



CLEANHORIZON

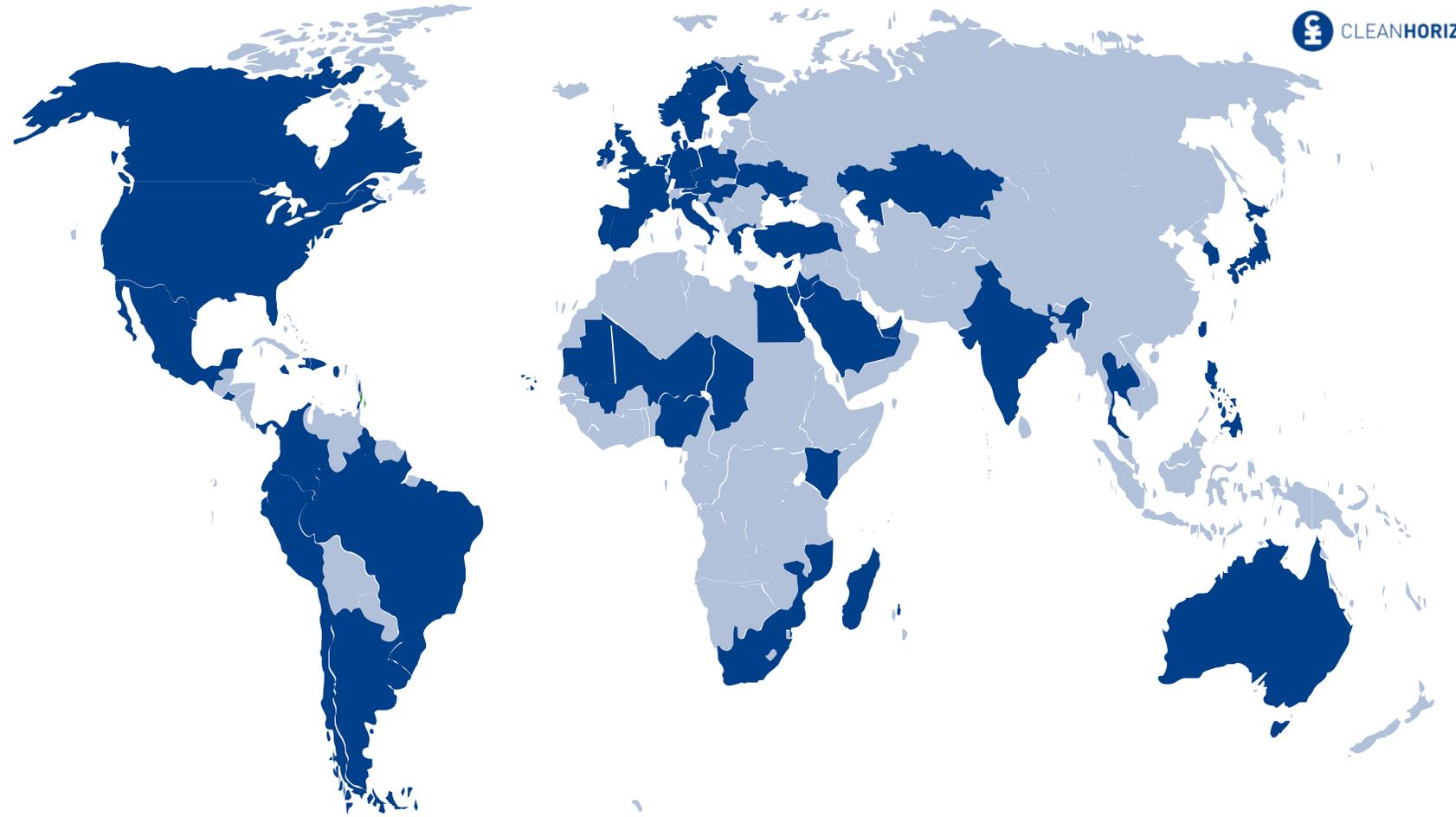
ONE-STOP SHOP ENERGY STORAGE CONSULTANCY SERVICES

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, Azerbaijan, 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.

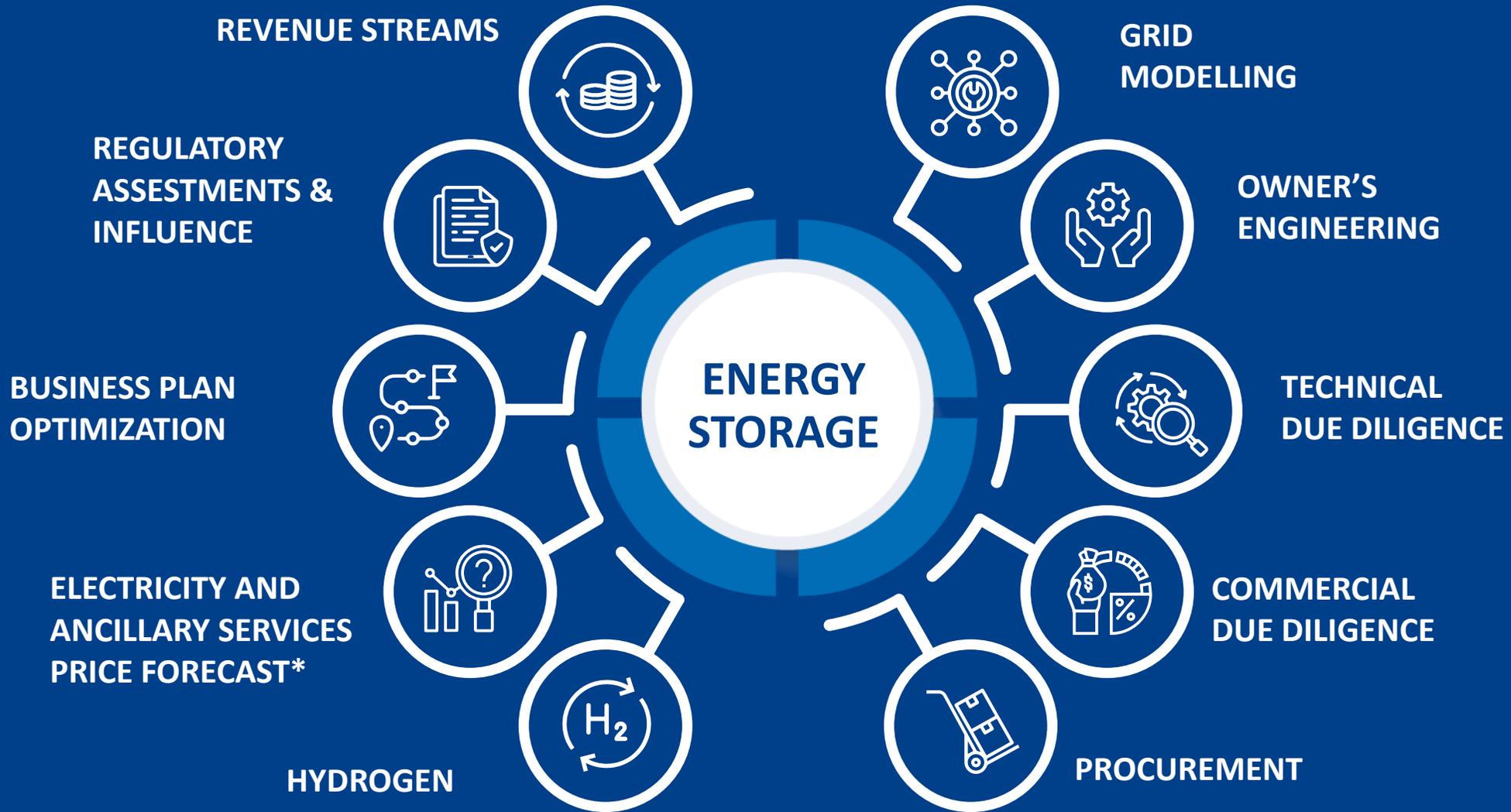
We also work for national utilities to help them quantify their energy storage master plan.

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

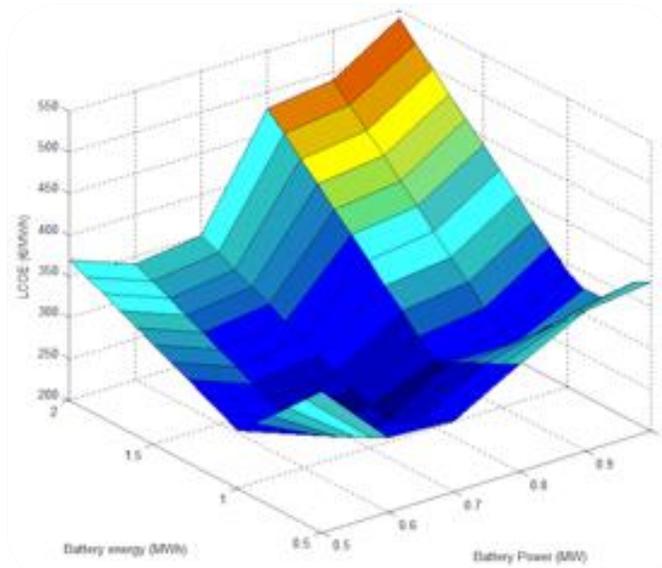


**TECHNICAL
CONSULTING**

CLEAN HORIZON DELIVERS OWNER'S AND LENDER'S ENGINEERING SERVICES FOR ENERGY STORAGE PROJECTS

AT THE PROJECT LEVEL

FROM STORAGE SIZING



TO PROCUREMENT

- ✓ Technical specifications
- ✓ Administration of RFP
- ✓ Selection of vendors
- ✓ Contract negotiation

AT THE GRID LEVEL



Helping utilities and planners assess the impact of energy storage on renewable integration and grid stability

SIZING, DESIGN AND PROCUREMENT

We support the complete project development process - from initial design to procurement, optimizing the storage configurations:

- Drafting and administering RFPs for storage assets
- Supporting contract negotiation on technical and financial terms
- Tendering the aggregator, negotiation of terms
- Detailed system design
- Commissioning



COSMOS SIMULATION TOOL

Since 2014, Clean Horizon has developed and continued to improve a “desktop version” of an EMS (Energy Management System). We use this tool to simulate storage operation and determine the optimal sizing of storage and hybrid projects – both from a technical and economic standpoint

- Project sizing
- Performance analysis
- Optimization



GRID IMPACT STUDIES AND NATIONAL ENERGY PLANNING

Working with island utilities, governments, and Development Finance Institutions, Clean Horizon supports long-term power system planning by assessing the techno-economic optimum of energy storage to support renewable energy integration and maintain grid stability



DUE DILIGENCE

Clean Horizon is one of the leading consultancies worldwide for the realization of due diligences of energy storage projects or IPP platforms





COSMOS:

a simulation tool for project sizing, performance analysis and optimization

Clean Horizon optimizes the economic model, based on the quantitative elements, including



Economic parameters

Storage CAPEX
Storage OPEX



Technical parameters

MW of storage
MWh of storage



Market parameters

Forecast of ancillary service prices
Forecast of wholesale prices
Forecast of balancing mechanism prices

In particular, this tool allows :

1

To determine optimal sizing for different configurations for the storage system

2

To calculate the cashflows, NPV and IRR

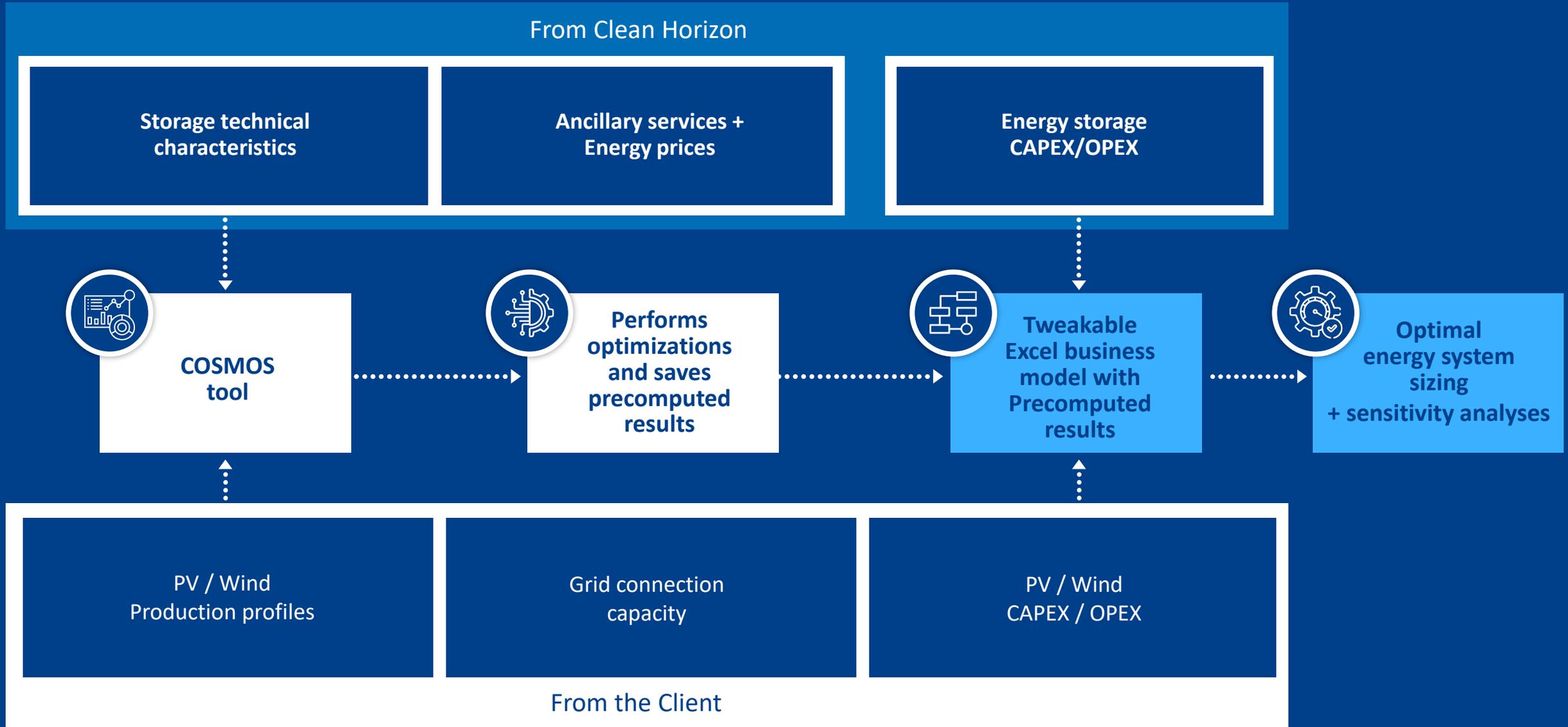
3

To easily generate sensitivity analyses

4

To optimize dispatch and to find an optimum scenario

COSMOS: HOW DOES IT WORK?



COSMOS: WHY IS IT BETTER COMPARING TO OTHER PROJECT SIZING TOOLS?

Clean Horizon model COSMOS enables optimal sizing of energy projects for various applications

COSMOS is more adaptable and provides all the features necessary to optimally size a project providing different services, incl: technologies, services, dispatch details, degradation, forecasts.

Enables optimal sizing of energy projects for various applications



Calculates accessible revenues for storage providing various services



COSMOS manages to calculate accessible revenues for storage providing a wide range of services. It can be adapted to any country and needs, incl: incentives, market services, customer constraints, peak shaving.

COSMOS

COSMOS provides all the tools required to analyze structured project financing. It provides details on the impact of taxes and incentives on financial metrics such as NPV and IRR. It also enables the calculation of the minimum PPA required for a viable project to reach a given IRR.



Allows to precisely analyze and optimize the project's business model



Allows to analyze the performances of storage systems

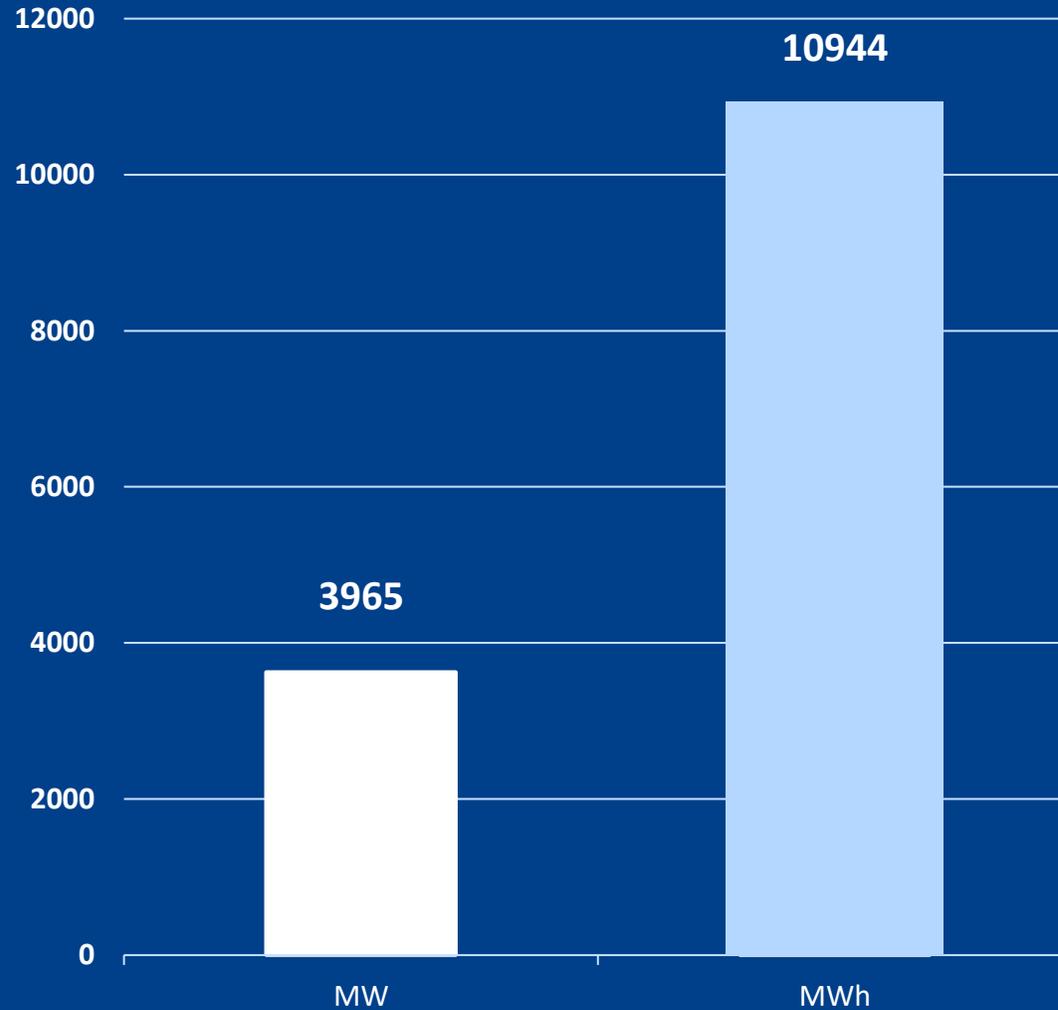
COSMOS provides various storage performance analysis tools. It also analyses the impact of battery use on its degradation and assesses which services can be provided.



**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





CLEAN**HORIZON**

We look forward
to working with you!

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