

### Efficiency Maine Commercial Baseline Study Results



## Tasks

- Sample Design
- Site Selection
- Recruiting
- Site Visits
- Data Cleaning and Entry
- Code Compliance
- Energy Use Intensity Comparison
- Data Analysis
- Report Writing



## Sample Design

- Sample Design
  - Dodge Database 2006 2010
  - ➢Building Types
    - Grocery, Office, Retail, Warehouse, Hotel, Bank/Financial, K-12 Schools, Residence Hall (Dorm)
  - Size − 57 sites (90% confidence level plus or minus 10%)



Population – Number of New Starts 2006 - 2011

	Buildin	g Size	
	Medium	Small	
Building Type	Commercial	Commercial	Total
Bank/financial institution		47	47
Grocery store	7	2	9
Hotels and motel	8	3	11
K-12 school	11	13	24
Office building	4	63	67
Residence hall/dormitory	6	24	30
Restaurant	1	57	58
Retail store	7	82	89
Warehouse	5	41	46
Total	49	332	381

Source: Dodge Database (Excludes Salt/Sand Storage Buildings)



### Regions

Study Region	County
East	Hancock
East	Penobscot
East	Waldo
East	Washington
Central	Androscoggin
Central	Kennebec
Central	Knox
Central	Lincoln
Central	Sagadahoc
North	Aroostook
South	Cumberland
South	York
West	Franklin
West	Oxford
West	Piscataquis
West	Somerset



- Oversampling
  - ≻23 Additional Sites for Geographic Coverage
  - ≻Target of 80



### Final Target by Building Type

Building Type	Total
Banks/financial institution	8
Grocery store	2
Hotels and motels	6
K-12 school	7
Office building	12
Residence hall/dormitory	9
Restaurant	10
Retail store	16
Warehouse	10
Grand total	80



### Sample to Population Comparison

Building Type	Sample	Population
Bank/financial institution	10.0%	12.3%
Grocery store	2.5%	2.4%
Hotels and motel	7.5%	2.9%
K-12 school	8.8%	6.3%
Office building	15.0%	17.6%
Residence hall/dormitory	11.3%	7.9%
Restaurant	12.5%	15.2%
Retail store	20.0%	23.4%
Warehouse	12.5%	12.1%
Total	100.0%	100.0%

## **Recruitment/Site Visits**

- Calls Made by Surveyors
   Chains Most Difficult Schedule
- Site Surveys
  - Had to Dig for Plans & Specifications
  - Difficult Determining Insulation Levels
    - Below Grade
    - Within Wall Cavities



### Final Count by Building Type

Building Type	Number of On-Site Survey Participants	Percent of Total Participants
Banks/Financial Institution	8	10.8%
Grocery Store	6	8.1%
Hotels and Motels	5	6.8%
K-12 School	6	8.1%
Office Building	14	18.9%
Residence Hall/Dormitory	7	9.5%
Restaurant	5	6.8%
Retail Store	12	16.2%
Warehouse	11	14.9%
Totals	74	100.0%



### Surveys by Region

Region	Number of On-Site Survey Participants	Percent of Total On-Site Surveys	Percent of Population
South	32	43%	54%
East	16	22%	15%
Central	15	20%	23%
West	7	9%	6%
North	4	5%	2%
Total	74	100%	100%



## **Recruitment/Site Visits**

### Surveys by Building Size

Building Size	Number of On-Site Survey Participants
Small commercial	53
Medium commercial	21
Total	74



# **Energy Use Intensities**

# Table 1: Distribution of Buildings Distribution of Buildings Buildings Included in the Build 2011 Baseline Included

	Included in the	Buildings
	2011 Baseline	Included in the
Building Type	Study	2011 EUI Study
Banks/Financial Institution	8	4
Grocery Store	6	6
Hotels and Motels	5	4
K-12 School	6	5
Office Building	14	7
Residence Hall/Dormitory	7	4
Restaurant	5	2
Retail Store	12	4
Warehouse	11	3
Totals	74	39



# **Energy Use Intensities**

Table 2: Baseline Study EUI Summaries							
Baseline Study EUI Summaries							
			Percent				
		CBECS*	Relationship to the	Number of			
Building Type	Average	Standards	CBECS Standards	Buildings			
Banks/Financial Institution	105.6	100.8	105%	4			
Grocery Store	214.5	199.7	107%	6			
Hotels and Motels	64.2	126.7	51%	4			
K-12 School	46.2	87.7	53%	5			
Office Building	82.2	120.1	68%	7			
Residence Hall/Dormitory	64.3	126.7	51%	4			
Restaurant	714.3	276.6	258%	2			
Retail Store	72.7	108.4	67%	4			
Warehouse	30.2	30.2	100%	3			
Totals				39			

2. Deceline Study Elli Sum



## **Energy Use Intensities**

**Table 3: Baseline Study Electric EUI Summaries** 

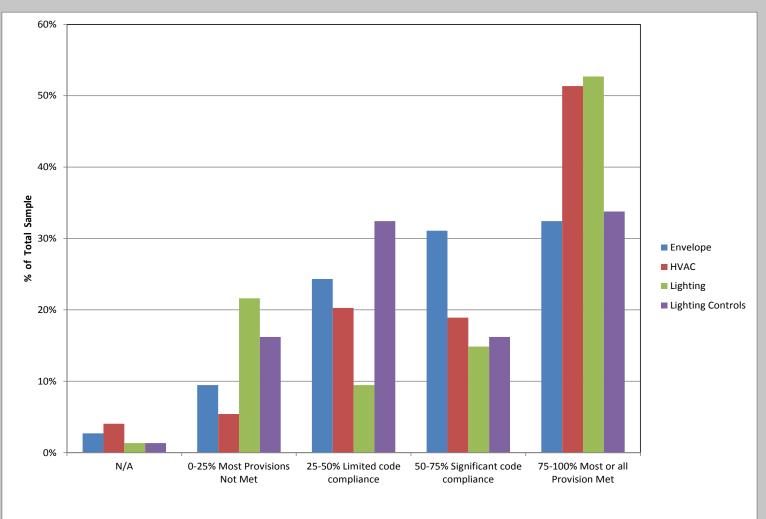
Baseline Study Electric EUIs								
Building Type	Number of Buildings							
Banks/Financial Institution	Average 17.8	6.9	258%	7				
Grocery Store	40.3	49.4	82%	6				
Hotels and Motels	9.6	13.5	71%	4				
K-12 School	4.3	11	39%	6				
Office Building	7.4	17.3	43%	8				
Residence Hall/Dormitory	8.4	13.5	62%	4				
Restaurant	143.4	38.4	373%	2				
Retail Store	10.1	14.3	71%	6				
Warehouse	5.6	7.6	74%	6				
Totals				49				



## Incentives by Building Type

		* - 4		% of Total	1.445	% of		Proticipant
Program Type	# of Participants	# of Projects	Total Incentive Paid	Incentives Paid	kWh Savings	Total kWh Savings	kW Savings	Participant Costs
Agriculture	178	313	\$411,263.22	2%	6,896,409.03	3%	1,772.09	\$1,039,730.09
College	25	148	\$634,994.02	2%	5,267,311.69	3%	1,201.14	\$1,613,919.30
Convenience Stores	111	178	\$200,848.42	1%	1,347,451.23	1%	217.35	\$528,008.58
Elementary/Secondary Schools	216	805	\$3,002,840.80	12%	16,707,428.27	8%	6,020.58	\$7,882,619.76
Garage/Repair	29	34	\$18,913.00	0%	152,244.80	0%	50.38	\$62,046.00
Grocery Store	107	224	\$1,113,487.09	4%	7,122,825.44	3%	1,192.26	\$2,162,129.27
Health	153	191	\$714,661.21	3%	3,913,013.10	2%	924.59	\$1,707,547.51
Hospital	33	96	\$806,322.62	3%	4,227,537.69	2%	741.47	\$2,339,371.63
Lodging	138	215	\$264,728.64	1%	4,160,323.47	2%	1,037.04	\$794,014.13
Manufacturing	475	882	\$7,618,708.14	30%	76,086,790.42	36%	10,527.06	\$21,451,405.68
Office	686	1088	\$2,312,880.22	9%	12,792,505.47	6%	3,454.77	\$5,915,971.90
Other	1122	1655	\$4,443,612.86	17%	30,555,084.00	15%	11,905.85	\$13,125,134.95
Restaurant	131	156	\$126,004.37	0%	885,803.66	0%	233.72	\$312,303.51
Retail	534	853	\$1,995,663.37	8%	20,757,363.00	10%	5,066.73	\$5,476,764.05
Warehouse	399	518	\$1,781,599.75	7%	19,242,175.84	9%	3,959.07	\$6,358,899.34
Totals:	3778	7356	\$25,446,527.73		210,114,267.10		48,304.10	\$70,769,865.69







### **Envelope Compliance**

	Bank/	Grocery		K-12	Office	Residential Hall/		Retail		Grand
	Financial Institute	,		School	Building			Store	Warehouse	Total
0								1	1	2
0-25% Most Provisions Not Met					1		1	2	3	7
25-50% Limited code compliance	2		2	1	5		1	5	2	18
50-75% Significant code compliance	3	3	3	1	5	1	3	3	1	23
75-100% Most or all Provision Met	2	1		6	6	5	1	1	2	24
Grand Total	7	4	5	8	17	6	6	12	9	74



### **HVAC Compliance**

	Bank/	Grocery		K-12	Office	Residential Hall/		Retail		Grand
	Financial Institute	,	Hotel		Building	•			Warehouse	
0					1			1	1	3
0-25% Most Provisions Not Met		1			2				1	4
25-50% Limited code compliance			3		2	1	2	5	2	15
50-75% Significant code compliance	2		1		3	1	2	2	3	14
75-100% Most or all Provision Met	5	3	1	8	9	4	2	4	2	38
Grand Total	7	4	5	8	17	6	6	12	9	74



### Lighting compliance

	Bank/	Grocery		K-12	Office	Residential Hall/		Retail		Grand
	Financial Institute	Store	Hotel	School	Building	Dormitory	Restaurant	Store	Warehouse	Total
0					1					1
0-25% Most Provisions Not Met	2			1	5		2	3	3	16
25-50% Limited code compliance	1		1		2			2	1	7
50-75% Significant code compliance	2	1	2		1		4	1		11
75-100% Most or all Provision Met	2	3	2	7	8	6		6	5	39
Grand Total	7	4	5	8	17	6	6	12	9	74



### Lighting Controls

	Bank/	Grocery		K-12	Office	Residential Hall/		Retail		Grand
	Financial Institute				Building				Warehouse	
0									1	1
0-25% Most Provisions Not Met	1	1	1	1	1	1	1	2	3	12
25-50% Limited code compliance	4		1	1	5	2	3	6	2	24
50-75% Significant code compliance		1	2	2	4		1	1	1	12
75-100% Most or all Provision Met	2	2	1	4	7	3	1	3	2	25
Grand Total	7	4	5	8	17	6	6	12	9	74



## Findings & Recommendations

- Construction Practices Highly Variable
- Envelope
  - ➢Building Science
  - Insulation Installation
    - Walls Cavities
      - Coverage
      - Thermal breaks (continuous)
      - Below Grade & Slabs
  - NFC Rating System Training



## Findings & Recommendations

- Mechanical Systems
   Sizing and Design
  - Sizing and DesignSystem Controls
- Lighting
  - Design for Lower LPD's.
    LED 8 Other New Technology
  - LED & Other New Technologies
- Lighting Controls
  - Training and Technical Assistance





- Comments
- Next Steps