

Demand-Limiting Assessment Tool for Small Commercial Buildings

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Outline

- **Tool Objectives**
- **Recent Updates**
- **Demonstration**
- **Future Work**

Small Building Assessment Tool

Tool Objectives

- Quick assessment tool for potential end users to evaluate
 - demand reduction
 - operating cost savings
 - occupant thermal comfort impacts
- Only allow users to change most important factors
 - Type and size of building
 - Location
 - Utility rates
 - Occupancy schedule
 - Demand-limiting parameters
 - Equipment efficiency
- Potentially useful as a tool for utilities to promote this technology

Small Building Assessment Tool

Recent Updates

- Added additional user changeable parameters
 - Design lighting and equipment power
 - AC rated EER and oversizing
- Added demand-limiting strategies
 - Limit peak AC demand to % of normal peak day value
 - Lighting control
 - Shading control
 - Alternative setpoint adjustment strategies, including minimum demand strategy
- Added library of electric utility rates for California utilities
- Added both AC and total building power and costs
- Updated help feature

Small Building Assessment Tool

Demo

Demand-Limiting Assessment Tool

File Edit Help

General Site Occupancy Strategies Costs Savings Peak Day Power Temperatures Comfort

Building

Type: Small Office Building

Area: 6600 SqFt

Design Lighting Power

Design Equipment Power

Equipment

Type

AC Rated EER

AC Oversizing Factor

Closed Damper Leakage: 0%

Base Case

Setback Thermostat Unoccupied Fan Cycling

US Canada

CA Climate Zones

Climate Zone 01

Climate Zone 02

Climate Zone 15

Use Default Site

About DLAT

Demand-Limiting Assessment Tool

Beta Version 01/2008, Copyright 2008,
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Note: This tool provides "quick" estimates of peak demand reduction along with cost and comfort impacts associated with a demand-limiting strategy that utilizes adjustment of building zone temperature setpoints within comfort bounds. The results are meant to be representative for a set of predefined prototypical buildings and equipment.

Future Work

- Add average kW reduction as an output
- Hold a user workshop
- Modify program structure to allow libraries of building materials, constructions, and buildings
 - enable easier implementation of new building types
- Develop building libraries
- Develop user and reference manuals
- Add variable-air-volume (VAV) capabilities
- Improve in response to user feedback

Small Building Assessment Tool

Demo

Demand-Limiting Assessment Tool

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General Site Occupancy Strategies Costs Savings Peak Day Power Temperatures Comfort

Building

Type: Small Office Building

Area: 6600 SqFt

Design Lighting Power: 1.7 W/SqFt

Design Equipment Power: 0.5 W/SqFt

Equipment

Type: Rooftop AC

AC Rated EER: 12

AC Oversizing Factor: 110%

Closed Damper Leakage: 0%

Base Case

Setback Thermostat Unoccupied Fan Cycling

US Canada

CA Climate Zones

- Climate Zone 01
- Climate Zone 02
- Climate Zone 03
- Climate Zone 04
- Climate Zone 05
- Climate Zone 06
- Climate Zone 07
- Climate Zone 08
- Climate Zone 09
- Climate Zone 10
- Climate Zone 11
- Climate Zone 12
- Climate Zone 13
- Climate Zone 14
- Climate Zone 15

Use Default Site

Small Building Assessment Tool

Demo

Demand-Limiting Assessment Tool

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General Site Occupancy Strategies Costs Savings Peak Day Power Temperatures Comfort

Building

Type: Small Office Building

Area: Small Office Building

Design Lighting: Retail Store

Design Equipment: Restaurant Dining Area

School Class Wing

School Gymnasium

School Library

School Auditorium

Equipment

Type: Rooftop AC

AC Rated EER: 12

AC Oversizing Factor: 110%

Closed Damper Leakage: 0%

Base Case

Setback Thermostat Unoccupied Fan Cycling

US Canada

CA Climate Zones

Climate Zone 01

Climate Zone 02

Climate Zone 03

Climate Zone 04

Climate Zone 05

Climate Zone 06

Climate Zone 07

Climate Zone 08

Climate Zone 09

Climate Zone 10

Climate Zone 11

Climate Zone 12

Climate Zone 13

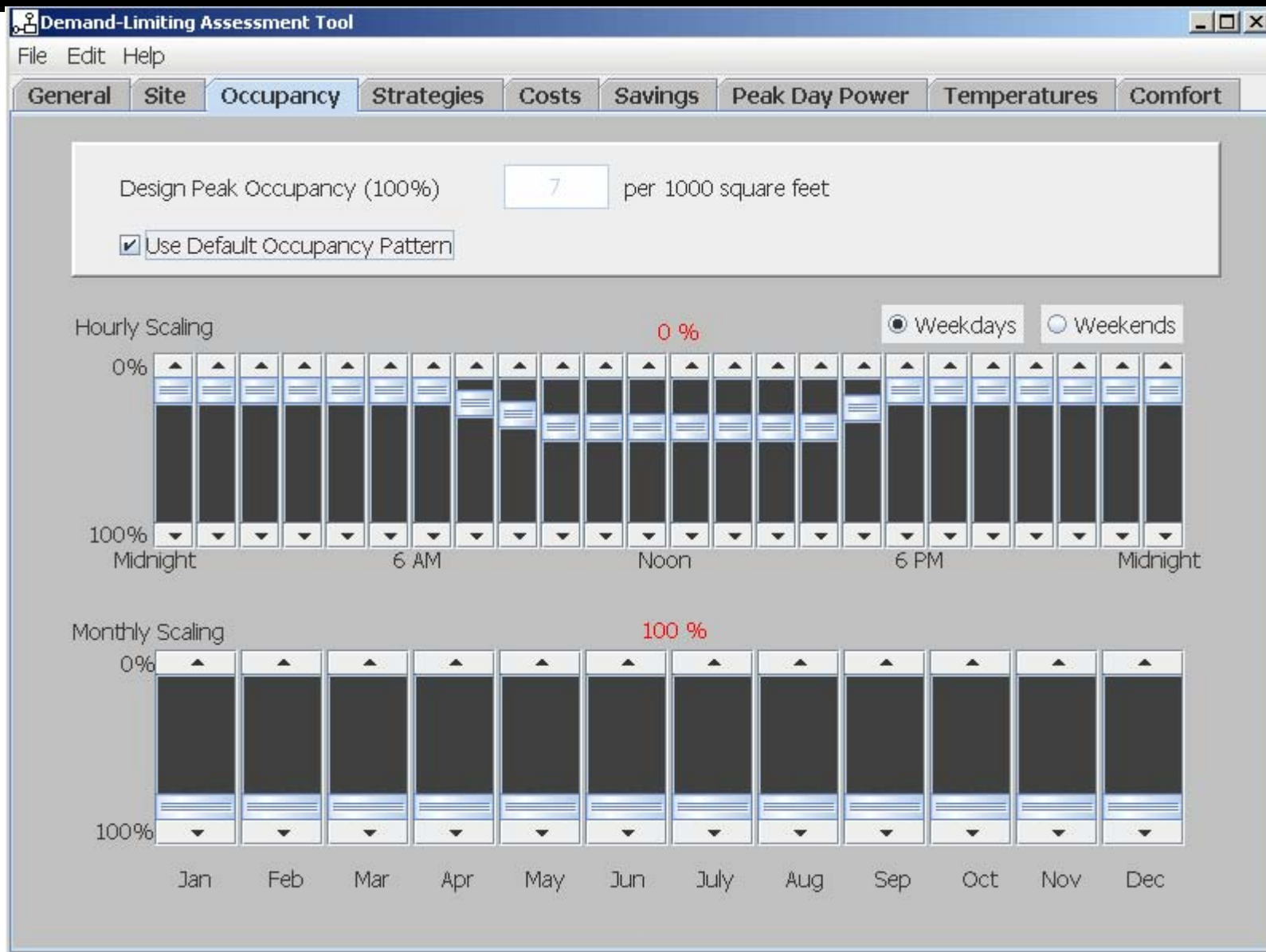
Climate Zone 14

Climate Zone 15

Use Default Site

Small Building Assessment Tool

Demo



Small Building Assessment Tool

Demo

Demand-Limiting Assessment Tool

File Edit Help

General Site Occupancy **Strategies** Costs Savings Peak Day Power Temperatures Comfort

Demand-Limiting Strategies

Limit AC Power Demand to a Percentage of Peak Day AC Power 10%

Number of Days for Demand-Limiting Control

Start Time for Demand-Limiting 12:00 PM Stop Time for Demand-Limiting 6:00 PM

Lighting Control

Use Default Lighting Control

Normal Day Percent of Design Lighting 90%

Demand-Limiting Day Percent of Normal Day 80%

Shading Control

Use Default Shading Control

Normal Day Percent of Window Shaded 0%

Demand-Limiting Day Percent of Window Shaded 50%

Thermostat Control

Use Default Setpoints

Normal Day Occupied Cooling Setpoint 75.0 F

Normal Day Unoccupied Cooling Setpoint 85.0 F

Demand-Limiting Day Precooling Setpoint 70.0 F

Maximum Occupied Cooling Setpoint 78.0 F

Start Time for Precooling 6:00 AM

Demand-Limiting Trajectory

Non-Linear Linear Step Function

Small Building Assessment Tool

Demo

Demand-Limiting Assessment Tool

File Edit Help

General Site Occupancy Strategies **Costs** Savings Peak Day Power Temperatures Comfort

Electric Utility Rates Program PG&E PG&E-E-19-E-CPP

Normal Electric Utility Rates

Season Summer Winter

Start Date May 1

	On Peak	Off Peak
Start	12:00 PM	10:00 PM
Stop	6:00 PM	9:00 AM

Without CPP Program

	On Peak	Mid Peak	Off Peak	Anytime	
Energy	0.140	0.102	0.072		\$/kWh
Demand	15.04	3.58	0.00	6.56	\$/kW

With CPP Program

	On Peak	Mid Peak	Off Peak	Anytime	
Energy	0.109	0.093	0.072		\$/kWh
Demand	15.04	3.58	0.00	6.56	\$/kW

CPP Event Electric Energy Changes

CPP Rates? Yes

Number of Days for CPP Rates 10

Summer

	Moderate CPP Rates	High CPP Rates
Start	12:00 PM	3:00 PM
Stop	3:00 PM	6:00 PM
Rate	0.305 \$/kWh	0.702 \$/kWh

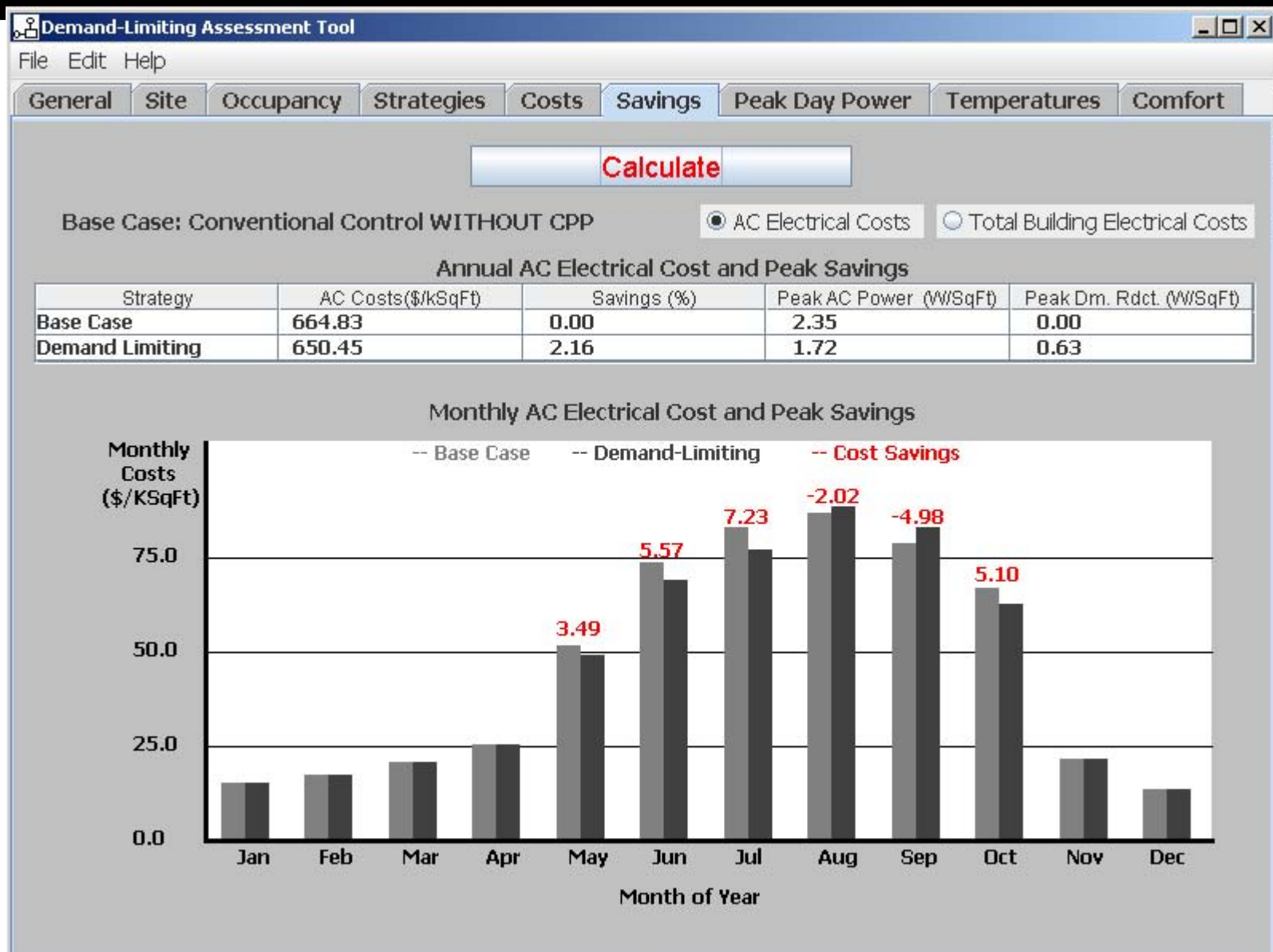
Base Case Selection

Conventional Control WITHOUT CPP

Conventional Control WITH CPP

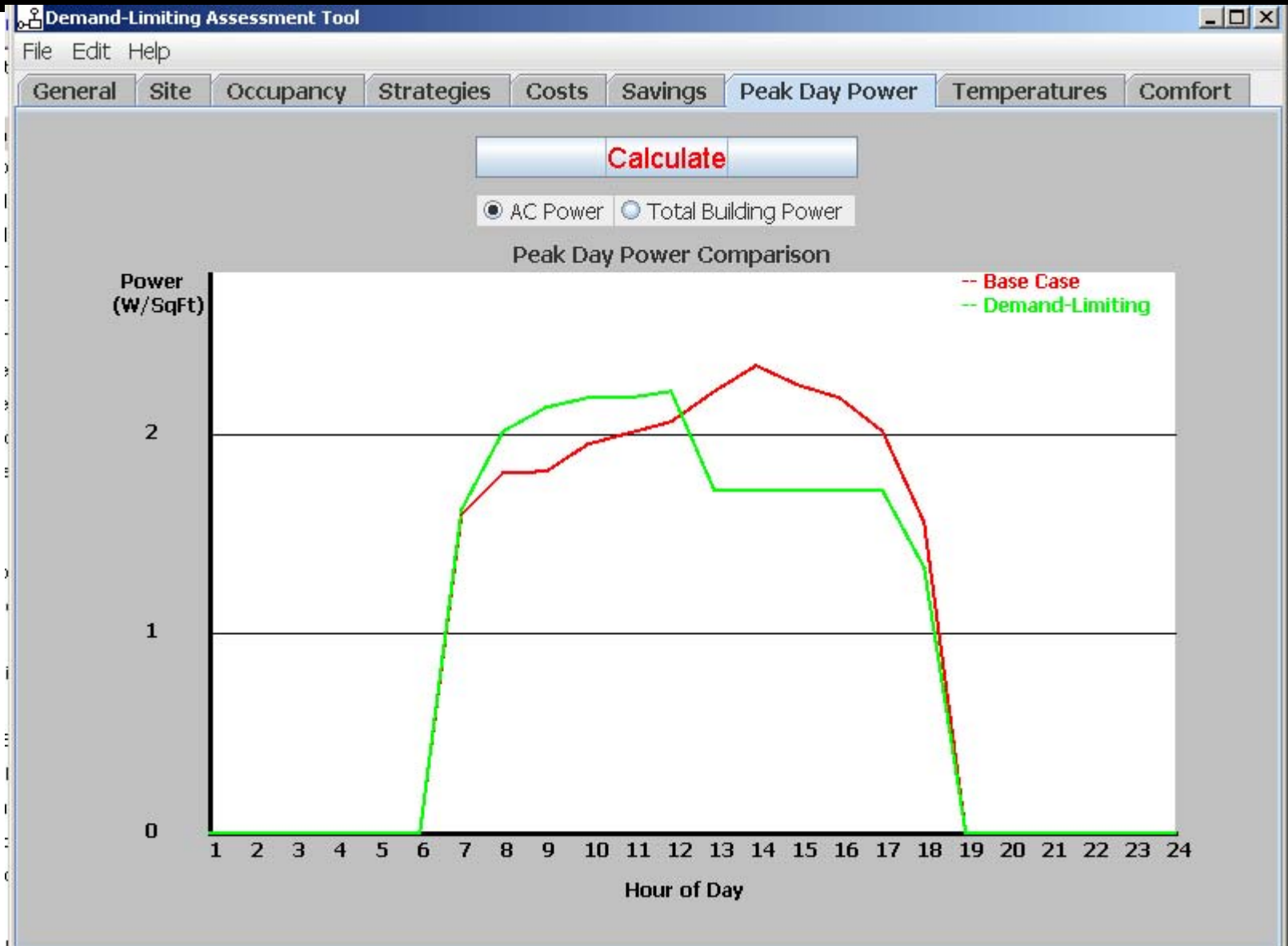
Small Building Assessment Tool

Demo



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Demo



Small Building Assessment Tool

Demo

