



شبكة المنظمات البيئية الأهلية الفلسطينية - أصدقاء الأرض فلسطين
The Palestinian Environmental Non-Governmental Organizations
Network



Enabling Environment for a Clean Energy Transition in Palestine

**Detailed Roadmap for Increased Renewable Energy
Transition in the West Bank**

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1. Introduction

The West Bank is currently facing a significant electricity shortage, primarily due to outdated and inefficient transmission and distribution infrastructure. The growing demand for electricity, coupled with high losses in the existing grid, exacerbates the situation, making it challenging to meet energy needs. To address this critical issue, it is essential to explore sustainable solutions that not only enhance electricity supply but also align with global efforts to combat climate change. Renewable energy sources present a viable solution to this problem, offering the potential to provide clean, reliable, and locally-sourced electricity.

This roadmap outlines a comprehensive strategy to increase the contribution of renewable energy in the West Bank, thereby addressing the electricity shortage and paving the way for a sustainable energy future. It focuses on improving infrastructure, developing supportive policies, attracting investments, building local capacity, fostering international cooperation, promoting research and development, and implementing energy efficiency measures. By following this roadmap, the West Bank can transition towards a more resilient and sustainable energy system. The details of each road map components are presented hereunder:

2. Infrastructure Improvement

2.1. Upgrade and Expand Transmission Lines

- Conduct a thorough assessment of the existing transmission infrastructure to identify weak points and areas of high losses.
- Initiate projects to replace outdated lines with high-capacity, low-loss alternatives. Focus on high-priority areas first.
- Develop new transmission lines to connect renewable energy projects to the grid, especially in remote areas with high solar and wind potential.
- Integrate smart grid technologies to enhance monitoring, control, and automation of the grid, reducing losses and improving reliability.

2.2. Improve Distribution Grid

- Upgrade transformers, substations, and distribution lines to handle higher loads and improve efficiency.
- Modify grid infrastructure to support the integration of distributed renewable energy sources (DER) like rooftop solar panels.
- Advanced metering infrastructure (AMI): Deploy smart meters to improve billing accuracy, detect outages, and manage demand.

3. Energy Efficiency Measures

3.1. Demand-side Management

- Promote the use of energy-efficient appliances through incentives and public awareness campaigns.
- Support retrofitting buildings with energy-efficient technologies such as improved insulation, efficient lighting, and HVAC systems.

3.2. Smart Grids

- Invest in smart grid technologies to enhance grid reliability and enable better demand response.
- Deploy tools and platforms to engage consumers in energy-saving practices and demand response programs.

4. Policy and Regulatory Framework

4.1. Supportive Policies

- Review and enable the tax incentive package, subsidies, and feed-in tariffs to make renewable energy investments more attractive.
- Review and enable the existing net metering policies that allow consumers who generate their own electricity to feed surplus energy back into the grid and receive compensation.

4.2. Regulatory Reforms

- Simplify the permitting process for renewable energy projects to reduce administrative burdens and accelerate project timelines.
- Ensure fair and non-discriminatory access to the grid for renewable energy producers.

5. Investment in Renewable Energy Projects

5.1. Solar Energy

- Identify and develop suitable sites for large-scale solar farms. Prioritize land that is not suitable for agriculture to minimize impact on food production.
- Launch programs to support the installation of solar panels on residential, commercial, and public buildings. Provide financial incentives and technical support.

5.2. Wind Energy

- Conduct detailed wind resource assessments to identify the most promising locations for wind farms.
- Initiate the development of wind farms in identified locations, ensuring community engagement and environmental considerations.

5.3. Energy Storage Solutions

- Invest in large-scale battery storage systems to store excess energy generated during peak production times and release it during high demand periods.
- Develop grid-scale storage solutions such as pumped hydro storage, where feasible.

6. Capacity Building and Training

6.1. Local Workforce Development

- Establish training centers to provide education and hands-on training in renewable energy technologies and grid management.
- Develop certification programs for renewable energy technicians and engineers to ensure a skilled and qualified workforce.

7. Public Awareness Campaigns

- Conduct public awareness campaigns to educate the population about the benefits of renewable energy and energy efficiency.
- Engage local communities in renewable energy projects to foster support and participation.

8. International Cooperation and Funding

- Seek grants, loans, and technical assistance from international organizations such as the World Bank, United Nations, and regional development banks.
- Partner with countries that have advanced renewable energy sectors to gain expertise and best practices.
- Create an attractive investment climate for private sector participation through clear policies, guarantees, and incentives.
- Encourage joint ventures between local and international companies to leverage global expertise and local knowledge.

9. Research and Development

- Allocate funding for local universities and research institutions to conduct research on renewable energy technologies and their applicability in the West Bank.
- Foster collaborations between academia, industry, and government to drive innovation and practical solutions.
- Implement pilot projects to test emerging renewable energy technologies and smart grid solutions.

- Establish robust monitoring and evaluation frameworks to learn from pilot projects and scale successful initiatives.

10. Implementation Plan

The successful implementation of this roadmap requires a phased approach, structured timelines, and coordinated efforts across various sectors. It is proposed that the road map to have a target vision to become fully renewable energy transitioned within 10 years and start taking actions accordingly. Below is a detailed implementation plan divided into 3 phases:

Phase 1: years 1-2:

1. Infrastructure Assessment and Planning

- **Conduct Comprehensive Assessments:**
 - **Action:** Evaluate the current state of transmission and distribution infrastructure.
 - **Institutional Role:** Ministry of Energy and Natural Resources, National Electric Utility Company, International Consultants.
 - **Outcome:** Detailed reports on infrastructure deficiencies and high-loss areas.
- **Develop Strategic Plans:**
 - **Action:** Create strategic plans for infrastructure upgrades and expansions.
 - **Institutional Role:** Ministry of Energy and Natural Resources, National Electric Utility Company, Regional Distribution Companies.
 - **Outcome:** Blueprint for modernization projects and grid expansion.

2. Policy and Regulatory Reforms

- **Introduce Incentive Programs:**
 - **Action:** Enable tax credits, subsidies, and feed-in tariffs for renewable energy projects.
 - **Institutional Role:** Ministry of Finance, Energy and Natural Resources Authority, Electricity Regulatory Council.
 - **Outcome:** Increased investment in renewable energy.
- **Establish Net Metering:**
 - **Action:** Implement net metering policies.
 - **Institutional Role:** Energy and Natural Resources Authority, Electricity Regulatory Council.
 - **Outcome:** Improved viability of small-scale renewable energy projects.

3. Pilot Projects and Initial Investments

- **Solar Energy Initiatives:**
 - **Action:** Initiate rooftop solar programs and pilot large-scale solar farms.
 - **Institutional Role:** Energy and Natural Resources Authority, Private Sector Developers.
 - **Outcome:** Demonstration of feasibility and benefits of solar energy.

- **Wind Energy Assessments:**
 - **Action:** Conduct detailed wind resource assessments.
 - **Institutional Role:** Energy and Natural Resources Authority, Research Institutions.
 - **Outcome:** Identification of promising locations for wind farms.
- **Energy Storage Pilot Projects:**
 - **Action:** Implement battery storage pilot projects.
 - **Institutional Role:** Electric Utility Companies, Private Sector.
 - **Outcome:** Validation of energy storage solutions for grid stability.

4. Capacity Building and Public Awareness

- **Training Programs:**
 - **Action:** Establish technical training centers and programs.
 - **Institutional Role:** Ministry of Education, Energy and Natural Resources Authority, Technical Institutes.
 - **Outcome:** Development of a skilled workforce for renewable energy projects.
- **Public Awareness Campaigns:**
 - **Action:** Launch educational outreach initiatives.
 - **Institutional Role:** Energy and Natural Resources Authority, NGOs.
 - **Outcome:** Increased public support and participation in renewable energy projects.

Phase 2: years 3-5:

1. Infrastructure Upgrades and Expansion

- **Modernize Transmission Lines:**
 - **Action:** Replace outdated transmission lines and expand the grid.
 - **Institutional Role:** National Electricity Transfer Company, Private Sector Contractors.
 - **Outcome:** Reduced transmission losses and increased grid capacity.
- **Upgrade Distribution Grid:**
 - **Action:** Enhance transformers, substations, and distribution lines.
 - **Institutional Role:** Electricity Distribution Companies, Local Governments.
 - **Outcome:** Improved efficiency and reliability of electricity distribution.

2. Scaling Renewable Energy Projects

- **Expand Solar Energy Projects:**
 - **Action:** Develop additional large-scale solar farms and increase rooftop installations.
 - **Institutional Role:** Energy and Natural Resources Authority, Private Sector Developers.
 - **Outcome:** Significant increase in solar energy contribution to the grid.
- **Develop Wind Farms:**
 - **Action:** Initiate construction of wind farms in identified locations.

- **Institutional Role:** Energy and Natural Resources Authority, Private Sector Developers, Local Governments.
- **Outcome:** Diversified renewable energy sources.

3. Energy Storage Solutions

- **Deploy Grid-Scale Storage:**
 - **Action:** Invest in large-scale battery storage and other grid-scale storage solutions.
 - **Institutional Role:** National Electricity Transfer Company, Private Sector.
 - **Outcome:** Enhanced grid stability and reliability.

4. Advanced Grid Technologies

- **Implement Smart Grids:**
 - **Action:** Integrate smart grid technologies for better monitoring and control.
 - **Institutional Role:** Energy and Natural Resources Authority, Electricity Distribution Companies, Technology Providers.
 - **Outcome:** Improved grid management and reduced losses.

5. Institutional and Policy Strengthening

- **Streamline Permitting Processes:**
 - **Action:** Simplify the permitting process for renewable energy projects.
 - **Institutional Role:** Energy and Natural Resources Authority, Electricity Regulatory Council, Local Governments.
 - **Outcome:** Faster project implementation.
- **Enhance Regulatory Framework:**
 - **Action:** Ensure fair access to the grid for renewable energy producers.
 - **Institutional Role:** Electricity Regulatory Council, Energy and Natural Resources Authority.
 - **Outcome:** Equitable opportunities for renewable energy developers.

6. Research and Development

- **Fund Local Research:**
 - **Action:** Allocate funding for renewable energy research at local universities.
 - **Institutional Role:** Ministry of Education, Energy and Natural Resources Authority.
 - **Outcome:** Innovations and tailored solutions for the West Bank.
- **Pilot Emerging Technologies:**
 - **Action:** Test and evaluate new renewable energy technologies.
 - **Institutional Role:** Energy and Natural Resources Authority, Research Institutions.
 - **Outcome:** Adoption of effective and advanced technologies.

Phase 3: years 5-10:

1. Completion of Major Projects

- **Finalize Infrastructure Projects:**
 - **Action:** Complete all planned transmission and distribution upgrades.
 - **Institutional Role:** National Electricity Transfer Company, Regional Distribution Companies.
 - **Outcome:** A modernized and robust grid infrastructure.
- **Full Integration of Renewables:**
 - **Action:** Achieve high penetration of renewable energy in the grid.
 - **Institutional Role:** Energy and Natural Resources Authority, Private Sector.
 - **Outcome:** A significant portion of energy needs met by renewable sources.

2. Continuous Improvement and Innovation

- **Ongoing R&D:**
 - **Action:** Maintain and expand research and development efforts.
 - **Institutional Role:** Energy and Natural Resources Authority, Research Institutions.
 - **Outcome:** Continuous innovation in renewable energy and grid management.
- **Monitor and Evaluate:**
 - **Action:** Establish ongoing monitoring and evaluation frameworks.
 - **Institutional Role:** Energy and Natural Resources Authority, Electricity Regulatory Council.
 - **Outcome:** Improved project performance and adaptation of best practices.

3. Sustainable Energy Market

- **Develop Green Economy:**
 - **Action:** Foster the growth of a sustainable energy market and green economy.
 - **Institutional Role:** Ministry of National Economy, Energy and Natural Resources Authority.
 - **Outcome:** Economic growth and job creation in the renewable energy sector.
- **Promote Energy Efficiency:**
 - **Action:** Implement widespread energy efficiency measures across sectors.
 - **Institutional Role:** Energy and Natural Resources Authority, NGOs.
 - **Outcome:** Reduced overall energy consumption and improved sustainability.

11. Institutional Setup and Coordination

1. Palestinian Energy and Natural Resources Authority (PENRA):

- Lead agency for planning, policy development, and coordination of renewable energy initiatives.
- Responsible for regulatory reforms, incentive programs, and international cooperation.

2. National Electricity Transfer Company:

- Oversee main transfer grid infrastructure upgrades and expansion projects.
- Implement smart grid technologies and manage large-scale energy storage solutions.

3. Regional Distribution Companies:

- Carry out distribution grid improvements and manage local renewable energy integration.
- Deploy advanced metering infrastructure (AMI) and engage in demand-side management.

4. Ministry of Finance:

- Develop and manage financial incentives, subsidies, and tax credits for renewable energy projects.
- Coordinate funding from international aid and development banks.

5. Local Governments:

- Facilitate the permitting process and support community engagement in renewable energy projects.
- Promote energy efficiency measures and local renewable energy initiatives.

6. Research Institutions and Universities:

- Conduct research and development on renewable energy technologies and grid management.
- Collaborate with industry and government on pilot projects and innovations.

7. Private Sector:

- Invest in and develop renewable energy projects (solar, wind, and storage).
- Engage in public-private partnerships and joint ventures with international companies.

8. NGOs and Community Organizations:

- Lead public awareness campaigns and educational outreach on renewable energy benefits.
- Support community involvement and capacity-building initiatives.