

LIBYA RENEWABLE ENERGY REVIEW · Q3 2026

Surooh for Domestic & International Trade Co. Ltd.

Wind · Solar · Hydrogen · Battery Energy Storage





Surooh for Domestic & International Trade Co. Ltd.

Profile

An investment broking service functions as a vital link between individual investors and the international financial markets, with an emphasis on wealth growth, financial stability, and strategic asset management

Vision Statement

To be the world's most trusted and innovative investment partner, empowering individuals and institutions to achieve lifelong financial freedom and generational wealth through intelligent, accessible, and sustainable investing.

Mission Statement

Our goal is to improve and democratise the investing process. We aim to deliver superior portfolio performance, transparent market access, and outstanding value to our customers at every stage of their financial journey by combining state-of-the-art technology, in-depth market knowledge, and individualised advisory services

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Core Values

Integrity First:

Fully transparent, truthful, and in line with our clients' best interests (fiduciary obligation).

Client-Centricity:

Putting the objectives of our clients at the core of every choice, instrument, and tactic we create.

Continuous Innovation:

To keep ahead of market trends, we continuously improve our platform, research capacity, and financial products.

Excellence:

Dedicated to thorough investigation, faultless implementation, and superior customer service.

Financial stewardship:

Involves focused on long-term, risk-managed growth while treating our clients' investments with the highest regard.

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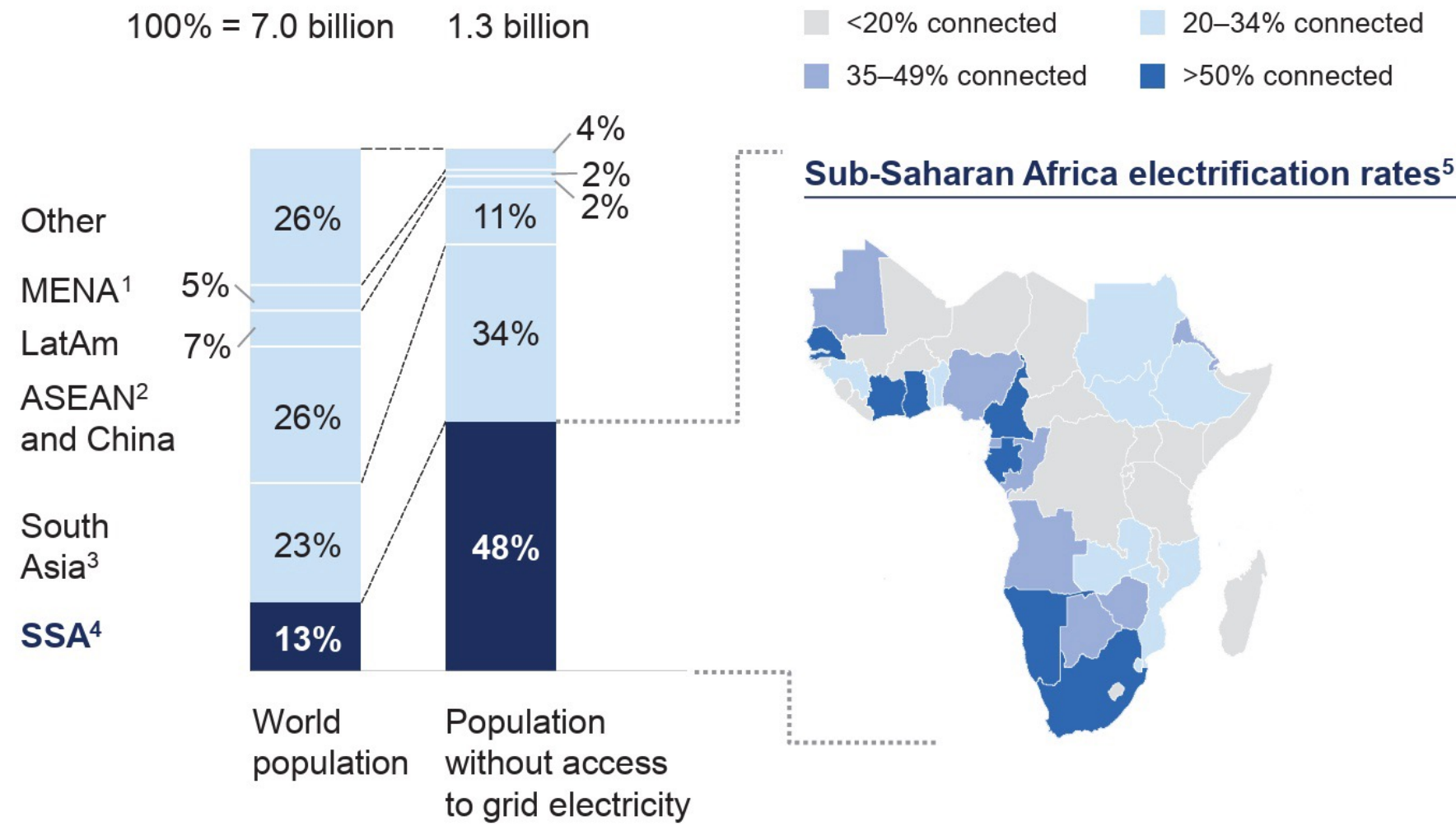
Strategic Pillars

- 1. Robust Infrastructure & Technology**
- 2. Expert Analysis & Perspectives**
- 2. Individualised Financial Counselling**
- 2. Compliance & Risk Management**



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**Distribution of population without access to electricity by region,
% of total population, 2011**



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Capital In, Electrons Out.

What one turbine, one megawatt of modules, one electrolyser and one battery container cost delivered into Libya — and what each of them produces here.

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The same electron, at half the capital.

1.7×

WIND

Installed cost in Libya of one 6 MW turbine from a US or EU OEM against an Asian one — same site, 3% less annual energy.

1.7×

SOLAR

A 100 MWdc plant delivered to Libya: \$80.8 m Western against \$46.6 m Eastern, for the same 203 GWh.

2.4×

HYDROGEN

Installed cost gap on a 1 MW electrolyser landed in Libya — buying roughly 6% more hydrogen per kilowatt-hour.

1.9×

STORAGE

Turnkey gap on a 100 MWh four-hour system.

What this means in Libya

Across all four technologies the physics is close to origin-neutral: a megawatt-hour from a Chinese turbine on the Derna ridge is indistinguishable from one produced by a Danish turbine on the same ridge. What differs — by a factor approaching two — is the capital required. In Libya that gap matters more than anywhere else in the region, because the counterfactual is not a market electricity price. It is a heavily subsidised tariff, a fuel-constrained gas fleet and, at the margin, diesel. Surooh's question is which supply chain to underwrite, at which warranty structure, for which of those three counterfactuals.

Libya as it actually is, not as the maps suggest.

0.01 %

renewable share of final energy consumption in 2021, on IEA figures — effectively a standing start.

8.2 GW

peak generation reached for the first time in 2026, against demand that still forces summer load shedding.

70 %

of the population with grid access in 2022. Roughly 200 remote villages sit more than 25 km from any line.

\$0.008

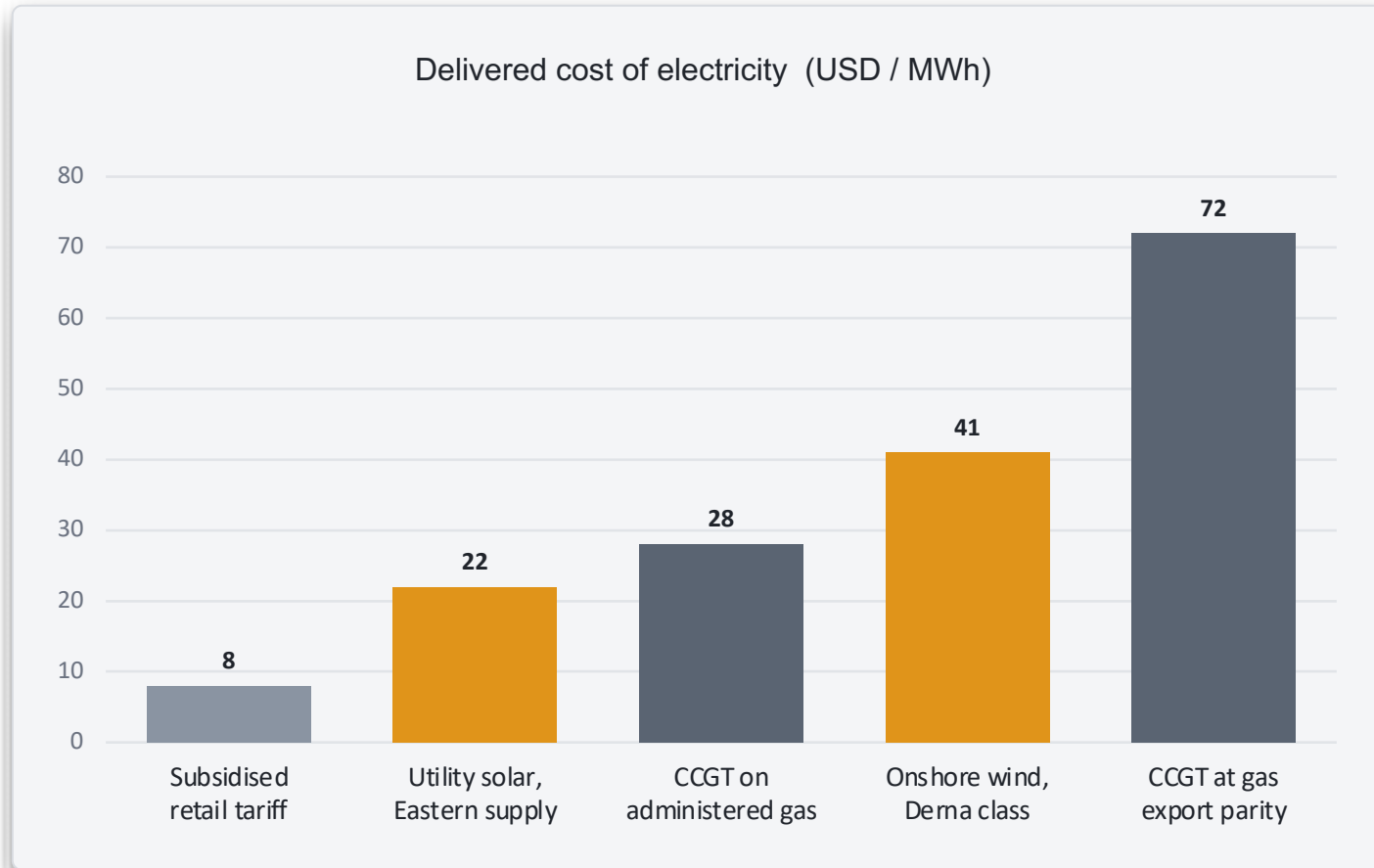
the residential tariff per kilowatt-hour. Solar does not compete against this number, and should not try.

The announced pipeline	Sponsor	Capacity
Al-Sadada solar, 280 km SE of Tripoli	TotalEnergies / GECOL	500 MW
Eastern Libya solar	PowerChina / EDF	1,500 MW
Ghadames solar, 500 ha, permitting	AG Energy / GECOL PPA	200 MW
Two further solar plants	Alpha Dhabi Holding	2,000 MW
Maqroon and Derna wind, REAoL plan	REAoL / GECOL	≈ 1,000 MW

Sources: IEA, GECOL and REAoL announcements, pv magazine, PVKnowHow / J.v.G. Technology country report. Announced capacity is not contracted capacity — most of the above remains at permitting or framework-agreement stage.

What renewable power actually competes against.

Delivered cost of electricity by source, USD per MWh



\$220 / MWh

the cost of diesel and heavy-fuel backup generation that fills the gap during load shedding. This is the number solar and storage actually beat.

The tariff is not the market

Retail power is administered, not traded. A merchant solar business case fails here; a GECOL tender, a captive industrial load or a fuel-displacement contract does not.

Gas has an opportunity cost

Every cubic metre burned domestically is one not exported through Greenstream. Priced at export parity, gas-fired generation is three times the cost of Eastern-sourced solar.

Renewable figures are Surooh estimates on the basis set out overleaf. Gas-fired costs assume an efficient CCGT at administered domestic gas versus European hub-linked parity.

How to read every comparison that follows.

1 THE UNIT

Each section prices one physical unit: a 6 MW onshore turbine, 1 MWdc of modules, a 1 MW electrolyser, a 5 MWh battery container. Ex-works and delivered-installed are always shown separately.

2 THE SITE

Two Libyan reference sites, held constant. Solar: the Sirte basin at roughly 2,200 kWh/m² annual GHI and 2,045 kWh/kWp tracked yield. Wind: a Derna-class coastal ridge at 7.5 m/s, 120 m hub.

3 THE LIBYA ADDER

Every delivered price carries an explicit 18% premium over Gulf benchmarks for security, war-risk insurance, mobilisation, demurrage at Misrata or Mellitah, and payment terms. It is shown as its own line, never buried.

4 THE ORIGINS

“Western” means North American or European OEMs. “Eastern” means China, India, Türkiye and Gulf assembly. Türkiye is treated as a distinct middle tier — closest port, no Western premium.

Money: USD, indicative Q3 2026. 7% WACC for wind, solar and storage; 8% for hydrogen. 25-year life for wind, 30 for solar, 20 for electrolyzers and batteries. Planning-grade only — not a binding offer.

SECTION ONE

01

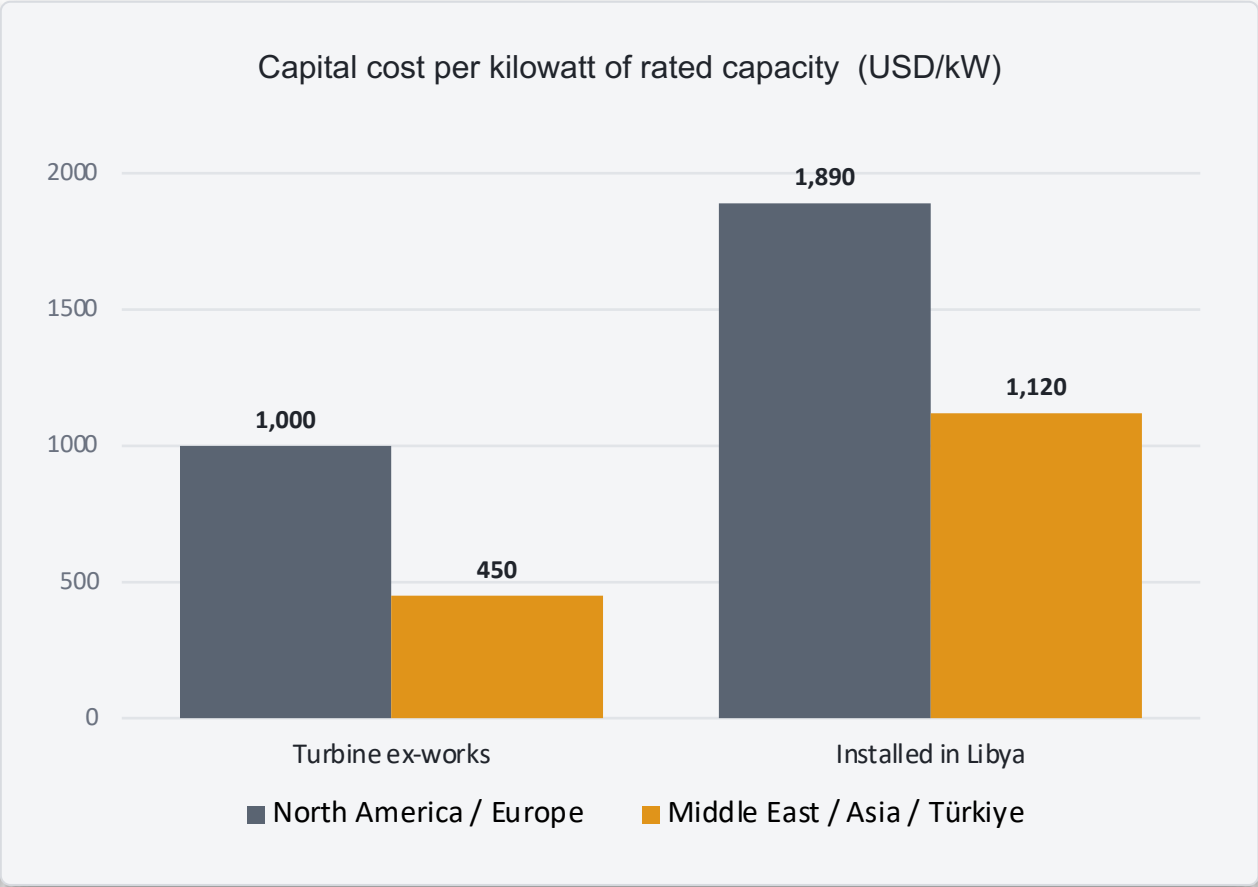
Wind Energy

One 6 MW onshore turbine delivered to a Derna-class coastal ridge — the best wind resource in the country, and the one REAoL has already zoned.

- Ex-works and Libya-installed pricing
 - Annual energy at Libyan coastal sites
- Warranty, availability and lead time

One turbine, two price tags.

6.0 MW onshore machine · 120 m hub · Derna-class ridge · delivered and installed in Libya

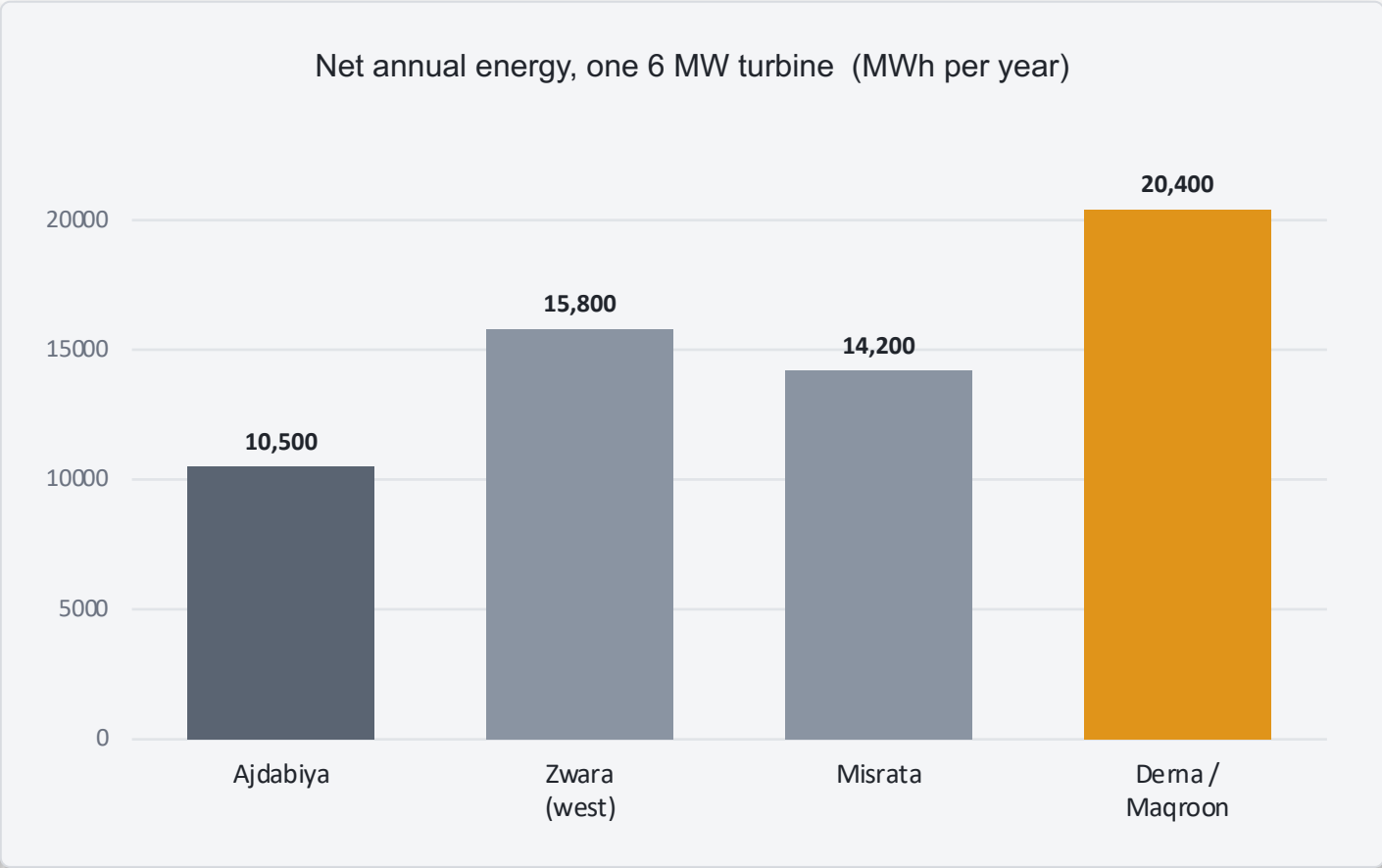


	NAM / EU OEM	ME / ASIA / TR
Ex-works, one unit	\$6.0 m	\$2.7 m
Installed in Libya	\$11.3 m	\$6.7 m
Net annual energy	21,000 MWh	20,400 MWh
Availability warranty	97 – 98 %	95 – 97 %
Capex per annual MWh	\$540	\$330
Indicative LCOE	\$62 / MWh	\$41 / MWh

Ex-works pricing reflects BNEF export benchmarks. Installed figures include foundation, tower, crane mobilisation, internal grid, commissioning and the 18% Libya adder. Chinese domestic clearing prices, near \$300/kW, are not achievable on export terms.

Libya's wind sits in the east.

Net annual energy from one 6 MW unit at four Libyan sites



7.8 m/s

the annual mean wind speed reported at Derna — the strongest measured resource on the Libyan coast, and roughly double the energy of the weakest site.

≈ 3 %

the residual energy advantage a Western machine holds on the same ridge, once rotor size and availability warranties are both counted.

\$46 m

the capital released across a 60 MW wind farm — ten units — by sourcing East rather than West at the same Libyan site.

Capacity factors of 20% at Ajdabiya, 27% at Misrata, 30% at Zwara and 39% on the Derna–Maqroon ridge. Site selection moves annual yield twice as far as OEM selection does.

Where each supply chain earns its price in Libya.

WESTERN OEM

- Twenty-year full-service agreements lenders already accept
- Export-credit agency cover — the one financing route open in Libya
- Deep engineering support for weak-grid interconnection
- Track record GECOL and REAoL can point to publicly

EASTERN OEM

- Roughly 45% of the Western price, ex-works
- Larger rotor diameter at the same nameplate rating
- Half the lead time, and willing to mobilise into Libya
- Open to localising tower fabrication and assembly

THE SUROOH POSITION

- Dual-track tender: both origins priced on one Libyan site model
- Third-party warranty wrap to lift Eastern kit to bankable
- Spares depot at Benghazi or Misrata to close the service gap
- Route the capital saved into extra installed capacity, not margin

On a 60 MW farm at Derna the two supply chains differ by roughly \$46 million in capital and about 6 GWh a year in output. Only one of those numbers changes the investment case.

02

SECTION TWO

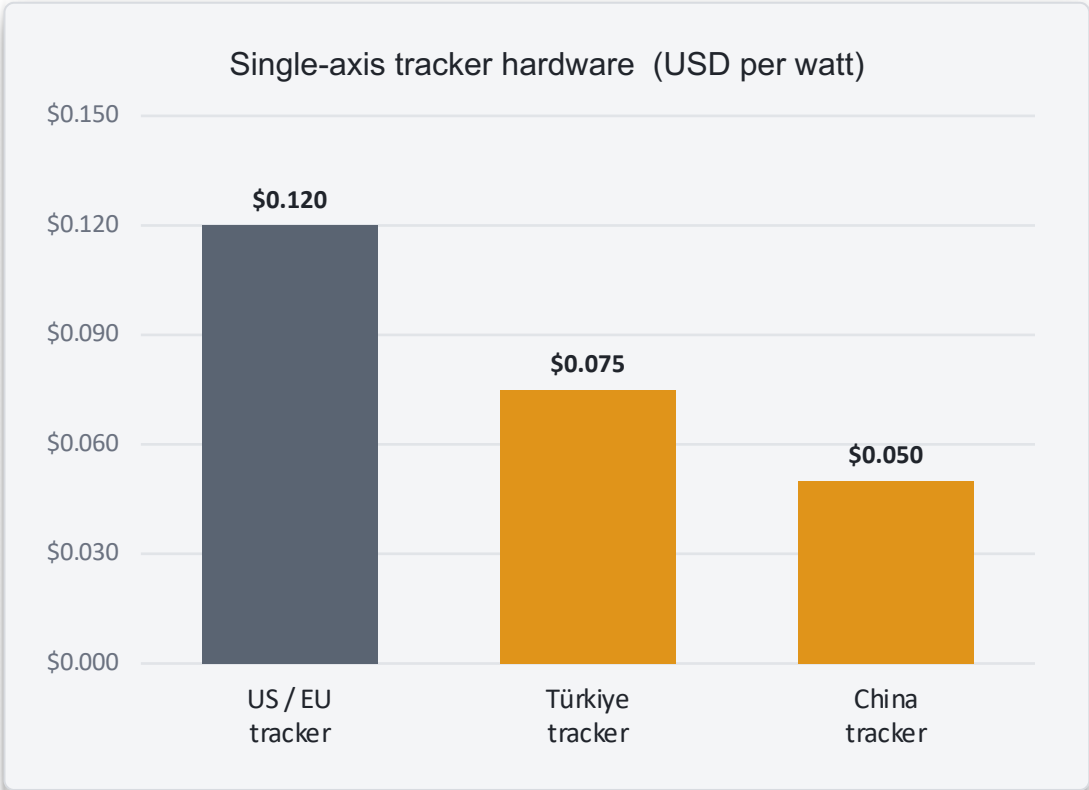
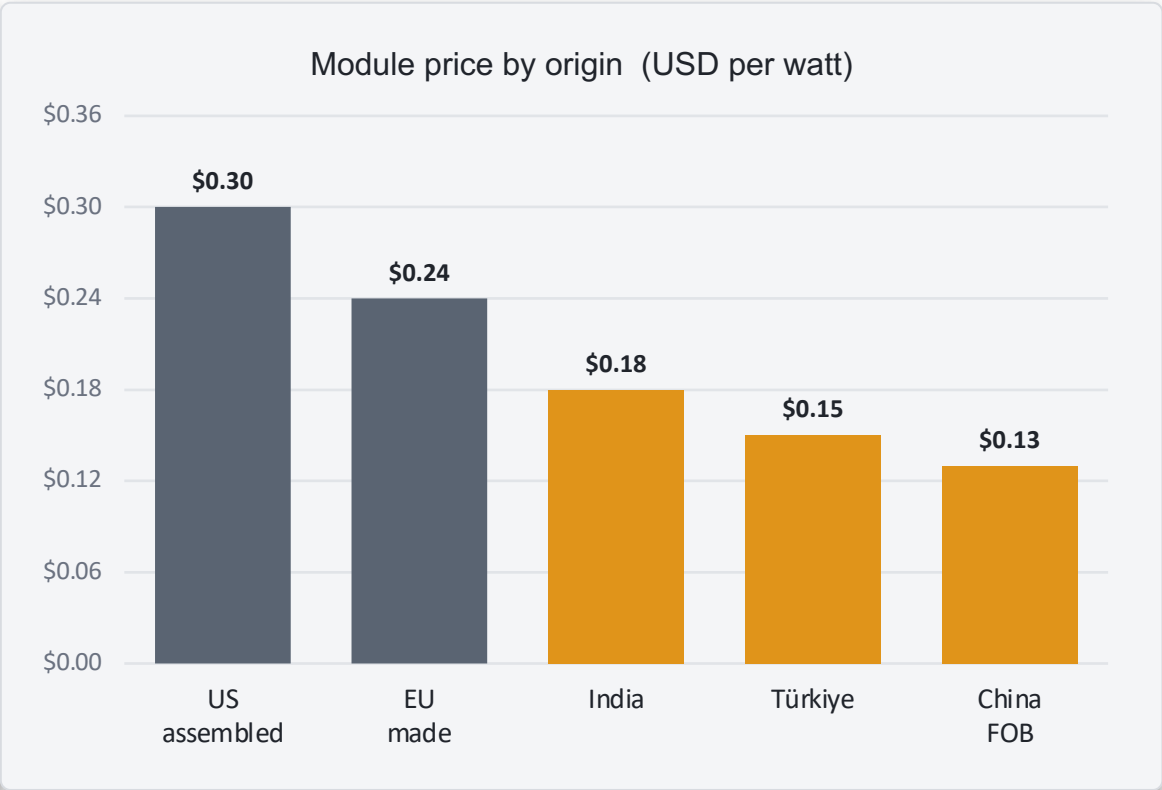
Solar Energy

One megawatt of modules and the steel that moves them, landed at Misrata. Libya's resource is world-class; its module price is whatever its supply chain decides.

- Module pricing per watt, five origins A 100 MWdc plant, built two ways
- Trackers and the Libyan yield uplift

A watt is a watt. The price is not.

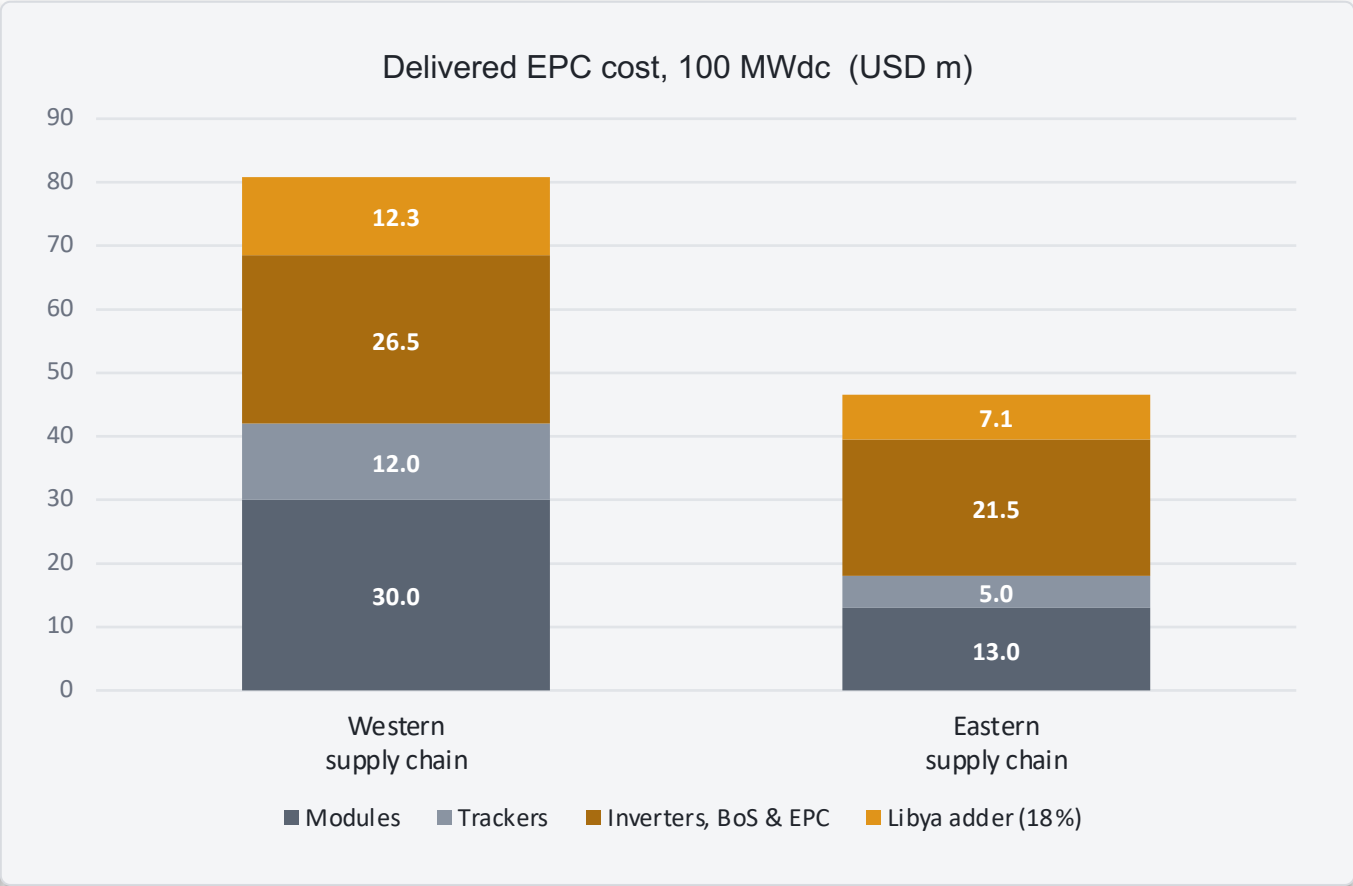
Tier-1 bifacial TOPCon modules and single-axis trackers, Q3 2026, before the Libya adder



One 580 W module **\$174** US-assembled · **\$87** from Türkiye — two days' sailing to Misrata · **\$75** FOB China.

A 100 MWdc plant, built two ways, in Libya.

Single-axis tracked bifacial plant, Sirte basin · USD millions

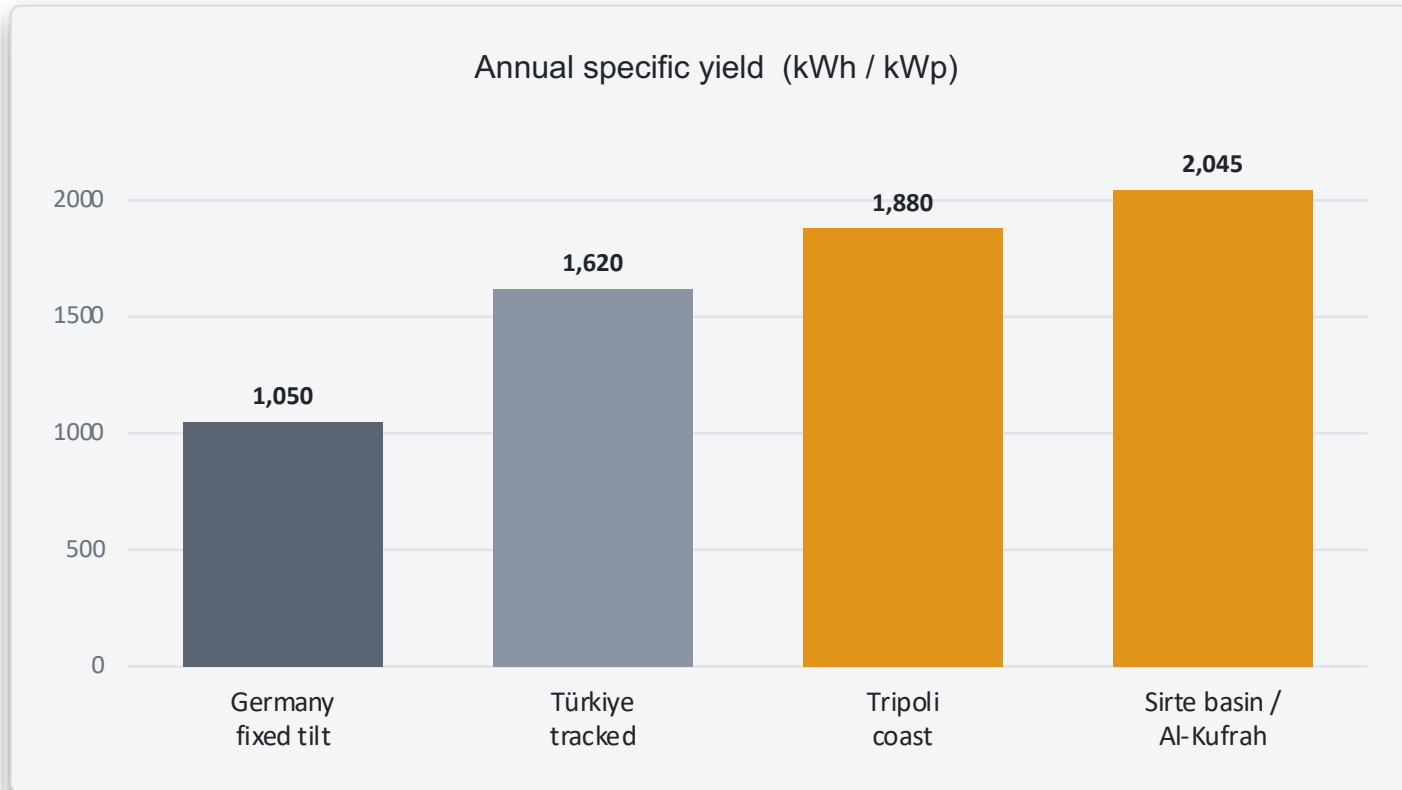


	Western	Eastern
Total EPC cost	\$80.8 m	\$46.6 m
Cost per kWdc	\$808	\$466
Year-one yield	205 GWh	203 GWh
Tracker uplift	+22 %	+22 %
Indicative LCOE	\$37 / MWh	\$22 / MWh

\$34 million released
Enough to fund a further 73 MWdc on the Eastern cost base — a 73% capacity increase for the same cheque.

Libya's resource is the asset. The rest is procurement.

Specific yield, single-axis tracked bifacial, kWh per kWp per year



+95 %

more energy from the same module in southern Libya than in northern Germany, before a single procurement decision is made.

1,020 GWh

what the announced 500 MW Al-Sadada plant should produce annually on this yield — roughly 3% of national generation from one project.

Verdict — Libya pairs roughly 3,000 sunshine hours with the world's cheapest modules. Budget an 8% summer thermal derate and 2–4% soiling; even after both, this is the strongest solar case in the Mediterranean.

03

SECTION THREE

Hydrogen Production

Grey, blue and green — and the electrolyser that separates them. The largest capital gap of the four technologies, and the one where Libyan geography counts for most.

-
- Cost and carbon by hydrogen colour
 - One 1 MW electrolyser, three origins
 - Libya's Mediterranean position

Three colours, three business models.

GREY

Steam methane reforming, vented

\$1.00 – \$2.10

per kg, 2026 range

9 – 11 kg CO₂ per kg H₂

Incumbent. In Libya, gas feedstock is already fully absorbed by power generation.

BLUE

Reforming with carbon capture

\$1.80 – \$4.70

per kg, 2026 range

1 – 3 kg CO₂ per kg H₂

Gas-price dependent. Libya has depleted Sirte basin reservoirs suited to CO₂ and hydrogen storage.

GREEN

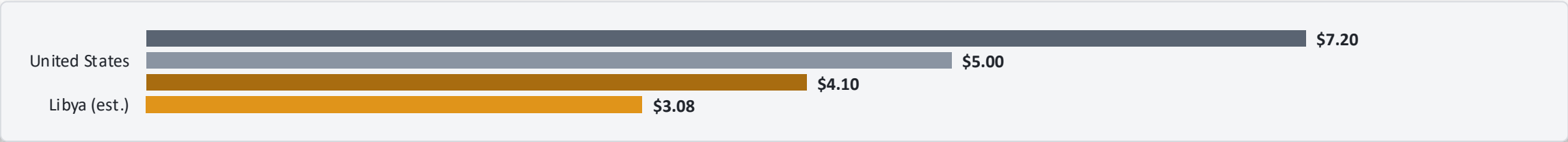
Electrolysis on renewable power

\$3.00 – \$7.60

per kg, 2026 range

Near zero, if genuinely additional

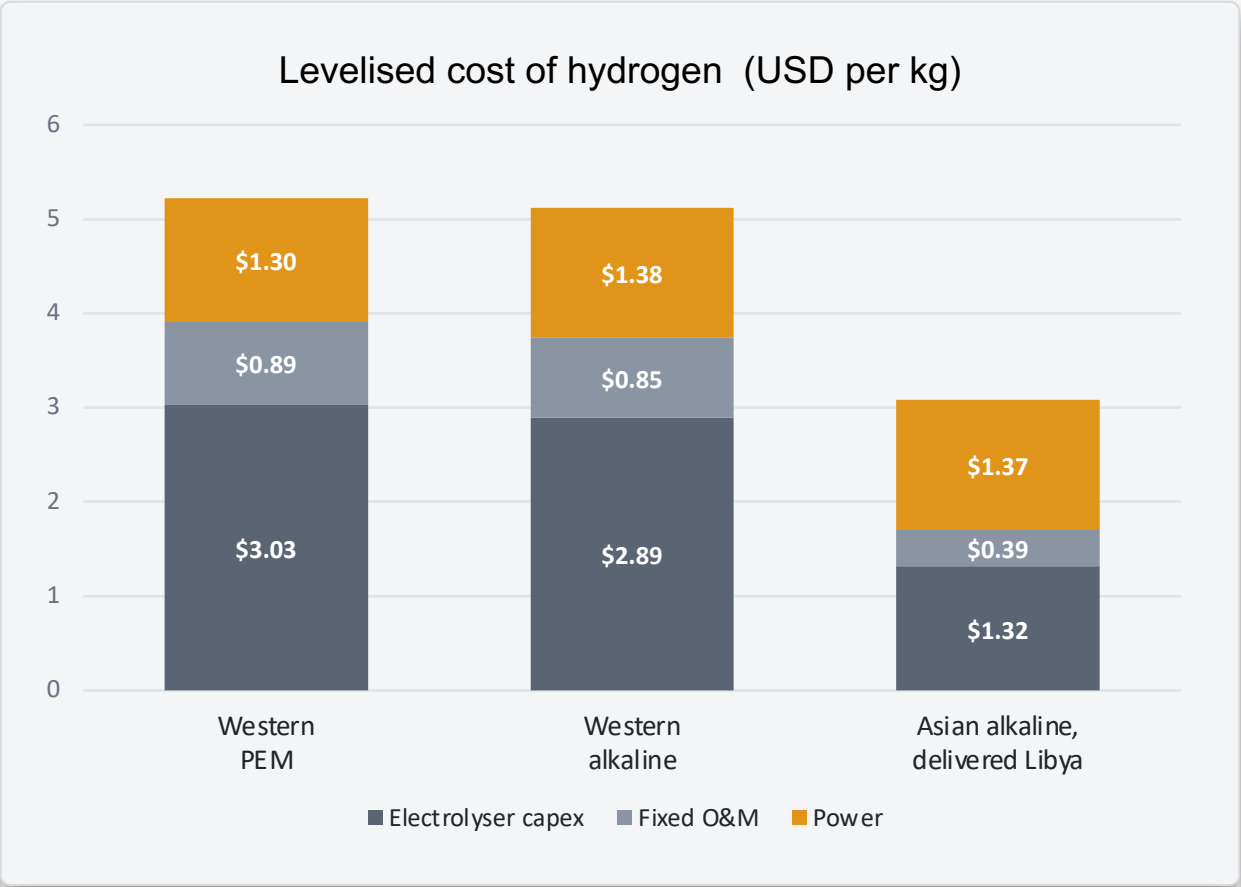
Capex and power-price dependent. Libya's solar resource puts it in the low-cost tier.



Green hydrogen production cost, unsubsidised. The Libya figure is a Surooh estimate on Eastern-sourced alkaline electrolysis at \$25/MWh Libyan solar; regional figures are Q1–Q3 2026 market data.

One megawatt of electrolysis, three ways to buy it.

1 MW nominal · 60% utilisation on Libyan solar-wind hybrid · \$25/MWh power · installed in Libya



	Western PEM	Western ALK	Asian ALK
Installed in Libya	\$3,010/kW	\$2,714/kW	\$1,239/kW
Specific energy	52 kWh/kg	55 kWh/kg	55 kWh/kg
Output at 60% load	101,100 kg/yr	95,600 kg/yr	95,600 kg/yr
Stack life	80,000 h	90,000 h	60–70,000 h
Levelised cost	\$5.22/kg	\$5.12/kg	\$3.08/kg

The efficiency premium is real — and too small

Western PEM converts power to hydrogen about 6% more efficiently. At \$25/MWh that saving is worth roughly \$0.08/kg — against a capex penalty of \$1.71/kg once landed in Libya.

Libya's advantage is 520 kilometres of pipe.

THE GEOGRAPHY

- 1 Greenstream runs 520 km subsea from Mellitah to Gela in Sicily, is owned 50-50 by Eni and the NOC, and was built for 11 bcm a year. Gulf producers ship ammonia and lose \$0.40–\$0.80/kg doing it. Libya has a direct physical link to the Italian grid.

THE HEADROOM

- 2 Greenstream flows have fallen from roughly 700 MMscfd in 2015 to under 100 MMscfd in 2025 as domestic gas demand absorbed supply. Libya's share of EU gas imports is now around 0.3%. That is spare export capacity looking for a molecule.

THE STORAGE

- 3 Depleted Sirte basin reservoirs are the most credible underground hydrogen storage candidates in North Africa, with Ghadames a secondary option — mature fields, existing pipeline networks, proximity to export terminals.

THE HONEST CAVEAT

- 4 The Southern Hydrogen Corridor declaration signed in Rome covers Germany, Algeria, Italy, Austria and Tunisia. Libya is not a party to it. Repurposing Greenstream for hydrogen is technically plausible and politically unbudgeted — treat this as a 2030s option, not a current pipeline.

Surooh's recommended exposure: trade the equipment and the EPC package, not the merchant molecule — margin without twenty years of hydrogen price risk.

04

SECTION FOUR

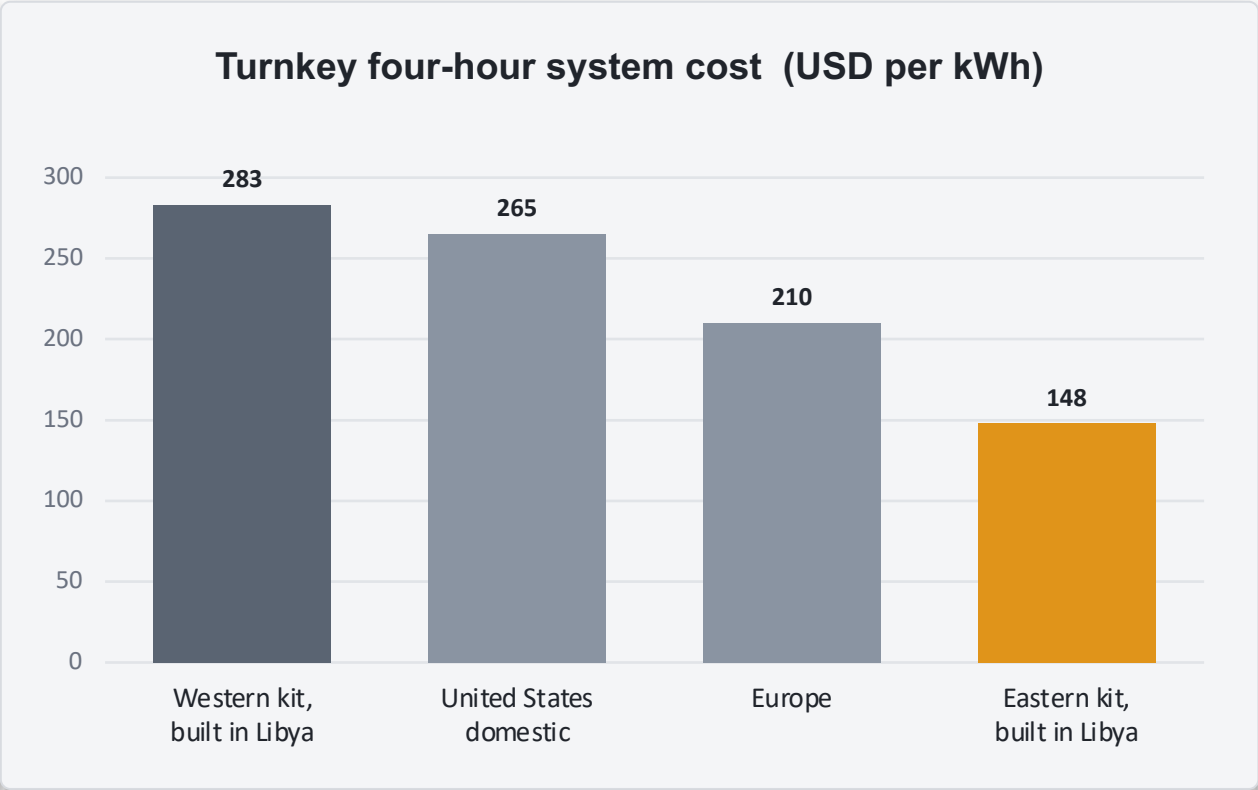
Battery Energy Storage

One 5 MWh container, and the hundred-megawatt-hour system it belongs to. In Libya this is not an arbitrage play — it is the answer to load shedding.

-
- Container pricing, DC side and turnkey
 - Firm power against diesel backup
 - Off-grid and rooftop applications

One container, four delivered prices.

5 MWh liquid-cooled LFP container · 314 Ah cells · four-hour duration



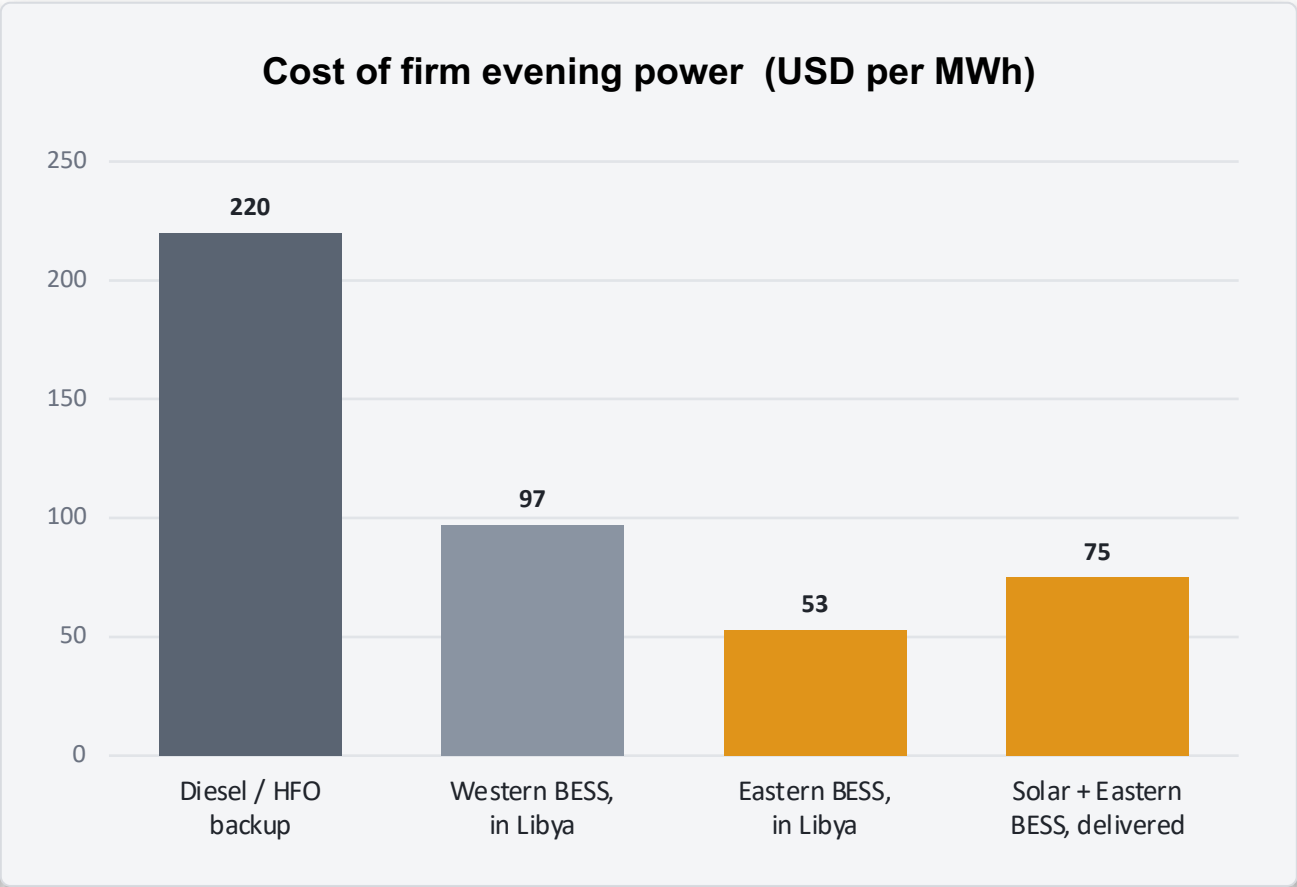
	US / EU built	Asia built
LFP cell, factory gate	\$85 – 95/kWh	≈ \$40/kWh
DC block, 5 MWh unit	\$1.15 m	\$0.63 m
DC cost per kWh	\$230	\$125
Turnkey in Libya, per kWh	\$283	\$148
Round-trip efficiency	88 – 90 %	87 – 89 %

Round-trip efficiency is effectively identical across origins. Storage is the purest capital comparison in this deck.

US and EU figures are domestic-market prices including their own tax credits and subsidies. Neither travels to Libya — the Libyan comparison is the first and fourth bars.

The competitor is a diesel generator.

100 MWh four-hour system · one cycle per day · 88% round-trip · 7% WACC · 20-year life



\$14.8 m

turnkey capital for a 100 MWh four-hour system on Eastern equipment, installed in Libya — against \$28.3 m for Western kit.

3× cheaper

than the diesel and heavy-fuel generation that currently fills the evening peak. This, not the retail tariff, is the benchmark that matters.

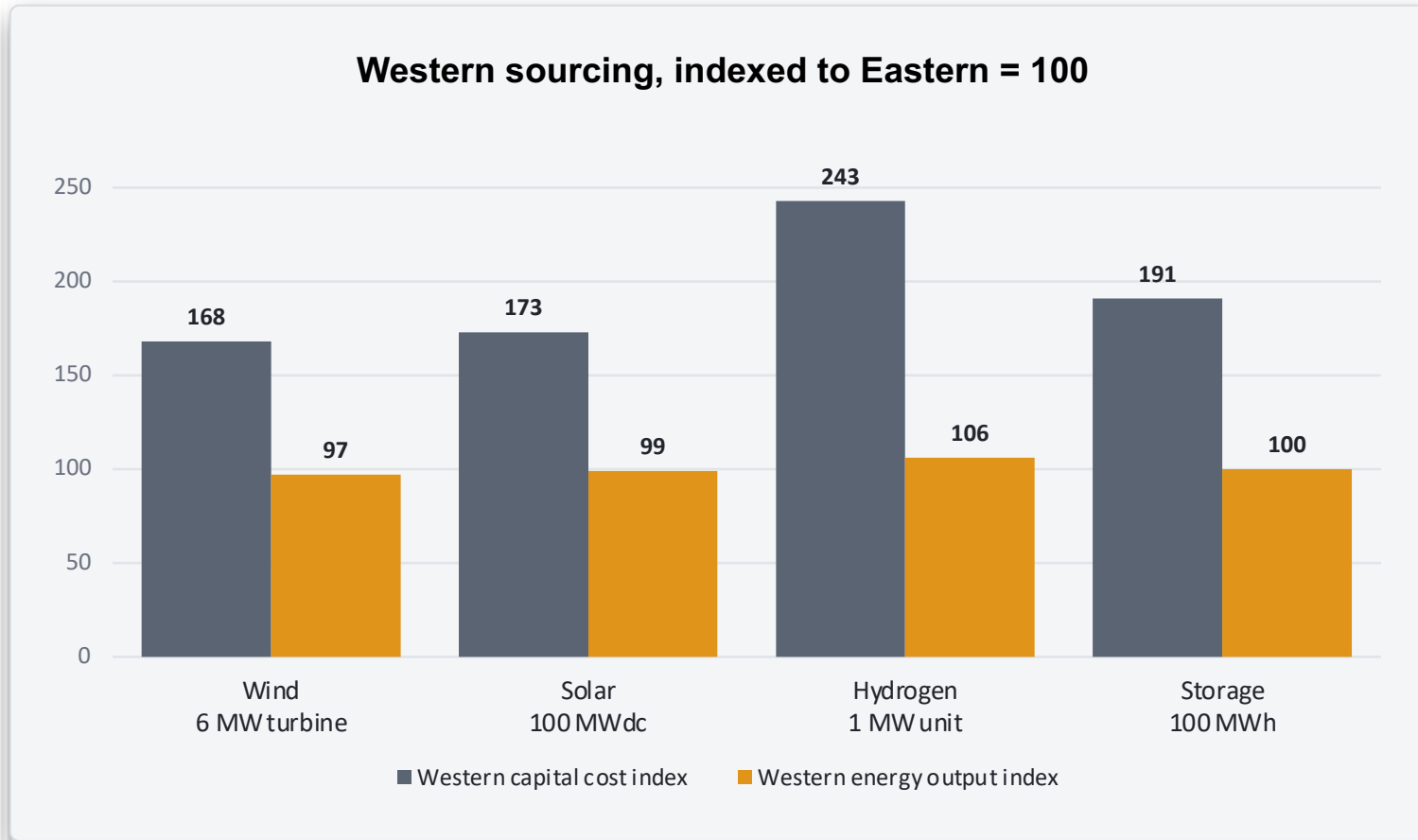
≈ 200 villages

sit more than 25 km from the grid, where households still buy kerosene at roughly 13% of monthly spend. Container-scale storage is the entry product.

Solar-plus-storage figure combines \$22/MWh generation with the Eastern storage cost, weighted for the share of output that is time-shifted rather than delivered directly.

Four technologies, one pattern.

Western sourcing indexed to Middle East / Asia sourcing = 100, both delivered into Libya



The pattern

- Capital cost varies by 68 to 143 percent across origins.
- Energy output varies by 6 percent — and in hydrogen the Western unit is the more productive one.
- The gap is widest where the technology is least mature and the supply chain least contested.
- Western subsidy closes the gap only inside the jurisdiction granting it. For Libya it is noise.
- What Surooh sells is not the discount. It is the confidence to take it.

What the 18% adder is actually paying for.

1 PROCUREMENT ROUTE

REaOL was established under Law No. 426 of 2007; government contracting runs through Administrative Contracts Regulation 563/2007 and CoM Decree 12/2023. GECOL is the offtaker for every announced solar project. There is no merchant route to market.

2 PAYMENT & CURRENCY

Dinar exposure, letter-of-credit availability and GECOL payment history are the three items that decide whether a project is financeable. Price them explicitly; do not treat them as contingency.

3 LOGISTICS & SECURITY

Misrata and Mellitah are the practical entry points. Budget demurrage, escorted inland transport and war-risk insurance. Türkiye's freight advantage over China is worth roughly a week and a container rate.

4 GRID & INTERCONNECTION

A grid that still load-sheds cannot absorb unmanaged intermittency. Every renewable package Surooh quotes should carry a storage or curtailment answer alongside it, or it will fail technical review.

The adder is an estimate, not a quotation. On a live tender it should be rebuilt line by line from freight quotes, insurance terms and the specific offtake counterparty.

Four ways we convert the spread into margin.

1 ORIGIN ARBITRAGE

Tender every package to both supply chains against one Libyan site model, so GECOL or the private offtaker sees the true delta rather than a marketing claim.

2 BANKABILITY WRAP

Third-party warranty, performance guarantees and a spares depot at Benghazi or Misrata that lift Eastern equipment to a standard lenders and REAoL will accept.

3 THE TÜRKIYE BRIDGE

Turkish assembly carries neither the Western premium nor the origin-risk discount, and is two days' sailing from Misrata. The natural middle route for any EU-facing or ECA-financed Libyan project.

4 LIFECYCLE ECONOMICS

Price stack replacement, degradation, soiling and the 8% summer thermal derate into the offer, so the cheaper unit is also the cheaper asset over twenty years.

Every figure in this deck is planning-grade and indicative. Binding pricing is site-specific and issued only against a completed technical specification.



The margin is in the sourcing decision.

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Libya · Indicative Q3 2026 benchmarks · Prepared for internal review

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