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

TSC Category	Digitalisation					
TSC Title	Modelling, Simulation and Visualisation					
TSC Description	Leverage on modelling, simulation and visualisation tools and techniques for more effective analysis, design and solution development for power systems					
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>**	
		Apply modelling, simulation and visualisation tools and techniques to process data from power systems	Oversee modelling, simulation and visualisation to review design and assess the state of the power system	Verify modelling, simulation and visualisation for analysis, design, and investigation of problems in power systems	Leverage insights from modelling, simulation and visualisation for real-time solutions for complex problems in power systems	
Knowledge		• Fundamentals of engineering graphics and computer-aided design (CAD) software • Principles of network monitoring systems • Concepts and principles of modelling and simulation • Basic visualisation strategies and techniques • Power systems and power electronics CAD software tools and functionalities • Supervisory control and data acquisition (SCADA) operation • Building information modelling (BIM) systems • International Standard Organisation (ISO) and Singapore Standards (SS) standards • Power system networks in Singapore • Load flow, cable sizing and power distribution board	• Principles of engineering graphics • 3D modelling strategies and techniques • Types of power systems computer-aided engineering (CAE) software • Data elements of network analysis • Power system monitoring and instrumentation • Power system modelling and simulation • International Standard Organisation (ISO) and Singapore Standards (SS) standards • Power system networks in Singapore	• Network power flows and network analysis • Engineering analysis tools and techniques • Data visualisation and aggregation tools and techniques • Concepts of digital twins • Principles and techniques of animation • Modelling concepts for Virtual Reality (VR) • Network power flows and network analysis • Big data and data analytics • International Standard Organisation (ISO) and Singapore Standards (SS) standards	• Network power flows and network analysis • Applications of 3D modelling on engineering and maintenance processes • Methods to influence adoption of modelling, simulation and visualisation technologies • Industry best practices and applications of modelling, simulation and visualisation technologies • Network power flows and network analysis • Artificial and computational intelligence • International Standard Organisation (ISO) and Singapore Standards (SS) standards	

Abilities		• Create basic power system models using CAD software • Comply with ISO and SS standards for 3D models • Use basic visualisation tools and techniques to create system models • Perform animation of power systems and transmission line flow values • Perform power system network monitoring • Record network information • Maintain historical information in SCADA systems • Operate BIM systems	• Review advanced modelling strategies and techniques to replicate the real-time characteristics of the power system • Apply multiple 3D CAD software and tools • Select suitable 3D modelling software for simulation and visualisation • Oversee network monitoring, system analyses and simulations • Analyse data from SCADA and BIM systems • Determine network demand and capacity • Interpret and explain results including anomalies in outputs • Assess risks based on simulation outputs • Ensure adherence to industry standards	• Review and analyse 3D and VR models with the use of engineering analysis tools • Identify areas of improvement based on data aggregation and virtual reality data visualisations • Oversee scenario visualisation for the power system • Witness simulations to test 3D models • Review what-if scenarios • Analyse relationships between actual network power flows, the scheduled power flows, and the capacity of the transmission system • Ensure compliance with relevant industry standards	• Determine potential uses of the digital twins and 3D models • Establish modelling responsibilities for the various scopes of work • Drive new engineering and maintenance processes that adopt digital twins and three-dimensional 3D modelling technologies • Assess efficiency and effectiveness of digital twins and three-dimensional 3D modelling to the engineering and maintenance processes • Review network systems to identify potential synergy of SCADA monitoring and network system operations • Explore and apply key animation principles and techniques to create 3D animation for VR optimisation • Establish key performance indicators to evaluate the robustness of modelling, simulation and visualisation processes	