# Concept Paper Abstracts
2024 Call for Advanced Technology Concept Papers

Prepared by the Advanced Technology Working Group (ATWG)

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Overview

This document presents abstracts of the Concept Capers received in response to the Advanced Technology Working Group's (ATWG) request in March 2024. The ATWG filed its *Initial Assessment* of the Concept Papers on July 1, 2024.[1] The ATWG review team wrote the following abstracts, organized into categories described below.

2 Hydrogen

4 Advanced Conductors and Lines

3 Grid Monitoring and Management

15 Concept Papers

6 DERMS
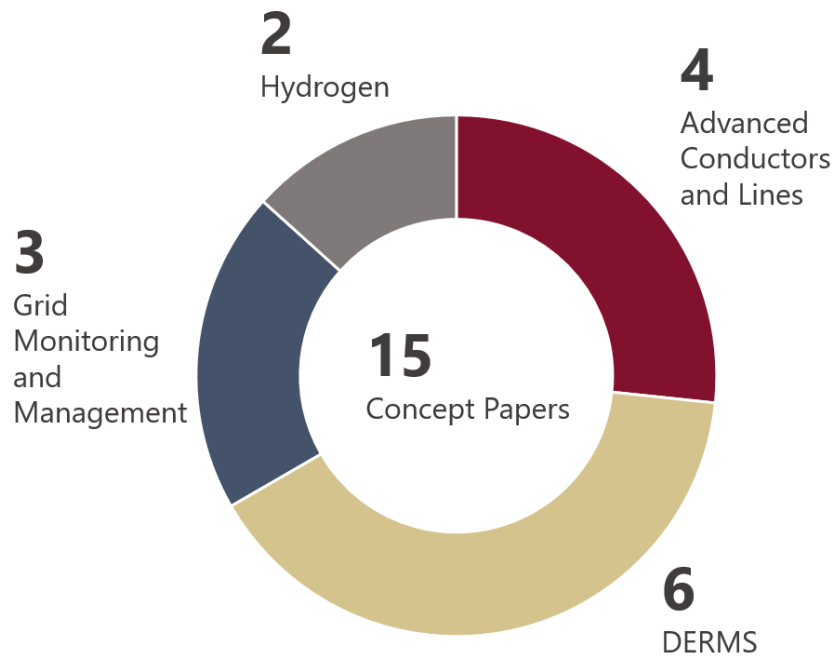
ADVANCED CONDUCTORS AND LINES

- Compact line design (1)
- Composite conductors (1)
- Superconductors (1)
- Electricity infrastructure cooling (1)

DERMS

- Digital twin platform (2)
- Flexible interconnections (1)
- Aggregate demand management (1)
- Digital market platform (1)
- Distributed energy storage network (1)

GRID MONITORING AND MANAGEMENT

- Real-time inertia measurement (1)
- Voltage optimization (1)
- Distribution system monitoring and management (1)

HYDROGEN

- Fuel cell electricity generation (1)
- Production, storage, and electricity generation (1)

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[1] Case 20-E-0197, *Initial Assessment of Advanced Technology Concept Papers*, Advanced Technology Working Group, July 1, 2024.

Advanced Conductors and Lines

1. Low Impedance Compact Line Design
Submitted by: BOLD Transmission LLC

BOLD Transmission's low-impedance compact line design enhances the capacity and efficiency of transmission lines by optimizing conductor size, bundle configuration, and phase-to-phase spacing. This technology could provide up to 60% more capacity to existing or new transmission line corridors with traditional components and reduced structure heights while reducing line losses, mitigating electric and magnetic fields (EMF), and reducing avian interactions. BOLD's compact line design can be deployed in a timeframe consistent with traditional line projects.

2. CTC Global ACCC® Conductor Concept Paper
Submitted by: CTC Global

CTC Global's ACCC® Conductor utilizes a carbon composite core that is significantly lighter and stronger than traditional steel cores, allowing it to carry more current with less thermal sag and reduced line losses. This innovative design enhances grid capacity, efficiency, and reliability. The conductor can be used to upgrade existing transmission lines or build new ones, reducing the need for additional structures and minimizing environmental impact.

3. Increasing Transformer Reliability and Longevity Through Passive Heat Dissipation
Submitted by: Heat Inverse

CoolFilm, developed by Heat Inverse, is a passive cooling technology designed to reduce the temperature of outdoor infrastructure such as transformers, solar inverters, and battery storage systems. The film reflects sunlight and emits thermal radiation, lowering the surface and internal temperatures of the equipment. This temperature reduction increases the equipment's efficiency and lifespan while reducing maintenance costs. The deployment process involves planning, targeted application, data collection, and expansion, with installation being straightforward and requiring minimal time.

4. Superconducting Transmission Lines in New York
Submitted by: VEIR

VEIR's superconducting transmission lines use advanced superconducting materials and a sophisticated liquid nitrogen-based cooling system to achieve significantly higher power transfer capacities compared to conventional lines. The system uses standard single-pole structures and substation terminal equipment, making it compatible with existing grid infrastructure. This technology enables efficient transmission of renewable electricity and reduces the need for new transmission corridors.

Distributed Energy Resource Management Systems (DERMS)

1. Optimizing The New York Power Grid: A Project for Sustainable Grid Management for Stability and Renewable Integration
Submitted by: SMPnet

SMPnet's Omega Suite optimizes voltage levels, reduces energy losses, and improves grid reliability and efficiency through real-time monitoring and control. System components like Optisys and Control optimize energy exchanges and respond quickly to grid fluctuations. The technology uses digital twins for precise simulations and predictive analytics for proactive management. It is scalable, flexible, and integrates seamlessly with existing infrastructure.

2. Increased Hosting Capacity through Flexible Interconnections
Submitted by: Mitsubishi Electric Power Products (Smarter Grid Solutions)

Mitsubishi Electric Power Products' Strata Grid and Element Grid Active Network Management (ANM) solutions allow the offering of flexible interconnections for all DER connections to speed up interconnection timelines, reducing congestion by reducing DER output when approaching constraints, managing distribution-level back-feed, and increasing circuit load factor by controlling DERs in real time to maximize utilization of existing grid infrastructure. This technology increases grid hosting capacity, reduces interconnection costs and timelines, and supports the integration of renewable energy.

3. Multi-tier Grid Optimization – Application to Cold Storage Facilities
Submitted by: Energy One Solutions International

The multi-tier grid optimization technology by Energy One Solutions International integrates thermal energy storage systems with a digital twin platform to optimize energy usage in cold storage facilities and Trailer Refrigeration Units (TRUs). The technology segments the grid into interconnected tiers, each managed independently but influenced by higher tiers. The digital twin platform uses AI-assisted models to predict, optimize, and monetize energy behavior, while the thermal energy storage systems use phase change materials to store thermal energy efficiently.

4. Meltek's Aggregate Demand Management
Submitted by: Meltek

Meltek's Aggregate Demand Management (ADM) technology integrates Demand Response (DR) and Value of Distributed Energy Resources (VDER) to manage energy demand in real time. The cloud-based platform acts as a real-time system operator, using AMI data to monitor and control energy usage. It interfaces with smart devices like thermostats, EV chargers, and inverters to optimize energy consumption and provide grid services. The platform uses standard communication protocols to connect with NYISO and utility systems, ensuring timely participant payment and incentives.

5. Statewide DER-Enabled Market Platform for Grid Flexibility
Submitted by: Piclo

Piclo Flex is a digital market platform that facilitates transactions of flexibility services between utilities and Distributed Energy Resource (DER) aggregators and owners. The platform matches grid service needs with DER capabilities through competitive auctions and managing the communication, dispatch, and financial settlement processes. It integrates various types of DERs and uses standard communication protocols for seamless operation. The platform can be deployed quickly and scaled to support many transactions, helping utilities manage grid congestion, reduce costs, and improve reliability.

6. The Intelligent Energy Storage Network for the Built Environment
Submitted by: Novele

Novele's Intelligent Energy Storage Network is a modular and distributed system designed for urban properties with limited space and stringent safety requirements. The system uses Energy Boards, each with a capacity of 5 kWh, to create scalable energy storage solutions that can be integrated into building management systems. The intelligent software platform enables real-time monitoring, demand response, load shifting, and renewable energy integration. The system also provides backup power during outages and enhances grid resilience by creating building-wide microgrids and Virtual Power Plants (VPPs).

Grid Monitoring and Management

1. Real Time Inertia Measurement Services
Submitted by: Reactive Technologies

Increased penetration of intermittent resources implies less inertia on the system and more frequency deviations. Reactive Technologies' real-time inertia measurement technology provides accurate and continuous monitoring of grid inertia through a sophisticated process of grid pulsing, high-frequency data measurement, secure data transmission, and advanced real-time analytics. Potential benefits include enhanced system reliability and security while supporting higher levels of renewable energy.

2. Voltage Optimization for the Distribution Grid
Submitted by: [DVI](DVI)

DVI's voltage optimization technology lowers voltage delivered by the utility by collecting real-time voltage data from AMI meters and voltage sensors, processing this data through its software suite, and optimizing set points for voltage control devices like voltage regulators and capacitor banks. This platform can integrate with existing ADMS and DERMS systems to enable SCADA control features. Potential benefits include enhanced energy efficiency and grid edge voltage visibility.

3. State Estimation and Forecasting with Dynamic Relay Settings for Distribution Protection and Control
Submitted by: Acelerex

Acelerex's REX software uses AI and real-time data to monitor and manage power distribution systems. It dynamically adjusts relay settings, detects faults, and forecasts DER production, enhancing grid reliability and efficiency and helping integrate DERs at the distribution level. This comprehensive approach ensures that the grid is more adaptive and responsive to changing conditions, minimizing downtime and supporting the integration of renewable energy sources. The system interfaces with advanced protection relay systems and utility SCADA systems, making it a scalable and cost-effective solution for modernizing the power grid.

Hydrogen

1. Hydrogen Fuel Cell Technology Providing Dispatchable Zero-Emissions Electricity
Submitted by: Plug Power

Plug Power's products span the entire hydrogen ecosystem, from production and liquification, to distribution, storage, dispensing/refueling, material handling applications, and megawatt-scale (MW) proton exchange membrane (PEM) fuel cell power systems. The company has manufacturing facilities for PEM electrolyzers and fuel cells in New York State.

2. Advancing Grid Modernization & Clean Energy with HYDRO-GEN™
Submitted by: Vivacity Power Inc

Vivacity Power's Hydro-Gen solution aims to implement an integrated hydrogen generation, storage, and utilization system through technologies such as electrolysis and fuel cells.