POWER ENGINEERING COMPETENCY FRAMEWORK FOR POWER ENGINEERING PROFESSIONALS IN PUBLIC SERVICE
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT

TSC Category	Decarbonisation					
TSC Title	Solar Photovoltaic Systems Application					
TSC Description	Oversee implementation of solar photovoltaic (PV) systems and their interconnection with the grid power systems through review of design, installation, testing, commissioning, operations and maintenance					
TSC Proficiency Description	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
			<Insert TSC Code>	**<Insert TSC Code>**	**<Insert TSC Code>**	**<Insert TSC Code>**
			Oversee installation, testing, operation and maintenance of solar PV systems according to project requirements	Review design, installation, testing and maintenance of solar PV systems and their integration with the power grid based on technical specifications and project requirements	Develop technical specifications and tender requirements for solar PV systems, review performance and compliance, and provide recommendations to optimise systems	Evaluate solar PV proposals and provide technical approvals against required performance standards, and regulatory and project requirements
Knowledge			• Types and functions of solar PV cells • Site suitability assessments • Near and far shading analyses • Weather data analyses • Solar PV mounting systems • Solar PV system configuration and installation • Panel tilt and orientation calculations • Cable sizing • Relevant regulations, standards, codes of practice and safety procedures	• Site suitability and energy assessments • Types of solar PV mountings and system components • Solar PV system control, sizing, balance and protection • Best practices for solar PV installation analyses • Energy yield assessment for 50%, 90% and 99% probability ranges • Energy efficiency and audit reports • Methods to calculate Levelised Cost of Electricity (LCOE) • Solar PV system testing and commissioning • Relevant regulations, standards, codes of practice and safety procedures	• Principles of solar radiation • Solar PV system implementation considerations • Solar PV system cost benchmarks • Solar PV installation cost analyses • De-rating and losses in grid-connected PV systems • Solar PV production estimates • System yield and performance • Solar PV system testing and commissioning • Market and regulatory frameworks • Relevant regulations, standards, codes of practice and safety procedures	• Market and regulatory frameworks • Energy security and efficiency issues in Singapore • Use cases and best practices for solar implementation • Principles of solar radiation • Solar PV system yield and performance • Large grid-connected PV systems • Economics of grid-connected systems • Concepts of smart grids • Relevant regulations, standards, codes of practice and safety procedures

Abilities			• Review calculations performed by contractors to determine the suitability of PV installation Oversee installation of solar PV systems and ensure compliance with industry standards, regulatory and project requirements • Witness the testing of solar PV systems and prepare progress reports Manage the maintenance of solar PV systems • Oversee environmental impact studies conducted by contractors	• Review energy assessments, energy audits and site analyses for installation of solar PV systems • Review data analyses and recommendations of site and optimisation of usable space • Evaluate PV module installation options for maximum yield • Evaluate the solar PV power output profile and provide recommendations for improvement • Recommend appropriate technologies to increase solar PV yield • Oversee testing and commissioning of solar PV systems • Review the performance of solar PV systems from remote monitoring and data logging software • Apply relevant regulations, industry standards, codes of practice and safety procedures	• Develop standards and technical requirements for grid-connected solar PV systems • Review cost of solar PV system based on system configuration, equipment options, labour cost and financing cost • Review calculations and forecasts to meet target for Levelised Cost of Electricity (LCOE) • Benchmark system performance with other solar PV systems • Identify solar PV system improvements based on best practices • Review and approve testing and commissioning of solar PV systems • Lead preventive inspection and maintenance for solar PV systems • Review compliance with relevant regulations, industry standards, codes of practice and safety procedures	• Lead project engineering, optimisation and risk mitigation for solar PV projects • Keep abreast with international benchmarks to identify areas for adoption in solar PV systems locally • Provide technical advice for solar policy, infrastructure and performance standards for solar integration with grid power systems • Recommend funding, incentives and schemes to drive adoption of solar in Singapore • Establish procedures to ensure compliance with relevant regulations, industry standards, codes of practice and safety procedures