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PG&E Gas R&D Hydrogen Efforts

2021-03-18

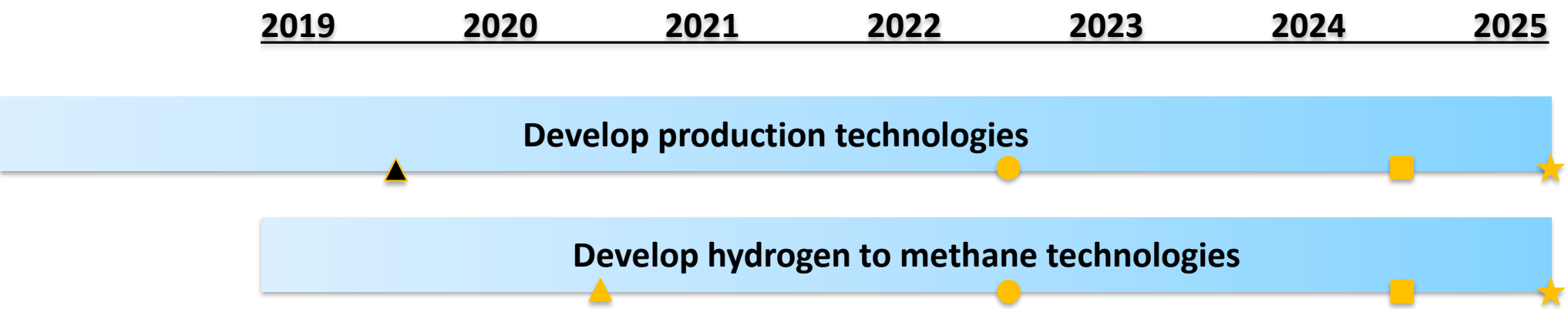
Together, Building a Better California

R&D Hydrogen Roadmap

Together, Building
a Better California

Hydrogen: Portfolio of production technologies and applications

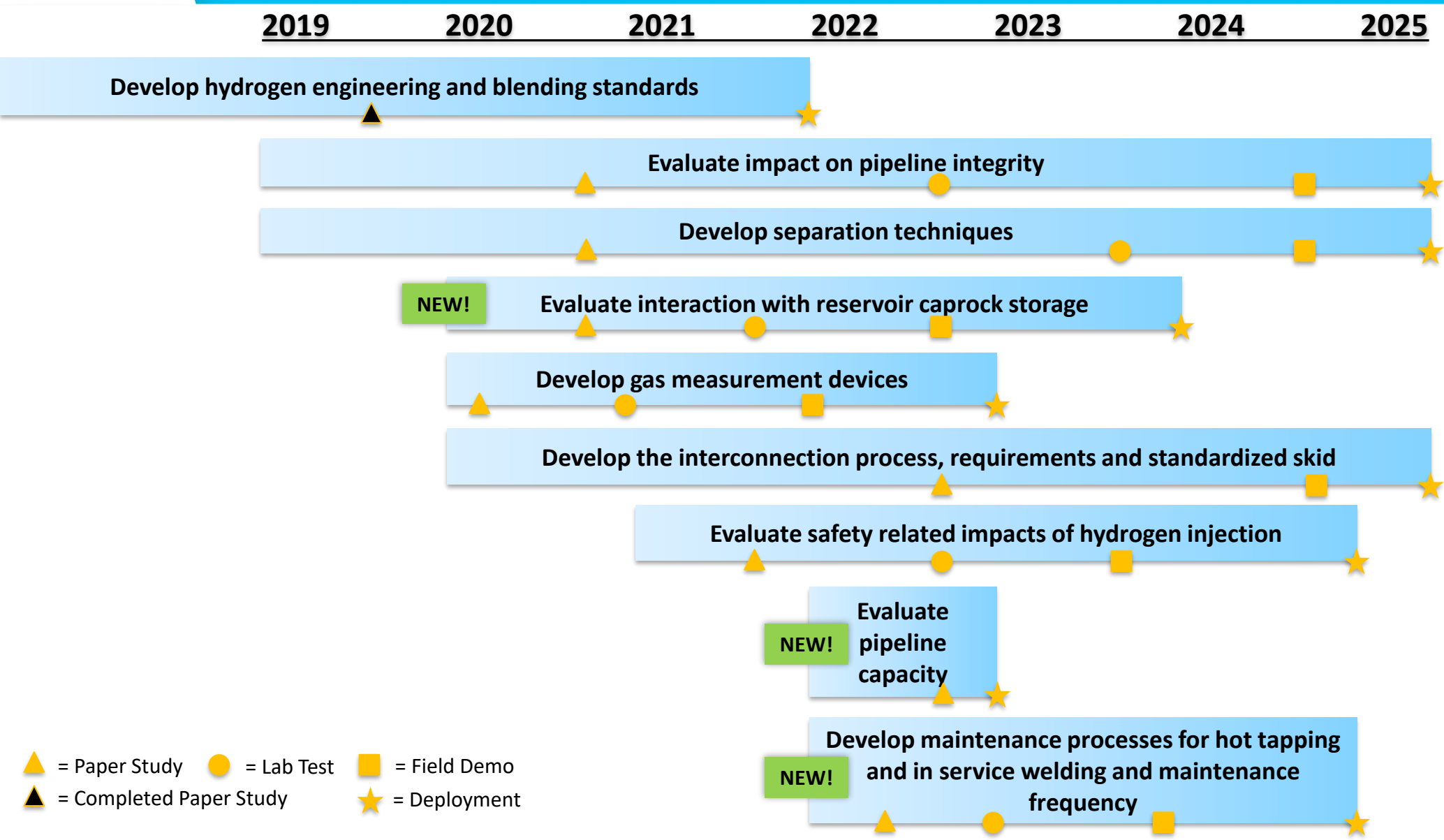
Up to 5%



▲ = Paper Study ● = Lab Test ■ = Field Demo ★ = Deployment
▲ = Completed Paper Study

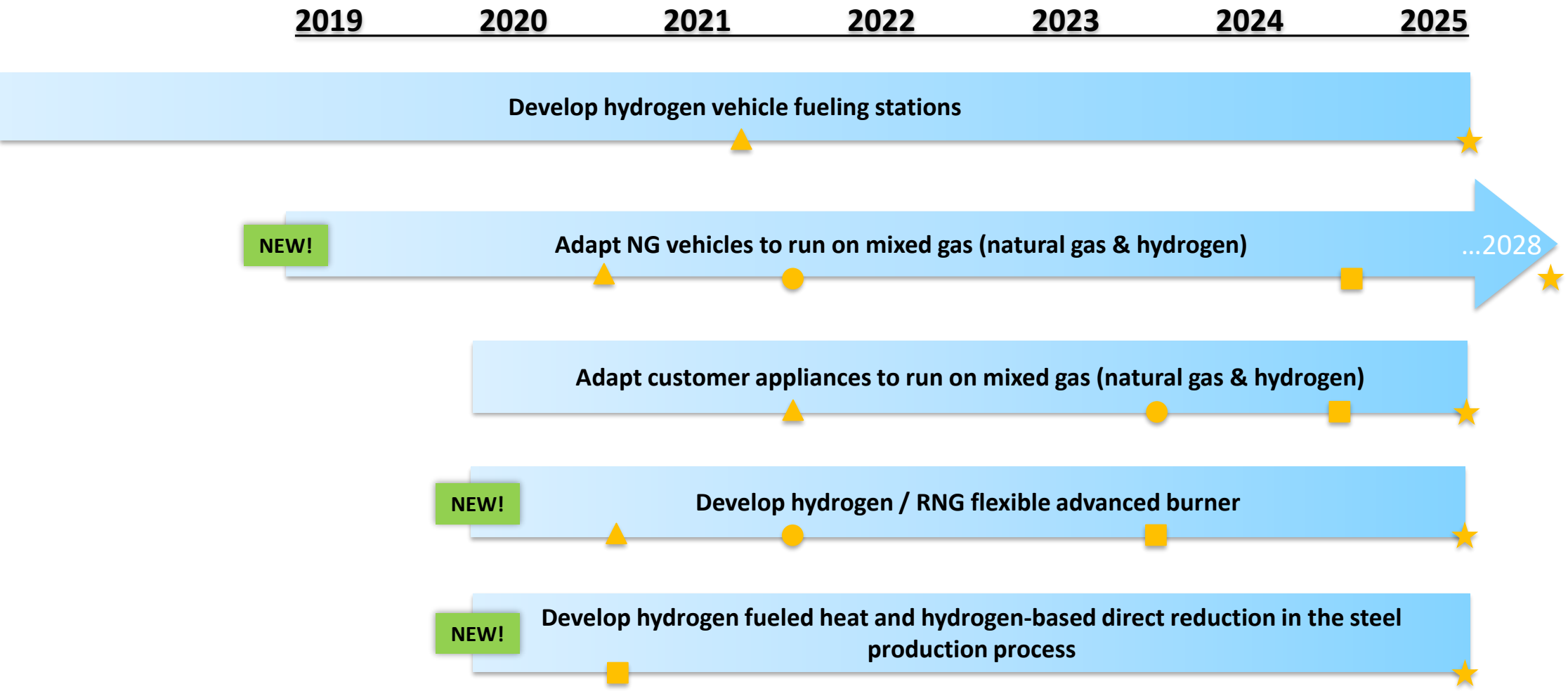
Hydrogen: Establish transportation using natural gas system

Up to 5%



Hydrogen: Establish customer utilization infrastructure

Up to 5%



Pipeline Research Council International, Inc.

MEAS 15-02

Emerging fuels – Hydrogen SOTA, Gap Analysis, Future projects, Roadmap

Project Final Results

LEADING PIPELINE RESEARCH

Approach

Objective

Identify R&D needed for companies to safely & reliably inject hydrogen into their pipelines at certain blend levels.

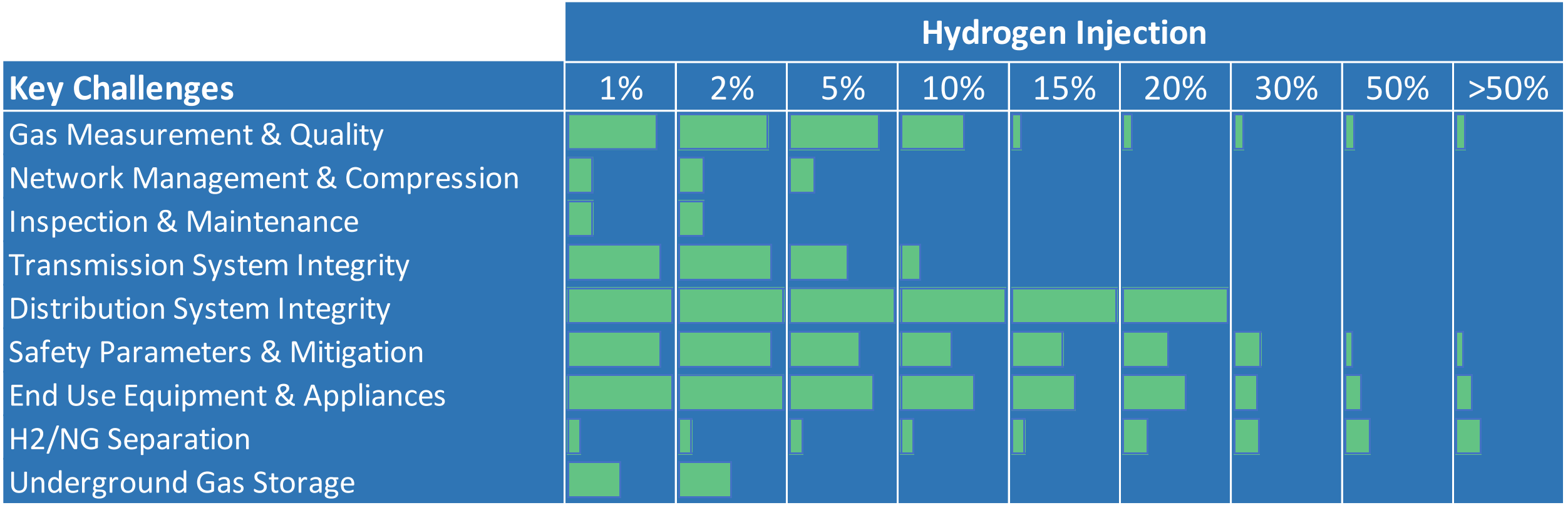
Technical Subjects

1. Integrity
2. Safety
3. End Uses
4. Metering
5. Network Management
6. Maintenance and Inspection
7. H2/NG Separation
8. Underground Gas Storage

Methodology

1. Mapping
2. State-of-the-art Analysis
3. Gap Analysis
4. Roadmap

Key Results & Gap Analysis



The green bars display current knowledge coverage for each key challenge and different levels of injection

Conclusions & Recommendations

Top 3 Challenges	2021 PRCI Project Ideas
Gas Measurement & Quality	▪ Impact on flow meter accuracy in transmission operating conditions ▪ Develop gas composition analysis tools ▪ Verify compatibility with USM sensor material and performance/accuracy
Compression	▪ Field and lab tests of compressor performance ▪ Evaluate material compatibility and integrity for compressors
Inspection & Maintenance	▪ Assess and define acceptability criteria for defects and third-party damage ▪ Develop more sensitive NDT/ILI tools to detect newly defined critical defects ▪ Assess integrity of repair techniques in transmission operating conditions

CEC Hydrogen Blending Scoping Workshop Questions

CEC Questions

Scale and priorities for demonstration

- Refer to Chapter 4 Testimony H2 Application
- Transmission – complex, lot of knowledge gaps
- Distribution – less complex, portions polyethylene sys may already be compatible

Key challenges for identified priorities and approach to technical tasks

- Refer to Chapter 4 Testimony H2 Application
- Testing and verification of all downstream components (including customer appliances) beforehand
- New development

Outcomes of demonstration and performance metrics

- Energy & efficiency
- Air quality – from utilization (e.g., customer appliances)
- Safety & reliability – risk, degradation, system capacity
- Economics – rates
- Scalability – existing gas system

Considerations for future GFOs

- Collaboration with industry, including within sectors of CEC
- Technical Advisory Committee (TAC)

Thank you