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Title:

PART I OF II: DEVELOPING NETWORK MODELS OF STATIONARY COMBINED HEAT AND POWER FUEL CELL SYSTEMS FOR LOW EMISSIONS AND ENERGY COSTS

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Stationary combined heat and power (CHP) fuel cell systems (FCSs) can provide electricity and heat for buildings, and can reduce greenhouse gas (GHG) emissions significantly if they are configured with an appropriate installation and operating strategy. The Maximizing Emission Reductions and Economic Savings Simulator (*MERESS*) is an optimization tool that was developed to allow users to evaluate avant-garde strategies for installing and operating CHP FCSs in buildings. These strategies include networking, load following, and the use of variable heat-to-power ratios, all of which commercial industry has typically overlooked. A primary goal of the *MERESS* model is to use relatively inexpensive simulation studies to identify more financially and environmentally effective ways to design and install FCSs. It incorporates the pivotal choices that FCS manufacturers, building owners, emission regulators, competing generators, and policy makers make, and empowers them to evaluate the effect of their choices directly. *MERESS* directly evaluates trade-offs among three key goals: GHG reductions, energy cost savings for building owners, and high sales revenue for FCS manufacturers. *MERESS* allows users to evaluate these design trade-offs and to identify the optimal control strategies and building load curves for installation based on either 1) maximum GHG emission reductions or 2) maximum cost savings to building owners. Part I of II articles discusses the motivation and key assumptions behind *MERESS* model development. Part II of II articles discusses run results from *MERESS* for a California town and makes recommendations for further FCS instalments.

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