



ONE-STOP SHOP ENERGY STORAGE CONSULTANCY SERVICES

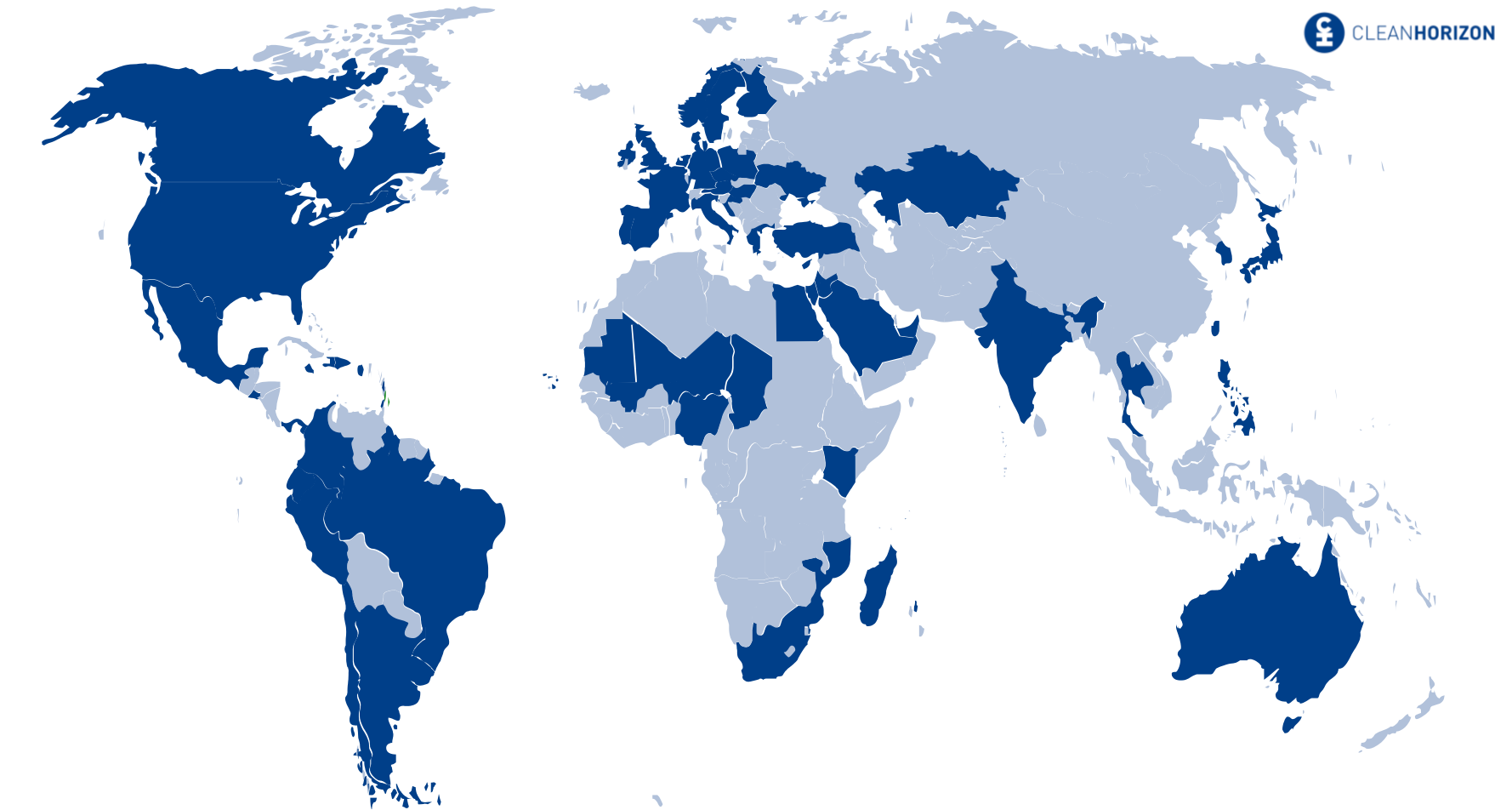
Q1-2023

www.cleanhorizon.com



CLEAN HORIZON

is active
on energy storage
worldwide



A DIVERSE TEAM OF STORAGE EXPERTS



MICHAEL SALOMON, Ph.D
CEO

Expertise:

Global storage markets, ESS strategy

Languages:



Countries and areas:

Israel



SAMUEL PORTEBOS, MSc.
HEAD OF TECHNICAL CONSULTING

Expertise:

Feasibility and sizing studies, technical due diligence, system design and audits

Languages:



Countries and areas:

Eastern Africa, Middle Africa, France, Belgium



CORENTIN BASHET, MSc.
HEAD OF MARKET ANALYSIS

Expertise:

Market analysis, revenue stream forecast, economic due diligence, trading strategies, market forecasts

Languages:



Countries and areas:

Southern Africa, UK, Ireland, Moldova, Ukraine, Turkey, Georgia, Armenia, Azerbaidjan, Thailand



NAIM EL CHAMI, MSc.
SENIOR ENERGY STORAGE ANALYST

Expertise:

Technology monitoring, financial and regulatory assessment, market forecast, procurement management, market analysis

Languages:



Focus countries/area:

USA, Oceania, Middle East, Canada, Pakistan, Palau, Vietnam



KREHI SERGE AGBLI, Ph.D
SENIOR ENERGY STORAGE ANALYST

Expertise:

Power systems modeling and analysis, storage- and hydrogen-based hybrid systems techno-economic analysis, hydrogen projects deployment

Languages:



Focus countries/area :

Netherlands, Central America, Western Africa, Algeria, Namibia, Zambia



KEILA SANTIAGO, MSc.
ELECTRICAL DESIGNER

Expertise:

Electric system design and protection

Languages:



Focus countries/area:

Portugal, Italy, Brazil



RACHEL LOCQUET, MSc.
SENIOR ENERGY STORAGE ANALYST

Expertise:

Trading strategy simulation, feasibility and sizing studies, hydrogen production system design optimization, electricity prices forecasts

Languages:



Countries and areas:

Austria, Germany, Switzerland, Slovenia, Slovakia, Greenland, Southern Asia, The Nordics, The Baltics



ROSEMARY COLAERT, MSc.
ENERGY STORAGE ANALYST

Expertise:

Sizing of standalone / hybrid storage systems, market analysis

Languages:



Countries and areas:

Greece, Poland, the Nordics, Central Asia



MOHAMED AMINE BENCHRIFA, MSc.
ENERGY STORAGE ANALYST

Expertise:

Trading strategies, market analysis, sizing studies

Languages:



Countries and areas:

Northern Africa, Southeast Asia, Japan



CHARLY BARRAL, MSc.
ENERGY STORAGE ANALYST

Expertise:

Hybrid/standalone storage system design and evaluation, market analysis

Languages:



Focus countries/area :

Taiwan



BEATRIZ BARROS, MSc.
ENERGY STORAGE ANALYST

Expertise:

Feasibility studies, technical due diligence, market analysis

Languages:



Focus countries/area :

Spain, South America, The Caribbeans, Portugal



OXSANA SHKIRAY, MSc.
SENIOR ENERGY STORAGE ANALYST

Expertise:

Market analysis, regulatory studies, marketing and communication

Languages:



Focus countries/area :

Ukraine, Romania, Bulgaria, Croatia, Czech Republic, Hungary



MARKET ANALYSIS

Strong market studies expertise worldwide in energy storage systems.

Our experts have technical, economic, regulatory expertise, and cover different geographies, constantly tracking market evolutions.

The expertise of the Clean Horizon team enables extensive understanding of challenges and opportunities for energy storage and hydrogen.



TECHNICAL CONSULTING

Relying on COSMOS, our dedicated energy storage modeling tool, we act as owner's engineer and lender's engineer for IPPs and lenders worldwide.

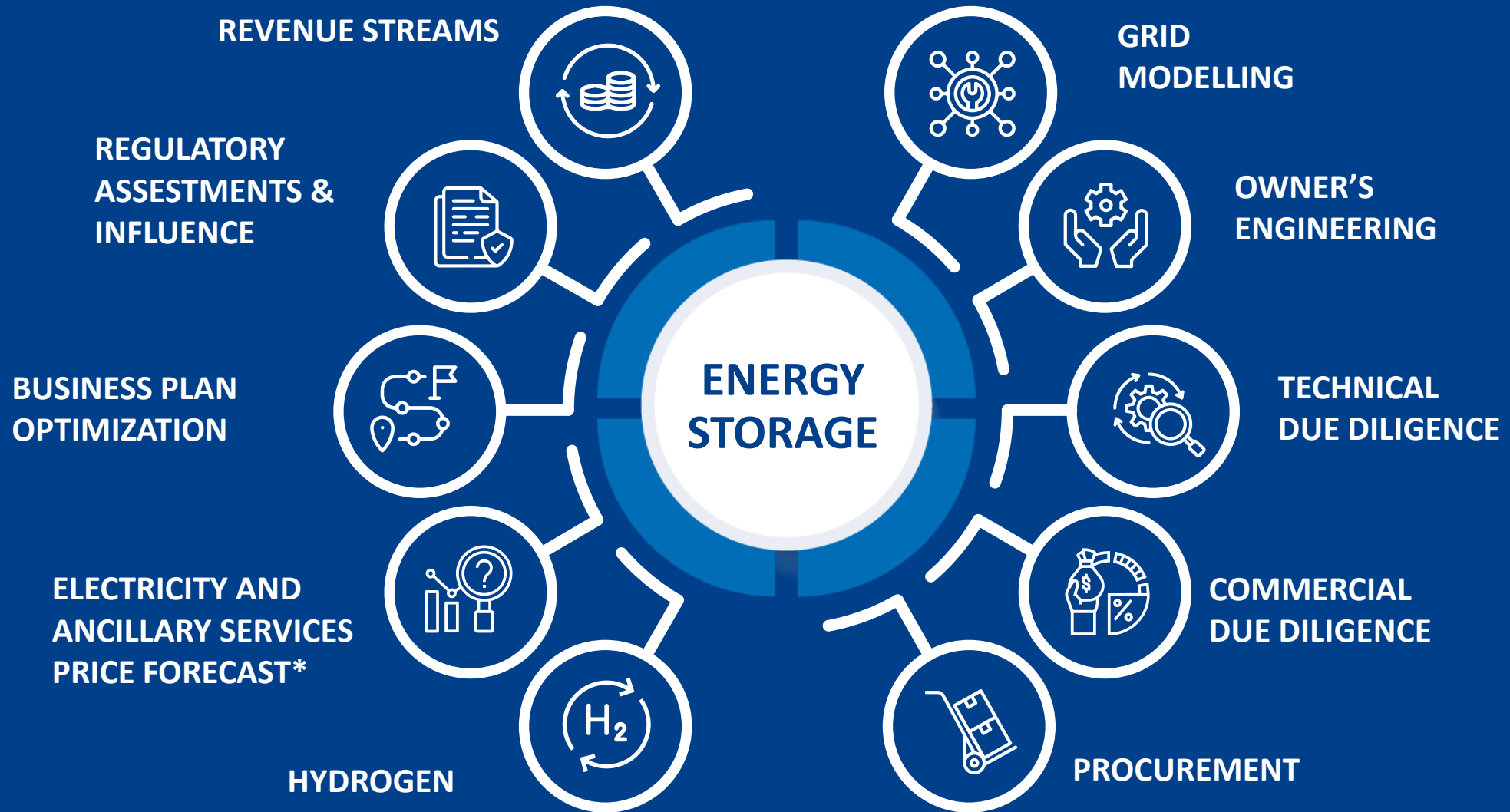
We also work for national utilities to help them quantify their energy storage master plan.

OUR UNIQUE OFFERING

Realistic assumptions &
accountability for results

We accompany your projects
from conception to commissioning

Reliable forecasting



*IN EUROPE

OUR SCOPE OF WORK FOR ENERGY STORAGE OR HYDROGEN PROJECTS



We assist decision makers, utilities and planners assessing:

- the impact of energy storage on renewable integration and grid stability
- markets for energy storage and green hydrogen projects

From conception to commissioning, including procurement, due diligence and monitoring

Clean Horizon's value added is our capability to use the same methods at the design phase and during operation, maximizing investor confidence

* In Europe



INTRODUCTION TO ENERGY STORAGE MARKETS

- Overview of technologies
- Global lessons learned and market trends
- Applications of utility-scale energy storage
- Raw material price, battery degradation, fire risk
- Recycling and repurposing, long duration storage

ECONOMIC & REGULATORY ANALYSIS

- Overview of specific power markets, installed capacity per country, market size forecast
- Revenues accessible for storage
- Help understand and shape regulations



BUSINESS PLAN OPTIMIZATION

- Market analysis, revenue stream analysis in different regions
- Battery storage optimal sizing, replacement and augmentation strategies
- Development of optimal storage trading strategy on the markets to build the revenue stack
- Building the business case for storage systems

COMPETITIVE ANALYSIS

- Technology, technical & economic analysis:
 - Electrochemical: Li-ion batteries, flow batteries, solid state batteries
 - Mechanical storage: gravitational storage, compressed air, liquid air, flywheels
 - Chemical storage: hydrogen through electrolysis
- Competitive landscape for developers and integrators in Europe, Asia, USA, Pacific.....

CONTENT PROVISION

Clean Horizon is regularly tracking and updating data on energy storage markets, providing:

- Data on 23 European countries*
- Analyses on the cross-border services and applied and upcoming regulations (related to FCR, aFRR, mFRR)
 - Expertise on regulation best practices worldwide:
 - **Europe:** Capacity Markets, FCR, aFRR, balancing mechanism
 - GB:** Dynamic Containment, Dynamic Moderation, Dynamic Regulation Firm Frequency Response, Balancing mechanism
 - USA:** Regulating reserves, capacity markets, supplemental reserves
 - Australia:** FCAS, energy market

STRATEGY SUPPORT

Clean Horizon provides support to develop strategies for the deployment of ESS projects:

- ① Help in prioritizing countries based on its market knowledge and client specificities
- ② Assistance in establishing a detailed activity timeline to deploy ESS
- ③ Suggestion of credible organization options to effectively implement the strategy
- ④ Assessment of the financial investments needed to execute the strategy



Austria
Belgium
Bulgaria
Denmark
Estonia
Finland
France
Germany
Great Britain
Greece
Italy
Ireland
Latvia
Lithuania
Netherlands
Northern Ireland
Norway
Poland
Portugal
Romania
Spain
Sweden
Switzerland



UFTF

Update From The Field

Discover our monthly analysis note on key data and trends affecting the energy industry worldwide.

Covering 7 continents, tracking main regulatory changes, projects and the most relevant topics in the energy storage field.



CHES

Clean Horizon Energy Storage Source

Access our dedicated platform with a worldwide database of all storage projects larger than 500kW, updated continuously by our experts.



TRAININGS

- ✓ Energy storage
- ✓ Hydrogen

Join our trainings or get access to recorded sessions.

Clean Horizon delivers business-to-business training sessions related to the energy storage and hydrogen sectors.

The content can be adapted to the specific needs of our clients and spans from the technological aspect to business models and revenue streams as well as project procurement best practices.

UPDATE FROM THE FIELD: PAST «FOCUS OF THE MONTH»

THE WHOLE WORLD OF ENERGY STORAGE

2022

European subsidies for energy storage
 New frequency response services in Great Britain
 Main difficulties in energy storage development
 The Texan energy storage market: a new eldorado?
 The Iberian Peninsula
 Pros & cons of local production versus import of green hydrogen: a case study
 The potential for battery storage systems in Latin America
 The Canadian energy storage market
 Long-duration energy storage, challenges and opportunities
 Renewable plus storage around the world

2021

India, a slowly maturing but deep energy storage market
 How does the current energy context impact on energy storage revenues?
 The Nordics - the new wave of storage deployment in Europe
 Poland, a slowly maturing storage market
 Greece, a key storage market ?
 Philippines, what's the rationale for storage?
 Capacity markets throughout the world and associated revenues for storage
 Battery performances
 South Africa: the opportunities for energy storage
 Australia: what's the business case for storage?
 Israel, the (real) 8GWh opportunity

2020

Europe 2025 battery storage market forecast
 Signed, sealed, delivered: energy storage procurement in the United States
 How Chile paves the way for a new era of large-scale energy storage in Latin America
 Evolution of battery storage system costs and associated O&M services
 The Chinese energy storage market
 PICASSO, secondary reserves harmonized across Europe, what's in it for storage?
 Energy storage contractual arrangements
 Rise of the Iberian peninsula market for stationary storage : Portugal leads the way and Spain slogs along
 Fire Safety of Stationary Lithium-ion Energy Storage Systems
 Hydrogen: the future energy career of Europe?

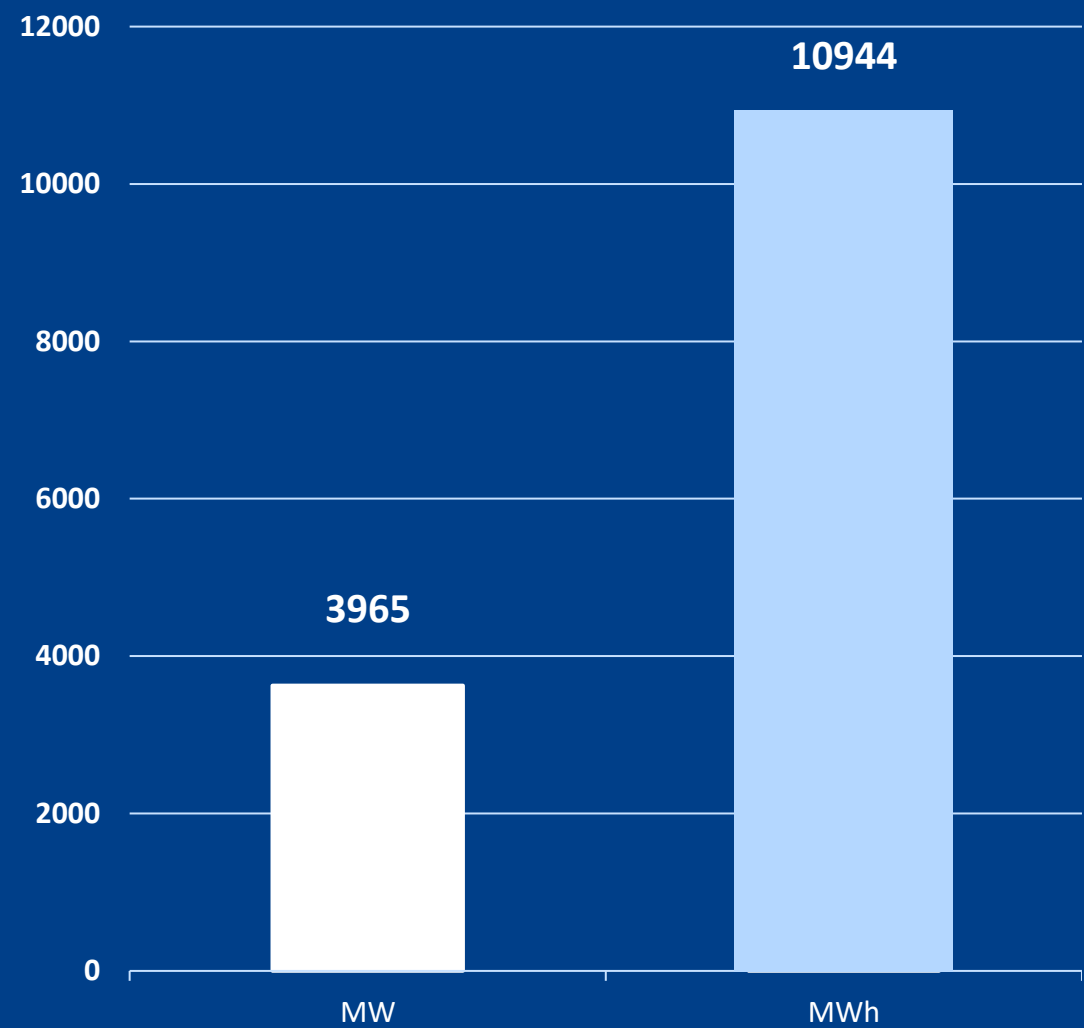




LEADERSHIP IN ENERGY STORAGE

DESIGNED OR AUDITED BY CLEAN HORIZON

As of April 2023, Clean Horizon had designed or audited over 10000 MWh storage projects



SAMPLE OWNER'S ENGINEERING AND LENDER'S TECHNICAL ADVISOR REFERENCES - Private sector

Date	Country	Power (MW)	Energy (MWh)
2022	United Kingdom	269	537
2021	Taiwan	40	53
2021	Germany	106	212
2021	Australia	260	520
2021	Belgium	50	100
2021	Germany	50	100
2021	South Africa	75	225
2021	Germany	2,5	6
2021	Uruguay	6	36
2021	Thailand	14	36

Date	Country	Power (MW)	Energy (MWh)
2021	France	2,4	2,4
2021	Israel	100	400
2021	Niger	3	6
2021	El Salvador	10	10
2021	Chile	10	30
2021	Israel	14	58
2021	Belgium	25	100
2021	Spain	100	200
2021	Taiwan	5	10
2021	France	2,4	2,4

Date	Country	Power (MW)	Energy (MWh)
2020	South Africa	240	1920
2020	South Africa	75	225
2020	South Africa	150	450
2020	France	4	8,9
2020	USA	100	400
2020	United Kingdom	69	69
2020	Belgium	25	100
2020	French Guyana	50	100
2020	Israel	54	216
2020	Australia	20	40



Development Finance Institutions



Geography of our projects

Kingdom of
Saudi Arabia

Uruguay

Burkina Faso

Nigeria

Mozambique

Chad

Mali

Mauritania

Cabo Verde

Mayotte

Barbados

Republic of Haiti

Republic of Guyana

Republic of Seychelles

Tahiti

Republic of Mauritius



Utilities



CLEAN HORIZON HAS CLIENTS WORLDWIDE ACROSS THE VALUE CHAIN

DEVELOPERS IPPS UTILITIES AND INVESTORS



STORAGE VENDORS AND INTEGRATORS



THEY TRUST US

All of Clean Horizon's clients and engagements are not represented in this list

CONFERENCES SINCE 2016 SPEAKING AND MODERATOR ROLES





We look forward
to working with you!

12 rue de la Chaussée d'Antin
75009 Paris, France
contact@cleanhorizon.com
Tél : +33 (0)1 78 76 57 04

Clean Horizon Americas
1200 BRICKELL AVE, SUITE 1960
MIAMI, FL 33131, USA
reports@cleanhorizon.com

www.cleanhorizon.com

