

Sustainable Design in Affordable Multi-family Rehabilitation

Portfolio-scale & Project-specific Approaches



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GREEN BUILDING SERVICES

CONTEXT

BUILDING EFFICIENCY PROJECT

**a portfolio-scale approach to
serious reductions of energy,
water, and waste.**

central city concern

founded in 1979

provides pathways to self-sufficiency through active intervention in poverty and homelessness

serves over 15,000 low-income and homeless people annually



central city concern continuum of services



**affordable
housing**



medical care



**employment
services**

Homelessness

Addictions

Mental Illness

Chronic Health

Trauma

No health insurance

Unemployment

Criminality



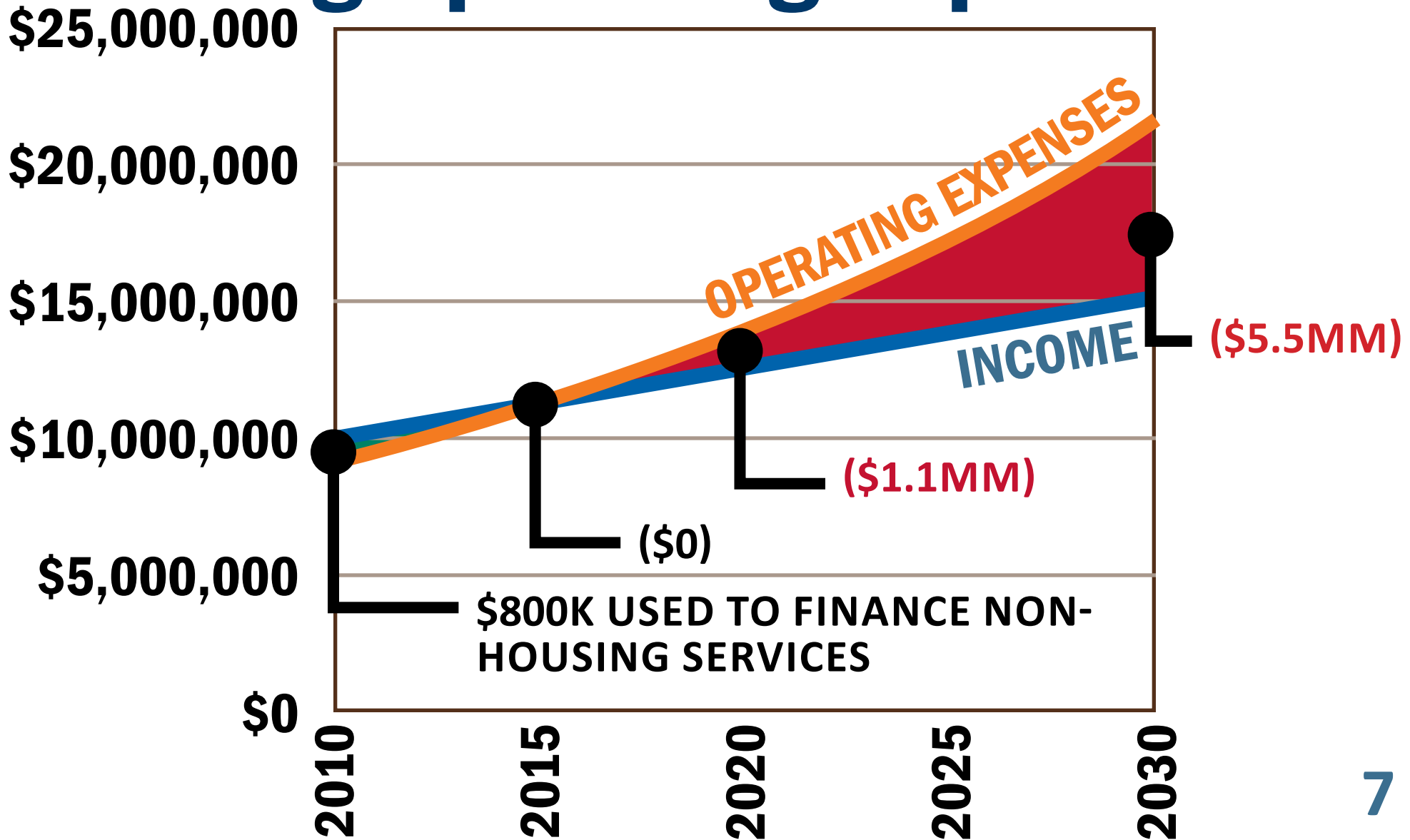
**drug & alcohol
treatment**

central city concern housing



why the concern?

housing operating expenses



why the concern about housing?

RESERVES

OTHER

UTILITIES
\$1.5MM

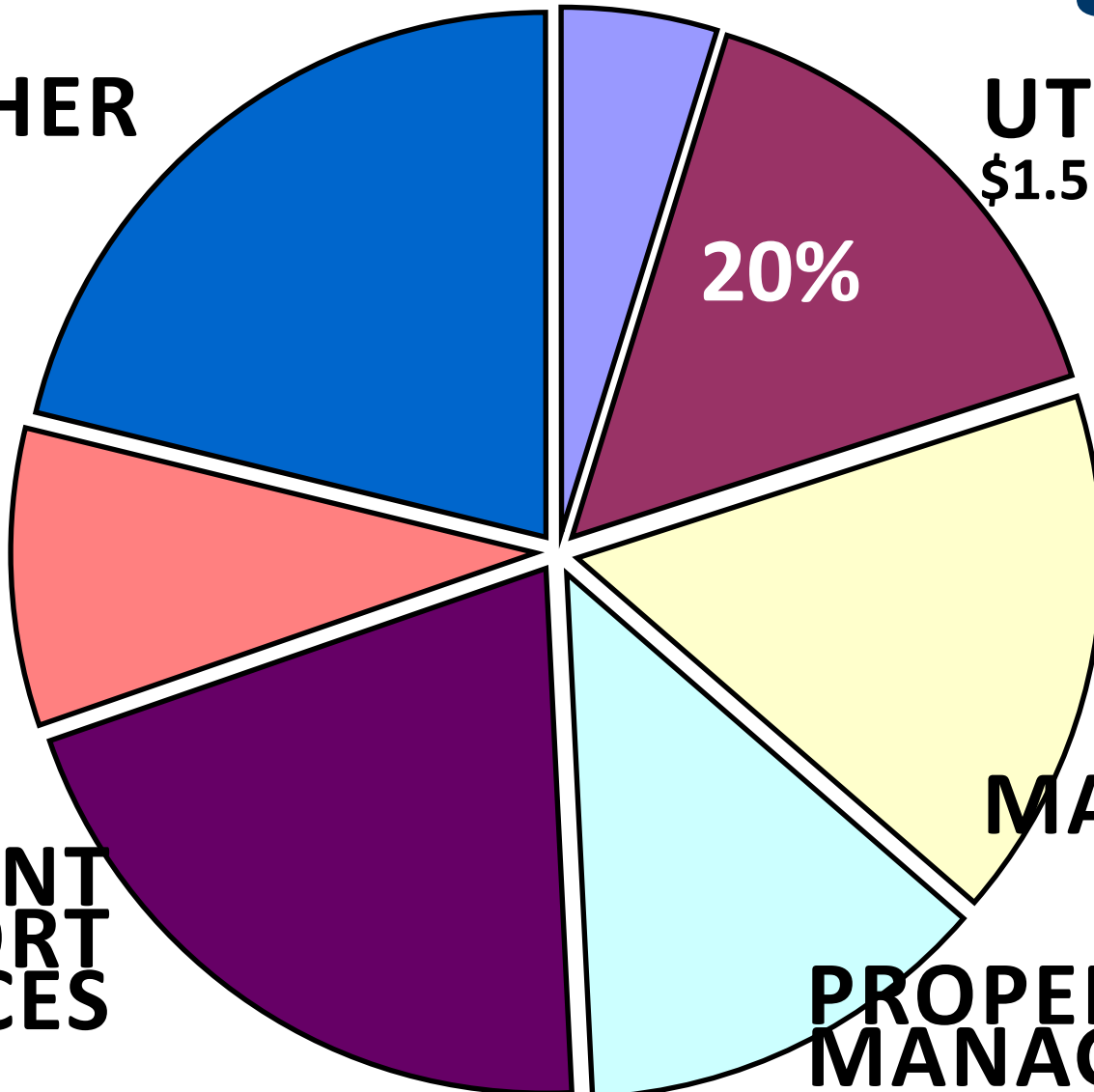
20%

DEBT
SERVICE

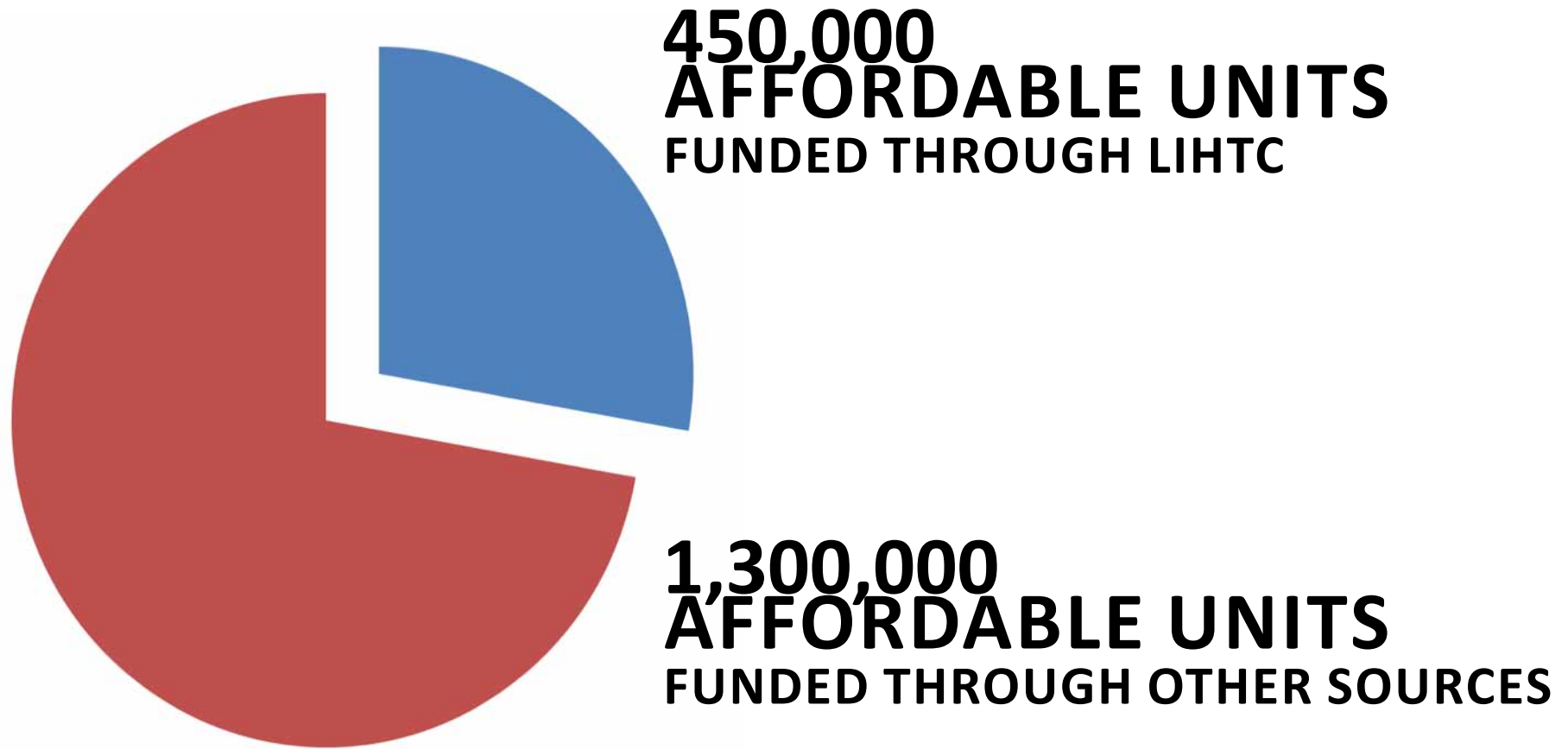
MAINTENANCE

RESIDENT
SUPPORT
SERVICES

PROPERTY
MANAGEMENT



affordable housing rehabilitation/investment opportunity



Total Multi-family Housing Units (1987-2007)

affordable housing investment life cycle

1. Concept Development
2. Tax Credit Application & Allocation
3. Syndication (Investment)
4. Development
5. Housing Operation
6. End of Limited Partnership Investment (Year 15)
7. Rehabilitation/Investment

affordable housing funding resources

1. Public Funding

- Weatherization Programs
- Federal Energy Efficiency Programs
- State, County and City Programs

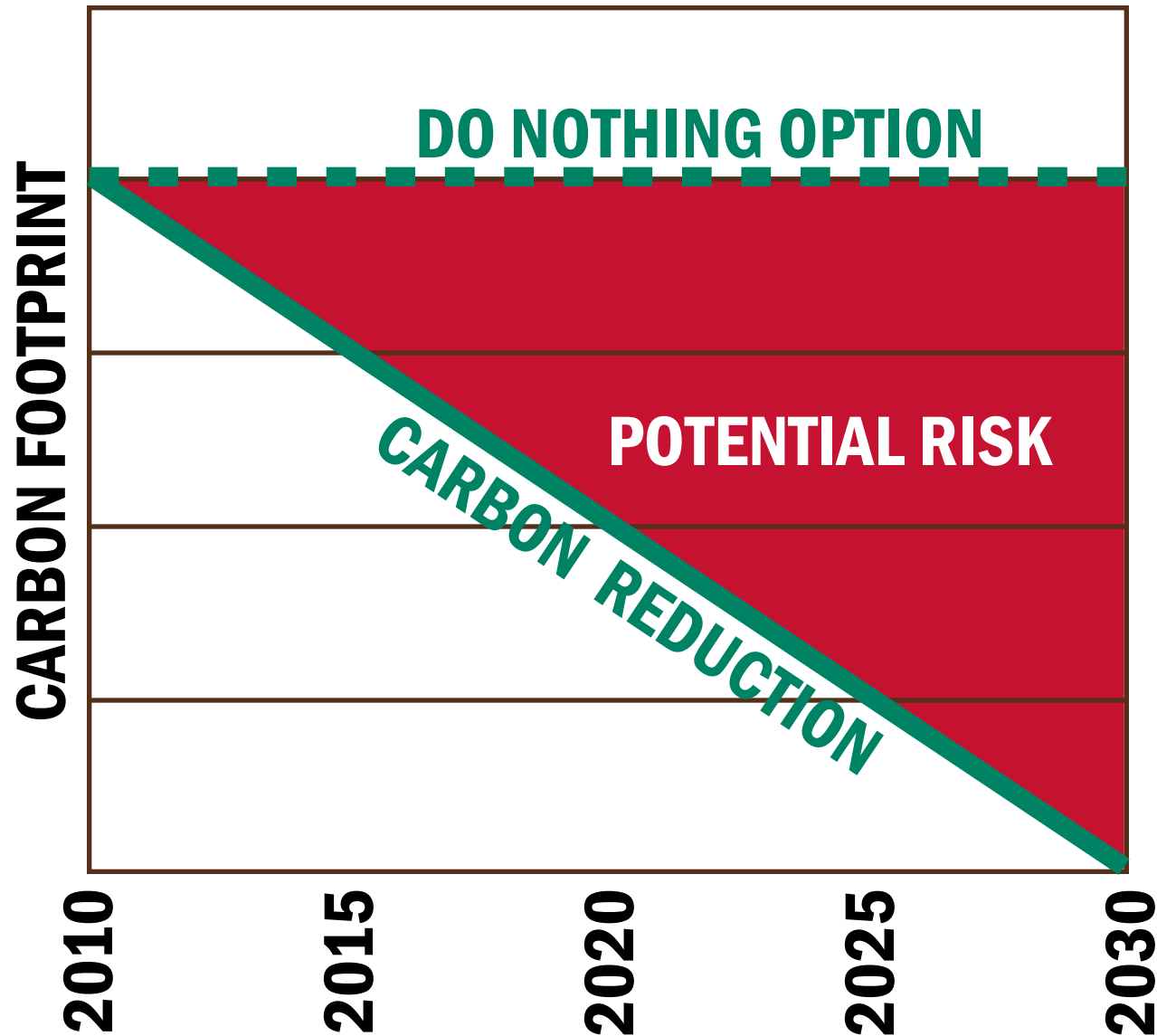
2. Grant Resources

- Philanthropic Funding
- Green Communities Initiative

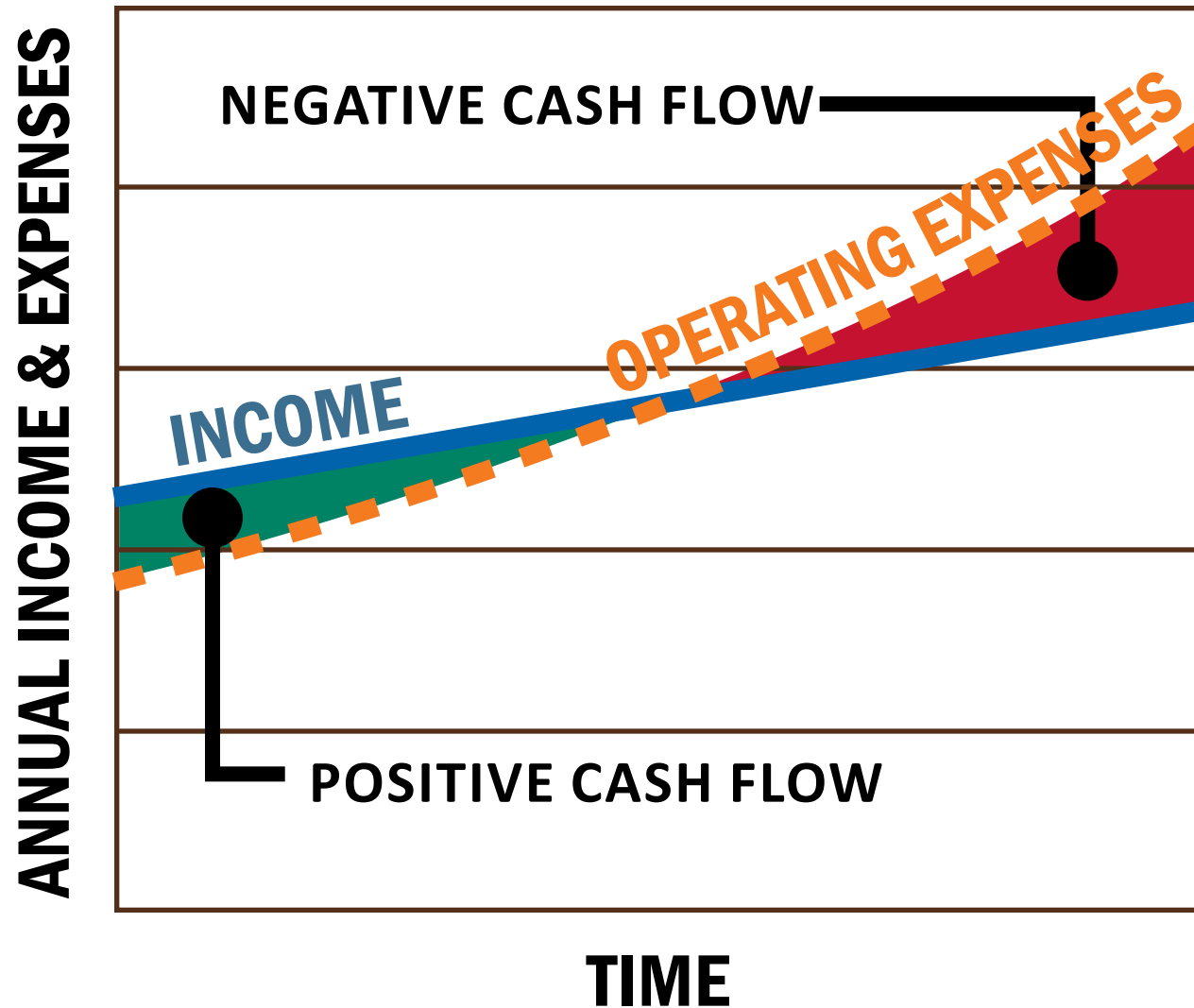
3. Loans & Creative Financing Concepts

- Green Retrofit Loan Program

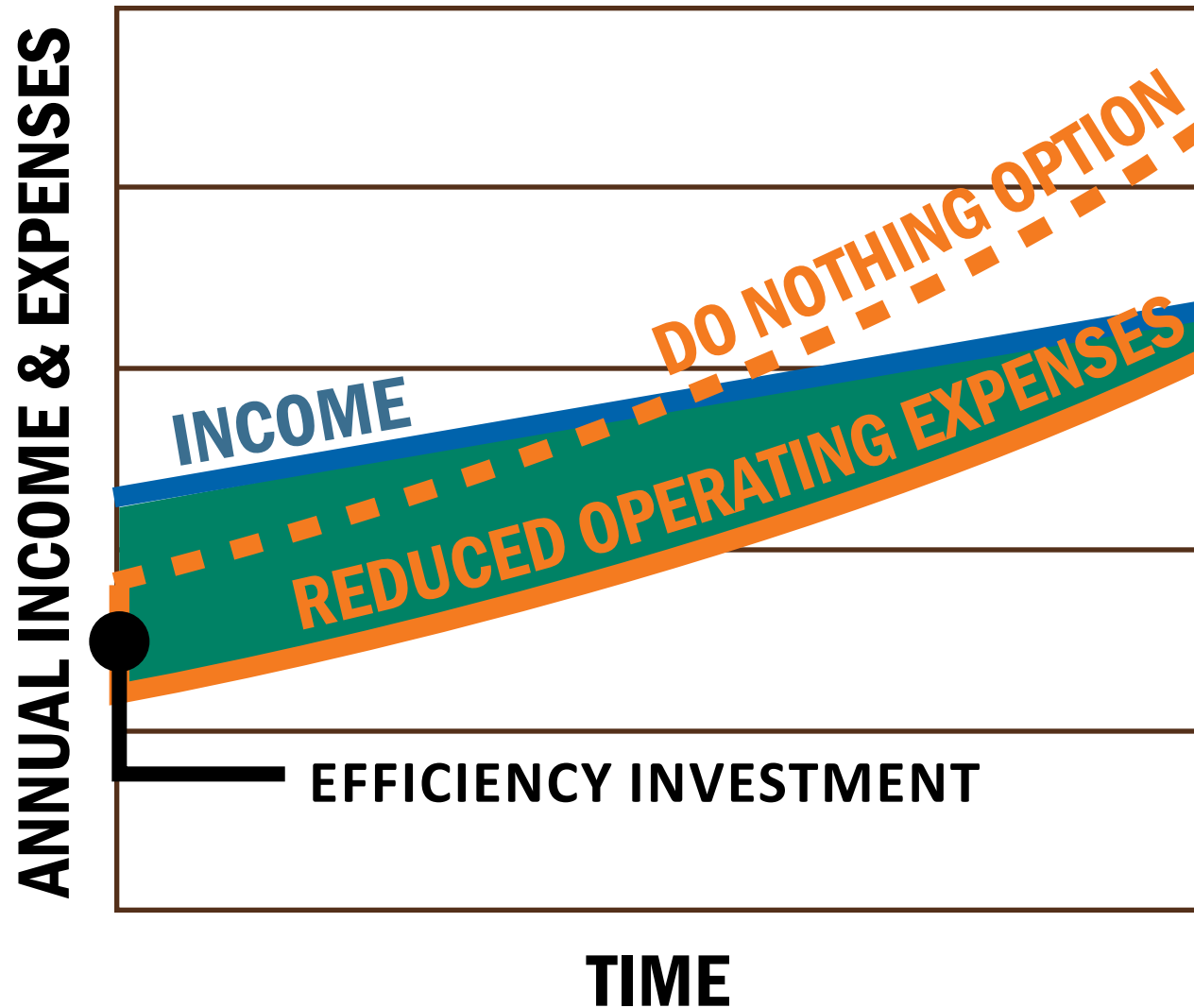
building performance & the carbon market



income & operating expenses do nothing option

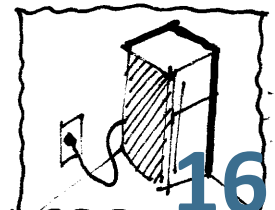
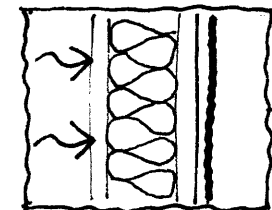
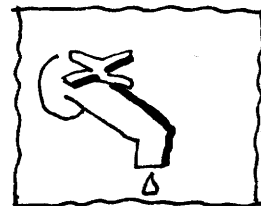
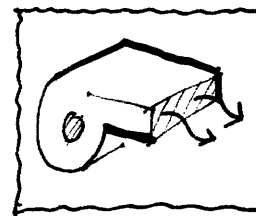
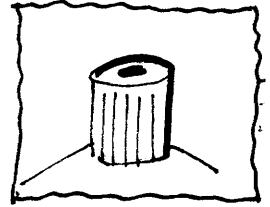
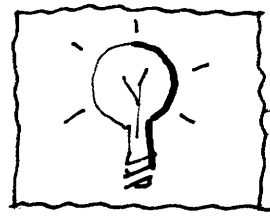


income & operating expenses improving cash flow



PROCESS

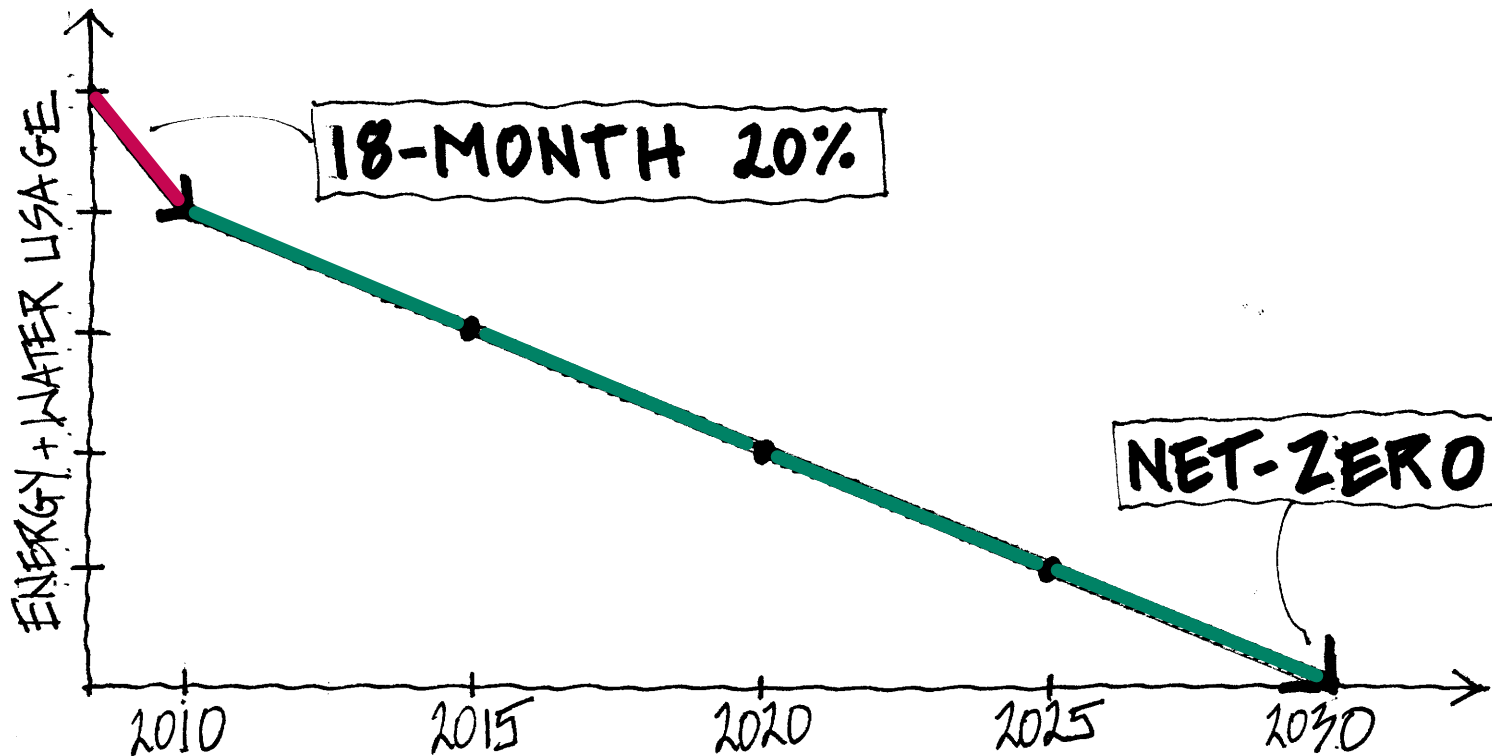
savings opportunities



building efficiency project

GOAL:

- IMMEDIATE 20% ENERGY, WATER, & WASTE REDUCTION
- 100% ENERGY, WATER, & WASTE REDUCTION BY 2030



building efficiency project

the first 20%

Vision (1/09 – 7/09)

- 1 Vision
- 2 Research
- 3 Brainstorm
- 4 Build Capacity

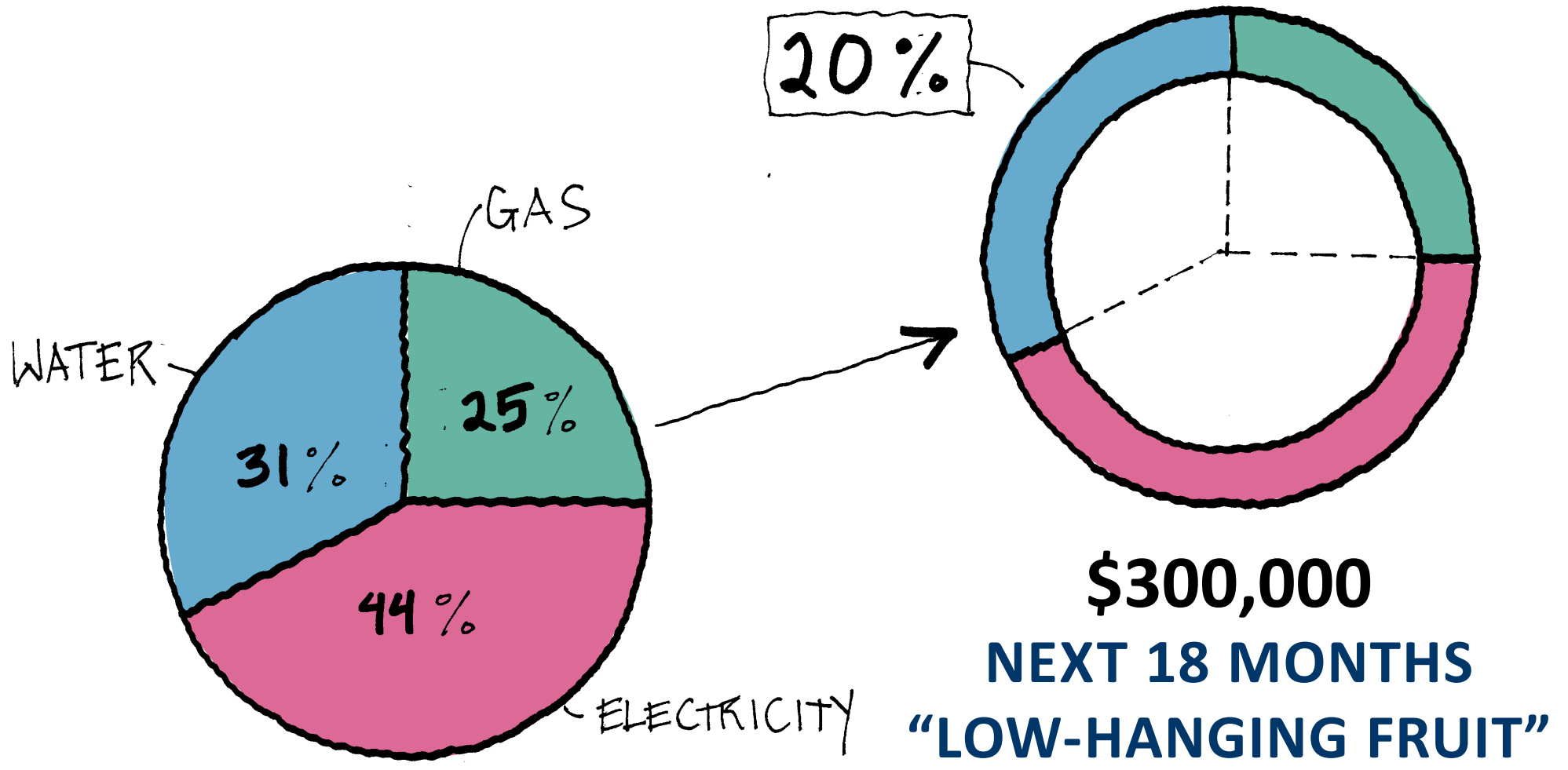
Planning & Design (8/09 – 12/10)

- 5 Building Component Inventory
- 6 Identify Conservation Opportunities <- WE ARE HERE
- 7 Model Savings
- 8 Cost Estimation
- 9 Financial Analysis
- 10 Funding

Implementation (1/10 – 7/11)

- 11 Construction
- 12 Measure Success, Celebrate, Repeat

vision establish vision 1



\$1,500,000 ANNUALLY



preliminary audit



| ADDRESS | 610 NW DAVIS ST PORTLAND, OREGON 97209 | 506 NW 5TH AVE PORTLAND, OREGON 97209 | 107 NW EVERETT ST PORTLAND, OREGON 97209 | 309 SW 4TH AVE PORTLAND, OREGON 97204 | 123 W BURNSIDE ST PORTLAND, OREGON 97209 | 726 W BURNSIDE ST PORTLAND, OREGON 97205 | 415 SW ALDER PORTLAND, OREGON 97204 | 310 NW 6TH AVE PORTLAND, OREGON 97209 | 8 NW 8TH AVE PORTLAND, OREGON 97209 | 225 NW COUCH ST PORTLAND, OREGON 97209 | 421 W BURNSIDE ST PORTLAND, OREGON 97209 | 10 N WEIDLER PORTLAND, OREGON 97227 |
|--|--|---|--|---|---|---|---|---|--|--|--|---|
| NEIGHBORHOOD | OLD TOWN | OLD TOWN | PEARL | DOWNTOWN | DOWNTOWN | DOWNTOWN | DOWNTOWN | OLD TOWN | PEARL | OLD TOWN | OLD TOWN | LLOYD |
| POPULATION | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS | LOW INCOME INDIVIDUALS |
| YEAR BUILT | 1912 | 1907 | 1900 | 1911 | 1910 | 1910 | 1905 | 2004 | 1914 | 1907 | 1965 | |
| LAST REHABILITATED | 1984 | 1986 | 1988 | 1988 | 1994 | 2004 | 2004 | N/A | 2006 | 2008 | IN PROGRESS | |
| HEATING | CENTRAL GAS BOILER + UNIT STEAM RADIATORS | CENTRAL GAS BOILER + UNIT STEAM RADIATORS | CENTRAL GAS BOILER + UNIT STEAM RADIATORS | CENTRAL GAS BOILER + UNIT STEAM RADIATORS | (75%) CENTRAL GAS BOILER + UNIT STEAM RADIATORS, (25%) ELECTRIC | (90%) CENTRAL GAS BOILER + UNIT STEAM RADIATORS / (10%) ELECTRIC WALL HEATERS | (90%) CENTRAL GAS BOILER + UNIT STEAM RADIATORS / (10%) ELECTRIC WALL HEATERS | ELECTRIC RADIANT COVE HEATERS | ELECTRIC RADIANT COVE HEATERS | CENTRAL GAS BOILER + UNIT STEAM RADIATORS | PACKAGED TERMINAL AIR CONDITIONERS | |
| VENTILATION | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | OPERABLE WINDOWS | UNDER CUT DOORS + HEAT RECOVERY VENTILATION SYSTEM | OPERABLE WINDOWS | OPERABLE WINDOWS | PACKAGED TERMINAL AIR CONDITIONERS |
| COOLING | N/A | 10% KITCHENS | N/A | 10% COMMON AREAS | N/A | 10% COMMON AREAS | 20% COMMON AREAS | 20% COMMON AREAS | 30% COMMON AREAS | 20% COMMON AREAS | N/A | 100% |
| WATER HEATING | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER | CENTRAL GAS HEATER |
| WINDOWS | SINGLE-PANED + STORM WINDOW | SINGLE-PANED + STORM WINDOW | DOUBLE-PANED | SINGLE-PANED + STORM WINDOW | SINGLE-PANED + STORM WINDOW | SINGLE-PANED + STORM WINDOW | SINGLE-PANED (ALUMINUM) | DOUBLE-PANED | DOUBLE-PANED | DOUBLE-PANED | DOUBLE-PANED | DOUBLE-PANED |
| INSULATION | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:NO | ROOF: YES EXTERIOR WALLS:YES | ROOF: YES EXTERIOR WALLS:YES | ROOF: NO EXTERIOR WALLS: NO | ROOF: YES EXTERIOR WALLS:YES |
| FLOORS | 3 + BASEMENT | 3 + BASEMENT | 4 + BASEMENT | 6 + BASEMENT | 7 + BASEMENT | 4 + BASEMENT | 3 + BASEMENT | 12 | 6 + BASEMENT | 3 + BASEMENT | 5 + BASEMENT | |
| UNITS | 38 | 60 | 76 | 106 | 99 | 76 | 180 | 197 | 70 | 182 | | |
| UNIT SIZE | 37 SRO, 1 STUDIO | 60 SRO | 76 SRO | 102 SRO, 4 STUDIO | 99 SRO | 76 SRO | 120 SRO, 60 STUDIO | 153 SRO, 38 STUDIO | 70 SRO | 182 STUDIO | | |
| OCCUPANTS (# OF BEDROOMS) | 38 | 60 | 76 | 106 | 99 | 76 | 180 | 197 | 70 | 182 | | |
| SITE AREA (ACRES) | 0.11 | 0.23 | 0.10 | 0.12 | 0.25 | 0.23 | 0.25 | 0.22 | 0.25 | 0.90 | | |
| DENSITY (UNITS/ACRE) | 345 | 261 | 760 | 883 | 396 | 330 | 720 | 895 | 280 | 202 | | |
| TOTAL GAS \$ / OCCUPANT / YEAR | \$280 | \$53 | \$234 | \$234 | \$356 | \$262 | \$278 | \$93 | \$59 | \$388 | \$81 | |
| TOTAL ELECTRICITY \$ / OCCUPANT / YEAR | \$144 | \$97 | \$187 | \$220 | \$239 | \$240 | \$233 | \$312 | \$205 | \$139 | \$378 | |
| TOTAL WATER \$ / OCCUPANT / YEAR | \$426 | \$166 | \$272 | \$239 | \$194 | \$190 | \$142 | \$300 | \$291 | \$116 | \$113 | |
| TOTAL UTILITY \$ / OCCUPANT / YEAR | \$850 | \$316*** | \$692 | \$514 | \$763 | \$527 | \$785 | \$644 | \$812 | \$697 | \$380 | \$640 |

1988

CENTRAL GAS BOILER + UNIT STEAM RADIATORS

OPERABLE WINDOWS

\$234

\$187

\$272

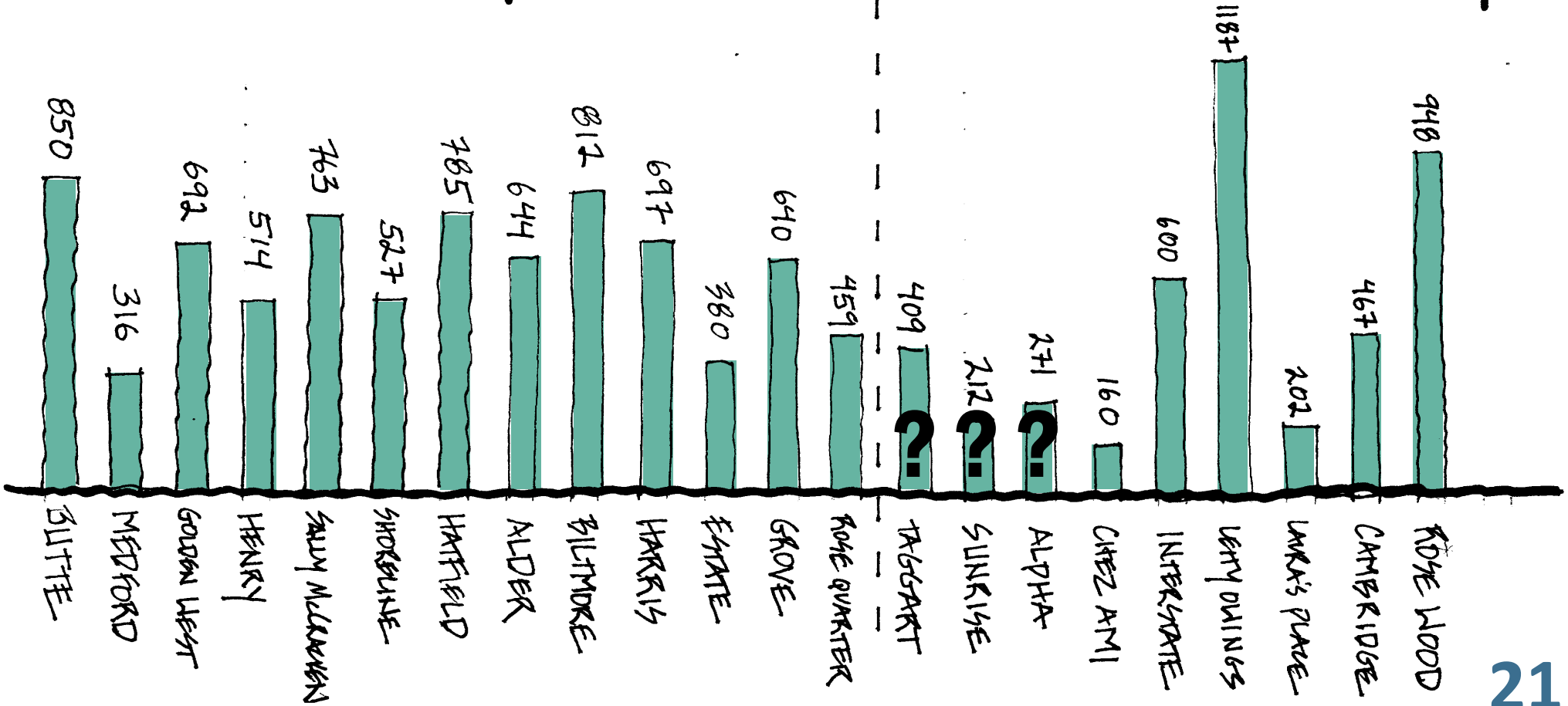
\$692

vision research 2

AUDIT - \$ / OCCUPANT / YEAR

(INDIVIDUAL)
HIGH DENSITY

(FAMILY)
LOW DENSITY



vision 2

ESTATE HOTEL

BEST: \$380 OCCUPANT/YR



INSULATED WALLS AND WIN.

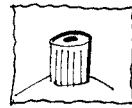
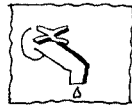
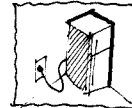
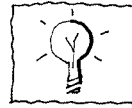
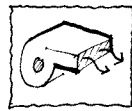
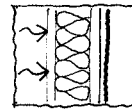
UNITIZED HEAT W/ OVERRIDE

EFFICIENCY FIXT./OCC. SENS.

ENERGY STAR APPLIANCES

LOW FLOW / DUAL FLUSH

RECYCLING ROOMS



BUTTE HOTEL

WORST: \$850 OCCUPANT/YR



NO INSULATION

CENTRAL HEAT/NO CONTROL

EFFICIENCY FIXT./NO OCC.

OLD APPLIANCES

NO AERATORS/OLD TOILETS

NO RECYCLING ROOMS

vision brainstorm 3





TEAM PRESENT FUTURE



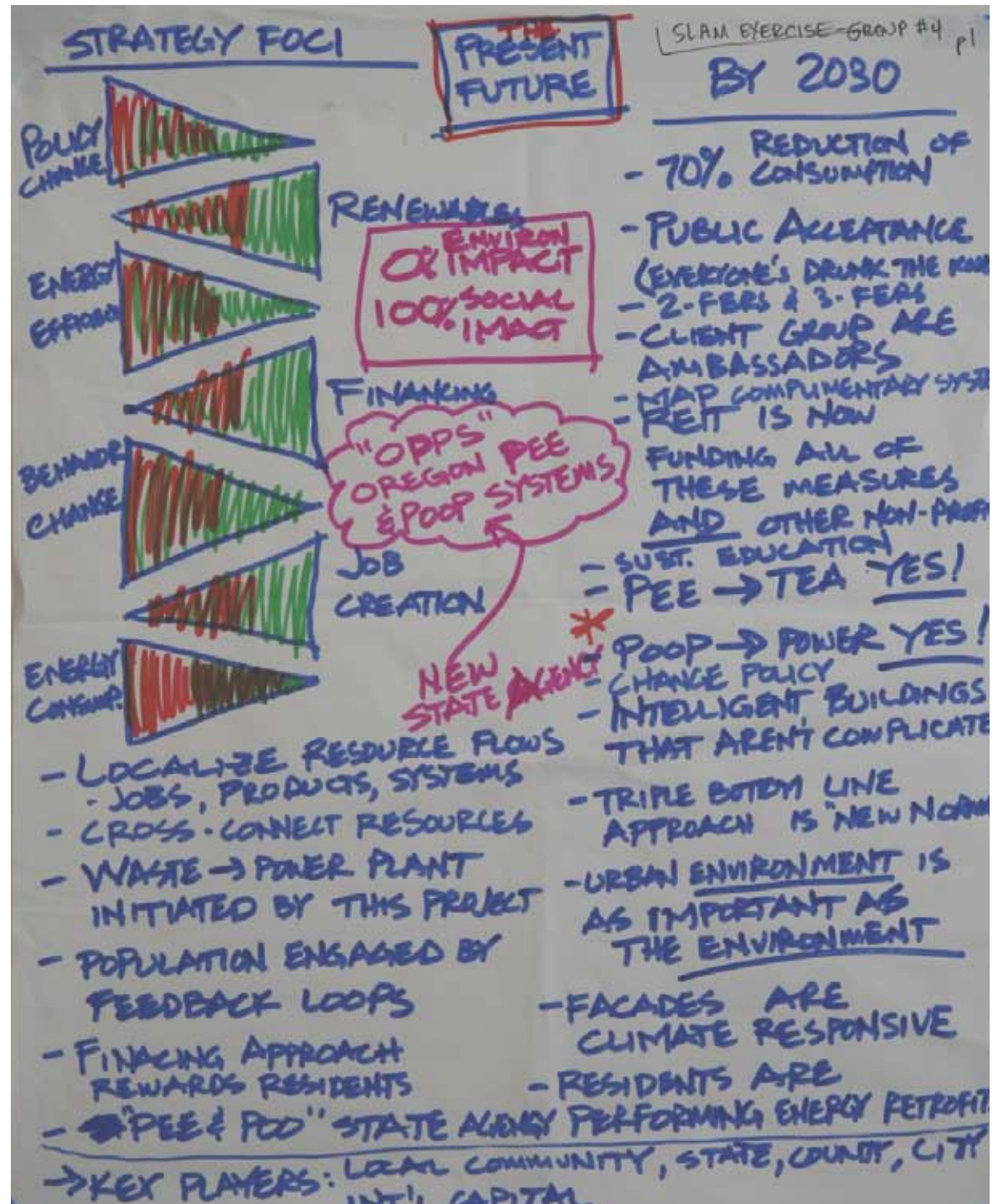
TEAM KILL BILLZ



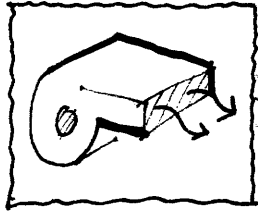
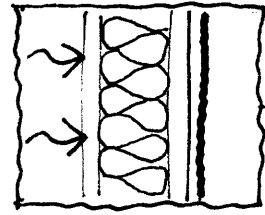
TEAM NET-ZERO CHAMPIONS



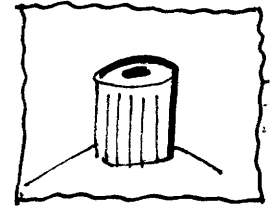
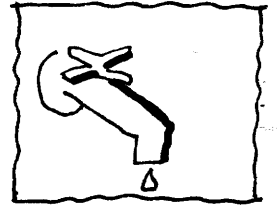
TEAM YES (Yellow Environmental Superstars)



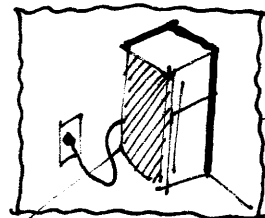
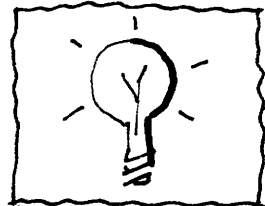
HVAC & Building Envelope



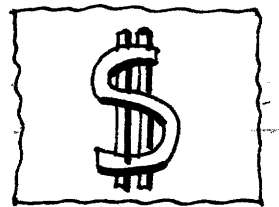
Water & Waste:



Lighting & Electrical:



Financing and Incentives:



vision brainstorm 3

charrette outcomes



- Education
- Stakeholder Input
- 20% reduction is possible!
- Prioritization of Building Efficiency Project
- Partnerships

vision build capacity 4



planning & design

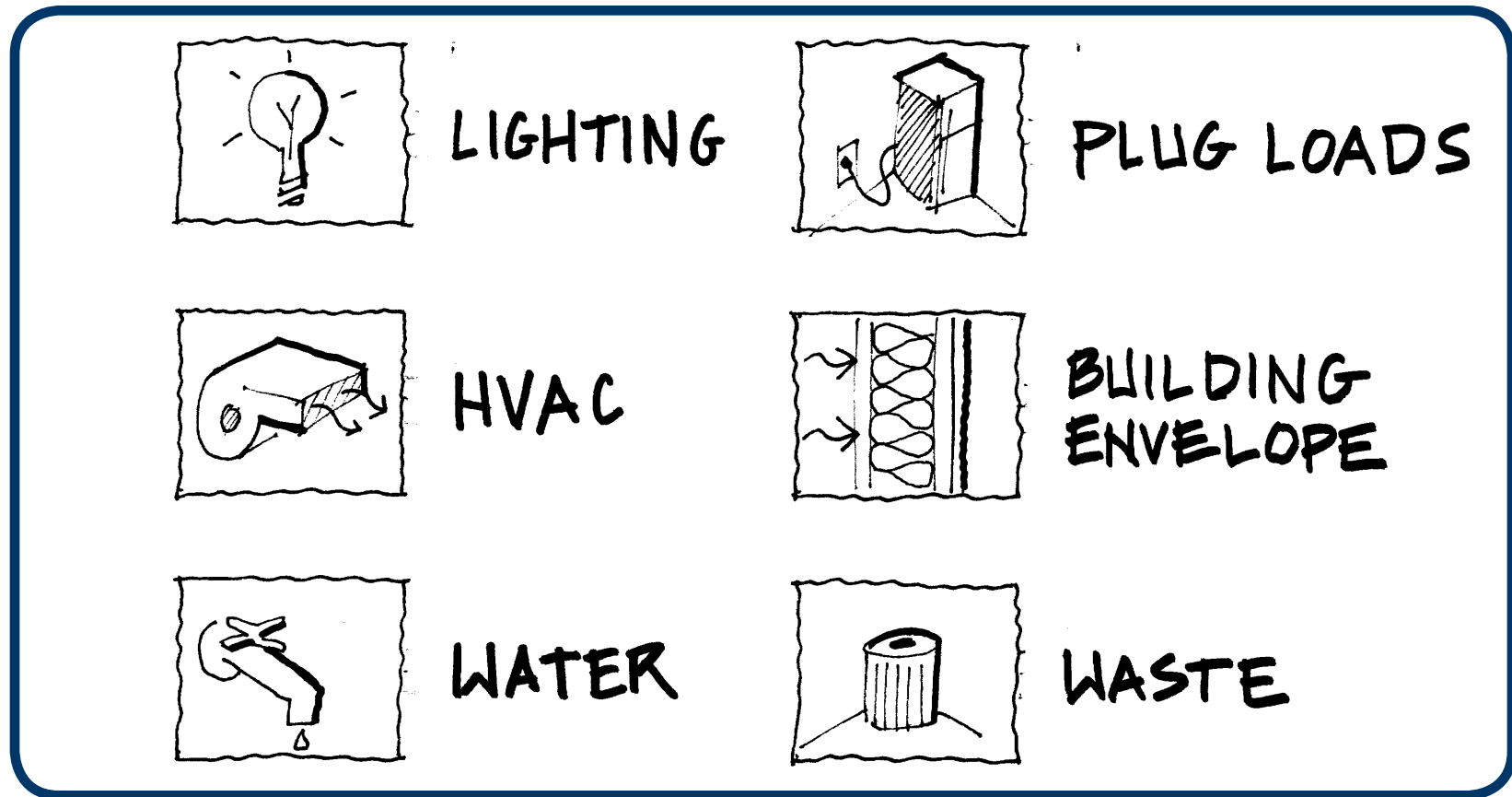
building component inventory 5

- gather record drawings
- perform walk-through
- generate as-built drawings
 - lighting
 - heating, ventilation, and cooling (HVAC)
 - plumbing
 - electrical plug-loads

planning & design

identify conservation opportunities

6

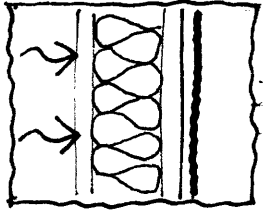


technology

behavior

planning & design model savings

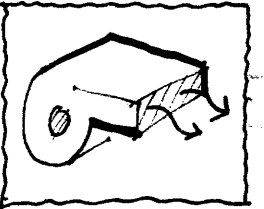
7



ECM1

Roof Insulation R38

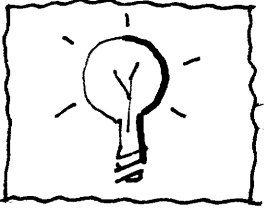
X,000
kWh/yr



ECM2

Solar Hot Water

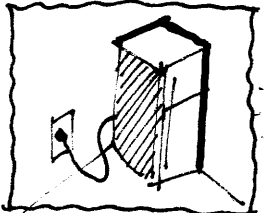
X,000
therms/yr



ECM3

Lighting Replacement

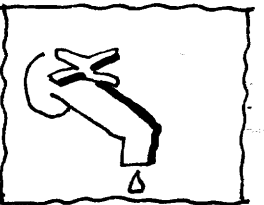
X,000
kWh/yr



ECM3

Ref. Replacement

X,000
kWh/yr



WCM1

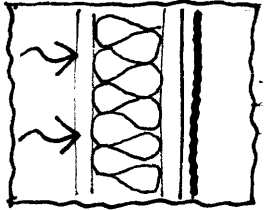
Install HET

X,000
gallons/yr

planning & design

cost estimation

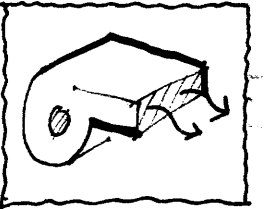
8



ECM1

Roof Insulation R38

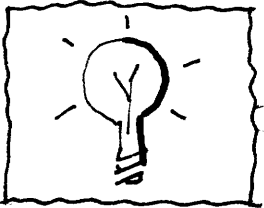
\$X,000



ECM2

Solar Hot Water

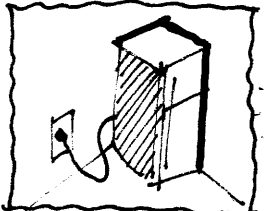
\$X,000



ECM3

Lighting Replacement

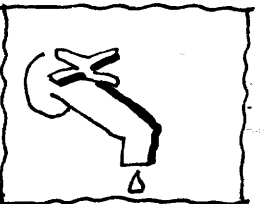
\$X,000



ECM3

Ref. Replacement

\$X,000



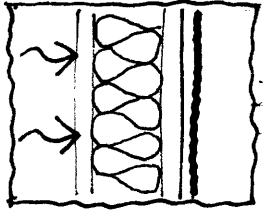
WCM1

Install HET

\$X,000

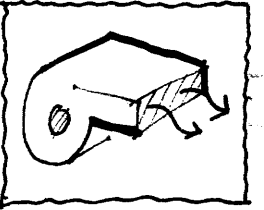
planning & design

financial analysis 9



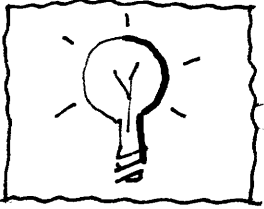
ECM1 Roof Insulation R38

X years/
X% ROI



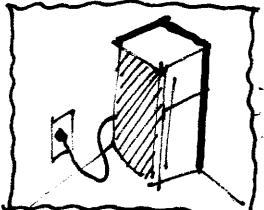
ECM2 Solar Hot Water

X years/
X% ROI



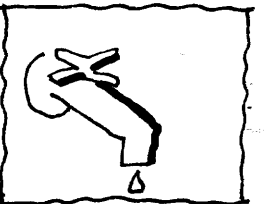
ECM3 Lighting Replacement

X years/
X% ROI



ECM3 Ref. Replacement

X years/
X% ROI

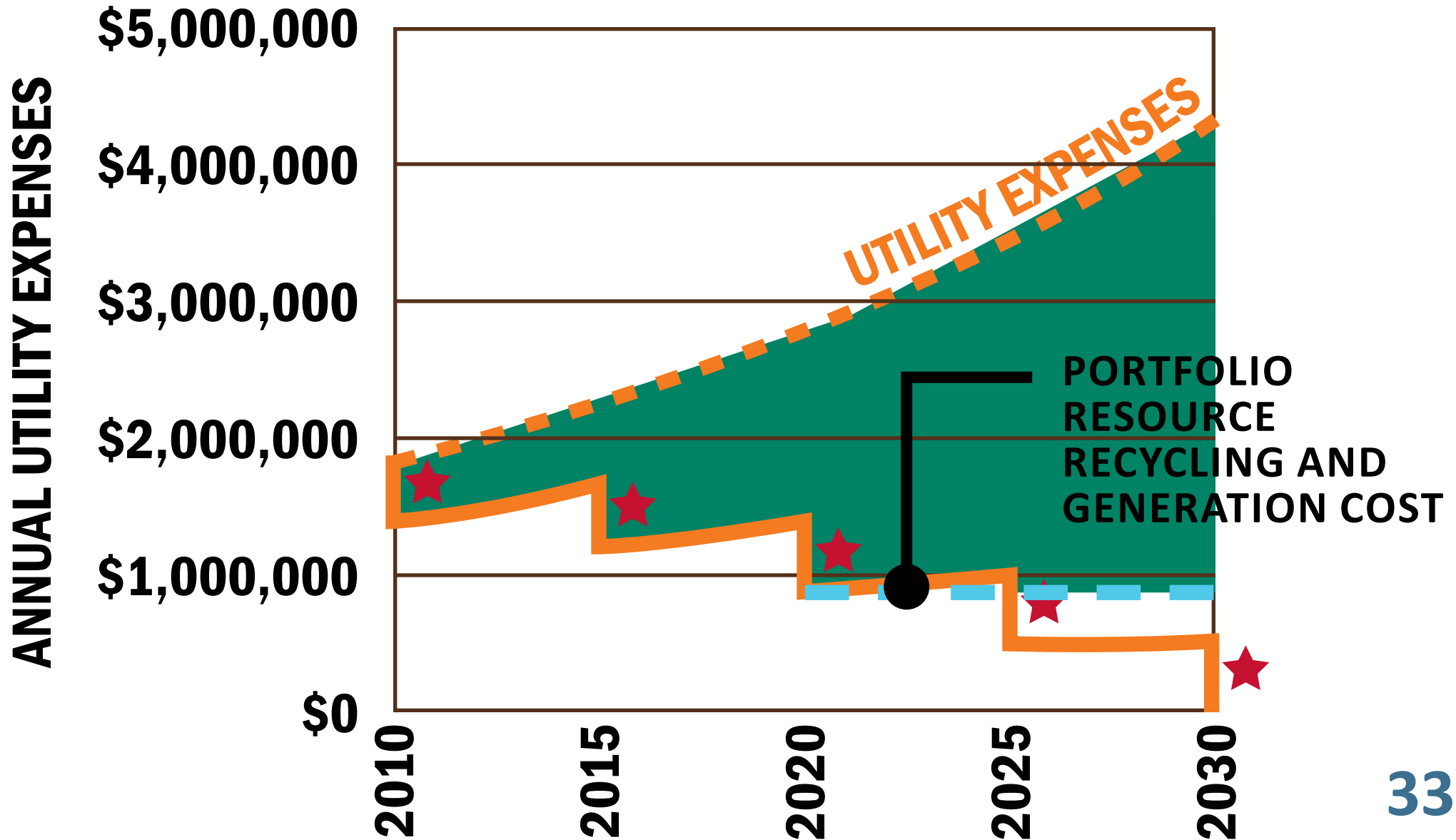


WCM1 Install HET

X years/
X% ROI

planning & design funding 10

★ EFFICIENCY INVESTMENTS



implementation **construction 11**

implementation measure success, celebrate, repeat **11**

IMPLEMENT



anticipated outcomes

- 20% energy, water, & waste savings (\$300,000 annually)
 - 1/2 used for debt service
 - 1/4 for preservation (reserve funding)
 - 1/4 for services (incl. green education)
- building components upgraded
- improved comfort
- healthier environment
- durable upgrades

- affordability and services preserved!

CONTRIBUTION

“This is unknown territory. No one really knows how to do net zero on a wide scale yet, especially for organizations with limited revenue streams.”

- Charrette Participant

Conventional Process

=

Conventional Results

EXCEPTIONAL PROCESS

=

EXCEPTIONAL RESULTS



resource conservation measures evaluating the first 20%

- portfolio scale implications
- synergies with other resource conservation measures
- alignment with 2030 net-zero goal
- behavior change strategy
- durability and maintainability
- occupant comfort and health
- implementation timeline
- other



“Create intelligent buildings that
are not complicated.”

- Charrette Participant

reflection questions

- What was helpful about this process? What would have made it better?
- Do you have other ideas for how to evaluate the resource conservation measures?

THANK YOU!



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CENTRAL CITY CONCERN



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