2013 LED Penetration Update

U.S. DOE Solid State Lighting Research & Development Multi-Year Program Plan (MYPP)

April 14 (Updated May 2014)

U.S DEPARTMENT OF ENERGY | **Energy Efficiency & Renewable Energy**

2013 LED Classification - Traction & Penetration

2012

1. A Type
2. Directional
3. Decorative
4. MR16
5. Downlight
6. Troffer
7. High Bay
8. Street Light
9. Parking

2013

Indoor:

1. A Type
2. Directional
3. Small Directional
4. Decorative
5. Linear Fixture
6. Industrial
7. Other

Outdoor:

1. Area/Roadway
2. Parking Garage
3. Building Exterior
4. Other

LED Energy Savings Potential (2012 Study)

A	B	G	H	I	J	K	L
No.	Lamp/ Luminaire Types	None LED Installed Base Units (mil)	Total Energy Consumption (tBtu)	Total Energy Consumption (tWh)	LED Potential Energy Savings (tBtu)	LED Potential Energy Savings (tWh)	LED Potential Energy Savings ($B)
1	A Type	3.3B	1,057.0	101.8	822.0	79.1	7.8
2	Directional	248M	195.0	18.7	174.0	16.7	1.7
3	Decorative	1.2B	367.0	35.4	298.0	28.7	2.8
4	MR16	46M	70.0	6.7	65.0	6.2	.6
5	Downlight	708M	382.0	36.8	278.0	26.8	2.6
6	Troffer	964M	2,374.0	228.6	1,146.0	110.4	11.0
7	High Bay	67M	1,096.0	105.6	483.0	46.5	4.6
8	Street	44M	452.0	43.5	238.0	22.9	2.3
9	Parking	54M	622.0	59.9	370.0	35.6	3.5
	Total	6,631	6,615.0	637.0	3,873.0	373.0	37

Note: tBtu = trillion Btu, tWh = trillion Watthour

2009-2012 Installed LEDs Base Units Penetrations

A	B	C	D	E	F	G
No.	LED Type Lamp & Luminaires	2012 None LED Installed Base Units (mil)	2009 LED Installed Base Units (mil)	2012 LED Installed Base Units (mil)	Growth From 2009-to-2012	2012 LED % Market Penetration
1	A Type	3.3B	0.4	19.9	52x	<1.0
2	Directional	248M	0.1	11.4	96x	4.6
3	Decorative	1.2B	0.2	4.7	21x	<1.0
4	MR16	46M	0.1	4.8	57x	10.0
5	Downlight	708M	0.5	5.5	11x	<1.0
6	Troffer	964M	0.04	0.7	15x	<0.1
7	High Bay	67M	0.06	0.3	5x	<1.0
8	Street	44M	0.2	1.0	4x	2.0
9	Parking	54M	0.02	0.6	35x	1.0
	Total	6,631mil	1.62	49.0		.7

(LED Penetration Analysis)

2012

A	B	C	D
No.	Applications	Installed Penetration	Units Installed
		(%)	(Million)
1	A Type	<1.0	19.9
2	Directional	4.6	11.4
3	Decorative	<1.0	4.7
4	MR16	10	4.8
5	Downlight	<1.0	5.5
6	Troffer	<0.1	0.7
7	High Bay	<1.0	0.3
8	Street	2	1
9	Parking	1	0.6
2012	Total All	0.7	49

Baseline:
6,631M units = None LED

"Other" (in 2013) were not analyzed in 2012

2013

A	B	C	D
No.	Applications	Installed Penetration	Units Installed
		(%)	(Million)
1	A Type	1.1	34.2
2	Directional	3.4	33.3
3	Small Directional	16	7.5
4	Decorative	0.7	8.3
5	Linear Fixture	0.7	4.9
6	Industrial	2.1	1.8
7	Other	0.5	3.8
	Total Indoor	1.3	95.5
8	Area/Roadway	7.1	3.3
9	Parking Garage	2.4	0.8
10	Buidling Exterior	7.9	4.7
11	Other	2.9	0.7
	Total Outdoor	5.8	9.5
2013	Total All	1.4	105

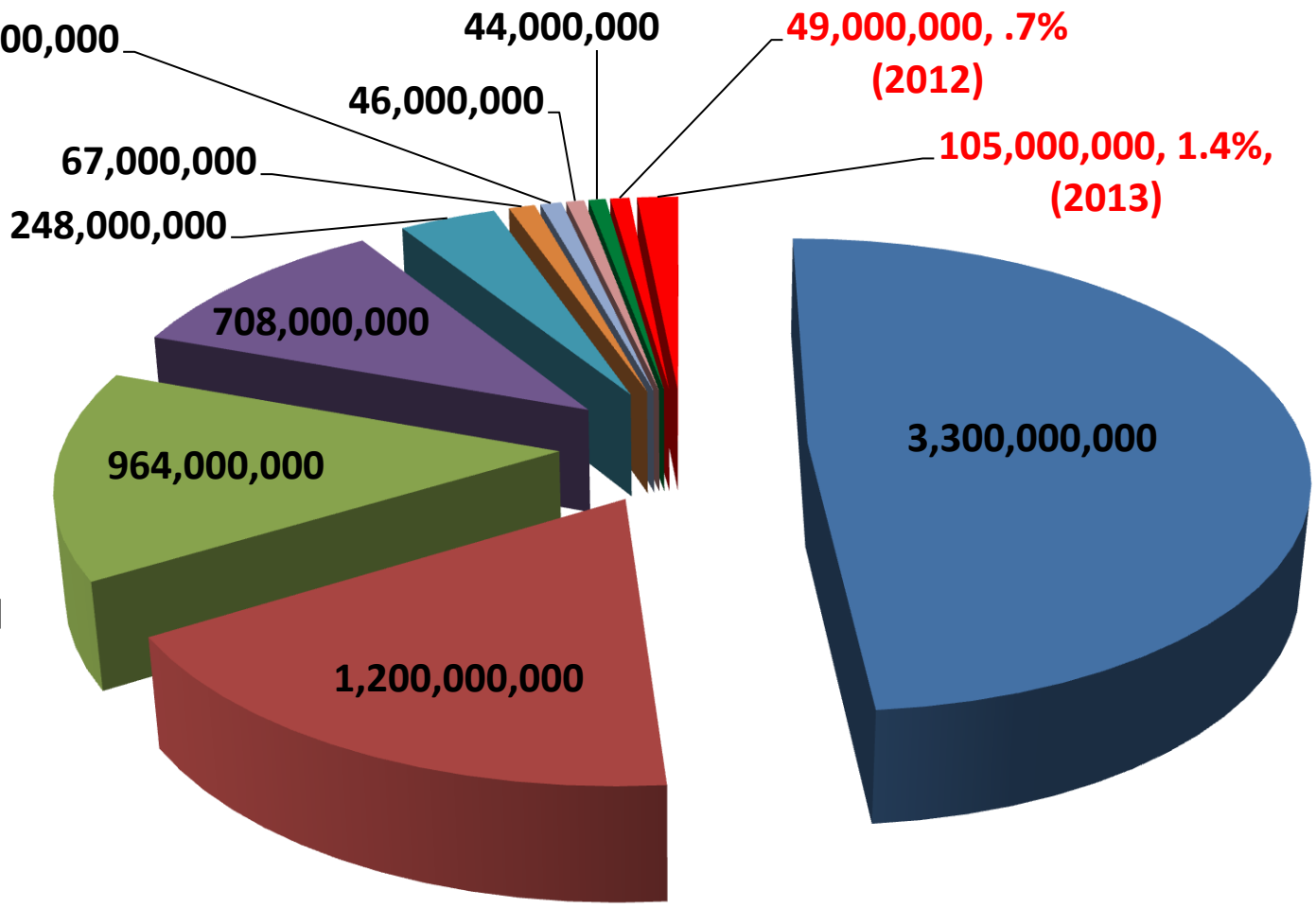
2013 LED Penetration Savings & Savings Potential

A	B	C	D	E			F		
No.	Applications	Installed Penetration	Units Installed	Energy Savings			Energy Savings Potential		
		(%)	(Million)	(Tbtu)	(Twh)	($)	(Tbtu)	(Twh)	($B)
1	A Type	1.1	34.2	40.5	3.9	-	802	77.3	-
2	Directional	3.4	33.3	79.7	7.7	-	395	38	-
3	Small Directional	16	7.5	15.3	1.5	-	71.9	6.9	-
4	Decorative	0.7	8.3	2.3	0.2	-	269	25.9	-
5	Linear Fixture	0.7	4.9	7.3	0.7	-	1,052	101	-
6	Industrial	2.1	1.8	9.2	0.9	-	789	76	-
7	Other	0.5	3.8	7.4	0.7	-	178	17.1	-
	Total Indoor	1.3	95.5	162	15.6	-	3,556	342	-
8	Area/Roadway	7.1	3.3	13.8	1.3	-	256	24.7	-
9	Parking Garage	2.4	0.8	6.5	0.6	-	140	13.5	-
10	Buidling Exterior	7.9	4.7	5.4	0.5	-	59.3	5.7	-
11	Other	2.9	0.7	1.2	0.1	-	48.6	4.7	-
	Total Outdoor	5.8	9.5	26.9	2.5	-	504	48.6	-
2013	Total All	1.4	105	188	18.1	1.8B	4,060	391	39
2012	Total All	0.7	49	71	6.8	675M	3,873	373	37

LED Penetration 2012 & 2013

None LED Units - Legend

1. A-Type
2. Decorative
3. Troffer
4. Downlight
5. Directional
6. High Bay
7. Parking
8. MR16
9. Street



2012 = 6,631,000,000 total None LED installed
(Energy Cost =$63.7B)
LED Potential Savings = 4,060tBtu

LED watt equivalent to Conventional Lighting

	A	B	C	E	D	F
	Conventional Light Bulb		LED Bulb	Expected Energy Savings	Service Life	Better Efficacy
		(Watt)	(Watt)	(%)	(Hours)	(%)
1a	Incandescent	100	18	82	50X	88
1b	Incandescent	75	13	82	50X	88
1c	Incandescent	60	10	83	50X	88
1d	Incandescent	40	6	85	50X	88
2	CFL	20	10	50	5X	55
3	Fluo. Tube	34	16-20	41	2X	17
4	Halogen	65	10	84	25X	75
5	HID	460	198	57	10x	30

U.S. DOE SSL Program Strategy

Core Research

Scientific research to fill technology gaps, provide enabling data

Product Development

Projects to develop or improve commercially viable materials, devices or systems

Manufacturing R&D

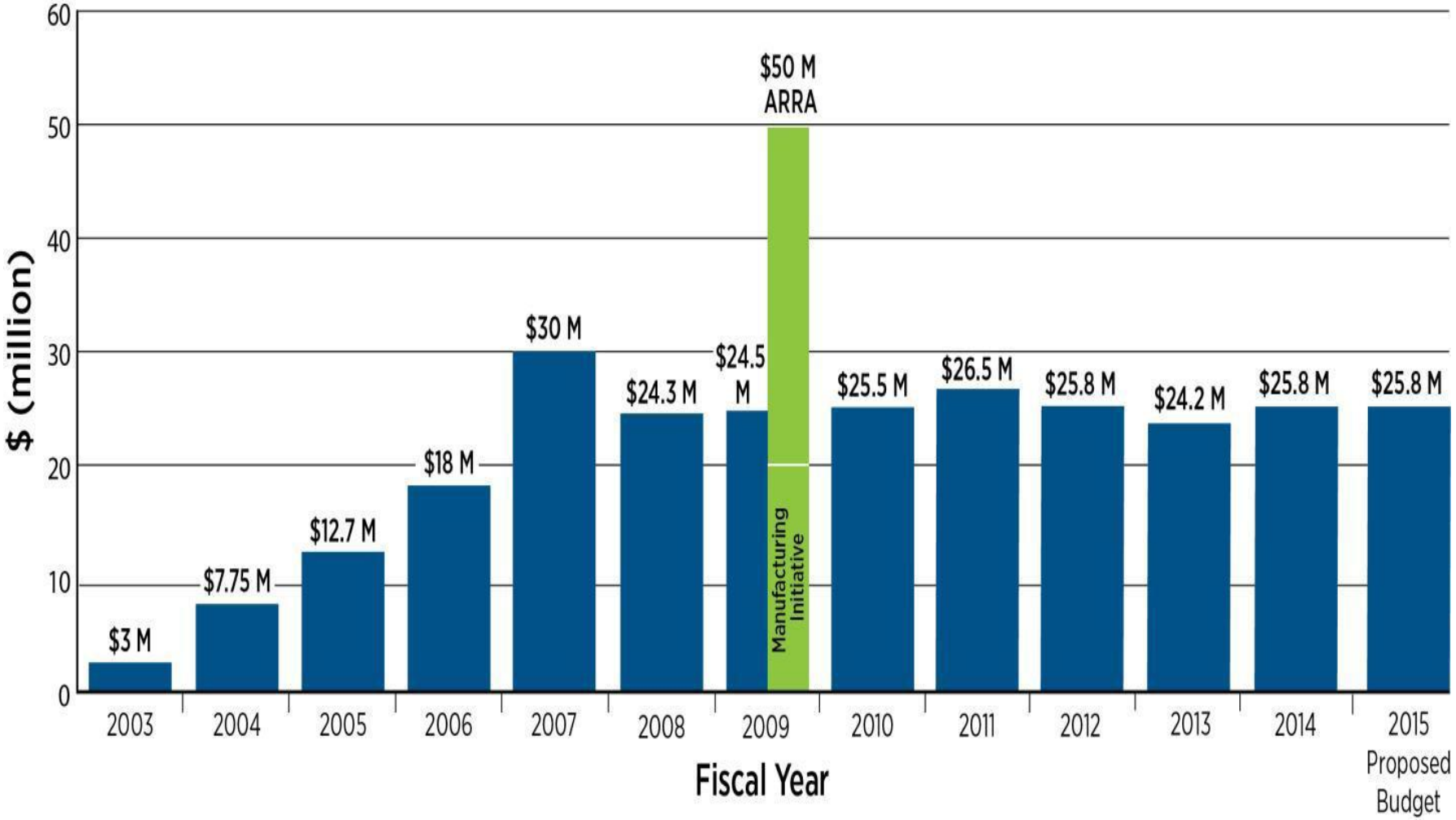
R&D to reduce costs through improvements in equipment, processes

Applied Technology R&D

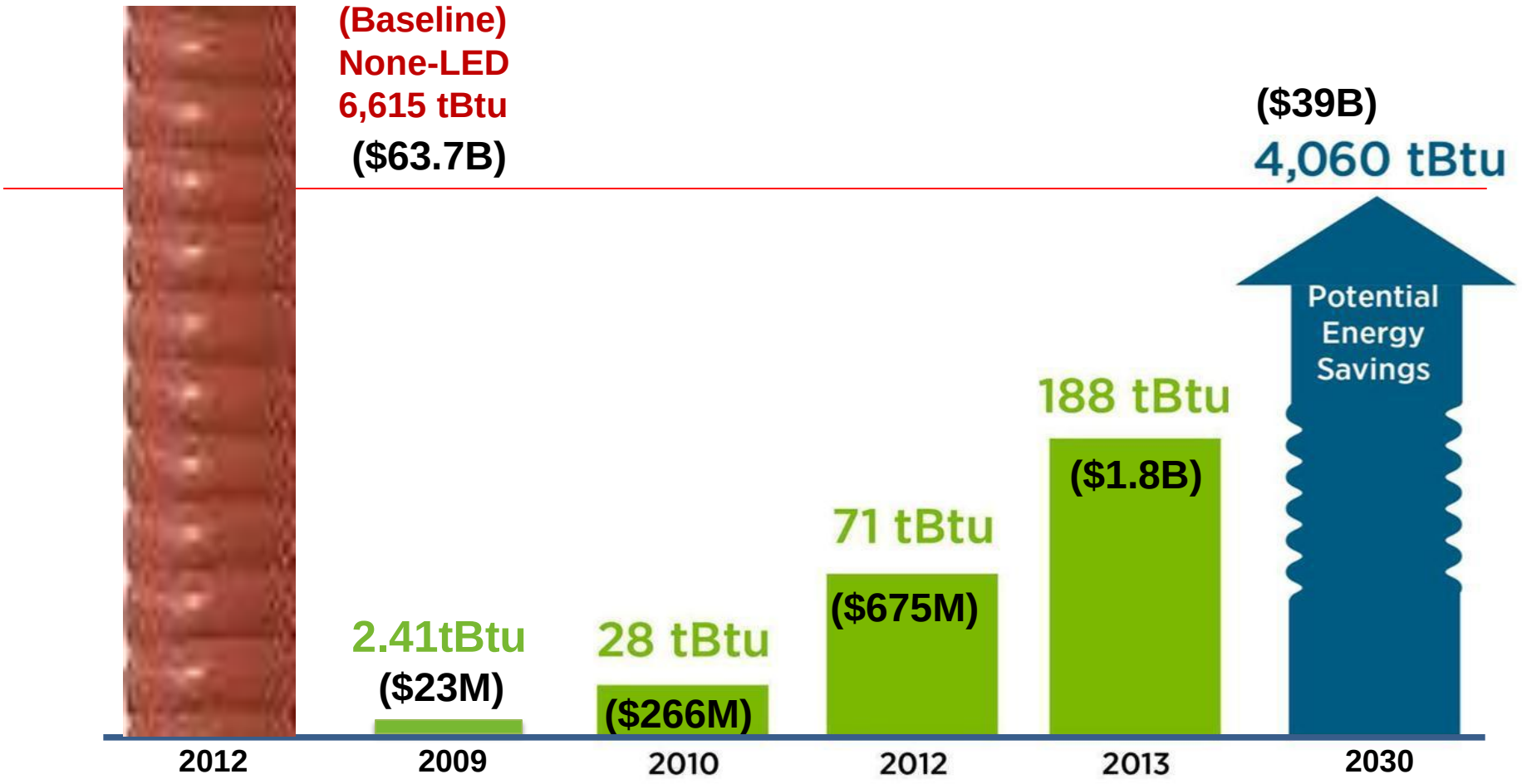
Field and laboratory evaluations, technical support for standards, technology competitions

Congressional Appropriations

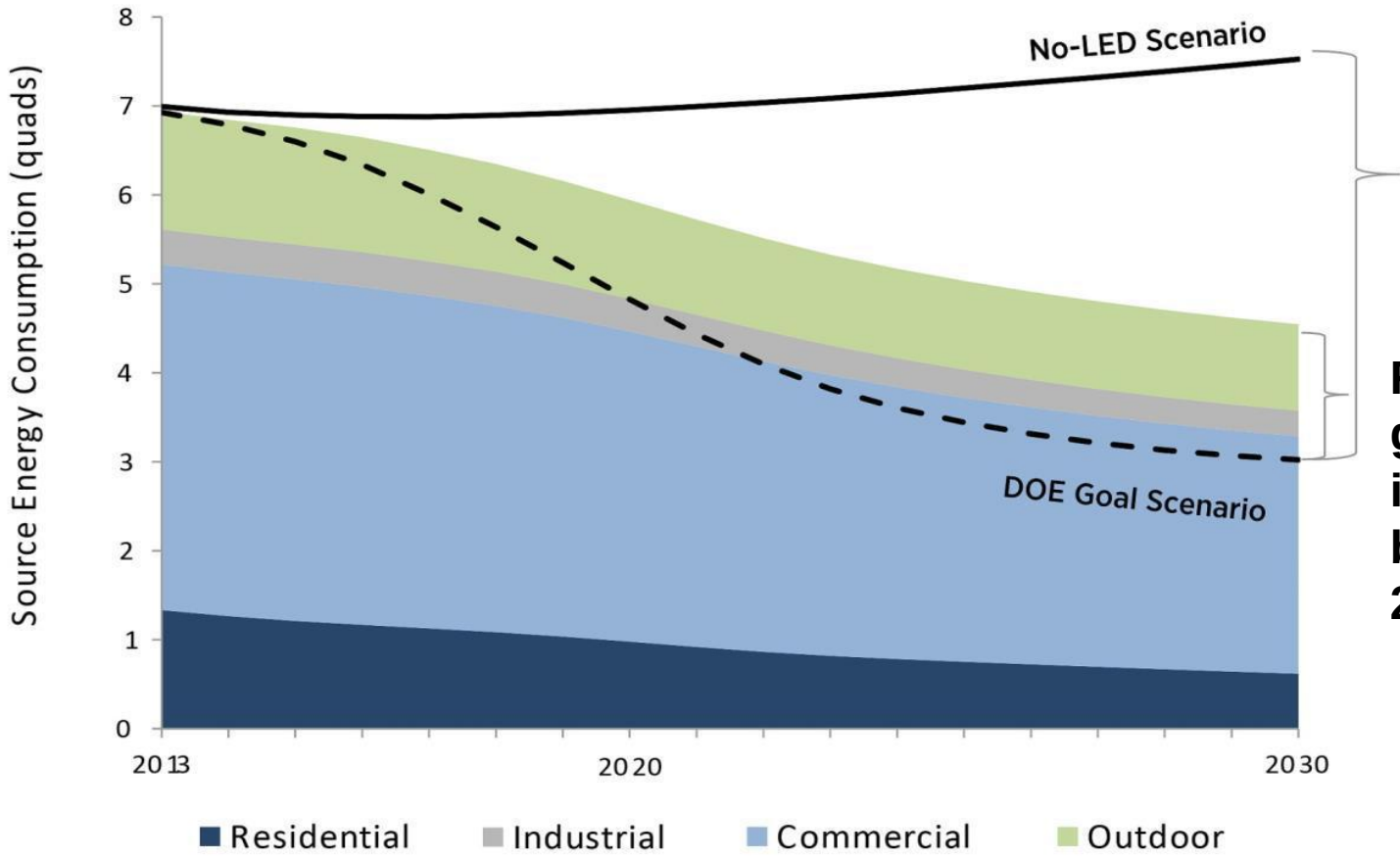
ARRA =America Recovery & Reinvestment Act (Stimulus)



Achievable Energy Savings



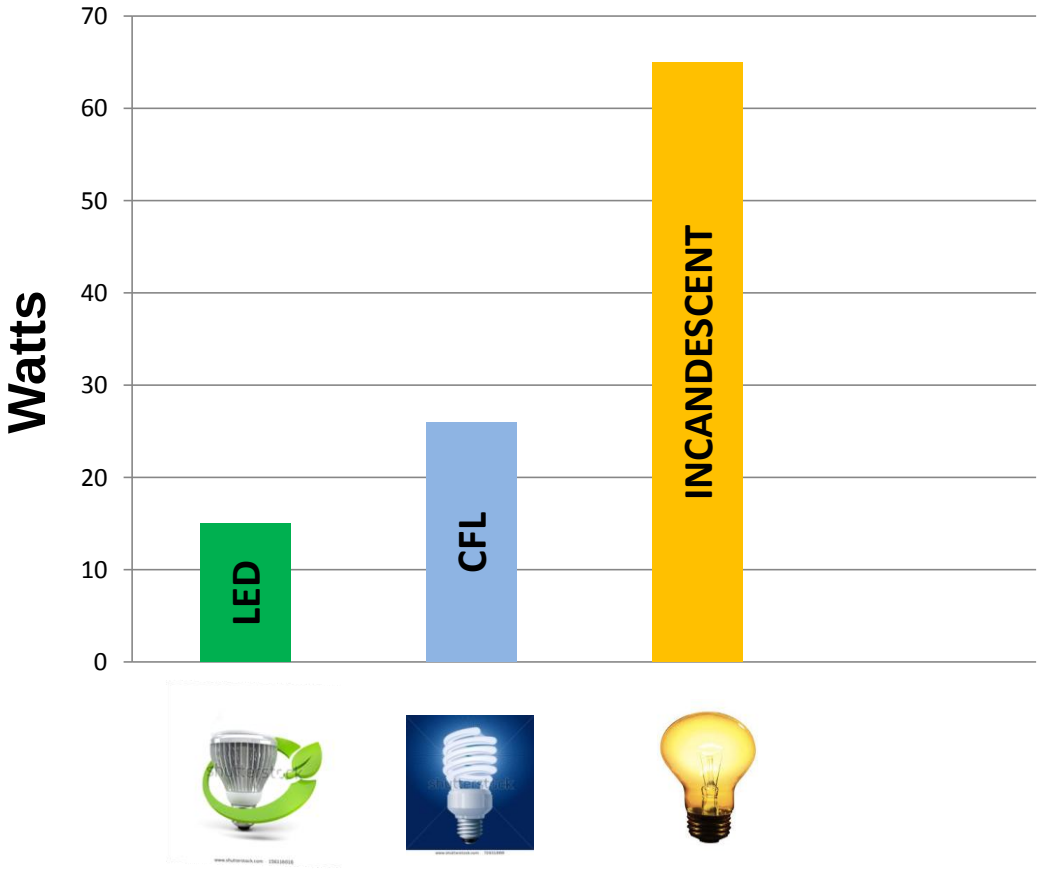
Energy Savings Forecast



60% Energy Savings

Reaching DOE goals can increase savings by an additional 20%

LED Lighting “A Type”- Efficiency Comparison



Efficiency:

Is ultra efficient compared to other lamps, deliver same amount light, uses only 10-15% power.

Value by Comparison:

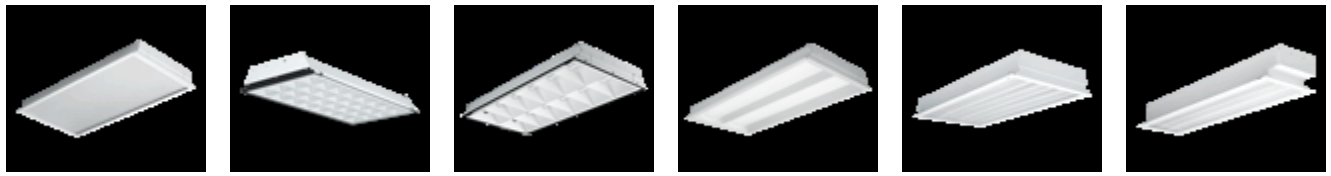
LED can replace 65 watts incandescent using only 10.5 watts. Its 50,000 hours lifetime uses 525 KWHr and only $63 in energy.

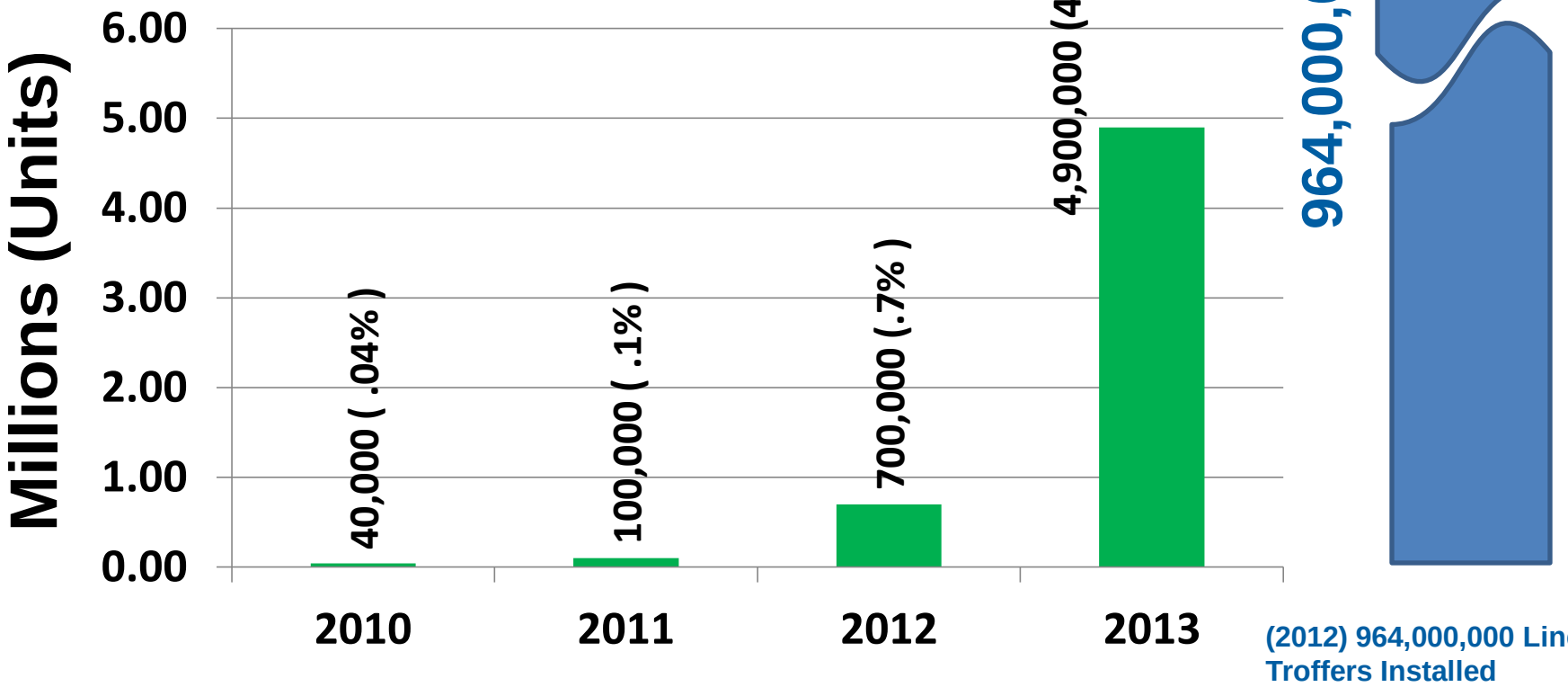
Incandescent 65 Watts:

Last 2,000 hours, consumed 3,250 KWHr, replaced 25 times, cost over $465.

Savings: Over $400 in energy.

LED Linear Troffers - Penetration





(2012) 964,000,000 Linear Troffers Installed

A Long Way to Go