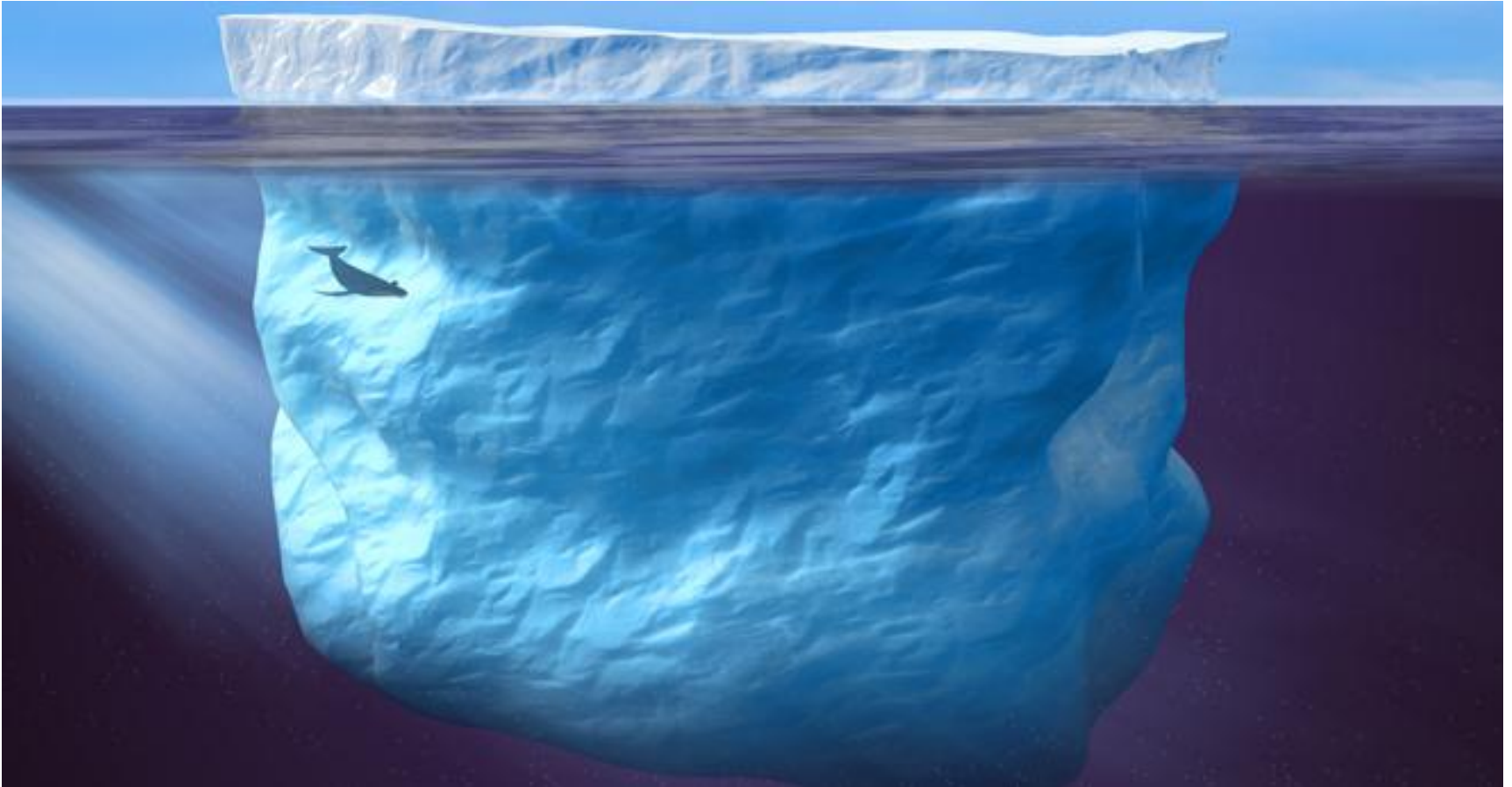


# Building Energy Modeling (BEM) Program Overview

<http://energy.gov/eere/buildings/building-energy-modeling/>



# BEM: An Energy-Efficiency Technology

**BEM is physics calculation of energy use from description of assets & operations**

- Multiple uses in the energy-efficiency space

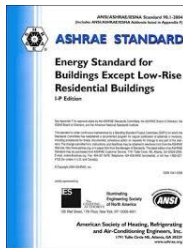
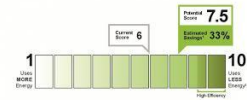
**“Integrative” design:** minimize energy consumption under constraints, e.g., first cost

- AIA 2030 Commitment-2013 (1,100 projects) performance over CBECS
  - Non-modeled: +29%, modeled: +44%, modeled with EnergyPlus: +48%
- P-Tool: 600 TBTU annual energy savings by 2030
- Sefaira Systems early-stage design & Xcel EDAPT (Design Assistance Program Tracker)



**Standards & rating systems:** code development & compliance

- CBECC-Com performance-path compliance & Commercial Building Asset Score



**Program design & implementation:** large scale portfolio analysis

- National Grid COFEE (Customer Optimization For EE) & BTO strategic prioritization tool

**Operation:** HVAC fault diagnosis, dynamic control & demand response

- QCoefficient model-predictive control



**Mission: increase effective application of advanced BEM**

# DOE's Role

## BEM differs from windows, heat pumps & sensors

- Information technology with no “unit” cost → DOE *can* build it
- An evaluation tool → transparency & impartiality matter → DOE *should* build it

## Ground rules for BTO (BEM) software

- State-of-the-art capabilities + commercial-friendly open-source licensing
- “Support 20 application vendors, not 20,000 end-users”



# DOE's BEM Portfolio



## State-of-the-art, industrial strength software—not research toys!

- EnergyPlus BEM engine + Radiance lighting engine
- OpenStudio BEM/lighting software development kit (SDK)—our deployment platform

## Research that supports products & improve user confidence

- Testing & validation

## Platforms & services for developers & end-users

- Partnerships with companies & professional organizations

# Collaborations Exploit, Extend & Establish Platform



## **CERC: US-China energy RD&D center (buildings is a part)**

- Impact analysis & modeling of occupant behavior

## **CBERD: US-India energy RD&D center (buildings is a part)**

- Compliance tools, model-predictive control & fault-detection/diagnosis

## **CBEI: Consortium for Commercial Building Energy Efficiency**

- OpenStudio development: BIM, DAYSIM & CONTAM/AFN
- Collaboration for integrative design