

## **THE ECONOMIC IMPACT OF THE CLEAN ENERGY FOR A HEALTHY ARIZONA PROPOSAL ON ARIZONA'S ECONOMY, 2018-2060**

Summary Report  
March 19, 2018

### **INTRODUCTION**

In February 2018 the *Clean Energy for a Healthy Arizona* ballot measure was filed with state election officials. If passed, this will require the state's public utilities to source half of their power from renewable resources by 2030<sup>1</sup>. Nuclear power is excluded from the list of renewables in the proposal. The proposition also calls for the creation of a renewable energy credit program based on the kilowatt hours (kWh) of electricity generated from eligible renewable sources.

The purpose of this summary report is to estimate the impact of the *Clean Energy for a Healthy Arizona* proposal on the state economy, 2018-2060, with reference to the state's largest utility, Arizona Public Service (APS).

Using a REMI model customized for the State of Arizona, the study estimates the variations in the state economy caused by the implementation of a *Clean Energy for a Healthy Arizona* proposal and a counterfactual "business as usual" (BAU) scenario in which APS continues with its evolving generating portfolio of nuclear, natural gas, coal, and renewables.

Four measures of economic impact are provided:

- **Total Employment:** this is an estimate of the total number of jobs in Arizona encompassing every sector and industry, including government and farm workers.
- **Private Nonfarm Employment:** this is an estimate of the total number of jobs in Arizona excluding government and farm workers.
- **GDP by State:** this is the market value of goods and services produced by labor and property in Arizona.
- **Disposable Personal Income:** this is an estimate of the total after-tax income received by any person residing in the state, deflated by the Personal Consumption Expenditure-Price Index, available for spending or saving.

A preliminary estimate of state and local tax revenue implications is also provided separate to the REMI model.

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<sup>1</sup> SRP is exempt due to its quasi-governmental status.

#### DATA SOURCES

APS supplied key data to Seidman to model both scenarios. This includes:

- Direct employment headcounts for both scenarios, 2018-2060.
- Annual operational costs for both scenarios, 2018-2060.
- Capital investment costs for both scenarios, 2018-2060.

#### METHOD

To estimate economic impacts, Seidman uses a REMI model customized for the State of Arizona.

Seidman models the impact of the different revenue requirements for the *Clean Energy for a Healthy Arizona* proposal and the BAU scenario on all non-utility consumer expenditure.

Seidman also carefully models the investment schedules required by the two scenarios for the electricity sector; mixing gas, nuclear and renewable generation, such as wind and solar, appropriately.

#### SUMMARY ECONOMIC IMPACTS

Table 1 summarizes the changes in the State of Arizona economy if APS is required to operate in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to the BAU scenario.

Seidman estimates that the State of Arizona economy would lose a total of \$36.8 billion in Gross State Product (GSP), 2018 through 2060, from the enforced changes in APS' operations and capital investments, if the utility operates in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to their BAU scenario.

Up to 305,000 job years of employment would be lost during the 43-year time horizon as a result of the changes in APS' operations and capital investment schedule required by the *Clean Energy for a Healthy Arizona* proposal.

This employment loss would include over 280,000 less job years of employment in private, nonfarm firms, 2018-2060.

Seidman also estimates that there would be \$23.0 billion less disposable personal income, 2018-2060.

Table 1's summary results therefore suggest a real reduction in the size of the Arizona economy if the *Clean Energy for a Healthy Arizona* proposal is implemented, with electricity held at 2018 pre-*Clean Energy for a Healthy Arizona* prices. There is some small mitigation of this associated with the indirect and induced effects from the additional resources devoted to the renewable electricity generation; but the implied additional direct expenditures required to maintain the current and forecast levels of electricity generation represent a significant loss to the economy.



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**TABLE 1: ESTIMATED DELTA ECONOMIC IMPACTS OF THE CLEAN ENERGY FOR A HEALTHY ARIZONA PROPOSAL, 2018-2060**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Gross State Product (GSP) <sup>2</sup> (Billions 2018 \$)	\$0.03	\$0.07	\$0.07	\$0.22	\$0.63	\$0.92	\$0.87	-\$0.06	-\$0.81	-\$1.02	-\$1.13
Total Employment (Job Years) <sup>3</sup>	371	874	788	2,492	7,205	10,226	9,492	-805	-8,915	-10,965	-11,793
Total Private Nonfarm Employment (Job Years)	357	836	742	2,381	6,897	9,711	8,896	-1,090	-8,771	-10,530	-11,174
Disposable Personal Income (Billions 2018 \$)	\$0.02	\$0.04	\$0.04	\$0.12	\$0.35	\$0.49	\$0.48	\$0.01	-\$0.34	-\$0.43	-\$0.50

	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Gross State Product (GSP) (Billions 2018 \$)	-\$1.36	-\$1.58	-\$1.87	-\$1.78	-\$1.66	-\$1.67	-\$1.70	-\$1.47	-\$1.81	-\$1.80	-\$1.50
Total Employment (Job Years)	-13,836	-15,860	-18,518	-17,337	-15,750	-15,619	-15,609	-13,191	-16,107	-15,729	-12,804
Total Private Nonfarm Employment (Job Years)	-13,040	-14,893	-17,362	-16,114	-14,530	-14,391	-14,369	-12,016	-14,857	-14,452	-11,609
Disposable Personal Income (Billions 2018 \$)	-\$0.63	-\$0.76	-\$0.93	-\$0.90	-\$0.87	-\$0.91	-\$0.95	-\$0.85	-\$1.05	-\$1.05	-\$0.92

<sup>2</sup> This is also sometimes labelled GDP by State.

<sup>3</sup> A job year is equivalent to one person having a job for 12-months. It should not be confused with the term "job." A person with 60 months' continuous service in a firm represents 1 job, but 5 job years of employment.


  
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	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Gross State Product (GSP) (Billions 2018 \$)	-\$1.17	-\$1.15	-\$1.03	-\$0.96	-\$0.96	-\$0.90	-\$1.04	-\$0.94	-\$0.92	-\$0.90	-\$0.87
Total Employment (Job Years)	-9,712	-9,416	-8,277	-7,545	-7,515	-6,903	-8,020	-6,998	-6,750	-6,487	-6,229
Total Private Nonfarm Employment (Job Years)	-8,665	-8,458	-7,409	-6,755	-6,770	-6,210	-7,320	-6,335	-6,119	-5,886	-5,658
Disposable Personal Income (Billions 2018 \$)	-\$0.78	-\$0.78	-\$0.72	-\$0.68	-\$0.69	-\$0.65	-\$0.73	-\$0.66	-\$0.66	-\$0.65	-\$0.64

	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	Total 2018-60
Gross State Product (GSP) (Billions 2018 \$)	-\$0.85	-\$0.83	-\$0.80	-\$0.78	-\$0.76	-\$0.74	-\$0.72	-\$0.70	-\$0.69	-\$0.68	-\$36.77
Total Employment (Job Years)	-5,973	-5,722	-5,475	-5,233	-5,001	-4,787	-4,590	-4,415	-4,268	-4,153	-304,855
Total Private Nonfarm Employment (Job Years)	-5,432	-5,209	-4,990	-4,775	-4,568	-4,379	-4,202	-4,046	-3,915	-3,813	-280,296
Disposable Personal Income (Billions 2018 \$)	-\$0.63	-\$0.61	-\$0.60	-\$0.59	-\$0.58	-\$0.57	-\$0.57	-\$0.56	-\$0.57	-\$0.57	-\$23.04

#### **SUMMARY FISCAL IMPACTS**

Table 2 summarizes the changes in the state and local fiscal revenues if APS is required to operate in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to a counterfactual BAU scenario.

Seidman estimates that state and local governments in Arizona would lose a total of almost \$3 billion in fiscal revenues, 2018 through 2060, from the enforced changes in APS' operations and capital investments, if the utility is required to operate in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to their BAU scenario.

This state and local government total fiscal loss would consist of approximately \$1.8 billion in state tax losses, and \$1.2 billion in local tax losses, 2018-2060.

Property taxes would fall statewide by more than \$859 million, 2018-2060.

The school district share of the projected property tax losses would be more than \$435 million, 2018-2060.

#### **SUMMARY IMPACTS FOR ALL PUBLIC UTILITIES IN THE STATE OF ARIZONA**

The economic and fiscal impacts summarized in Tables 1 and 2 are exclusively based on changes in APS' operations and capital investments, if the utility is required to act in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to a counterfactual BAU scenario. APS is the largest public utility in the state, but there several others, including Tucson Electric Power (TEP). The early retirement of Palo Verde resulting from the implementation of the *Clean Energy for a Healthy Arizona* proposal will also have an impact. 71% of Palo Verde's electricity generation is the result of investment from SRP (17%) or non-Arizona utilities (54%). Table 3 estimates the economic and fiscal impact of all public utilities in the state being required to act in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to their counterfactual BAU scenarios. The estimated impacts assume that Arizona's public utility sector (excluding SRP) is 1.5 times the size of APS. The electricity generation by non-Arizona utilities at Palo Verde is treated as a loss of electricity exports in the analysis.

Seidman estimates that the State of Arizona economy would lose a total of more than \$72.5 billion in Gross State Product (GSP), 2018 through 2060, from the enforced changes in public utility operations and capital investments, if they are required to operate in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to their BAU scenario.

More than 547,000 job years of employment would be lost during the 43-year time horizon as a result of the changes in public utility operations and capital investment schedule required by the *Clean Energy for a Healthy Arizona* proposal.

This employment loss would include over 501,000 less job years of employment in private, nonfarm firms, 2018-2060.

Seidman also estimates that there would be \$42.5 billion less disposable personal income, 2018-2060.



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**TABLE 2: ESTIMATED DELTA FISCAL IMPACTS OF THE CLEAN ENERGY FOR A HEALTHY ARIZONA PROPOSAL, 2018 – 2060**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Total State & Local Taxes (Millions 2018 \$)	\$2.50	\$5.90	\$5.41	\$17.37	\$51.15	\$74.18	\$70.30	-\$4.53	-\$65.45	-\$82.74	-\$91.31
Total State Taxes (Millions 2018 \$)	\$1.49	\$3.50	\$3.21	\$10.30	\$30.33	\$43.99	\$41.69	-\$2.68	-\$38.81	-\$49.07	-\$54.15
Total Property Taxes (Millions 2018 \$)	\$0.72	\$1.71	\$1.57	\$5.02	\$14.79	\$21.45	\$20.33	-\$1.31	-\$18.93	-\$23.93	-\$26.40
School District Share of Property Taxes (Millions 2018 \$)	\$0.37	\$0.86	\$0.79	\$2.54	\$7.49	\$10.87	\$10.30	-\$0.66	-\$9.59	-\$12.12	-\$13.37

	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Total State & Local Taxes (Millions 2018 \$)	-\$109.49	-\$127.75	-\$151.27	-\$144.16	-\$133.73	-\$134.94	-\$137.13	-\$118.78	-\$146.50	-\$145.05	-\$121.05
Total State Taxes (Millions 2018 \$)	-\$64.93	-\$75.76	-\$89.70	-\$85.48	-\$79.30	-\$80.02	-\$81.31	-\$70.44	-\$86.87	-\$86.01	-\$71.78
Total Property Taxes (Millions 2018 \$)	-\$31.66	-\$36.94	-\$43.74	-\$41.69	-\$38.67	-\$39.02	-\$39.65	-\$34.35	-\$42.36	-\$41.94	-\$35.00
School District Share of Property Taxes (Millions 2018 \$)	-\$16.04	-\$18.71	-\$22.16	-\$21.11	-\$19.59	-\$19.77	-\$20.09	-\$17.40	-\$21.46	-\$21.24	-\$17.73


  
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	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Total State & Local Taxes (Millions 2018 \$)	-\$94.62	-\$92.93	-\$83.31	-\$77.33	-\$77.73	-\$72.48	-\$84.36	-\$75.63	-\$74.18	-\$72.32	-\$70.46
Total State Taxes (Millions 2018 \$)	-\$56.11	-\$55.10	-\$49.40	-\$45.86	-\$46.10	-\$42.98	-\$50.02	-\$44.85	-\$43.99	-\$42.89	-\$41.78
Total Property Taxes (Millions 2018 \$)	-\$27.36	-\$26.87	-\$24.09	-\$22.36	-\$22.48	-\$20.96	-\$24.39	-\$21.87	-\$21.45	-\$20.91	-\$20.38
School District Share of Property Taxes (Millions 2018 \$)	-\$13.86	-\$13.61	-\$12.20	-\$11.33	-\$11.39	-\$10.62	-\$12.36	-\$11.08	-\$10.87	-\$10.59	-\$10.32

	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	Total 2018-60
Total State & Local Taxes (Millions 2018 \$)	-\$68.60	-\$66.75	-\$64.81	-\$62.95	-\$61.09	-\$59.39	-\$57.86	-\$56.56	-\$55.59	-\$54.95	-\$2,970.97
Total State Taxes (Millions 2018 \$)	-\$40.68	-\$39.58	-\$38.43	-\$37.33	-\$36.22	-\$35.22	-\$34.31	-\$33.54	-\$32.97	-\$32.58	-\$1,761.75
Total Property Taxes (Millions 2018 \$)	-\$19.84	-\$19.30	-\$18.74	-\$18.20	-\$17.67	-\$17.17	-\$16.73	-\$16.36	-\$16.08	-\$15.89	-\$859.12
School District Share of Property Taxes (Millions 2018 \$)	-\$10.05	-\$9.78	-\$9.49	-\$9.22	-\$8.95	-\$8.70	-\$8.47	-\$8.28	-\$8.14	-\$8.05	-\$435.16


  
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**TABLE 3: ESTIMATED DELTA ECONOMIC & FISCAL IMPACTS OF THE CLEAN ENERGY FOR A HEALTHY ARIZONA PROPOSAL, 2018-2060, FOR ALL PUBLIC UTILITIES**

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021-2030</b>	<b>2031-2040</b>	<b>2041-2050</b>	<b>2051-2060</b>	<b>TOTAL 2018-2060</b>
Gross State Product (GSP) <sup>4</sup> (Billions 2018 \$)	\$0.05	\$0.11	\$0.10	-\$8.38	-\$30.14	-\$19.27	-\$15.00	-\$72.54
Total Employment (Job Years <sup>5</sup> )	556	1,311	1,183	-70,473	-256,232	-133,994	-90,068	-547,716
Total Private Nonfarm Employment (Job Years)	535	1,254	1,113	-66,979	-234,775	-120,535	-81,907	-501,295
Disposable Personal Income (Billions 2018 \$)	\$0.03	\$0.06	\$0.06	-\$3.08	-\$16.17	-\$12.60	-\$10.88	-\$42.58

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021-2030</b>	<b>2031-2040</b>	<b>2041-2050</b>	<b>2051-2060</b>	<b>TOTAL 2018-2060</b>
Total State & Local Taxes (Millions 2018 \$)	\$3.70	\$8.88	\$8.07	-\$677.37	-\$2,435.77	-\$1,556.84	-\$1,212.20	-\$5,861.54
Total State Taxes (Millions 2018 \$)	\$2.20	\$5.27	\$4.78	-\$401.67	-\$1,444.38	-\$923.19	-\$718.82	-\$3,475.82
Total Property Taxes (Millions 2018 \$)	\$1.07	\$2.57	\$2.33	-\$195.88	-\$704.36	-\$450.20	-\$350.54	-\$1,695.00
School District Share of Property Taxes (Millions 2018 \$)	\$0.54	\$1.30	\$1.18	-\$99.21	-\$356.77	-\$228.03	-\$177.55	-\$858.54

<sup>4</sup> This is also sometimes labelled GDP by State.

<sup>5</sup> A job year is equivalent to one person having a job for 12-months. It should not be confused with the term "job." A person with 60 months' continuous service in a firm represents 1 job, but 5 job years of employment.



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Seidman also estimates that state and local governments in Arizona would lose a total of more than \$5.8 billion in fiscal revenues, 2018 through 2060, from the enforced changes in all public utility operations and capital investments, if they are required to operate in accordance with the *Clean Energy for a Healthy Arizona* proposal, compared to their BAU scenarios.

This state and local government total fiscal loss would consist of approximately \$3.5 billion in state tax losses, and \$2.3 billion in local tax losses, 2018-2060.

Property taxes would fall statewide by \$1.7 billion, 2018-2060.

The school district share of the projected property tax losses would be more than \$858 million, 2018-2060.

Table 3's summary results for the public utility sector therefore suggest a real reduction in the size of the Arizona economy if the *Clean Energy for a Healthy Arizona* proposal is implemented, with electricity held at 2018 pre-*Clean Energy for a Healthy Arizona* prices. There is some small mitigation of this associated with the indirect and induced effects from the additional resources devoted to the renewable electricity generation; but the implied additional direct expenditures required to maintain the current and forecast levels of electricity generation represent a significant loss to GSP, employment, disposable personal income, and state and local taxes for the 43-year study horizon as a whole.

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