

ENERGY AND TECHNOLOGY

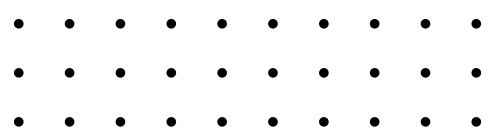
Community-Based Resilience Solutions

Mathias Berthelot

Cassandra Pin

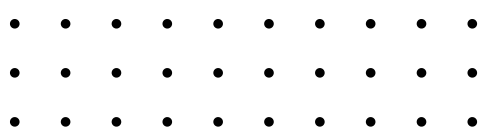
Sophie Chen





OUTLINE

1. Infrastructure Resilience Challenges
2. Community-based Solutions
3. The Rockaways
4. Microgrid Basics
5. Funding Sources and Financing
6. Cost Estimate and Insights
7. Integrating Resilience Assets
8. Summary
9. Q&A



INFRASTRUCTURE RESILIENCE CHALLENGES

CLIMATE CHANGE

Increasing frequency and severity of extreme weather events and natural disasters

FUNDING

- **~50%** of BIL/IIJA still unspent
- **33%** of IRA energy and climate funding unspent
- Unclear how much of Biden appropriations are shielded from repeal, but further funding increases are unlikely

Energy and Technology

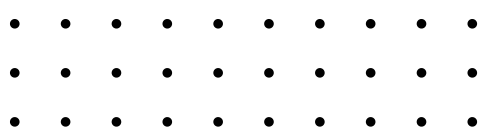
INFRASTRUCTURE CONDITION AND CAPACITY

60% of U.S. distribution lines are surpassing their 50-year life expectancy, while demand is forecasted to increase **20-40% by 2050**

REGULATION

Interconnection procedures and queuing (FERC), NEPA permitting, and local permitting and zoning all hamper transmission expansion and grid modernization





COMMUNITY-BASED SOLUTIONS

LOCAL ENGAGEMENT AND ADVOCACY

- Communities advocate based on local risks and needs
- Creative, unique solutions tailored to specific areas

PUBLIC-PRIVATE PARTNERSHIPS

- Collaboration with private companies & local governments to secure additional funding

ECONOMIC ACTIVITY

- Training and employing residents in grid maintenance boosts the local economy
- Workforce supports ongoing maintenance & upgrades



THE ROCKAWAYS

Case Study

HURRICANE SANDY IMPACTS

- **100,000+** residents affected
- Power outages, critical failures (hospitals, water pumps) lasting for **3 weeks**



PROPOSED MICROGRID SOLUTION

GENERATION

Distribute local wind & solar

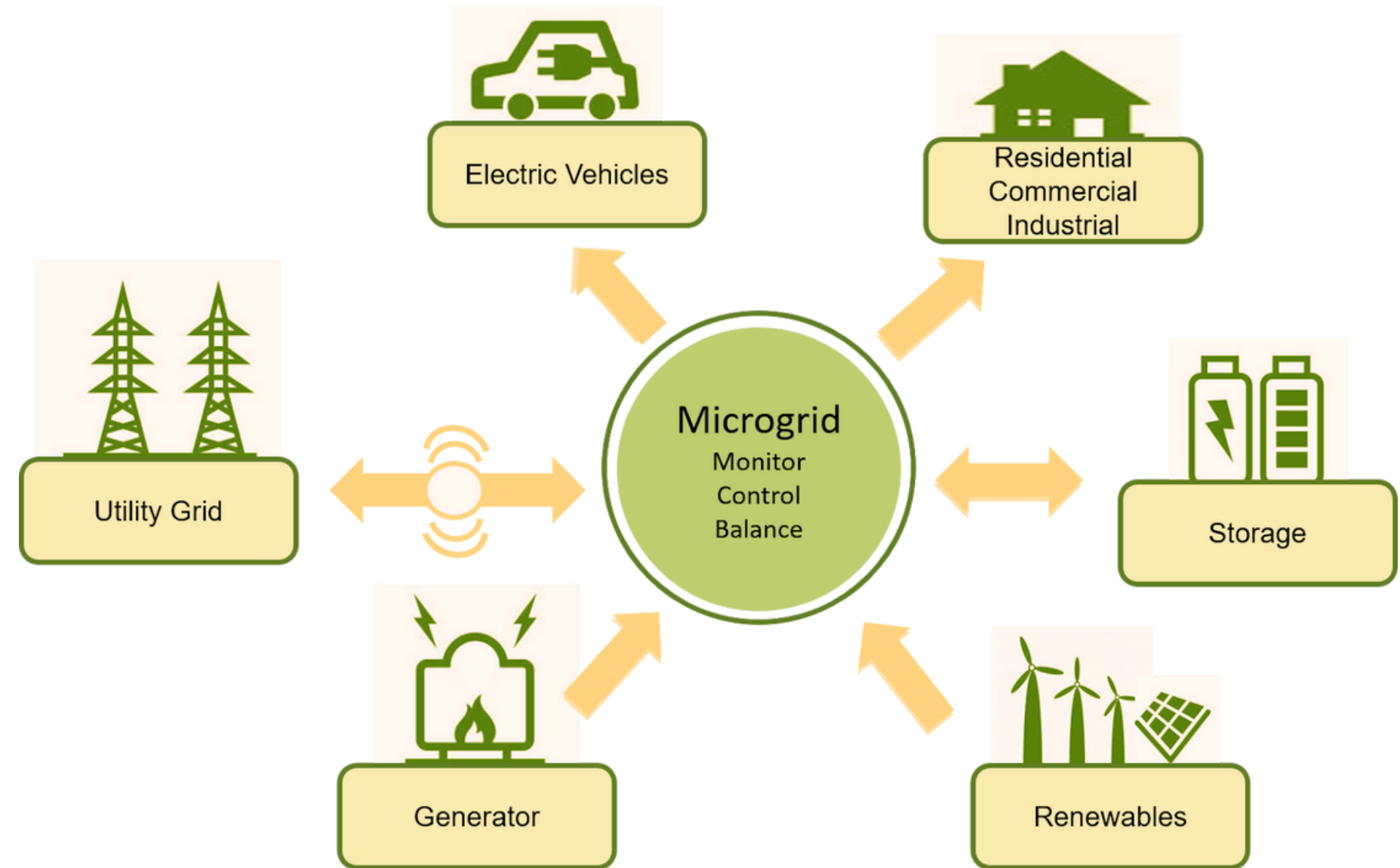
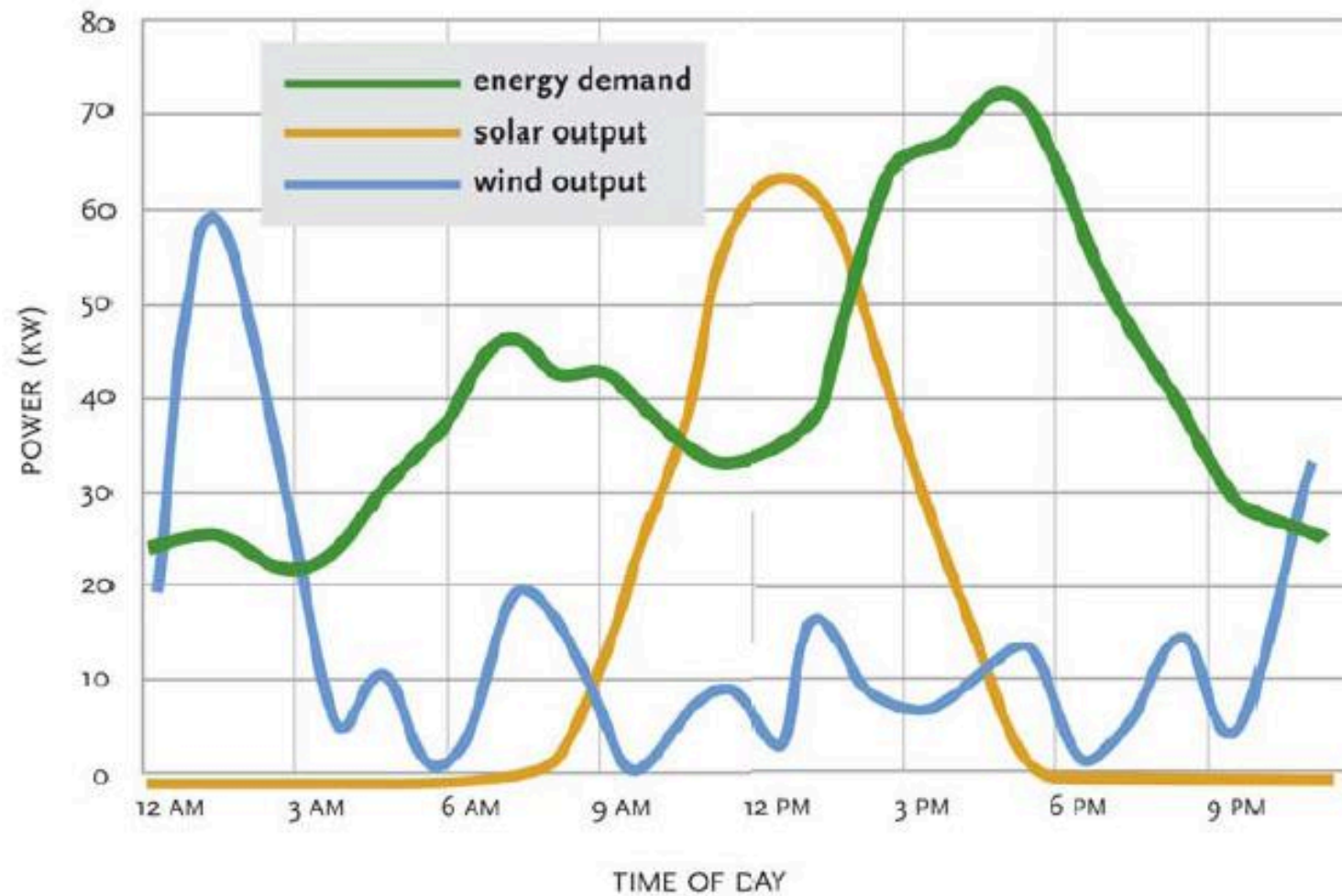
STORAGE

Stabilize supply off peak or during storms

INTEGRATION

Reliability with or without main grid

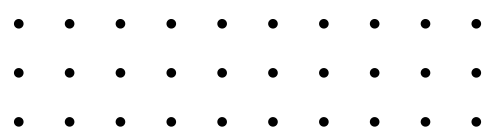
MICROGRID BASICS



MICROGRID

A localized energy grid and control system

- Matches demand by managing intermittent resources (wind, solar), batteries and main grid
- Can seamlessly disconnect from the main grid in outages
- Strategically designed and hardened against storm impacts
- Prioritizes critical loads during emergencies



FUNDING SOURCES AND FINANCING

PUBLIC-PRIVATE PARTNERSHIPS

Long Island Power Authority
Other utilities working for CLCPA compliance
Grid technology companies
Private developers

FEDERAL FUNDING

Previous DOE Microgrid Funding, FEMA
Disaster Preparedness, HUD
Current **tax credits** for clean generation,
storage, and microgrid control (up to 30% of
investment + 20% for a low-income zone)

STATE AND CITY FUNDING

NYSERDA and NY Power Authority (NYPA)
NYCEDC and Mayor's Office of Resiliency
Green bond financing

REVENUE STREAMS

Net metering: sell excess power to main grid
Peak shaving: battery storage system reduces
net demand fluctuations
Ancillary services: provide frequency
regulation and voltage support
Avoid losses associated with grid disruptions



COST ESTIMATE AND INSIGHTS

NREL Microgrid Cost Study

- \$/MW for delivery increases with complexity (more renewables, higher “soft costs”)
- Grid control and intelligence devices are becoming more affordable
- Utility-scale microgrids connect at medium voltage level, increasing infrastructure costs

Microgrid with DERs: Cost Estimate by Scale

| | |
|---------------------------------------|----------------------------|
| Residential | \$10,000 - \$50,000/MW |
| Community Microgrid | \$500,000 - \$2 million/MW |
| <u>Large Commercial/Utility-Scale</u> | \$2-4.5 million/MW |

Estimated Rockaways demand: 100 MW

**Rockaways Microgrid cost estimate: \$250-500 million,
depending on extent and design**

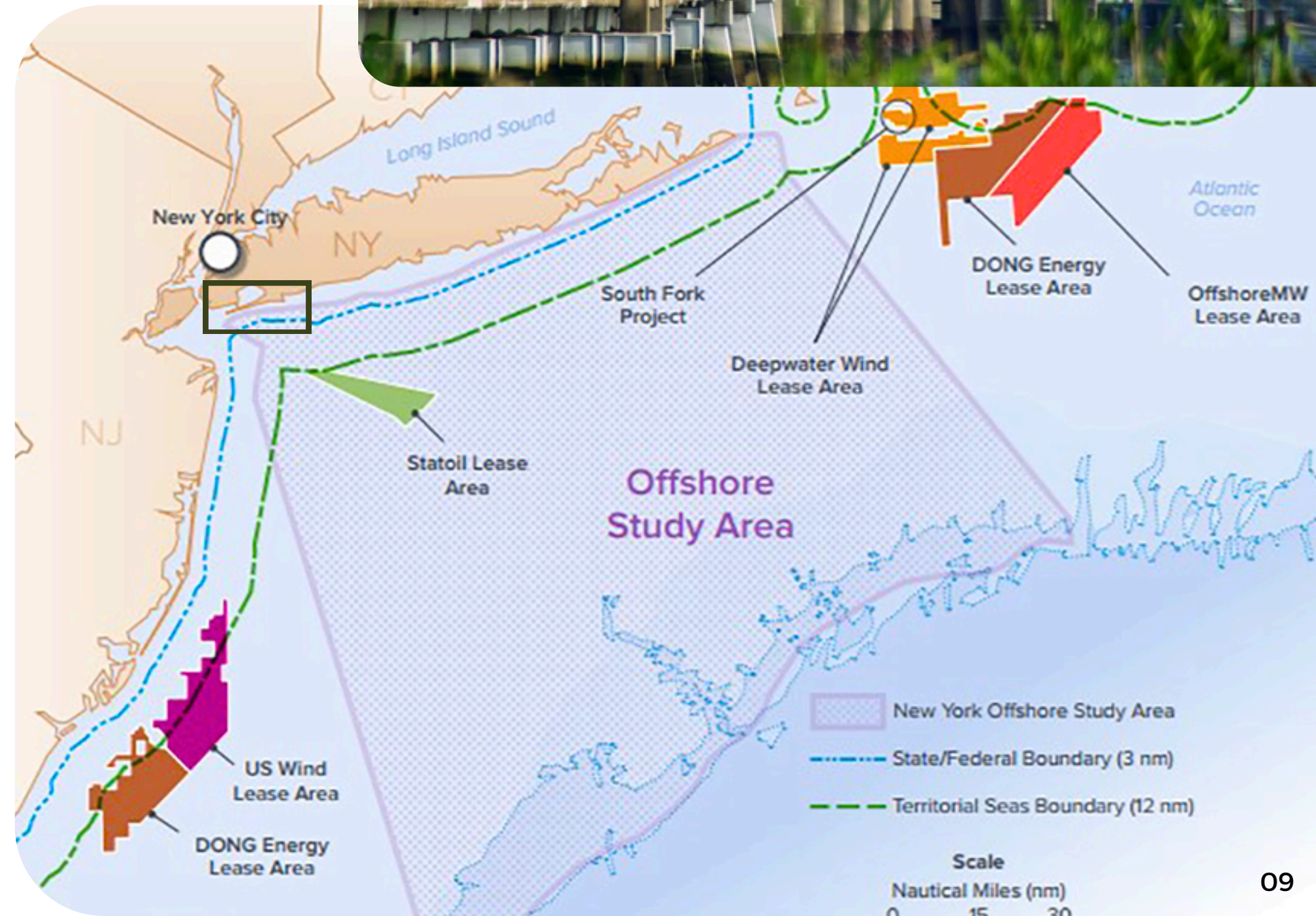
INTEGRATING RESILIENCE ASSETS

OFFSHORE WIND INTEGRATION

- Grant integration and control of new wind power assets to Rockaways microgrid
- Direct peak shaving revenue towards maintenance

A-LINE REPAIR AND RECONSTRUCTION

- Install medium voltage distribution cables along the fortified aboveground viaducts





Q&A



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