FORT COLLINS UTILITIES

IDAP Participant Training

11/12/13

City of Fort Collins Utilities

Nexant

Agenda

- IDAP Objectives
- IDAP Structure
  - Highlights, Project/Facility Requirements, Target EUI, Incentives
- Participation
- Consultant (Energy Modeler) Eligibility Requirements
- Modeling Process
- Getting Started
- Questions

IDAP Objectives

Integrated Design Assistance Program

"Integrated building design is a process in which multiple disciplines are integrated in a manner that permits synergistic benefits to be realized. The goal is to achieve high performance and multiple benefits at a lower cost than the total for all the components combined."

Integrated Design Assistance Program

Goal: Obtain verifiable energy savings by involving the design team in the early integration of energy efficiency strategies into the building design

Focus: Consistent process that aligns with the design team schedule

Approach: Performance based

Target Facilities: New Construction and Major Renovation commercial projects

Target Market: Architects, engineers, owners

Timing: Today

Why Participate in IDAP?

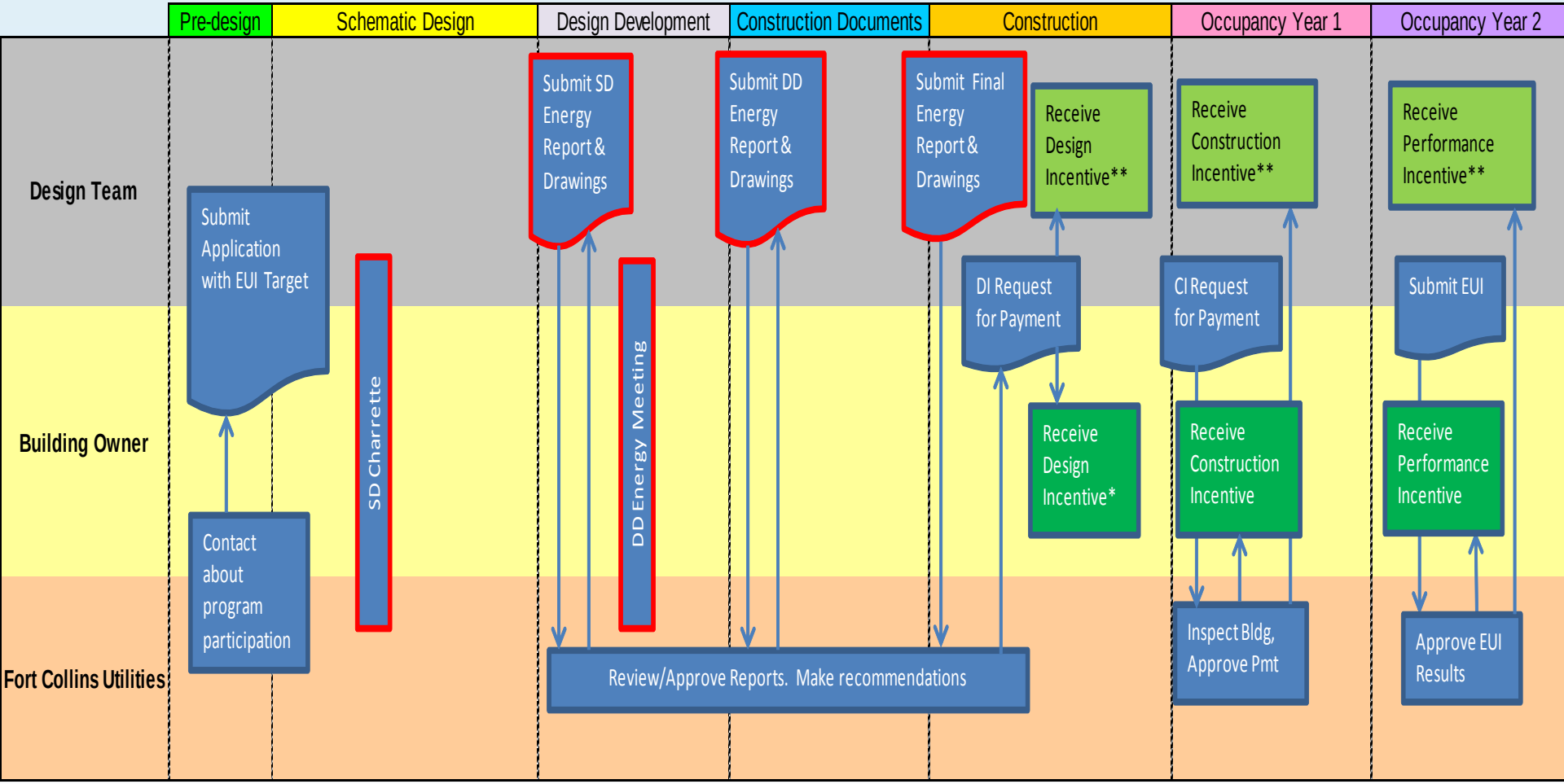
- High performance design
  - Whole building approach
  - Building performance
  - Reduced operations and maintenance
  - Reduced warranty callbacks
- Technical and financial support
  - Leveraging your utility dollars
- Reduce life cycle cost of building
- Increase property value/lease rates
  - Improve amenities of space
    - Occupant comfort
    - Desired place to work
  - Recognition (Utilities, Energy Star, LEED)

IDAP Structure

IDAP Highlights

- Performance based approach
  - Based on Architecture 2030 Challenge® initiative
  - Achieve % performance below 2003 CBECs data (or most current)
- Encouraging sustainable design and use of renewables
- Former IDAP for existing buildings was used to inform this version
- Design, Construction and Performance based incentives for electricity (and natural gas) for the Target EUI (BTU/SF/yr)
- IDAP assistance services
  - Overall guidance and quality control
  - Participation at 2 meetings (minimum)
  - IDAP report deliverables/templates

IDAP Highlights



*Items with red borders each count toward 20% of the design incentive. Owner/Design Teams completing all 5 items receive 100% of the design incentive. Design Incentive for DT is 1/3 of Owner Incentive.
**Design Team (DT) Performance Incentives are 1/3 of Owner Performance Incentives.

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Project Screening

- Owner and design team commitment to design assistance process
- Stretch goals: owner is motivated to pursue and fund a high performance design and exceed energy code
- Electricity provided by Utilities
- Year-round usage
- Facility size (scalable, but larger facilities provide more savings), minimum size of 5,000 SF
- Comprehensive design approach
- Early involvement in design process (schematic or earlier)
- Align with traditional architectural milestones: owner's schedule allows for this process

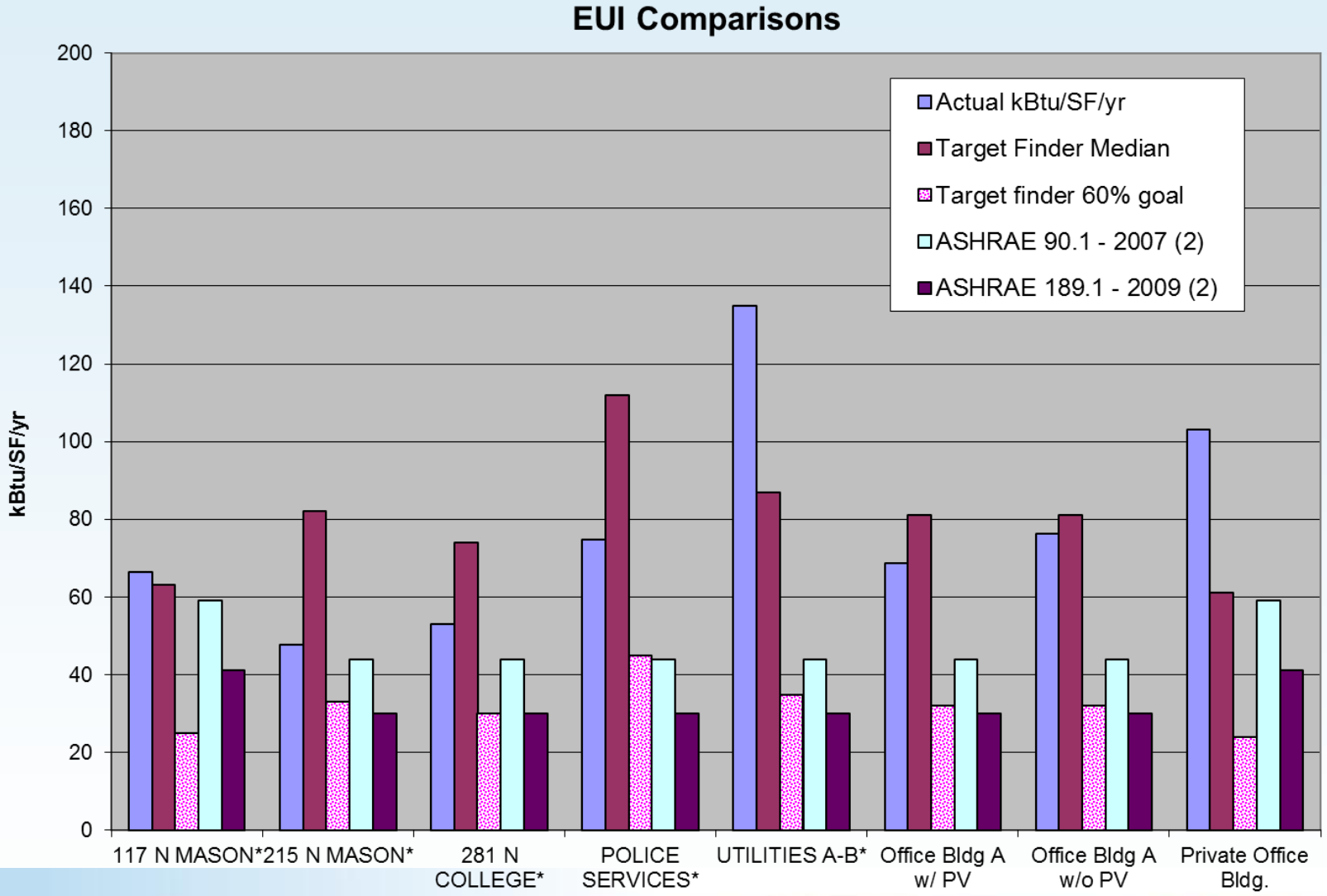
Facility Eligibility Requirements

- Projects in the earliest stages of programming or SD; flexibility in building shape, orientation and systems selections
- Project has a goal to design to an energy target based on Architecture 2030 Challenge®
- Utilities' staff and IDAP Manager and Administrator will be included in the meetings related to energy use and appraised of project process
- Generally recommended for buildings greater than 10,000 SF unless design owner can justify IDAP benefits
- Commercial or high-rise residential buildings planning for New Construction or Major Renovation
- IDAP Manager makes final decision on program eligibility

Building Performance Goal

- Based on Architecture 2030 Challenge®
  - Target EUI percent below regional median for project building type:
    - 60% now through 2014
    - 70% in 2015
    - 80% in 2020
    - 90% in 2025
    - Carbon-neutral in 2030, using no fossil fuel GHG (greenhouse gas) emitting energy to operate
  - Final target approved by IDAP Manager
- Target EUI set based on completion date of 100% CDs and construction has to be complete within 2 years of the design

Building Performance Goal



Building Performance Goal

- What is Energy Star?
  - Industry accepted benchmarking tool to evaluate the performance of a building compared to other similar buildings based on:
    - Size
    - Location
    - Use
- Evaluate both new construction and existing building
  - Target Finder for new buildings or major renovations
    - A design tool, based on same database and able to set % reductions
  - Energy Star applies to existing buildings
    - Energy Star Score of 0-100
    - Greater than 75 gets certificate
- Energy Star® Website: **www.energystar.gov/TargetFinder**

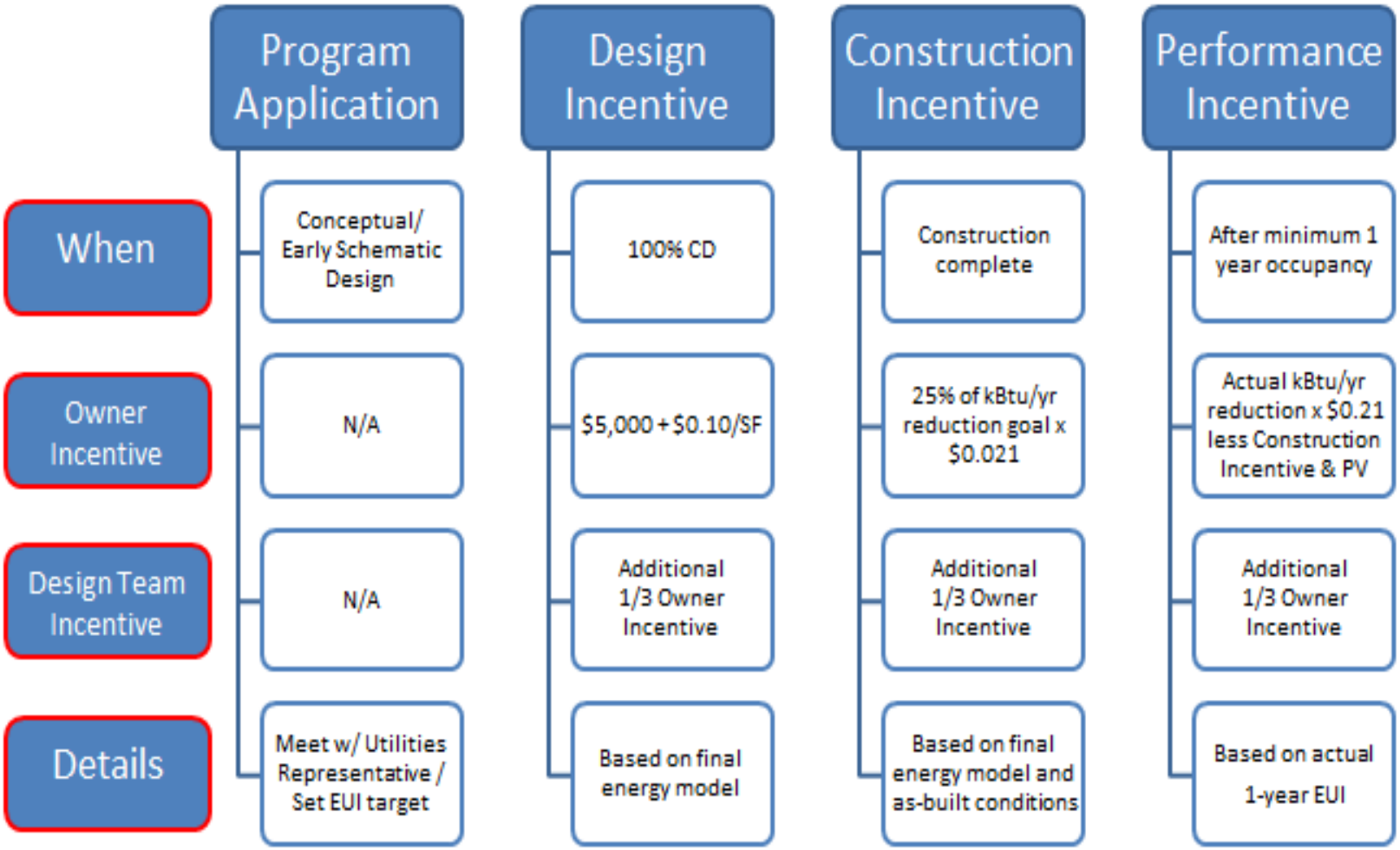
Building Performance Goal

- Buildings with multiple end uses
  - A process is in place to account for different building type scenarios (e.g., office/retail)
- Property types not located in Energy Star® Target Finder
  - Energy consultant has a process to follow
- Building performance goal for major renovations follows a similar process

Incentives

- 3 types of incentives (for owner and design team)
  - Design
  - Construction
  - Performance
- Intent: Offset a portion of expenses for owner and design team to pursue high-performance design
- See next figure for overview

Incentive Structure



Design Incentive

- Fixed value based on gross floor area of bldg
- 5 key components to incentive (20% each) & meet performance target
  1. Hold a schematic design charrette,
  2. Submit a Schematic Design Energy Report,
  3. Hold a design development energy meeting,
  4. Submit a Design Development Energy Report, and
  5. Submit a Final Energy Report and Construction Documents at the end of design

Incentive receipient	Incentive
Owner	$5,000 + $0.10/SF
Design Team	($5,000 + $0.10/SF) * 1/3

Construction Incentive

- A pre-payment of a portion of the Performance Incentive
- Key components:
  - Constructed facility needs to be representative of the Final Energy Report
  - Sign off on Cx activities and final Cx report
  - Construction incentive is 25% of the Performance Incentive based on meeting Target EUI
  - Cx scope and costs are the owner's responsibility
  - Renewables will not be factored into incentive, if applicable

Construction Incentive

- Each incentive calculated and paid to the owner and design team, respectively

Owner Incentive Formula	**$(0.25)(A)(E_M – E_T)(I) = P_1$ = ($) Owner Construction Incentive**
Design Team (DT) Incentive Formula	**$[(0.25)(A)(E_M – E_T)(I)]/3$ = ($) DT Construction Incentive**
Variables used in formula	**A** = SF = Gross floor area of the project. Gross floor area is the total conditioned floor area, expressed in square feet (SF), measured from the principal exterior surfaces of the building, not including parking areas.
	E_M = EUI (kBtu/SF/year) = The regional median EUI for the project building type (as defined by ENERGY STAR Target Finder or other approved method)
	E_T = EUI (kBtu/SF/year) = IDAP Target EUI approved for the project
	I = Incentive rate ($/kBtu/yr) = $0.021

Performance Incentive

- Actual utility data for any 12 consecutive months within the first two years of occupancy is submitted showing that the building is at or below the Target EUI
- Key components:
  - Actual occupancy needs to be 80% or greater
  - Process loads accounted for if more than 5%
  - Renewables are subtracted out of EUI
  - RECs will not count towards EUI reduction

If different, adjustments made to Target EUI

Performance Incentive New Construction

- Each incentive calculated and paid to the owner and then design team, respectively

Owner Incentive Formula	**$(A)(E_M - E_A)(I) - P_1 - (R_{kW} \times R_{cf}) =$ ($) Owner Performance Incentive**
Design Team (DT) Incentive Formula	**$[(A)(E_M - E_A)(I) - P_1 - (R_{kW} \times R_{cf})]/3 =$ ($) DT Performance Incentive**
Variables used in formula	**P_1** = ($) Performance incentive paid after construction
	A = SF = Gross floor area of the project. Gross floor area is the total conditioned floor area, expressed in square feet (SF), measured from the principal exterior surfaces of the building, not including parking areas.
	E_M = EUI (kBtu/SF/year) = The regional median EUI for the project building type (as defined by ENERGY STAR Target Finder or other approved method)
	E_A = EUI (kBtu/SF/year) = Actual measured building EUI (typically from utility bills)
	I = Incentive rate ($/kBtu/yr) = $0.021
	R_{kW} = kW = Rated output of PV System after Inverter*
	R_{cf} = $/kW = Cost Factor = $150/kW*

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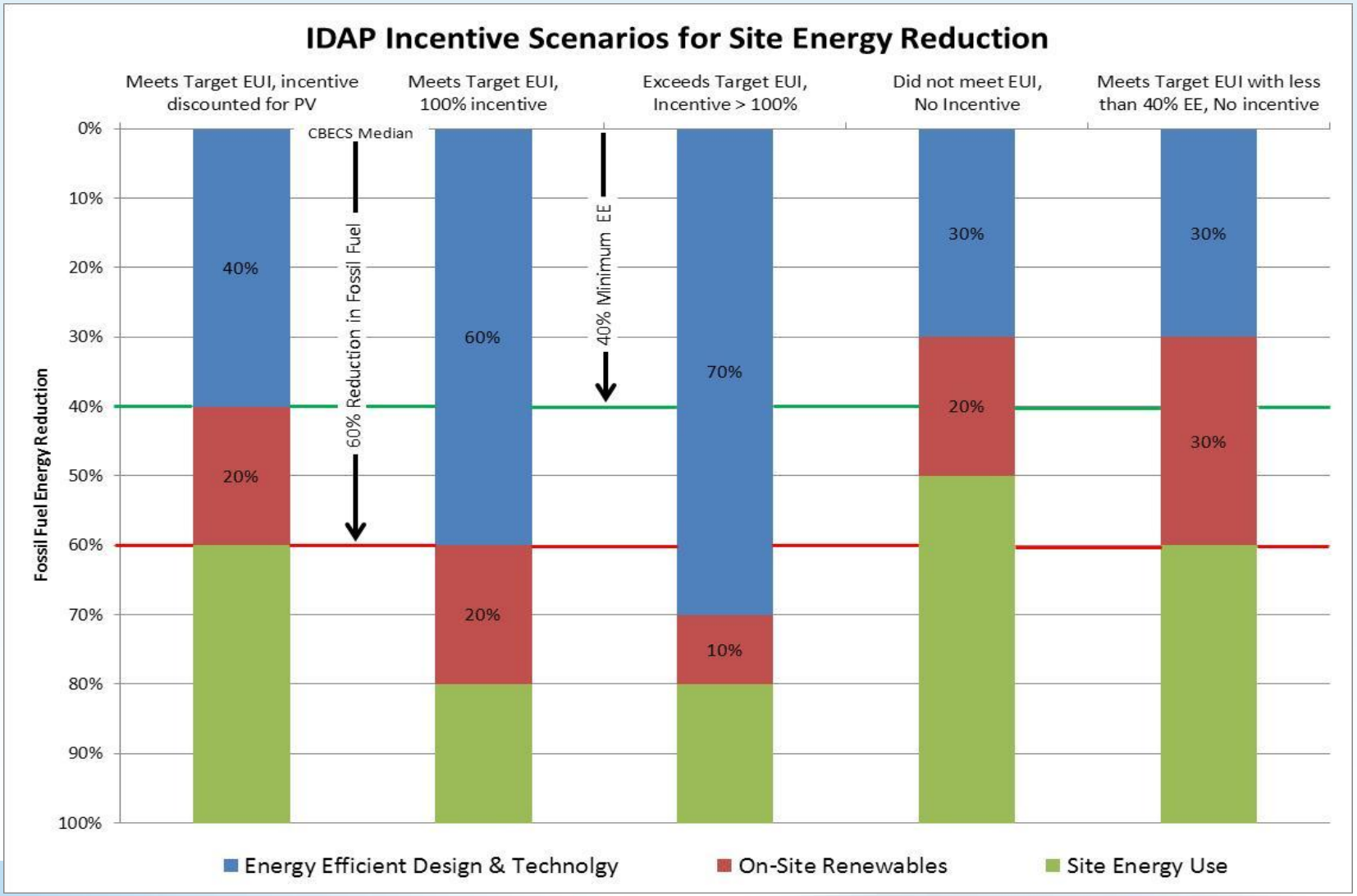
Incentive Scenarios



Incentive Calculation Example

- Given: 20,000 SF Building

Metric	Property Estimate at Design	Design Target*	Median Property*
ENERGY STAR score (1-100)	84	97	50
Source EUI (kBtu/ft²)	136.8	86.9	217.3
Site EUI (kBtu/ft²)	55.5	35.3	88.2
Source Energy Use (kBtu)	13675042.6	8690000	21730000
Site Energy Use (kBtu)	5553198.3	3530000	8820000

- Design Incentive (all 5 criterion & EUI Target met)

($) Owner Construction Incentive = $5,000 + $0.10/SF
= $5,000 + ($0.10/SF x 20,000 SF)
=$7,000

($) DT Construction Incentive = ($5,000 + $0.10/SF) / 3
= [$5,000 + ($0.10/SF x 20,000 SF)] / 3
=$2,333

Incentive Calculation Example

- Construction incentive

($) Owner Construction Incentive = P_1 $= (0.25)(A)(E_M - E_T)(I)$

$= (0.25)(20{,}000)(88.2\text{-}35.3)(0.021)$

$=$ **$5,555**

($) DT Construction Incentive $= [(0.25)(A)(E_M - E_T)(I)] / 3$

$= [(0.25)(20{,}000)(88.2\text{-}35.3)(0.021)] / 3$

$=$ **$1,852**

- Performance Incentive (actual EUI is 32.5, 20 kW PV)

($) Owner Performance Incentive $= (A)(E_M - E_A)(I) - P_1 - (R_{kW} \times R_{cf})$

$= (20{,}000)(88.2\text{-}32.5)(0.021) - \$5{,}555 - (20)(150)$

$=$ **$14,840**

($) DT Performance Incentive= $[(A)(E_M - E_A)(I) - P_1 - (R_{kW} \times R_{cf})] / 3$

$= [(20{,}000)(88.2\text{-}32.5)(0.021) - \$5{,}555 - (20)(150)] / 3$

$=$ **$4,946**

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Incentive Example Summary

- Total potential incentive for a 20,000 SF building that exceeds median EUI by 63.2%

Incentive Type	Owner	Design Team
Design	$7,000	$2,333
Post Construction	$5,555	$1,852
Performance	$14,840	$4,946
Total	**$27,395**	**$9,131**

- Incentive Caps and Availability
  - Participant max lifetime design incentive = $50,000
  - Performance incentive max/yr/customer = $100,000
  - Overall incentive funding is limited and available on a first come first serve basis
  - Caps can be exceeded with IDAP Manager approval

Participation

Getting Started

- Pre-application meeting
  - Discuss project, qualifications (project/design team), process
- Application Phase
  - Submit application to Utilities in conceptual or SD phase
- Overall Process
  1) Participate in a Schematic Design Charrette,
  2) Schematic Design Energy Report (Utilities format) and drawings,
  3) Participate in a Design Development energy meeting,
  4) Submit a Design Development Energy Report (Utilities format) and drawings, and
  5) Submit a Final Energy Report (Utilities format) at the end of design and Construction Documents.

Meeting 1: SD Design Phase Charrette

- Attendees: IDAP Manager, IDAP Administrator, Modeler, Design Team/Owner, Project stakeholders (e.g. future occupants, maintenance staff)
- Key Elements:
  - Collaborative effort and dynamic exercise
  - Scope of IDAP is presented and discussed
  - DT needs to be prepared to discuss Target EUI and one or multiple high performance building designs to be analyzed
  - Modeler will get direction on designs, building characteristics, schedule for design team to have costs for each design, schedule, and future meeting dates
- Deliverable/Next Steps:
  - One or multiple models/results/LCCAs analyzed and summarized in SD Energy Report then sent to IDAP Team for review

Meeting 2: DD Energy Meeting

- Attendees: Same as Meeting 1
- Key Elements:
  - Scheduled once the SD Energy report is approved by IDAP Team
  - Modeler will facilitate discussion of report/design
  - Design team selects design
  - Modeler collects final details on selected design to finalize model
- Deliverable/Next Steps:
  - Refine and finalize selected model/results/LCCA and summarize in DD Energy Report and then send to IDAP Team for review
  - Once approved, report sent to design team/owner to incorporate into CDs
  - Refine predicted EUI, if necessary

Final Energy Report and CD Review

- Key Elements:
  - Design team provides modeler 100% CDs for review to confirm the high performance design modeled matches the CD package
  - If key features are overlooked they are noted and discussed with design team for incorporation
  - If they aren't incorporated then the model is updated along with the predicted EUI
- Deliverable/Next Steps:
  - Finalize model, if necessary, and summarize results of CD review and model in Final Energy Report
  - Submit report to IDAP Team for approval
  - Once approved, report sent to design team/owner to review
  - Design incentive provided based on results of FER

Construction

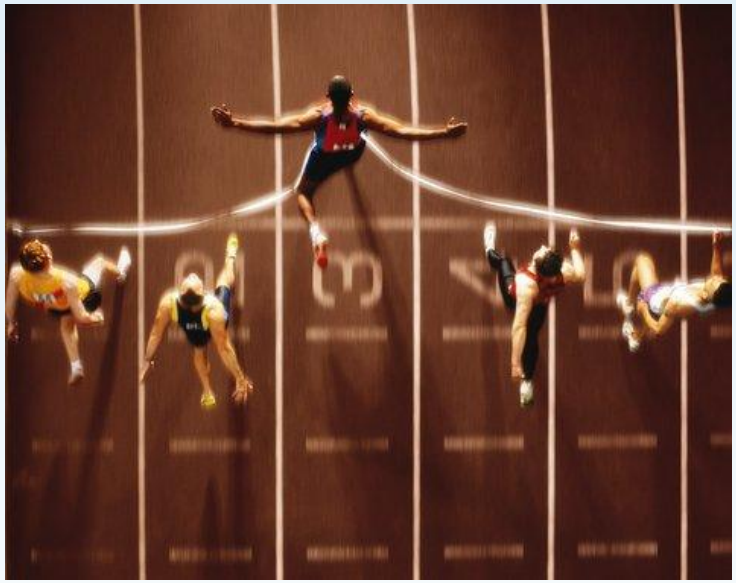
- Required by IDAP and per City Code guidelines
  - Air barrier test all new/existing buildings and additions
    - Can be waived by IDAP Manager on a case by case basis for existing buildings
  - Cx (15,000 SF and greater) but required for all buildings under IDAP
- Cx and air tightness is responsibility of owner
  - Electronic copies of both reports need to be submitted to IDAP Team to receive the Construction Incentive

Post Construction

- Final Inspection
  - Deficiencies identified and not resolved during Cx need to be factored into energy model and predicted EUI if they cannot be rectified
  - If the Target EUI can be met at this point, then the Construction Incentive will be paid

Building Occupancy

- Performance Period
  - Based on consecutive 12 months of actual utility data (E_A)
  - 2 year period allows for optimizing building performance
  - IDAP Team available to assist during this phase
  - Performance Incentive paid if Target EUI is met



Consultant Eligibility Requirements

Energy Modeling Consultant Selection

- Can join at anytime contingent on the following
- Preapproved by IDAP Manager based on:
  - Certifications in ASHRAE BEMP, AEE BESA and/or gone through 5 reviews with GBCI
  - Experience in reviewing CDs
  - Ability to develop reports and lead technical discussions
  - Provide references for past energy/IDA projects
  - Modeling multiple building types
  - Model needs to meet ASHRAE 140 standard
- Identified staff must attend training
- Contract directly with owner or design team

Modeling Process

Overall Model Scope

- Baseline is Target EUI from Energy Star® or other sources, as applicable
- There's only one predictive model of the proposed building (i.e., no comparative modeling in IDAP)

IDAP Whole Building Strategy

- Coordinating across design team disciplines:
  - Building shape and orientation
  - Building envelope, thermal design and efficiency
  - Daylighting and electric lighting design and controls
  - HVAC mechanical systems & duct/pipe design
  - Use of properties of water and air to minimize energy use
  - Fenestration optimization
  - Enhanced control automation
  - On-site, integrated renewable systems
- Other factors to consider:
  - Occupancy & space utilization
  - Schedules
  - Internal gains and service loads (anticipated plug loads, people, building equipment)

Examples of Specific Measures

Category	Measure	
Envelope	Continuous air barrier Improved wall insulation High efficiency glazing	Improved roof insulation Cool roof
Lighting	High efficiency fixtures (Interior) Lower ambient lighting levels Highly reflective ceiling	Occupancy sensors Efficient exterior lighting fixtures
Daylighting	Light conveyors Interior/exterior light shelves Sloped ceiling Reflective ceiling	Stepped daylighting controls Dimming daylighting controls Skylights/roof monitors Tuned glazing
HVAC Systems	High efficiency chiller High efficiency boiler Water side economizer Ground-source heat pump Water-source heat pump Variable refrigerant flow heat pumps Building thermal mass Point-of-use domestic hot-water heaters	Evaporative cooling technologies VFDs on pumps and cooling tower fans Infrared heating Displacement ventilation Radiant heating/cooling Natural ventilation Chilled beams High efficiency refrigeration equipment
On-site renewable systems	Onsite micro-wind Photovoltaic solar	Solar water heating
Passive design strategies	External overhangs Building orientation Low pressure drop duct & piping design	Optimizing window to wall ratio Trees for shading and wind protection

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Getting Started

Next Steps

- Program design documentation can be found on the Utilities website www.fcgov.com/idap
  - Consultant Application
  - Consultant Manual
  - Participant Manual
  - Participant Application
  - Program Templates
- If you have potential/future projects get in touch with IDAP Manager

Contact Information

- Fort Collins Utilities:
  - Gary Schroeder – IDAP Manager
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  - Kelley Gonzales - Sr. Energy Services Engineer
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Questions