ORACLE

Oracle Energy and Water
Customer Edge
Conference

Complex Billing Concepts

Oracle's commitment to modern utilities' AMI related billing needs

Name
Ha Bui
Solution Consultant
Oracle Energy & Water
March 13, 2023 1PM

San Diego Trivia!

What is the name of the local professional baseball team?

It was the Franciscan Friars -- Father Junípero Serra and Don Caspar de Portolá -- who founded the first Spanish colony in southern California. “Padre,” of course, is Spanish for “Father” or “Friar” and **the name stems directly from the priests who established the first Spanish Missions in California in 1769**.

Our Mission

To provide the best meter solutions to address the world's energy and water challenges.

Accurate Billing and Settlement per market rules

- Market Trends
- Best Utility Practice
- A solution that will grow and evolve with industry trends

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Solution Consultant
Oracle Energy & Water
March 13, 2023

The Agenda

1. Complex Billing → What does it mean?

2. Oracle's E&W commitment to addressing evolution of billing

3. Key use cases introduced with AMI and leveraging product features and concepts

What is Complex Billing?

- **Meter and Management of Meter Data is complex**
  - Typically, multi-accounts, multi-premise, multi-meter/multi-channels per meter, bi-directional metering, etc. with complex relationships
  - Totalization, Aggregation, Balancing, Imbalance, Netting,
- **Charge calculation is complex**
  - Multi-Layers of Service Agreements may exist.
  - Contract Options, renewals, cancellations
- **Invoice presentation is complex**
  - Multi-page invoice and/or statement
  - Almost always requires ALL interval data to be sent to customer.
  - Some requires a specific MS-Excel spreadsheet to be submitted as invoice
- **Billing process is complex**
  - Accrual
  - True-up / Re-statement
  - Prior-period adjustments
  - Adjustments to Adjustments

Quick question…

OPEN YOUR ORACLE EVENTS APP

- *Navigate to our session*
- *Click on polls*
- *Select poll to vote*

OPEN & SHARE RESULTS >> HERE

When rolling out a new rate tariff/ program, what is your biggest hurdle in supporting new customer rate initiatives today?

A. Ensuring ability of metering solution to provide bill determinants to CIS

B. Ensuring CIS and Rating engine has capability to

support new tariff calculations

C. Presentation of Customer Invoice

D. Customer Engagement/ Rate Adoption

Oracle’s E&W commitment to addressing evolution of billing

Oracle E&W Products with Complex Billing Capabilities

On-Premise

CC&B

Customer Care & Billing

- The Rating Side of Complex Billing
- Requires an MDM
- Requires pre-calculated “complex” Billing Determinants

MDM/AMS

Meter Data Management/ Advanced Metering System

- AMS is same as MDM but adds ability to manage interval measurement
- Allows complex interval billing determinant calculations
- Requires integration to a Rating system, i.e., CC&B

C2M +AMS

Customer to Meter

- MDM & CC&B in a single instance
- All capabilities of CC&B and MDM
- Includes the following capabilities:
  - Customer Operations
  - Service Orders
  - Revenue Management
  - Device Management
  - Meter Data Management
  - Head-End Integration (note: specific AMI Vendor adapters are extra cost)

SaaS

CCS + AMS

Customer Cloud Service

- Cloud version of C2M
- Includes the following:
  - BI Publisher for invoicing
  - Includes all currently supported AMI Vendor adapters
  - OUAV – Oracle Utilities Analytics Visualization

MSCS

Meter Solution Cloud Service

- Exact capabilities of MDM+AMS
- Includes the following:
  - Includes all currently supported AMI Vendor adapters
  - OUAV – Oracle Utilities Analytics Visualization

BCS

Billing Cloud Service

- Standalone Complex Billing Solution
- All Features of CCS minus:
  - Credit & Collections
  - Service Orders
  - Device Management

End to end usage to invoice process

Business users can design, build, and maintain without coding

Step 1: Cleanse Usage

- Measurement data is loaded
- Validation, Editing, and Estimation is performed
- Additional values are derived (gallons to thousand gallons)

Step 2: Apply Usage Rules

- Calculate bill determinants
  - Totalize usage
  - Usage Variance calculations
  - Request approval
- Check if threshold was exceeded

Step 3: Calculate Charges

- Leverage out of the box calculation rule types: flat charges, service quantities, stepped service quantities, minimums, maximums, apply to, perform math
- Apply prices
- Perform GL mapping

Step 4: Generate Bill

- Invoice extract is created for printing / email / posting to the web
- Support for both XML extract and/or a flat file

METER → CASH

Standard Configuration

Advanced pre-built bill determinants and rating calculations calculations

STANDARD PRECONFIGURED RULES

Usage Rules

- Defines the calculation of Billing Determinants for use by the Rating
  - Residential, commercial, and industrial billing support
  - Simple Scalar/Register Reads
  - Simple Interval Totalization
  - Interval Time-of-Use
  - Support for unmetered items
  - Curtailments
  - Demand Response
    - Critical Peak Periods (CPP)
    - Peak Time Rebate (PTR)
  - Peak Values (Coincident / Non-Coincident)
  - Interval Curves (Real or Derived)
  - Validation against a Tolerance
  - Rule to call other Usage Groups
  - Eligibility Criteria

Vector and Service Quantity Math

- Library of functions: Math, Trigonometric, etc.
- Math Expressions (SQRT (X^2 + Y^2))
- Conditional Expressions (IF X > Y THEN X+Y ELSE X*Y)
- Combination of above
- Powerful user-interface allows customers to write complex formulas

Rating Rules

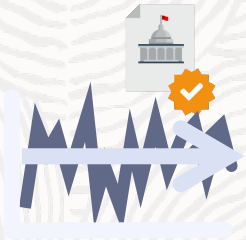
- Defines the pricing for products offered to the market.
  - Tariff / Contract Billing
  - Unlimited number of charge lines
  - Proration is handled automatically
  - Consumption values may be further manipulated, if needed.
  - Testing and checking rates:
    - What-if Analysis
    - Validating Billing Queries from customers
    - Calculating quotes for sales
  - Summary Billing for many services
  - Cancel/Rebill
  - Billable charges for 3rd party calculations

Key use cases introduced with AMI and leveraging product features and concepts

Charlie is responsible for rates

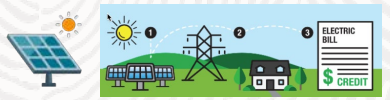
Charlie
“Billing and Rating Analyst”

1. Transition from Register to Interval or TOU based billing



2. Demand Response/ Event base pricing e.g. Peak Time Rebate

3. Net Energy Metering and Community Solar Programs



4. Complex Pricing and Contracts

1. **Transition from Register to Interval based billing**

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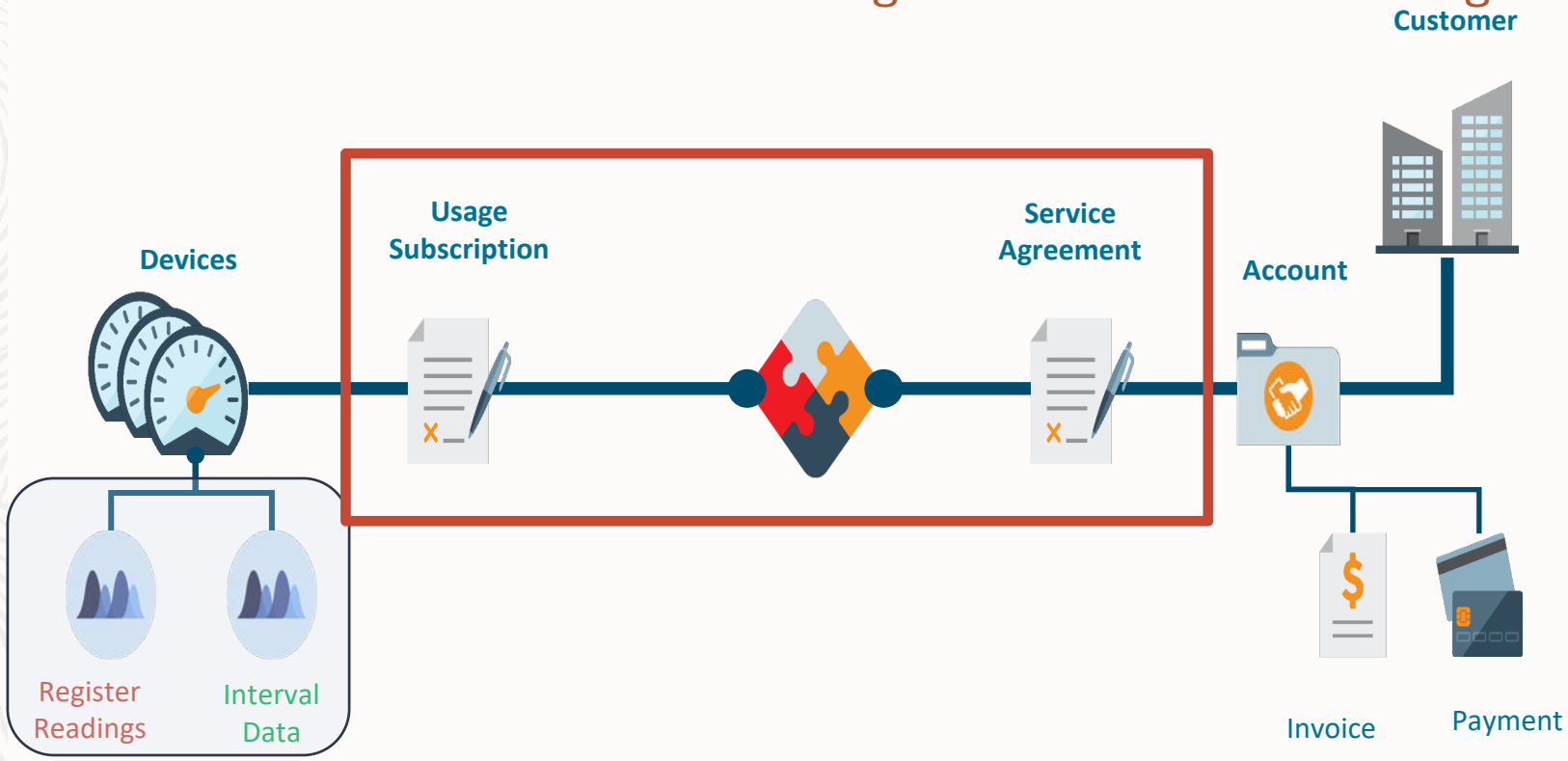
Standard Data Model

Standard data model allows for register and interval data billing



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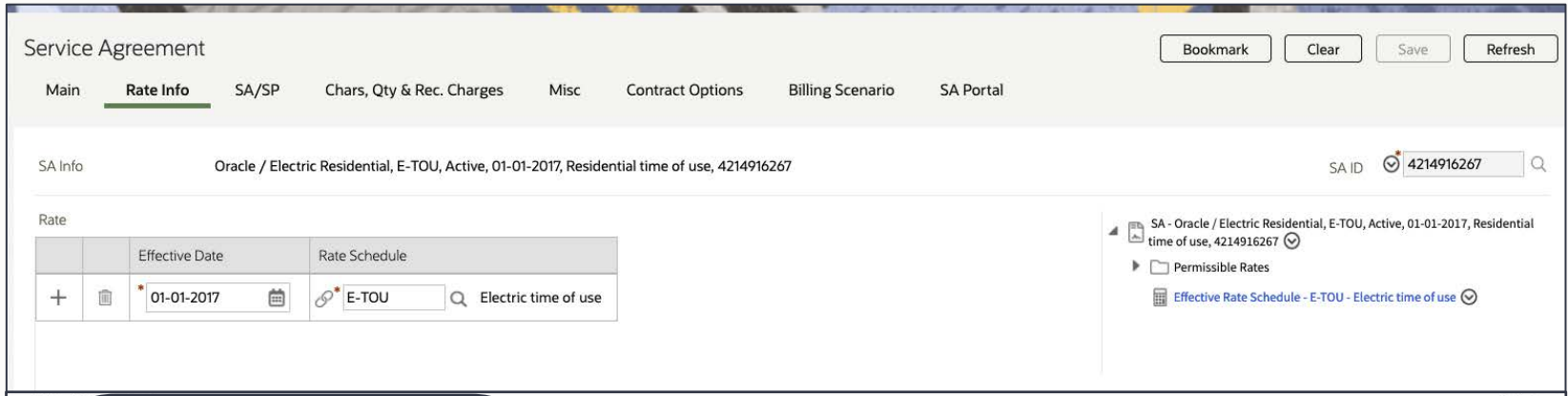
Service Agreement- Rate Schedule

Rate Schedule defines rules required for billing calculations…



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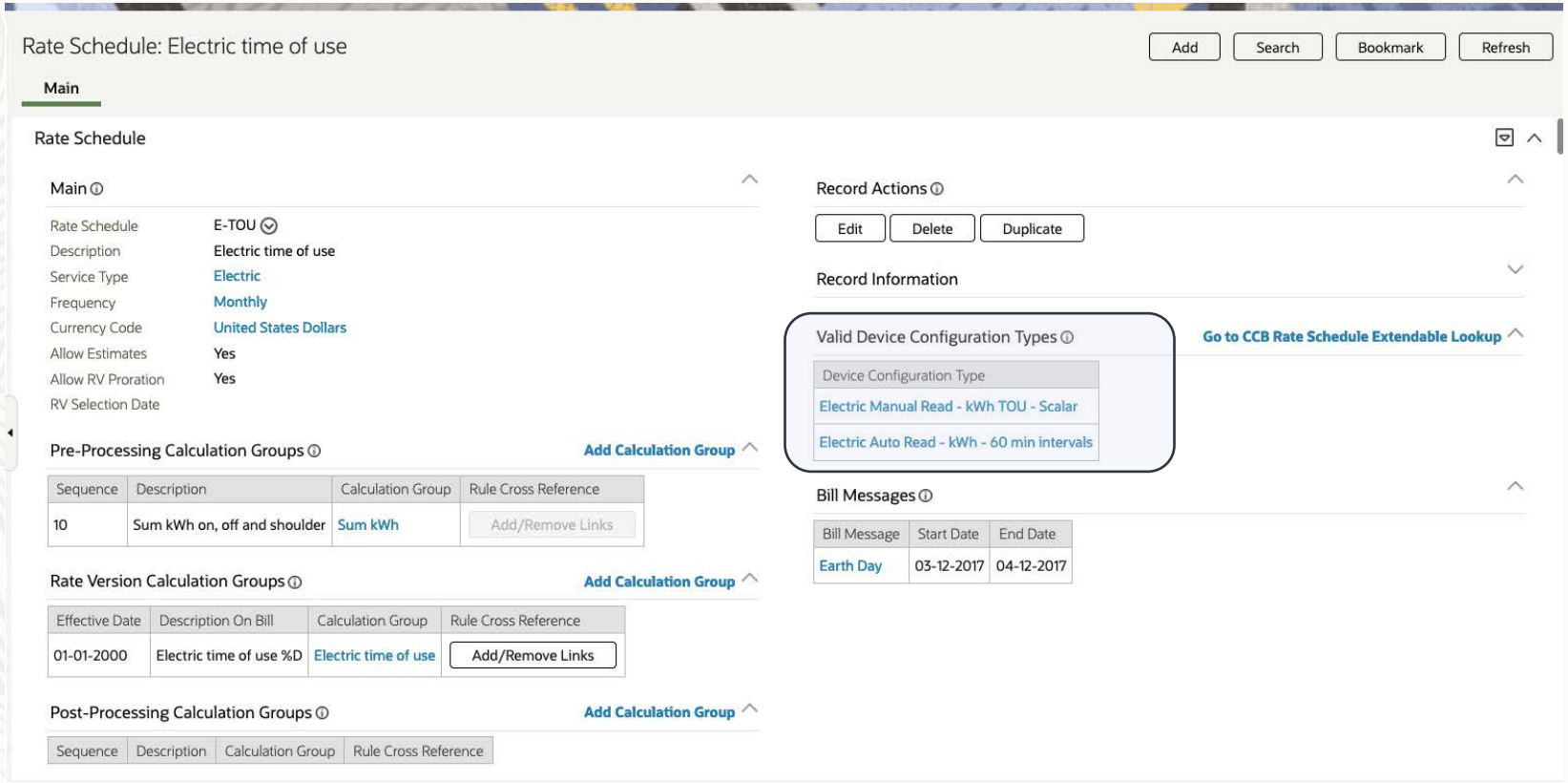
Rate Schedule

....but also validates appropriate device configuration



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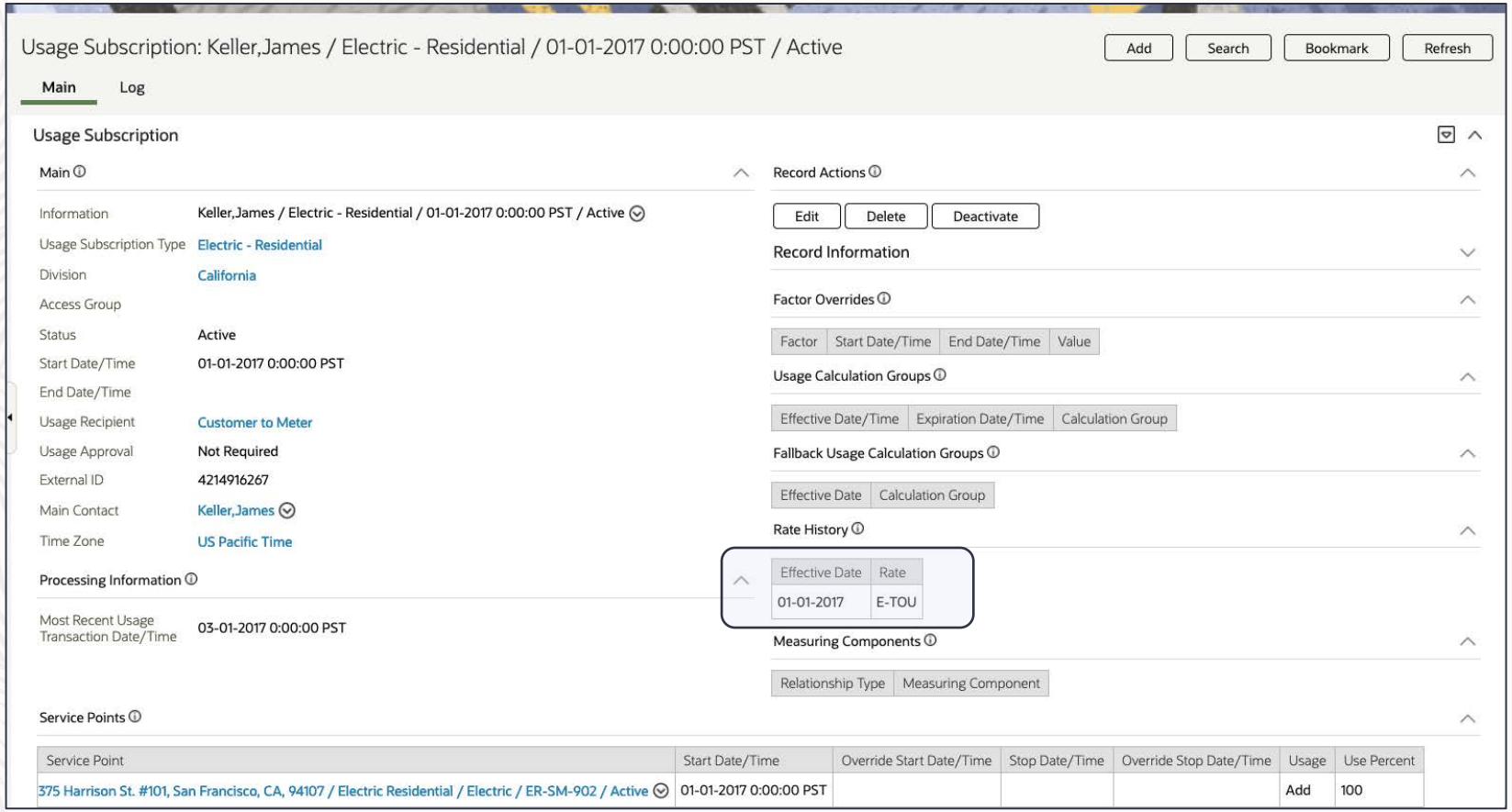
Rate Schedule – Usage Subscription

Provide a relationship link to how the usage should be calculated in supporting the Rate Schedule



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Rate Schedule – Extendable Look-up Configuration

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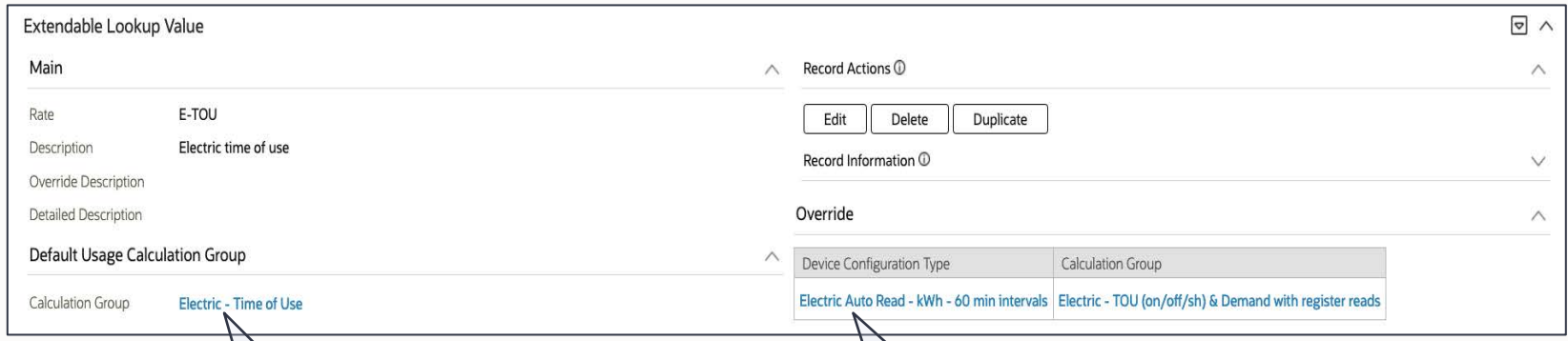

Established default usage calculation e.g. requires standard scalar/ register reads to support billing

Applies override usage calculation based on change or type of device configuration

1. **Transition from Register to Interval based billing**

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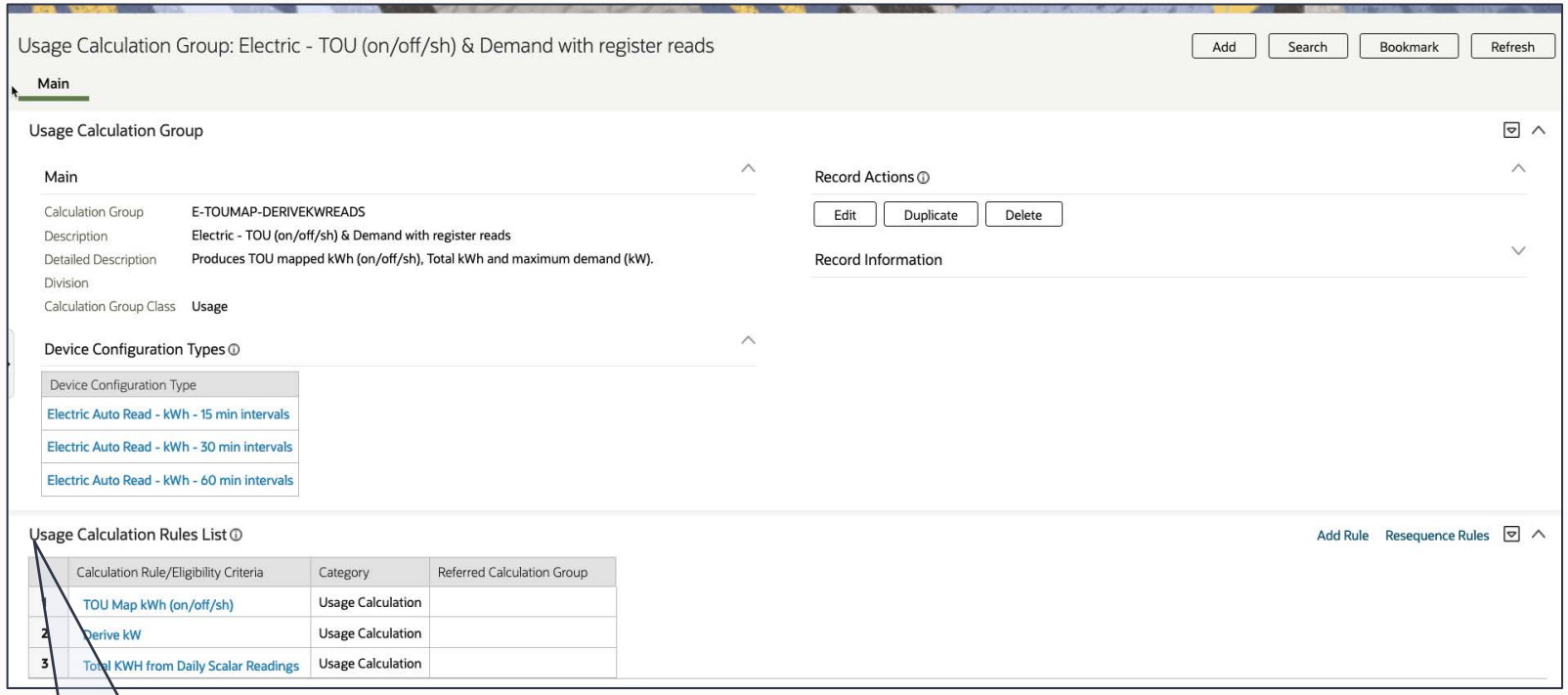
Usage Calculation Group- Rules

Provide list of usage calculation rule(s) that will output the desired results for billing



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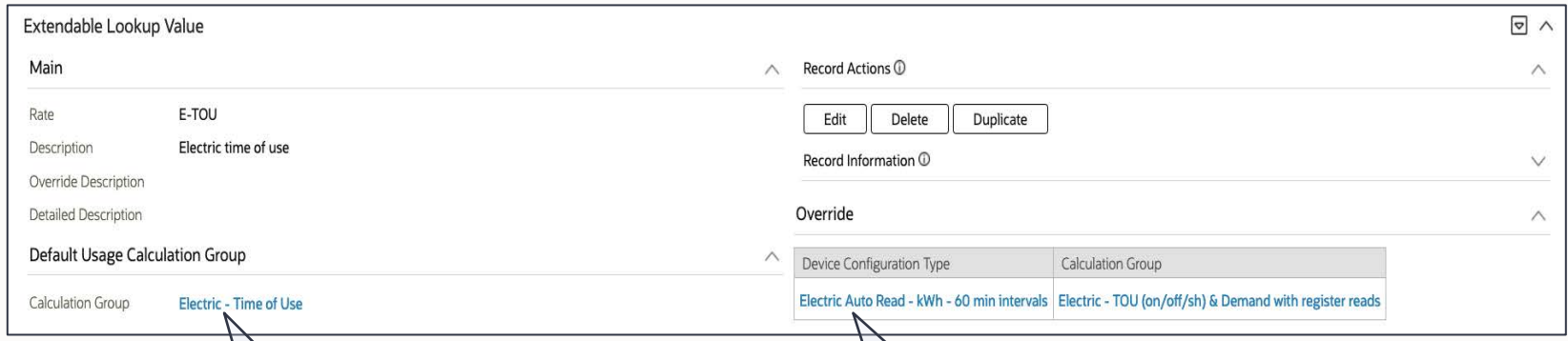

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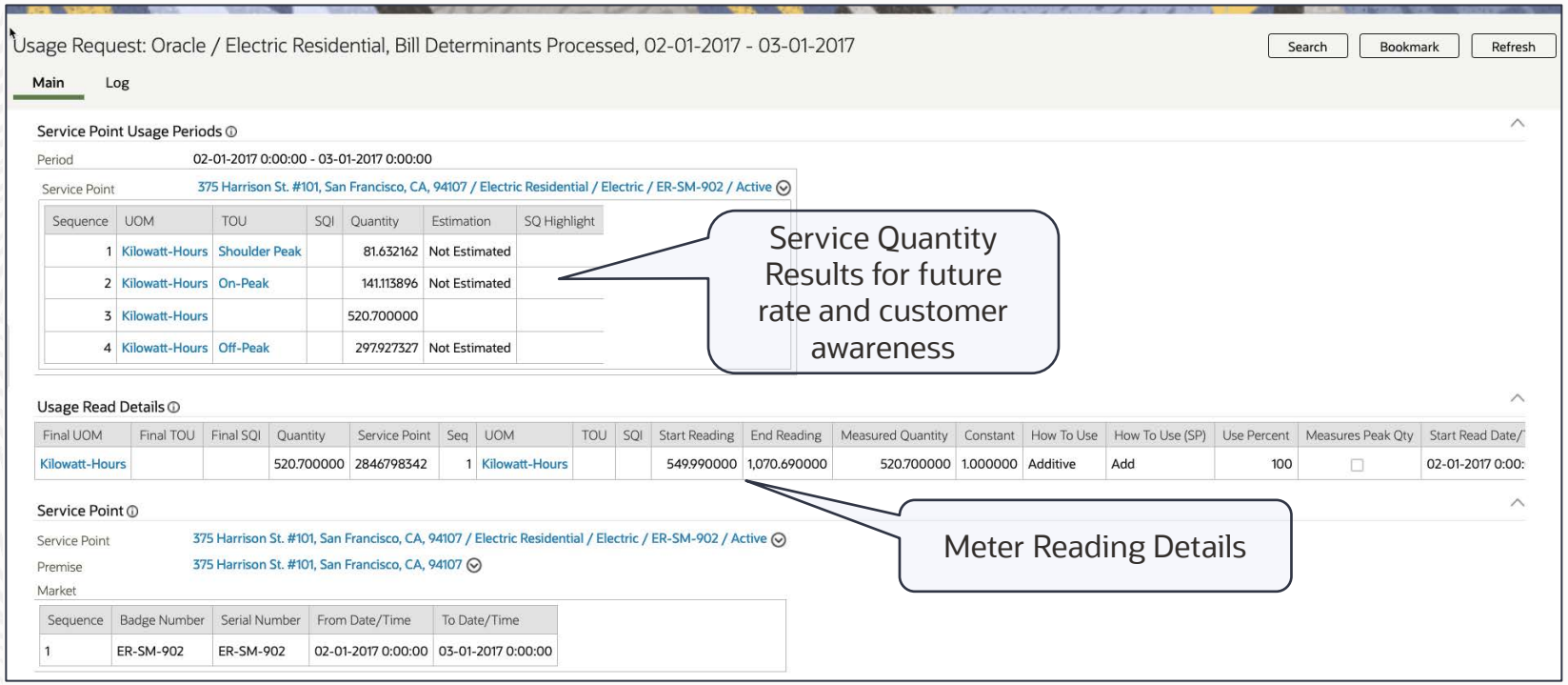
Usage Calculation Results

Usage Calculation Rules Service Quantity (SQ) results can be used for more than just billing and rating. SQs are also used for interim calculation and informational purposes



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Rate Schedule Execution- Bill Calculation Results

Service Quantity (SQ) are summarized scalar results values so rating isn't impacted with usage calculation determining how to summarize the information

Calculation Lines

Description on Bill	Calc Amount	RC Seq / Calc Rule	Print	In Summary
Header 1, 02-01-2017 to 02-28-2017, Electric time of use (01-01-2000)	$57.81			
Service charge	$15.00	Service charge	Y	Y
141.11 kWh at $0.134 per kWh peak usage	$18.91	On peak - kWh	Y	Y
297.93 kWh at $0.03029 per kWh off peak usage	$9.02	Off peak - kWh	Y	Y
81.63 kWh at $0.06783 per kWh shoulder peak usage	$5.54	Shoulder peak - kWh	Y	Y
PCA 520.67 kWh at $0.00547 per kWh	$2.85	Power cost adjustment	Y	Y
Energy total	$36.32	Total energy charge	Y	Y
Total taxable amount	$51.32	Total taxable amount	N	Y
City sales tax 11.5%	$0.00	City tax	N	Y
State sales tax 7.5%	$6.36	State tax	Y	Y
County sales tax 0.25%	$0.13	County tax	Y	Y
Tax total	$6.49	Total taxes	N	Y
Total charges	$57.81	Total charges	Y	N

Application of Rate Calculation against Usage related Service Quantity

1. Transition from Register to Interval or TOU based billing

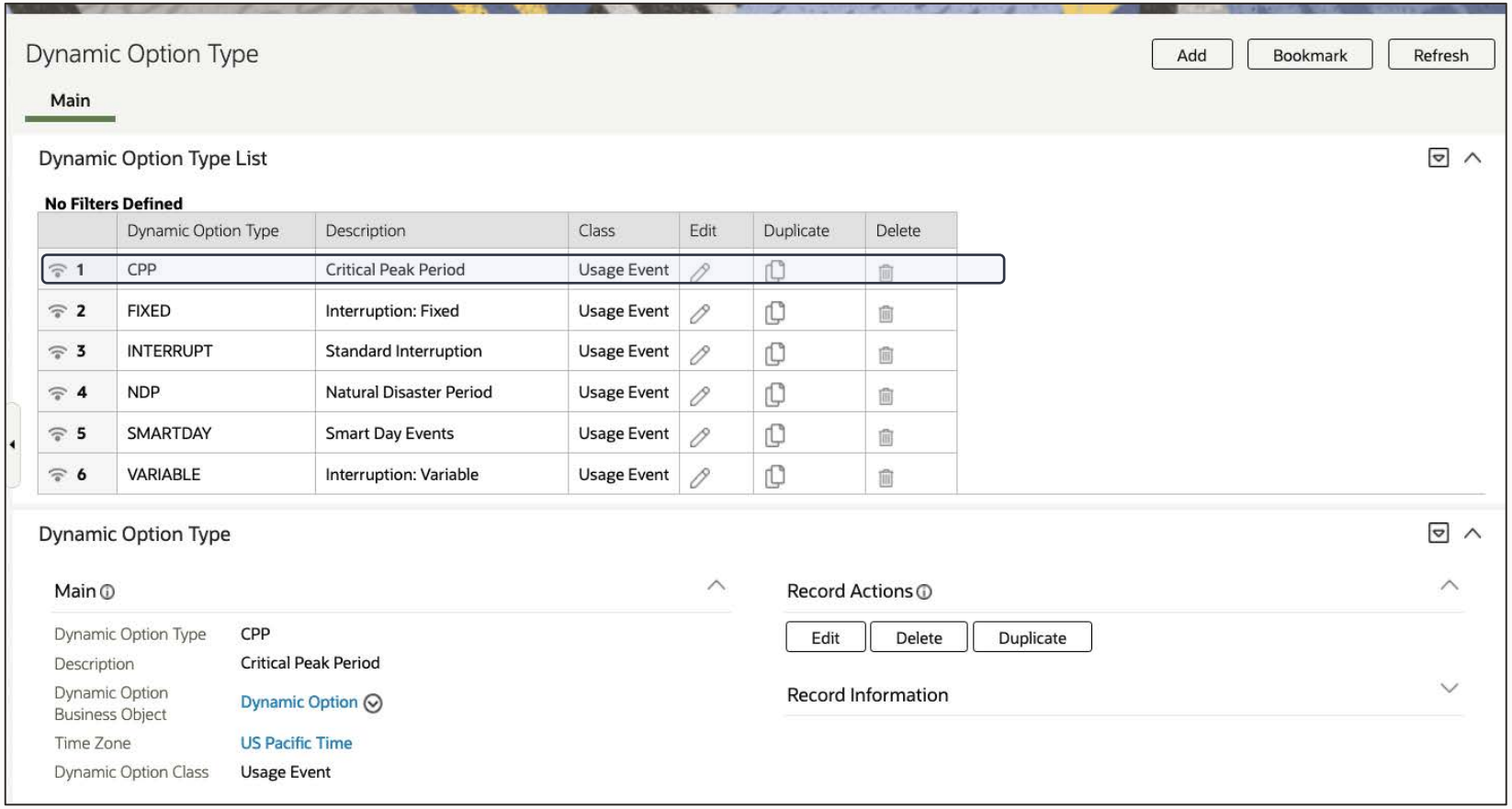
2. Demand Response/ Event base pricing e.g. Peak Time Rebate

3. Net Energy Metering and Community Solar Programs

4. Complex Pricing and Contracts

Dynamic Event Option

Dynamic options specify and override on how usage is normally calculated such as a Critical Peak or Curtailment period



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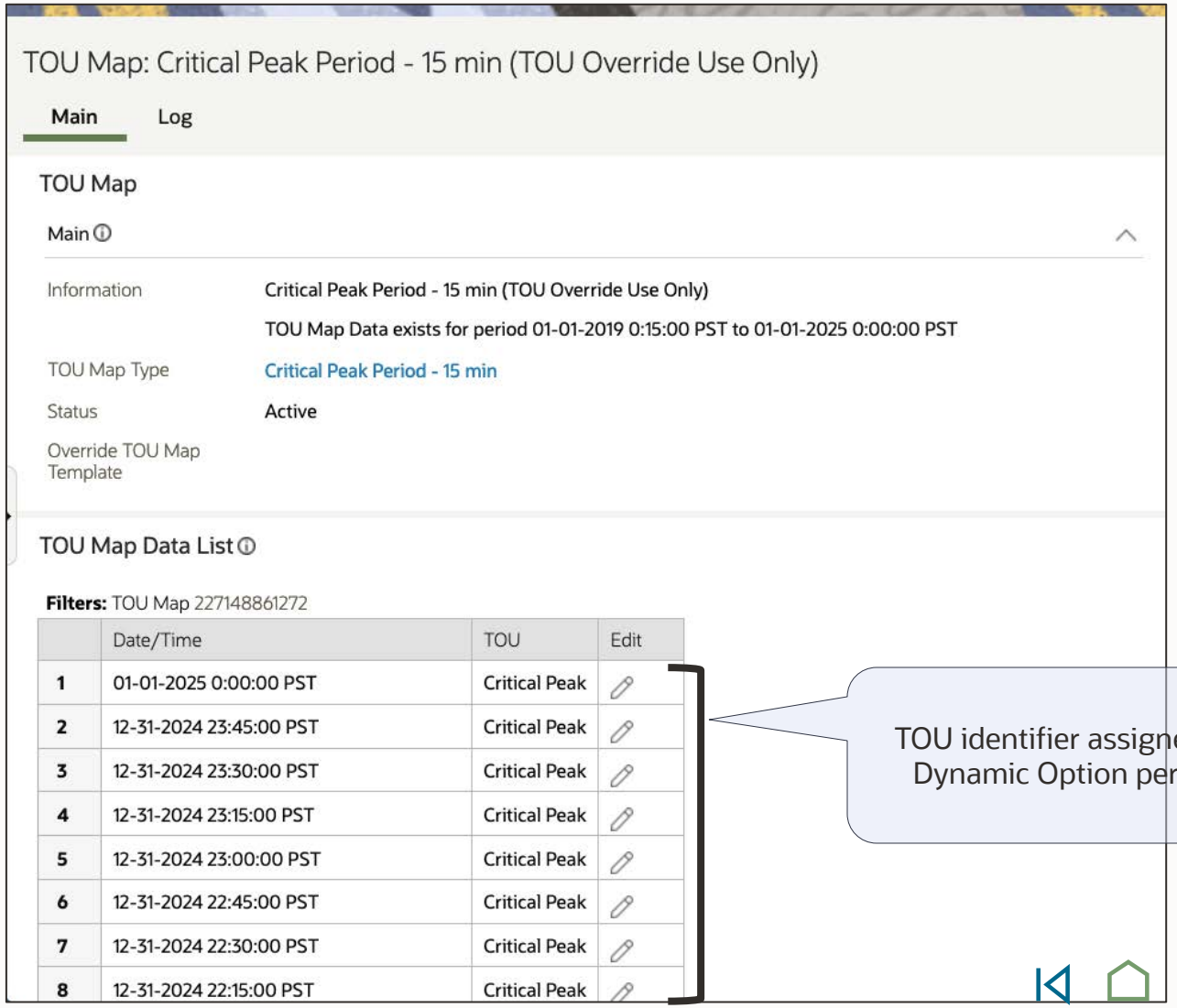
Dynamic Option Time of Use (TOU) Map

Dynamic options reference a Dynamic TOU Map that allows for identification of dynamic option down to required interval resolution



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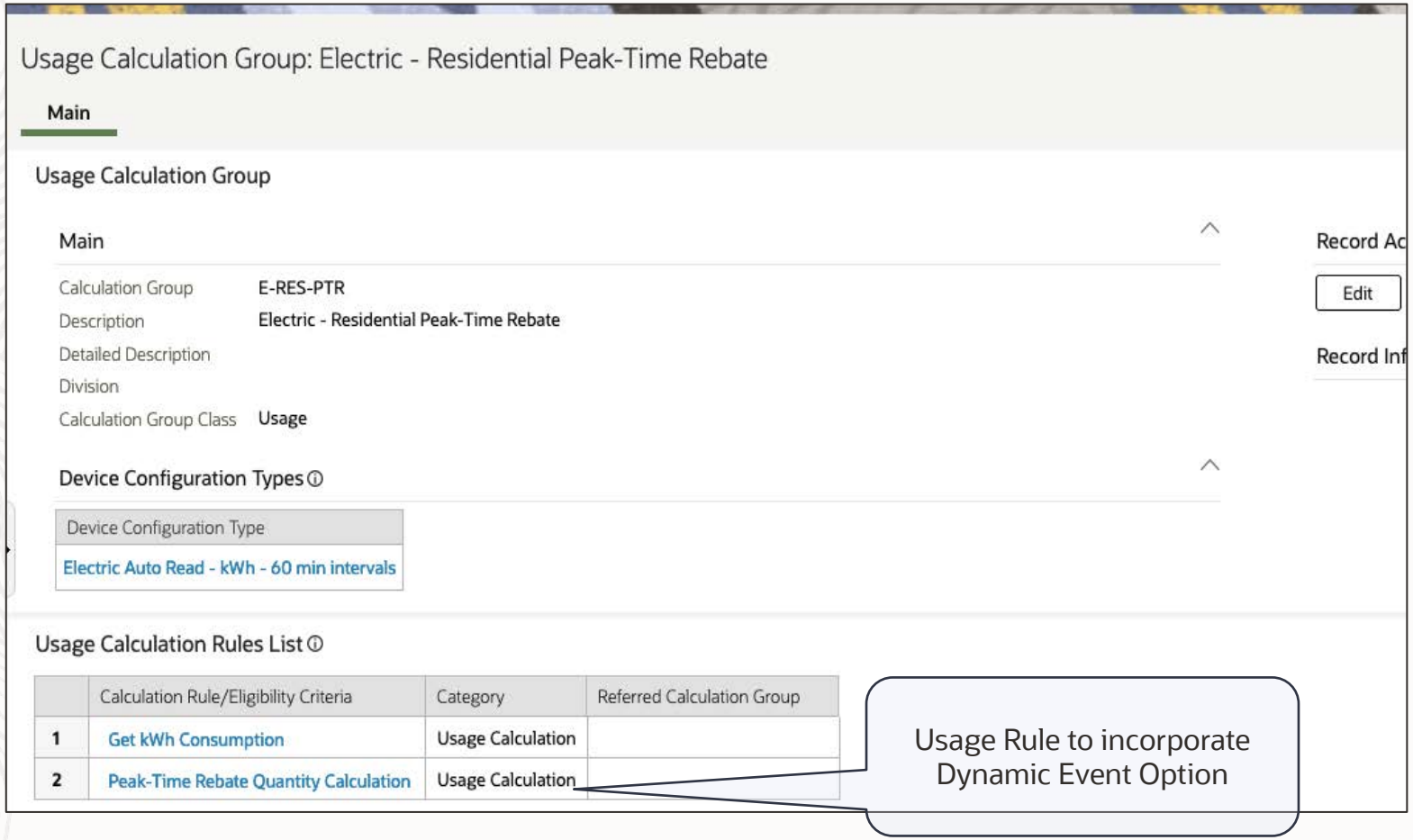
Usage Calculation Group- Rules

Provide list of usage calculation rule(s) that will output the desired results for billing based on required Dynamic Event Option



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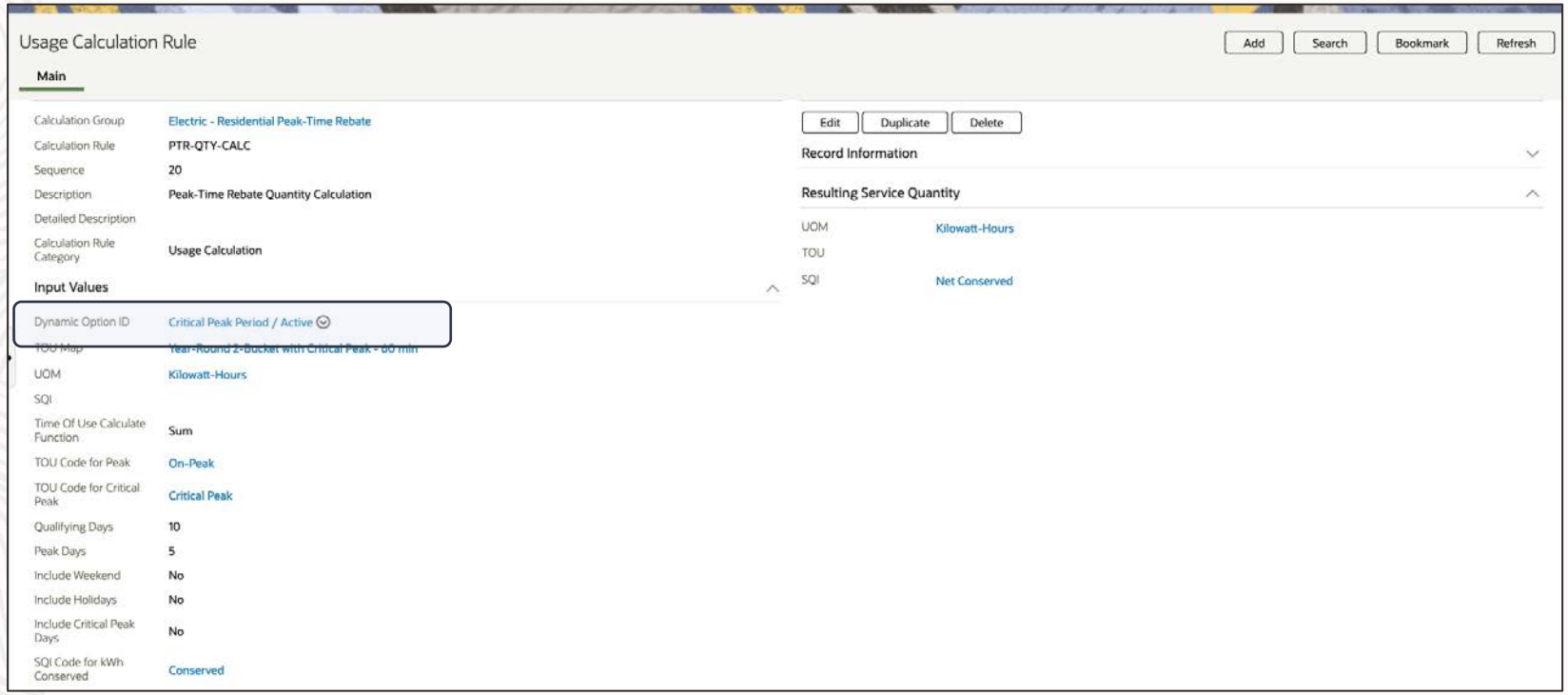
Usage Rule reference to Dynamic Option Event

Usage rule are allowed to reference Dynamic Option Event to apply appropriate Service Quantity Identifier for Billing



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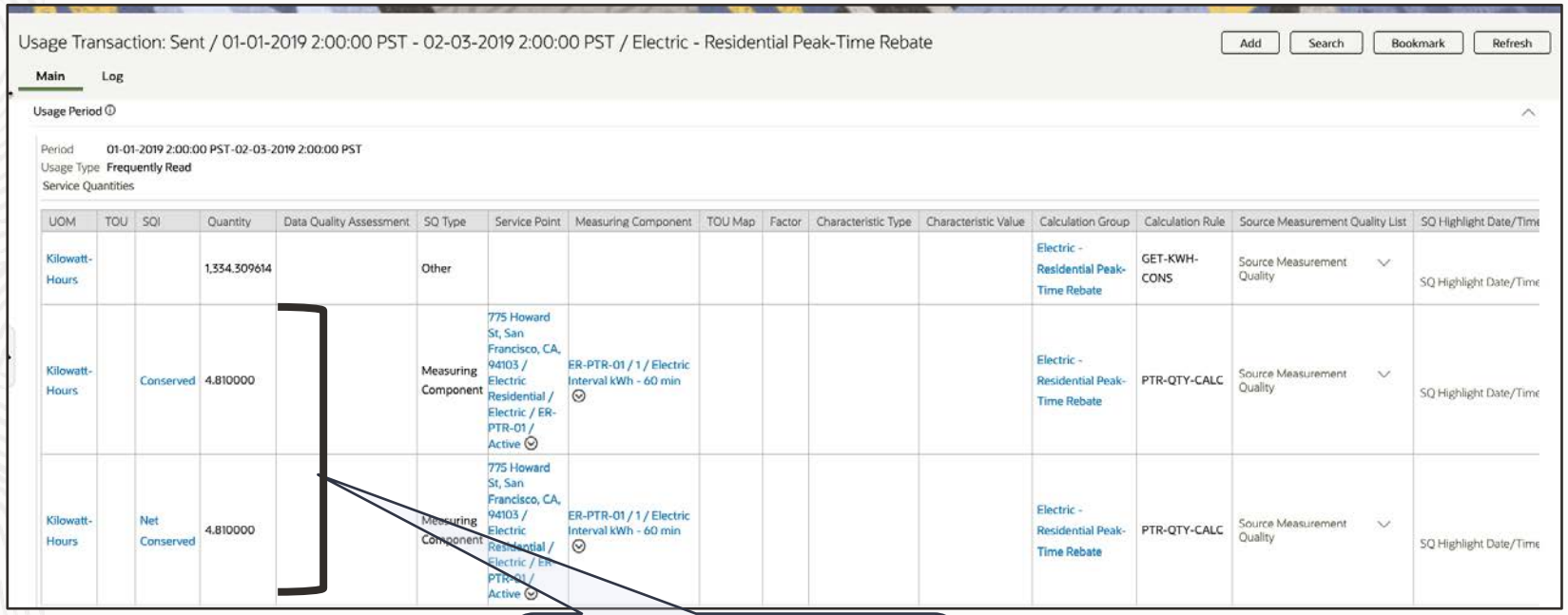
Usage Calculation Results

Provide list of usage calculation rule(s) that will output the desired results for billing



Usage Rule SQI results as Dynamic Event Option period is identified

1. Transition from Register to Interval or TOU based billing

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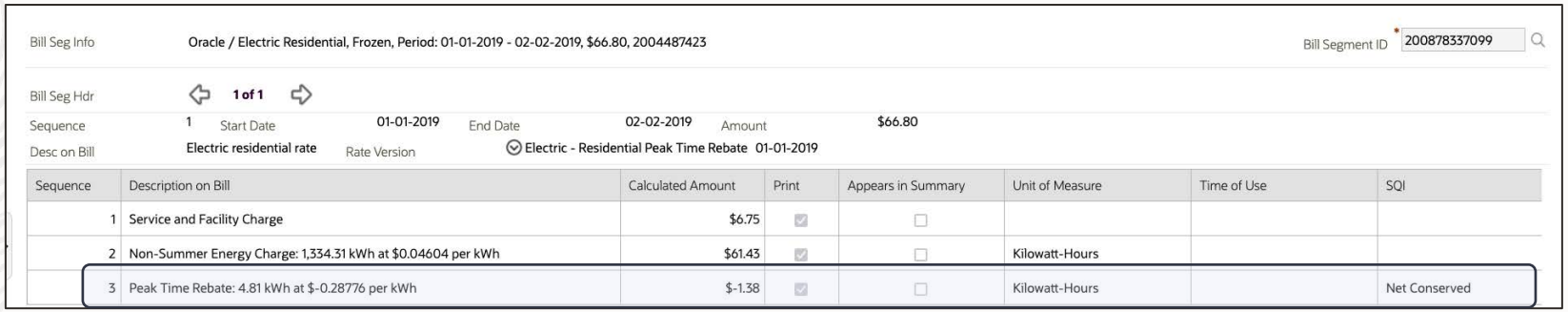
Rate Schedule Execution- Bill Calculation Results

Usage Calculation Rules Service Quantity (SQ) results are then passed to rating calculations (SQ rule- Quantity times Bill Factor)



Bill Seg Info: Oracle / Electric Residential, Frozen, Period: 01-01-2019 - 02-02-2019, $66.80, 2004487423

Bill Segment ID: 200878337099

Bill Seg Hdr: 1 of 1

Sequence: 1 Start Date: 01-01-2019 End Date: 02-02-2019 Amount: $66.80

Desc on Bill: Electric residential rate Rate Version: Electric - Residential Peak Time Rebate 01-01-2019

Sequence	Description on Bill	Calculated Amount	Print	Appears in Summary	Unit of Measure	Time of Use	SQI
1	Service and Facility Charge	$6.75	☑	☐			
2	Non-Summer Energy Charge: 1,334.31 kWh at $0.04604 per kWh	$61.43	☑	☐	Kilowatt-Hours		
3	Peak Time Rebate: 4.81 kWh at $-0.28776 per kWh	$-1.38	☑	☐	Kilowatt-Hours		Net Conserved

1. Transition from Register to Interval or TOU based billing

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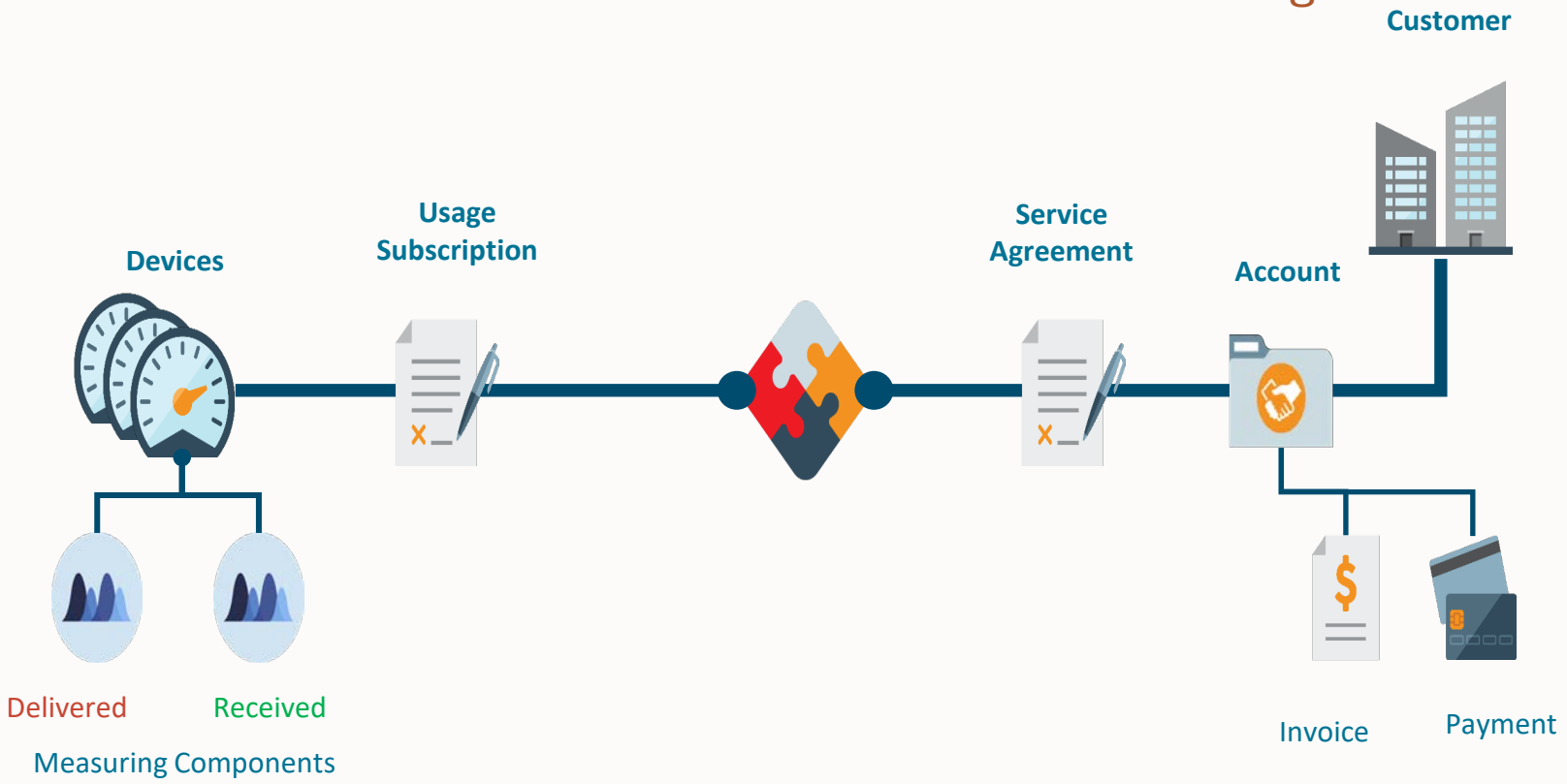
Standard Data Model

Standard data model allows for individual Net Metering



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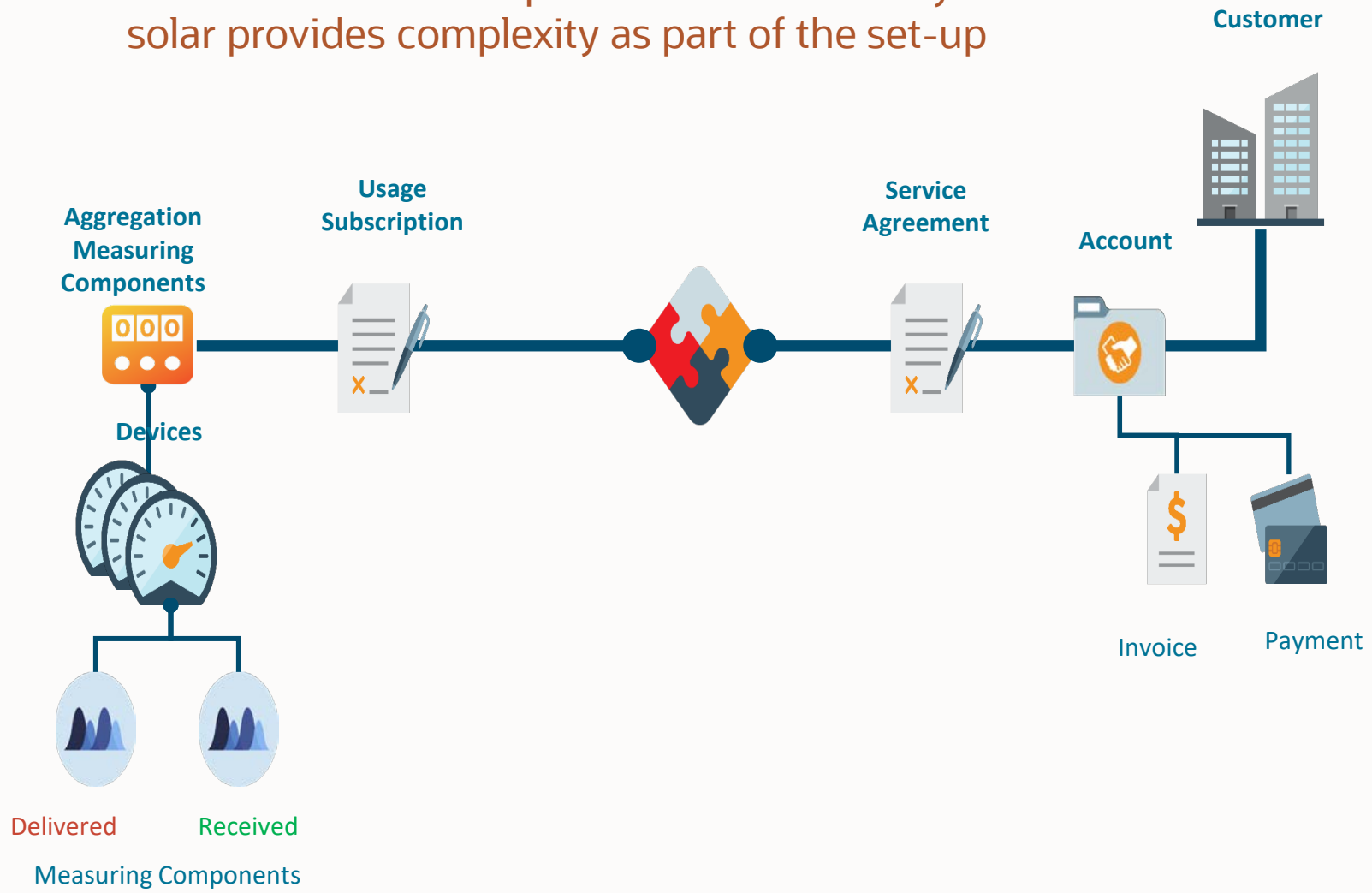
Standard Data Model

Introduction of concepts such as community and shared solar provides complexity as part of the set-up



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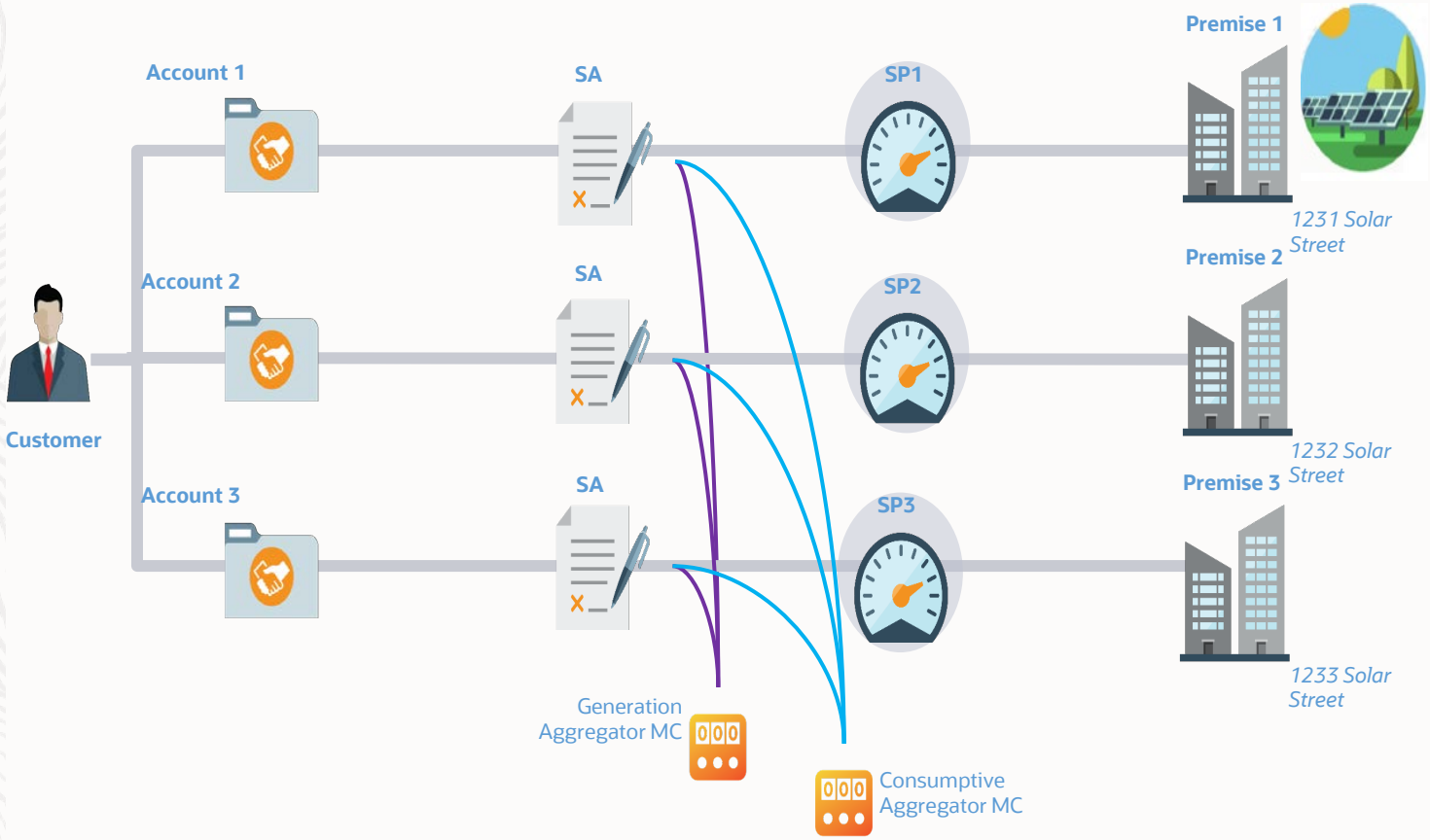
Complex Solar Arrangement and Set-up

Introduction of concepts such as community and shared solar provides complexity as part of the set-up



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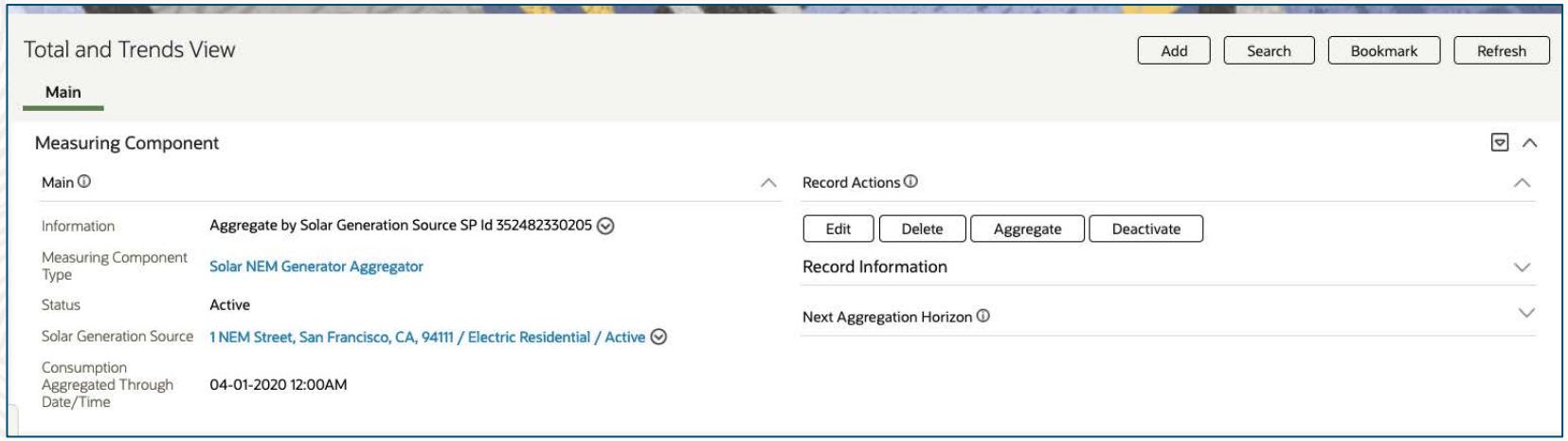
Dynamic Aggregation

Use of dynamic aggregation will allow to such as community and shared solar provides complexity as part of the set-up



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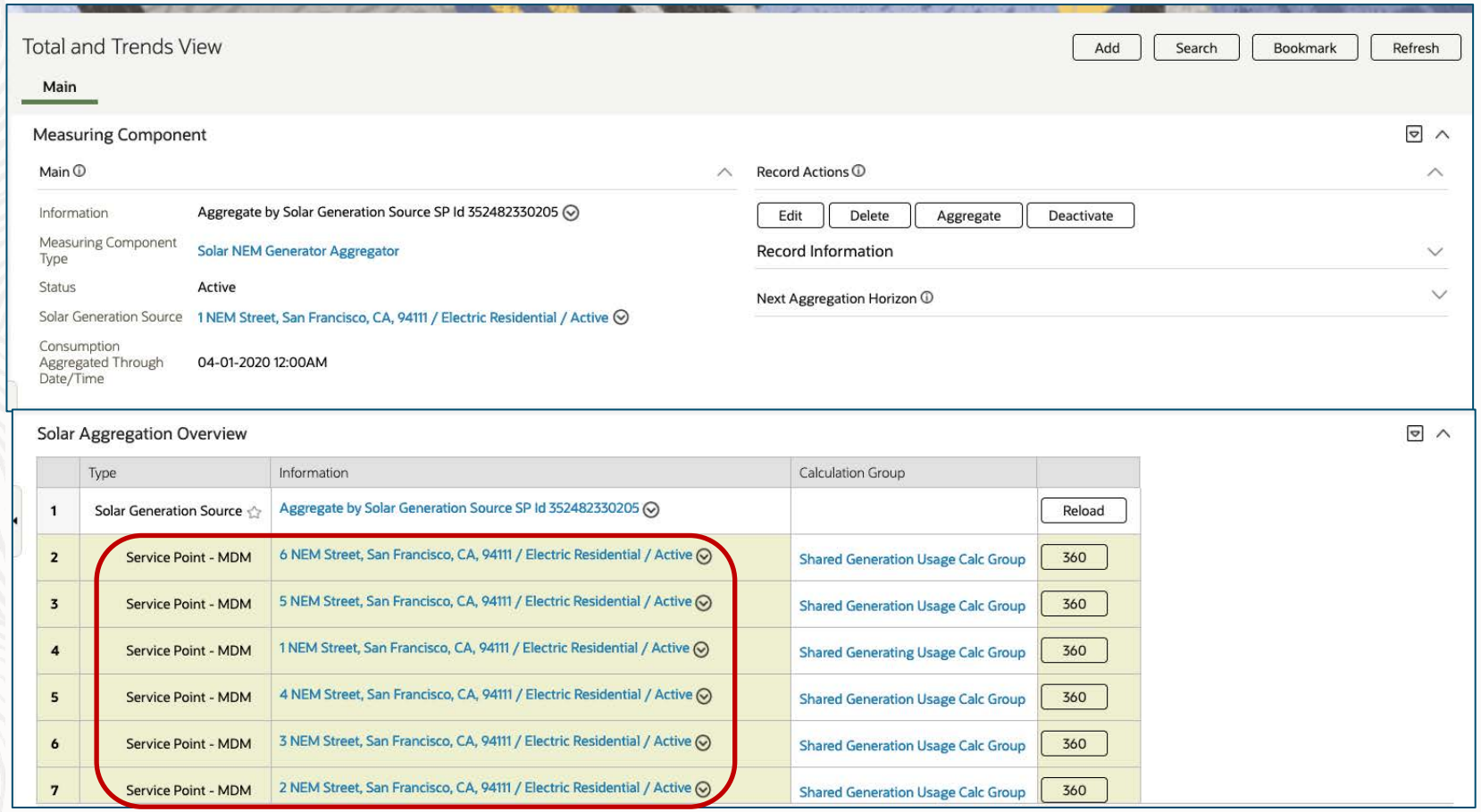
Dynamic Aggregation

Use of dynamic aggregation will allow to monitor periodic load of community and shared generation and load as required



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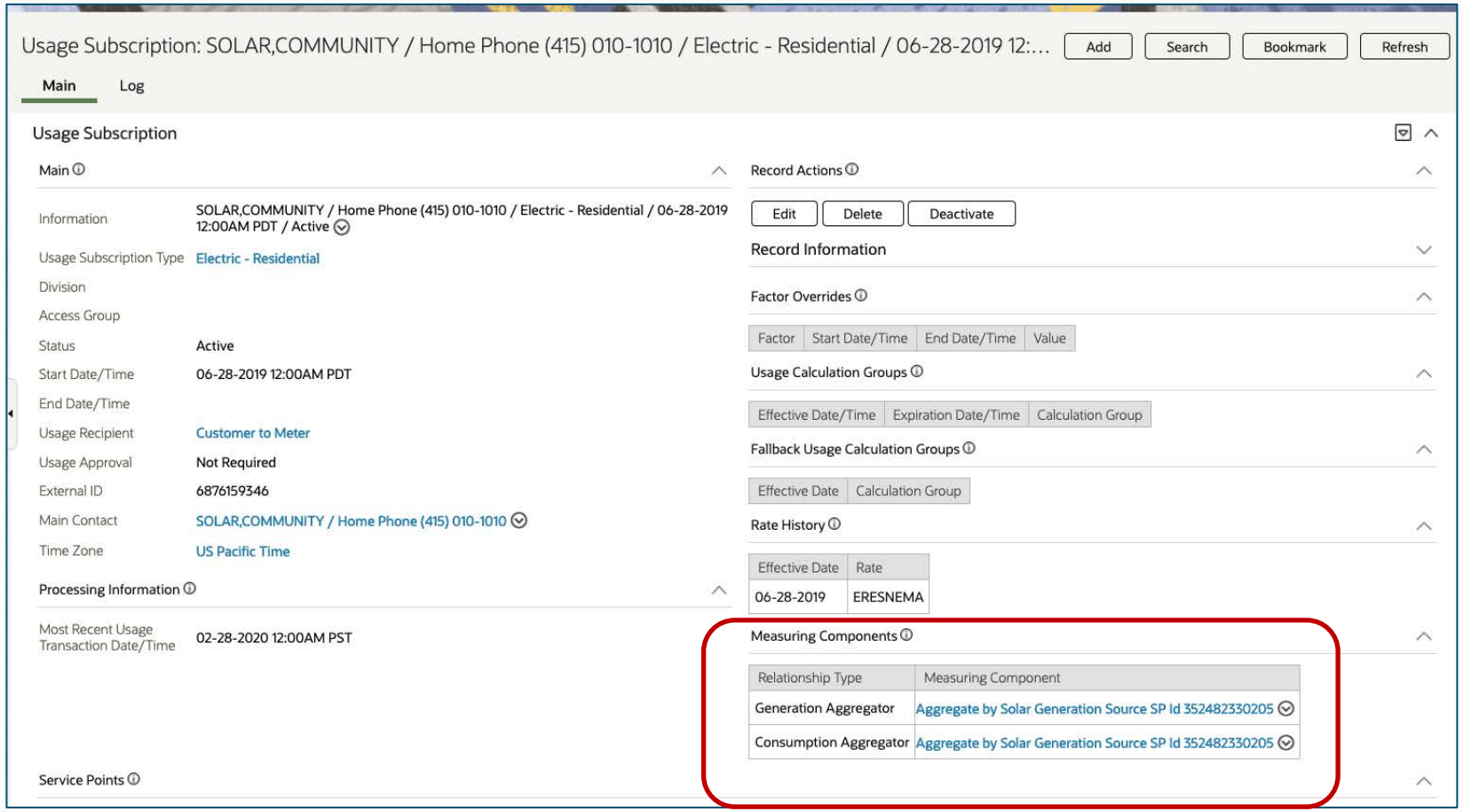
Usage Subscription – Aggregation MCs

Provide a relationship link to aggregation MCs to be used as part of usage calculation process



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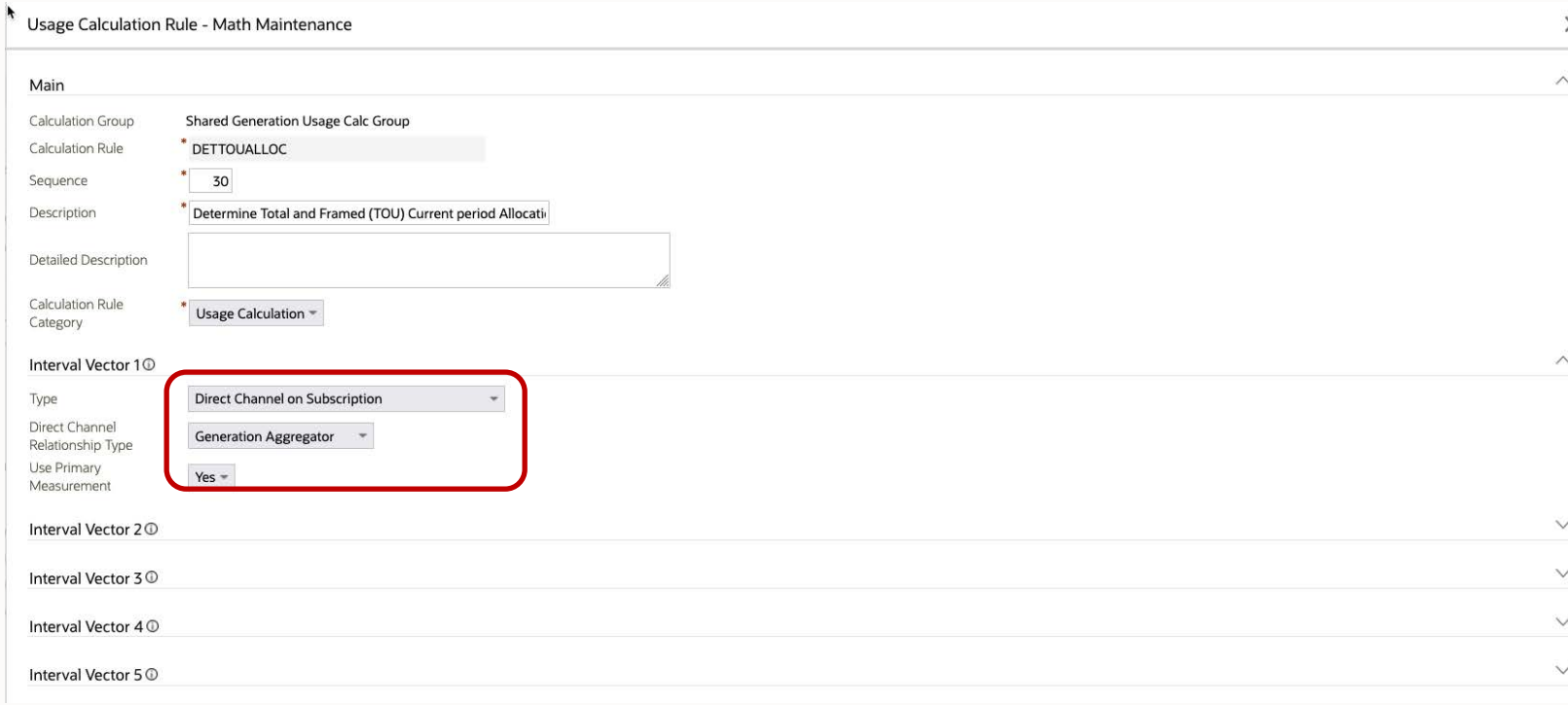
Usage Rule

Standard Vector and Interval Calculation rules will allow for reference to established Aggregation MC associated with the Usage Subscription



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Usage Calculation Results

Provide list of usage calculation rule(s) that will output the desired results for billing

Usage Transaction: Sent / 01-29-2020 12:00AM PST - 02-28-2020 12:00AM PST / Shared Generation Usage Ca… Add Search Bookmark Refresh

Main Log

Kilowatt-Hours		Aggregated Cumulative Usage	131,779.796280		Other							NEM Cumulative Generation/Usage for Benefitting Account Calc Group	GETCMLOAD
Kilowatt-Hours		Cumulative Generation	44,745.892040		Other							NEM Cumulative Generation/Usage for Benefitting Account Calc Group	GETCMGEN
Kilowatt-Hours		Previous Bill Periods' Allocations	0.000000		Other							NEM Cumulative Generation/Usage for Benefitting Account Calc Group	GETPREVALLC
Kilowatt-Hours		Relative Proportion of Load Percentage	0.060824		Other							Shared Generation Usage Calc Group	GET_CPERALL
Kilowatt-Hours		Bill Period Allocation - Scalar	2,721.638287		Other							Shared Generation Usage Calc Group	CALCCURPER

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2. Demand Response/ Event base pricing e.g. Peak Time Rebate

3. Net Energy Metering and Community Solar Programs

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Rate Schedule Execution- Bill Calculation Results

Usage Calculation Rules Service Quantity (SQ) results are then passed to rating calculations (SQ rule- Quantity times Bill Factor).

Bill Seg Info: Oracle / E-Residential NEM-A Sub SA, Freezable, Period: 01-28-2020 - 02-27-2020, $1,399.56, 1992166716

Bill Segment ID: 199295298325

Bill Seg Hdr: 1 of 2

Sequence: 1 Start Date: 01-29-2020 End Date: 02-27-2020 Amount: $1,399.56

Desc on Bill: Energy Charges Rate Version: Electric NEM Energy Charges (Benefitting) 01-01-2010

Sequence	Description on Bill	Calculated Amount	Print	Appears in Summary	Unit of Measure	Time of Use
1	300.00 kWh at $0.282 per kWh	$84.60	☑	☐	Kilowatt-Hours	
2	4,412.61 kWh at $0.298 per kWh	$1,314.96	☑	☐	Kilowatt-Hours	
3	0.00 kWh at $-0.282 per kWh	$0.00	☐	☐	Kilowatt-Hours	

1. Transition from Register to Interval or TOU based billing

2. Demand Response/ Event base pricing e.g. Peak Time Rebate

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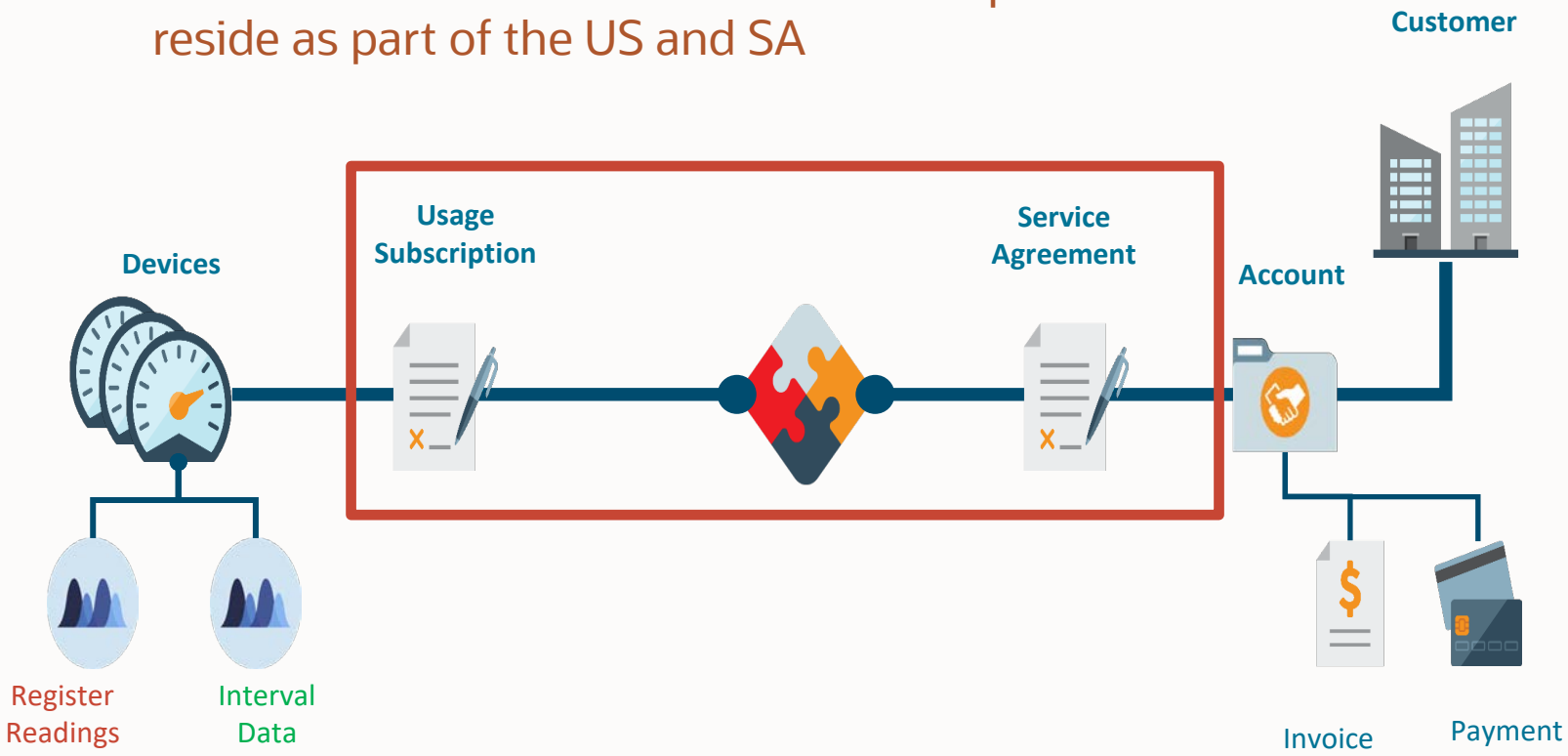
Standard Data Model

Standard data model allows for various parameters that reside as part of the US and SA



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2. Demand Response/ Event base pricing e.g. Peak Time Rebate

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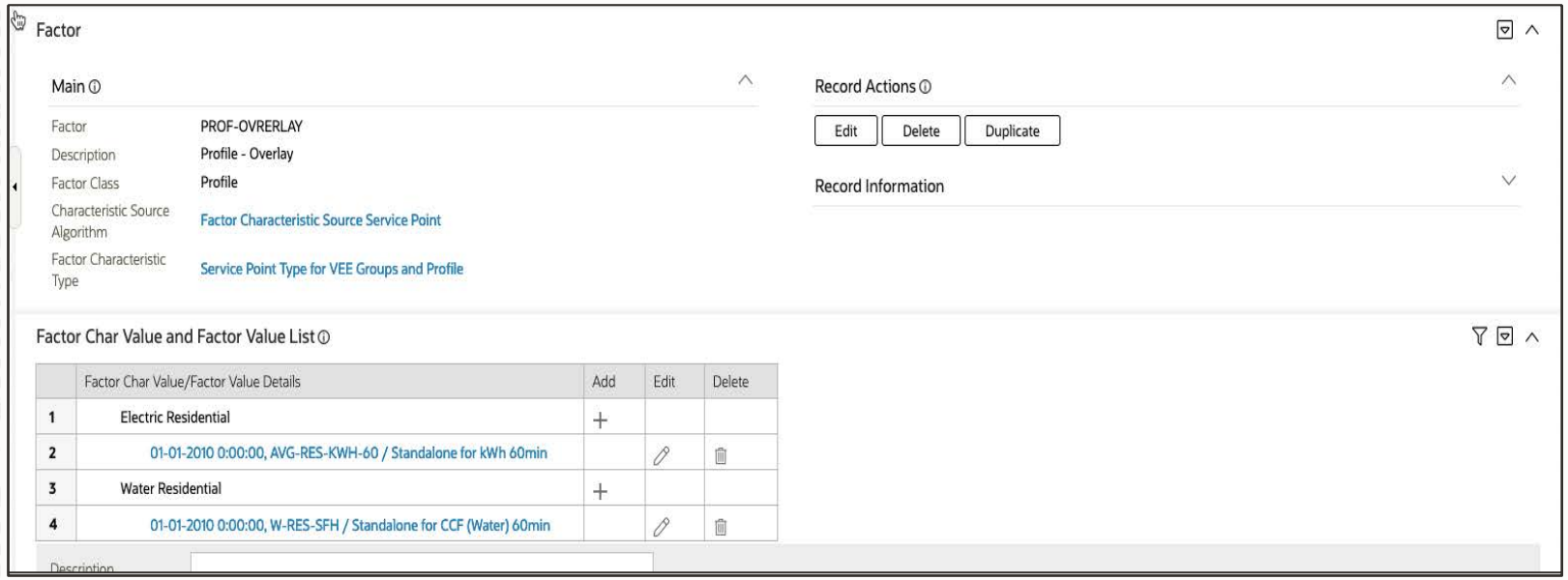
4. Complex Pricing and Contracts

Factors

Factors can be used to reference billing factors (flat, rate charges), but they can also be used for baseline comparisons, interval data adjustments and pricing adjustments when referencing a profile



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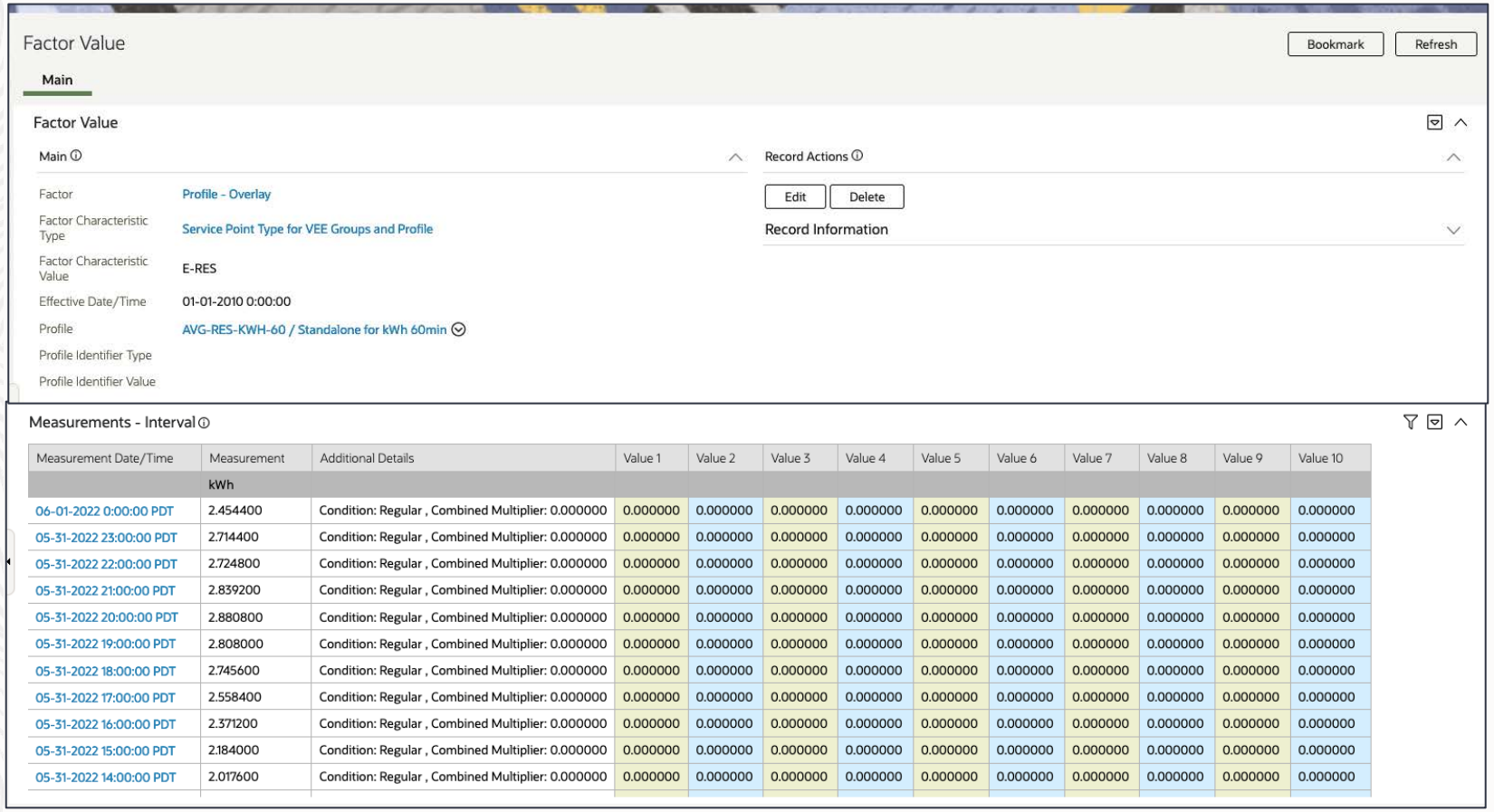
Profile Factor- Standalone Measuring Component

Profile Factors can be linked to a Standalone Measuring Component to include any type of time series data that is required as part of interval data required calculations.



Measurement Date/Time	Measurement	Additional Details	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7	Value 8	Value 9	Value 10
	kWh											
06-01-2022 0:00:00 PDT	2.454400	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 23:00:00 PDT	2.714400	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 22:00:00 PDT	2.724800	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 21:00:00 PDT	2.839200	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 20:00:00 PDT	2.880800	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 19:00:00 PDT	2.808000	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 18:00:00 PDT	2.745600	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 17:00:00 PDT	2.558400	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 16:00:00 PDT	2.371200	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 15:00:00 PDT	2.184000	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
05-31-2022 14:00:00 PDT	2.017600	Condition: Regular , Combined Multiplier: 0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

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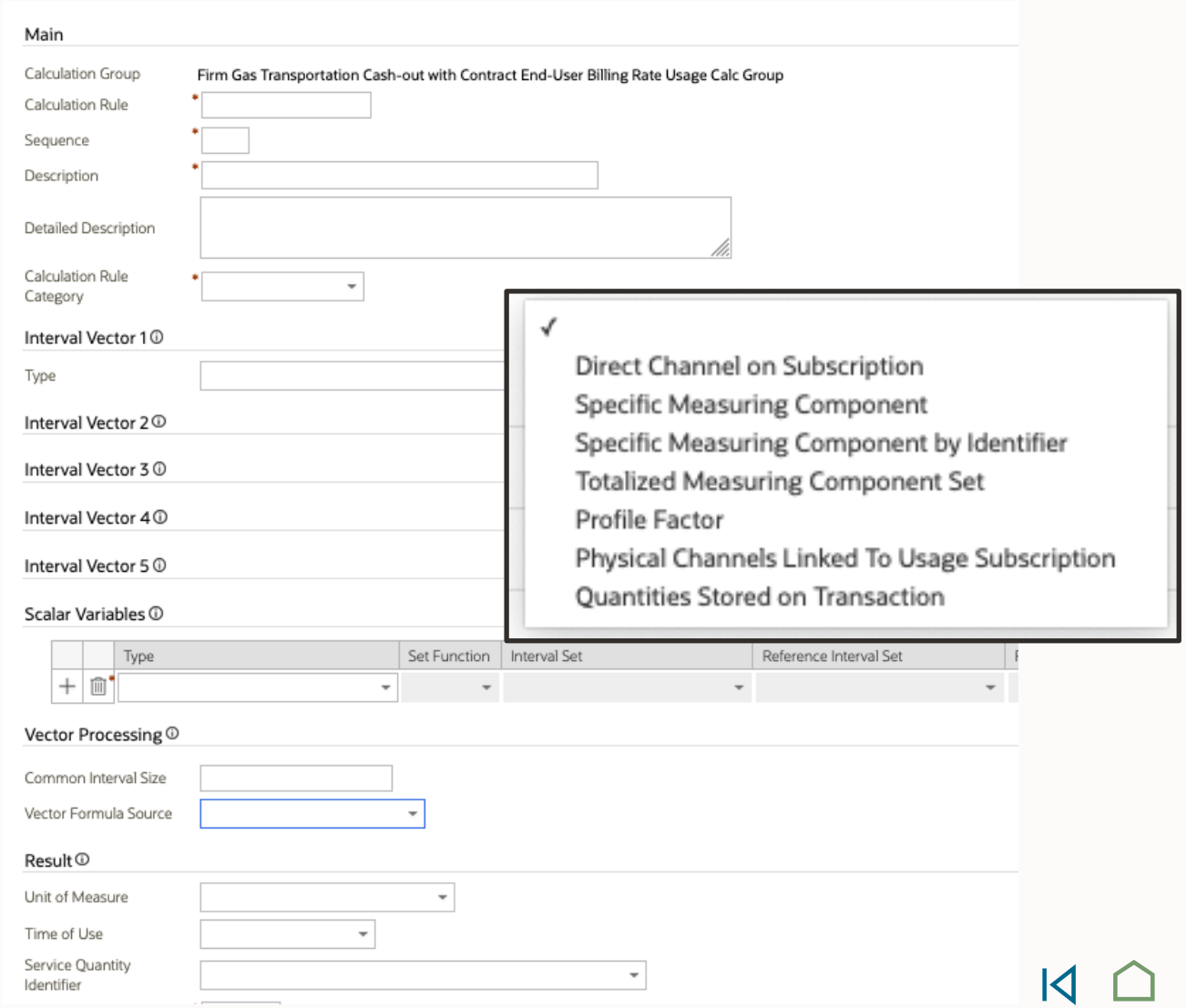
Usage Rule reference and use of Profile Factors*

Factors can be used for interval pricing and used as part of usage and billing processing



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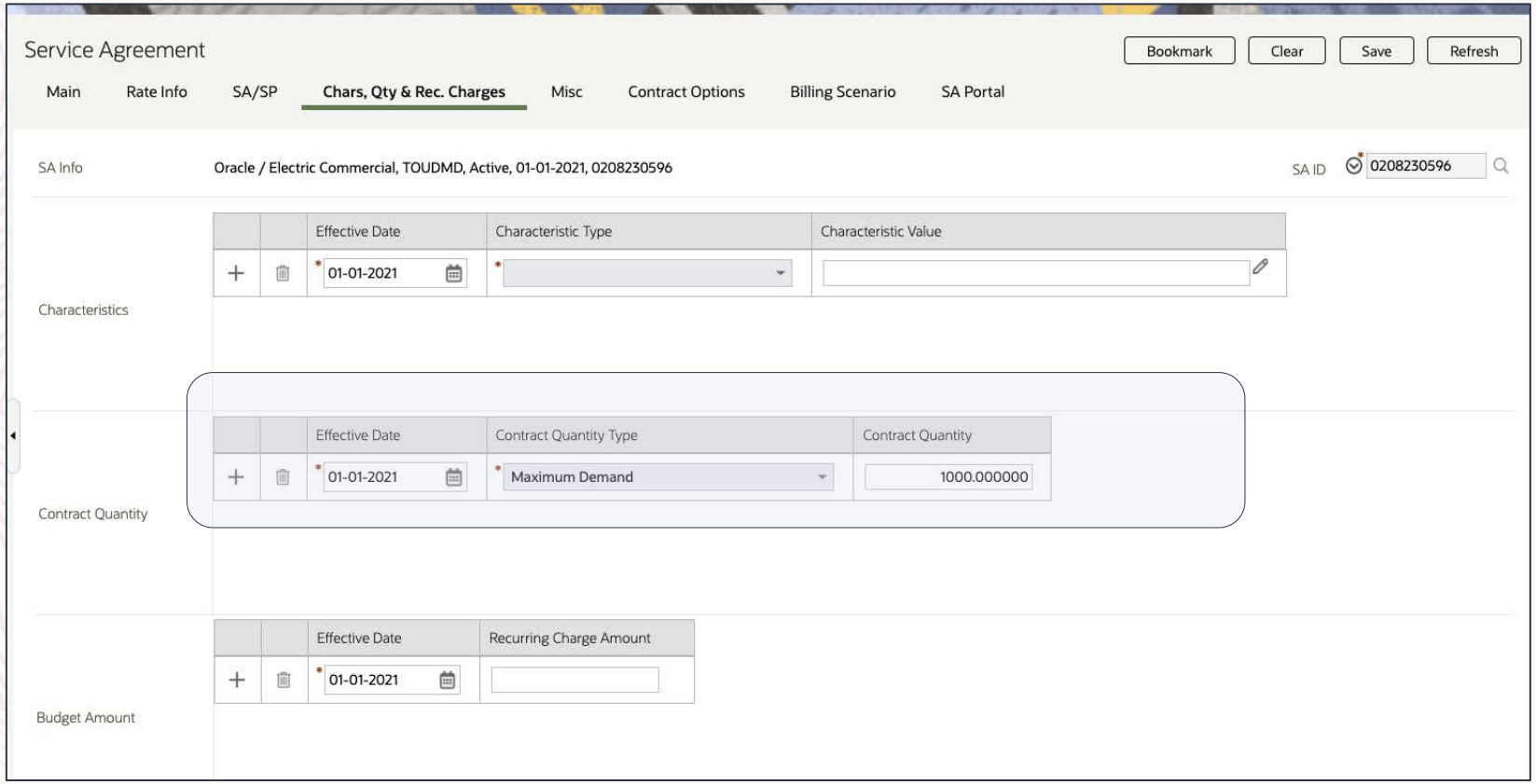
Contract Quantities

Contract Quantities are available to be configured for customer specific parameters



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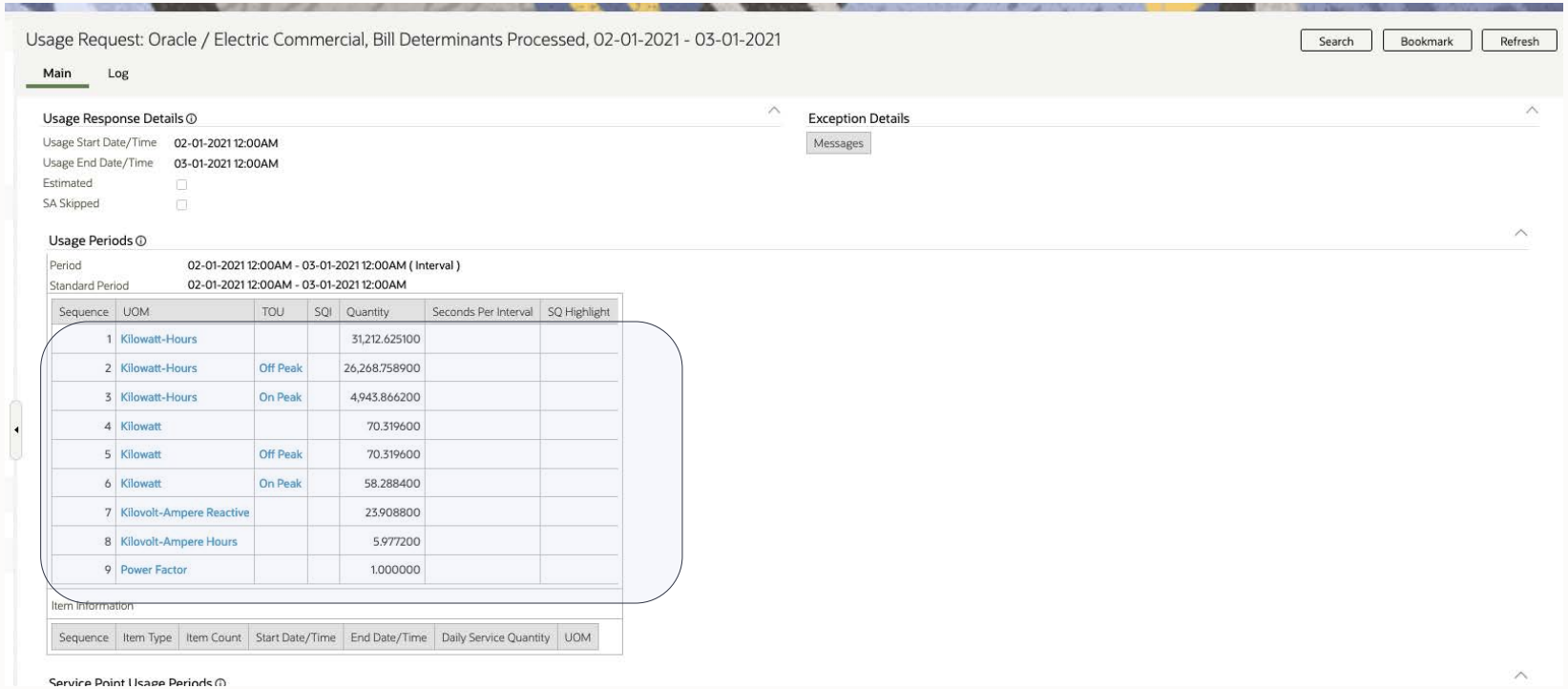
Usage Calculation results

Sometimes usage calculation rules service quantity (SQ) results are not enough and more steps for pre-billing are necessary…



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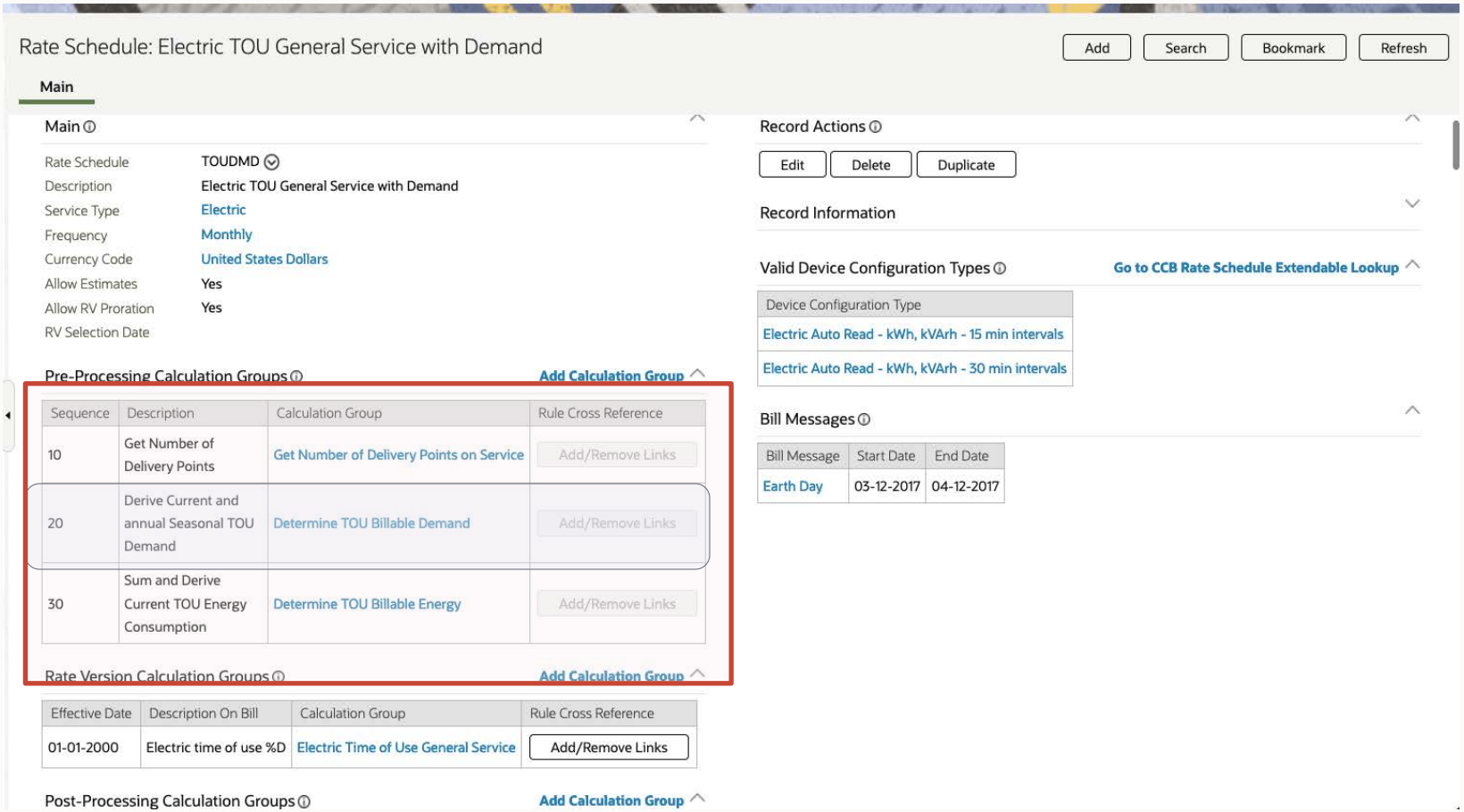
Rate Schedule- Pre-Processing Calculation

Additional pre-billing steps are required in addition to usage bill determinant processing is required



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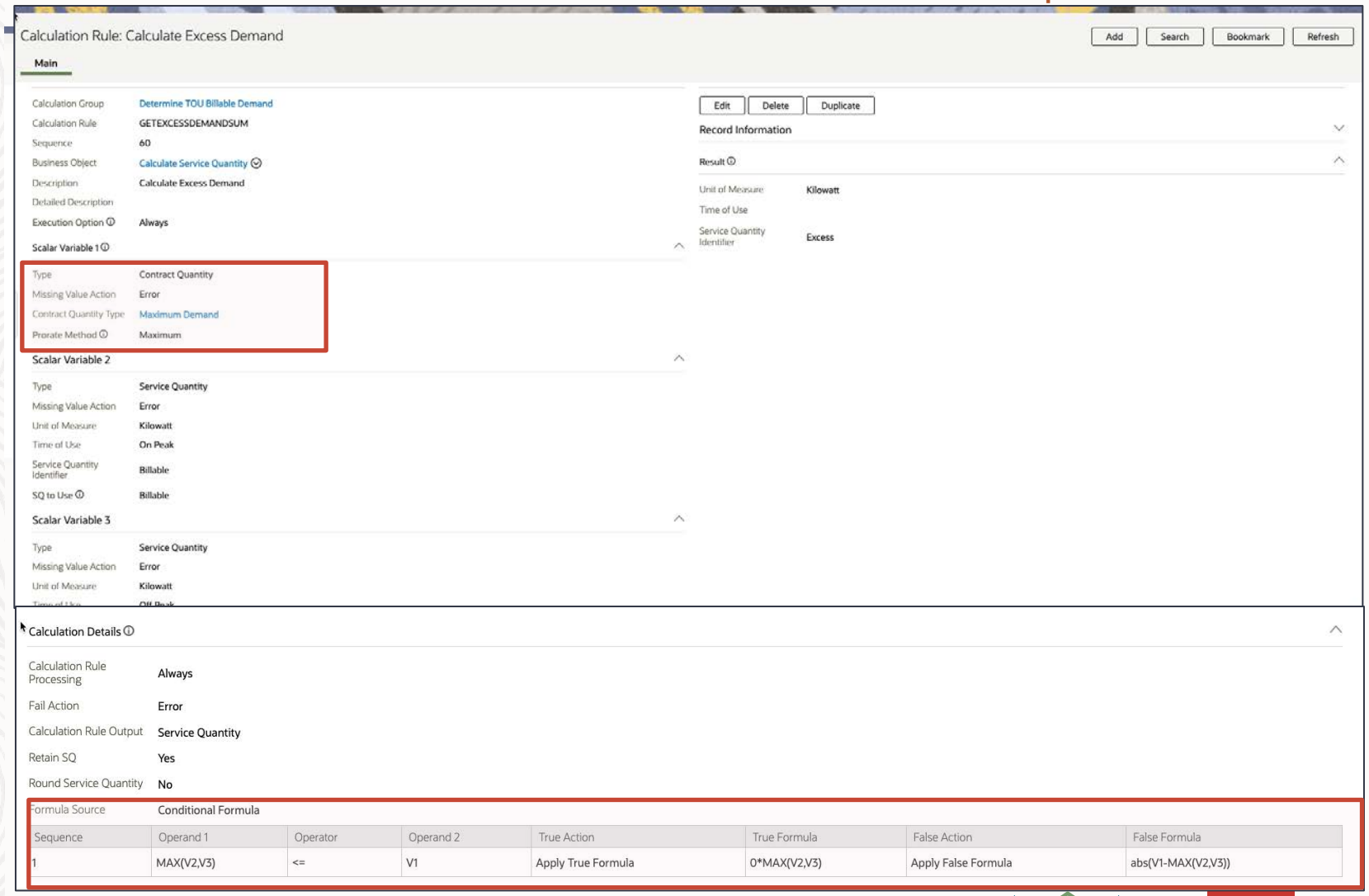
Rate Schedule- Pre-Processing Calculation

Service Quantities evaluation based on contract quantities and established factor values or historical service quantities



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Rate Schedule Execution- Bill Calculation Results

Usage Calculation Rules Service Quantity (SQ) results are then passed to rating calculations (SQ rule- Quantity times Bill Factor)

Bill Seg Info: Oracle / Electric Commercial, Freezable, Period: 02-01-2021 - 03-01-2021, $8,360.55, 0208230596 — Bill Segment ID: 020305114590

Bill Seg Hdr: 1 of 1

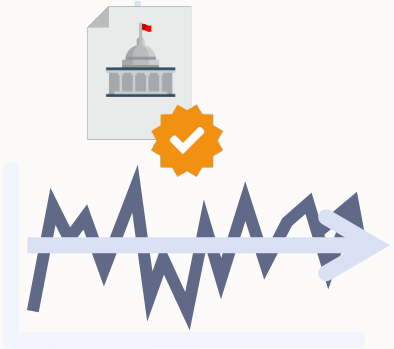
Sequence: 1 — Start Date: 02-02-2021 — End Date: 03-01-2021 — Amount: $8,360.55

Desc on Bill: Electric time of use — Rate Version: Electric TOU General Service with Demand 01-01-2000

Sequence	Description on Bill	Calculated Amount	Print	Appears in Summary	Unit of Measure	Time of Use
1	Service Charge: 1.00 delivery points @ $1,500.00	$1,500.00	☑	☐		
2	Admin Charge: 1.00 delivery points @ $350.00	$350.00	☑	☐		
3	On Peak Demand Charge: 300.00 On Peak kW @ $10.69	$3,207.00	☑	☐	Kilowatt	On Peak
4	Maximum Demand Charge: 300.000 Maximum kW @ $6.18	$1,854.00	☑	☐	Kilowatt	
5	Excess Demand Charge: 0.00 Excess kW @ $10.69	$0.00	☐	☐	Kilowatt	
6	On peak Energy Charge: 4,943.87 On Peak kWh @ $0.06103	$301.72	☑	☐	Kilowatt-Hours	On Peak
7	Off peak 200 HUD: 11,836.29 kWh at $0.04879 per kWh (0 - 11,836.29 kwh)	$577.49	☑	☐	Kilowatt-Hours	Off Peak
8	Off peak 200 HUD: 11,836.30 kWh at $0.00871 per kWh (11,836.29 - 23,672.59 kwh)	$103.09	☑	☐	Kilowatt-Hours	Off Peak
9	Off peak 200 HUD: 2,596.17 kWh at $0.00502 per kWh (23,672.59 - 26,268.76 kwh)	$13.03	☑	☐	Kilowatt-Hours	Off Peak
10	City sales tax 11.5%	$0.00	☐	☑		
11	State sales tax 7.5%	$454.22	☑	☑		
12	Tax total	$454.22	☐	☐		

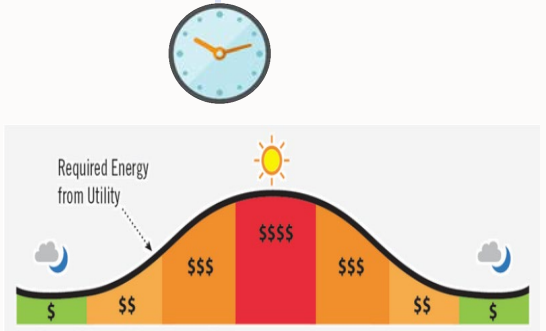
Ready with your AMI Billing Journey TODAY and Beyond!!!!

Volume based Rates



Consumption X $ (Price)

Time-of-Use

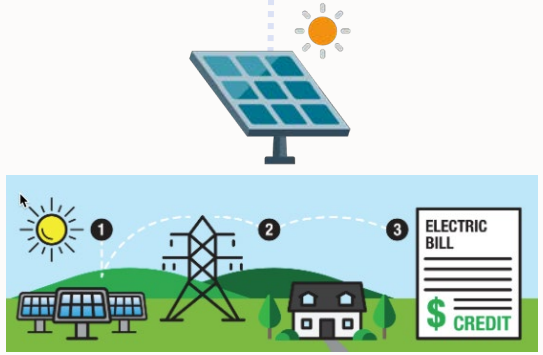


Time-varying rates based on peak usage times

Demand Response

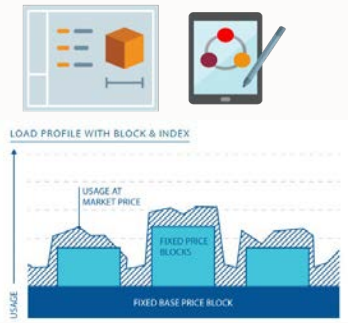
Dynamic Pricing, Event based curtailment billing

Renewable Energy



Managing of renewable solar generation and allocations

More Customer Programs…



Complex Pricing and Contracts

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Conclusion

Our 3 Key Takeaways:

- Oracle Energy & Water has several products that use to support through AMI billing evolution.
- Complex Billing concepts are not new they are being normalized with AMI.
- Oracle continues its investments in standardizing these complex billing concepts to allow utilities to quickly implement.
- Please contact us for more information.

Complex Billing Concepts

Oracle's commitment to modern utilities' AMI related billing needs

Ha Bui

Principal Solution Consultant

Oracle Energy & Water

Thank you

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Questions?

Ha.bui@oracle.com
713-591-5343


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