European Commission

Clean energy for EU islands

Study on connection policies and management of

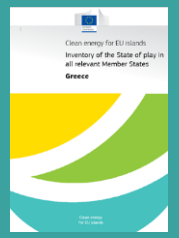
Energy systems under conditions of asynchronous generation in the **non-interconnected islands**

Secretariat regulatory work

Regulatory inventory

2021

2023



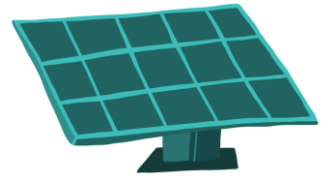
Regulatory barriers and recommendations 7 MSs

Connection policies and management of energy systems

2024

Goal of the study

1



Deeper understanding **of the existing grid, regulatory and operating constraints**

2

Help preparing the grid regulation and operating procedures **for the increasing uptake of renewable energy**

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Study focus

- **Technology developments** on the supply and demand side
- Electricity system **operational practices**
- **Island-tailored** grid connection policy and codes

Target groups

- Distribution System Operators (DSOs)
- Transmission System Operators (TSOs)
- Regulatory Authorities
- Governments

Case studies

Interviews

Workshops

Participants

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Study results: Main identified challenges

1. **Power interruptions and outages**
2. **High curtailment of the existing RE**
3. **Limited resources for the implementation of new solutions**
4. **Lack of smart systems and controllability of distributed RE**
5. **Complex and fragmented permitting and connection policies**

19 recommendations

+

Best practices on EU islands

Foster the use of hybrid power plants

Governments & Regulators

Benefits for islands

- Maximize use of local RE
- Optimized use of the existing grid capacity
- Multiple services and revenue streams

Actions

- Regulation measures (connection capacity, metering, grid charges)
- Permitting procedures for new hybrid plants and for retrofitting

Best practices

Greece (e.g. Tilos, Ikaria)

- **Legislation** supports hybrid power plants
- **Regulation** gives large margins to operators
- Tenders for hybrid power plants on islands

Graciosa (Portugal)

- **Wind + solar + BESS** hybrid plant
- 60% RES penetration **(up to 100% instantaneous)**

Enhance the use of centralized storage systems

Governments, Regulators, & System Operators

Benefits for islands

- Provide grid services & operational flexibility based on system needs
- Support distributed generation and reduce curtailment

Actions

- Enabling regulatory framework that recognizes the fundamental role of storage on islands
- Supporting investments from DSOs and include storage in grid planning

Best practices

France (Réunion, Guadeloupe, Martinique)

- **Used for improved grid stability (frequency, voltage variations, grid forming) with VRE**

Porto Santo (Portugal)

- BESS for frequency regulation and voltage control **+grid-forming and inertia** provision
- **Reduced curtailment + enhanced security of supply**

Source: GR.Madeira

Specific grid codes and regulations for islands

Governments & Regulators

Benefits for islands

- Reduced uncertainties and enhanced attractivity for investors
- Contribution to system stability from most production plants

Actions

- Define specific requirements for RE plants
- Define a framework for curtailment and its remuneration
- Define a framework for demand side management and its remuneration

Best practices

Madeira archipelago (Portugal)

- Specific connection requirements for RE from 2019 (LVRT, HVRT, Reactive and Active Current Injection,…)

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REGIÃO AUTÓNOMA DA MADEIRA

Presidência do Governo

Decreto Regulamentar Regional n.º 8/2019/M

Sumário: Aprova o Regulamento da Rede de Transporte e de Distribuição de Energia Elétrica da Região Autónoma da Madeira.

Conclusions

- Each non-interconnected island electricity system is unique in the way it operates and requires its own system analysis.
- The modernisation of island grids requires significant investments and efforts but will lead to higher sustainability, enhanced energy security and reduced operational costs.
- Regulators and system operators should have a systemic way to collaborate, share experiences and learn from each other in the process of decarbonisation of EU islands.

Stakeholders involved in the study

France	Ademe
	Akuo Energy
	Bora Bora municipality
	CRE
	EDF
	EDF R&D
	EDF SEI
	EdT Engie
	Energy Pool
	Horizon Réunion
	Laboratoire PIMENT
	Polynesian Government
	SIDELEC
	Te Uira Api no te Mau Motu SPL
	Temergie, la Reunion cluster
	TEP
	Total Energies
	Université de la Polynésie Française
	Université de la Réunion
Greece	HEDNO
	IPTO/ADMIE
	Ministry of Energy and Environment
	National Technical University of Athens
	PPC
	PPC Renewables
	RAEWW

Italy	ARERA
	Chimica Verde Bionet
	Consiglio Nazionale delle Ricerche
	e-distribuzione/Enel
	Fondazione Marevivo
	Impresa Elettrica D'Anna e Bonaccorsi S.r.l.
	MISE
	Politecnico di Torino
	Regione Siciliana
	S.MED.E. Pantelleria S.P.A.
	SEA Società Elettrica di Favignana S.p.A.
	Società Elettrica Liparese S.r.l.
	UNIEM
Portugal	AREAM
	Azores government
	EDA
	EEM
	ERSE
	Força Açoreana S.A.
	Hidroenergias- Agricultura e Energia Lda
	INESCTEC
	IST
	Madeira government
	VAT Portugal

Netherlands	ACM
	ASDC Group
	ContourGlobal
	Elmar N.V.
	Government Aruba
	TNO
	University of Aruba
	Utilities Aruba N.V.
	WEB Aruba N.V.
	WEB Bonaire
	Ministry Economic Affairs and Climate
Spain	CNMC
	Endesa
	IDAE
	Instituto Tecnológico de Canarias
	MITECO
	Red Electrica
	Canary government (2024)
	Balearic government (2024)
	Red Electrica
EU/Global	EU DSO entity
	CEER
	Eurelectric
	IRENA

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Thank you!

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