



NWEMS



# Meter Data Management Systems & Complex Billing

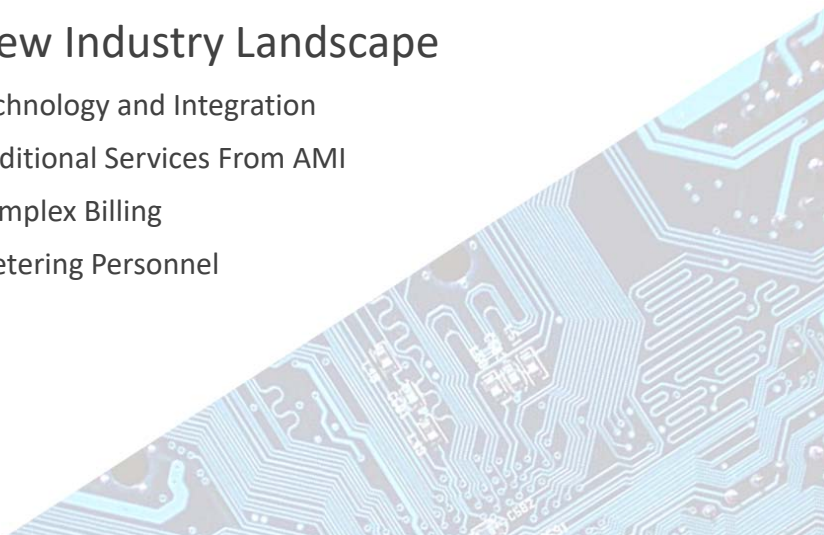
May 21, 2019 | Northwest Electric Meter School | Lewis McKillop

**WesternEnergy**  
INSTITUTE

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## » New Industry Landscape

- » Technology and Integration
- » Additional Services From AMI
- » Complex Billing
- » Metering Personnel



## New Industry Landscape

### » Load History

- Economic, technology and a housing boom creates load growth
- Peak load growing much faster than base load
- Japan's Nuclear Disaster, Lack of Spent Fuel Storage
  - Change in energy strategy away from nuclear base load

### » Traditional Base Load Generation

- Environmental and social standing of coal and nuclear generation gives way to peak delivering generation (Peaker Plants)
- Existing utility owned hydro generation is no longer considered renewable in the US

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## New Industry Landscape

### » Regulatory Aspect

- PURPA
- Energy Policy Acts
- Focus on Renewable Energy Incentives
  - Electric Vehicles, Renewable Energy Technologies

### » Market Aspect

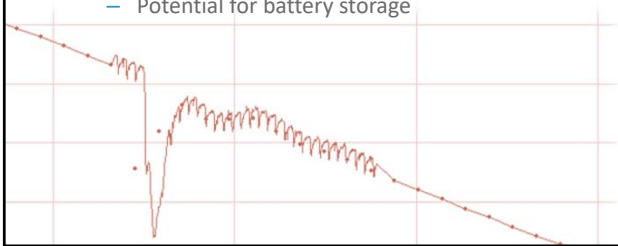
- Prominent companies going "All Green"
- Net-Meter and Distributed Generation Programs
  - Annual distribution to other accounts or carryover

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## New Industry Landscape

### » Impacts of Renewable Energy

- Renewable generation like solar and wind are dramatically variable
- Market volatility – Price volatility – Supply exceeding demand – Negative power price
- Some markets experience a shift in peak load due to residential solar and other green sources
- Formation of regional Energy Imbalance Markets EIM – (5 minute data)
- Potential for battery storage



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## New Industry Landscape

### » Flexible Recovery

- Time Variant Pricing
  - Dynamic TOU – Variable periods based on energy needs
- Time Variant Payments
  - PURPA On/Off Peak Values with shorter term contracts from 20 years to 2 years
  - Net-Metering TOU

### » Demand Side Management

- Direct load control
- Indirect load control from Aggregators

### » Energy Imbalance Market

- Resource scheduling in the market allows optimal allocation of renewable resources

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## Technology and Integration

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- » **Solid-State Metering**
    - Bi-directional metering w/multiple demand registers
    - 30+ register channels w/multiple interval channels
  - » **Hybrid AMI Systems**
    - Multiple technologies used to reach all regions within a service territory
  - » **Communications Technology**
    - RF
    - Power Line Communications
    - Broadband (Cellular, DSL, Fiber, Modem)
    - Satellite

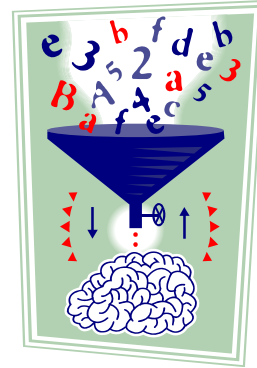
## Technology and Integration

### » Meter Data Management Systems (MDM)

- Data Volume
- Validation Estimation & Editing
- Dynamic Time-Variant-Pricing
- Data Analytics

### » Data Warehousing

- Analytics
  - Revenue Protection
  - Rate Analysis
  - Customer Data Presentment
  - Unbilled Revenue
  - Electrical System Model
  - Monitor Schedule/SCADA/Meter Data



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## Technology and Integration

### » Customer Information Systems

- Complex Billing
- Support dynamic rate options
- Support rate flexibility and analysis
- Aggregation across multiple accounts (credits and debits)

### » Energy Management Systems EMS

- Regional Energy Markets
- Schedule/SCADA/Metering



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# Technology and Integration

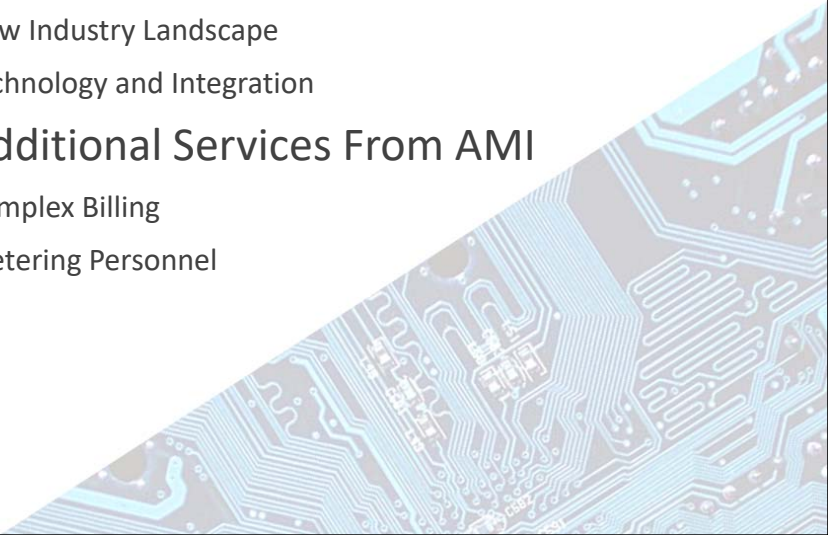
The diagram illustrates the data flow between various systems in an AMI, MDMS, and legacy environment. The central components are the AMI Server and MDMS. Data flows include:

- AMI Server:** Receives data from Selected Smart Meters (Outage Data), All Smart Meters (Energy Use & Electrical System Data), and Smart Meters (Demand Forecast). It sends data to OMS (Represented Outage Data) and the AMI Load Control Device (Control Load Data).
- MDMS:** Receives data from the AMI Server (Daily Batch Process) and the Data Mart (Daily Batch Process). It sends data to CIS (Hierarchy plus) and the Data Mart (Hierarchy plus).
- Legacy Systems:** OMS (System Operations) and CIS (Customer Information System) are connected to the AMI Server and MDMS respectively.
- Data Mart:** Receives data from the MDMS and provides data to Load Research, System Planning, and Other Internal Utility Users.
- Customer Service Reps. (Intranet):** Receives data from the MDMS (Recent Energy Use Data).
- Utility Customers (Internet):** Receives data from the MDMS (Historic Energy Use Data).

Legend:

- Scheduled Process (Yellow box)
- Initiated Process (Green box)

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- A decorative graphic of a circuit board, likely a printed circuit board (PCB), is positioned in the bottom right corner of the slide. It features intricate blue and white traces on a dark background, with various electronic components like resistors and capacitors visible. The graphic is angled diagonally across the bottom right portion of the slide.
- » New Industry Landscape
  - » Technology and Integration
  - » **Additional Services From AMI**
  - » Complex Billing
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## Additional Services From AMI

- » **Direct Load Control**
  - Entire Service Point
  - Specific Appliance
- » **Electrical System Data**
  - Timestamped Volt/VAR Information
  - Transformer Loading
  - Forecasting Based on Historical Data
- » **Predictive Analytics**
  - Automatic Order Generation
- » **Distributed Generation**
  - Load Profiling
  - Rate Making/Modeling
  - Voltage/Current Data
- » **Outage Management**
  - Outage Detection
  - Restoration Confirmation
  - Planning for Scheduled Maintenance

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## Additional Services From AMI

- » **Remote Service Connect/Disconnect**
  - Payment Delinquency (CFNP Process)
    - Soft Disconnect Options
      - Energy use, time, or current limiting
    - Disconnect schedule that is reliable and expected
    - Options for reconnect arming
  - Customer Requested
  - Faster service completions with more accurate billing reads
- » **Energy Prepay w/Auto Disconnect**
  - Mobile apps for instant payment and monitoring
  - Eliminates outstanding balances



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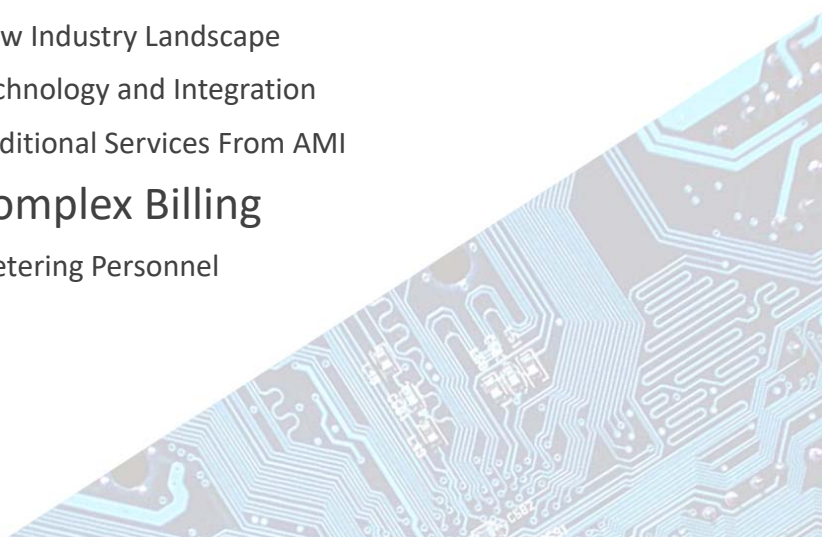
## Additional Services From AMI

- » Customer Data Presentment
  - Customers want options
- » Online Rate Calculators
  - Predict multiple rate scenarios from historical data
- » Other Customer Engagement Opportunities
  - Mobile apps for monitoring and management
  - Energy use and pricing alerts
  - Third party info sharing
  - Information on available programs tailored to the customer



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## Complex Billing

- » Energy Cost Volatility
  - Energy and delivery cost separation
  - Demand/facilities charges with time-variant rates on both consumption and generation
- » Generation priced to reflect the value of when it is delivered.
- » Dynamic rate changes within billing periods
  - Aggregation
    - Like and unlike rates – i.e. community net, feed in tariffs
  - Net rate credit carryover
  - Buy-All, Sell-All


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## Complex Billing

- » Based On Time-Variant Data
  - 60 Minute – Mass Market
  - 5-15 Minute – Large Commercial, Industrial
  - 1-5 Minute – EIM, Interconnection Points, Generation
- » Bidirectional Metering
  - Net Register and Interval
  - Single Meter w/2 Channels – Delivered and Received
  - 2 Meter Installations
    - Preserve Demand
    - Capture both directions on the generation circuit



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## The days of cleaning mechanical registers and calibrating discs are over

- » Reduction in Periodic and Statistical Sample testing
    - Technology advancement forces early retirements
  - » Shift from field site validation to data site validation
  - » Complex metering Installation, programming, and Validation
    - Net, Cogeneration, Distributed Generation
  - » Backhaul Metering Component Troubleshooting
    - Communications meter and supporting devices
    - Synchronization and interface to backhaul systems
  - » Workforce Management Systems
    - Immediate order acknowledgement and completion
  - » Process and Data Management
    - Act as the eyes in the field with respects to cross-platform troubleshooting
    - Work with other departments about the meaning of meter data
- EXCHANGING EXPERTISE SINCE 1893

## Questions

