



## **Market Segment Watch: Caribbean islands** *A promising market for energy storage*

Clean Horizon, the European expert on energy storage since 2009, released its new Market Segment Watch on the Caribbean islands.

The high reliance of the Caribbean islands on petroleum products and the high oil costs in the previous decade led to tremendous electricity generation costs. This resulted in a clear will to diversify the electricity generation portfolio from fossil fuels, renewables standing in the front seat due to decreasing prices and decarbonization targets. Moreover, the lack of interconnections inherent to islands exacerbates the increasing need for flexibility that renewables entail, which, coupled with the **decreasing prices of energy storage technologies** triggers **favorable energy storage business cases**.

The aim of this study is to identify and quantify the potential for energy storage in the Caribbean islands. For that purpose, **key business cases** for energy storage are analyzed: spinning reserve replacement and oil-fired generation mitigation, with specific case studies on Guadeloupe and Barbados.

Additionally, the potential of the Caribbean islands for such applications is quantified, providing a **ranking of energy storage opportunities**.

Finally, the electricity landscape of four representative islands is detailed, namely: **Dominican Republic, Jamaica, Guadeloupe and Barbados**.

### Key questions addressed:

- What triggers an interest for energy storage in the Caribbean?
- What are the emerging business cases for energy storage assets in the Caribbean islands?
- What are the actions that should be taken to trigger energy storage development?
- What are the good practices for storage implementation in isolated grids?

### Who needs this report?

- Energy storage equipment manufacturers
- Integrators looking at the Caribbean market
- Project developers willing to better understand the opportunities for storage
- Investors willing to better understand the risks associated with storage and the business cases
- Utilities looking for opportunities with energy storage
- Commercial and industrial electricity consumers



## Table of contents

### Introduction

### Battery storage systems and lithium-ion battery prices

- 1 Storage key use cases in the Caribbean islands and case studies
    - 1.1 Replacing spinning reserves with energy storage
      - 1.1.1 Use case description and rationale
      - 1.1.2 Barbados case study
    - 1.2 Variable renewables integration
      - 1.2.1 Use case description and rationale
      - 1.2.2 Guadeloupe case study
    - 1.3 Energy storage on the consumer side
      - 1.3.1 Energy storage behind the meter (BTM)
      - 1.3.2 Off-grid large consumers or communities
    - 1.4 Insights into grid investment deferral and backup aggregation
      - Focus 1: Backup storage aggregation in Haiti
      - Focus 2: Grid investment deferral in the Dominican Republic
  - 2 The market for energy storage in the Caribbean islands
    - 2.1 Mitigating oil-fired generation
    - 2.2 Intermittent renewables integration
    - 2.3 Ranking of high potential islands
  - 3 Representative Caribbean islands electricity landscape
    - 3.1 Dominican Republic
      - 3.1.1 Electricity sector overview
        - 3.1.1.1 Generation
        - 3.1.1.2 Transmission
        - 3.1.1.3 Distribution
        - 3.1.1.4 Vertically integrated utilities
      - 3.1.2 Renewables development
      - 3.1.3 Energy storage outlook
    - 3.2 Jamaica
      - 3.2.1 Electricity generation overview
      - 3.2.2 Independent power producers
      - 3.2.3 Jamaica Public Service Company (JPS)
      - 3.2.4 Renewables development
      - 3.2.5 Energy storage outlook
    - 3.3 Guadeloupe
      - 3.3.1 Electricity sector overview
      - 3.3.2 Renewables development
      - 3.3.3 Energy storage outlook
    - 3.4 Barbados
      - 3.4.1 Electricity sector overview
      - 3.4.2 Renewables development
      - 3.4.3 Energy storage outlook
  - 4 Conclusions
- Appendix: Existing and announced energy storage projects in the Caribbean islands



List of figures

Figure 1: Battery components

Figure 2: Costs associated to a 1MW / 1MWh Li ion battery as of 2016 and evolutions for 2020

Figure 3: Mitigating spinning reserve with energy storage

Figure 4: Battery capital expenditure and yearly savings for each MW of reserve replaced

Figure 5: Economics associated to the use of a 5MW battery to supply reserve on Barbados

Figure 6: Comparison of operational costs relating to the provision of reserve in Barbados and Europe

Figure 7: Example of frequency behavior in case of generator fault with decreasing system inertia

Figure 8: Constraints of the 2015 CRE tender in the French islands (1MW<sub>p</sub> PV)

Figure 9: Electricity generation costs in Guadeloupe (€/MWh)

Figure 10: Electricity generation cost for a genset fleet depending on the load and benefits of a 2 MW battery

Figure 11: Available generation and demand as of 2013 and DR's grid upgrade plan 2013-2020

Figure 12: Installed oil-fired electricity generation capacity in the Caribbean islands (MW)

Figure 13: Cuba and Dominican Republic situation comparison

Figure 14: Share of intermittent renewable sources in terms of installed capacity (%) and renewable targets

Figure 15: High potential Caribbean islands for energy storage development

Figure 16: Martinique and Guadeloupe situation comparison

Figure 17: Dominican Republic energy mix by source in 2015

Figure 18: JPS net electricity generation in 2014, excluding IPPs generation share (in GWh)

Figure 19: Guadeloupe electricity mix as of 2014 (GWh)

Figure 20: Typical Guadeloupe daily dispatch

Figure 21: Barbados electricity generation portfolio totaling 249 MW (MW)

Figure 22: Summary of the different business cases relating to the different islands as well as actions to favor energy storage development

**Interested?**

The report is available at:

<http://www.cleanhorizon.com/#reports>

**Any question? Contact us!**

Email: [reports@cleanhorizon.com](mailto:reports@cleanhorizon.com)

Phone: +33 (0)1 78 76 56 20