

## DEEP

Quick retrofit analysis by querying a database

1. Small and Medium Office & Retail  
7 Bldgs, 6 Vintages, 16 CA Climates

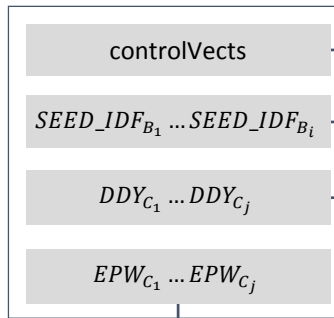
2. 100 Energy Measures: Individual & Packages

**DEEP –**  
A Pre-simulated Database built upon 10 million EnergyPlus runs



## Large-scale Simulation Method for DEEP

### 1. Setup Prototype Buildings

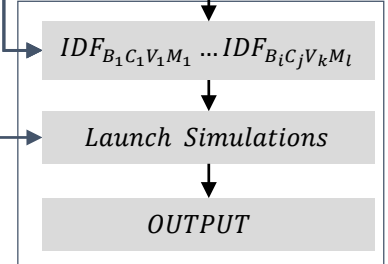


Legend:  
B: Building type      *i*: Building type id  
C: Climate zone      *j*: Climate zone id  
V: Vintage            *k*: Vintage id  
M: Measures        *l*: Measure id

### 2. ECM Modeling

$ECM_{M_1} \dots ECM_{M_l}$

### 3. E+ Runs on Super Computers



## Overview

*Database of Energy Efficiency Performance (DEEP)* enables a quick retrofit analysis for small and medium-size office and retail buildings in California by querying a database built upon about 10 million EnergyPlus simulations run on DOE's NERSC center.

## Main Features

- Covers seven building types, six vintages, 16 California climate zones, and 100 ECMs
- Provides the energy retrofit analysis with recommended ECMs, their energy savings, investment cost, and financial payback period
- DEEP powers the preliminary retrofit analysis of the Commercial Building Energy Saver (CBES) Toolkit
- Evaluates the comprehensive energy performance of diverse ECMs covering envelope, lighting, HVAC, plug-loads, and service hot water as well as packages of measures to consider interactive effects
- DEEP contains results of:
  - Monthly energy consumption breakdown into end uses such as lighting, cooling, heating, service hot water, electric equipment, fan and pump.
  - Peak electrical demand and time of the year
  - HVAC system capacities
  - Energy (electricity and natural gas) costs
  - Peak demand charges
  - Retrofit investment costs and payback years

## Prototype Buildings

Prototype Buildings			
Building types	Gross floor area (ft <sup>2</sup> )	Forms	Climates
Office	Small 1-story	5,500	Arcata Santa Rosa Oakland Sunnyvale Santa Maria Los Angeles San Diego El Toro Pasadena, Riverside Red Bluff Sacramento Fresno China Lake El Centro Mount Shasta
	Medium 2-stories	10,000	
	Medium 3-stories	53,628	
Retail	Small	8,000	
	Medium	24,962	
Mixed-use	Retail at the 1 <sup>st</sup> floor, office at the 2 <sup>nd</sup> Floor (9,996)		
	Retail at the 1 <sup>st</sup> floor, office at the 2 <sup>nd</sup> and 3 <sup>rd</sup> Floors (14,494)		

Vintages	Before 1978, 1978-1992, 1993-2001, 2002-2005, 2006-2008, 2009-2013
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Measure Categories	Envelope, Lighting, Plug Loads, HVAC, Service Hot Water, Controls and Operation
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