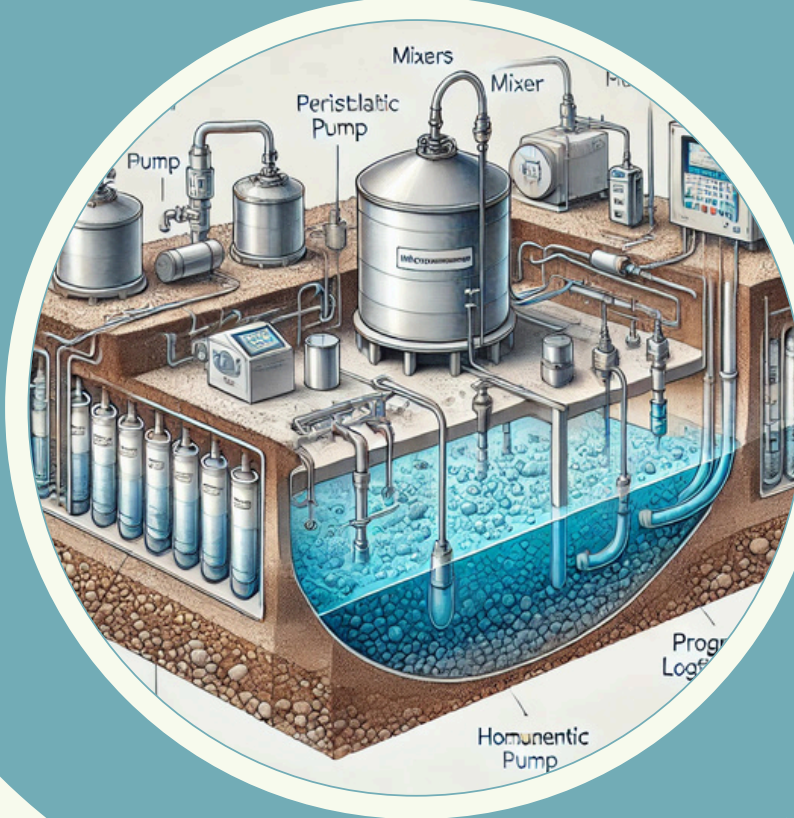
2



## Dam



## Pumping System



4

There are some positive and negative scenarios in the future. Also there will be some expected.

3

The pump that we dreamed could be applied in the some areas in Kayseri like Yamula Dam and Develi Plain.