Driving Forces of Change in the Intermountain West

Western Lands and Communities,

a joint program of the Lincoln Institute of Land Policy and Sonoran Institute

PLANNING FOR AN UNCERTAIN FUTURE

How can we plan for a future we can't predict? Through ***exploratory scenario planning***, Western Lands and Communities helps communities in the Intermountain West create long-term plans that are effective across a range of possible scenarios. In other words, we help build plans that work even when we can't know for sure what the future will bring. For more information visit www.sonoraninstitute.org/xsp.

Participants in exploratory scenario planning workshop listen intently; Durango, Colorado.

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Western Lands and Communities

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EXPLORATORY SCENARIO PLANNING BACKGROUND

The Intermountain West is a region of incredible scenic beauty, vast open spaces, abundant wildlife, and countless recreational opportunities. Its communities are both urban and rural, and also include amenity communities that are situated within large-scale, intact open lands. The eight Intermountain West states – Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming—are home to 23 million people, over seven percent of the United States' total population. More than half the region's land is in public ownership and is owned by the Bureau of Land Management, Forest Service, National Park Service, Fish and Wildlife Service, tribes, and state trust lands.

Over the past 25 years, the Intermountain West has changed in ways that no one could have predicted, and rapid, unexpected change will continue to alter our landscape and way of life over the next quarter century. With this in mind, communities trying to create long-term plans in this region face a daunting challenge. Fortunately, there are planning methods available that can help them prepare for situations that are both highly uncertain and complex. Western Lands & Communities, a joint program of the Lincoln Institute of Land Policy and the Sonoran Institute, is bringing exploratory scenario planning to Intermountain West communities to allow them to effectively plan for and adapt to an unpredictable future.

Exploratory scenario planning begins with an understanding of the forces of change. This fact sheet highlights several of the key forces that will drive change in the Intermountain West over the next 25 years. These include population growth and shifting demographics, climate change, evolving local and regional economies, and changing energy resources and prices.

POPULATION AND DEMOGRAPHICS

There are four key trends of population and demographics changes that are significant to the Intermountain West: increasing population, growing urbanization, aging population, and a growing Hispanic population.

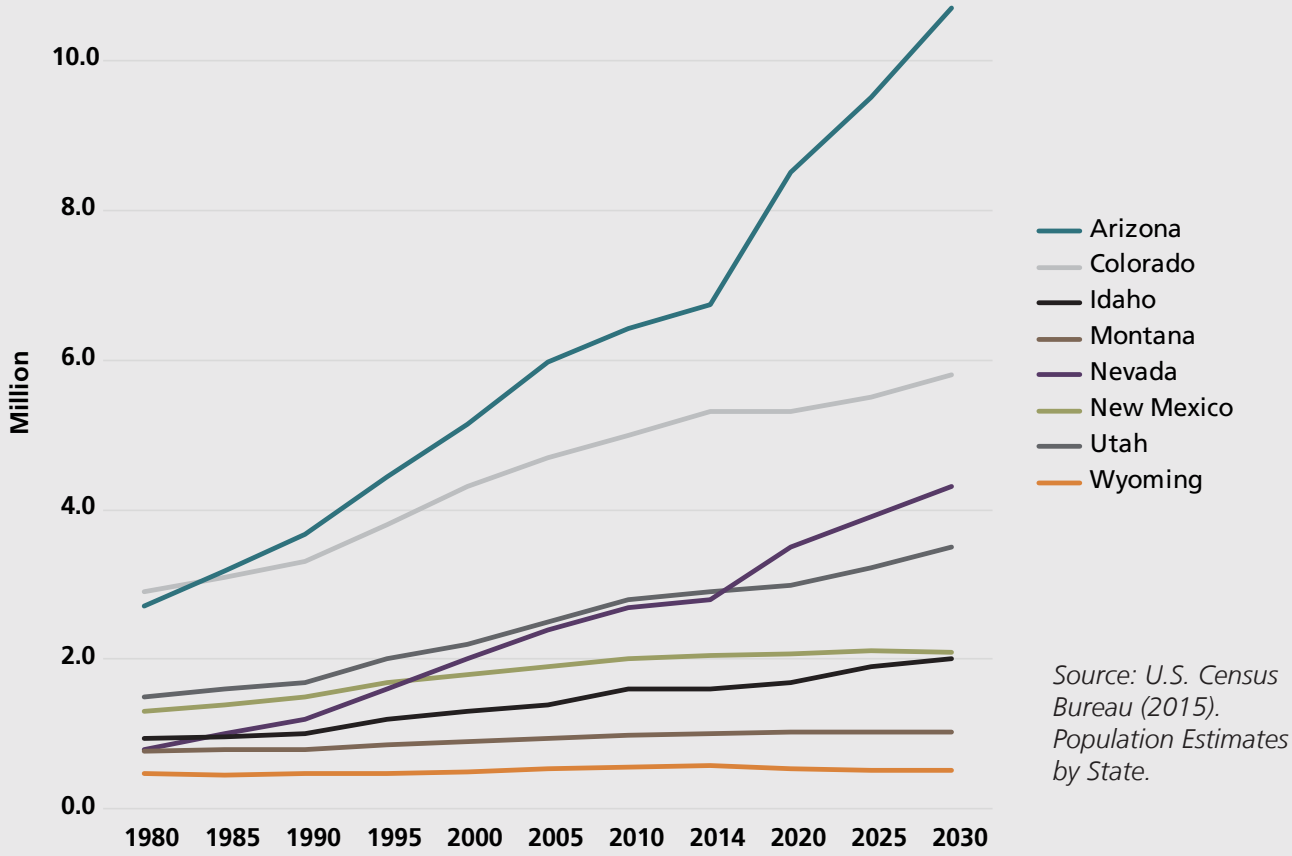
The Intermountain West has been one of the fastest-growing regions of the nation for several decades. Data show that population growth in the Intermountain West will continue, but at a slower rate than has occurred in previous years.

As more people move into the Intermountain West, there is a trend that the region will become increasingly urban. Figure 2 shows the Intermountain West's rise in urbanization over the past 60 years, particularly in Arizona, Nevada, and Utah. Conversely, Wyoming has seen a reduction in its urban population over the same time period.

Americans are getting older, and our aging population is another key component of current and future demographic changes. Projections suggest that by 2030, 20 percent of the Intermountain West will be over 65. According to the U.S. Census Bureau projections, by 2030 Wyoming, New Mexico, and Montana will rank in the top five U.S. states with the highest percentage of population age 65 and older. This aging trend is expected to steadily increase until about 2035, when the projections level out due to the decline of the Baby Boomer generation.

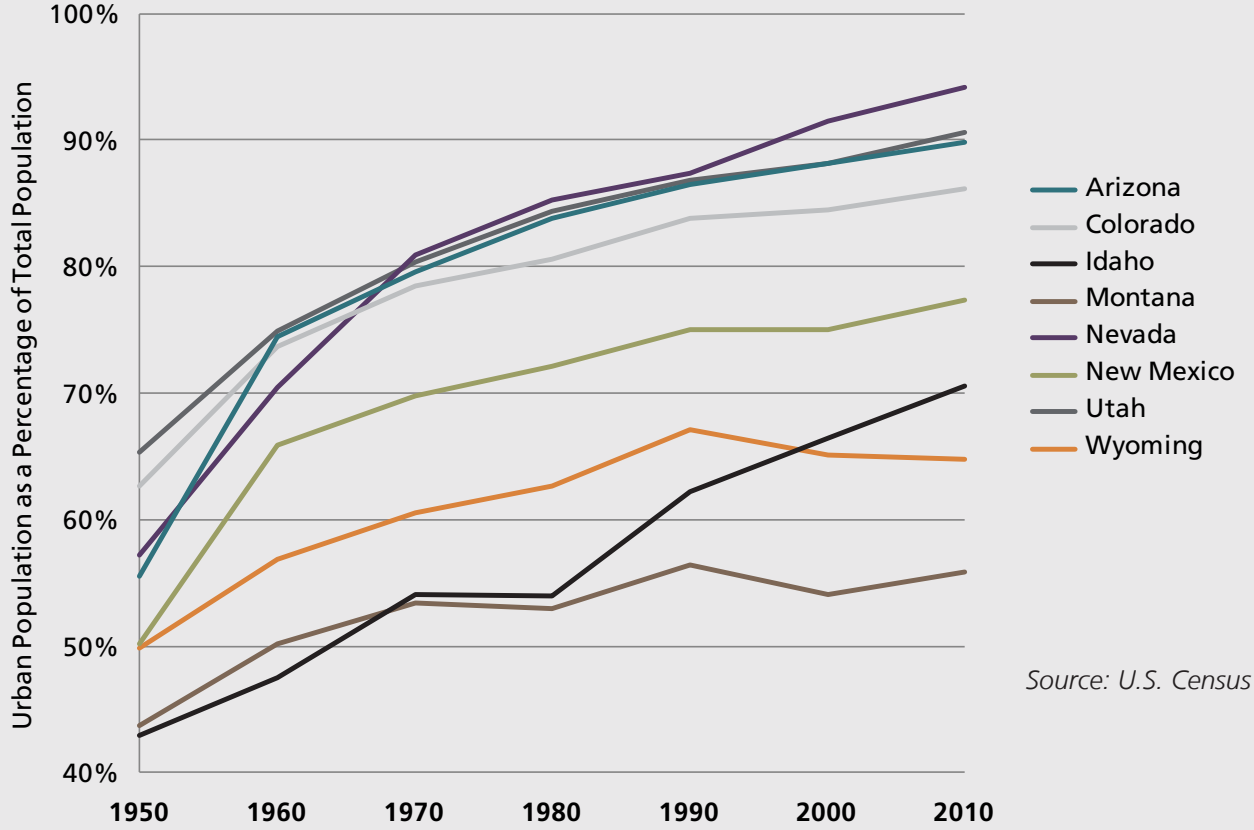
Another significant demographic shift occurring in the Intermountain West is an increasing Hispanic population, a trend that has accelerated in the last few decades. According to U.S. Census Bureau population estimates, as of July 1, 2013 there were roughly 54 million Hispanics living in the United States, representing approximately 17 percent of the U.S. total population and making people of Hispanic origin the nation's largest ethnic or race minority. Initially concentrated primarily in the border states, growth of the Hispanic population in recent years has extended further into the interior West.

Figure 1. Population Growth in the Intermountain West 1980-2030



Source: U.S. Census Bureau (2015). Population Estimates by State.

Figure 2. Increasing Urbanization in the Intermountain West



Source: U.S. Census Bureau.

As these four demographic changes play out over the coming decades, they will have a wide array of impacts. Major impacts include:

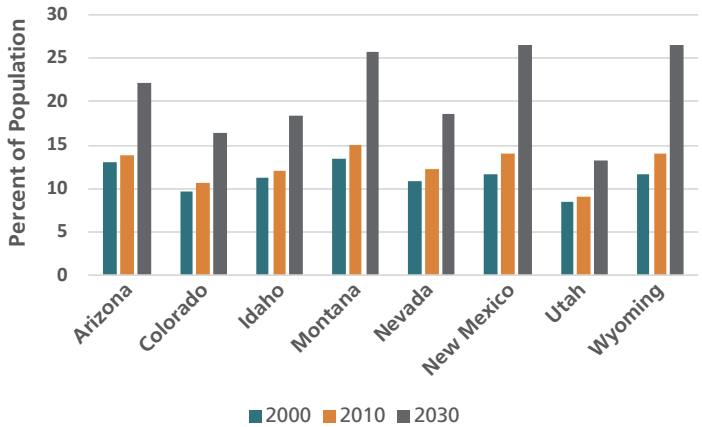
- Development will be focused in and near towns and metropolitan areas and will require additional infrastructure to move water and energy to growing urban areas.

- The aging population and growing Hispanic population will influence the housing market, with preferences for location and types of housing likely to be different than in the past. It will also require a shift in education and social services to serve the needs of these growing population sectors.

- Local and regional economies will evolve. Healthcare for an aging population will become an increasingly larger economic sector.

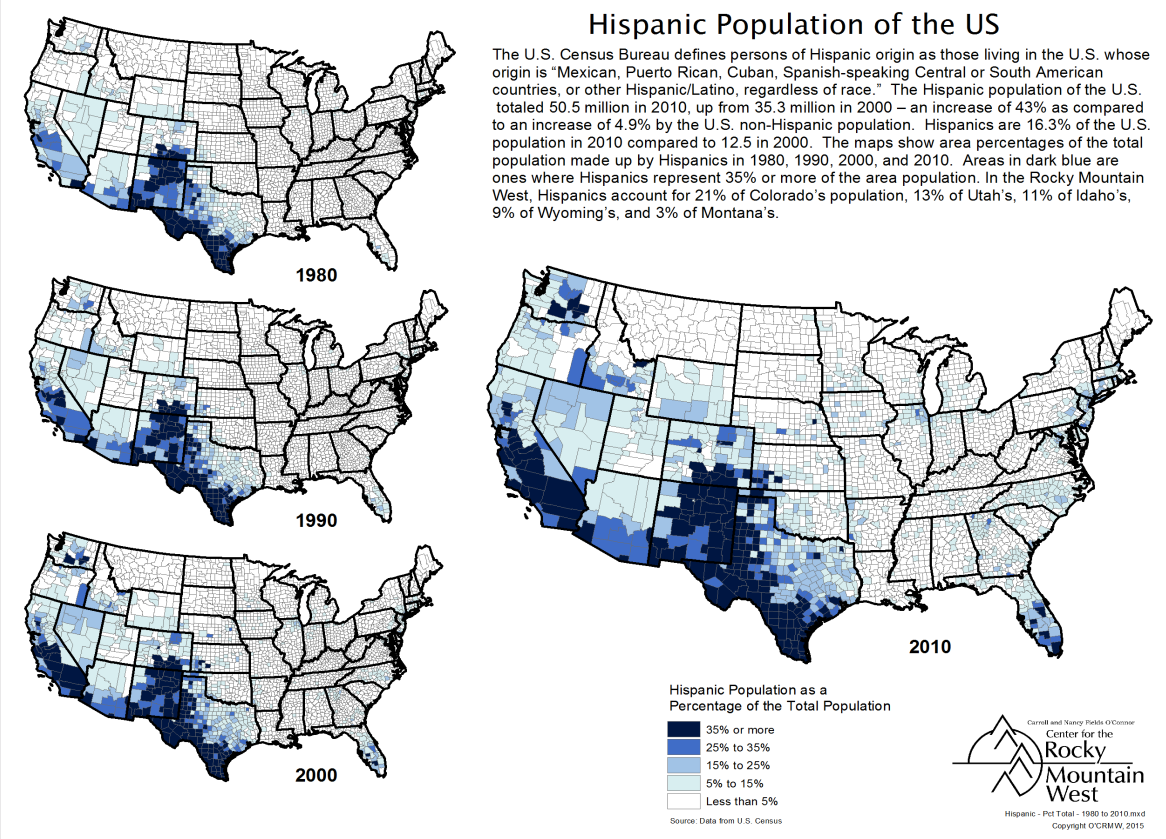
- The initially increasing, and then slowing, population growth will change requirements for water, energy, and transportation infrastructure.

Figure 3. Percent of Population Age 65 and Older in Intermountain West



Source: U.S. Census Bureau (2015). Population Estimates by State.

Figure 4. Hispanic Population of the U.S.

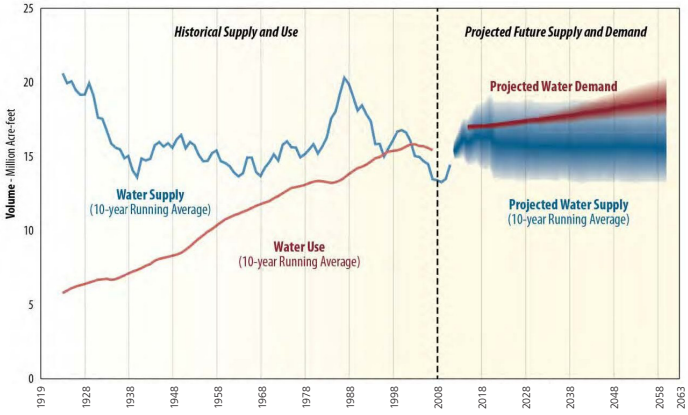


CLIMATE CHANGE

Future projections for the region suggest that temperatures will rise and precipitation will be less predictable. These two variables signal a future marked by water scarcity, prolonged drought, and the risk of larger and more frequent wildfires.

The most well-known example of western water scarcity is the plight of the Colorado River, whose basin extends into six of the Intermountain West states (WY, CO, UT, NV, AZ, and NM) as well as California and supplies water for 30 million people and thousands of acres of farmland. According to the Colorado River Basin Water Supply and Demand Study, water demand in the basin now outstrips supply and is expected to continue to do so well into the future. The study projects an average imbalance between supply and demand of 3.2 million acre-feet by the year 2060. Although approximately 75 percent of western water demand is for agriculture, the rising water demand in the Intermountain West is being driven primarily by increasing municipal and industrial users, which is due to population growth.

Figure 5. Colorado River Basin Supply and Demand Study Projections



Source: U.S. Department of the Interior, Bureau of Reclamation (2012).

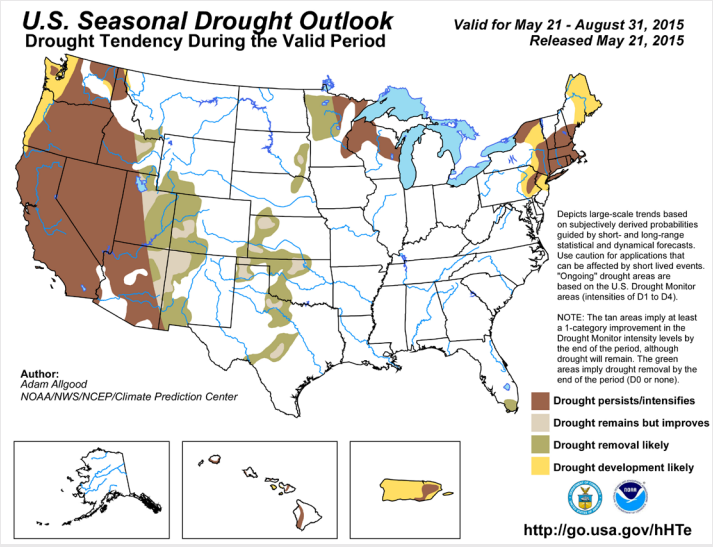
Ongoing water scarcity will affect all aspects of life in the Intermountain West in the future. Some of these impacts include:

- Changes in the size and location of agriculture operations, what crops are grown, and how they are watered.
- Where and how land can be developed.
- Changes in water allocation could create conflicts between upstream and downstream users and could pit water-using sectors against each other (i.e., agricultural, municipal, industrial, recreational, and environmental).
- Threats to energy production (both hydroelectric and traditional electric power plants) and mining operations, all of which rely on water for their operations.
- Reduced or degraded plant and animal habitat.

Along with water scarcity, drought conditions have been widespread for over 10 years, beginning in the early 2000s in most of the West. Tree ring data suggest that the West historically has experienced many periods of 25 or more continuous years of drought and is likely to continue to see periods of drought in the future. The U.S. Seasonal Drought Outlook predicts that much of the West will have a drought that persists or intensifies through the upcoming season. Among other impacts, prolonged drought can greatly impact the future of farming in the West, a staple of the Western economy and heritage.

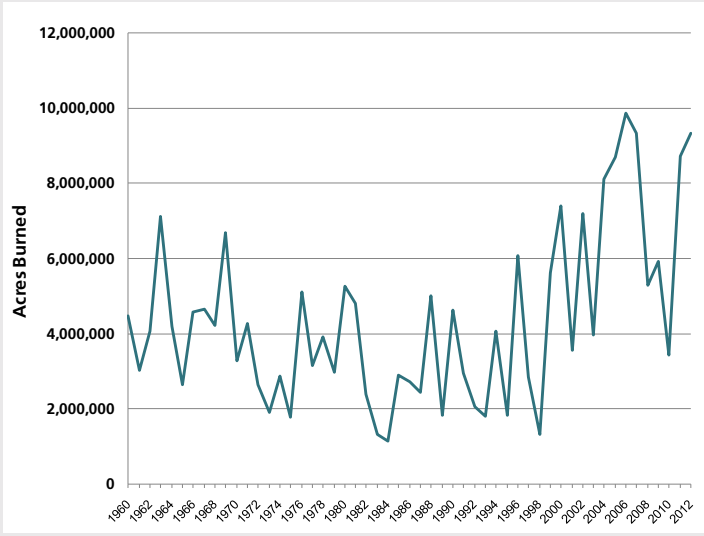
Drought conditions are a key factor in wildfires. Drought not only creates dry fuel conditions, but also promotes bark beetle infestations that leave millions of acres of dead and dying trees that are prone to wildfire. The number of acres of land burned by wildfire has been increasing for the last 15 years and will likely continue as climate variability exacerbates drought conditions. Increasing wildfire activity can impact tourism and recreation, and can greatly affect water quality by damaging watersheds. In fire-damaged watersheds, flooding often increases and causes reservoirs and streams to clog with sediment.

Figure 6. U.S. Seasonal Drought Outlook



Source: U.S. Drought Monitor (2015).

Figure 7. Wildland Fires in the U.S.



Source: National Interagency Fire Center (2015).

ECONOMY

The economy is one of the most fundamental drivers of change in any region, and this is also true in the Intermountain West. The essential questions are: Will the economy grow? By how much? And which sectors of the economy will contribute most?

Over the last 40 years, key components of the Intermountain West economy include the rise of the service economy and the decreasing relative contributions of agriculture, extractive industries, and manufacturing. These general trends are likely to continue.

Moving forward there are many factors that could influence the economic growth of industries that rely on natural resources, such as agriculture, extractive industries, and tourism and outdoor recreation.

Agriculture, for example, is a small component of the overall economy, but uses approximately 75 percent of the water supply in the region. This industry may be affected by water scarcity and by population growth that increases water demand in urban areas. Shifting water away from agriculture toward cities would raise important questions about the region's ability to produce food and the cultural importance of agriculture to the Intermountain West.

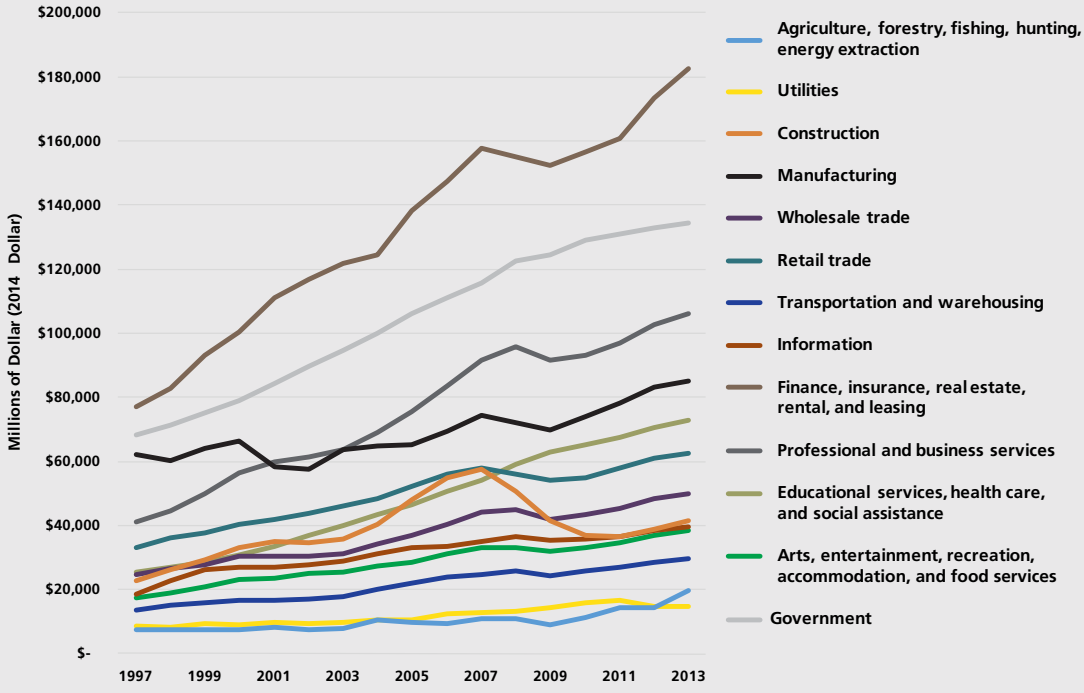
Tourism and outdoor recreation is a hallmark of many Intermountain West communities as many people travel to the Intermountain West to enjoy its unspoiled natural landscapes and countless outdoor recreation opportunities. However, the region's ability to continue to attract tourists and recreationalists depends on how well we protect, maintain, and/or restore our environmental treasures.

ENERGY

The West's fortunes have historically been closely tied to its abundant natural energy resources, and the energy sector continues to be a key driver of change that will impact the economy and natural resources in the Intermountain West. Yet, the West's energy future is notoriously difficult to predict, as demonstrated by the many boom-and-bust cycles western communities have endured.

The Intermountain West's major energy resources include natural gas, coal, shale deposits, and the renewable resources of wind and solar power.

Figure 8. Income Sources in the Intermountain West 1997-2013

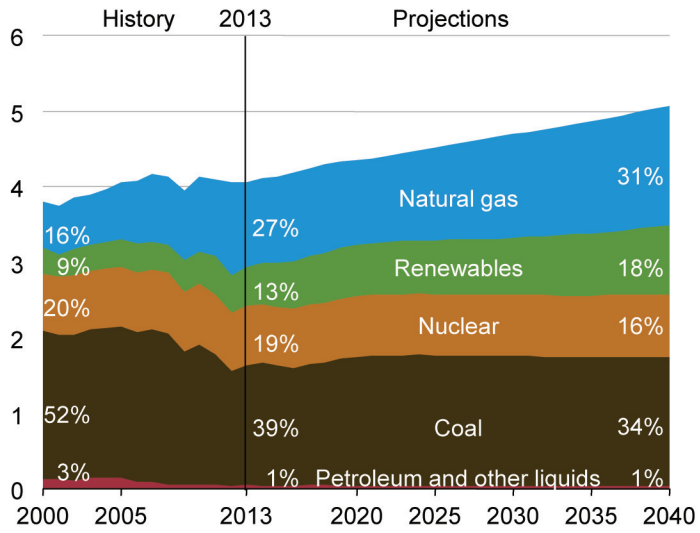


Source: U.S. Bureau of Economic Analysis, U.S. Department of Commerce (2015).

In the region, as across the United States, the production of natural gas has increased. According to the U.S. Energy Information Administration, this increased production has kept prices low, providing a boost to the industrial sector that is expected to expand industrial production over the next 10 to 15 years. Low prices have also spurred increased use of natural gas for electricity generation (as shown in figure 9) and for transportation, and has expanded export opportunities. These trends are likely to continue, but the extent of the growth of natural gas production may be constrained by insufficient pipeline availability.

Coal has been a major source of energy for electricity generation in the past, but as figure 9 shows, this trend is changing. While there will be a decreased dependence on coal for electricity generation, much of the coal that is used will come from the Intermountain West. The top 10 coal-producing mines in the United States are located in Wyoming and Montana, and the top coal-producing mine in the world is located in Wyoming. The U.S. Energy Information Administration projects sufficient coal reserves to last for several decades. However, some sources suggest that coal extraction and use may be constrained by concerns about water and air pollution and the safety of miners. Also, the evolving regulation of carbon could make coal a much less attractive energy source.

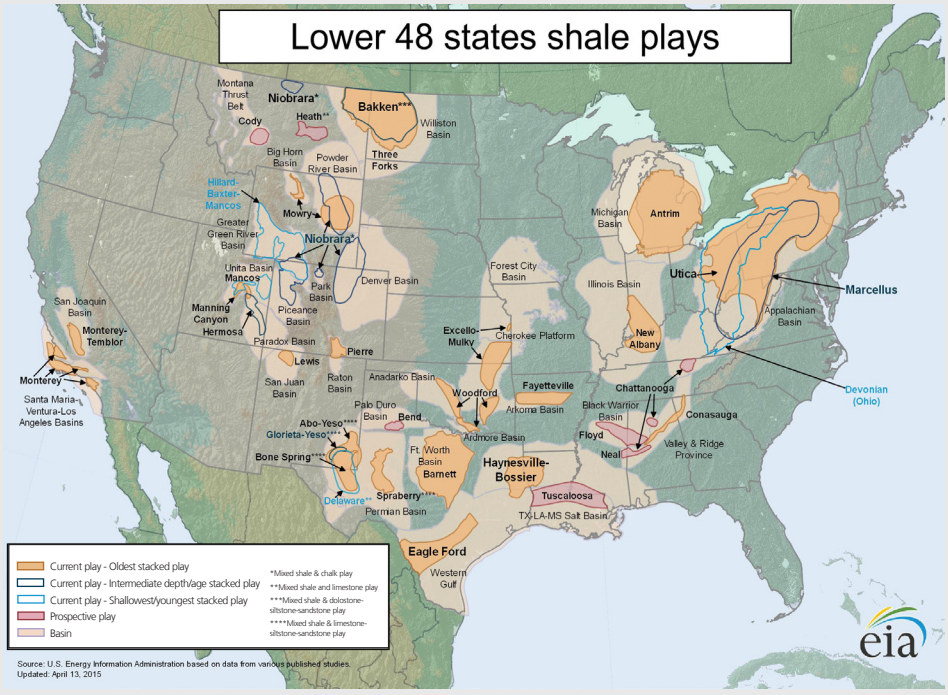
Figure 9. Electricity Generation by Fuel 200-2040 (trillion kilowatthours)



Source: U.S. Energy Information Administration (2014).

Oil and gas extraction is significant in the Intermountain West. Figure 10 shows the shale plays that are currently extracting petroleum products including natural gas and those that have future potential for extraction. While this industry is currently producing in the Intermountain West

Figure 10. Lower 48 States Shale Plays



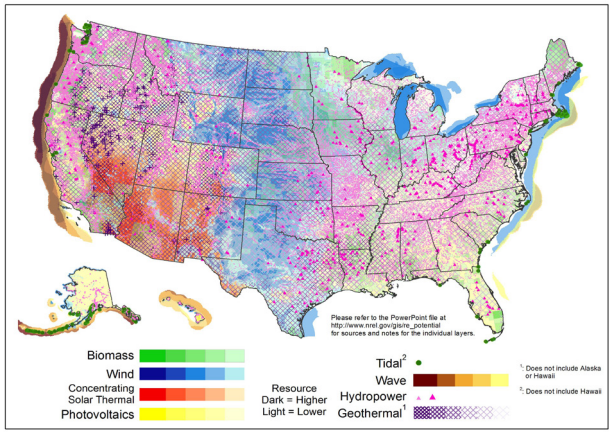
Source: U.S. Energy Information Administration (2015).

region, there is great uncertainty and volatility associated with oil prices, amount of resources, demand, and production moving into the future.

Overall the extractive sector is likewise a relatively small component of the regional economy, but global commodity demand and pricing could significantly change that, especially regarding coal and metals. The extensive coal resources in Montana and Wyoming could move into world markets should transportation infrastructure be developed. Likewise, if the immense oil reserves contained within the Green River Shale in Colorado, Utah, and Wyoming were to be developed, the extractive sector would become a much larger proportion of the Intermountain West economy.

The Intermountain West is blessed with tremendous renewable energy resources. The potential for solar energy growth in the Southwest and wind energy production through the Rockies--particularly in Montana and Wyoming--is especially promising. The Energy Information Administration predicts that, nationwide, electricity generated from renewable energy will increase from 9 percent in 2008 to 17 percent by 2035. Costs associated with solar energy in particular are decreasing, as the technology becomes more efficient, and therefore is being used more widely than it has in the past. However, the growth of renewable energy is dependent on a number of factors, including state policies requiring that certain portions of electricity come from renewable sources, cap and trade programs that favor renewable energy

Figure 11. U.S. Renewable Resources

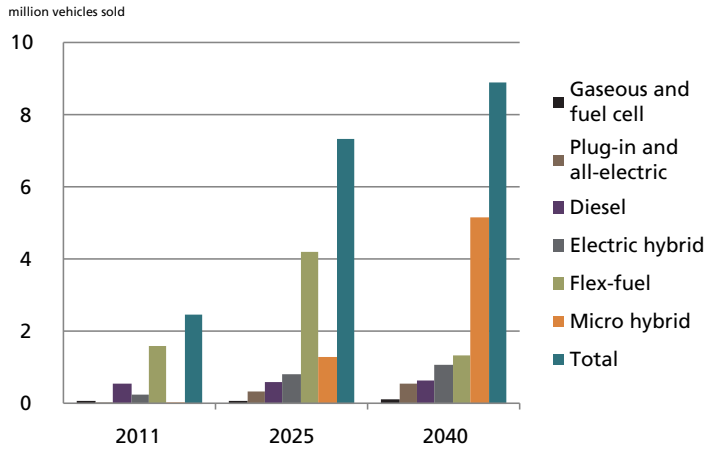


Source: National Renewable Energy Laboratory (2009).

sources, federal incentives for renewables, and the development of adequate transmission capacity. Taxes on carbon or fossil fuels, if enacted in the U.S., could also spur a shift toward more production and consumption of alternative energy fuels.

Technology is another factor that will have a great impact on the future of energy in the region. The Energy Information Administration predicts that improvement in the efficiency of light-duty vehicles through such technologies as hybrid and electric vehicles, will lead to a sharp decline in total light-duty vehicle energy use. Figure 12 shows that the sales of non-gasoline technology vehicles are predicted to increase significantly over the next 25 years, which could have a significant impact on total energy consumption and use for transportation.

Figure 12. Sales of Light-duty Vehicles Using Non-gasoline Technologies



Source: U.S. Energy Information Administration (2014).

Looking ahead, energy growth in the Intermountain West is uncertain and complex. Energy production provides jobs and opportunities, but industry downturns can be devastating to local and regional economies. Environmental impacts, both from energy production and use, are also concerning. Some of these include air pollution, high water use, contaminated water supplies, harm to local ecosystems, and increased carbon emissions. Expanding and accelerating development of the region's oil, natural gas, and coal reserves could also threaten historic scenic landscapes or traditional recreational land uses, and is sure to increase conflict over access to (and use of) public lands.

DRIVING FORCES OF CHANGE: A STARTING LIST

The driving forces of change discussed in this fact sheet are just a start. Below is a more complete list that your community can consider when using exploratory scenario planning to plan for future conditions.

- Economy
- Population and Demographics
- Technology
- Governance
- Cultural Change
- Public Health
- Education
- Consumer Preferences
- Climate
- Natural Habitat/Species
- Natural Resources
- Land Use Issues

For more detail on the topics above, please refer to the Lincoln Institute of Land Policy working paper titled, "Determinants of Change in the Intermountain West." The report can be found at the following link: https://www.lincolninst.edu/pubs/2392_-Determinants-of-Change-in-the-Intermountain-West.

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ABOUT WESTERN LANDS AND COMMUNITIES

Western Lands and Communities is a joint program of the Lincoln Institute of Land Policy and the Sonoran Institute that takes a long-term strategic perspective on shaping growth, sustaining cities, protecting resources, and empowering communities in the Intermountain West. The program was established in 2003.

ABOUT THE LINCOLN INSTITUTE OF LAND POLICY

www.lincolninst.edu

The Lincoln Institute of Land Policy is the leading resource for key issues concerning the use, regulation, and taxation of land. Providing high-quality education and research, the Lincoln Institute strives to improve public dialogue and decisions about land policy. As a private operating foundation whose origins date to 1946, the Institute seeks to inform decision making through education, research, policy evaluation, demonstration projects, and the dissemination of information, policy analysis, and data through our publications, Web site, and other media. By bringing together scholars, practitioners, public officials, policy makers, journalists, and involved citizens, the Lincoln Institute integrates theory and practice and provides a nonpartisan forum for multidisciplinary perspectives on public policy concerning land, both in the U.S. and internationally.

ABOUT THE SONORAN INSTITUTE

www.sonoraninstitute.org

The Sonoran Institute inspires and enables community decisions and public policies that respect the land and people of western North America. Facing rapid change, communities in the West value their natural and cultural resources, which support resilient environmental and economic systems.

Founded in 1990, the Sonoran Institute helps communities conserve and restore those resources and manage growth and change through collaboration, civil dialogue, sound information, practical solutions, and big-picture thinking.

For additional information about exploratory scenario planning and how we can help your community, please contact:

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