Sustainable Tucson

An Updated Energy and Resource Perspective for a More Resilient Community Throughout Tucson and Pima County

by John A. "Skip" Laitner

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Abstract

Could we imagine how the larger Tucson community might create more than 40,000 new permanent jobs over the next 20 years? Above business-as-usual, and in ways that lower our energy and water bills?? Even as we also create a more livable desert and climate???

Who wouldn't be interested in a more sustainable future made possible by a more responsible, creative, and productive use of energy, water, and other resources? This brief economic narrative maps out the potential scale and scope of a better future for both Tucson and Pima County. Yet, it will require deeper cooperation, investment, and commitment from the entire community. Hence, the convening of the ***Renew Tucson Summit*** so that we can explore how the larger community might enable that better future. As colleague and award-winning materials scientist Dr. Saul Griffith has said: "It is urgent for every player to act and do their part. Individuals, governments, businesses, and the market—we need every tool in the box, and we need them working together" (Griffith 2021).

An Opening Perspective

In 1970, the Tucson Metropolitan Statistical Area (MSA), essentially all of Pima County more broadly, was an emerging economic region with a growing population of roughly 357,400 people. That was about one-third of the nearly 1.1 million people who live here today in 2026. The 1970 regional economy, measured by its Gross Domestic Product (GDP), was not quite one-seventh the scale of today's ~$54.0 billion dollars (with both values measured in constant 2017 dollars; see Woods & Poole 2025). At the same time, most of the focus on expanding the economy over these many years has been to promote the growth of capital (e.g., infrastructure and equipment) and labor. Yet…

Without the availability and productive use of energy, neither capital nor labor would be able to perform at all. In short, energy animates both capital and labor to function, to work, and to deliver needed goods and services throughout the entire local economy (Keen, Ayres, and Standish, 2019). Equally important, the inefficient and wasteful use of energy, water, and other resources weakens our social and economic well-being as it also contributes to a variety of environmental and health effects, including air and water pollution and the growing burden of climate change.[1]

Indeed, as noted in the table below, the evidence suggests, in part, that a "lagging energy and resource productivity" may weaken the improvement in per capita GDP over the next 25 years so

[1] As this narrative was first written, Tucson set a record 7 straight days of high temperatures from March 18 through March 24, 2026. This included 4 days of 100°F or more when the earliest 100 degree days this year preceded the historical benchmark by three weeks!

that it may expand only at two-thirds of the rate compared to the historical period of 1970 to 2025. This is a pattern that is expected for Arizona as a whole as well as the United States altogether.[2]

Comparing Key Pima County Annual Growth Rates for Selected Periods of Time				
Time Period	**Population**	**Per Capita GDP**	**GDP**	**Employment**
1970 to 2025	2.05%	1.40%	3.47%	2.54%
2025 to 2050	0.67%	0.87%	1.55%	0.84%
Source: Laitner calculation based December 2025 Woods & Poole Data for Pima County.				

The big implication? *Assuming no new taxes, a weaker growth in per capita GDP and employment may mean that the City of Tucson, Pima County government operations, the University of Arizona, and Pima Community College may all experience a series of budget shortfalls under business-as-usual conditions over the period 2025 through 2050.* And the rate of improvement in per capita income for families and businesses is also likely to erode compared to the historical trends.

To give this narrative a more uplifting perspective, we might look at how a shift in the magnitude of energy expenditures could also lead toward more jobs, especially more local jobs, and also a more productive economy. Pima County, as a whole, may now consume or spend on the order of ~$4.2 billion a year for the many different kinds of energy purchases we all make—whether for transportation, industrial operations, commercial businesses, water, air conditioning, lighting, and other electronic and computer needs.[3] As we do yearly with the Tucson Gem and Mineral Show, however, if we were to promote and celebrate "the Artistry" of more productive investments in our community's people and infrastructure, we can also smartly reduce those energy costs by 25 percent (or more). And the evidence suggests that yes, we can clearly do that (Griffith 2021). With the appropriate scale of local investments, we might celebrate the creative savings of over $1 billion a year in avoided energy costs throughout Tucson and Pima County.

This scale of energy and resource savings is several times bigger than the annual revenues of the Gem Show. Even more critically, that scale of productivity improvement can lead to more construction jobs, more manufacturing and other supply chain jobs—at a bigger magnitude than what we might gain from an investment in the proposed Project Blue Data Center (Laitner 2025). Perhaps equally acute, a high degree of local resource productivity can also reduce water and material consumption in a very big and positive way. Hence, the question...

Why do we celebrate the Gem Show (as we should), but we overlook the benefits of a greater and more productive use of renewable energy, water and other resources (as we also should)? Indeed, there are huge opportunities that: (a) we can clearly take advantage of; and which (b) can be put to very good use for the common good—in the form of productive investments which lower costs, and

[2] In fact, the future growth for U.S. per capita GDP, over the years 2025 to 2050 is expected to be on the order of 71 percent of the rate in the period 1970 to 2050. For the State of Arizona, it may be a slightly improved 80 percent while for Pima County—as shown in table above, a much weaker 62 percent (Wood & Poole 2025).

[3] The estimate of total energy expenditures for Pima County is based on 2023 data from Arizona State Energy Profile released by the U.S. Energy Information Administration (EIA 2025), and with a per capita income-adjustment calculation for Pima County (Woods and Poole 2025). Because data for Pima County is not as complete as for Arizona as a whole, in generating this and other statistics which can provide a sense of local scale in this essay, the analysis provided here is one of "modeling for insights" rather than precision (See, Huntington, Weyant, and Sweeney, 1982).

which can do so in ways that stimulate more jobs, a healthier climate, and a more robust economy! So, why not promote big investments in the more dynamic use of local renewable energy, water, and other resources? If we can pull the big market levers, enabled by smart local government policies, programs and investment initiatives, then a huge set of economic opportunities awaits us.[4] And all of that could generate an array of benefits for the common good, while using less energy, water and other material resources. As Sustainable Tucson has been working to promote what is called an "Infrastructure Investment Summit" in April 2026—now called the ***Renew Tucson Summit*** (an investment in people and infrastructure)—all of this can open a very important and positive set of steps forward. Without raising taxes. If we choose to make it happen.[5]

With the Question—Are We Living More by Waste than Ingenuity?

Research colleagues at the Weizmann Institute of Science (a research university in Rehovot, Israel) published a study in 2020 suggesting that all the Anthropogenic mass (or as I sometimes call it, the "humanmade mess") now likely outweighs all of the biomass on Earth (Elhacham et al. 2020). This statistic alone should remind everyone of *Newton's Third Law of Motion*—that for every action there is an equal and opposite reaction. Whether we are talking about energy, water, and other resources, both the scale of consumption, together with all the waste created by the use of all those materials, can damage the many ecosystems on Earth as well as accelerate climate change.[6] It can further expand what is called the Earth-Energy Imbalance (EEI), make worse our local air quality, and increase the loss and ongoing erosion of soil, disease, damaging health effects, and so much more.

In 1776 the global economy had fewer than 800 million people on Earth. Today there are more than 8.2 billion individuals. Imagine that you once lived in your home alone, but today you've had to accommodate more than 10 times that number of people within your single household. There are consequences. In the U.S. alone, over the years 1950 through 2025, we consumed total energy on the order of 300 billion tons of coal equivalent, and more than twice that volume of total domestic materials whether biomass, fossil fuels, metallic ores, and other minerals. That scale of consumption and waste has climate and environmental consequences.

In a 2018 essay for the Environmental Law Institute's bimonthly magazine, *The Environmental Forum*, my colleague Meagan Weiland and I said, "Let's Talk Trash" (Laitner and Weiland, 2018). We asked the question: "Do we live more by waste than ingenuity?" We noted that, yes, each person then in the United States (then based on 2014 data), created an average of 4.4 pounds of municipal solid waste every single day.

But we also noted, if we add to that municipal solid waste problem, all of the annual fecal matter from humans, cows and pigs, all of the soil erosion from agricultural and land use practices, and

[4] For a deeper inquiry into the capacity of local investment initiatives, see a legal assessment of municipal authority by Dittmer and Laitner (2026) which complements this economic narrative.

[5] For more details on the Renew Tucson Summit as it convenes on April 23/24, 2026 (*Investing in People, Infrastructure, and Our Well-Being), see:* https://www.renewtucson.org.

[6] More than 15,800 scientists from 167 countries—ranging from Morocco, Egypt and Cameroon to Russia, China and the United States (including the author of this manuscript)—signed an emergency declaration, warning that: "We are hurtling toward climate chaos. The planet's vital signs are flashing red. The consequences of human-driven alterations of the climate are no longer future threats but are here now"(Ripple et al., 2025). A further update can be found in Ripple et al. (2026).

also the air pollution with all of the carbon dioxide emissions, that total magnitude of waste grows to ~280 pounds per person/day. Likely much more, since none of this data included losses of water, coal ashes, mining tailings, and the many other forms of waste spread throughout our many economic and social activities. With a final sense of scale?

Even with a limited metric and a somewhat outdated estimate, including the now 342 million people who live here in the United States today, that 280 pounds of waste per person per day, which likely grew by at least 4.7 percent, is likely well over 18 billion tons per year – just for the United States alone. And as further evidence of Newton's Third Law? A new valuation by University of Arizona economist and colleague, Dr. Derek Lemoine, indicated that "climate change has already made the United States poorer." He estimates that the effects of past temperature increases have eroded U.S. personal income by 12 percent since the year 2000" (Lemoine 2025). For the Tucson MSA (i.e., Pima County) that implies a loss on the order of ~$200 million (in current dollars) for just this year alone.[7]

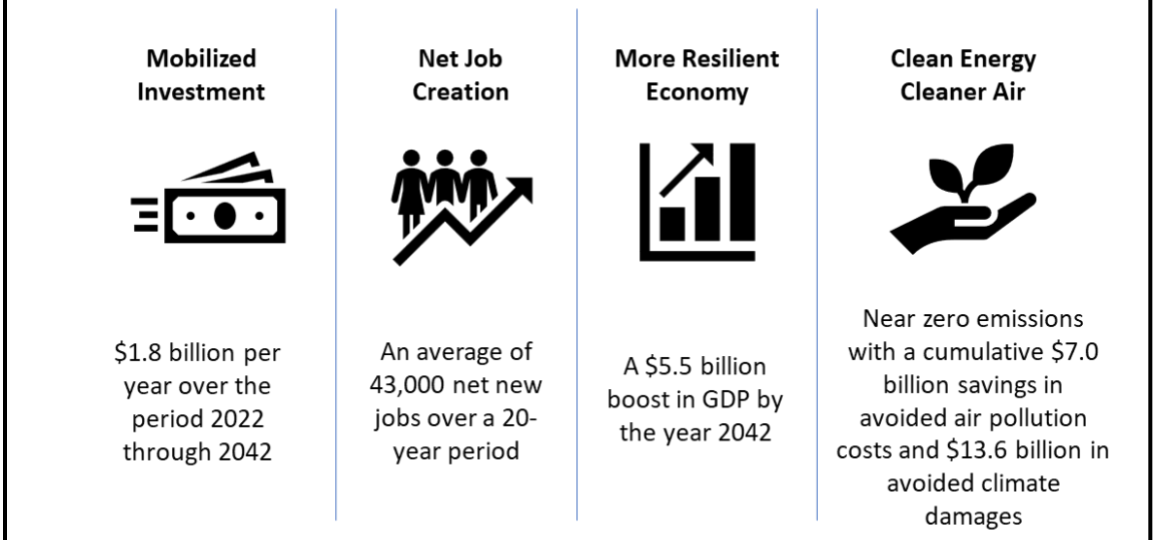
A Critical Opportunity for the Tucson MSA (Pima County) Economy

Since 1950 the U.S. economy has grown by a factor of 9.7 times (again, measured by GDP in constant dollars), but total energy use has increased by only 2.8 times. In other words, energy supply, over the years 1950 through 2025, provided only 29 percent of the total energy services that were needed over those 76 years, while the smarter and more productive use of that energy has enabled a 71 percent of the expansion of our economy.[8] While it appears that the rate of energy productivity improvements may falter over the next 25 years, there are a large number of studies which suggest that we can do much better if we make better choices and stimulate a smarter scale of local productive investments—in both people and infrastructure.

As but one example, spearheaded by best-selling author Jeremy Rifkin, and in collaboration with the engineering firm of Black & Veatch, Adrian Smith + Gordon Gill Architecture, and the World Resources Institute (among others), our team provided a deep-dive economic assessment in July 2021 as part of a 242-page, $16 trillion infrastructure investment report for then-U.S. Senate Majority Leader Senator Charles Schumer.[9] The analysis, as summarized in the infographic on the next page, showed that as a result of a more energy productive infrastructure, Pima County's share of new net jobs would likely increase, even as GDP is also strengthened, while both the economic burdens of climate and air pollution are reduced.

[7] Because Pima County has a different structural or economic profile than the average county within the United States, this is only a working estimate to suggest the possible scale of impact rather than the precise impact of lost personal income within the region.
[8] Laitner calculations based on March 2026 data from Energy Information Administration (EIA) historical data (1950 to 2024) and the Short-Term Energy Outlook (1998 to 2025). See https://www.eia.gov/analysis/. For those who might be interested, I'm happy to share further details and analysis as it might be helpful.
[9] The report was titled: "AMERICA 3.0 THE RESILIENT SOCIETY A SMART THIRD INDUSTRIAL REVOLUTION INFRASTRUCTURE AND THE RECOVERY OF THE AMERICAN ECONOMY." See https://foet.org/wp-content/uploads/2021/07/Jeremy-Rifkin-America-3.0-The-Resilient-Society-20210728.pdf.

America 3.0 The Resilient Society – Potential Pima County, AZ Share
Estimated Investment and Benefits of a More Energy-Efficient, Resource Productive U.S. Economy



Source: Economic Assessment by John A. "Skip" Laitner and the DEEPER Modeling System of an Energy Productivity Enhancement of the US Infrastructure over the Period 2022 through 2042 (August 2021). Based on the 2019 share of GDP for Pima County, Arizona compared to the whole of the United States, and with all financial values expressed in constant 2012 dollars.

As a result of the Rifkin team's early collaboration with key aides and legislative staff beginning in late 2020, a number of the report's recommendations found their way into the Infrastructure Investment and Jobs Act (IIJA late 2021) and the Inflation Reduction Act (IRA in 2022). While the Congressional funding was, unfortunately, not on the scale of investment recommended in the full report, it was still a positive step forward. Again, as summarized in the infographic above, Pima County's share of employment, together with the larger economic advantages and the full set of environmental benefits would have been significant—on the order of a net gain of ~40,000 (or more) jobs even as the economic burden of greenhouse gas emissions and other pollutants would have been significantly diminished (see, Laitner 2021).

Two critical aspects of this opportunity must be told. First, recent Congressional legislation has defunded and weakened many of the IRA and IIJA investments. That means we are going to need much more local investment initiatives to bring about the full range of social, environmental, and economic opportunities. Second, most people do not really understand the role of both public and private investment needed to make something like this happen. In short, there is a critical need to share and help the larger public better understand and appreciate how governance can enable Tucsonans to say "yes to climate action," as they are also saying "yes to a greater economic resilience." While that resilience will absolutely require greater local investment, there are very big returns that will emerge from that larger scale of productive investment. *Again, if we choose to make it happen!!!*

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About the Author:

John A. "Skip" Laitner is a member of Sustainable Tucson. He is a long-time award-winning energy and resource economist who collaborates with national and international colleagues to promote local jobs and prosperity through greater energy and resource productivity. Laitner has authored over 340 book chapters, journal articles, and reports on a variety of related topics.