

Campus buildings improvement for higher energy consumption Efficiency

Revised June 2022

Mutah University

Maintenance and sustainable unit

Building Energy Management Vision

During this decade, there is a growing global emphasis on adopting more rigorous and innovative measures to preserve and effectively manage university energy resources. Mutah University's Energy Management Vision has become an increasingly prominent focus for the university's management and technical staff in response to global and local energy crisis challenges. Numerous university departments and centers collaborate to bring this vision to fruition, as illustrated in Figure 1:

- Training, Consultation, and Communication Center
- **Maintenance and Sustainability Unit**
- Prince Faisal Center for Dead Sea, Environmental, and Energy Research
- Entrepreneurship Center
- Community and Development Center

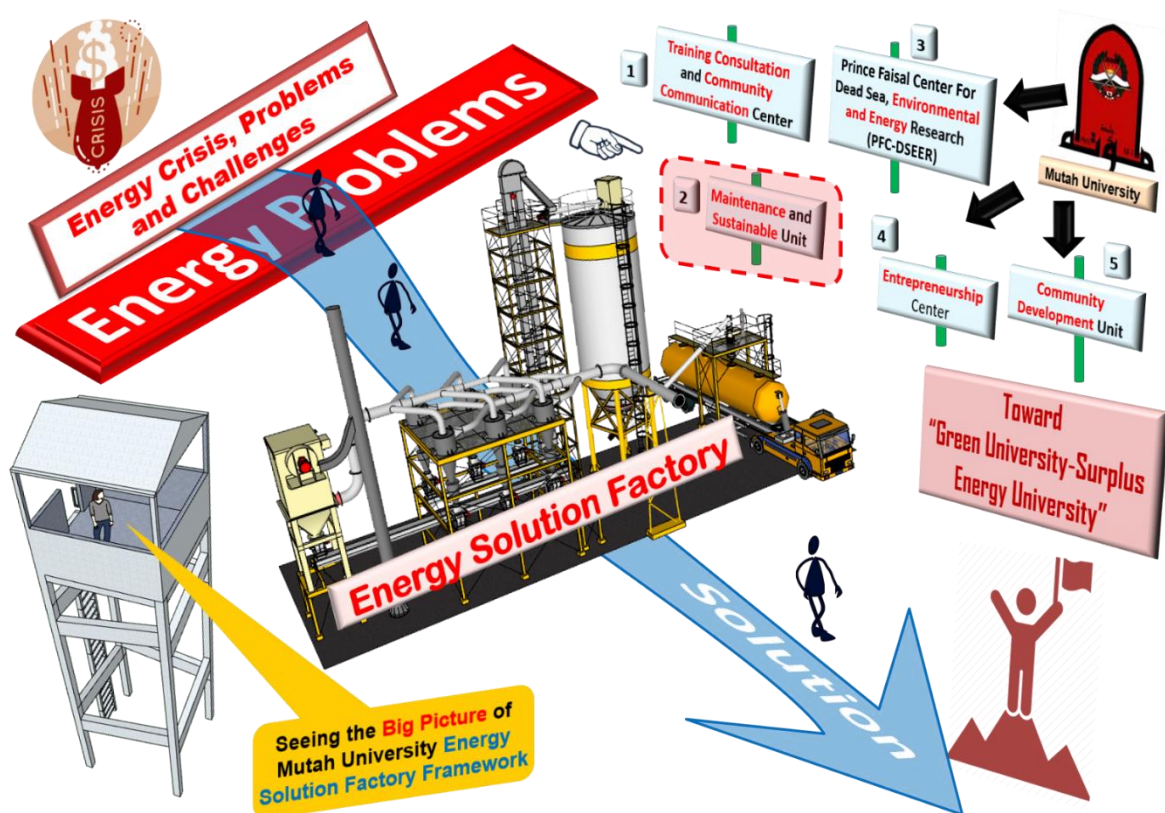


Figure 1: A Visual big picture of Mutah University Energy Management vision based on the Energy Solutions Factory Framework

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The effectiveness of energy management activities at Mutah University is hindered by fragmentation and the lack of a comprehensive vision capable of integrating the various initiatives across multiple units and centers. The Energy Solution Factory Framework emerges as a pivotal structure capable of harmonizing these energy management endeavors under a single, adaptable umbrella, as depicted in Figure 1. Academic institutions are universally acknowledged as hubs for policy development, technological advancements, and knowledge generation that can be nurtured to yield innovations across diverse domains. Embracing the concept of universities as 'factories' capable of transforming challenges into opportunities, facilitating the transfer of knowledge and technologies, and fostering innovative solutions is central to Mutah University's Energy Management Vision, as illustrated in Figure 1

Integrated Picture of Mutah University Energy Management Activities

Integrating Energy Management Practices significantly enhances the evolving Energy Management Vision. This vision revolves around consolidating Energy Management Practices provided by the five principal university centers and units mentioned earlier into a cohesive framework with the overarching goal of transforming Mutah University into a sustainable Energy Surplus University, as depicted in Figure 2. The significance of countering the drawbacks associated with the fragmentation of these diverse initiatives becomes evident in creating a comprehensive overview of the university's energy management endeavors, as illustrated in Figure 2. Gaining a holistic perspective on these collaborative practices is crucial for achieving Energy Management Integration.

Constructing Far Reaching Road Map of Mutah University Energy Management Activities based on Seed to Fruit Framework

The previous adoption of the Solution Factory Framework facilitated the development of a versatile template, transforming all energy management initiatives into a standardized format that can be easily adapted for implementation in various settings, as depicted in Figure 1. Creating a unified overview marked a crucial shift in our approach to Energy Management, transitioning from a fragmented mode to a more cohesive and continuous one, as shown in Figure 2. Now, the focus is on a more detailed level of integration, delving into energy management activities from a seed growth perspective, categorizing them into four types, as illustrated in Figure 3:

- Seed Activities
- Root Activities
- Branch Activities
- Fruit Activities"



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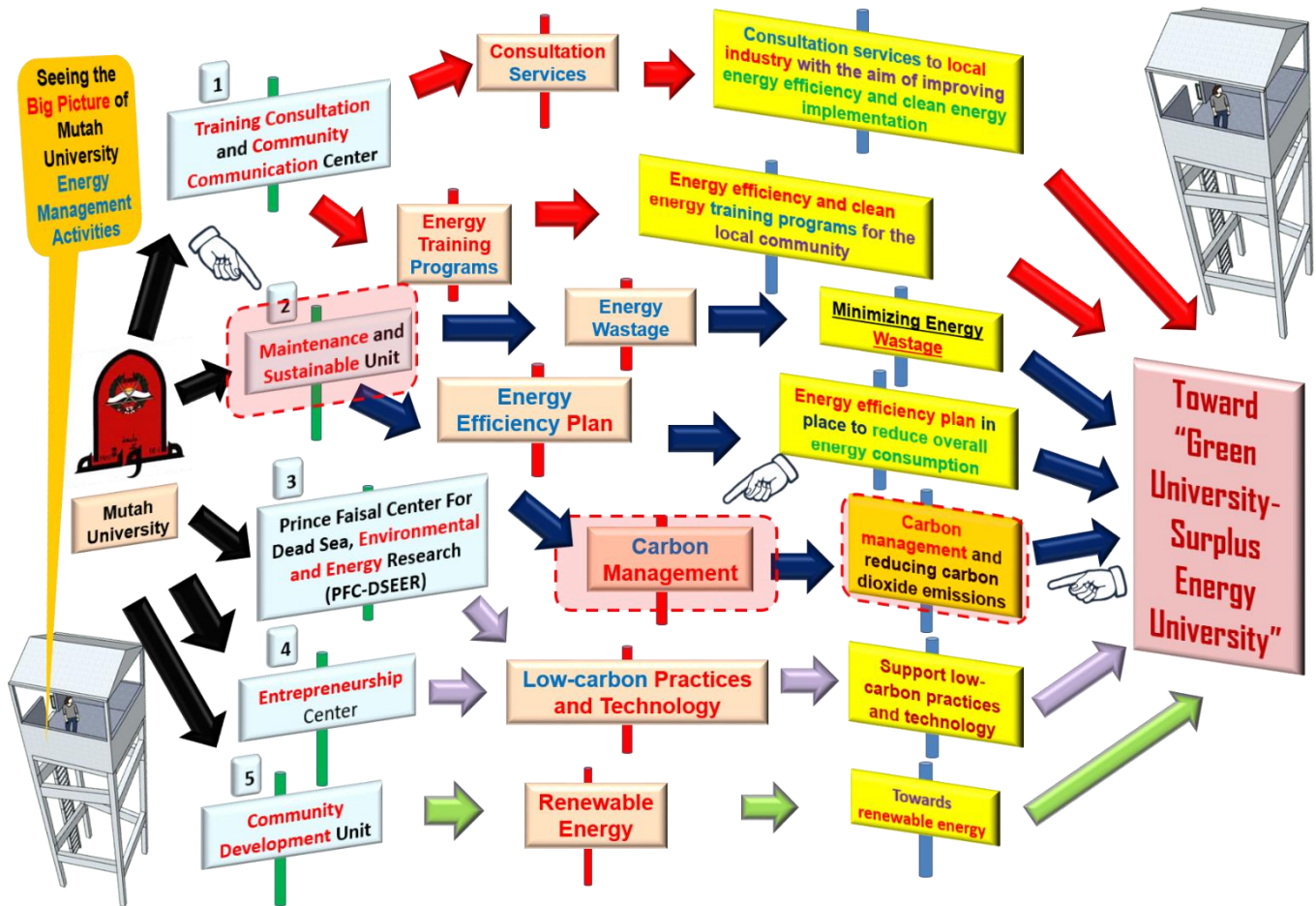


Figure 2: A Visual Big Picture of Mutah University Energy Management Activities

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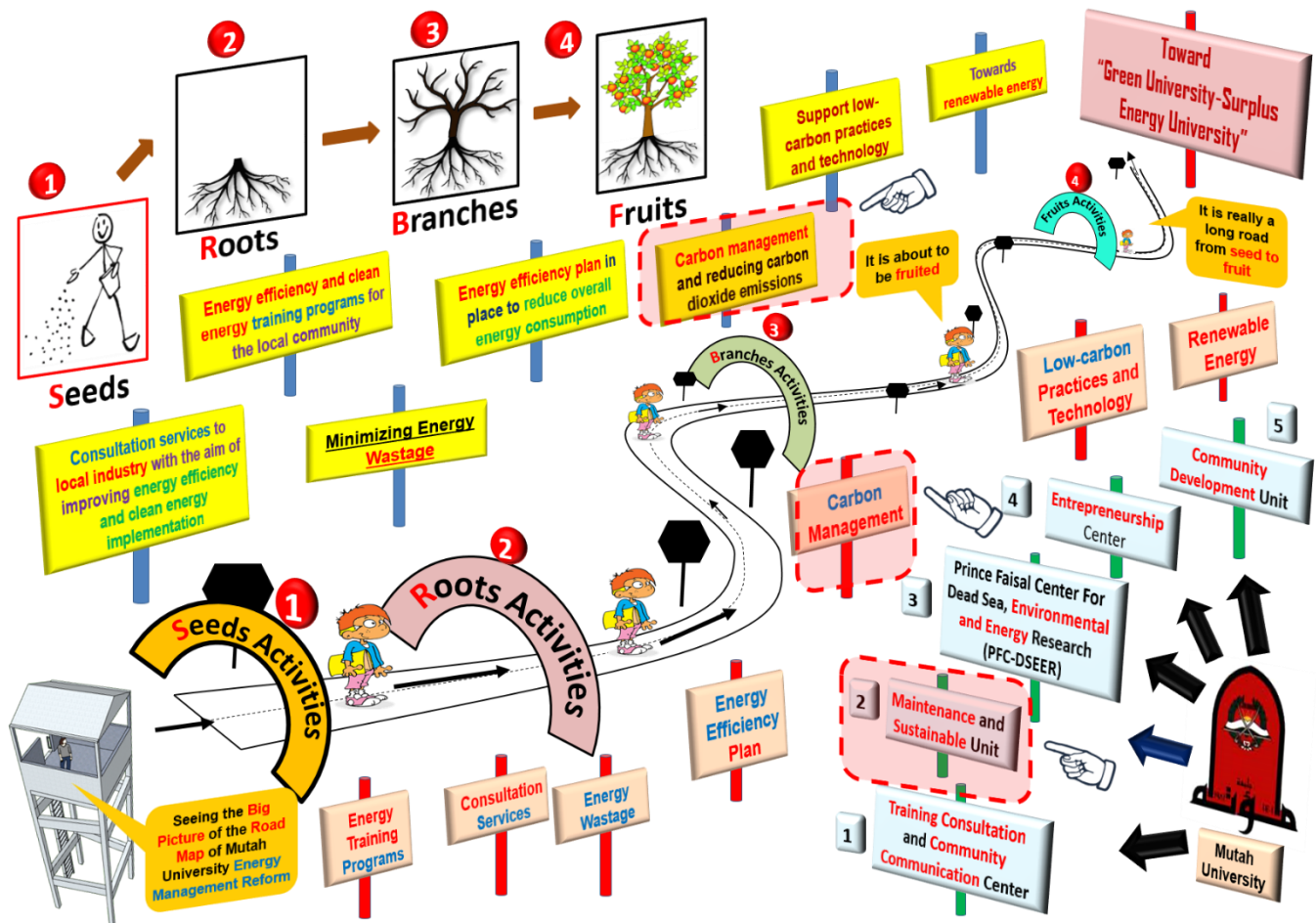


Figure 3: A Visual Road map of Mutah University Energy Management Activities based on Seed to Fruit Framework

The seed-to-fruit framework will establish an essential interconnection within this network of activity fragments, facilitating the transition of Energy Management Thinking towards an instrumental mode that imparts purpose to this intricate web of both sequential and parallel practices, as depicted in Figure 3

Maintenance and sustainable unit

The Maintenance and Sustainability Unit was founded in 1993 and encompasses the following departments:

- Maintenance Department
- Mechanical Department
- Electrical Department
- Follow-up and Field Control Department
- Communications Department
- Buildings Department"

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Buildings department

The Buildings Department oversees the operations and safety of all buildings, ensuring their functionality by monitoring various building systems, including heating, cooling, lighting, and public safety. Additionally, the department has initiated a shift towards transforming buildings into energy surplus producers. This includes developing insulation systems, replacing windows with energy-efficient double-glazed alternatives, substituting conventional lighting units with energy-efficient LED systems, and implementing contemporary air circulation systems to optimize energy usage for building cooling and heating.

The Buildings Department adopts the building development plan at Mutah University for high-efficiency buildings by developing many systems such as insulation systems, energy-saving glass, revolving doors, solar water heating systems, air circulation systems, and many others. The transformation of the university's buildings into high-efficiency buildings is shown in Table (1).

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Table 1: Percentage of transformation of the university's buildings into high-efficiency buildings.

Buildings name	Insulation system	Double glazing windows	Revolving doors	LED lighting	Solar water heating	Cooling and heating system	Completion Percentage
Presidency Buildings	Done	Done	Done	Done	Done	Done	100
Engineering Faculty	Done	Done	Done	Done	Done	Done	100
Science Faculty	Partially done	Schedule	Done	Done	Done	Schedule	70
Nursing Faculty	Done	Done	Done	Done	Done	Done	100
Arts Faculty	Done	Done	Done	Done	Done	Done	100
Business faculty	Done	Done	Done	Done	Done	Done	100
Law Faculty	Done	Schedule	Schedule	Done	Done	Done	75
Social science faculty	Schedule	Schedule	Done	Done	Done	Done	60
Religious Faculty	Done	Done	Schedule	In progress	In progress	Done	45
Educational Science Faculty	Done	Done	Schedule	Done	Done	Schedule	65
Sports Science Faculty	Done	Done	Done	Done	Done	Done	100
Medicine Faculty	Done	In progress	In progress	Done	Done	In progress	63
Pharmacy Faculty	In progress	In progress	Done	Done	Done	Done	55
Information Technology Faculty	Schedule	Schedule	Done	Done	Done	Schedule	40
Agriculture Faculty	Done	Schedule	Schedule	Done	Schedule	Done	40
Halls	Done	Done	Done	Done	Done	Done	100
Cafeterias	Done	Done	Done	Done	Done	Done	100
Campus outside, landscapes & Road light	NA	NA	NA	Done	NA	NA	100

