METERING **SOLUTIONS**

Advanced Metering Infrastructure (AMI)

More than Just Meter Reading

ASCE Winter Meeting
March 7th, 2023

Alabama Power

Why We're Here

Alabama Power

2007

Started building out the state's largest "Advanced Metering Infrastructure" (AMI) system to service our 1.5M customers

2019

Opened the APC network to water and gas utilities who want to realize the benefits of AMI for their system

Traditional Reading Options

Manual

Each meter is visually inspected, and that data is manually entered

Drive-By (AMR)

A form of communication technology that water utilities use to collect water consumption and status data from water meters. AMR systems can be either walk-by or drive-by

Build Your Own Network (AMI)

Utility builds and maintains their own infrastructure

AMI Benefits

8,760 Meter Reads Annually

Increased Employee Safety

Improved Operational Efficiency

Increased Billing Accuracy

Access to Real Time Data & Analytics

Resource Allocation Opportunity

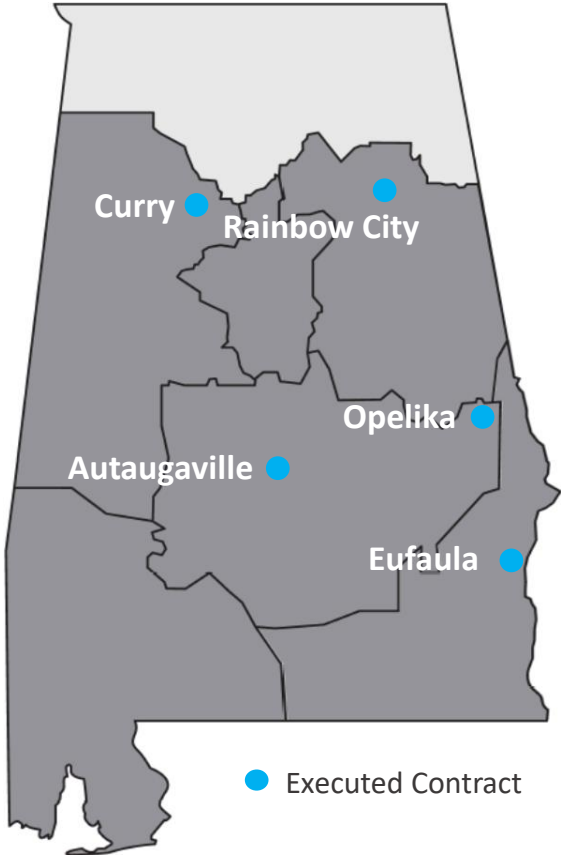
2-Way Capabilities

Increased Customer Service

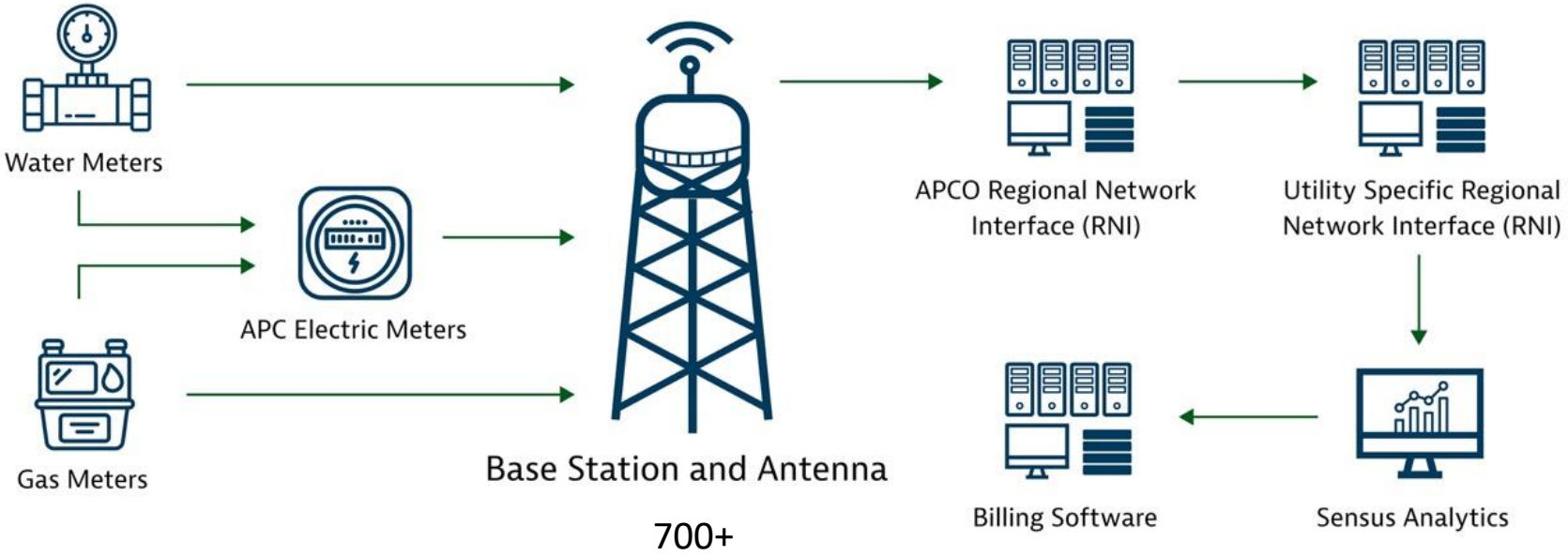
APC Metering Solutions Customers

34,000 Meters

(In addition to APC's 1.5M)



APC FlexNet Infrastructure



Partnership Benefits with APC

FINANCIAL

- **Known** monthly expense
- Flexibility for **phased-in** approach
- Meter/transmitter lease **option**

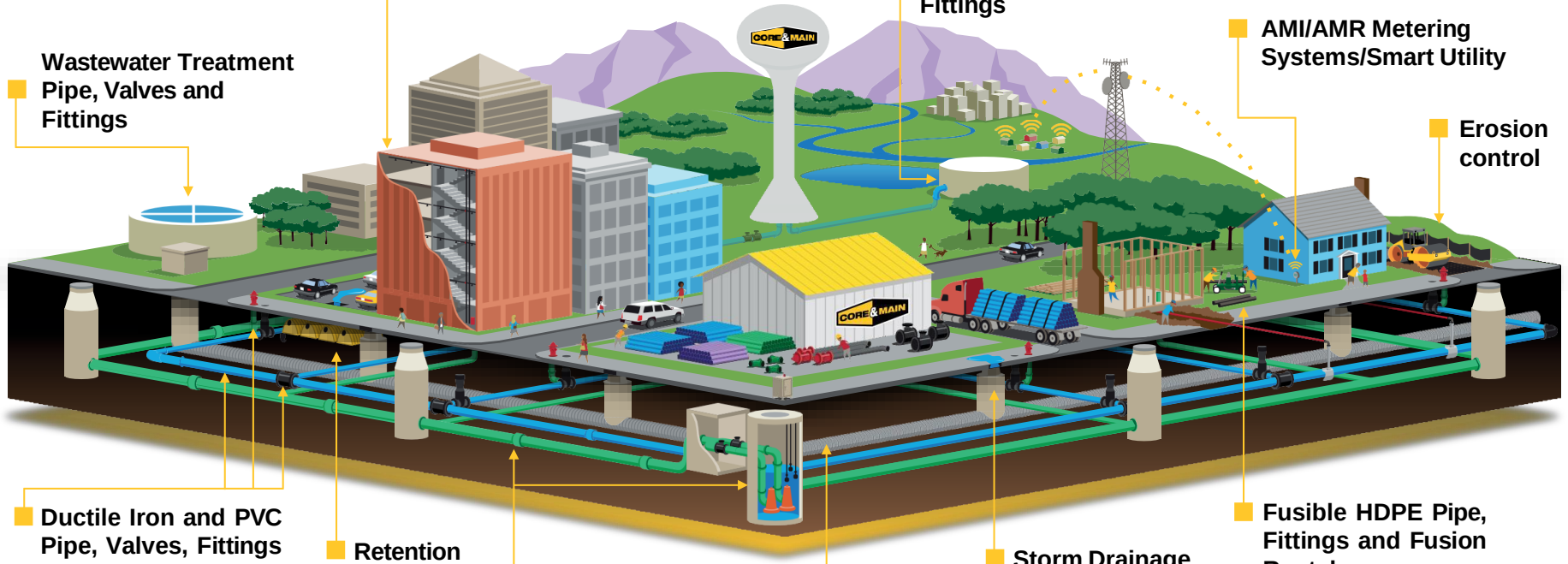
RESOURCES

- Largest, most **reliable** & **private** AMI network in Alabama
- APC monitors and **maintains** AMI system
- **24/7** emergency response. **72-hour** battery backup

INTANGIBLES

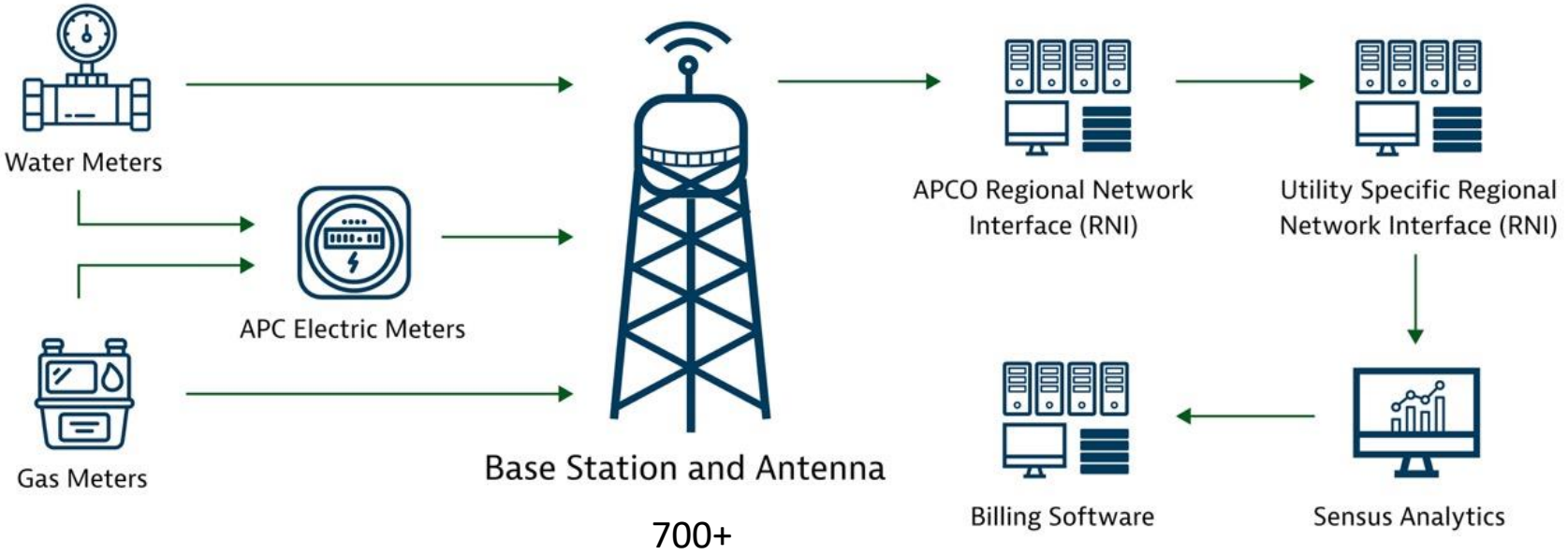
- **Eliminates** infrastructure investment
- Allows utility to **focus** on other key parts of the business
- **Partnership** with APC offers customer peace of mind

PRODUCTS AND SERVICES FOR CITY INFRASTRUCTURE

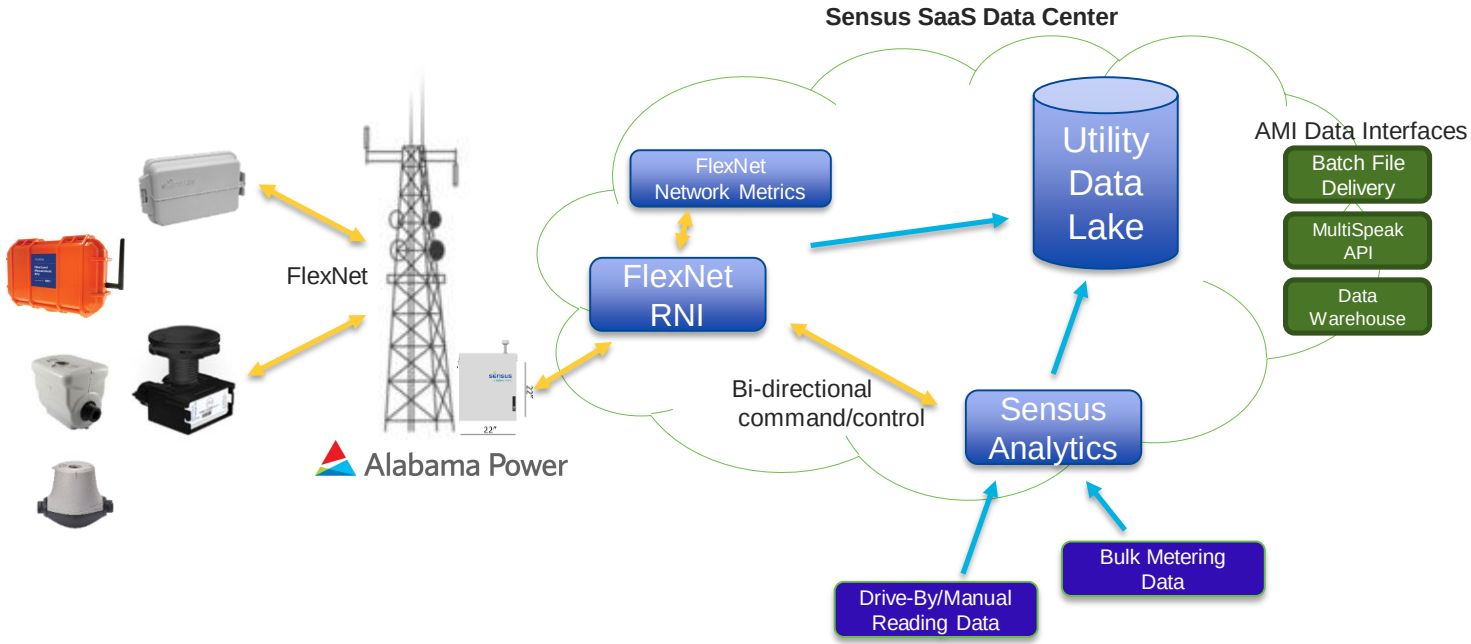


© Core & Main All Rights Reserved. Confidential and Proprietary Information.

APC FlexNet Infrastructure



Infrastructure and Integrations



- All SaaS infrastructure hosted by APC/Sensus in Alabama
- Proven and flexible approach across customers with different deployment patterns
- Proven utility solution integrations

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Infrastructure and Integrations

SYSTEM | **ADMINISTRATION** | **OPERATIONS**

Data Devices
Meters
Sensors
Collectors

Headend System
Registers & Intervals
Remote Actions
Events & Alerts
AMI / C&I / AMR

Meter Data Management System
Analytics
Reporting
Validated Billing Data
Meters & Locations
Notifications

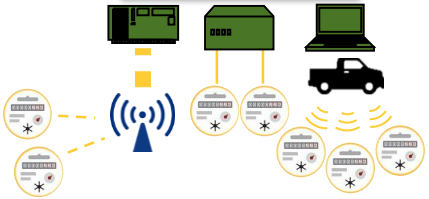
Other Operations Software
Water/Waste, Water, SCADA, SSO/INI Monitoring, Backflow Management, Engineering Design, Pressure Management, etc.

Leak/Condition Assessment

GIS & Mapping

Asset Management

Revenue/Warranty Assurance



Customer Engagement
Portal
Notifications
Social Media

Customer Support
Call Center
IVR

Billing & Payment
Print & Mail
Payment Options
(Pre-Pay/Kiosk/Online)

Customer Information System (CIS)

Mobile Field Operations

Work Order Management

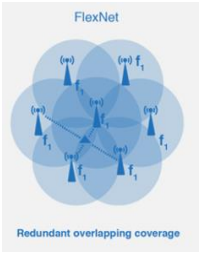
Service Order Management

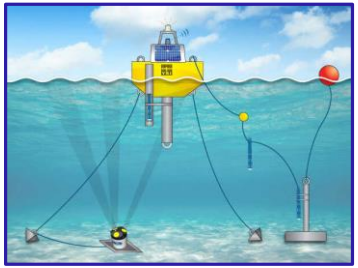
Operation Infrastructure Beyond Meters

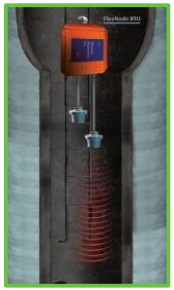
Data — Application Redundancy

Comms — RF Redundancy
Battery Backup

Field Devices — Battery Devices





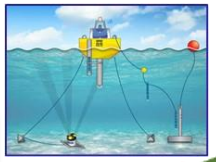


© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Way Beyond the Meter

Water Distribution

Transmission



- Pressure profiling
- Pressure Transient monitoring

- Water Metering
- Leak detection
- DMA Prioritization
- Water Balance

Distribution

Source Water Quality and Energy Efficiency

- Water quality from raw supply
- Energy cost and consumption optimization

Pipe Risk Assessment

- Risk of failure
- Consequence of failure
- CIP prioritization

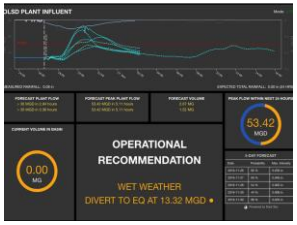
Transmission and distribution

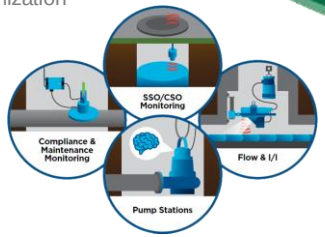
Distribution Level Water Quality

- Water quality prediction and optimization
- Level of service optimization for boil water notices.

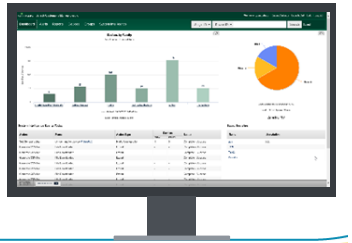
Treatment Optimization

- High-efficiency aeration management systems
- Preventative management
- Treatment plant optimization





Meter Data Analysis



- Payment Risk Mitigation
- Meter replacement plans

Wastewater Networks

- SSO reduction
- WW Network operation optimization
- CIP prioritization

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

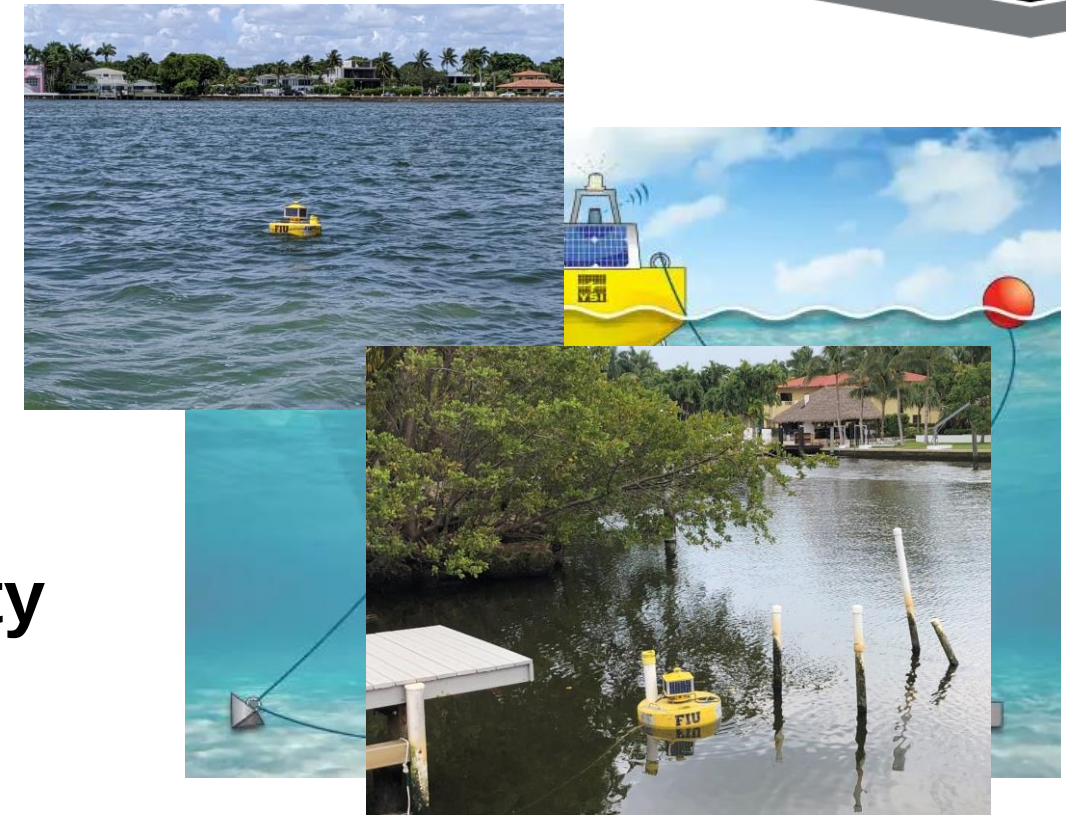
IOT Solutions

Retro-fitting to an urban environment

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

a xylem brand

YSI Water Quality Monitoring



© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Utility Science, Systems & Software (US^3)

UTILITY SYSTEMS SCIENCE & SOFTWARE

WATER QUALITY MONITORING

Water quality parameters including pH, conductivity, temperature, turbidity and dissolved oxygen. Integration into the web, SCADA or handheld.

STORMWATER MONITORING

Real-time Stormwater Monitoring using standard off-the-shelf Utility IoT products. Measure water level, flow, weather station results and water quality.

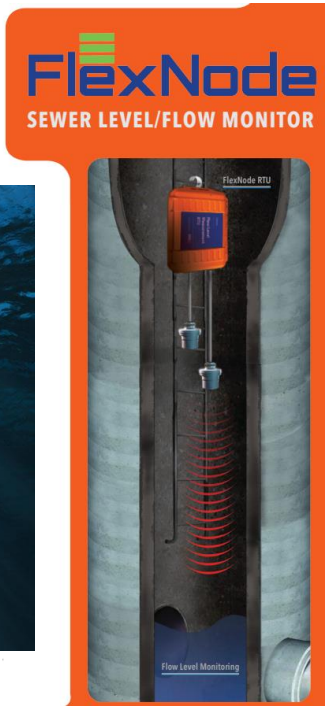
FLOOD MONITORING

Monitor City and County Wide Flood Status, in Real-Time. Activate lighting for events or emergency conditions. Control via Web or Handheld.

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Utility Science, Systems & Software (US³)

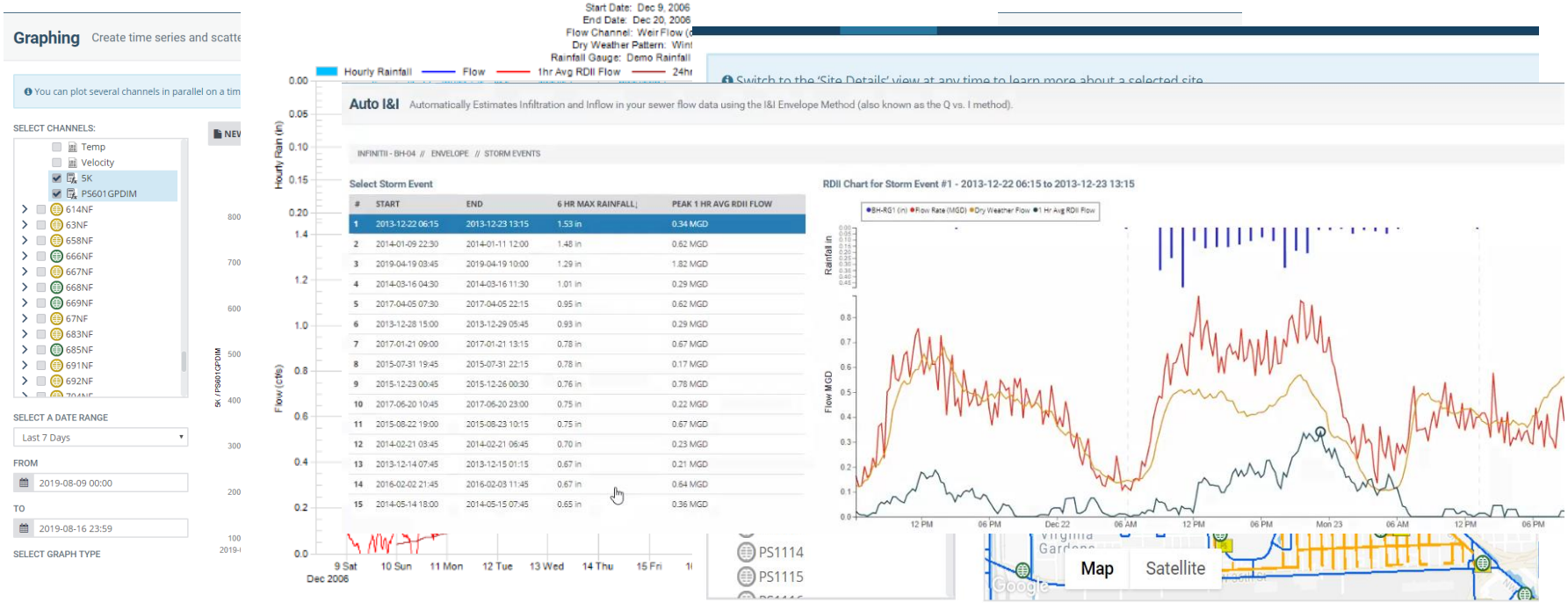
FlexNode



US³
UTILITY SYSTEMS SCIENCE & SOFTWARE

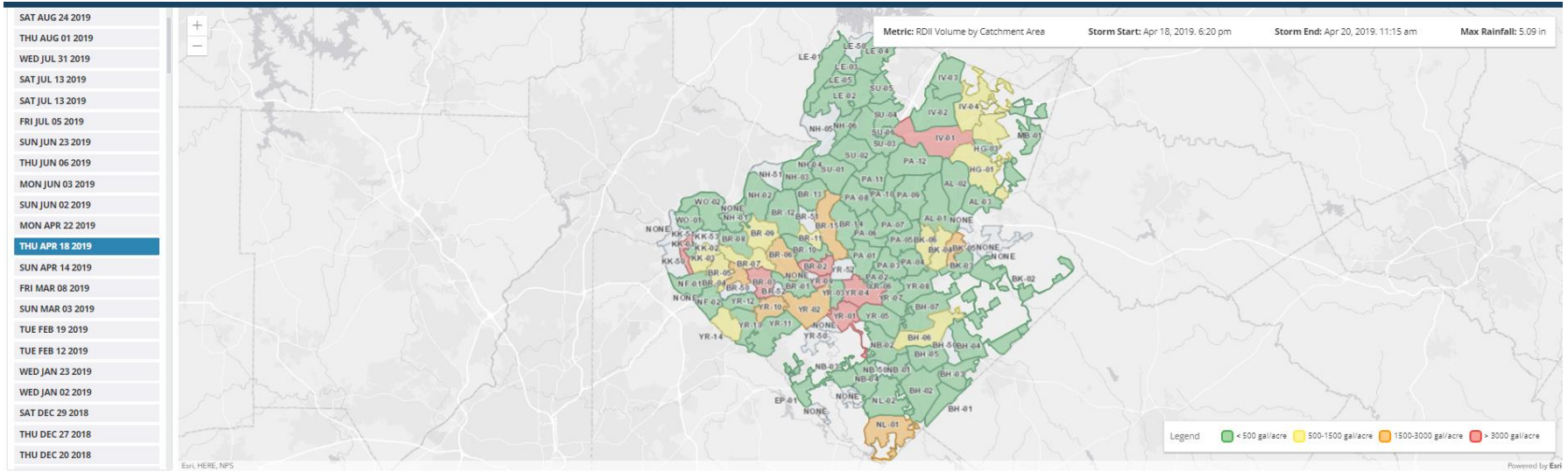
© Core & Main All Rights Reserved. Confidential and Proprietary Information.

How do we use this data?



© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Smart Utility Monitoring



Choose Metric:

- RDII VOLUME BY CATCHMENT AREA (GAL/ACRE)
- RDII VOLUME BY PIPE LENGTH (GAL/LF)
- RDII FLOW BY PIPE AREA (MGD/IN-MILE)
- PEAK FLOW BY AREA (MGD/ACRE)
- CV RAIN CAPTURED (%)

SITE		CATCHMENT AREA	PIPE LENGTH	PIPE AREA	TOTAL RAINFALL	RDII VOLUME BY CATCHMENT AREA	RDII VOLUME BY PIPE LENGTH	RDII FLOW BY PIPE AREA	PEAK FLOW BY AREA	CV RAIN CAPTURED
AL-01	DETAILS	83798715 ft²	27.78 mi	192.12 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
AL-02	DETAILS	85618069 ft²	26.88 mi	246.58 in-mile	3.56 in	76.09 gal/acre	5563.87 gal/LF	0.01 MGD/in-mile	0 MGD/acre	0.08 %
AL-03	DETAILS	70618612 ft²	36.15 mi	231.48 in-mile	3.56 in	462.73 gal/acre	20751.34 gal/LF	0.03 MGD/in-mile	0.001 MGD/acre	0.48 %
AL-04	DETAILS	54587740 ft²	16.23 mi	129.77 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-01	DETAILS	78538520 ft²	26.94 mi	316.16 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-02	DETAILS	104177468 ft²	21.41 mi	347.47 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-03	DETAILS	61257884 ft²	22.09 mi	208.99 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-04	DETAILS	98316005 ft²	39.57 mi	263.5 in-mile	4.12 in	358.79 gal/acre	20464.7 gal/LF	0.05 MGD/in-mile	0.002 MGD/acre	0.32 %
BH-05	DETAILS	44936761 ft²	20.46 mi	181.58 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

Advanced Metering Infrastructure Solution Architecture for Water & Sewer

CORE+™
SMART Utility, SMART Decisions

Wastewater AMI Head-end

Application Program Interface

FTP
CMEP FTP
CMEP FTP
Manual Input
Rest API
SmartCover API
NOAA Data already incorporate with FlowWorks
Manual Pulls at Request

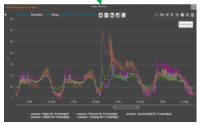
Analytics

US3 Power BI Analytics

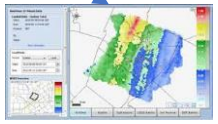
Sensus Analytics

Sensus Analytics

YSI Hydrosphere


Xylem Surgeview

SmartCover Monitoring System


RainVieux GARR Data

Miami Dade SCADA

Network

NB-IoT

NB-IoT

iridium

NOAA

Telemetry Solution

FlexNode

FlexNode

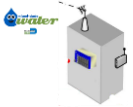
FlexNode

Sensus 520M SmartPoint

Visenti Sentinel RTU

SmartCover E-Box

NOAA


WASD SCADA RTU

Sensor Application

Gravity Sewer Flow Meter

Emergency Pump Station Level Monitoring

h2S Monitoring

Water AMI

Water Quality Monitoring

Force Main Monitoring

SSO Level Monitoring

Rain Gauge

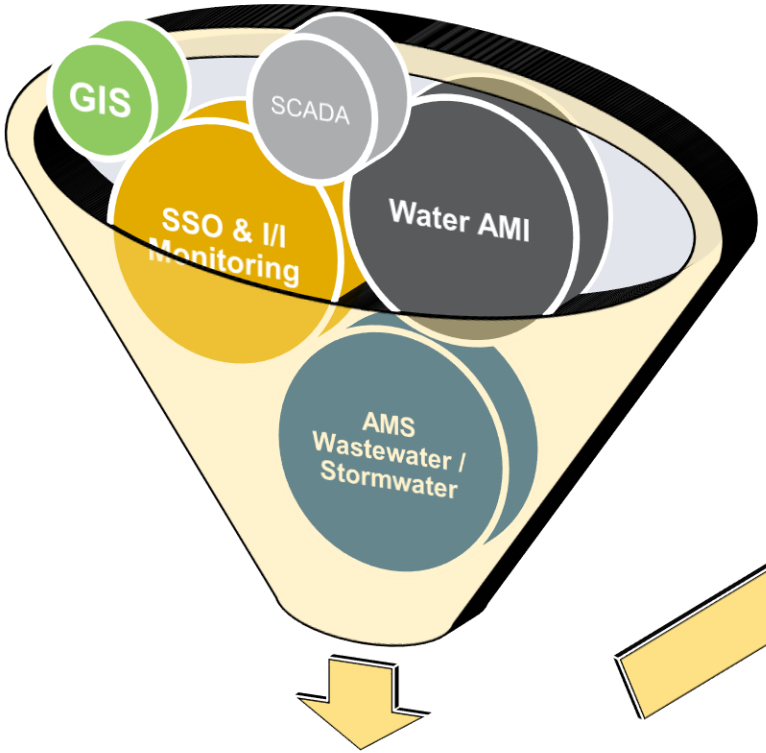
Venturi / Mag Combo Meter

Executive Management

Engineering

Meter Shop

Operations



Operational Deployments

Hydraulic Model

Integrated Resiliency Solution

Regulatory Compliance

I/I Analysis

sensus

Alabama Power

CORE&MAIN

CORE+
SMART Utility, SMART Decisions

© Core & Main All Rights Reserved. Confidential and Proprietary Information.

QUESTIONS?

Ownership Options

With either option APC will work closely with the customer to ensure the meters selected are compatible with the APC transmitter

OPTION ONE Meter Read Only	OPTION TWO Meter Read & Lease
AMI Standard – Sensus RNI meter reading with analytics + Customer utilizes existing meters or purchases meters / transmitters **5, 10 or 15-year term**	**AMI Standard** – Sensus RNI meter reading with analytics + Customer leases meters / transmitters from APC **15-year term**

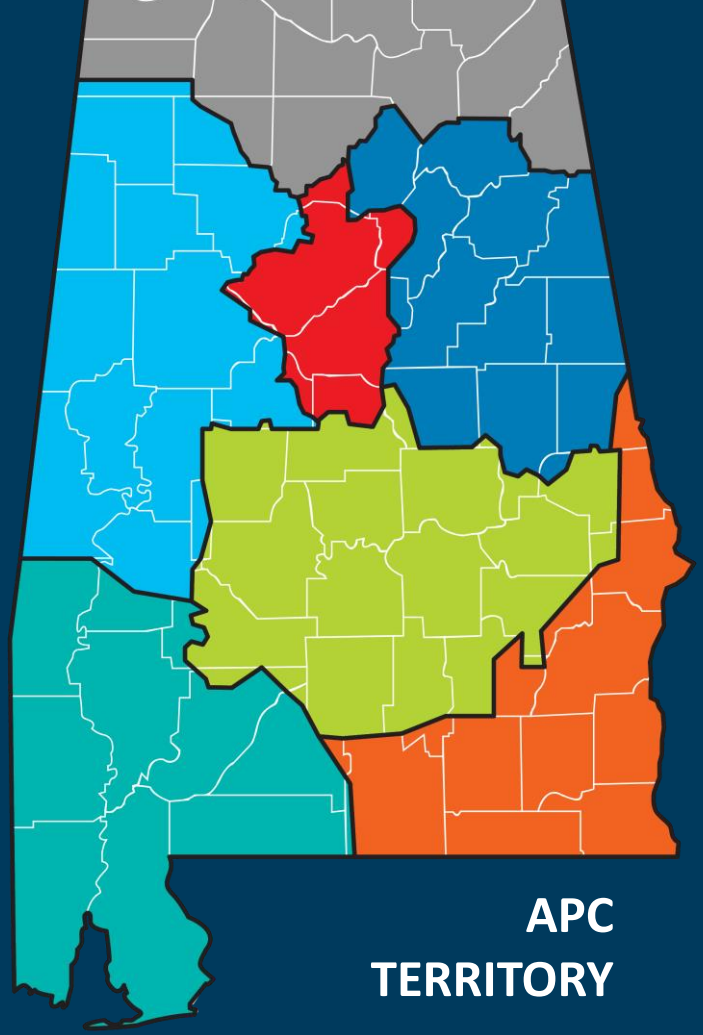
APC FlexNet Network

Customer Base

- 1.53 Million Devices on the Network
- 700+ Base Stations and Growing
- 99.90% Read Success Rate

Service Territory

- Early Adopter
- Advanced Applications
  - Outage and Restoration
  - Voltage Monitoring
  - Customer Phase Detection
  - Capacitor Bank Monitoring
  - Demand Response



APC Metering Solutions

An APC-managed service for utilities that will offer remote meter reading capabilities to water, gas and electric systems in a secure environment using the AMI network.

By leveraging our AMI infrastructure, we can increase speed to market and lower the overall network cost to our customers

UTILITY SERVICES

Advanced Metering Infrastructure

Common Pitfalls with AMI Meter Reading

Significant capital investment

Capital required to upgrade meter and network infrastructure

System integration issues

Billing errors from improper meter registration/installation

Lack of industry-wide standards for AMI systems

Components from different manufacturers may be incompatible

Partnering with Industry Leaders

Alabama Power

Network infrastructure provider
AMI Network maintenance
Potential for capital provider

SENSUS

Manufacturer of product
Software provider
Data hosting

CORE & MAIN

Distributor of product
Expert product knowledge
Billing integration support

UTILITY SOLUTIONS OF AMERICA, INC

Sensus certified installer
Warranty assurance option
Monitor of analytics

AVR
An i3 Verticals Company

Utility billing software
Work order management
Back-office solutions

SENSUS Analytics

SENSUS

Long-term data storage (3+ years)

- Consumption intervals, alarms and voltage
- Data integration (GIS, Asset Management, Billing)
- Ease of exporting

Robust reporting and visualization of data elements

Modular and flexible design

Data access, insight and analytics

Functionality can be used in lieu of MDM