

# Trusted Data Collaboratives for Safe and Sustainable Water

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Principal Architect  
Worldwide Public Sector



# A world with complex water challenges

Innovation and transformation begins with higher utilization of data assets.

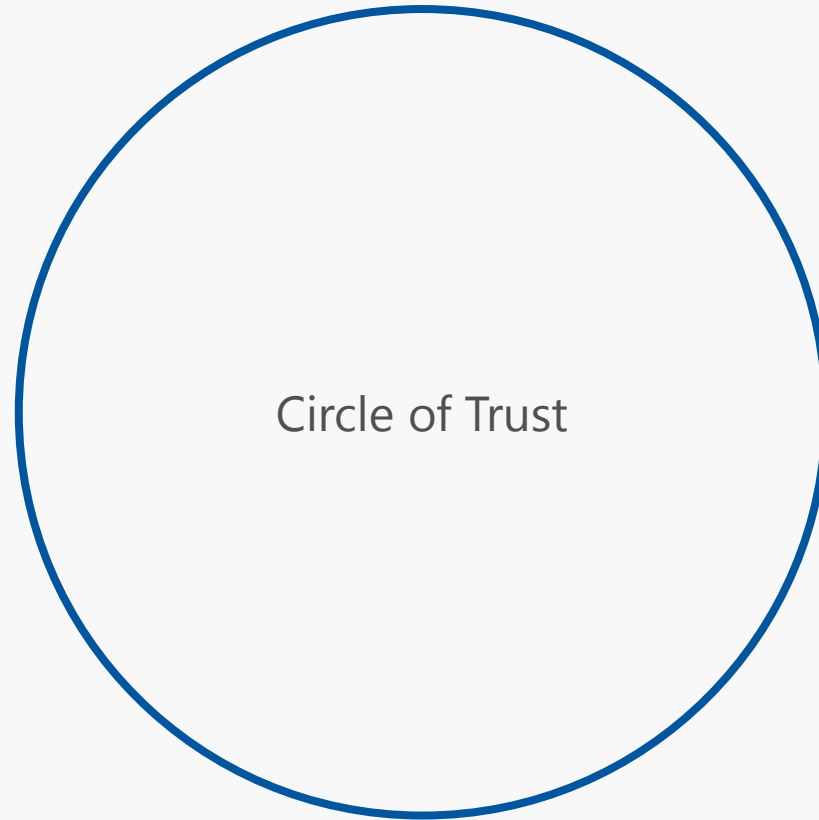
Data can unlock new insights and prompt action

# So why is data sharing so challenging?

Data Accessibility	Limited Usefulness	Trust in 2 <sup>nd</sup> /3 <sup>rd</sup> Party Recipients	Asset Value
<ol style="list-style-type: none"><li>1. What data exists?</li><li>2. Data is stored in difficult to access systems</li><li>3. Data access is expensive (unsustainable)</li></ol>	<ol style="list-style-type: none"><li>1. Sparse or erroneous data</li><li>2. Anonymized</li><li>3. Aggregated / summarized data</li></ol>	<ol style="list-style-type: none"><li>1. Use is not transparent</li><li>2. Compliance with data transfer agreements</li><li>3. Compliance with security and privacy policies</li></ol>	<ol style="list-style-type: none"><li>1. Data leakage</li><li>2. Underutilized data</li><li>3. Data monetization</li></ol>

# What is Trust?

First step to managing "Trust" is to identify who/what is inside and outside the "Circle"



Within a single environment or from a single perspective, trust is relatively easy to ascertain...

# Trust is complex to define and manage in distributed environments

What Trust is depends on who you are, your relationship to the data subject in context with each action

- Different & distinct parties
- Different & distinct data practices
- Different & distinct relationship with the data subject
- Different & distinct obligations

....Naturally "trust" is different & distinct based on the incentives, priorities and expectations for the various parties interacting with shared data



Public Domain

National Security & Critical Infrastructure

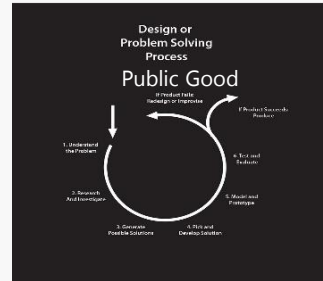


Data-Handling Obligations

Public Sector



Private sector interactions (Entity/Organization)



Public Health and Safety

**Individual Data Subject**

Different relationships with the "customer" (data subject)



Collaborative - Health, Water, Energy, Finance...

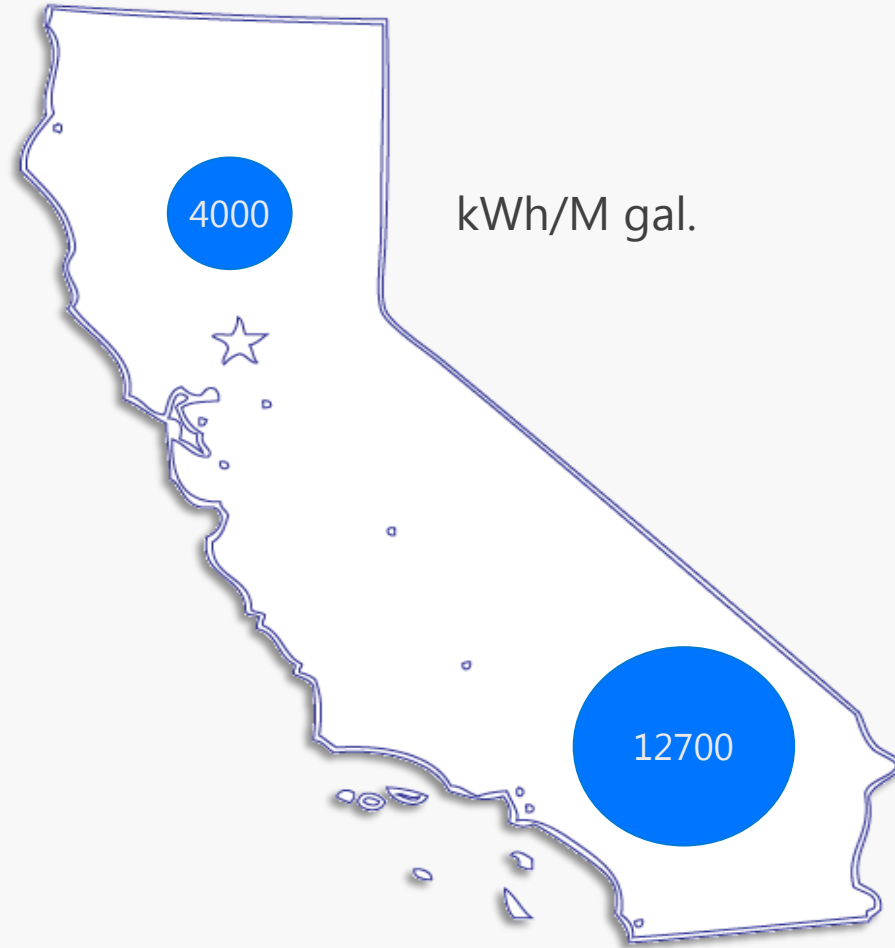
Cloud services, network/platform operators, service providers, carriers and joint products/services interacting with "customer" (data subject)





# UC Davis Center for Water-Energy Efficiency

Leading research at the nexus of Water and Energy Conservation



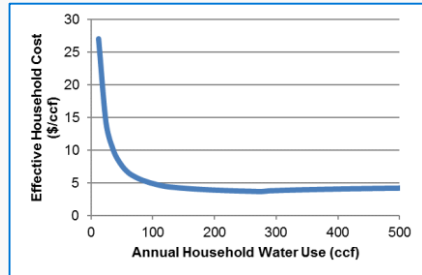
## Energy Use for Water in CA:

- 20% of Electricity (7% infrastructure)
- 30% of Natural Gas
- 2.1M bbl/yr of Diesel
- 100M t. CO<sub>2</sub>-eq.



# Water Conservation through Data Collaboration

*Research scenarios and data sources*



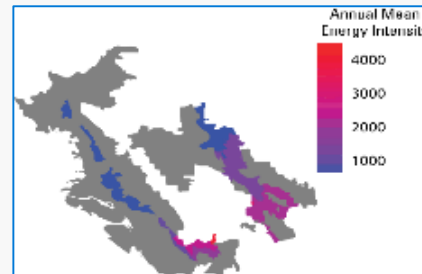
Equitable Rate Structures



Behavior Based Consumption



Energy Savings from Water Conservation



Water-Energy Intensity



Leak Loss Detection



Pipe Burst Prediction

## Common Data Sources

### Enterprise

- Billing and rate structures
- Capital planning
- Budgeting
- Workforce management**

### Infrastructure

Network Data:

- Network design**
- Asset attributes**

Time series data:

- On/off, open/closed
- Flow and pressure
- Energy consumption
- Water quality

### Customer

- Customer types and location \*\***
- Water Meter Data (monthly or AMI) \*\***
- Energy Meter Data (gas/electric) \*\***
- Water conservation programs
- Outreach and communication

\* PCII Protected data

\*\* PII Protected data

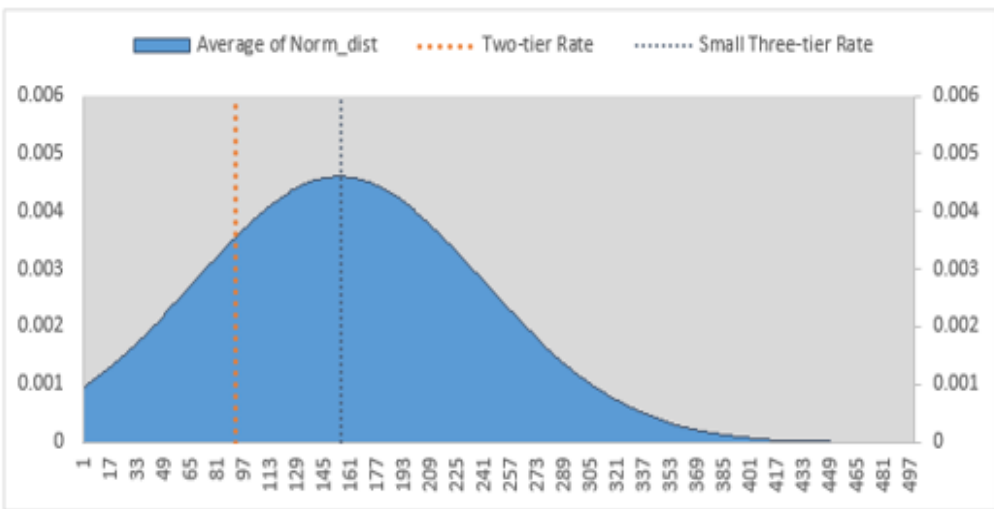
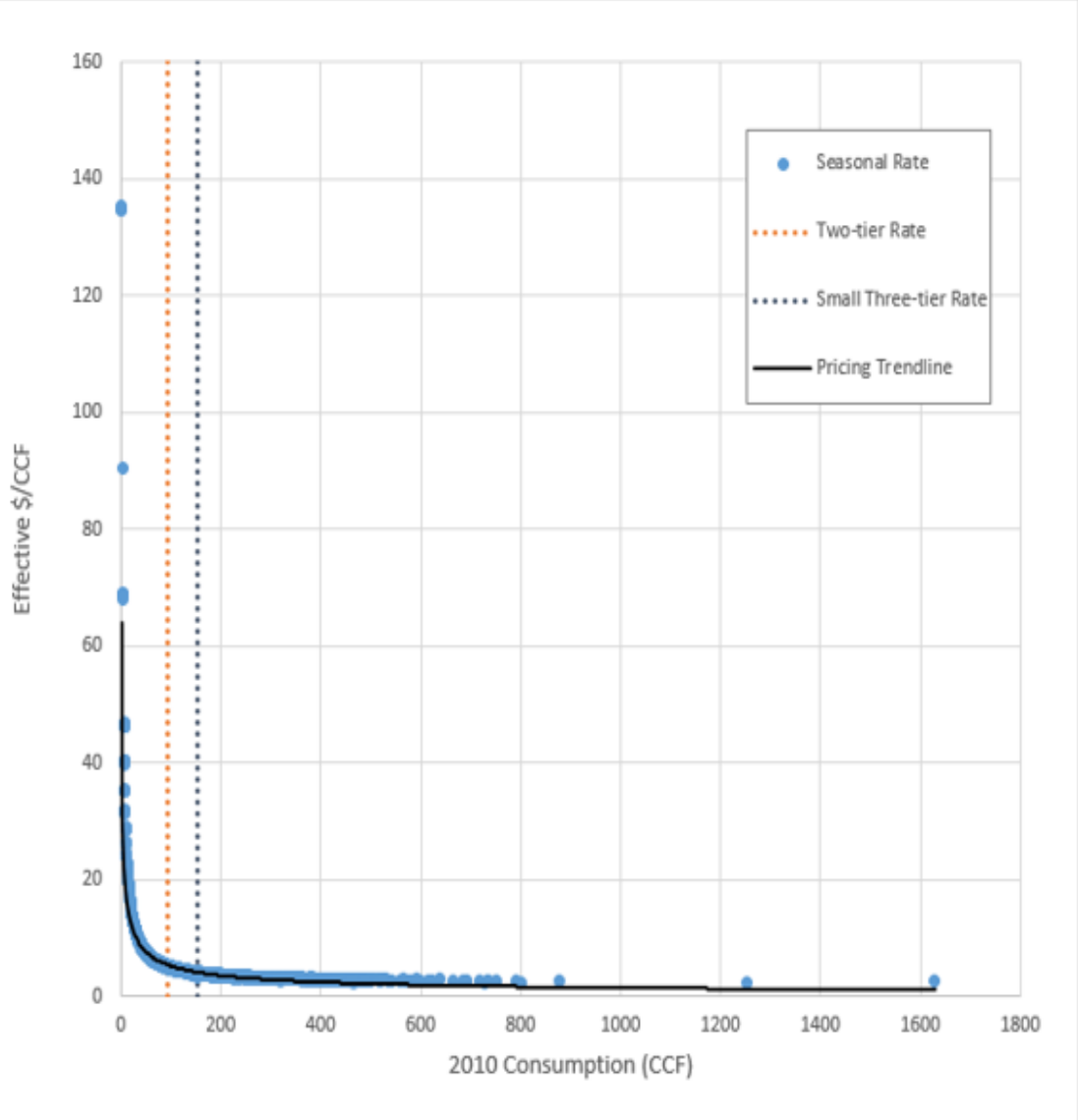
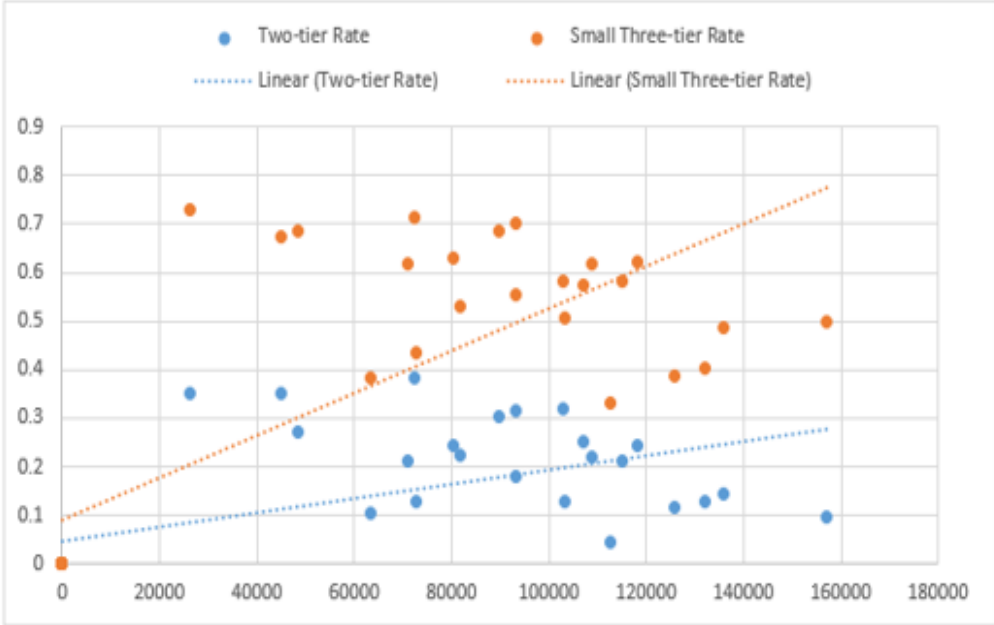
### Water Rate Equity Calculator

#### Two-tier Rate

% Fixed:	40
% Volumetric:	60
Fixed Charge (\$):	\$11.50

Top of Tier (ccf)	Volumetric Charge (\$/ccf)
Tier 1	18   \$1.50
Tier 2	29   \$1.90
Tier 3	0   \$2.33

Monthly Consumption to Fairness (ccf)	7.67
Annual Consumption to Fairness (ccf)	92.0



#### Rate

Adopted Rate	CBFR Rate
Small Three-ti...	Two-tier Rate
Uniform Rate (...)	

#### measure

Median Household Income
Median Value Of Owner Occupied...
Proportion of Population That Ren...



Pressure Zone

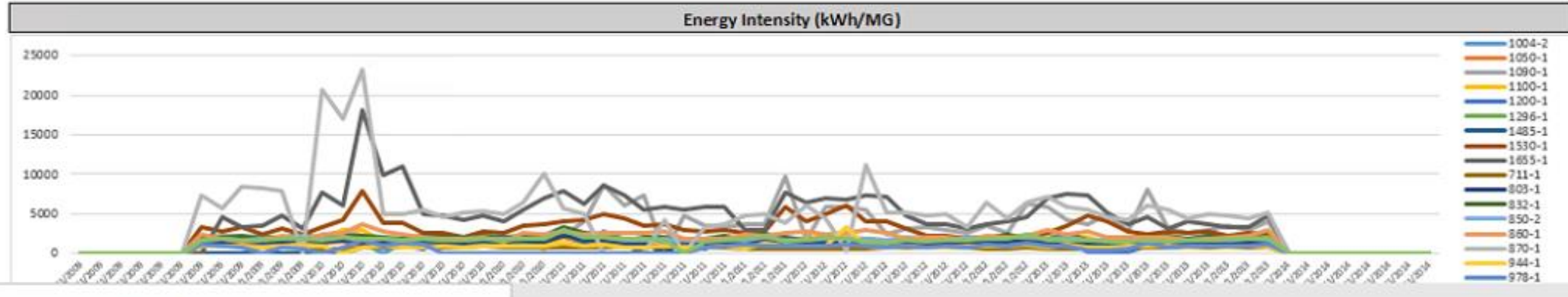
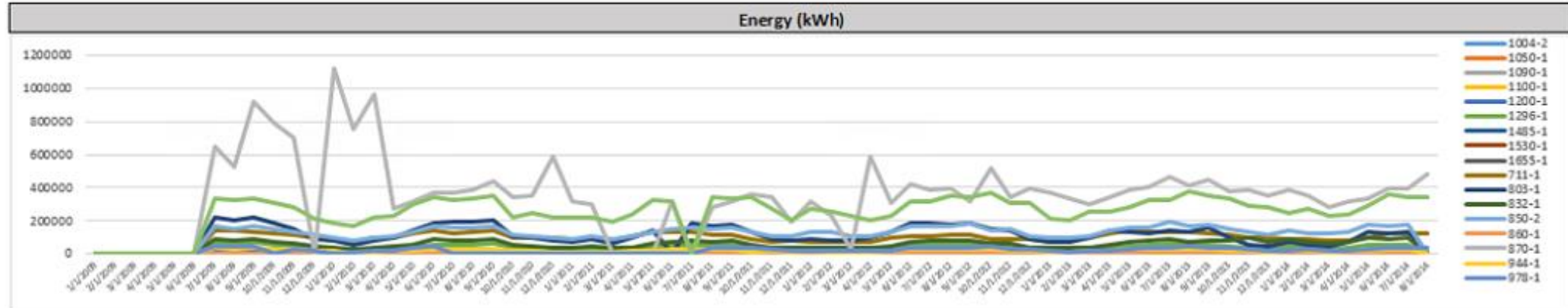
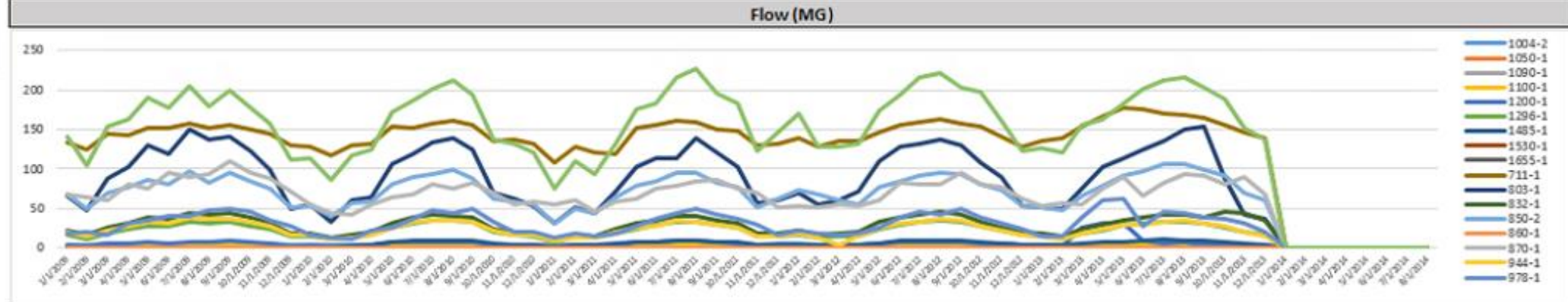
1004-2	1050-1	1090-1
1100-1	1200-1	1296-1
1485-1	1530-1	1655-1
711-1	803-1	832-1
850-2	860-1	870-1
944-1	978-1	980-2

Year

2009	2010	2011
2012	2013	2014

Month

Jan	Feb	Mar
Apr	May	Jun
Jul	Aug	Sep
Oct	Nov	Dec





id

1004-2	1050-1	1090-1
1100-1	1200-1	1296-1
1485-1	1530-1	1655-1
711-1	803-1	832-1
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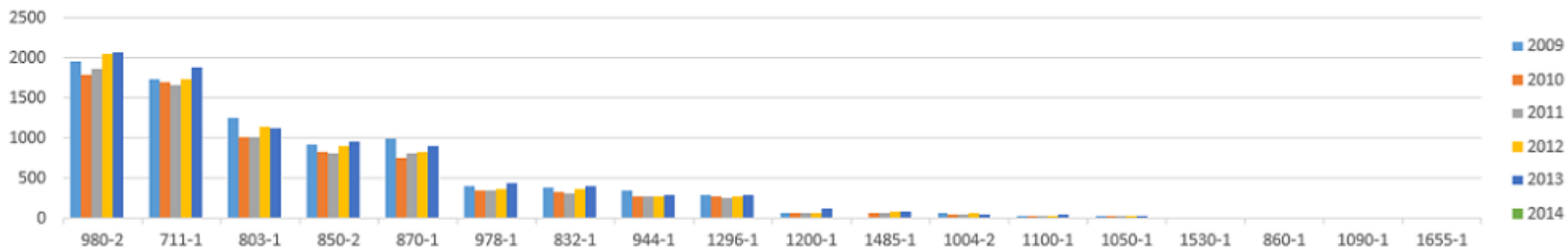
year

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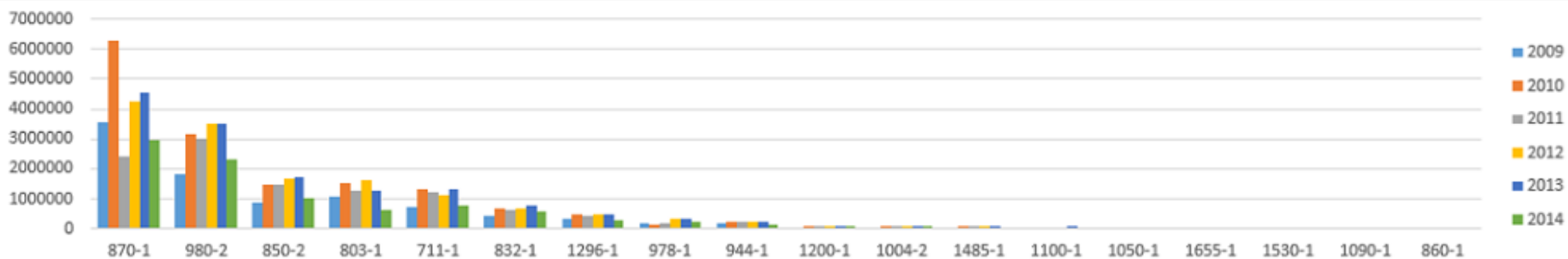
month

Jan	Feb	Mar
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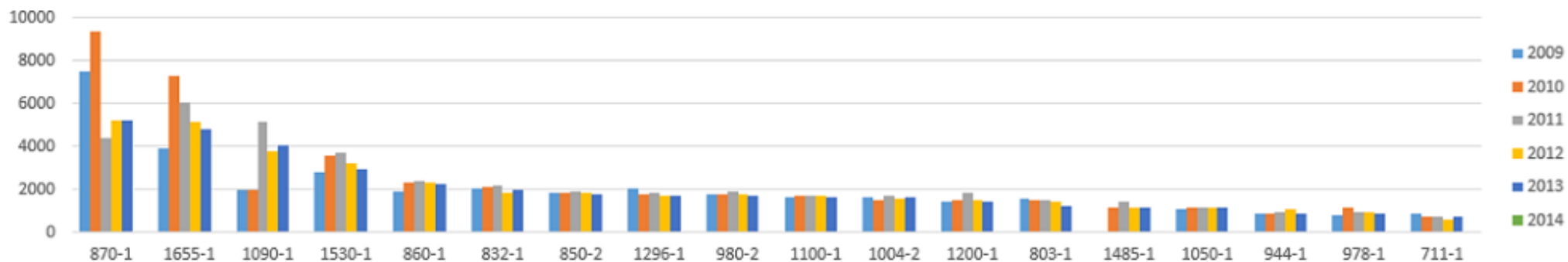
Flow (MG)



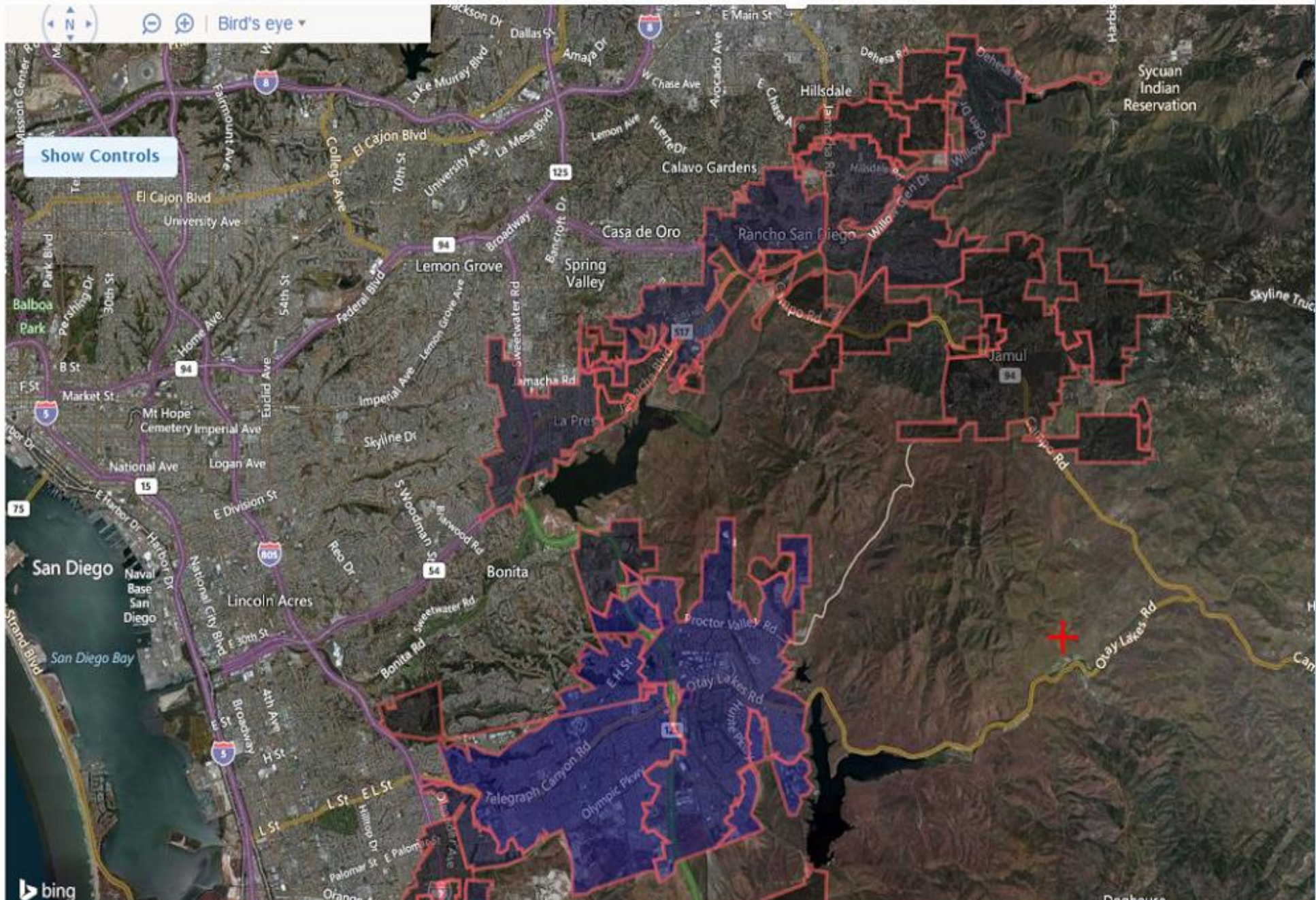
Energy (kWh)



Energy Intensity (kWh/MG)







Navigation icons: Home, Zoom In, Zoom Out, Bird's eye view

Show Controls

Controls

Maps

Table      Opacity

Otay Water     

Query Filter

Pressure Zone:

<input checked="" type="checkbox"/> 1004	<input checked="" type="checkbox"/> 1050	<input checked="" type="checkbox"/> 1090	<input checked="" type="checkbox"/> 1100
<input checked="" type="checkbox"/> 1200	<input checked="" type="checkbox"/> 1296	<input checked="" type="checkbox"/> 1485	<input checked="" type="checkbox"/> 1530
<input checked="" type="checkbox"/> 1655	<input checked="" type="checkbox"/> 340	<input checked="" type="checkbox"/> 458	<input checked="" type="checkbox"/> 485
<input checked="" type="checkbox"/> 493	<input checked="" type="checkbox"/> 520	<input checked="" type="checkbox"/> 550	<input checked="" type="checkbox"/> 570
<input checked="" type="checkbox"/> 580	<input checked="" type="checkbox"/> 624	<input checked="" type="checkbox"/> 640	<input checked="" type="checkbox"/> 657
<input checked="" type="checkbox"/> 711	<input checked="" type="checkbox"/> 803	<input checked="" type="checkbox"/> 832	<input checked="" type="checkbox"/> 850
<input checked="" type="checkbox"/> 860	<input checked="" type="checkbox"/> 871	<input checked="" type="checkbox"/> 944	<input checked="" type="checkbox"/> 978
<input checked="" type="checkbox"/> 980			

Year: 2011 ▾

Month: Jan ▾

Metric: Flow ▾

Query    Reset

Current View

Latitude: 32.62874589

Longitude: -116.63834282

Zoom Level: 12



# CA Water-Energy Trusted Data Collaboratives

Research Data Collaborative(s)

UC Davis Center for Water-Energy Efficiency

Industry Data Collaborative

California Water-Energy Data Collaborative

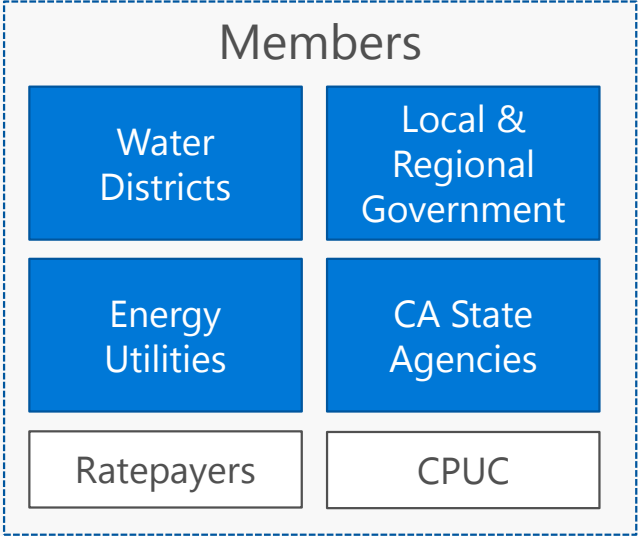
Private Data Collaboratives

Water District Private Data Collaborative

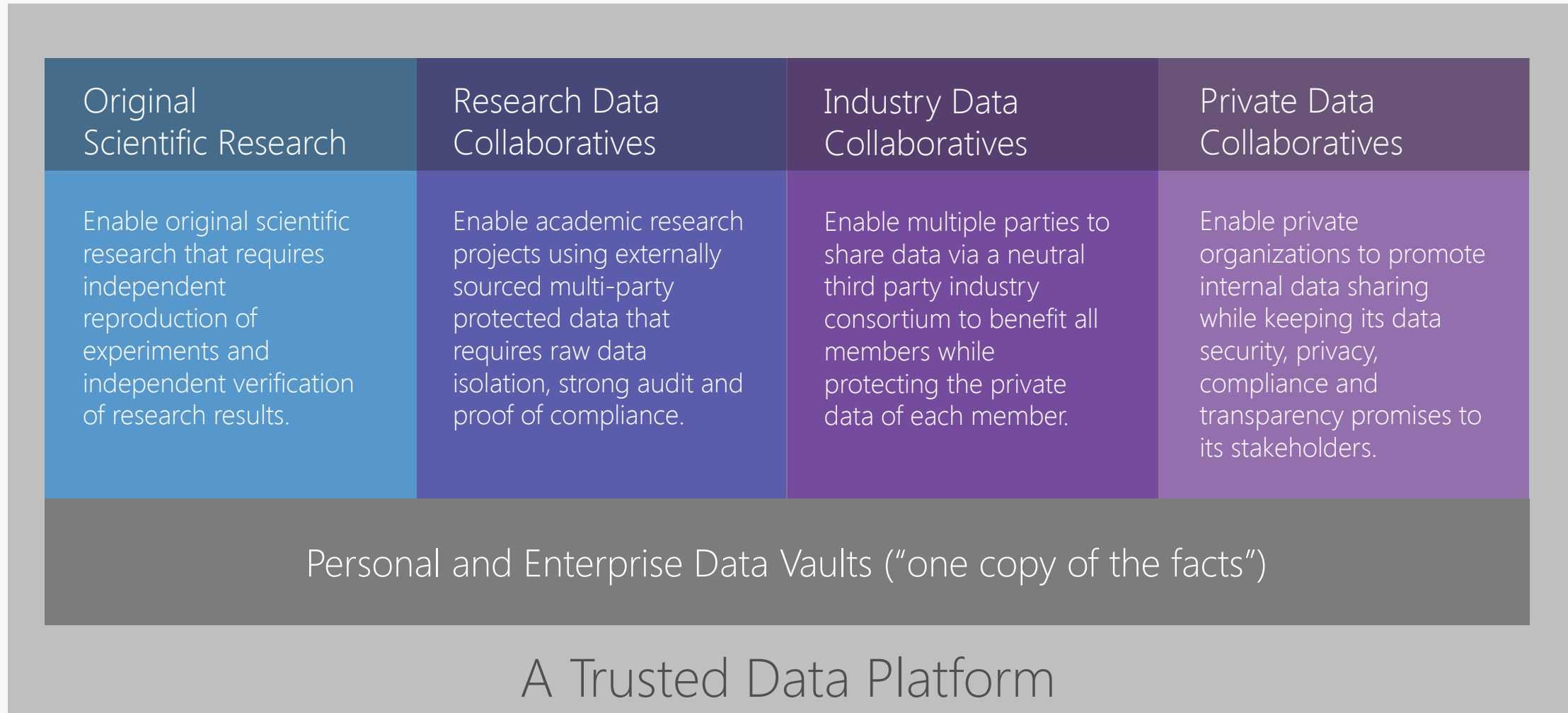
Energy Utility Private Data Collaborative

CWR Private Data Collaborative

California Conservation Data Vault



# Types of Trusted Data Collaboratives



# Data Vault

An hyper-scalable repository of potentially sensitive data from multiple parties that facilitates secure data sharing. Provides mechanisms for data ingestion, policy tagging, encryption, storage and strong access to data while maintaining compliance with a diverse set of effective policies.

## Personal Data Vault

1. Personal Profile
2. Employment Data
3. Product telemetry
4. Personal Health Data

## Enterprise Data Vault

1. Customer data
2. Employee data
3. Product telemetry
4. Internal Operations

## Community Data Vault

1. Civic environmental sensor data

# 3 Principles for Trusted Data Collaboratives

1

## Transparency

Each party must be transparent in their motivations, policies and regulatory constraints regarding data: collection, storage and retention, sharing, use and publication.

2

## Accountability

Encourage broad data sharing whilst protecting the rights and interests of Data Subjects and Data Owners via controls that maintain data provenance, chain of custody and algorithmic/analytical transparency.

3

## “Fair” Value Exchange

The collaborative usage of data demonstrates a fair value exchange between data providers (e.g. data subjects and/or data owners) and data consumers

*These three principles form the basis of an operational **Trust Framework**.*



## OUR COMMITMENT TO **TRUST**



TRANSPARENCY



PRIVACY



COMPLIANCE



SECURITY





# Microsoft mission

Empower every person and every organization on the planet to achieve more

