

ENERGY IMPACT ILLINOIS / ENCOMPASS

# Retrofit Gateway Services – Road Map

## EXAMPLE BUILDING

*September 25<sup>th</sup>, 2013*

*(Version v1.0)*



Chicago Metropolitan  
Agency for Planning



POSITIVENERGY



PRACTICE



# Agenda

- 1. Retrofit Gateway Services**
- 2. Meeting the EXAMPLE BUILDING'S Goals**
- 3. Retrofit Road Map for EXAMPLE BUILDING**
- 4. Implementation & Next Steps**

# 1. Retrofit Gateway Services

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## Objective:

- Support buildings in meeting and exceeding energy reduction targets and energy-related business goals

## Approach:

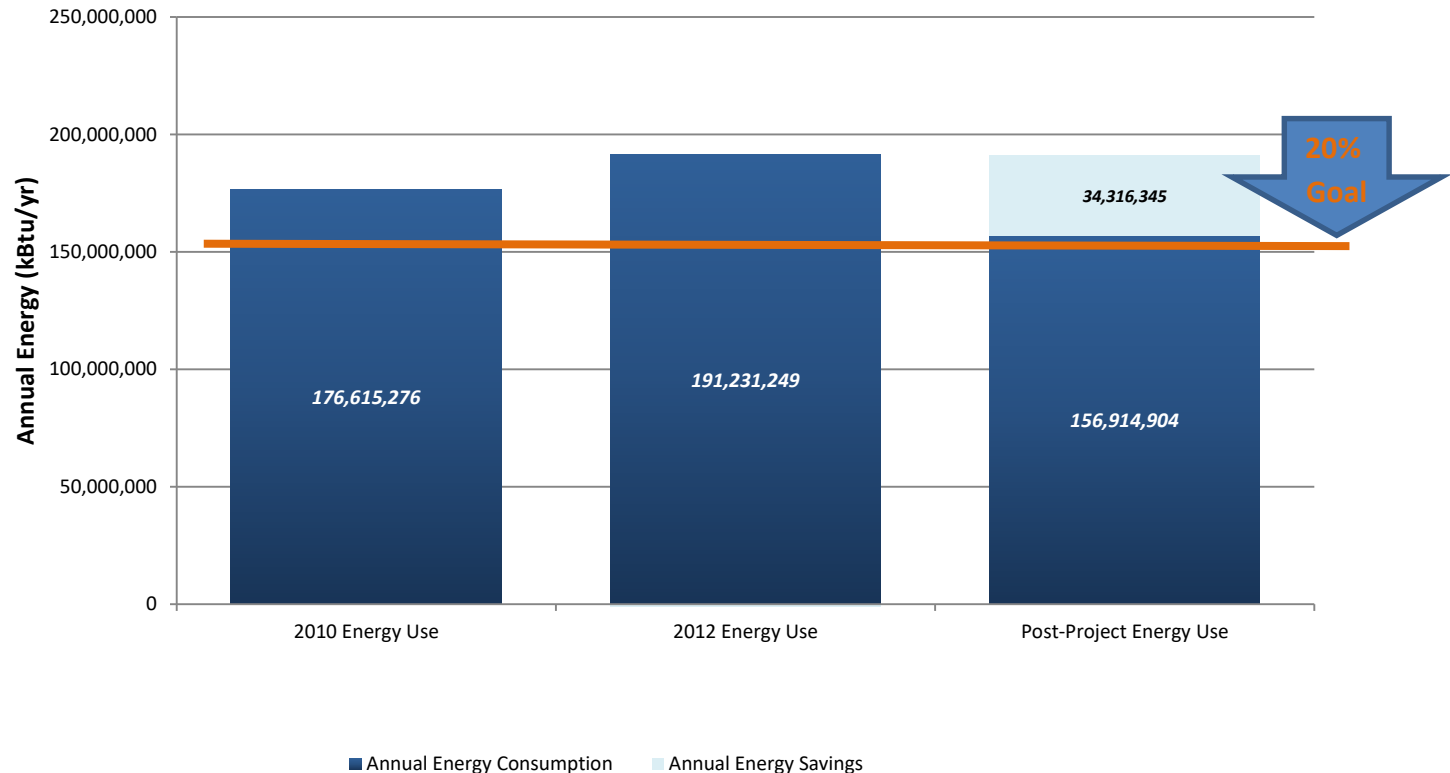
- Synthesize previous studies and assessments
- Prioritize and sequence efforts to try and reach 20% Retrofit Chicago energy use reduction target
- Frame business case and 5-year implementation road map based on Internal Rate of Return, Payback Periods, and Energy Use Impact

## Overview:

- No-cost Road map services **valued at \$25,000** for EXAMPLE BUILDING
- Building (funded by the United States Department Of Energy)
- Provided by **Chicago Metropolitan Agency for Planning**, in partnership with **Retrofit Chicago's Commercial Buildings Initiative** and **PositivEnergy Practice**

## 2. Meeting the EXAMPLE BUILDING'S Goals

The EXAMPLE BUILDING established a whole-building energy reduction goal of 20% or greater by 2017:



## 2. Meeting The EXAMPLE BUILDING'S Goals

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- **Pursue desired certification**
  - Committed to pursuing Energy Star certification and potential LEED accreditation
- **Maintain long term hold with existing tenants**
  - Improve the thermal comfort within the building resulting in less complaints
- **Maximize performance of existing systems**
- **Save money operationally**
  - Reduce maintenance and operating costs on existing building-wide operating systems

### 3. Retrofit Road Map for EXAMPLE Building

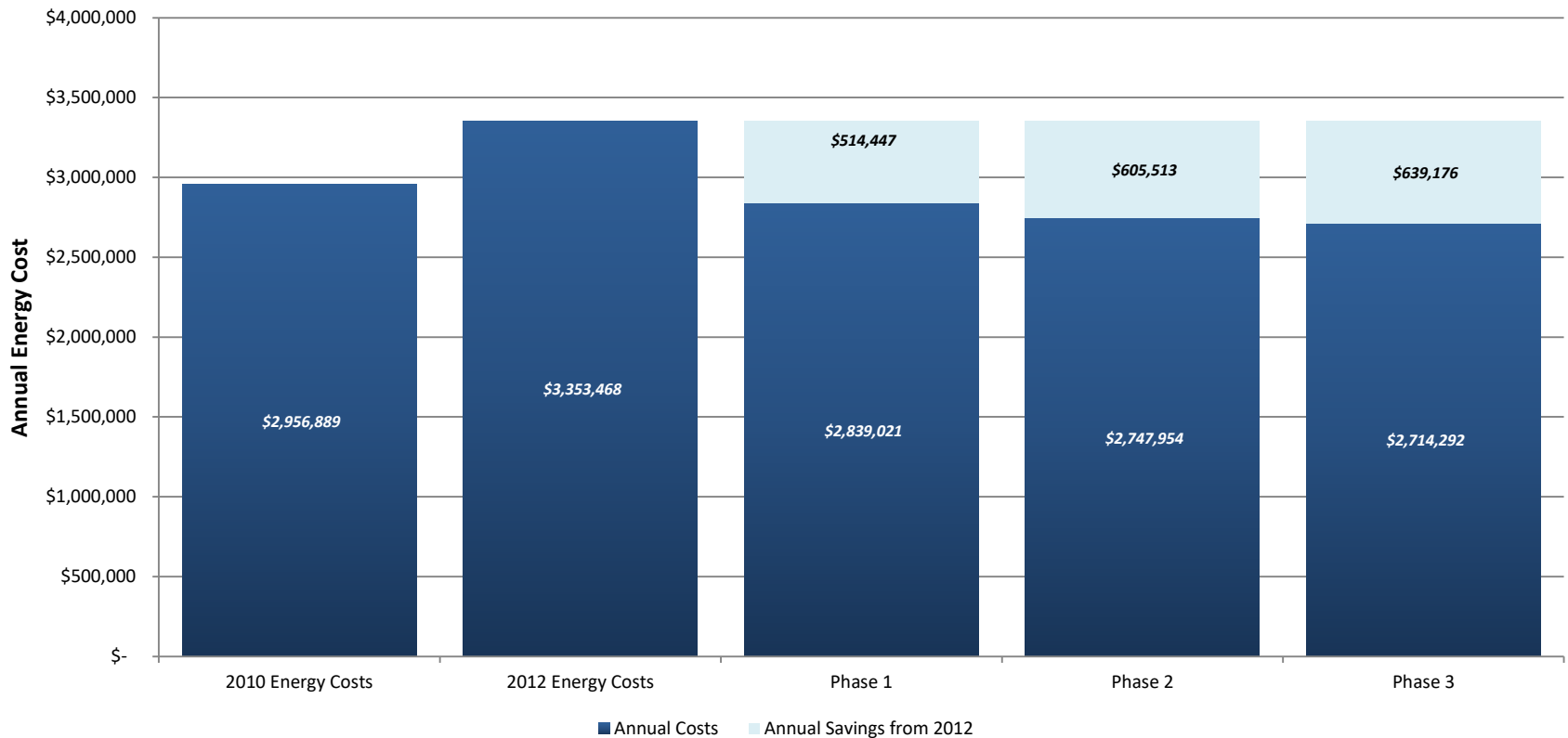
## Business Case for Implementation

	Previous Measures	Road Map Energy Conservation Measures (ECMs)			Project Totals
		Phase 1	Phase 2	Phase 3	
<b>Key Measures</b>	Occupancy Increase (Not included in Road Map)	Lighting Retrofits and Variable Speed Drive Installations	Variable Volume Retrofit	Variable Volume Retrofit	<b>18% Energy Reduction in 5 Years</b>
<b>Install Cost Before Incentives</b>		\$1,954,824	\$625,700	\$915,800	<b>\$3,496,324</b>
<b>Potential Utility Incentives</b>		\$278,644	\$117,654	\$0	<b>\$396,299</b>
<b>Capital Required</b>		\$1,676,180	\$508,046	\$915,800	<b>\$3,100,025</b>
<b>Annual Energy Cost Savings</b>		\$514,447	\$91,067	\$33,662	<b>\$639,176</b>
<b>Reduction in Annual Energy Use</b>	-8.3%	10.5%	5.2%	2.2%	<b>17.9%</b>
<b>Simple Payback (Years)</b>		3.3	5.6	27.2	<b>4.9</b>
<b>Internal Rate of Return</b>		29.0%	13.2%	-14.3%	<b>16.8%</b>
<b>Net Present Value (DR=5%)</b>		\$2,345,990	\$214,016	-\$614,227	<b>\$1,945,778</b>
<b>Implementation Timeline</b>	2010-2012	2013-2016	2014-2015	2016-2017	<b>2012-2017</b>

# 3. Retrofit Road Map for EXAMPLE BUILDING

## Strategic Sequencing to Savings

*Implementing Road Map measures could result in up to \$639,000 in annual energy cost savings by 2017 for the building.*



# 3. Retrofit Road Map for EXAMPLE BUILDING



ECM #	ECM Description	Total Energy Savings		Reduction		Cost Savings	Install Cost	Incentives	Capital Req.	Payback Post Incentives	Capital Req / Energy Savings	10YR IRR	Net Present Value
		kBTU/yr	kBTU/sf/yr	%	Cumulative	\$/YR1 Savings	\$	\$	\$	years	\$/kBTU saved	%*	DR=5%*
<b>2010-2012 Completed ECMs</b>		<b>-14,615,973</b>	<b>-9.6</b>	<b>-8.3%</b>	<b>-8.3%</b>								
<b>Phase 1</b>	<b>Prerequisite</b>												
1	Implement lighting retrofit measures in 24 hour burn areas	1,101,960	0.7	0.6%	0.6%	\$28,292	\$73,304	\$12,663	\$60,642	2.1	\$0.06	47%	\$159,054
2	Implement lighting retrofit measures in other base building areas	516,528	0.3	0.3%	0.8%	\$13,261	\$41,510	\$5,095	\$36,416	2.7	\$0.07	35%	\$66,944
3	Retrofit Remaining Fluorescent Exit/Stair Signs to LED	11,955	0.0	0.0%	0.9%	\$307	\$10,005	\$1,000	\$9,005	29.3	\$0.75	-15%	(\$6,224)
4	Implement lighting retrofit measures in [REDACTED]	4,197,774	2.8	2.2%	3.0%	\$107,774	\$440,104	\$5,893	\$434,211	4.0	\$0.10	22%	\$412,368
5**	Install variable speed drives (VSDs) on cooling tower fans [REDACTED]	330,261	0.2	0.2%	3.2%	\$8,479	\$76,800	\$12,000	\$64,800	7.6	\$0.20	6%	\$3,264
6**	Install variable speed drive (VSD) on large condenser water pump [REDACTED]	603,873	0.4	0.3%	3.5%	\$15,504	\$43,200	\$12,000	\$31,200	2.0	\$0.05	50%	\$89,096
7**	Install variable speed drives (VSDs) on remaining condenser and hot water pumps [REDACTED]	1,063,135	0.7	0.6%	4.1%	\$27,295	\$221,500	\$53,400	\$168,100	6.2	\$0.16	11%	\$49,074
8a	Install variable speed drives (VSDs) on [REDACTED] building perimeter induction fans [REDACTED]	1,042,269	0.7	0.5%	4.6%	\$26,759	\$67,500	\$16,500	\$51,000	1.9	\$0.05	53%	\$156,493
8b	Install variable speed drives (VSDs) on [REDACTED] building perimeter induction fans [REDACTED]	487,661	0.3	0.3%	4.9%	\$12,520	\$81,300	\$7,200	\$74,100	5.9	\$0.15	12%	\$25,375
9	Install variable speed drives (VSDs) on interior fan systems in [REDACTED] building [REDACTED]	1,345,087	0.9	0.7%	5.6%	\$34,534	\$122,600	\$13,500	\$109,100	3.2	\$0.08	30%	\$160,738
10	Install variable speed drives (VSDs) on interior fan systems in [REDACTED] building [REDACTED]	4,196,653	2.8	2.2%	7.8%	\$107,745	\$180,700	\$49,500	\$131,200	1.2	\$0.03	83%	\$700,730
11	Retrofit remaining constant volume fan systems with variable speed drives and reduce flow by a specified reset schedule	3,537,075	2.3	1.8%	9.6%	\$90,811	\$487,900	\$57,000	\$430,900	4.7	\$0.12	17%	\$285,531
12	Add dewpoint economizer control to all induction unit constant volume fan systems and differential enthalpy economizer control to all interior fan systems	886,325	0.6	0.5%	10.1%	\$22,756	\$30,400	\$18,184	\$12,216	0.5	\$0.01	187%	\$162,748
13	Convert [REDACTED] floor air handling unit (AHU) [REDACTED] chilled water coil into a self-contained cooling source	717,032	0.5	0.4%	10.5%	\$18,409	\$78,000	\$14,711	\$63,290	3.4	\$0.09	27%	\$80,799
<b>Phase 1 Totals</b>		<b>20,037,588</b>	<b>13.2</b>	<b>10.5%</b>	<b>10.5%</b>	<b>\$514,447</b>	<b>\$1,954,824</b>	<b>\$278,644</b>	<b>\$1,676,180</b>	<b>3.3</b>	<b>\$0.084</b>	<b>29%</b>	<b>\$2,345,990</b>
<b>Phase 2</b>													
14	10 Convert constant volume regulators on the low and mid rise of the [REDACTED] building to variable air volume units utilizing VAV retrofit kits	10,023,683	6.6	5.2%	15.7%	\$91,067	\$625,700	\$117,654	\$508,046	5.6	\$0.05	13%	\$214,016
<b>Phase 2 Totals</b>		<b>10,023,683</b>	<b>6.6</b>	<b>5.2%</b>	<b>15.7%</b>	<b>\$91,067</b>	<b>\$625,700</b>	<b>\$117,654</b>	<b>\$508,046</b>	<b>5.6</b>	<b>\$0.051</b>	<b>13%</b>	<b>\$214,016</b>
<b>Phase 3</b>													
15	9 Convert interior fan systems to variable air volume (VAV) in [REDACTED] building with the installation of VAV retrofit kits	4,255,073	2.8	2.2%	17.9%	\$33,662	\$915,800	\$0	\$915,800	27.2	\$0.22	-14%	(\$614,227)
<b>Phase 3 Totals</b>		<b>4,255,073</b>	<b>2.8</b>	<b>2.2%</b>	<b>17.9%</b>	<b>\$33,662</b>	<b>\$915,800</b>	<b>\$0</b>	<b>\$915,800</b>	<b>27.2</b>	<b>\$0.215</b>	<b>-14%</b>	<b>(\$614,227)</b>
<b>Totals</b>		<b>34,316,345</b>	<b>22.5</b>		<b>17.9%</b>	<b>\$639,176</b>	<b>\$3,496,324</b>	<b>\$396,299</b>	<b>\$3,100,025</b>	<b>4.9</b>	<b>\$0.090</b>	<b>17%</b>	<b>\$1,945,778</b>

\* A 1% utility escalation rate was assumed for IRR and NPV calculations.

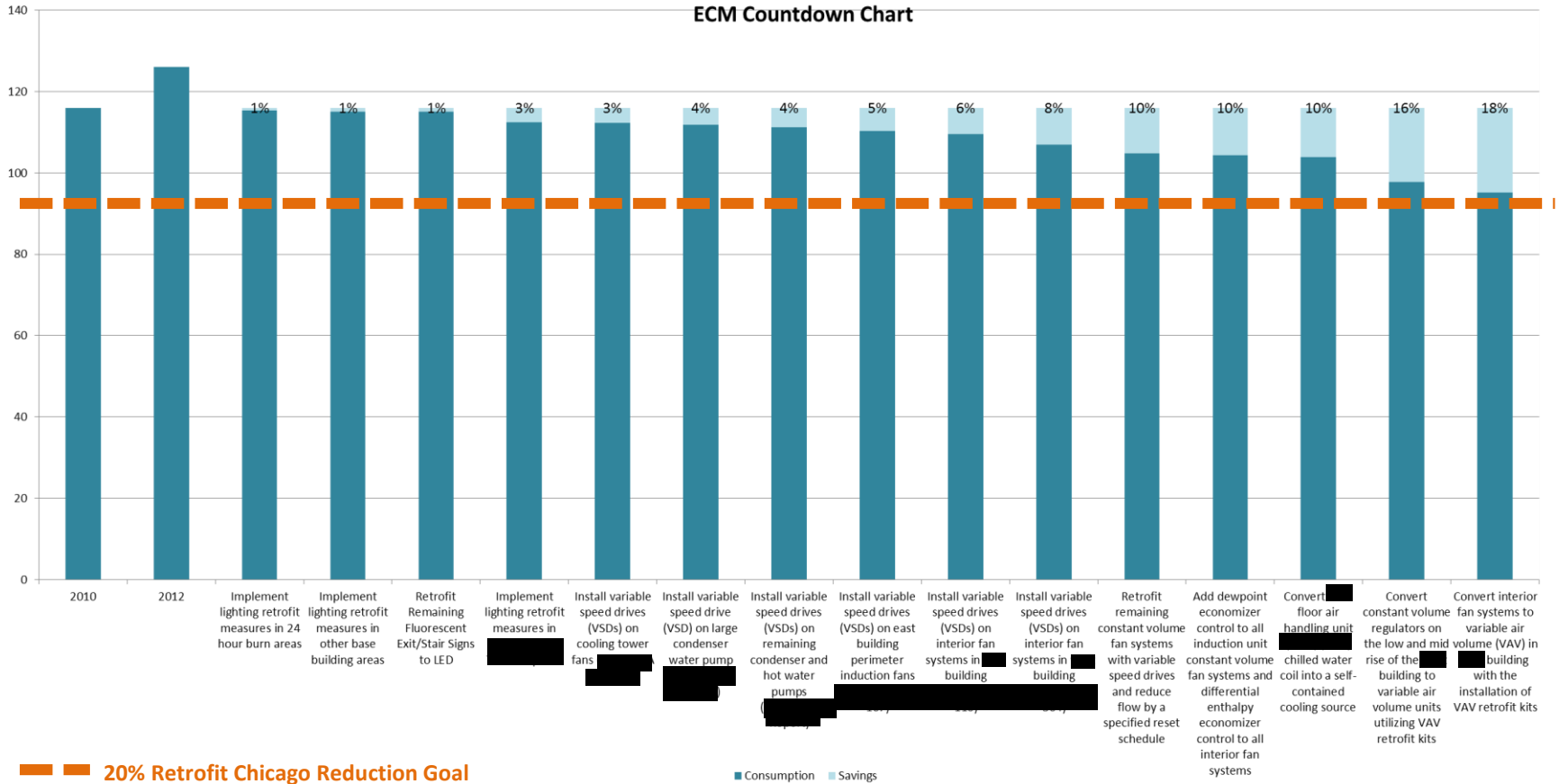
\*\*Information provided through a previous study done for the building [REDACTED]





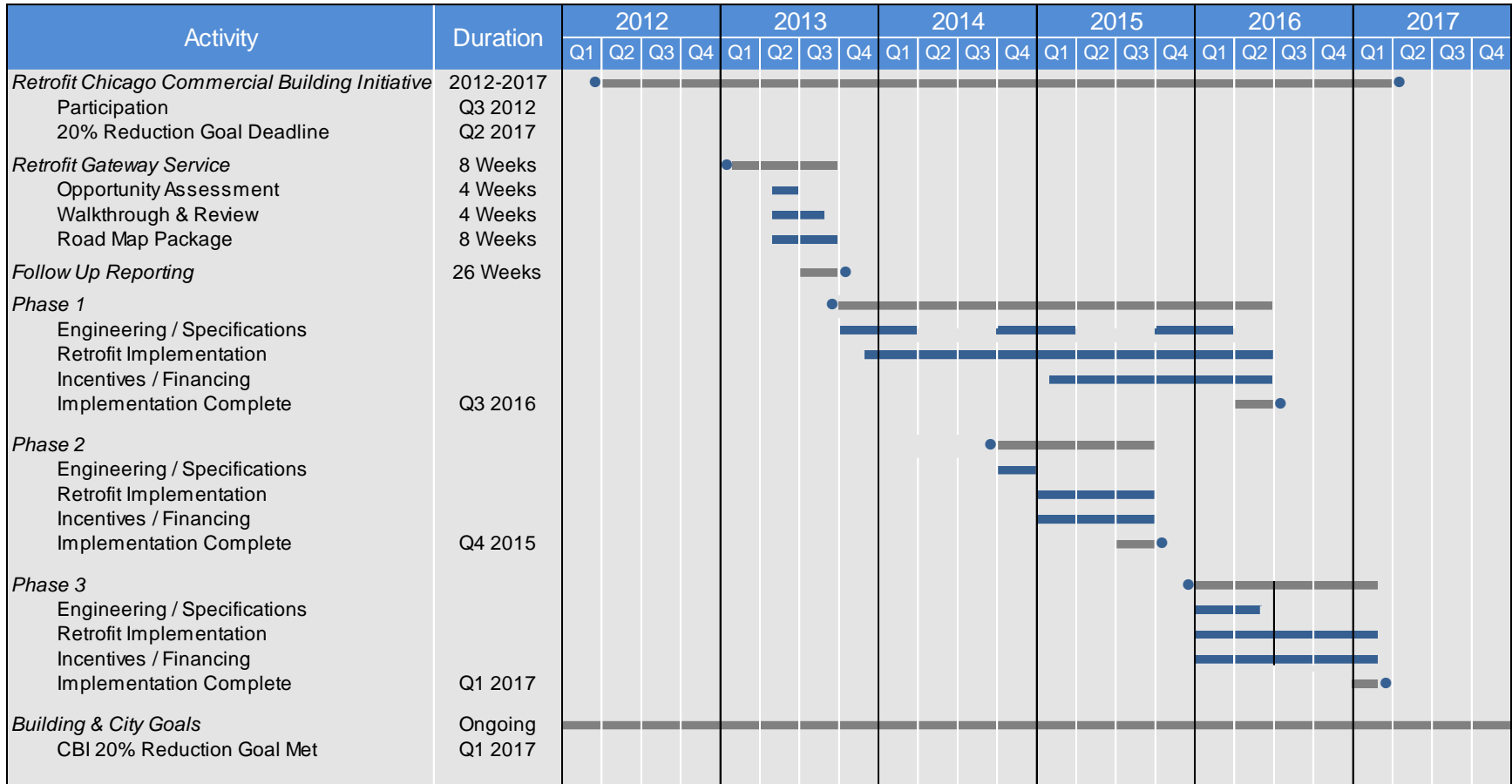
# 3. Retrofit Road Map for EXAMPLE BUILDING

## Path to Energy Reduction -Energy Use Intensity Snapshot (kBtU/SF/YR)



# 4. Implementation & Next Steps

## Proposed Timeline for Implementation



## 4. Implementation & Next Steps

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### Re-enforcing Strategies

*Add value through initiatives that complement and reinforce the investment in energy efficiency:*

- **Retrofit Chicago's Commercial Building Initiative**
- **Chicago Green Office Challenge**
- **Ongoing Utility Incentive Programs and Support**
- **Energy Impact Illinois and EnCompass tool**

## 4. Implementation & Next Steps

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### Next Steps

*By continuing to work diligently, the EXAMPLE BUILDING has a tremendous opportunity to achieve an 18% energy reduction with a 4.9 year payback on the investment made by building ownership.*

- **Review Next Steps Handout**
- **Q & A**