



OPAI AI Use Case Work Stream Kickoff

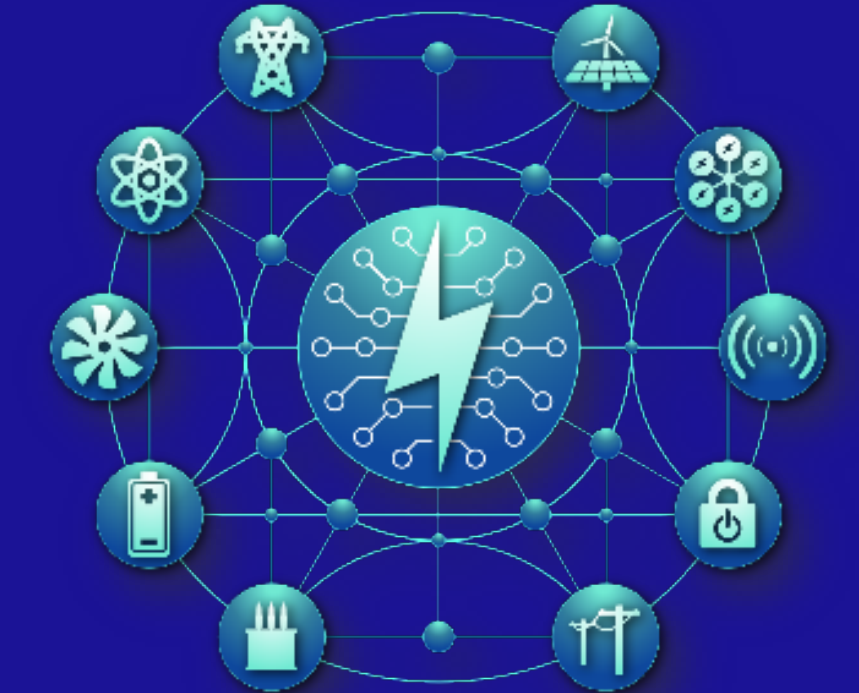
Open Power AI Consortium



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Agenda

- Welcome and EPRI Introductions
- Open Power AI Introduction
- Use Case Workstream Introduction
 - AI use case state of the energy industry
 - Goals for the workstream
 - Use case survey structure
 - Instructions and Demo
 - Next Steps
- Adjourn



**OPEN POWER
AI CONSORTIUM**

Use Cases Workstream

Open Power AI Consortium Leaders

Daniel Brooks

- OPAI Executive Lead
 - Executive Advisory Group (EAG) Lead



Jeremy Renshaw

- Overall OPAI Lead
 - Member Representative Committee (MRC) Lead



Apurba Sakti

- OPAI Operational Manager
 - Assisting with member connections, operations, and technical excellence



OPAI Work Stream Leads

Jason Hollern

- Implementation Work Stream Lead



Adrian Kelly

- AI Use-Cases Work Stream Lead



Ben Sooter

- Domain-Specific Model Work Stream Lead



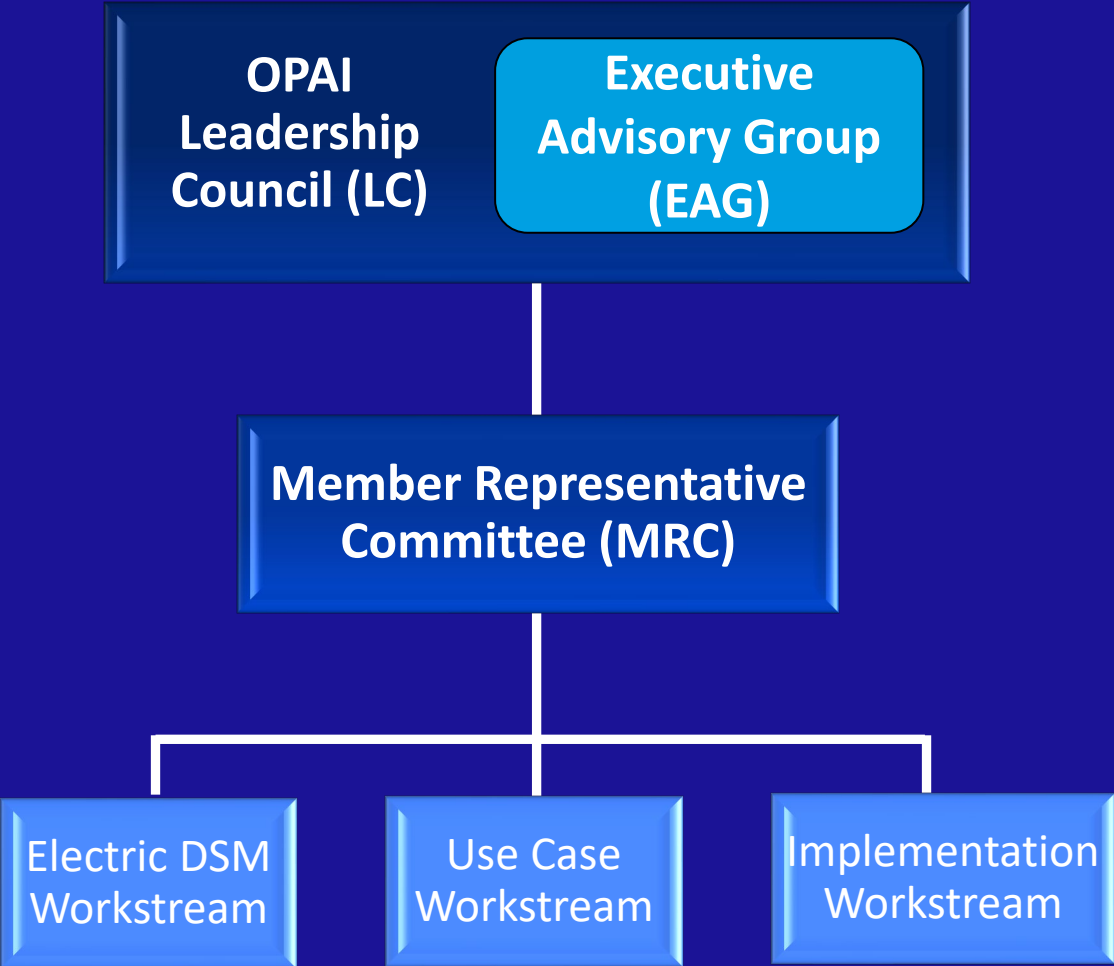


Open Power AI Status Update

OPAI Consortium Member Engagement

 Consortium Engagement

Many companies continue to join the consortium



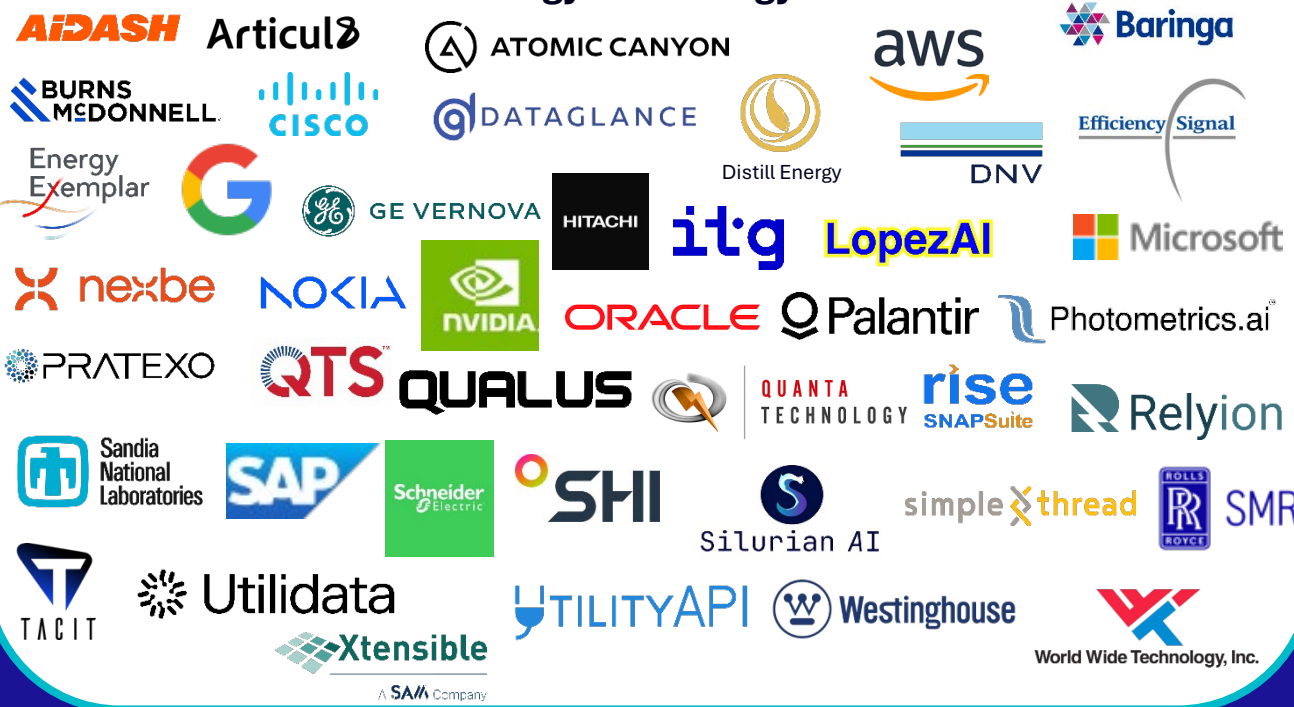
>175 Confirmed Members

>125 MOU/Requests In-Process

<https://msites.epri.com/opai>

OPA1 Participants

AI and Energy Technology Partners



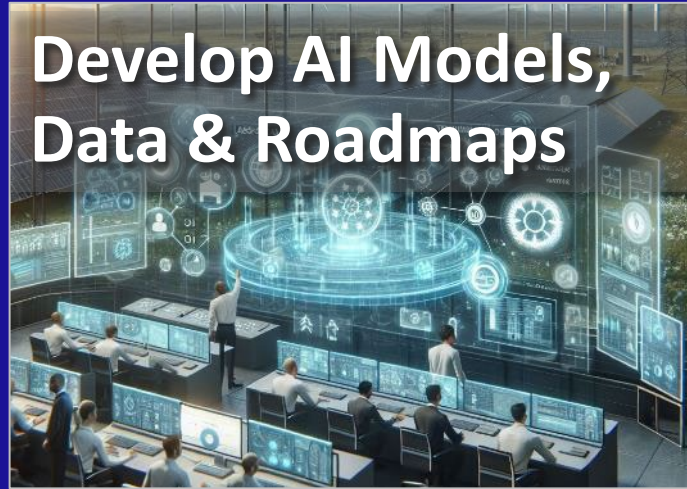
Academia & Other Strategic Partners



Energy Partners



Open Power AI Consortium – Key Objectives



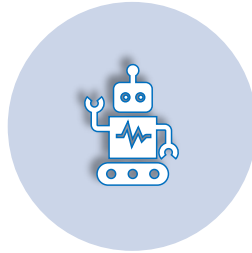
Create an ecosystem for stakeholders to identify, develop, validate and deploy AI solutions to transform the electric sector

The image features a blue gradient background with a faint, glowing globe in the center. The globe is surrounded by a network of white lines and dots, suggesting a global network or data flow. The text "AI Use Cases Workstream" is centered over the globe in a white, bold, sans-serif font. The overall aesthetic is clean, modern, and tech-oriented.

AI Use Cases Workstream

State of the AI in Energy Industry - Summary

Need for Automation



The need for automation (and AI)



AI for Process Automation / AI for Decision Making

Developing Use Cases



Good ideas but generally low level of maturity and adoption.



Difficult to set value use case ideas to prioritize

Solutions, Platforms and Technology

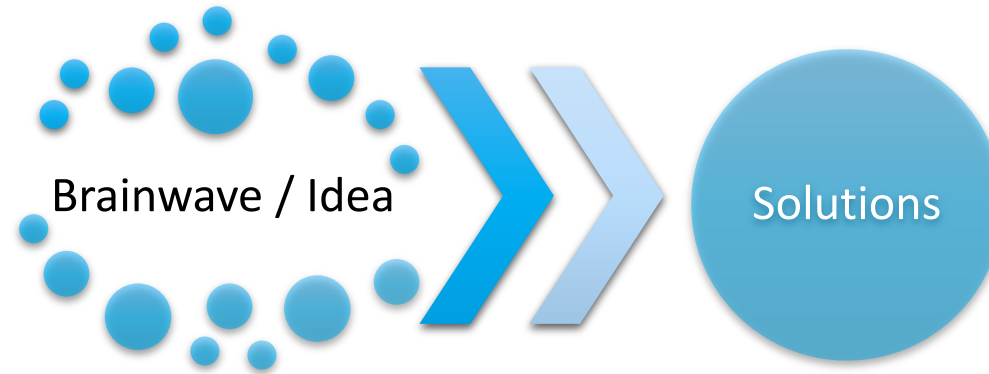


Platforms, cloud HPC solutions



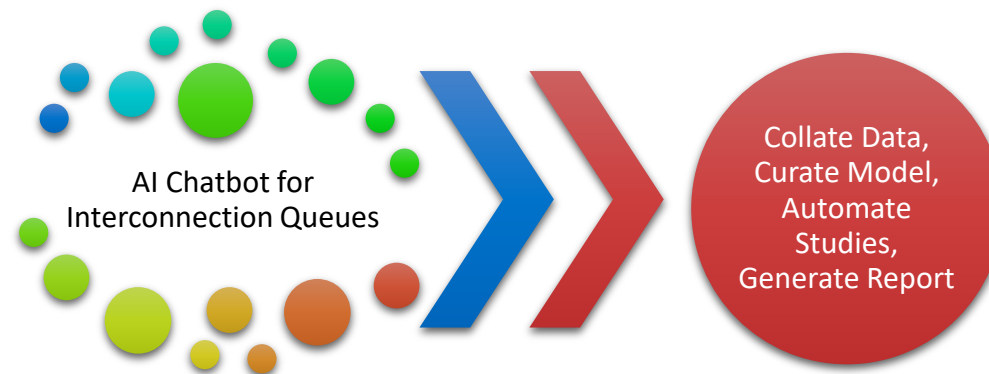
Software technology providers, startups, developing solutions.

Streamlining Ideas to Map to Engineering Processes



What Problem is this Solving?

Engineering Process Enhancement, Efficiency, Automation



What Problem is this Solving?

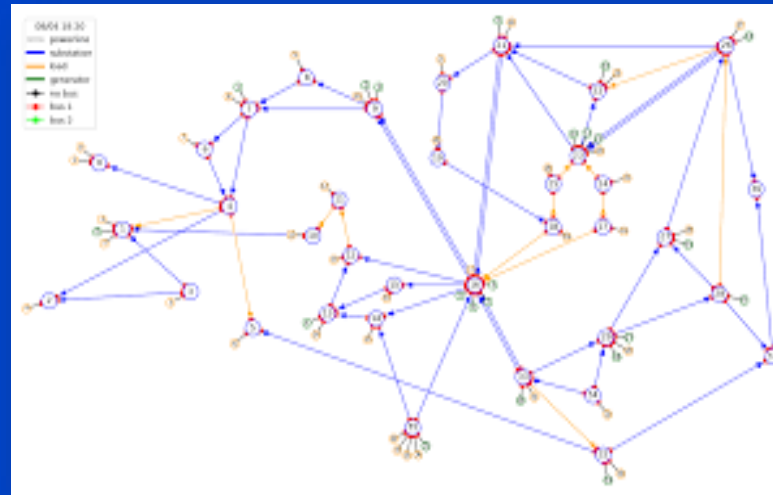
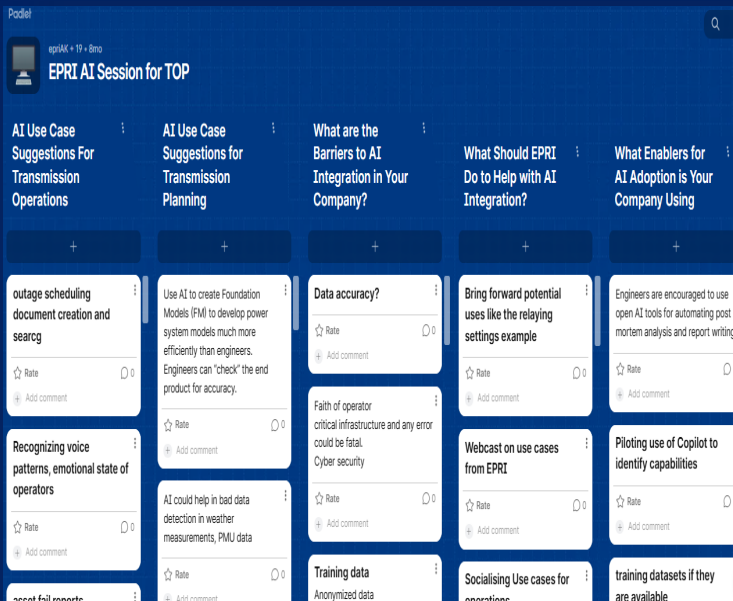
Engineering Process Enhancement, Efficiency, Automation

Where Do Use Case Ideas Come From?

➤ EPRI Workshops and Advisories

➤ Industry Initiatives Demos and Concepts

➤ EPRI R&D, Global Engagement With Technology Providers



Public Use Case Lists – Too Generic, Non-Functional, Not Linked to Processes, Not Linked to Utilities

Spark Optimus

Table of contents

1. Generated self-service repair guides
2. Partly-automated replies for resolving disputes and complaints
3. Automated call logging and summarization
4. Automated market, competitor, and pricing reports
5. Automated payment or churn risk alerting
6. Assisted data field entry
7. Localized marketing content
8. Maintenance & technician assistance
9. Automated chatbot improvements
10. Personalized training for customer service & tele sales agents

Gartner

Gartner

Figure 1: GenAI Use-Case Prism for Energy and Utilities

GenAI Use-Case Prism for Energy and Utilities



Source: Gartner
797390_C

Goals of the OPAI Use Cases Workstream

1. To create and curate the world's most complete source of information on energy sector AI use cases.
2. Energy utilities assess and prioritize by function
3. Technology providers match their solutions to use cases and maturity assess
4. Take forward the priority use cases to be co-developed by the OPAI community

AI Use Case Workstream

Why?

AI is expensive. Need to know where to prioritise effort and resources

- There are example of use case repositories in industry, mostly incomplete, impartial, pre-mapped to solutions
- No broad-based utility-assessment

What?

EPRI have a long list (200+) of energy sector AI use cases gathered through workshops, experience, industry engagement

- Need to streamline them:
 - TO identify what are actual priorities over nice to have
 - Streamline for further development in OPAI

How?

We need your help:

- Two surveys
 1. Utility prioritization
 2. Technology Provider Maturity Assessment

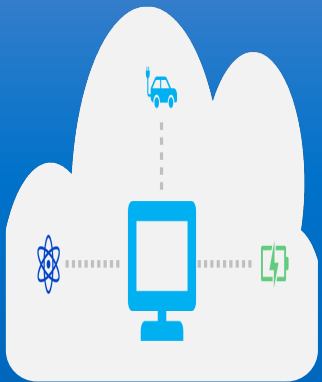
Who is the Survey Intended For? We Need to Group Fill In



Energy Sector Utilities

- Generators and resources
- Market participants
- Grid asset owner
- Grid asset operators
- Energy suppliers
- Large energy users

**Energy Utility
Energy AI Use Case
Assessment**



Technology Providers and Research Institutes

- Large-scale software technology providers
- Small-scale software technology providers
- Startups
- Hardware technology providers
- Universities and academia
- Research institutes
- National labs

**Technology Provider
Energy AI Use Case
Technology Maturity
Assessment**

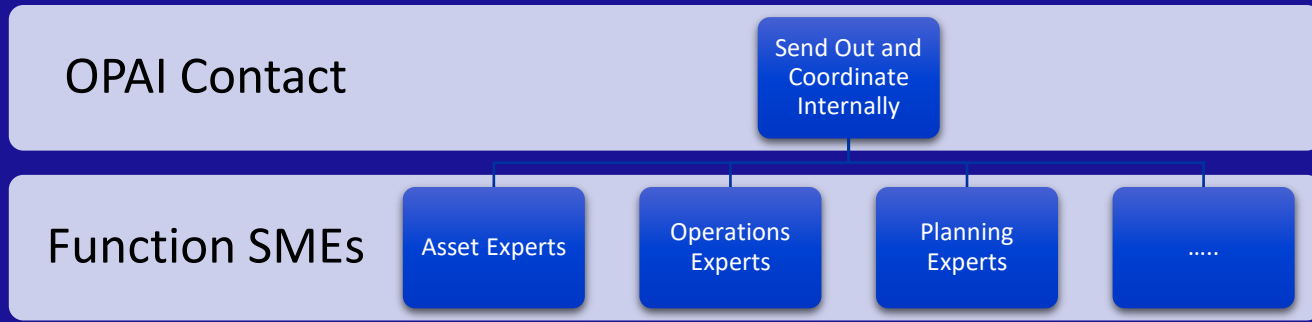
Functional Breakdown

- We tried our best to group by function.
- This is to target SMEs and for future co-development
 - Segregated by Sector – Function
 - Grid
 - Nuclear Power Plant
 - Thermal Power Plant
 - Data and models are usually function dependent
 - Solutions can be repurposed within functions
 - AI Use cases should be mapped to engineering process improvements
- Warning: Some use cases are multi functional and don't fit neatly into single categories

* 2. Energy System Function (Note: you will be redirected to a set of use cases based on your answer. You can retake the survey as many times as possible, to select other functions)

- Grid - Asset Management
- Grid - Asset Performance
- Grid - Balancing
- Grid - Battery Energy Storage System Management
- Grid - Cyber Security
- Grid - Data and Model Management
- Grid - Distribution Operations
- Grid - Distribution Planning
- Grid - Electric Transportation
- Grid - Energy End Use Management

How We Intend the Survey to Work



- YOU DON'T NEED TO EVALUATE ALL 300 USE CASES!
- Function SMEs evaluate use cases in their function
- Multiple SMEs per company can fill out survey
- SMEs can evaluate use cases in multiple functions by reopening the survey
- Utilities can be technology providers

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Energy Utility Energy AI Use Case Assessment

4. Advanced Metering Infrastructure (AMI) Data Validation

AI validates smart meter data by detecting anomalies, missing values, or implausible readings. Models compare real-time data against historical patterns and neighboring meters. Errors are flagged and corrected or imputed before billing or analysis. This ensures accurate consumption records and strengthens customer trust.

	Limited	Minimal	Moderate	Significant	Extensive
Impact - Company or Customer Cost Saving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact - Reliability of Resilience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact - Safety or Security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Implementation Complexity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk of Misoperation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have an existing project for this use case in your company?...if so please describe

- Use Case Name
- High-level description
 - What the use case is, how it would potentially work if an AI solution was developed.
- 6 assessment categories, 5 levels
- Free text box to describe:
 - If your company has an application either in development or production

Please be decisive, resist selecting “Moderate”.

We need to prioritise the high priority use case ideas and de-emphasise the low priorities

Assessment Criteria Description

Use Case Assessment Criteria



Impact – Reliability & Resilience



Impact – Safety & Security



Impact – Savings for Company & Customer



Implementation Complexity



Data Availability



Risk of Misoperation

Assuming a technology solution was available

1. What would its impact be on the reliability of the asset, plant, network or infrastructure?
2. What would the impact be on worker or public safety, or cyber physical or energy asset security
3. What would be impact be on either the company costs or customer savings
4. How difficult would the solution be to develop hypothetically
5. How available and structured are data required to develop a solution
6. If the solution were to misoperate, what would the risk be to people, assets, networks, systems

Technology Provider Energy AI Use Case Technology Maturity Assessment

3. Advanced Metering Infrastructure (AMI) Data Historical Backcast and Forecast

Time-series forecasting models use historical AMI data to generate load forecasts and back-casted estimates for periods of data loss. AI improves accuracy by incorporating weather, occupancy, and event data. These predictions support planning, tariff design, and load profiling. The models also adapt to changing consumption patterns.

TRL 1: Basic principles observed and reported	TRL 2: Technology concept formulated	TRL 3: Proof of concept	TRL 4: Laboratory validation	TRL 5: Relevant environment validation	TRL 6: Demonstration in relevant environment	TRL 7: Prototype demonstration in operational environment	TRL 8: System completed and qualified	TRL 9: Actual system proven in operational environment
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please elaborate on technology in prototype, demonstration or production with one or more energy sector utility

- The same use case names and descriptions
- High-level description
 - What the use case is, how it would potentially work if an AI solution was developed.
- Technology solution maturity assessment
 - 1-9 Scale Technology Readiness Level
- Free text box to describe:
 - If your company has a demo or solution with an energy sector utility.
 - Mention the utility (for verification) other pertinent details / links

Please resist the temptation to select production maturity with all use cases. While your technology may be capable in theory, we are interested in tracking demos and matching to use cases

Technology Provider Energy AI Use Case Technology Maturity Assessment

1. TRL 1: Basic principles observed and reported—Early fundamental research, theoretical foundation only.
2. TRL 2: Technology concept formulated—Potential applications identified, but not yet proven or detailed.
3. TRL 3: Proof of concept—Active research, both analytical and lab studies to demonstrate feasibility.
4. TRL 4: Laboratory validation—Basic components tested together in a controlled lab environment to validate performance.
5. TRL 5: Relevant environment validation—Integrated prototype tested in a simulated or otherwise relevant environment to demonstrate realistic performance.
6. TRL 6: Demonstration in relevant environment—A system/subsystem level prototype demonstrated in an environment simulating real-life conditions.
7. TRL 7: Prototype demonstration in operational environment—Prototype tested in an actual operational or field environment, close to real-world use.
8. TRL 8: System completed and qualified—Final form of the technology tested and validated under expected operational conditions.
9. TRL 9: Actual system proven in operational environment—Technology is fully deployed, operational, and proven in its final environment.

**Please resist the temptation to select production maturity with all use cases.
While your technology may be capable in theory, we are interested in tracking demos and matching to use cases**



Demo of the Survey

One Final Question.....

- Maybe we missed something.....!
- If we did - please add it before finishing the survey in the comment box
- Even if unsure, add it. We will figure out if its already covered
- We will develop an open form for new use case entry after the survey is complete

OPAI Use Case Survey for Energy Utilities and Operators

Other Use Cases Not Included

186. Are there any other energy sector AI use cases you are working on, or familiar with that are not included in the survey? Please elaborate

How Will We Use the Survey Data ?

Use Case Functional
Prioritisation

- Top 5 10 Asset Management
- Top 5-10 Operations
- Top 5-10 Markets, Planning....etc

Use Case Assessment Criteria
Prioritization

- Top 5-10 Reliability and Resilience
- Easiest to implement
- Least risky...etc

Use Case to Technology
Matching

- Map high priority use cases to medium to high technology solution maturity

Use Case Co-Development

- OPAI will bring forward the highest priority use cases for co-development
- Potential data availability identified in survey, utilities with highest need may provide

Utility and Industry Demo
Spotlights

- May reference and spotlight utility or technology use case implementations

Company Benchmarks

- Utilities that fill in the survey will receive their individual company results, relative to industry averages

Tech Provider Call to Action

- Are there gaps in industry that your technology can address

Regular Updates

- Survey can be rerun regularly to assess state of the industry

Use Case Maturity Assessments

Matrix Evaluations

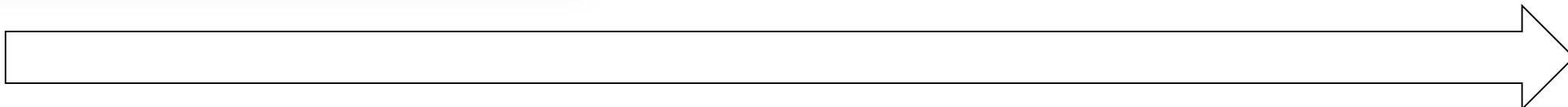


Use Case ↔ Technology Matching

Phase TRL	
Research	1
	2
	3
Development	4
	5
	6
Deployment	7
	8
	9

Co-Development of Use Cases

- Virtual Co-Development Space 1
- Virtual Co-Development Space 2
- Virtual Co-Development Space 3
- Virtual Co-Development Space 4
-



Proposed Workstream Research Output

1. Webpage with lists of use cases and metadata
2. Graphical, interactive summaries of use case metadata
3. Co-Development platform(s)



Next Steps and Timelines

Implementation Work Stream Virtual Meeting
Use-Case Work Stream Virtual Meeting
Domain-Specific Model Virtual Meeting
OPAI Executive Advisory Group
OPAI Member Representative Committee
EPRI Holiday

OCTOBER						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Work Stream Kickoff

NOVEMBER						
Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Use Case Survey Check in and Preliminary Results
November 12-13

November 28th - Survey Closed

DECEMBER						
Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Results Collated
December 15th Webcast on Survey Results

Company specific survey results released

Use Case 1 Kickoff





TOGETHER...SHAPING THE FUTURE OF ENERGY®