Regulatory Framework & Policy Support

A supportive regulatory environment is crucial for successful AMI deployment in Nigeria.

NERC Regulations

The Nigerian Electricity Regulatory Commission (NERC) has issued guidelines including the MYTO, allowing utilities to recover AMI deployment costs through tariffs.

Presidential Executive Order

Power Sector Reforms prioritize metering and smart grid initiatives, providing a clear policy mandate for the nationwide rollout of AMI systems.

Meter Asset Provider (MAP) Scheme

This innovative scheme allows third-party investors to finance and own smart meters, reducing upfront financial burdens on DisCos and accelerating deployment.

Data Protection & Cybersecurity

New regulations address data privacy and security concerns associated with AMI, ensuring consumer trust and the integrity of critical power infrastructure.

Technology Selection & Vendor Evaluation

Selecting the right technology and vendor is critical for a successful AMI deployment. Below are the key evaluation criteria:

Technical Specifications

Compliance with IEC 62056, accuracy class, communication protocols, and anti-tamper features.

Scalability & Interoperability

Ability to scale to millions of meters and seamless integration with existing CIS and Billing systems.

Cost of Ownership

Total lifecycle cost (10-15 years) including procurement, installation, communication, and maintenance.

Vendor Experience & Support

Proven track record in similar projects, local support capabilities, and long-term maintenance commitment.

Cybersecurity

Robust security architecture to protect against hacking, data breaches, and meter tampering.

Strategic Advantage

A thorough evaluation ensures a future-proof investment and minimizes risks in the long run.

Critical Decision Matrix for AMI Deployment Success

Financial Modeling & ROI Analysis

Cost Breakdown

CAPEX (Capital)

- Smart meters & infrastructure
- MDMS software & installation

OPEX (Operational)

- Communication & licensing
- Maintenance & support

Revenue Streams

Loss Reduction

Energy saved from technical/commercial losses.

Operational Savings

Automated reading & improved collection.

New Opportunities

Time-of-use pricing & value-added services.

ROI Calculation

Typical Payback Period

3-7 Years

Calculated based on the Net Present Value (NPV) of cash flows, considering both CAPEX and recurring savings.

Key Insight: While upfront CAPEX is significant, recurring operational savings and loss reduction ensure a compelling business case with positive ROI within a reasonable timeframe.

Case Study Deep Dive: Huawei's PLC-IoT Solution

Solution Architecture

- **Smart Meters:** DTZY341-G with built-in PLC-IoT modules.
- **Hybrid Network:** PLC for last-mile, IoT for backhaul to MDMS.
- **SMMS Platform:** Data collection, analysis & customer management.

Deployment Scale

- **Massive Deployment:** Over 500,000 smart meters installed in Ikeja Electric area.
- **Wide Coverage:** Serves both residential & commercial customers across multiple feeders.

Key Achievements

- **Loss Reduction:** 15% drop in technical losses via smart monitoring.
- **Revenue Growth:** 25% efficiency gain in collection with accurate billing.
- **Cost Efficiency:** 40% reduction in manual meter reading costs.

Transforming Ikeja Electric's operations with reliable PLC-IoT connectivity and data-driven insights.

Risk Assessment & Mitigation Strategies

Technical Risks

Risk: Communication network failure or poor performance impacting data transmission.

Mitigation: Conduct thorough site surveys, deploy hybrid communication technologies, and implement real-time network monitoring systems.

Financial Risks

Risk: Higher-than-expected deployment costs or delayed return on investment (ROI).

Mitigation: Develop detailed financial models with contingencies, secure multi-year funding, and prioritize high-impact areas for early deployment.

Operational Risks

Risk: Resistance from staff or customers to new technology adoption and processes.

Mitigation: Invest in comprehensive staff training programs and launch customer education campaigns to build awareness and acceptance.

Security Risks

Risk: Vulnerabilities to data breaches, cyberattacks, or unauthorized access to AMI data.

Mitigation: Implement end-to-end encryption, conduct regular security audits, and ensure strict compliance with data protection regulations.

Future Trends: AMI & Renewable Energy Integration

As Nigeria increases its renewable energy penetration, AMI will play a critical role in managing the new grid dynamics.

Net Metering & Feed-in Tariffs

Enables accurate measurement of rooftop solar exports, facilitating fair compensation and tariff programs.

Demand Response

Smart signals encourage shifting consumption to high renewable generation periods, optimizing usage.

Grid Balancing

Real-time data helps operators balance supply/demand effectively, accommodating variable wind/solar output.

EV Charging Management

Integrates with EV infrastructure to enable smart charging, optimizing grid load and utilizing clean energy.

Conclusion: The Imperative for Action

The Time is Now

Nigeria's power sector cannot afford delay. The costs of inaction—persistent losses, unreliable supply, and missed opportunities—far outweigh the investment required.

A Clear Path Forward

This roadmap provides a comprehensive, phased approach to AMI deployment, fully supported by robust policy, cutting-edge technology, and sustainable financial models.

Collaboration is Key

Success demands strong synergy between government, regulators, DisCos, technology providers, and end-customers to drive systemic change.

NNEPIE 2026 is the Catalyst

NNEPIE 2026 will unite all stakeholders, showcase transformative solutions, and serve as the launchpad to accelerate Nigeria's AMI revolution.

Glossary of Key Terms

AMI (Advanced Metering Infrastructure)

A system of smart meters, communication networks, and data management software enabling two-way utility-customer communication.

MDMS (Meter Data Management System)

The software platform that collects, processes, and analyzes data from smart meters.

PLC (Power Line Communication)

A technology that uses existing power lines to transmit data signals efficiently.

DisCo (Distribution Company)

A company responsible for distributing electricity to end-users across a specific region.

NERC (Nigerian Electricity Regulatory Commission)

The government agency responsible for regulating the electricity sector in Nigeria.

MAP (Meter Asset Provider) Scheme

A program allowing third-party investors to finance and own electricity meters for distribution.

MYTO (Multi-Year Tariff Order)

A regulatory mechanism setting electricity tariffs for a multi-year period to ensure utility cost recovery.

Terms defined based on Nigerian Electricity Sector context

References & Further Reading

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Multi-Year Tariff Order (MYTO) 2021-2025.

International Energy Agency (IEA)
Africa Energy Outlook 2023.

World Bank (2022)
Nigeria Distribution Sector Recovery Project (DISREP) Implementation Status Report.

Nigerian Bureau of Statistics (NBS)
Annual Power Sector Statistics.

Huawei (2023)
Case Study: Smart Metering Solution for Ikeja Electric.

IEEE (2022)
Guide for Smart Grid Interoperability of Energy Technology and IT Operation with EPS.

Q&A Session

QUESTIONS & ANSWERS

Thank you for your attention. I will now be happy to take any questions you may have.

Feel free to ask about AMI Roadmap, Benefits, or NNEPIE 2026 Expo

Implementing Advanced Metering Infrastructure in Nigerian Distribution Networks

A Technical Roadmap for NNEPIE 2026

Presented by Prof. John Okafor

Nigeria International New Energy & Power Industry Expo 2026 | September 16-18, 2026 | Landmark Centre, Lagos, Nigeria

Table of Contents

Executive Summary

Industry Challenges: Nigeria's power sector faces significant hurdles with high technical and commercial losses, estimated at over **40% combined**.

Critical Solution: Advanced Metering Infrastructure (AMI) is proven to address these issues by providing **real-time data and control** across networks.

Strategic Roadmap: This report outlines a comprehensive, phased technical roadmap for deploying AMI across Nigeria's distribution networks.

Substantial Benefits: Projected **15-20% reduction in technical losses** and a **10-25% increase in revenue collection** post-deployment.

Join NNEPIE 2026: Explore the latest AMI technologies, network with industry leaders, and shape the future of Nigeria's power sector.

02

Nigeria’s Power Sector: Challenges & Opportunities

ENERGY TRANSFORMATION & SUSTAINABILITY

Overview of Nigeria's Power Sector

Current Capacity & Generation

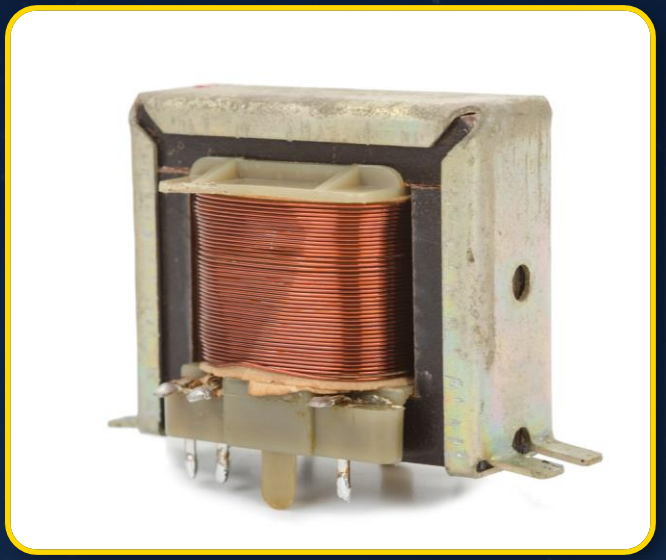
Nigeria has an installed generation capacity of over12,500 MW, but actual generation is often limited to around 4,000-5,000 MW due to gas supply issues and aging infrastructure.

Distribution Network

The network is fragmented among11 DisCos, serving a population of over 200 million people.

Key Challenges

Persistent issues of reliability, efficiency, and financial sustainability hinder the sector from meeting growing demand.



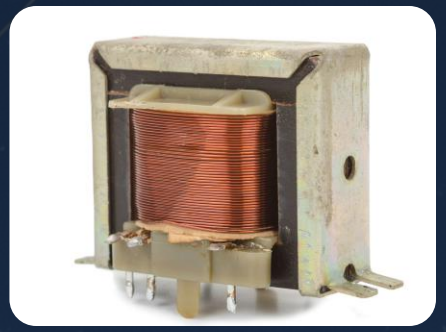
Aging Power Transformer - Symbol of Infrastructure Challenges

Installed Capacity:12,500+ MW

Actual Generation:4-5 GW

Distribution Cos:11 DisCos

Key Challenges: Technical & Commercial Losses



Technical Losses

Aging infrastructure, overloaded transformers, and poor maintenance lead to significant energy losses during transmission and distribution, estimated at 8-10% of generated power. These losses represent a direct waste of valuable resources.

Commercial Losses

This is a much larger problem, accounting for 25-30% of losses. It includes electricity theft, meter bypassing (which affects a staggering 68% of consumers), inaccurate estimated billing, and poor revenue collection efficiency, crippling the financial health of DisCos.

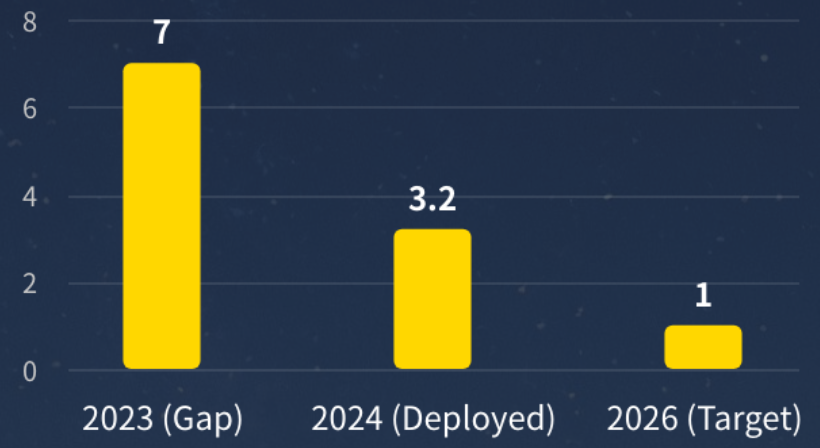
The Metering Gap Crisis

The Crisis in Numbers

Nigeria faces a critical metering gap exceeding **7 million customers**. This lack of accurate metering has led to:

- ❖ Widespread reliance on estimated billing
- ❖ Frequent disputes and eroded trust
- ❖ Substantial, avoidable revenue loss for DisCos

Metering Gap Reduction Trajectory



Government Initiatives: The Presidential Metering Initiative (PMI) and Meter Asset Provider (MAP) scheme aim to accelerate deployment.

CHAPTER 03

Advanced Metering Infrastructure (AMI)

An Overview

What is Advanced Metering Infrastructure (AMI)?

AMI is a comprehensive two-way communication network connecting smart meters to a central data management system. It enables real-time energy monitoring, remote service control, and transforms how utilities manage networks and engage with customers.

Smart Meters

Endpoint devices that measure and record energy usage, detect tampering, and communicate data bi-directionally with the network.

Communication Network

The digital backbone transmitting data using PLC, RF, or Cellular technologies, ensuring reliable connectivity between meters and utilities.

Meter Data System

Central software platform collecting, processing, analyzing, and storing data for accurate billing, network optimization, and customer service.

KEY BENEFIT:Enables real-time visibility and control, critical for modernizing Nigeria's power sector.

Key Functions of Smart Meters

Smart meters form the core of the AMI system, empowering utilities with advanced monitoring and control capabilities.

Real-time Consumption

Granular energy data for better load management and demand response.

Tamper Detection

Instant alerts for bypass attempts, significantly reducing theft.

Remote Meter Reading

Eliminates manual visits, saving operational time and costs.

Power Quality Monitoring

Tracks voltage/frequency to quickly resolve network issues.

Prepaid Billing

Enables advance payment, improving cash flow and reducing bad debts.

Remote Service Control

Remotely disconnect/reconnect service for efficiency.

Communication Technologies in AMI

The communication network is critical for AMI success. Below is a comparison of key technologies:

PLC (Power Line)

Pros:Cost-effective, uses existing power lines, widely available infrastructure.
Cons:Susceptible to interference, signal degradation over long distances.

RF (Radio Frequency)

Pros:Reliable communication, good penetration, ideal for dense urban areas.
Cons:Limited transmission range, performance affected by physical obstacles.

Cellular (GSM/4G)

Pros:Wide coverage, high bandwidth, perfect for remote/rural installations.
Cons:Higher operational costs due to recurring data charges from providers.

Nigeria's optimal solution will likely involve a**hybrid approach**combining these technologies for reliability and cost-efficiency.

04. Technical Roadmap

for AMI Deployment in Nigeria

PHASED DEPLOYMENT STRATEGY & INFRASTRUCTURE PLANNING

AMI Deployment Roadmap: A Phased Approach

Planning & Assessment

Months 1-6

Lay the groundwork with stakeholder engagement, network analysis, technology selection, and financial planning.

Pilot Implementation

Months 7-12

Test the solution in a controlled environment to validate performance, gather feedback, and refine the approach.

Scaling Up

Months 13-36

Roll out the AMI system across the entire franchise area in a phased manner, ensuring minimal disruption.

Operation & Maintenance

Ongoing

Establish continuous monitoring, maintenance, and optimization processes to ensure long-term success.

A phased approach ensures risk mitigation and smooth nationwide rollout for long-term operational excellence.

Phase 1: Planning & Assessment

The planning phase is critical for setting the project up for success. Key tasks include:

Stakeholder & Requirements

Collaborate with DisCos, regulators, and customers to define needs and expectations.

Network Analysis

Audit existing network readiness for AMI and identify potential challenges.

Technology Selection

Select smart meters, communication tech, and MDMS based on analysis.

Regulatory Review

Ensure compliance with regulations and identify needed policy changes.

Financial Planning

Develop cost estimates, funding sources, and a clear business case.

Foundation for Project Success: Comprehensive Preparation & Analysis

Phase 2: Pilot Project Implementation

A pilot project is essential to validate the chosen AMI solution in a real-world setting. Key tasks include:

Site Selection & Prep

Choose a representative area and prepare network/customer premises for installation.

Procurement & Install

Source and install smart meters, communication equipment, and MDMS.

Integration & Testing

Ensure seamless component collaboration and perform rigorous testing to resolve issues.

Data Validation & Monitoring

Verify data accuracy and monitor system performance against key metrics.

Feedback & Lessons

Gather feedback from customers/staff to identify lessons and adjust strategy.

“Lessons learned here will be crucial for refining the deployment strategy.”

Phase 3: Scaling Up & Full Deployment

Following a successful pilot, the project moves to full-scale deployment. Key tasks include:

Mass Procurement & Logistics

Secure equipment volume and plan efficient delivery/storage across the franchise area.

Field Teams & Training

Recruit, train, and deploy technician teams for efficient meter installation.

Phased Rollout Strategy

Prioritize high-loss areas and key customer segments to maximize early benefits.

Customer Education

Launch campaigns to educate customers on new smart meters and usage.

System Integration

Integrate AMI with billing, CRM, and outage management systems seamlessly.

Phase 4: Operation & Maintenance (Ongoing)

AMI deployment is not a one-time project but an ongoing operation. Key tasks include:

Continuous Monitoring & Data Analysis

Use MDMS to monitor the network and analyze consumption patterns for trends and anomalies.

Regular Equipment Maintenance

Establish schedules for maintaining and replacing meters to ensure system reliability.

Software Updates & Upgrades

Keep MDMS and firmware updated with the latest features and security patches.

Customer Support & Resolution

Provide dedicated support for issues related to smart meters or billing.

Performance Reporting & Optimization

Report on KPIs and use insights to optimize the system and maximize benefits.

“Continuous improvement ensures the long-term sustainability and value of the AMI investment.”

CHAPTER 05

Benefits of AMI

Reducing Losses & Improving Revenue

Reducing Technical Losses

AMI Network Visibility

AMI provides unprecedented real-time visibility by monitoring voltage, current, and power quality at the customer level. This allows utilities to quickly identify overloaded transformers, faulty lines, and phase imbalances.

By enabling proactive maintenance and targeted interventions, AMI transforms utility operations from reactive to proactive.

Technical Loss Rate Comparison

Before AMI	After AMI
12%	8%

Reduction: 4% (33% Improvement)

Case studies have consistently shown that AMI implementation leads to a significant reduction in technical losses, often achieving 15-20% or more reduction through optimized grid management.

Reducing Commercial Losses

AMI is a powerful tool in the fight against commercial losses:

Eliminates Estimated Billing

Smart meters provide accurate, real-time consumption data, replacing inaccurate estimates with precise bills, which builds trust and reduces disputes.

Detects Theft and Tampering

Advanced tamper detection features immediately alert utilities to unauthorized access or manipulation, making theft harder and riskier.

Enables Prepaid Billing

Prepaid smart meters ensure customers pay before use, virtually eliminating bad debts and significantly improving cash flow management.

Improves Collection Efficiency

Automated billing and payment processes reduce administrative costs and simplify customer payments, leading to significantly improved collection rates.

Improving Revenue Collection

The combined effect of reducing technical and commercial losses, along with improved billing accuracy and collection efficiency, directly translates into increased revenue for DisCos. Studies show utilities implementing AMI typically see revenue increases of 10-25% within a few years, creating a positive cycle of growth.

Projected Revenue Growth (3 Year Outlook)

Reinvestment Cycle: Additional revenue generated can be reinvested into further network improvements and expansion.

Enhancing Operational Efficiency

Beyond revenue, AMI drives significant operational efficiencies across key utility functions:

Automated Meter Reading

Eliminates costly manual readings, saving labor and transportation expenses while reducing human error.

Remote Service Management

Enables remote disconnect/reconnect, cutting operational costs and improving response times for customers.

Predictive Maintenance

Data analytics predict failures, allowing proactive scheduling to minimize downtime and repair costs.

Improved Outage Management

Real-time data pinpoints outage locations instantly, accelerating restoration and boosting satisfaction.

"AMI streamlines processes, reduces costs, and allows utilities to operate with unprecedented effectiveness."

Enhancing Customer Service

Accurate & Transparent Billing

Bills based on actual usage eliminate disputes and build trust through transparency.

Empowerment Through Data

Real-time usage data helps customers understand and manage their energy consumption effectively.

Faster Issue Resolution

Utilities resolve inquiries remotely and quickly, significantly improving the customer experience.

Improved Reliability

Operational efficiencies lead to a more stable power supply, the most critical service improvement.

“AMI transforms the utility-customer relationship from reactive to proactive and transparent.”

06. Case Studies: AMI Success Stories

Real-world Impact & Transformative Results from Nigeria & Beyond

Case Study 1: Huawei's AMI Solution for Ikeja Elec

Challenge

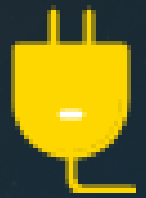
Ikeja Electric faced high technical/commercial losses, inefficient manual meter reading, and slow revenue collection.

Solution

Deployed end-to-end AMI with anti-tampering smart meters, PLC-IoT network, and IoT-based MDMS.

Results

Reduced technical losses by15%and increased revenue collection efficiency by25%, with improved load balancing.



Smart Metering Technology

15% ↓

Technical Losses

25% ↑

Revenue Efficiency

Case Study 2: World Bank's DISREP Program

Challenge

Nigeria's distribution sector faced a massive metering gap, high losses, and poor operational performance.

Solution

The DISREP program provided financing and technical support for AMI deployment across 11 DisCos, aiming to install millions of smart meters.

Objective

Close the metering gap, reduce commercial/collection losses, enhance service quality, and improve financial sustainability.

Supporting Nigeria's Power Sector Recovery

Case Study 3: AMI Success in Other Developing Coun

Bangladesh

The Bangladesh Rural Electrification Board (BREB) partnered with Itron to deploy 500,000 smart prepaid meters. This enabled automated reading, reduced losses, and empowered customers with better control over their energy use.

India

The Haryana Power Sector Improvement Project deployed AMI to reduce commercial losses and enable advanced features like demand response and time-of-use billing, demonstrating scalability.

Tanzania

The MIMIC initiative used data analytics similar to AMI to improve the efficiency and quality of Acute Myocardial Infarction (AMI) care, showing broader applicability of data-driven solutions.

Key Takeaway: AMI solutions demonstrate scalability and adaptability across diverse developing contexts.

07. Conclusion & Call to Action for NNEPIE 2026

ACCELERATING NIGERIA'S POWER SECTOR TRANSFORMATION

Conclusion

Proven Solution

AMI is a proven technology that directly addresses Nigeria's critical power sector challenges of high losses and poor revenue collection.

Clear Roadmap

A phased technical roadmap provides a structured and achievable path for successful AMI deployment across Nigeria's distribution networks.

Substantial Benefits

AMI delivers significant benefits, including reduced technical and commercial losses, improved revenue, enhanced efficiency, and better service.

Collaborative Effort

Success requires strong collaboration between DisCos, providers, regulators, and government, supported by policies and financing.

NNEPIE 2026: Explore AMI Solutions

The premier platform to explore the latest AMI technologies and solutions for Nigeria's power sector, connecting innovators and stakeholders.

Meet Leading Providers

Connect with world's top AMI tech providers, integrators, and vendors.

Attend Technical Seminars

Expert-led workshops on deployment strategies, best practices & case studies.

Network with Stakeholders

Engage with policymakers, utility executives & industry experts.

Discover Innovations

See cutting-edge smart metering, grid modernization & energy management.

Save the Date: September 16-18, 2026 | Landmark Centre, Lagos, Nigeria

Website: https://www.nnepie.com

Why Attend NNEPIE 2026?

Access to Cutting-Edge Technology

Explore the latest AMI solutions, smart grid technologies, and renewable energy systems from global and local innovators.

Business Development Opportunities

Identify potential partners, suppliers, and customers to grow your business in Nigeria's booming energy market.

Market Insights

Gain valuable insights into Nigeria's energy policies, market trends, and investment opportunities from industry leaders.

Showcase Your Solutions

Demonstrate your products and services to a targeted audience of key decision-makers and influencers in the power sector.

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For sponsorship and exhibition opportunities, please reach out to us via the channels above.

Thank You

We look forward to welcoming you at NNEPIE 2026!

Nigeria International New Energy & Power Industry Expo 2026

September 16-18, 2026

Landmark Centre, Lagos, Nigeria

Building a brighter, more electrified future together

Appendix: AMI Tech Specs

Smart Meter Specifications

- **Communication:** PLC-IoT, GPRS, NB-IoT
- **Accuracy Class:** Class 1 for active energy
- **Display:** LCD with backlight
- **Tamper Detection:** Magnetic, tilt, cover open
- **Protection:** IP54 / IP65 Rated
- **Operating Temp:** -25° C to +60° C

MDMS (Meter Data Mgmt) Features

- Data Collection & Validation
- Billing & Invoicing Integration
- Customer Information System (CIS) Integration
- Advanced Analytics & Reporting
- Outage Management & Monitoring
- Remote Command & Control

Specifications are subject to regional standards and project customization requirements.

Appendix: Cost-Benefit Analysis

Key Costs (Investment)

- Smart Meter Procurement: $50-100 per unit
- Communication Network: $10-20 per meter
- MDMS Implementation: $500k - $2M
- Installation & Training: $20-30 per meter

Key Benefits (Annual)

- Reduced Technical Losses: $0.05-0.10/kWh saved
- Reduced Commercial Losses: $0.10-0.15/kWh saved
- Operational Savings: 20-30% reduction in ops
- Revenue Collection: 10-25% increase

Payback Period

Typically 3 - 5 Years (Based on typical loss reduction and efficiency gains)

AMI = Advanced Metering Infrastructure | MDMS = Meter Data Management System