

**APPLICATION OF SOUTHERN CALIFORNIA GAS COMPANY FOR
ANGELES LINK PHASE 2 A.24-12-011**

DATA REQUEST CalPA-SCG-DR04

Date Requested: May 7, 2025, Submitted: May 21, 2025

QUESTION 1:

Cal Advocates understands that the Angeles Link project proposed by Southern California Gas Company (SoCalGas) will depend on renewable energy resources. The following questions reference the primary renewable energy resource on which SoCalGas will depend for the Angeles Link Project (i.e., solar generated energy).

In Section 1.3 of the Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report, SoCalGas and Burns & McDonnell state that

“solar power paired with electrolyzers is expected to be the primary renewable energy source and technology used for hydrogen production at scale for transport by Angeles Link. This considers that solar irradiance in most of SoCalGas’s territory (Central and Southern CA) is some of the best in the country. Solar is also a mature technology, among the least expensive renewable energy generation options available, and can be co-located near hydrogen production.” FN1

In Section 6.1 of the Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report, SoCalGas and Burns & McDonnell emphasize how solar will be the primary power resource for this project by saying

“the Renewable Energy Technology Assessment included in Appendix A summarizes a range of viable renewable energy resources to support electrolytic hydrogen production. The report concludes that solar is the most widely suitable power resource for SoCalGas’s service territory, which serves Central and Southern California. ... Other renewable power resources, including biomethane, biomass, geothermal, hydroelectric, and offshore wind, are expected to support total hydrogen production on a smaller scale than solar due to their resource limitations in Southern California.” FN2

In Section 2 of the Prepared Direct Testimony of Neil Navin on Behalf of Southern California Gas Company, Chapter 2 of the Angeles Link and Summary of Phase 1 Studies, Neil Navin states that regarding viability and cost Effectiveness,

“the Production Study reviewed various clean renewable hydrogen production technologies. The study identified solar generation paired with Proton Exchange Membrane (PEM) electrolyzers as the primary renewable energy source and technology likely to be used for clean renewable hydrogen production at scale for transport by Angeles Link, due to its maturity, cost-effectiveness, and the abundance of solar irradiance in SoCalGas’s service territory.” FN3

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FN 1 – Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 1, July 2024.

FN 2 - Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 1, July 2024.

FN 3 – Prepared Direct Testimony Of Neil Navin On Behalf Of Southern California Gas Company (Chapter 2 – Angeles Link and Summary Of Phase 1 Studies) at NN-14, lines 17-21, December 20, 2024 (<https://www.socalgas.com/sustainability/innovation-center/angeles-link/phase-2>)

Questions 1-4 pertain to the solar power generation site(s) for the Angeles Link project.

Question 1:

- a. Please identify and describe the expected solar generation locations the Angeles Link team has identified and plan to use in the Central Valley. Please explain and provide as much details as are available on the size, procurement process, permitting process, and potential safety concerns of each solar generation location.
- b. Will the solar generation created at the solar panel sites be interconnected to the CAISO grid as a participating or non-participating generator? If so, what type of deliverability status (Energy Only Deliverability Status, Full Capacity Deliverability Status, etc.) is intended for those resources?
- c. Will the solar resources appear in any CAISO reports?
- d. What is SoCalGas's understanding as to how energy exports from the Angeles Link-supporting solar resources will affect generation exports and deliverability of other regional resources? Please provide as much detail as possible.
- e. What is SoCalGas's understanding as to how the Angeles Link Project-supporting solar generation will affect future transmission planning needs for the surrounding area? Please provide as much detail as possible.
- f. What is the largest solar production site currently in operation in southern California on which SoCalGas will rely, in whole or in part, for hydrogen that will produced as part of the Angeles Link Project?
- g. What is the largest commercially private solar production site currently in operation in southern California on which SoCalGas will rely, in whole or in part, for hydrogen that will produced as part of the Angeles Link Project? Is this private solar production site CAISO-connected? How has this precedent helped to inform SoCalGas in their planning for this application?

RESPONSE 1:

SoCalGas objects to this request on the grounds it is vague and ambiguous and unintelligible to the extent it misunderstands the nature of Angeles Link. Angeles Link is proposed as a pipeline system for the transport of clean renewable hydrogen¹. Angeles Link—the pipeline system—does not include hydrogen production, nor does SoCalGas intend to produce hydrogen. Rather, Angeles Link will transport clean renewable hydrogen that is produced and consumed by third parties. SoCalGas further objects to this request on the grounds it assumes Angeles Link “will depend on renewable

¹ The Commission defines clean renewable hydrogen as “hydrogen that does not exceed a standard of four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram of hydrogen produced” (Decision (D.) 22-12-055 at 42).

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energy resources.” Renewable energy resources could meet the Commission’s definition for “clean renewable hydrogen,” but it is not the only method. SoCalGas additionally objects to this request on the grounds it references the “Draft Report,” which was superseded by the Final Report. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Question 1a:

Please identify and describe the expected solar generation locations the Angeles Link team has identified and plan to use in the Central Valley. Please explain and provide as much details as are available on the size, procurement process, permitting process, and potential safety concerns of each solar generation location.

Response 1a:

SoCalGas additionally objects to this request on the grounds it is unintelligible to the extent it assumes SoCalGas “plan[s] to use” “solar generation locations.” The purpose of the referenced study was to determine whether it would be feasible for third parties to produce clean renewable hydrogen. Additionally, SoCalGas objects to this request to the extent it seeks information equally available to the requesting party, namely in the Phase 1 Production Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

The study concludes that it is feasible for third parties to produce clean renewable hydrogen; please see Production Study for further information, specifically Section 10 that assesses potential land availability and Section 4.4 that discusses electrolyzer manufacturing and supply chains.

Question 1b:

Will the solar generation created at the solar panel sites be interconnected to the CAISO grid as a participating or non-participating generator? If so, what type of deliverability status (Energy Only Deliverability Status, Full Capacity Deliverability Status, etc.) is intended for those resources?

Response 1b:

SoCalGas additionally objects to this request on the grounds it is vague and ambiguous and unintelligible to the extent it assumes SoCalGas will be involved in hydrogen production (namely, the question asks what SoCalGas intends with respect to deliverability status). SoCalGas further objects to the request to the extent it seeks information that is equally available to the requesting party, namely in the Production Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

As detailed in the Phase 1 Production Study, anticipated third-party hydrogen production is based on solar generation using dedicated renewable resources and does not account for interconnection to California Independent System Operator (CAISO's) transmission system. As SoCalGas is not a hydrogen producer, it would not be making decisions related to interconnections (e.g., and associated participating generator) with CAISO.

Question 1c:

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Will the solar resources appear in any CAISO reports?

Response 1c:

SoCalGas additionally objects to this request on the grounds it is vague and ambiguous and unintelligible to the extent it assumes SoCalGas will be involved in hydrogen production. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

As an independent electric system operator, CAISO determines what is included in its own reports.

Question 1d:

What is SoCalGas's understanding as to how energy exports from the Angeles Link-supporting solar resources will affect generation exports and deliverability of other regional resources? Please provide as much detail as possible.

Response 1d:

SoCalGas additionally objects to this request to the extent it seeks information that is equally available to the requesting party, namely in the Production Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Impacts of Angeles Link on energy exports and deliverability of other regional third-party generation resources were not analyzed in the Production Study. SoCalGas is not a hydrogen producer and accordingly would not be making production related decisions.

Question 1e:

What is SoCalGas's understanding as to how the Angeles Link Project-supporting solar generation will affect future transmission planning needs for the surrounding area? Please provide as much detail as possible.

Response 1e:

SoCalGas additionally objects to this request on the grounds it seeks information that is equally available to the requesting party, namely in the Production Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

As noted in response to 1b above, the Production Study assumes solar generation supporting hydrogen production would use dedicated renewable resources. The potential impacts on future electric transmission planning needs were not included within the scope of the Production Study.

Question 1f:

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What is the largest solar production site currently in operation in southern California on which SoCalGas will rely, in whole or in part, for hydrogen that will produced as part of the Angeles Link Project?

Response 1f:

SoCalGas additionally objects to this request on the grounds it is vague and ambiguous and unintelligible to the extent it assumes that hydrogen will be produced “as part of the Angeles Link Project” and that SoCalGas will rely on existing facilities currently in operation. SoCalGas further objects to this request on the grounds it seeks information that is equally available to the requesting party, namely in the Production Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

The Phase 1 Production Study assumes that hydrogen production will rely on new incremental solar resources.

Question 1g:

What is the largest commercially private solar production site currently in operation in southern California on which SoCalGas will rely, in whole or in part, for hydrogen that will produced as part of the Angeles Link Project? Is this private solar production site CAISO-connected? How has this precedent helped to inform SoCalGas in their planning for this application?

Response 1g:

SoCalGas additionally objects to this request on the grounds it is compound, vague and ambiguous, and unintelligible to the extent it assumes that hydrogen will be produced “as part of the Angeles Link Project,” that SoCalGas will rely on existing facilities currently in operation, and with respect to the phrase “largest commercially private solar production site.” Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

See Response to 1.f above.

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QUESTION 2:

- a. Please provide a compilation of California Public Utilities Commission (CPUC)-adopted Integrated Resource Planning (IRP) portfolio(s), IRP procurement orders, and/or the 2023/2024 Integrated Energy Policy Report(s) (IEPR) on which SoCalGas is relying in support of the Angeles Link Project. Please also provide copies of any plans for or increased adoption of the use of hydrogen power.
- b. Please provide a compilation of IEPR(s) that incorporate the adoption of or plans

RESPONSE 2:

SoCalGas objects to this request on the grounds it is overly broad and unduly burdensome, particularly to the extent it seeks information that is publicly available and thus is equally available to the requesting party, including in the Phase 1 Demand Study. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

In the Angeles Link Phase 1 Demand Study, SoCalGas evaluated potential hydrogen demand across the power generation, mobility, and industrial sectors within SoCalGas's service territory through 2045. These projections range from 1.9 to 5.9 million metric tons per year (MMTPY) depending on the scenario and estimate the potential market for clean renewable hydrogen, a portion of which could be served by Angeles Link.

Please refer to the Demand Study² for detailed market analysis. The Demand Study includes a comparison of third-party demand projections, for example, CEC's IEPR estimates hydrogen demand to be up to 2.9 MMTPY for California's mobility and power generation sectors. SoCalGas also provides additional information regarding hydrogen demand in its Q1 2024 Quarterly Report, Appendix 3, Global Response 1 – Demand Study. These third-party demand estimates demonstrate the feasibility and viability of Angeles Link.

Since the Demand Study was published, there has been additional third-party literature that provides insights regarding potential adoption of hydrogen for power generation. The literature generally supports the need for infrastructure, such as Angeles Link, to connect third-party hydrogen production to end users. The following is a non-exhaustive list of recent supporting literature:

1. Los Angeles Department of Water and Power (LADWP) LA100 Plan

The references below discuss various analysis conducted by third parties (Ascend Analytics and National Renewable Energy Laboratory (NREL)) which detail various scenarios and potential non-combustion alternatives. The LA 100 Plan found a continued and growing need for dispatchable generation capacity located in the LA basin that can operate for extended periods of time and provide system reliability and resilience against transmission failures, including during periods of extremely high demand and/or low renewable output. The results reveal that LADWP's dispatchable generation units are anticipated to have a capacity factor

² Angeles Link Phase 1 Final Demand Study available at:
<https://www.socalgas.com/regulatory/angeleslink>

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between 2%-17%, which shows that hydrogen will play a key role for in-basin generation during stressed grid conditions and support energy system reliability and resiliency.

- LA100 Plan, Advisory Group Meeting #7 Update Presented on March 20, 2025: [ladwp.com/sites/default/files/2025-03/LA100 Plan Advisory Group Meeting 7 March 20%2C 2025.pdf](https://ladwp.com/sites/default/files/2025-03/LA100_Plan_Advisory_Group_Meeting_7_March_20%2C_2025.pdf)
- NREL Scattergood Modernization Project Alternatives: Summary of Findings: [webprod.ladwp.com/sites/default/files/2025-03/Scattergood Moderniazation Alternative Study Final.pdf](https://webprod.ladwp.com/sites/default/files/2025-03/Scattergood_Moderniazation_Alternative_Study_Final.pdf)

2. California Air Resources Board (CARB) Senate Bill (SB) 1075 Technical Analysis Workshop

CARB discusses the potential role of hydrogen in CA's climate plan (<https://ww2.arb.ca.gov/sites/default/files/2025-02/sb-1075-workshop-022525-presentation-carb.pdf>) and then E3 presented analysis on potential hydrogen production pathways and economics, transmission and distribution delivery options and costs, and end use sectors and costs (<https://ww2.arb.ca.gov/sites/default/files/2025-02/sb-1075-workshop-022525-presentation-e3.pdf>). E3 highlights the potential for hydrogen to serve as a seasonal storage medium, and will further study this in more detail as part of its SB 1075 analysis. As provided in comments to CARB in March 2025, SoCalGas supports further analysis of hydrogen demand for power generation. https://ww2.arb.ca.gov/system/files/webform/public_comments/22856/SoCalGas%20SB%201075%20Workshop%20Comment%20Letter%203.25.25.pdf

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QUESTION 3:

In Section 1.3 of the Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report (July 2024), SoCalGas and Burns & McDonnell state that “based on preliminary analysis, approximately 2 million acres of potentially available land for energy development was identified in three primary production locations within the SoCalGas service territory. Potential production locations include San Joaquin Valley (SJV), Lancaster, and Blythe.” FN4

Section 10.3 of the Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report (July 2024), SoCalGas and Burns & McDonnell state the following in reference to Land Availability: FN5

“Production of the maximum case of 1.5 MMTpy of clean renewable hydrogen throughput is assumed to require 39 GW of solar capacity assuming the solar only design. Assuming 6 acres per MWac of solar output, the land area required for this capacity is estimated to be 240,000 acres (375 square miles).

Land area available within each Production Area after constraints were applied (see section 10.2) are below:

- o San Joaquin Valley – 535,000 acres (836 square miles)
- o Lancaster – 1,124,000 acres (1,756 square miles)
- o Blythe – 273,000 acres (427 square miles)”

- a. For each of the three main production areas, please provide a complete list of all primary land use permitting authorities that would issue the discretionary use permits, permits to construct or other equivalent permits that would enable construction on city, county, state or Federal lands.
- b. For each primary land use permitting authority, please describe and provide documentation of any conversations, discussions or outreach efforts that have occurred between SoCalGas and each such primary land use permitting authority. Please identify the staff of the permitting authorities that have been consulted.

FN 4 – Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 2, July 2024.

FN 5 – Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 25, July 2024.

RESPONSE 3:

SoCalGas objects to this request on the grounds it is vague and ambiguous and unintelligible to the extent it misunderstands the nature of Angeles Link. Angeles Link is proposed as a pipeline system for the transport of clean renewable hydrogen. Angeles Link—the pipeline system—does not include hydrogen production, nor does SoCalGas intend to produce hydrogen. Rather, Angeles Link will transport clean renewable hydrogen that is produced and consumed by third parties. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Question 3a:

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For each of the three main production areas, please provide a complete list of all primary land use permitting authorities that would issue the discretionary use permits, permits to construct or other equivalent permits that would enable construction on city, county, state or Federal lands

Response 3a:

SoCalGas additionally objects to this request on the grounds it is overly broad and unduly burdensome, particularly to the extent it seeks “a complete list of all” items. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

Permitting for clean renewable hydrogen production projects would be handled by third-party producers and was not evaluated in the Production Study. See also SoCalGas’s Q3 2024 Quarterly Report, Appendix 3 Responses to Comment Letter 13 (The Public Advocates Office, August 16, 2024), specifically comments 13-1, 13-2, 13-3, and 13-4.³

Question 3b:

For each primary land use permitting authority, please describe and provide documentation of any conversations, discussions or outreach efforts that have occurred between SoCalGas and each such primary land use permitting authority. Please identify the staff of the permitting authorities that have been consulted.

Response 3b:

SoCalGas additionally objects to this request on the grounds it is overly broad and unduly burdensome. Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

SoCalGas did not engage any permitting agencies as part of its Production Study.

³ Stakeholder feedback and detailed SoCalGas responses can be found within the published Quarterly Reports, accessible at: <https://www.socalgas.com/regulatory/angeleslink>

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QUESTION 4:

Questions 4-7 pertain to the seasonality of hydrogen production and demand.

In Section 1.3 of the Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report (July 2024), SoCalGas and Burns & McDonnell state that "...system curtailments will likely be sporadic and seasonal. If production facilities were grid-connected, curtailed energy could be used opportunistically to produce hydrogen that Angeles Link could transport." FN6

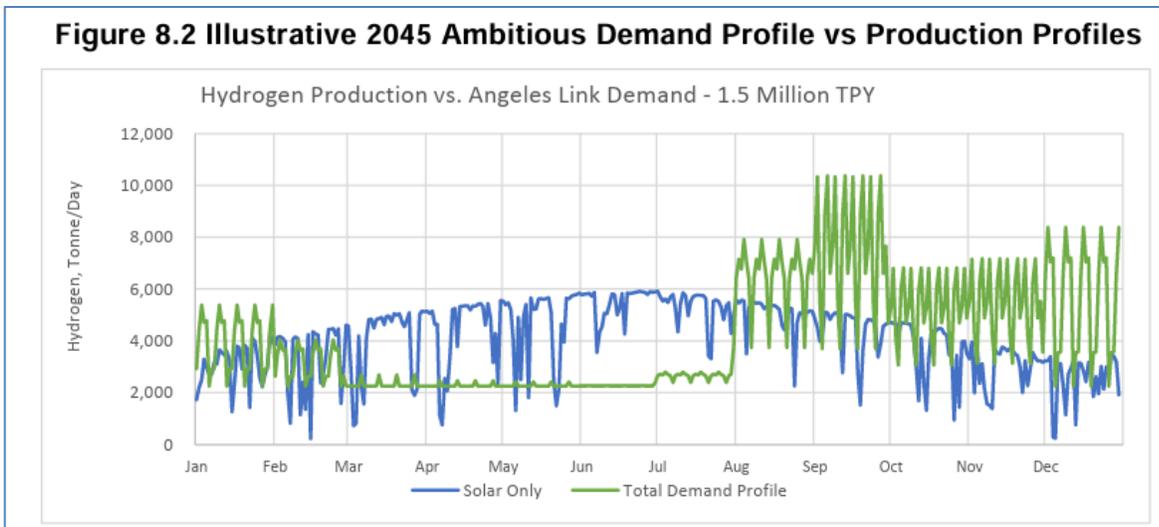
Question 4. For each month in a typical year, please provide an estimate of the solar capacity (MW) and total energy (GWh) that will be used to generate hydrogen to be delivered by the Angeles Link.

FN6 - Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 2, July 2024.

RESPONSE 4:

SoCalGas objects to this request on the grounds it seeks information that is equally available to the requesting party, namely in the Production Study. Subject to and without waiving the foregoing objection, SoCalGas responds as follows.

The chart below, from the Production Study,⁴ demonstrates the hydrogen production curve expected for 1.5 million metric tons of hydrogen per year, assuming the electrolyzer has an efficiency of 60 kwh per kg of hydrogen produced.



QUESTION 5:

⁴ Angeles Link Phase 1 Final Production Study at 48 is available at: <https://www.socalgas.com/regulatory/angeleslink>

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Would hydrogen producers that would interconnect to the Angeles Link plan to use battery storage to meet demand during peak hydrogen demand periods? If so, please provide an estimate of the amount of battery storage anticipated?

RESPONSE 5:

SoCalGas objects to this request to the extent it seeks information that is not in its possession, custody, or control. SoCalGas does not propose to produce hydrogen as part of Angeles Link. Subject to and without waiving the foregoing, SoCalGas responds as follows.

The Production Study assumed producers would have dedicated solar power systems that did not use battery storage to supplement hydrogen production (i.e., use energy from the battery when energy from the solar panel was not available).

SoCalGas has proposed to develop a broader understanding of third-party production and potential system configurations in Phase 2.⁵

⁵ Angeles Link Phase 2 (A.24-12-011) Prepared Direct Testimony of Amy Kitson (Chapter 3 - Project Development and Programmatic Activities) at AK-2.

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QUESTION 6:

If sufficient solar power cannot be delivered to the electrolyzer, please detail what contingency plan would be used to ensure power is available.

RESPONSE 6:

SoCalGas objects to this request on the grounds it is vague and ambiguous. SoCalGas further objects to this request to the extent it assumes power can be “ensured.” Subject to and without waiving the foregoing objections, SoCalGas responds as follows.

SoCalGas understands this question to ask what contingency plans were considered for the availability of power in the Production Study.

The Production Study assumes that renewable power requirements would be met with power generation that is incremental and dedicated to hydrogen production. For purposes of the feasibility analysis conducted in Phase 1, resources were sized to meet production requirements. In Phase 2, SoCalGas will further assess clean renewable hydrogen production technologies and potential system configurations.⁶

⁶ Angeles Link Phase 2 (A.24-12-011) Prepared Direct Testimony of Amy Kitson (Chapter 3 - Project Development and Programmatic Activities) at AK-14.

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QUESTION 7:

The Production Planning Assessment assumes that solar will be the primary source of power. However, the study also suggests that “other renewable power resources, including biomethane, biomass, geothermal, hydroelectric, and offshore wind, are expected to support total hydrogen production on a smaller scale than solar due to their resource limitations in Southern California.” FN7

Please provide the estimated quantity of energy from the following resources that SoCalGas anticipates will be necessary to support hydrogen production. If there is a resource that has not been listed below, please add it.

- Solar
- Biomethane
- Biomass
- Geothermal
- Hydroelectric
- Offshore wind

FN7- Executive Summary of the Angeles Link Phase 1 Production Planning and Assessment Draft Report at Page 25, July 2024.

RESPONSE 7:

SoCalGas objects to this request on the grounds it is unintelligible to the extent it misinterprets the Production Planning Assessment. Subject to and without waiving the foregoing, SoCalGas responds as follows.

In the Production Study, SoCalGas assumes solar will be the primary source of power, and 39 GW of solar capacity was estimated to be adequate to produce 1.5 MMTPY, to meet the anticipated energy requirements to produce hydrogen that would be transported by Angeles Link. The Production Study did not estimate the quantity of energy that would be necessary from other resources.