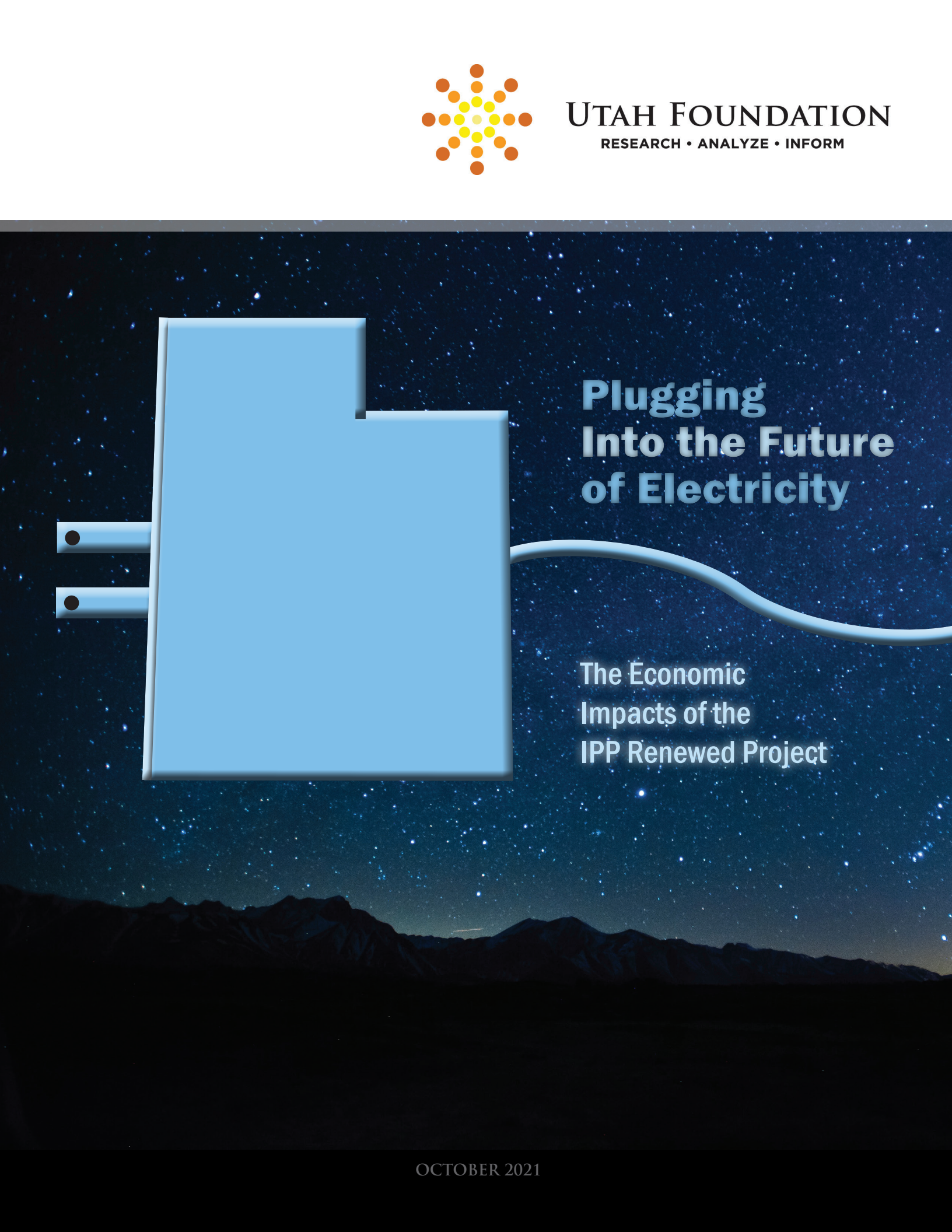

UTAH FOUNDATION
RESEARCH • ANALYZE • INFORM
Plugging
Into the Future
of Electricity
The Economic
Impacts of the
IPP Renewed Project
OCTOBER 2021

Plugging Into the Future of Electricity
The Economic Impacts of the IPP Renewed Project

Utah Foundation Project Staff
Christopher Collard, *Senior Analyst, Principal Author*
Shawn Teigen, *Vice President/Director of Research*
Peter Reichard, *President*
Megan Luther, *Outreach Coordinator*
Erin Hernandez, *Research Intern*
Heidi Prior, *Research Intern*

Research Report 790

About the Utah Foundation
The Utah Foundation's mission is to produce objective, thorough and well-reasoned research and analysis that promotes the effective use of public resources, a thriving economy, a well-prepared workforce and a high quality of life for Utahns. The Utah Foundation seeks to help decision-makers and citizens understand and address complex issues. The Utah Foundation also offers constructive guidance to improve governmental policies, programs and structures.

The Utah Foundation is an independent, nonpartisan, nonprofit research organization.

Support Our Work
The Utah Foundation relies on the support of business and civic leaders and average citizens to produce the high-quality, independent research for which we're known. To become a member or sponsor one of our projects or programs, contact us at 801-355-1400.

Utah Foundation
RESEARCH • ANALYZE • INFORM

P.O. Box 387
Salt Lake City, Utah 84110
utahfoundation.org

INTRODUCTION

Having provided coal-generated electricity since the mid-1980s, the Intermountain Power Agency (IPA) has decided to build a combined-cycle[1] gas power plant by 2025 to replace the coal-fueled generators. The plan, known as IPP Renewed, will include turbines that run on a mixture of natural gas and hydrogen, with 30% hydrogen at start-up – transitioning to 100% hydrogen by 2045. The project will also include the complete replacement of the high voltage direct current converter stations on both ends of the transmission system connecting Delta with Southern California. This transmission infrastructure upgrade will ensure the reliable delivery of power from IPP to Southern California.

The project will yield substantial economic impacts. Because most of the electricity it produces will go to California, it brings revenue in from another state, rather than simply reshuffling economic activity within Utah.

This report explores the IPP Renewed endeavor and its economic impact to the state and local communities. The Utah Foundation undertook this project on a consulting basis at the request of IPA.

BACKGROUND

IPA is a political subdivision of the State of Utah created in 1977 by 23 municipal power systems jointly exercising their municipal powers in the finance, construction and operation of an electricity generation facility known as the Intermountain Power Project (IPP).[2] By the early 1980s, IPA entered into power sales contracts with over 30 purchasers (including six California municipal utilities) for the sale of IPP capacity and output through the first half of 2027. Currently, IPP consists of a coal-fueled power plant in Delta, Utah capable of generating 1,800 megawatts of electricity with transmission lines to transport generated power directly to Southern California, as well as connecting to the western power grid in central Utah.

KEY FINDINGS OF THIS REPORT

- The construction period, most of which will take place from 2022 through 2026, will represent a $2 billion investment, increasing the state's gross domestic product up to 0.18% annually from 2022 through 2026. It will directly support an average of 500 jobs annually during this period which will in turn support up to an additional 600 jobs across the state.
- Most of the construction jobs will be located in Millard County, where the economic benefits represent a much larger share of the local economy. There, the 450 construction jobs annually to build the new plant will represent 10% of the county's average employment. This estimate does not include the extra jobs created through supply chain purchases or employees' additional earnings.
- After completion of the project, 120 permanent IPP jobs will support up to 540 additional jobs from suppliers and the jobs demanded by increased regional earnings.
- The construction of the new converter stations will maintain a high level of reliability on the direct current transmission line and extend its life for decades to come. This could attract renewable projects to locate in the area, while providing carbon-free electricity to southern California and potential Utah purchasers.
- After completion of the project, extra capacity will be available on the transmission lines. This means that other generation projects could develop in the area to help meet the demand for electricity in Southern California. If the transmission line were fully utilized, it could mean a direct effect of 1,300 temporary jobs and an additional 91 ongoing jobs in the community, which could support an additional 1,148 jobs during the construction phase and 410 permanently.
- There are expected additional economic benefits from the construction of renewable energy and green hydrogen infrastructure, opportunities for natural gas and other commodities storage, and the emerging production, storage and export of hydrogen gas.

Environmental requirements in California that became effective in 2006 prohibit local governments from establishing long-term agreements that fall short of specific greenhouse gas emission standards. In order to continue serving California purchasers (which buy 98% of the electricity generated), IPA is pivoting from its coal-fueled operation to a gas-fueled operation, with escalating goals for renewable energy usage over time.

Delta also happens to be the location of the largest "gulf-style" geologic salt for-

IPA serves 35 purchasers across the Western United States.

Figure 1: Map of IPA purchasers and transmission lines

WHAT IS GREEN HYDROGEN?

Currently, most hydrogen is produced from fossil fuels and used for chemical and industrial applications. Approximately 76% of hydrogen is produced from natural gas sources, and the rest mainly from coal.* This "grey" hydrogen fails to meet zero-emissions goals.

Blue hydrogen is produced when plants implement additional technology to capture carbon emissions emitted from fossil fuel-sourced hydrogen. While more expensive than grey hydrogen, it is cheaper than green hydrogen. It is not a zero-emission fuel source, but with an efficient carbon capture and storage system, it could be.†

Green hydrogen is produced via electrolysis using renewable energy sources. The byproduct of converting that green hydrogen back into electricity through the new generation units is carbon-free. The main byproduct is water vapor.‡

* Patel, Sonal, 2019, "The big picture: Hydrogen power," October 1, Power Magazine, www.powermag.com/the-big-picture-hydrogen-power/; Endemann, Buck, Daniel Cohen, Molly Barker, Olivia Mora, Natalie Reid, and Matthew Clark, 2021, "DOE Plans Grid Energy Storage & Grants for Clean Hydrogen." National Law Review, www.natlawreview.com/article/energizer-volume-86.

† Magill, Jim, 2021, "Blue vs. green hydrogen: Which will the market choose?" Forbes, May 21, www.forbes.com/sites/jimmagill/2021/02/22/blue-vs-green-hydrogen-which-will-the-market-choose/.

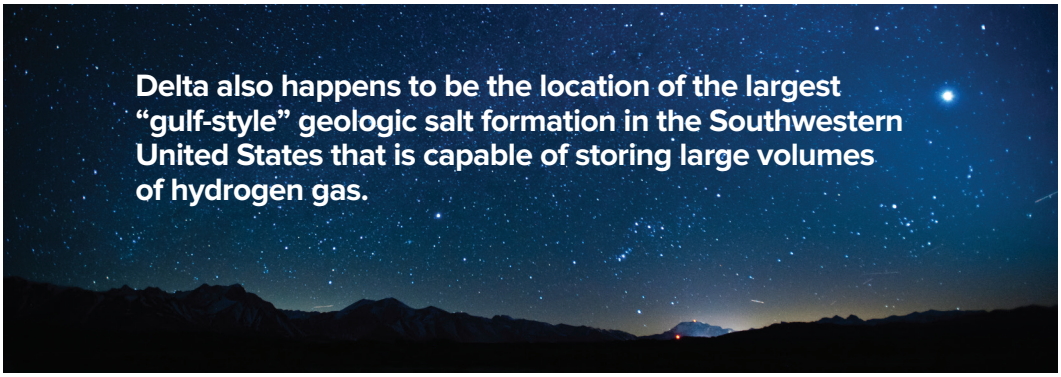
‡ Ibid.

mation in the Southwestern United States that is capable of storing large volumes of hydrogen gas. Along with associated infrastructure, these salt caverns have the potential to provide massive amounts of energy storage in the Western states. The creation of salt caverns by a joint venture of Magnum Development and Mitsubishi Power Systems could open the way for a major green energy hub at the location.[3] This will spur additional economic activity from a variety of renewable sources and support industries over the longer term. IPA's presence offers a conduit for the export of stored energy from the location.

METHODOLOGY

The Utah Foundation used information provided by IPA regarding its planned investment into the IPP gas-fueled power plant and used economic multipliers provided by the Bureau of Economic Analysis RIMS II model.

IPP Renewed is still in the planning stages, and some details are subject to change. Because IPP Renewed will be among the first in integrating these technologies at utility scale for use in energy storage and electricity generation, some future costs and outcomes cannot yet be determined. To the degree that IPA estimates change over the course of this project, the results of this study may overstate or understate the true economic impact of the project. For more details, see the Appendix.



POWER CATEGORIES

Intermittent Power: Power that is not continuously available and may not be available on demand. For example, wind and solar are both intermittent power sources. Solar power is not generated at night and wind power is not generated when the wind does not blow.

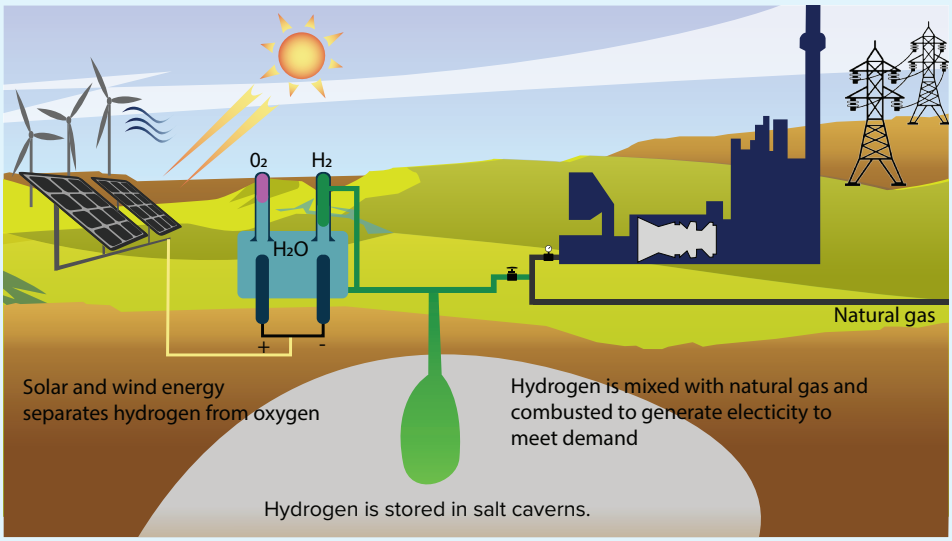
Baseload Power: The minimum level of continuous output that power generators can run to meet demand without completely shutting down. IPP as a coal-fueled power plant was designed to produce baseload power, serving as a steady power source.

Dispatchable Power: A controlled power generation source that can be ramped up or down on demand to match changing power needs of the electrical grid. IPP as a gas-fueled power plant will be used to stabilize the intermittency of renewable resources by ramping its generation up or down. When combined with the salt cavern storage system, IPP can store the intermittent renewable energy in the form of hydrogen for later use in the turbine generators.

Energy Storage: The conversion of electrical energy into another medium to be converted back to electrical energy at a later time. This could be stored as chemical energy (as in a battery), thermal energy (such as storing heat in molten salt) or potential energy (such as pumping water uphill, stacking concrete blocks, or pressurizing air). In the case of IPP Renewed, renewable energy will be used to convert water into green hydrogen to be stored in a salt cavern. That stored fuel will be later converted back into electricity through the IPP generators.

IPP will use solar and wind to produce hydrogen, store it in salt caverns, and use it along with natural gas to generate electricity.

Figure 2: Diagram of IPP Renewed



IPP Renewed will invest $1.7 billion in Utah and support 500 temporary jobs annually – and 120 permanent jobs after completion.

Figure 3: Planned Schedule of Jobs and Investment of IPP Renewed

	Power Plant Construction Jobs	Transmission Construction Jobs	Power Plant Investment	Transmission Investment	Total Construction Jobs	Total Investment
2021	-		$21,000,000	$10,608,000	0	$31,608,000
2022	98	40	224,000,000	18,720,000	138	242,720,000
2023	615	40	320,000,000	86,112,000	655	406,112,000
2024	784	121	247,000,000	215,280,000	905	462,280,000
2025	744	121	197,000,000	149,760,000	865	346,760,000
2026	20	26	$96,000,000	$132,912,000	46	$228,912,000

	Ongoing Electrical Production Jobs	Ongoing Electrical Transmission Jobs	Total Ongoing Jobs
Ongoing	90	30	120

DIRECT IMPACTS OF IPP RENEWED

Construction

From 2021 to 2026, IPA will invest more than $1.7 billion in new Utah infrastructure. Nearly two-thirds of that will manifest in the construction of the new combined-cycle gas power plant in Delta. The remaining amount will be spent upgrading the transmission infrastructure that transmits energy from Delta to Southern California. These two projects will, on average, support more than 500 construction jobs annually from 2022 through 2026.

Generation

In addition to the construction jobs generated from investments in the new power plant and upgraded transmission infrastructure, the generation of electricity will support 120 jobs ongoing beginning in 2025.

TRANSITION OR BUST

This report provides estimates on the impact of the IPP construction and ongoing production of electricity from the combined-cycle gas power plant planned to be commercially operating in 2025. This report frames the economic impact of the development and operation of the IPP gas plant against an alternative baseline of nothing. However, the economic impact of current operations is already significant. Previous Utah Foundation research reported an overall "coal-fueled" economic impact of $866 million in economic activity and 4,600 in jobs.* The economic benefits of IPP Renewed construction and production of electricity will not be on top of the current benefits, but in place of them. Indeed, the economic impacts beyond 2025 will likely net out smaller than the current ongoing impact. The energy supply chain will also see changes. In 2020, IPP's use of coal accounted for nearly 25% of the coal produced in Utah.† Unless these coal mines can find a way to export a comparative amount of coal, the closure of the coal-fueled power plant will have substantial impact throughout Utah's coal extraction communities. However, the longer-term economic impacts on the energy hub at full potential remain to be seen. And, more to the point, keeping the status quo in place is not an option.

For the purpose of this study, the Utah Foundation compared the estimated economic benefit of IPP Renewed against an alternative baseline of nothing because that appears to be the likely alternative. Approximately 98% of the electricity generated by the coal-fueled power plant has been exported to southern California. These long-term agreements expire in 2027. While the coal-fueled power plant has not reached its end of life and would still be capable of meeting electricity generation needs, in 2006 the State of California passed legislation limiting the agreements into which California electricity providers can enter. California electricity providers were mandated to have a 60% renewable energy portfolio by 2030 and 100% renewable by 2045.‡ As a result of California state legislation, the California municipalities that purchase electricity from IPP would not be able to renew their agreements in 2027 for coal-fueled power and still meet the standards imposed by the state. Without the California purchasers (which historically have purchased approximately 98% of the power generated by IPP), IPP would no longer be viable. Without making the commitment to pivot away from coal as a fuel source, IPP would have no other purchasers for the vast majority of its electricity and would be forced to cease operations. In that case, the economic benefit of IPP to Millard County and Utah would be reduced to nothing.

* Utah Foundation, 2010, "Economic and fiscal impact analysis of the Intermountain Power Project."

† Intermountain Power Agency, 2021, "2020 annual report," https://www.ipautah.com/wp-content/uploads/2020/12/IPA-Annual-2020-11-30v2.pdf; Utah Geological Survey, 2021, "Coal production in Utah by coal mine," http://geology.utah.gov/docs/statistics/coal2.0/pdf/T2.8.pdf.

‡ California Senate Bill 1368, 2005-2006 and Senate Bill 100, 2017-2018.

INDIRECT AND INDUCED IMPACTS

Construction

The construction of the power plant and the upgraded transmission infrastructure is expected to have a significant impact on the wider economy. Utah Foundation projections estimate that the $1.7 billion direct investment in new and upgraded infrastructure in Utah will add between $1.2 billion and $1.3 billion to Utah's gross domestic product. An additional $636 million to $706 million in economic activity from additional household expenditures will echo from that investment. The resulting $1.9 billion to $2.1 billion represents an annual average of $308 million to $342 million for six years, which would be equivalent to contributing 0.16% to 0.18% to Utah's 2020 GDP.

The average of 500 construction jobs from 2022 to 2026 will support an additional average of 450 to 600 spinoff jobs annually. These jobs will be concentrated in communities that provide the construction inputs for the new infrastructure and the construction workers' residential and work areas. This will provide an additional average $70 million to $100 million in household earnings annually to employees and relevant communities.

This project is still in early stages. To the degree that construction workers are hired from outside the state, or specialized engineers are needed for sensitive equipment and brought in from outside the state, estimates may overstate the true impact.

IPP Renewed's 500 temporary jobs annually will support up to 600 additional jobs, and its permanent 120 jobs will support up to 540 additional jobs.

Figure 4: Planned Schedule of Direct, Indirect and Induced Jobs of IPP Renewed

	Direct Jobs (working on IPP)	Indirect Jobs (from the supply chain)	Induced Jobs (from additional earnings in the community)
2021	-	-	-
2022	138	41-55	78-104
2023	655	194-259	369-492
2024	905	269-358	510-680
2025	865	257-342	488-650
2026	46	14-18	26-35
Ongoing	120	220-245	266-296

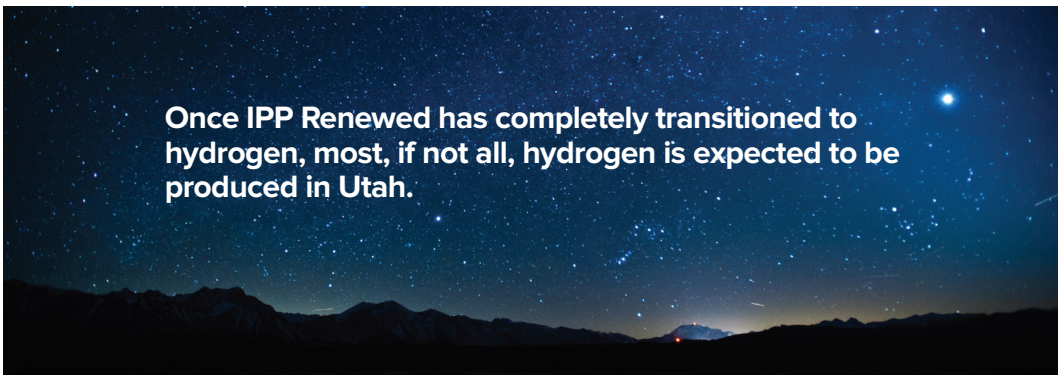
Generation and Transmission

The 120 ongoing jobs at IPP will support an additional 220 to 245 jobs in the supply chain. Once IPP Renewed has completely transitioned to hydrogen, most, if not all, hydrogen is expected to be produced in Utah. Natural gas, however, is usually obtained from a regional hub (a middleman), and the geographic location of production is unclear, meaning it could vary as markets change. When the hydrogen production occurs in Utah, the state can expect to see the full economic impact to the local supply chain. In the meantime, to the degree that the natural gas used is produced outside the state, the supply chain impacts will be limited.

The wages from all ongoing direct and supply chain jobs will support an additional 266 to 296 ongoing jobs in the community. Altogether, IPP Renewed should support 594 to 660 permanent jobs. This would represent 12% to 14% of the jobs in Millard County and $20 million to $22 million in household earnings.[4]

Benefits to the State and Local Governments

The new combined-cycle gas power plant in Delta will produce four avenues of economic activity in the state. First, IPA will pay a gross receipts tax to the state government. This will equate to $2 million to $5.5 million annually. IPA will also pay a fee in lieu of ad valorem tax (in place of a property tax) on IPP infrastructure to local governments of about $15 million to $19 million annually. Employees will pay income tax to the state government. This will equate to about $2 million to $4 million over the 5-year



IPP Renewed is expected to support up to $26 million annually and one-time $5.6 million in taxes and fees.

Figure 5: Estimated Taxes and Fees Related to IPP Renewed

From employees			
	Income tax		
		Total temporary revenues from construction	$2 million to $4 million
		Ongoing revenues	$970,000 to $1.2 million
	Sales tax		
		Total temporary revenues from construction	$1.2 million to $1.9 million
		Ongoing revenues	$400,000 to $550,000
From IPP			
	Gross receipts tax		$2 million to $5.5 million
	Fee in lieu of ad valorem tax		$15 million to $19 million

construction period, and will be $970,000 to $1.2 million ongoing beginning in 2025. Finally, employees will pay sales tax on purchased applicable goods and services. This will equate to between $1.2 million and $1.9 million over the 5-year construction period, and will be about $400,000 to $550,000 ongoing beginning in 2025.

All told, IPP and its induced impact are expected to contribute $18 million to $27 million annually after it is fully operational. The construction period will contribute an additional one-time $3.1 million to $6 million in sales and income taxes. For the assumptions that inform these estimates, please see the Appendix.

It should be noted that this project aligns with state goals in both its industry and its location. The energy industry is one of the industries targeted by the Governor's Office of Economic Opportunity and is taking place in rural Utah, a focus area for the office.[5] Moreover, IPA is supporting this economic development without any anticipated request of state or local incentives.

ENERGY HUB

Beyond the gains discussed so far, IPP Renewed offers the potential to jumpstart further economic development. The new gas-fueled power plant will produce less electricity than the current coal-fueled power plant. This will result in unused capacity on the transmission lines that could perhaps be filled through other electricity generation projects. It is expected that much of this new electricity generation would be renewable sources such as wind and solar. If the transmission lines were fully utilized, it could mean a direct effect of 1,300 temporary jobs and an additional 91 ongoing jobs in the community, which could support an additional 1,148 jobs during the construction phase and 410 permanently. However, this further development will depend on the demand of California purchasers for additional renewable energy. [6]

Moreover, the Kern River Gas Transmission Company will construct a new natural gas pipeline connecting Delta with intermountain west natural gas pipelines. IPP Renewed

will utilize this new pipeline to provide the natural gas that will be initially used to generate electricity. This pipeline will connect the area to much of the natural gas across the Rockies and allow Magnum Development to store natural gas in the salt cavern formations.[7] Utah could see still further economic benefit to the degree that out-of-state actors purchase storage services from Magnum Development.

SELECT HYDROGEN POWER PROJECTS

United States

Long Ridge Energy Terminal (Hannibal, OH): This combined-cycle plant will utilize a combination of natural gas and hydrogen. Operation scheduled to begin in 2021 will use hydrogen byproducts from nearby industrial plants. Developers plan a ten-year transition to 100% electrolysis-produced hydrogen.*

Chickahominy Power (Charles City County, VA): Cadiz Combined Cycle Plant (Harrison County, OH, USA) and Danskammer Energy Center (Orange County, NY, USA): Three gas-fueled plants contracted to install new hydrogen compatible turbines designed to facilitate the gradual transition to hydrogen power.†

Orange County Advanced Power Station (Bridge City, TX): A 1.2-gigawatt combined cycle plant expected to install hydrogen compatible turbines. Initially grey hydrogen will be used with a planned transition to hydrogen created via nuclear-fueled electrolysis. The area also has access to salt caverns for hydrogen storage.‡

Europe

ENERTRAG Hybrid-Power-Plant (Uckermark region, Eastern Germany): This facility opened in 2011 and stores excess wind energy as hydrogen which is then converted back into electricity (mixed with biogas) at times of high demand.§

Hassfurt CoGeneration Plant (Hassfurt, Germany): A small cogeneration plant uses hydrogen from wind power to generate electricity for the municipality.

Asia

Fukushima Hydrogen Energy Research Field (Namie, Fukushima Prefecture, Japan): Began producing hydrogen via electrolysis fueled by solar power. Hydrogen shipped via trailers powers hydrogen fuel cell power generators, cars, and busses. ¶

Lam Takhong Wind Hydrogen Hybrid Project (Thailand): A small fuel cell provides grid stability powered by hydrogen generated from wind power. #

Australia

Crystal Brook Energy Park (South Australia): Studying the feasibility of including a hydrogen hub in addition to a lithium-ion battery storage system powered via solar and wind generation.**

* Greenwood, Al, 2021, "U.S. power plant to burn hydrogen made from water electrolysis," ICIS Explore, Independent Commodity Intelligence Services, www.icis.com/explore/resources/news/2020/10/13/10562965/us-power-plant-to-burn-hydrogen-made-from-water-electrolysis.

† Patel, Sonia, 2020, "Mitsubishi Power snags hydrogen integration contracts for 2GW of new gas power," Power Magazine, www.powermag.com/mitsubishi-power-snags-hydrogen-integration-contracts-for-2-gw-of-new-gas-power/.

‡ Patel, Sonia, 2021, "1.2-GW dedicated hydrogen-fired power plant starts taking shape in Texas," Power Magazine, Aug 3, www.powermag.com/1-2-gw-dedicated-hydrogen-fired-power-plant-starts-taking-shape-in-texas/.

§ European Commission, 2021, "The first hybrid electricity-fuel-heat power plant with hydrogen storage in the world-projects." https://ec.europa.eu/regional_policy/en/projects/germany/the-first-hybrid-electricity-fuel-heat-power-plant-with-hydrogen-storage-in-the-world.

 FuelCellWorks, 2019, "Germany: Hassfurt successfully commissions hydrogen cogeneration plant into operation," https://fuelcellsworks.com/news/germany-hassfurt-successfully-commissions-hydrogen-cogeneration-plant-into-operation/.

¶ Toshiba Energy, 2020, "The world's largest-class hydrogen production, Fukushima Hydrogen Energy Research Field now is completed at Naime town in Fukushima," https://www.toshiba-energy.com/en/info/info2020_0307.htm.

Electricity Generating Authority of Thailand, 2018, "EGAT to develop the first wind hydrogen hybrid in Asia to support the future of renewable energy," https://www.egat.co.th/en/news-announcement/news-release/egat-will-develop-the-first-wind-hydrogen-hybrid-in-asia-to-support-the-future-of-renewable-energy.

** Commonwealth Scientific and Industrial Research Organization, 2020, "Neoen Australia Hydrogen Superhub (Crystal Brook Energy Park)," https://research.csiro.au/hyresource/neoen-australia-hydrogen-superhub-crystal-brook-energy-park/.

IPP Renewed will require an additional investment in the construction of hydrogen production and storage systems. Magnum, along with its partner Mitsubishi Power, has applied for nearly $600 million to finance the construction.[8] Beyond that initial investment, the extent of the spinoff developments supported by IPP Renewed in the energy hub region remains to be seen. Green hydrogen is viewed by many as one of the fundamental sources of carbon-free energy for the world's future.[9] With Utah being an early adopter in the production and storage of green hydrogen at utility scale, and with the unique geologic formations, there is potential for the expanded production and export of hydrogen as well. Given the public sector policy pressures and the private sector investments around green energy, the long-term potential appears substantial.

CONCLUSION

The days of coal-fueled electricity generation in Utah are fading away. This brings economic challenges, but it also offers opportunities to pivot to a promising new future for affected communities. The IPP Renewed construction project will provide billions of dollars in direct investment and hundreds of construction jobs over several years. Most of the construction jobs will be located in Millard County, where the economic benefits represent a much larger share of the local economy.

After the completion of the project, IPP Renewed will mean hundreds of direct and indirect permanent jobs across the state, with related tax impacts to state and local coffers. Because the majority of revenues will come from California purchasers, this infusion represents real economic expansion, rather than a reshuffling of local economic activity.

In the longer term, a higher level of available capacity on the IPP transmission lines would allow other renewable projects to locate in the area. The clustering of economic activity around this energy hub could at the very least spur thousands of construction jobs and hundreds of permanent jobs.

In the long term, green hydrogen appears to be one of the most promising carbon-free forms of energy. From 2000 to 2019, 252 megawatts of green hydrogen projects were deployed across the U.S. But from 2020 to 2025, 3,205 megawatts will have been deployed. Continued growth will drive down the cost per unit, making hydrogen more cost-effective for additional applications. Utah, by being one of the first movers, stands to be well-positioned in producing, storing, and potentially exporting hydrogen for future transportation, industrial, and energy use. And the IPP Renewed endeavor forms a key part of the vanguard.

APPENDIX: ANALYTICAL APPROACH

The Utah Foundation used multiplier analysis for this report. Multiplier analysis looks at the direct input in the economy and calculates how that input will support a higher level of demand of inputs (natural gas and hydrogen in this case). It also looks at the additional demand in other sectors of the economy generated by workers using their wages to purchase the things they need or want in the local economy. These purchases in turn have their own similar economic echoes. The inputs – with all their economic echoes – is a multiplier effect.

Multiplier analysis is a common method for assessing the economic impact of a new installation, on-going economic activity, and also the negative impact of the loss of a local business installation. In this case, the Utah Foundation is assessing the on-going and projected future impact of the economic activity generated by one project in the electricity generation industry, IPP Renewed.

The Utah Foundation used RIMS II for its analysis. RIMS is produced by the Bureau of Economic Analysis (BEA) using an opensource model using publicly available data.

IPA provided the Utah Foundation with financial data which represent total estimated spending or change in final demand for the project, along with estimates of employment and earnings. Final demand multipliers were used to estimate the impact on GDP, while direct-effect multipliers were used to estimate impacts on earnings and jobs. The Utah Foundation used both Type I and Type II to differentiate between indirect and induced impact. Since IPP is in an industry that supports primary jobs, it is important to use Type II multipliers that account for the induced spending of earnings by households employed in the affected industry. The Utah Foundation used multipliers for the construction industry when looking at the temporary impact of infrastructure investment, and used multipliers from detailed industry *Electric Power Generation, Transmission, and Distribution* when estimating ongoing impacts.

The Utah Foundation used multipliers calculated by the entire state. A general issue in economic analysis with using state-level multipliers in lieu of regional multipliers may overstate the true economic benefit. However, in the case of a large infrastructure project such as a power plant, substitution effects should be less of a concern because facility planning accounts for oversaturation issues better than other sectors, such as retail. With a recognition that there may be a slight high bias in the findings for the reasons enumerated above, but to be consistent with the research design, this study used state-level multipliers for Utah.

Analytic Approach – Identifying the Affected Industries

There are various ways to approach the question of industries affected by the multiplier effect. The first is to assess the multiplier effect on all of the specific industry-level spending undertaken by the project. This is referred to as the bill of goods approach and is generally used in instances when there are multiple and varying business models within the specific industry. In this instance, the bill of goods approach is considered more accurate because it captures the particular nuances of the spending patterns of the organizations or projects under study. However, the bill of goods approach is also more data and computationally intensive. In the case of IPP, a separate multiplier would be applied to each category of spending (fuel purchases, insurance, maintenance, etc.) and then each separate multiplier effect would be combined into a total effect.

Because such data are not available, the Utah Foundation used a change in final demand multiplier for the construction period. For ongoing operations, the final demand change was not available, but could be estimated using the expected ongoing jobs. In the case of IPP, infrastructure investment and exports are considered

changes in final demand. The final demand multipliers used are included in the table below.

Final Demand Sales	Type I	1.5363
	Type II	2.2453
Final Demand Earnings	Type I	0.5766
	Type II	0.7868
Final Demand Unemployment	Type I	1.02627E-05
	Type II	1.57903E-05
Final Demand GDP	Type I	0.7847
	Type II	1.1958
Direct-Effect Earnings	Type I	1.3329
	Type II	1.8188
Direct-Effect Employment	Type I	1.3958
	Type II	2.1476

Static vs. Dynamic Effects

RIMS II multipliers are derived from a static equilibrium model. Static equilibrium models imply no time dimension. However, because the multipliers are derived from annual national income data, most studies assume that the multiplier effects are fully realized within a one-year period. The Utah Foundation broke out construction annually to address this. If it takes longer than one year for the impacts to be fully felt in the Utah economy, the annual multiplier analysis will slightly overstate the true economic impact.

Multiplier effects only occur when infusions, or revenue earned from outside the regional economy (in this case the state of Utah) are recirculated within that economy. Infrastructure investments are generally considered such an infusion. The Utah Foundation adjusted estimated ongoing IPP revenue data to account only for revenues generated from out-of-state purchasers.

Injections into the Economy

California purchasers have the right to approximately 75% of the electricity generated. However, depending on demand, not all power for which contracts exist is sold to the party of the contract. In the case of excess supply, power originally contracted to one party may be sold elsewhere. According to IPA staff, this has been the case historically with IPP power. A majority of the power contracted to Utah municipal and cooperative utilities has been resold by them to certain of the California purchasers. As a result, historically approximately 98% of IPP's generated power was sold directly or resold by Utah purchasers to parties outside the state of Utah. This is important for this study because only injections from outside the regional economy create a multiplier effect. While Utah municipalities may benefit from the access to what will eventually be carbon-free power from IPP, it is principally the California purchasers that currently drive the economic impact, and they are assumed to continue to do so for the purposes of this report. For more information on how additional power generation and transmission could benefit Utah, see the study commissioned by the 2019 Utah State Legislature.[10]

Sales Tax Estimates

The Consumer Expenditure Survey produced by the Bureau of Labor Statistics for the Western region indicates that individuals spend approximately 26% to 32% of their income on goods that would be taxable in Utah. The Tax Foundation estimates

that average sales taxes in Utah are 7.19%.[11] These numbers were used to estimate how much sales tax would be collected.

Income Tax Estimates

Utah has a flat income tax of 4.95%. However, data from the Utah State Tax Commission show that after accounting for tax breaks, the statewide median effective tax rate is 3.18%.[12] The nominal tax rate was used for the high estimate and the median effective tax rate was used for the low estimate.

Gross Sales Estimates

State statute sets a gross receipts tax (a tax on the sales an entity makes) of 0.625% for entities collecting between $10 million and $500 million and 0.9375% for entities collecting between $500 million and $1 billion.[13] There are many uncertainties around how much power will be produced and the price that will be charged. Preliminary estimates expect between 4,000 and 7,000 gigawatts to be produced annually. The cost of energy is also not clear. The U.S. Energy Information Administration (EIA) has developed a value known as the levelized avoided cost of electricity (LACE). This value provides a proxy measure for potential revenue from the sale of electricity.[14] Based on the EIA's estimates, a combined-cycle gas power plant would receive similar revenue to a supercritical coal plant. Because hydrogen is such a new technology, EIA does not have any estimates regarding its potential revenues. However, it may seem to help non-dispatchable energy (solar) which sells at a discount reach higher levels of revenues because it overcomes the dispatchability problem. The Utah Foundation therefore makes the estimates of the gross sales based on the assumption that IPP will be able to obtain equivalent revenues per unit of electricity generated.

Fees in Lieu of Ad Valorem (Property) Tax Estimates

It is difficult to estimate the future assessed value of a property. Unlike home sales which trade often, there are not really any comparable sales of power plants to evaluate. It is a little more feasible to evaluate the worth based on the income generated, although as a special purpose government entity, IPA does not collect profits and income alone may underestimate the value of the property. The clearest method is the cost method – the value of the property based on how much it would cost to replace it. The property value in this case should be similar to the infrastructure investment. As the majority of the taxed property will be in Millard County, the Utah Foundation used the 2020 tax rate for the primary IPA property. IPA reports in its publicly available annual disclosure documents that Millard County, the Utah State Tax Commission and IPA are currently disputing the size of IPA's "Municipal Exclusion" (an exclusion to the fee base equal to the share of power purchased by Utah municipal purchasers). [15] Depending on the outcome of current litigation, the municipal exclusion could range from 0% to 14.04%. These ranges were used in calculating the estimated property tax payments.

ENDNOTES

1 A gas powerplant that uses the expanded volume of combusted gasses and steam generated from heat to generate power.

2 Utah State Statute §11-13-103 and Utah State Statute §67-1a-15.

3 Information provided by Magnum Development. See https://magnumdev.com/.

4 The Utah Foundation generated these estimates by comparing personal income to the share of sales tax generated in Utah counties.

5 Governor's Office of Economic Opportunity, 2021, "Center for Rural Development," https://business.utah.gov/rural/; Governor's Office of Economic Opportunity, 2021, "Targeted Industries," https://business.utah.gov/uniquely-utah/targeted-industries/.

6 Fernandez, Jesse, Natalie Flnn, Sam Gibbes, Matt Griffis, Takahiro Isshiki, Laura Palombi, Nerissa Rujanavech, Sarah Tomsky, and Meredith Tondro, 2010, "Renewable energy in the California Desert: Mechanisms for evaluating solar development on public lands," *University of Michigan,* http://webservices.itcs.umich.edu/drupal/recd/?q=node/64.

7 Magnum Development, 2020, "Magnum Natural Gas Midstream Storage Project," https://magnumdev.com/project-information/magnum-gas-storage/.

8 Business Wire, 2021, "Advanced Clean Energy storage project invited to submit part II application for up to $595 million financing from U.S. Department of Energy for proposed hydrogen hub and long-duration renewable energy storage project," May 11, www.businesswire.com/news/home/20210511005835/en/Advanced-Clean-Energy-Storage-Project-Invited-to-Submit-Part-II-Application-for-up-to-595-Million-Financing-from-U.S.-Department-of-Energy-for-Proposed-Hydrogen-Hub-and-Long-duration-Renewable-Energy-Storage-Project.

9 International Energy Agency, 2019, "The future of hydrogen: Seizing today's opportunities." https://iea.blob.core.windows.net/assets/9e3a3493-b9a6-4b7d-b499-7ca48e357561/The_Future_of_Hydrogen.pdf; The Hydrogen Council, 2020, "Path to hydrogen competitiveness: A cost perspective" https://hydrogencouncil.com/wp-content/uploads/2020/01/Path-to-Hydrogen-Competitiveness_Full-Study-1.pdf.

10 Simonson, Gary, Daniel Ramirez, John Muhs, Cidney Emery and Keegan Moyer, 2021, "Utah transmission study: a study of the options and benefits to unlocking Utah's resource potential," *Utah Office of Energy Development,* https://energy.utah.gov/wp-content/uploads/2021-Utah-Transmission-Study-Technical-Report-FINAL-210121.pdf.

11 Cammenga, Janelle, 2021, "State and local sales tax rates, 2021," *Tax Foundation,* https://taxfoundation.org/2021-sales-taxes/.

12 Utah State Tax Commission, 2019, "State Returns," https://tax.utah.gov/econstats/income/state-returns.

13 Utah State Statute §59-8-104(1), https://le.utah.gov/xcode/Title59/Chapter8/59-8-S104.html.

14 U.S. Energy Information Administration, 2021 "Levelized Costs of New Generation Resources in the Annual Energy Outlook 2021," www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf.

15 Intermountain Power Agency, 2020, "Annual disclosure report for fiscal year 2019-2020," https://emma.msrb.org/P21517559.pdf.

UTAH FOUNDATION
RESEARCH • ANALYZE • INFORM
P.O. Box 387
Salt Lake City, Utah 84110
utahfoundation.org

PLUGGING INTO THE FUTURE OF ELECTRICITY

THE ECONOMIC IMPACTS OF THE IPP RENEWED PROJECT