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.

*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.
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 (within PRPA service territory)
- 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’/EW 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

EUI Comparisons

- Actual kBtu/SF/yr
- Target Finder Median
- Target Finder 60% goal
- ASHRAE 90.1 - 2007 (2)
- ASHRAE 180.1 - 2009 (2)

kBtu/SF/yr

117 N Mason* 215 N Mason* 281 N College* Police Services* Utilities A-B* Office Bldg A w/ PV Office Bldg A w/o PV Private Office Bldg.
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](http://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

Program Application
- Conceptual/Early Schematic Design
- N/A
- Meet w/ Utilities Representative / Set EUI target

Design Incentive
- 100% Construction Documents
- $5,000 + $0.10/SF
- Additional 1/3 Owner Incentive
  - Based on project square footage and specific design milestones

Construction Incentive
- Construction complete
- 25% of kBtu/yr reduction goal x $0.021
- Additional 1/3 Owner Incentive
  - Based on final energy model and as-built conditions

Performance Incentive
- After minimum 1 year occupancy
- Actual kBtu/yr reduction x $0.021 less Construction Incentive & PV
- Additional 1/3 Owner Incentive
- Based on actual 1-year EUI

Owner Incentive
- N/A

Design Team Incentive
- N/A
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

<table>
<thead>
<tr>
<th>Incentive recipient</th>
<th>Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>$5,000 + $0.10/SF</td>
</tr>
<tr>
<td>Design Team</td>
<td>($5,000 + $0.10/SF) * 1/3</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Owner Incentive Formula</th>
<th>((0.25)(A)(E_M - E_T)(I) = C = ($)) Owner Construction Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Team (DT) Incentive Formula</td>
<td>([\frac{(0.25)(A)(E_M - E_T)(I)}{3}] = ($)) DT Construction Incentive</td>
</tr>
</tbody>
</table>

### 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 average EUI for the project building type (as defined by ENERGY STAR Target Finder or other approved method)

- **\(E_T\)** = EUI (kBtu/SF/year) = IDAP EUI performance target 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
  – REC’s 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 Design Team, respectively

<table>
<thead>
<tr>
<th>Owner Incentive</th>
<th>( (A)(E_M - E_A)(I) - C - (R_{kW} \times R_{cf}) = ($) ) Owner Performance Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Team (DT) Incentive</td>
<td>([\frac{(A)(E_M - E_A)(I) - C - (R_{kW} \times R_{cf})}{3}] = ($) DT Performance Incentive)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>C = ($) Construction incentive (See Table 3-2 above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = SF</td>
<td>Gross floor area of the project. Gross floor area is the total conditioned floor area, expressed in square feet (SF), measured from the principal exterior surfaces of the building, not including parking areas.</td>
</tr>
<tr>
<td>E_M</td>
<td>EUI (kBtu/SF/year) = The regional median EUI for the project building type (as defined by ENERGY STAR Target Finder or other approved method)</td>
</tr>
<tr>
<td>E_A</td>
<td>EUI (kBtu/SF/year) = Actual measured building EUI (typically from utility bills)</td>
</tr>
<tr>
<td>I</td>
<td>Incentive rate ($/kBtu/yr) = $0.021</td>
</tr>
<tr>
<td>R_{kW}</td>
<td>kW = Rated output of PV System after Inverter*</td>
</tr>
<tr>
<td>R_{cf}</td>
<td>$/kW = Cost Factor = $150/kW*</td>
</tr>
</tbody>
</table>
Incentive Scenarios
Incentive Calculation Example

- Given: 20,000 SF Building

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

- 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 = C = (0.25)(A)(E_M – E_T)(I)
= (0.25)(20,000)(88.2-35.3)(0.021)
= $5,555

($) DT Construction Incentive = [(0.25)(A)(E_M – E_T)(I)] / 3
= [(0.25)(20,000)(88.2-35.3)(0.021)] / 3
= $1,852

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

($) Owner Performance Incentive = (A)(E_M – E_A)(I) – C – (R_{kw} x R_{cf})
= (20,000)(88.2-32.5)(0.021) – $5,555 – (20)(150)
= $14,840

($) DT Performance Incentive = [(A)(E_M – E_A)(I) – C – (R_{kw} x R_{cf})] / 3
= [(20,000)(88.2-32.5)(0.021) - $5,555 – (20)(150)] / 3
= $4,946
Incentive Example Summary

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

<table>
<thead>
<tr>
<th>Incentive Type</th>
<th>Owner</th>
<th>Design Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>$7,000</td>
<td>$2,333</td>
</tr>
<tr>
<td>Post Construction</td>
<td>$5,555</td>
<td>$1,852</td>
</tr>
<tr>
<td>Performance</td>
<td>$14,840</td>
<td>$4,946</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$27,395</strong></td>
<td><strong>$9,131</strong></td>
</tr>
</tbody>
</table>

- 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

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

• Program design documentation can be found on the Utilities website [www.fcgov.com/idap](http://www.fcgov.com/idap)
  – Program Application
  – Consultant Application
  – Consultant Manual
  – Participant Manual
  – Approved Energy Consultants
  – Program Templates

• If you have potential/future projects get in touch with IDAP Manager
Contact Information

• Fort Collins Utilities:
  – Gary Schroeder – IDAP Manager
    • 970.221.6395 and gschroeder@fcgov.com
  – Kelley Gonzales - Sr. Energy Services Engineer
    • 970.221.6857 and kgonzales@fcgov.com
  – Michael Authier – Energy Services Engineer
    • 970-221-6768 and mauthier@fcgov.com
  – Customer Service Hotline
    • (970) 221-6700 and/or utilities@fcgov.com

• Nexant – IDAP Administrator
  – Jim Zarske: 303.402.2497 and jzarske@nexant.com
  – Campbell (Mac) Tilt: 303.998.2461 and ctilt@nexant.com
Questions