NATIONAL ENERGY ROADMAPS FOR ISLANDS



Roadmaps support an Island's transition to renewable energy by providing clear pathways for the deployment of renewables that cover the necessary technical, economic and policy elements. The roadmap analysis is usually centred on identifying the least-cost power system for the future, with additional assessments of how this system would be optimally dispatched. This analysis can be supported by an examination of the potential for renewables in end-uses and other sectors such as: heating, cooling and transportation. The roadmap also contains specific policy recommendations to enable its implementation.

ROADMAP PROCESS



ROADMAP REQUEST

- Letter from Member country to **IRENA's Director General**
- Defines rationale for roadmaps

SCOPE OF WORK

- Defines analysis and deliverables based on:
- Government priorities • Available data



ROADMAP ANALYSIS

- Determines least-cost future energy system
- Provides specific policy recommendations

WORKSHOP

- Analysis results discussed with government and stakeholder
- Workshop insights incorporated into final report

REPORT

- Delivered for government endorsement
- Gives full analysis details and recommendations
- Additional deliverables can include: Models developed
- Communications materials



(\$) **Energy sector** stakeholders

IRENA





TODAY'S ENERGY SYSTEM

ROADMAP

- Identifies the least-cost, technically sound energy mix to meets government's policy priorities
- For most islands focuses on electricity generation, the sector where renewables can have the greatest impact
- Delivers quantitative insights from detailed modeling of power system capacity expansion and dispatching

partners

ROADMAP INSIGHTS

FUTURE ENERGY SYSTEM

50

ROADMAP ANALYSIS

Dispatching model Grid integration study Capacity expansion SMALL ISLANDS • Examines power sector • Least-cost power system is • Complementary analysis based investment options and dispatched with high time on roadmap insights operational costs resolution • Capacity expansion and dispatching • Very high time resolution analysis can be combined to deliver an • Determines least-cost system • Identifies operational Identifies specific measures optimal system to meet long term demand constraints and cost impacts that address operational (10 to 20+ years) • Limited total investment: Optimal system constraints can be installed as a single project replacing the existing electricity system Renewables **Roadmap quantitative insights** integration • Quantitative insights used to develop policy recommendations measures • Typically address transitioning from a power system where costs are **BIG ISLANDS** driven by fuel consumption to a renewables system where costs are driven by upfront investments • Optimal generation mix too costly for one project • Analysis provides project time-line of inves-**Roadmap policy recommendations** tments to meet demand over period of roadmap • Dispatching investigates the impact of each project to ensure optimal evolution of

BARBADOS Ψ



Least-cost capacity expansion plan 2015-2030

Dispatching

Production cost modelling of 2014 and 2030 scenarios



Roadmap gives detailed insight on how renewables can reduce power sector costs.

Roadmap identifies options to support battery storage deployment. Stored electricity can: Requires Investment Meet peak demand without the need to commit additional thermal generation units

power system





Capacity expansion

Least-cost capacity expansion plan 2015-2030

Dispatching

EU JRC performed production cost modelling of 2030 scenarios

- The roadmap included six scenarios to provide insight on the impact of key energy sector decisions including:
- Deploying an undersea electrical cable • The potential for natural gas generation
- Renewables played a key role in all scenarios covering 26 to 40 percent of 2030 demand
- The roadmap included analysis on integration of variable renewable energy (VRE) covering:
- Recommendations on VRE forecasting • Options for VRE to provide grid support services

Capacity expansion model shows that renewables can reduce generation costs. Annual generation consolidated (TWh) 25.6% 120 110 40.09 Generation cos RE share (USD/MWh) (USD/MWh) RE share 172 6.5% Generation cost 2013 2030: Min RE 2030: Max RE Natural Gas 🦳 Wind 🧮 Centralized PV 🔛 Distributed PV 🔜 CSP 📰 Biomass 🔜 Imports Diesel



Capacity expansion

Least-cost system design and modular deployment 2015-2025 for two main islands

Roadmap shows that PV curtailment is a potential issue and identifies specific measures to boost RE share. Load (MW) 2500 — Electricity demand 2000 PV output curtailed PV output dispatched





Dispatching

Optimized dispatch of 2014 and 2025 least-cost system for two main islands







DOMINICAN REPUBLIC

Capacity expansion

REmap analysis identified the potential for RE in the energy mix by 2030

Dispatching

VRE penetration and transmission bottlenecks estimated based on projected VRE generation and duration curves

Dominican Republic REmap 2030 analsys shows significant renewables capacity expansion is possible.







9 MW biogas

systems

International Renewable Energy Agency