Version List for DER-CAM

Only the most recent versions of DER-CAM are shown and described below.

Legend for table:

<u>I&P:</u> Investment and Planning version: determines optimal equipment combination and operation based on *historic* load data, weather, and tariffs

<u>O:</u> Operations version: determines optimal multi-day-ahead scheduling for installed equipment and *forecasted* loads, weather and tariffs

<u>web:</u> free available academic and non-commercial version with limited features, access at http://der.lbl.gov/der-cam/how-access-der-cam

<u>det:</u> deterministic version, all data is assumed to be known perfectly

<u>stoch:</u> stochastic version in which some input data can be specified as scenarios and is used in stochastic programming

<u>research:</u> research license which needs a collaboration license agreement

<u>comm:</u> non-exclusive commercial license is available

General and simple DER-CAM presentation can be found at: http://der.lbl.gov/sites/der.lbl.gov/files/rpt81431.PDF

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Version Number	Characteristic	Public Release Date	Accessibility	Uncertainty	Features	Publication
3.9.4	I&P	24 April 2012	research / comm	det	☺ 36 load profiles characterizing a year (week, weekend, peak profiles for every month) ☺ optimizes one typical year based on the 36 load profiles ☺ 5 load profile types: electricity only, cooling, refrigeration, heating, domestic hot water, and natural gas only ☺ only natural gas as energy carrier for combined heat and power (CHP) ☺ CHP, electric and heat storage, PV, solar thermal, absorption cooling, heat pumps, basic load shifting, basic efficiency measures, electric vehicles; ☺ fuel cell run-time constraint to model SOFC and PEM fuel cells ☺ multi-objective (costs and CO_2) ☺ policy measures as feed-in tariffs or Self Generation Incentive Program in California ☺ allows to force technologies into the solution ☺ electricity sales ☺ ZNEB and ZCB	📖 http://der.lbl.gov/publications/electric-storage-californias-commercial-buildings 📖 http://der.lbl.gov/sites/der.lbl.gov/files/LBNL-4929E.pdf 📖 http://der.lbl.gov/publications/web-based-economic-environmental-optimization-microgrids
3.9.4a	I&P		research / comm	det	☺ based on 3.9.4 from above, but with California Peak Day Pricing modeled	📖 http://der.lbl.gov/sites/der.lbl.gov/files/LBNL-6267E_0.pdf
WebOpt version 2.4.0.24	I&P	June 2013	web / academic	det	☺ based on 3.9.4 from above ☹ without electric vehicles ☹ without policy measures as feed-in tariffs or Self Generation Incentive Program in California ☹ without electricity sales ☹ no technologies can be forced ☹ without ZNEB and ZCB ☺ with load profile database for ASHRAE Climate zones (762 buildings in the US) ☺ automatic multi-objective frontier feature	📖 http://der.lbl.gov/der-cam/how-access-der-cam

					☺ Chinese and English version available	
4.0.0	I&P	July 2013 (separ. pieces are already avail.)	research	det	☺ based on 3.9.4 from above ☺ with cold storage ☺ with passive measure (window change, building shell upgrades) ☺ passive measures influencing heating and cooling loads ☺ multi temperature heat storage (65C and 95C) ☺ multi-energy carrier for distributed energy resources and heating	forthcoming
3.9.4.m	I&P	Sept. 2013	research	det	☺ based on 3.9.4 from above, but ☺ with multiple year optimization horizon which • optimizes building total energy cost over several years (the number of years is a set that can be modified by the user) • has an option that does/does not renew investments (same technologies, same capacities) in installed technologies after the lifetime is reached ☺ with linear model for battery degradation (i.e. capacity loss due to ageing)	
1.1.0.w	I&P	April 2012	research	det	☺ based on 3.9.4 from above, but ☺ with 12 typical week profiles to better model load shifting between week days and weekend days	
2.0.0.w	I&P	Sept 2013	research	det	☺ based on 1.1.0.w, but ☺ with multiple year optimization horizon which • optimizes building total energy cost over several years (the number of years is a set that can be modified by the user) • has an option that does/does not renew investments (same technologies, same capacities) in installed technologies after the lifetime is reached ☺ with linear model for battery degradation (i.e. capacity loss due to ageing)	
Operations DER-CAM 6.0.0	O	2011	research / comm	det	☺ basic operations DER-CAM code for scheduling pre-determined DER configurations including the following: electric storage, flow batteries, solar thermal, PV, fuel cell, heat and cold	http://der.lbl.gov/sites/der.lbl.gov/files/lbnl-4497e.pdf http://der.lbl.gov/sites/der.lbl.gov/files/LBNL%20-%2081939.PDF

					storage, absorption chilling	📖http://der.lbl.gov/sites/der.lbl.gov/files/LBNL-6127E.pdf
Operations DER-CAM 6.1.0.ev	O	TBD	research / comm	det	☺ Operations DER-CAM code based on Operations DER-CAM 6.0.0 (see above) with additional modules for charging of EV fleet and determining cost-optimal frequency regulation bid for day-ahead ancillary services market ☺ variable time-step 1hr, 15min, 5min	forthcoming
Operations DER-CAM stochastic version 6.1.2.s	O	2011	research	stoch	☺ added stochastic capabilities based on Operations DER-CAM 6.0.0 ☺ enabled choice for individual DG technologies to behave as deterministic or stochastic ☺ added hourly max output parameter to model outages in DG (applied to fuel cell) ☺ stationary storage behaves as deterministic to compensate for uncertainty in DG output	📖Cardoso G., M. Stadler, A. Siddiqui, C. Marnay, N. DeForest, A. Barbosa-Póvoa, P. Ferrão, *"Microgrid Reliability Modeling and Battery Scheduling Using Stochastic Linear Programming",* Electric Power Systems Research, Volume (103) 2013, Pages 61-69, ISSN: 0378-7796 (forthcoming)
1.0.0.s	I&P	01 March 2013	research	stoch	☺ based on 1.1.0.w from above ☺ but with 12 typical week profiles to better model load shifting between week days and weekend days ☺ new electric vehicle fleet management module ☺ uncertainty in EV driving pattern ☺ stochastic capabilities enabled	📖http://der.lbl.gov/sites/der.lbl.gov/files/lbnl-5937e.pdf
2.0.0.s	I&P	fall 2013	research	stoch	☺ based on 1.0.0.s ☺ consideration of uncertainty for wind and PV ☺ islanding and microgrid reliability ☺ variable time-step 1hr, 15min, 5min	