

## Hydrogen Blending in the Town of Truckee Plan Workpaper Supporting Chapter 4

### Joint IOU Hydrogen Blending Demonstration Application

#### **Explanation of Work Paper**

This work paper (WP-3) includes all Level 4 cost estimates to support the Southwest Gas Hydrogen Blending Demonstration Project (Project) in Truckee, California. For information on Loaded Costs and revenue requirements, see Chapter 7 testimony.

Table 1 summarizes the O&M costs related to the project. Tables 2 to 5 reflect the costs by Project Phase, as laid out in Chapter 4 testimony.

**Table 1: Total Project Direct Cost (\$000's)**

| Table 1: Total O&M<br>(In Millions) |      |      |           |              |
|-------------------------------------|------|------|-----------|--------------|
|                                     | 2023 | 2024 | 2025-2027 | Total        |
| O&M                                 | 0.00 | 1.64 | 8.57      | 10.21        |
| Total                               | 0.00 | 1.64 | 8.57      | <b>10.21</b> |

#### **Cost Mechanism Justification**

The Project in Truckee, California, is designed to be a temporary installation. Once the Project is planned, designed, constructed and commissioned, Southwest Gas will test various hydrogen blends over an 18-month period. Upon the conclusion of testing, all equipment will be decommissioned and removed, with the pipeline interconnect abandoned in place. Southwest Gas' Project is temporary and short-term, and therefore consistent with a research and development project. As such, Southwest Gas is treating all costs associated with its project as an expense.

#### **Project Description**

Southwest Gas' Project is designed to test, analyze, and report the hydrogen blending process at a high altitude, cold weather climate. Moreover, the scope is unique as it contemplates testing the technology on commercial customers with different natural gas appliances including a back-up natural gas generator, a range, gas lights, radiant heaters, furnaces, boilers, and water heaters. The Project will include generation of hydrogen from an electrolyzer for 18-months. A baseline measurement will be taken at 100% natural gas and then a blend of hydrogen will be introduced to the system starting at 5% up to 20% over the duration of the project. The hydrogen-blended gas will flow through plastic pipelines, steel house lines and end user equipment. The project scope includes commercial accounts with a peak hour load of approximately 17 MCFH. The Project will focus on the impacts of extremely cold weather and hydrogen in the system. There should be significant differences in the system capacity of the network due to the physical effects that cold weather will have on the different gases. The town of Truckee is one of the coldest cities in the US with average low temperatures below freezing for 8 months of the year.

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#### ***Project Plan***

| PHASE & ACTIVITY   | DESCRIPTION   | DURATION   |
|--|---|--|
| 1. Planning, Design, Construction and Commissioning            | Hydrogen production and blending equipment is procured; system is designed, constructed, and commissioned on campus; pre-demo equipment and pipeline system inspections and any necessary remediation are conducted; stakeholder engagement; temporary pressure regulating stations installed and campus isolated | 21 months  |
| 2. Testing and Demonstration                                   | Hydrogen is blended in system on a testing schedule; data is collected; periodic inspection of equipment and pipelines; test samples of pipelines and components pre- and post-hydrogen blend exposure  | 21 months (18 months live blending and 3 months asset inspection and validation) |
| 3. Decommissioning & Equipment Removal, and System Restoration | Hydrogen equipment is removed from campus; temporary pressure regulator stations removed and campus restored  | 5 months   |
| 4. Knowledge Sharing   | Data from pilot is analyzed and a public report will be released  | 3 months   |

#### **Forecast Methodology (Construction Costs and Labor)**

#### **Schedule**

#### **PHASE 1 COSTS**

| Table 2: Phase 1 O&M<br>(In Millions) |      |      |           |       |
|---------------------------------------|------|------|-----------|-------|
| Phase 1                               | 2023 | 2024 | 2025-2027 | Total |
| O&M                                   | 0.00 | 1.40 | 7.50      | 8.90  |
| Total                                 | 0.00 | 1.40 | 7.50      | 8.90  |

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#### **Phase 1 Assumptions**

The following assumptions were made to develop this cost estimate:

- Class 5 Estimate (- 50% / +100%)
- The electrolyzer and blending equipment will be purchased in 2023, but will take up to 18-months to be installed.
- Costs include the installation of a small segment of polyethylene (PE) pipe to allow Southwest Gas operations to continue without interruptions caused by the blended gas pilot. These operations include the continued use of 100% natural gas to fill bottles that customer service uses to provide service to other customers throughout the Town of Truckee, CA.
- All costs shown include a 20% contingency above the estimated value.

#### **PHASE 2 COSTS**

Table 3: Phase 2 O&M  
(In Millions)

| <b>Phase 2</b> | <b>2023</b> | <b>2024</b> | <b>2025-2027</b> | <b>Total</b> |
|----------------|-------------|-------------|------------------|--------------|
| O&M            | 0.0         | 0.24        | 1.01             | 1.25         |
| Total          | 0.0         | 0.24        | 1.01             | 1.25         |

#### **Phase 2 Assumptions**

The following assumptions were made to develop this cost estimate:

- Class 5 Estimate (- 50% / +100%)
- Baseline measurements and continuous analysis and reporting will commence in 2024 and will continue for the duration of the project.
- Analysis and reporting will be outsourced to a third-party that specializes in hydrogen hazard analysis.
- All costs shown include a 20% contingency above the estimated value.

#### **PHASE 3 COSTS:**

Table 4: Phase 3 O&M  
(In Millions)

| <b>Phase 3</b> | <b>2023</b> | <b>2024</b> | <b>2026</b> | <b>Total</b> |
|----------------|-------------|-------------|-------------|--------------|
| O&M            | 0.0         | 0.0         | 0.06        | 0.06         |
| Total          | 0.0         | 0.0         | 0.06        | 0.06         |

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**Phase 3 Assumptions**

The following assumptions were made to develop this cost estimate:

- Class 5 Estimate - 50% / +100%
- Costs are associated with decommissioning the equipment and restoration costs including pavement.
- All costs shown include a 20% contingency above the estimated value.

**PHASE 4 COSTS**

| <b>Phase 4</b> | <b>2023</b> | <b>2024</b> | <b>2026-2027</b> | <b>Total</b> |
|----------------|-------------|-------------|------------------|--------------|
| O&M            | 0.0         | 0.0         | 0.0              | 0.0          |
| Total          | 0.0         | 0.0         | 0.0              | 0.0          |

**Phase 4 Assumptions**

The following assumptions were made to develop this cost estimate:

- Class 5 Estimate (- 50% / +100%)
- There will be negligible costs associated with sharing reported results.