APPENDIX

TABLE 1
LSTM MODEL PARAMETERS

Parameter	Value	Parameter	Value
Number of layers	3	Hidden units	64
Output dimension	1	Dropout rate	0.1
Activation (output)	ReLU	Optimizer	Adam
Learning rate	0.001	Batch size	32
Maximum epochs	100	Loss function	MSE
Sequence length	20	Prediction horizon	1 hour

TABLE 2
GRU MODEL PARAMETERS

Parameter	Value	Parameter	Value
Number of layers	3	Hidden units	64
Output dimension	1	Dropout rate	0.1
Activation (output)	ReLU	Optimizer	Adam
Learning rate	0.001	Batch size	32
Maximum epochs	100	Loss function	MSE
Sequence length	20	Prediction horizon	1 hour

TABLE 3
BILSTM MODEL PARAMETERS

Parameter	Value	Parameter	Value
Number of layers	3	Hidden units (per direction)	64
Total hidden output	128	Bidirectional	True
Output dimension	1	Dropout rate	0.1
Activation (output)	ReLU	Optimizer	Adam
Learning rate	0.001	Batch size	32
Maximum epochs	100	Loss function	MSE
Sequence length	20	Prediction horizon	1 hour

TABLE 4
BIGRU MODEL PARAMETERS

Parameter	Value	Parameter	Value
Number of layers	3	Hidden units (per direction)	64
Total hidden output	128	Bidirectional	True
Output dimension	1	Dropout rate	0.1
Activation (output)	ReLU	Optimizer	Adam
Learning rate	0.001	Batch size	32
Maximum epochs	100	Loss function	MSE
Sequence length	20	Prediction horizon	1 hour

TABLE 5
Q-LEARNING LAYER PARAMETERS

Parameter	Value	Parameter	Value
Hidden layers	[128, 128]	Activation	ReLU
Learning rate (α)	0.001	Discount factor (γ)	0.95
Initial epsilon (ε)	0.1	Final epsilon (ε)	0.01
Batch size	64	Optimizer	Adam
Reward weights (λ, η, ζ)	(1000, 5, 20)	State/Action dim	(14, 3)

TABLE 6
PPO LAYER PARAMETERS

Parameter	Value	Parameter	Value
Hidden layers	[128, 128, 128]	Activation	ReLU
Actor learning rate	3×10^{-5}	Critic learning rate	5×10^{-4}
Clip ratio (ϵ)	0.3	Discount factor (γ)	0.99
GAE lambda (λ)	0.95	Entropy coefficient	0.2
Value loss coefficient	0.5	Optimizer	Adam
Diversity weight (α)	0.2	Stability weight (β)	0.005