Residential Solar and Battery Storage
Time of Day Rates

Northern Colorado Renewable Energy Society Meeting
Leland Keller, Lucas Mouttet
Solar Programs

- Residential Rebate
- Solar Affordability Program
- Community Solar
- Commercial Rebate
- Solar Power Purchase Program (SP3)

PRPA Resources:
- Rawhide Flats Solar (30 MWac)
- 2018 solar purchase under negotiation (~20 MW)
Growth of Grid-Connected Solar

Annual Solar Generation Capacity Additions

- Total Capacity (kW-DC)
- Business
- Home


Fort Collins Solar 2016

System Size (kW)
- 1 - 10
- 10 - 50
- 50 - 100
- 100 - 200
- 200 - 500
- 500 - 1000
Residential Rebates

Rebates based on installed PV system size:
- Up to $1,500 (@ $0.50/watt-DC)
- Limited to 120% of total consumption

Projects installed in 2017:
- 6 kW average size
- $21,000 average total cost
- $3.56/watt-DC average cost

Get Started: www.fcgov.com/solar
YOUR ELECTRIC RATE IS CHANGING

NON-SUMMER
OCTOBER-APRIL
WEEKDAYS ONLY

OFF-PEAK HOURS (LOWEST ELECTRIC PRICE)

ON-PEAK HOURS (APX. 3X HIGHER PRICE)

5PM

SUMMER
MAY-SEPTEMBER
WEEKDAYS ONLY

OFF-PEAK HOURS (LOWEST ELECTRIC PRICE)

ON-PEAK HOURS (APX. 3X HIGHER PRICE)

7PM

2PM

-- EFFECTIVE OCT. 1, 2018 --
Grid of the Future

Flexible
Sustainable
Data Driven
Equitable
Why TOD Rates?

Monitor My Use

Electric Costs

$49 Projected
As of JAN 1: $7

Details

Your rate plan is Residential Energy

Electric Use

Use is down 53%

Details

Current average daily use compared to last bill period.

Water Costs

$16 Projected
As of Mar 31: $16

Details

Your rate plan is Residential Single Family Water

Water Use

Use is up 13%

Details

Current average daily use compared to last bill period.

Provide more timely customer service solutions

Prepare us and the community for the future

Use information to maintain high system reliability

Make operations even more cost-effective

NON-SUMMER
OCTOBER–APRIL
WEEKDAYS ONLY

SUMMER
MAY–SEPTEMBER
WEEKDAYS ONLY

OFF-PEAK HOURS (LOWEST ELECTRIC PRICE)

9PM

5PM

OFF-PEAK HOURS (LOWEST ELECTRIC PRICE)

7PM

OFF-PEAK HOURS (LOWEST ELECTRIC PRICE)
Similar Price Models

- Toll lanes
- Matinee movies
- Airline tickets
- Rideshares
Electric rate based on the hour (time) of use

On-Peak and Off-Peak Hours

- On-peak = afternoons/evenings when electric use is higher, cost will be higher
- Off-peak = days/nights/weekends when electric use is lower, cost will be lower
<table>
<thead>
<tr>
<th>Time-of-Day</th>
<th>Electric Heat Time-of-Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>~90% of customers</td>
<td>~10% of customers</td>
</tr>
<tr>
<td>On-peak and off-peak pricing</td>
<td>Slightly higher on-peak and off-peak pricing</td>
</tr>
<tr>
<td>Seasonal rate shifts for</td>
<td>Seasonal rate shifts for</td>
</tr>
<tr>
<td>summer &amp; non-summer</td>
<td>summer &amp; non-summer</td>
</tr>
<tr>
<td>Tier at 700 kWh per month</td>
<td>No additional tier pricing</td>
</tr>
</tbody>
</table>
## 2018 Time of Day Pricing

<table>
<thead>
<tr>
<th>Season</th>
<th>Period Type</th>
<th>Rates (¢/kWh)</th>
<th>Solar Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>On-Peak</td>
<td>-23.45</td>
<td>+22.13</td>
</tr>
<tr>
<td></td>
<td>Off-Peak</td>
<td>-6.63</td>
<td>+6.26</td>
</tr>
<tr>
<td>Non-Summer</td>
<td>On-Peak</td>
<td>-21.05</td>
<td>+19.86</td>
</tr>
<tr>
<td></td>
<td>Off-Peak</td>
<td>-6.45</td>
<td>+6.08</td>
</tr>
</tbody>
</table>

*Charge for all kWh used in excess of 700 kWh in any month is 1.76 ¢/kWh for non-electric home heat source*
Net excess only occurs when generation exceeds the home’s load.

Electric meters have delivered (Net Use) and received (Net Excess) registers.
# Bill Credits from Solar Generation

## Bill Details

### Account Number: 123456-123456

### Service Address: 123 Address Street

<table>
<thead>
<tr>
<th>Account Number</th>
<th>Customer Name</th>
<th>Service Address</th>
<th>Bill Date</th>
<th>Due Date</th>
<th>Amount Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>123456-123456</td>
<td>Your Name</td>
<td>123 Address Street</td>
<td>06/25/16</td>
<td>06/14/16</td>
<td>$153.74</td>
</tr>
</tbody>
</table>

### Billing and Payment Summary

- Payment due last billing period: $156.99
- Payments received since last billing: $156.99
- Previous balance, please pay by now: $153.74
- Charges this billing period due 9/14/2016: $153.74
- Total amount due: $153.74

### Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Date</th>
<th>Service Date From</th>
<th>To</th>
<th>Days</th>
<th>Meter Readings</th>
<th>Multiplier</th>
<th>Usage</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Energy</td>
<td>07/23/16</td>
<td>08/23/16</td>
<td>31</td>
<td>46087</td>
<td>46798</td>
<td>1</td>
<td>710 kWh</td>
<td>$5.37</td>
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<tr>
<td>Base Charge</td>
<td>E130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>500 kWh</td>
<td>$46.11</td>
</tr>
<tr>
<td>Tier 1</td>
<td>E130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>210 kWh</td>
<td>$23.19</td>
</tr>
<tr>
<td>Tier 2</td>
<td>E130</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>237 kWh</td>
<td>-$24.97</td>
</tr>
<tr>
<td>Electric Net</td>
<td>07/23/16</td>
<td>08/23/16</td>
<td>31</td>
<td>1541</td>
<td>1828</td>
<td>1</td>
<td>287 kWh</td>
<td>-$41.97</td>
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<tr>
<td>Returned Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>16500</td>
<td>$16.33</td>
</tr>
<tr>
<td>Water Base Charge</td>
<td>07/23/16</td>
<td>08/23/16</td>
<td>31</td>
<td>10027</td>
<td>16527</td>
<td>1</td>
<td>7000 gal</td>
<td>$17.70</td>
</tr>
<tr>
<td>Tier 1</td>
<td>W220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>6000 gal</td>
<td>$17.44</td>
</tr>
<tr>
<td>Tier 2</td>
<td>W220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>4800</td>
<td>$36.32</td>
</tr>
<tr>
<td>Wastewater</td>
<td>07/23/16</td>
<td>08/23/16</td>
<td>31</td>
<td></td>
<td></td>
<td>1</td>
<td>11.74</td>
<td></td>
</tr>
<tr>
<td>Stormwater</td>
<td>07/23/16</td>
<td>08/23/16</td>
<td>31</td>
<td></td>
<td></td>
<td>1</td>
<td>13.74</td>
<td></td>
</tr>
</tbody>
</table>

**Definition of Units**

- KWH - Kilowatt-hour
- GAL - Gallons
Distributed Residential Solar + Battery Storage

- Unaided Load
- With Solar
- With Solar+Battery
- Grid
Demonstration Pilot underway

- Several residential batteries already connected
- JCI 92 kWh commercial battery
Questions?

Leland Keller
lkeller@fcgov.com

Rhonda Gatzke
rgatzke@fcgov.com

Lucas Mouttet
lmouttet@fcgov.com

www.fcgov.com/solar
30% Tax Credit applies to:

• Total cost of solar system which you own

• Battery systems which are charged by solar generation

Consult your tax advisor!
Solar Policies and Goals

- **Energy Policy**
  - 20% renewable electricity by 2020
  - 2% locally installed on the distribution system, ~20MW PV

- **2017-18 Programs and Funding**
  - Residential rebates, 2 MW
  - Commercial rebates, 2 MW
  - Solar Power Purchase Program (SP3), ~2MW
  - Community Solar, 1 MW
Rawhide Flats Solar

- Commercial operation: Oct 2016
- Developed by juwi solar, Inc and owned by PSEG
- 30 MW ac / 36 MW dc
- Single axis tracking
- Expected output 65,000 MWh/yr, declining ~0.5%/yr
- Equivalent to 2% of muni retail sales