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Nota di contenuto	Contents; Foreword; Preface; Abbreviations; Symbols; Chapter 1: Challenges in effectively managing energy resources, infrastructures and conversion technologies; 1.1 Global urbanisation and efficiency of energy systems; 1.2 Evolution of urban energy systems; 1.3 Integrated management of energy systems; Chapter 2: Integrated modelling review; 2.1 Modelling issues concerning DERs; 2.1.1 Meeting the challenges of decentralised power generation; 2.1.2 Impacts of cogeneration technology on electric networks; 2.1.3 Impacts of PHEV technology on electric networks 2.2 Approaches on modelling multiple energy networks2.2.1 Multi-generation analysis; 2.2.2 Integrated energy transportation systems; 2.2.3 Modelling of energy hubs; 2.2.4 Integrated natural gas and electricity studies; Chapter 3: Modelling of energy service networks; 3.1 Modelling electrical networks; 3.1.1 Fundamentals of electrical systems; 3.1.2 Defining the electrical load flow problem; 3.1.3 Nodal formulation and the admittance matrix; 3.2 Modelling natural gas networks; 3.2.1 Fundamentals of natural gas systems; 3.2.2 Defining the natural gas load flow problem 3.2.3 Nodal formulation and the incidence matrix3.3 Analogies in energy service networks; 3.3.1 Modelling components and variables; 3.3.2 The Newton-Raphson algorithm; 3.3.2.1 The electrical system Jacobian matrix; 3.3.2.2 The natural gas system Jacobian matrix;

3.3.2.3 Load flow conclusions; Chapter 4: Modelling embedded technologies in energy service network; 4.1 Modelling on-load tap-changer transformers; 4.1.1 Fundamentals of OLTC transformers; 4.1.2 OLTC modelling equations; 4.2 Modelling compressor stations; 4.2.1 Fundamentals of compressor stations; 4.2.2 Compressor modelling equations
 4.3 Modelling CHP technologies4.3.1 Fundamentals of combined heat and power units; 4.3.2 Nodal formulation of natural gas networks with CHPs; 4.3.3 Thermal energy storage management equations; 4.4 Modelling PHEV technologies; 4.4.1 Fundamentals of plug-in hybrid electric vehicles; 4.4.2 Nodal formulation of electrical networks with PHEVs; 4.4.3 Electrochemical energy storage management equations; Chapter 5: Time-coordinated optimal power flow for energy service networks; 5.1 TCOPF problem outline; 5.1.1 Problem description; 5.1.2 Optimisation solver
 5.1.3 Input data and assumptions of the TCOPF tool5.2 TCOPF objective functions; 5.2.1 Plug and forget; 5.2.2 Fuel cost; 5.2.3 Energy loss; 5.2.4 Energy cost; 5.2.5 Composite objectives; 5.3 Mathematical TCOPF formulation; 5.3.1 Objective function formulations; 5.3.1.1 For plug-and-forget scenario; 5.3.1.2 For fuel cost minimisation; 5.3.1.3 For energy loss minimisation; 5.3.1.4 For energy cost minimisation; 5.3.1.5 For composite objective minimisation (e.g. cost of spot prices vs. cost of emissions); 5.3.2 Constraints; 5.3.2.1 Concerning electrical networks
 5.3.2.2 Concerning natural gas networks

Sommario/riassunto

Focuses on modelling two key infrastructures (natural gas and electrical) in urban energy systems with embedded technologies (cogeneration and electric vehicles) to optimise the operation of natural gas and electrical infrastructures under the presence of distributed energy resources
