A MGRPO-TD3 Strategy for Optimizing Multi-Area HPT Networks

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This supplementary document compiles the key modelling assumptions, component efficiencies, cost coefficients, and baseline travel-time coefficient inputs, used to parameterize the technical analyses reported in the paper.

1) PEM Electrolyzer Parameters

Table I lists the electrochemical and cost coefficients that define the PEM electrolyzer model adopted in this study [1].

TABLE I
ELECTROCHEMICAL AND COST PARAMETERS OF THE PEM ELECTROLYZER

$\mathfrak{I}_1$	$\mathfrak{I}_2$	$\mathfrak{I}_3$	$\mathfrak{I}_4$	$\mathfrak{I}_5$	$\mathfrak{I}_6$	$\mathfrak{I}_7$
99.5%	-9.5788 (m^2/A)	-0.0555 $(m^2/A \times ℃)$	0	1502.7083 (m^4/A)	-70.8005 $(m^4/A \times ℃)$	0

F	z_{mk}	μ^{PEM}
96485.34 (C/mol)	0.002016 (kg/mol)	36 ($/kg) per year

2) Compressor, Hydrogen Tank, and Electrical Storage Parameters

Table II consolidates the thermodynamic constants and operating-cost coefficients used to model the hydrogen compressor, hydrogen tank, and on-site electrical storage systems, as sourced from [2]-[4].

TABLE II
THERMODYNAMIC AND OPERATIONAL PARAMETERS FOR COMPRESSOR, HYDROGEN TANK, AND ELECTRICAL STORAGE UNITS

Compressor				
ς	R^{gc}	μ^{comp}	ϱ^{ih}	ϱ^{ie}
1.41	4.124 kJ/(kg·K)	1 ($/kg) per year	14.31 (kJ/kg.K)	0.8
Hydrogen tank				
μ^{tank}	SoC^T_{max}	SoC^T_{min}	η^T_{ch}	η^T_{dc}
32 ($/kg) per year	0.9	0.05	0.9	0.9
Electrical storage				
SoC^{ES}_{min}	SoC^{ES}_{max}	η^{ES}_{ch}	η^{ES}_{dc}	μ^{ES}
0.1	0.9	0.95	0.95	0.0005 ($/kWh)

3) Hydrogen-Pricing Equation Coefficients

Table III summarizes the key coefficients appearing in the dynamic hydrogen-pricing formulation with values taken from [5], [6].

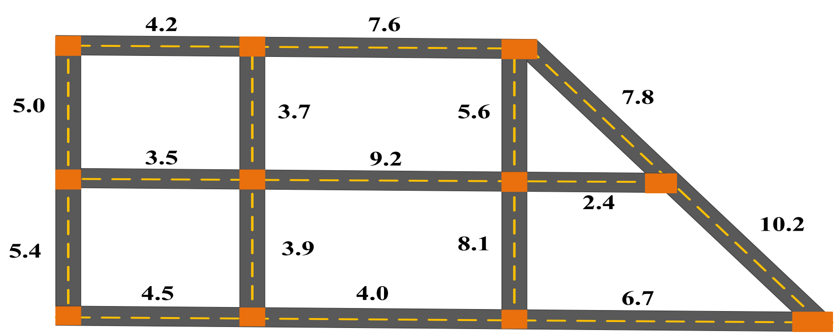
TABLE III
COEFFICIENTS USED IN THE HYDROGEN-PRICING MODEL

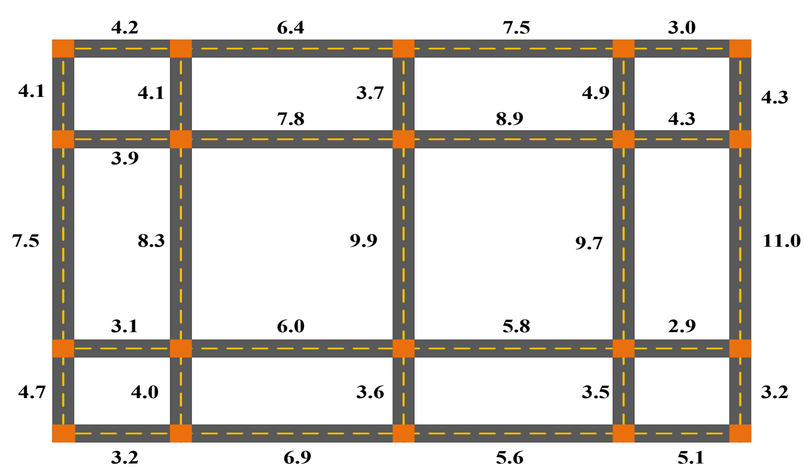
ω_t^{ren}	C_t^{ren}	δ^{SP}	η_t^{PEM}
0.6	0.03 ($/kWh)	1 ($/kg)	45 (kWh/kg)

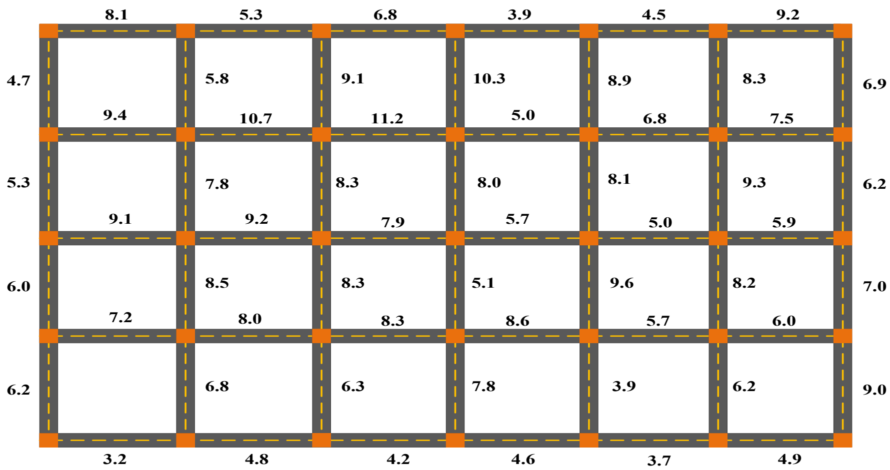
4) Non-Congested Travel Time Coefficients

Table IV lists the non-congested travel time coefficients used as baseline inputs in the OD-equilibrium model for the Calgary network. The inter-area coefficients are 62.5 between Areas #1 & #2, 83.7 between Areas #1 & #3, and 106.7 between Areas #2 & #3.

TABLE IV
ASSUMED NON-CONGESTED TRAVEL TIME COEFFICIENTS BETWEEN TRAFFIC AREAS







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