# Kyrgyzstan Tunnel Solar Power Support Project

～ Sustainable energy supply to remote construction sites ～

TAKENAKA
TAKENAKA CIVIL ENGINEERING & CONSTRUCTION CO.,LTD.

× D+Daiwatech

# Table of Contents

# 1. Project Overview

◆ Project Name:

Kyrgyzstan Tunnel Solar Support

◆ Project Objective:

To provide a stable power supply to remote construction sites

◆ Delivery Details:

Two 40-foot solar module houses and two 20-foot solar module houses with toilets

◆ Installation Location:

Karakol Tunnel Construction Site, Kyrgyzstan

◆ Operation Period: Operation begins in August 2025, planned for up to 40 months

◆ Partner Companies: Takenaka Civil Engineering × Daiwatech

# 2. Project Background (Infrastructure Conditions in Kyrgyzstan)

Construction work in Kyrgyzstan's mountainous regions poses a major challenge: ensuring a stable power supply. The site's remote location and harsh climatic conditions make the need for a reliable, sustainable energy source particularly acute.The tunnel project management is keen to implement environmentally friendly solutions, placing emphasis on utilizing renewable energy technologies in line with the Sustainable Development Goals (SDGs).Our products were highly praised for their ability to provide an independent, environmentally friendly power supply at the construction site. Japanese engineering technology is particularly trusted for its efficiency and reliability.Furthermore, long-term tunnel construction projects require improvements to the working environment and increased energy independence at the site.These factors further supported the need for this project.

# 3. Specifications of the Delivered Solar Modular House

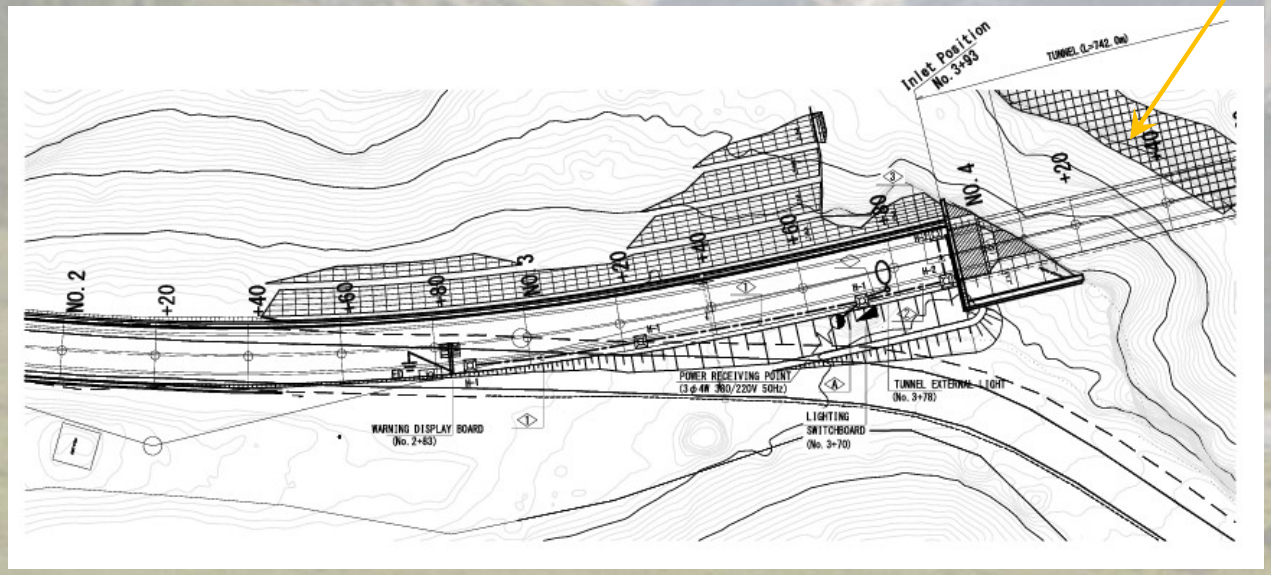
- Container Size: 40 ft x 2 / 20 ft x 2
- Interior Features: – 40 ft: 4 LED lights, 2 ventilation fans, 1 air conditioner, 12 electrical outlets – 20 ft: 4 LED lights, 4 ventilation fans, 1 air conditioner, 4 electrical outlets, 1 bio-toilet, 1 waterless urinal, 1 sink
- Cold Resistance: The high airtightness of the ocean container and reinforced insulation with glass wool allow for stable operation even in low-temperature environments.

40ft

20ft

# 4. Installation Location and Site Conditions

**The climatic conditions of the Karakol region, the complex topography of the Tien Shan mountain range, and the region's inadequate infrastructure present significant challenges to stable power supply. The high altitude and considerable distance from the main power grid limit the available electricity, potentially causing difficulties in securing power for construction sites.**




# 5-1. Collaboration with Takenaka Civil Engineering (Purpose, Function, Conditions, Investigation)

1. Purpose

• To demonstrate Takenaka Civil Engineering's commitment to SDGs and environmentally conscious solutions by introducing an autonomous off-grid system to the site.

2. Functional Features

• Off-grid power supply (40ft/20ft): - Roof-mounted solar panels - Energy storage battery unit - Fully autonomous system

• Eco-toilet: - Bacterial decomposition system - Minimal water usage

3. Installation Requirements

• No shade • Accessible for delivery and installation • Flexible site selection within specified parameters

4. Site Surveys (May 2025)

• Karakol: Installation site • Sunlight conditions • Weather conditions

• Bishkek: Logistics • Market research • Material procurement status

# 5-2. Collaboration with Takenaka Civil Engineering (Installation Planning, Safety Measures, Operational Support)

5. Installation Plan

• Delivery plan for 40ft/20ft containers • Foundation preparation and levelling • Installation of solar panels at optimal angle • Connection of energy storage battery units • Installation of eco-toilets and ventilation provision • Trial operation and system functionality verification

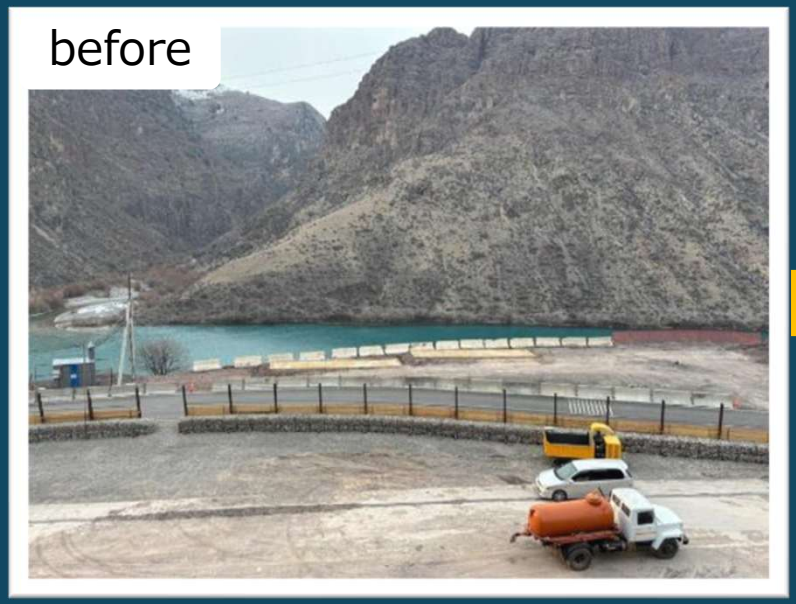
6. Safety measures

• Restrictions on work areas during delivery • Electrical safety: cable protection, waterproofing measures, leakage prevention • Safety during high-level work for panel installation (fall prevention measures) • Hygiene management for eco-toilets • Safety instruction for local staff • Formulation of emergency response plans

7. Operational Support

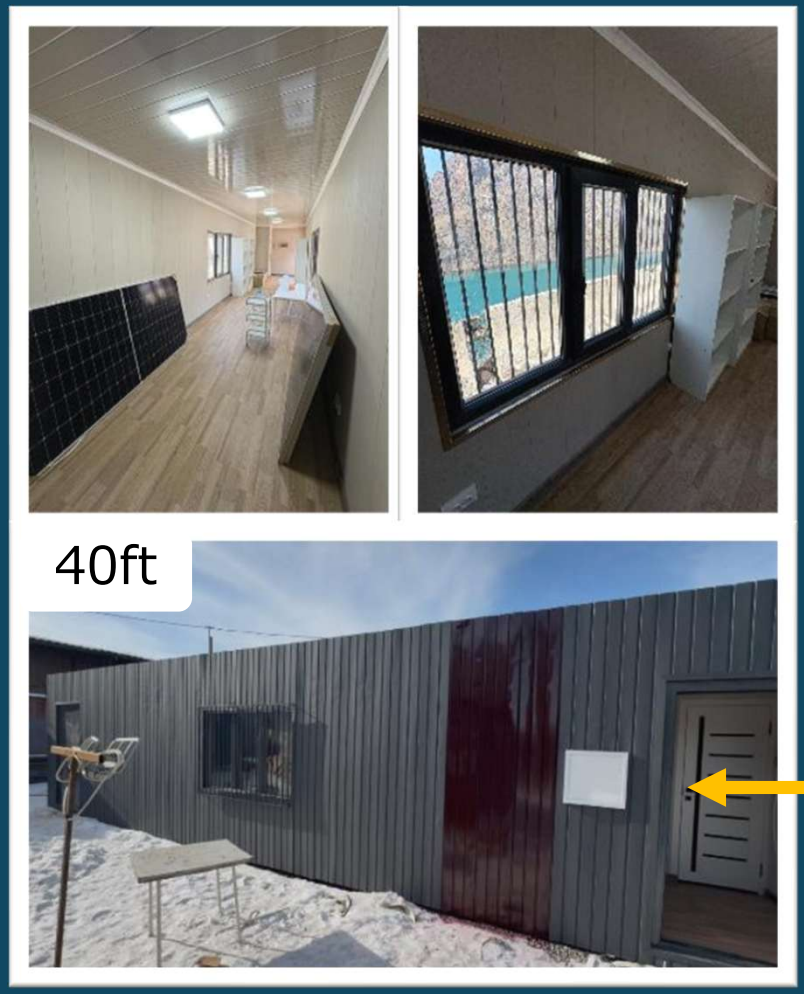
• Remote monitoring of storage batteries • Monitoring of power generation, charge status, and system conditions • Notification in the event of abnormalities • Technical support as required

# 6. On-site photographs (before/after construction)



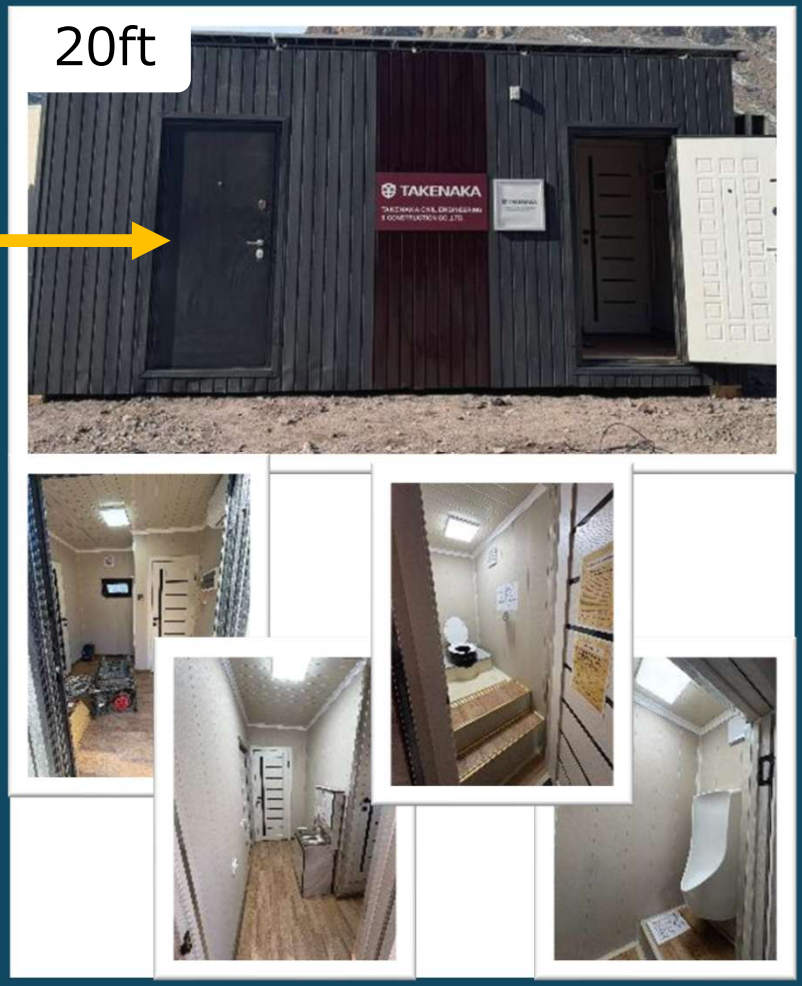


# 7. Photographs of interior fittings (interior)




Energy storage system

Energy storage system



# 8-1. Implementation Benefits and Advantages

1. **Improving the stability of electricity supply**
   Solar panels and energy storage systems provide a stable power supply on site, reducing the risk of power outages and power shortages.

2. **Reduction in power generation costs**
   Utilising on-site power generation reduces fuel consumption and lowers the running costs associated with operating diesel generators.

3. **Improvement of working conditions**
   By reducing noise and exhaust emissions, a more comfortable working environment is achieved, and equipment and ICT systems operate stably.

4. **Reduction of $CO_2$ emissions**
   Reducing the use of fossil fuels will lessen environmental impact and contribute to the achievement of the Sustainable Development Goals (SDGs).

5. **Contribution to reducing the construction period by five days**
   Early operational commencement and reduced work interruptions due to power issues will contribute to improved efficiency and shorter project timelines.

# 8-2. Implementation Effects and Benefits ($CO_2$ Reduction Effect)

【$CO_2$ Emissions Reduction (Estimated Value)】

When diesel generators are replaced with stand-alone solar power systems, the following $CO_2$ reduction effect is expected (calculated based on a coefficient of 0.7 kg-$CO_2$/kWh).

- 40ft module: Approximately 28 kg $CO_2$ per day (per module)
- 20ft module: Approximately 16.8 kg $CO_2$ per day (per module)

- For the entire project (40ft × 2, 20ft × 2): Approximately 90 kg $CO_2$ reduction per day (estimated value)

# 9-1. Future development of the project

| | |
|---|---|
| ① Expansion within Kyrgyzstan<br>（ Implementation at new sites and in new projects ） | ② Entry into the Central Asian market<br>(Model scale development) |
| ③ Improvements to Solar Houses and Development of New Products | ④long-term cooperation with Takenaka Civil Engineering |

- 1. Expansion to other sites within Kyrgyzstan utilising the JICA scheme
  Utilising JICA's pre-feasibility study, we plan to conduct an analysis of the construction materials market and investigate the current state of the industry. Based on this data, we will deploy the system to new construction sites and optimise the solution to meet the requirements of government agencies and private companies. This aims to establish a model that can be adopted as a national standard. 。
- 2. Market expansion across the whole of Central Asia
  Based on the model developed in Kyrgyzstan, we envisage scaling it across the entire Central Asian region, including Kazakhstan, Uzbekistan, and Tajikistan. This solution is designed to address the needs of infrastructure, mining, and construction projects.

# 9-2. Future development of the project


3. Improvements to the 'Solar House' and new product development

(based on mobile house demand research)

JICA's research analyses demand for mobile housing modules and the characteristics of local markets. This data forms the basis for refining existing solutions and developing new products tailored to the needs of nations, businesses, and local communities. The objective is to simultaneously resolve social challenges and expand markets.

4. Further cooperation with Takenaka Civil Engineering We will continue joint projects and technical partnerships, and further strengthen our long-term cooperative relationship through participation in large-scale infrastructure projects in the region.

# 10. Company Information （Daiwatech）

Daiwa Tech Co., Ltd. — Company Information

■ Primary business areas: Solar power systems, off-grid solutions, mobile power modules, modular housing, international projects

■ Key achievements: Domestic installations in Japan, projects with general contractors, overseas supply, solutions for remote locations, projects in Kyrgyzstan


Address :

**Tokyo Head Office 1-4-10 Shiba Daimon, Minato-ku, Tokyo 105-0012 TEL/03-6435-8963**

**Nagoya Main Office3-43 Oonoki, Nishi Ward, Nagoya City, Aichi Prefecture 452-0803TEL/052-506-7281　FAX/052-506-7283E-mail : dt@daiwatech.info**

**Website: https://www.daiwatech.info/**


D+Daiwatech