CLEANERGY

"Global Revolution for Sustainable Growth"



AGENDA

01 Energy Landscape

02 Efficiency: Hydrocarbon

03 Effectiveness: Cleanergy

04 Boom & Bust Cycle

05 Future World Vision

ENERGY LANDSCAPE WILL BE DOMINATED BY "CLEAN ENERGY"

ENERGY MIX



Source: IEA (2024)

EFFICIENCY : FOURTH INDUSTRIAL REVOLUTION



4th INDUSTRIAL REVOLUTION IN 2023-2030



1st INDUSTRIAL REVOLUTION

(1760-1840)

Development of the steam engine revolutionized transportation and industry.



2nd INDUSTRIAL REVOLUTION

(1870-1914)

Widespread adoption of electricity. Innovations like the telephone and internal combustion engine.



3rd INDUSTRIAL REVOLUTION

(1960-2000)

Digital revolution marked by the rise of computers and the internet. World Wide Web changed all businesses.

Source: IEA (2024)

EFFICIENCY : FOURTH INDUSTRIAL REVOLUTION



EFFICIENCY AND PRODUCTIVITY

The Fourth Industrial Revolution boosts productivity with automation and AI, streamlining processes and reducing waste.



COST MANAGEMENT

Smart systems and data-driven insights enable better allocation of resources, reducing overhead and operational expenses while maximizing output efficiency.



CLEANER SOLUTIONS

Clean energy minimize environmental impact while promoting eco-friendly production processes for a greener future.

4th INDUSTRIAL REVOLUTION



Source: IEA (2024)

EFFICIENCY :
SMART GRID OPTIMIZATION

30%

According to a study by McKinsey, AI-driven predictive maintenance can reduce maintenance costs by **10-40%** and downtime by **50%**.

Deloitte reports the use of smart grids can increase the efficiency of renewable energy distribution by **5-10%** and enhance profitability by **2-3%** in grid-tied renewable energy projects.



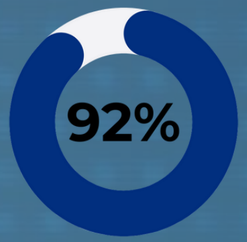
Source: Wood McKinsey, Deloitte (2024)



EFFICIENCY : HYDROCARBON

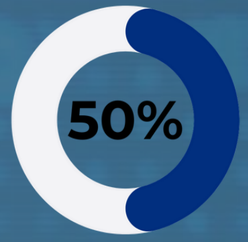
INVESTMENT IN ADVANCED TECHNOLOGY

GLOBAL OIL AND GAS INDUSTRY



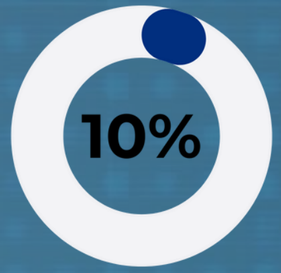
Investment

Investment and plan to invest in technological projects within two years.



Adopt

Already implementing advanced technological projects

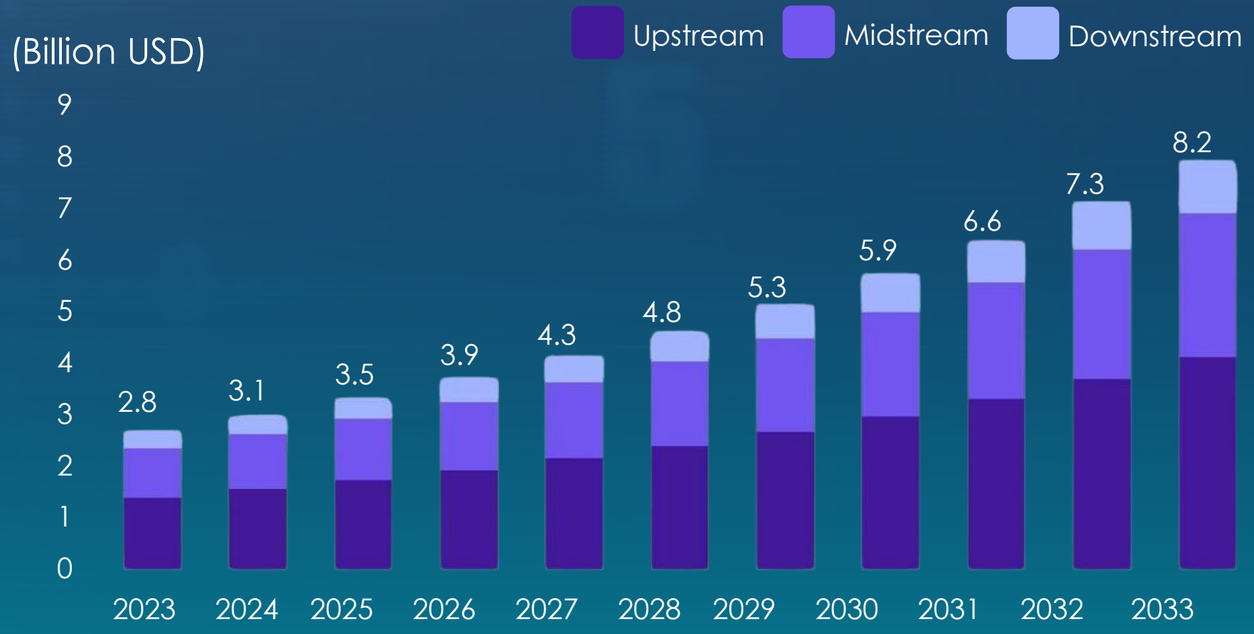


Increase

Advance technological projects increased revenue in 2023

Global Investment in Technology for Oil and Gas Industry

Size, by operation, 2023-2033 (Billion USD)



Source: IEA (2024)

ADVANCED TECHNOLOGY IN EVERY PROCESS

UPSTREAM

EXPLORATION

- Seismic Data Interpretation
- Subsurface Characterization

FIELD DEVELOPMENT

- Asset Design and Planning
- Project Cost Estimation
- Construction Safety
- Generative Design

PRODUCTION

- Production Optimization
- Virtual Flow Meters
- Emissions Reductions
- Flow Assurance

RESEARCH & DRILLING

- Material Discovery
- Technological Innovation

OPERATIONS

- Reservoir Simulation
- Well Placement
- AI Geosteering

OPERATIONS

- Remote Monitoring
- Remote Operations
- Autonomous AI Autopilot
- Operational Safety
- Energy Management

MIDSTREAM

TRANSPORTATION

- Pipeline Integrity
- Logistics Optimisation
- Inventory Management

ASSET MANAGEMENT

- Asset Performance Management
- Digital Twins
- AI Geofencing

DOWNSTREAM

REFINING& PROCESSING

- Process Optimisation
- Real-time Quality

RETAIL

- Demand Forecasting
- AI Robotic Fueling

ENVIRONMENTAL MONITORING

- Emissions Monitoring
- Spill Detection and Response

TRADING

- Pricing Optimization
- Benchmarking

Source: IEA (2024)

EFFICIENCY : EXPLORATION & PRODUCTION

Seismic Data Interpretation

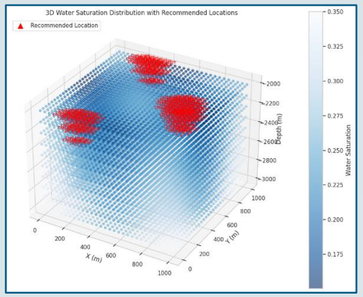
Machine learning algorithms analyze seismic waves and geological features, identifying patterns indicate oil and gas reservoirs underground.

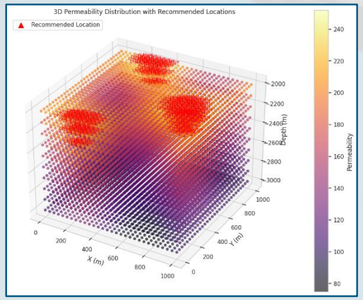


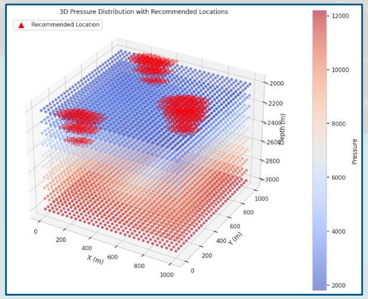
52%

Reservoir Management

Simulate various production scenarios and predict reservoir performance with high accuracy, maximizing recovery rates and minimizing operational costs.







Source: IEA (2024)

COST MANAGEMENT : EXPLORATION & PRODUCTION





31%

PREDICTIVE MAINTENANCE

Data Collection and Monitoring

AI systems collect real-time data from sensors installed in energy equipment

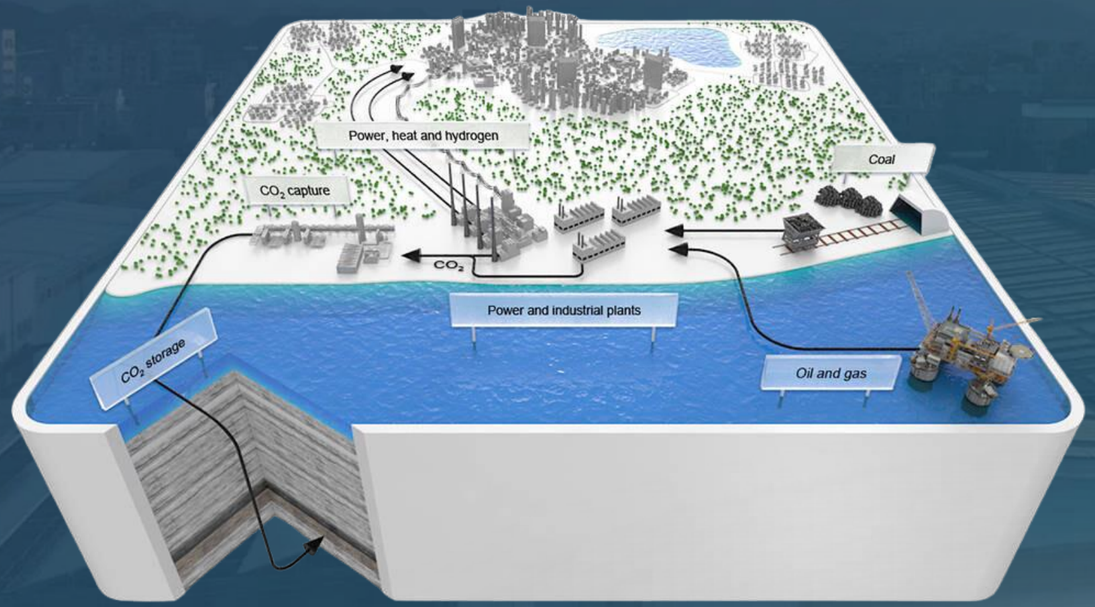
Pattern Recognition

AI algorithms analyze large volumes of data to identify patterns and anomalies that indicate potential equipment failures.

Source: IEA (2024)

HYDROCARBON BECOMES CLEANER

Power of Innovation will increase ROI





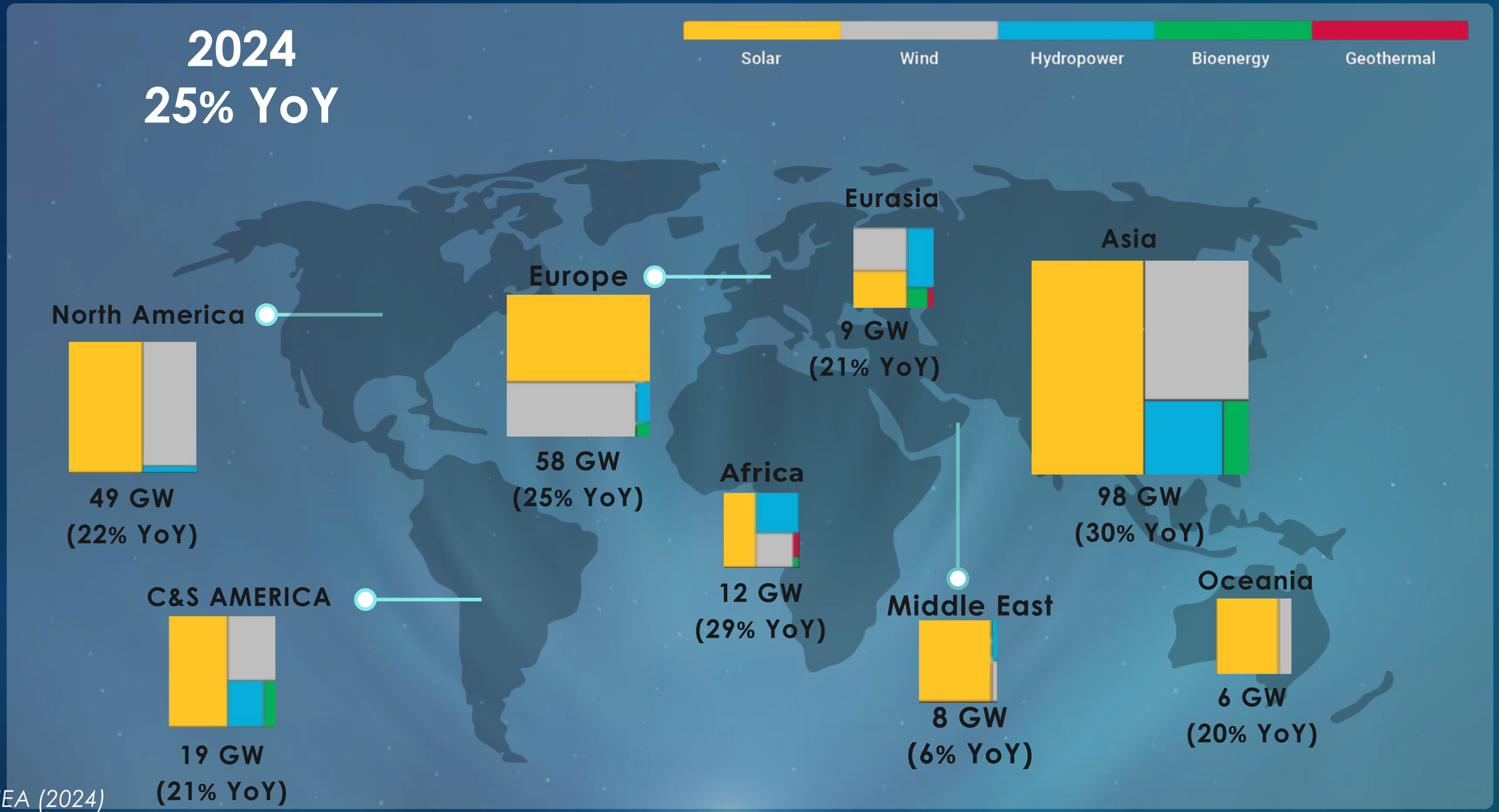
ROI: -5% to 5%

ROI: 15% to 25%

Source: IMF, World Bank, IEA (2024)

EFFECTIVENESS: RENEWABLE

RENEWABLE : STRONG CAPACITY GROWTH

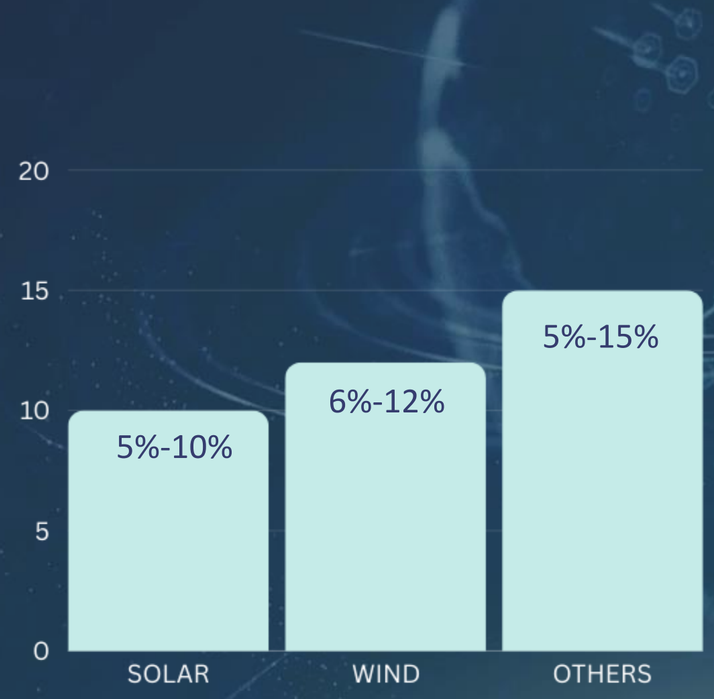


Source: IEA (2024)

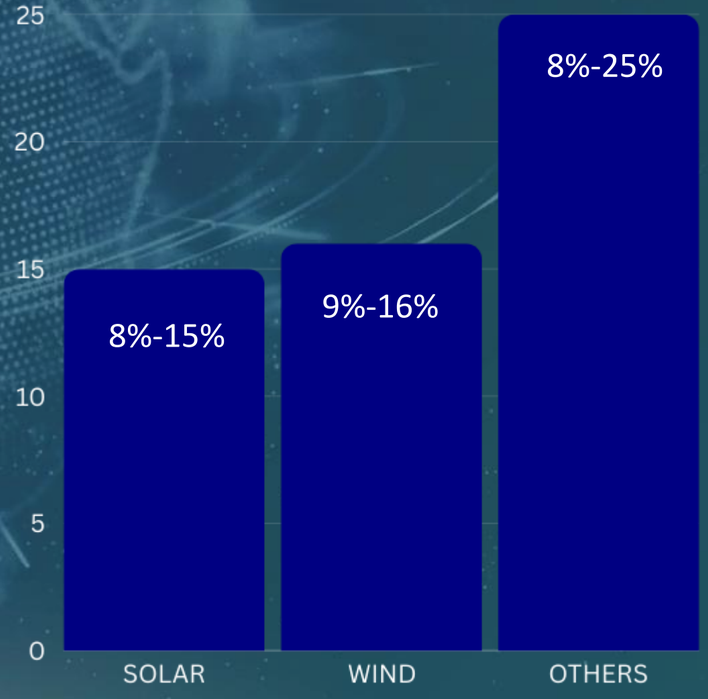
RENEWABLE : TECHNOLOGY IS A GAME CHANGER

DUE TO LOWER COST AND HIGHER RETURNS

ROI IN 2010-2020



ROI IN 2023-2030



Source: IEA, World Bank, IMF, Reuters (2024)

SOLAR ENERGY : ADVANCED BATTERY

HIGHER ELECTRIC STORAGE

Case Study	Key Benefits
TESLA MEGAPACK	30-60% Higher Density 50% Thermal Management 40% Cost Efficiency 30% Lower Maintenance 20-30% Life Cycle

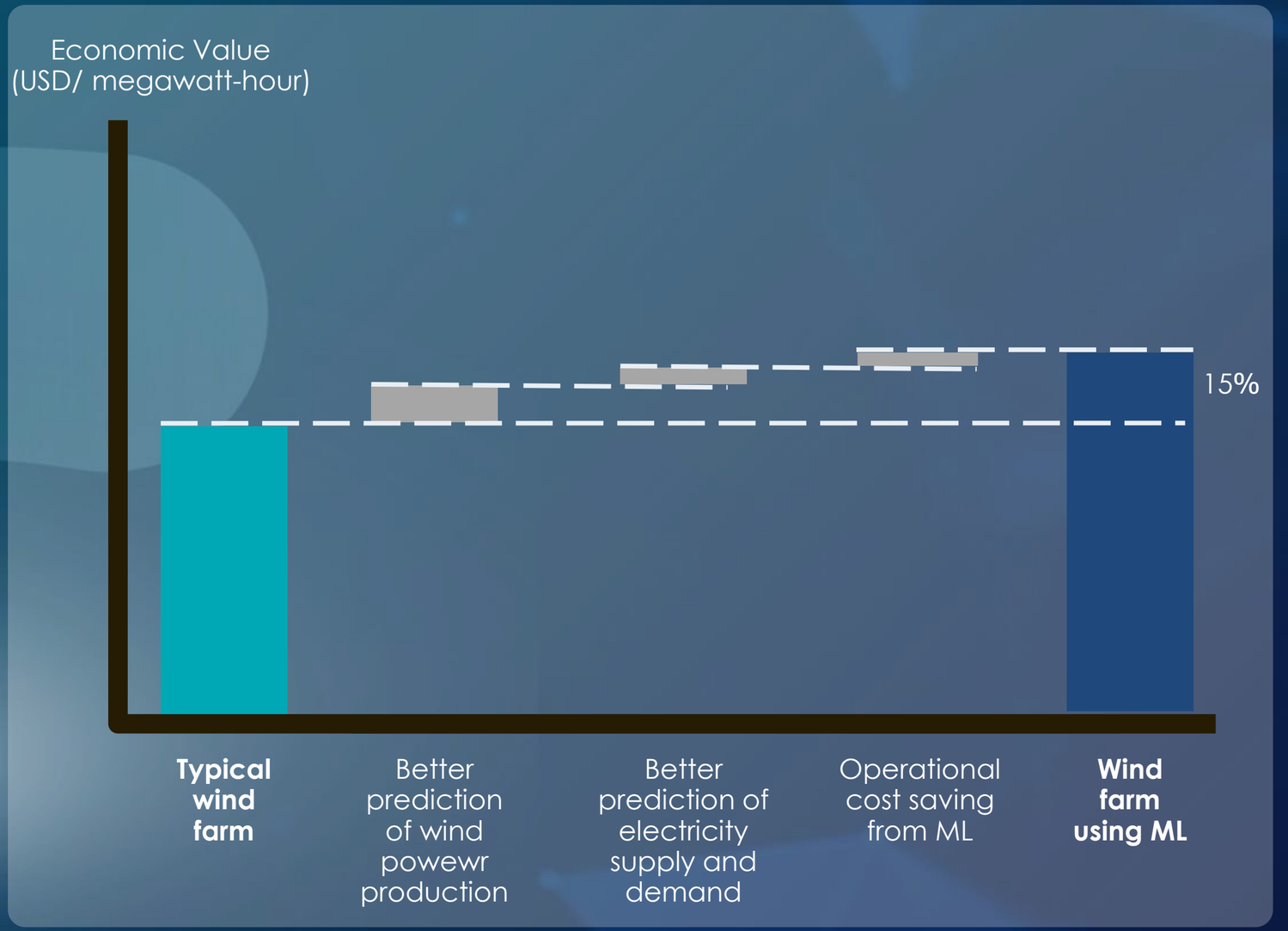


Source: TESLA (2024)

WIND ENERGY : MACHINE LEARNING

POSITIONING AND MANAGING FOR MAXIMIZING PRODUCTIVITY





Source: Reuters (2024)

NUCLEAR : SMALL MODULAR REACTOR (SMR)

DOWNSIZING FOR RELIABILITY



Case Study	Key Benefits
Google & Kairos Power	30-50% Lower Cost of Capital, 2 times shorter construction Reduce 6 MMTCO2e (compared with Coal) > 90% Consistency (Solar 25-30%, Wind 35-45%)

Source: KAIROS POWER (2024)

HYDROGEN PROJECTS : FOCUSING ON GREEN INVESTMENT

Canada
Iberdrola and Fertiberia Green Hydrogen Project

United Kingdom
HyDeploy, HyNet

Germany
Refhyne Project

United States
Hydrogen Energy California (HECA)

Japan
Fukushima Hydrogen Energy Research Field (FH2R)

Australia
Western Green Energy Hub (WGEH)
Hydrogen Energy Supply Chain (HESC)



Green	Turquoise	Blue	Pink	Grey	Brown
Electrolysis; *Renewable energy source*	Pyrolysis; *Methane*	Steam Methane Reforming with CCS; *Fossil fuels*	Electrolysis; *Nuclear*	Steam Methane Reforming; *Natural gas*	Gasification; *Coal*

Source: Platts (2024)

HYDROGEN : NEED CONTINUOUS GOVERNMENT SUPPORT

No region has fully defined its policy framework for low-carbon hydrogen

	PRODUCTION SUPPORT	ELECTROLYSIS	CERTIFICATION	DEMAND
JAPAN	✓	✓	✓	✗
AUSTRALIA	✓	✓	✓	✗
EU	✓	✓	✓	✓
INDIA	✓	✓	✓	✗
SOUTH KOREA	✓	✓	✓	✗
UK	✓	✓	✓	✓
US	✓	✓	✓	✗

Source: Platts (2024)

RENEWABLE : SUSTAIN GOVERNMENT SUPPORT

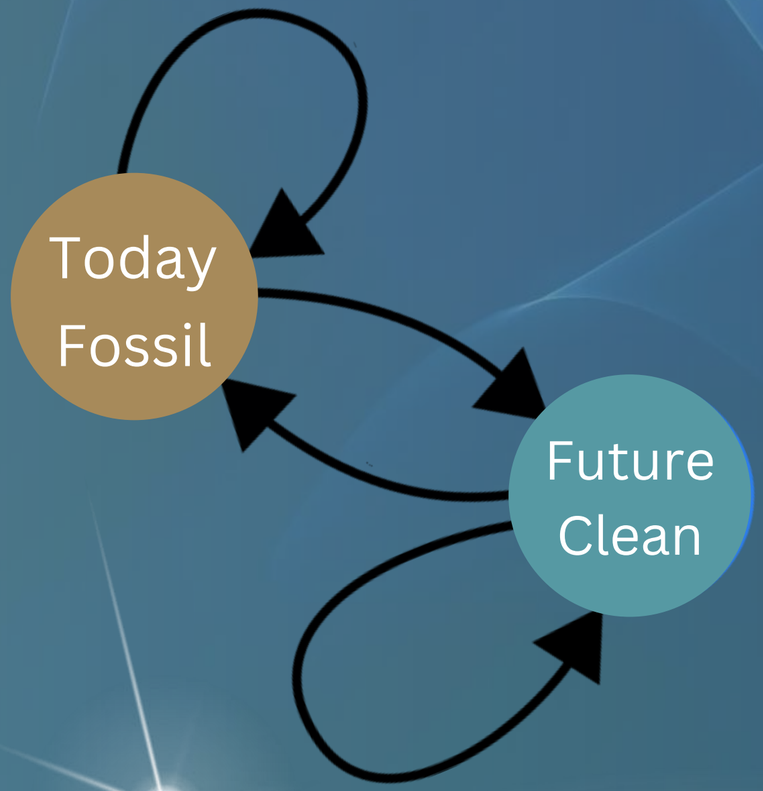
BOOM & BUST CYCLES

Investment in Southeast Asia's renewable energy by country

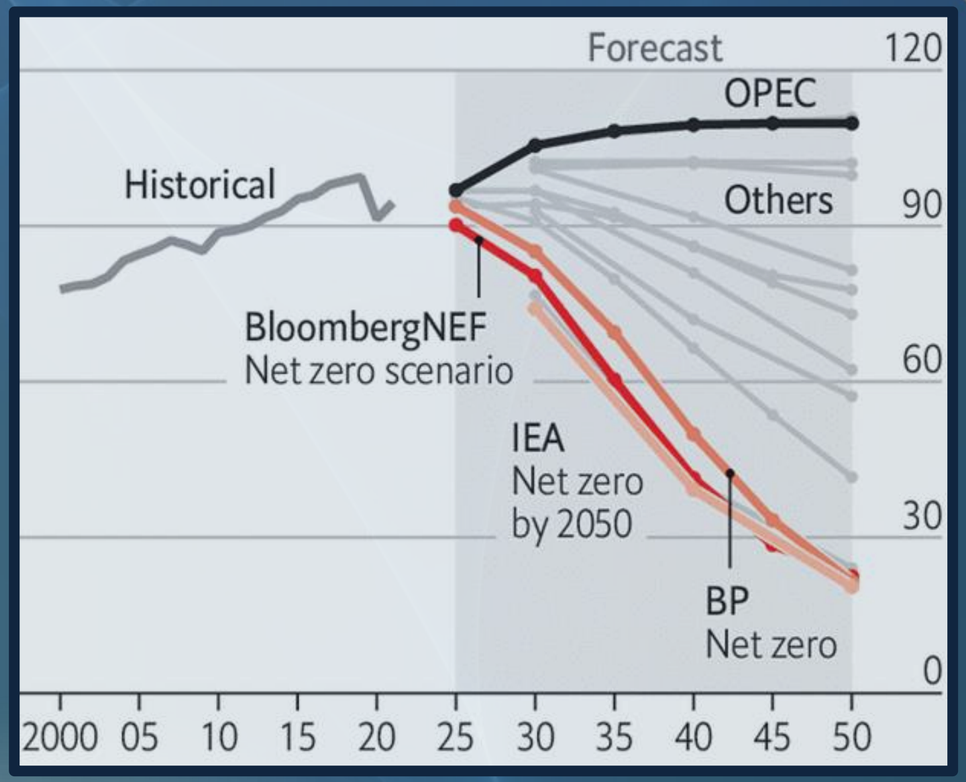


Source: BNEF (2024)

FUTURE WORLD VISION



Global Oil Demand **MMBD**



Source: BNEF, IEA, BP, OPEC (2023)


THANK YOU