mprc
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Growth Beyond OGSE Outlook:

Solar Photovoltaic (Solar PV)



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INTRODUCTION

As the global energy system moves through a period of structural change via the energy transition, solar photovoltaic (PV) has emerged as one of the most accessible and scalable pathways for energy transition. Once viewed primarily as an alternative power source, solar is now a mainstream investment destination, supported by declining technology costs, maturing project delivery models and growing demand from governments, utilities, corporations and consumers seeking cleaner and more secure electricity supply. Its appeal lies not only in its decarbonisation potential, but also in its relatively lower barriers to market entry compared with many other energy transition segments.

The rise of solar is taking place against a shifting geopolitical backdrop. Energy security concerns, volatile fossil fuel markets, supply chain realignments, industrial policy and corporate net-zero commitments have accelerated interest in renewable power. Recent geopolitical instability has also reinforced the importance of energy sovereignty, as countries seek greater control over their energy supply, reduce dependence on imported fuels and strengthen resilience against external shocks. For many economies, solar PV offers a way to diversify energy supply, reduce exposure to imported fuels and build domestic green industries.

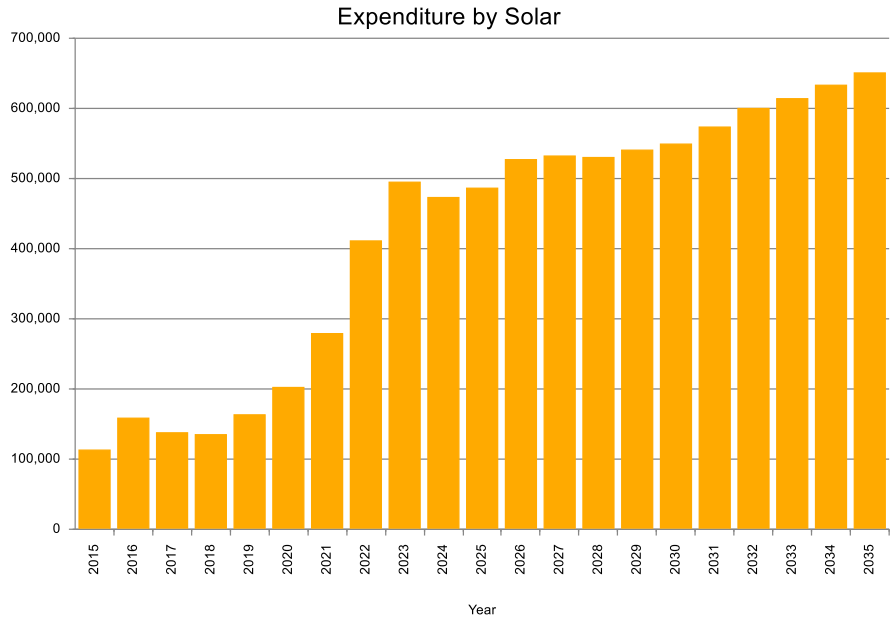


Figure 1: Global solar expenditure (Million USD).[1]

For Malaysia, solar PV represents a practical growth avenue within the broader energy transition and has been highlighted as one of the energy transition levers under the National Energy Transition Roadmap (NETR).[2] The country's policy direction, including its ambition to increase the share of renewable energy in installed capacity to 70% by 2050[2],shown in Figure 2, has created momentum for larger and more diverse

solar deployment models. This is especially relevant for companies with experience in oil and gas where capabilities such as project management, marine operations, fabrication, electrical and mechanical works, asset integrity, inspection, maintenance and safety management can be repositioned for solar-related opportunities.

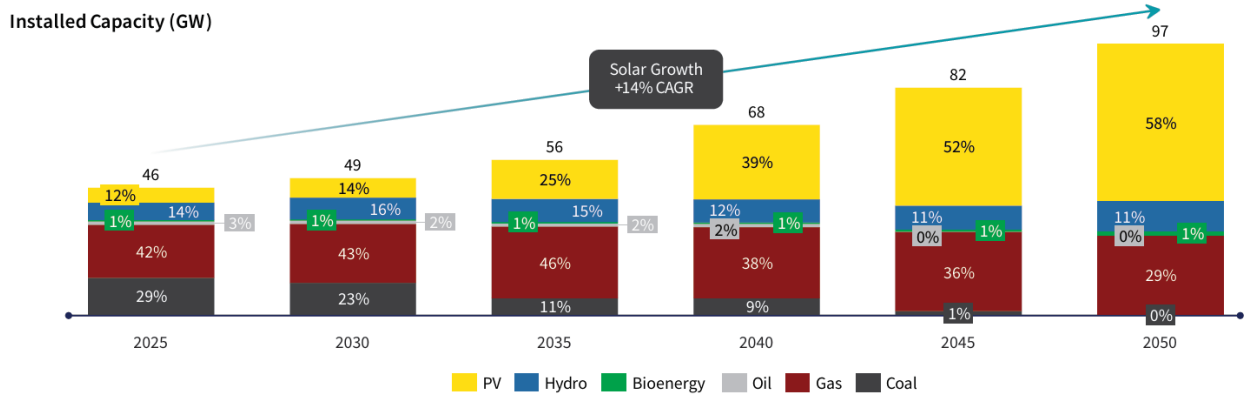


Figure 2: Projected power system installed capacity mix 2050 (GW).[2]

Key solar PV segments shaping near- to medium-term opportunities include both land-based solar and floating solar. Land-based solar covers Large Scale Solar (LSS), ground-mounted commercial & industrial (C&I) solar, and rooftop solar. LSS refers to utility-scale solar farms connected to the grid, typically developed through competitive bidding or power procurement mechanisms, while ground-mounted C&I solar involves on-site solar systems installed on available land within industrial or commercial premises. Rooftop solar, particularly in the commercial and industrial segment, involves solar installations on factories, warehouses, commercial buildings and other large electricity-consuming premises, often driven by cost savings, sustainability targets and corporate renewable energy procurement. Floating solar covers PV systems installed on water bodies, including reservoir-based floating solar, Hybrid-Hydro Floating Solar (HHFS) and offshore solar. Reservoir-based floating solar refers to solar PV systems deployed on lakes, dams or reservoirs, while HHFS integrates floating solar assets with hydropower infrastructure. Offshore solar extends floating PV concepts into more challenging marine environments, where technical requirements such as wave conditions, corrosion management and anchoring become more complex.

While the exact deployment mix across solar categories will depend on land availability, grid readiness, project economics and policy mechanisms, Malaysia's future solar capacity is expected to come from a combination of land-based solar and floating solar. LSS will likely remain the main utility-scale growth engine, supported by ground-mounted C&I solar and rooftop solar for distributed generation, while reservoir-based floating solar, HHFS and offshore solar can help unlock additional capacity where land-based deployment is constrained. More importantly, these segments point to areas where Malaysian companies can participate, where existing capabilities may be transferable, and how the solar market can become a meaningful platform for OGSE diversification in the energy transition.



CONTEXT SETTING

Market Structures

Malaysia's electricity market has historically been structured around a regulated and centrally planned model, particularly in Peninsular Malaysia. Under the Single Buyer model, electricity generation planning and procurement are coordinated through the Single Buyer[3], a ring-fenced entity within Tenaga Nasional Berhad (TNB), under the oversight of the Energy Commission (ST). This structure was designed to ensure security of supply, system reliability and coordinated investment in generation capacity. For many years, the market was dominated by conventional power generation sources such as gas, coal and hydro, with independent power producers participating through long-term power purchase agreements. Solar entered this landscape gradually, first as a policy-supported renewable energy source rather than a fully merchant or liberalised market opportunity. Its participation was enabled through government-led schemes, regulated procurement mechanisms and incentives aimed at encouraging renewable energy deployment.

The growth of solar adoption in Malaysia has been closely linked to policy incentives and the role of key governing bodies. The Sustainable Energy Development Authority Malaysia (SEDA) has played an important role in administering renewable energy mechanisms such as the Feed-in Tariff (FiT) and Net Energy Metering (NEM), while ST regulates the electricity supply industry, oversees licensing, and administers competitive procurement programmes such as LSS. Early solar development was encouraged through the FiT mechanism, which provided fixed tariff support for renewable energy generation. As technology costs declined and solar became more commercially viable, Malaysia shifted towards more competitive and market-oriented mechanisms, including LSS auctions for utility-scale projects. These

schemes helped broaden solar participation beyond utility-scale developers to include businesses seeking electricity cost savings and sustainability benefits.

Over time, Malaysia's solar market has evolved from policy-driven deployment into a more diversified ecosystem covering LSS, floating solar and rooftop solar. The LSS programme created a structured pathway for large solar farms to sell electricity to the grid, while later rounds became increasingly competitive and attracted larger, more sophisticated developers. Floating solar, including HHFS, emerged as a response to land constraints and the opportunity to utilise reservoirs, dams and other water bodies for renewable energy generation. More recently, corporate power purchase arrangements and Third-Party Access (TPA) concepts have gained relevance through frameworks such as the Corporate Renewable Energy Supply Scheme (CRESS), which allows renewable energy developers and corporate consumers to enter more direct supply arrangements using the grid.

Current Status

Land-Based Solar

Land-based solar in Malaysia covers several deployment models, including LSS, ground-mounted C&I solar, and rooftop solar, with LSS remaining the most prominent route for utility-scale development. In Peninsular Malaysia, LSS provides a structured pathway for developers to develop, construct and operate grid-connected solar PV plants through competitive bidding administered by ST. The programme has progressed from earlier bidding cycles into larger procurement rounds, with LSS5 launched in 2024 at a total capacity of 2,000MW$_{ac}$ and projects expected to achieve commercial operations in stages from 2026 to 2027. LSS5+ further expanded the market with 13 approved projects totalling approximately 1,975MW$_{ac}$, including ground-mounted and water-based solar projects. Looking ahead, LSS6 is expected to become the next major utility-scale solar catalyst, with a target allocation of about 2GW and a likely rollout in 2026, with awards expected in late 2026 or early 2027. Unlike earlier solar-only rounds, LSS6 is expected to include mandatory battery energy storage system (BESS) integration, supporting grid stability and reducing the intermittency of solar generation.

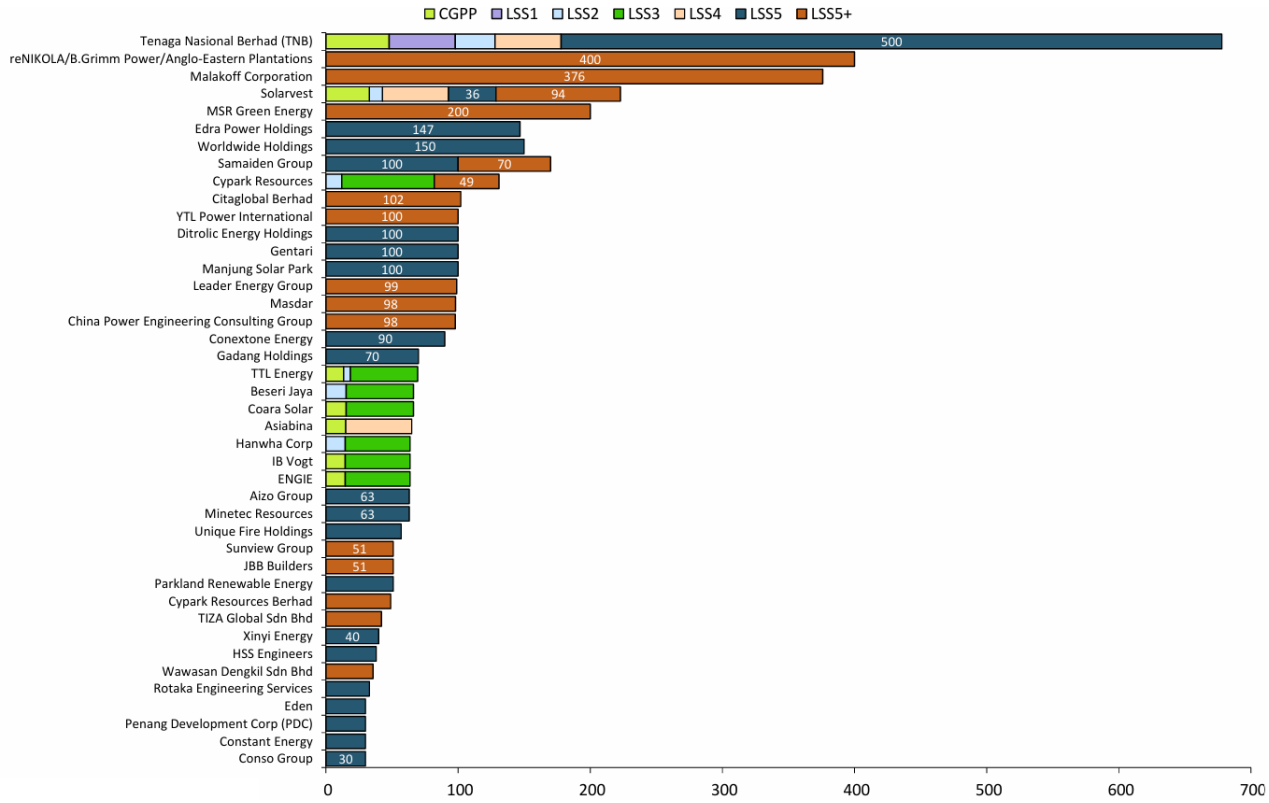


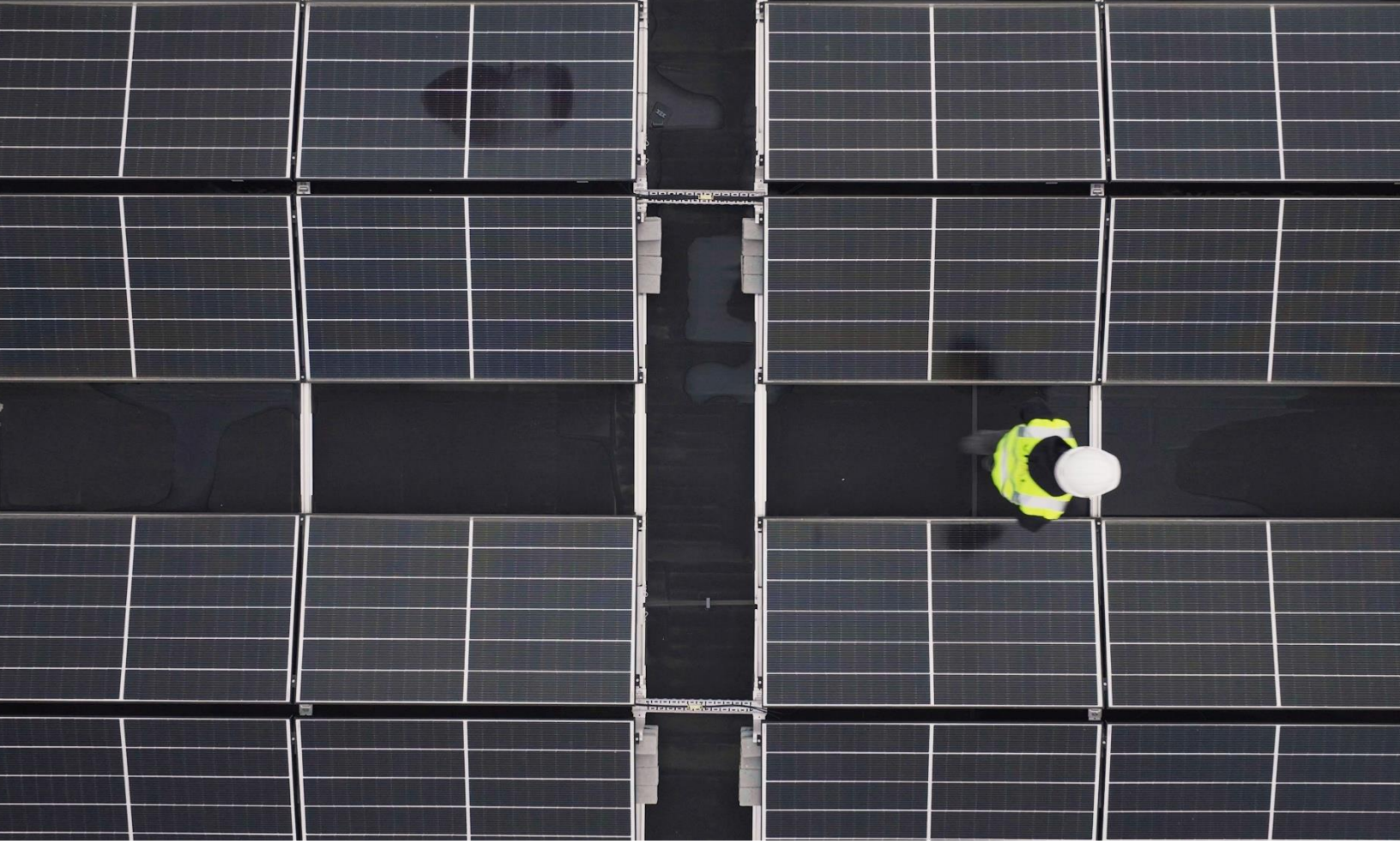
Figure 3: Malaysia Corporate Green Power Program (CGPP) and Large-Scale Solar (LSS) selected auction winners (MW_{ac}).[4]

As shown in Figure 3, the selected CGPP and LSS auction winners show a broad mix of participants, led by TNB, reNIKOLA/B.Grimm Power/Anglo-Eastern Plantations, and Malakoff Corporation, alongside recurring solar players such as Solarvest, Cypark Resources, Samaiden Group, and Genting. The wide spread of award recipients indicates that Malaysia's solar market is attracting participation from both established energy incumbents and newer renewable energy developers, reflecting a more diverse and competitive project landscape.

Floating Solar

Floating solar is gaining momentum as Malaysia looks to scale solar deployment beyond land-based sites. In Sarawak, the 50MW_{ac} Batang Ai floating solar project became operational in December 2024 and serves as an early reference for reservoir-based Floating Solar. The Bakun and Murum reservoirs have also been identified as potential future sites. In Peninsular Malaysia, larger opportunities are expected to come through HHFS developments led by TNB Genco. Key projects include Kenyir in Terengganu, which has an estimated long-term potential of approximately 1,995MW_{ac} and is expected to be developed in phases. Temengor and Nenggiri have also been identified as potential HHFS sites, each with indicative capacity of around 600MW_{ac}. Offshore solar remains at an earlier stage, with current activity focused on pilots and

proof-of-concept projects. These include offshore renewable energy testing in Terengganu and earlier plans for a 780kW offshore floating solar project off Tioman Island.



Opportunities in Solar Photovoltaic Projects

Potential Scopes, Works & Activities in Solar Projects

The development of a utility-scale solar project encompasses a broad range of work packages across the full project lifecycle, from early-stage feasibility and site assessment through to engineering, procurement, and construction, permitting, testing and commissioning, and long-term operations and maintenance. Beyond the core delivery scope, opportunities extend into specialised areas such as battery energy storage integration, digital twin and predictive maintenance solutions, hybrid renewable configurations, and corporate commercial services including Corporate Power Purchase Agreement (PPA) structuring and carbon credit management. Together, these work packages represent the full spectrum of service and supply chain opportunities available within a single utility-scale solar project.

Although LSS projects may offer fewer direct capability adjacencies for OGSE players compared with Floating Solar, opportunities still exist in selected equipment, electrical and balance-of-plant scopes. Some

OGSE companies are already beginning to supply relevant equipment and capabilities into LSS projects, including compact substations, electrical packages, control systems, fabrication works and site support services. For companies seeking to participate in the LSS value chain, collaboration with established solar EPC contractors and project developers will be important, as these players typically lead project delivery, procurement and grid-connection execution. As shown in Figure 4, key EPC participants across LSS programmes include Solarvest, Samaiden Group, China Energy Engineering Corporation, Sunview, MSR Green Energy, ERS Energy, Cypark Resources, TNB Engineering Corporation and Ditrolic Energy. Building partnerships with these established market participants can provide OGSE companies with practical entry points into LSS projects, particularly where their existing strengths in engineering, project execution, electrical systems, asset reliability and health, safety and environmental (HSE) management can complement solar-specific expertise.

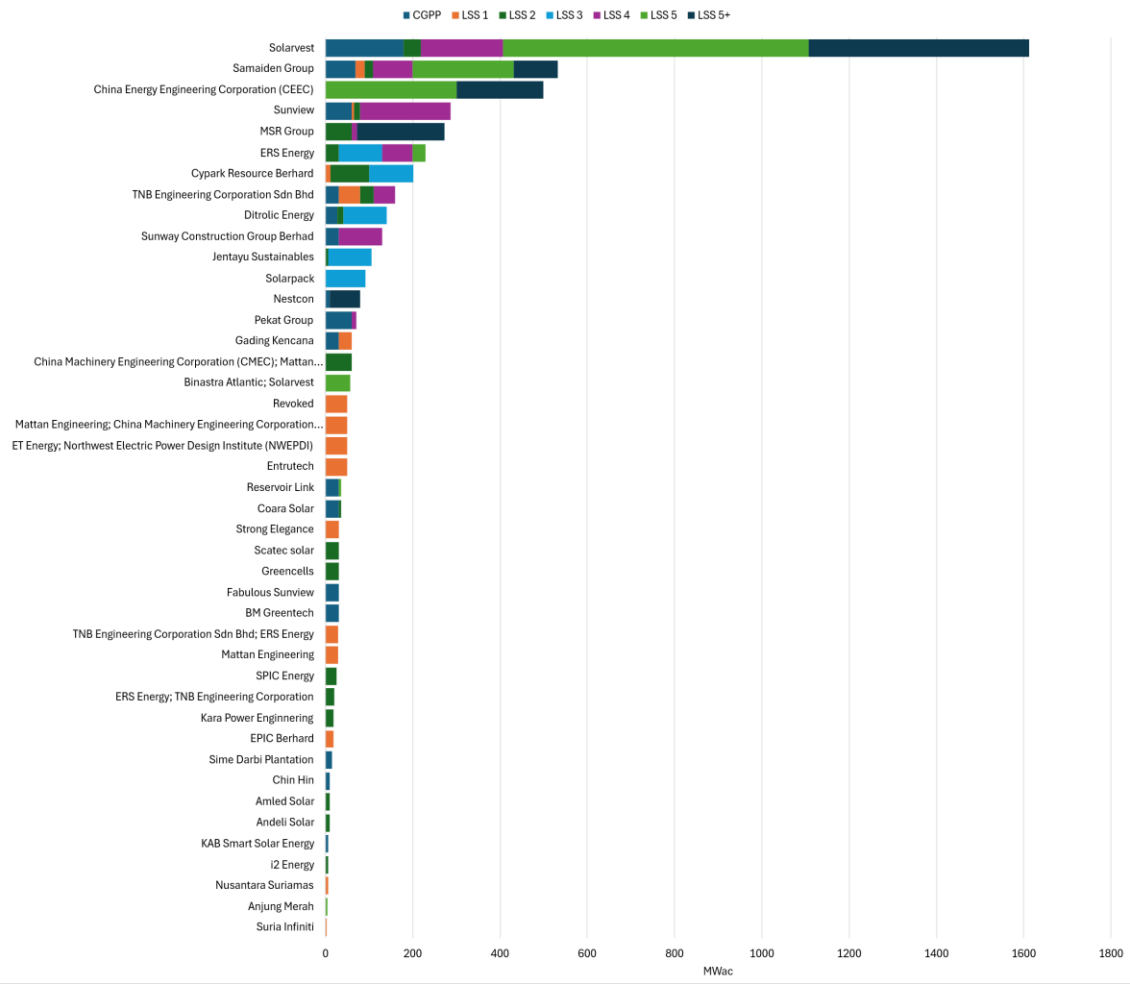


Figure 4: Malaysia Corporate Green Power Program (CGPP) and Large-Scale Solar (LSS) Engineering, Procurement and Construction (EPC) awards.

Work Package	Key Activities/Scope Highlights
Project Development and Feasibility	• Site identification, resource assessment, and feasibility studies • Land acquisition, legal clearances, and title verification • Stakeholder engagement and community consultation • Environmental and social impact assessments • Grid connection studies and power evacuation planning
Preliminary Engineering & Design	• Initial project engineering and site layout optimisation • Technology selection (PV modules, inverters, structures, BESS if applicable) • Preliminary design and technical specifications (anchoring & mooring design)
Permitting and Regulatory Approvals	• Securing planning, construction, environmental, and grid connection permits • Navigating local, regional, or national regulatory frameworks •
Detailed Engineering, Procurement, and Construction (EPC/EPCC)	• Detailed design and final engineering (civil, structural, and electrical) • Procurement and supply of equipment (modules, inverters, transformers, cabling, SCADA, protection systems, BESS, etc.) • Civil works (land clearing, grading, roadways, foundations, fencing, drainage) • Structural works (mounting systems, racking installation) • Mechanical installation (tracking systems, module mounting)

	• Electrical installation (wiring, inverters, substations, grid intertie) • Telemetry and SCADA installation for monitoring and control • Anchoring & mooring expertise • Construction management and site supervision
Testing, Commissioning, and Grid Integration	• Quality assurance/quality control (QA/QC) throughout construction • System testing (mechanical, electrical, and performance testing) • Grid synchronisation and commissioning (including BESS if applicable)
Operations and Maintenance (O&M)	• Routine inspection and preventive maintenance • Repairs and corrective actions • Performance monitoring, diagnostics, and reporting • Spare parts management • Warranty claims and after-sales support • Cleaning (module washing strategies)
Decommissioning and Repowering	• Environmental restoration and safe dismantling plans • End-of-life recycling/disposal or repowering for future use
Ancillary Services and Support Packages	• Security and site access control • Temporary facilities (site office, utilities) • Training and capacity building for local workforce • Health, safety, and environmental management (HSE)

Specialised / Value-Added Packages	• Integration of energy storage (BESS design, installation, and operation) • Digital twin solutions (real-time monitoring and predictive maintenance) • Hybrid solutions (integration with wind, hydro, or other renewable energy sources)
Corporate / Commercial Work Packages	• Corporate Power Purchase Agreement (PPA) structuring • Participation in trading/market bidding (where permitted) • Carbon credit/offset management

Table 1: Potential scopes and works from solar projects.

Floating Solar an Adjacent Sector for OGSE

Floating solar represents a promising adjacent sector for Oil & Gas Services and Equipment (OGSE) companies seeking to diversify into the renewable energy value chain. While floating solar shares many common components with conventional land-based solar PV systems, its deployment on water introduces engineering, installation, and operational requirements that closely resemble those found in offshore oil and gas activities.

OGSE companies possess extensive experience in offshore and sub-surface works, including marine engineering, mooring and anchoring systems, offshore construction, underwater inspections, cable installation, and asset integrity management. These capabilities provide a strong foundation for participation in floating solar projects, particularly as project sizes increase and operating environments become more complex.

Unlike land-based solar systems, floating solar installations are deployed on floating platforms that are continuously exposed to environmental forces such as wind, waves, currents, and water-level fluctuations. As a result, the design and operation of floating solar projects require specialised expertise in floating structures, anchoring systems, marine logistics, and electrical systems operating in aquatic environments, areas where many OGSE players already have established competencies.

	Land-Based PV	Floating PV
Array Configuration	• Design must accommodate terrain. • Flexible row spacing. • May consist of large tables of PV panels.	• Modular design on “flat” water surface. • Row spacing determined by floating structure. • Consist of floating islands.
Mounting & Support Structures	• Piles & racks structure. • Easier to implement tracking. • Potentially more susceptible to resonance effects.	• Floating platform structure. • Anchoring & mooring system is essential. • Maintenance walkway required. • Experiences forces from winds, snow, waves, and currents.
Electrical Equipment & Cables	• String inverters & electrical boxes may be placed under PV modules. • Cables are placed in conduits above ground buried underground.	• Electrical equipment may be placed on floats or on shore. • Cables mainly routed on floats. • Potential need for higher protection standards & test certifications.

Table 2: Differences between land-based PV and floating PV.

Upcoming Projects

Malaysia’s upcoming floating solar pipeline presents a significant diversification opportunity for OGSE players, particularly where large-scale water-based deployment requires capabilities adjacent to marine, offshore and infrastructure project delivery. Key projects to monitor include the proposed HHFS developments at Temengor and Nenggiri, each with an indicative capacity of 600MW$_{ac}$. The largest near-term opportunity is expected at Kenyir, where the HHFS development is understood to have a total capacity

of approximately 1,995MW_{ac}, to be developed in phases. This phased development structure provides a longer runway of opportunities for contractors and service providers, beginning with early-stage engineering, feasibility, environmental and grid studies, followed by engineering, procurement, construction and commissioning (EPCC) packages, floating platform deployment, anchoring and mooring works, electrical installation, BESS integration, commissioning, and recurring operations and maintenance. For OGSE players, these projects represent a practical pathway to repurpose existing strengths in marine engineering, project execution, asset integrity and field operations into Malaysia's growing renewable energy infrastructure market.

Conclusion

Solar PV presents a practical diversification pathway for OGSE companies as Malaysia's renewable energy market continues to scale. While land-based solar may offer fewer direct adjacencies compared with floating solar applications, opportunities may remain in selected equipment supply, electrical balance-of-plant, compact substations, grid-related works, project execution support, asset reliability and HSE management. Stronger capability transfer for the OGSE industry is expected in floating solar, where large-scale deployment requires marine engineering, anchoring and mooring systems, floating structure support, cable routing, corrosion management, inspection, operations and maintenance and complex field execution. These are areas where OGSE companies already possess relevant experience, making it a credible entry point for companies seeking to reposition existing capabilities into the energy transition.

In this context, the Growth Beyond OGSE (GBO) programme under the Malaysia Petroleum Resources Corporation (MPRC) serves as a strategic platform to support Malaysian OGSE companies in capturing opportunities beyond the traditional oil and gas sector. The initiative can facilitate capability development, strategic partnerships and market access for OGSE players seeking to participate in adjacent and emerging sectors such as renewable energy, power infrastructure and energy transition technologies. In parallel, MPRC's Strategic Partnership Support Programme (SPSP) can support OGSE companies interested in forming partnerships with experienced solar developers, EPC contractors, technology providers and project owners. By aligning existing industry capabilities with Malaysia's growing solar market, these platforms can help OGSE companies reduce market-entry barriers, strengthen competitiveness and position themselves for upcoming solar opportunities.

References

[1] Service Demand Cube, Rystad Energy

[2] National Energy Transition Roadmap (NETR), Ministry of Economy

[3] Single Buyer Official Website

[4] Southeast Asia R&P solutions, Rystad Energy

Acknowledgement

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