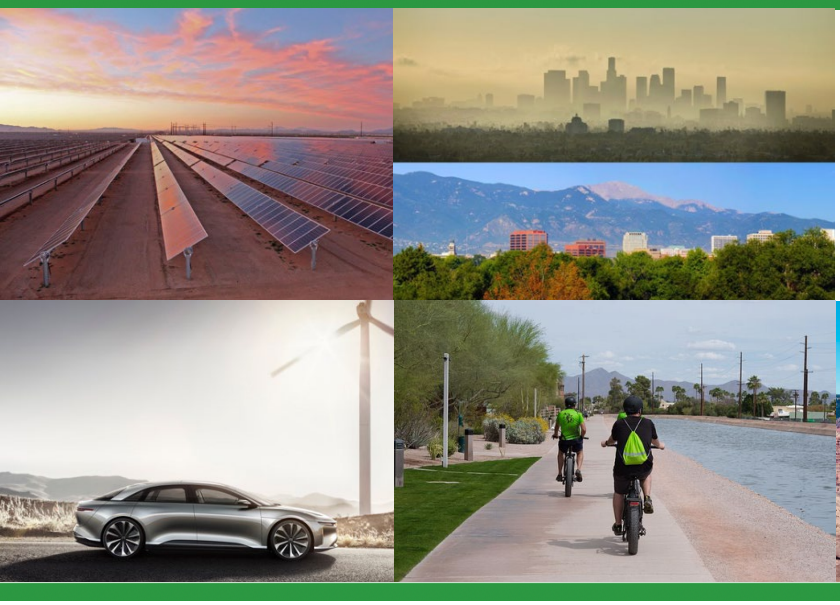

The Nature Conservancy

Arizona Thrives

A Path to a Healthy and Prosperous Future

December 2019

The Nature Conservancy

integrated WORK

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Arizonans have prospered by having a strong spirit and being resourceful and resilient. Arizona is the sixth largest state, with the fifth largest city and is the third most biologically rich state in the nation.[1]

Arizona is on the rise. One of the fastest growing states in the country, Arizona is developing an increasingly diverse and dynamic economy. This is all the more remarkable because it has been done in an arid region where the ability to thrive was not guaranteed. Yet Arizonans have learned to adapt to our environment and made some key investments and forward-looking policies.

Arizona is ahead of the curve. Today, Arizona's leaders are looking ahead toward new challenges that must be addressed to continue growing a vibrant economy and a healthy and prosperous future for its people. Attracting the industries of the future as well as maintaining competitiveness nationally and internationally requires leveraging emerging technologies and promoting a healthy environment.

Phoenix is the hottest city in the nation and is projected to become much hotter. Several Arizona counties rank among the lowest in the U.S. for air quality.[2] The forests that sustain our largest renewable water supply are at risk of catastrophic fire.[3] Twenty-year droughts may become the new normal if proactive measures are not taken.

There is a growing agreement that more needs to be done[4] and Arizona is positioned to lead in a way that works for Arizonans. The convergence of public support, lower-cost clean energy, a need to meet clean air standards, and demands by businesses for clean energy and healthy communities presents an opportunity for broad-based leadership and individual action. Additionally, Arizona's rural and tribal communities have unique opportunities and challenges that must be considered in developing a path forward to ensure they are not left behind.

We can continue to debate and wage costly battles over the future of Arizona or we can act now to set a course that will put us on a path where people and nature can thrive.

This report is intended to change the conversation about why it matters and what it will take to get there. It provides a framework for Arizona to move toward clean energy that is affordable, reliable and competitive, and attainment of clean air standards that will make Arizona more livable and able to attract high-wage jobs. It recognizes there is no one solution and calls on us to work better together.

We have an opportunity to create a path that provides for us now and will allow our children and grandchildren the opportunity to thrive and prosper in the future. The time to act is now.

Patrick Graham
State Director, The Nature Conservancy in Arizona

Executive Summary

In March 2019, The Nature Conservancy convened a group of respected people who care about the issues of clean air, clean energy and building a robust economy in Arizona, charging them with an approach that would be inclusive and integrated versus polarizing and divisive. Since then, this group has engaged experts and key stakeholders across sectors and defined a set of actions that make sense, are achievable and will work for our state.

To clean up our air and make Arizona healthier and better for business we can:

- Make it easier for people to drive less, especially alone
- Make it easier to make, sell and buy clean fuel cars
- Get older, more polluting, cars off the road
- Plant more of the right kinds of trees in inner cities

The road to clean energy includes:

- Making it easier for power companies to develop and deliver clean solutions
- Promoting energy saving programs
- Using cleaner fuels to make and move goods to market
- Making our forests healthy and less likely to have big wildfires

The goals identified were to meet Federal Air Quality Standards for ozone emissions by 2024 and put Arizona on a path to achieve net zero carbon emissions by 2050.

The specific areas of opportunity highlighted below are within our reach and are even more impactful when taken together rather than implemented in isolation.

	Lever	Area of Opportunity
Clean Air	Mobility	Increase coordination of mobility efforts; develop land use tools to grow transit-oriented development; influence consumer behavior
	Electric Vehicles	Develop tools to reduce barriers to electric vehicle adoption; coordinate charging station deployment
	Reduce Auto Emissions	Continue and expand incentives for fuel-efficient vehicles, evaluate buy-back programs for vehicles older than 2004, implement fleet modernization and sharing programs
	Increase Tree Cover/Natural Solutions	Create “cool islands” in urban cores; include pathways to transit and shaded transit shelters
Clean Energy	Clean Portfolio	Incentivize storage innovation; proactively support utility research and development; allow cost recovery for innovation and transition.
	Energy Efficiency/Built Environment	Promote utility programs; support opportunities for increased manufacturer and construction industry efficiency programs
	Industry and Commercial Transportation	Support the development of clean and/or carbon-neutral fuels
	Forest Health/Biomass	Thin forests by 50,000 acres per year over 20 years; produce clean biomass energy; increase forest carbon storage

Meeting air quality standards and achieving progress towards clean energy goals requires working across all sectors of the economy. Approaching each sector and element independently will be harder and more expensive than solving for them together. An integrated approach will also help build a broad coalition of stakeholders and increase our collective impact.

A Pragmatic Approach to Prosperity

Arizonans have prospered by having a strong spirit and being resourceful and resilient from the early days of the Hohokam society over 4000 years ago to our thriving innovation economy today. A clean economy will be a critical factor in helping Arizona continue a strong economic growth and attract high-wage jobs.

We are positioned to build a thriving clean economy in Arizona. Arizona has everything we need to lead on these issues if we work together.

Why Now?

There is a convergence of interests that make this the right time to come together and chart a course for a future with clean air, quality jobs and clean energy to power our future growth. Over the past decade tens of millions have been spent battling to influence Arizona's energy future with over $60M of that spent on last year's Proposition 127 alone[5]. New policy proposals promise to perpetuate that battle and deepen divisions. Few people disagree about where we need to go. The battle has been over how to get there. We believe there is a better way.

Polling confirms there is growing bipartisan support among the public for clean energy and clean air. There is a growing awareness that being out of compliance with federal ozone standards will threaten human health[6] and cost Arizona hundreds of millions of dollars in lost economic growth.

Market forces are making the transition to clean energy more affordable and competitive.[7] The recent successful negotiations to avert a water crisis on the Colorado River illustrates both what is possible and the consequences of delaying action.[8]

Many institutions, organizations and governments have been working on these issues over a long time. The challenge is not a lack of good ideas or committed parties. Rather, it is the lack of a coordinated effort, convening entity, or clear plan to steer these efforts so that they result in innovation and progress rather than conflict and unneeded expense.

Throughout 2019 The Nature Conservancy in Arizona has engaged a range of interested parties to explore the level of support for creating a framework and process that could offer a solution-oriented, efficient, collaborative and integrated way to simultaneously promote clean air, clean energy and a prosperous economy. Our belief that a better way is possible has been met by resounding support and a real desire to carve out a new path.

The Nature Conservancy's mission is to "conserve the lands and waters upon which all life depends." Because of our reputation for being trusted and collaborative, we initially offered to be a catalyst for changing the conversation and moving forward. There was also agreement that no institution or body is positioned to do that currently, especially when looking across sectors and issues. We agreed our role was not to tell people what to do. It was not to write a plan. Instead, we are working to help take advantage of this critical moment in time to bring people together to do something none of us could do on our own. We are creating the conditions for Arizonans to come together, to lead the way as they have in the past.

We began with a nimble task force to help guide the creation of a framework and metrics for key constituents. They included Kirk Adams, Gary Dirks, Hunter Moore, Karen Peters and Bill Post. We engaged a broad cross section of experts and interests to frame up the issues and challenges and have worked to synthesize an integrated way forward. That effort has produced the key levers and approach outlined above and identified a coalition of key players well positioned to carry this work forward together.

Our Approach and Principles

The approach we have taken recognizes there is no simple solution to complex issues. These issues are connected in such a way that one can create unintended negative consequences by operating in isolation or we can discover more effective solutions by looking at the issues together. The approach is intended to be transparent, build trust and shift from interest-advocacy to collaborative problem-solving. We set forth these principles to guide our work:

We are committed to outcomes that:

- Have real impact
- Are forward-thinking and adaptive
- People can depend on

We will get there by:

- Respecting the needs and concerns of all stakeholders
- Building a broad base of support
- Building trust along the way

The framework we outlined above and detailed here aims to improve quality of life for Arizonans by addressing clean air and clean energy together to create a thriving clean economy.

We are a state that values innovation and ingenuity and we have an opportunity and the need to engage our residents in devising solutions that:

- Position us as a national leader in developing clean energy and air solutions
- Foster innovation and invite investment in both rural and urban areas
- Demonstrate the potential of emerging technologies
- Improve the livability of our cities by mitigating impacts of heat and air quality
- Positively impact the health of our most vulnerable populations
- Create opportunities for employment and recreation

How Arizona Can Lead

Arizona is uniquely positioned to play a leadership role in this growing movement:

- We have an abundance of sunshine and lands suitable for clean renewable energy and storage.[9]
- We are an ideal testing-ground for innovation:
    - Arizona is the third-largest producer of solar energy[10]
    - Private investment in electric vehicle manufacturing is locating here[11,12]
    - Nature-based solutions can significantly improve livability in neighborhoods and cities[13]
    - Our unique political environment positions us to develop pragmatic solutions with broad marketability beyond our borders
- The compounding effect of heat on pollution in our state gives us incentive to come up with true innovations, not only incremental improvements[14]
- By investing in solving our forest health we can provide benefits to rural communities and improve water supplies for urban areas, while reducing harmful emissions[15]
- We are positioned to be an exporter of clean energy in the future.

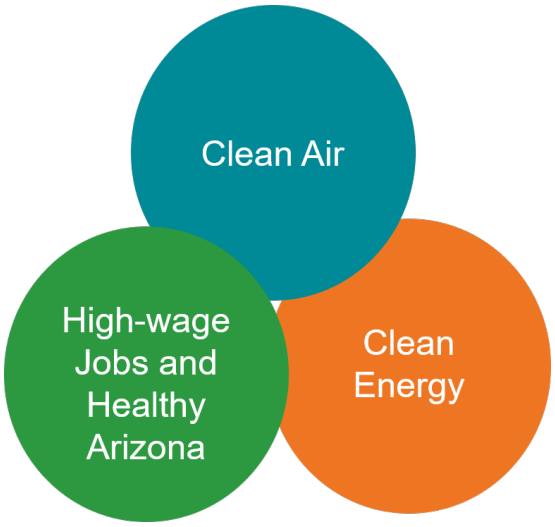
What we are proposing is an opportunity to create solutions that work for Arizona. Those solutions are most likely to succeed if they consider the important connections between clean air, clean and reliable energy, and a prosperous economy.

Currently those responsibilities are divided among different branches and levels of government and across industries, communities and sectors. Success will depend on the active participation of people and organizations across Arizona. This means providing useful information, support, incentives and inspiration to take action.

Some of the players involved include the Department of Environmental Quality, Arizona Commerce Authority, Arizona Corporation Commission, cities and counties, urban and rural communities, Residential Utility Consumer Office, Indian Nations, utilities and electric co-ops, business interests large and small, commercial and residential development, public interest groups, universities and more. Some have regulatory authority; others are providers, consumers, researchers and entrepreneurs. All need to work well together to chart this more integrated and coordinated set of solutions.

The Goals

It is time to accelerate the transition to a low-carbon future in a way that is affordable, reliable competitive and equitable. The change has already begun, and the choice is to lead the way, or find ourselves adapting to others' solutions. We need to chart the future in a way that will be sustainable and enduring over time. Some actions and solutions are evident today while others will require new innovations and discoveries. We can begin by addressing three goals.



One goal is to come into **attainment with the federal clean air standards with respect to ozone**. Much progress has been made over the past two decades and the issue is challenging because much of the ozone in Arizona comes from outside the state. That makes it no less important.

Another goal is **striving to achieve a reduce carbon emissions**. Addressing this issue economy-wide will result in a more balanced and coordinated approach than prior proposals. Often attention is only focused on the electric utility sector, yet transportation, commercial and residential development, and land use are larger sources of emissions when combined.[16]

In achieving the first two goals it is important to **design solutions in a way that allows our economy to continue to prosper and to ensure that the needs of those adversely impacted by the transition will be taken into account**. A clean economy is one that produces goods and service while producing low-carbon emissions and meeting air quality standards in a sustainable way. The solutions need to be affordable, reliable and competitive. Some of the changes being driven by market forces or technology create disruptions to economies, people and the environment. Considering those effects will support a more just transition.

Arizonans have always thrived by being resourceful in the face of challenge and change. We need to leverage our resources to create an Arizona for the 21st century. By powering innovation for clean air and clean energy we will build communities and a natural environment that are livable and healthy. We need to be working together to find solutions that build on the innovative spirit and resourcefulness that brought us to this place in time.

Following, we outline how these elements, taken together, create real opportunity for pragmatic solutions that will harness Arizona's ingenuity to create good jobs and fuel a clean economy.

Elements of a Pragmatic Solution

We have been focusing on identifying strategies to create a future where attaining cleaner air and access to reliable and affordable clean energy fuels a growing, prosperous, and clean economy. The problem is carbon dioxide and ozone, by-products of burning fossil fuels, along with other greenhouse gasses are the waste products that are changing our climate and polluting our air.

Despite other differences, there is strong bipartisan support for clean air and clean energy. This allows us to step over disagreements and move to solutions that a broad majority can support. As we have pursued this integrated path, we have identified key levers that, taken together, present a pragmatic path to progress that avoids the pitfalls of more polarizing, single-interest approaches.

How we shape a healthy and prosperous future is important. Solutions that are mandate-driven or focused narrowly on one aspect of the problem create unevenly distributed impacts, foster divisiveness, and will ultimately fail to address the root causes of our challenges in lasting ways, or to drive the kinds of innovation required to truly be leaders in a changing energy and economic landscape.

We are changing the conversation to catalyze real and lasting change. Ultimately, we will succeed best by inspiring and incentivizing businesses and the people of Arizona to be at the forefront of the efforts to shape their own destiny. We are a proud and independent state and we have an opportunity to build a movement by engaging Arizonans in the inspiring goal of crafting lasting and impactful solutions to some of our greatest challenges by leveraging our own ingenuity, harnessing the power of our most abundant natural resources, and attracting investments that will fuel innovative solutions that improve our lives and can be exported to other communities facing similar challenges.

Together, we can set shared goals and lay out a path to reach them.

One of the galvanizing features of this work has been establishing a clear set of framework elements to focus our work and identify opportunities for synergy. This has allowed for greater coordination of effort throughout this process and sets us up to craft solutions that can be broadly supported going forward. We believe that the most powerful solutions will address a combination of these elements:

- A clean air solution that improves quality of life and achieves attainment
    - Addressing mobility to decrease reliance on single-driver trips
    - Increasing electric vehicles and low-emissions transport solutions
    - Reducing auto emissions and improving fuel efficiency
    - Increasing tree canopy cover to improve city livability

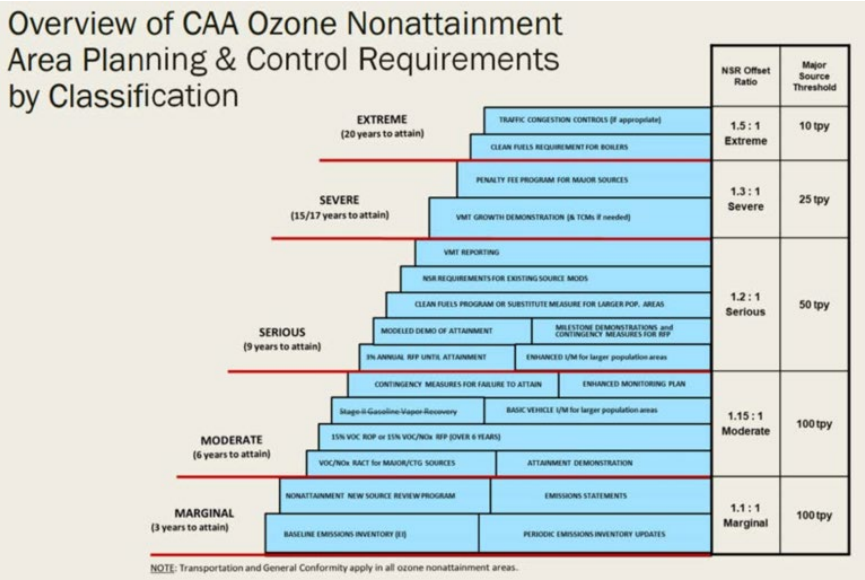
- A clean energy approach that builds a pragmatic path to net-zero emissions by:
    - Encouraging clean electric energy production solutions
    - Improving the efficiency of our most energy-consuming sites and devices
    - Increasing clean-fuel use in commercial transportation
    - Promoting forest health and increasing the economic value of biomass

Clean Air: Achieving Attainment

The creation of the Clean Air Act (CAA) in 1963 launched a national effort to maintain healthy air quality by controlling air pollution. While the Environmental Protection Agency (EPA) regulates many air pollutants, certain pollutants are known as “criteria” air pollutants because the EPA uses health-related criteria for permissible exposure levels.[17] The permissible levels are known as the National Ambient Air Quality Standards (NAAQS).[18] A non-attainment designation under the Clean Air Act carries serious repercussions including the loss of federal highway funding and the loss of economic development opportunities. Some of the economic impacts of non-attainment include enhanced regulatory oversight, permitting restrictions on new construction and mandatory emissions offsetting. [19]

The Arizona Department of Environmental Quality (DEQ), and many of the larger counties, routinely track air quality standards.[20] Achieving attainment of these standards is important both for air quality and for economic development as non-attainment areas have barriers to investment that make it harder to attract high-quality jobs in some areas of the state.[21]

Maricopa County has already adopted the EPA's targets and set a goal to meet these standards by 2024 that is intended to prevent a status change from "marginal" non-attainment to "serious" non-attainment and avoid even more punitive impacts.[22]



Yet in Arizona, much of the ozone that affects our air quality is beyond our direct control, blowing in from California and Mexico.[23] How to achieve this goal is still not fully defined and more coordinated efforts are needed.

During the course of our work, partners from Arizona State University (ASU) and the Department of Environmental Quality met to identify elements of a mobility framework and put forward the following three tiers of actions for addressing air quality. Each of these will be necessary elements of achieving attainment:

1. **Reduce driving**, and in particular reduce the number of single-driver trips.
2. **Switch to clean fuels**, including electricity, hydrogen and natural gas.
3. **Encourage more fuel-efficient vehicles** (that are less polluting).

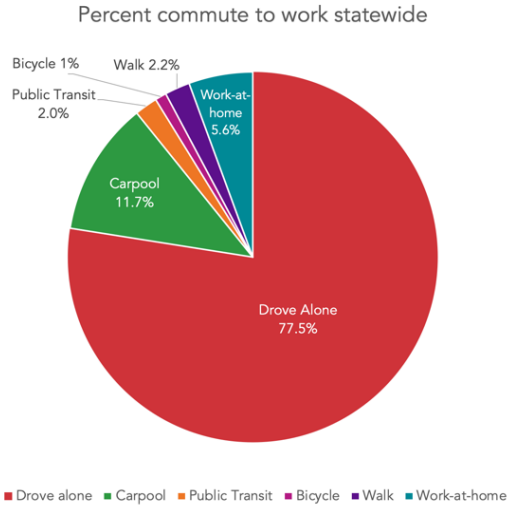
By addressing these issues together, we can devise solutions that work for the largest number of people while achieving maximum benefit in a lasting way.

In addition to these three strategies, our work also identified increased tree canopy in urban areas as an important lever in improving air quality. Trees in urban areas absorb carbon and reduce urban heat and have a synergistic effect with mobility solutions. Arizona has a real opportunity to pioneer livability in our cities through natural solutions.

Addressing Mobility to Reduce Single-Rider Trips

Key insights: Arizona has experienced steady population growth over the last 50 years, and while the rate has decreased somewhat, total population continues to increase; Maricopa County is currently the fastest growing county in the U.S.[24]

As the population has grown, the Phoenix metro area has ballooned in size to nearly 15,000 square miles.[25] This low-density, sprawling growth means that most people drive long distances for their commutes.[26] In 2015, people who worked in Phoenix tended to live farther away than they did in 2000—increasing both the time and cost of their commute.[27]



Of the more than 2.8M Arizonans who commute to work daily, 77.5 percent drive alone, with just 12 percent sharing a ride and 2 percent using public transit.[28] These factors contribute to Phoenix having the fourth most stressful commute in the U.S.[29]

Today, only two percent of Arizona's population (143,400 people) currently use public transport to commute to work each day.[30] Increasing this number, particularly in major cities such as Phoenix and Tempe, could help significantly reduce emissions across the state. In addition to reducing local air pollution, reducing vehicle miles has further benefits such as alleviating congestion, improving safety, and reducing infrastructure maintenance.[31]

Enduring Challenges: Changing how people move requires integrated planning that considers a range of factors, including:

- Increasing population
- Transit (availability, cost, and impact on commuting time)
- Ridesharing (safer and easier to arrange and coordinate)
- Multi-modal transportation (including addressing first and last mile challenges)
- Heat action planning (ensuring adequate shade and shelter in transit areas)

Changing commuter behavior is also a challenge on the road to attainment. Figuring out how best to reduce vehicle miles driven will be important to reducing emissions.

Areas of Opportunity: This is an area ripe for **specific goals and innovative, coordinated effort**. Both **direct and indirect approaches to influencing commuter behavior** can make an important difference. These may include **land-use policies** that support transit-oriented development, direct incentives and **public service advertising** that encourage ride sharing or **working with employers** to offer teleworking options.

Increasing Electric Vehicles and Low-Emissions Transport Solutions

Key Insights: While efforts to increase mobility options and reduce single-rider trips is an important element of any comprehensive clean energy and clean air framework, given the large number of those trips that occur today, decreasing the emissions produced by those trips is also a top priority.

Even with today's energy mix, driving an electric vehicle (EV) is more than 50 percent less polluting than driving a gasoline-powered vehicle.[32] Using clean energy to charge EVs reduces their carbon emissions to close to zero.[33] Other alternative-fuel vehicles can also make a difference.

Enduring Challenges: First, infrastructure is still scarce and unevenly distributed as Arizona currently has ~474 EV charging stations across the state for more than 11,000 EVs with the majority of charging stations clustered around Phoenix and Tempe.[34]

The business model for charging stations and pragmatics of when and where people will charge their vehicles remains unclear and unresolved creating ambiguity that hinders both consumer adoption and corporate investment. Infrastructure alone isn't enough though.

Second, the production costs of electric vehicles remain, on average, $12,000 per unit higher than comparable internal combustion engine vehicles and carmakers still struggle to recover those costs through pricing alone.[35] So, the incentive to promote sales is low.

Third, EVs remain a less attractive option for many consumers. Few models are available, and many are sold only in certain states,[36] and a 2018 study found that on average the levelized cost of an electric vehicle (including the high initial capital costs, depreciation costs and maintenance) remained significantly higher than a comparable gasoline-powered vehicle.[37]

Making electric vehicles a cost-effective and attractive option for consumers and helping overcome barriers to profitability can help address these challenges.

Areas of Opportunity: Overall, Arizona is uniquely positioned to both benefit from early advances and increased usage of electric vehicles and to help serve as a catalyst for a rapidly evolving industry in need of pragmatic partnership. Lucid Motors has announced plans to locate a manufacturing plant in Casa Grande providing projected employment for up to 2,000 workers by 2022 and an intent to eventually build 130,000 cars per year.[38] Nikola Motor Company is also locating a hybrid-electric truck factory in Coolidge and expects to start building trucks in 2021 and be able to build 35-50,000 trucks per year by 2023.[39] By partnering with both consumers and manufacturers the state could be a major catalyst for both personal and commercial EV adoption and speed the path to profitability for Original Equipment Manufacturers.[40] Better coordination of charging station deployment can also help ensure a smooth transition. Even modest efforts to shift public opinion and make adoption more attractive can have a significant positive emissions impact.

Policy incentives (including federal tax credits) and state and local incentives play a significant role in stimulating EV adoption and Arizona is already demonstrating leadership in this area:

- In Dec. 2018, the Arizona Corporation Commission launched an EV Policy to incentivize regulated utilities to invest in infrastructure and program-development.[41]
- Salt River Project provides incentives for "super off-peak" charging rebates.[42]
- Tucson Electric Power offers residential time-of-use discounts.[43]
- Arizona Public Service offers off- and super-off-peak use rates decrease charging costs to the equivalent of 30-90 cents/gal.[44]

Other statewide incentives for electric vehicles include:[45]

- Household tax credit
- License and registration discounts
- Parking incentives
- Insurance discounts
- Clean city programs
- HOV lane access policy

Creating clearer goals and more coordination of messaging around the benefit to the state's air quality and economy of reduced emissions and **developing tools to reduce barriers to EV adoption** could get more leverage out of existing programs as could **improve coordination of charging station deployment**.

Reducing Auto Emissions and Improving Fuel Efficiency

Key Insights: In addition to ride displacement and increasing use of clean fuel vehicles, there is also a significant clean air benefit to replacing older vehicles with newer ones that are less polluting. According to the EPA, compared to 1970 vehicle models, new cars, SUVs and pickup trucks are roughly 99 percent cleaner for common pollutants (hydrocarbons, carbon monoxide, nitrogen oxides and particle emissions).[46] New heavy-duty trucks and buses are roughly 99 percent cleaner than 1970 models. In addition, every $1 spent to reduce emissions results in $9 of benefit to public health and the environment.[47]

A 2019 vehicle that gets 40mpg produces 3.25 tons of CO_2 for an average of 15,000 miles travelled per year compared to a car that gets 30 mpg (which produces 4.35 tons of CO_2 over the same distance). Following recent efficiency trends, by 2050, new gasoline cars could get as much as 60 mpg and reduce their emissions to 2.15 tons of CO_2 over the same distance.[48]

In addition, there is also a strong expectation of movements to adopt further increases in low sulfur gasoline fuels. This could lead to a 90 percent reduction in sulfur emissions from gasoline vehicles.[49]

Reducing these older, less efficient vehicles and replacing them with more efficient models at the same time that single-rider trips are reduced and more EVs are adopted can have a significant positive effect on emissions.

Enduring Challenges: There are two significant barriers related to achieving meaningful improvements here.

The first is practical—simply "buying back" older cars makes no difference to air quality if they aren't permanently removed from the road. The disposal of old vehicles, and production of new ones, have their own negative impacts on air and energy.[50] That said, as we saw above, newer cars get considerably better fuel efficiency than older models meaning that moving to a newer vehicle is still considerably better over the life of the vehicle than keeping the older one on the road.[51]

The second challenge is one of public perception. Any efforts that appear to limit personal choice or mandate behavior tend not to be well received in areas that place a premium on individualism and personal liberty. This perception affects both people's choice of personal vehicle and their preference for the "freedom" that comes with driving themselves vs using other transit options. Making less-polluting forms of transit attractive to consumers is key.

The polarization around this issue has caused some of these views to become even more entrenched with things like "rolling coal" (causing one's car or truck to emit a burst of emissions) or ICE-ing (blocking electric charging stations with pickup trucks or other large internal combustion engine vehicles) gaining in popularity as a perceived rebuke to efforts seen as too extremely "liberal[52]." This is bad for public health, bad for the environment and fosters divisiveness and contention on issues that require us to come together.

Areas of Opportunity: The DEQ already provides **incentives** for owners of older vehicles that fail emissions standards to make repairs.[53] Arizona is also at the leading edge of states that have passed legislation imposing civil penalties on motorists who block access to electric charging stations[54]. These efforts can be more broadly **promoted and expanded**. **Buy-back programs for high-emitting vehicles** (older than 2004) should also be evaluated along with **implementation of fleet modernization and sharing efforts**.

One key area of opportunity for Arizona is exploring innovative offset solutions that help to solve some of these challenges while also making Arizona attractive to industry. More and more companies are experimenting with solutions that invest in clean technologies at various points in their supply chain and/or that make a positive difference to local communities to offset their own carbon emissions.[55] Providing offset credits to large companies who fund buy-back programs and dispose of older vehicles could immediately reduce emissions, increase the market for newer alternative fuel vehicles, and make Arizona even more attractive to economic development. Likewise, fleet modernization and sharing programs can both have an immediate positive impact on emissions and accelerate market transitions.

Setting standards and attainable goals is also a powerful way to spark innovation and fuel economic development. When the EPA first set emissions standards, the pressure it put on industry to generate solutions created some of the most important environmental innovations (think catalytic converter) and spurred inventions that have made cars and trucks cleaner, safer and more reliable.[56] The economic investment in developing things like computerized engine controls, on-board diagnostics and fuel injection have created tens of thousands of jobs and billions of dollars of sales.[57] Goals have already been established that are good for air quality in Arizona. Creating the incentives that also spark innovation and investment in the technologies of tomorrow will be important to meeting these goals.

Increasing Tree Canopy Cover to Improve City Livability

Key Insights: Heat is especially dangerous in cities, which tend to be much warmer than surrounding less-developed areas.[58] Cities also tend to have higher levels of air pollution, which contribute to 7 million deaths every year.[59] Phoenix is the 6th hottest city in the world.[60] Urban heat is impacting people's health, safety, comfort and economic development, and this is projected to worsen over time.[61] The number of days above 110˚F are expected to more than double by 2060.[62] Phoenix was also ranked the 7th most polluted city in the country in 2019, receiving an 'F' grade from the American Lung Association in its 20th annual State of the Air report.[63] With 60 percent of Arizona's population concentrated around Phoenix, heat and pollution constitute a major public health concern.[64] Over 1,000 people died due to heat in Maricopa County over the past decade and the numbers are increasing each year.[65] And, exposure to high ozone levels can aggravate asthma, cause a range of lung diseases, and make it harder for the body to fight off infections, decreasing overall health and quality of life.[66]

Ozone levels are also at their highest during the summer months.[67] Pollution in urban areas, (including CO_2 and Nitrous Oxides from cars and factories) trap heat, and at the same time, urban heat exacerbates pollution and global warming by increasing the demand for air conditioning and other sources of cooling, which results in additional power plant emissions of heat-trapping greenhouse gases. All of this represents a positive feedback cycle which leads to continual increases in urban temperatures and worsening of overall air quality.[68] In addition to these heat impacts, ozone pollution is also bad for public health, especially in the heat of summer when high ozone levels can cause a wide range of breathing difficulties, especially in vulnerable populations and among those who work or play out-of-doors.[69]

Using lighter natural materials or even painting them white under the right conditions can significantly reduce urban heat and disrupt this cycle.[70] The sunshade created by trees has also been found to reduce temperatures by 1-5C.[71] Increasing tree and shade canopy cover by planting the right tree in the right place can reduce temperatures and improve air quality substantially.[72] Conversely, planting the wrong trees can worsen overall air quality.[73]

Enduring Challenges: Rising temperatures and poor air quality in Greater Phoenix affect everyone. However, underserved neighborhoods have the lowest percentage of tree canopy and are impacted the most.[74] On some days, there are neighborhoods that are as much as 13°F hotter than others due to

the lack of tree and shade canopy cover.[75] Residents in underserved neighborhoods are less likely and/or able to advocate for heat-reducing, nature-based solutions, and may not be aware of the role that nature can play in mitigating urban heat.

While rising heat is and poor air quality are impacting our economy, their effects have not been well quantified, and the cost of non-action has not been considered in decision-making. Trees are a cost-effective solution in mitigating heat, improving air quality, storing carbon, reducing storm water runoff, and promoting physical activity.[76] While Phoenix has a goal to increase tree cover to 25 percent[77], current budget levels barely allow the city to keep up with replacement of trees that die.[78]

Excessive heat also increases water and energy consumption which increase carbon emissions. An estimated 5-10 percent of Phoenix's energy demand is used to compensate for the city's urban heat problem.[79]

Areas of Opportunity: Cool islands have been found to have the greatest cooling benefits when strategically **targeted in urban city cores**.[80] Using lighter natural materials on roofs and planting the right trees in the right locations can also reduce the negative effects of heat on air pollution. Planting the wrong trees can worsen the situation. The iconic palm tree, for example, provides little shade, consumes a lot of water, and emits more pollution than it absorbs. Strategically adding more green space to Arizona's inner-city urban communities would have widespread health and economic benefits. While investment will be needed to increase tree cover in underserved communities, many communities can afford to take action to cool and improve air quality at their homes and in their neighborhoods with the right information and incentives. Currently, July average daytime temperature in Phoenix peak at around 104 ° F (40 ° C). Concerted efforts to address urban heat could make the city more livable and improve air quality.

Networks of **walkable cool corridors** within and between neighborhoods and public transport hubs can also incentivize biking, walking and increased public transport adoption.[81] By proactively investing in green spaces, particularly in inner city areas, Arizona can be a pioneer in improving city livability. By also **including bike and pedestrian-friendly pathways and ensuring that bus stops have shade,** these green spaces can also have a beneficial effect on mobility issues.[82]

Urban heat and air quality have become a priority for a handful of stakeholders from across sectors in the Valley including City of Phoenix, Maricopa County, The Nature Conservancy, Arizona State University and others. Similar programs exist in Tucson and Pima County. However, in order to reduce heat and improve air quality at a scale large enough to make a difference, it will be important for stakeholders to create a shared vision for heat mitigation and its benefits to air quality and disseminate existing information and tools to decision-makers in order to achieve broader social change and collective impact.

Clean Energy: A Roadmap to Net Zero Carbon Emissions

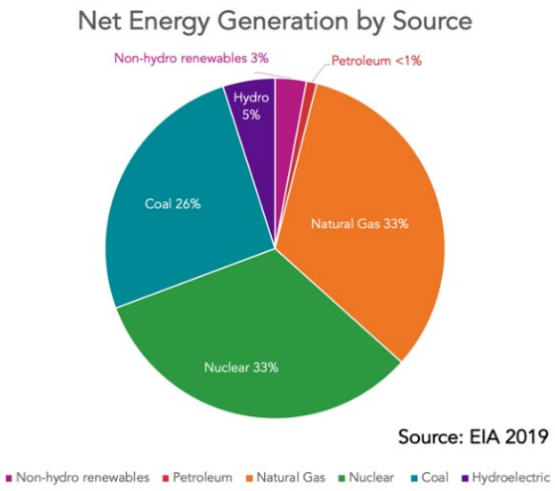
Over the last several years many efforts to define a path to a clean economy have placed the burden squarely on the shoulders of regulated utilities and rate payers via defined targets and timeframes. Progress has been made. However, public debates over how and how fast to reduce emissions have been costly and polarizing and have not yielded an agreed upon path to cleaner energy.

By taking the integrated approach to this work outlined above, Arizona can establish where it has the greatest opportunity to lead in this regard so that smart targets can be collectively set. Creating a pragmatic pathway to determining how we get there and in what timing, is better done through an integrated and collaborative process that can endure, and with broad support it can improve results.

Reliable and Affordable Clean Electricity Production

Key Insights: While several of the proposals put forward in recent years have sought primarily to address the clean energy mix in regulated utilities' portfolios, any such approach must be done in a way that ensures both reliability and affordability for ratepayers. And, factors such as energy storage and demand management are important elements of this equation.

Arizona has abundant renewable energy resources, primarily solar.[83] It is also a major nuclear power producer and net energy exporter.[84] Achieving carbon-neutrality in the energy sector will require replacing fossil fuel sources with cleaner alternatives and/or investing in other natural and technical solutions to offset these emissions. Most agree that achieving 80 percent clean energy by 2050 is achievable with existing technologies, while the last 20 percent will require innovation or advancements[85]. Salt River Project's 2035 Sustainability Plan committed to a reduction in CO_2 emissions per megawatt hour by 62 percent from 2005 levels by 2035 and by 90 percent by FY 2050.[86]



The energy market is already driving this transition.[87] Coal plants in Arizona and across the nation are closing, and the pace at which others close will accelerate due to the low cost of natural gas and as clean energy sources continue to become even more cost competitive.[88] This presents an opportunity to consider transition issues for communities and the state.

Today, cost-competitive renewable energy sources like wind and solar are intermittent and less able to be accessed "on-demand" when energy consumption is highest. This means that storage and load

management solutions will become even more critical as more renewable energy comes into electrical energy portfolios.[89,90]

Over the last decade, a significant amount of clean energy resources, specifically solar electricity generation, have been deployed in Arizona. These resources have largely been comprised of large-scale, utility-owned and contracted facilities, as well as smaller, distributed generation facilities that provide energy directly to customers (e.g. rooftop solar). While the challenge of managing peak demand exists everywhere, Arizona has unique characteristics due to hotter temperatures.[91]

To address this challenge, short term storage technologies and advanced inverters are being developed that can make energy sources that once depended on the time of day when they were produced (e.g. solar and wind) able to be stored for later use and dispatched when needed.[92]

In 2019, Arizona Public Service announced it will add 850 megawatts of battery storage and at least 100 megawatts of solar generation by 2025, making its solar power officially "dispatchable."[93] The plan includes outfitting existing utility-owned solar projects with 200 megawatts of batteries, deploying 500 megawatts of new battery resources, and contracting for 150 megawatts of third-party owned storage.

Major advancements in storage technologies have been achieved over the past five years, and while it is expected that these technologies will become increasingly sophisticated and affordable in the next few years, they are not yet at a point of fully solving the load management problem. The ground-breaking Tucson Electric Power hybrid PPA, for example, is expected to provide low-cost energy (some estimates are below 3¢/Kwh) with 100 megawatts of solar and 30 megawatts of 4-hour storage.[94] That current industry-standard of four-hour storage is not yet long enough to fully provide overnight or emergency supply or to fully address other load management issues, however.

For this reason, addressing demand management programs is also an important element of addressing the energy mix, and opens the door to innovation in energy efficient technologies. In the most recent Grid Modernization Index, Arizona moved up three spots to sixth overall for state support, customer engagement, and grid operations.

As utilities advance policy to address demand-side management programs and create new incentives, customers can sometimes struggle to understand their options.[95] Having better coordinated solutions can allow customers to make more informed choices while reducing uncertainty for industry.

Enduring Challenges: In Arizona, load management challenges are even greater than they are in other states due to the hot climate which is experienced for most of the year.[96] More than 9 in 10 homes have air conditioning, creating major peak demand challenges especially during the summer months.[97]

One of the perceived hurdles to significantly increasing the proportion of renewable energy in the mix has historically been that most renewable energy sources are easily able to be controlled by operators or amped up according to demand.[98] However, in 2019, this perception is no longer wholly accurate due to advancements in storage, communication and control technologies.[99]

Economic incentives are also often misaligned to demand-management goals and access to the technologies is not evenly distributed making them a poor system-level fix.[100]

In addition, today's regulatory and rate structure environment means that regulated utilities must bear the full cost of research and development and only successful innovations stand to be included in rate-base setting. Meanwhile, the threat of deregulation creates uncertainty.[101]

Another challenge is that increases in large-scale renewable energy production will affect land use in ways that may also impact critical ecosystems, habitats and landscapes creating the potential for conflict between renewable energy development and conservation goals.

Areas of Opportunity: Advancements in smart inverters, batteries, communication and control technologies are making traditionally renewable energy systems that have historically only been available at certain times of day or under specific weather conditions (such as wind and solar), increasingly able to be captured for later use. Encouraging storage innovation will help support the transition to cleaner energy sources.[102] Today, batteries primarily address short-term needs. Longer-term **storage solutions** like pumped hydropower, hydrogen storage and Grid-Integrated Water Heating (GIWH) and, EV-Grid Integration **are ripe for innovation** and already being explored and developed by Arizona companies and utilities.[103,104]

Creating a mechanism to **encourage early-stage innovation by utilities** and rapid learning would likely benefit ratepayers in the long term and engage utilities as partners in generating pragmatic, workable solutions. As goals change, the way regulated utilities recover costs needs to change to support this transition. **Allowing cost recovery for innovation and a transition to cleaner fuels** will help.

As new renewable energy installations are developed, a Nature Conservancy report has demonstrated that site selection methods can help choose locations that are well-suited to energy production, already developed in some way and close to transmission lines. This saves costs both in development itself and in avoiding potential environmental impact delays.[105]

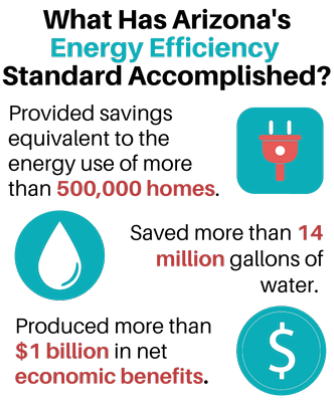
Energy Efficiency and Built Environments

Key Insights: An estimated 60-80 percent of energy is lost due to inefficiency.[106] With almost 60 percent of Arizona's electricity coming from coal-fired and natural gas-fired power plants, this energy loss contributes to excessive air pollution. The key benefits of energy-efficiency programs include energy cost savings (for customers and utilities), jobs and economic growth, improved economic stability, reduced water consumption and improved air quality. As an example, if Arizona used electricity 10 percent more efficiently, it would cut pollution from the electric sector by almost 4.5 million metric tons, the equivalent of taking one million cars off the road for a year.[107]

While many of the efforts to address clean energy and air in Arizona have focused specifically on utilities and electricity production and on personal vehicle use, taking a more holistic economy-wide

approach allows us to address areas where the challenge is equally large and the opportunity for impact even greater.

The goal of energy efficiency is to reduce the amount of this energy loss; saved or recovered energy is generally considered the least expensive energy resource.[108]



Simply put, it costs less to use the energy you have already purchased more wisely than to buy more, even at lower costs. In 2010, the Arizona Corporation Commission adopted an Energy Efficiency Standard that required certain electric and gas utilities in the state to meet prescribed energy efficiency requirements by 2020.[109] According to Arizona Public Interest Research Group, these efforts have generated savings equivalent to the energy use of more than half-a-million homes in addition to saving water and producing significant economic benefit.[110]

Energy efficiency programs in Arizona can have a significant positive economic impact by generating jobs for Arizona workers and fostering economic development for Arizona's communities, including those in construction and manufacturing.

Enduring Challenges: While lots of consumer data exists to demonstrate the long-term value of more energy efficient products—especially larger appliances—shifting purchasing behavior remains a real challenge.[111] Most research points to relatively straightforward obstacles: people don't do enough research, they don't pay attention to energy ratings when exploring options, and/or they do what is familiar or habitual even over things that might save them money in the long run, especially if up-front costs are higher.[112]

Meanwhile, building codes and standards that require more efficient products and practices are cited by some builders as making it harder to compete on price with the existing built environment, meaning that some of the energy consumption of existing buildings is "locked-in;" potentially for decades.[113]

Because point-of-sale costs and lifetime-use costs are generally not well connected to one another, and the actual cost-of-use depends on many factors including an individual's rates and participation in a variety of demand-side management programs, determining the true cost of these durable goods can be challenging for even the most committed and curious consumers.[114] As alluded to above, variability across utilities, and over time, in demand-side incentives can make understanding one's options a challenge that further complicates consumer choice.

Areas of Opportunity: Research shows that the main driver of energy efficient behavior adoption is cost savings, which can be influenced both by policy, through business and consumer incentives, and by promoting shared solutions. Making lifetime savings more visible up front, and/or providing incentives to buy more energy efficient products has been shown to make a difference in buying decisions.[115]

As more appliances become "smart" there is also an opportunity to partner with utilities to promote the adoption of technologies that also positively impact storage and load management.

Various energy efficiency policies, incentives and programs are currently available to Arizonans and need to be maintained and/or expanded including:

Federal: The American Recovery and Reinvestment Act (ARRA),[116] Weatherization Assistance Program,[117] lighting and appliance standards and rebates[118] and "Challenge Home.[119]

State: ACC Energy Efficiency Standards,[120] Natural Gas Demand-Side Management,[121] Arizona Department of Housing Weatherization Program[122] and Building Energy Codes.[123]

Local: Green Building programs (e.g. Scottsdale,[124] Pima County[125] and Energize Phoenix[126]).

Utility: Residential energy saving rebates and programs for residential and commercial customers.[127,128]

Some of these challenges can also be addressed via incentives for retrofitting both residential and commercial properties with more efficient technologies and is an area ripe for innovation. As above, unique partnership opportunities could exist between developers who face cost pressures associated with green building and the manufacturers of clean technologies in need of critical mass in the marketplace to scale their solutions.

More and more leading developers are recognizing the negative impacts of heat and high energy demands on their tenants and are investing in innovative heat resilience technologies that also have energy efficiency benefits due to reduced indoor climate control demands. In Phoenix, the redevelopment of Edison Eastlake is attracting national attention for using innovative building strategies such as considering the orientation and construction materials for buildings and for integrating open space, tree canopy, and shade into community planning.[129]

Building on existing incentive programs and promoting innovative partnerships between utilities, manufacturers and merchants could have significant positive impact. These can be further enhanced by **support for increased manufacturer and construction industry efficiency programs**.

Clean-fuel Use in Industry and Commercial Transportation

Key Insights: Both the industrial and transportation sectors use fuel from many sources and represent areas of opportunity for innovative partnership and creative problem solving.

In 2018, the industrial sector consumed 32 percent of all energy economy-wide, and by 2025 that proportion is expected to exceed 36 percent. The transportation sector is a close second, consuming 29 percent of energy nationwide.[130]

The industrial sector has shown steady progress in improving energy efficiency over the past few decades, and energy efficiency improvements are expected to continue.[131] The transportation sector, too, has invested in replacing traditional petroleum-based fuels with cleaner energy sources.[132] Where each of these sectors may have unique solutions to develop, there is also opportunity to address them in tandem in a more integrated way as many industrial consumers also operate transportation fleets and/or are heavy consumers of transportation in moving goods to market.

Enduring Challenges: In industrial settings, barriers to energy efficiency are both internal and external.[133] For the businesses themselves, companies can face fierce internal competition for capital requiring energy efficiency programs to return their full investment in very short timescales that often provide a disincentive to up-front investment. Corporate tax structures that favor depreciation over time and split incentives divide both up-front costs and incentive benefits across business units in ways that complicate and slow down decision-making.

Some solutions are also more industry or site specific.[134] For example, manufacturers might have large sites in wide-open spaces that allow them to produce electricity with solar electric systems located on their properties. Others may be able to use water both for industrial cooling and for power generation. While these differences present obstacles to a one-size-fits all solution, they present real opportunity if what we are looking for are pragmatic solutions to achievable goals.

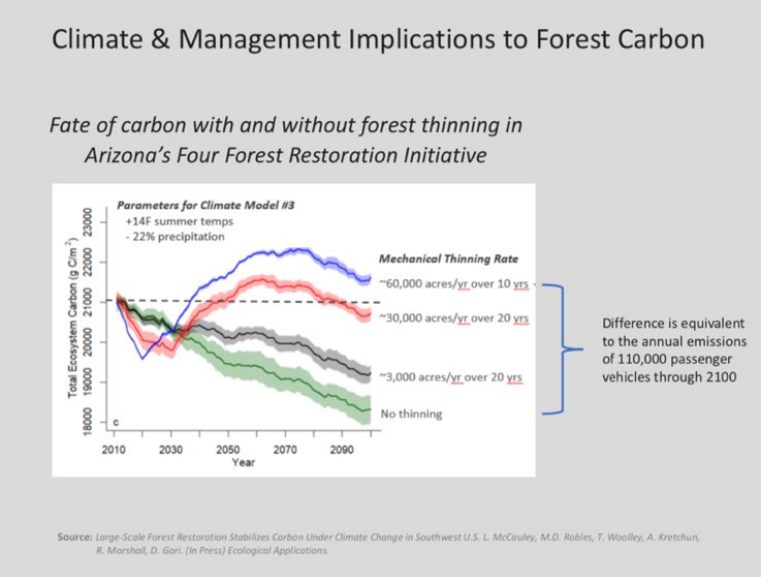
Areas of Opportunity: Promoting innovation and **fostering cross-sector partnerships** between areas like industry and transportation, coupled with investments in **developing cleaner fuels** could provide beneficial cost savings to companies and consumers alike while fueling meaningful innovation in areas that can make a big impact on clean energy and air.

Forest Health/Biomass

Key Insights: Arizona's Ponderosa forests are overgrown. Decades of fires suppression have created forests that are up to 44 times denser than a healthy forest and full of low-value, small-diameter wood. These forests are at great risk of catastrophic fire, which threaten life and property and can release massive stores of carbon and contribute to poor air quality. Proactively thinning forests to return them to a healthy, natural condition reduces the risk of wildfire and research from The Nature Conservancy[135] showed it would increase water yield by up to 20 percent.

TNC's research also showed forest restoration has direct impacts on carbon.[136] If 60,000 acres were thinned per year in the Four Forests of Northern and Eastern Arizona, it would lead to carbon benefits equivalent to removing 110,000 passenger vehicles annually through 2100.

Enduring Challenges: Two big challenges in forest restoration are the poor economics and the need to modernize United States Forest Service (USFS) business practices. The government cannot afford to restore Arizona's forests without industry. The cost would exceed a billion dollars. It is necessary to develop a diverse wood products economy in Northern Arizona, yet the small-diameter wood that makes up much of Northern Arizona's forests is of limited economic value, and there is minimal data available to support industry investment and decision-making.



Evidence of the problem is that the USFS released seven timber sales over the past year and did not receive a single bid to thin the timber. Under the current plan there are requirements to remove much or all the smallest trees, limbs etc. because of concern over fire risk. This creates further economic challenges. The only use for those products has been burning as biomass to produce electric energy. However, the cost to produce this electricity is more than double the least-cost option for energy. An incentive will be needed to process the biomass to achieve the full restoration goal.

USFS business practices are based on a different era – when the focus was harvesting large, high-value trees and leaving the small material behind to be burned. To reduce the cost gap between what is economical for business to harvest, there is a need to modernize USFS business practices.

One TNC model showed that three simple changes to USFS practices would result in timber unit that is now valued at a negative $18/ton to harvest could result in a potential profit of $4.90/ton. As with many large organizations, change has been slow despite the data.

Areas of Opportunity: A Request for Proposals has been published to attract wood-products company investment. The results of this process may not be known until mid-2020. In addition, there is an acute need to conduct a comprehensive assessment of tree size and distribution and economic analysis to inform USFS and the wood-products industry. Among other things, such an assessment would help quantify how much of an economic gap exists so actions could be taken to close that gap. If USFS accelerates modernization of their process it would provide more certainty and reduce costs further.

Returning forests to a fire-adapted state by enabling wood-products companies to thin forest acreage is an important investment in long-term clean air and energy solutions. We know the math on this, enabling wood products companies to **thin forests by 50,000 acres per year over 20 years** will have a significant positive effect on forest health, reduced the risk of catastrophic fire, and provide needed protection for Arizona's water supply.

Summary of Opportunities

Our work has identified eight specific levers that can position Arizona as a leader, fostering the innovation that will improve our air quality, fuel the transition to clean energy and attract high-wage jobs to the state.

Taken alone, each of these is daunting and won't add up to adequate progress. Taken together, however, no one industry or segment bears the burden alone and creative solutions become possible that are not available in isolation.

	Lever	Area of Opportunity
Clean Air	Mobility	Increase coordination of mobility efforts; develop land use tools to grow transit-oriented development; influence consumer behavior
	Electric Vehicles	Develop tools to reduce barriers to electric vehicle adoption; coordinate charging station deployment
	Reduce Auto Emissions	Continue and expand incentives for fuel-efficient vehicles, evaluate buy-back programs for vehicles older than 2004, implement fleet modernization and sharing programs
	Increase Tree Cover/Natural Solutions	Create "cool islands" in urban cores; include pathways to transit and shaded transit shelters
Clean Energy	Clean Portfolio	Incentivize storage innovation; proactively support utility research and development; allow cost recovery for innovation and transition.
	Energy Efficiency/Built Environment	Promote utility programs; support opportunities for increased manufacturer and construction industry efficiency programs
	Industry & Commercial Transportation	Support the development of clean and/or carbon-neutral fuels
	Forest Health/Biomass	Thin forests by 50,000 acres per year over 20 years; produce clean biomass energy; increase forest carbon storage

The Power of an Integrated Approach

Integrated approaches to problem solving are more powerful and effective than isolated ones, especially on complex issues that require "system leadership."[137] The Institute for the Future[138] has spent more than 50 years helping organizations and communities look back from the future to make smarter decisions in a present that is increasingly volatile, uncertain, complex and ambiguous. Many systems facing large-scale complex change are confronting the need for greater integration in solving seemingly intractable problems.

A more isolated approach is less effective because when we look at something apart from the broader system it sits in, we both magnify and mask the effects of individual parties. It can look like a problem "belongs to" a given organization, geography or industry, but in most cases complex problems can't be solved by any one entity. Any attempt to do so inevitably tends to take on symptoms of the problem, not the problem itself. Only when we "zoom out" and take a broader view can we find truly innovative solutions that will yield lasting results. Getting broad buy-in also tends to be easier when we look at the big picture.

As our task force has worked to engage stakeholders and understand the underlying issues of creating a framework for an integrated plan for clean air, clean energy and a clean economy in Arizona, we see opportunity for synergy that can both help us come up with more powerful solutions, and give us real incentive to come together around issues that, taken in isolation, have been polarizing.

A few examples include:

- Increasing electric vehicle use and deployment of charging stations by utilities or companies looking to mitigate ozone emissions
- Communities and employers planting trees along transportation corridors to increase public transit use[139]
- Advanced manufacturing and construction industries partnering with one another to bring goods to market in cost-competitive, job-creating and eco-friendly ways[140]
- Encouraging partnerships between industries who stand to benefit from energy efficiency efforts and cleaner forms of transportation moving their goods to market[141]
- Leverage abundant solar power as it becomes more inexpensive to create synthetic fuels[142]

While these are just a few potential examples of the benefits that can come from an integrated approach, the greater benefit comes from the coordination between these systems and the new ideas and opportunities they can launch as each new solution starts feeding and reinforcing the others. For example, innovations in commercial transportation can improve the fuel efficiency of construction fleets, advanced manufacturing solutions can create good jobs and also make cities more enjoyable to live in, and turning solar power into "liquid sunshine" can both help offset load management challenges in the electric power sector and fuel other opportunities for economic growth as an energy producer and exporter.

Coming up with these kinds of solutions, positions us to solve our own challenges together and have shared pride in the outcomes.

What it Will Take

We propose shifting from an advocacy-based approach to an informed, pragmatic, solution-based one. This approach can encourage more rapid learning and innovation co-creating solutions that are good for Arizona. By evaluating the viability and impact of various strategies across sectors we can invest in the best strategies moving forward.

Arizona has unique conditions and resources that enable a uniquely Arizona solution. We have committed government agencies; strong, engaged not-for-profit entities and organizations; a dynamic business community; and an innovative system of research universities. The way our regulatory authorities are structured, and the composition of our energy providers and their energy mix is unlike most states. When combined with processes that have been in motion for some time, these conditions all argue for a uniquely Arizona approach to the future of clean air, clean energy and economic development.

Setting Goals

The goals for clean air are defined by the Federal Clean Air Standards and Arizona is working to come into attainment for the new more stringent requirements for ozone. **We propose Arizona commits to the development of a framework that achieves a goal of carbon net neutral by 2050 economy wide.** Focusing only on the electric utility sector will only address an already declining portion of the emissions and likely lead to less innovative solutions for the economy.

While a 2050 goal is our north star, it is distant and not achievable with current technology or behaviors. By bringing together a collaborative group of stakeholders to develop interim goals that reflect what each sector is able and willing to contribute to emission reduction, we can begin to focus on what will need to be done. Those include electrical energy generation, residential and commercial development, transportation and other industry. Along with public and nonprofit sector stakeholders as well as rural and tribal perspectives, we can chart a course of action that will engage their constituencies even more fully.

Approaching this path forward allows for learning, developing understanding and commitment. It also recognizes that to be successful the broader public will need to be committed and make educated choices. Many of the decisions needed to reach attainment will never be mandated such as what kind or car, appliance or home to buy. Education about the benefits and incentives are ways to shift public opinion and behavior can best be influenced in a coordinated way. In other areas, regulation will be needed to level the playing field such as in setting emission standards for new cars.

Implementation

Over the past six months, **we have changed the conversation** to a more collaborative and solution-oriented approach.

People agreed there was a convergence of interests that made now the right time – bipartisan public support, positive market forces, to avoid the high cost of polarized advocacy, and an urgency to act.

We formed a nimble task force to guide and shape our work. After careful consideration we determined that clean air and clean energy were closely linked as it relates to ozone and carbon emissions and that to make a difference, we needed to look across all areas of the economy.

We engaged over 50 experts over six months to help develop the key elements that serve as a framework for a clean air and clean energy plan. We identified eight elements that have been summarized in this report, Arizona Thrives.

Now we are preparing to take the next step.

Change is coming. We can react to the impending changes or envision and prepare for the future.

As we move forward, we have met with more than 40 leaders across industries, levels of government, rural and urban to review these findings and get their advice. There is a high level of interest to move forward and explore how diverse segments of the economy can work together to address these strategies in collaboration and in a way that works for Arizona.

In the months ahead, we will convene leaders across four key economic segments, including electric energy generation, local transportation, residential and commercial development, and other industry. We will use the results of this report as a building block to identify and evaluate strategies within and across sectors and agree upon goals.

Our Guiding Principles

Throughout the last few months, the taskforce and stakeholders have developed a set of guiding principles to align around the goals and ensure progress:

Integrated
- Air and energy
- Economy wide/cross-sector
- Assess issues and options

Credible
- Objective and reliable information
- Independent
- Transparent

Durable
- Continues beyond any one administration
- Builds lasting partnerships
- Creates enduring structures and networks
- Financially sustainable

For implementation:
- Accelerates innovation
- Creates sustainable solutions
- Shared measurements

Conclusion

There isn't a singular path to success. What is important is that we start now to turn polarization into innovative, collaborative solutions that position Arizona as a pragmatic, effective leader in developing a clean economy.

This is a big undertaking that will need focused attention for several decades and broad public support and engagement to be successful. Progress requires collaboration among a broad spectrum of stakeholders committed to developing integrated approaches to clean air, clean energy and a clean economy.

There is a sense of urgency and at the same time a need to ensure solutions result in improved quality of life, reliable, affordable, and competitive electric power and a robust and thriving economy. The technology and markets are changing rapidly, and innovation and learning will need to accelerate. A public, private and social impact partnership is one way to engage the strengths of all of Arizona in crafting and implementing solutions. The work we do will generate near-term solutions and build the partnerships necessary for next-generation innovation. Failing to act will have significant economic, human health and environmental consequences for generations.

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