

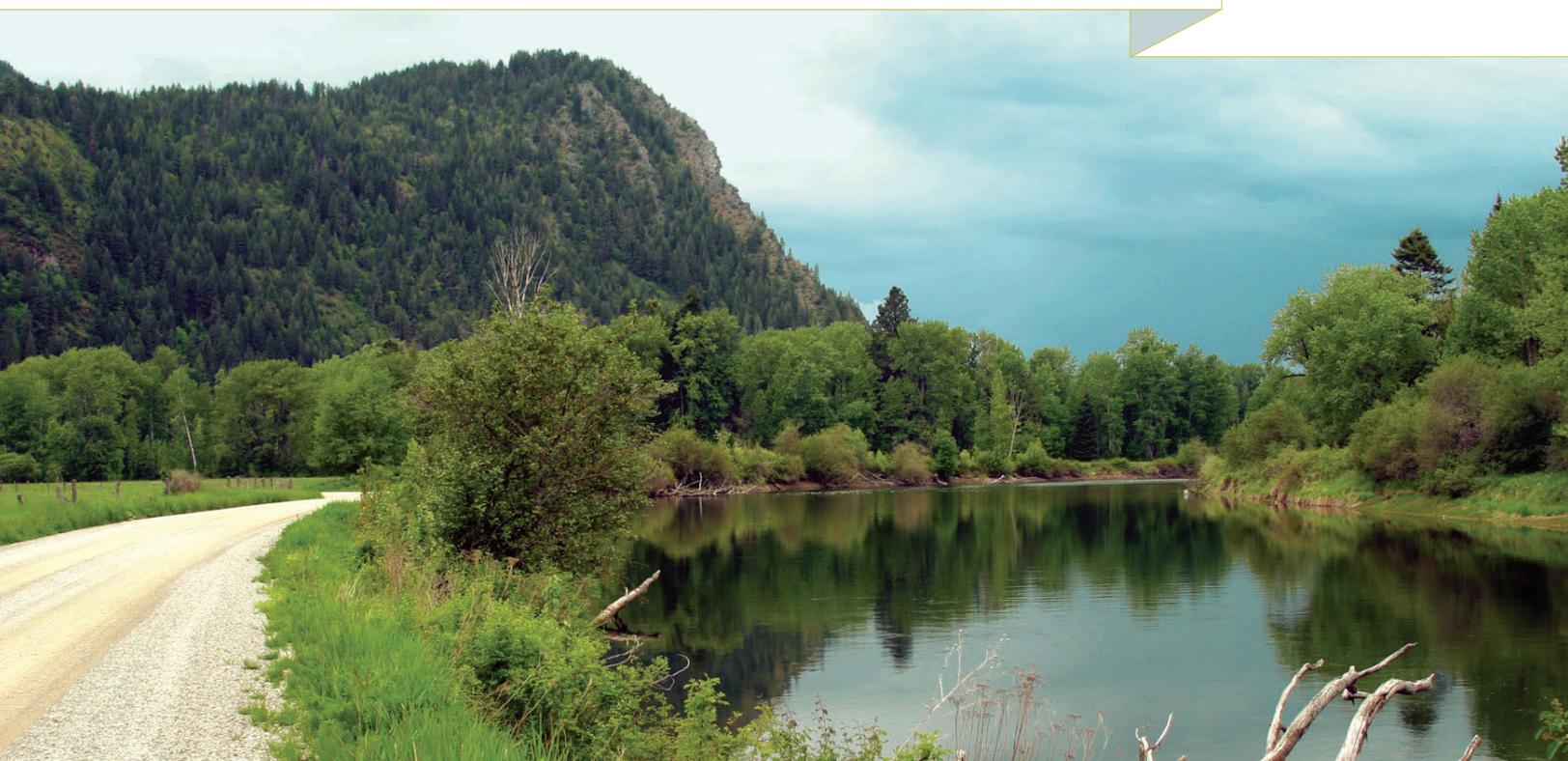
Growing the Idaho Economy

Moving into the Future

2010-2030

“The greater danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it.”

Michelangelo (1475-1564)



IDAHO'S TRANSPORTATION SYSTEM WILL PLAY A VITAL ROLE, PERHAPS THE DECISIVE ROLE, IN WHETHER THE ECONOMIC OPPORTUNITIES DISCUSSED IN THIS REPORT ALONG WITH COUNTLESS OTHERS THAT WILL EMERGE IN THE COMING DECADES, CAN BE REALIZED.

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“PREFERRED FUTURE
PLANNING IS NOT
REALLY ABOUT
THE FUTURE. IT IS
ABOUT FOLDING
THE FUTURE BACK
ON THE PRESENT
SO THAT YOU
CAN MAKE BETTER
DECISIONS TODAY.”

GLEN HIEMSTRA

Growing the Idaho Economy

Moving into the Future

Table of Contents

- 2. Executive Summary
- 4. An Introduction to the Future
- 6. **Section One:** To Compete in the World You Must be World-Class
- 10. **Section Two:** The Evolving Global Economic Environment
- 26. **Section Three:** Opportunities for Idaho
- 40. **Section Four:** Risks to a Preferred Future
- 42. **Section Five:** Strategic Implications
- 48. **Section Six:** Case Studies
- 52. Conclusion
- 53. Credits

Executive Summary

This report on transportation and the future Idaho economy was commissioned as part of the larger effort to develop a new Statewide Transportation Plan (STP). This plan has been focused on three interlinked goals: grow the economy, improve safety, and increase mobility.

Goals of the Statewide Transportation Plan



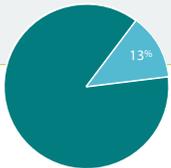
As part of the project, a “futurist” report was requested, a report that would adopt an outside perspective on the very long-range future of Idaho that might go beyond conventional assumptions about the future. The purpose of this report is not just to repeat back to Idaho citizens what they already see, but to offer a set of assumptions

that may not be as obvious, based on research, experience in other settings, and the insight gained from studying future trends with a wide-angle, long-range lens for some time.

We describe here a possible long-range future for the economy of Idaho and how that future is related to transportation. By “long-range” in this report we mean a period 20 years from now, and beyond.

The future Idaho economy we envision is one aimed at capitalizing on world-class creative and natural assets, a major leadership role in developing the global energy future, increased and sustainable agriculture production in an evolving weather and regulatory environment, and enhanced attractiveness in the tourism and hospitality business.

The report begins with an inventory of some of the world-class assets to be leveraged, including outdoor and recreation opportunities, as well as science, technology, and business assets. The next section is a review of the key driving forces shaping the future of Idaho. The forces will impact transportation mobility, and safety, and in turn be influenced by the quality of the Idaho transportation



13 PERCENT OF U.S. AUTO MILES WERE DRIVEN BY YOUNG PEOPLE AGES 21-30 IN 2009, COMPARED TO 20 PERCENT IN 1995. HOW MUCH WILL DRIVING BEHAVIOR CHANGE BY 2030?

system. Driving forces include population growth and a changing demographic mix; the knowledge-based economy in a world catching up in education; the cost of traditional fuels and development of 21st-century energy; technology; real and regulatory impacts of climate issues; and challenges to food security and 21st-century agriculture.

In Section 3, we present a set of long-range economic opportunities for Idaho. Comparing the local view to the futurist view, the report suggests leveraging the traditional economy, and then moving beyond that into primary growth areas. These include next-generation energy technology, leadership in tourism and recreation, sustainable agriculture to meet global and local needs, attracting the creative class with community development, and leveraging higher education.

Four future scenarios are then presented:

- Sunrise Energy Technology Corridor
- Creative Class Cities
- 21st-century Agriculture
- Tourism of the Future

In Section 4 we take note of risks to a preferred future, including funding of transportation improvements; global economic imbalances; water availability, port and river access; education; political culture; availability of private capital; and a transportation bottleneck.

Section 5 brings us the major conclusions regarding strategic implications for transportation.

Twelve long-range strategic issues are highlighted:

- Focus on critical commerce corridors.
- Preserve and maintain the current system.
- Plan for a significant vehicle transition with related infrastructure change.
- Expect an increase in freight traffic of all kinds.
- Plan to increase density of cities and towns.
- Plan to at least double transit capacity.
- Add lane miles.
- Join the national research into intelligent transportation systems to improve mobility and safety.
- Improve system performance with information.
- Explore new materials for system improvements.
- Pay attention to rail and ports.
- Think more broadly than transportation systems.

Finally, in Section 6 three regional case studies are presented, where infrastructure planning and economic development have been successfully linked.

Creating a preferred future is ultimately a matter of making wise strategic choices, as individuals, businesses, communities, and as a state.

This report is our view of possible and preferred futures for Idaho, for how a robust and growing economy can be built and the strategic implications for transportation. It is not a standard technical report, and it is not a reflection back of local views. Rather it is a wide-angle, long-range vision, produced from our professional futurist perspective. We hope that it provides both food for thought and a challenge to action.

An Introduction to the Future

The State of Idaho completed a long-range transportation vision project, in 2004. That project included a significant effort to engage Idaho citizens and stakeholders to imagine a transportation future 30 years out.

This report is not designed to repeat that effort, after so short a time, but does offer an opportunity to ask whether assumptions made then about the decades that will take us to 2030 and beyond still make sense. As we will discover in the pages that follow, the answer is generally yes, but with two vital exceptions.

The first basic assumption made in 2004, which was implied but not explicitly stated, was that economic growth would come rather naturally to Idaho. At the time the 2004 report was being created the national economy had experienced the economic downturn that accompanied 9/11. That downturn had, in turn, exacerbated the dot-com bust of the year before. Few at the time foresaw that a deepening debt crisis, already building in 2004 but unseen, would eventually trigger what we now know as the deepest economic crisis in two generations. The impact on Idaho has been significant, with total employment falling by more than 45,000 people while the unemployment rate doubled.

“WE EXPECT THE PACE OF CHANGE IN THE NEXT 20 YEARS TO BE INTENSE. AN ECONOMY THAT EXPECTS TO COAST ALONG OR TO RELY ON BUSINESS AS USUAL MAY SURVIVE, BUT WILL NOT AUTOMATICALLY FLOURISH.”

In Idaho, as in the nation, it now appears that it will be a difficult climb out of this economic challenge. As compared to 2004, we now believe that the future of the Idaho economy is not assured. We expect the pace of change in the next 20 years to be intense. An economy that expects to coast along or to rely on business as usual may survive, but will not automatically flourish. For these reasons

and others, the governor of Idaho, Butch Otter, recently created [Project 60](#), aimed at increasing the Idaho GDP from \$51 billion to \$60 billion. This goal may be more ambitious than it appears initially, because achieving the goal will mean not just adding to the current economy, but thinking in new ways. This report is very much about those new ways of thinking. Part of that thinking, as envisioned by the Statewide Transportation Plan, is that transportation and economic growth are linked.

The second assumption made by the planners in 2004 was that while aware of the changing energy future, they did not fully anticipate the speed at which the era of cheap and easy fossil fuel would come to an end.

As we will see, the fossil fuel era, on which our transportation system is so dependent, is nowhere near an end. There are unexplored regions with potential for oil currently off-limits that may be

opened up at some point. Still, the “cheap and easy” part appears to be winding down. One need look no further than the high cost of road improvements being planned for the fall of 2010, so that heavy equipment can pass from the Port of Lewiston to the Alberta Tar Sands. If, in addition to the one-time road improvement costs, you calculate the high cost of converting the tar sands into fuel, and also the degree to which the United States is depending on the tar sands for future fuel, you can begin to see that planners in 2004 may have underestimated the changing energy future.

Going forward, in comparison to the assumptions made in 2004, we now see significant market-based pressure to speed the conversion of the transportation system toward one that uses less fossil fuel in the next two decades. This will not mean a rush away from private vehicles, or from truck-based commercial transportation. It will mean a gradually accelerating re-mix of vehicle types, fuel options, electricity, changing community forms and associated transportation needs. It will mean increased urgency to rethinking transportation funding.

A Long-Term Perspective

There is a certain paradox about peering into the distant future. On the one hand we think that the future is or ought to be predictable. We think that with the right mathematical formulas or gut feelings we can extrapolate from current trends and the future will be clear. But it is not clear.

Alternatively, we think of the future as something unpredictable. We think of it as something “out there,” a thing over which we have little control and to which we must adapt as it happens. We presume that the further ahead one looks, the less predictable the future becomes.

A more useful perspective, and the one that guides this study, is that the future economy of Idaho and the transportation system that enables it will be the product not just of external forces that are more or less predictable, but also of many choices to be made between now and then. The true future paradox is this – the further out we look, the more “choice-full” the future becomes. That is, the shape and nature of the Idaho economy a year or two from now is pretty fixed. But the economy of Idaho circa 2030 is quite open-ended and will depend partly on what Idahoans do between now and then. The further ahead you look, the more choices you create.

This report is our view of possible and preferred futures for Idaho, of how a robust and growing economy can be built, and of the strategic implications for transportation. It is not a standard technical report, and it is not a reflection back of local views. Rather it is a wide-angle, long-range vision, produced from our professional futurist perspective. We hope that it provides both food for thought and a challenge to action.

It is up to the readers of this report to make the choices.

To Compete in the World You Must Be World-Class

This is a story often told in Idaho. In 1935 Averell Harriman, chief executive of the Union Pacific Railroad, decided to promote passenger traffic by developing a world-class ski resort, one that would rival those he knew in Austria and Switzerland. A search of prospective sites in the West ended in Ketchum, Idaho, and Sun Valley was born. It was perhaps the first effort in the state to explicitly develop something that would be seen as world-class.

We live in a competitive world, one that will be more competitive by 2030. This competition is based on value to the customer, costs to the producer, and intrinsic differentiators that provide a market advantage. To compete, Idaho must most of all see itself as, and be, world-class. A key task for the long-term future will be maintaining and developing world-class assets.

World-class assets in 2010 to maintain and further develop

Outdoor Recreation and Tourism Opportunities

SUN VALLEY The 50-year master plan for Sun Valley resort explicitly states as its goal to keep Sun Valley positioned as world-class, while actually decreasing the maximum unit development allowed on resort lands. Projected development in the nearby city of Ketchum includes several four- and five-star hotels, replacing hotel and motel rooms lost to development. An increase in available rooms will be important in the long term.

Three things are required for the long-term success of Sun Valley, Ketchum, and the greater region. One is a systemic, cooperative approach to development and transportation in the Wood River Valley corridor, as recommended by a 2007 report envisioning an economic partnership in the region. Second will be a continued focus on improving transportation into and out of the region. The primary focus should be on improving air service in line with local population growth and seasonal traffic demand.

It is ironic that a development envisioned to increase train traffic lost its train service decades ago. It may not be realistic to envision a new passenger rail service to the Valley by 2030, if ever, despite increased funding for trains in the U.S. However, looking ahead one alternative in keeping with the sustainability goals of the region would be to develop a plan for electric or hybrid bus rapid transit from Boise and Pocatello, and the same for commuter and recreation traffic in the Valley.

Third, in talking with people in Idaho we have been told that Sun Valley is seen by many Idahoans as somehow separate from the state because of the visitors who live and visit there. In the future, in order to compete on the world stage it will be valuable for Idahoans everywhere to embrace Sun Valley as an asset.

GATEWAY TO YELLOWSTONE AND GRAND TETON NATIONAL PARKS

Better positioning the Idaho Falls area as a gateway to the Tetons and to Yellowstone Park will build tourism revenue 2030. Two things are most needed: improved investment in tourism amenities in the Idaho Falls–Rexburg corridor, and improved



promotion of this western entry point to the national parks to the east, particularly aimed at diverting visitors from West Coast states to this region as their entry, rather than to Montana or Wyoming.

COEUR D'ALENE AND SURROUNDING LAKES AND MOUNTAINS Long recognized as a magnet for summer and winter recreation, the Coeur D'Alene – Sandpoint corridor, along with the eastern reach to Kellogg has developed in the past 25 years to a level of sophistication and amenities that surprises even the most ardent boosters. To maintain a world-class reputation the region will need to continue to upgrade its destination facilities and attractions to four-and five-star levels, while maintaining a base of affordable attractions for the inland Northwest population.

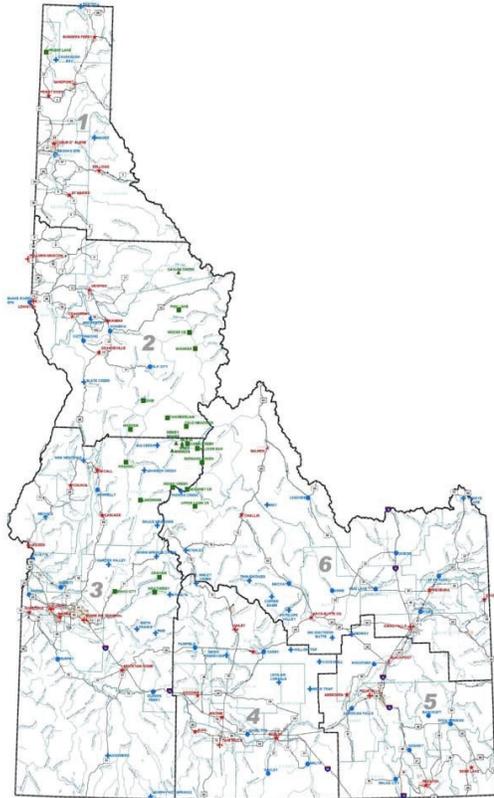
IDAHO WILDERNESS—HELLS CANYON, SALMON RIVER, SAWTOOTH AND OTHER MOUNTAINS Idaho ranks fourth in territory set aside as wilderness compared to other states, and this wilderness is attractive to a wide population of residents and tourists. The Salmon River and Hells Canyon are recognized as world-class recreation opportunities. We can assume that this wilderness protection will be maintained. What is needed by 2030 is development of area amenities that provide entry to these wilderness areas, improved transportation to entry portals, and improved marketing, especially to the North American population, of the availability of recreational opportunities in this wilderness.

BACK COUNTRY AIRSTRIPS There is an interesting confluence of a long-term technology trend and an existing but little known asset in Idaho. The technology development is the improved

performance and safety of small private aviation. Based partly on better materials, and partly on advances in navigation and safety equipment, private aviation in the form of privately owned vehicles or air taxi companies can be expected to grow by 2030. The Small Aircraft Transportation System project conducted by NASA from 2001 to 2005 studied ways to utilize 3,400 small community airports in all kinds of weather. The NASA project concluded successfully as a demonstration, and since then the Air Taxi



Association has been slowly building a roster of member companies worldwide. In addition, the FAA and international equivalent agencies are requiring advances in aircraft as well as ground



Idaho Aviation System Airports

navigation and communication systems that will radically improve airspace access and safety. Most of these improvements will be in place by 2020 and all of them by 2030. Assuming adequate and affordable supplies of fuel or alternative fuels, small aircraft will be widely in use by 2030.

Existing Idaho asset is the wide [network of back country airstrips](#). By 2030, this network of airstrips could become a significant recreation asset as well as a community asset if maintained and improved between now and 2030.

SCENIC BYWAYS Spectacular Idaho scenery has always been here, but starting in the late 1970s the Idaho Transportation Department began to officially recognize scenic routes, and to support them. In 2010 alone nearly \$1.5 million went toward support for scenic corridors, using funds

from the National Scenic Byways Program. It is possible that by 2030 these scenic routes will be valued even more as a world-class treasure. Global population growth combined with environmental degradation elsewhere will likely mean that regions that preserve their natural heritage will be highly regarded. In addition to attracting regional visitors who wish to vacation near to home, this network of roads may also attract more international visitors. This will be more likely if the scenic routes and the small communities associated with them provide technical support for a more electrified personal vehicle system that may account for 25 percent of all traffic by 2030.

Science, Technology and Business Assets

IDAHO NATIONAL LABORATORY The [Idaho National Laboratory](#) (INL) is a leading center of nuclear energy research and development. Begun in 1949, INL comprises nine major applied engineering, interim storage, and research and development facilities. Located between Idaho Falls and Arco, INL employs approximately 8,000 people. It is undisputedly a world-class enterprise. Affiliated with the Lab are the Center for Advanced Energy Studies (CAES), and related spin-offs.

As we propose later in this report, this world-class operation could be leveraged by 2030 into global leadership in energy and related sciences, and into a thriving technology and higher education corridor stretching from Rexburg to Pocatello and well beyond to affiliated centers statewide and regionwide.

TECHNOLOGY PRESENCE: MICRON AND HP [Micron Technology, Inc.](#) established Idaho and the greater Boise area in the late 1970s as a world player in the information technology revolution. Micron Technology is not only the world's second-largest DRAM (primary memory

device used in PCs) manufacturer, its current products include display technologies, and it is also involved with health care technology and potentially solar energy manufacturing. Micron has had a volatile history in a volatile industry, but along with other leaders like Hewlett Packard, it has built a legacy that can be further developed with an effort to sustain not only the Treasure Valley but other Idaho corridors as technology centers in the next 20 years.

JR SIMPLOT LEGACY AND IDAHO

AGRICULTURE The world population, now at 6.7 billion people, is expected to grow to 8.2 billion by 2030, nearly a 25 percent increase.

The amount of food required is expected to grow by a greater percentage, as a larger proportion of the global population achieves a middle-class lifestyle. Thus, Idaho agriculture, already a world-class asset, at a steady state would grow at least 25 percent, and most likely will increase even more. Historically the [JR Simplot Company](#) set the pace in Idaho in its contribution to national and international agriculture. In the future Idaho can continue to play a leadership role in the development of sustainable agriculture for global commodities and for a revitalized local agriculture. Food processing will be a major part of this leadership.



The Evolving Global Economic Environment

There are six dynamic forces shaping the future economy. Each of these forces has particular meanings for Idaho, offering both challenges and opportunities.

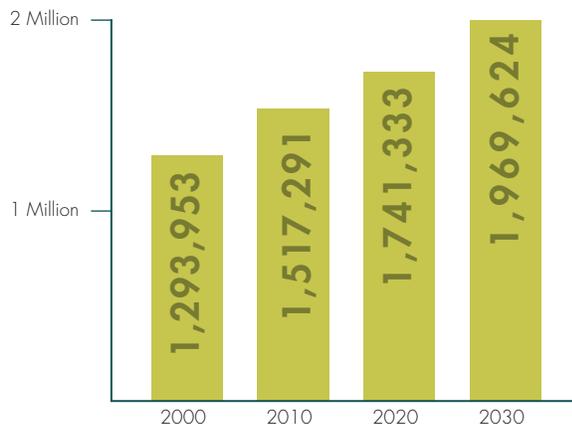
Population growth and a changing demographic mix

The most predictable future trends involve demographics, the shape and nature of the future population. The most recent Census Bureau forecast for Idaho is that the state population will grow from 1.55 million people in 2010 to 1.97 million in 2030, an increase of 27 percent. It

state fell. Migration of people into the state, the largest driver of population growth, fell to 14,000 from 2008 to 2009, for example, the first time in several years that the number was below 20,000. Natural population growth—births less deaths—was also at about 14,000 for the same year. By late 2009 Idaho's growth rate had fallen to 1.2 percent annually, dropping Idaho from the sixth fastest to the 12th-fastest-growing state on a percentage basis.

Despite the recent downturn, assuming average economic performance over the next two decades in the nation, and also assuming no major limits on legal immigration, Idaho will need to provide housing, transportation, jobs, and public services for about 400,000 more people in 2030 than in 2010. This alone is a large challenge.

Idaho Population Total
12th Fastest Growth Rate among States



should be noted, however, that as predictable as population appears to be, economic performance and national policy can influence growth rates up or down. For example, due to the great recession of 2007–2010, the population growth rate in the

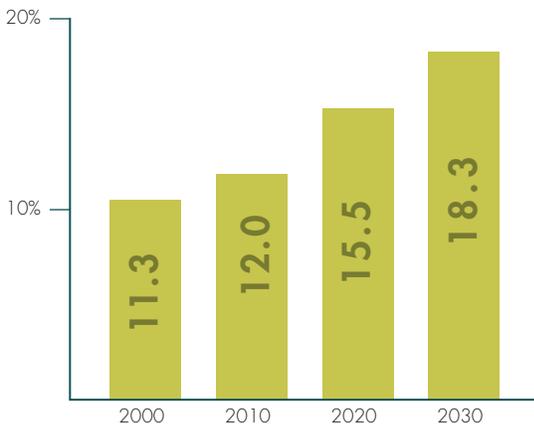
Inside the general population numbers are three population trends that are important to note. First is an aging population. On January 1, 2011, the first baby boomer will turn 65. Over the next 20 years, tens of millions more boomers will turn 65, and by the year 2030 we will look back on the results of the long-anticipated age wave. Idaho is no exception, though it is somewhat younger than the national average. While in 2010 only 12 percent of the Idaho population is 65 years of age and older, by 2030 the Census Bureau predicts that at least 18 percent of the Idaho population will be over 65.

We think this forecast may be a bit low. Idaho can become an attractive place for older people to live, limiting the number of aging residents who leave, and potentially increasing the number who desire to move in. Thus, it seems a plausible forecast to imagine that in the average city or town in Idaho



Idaho's Aging Population

Percent Age 65 and older



in 2030 one of every five people will be older than 65. This will impact all future issues, but one that stands out is employment. The Idaho Department of Labor has already seen an increase in the work force over the age of 55 from just 12 percent in 2001 to over 16 percent in 2010, and by 2030, for a variety of reasons, we can expect the 55 and over work force to be 20 to 25 percent of the total work force.

The second population trend after aging is growing diversity in the Idaho population, a trend that has been in place for many years. This has involved primarily in-migration of people with Hispanic heritage. The result has been a minorities population increase in one decade to nearly 15 percent, two-thirds of them Hispanic. Southern counties in Idaho have seen the greatest growth in minority populations.

“IN THE AVERAGE CITY OR TOWN IN IDAHO IN 2030 ONE OF EVERY FIVE PEOPLE WILL BE OLDER THAN 65 YEARS OF AGE.”

The third population trend after aging and diversity is that by 2030 the great majority of adults, both young and middle-aged, will be post-Generation X. That is, they will be members of the Millennial generation, also called digital natives, or they will be post-millennials born in this century. This group is not only very large—larger than the baby boom generation—but different in an important way. They are the first computer and Internet generations, having grown up since infancy with computers, 24/7 network access, cell phones, Bluetooth-enabled cars, and so on. They approach most life activities differently, using the network first.

One critical example for the future is recent research showing, for the first time since the advent of the automobile, a youth generation less likely to own a car, drive a car, or have a driver's license than the previous generation. As reported in *Advertising Age*, “In 1978, nearly half of 16-year-olds and three-quarters of 17-year-olds in the United States

had their driver's licenses, according to Department of Transportation data. By 2008, the most recent year data was available, only 31 percent of 16-year-olds and 49 percent of 17-year-olds had licenses, with the decline accelerating rapidly since 1998. Of

course, many states have raised the minimum age for driver's licenses or tightened restrictions; still, the downward trend holds true for 18- and 19-year-olds as well and those in their 20s.

It's not just new drivers driving less. The share of automobile miles driven by people aged 21 to 30 in the U.S. fell to 13.7 percent in 2009



from 18.3 percent in 2001 and 20.8 percent in 1995, according to data from the Federal Highway Administration's National Household Travel Survey released earlier this year." *(Advertising Age, May 31, 2010)*

This dramatic decline in driving behavior by young people occurred in a period when the percentage of the national population aged 21 to 30 actually increased slightly. The explanation goes well beyond restrictions on driving for 16 to 18-year-olds, into a shift in values and behavior. Interest in cars has waned. They have become more expensive. Interest in digital communications has sky-rocketed. Digital communication has become less expensive. Young people in 2010 and adults in 2030 may find it far easier to text, to do computer-based work, and generally to stay connected while using public transportation rather than when driving a car. Even as legislatures around the nation ramp up bans on digital communication while driving, the desire to work while commuting will continue to increase. All of these factors, combined with technology advances themselves, may make driving behavior in 2030 not at all like behavior prior to 2010.

This trend is worth watching because decreased driving will mean moderating gas prices, less

gas tax revenue, and more demand for public transit. At the same time, mobility and safety should show improvement naturally.

The knowledge-based economy as the world catches up in education

In the past 30 years the key ingredients of commerce evolved from the traditional set—raw materials, labor, energy, and capital—to include intelligence, not just of the people involved, but of the product or service itself. That is, a product or service is more valuable the better the intelligence that goes into it, and the better the intelligence the customer can obtain by using the product or service. Smart wins and this will be increasingly true over the next 20 years.

A knowledge value economy in 2030 will have the following characteristics:

- Information is the primary commodity, more than land, raw materials, or even manufactured products or services themselves.
- Knowledge is the element of greatest value, and ability to survive and flourish depends more and more on ability to learn new knowledge and apply it quickly.
- Communicated knowledge increases value the most and those companies that enable such communication will be dominant.
- The competitive advantage of all products and services increasingly resides in the knowledge value of the product or service. How much knowledge went into its production? How much knowledge is contained within it? To what extent and how easily can the customer perceive or access the knowledge value?
- When a physical product such as land or a manufactured item is sold, the seller no longer has the product. In contrast, when knowledge

value is sold, the seller retains the knowledge value after the sale. Knowledge value is thus never lost, but only increased through transactions. Hence there can never be scarcity of knowledge value, and without scarcity there will always be pressure to lower prices.

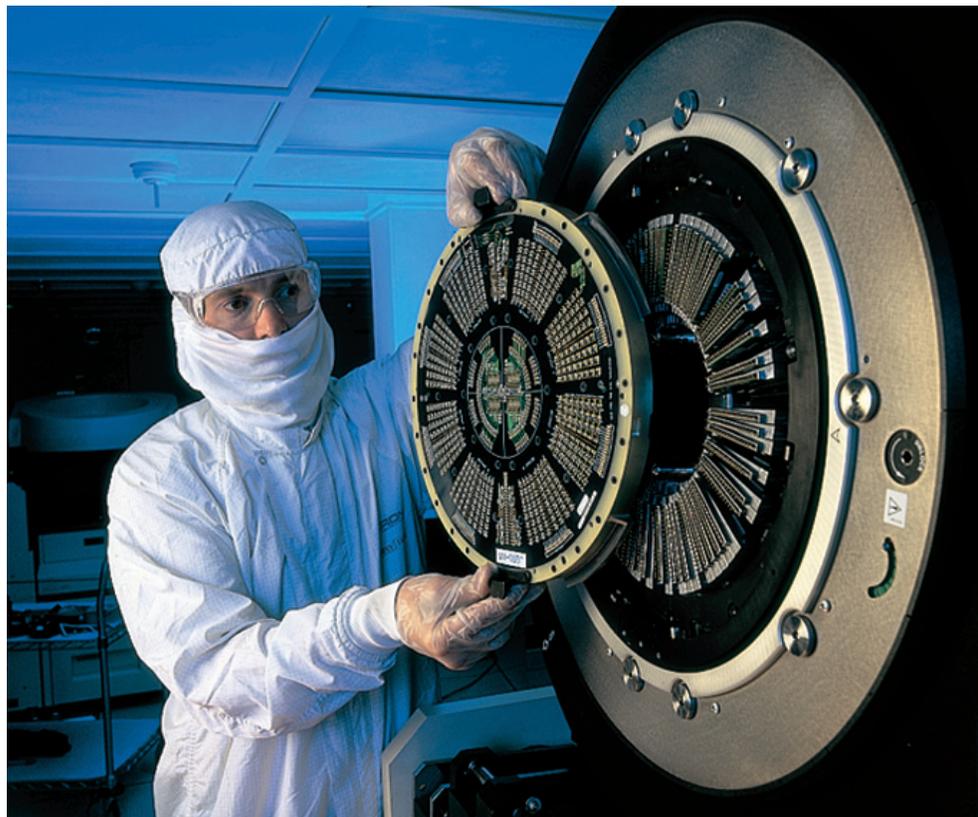
- The pace of technological change will quicken. Integrated communication systems, which enable collaboration and quickly communicate new discoveries will accelerate this pace even further.
- The shelf life of knowledge value will decrease continuously, thus putting a premium on speed. Design and production cycles taking years, even months, will become obsolete.

Equally important to Idaho's future, the creation of intelligence or knowledge value is not confined to the U.S. or a few countries. As recently as 1990 the United States produced 30 percent of the world's college graduates. By 2010 that number was 14 percent and falling, as the rest of the world, particularly nations like India, China, and Brazil, catch up.

By some measures, Idaho is well-positioned to compete in a knowledge intensive global economy. Idaho leads the nation in patents per capita, and is fifth per capita in new companies and 11th among states in technology-related jobs. But Idaho lags in education, ranking just 41st among states in the proportion of its population with a college degree, about 20 percent. Considering the historic Idaho economy, this percentage was fine, but looking ahead greater education achievement becomes

more important. Mike Rush, executive director of the Idaho State Board of Education in April 2010, stated it this way:

"You know, we've kind of got a modern day Sputnik...We're getting our tails kicked, and we've got to decide how to deal with it. One of the things that I think is absolutely critical for people to realize is that the United States is the only industrialized country in the world with a declining college participation rate. If things continue going



as they are, the U.S. will fall from first to last place in post-secondary education completion rates in the world. I don't know where we want to be...but I know darn well we don't want to be last because I don't think we can sustain our standard of living at that level of participation." (CDAPress.com, April 24, 2010)



Cost of traditional fossil fuels and development of 21st-century energy

The 20th century was built on oil. Though discovered in the 19th century, it was the discovery of really cheap and high-quality oil in Pennsylvania, Texas, and especially Saudi Arabia that enabled the mechanization of agriculture, the growth of manufacturing, the creation of suburbs, the luxury of more than one car for every home in America, and the explosion of human population, from 1.6 billion people in 1900 to 6.8 billion today.

A mature oil field is an amazing thing, costing only \$3 a barrel to retrieve, sold at \$70 a barrel or more. But we know that the era of cheap and easy energy, particularly oil, is coming to an end. It is not that we are running out of oil, or natural gas or coal, for that matter. It was a Saudi oil minister who famously said, “The stone age came to an end not because we ran out of rocks. And the same will be true of the oil age.” Rather, with each passing decade, the sources of these traditional fossil fuels become relatively more expensive and, in the case of oil, more risky or dangerous to obtain. The 2010 oil disaster in the Gulf of Mexico illustrates these

two points simultaneously—there is oil to be found, but getting it is more expensive, and technologically more risky than what we have done before. At some point in the near future the risk-benefit ratio for oil may force a faster shift toward a new energy future for transportation.

There is also concern about the long-term environmental impact of continued heavy use of fossil fuels as global population grows, becomes more affluent, and thus increases energy demand.

The bottom line is this: There is growing understanding that new energy sources are an important part of the future, and will therefore be a high-growth business in the next two decades and well beyond. We would go so far as to say that developing new energy sources during the rest of the 21st-century will represent the biggest opportunity in history.

The U.S. Department of Energy put it this way in 2005: “The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented.

Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking.” (Report for the U.S. Department of Energy by the Science Applications International Corporation, 2005)

Going forward, it is obvious that we will see substantial growth in biomass energy, wind energy, solar energy, and nuclear energy, to supplement, and perhaps in the very long run, eventually largely replace fossil fuels for many uses. This may impact transportation-related uses of fossil fuels first. The next two decades are likely to see an accelerating shift toward personal and commercial vehicles that use biomass-based fuels (ethanol and biodiesel), or are hybrid or fully electric. Shifting transportation fuel sources will impact tax policy. Joining other states that are developing infrastructure to support electric vehicles is also vital. Idaho is exceptionally well placed to play a leadership role in this energy future.

“THE BOTTOM LINE IS THIS: THERE IS GROWING UNDERSTANDING THAT NEW ENERGY SOURCES ARE AN IMPORTANT PART OF THE FUTURE, AND WILL THEREFORE BE A HIGH-GROWTH BUSINESS IN THE NEXT TWO DECADES AND WELL BEYOND.”

At that time several technology domains emerged as central to Idaho’s innovation economy, based both on current activity and available competencies.

The technology domains that emerged were:

- Agricultural/Biological Sciences
- Power & Energy
- Software Technology
- Digital Imaging & Sensor Technology
 - New Materials & Nanotechnology
 - Communication Technology

While this Department of Commerce view from a half-decade ago continues to make sense, we believe that five fundamental technology development trends will dominate the next two decades and provide economic growth potential in Idaho.

The dominant technology development trends are:

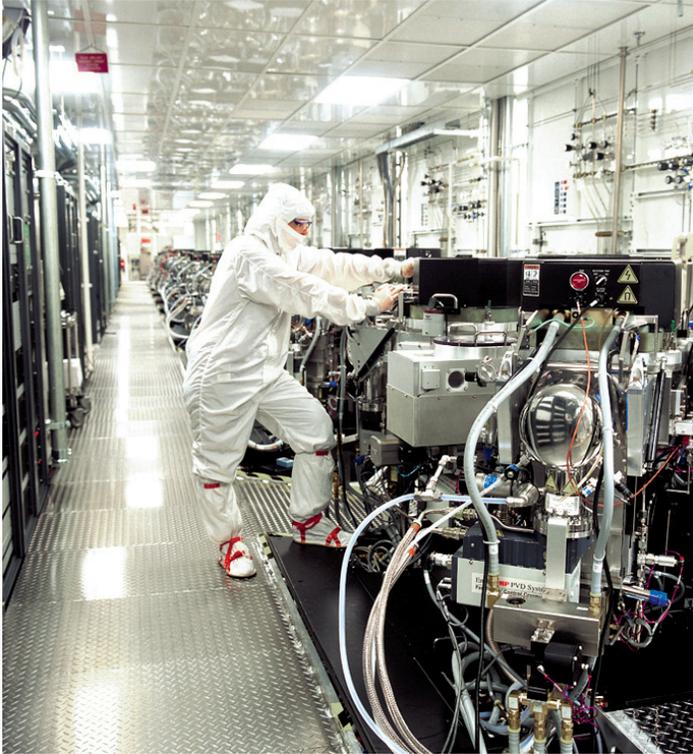
- Nanotechnology
- Biotechnology
- Information Technology
- Robotics
- Health Care Technology

Technology

In 2004 the Idaho Science and Technology Advisory Council used a summit meeting and additional study to outline Idaho’s Core Competency Report, and later a science and technology strategic plan, both of which are available at the [Department of Commerce website](#).

Nanotechnology

Nanotechnology most simply defined is the ability to see and to manipulate matter at the nano-scale—the realm of atoms and molecules. This ability, new in the last several decades, is enabling science and business to 1) make things that are very small, such as ever smaller semiconductors, 2) make things that



are large, but that have different properties, such as nanotech concrete, and 3) make things that have unique properties, such as nanotech solar cells that are printed on inkjet-like printers.

In 2010 the Project on Emerging Nanotechnologies estimated that more than 1,000 nanotechnology-based consumer products, as identified by their manufacturers, were currently on the market.

On March 12, 2010, the [National Nanotechnology Initiative](#) presented its third report on the current state of the field to President Barack Obama. Two things jump out of the report. First, the U.S. is losing its former leadership position in nanotechnology research, funding, and publications, to the European Union and to China. While this is not unusual—the U.S. is generally ceding technology leadership to global competitors due to lack of effort and funding—it is an issue of concern.

Second, looking at nanotechnology beyond 2010, the report to the President calls for national, state, and local initiatives to advance nanotechnology applications in five areas:

- Extending the capabilities of Information Technology
- Health care in the 21st century
- Beyond Steel – High Strength Materials
- Energy and the Environment
- National Security

This national initiative will fund research in three “signature initiative platforms for nanoscience and nanotechnology: Nanotechnology Applications for Solar Energy, Sustainable Nanomanufacturing, and Nanoelectronics for 2020 and Beyond.” For example, one hope is to develop the use of carbon dioxide as a chemical feedstock.

Idaho has a growing scientific interest in nanotech as well as companies and institutions working in the field, including Micron Technology, Hewlett-Packard Co., NanoSteel, Positron Systems, Atlas Mining Company, Idaho National Laboratory, Boise State University, Idaho State University, and the University of Idaho. By 2030 the U.S. National Nanotechnology Initiative has forecast that nanotech-related businesses will be generating trillions of dollars. The products of nanotechnology may lead to lighter and stronger vehicles, better batteries, and cheaper sensors and communication, all of which will aid mobility and improve transportation safety.

Biotechnology

On May 25, 2010, a team at the Craig Venter Institute in San Diego announced that it had created a synthetic, self-replicating bacterial cell, for the first time in history. The genome controlling the nature and replication of the cell was created.

It is a kind of software program, as scientists continue to digitize biology, that turns the natural code of the genome into something like computer code. Over the next two decades the “ability to routinely write the software of life” will lead to further advances in science. We can expect new applications, products, and enterprises in medicine, drug and vaccine development, environmental protection and clean-up, advanced biofuels, clean water technology, and agriculture.

The biological sciences that comprise what we call biotechnology have been a growth field for several decades, leading to many breakthroughs and business opportunities. Idaho has been a small player in this field, while several states and regions have made major efforts to support biotech corridors and industry concentrations. Idaho made early efforts in the previous decade to promote biotech, but the promise of biotech in the coming decades suggests there will be greater value to such efforts going forward.

According to the Biotechnology Industry Organization, biotech includes:

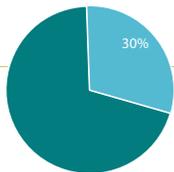
- Health Care Applications, such as diagnostics, vaccines, personalized medicine, and plant-made pharmaceuticals.
- Agricultural Production Applications, such as crop, forest and animal biotechnology, and aquaculture.

- Food Biotechnology, including improved raw materials, food processing and safety testing.
- Industrial and Environmental Applications, such as biocatalysts, biofuels, cellulosic ethanol, biorefineries, green plastics, environmental biotechnology, and industrial sustainability.
- Other uses, such as DNA fingerprinting and preparation for biodefense and pandemics.

Industrial biotech applications seem to be nearly endless and include biological fuel cells, chemicals, pharmaceuticals, food flavoring compounds, biopolymers for automobile parts, bioethanol for transportation, nutritional oils, biohydrogen, chem/bio warfare agent decontamination, pulp and paper bleaching and biopulping, enzyme food processing aids, metal ore heap leaching, electroplating/metal cleaning, metal refining, sweetener production, road surface treatments, vegetable oil degumming, and many more.

There are already many consumer goods being made with industrial biotech, including detergent, bread, vitamins, antibiotics, bedding, clothes, paper, and ethanol fuel.

The simple point of listing these of biotech advances is that in the next two decades the number of products and processes that rely on biotechnology, and the number of research institutions and businesses working in the field of biotechnology will grow significantly. More importantly, the kind



30 YEARS AGO THE U.S. PRODUCED 30 PERCENT OF THE WORLD'S COLLEGE GRADUATES. TODAY THAT NUMBER IS 14 PERCENT AND FALLING.



of biotech advances that are already being applied are aimed at improving the performance of many traditional Idaho industries: agriculture, mining, pulp and paper, as well as more recent economic stars like health care and energy. In terms of transportation policy, supporting commercial technology corridors and providing adequate infrastructure will assist development. And research into better road surfaces and alternative fuels may bring down the cost of transportation improvements. The bottom line: Any state that does not play in this field will be a technology laggard.

On the horizon are three biotech developments of special note for Idaho. First will be a convergence of the desired outcomes of those who promote organic agriculture and those convinced that the future of agriculture is in genetically engineered and biotech solutions. Driving this convergence will be the need to reduce the environmental impact

of nitrogen fertilizers and chemical pesticides. In some markets, outright bans will drive a need to rethink agriculture and to find new solutions. For example, on June 1, 2010, the headline below appeared on the Fox News website in Tampa Bay, Florida.

TAMPA - Beginning Tuesday and continuing until September, the use of nitrogen-based fertilizers is not allowed in Pinellas County...The recent findings have Hillsborough County considering a similar ordinance, while Sarasota County has already put a ban in place. (*myfoxtampabay.com, June 1, 2010*)

Phosphate limits in Canada, nitrogen limits in the European Union, and increased regulation everywhere suggest that an advanced agriculture, necessary to feed more than 8 billion people and based on the best biotech science, will become necessary in the next two decades.

The second biotechnology development on the horizon, referred to previously, will come from a desire to more rapidly develop biological alternatives to fossil fuels, both advanced biofuels using crops like jatropha or algae as well as ethanol fuels from cellulosic waste or primary products. Idaho's geography and agriculture legacy, combined with its scientific institutions, suggest economic opportunity, though with eventual impact on traditional gas tax revenue.

Third, by 2030 it is expected that biotech medicine will lead to an increase of average human life span of one year for each passing calendar year—in other words a super-aging society. Investment in biotech research aimed at living healthier and longer will grow rapidly. As noted previously, an older population will necessarily require more varied transportation options. While the life sciences have been less a focus in Idaho research institutions

and companies, there is a sufficient base of competency in the state to be able to play a role in this aspect of biotech.

Information Technology—Faster, Cheaper, Better

Today's Internet has 1.8 billion users, according to Internet World Statistics. The number of mobile broadband subscribers is exploding, hitting 400 million by 2010. The Ericsson Company predicts that there will be 3.5 billion mobile broadband users by 2015, nearly half the world's population. There's no doubt that billions more people will have high-speed Internet access by 2030.

Mobile social networking products, services, applications, components, and advertising will generate more than \$2.5 trillion in revenue by 2020, according to iSuppli. Companies and regions that don't keep up could become irrelevant. Looking more broadly, despite the dot-com bust of a decade ago, and the IT slow-down associated with the recent economic recession, the commercial Internet continued to produce incredible economic consequences. If growth in both business-to-business and business-to-consumer e-commerce continues to expand at even just half the pace we have seen over the last five years, the global value of e-commerce could reach \$24 trillion by 2020.





The business opportunities associated with continued information technology growth thus will be very large, but, as always, uncertain and varied. As Idaho companies have learned in recent years, the IT business can be one of booms and busts. But IT will continue to be an appropriate area to look to for growth. A study by the University of Maryland's David Kirsch and Brent Goldfarb revealed that the five-year survivability rate of the approximately 50,000 companies, most of them dot-coms, that sought venture capital to exploit Internet commercialization opportunities was 48 percent. That is actually a good track record—a little better survival rate than for traditional businesses.

As more critical infrastructure gets hooked up to the Internet, the Internet is expected to become a network of devices as well as a network of computers. A major growth area will be the installation of millions of infrastructure sensors to monitor the status of things like structural integrity of bridges, condition of roads, traffic congestion and flow, and so on, all connected in real time to the net. Similarly, sensor networks in areas at risk of

wildfire are being contemplated, allowing for early warning systems better than those that exist today. The same kinds of sensor systems are envisioned in relation to national security, to monitor water systems, for example, for biological, chemical, and nanotech agents. All of this will add up to significant business opportunities in sensor design, manufacturing, and installation as well as software and geographic information systems to make use of all of this real-time data. Distance disappears for people too, as communication displays become more visual and three-dimensional.

Software services, including things like personal photo libraries, email, and so on, are migrating from your personal machine to the "Cloud," which simply means being housed in giant server farms around the globe. A recent study from Telecom Trends International estimates that cloud computing will generate more than \$45.5 billion in revenue by 2015. This has led states like Oregon and Washington to become aggressive in pursuing large server farms. In fact, in late March 2010, the governor of Washington signed legislation providing tax exemptions to companies that build

and operate server farms in rural areas. The tax incentives be good through 2018.

Studies from the Brookings Institute, MIT, the World Bank, and other organizations all tell us the same thing—that even modest increases in broadband adoption can yield thousands of new jobs. Broadband empowers small businesses to compete and grow, and will ensure that the jobs and industries of tomorrow are created in the United States.

The interrelationships of IT and transportation are clear. The need to drive a car to shop, learn, or visit will decrease. Local delivery of goods ordered online will grow. The number of employees worldwide who currently telecommute regularly is expected to reach more than 1 billion by 2011. An estimated 75 percent of U.S. employees will be mobile within three years, meaning that they can perform work functions wherever they are.

Rural areas, however, continue to lag behind urban areas in Internet use, with 71 percent of rural residents versus 77 percent of urban residents using it. Broadband is used by 36 percent of rural Internet users versus 54 percent of urban Internet users. This urban-rural disparity both in Internet access and mobile broadband access may narrow somewhat in the future, but will remain a challenge for a state like Idaho.

“EACH OF THE IDAHO UNIVERSITIES CONDUCTS RESEARCH AND TEACHING RELATED TO ROBOTICS, K-12 ROBOTICS COMPETITIONS IN ROBOTICS ARE WELL KNOWN, AND EVEN THE 4-H HAS A PROGRAM IN ROBOTICS IN IDAHO.”

America’s 2020 Broadband Vision

In early 2009 the U.S. Congress directed the FCC to develop a [National Broadband Plan](#).

The resulting plan describes concrete ways in which broadband can be a part of 21st-century

solutions to some of our nation’s most pressing challenges, including:

- Extending the availability and lowering the costs of quality health care by putting digital health tools in the hands of doctors and hospitals across the country and removing geographic barriers for patient treatment.
- Providing our children with a world-class, 21st-century education, connecting them to the global library, and giving them the digital skills they need for the future.
- Expanding digital opportunities by moving our adoption rates from roughly 65 percent to more than 90 percent and making sure that every child in America is digitally literate by the time he or she leaves high school.
- Making our electric grid smart and efficient, and providing Americans with the information they need to make their homes and buildings smarter.
- Ensuring that law enforcement officers and first responders across the country have cutting-edge, reliable communications technologies to respond to emergencies efficiently and effectively.

In many ways the National Broadband Plan is less a “plan” than a description of the business

opportunities of the coming two decades, opportunities that will occur as regions provide the educated work force, the infrastructure, and the business climate for entrepreneurial creativity to emerge.

Robotics

A robot is a machine that performs a task, generally one formerly done by a human, without immediate human intervention. When we think of robots we imagine robotic arms assembling or painting automobiles in a factory. Or, perhaps we think of our Roomba vacuum cleaning machine. When we think of the future we imagine science fiction robots, human-like creatures performing many complex tasks. The ASIMO robot from Honda is the best-known humanlike robot.

“WORK IN THE FIELD OF HEALTH CARE REPRESENTS THE SECOND LARGEST SOURCE OF EMPLOYMENT IN IDAHO, SECOND ONLY TO RETAIL TRADE, AND GREATER THAN TOURISM OR AGRICULTURE. ”

Idaho even has its own robot, PLEO, a “companion pet” robot developed originally by Ugobe in Eagle, Idaho, now owned by Innvo Labs.

What we don’t think of, generally, is how pervasive robots are becoming. Recent estimates by the Institute of Electrical and Electronic Engineers (IEEE) put the number of robots working worldwide at 8.6 million.

These include two basic types of robots:

- **Industrial robots**—welding systems, assembly manipulators, silicon wafer handlers, and so on. These are generally big, heavy, expensive, many-degrees-of-freedom machines.
- **Service robots**—professional service robots (things like bomb-disposal bots, surgical systems, milking robots) and personal service robots (vacuum cleaners, lawn mowers, all sorts of robot hobby kits and toys).



The IEEE forecasts that, given historical sales trends (with the exception of 2009), by 2012 there will be 13 million robots in the world. How many there will be in 2030 is speculative, but we might expect the number to approach 100 million, meaning there is a very large industry opportunity.

Idaho has a noticeable history with robotics. The Idaho National Laboratories has an active research and development program in robotics and intelligence systems, focused on "adaptive robotics." The program develops machines that can adapt on the fly, and can do things like detect and measure gamma radiation, clean up hazardous wastes remotely, swarm together to carry out tasks, or fly autonomously. Each of the Idaho universities conducts research and provides education related to robotics; K-12 robotics competitions are well-known and even the 4-H has a program in robotics in Idaho.

Health Care Technology

Health care represents the second largest source of employment in Idaho, second only to retail trade, and greater than tourism or agriculture. Looking ahead to an aging population, it is obvious that health care will continue to be a growth industry. Recent national health care reform legislation was aimed mostly at increasing access to health care for a wider population, which is likely to drive up the need for health care services. The recent reform legislation only indirectly took on the increasing cost of health care, and that will be the task of the next two decades.

Technology will play a key role in driving down health care costs, while simultaneously improving quality. There is tremendous entrepreneurial activity going on in health care technology. Some of this exists, obviously, within the larger tech arenas of nanotechnology or biotechnology, but much of

it stands on its own. For example, entrepreneurs around the U.S. are developing devices like hand-held, cell-phone-based ultrasound equipment that may bring inexpensive diagnostics to every clinic. Others are working on hospital beds that monitor patient vital signs without needing to wire a patient to the equipment and can communicate the vital signs anywhere via the Internet.

The Meridian health sciences and technology corridor, anchored by St. Luke's and supported by Idaho State and Boise State universities is an excellent contemporary example of leveraging concentrated medical expertise adjacent to an interstate corridor and air transit, near desirable areas to live. TetriDyn Solutions works in health sciences information. Idaho Technology Inc., founded in Idaho Falls, works on biodefense, genotyping, food security and other advanced issues. Companies like these illustrate the future opportunities for new and existing Idaho companies in health care technology.

Real and regulatory impacts of climate change

In recent years the scientific question of whether the Earth's climate is changing, and if so, in what ways and for what reasons, became the subject of political debate. While this was happening, two trends emerged.

First, businesses in the U.S. generally moved past the question of whether they ought to focus on being sustainable, to the question of what they need to do to be more sustainable than they had been. It has been a simple equation. Being sustainable can improve the bottom line, and customers expect it.





Second, nations around the world took on sustainability as a business opportunity, and began to surpass the United States in developing and deploying sustainable technology and best practices. The primary examples of this are wind power in Europe, solar power manufacture in China, and high-speed train transportation and manufacture in both Europe and Asia. Such moves made elsewhere, part of a deliberate strategy to build sustainable cities and nations, has put the future leadership of the United States in greater jeopardy than if we had kept pace.

It is vital to note that surface, air and water-based transport are all inextricably linked to strategies for responding to climate change. The trend is toward demanding greater sustainability.

This means, in response, that the next two decades will see business growth opportunities in:

- Green building design and construction
- Design, manufacture and maintenance of more efficient vehicles, including hybrid and electric vehicles

- Development of more walkable and transit-friendly communities in which people who choose to can be less dependent on driving
- Development of more sustainable products and manufacturing processes that emphasize the “closed loop” in which it is assumed that products, energy, waste, and so on will be recycled or reused to the maximum extent

Challenges to food security and 21st-century agriculture

The world’s population may increase by more than 50 percent in the next 40 years. To meet human nutritional needs we will have to supply as much food in the next 40 years as has been produced during all of human history up until now. In addition, this food has to be safe, sustainably grown, and available where it is needed. This is the challenge of **food security** on a global scale.

In addition, on a national and local scale we have to ask whether, in the next two decades, it will

continue to be economical to routinely plan on the 1500-mile Caesar salad, with most of our food being shipped via fossil fuels thousands of miles before being consumed. Safe and well-maintained farm-to-market roads of 150 miles may become more important in the coming years.

Idaho is well-positioned to respond to food security challenges, paradoxical though they are. First, the state has a long history of providing food to the global commodity markets, and with the increased demand for food these markets are very likely to grow substantially so long as growth can be made sustainable both economically and environmentally. Second, Idaho food growers have joined in meeting the growing demand for organic and local food. Dozens of Idaho farmers, for example, are

part of networks like “[Idaho’s Bounty](#)” which focus on supporting agriculture that aims to serve markets mostly within a 150-mile radius. Such farming will not approach traditional farming in the coming two decades in terms of market value, nor is it well-positioned to respond to the global food challenge. But for many Idaho families it will be a high-growth and satisfying business.

Twentyfirst-century agriculture can be thought of, then, as a robust, commodity-based traditional agriculture managed in a sustainable way; commercial-scale organic agriculture aimed at national and international markets; with an increasing amount of local and often organic agriculture aimed only at local markets. These three systems comprise the [agriculture of tomorrow](#).



Section Three

Opportunities for Idaho

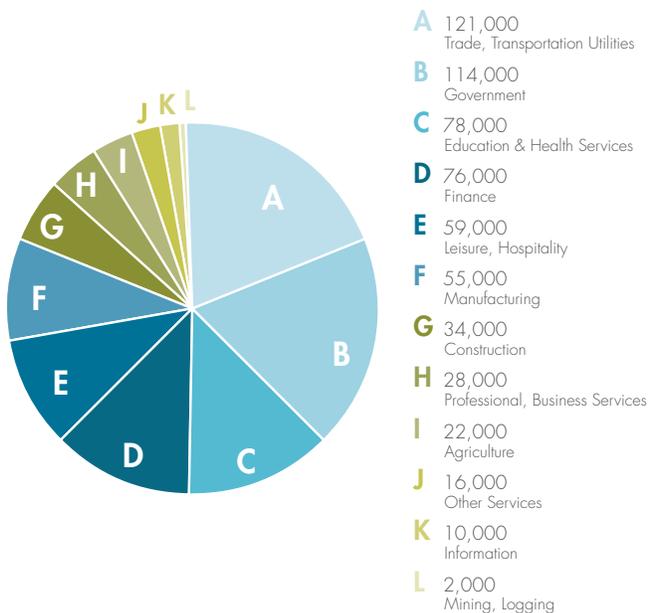
By focusing on world-class assets and leveraging the driving forces of the next two decades, Idaho can better position itself for above-average growth, and sustainability

Traditionally, and especially in the last three decades, the Idaho economy has become an interesting mix of old and new, and this should continue into the future.

arrangements. Ultimately, the new frontier “of opportunity for Idaho will come from new technologies that re-invent energy, diminish distance, create new value, and launch new products.

The health care industry, already an employment sector, will likely be Idaho’s greatest job creator as it’s fastest-growing, largest and highest-paying industry.

Idaho Economic Sectors by Employment
2009



Idaho’s agricultural sector could double in the next 20 years, based on the 2010 starting position of producing 6 percent of the nation’s dairy, 21 percent of its potatoes, 9 percent of the hay, 4 percent of wheat and 2.5 percent of the nation’s cattle and calves. In addition, there is a small but growing area of agriculture focused on organic and local food. A doubling of production has obvious implications for future transportation, namely the need for increased farm-to-market road, rail and river port transportation, as well as enhanced air and intermodal capacity. Without a capacity increase, mobility and safety will suffer and economic growth in agriculture may be curtailed.

The United States is the largest consumer and producer of processed food products in the world. The Idaho food-manufacturing stage will continue to be dominated by large-scale, capital-intensive, highly diversified corporations. At the same time, there is an opportunity to shift processing and manufacturing back Idaho’s smaller communities, where this work began, as some agriculture relocalizes.

Growing the Traditional Economy

Idaho can prove particularly attractive to technology-led, entrepreneurial companies especially as it receives national attention for a unique collection of assets and cooperative

The Gem State is one of four states that led the nation in percentage of green job growth, according to the Pew Center on the States. Idaho



jobs in wind, solar, biofuel, and energy efficiency will grow rapidly. There were 4,500 jobs in green industry in Idaho in 2009. Wind farms and biomass plants will expand in rural areas of the state, according to the Idaho Department of Commerce. In Idaho, the push for alternative energy has only begun. Alternative fuels will expand exponentially, moving into additional areas beyond energy production, into energy transmission and energy storage.

A \$3.4 billion industry, tourism in Idaho will experience continued growth and could double in size by 2030 especially if more international tourists can be attracted.

In relation to the size of the total state economy, Idaho's wood and paper industries traditionally have accounted for significant income and employment. Over \$1.4 billion of Idaho wood and paper products were sold in 2009, down from earlier years. \$1.5 billion worth of minerals are processed in Idaho annually, and the mining industry pays \$12 million in taxes, royalties and fees.

Boise has been recognized in the past as a fast-growing and attractive "high-tech city" although as with other sectors development slowed with the economic recession. A return to growth will create

demand for increased access to research facilities and advanced academic opportunities. Investment in the public university and college network in Idaho, along with the private system, is needed in order to support world-class innovation in energy, health care, agriculture, technology, and information systems in Idaho.

"INVESTMENT IN THE PUBLIC UNIVERSITY AND COLLEGE NETWORK IN IDAHO, ALONG WITH THE PRIVATE SYSTEM, IS NEEDED IN ORDER TO SUPPORT WORLD-CLASS INNOVATION IN ENERGY, HEALTH CARE, AGRICULTURE, TECHNOLOGY, AND INFORMATION SYSTEMS IN IDAHO."

Looking Ahead— a Local View

As part of the Statewide Transportation Plan project, a series of regional meetings was convened in the six transportation districts. At these meetings attendees were asked to describe their sense of the current economic drivers in their region, and give their prediction of future economic drivers. The

findings demonstrate that people do have a basic understanding of the current and future economic situation, but tend to think in relatively conventional ways about the future. They are also, in the middle of 2010, cautiously optimistic about the future at best.

To briefly summarize the future views of the regional meetings, we begin with District 1, the five northernmost counties in Idaho. Meeting participants there agreed that while economic data show that retail trade, health care, construction, manufacturing, and government are the key economic sectors locally, in



reality construction had fallen as a key driver, and tourism was conspicuously missing. They believe that the actual two largest drivers are tourism, and interconnections with the Spokane, Washington, metro area. Looking ahead, the attendees did not see a lot of change in the next 20 years, and said that tourism and health care, both bolstered by the aging population, will become the key economic engines for the region. They expressed a desire for a rebirth of manufacturing, focused on forest products and entrepreneurial activity.

District 2 lies immediately south of District 1, and includes Idaho's only inland seaport, as well as Moscow, home of the University of Idaho and Lewiston, home to Lewis Clark State College. Despite the excellent education base, it seems that few graduates stay in the region, instead seeking opportunity elsewhere. The people in this district feel at a disadvantage, because of their location. This is the only district without an interstate highway. Attendees understand that the future will be largely of their making, and see their future economy centered on education, tourism, health care, manufacturing, and agriculture.

District 3 encompasses southwest Idaho, including Boise and the surrounding metropolitan communities. Meeting attendees are frustrated by mobility issues related to travel to the faster growing suburban cities to the west, including Star, Eagle, Nampa, Meridian, and Caldwell. Current economic drivers include healthcare, arts and culture, recreation and tourism, education, government, professional services, manufacturing, and agriculture. Looking to 2030, meeting attendees believe that key future economic drivers will remain the same, except that green energy will advance in importance compared to agriculture which they expect to decline in importance.

District 4 is in the central portion of southern Idaho, bordered by Nevada and Utah to the south. It has been primarily an agricultural district, though it includes the recreation mecca of Sun Valley and surrounding cities in the northern part of the district. Current economic drivers are seen as health care, agriculture, tourism, retail, and manufacturing. Looking to 2030, meeting attendees believe that future economic drivers will be health care, alternative energy, retail, agriculture, and manufacturing. This group identified a key risk factor to their long-term future, which is water. The district is heavily irrigated, via a canal system and wells. The viability of this irrigation is related to future annual snow pack, which is believed to be decreasing in a changing climate. One area of concern in this district is that people in general are said to view Sun Valley as not part of the "real Idaho" and this view may contribute to not leveraging that world-class asset to the fullest.

District 5 sits in the southeast corner of the state. Pocatello is the largest city, county seat, and home to Idaho State University. People in the region feel disadvantaged, without the tourism draw of the more mountainous district to the north, or Sun Valley to the west. While the technology research center

of the Idaho National Laboratory is only 50 miles away, local people have seen it as outside their sphere, rather than looking at it as a state resource. The current economic drivers are education, mining and manufacture, agriculture, and government. In 2030 people anticipate that the economy will center on alternative energy, including companies like Hoku, Nordic Wind Power, and Peterson, along with education, health care, and government.

District 6 is located in the northeast corner of lower Idaho, just north of District 5, and comprises a combination of flatland farming around Idaho Falls and prime tourist, recreation, and wilderness land to the north and east. Idaho Falls is the third-largest metropolitan area in the state behind Boise City-Nampa and Coeur d'Alene, but the second-largest independent economic and cultural center. In the past decade, with several higher education institutions including Idaho State University. Rexburg is home to the new BYU Idaho.

Idaho Falls bills itself as the gateway to Yellowstone National Park and Grand Teton National Park. Historically the local economy was based on agriculture and being a regional hub of agriculture, medicine, transportation, and commerce.

Recently the economy has been diversifying around science and technology because of the presence of the Idaho National Laboratory (INL), the Center for Advanced Energy Studies (CAES), and related companies. AREVA, a French-owned energy services company has proposed a \$2 billion investment in a uranium enrichment facility and this project is in licensing process with the Nuclear Regulatory Commission with a hoped for opening by 2014.

The presence of this scientific base has received national recognition and Idaho Falls promotes

itself as a leading small city for bioscience jobs. When meeting attendees imagined future economic drivers, they called out the technology industry connected to INL, tourism, health care, agriculture, and manufacturing.

Future Economic Drivers Statewide View of 2030
Health Care
Alternative and Green Energy – sun, wind, nuclear
Recreation/Tourism
Education/Government
Retail
Manufacturing
Arts and Culture

What stands out, overall, in reviewing these local forecasts of the future economy are three observations, each heavily dependent on transportation:

1. A consensus that producing alternative energy, both the technology for it and the energy itself, is fundamental to the future of most regions of the state.
2. A belief in, perhaps best expressed as a hope for, a revitalized local manufacturing capacity.
3. A tendency to discount the future of agriculture in Idaho. We don't know whether this view is a result of agriculture becoming less labor-intensive over time, loss of local agricultural land near metro areas, or a general misreading of future food needs. As we argue elsewhere, this is one assumption that we disagree with, believing that agriculture could double, or grow even more, in the coming two decades in Idaho.

Statewide Opportunities

Next-generation energy technology

In early June 2010 two seemingly random events caught our attention as we imagined the future of the Idaho economy. First, while watching a game on television during the World Cup in South Africa, a company name in a field-side advertising panel was noted—Yingli Solar. A quick search revealed Yingli to be a Chinese company, one of the largest solar power manufacturers in the world, and a leading 21st-century company. Its bold advertising seemed to say, “We are the future,” while in the U.S. the focus was on how to stop an oil spill.

The second early June 2010 event was an important announcement in Boise during the annual state of the city gathering that revealed plans to build a \$45 million solar power installation near the Boise airport. This 10-megawatt solar photovoltaic park, along with a companion set

of solar panel structures for an airport parking lot, will be built, if all goes according to plan, by homegrown Sunergy World.

This solar power project is just the latest in a series that are setting up Idaho, and in particular the southern tier of the state, to take a leadership role in challenging the current global players investing in the next generation of energy. Chief among these projects, we believe, will be solar energy, including research and development, design, manufacturing, and installation of solar facilities—both photovoltaic, where major advances in technology remain available, and thermal solar energy.

Idaho has significant wind capacity as well, and installations like the Goshen North wind farm near Idaho Falls will produce enough electricity to power 37,000 homes. INL has identified many sites in Idaho where useable wind is available. On the manufacturing side, the Pocatello assembly plant of Nordic Wind Power has been shipping giant turbines nationally and internationally, and the higher education community has committed educational resources to wind engineering.



The agricultural community should be taking a serious look at energy production as well. It is a little-known piece of history that when John Deere first imagined his tractor, he assumed that each local farmer would own a tractor and produce his own biodiesel fuel on the farm, from waste and from produce. He imagined a closed loop system. Cheap oil changed that vision, of course, but the prospect of using agricultural waste products, as well as looking at the introduction of new crops or algae farms for fuel production should be on the radar of the Idaho ag community.

Finally, Idaho should aim to be the national leader in an American renaissance of nuclear energy for the 21st century. The U.S. Department of Energy is actively supporting the development of third generation nuclear power to replace an aging nuclear infrastructure, but more so to provide the amount of electric energy assumed to be necessary for both a growing population engaged in information work, and for the coming transition of transportation toward increasing electrification. Tapping an estimated 1.8 million tons of thorium in the Lemhi Pass area could be key to this potential nuclear future.

Gov. C.L. "Butch" Otter summarized the green energy future for Idaho on June 3, 2010: "Not only are we harvesting the wind, but we are harvesting the sun with our solar panel production. We are harvesting hot water under the ground with the geothermal production that we have now down at Raft River, we are already producing 17 megawatts of electricity on the geothermal and obviously with

the renewable opportunities that we have with our forests biomass that's not too far behind." (www.kpvi.com June 3, 2010)

Leadership in tourism and recreation

International tourism is the world's largest export earner and an important factor in the balance of payments of most nations. Tourism is becoming the world's largest industry in part because of the millions of travelers from such booming economies

as China, India, Brazil, and Russia. In the United States, tourism is the nation's second largest retail industry. The number of international tourist arrivals has grown exponentially over the past 50 years.

Tourism is traditionally an industry that comprises

attractions, restaurants, accommodations and transportation. In Idaho, tourism can provide the basis upon which communities can renew their pride in heritage and the quality of life. Traditional crafts, ethnic cultures, and historic rites and celebrations are a few examples of "attractions" which are increasingly popular among tourists.

Scenery has never been more important in deciding where economic growth happens in America. A quick scan of the economic landscape quickly reveals a pattern in which mountains, rivers and lakes are powerful magnets of economic activity. Idaho is known as the "whitewater state" for rafting and kayaking, and is blessed with an extensive system of scenic byways, and the most accessible network of back-country airstrips. And of course

"FINALLY, IDAHO SHOULD AIM TO BE THE NATIONAL LEADER IN AN AMERICAN RENAISSANCE OF NUCLEAR ENERGY FOR THE 21ST CENTURY."





Idaho is home to world-class destinations such as Sun Valley and the greater Coeur d'Alene and Sandpoint areas. Ensuring ease of access to these areas, planning for investments in an electricity-based transportation infrastructure in the scenic corridors, and where appropriate, providing for much-enhanced public transportation must all be a part of any future plan.

The most urgent issue in Idaho tourism should be a very rigorous development strategy that satisfies the demand of current generations while ensuring the capacity to meet the travel demands of future generations. Tourism is transportation, and without capacity and safety there are no tourists.

Building Idaho's economy by increasing visitor expenditures throughout the state should be a goal. The next two decades will see new opportunities in ecotourism, agritourism (guest ranches and farm experiences), and heritage tourism for communities that preserve and promote their historic features. Farm communities will not generally become tourist

communities. But these approaches can add several successful small businesses and make communities more interesting to potential new families.

Sustainable agriculture to meet global and local needs

Today, food items are shipped worldwide and enormous quantities of food are routinely transported from places of abundance to sites of scarcity, enabling cities to be built in deserts. Still, in the past 40 years, the United States lost more than 1 million farmers and ranchers. During that period, income from farming operations, as a percentage of total farm household income, plunged to half of the previous level. Today, only **11 percent of family farm income comes from farming**. In order to maintain viable households, rural Americans have been forced to seek alternative sources of support, and benefits such as health insurance. These factors have changed the face of rural America.

We believe, and have already argued, that Idaho should imagine a doubling of its agriculture base in the next two decades, as measured by production, income, and employment with commensurate impact on the Port of Lewiston, as well as intermodal and other transportation needs. We have noted that 21st-century agriculture will include three primary components: sustainable traditional commodity farming, commercial-scale organic farming for national and international markets, and a high-growth curve in local farming serving local markets, both organic and traditional.

We also anticipate a small but accelerating transition toward what will be called fossil fuel—frugal farming. Such farming requires more human labor and aims to lower fossil fuel and chemical inputs. It will not be for everyone, but we see it growing around the country.

Both large and small-scale agriculture will continue to become more knowledge-intensive, requiring technical and systemic knowledge on the part of farmers. A proactive and intelligent effort to grow agriculture in Idaho will have many benefits: more careers in farming, more protection for the environment, less soil erosion, a revitalization of rural culture, and even improvements in public health.

Attracting the creative class with community development

In recent years a great deal of analysis has been focused on what is required for a community to attract the “creative class,” meaning both creative high-tech industries, and an educated and more highly paid labor force. Beginning in the 1990s and into the first decade of this century, Boise was considered a prime example of a community that had figured out how to do this—a combination of smart urban development, support for and from higher education, and clustering of a critical mass of tech companies. This spilled over into the surrounding metro area and was combined with construction to create robust economic growth. On a smaller scale, other Idaho metro areas, particularly Idaho Falls, mimicked this success.

But the economic crash of the past few years, which hit both high tech and construction very hard, brought this economic surge to an end. Now, according to a recent study from the Brookings Institute on the “[State of Metropolitan America](#)” cities have to reformulate their strategies. The Boise area, classified as a “mid-sized magnet” in this study, is advised to “Seek greater economic balance in the wake of the housing crash. Smart infrastructure investments in these metro areas could promote growth of alternative energy production and distribution, international travel and tourism, and linkages with larger nearby centers of global commerce. Their leaders must also be fierce

champions for the continued viability of 2 year and 4 year higher education institutions, which offer the best hope for ensuring that their large and growing young minority populations can share in the fruit of future economic growth.” The [Idaho Technology Council](#) champions similar initiatives.

Enhancing higher education

Support for higher education is critical to the future. The “State of Metropolitan America” report points out that “younger adults, especially in larger metro areas, are not registering the same high levels of degree attainment as their predecessors.” [The National Report Card on Higher Education 2008](#), published by the National Center for Public Policy and Higher Education, found that Idaho misses the mark in affordability of higher education. Idaho



Sunrise Energy Technology Corridor



has great education assets to leverage, particularly as related to innovation, and making a decision to support these institutions at world-class levels would be prudent. The challenges include affordable access to higher education and finding ways to provide adequate state support for university budgets over the next two decades in the midst of many competing budget priorities.

Future world-class assets—four scenarios

The opportunities for the future come together in the following four scenarios for 2030, described as though they have happened.

Sunrise Energy Technology Corridor

In 2030, the long 300-mile corridor from Rexburg in the east to Nampa in the west has become home to the Sunrise Energy Corridor, the nation's largest and fastest-growing technology corridor. Blessed

with leading private and public industry including the Idaho National Laboratory, semiconductor and poly-silicon and photovoltaic manufacturers, and with a college population of over 40,000 students at Idaho State University in Pocatello, BYU-Idaho in Rexburg, the Idaho Technical College in Idaho Falls, Boise State University, the College of Idaho in Caldwell, and area community colleges, the entire corridor is leading the nation into its next energy future.

Between 2010 and 2020 the region recognized its abundance of natural and manmade resources and came together to identify and enhance its ability to grow the next energy sector, including nuclear energy, solar, and wind. The universities and INL began to work with each other and to train engineers for employment in INL and the spin-offs formed to commercialize technology created there. Venture capitalists from the Silicon Valley noted that the metro centers in this Idaho corridor had similarities with the incubators of the San Francisco Bay Area, where universities, large companies and national laboratories spawned the technology industry 60 years before. They began to bring

capital to the region and its proximity to the great mountains and ski areas such as the Grand Tetons and Sun Valley resulted in more of them making the region their home.

This region still had wide-open spaces, affordable real estate, a sunny climate, and natural resources and employment opportunities in abundance, and over time the graduates of the universities stayed, worked, and raised a new generation of tech-savvy Idahoans. With unparalleled natural and human assets, the Sunrise Energy Corridor greets the rising sun over 300 days each year.

A smart transportation grid that crossed the traditional Idaho transportation district lines facilitated the development of the corridor. High-speed rail or bus rapid transit was developed along the entire corridor, along with a dedicated truck lane system to speed freight movement. At the state capital the visionary leaders noted the potential impact of INL and that its focus on green energy

was perfectly timed with the steadily increasing price of fossil fuels and they allocated even more research dollars to the public universities in the region. In response, the universities added energy engineering and computer science majors and also began to be actively involved in shaping the technology and energy economy.

Creative class cities tied to both outdoor recreation and the digital world

In 2030, individual metro areas all over Idaho reaped the benefits of their efforts to become creative class communities over the past two decades. Wherever you found an Idaho city in 2010, you could note the local opportunity to capitalize on access to natural and recreational assets, relatively affordable housing, and in many cases, proximity to college and university education. Many had town centers that, if not currently lively, had the potential to revitalize, while





the wider community had potential to improve the livability and walkability of neighborhoods.

Mayors, councils, and business associations came together in the early years after 2010 and dedicated themselves to envisioning a connected and vital network of cities with enhanced transportation mobility and safety.

Following formulas like that in the “State of Metropolitan America” report, strategies focused on:

- Improved transportation options including doubling of transit capacity in appropriate cities and between cities where heavy tourist traffic existed
- Support for education
- A focus on housing and services for an older population
- Health care services and in the vicinity of the major universities, biotech and health care research
- Assurance of the highest-capacity digital communication networks possible, so that digital commerce could emerge in smaller communities as well as large

“IN 2030, INDIVIDUAL METRO AREAS ALL OVER IDAHO REAPED THE BENEFITS OF THEIR EFFORTS TO BECOME CREATIVE CLASS COMMUNITIES OVER THE PAST TWO DECADES.”

- Support for local agriculture, through preservation of local ag lands, better farm to market transport and promotion of farmers markets
- Support for 21st-century energy initiatives in the local area—wind in some areas, solar in most, and nuclear power

There was one development that changed transportation and community development patterns more than all the others in Idaho. That was a serious commitment to making Boise International Airport and the greater Treasure Valley region into a new multimodal transportation center, a project that commenced in earnest after 2010. An effort was made to learn from ambitious “aerotropolis” developments like Dubai World, Beijing Capital City Airport, and Suvarnabhumi International Airport, the Bangkok aerotropolis that opened in

2007. The Idaho project combined with regional land use planning; high-speed transportation to points east, west, and south; the energy technology corridor under development; and finally in-fill housing developments planned for the coming decades. Thus the multimodal transportation center project was a keycatalyst in not just reviving but jump-starting the Idaho

economy in ways that were hard to imagine 20 years ago. Yes, our project is smaller in scale than Dubai or Bangkok, but huge for us.

An indispensable ingredient in enabling the multimodal transfer project to go forward was a rethinking of the roles of state and local jurisdictions in transportation and planning.

New forms of transportation financing, driven mostly by changes in fuel use and transportation patterns, along with a redesign of revenue sharing formulas and decision-making responsibility meant that local areas in the state had more options when creating their transportation and community future. This is a never-ending process, as conditions continue to change with the pace of technology development that just seems to keep accelerating.

By 2030, if you walk the streets of Boise, but also of Sandpoint or Coeur d'Alene, Moscow or Lewiston, Nampa or Eagle, Idaho Falls or Twin Falls, Ketchum or Hailey, or virtually any city in the state, you are walking in a high-tech, forward-looking, attractive, and yet strangely traditional, even old-fashioned town. These are cities of the future.

organic farming was embraced as a commercial opportunity. Third, local agriculture serving the local food movement gained considerable share. This



21st-century agriculture

In 2030, building on its long agriculture history, Idaho has doubled in two decades its agriculture output, income, and employment. While there is no single model for successful agriculture in 2030, these results were accomplished by simultaneous pursuit of five development tracks. First, traditional commodity agriculture, operating in an increasingly sustainable fashion, sought international markets, expanded production with improved information and biological sciences, and added energy production to the portfolio. Second,

was a particular asset to the tourism sector as local resorts and restaurants emphasized their use of fresh local food.

Fourth, a new agriculture sector was supported, to contribute to the alternative energy industry. This comprised crops grown for ethanol production, crops grown for biodiesel production including the extensive algae farms visible on Idaho's southern border, along with near universal use of agricultural waste for energy production. The algae farms were especially noteworthy. According to



researchers at a Department of Energy plant in New Mexico, single-celled microalgae, grown in pond water contained in large greenhouse-like structures, produce a biofuel that is lead-free and biodegradable, emits two-thirds less carbon dioxide and other pollutants than gasoline, and can run any modern diesel engine. Even better, algae required only a fraction of the land area of biofuel-producing crops.

The final strategy related to agriculture focused on food processing. The conversion of Idaho agricultural materials to value-added products, including not just packaged food but also products ranging from pharmaceuticals to commodity fuels and chemicals, helped to meet the nation's chemical and energy needs. Research conducted in this area led to new markets for agricultural crops, wastes, and by-products, resulting in greater demand for agricultural crops, increased economic returns to farmers, and reduced national dependence on petroleum. Best of all, by 2030 increased food processing had contributed to

growth in basic manufacturing jobs in communities that in decades past had seen the loss of such jobs.

Tourism of the future

In 2030 people continue to want, and in fact to need, recreation and travel. While at the beginning of the last two decades some experts were seriously asking whether rising fuel costs would limit recreational travel, by 2030 we know that was not the case. What happened instead was the burst of creativity in vehicle and fuel technologies that enabled travel to continue.

The number of visitors to Idaho has increased from about 30 million trips in 2010 to 40 million in 2030. Visitors are attracted most of all by Idaho's reputation for adventure tourism. This includes the traditional whitewater experiences that Idaho has been famous for, its skiing destinations, and its wilderness and mountains. There is great interest now, in 2030, in the extensive system of back-country fly-in destinations, which have been

TO FEED A WORLD POPULATION THAT WILL INCREASE BY 50 PERCENT IN 40 YEARS, WE MUST PRODUCE AS MUCH FOOD IN 40 YEARS AS IN **ALL OF HISTORY** UP TILL NOW.

carefully nurtured and maintained for the past two decades. With the advent of autonomous and safe small planes, operated both by private individuals and by two air taxi companies, use of the back-country air-strips expanded. This development was especially aimed at the aging population no longer able to access deep wilderness on foot or horseback, but still interested. A system of upscale back-country huts, on the model of European and Northeast U.S. hut-to-hut systems has been developed as well via new wilderness rules.

“WHAT HAPPENED INSTEAD WAS THE BURST OF CREATIVITY IN VEHICLE AND FUEL TECHNOLOGIES THAT ENABLED TRAVEL TO CONTINUE.”

The Idaho recreation system did have to adjust in two important ways.

First, in the world-class resort areas amenities were upgraded to attract the global traveler. Second, in wilderness entry points a stronger effort to provide sustainable access was pursued. This included ecotourism, transportation such as low-impact transit between sites, affordable accommodations and amenities in entry point communities, and continued protection of wild areas even with the addition of the hut system.

As private vehicle travel began to transition toward electric vehicles, first with hybrids, later with the flood of fully electric vehicles that appeared by 2020, it became necessary to provide for recharging along scenic byways and in tourist towns.

More than ever, Idaho became a famous destination to visit.

From localized to systemic thinking

These four scenarios illustrate two larger points.

One is that a shift from localized to systemic thinking is necessary in order to conceive of ambitious results. The second is that if current economics dominate the future allocation of transportation dollars we will be doomed to repeat the past because we will make decisions based on recent economic trend lines. It is admittedly difficult to allocate improvement dollars to support

areas not currently in clear need or that seem hopeless, because of limited budgets. But allocating dollars toward potential and vision can lead to statewide economic growth.



Idaho Scenic Byways

Section Four

Risks to a Preferred Future

Idaho, like the nation and the world, faces considerable risks in shaping a positive future. It is important to anticipate such risks and develop mitigation or preventive plans for them.

Among the risks to the preferred economic future are:

- Funding of transportation improvements. This is a well-recognized risk, statewide and nationally. Yet, not enough has been done to address it. The risk derives from two sources. First, traditional funding methods are falling short, as fuel taxes fail to keep up with needs. Second, the needs are increasing as an infrastructure maintenance deficit accumulates. Federal officials estimate that the Highway Trust Fund falls behind by about \$8 billion per year currently. Devising methods to narrow this gap is consistently delayed. Additionally, if the focus in Washington, D.C. shifts decidedly toward deficit reduction, the need to replace federal dollars with state dollars will increase and will be difficult to accomplish.
- Global economic imbalances. Obviously in 2010 the whole world is struggling to find the right balance between economic stimulus during a deep recession, and minimizing future debt. Unless we find the correct balance and the appropriate timing of stimulus versus austerity, there are fears of a “lost decade” that would limit both private economic growth and public investment in infrastructure. This is largely beyond local control, but when investment is possible, aiming it at the highest productive outcomes will be more important than ever.
- Water availability in the Treasure Valley, Magic Valley, and elsewhere. A concerted and careful plan to conserve and protect water is essential, particularly if climate conditions reduce snowfall or produce



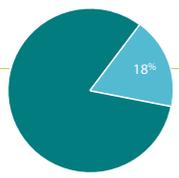


prolonged droughts in areas dependent on snowfall for irrigation.

- Manage the delicate balance between protecting endangered species and providing river access in Lewiston and the Quad Cities. Protecting this port access seems vital to the industrial and agricultural future of the inland wheat farmers, paper and wood product manufacturers, and other shippers of commodities to foreign and domestic markets.
- Lack of educational attainment and focus compared to competing areas. The future is knowledge intensive. A culture that emphasizes educational attainment, and public policy that supports education are essential.
- Political culture that inhibits the public investments needed to compete in a global economy. In contrast to other periods of history, we live in a time where public investment in infrastructure to support business development is difficult, both economically and politically. Yet public vision, investment, and incentives, combined with entrepreneurial initiative, will be necessary to achieve a robust economic future.

“IT IS IMPORTANT TO ANTICIPATE SUCH RISKS AND DEVELOP MITIGATION OR PREVENTIVE PLANS FOR THEM.”

- Availability of private capital. This is an ongoing issue in most states that want to spur economic development and it is no different in Idaho. Economic opportunities based on developing new technologies have relatively long gestation periods and private investment is essential in the early stages. The lack of homegrown venture capital funds could be a hindrance. The centers of technology investment lie to the west (Seattle), to the south (California) and east (Boston and New York). Gaining visibility with investors in these regions can happen, but not by chance; a concerted and coordinated effort will need to be made and it will need to emphasize not only the future potential of Idaho; but also the world-class assets identified earlier in this report.
- The long-standing transportation bottleneck between southern and northern Idaho. As Gov. Otter likes to say, “Northern Idaho is a direction, not a place.” While highway improvements have been made, this perennial division continues to pose a risk to whole-state economic integration.



18 PERCENT OF CURRENT IDAHO ROADS AND 29 PERCENT OF BRIDGES NEED REPAIR OR REPLACEMENT.

Section Five

Strategic Implications



What is needed in Idaho to achieve this economic future? The primary focus of this section is on transportation infrastructure, but other factors are important as well. These include attracting talent via education, and cultural and recreational opportunities; developing affordable and attractive housing, especially in walkable communities and neighborhoods; and generating capital, the missing link. Financial and tax incentives can boost economic innovation—incentives such as research and development tax credits, sales and use tax exemptions, creation of capital access funds and investment tax credits, to name just a few of many possible incentives used by competing states and regions. We have also made clear the importance of communications and energy infrastructure to the future. However, strategic investment in transportation will be a key to Idaho's future economic well-being, mobility, and safety.

Strategic Development—the role of transportation

In 1956 President Eisenhower signed the Interstate and Defense Highways Act, a transformational moment for the nation. The vision was clear: “to connect principal metropolitan areas, cities and industrial centers, serve national defense, and connect with Canada and Mexico.” There are many who think that was the last time the country, or the regions within it, shared a unified vision for transportation.

Idaho's transportation system will play a vital role in determining whether the economic opportunities discussed in this report, along with countless others that will emerge in the coming decades, can be realized. The total Idaho transit network—the interstate, other highways, streets and roads, rail, bus, air, freight, port facilities, intermodal transfer points, bikeways, scenic byways, trails, greenbelts, and sidewalks—must all be maintained, expanded, and integrated to build a rich future.

This must be done in a future in which transportation will differ in some important ways from the transportation world of 2010. First, as we have seen, driving behavior of the next demographic generations may lead to fewer vehicle miles and few vehicles per capita, even without energy costs factored in. This is because generations raised on communications technology—technology that will be richer, fully visual, three-dimensional, and even more ubiquitous in 2030—will turn to communications rather than physical travel



to conduct more of life’s activities. So, we should be planning for less driving, less commuting, but more local deliveries than today.

Second, vehicle technologies will have greatly advanced in 20 years, and much of today’s vehicle fleet will have turned over. By 2030, older vehicles will be much more fuel-efficient than the average vehicle of 2010. Further, we estimate that 20 to 25 percent of vehicles by 2030 will be either plug-in hybrid vehicles or will be battery-driven fully electric. This means rethinking fuel tax policies, but even more it means beginning now to plan for the robust charging and electric grid infrastructure needed. There is also a reasonable probability that some private and commercial vehicles will be capable of driving themselves by 2030—that is, there will be many autonomous, artificially

intelligent, robotic vehicles by then. The use of such vehicles, and the intelligent infrastructure necessary to support them, will likely become an imperative in the coming two decades, an entirely new factor for transportation planners to take into account. The promise of such intelligent vehicles and infrastructure will be greater mobility and much greater safety, without the need to substantially expand the road system.

Beyond auto and truck vehicle advances, we can also anticipate that by 2030 there will be greater interest in, need for, and financial support for in-city transit, and higher-speed rail connections between major U.S. cities, including the current and former Amtrak routes through Idaho. Within metro areas, we expect continued modest development of rail-based transit systems, especially street cars.





In a way, this is back to the future. The economic multiplier of rail versus bus transit will always be subject to debate, but developers and merchants are more likely to build attractive urban centers near rail because they are secure in the knowledge that the system will not be moved or otherwise changed once it is in place. While as of 2010 no fixed-rail transit systems are currently approved in Idaho, we would encourage the densest Idaho metro areas, like Boise or the Coeur d'Alene to Spokane corridor, to be open to exploring rail transit as a way to best position their areas for long-term economic security.

Advances in infrastructure technology will also play a major role in transportation planning and development in the coming two decades. Chief among these are the long-anticipated improvements from the installation of intelligent transportation systems. The use of such systems will, we believe, significantly increase capacity of current infrastructure within metro areas. [Advances in intelligent signalization](#) are a good example. The best of the new systems being researched are capable of learning, capable of communicating with vehicles, and capable of predicting future situations. One such research project envisions a system in which autonomous or intelligent

vehicles will, using wireless communications, make a kind of reservation to enter and pass through intersections; the intersection software will time the signal lights in such a way to accommodate reservations, allowing more traffic for maximum mobility, and virtually eliminating intersection collisions.

On the construction side, there are many advances that should enable cheaper construction and more affordable maintenance costs. Examples include geosynthetic reinforced soil for bridge abutments, and one of the newest innovations, [diverging diamond interchange](#) design. The latter is being installed for the first time in the U.S. by the Missouri Department of Transportation, and saves considerable construction expense, compared to standard cloverleaf interchanges, while also providing better mobility enhancement and safety improvements.

Also improving safety, the construction design called "[safety edge shoe design](#)" has proven to reduce run-off-the-road fatalities significantly. This may be an especially valuable innovation, over time, for Idaho's miles of rural and two-lane roads as new construction and repairs are done.

The strategic implications for transportation can be summarized in 12 key points:

1. **Focus on critical commerce corridors.** While in this report we described just one rather grand corridor, which we called the Sunrise Energy Technology Corridor, in fact, the state has several potential corridors aimed at technology, manufacturing, tourism, and agriculture. Moreover, federal funds are increasingly designated for supporting an economic corridor approach to development, and this should be leveraged. Doing so will mean crossing traditional transportation, community and state planning boundaries and acting in a unified and regional way.

2. **Preserve and modernize the current system.** Priority in funding should go to preserving the system of roads, highways, and bridges built in the last century, and where possible, modernizing them. This is no small recommendation, routine though it may seem, as illustrated by the [2010–2014 Statewide Transportation Improvement Program](#). Projects planned for 2010 to 2013 alone total some \$2.2 billion, and given anticipated growth combined with aging assets, the cost out to 2030 is nearly incalculable. Looking at the total deficit in maintenance versus anticipated revenues, two conclusions stand out. First, any means to modernize and streamline the system is essential. Each repair should leave the system better and cheaper to maintain, not merely patched.

Second, securing the necessary federal and state funding will be a very large challenge. We have mentioned techniques like geosynthetic reinforced soil systems. There are also next-generation bridge and pavement structures using composites and nano-concretes in the research pipeline. Federal highway researchers bemoan the difficulty in getting state transportation departments and engineers to adopt these new technologies, but doing so may become the only way to preserve the system.

Third, new funding models will be necessary in the next two decades to address anticipated funding shortfalls. With 29 percent of current Idaho bridges and 18 percent of roads needing repair and replacement and others declining rapidly, it will be difficult to maintain the system in future years without revenue increases.

3. **Plan for a significant vehicle transition over the two decades.** As we have indicated elsewhere, there is reason to expect a decline in private vehicle use in the next two decades. Indicators of this include declining interest in driving among young people who prefer to move bits of information rather than themselves, and real declines in average



vehicle miles traveled in recent years. At the same time, private vehicles will dominate the Idaho landscape in 2030, as they do now. These vehicles will, however, be more likely to use hybrid, alternative fuel, and electric drive systems. This suggests a need to plan for alternate funding mechanisms as compared to fuel taxes, and to prepare key corridors to support a more electrified vehicle fleet. Neither



of these implications is new, but they are growing nearer to reality. The new vehicle fleet does promise important advances in safety, perhaps decreasing the burden on infrastructure to some degree. Safety advances will include better materials and standard intelligence systems such as on-board collision avoidance.

4. **Expect an increase in freight traffic of all kinds.** The economic activity envisioned here assumes an increase in local deliveries of packaged goods ordered via the Internet and of locally grown food, beyond that resulted from population growth. It also assumes a significant increase in the movement of raw materials to manufacturing facilities, and increased movement of manufactured goods, some of them very large such as wind energy components, and some of them possibly hazardous. The national vision of dedicated truck and freight lanes, while it seems a difficult reach in terms of funding, makes sense on major interstate corridors, and setting a goal to build them is wise.
5. **Plan to increase the density of cities and towns, and provide for efficient and walkable neighborhoods.** It is probable that certain suburbs and shopping centers will be **reinvented as denser and more villagelike development**. The market and demographics will drive this trend, but policy decisions can help. One of the significant transportation mistakes made in the past, for the purpose of saving initial investment dollars, has been building residential areas without sidewalks. Two things invite the use of the most simple transportation system ever, our two feet. These things are sidewalks and places to walk to. And the best thing to walk to, it turns out, is a grocery store. An information worker who can walk easily to a grocery store needs to drive quite rarely. Encouraging livable neighborhoods with those two amenities will increase the attractiveness of Idaho communities.
6. **Plan to at least double public transit capacity in metro centers, and public transportation between close population centers in key economic corridors.** This is not a calculation based on meeting current needs. Rather it is a choice regarding the quality of transportation options for the future, a hedge against energy shocks, and a move designed to accommodate likely demographic trends. As we have seen, Idaho like the rest of the nation anticipates an aging population, perhaps as much as 20 percent of the population. When asked, people say they hope to keep driving into old age. But the facts are that already 25 percent of people over age 65 no longer drive. If we expect to have a mobile elder population, options will be needed.
7. **Add lane miles.** As noted in the Statewide Transportation Improvement Program 2010-2014, every district in Idaho anticipates growth in population. If the vision in this report is to be realized, given this likely growth in Idaho population and increased economic activity, additional road capacity will be necessary. The growth in miles will not match the growth in population on a percentage point basis, so these system enhancements must be carefully targeted toward prospective bottleneck and economic development areas.
8. **Join the national research and development effort to use intelligent transportation systems to improve mobility and safety.** Over the next two decades, in fact in the near future, intelligence built into vehicles and into the transportation infrastructure promises to radically reduce accidents. For example,

sensors built into intersections, interfaced with sensors in vehicles, will soon be able to inform all inbound traffic of other approaching vehicles. Automatic collision avoidance systems could warn or even prevent potential collisions.

9. **Improve system performance with information.** Imagine a future in which personal communication tools allow us to move about with full information about route conditions, bottlenecks, transportation options, exactly where all transit vehicles are in real time. Imagine a future in which the infrastructure is constantly reporting on its condition, and adjusting its performance. The ITD public transportation ride tool, based on geographic information systems, that is moving to realtime use right now is a start in this direction.

10. **Explore new materials for system improvements.** This might involve polymer-based materials and nanomaterials for road surfaces. It might involve more exotic products currently being researched to surface parking lots, sidewalks, and **even roads with solar cells** covered with spray-on liquid glass tough enough for traffic, and capable of self-heating and self-cleaning. We should not be confined by conventional thinking.

11. **Pay attention to the rail system and ports.** It is possible that in the coming two decades a major federal push to improve higher speed intercity rail will be sustained. If this happens, then looking to join east-west corridors and to promote a southern route to Utah and California would be vital. The key for Idaho is not to be left out of higher speed rail if it is built. As for the Port of Lewiston, it is a competitive advantage for otherwise landlocked Idaho to have a port such as this. We believe that aggressive efforts to preserve this port, and expand its intermodal capacity will be an economic winner in the coming two decades. We also have one far-out idea that we recommend considering. The Port of Lewiston is hampered perhaps most of all by lack of access to interstate highways. In addition to enhancing rail throughput, why not become

the first state in the nation to develop a blimp-based freight hauling system from Lewiston to an appropriate intermodal center adjacent to an interstate. **Move containers by blimp** from the Port of Lewiston to another point, or points, in Idaho, thus enabling the Port to handle more container traffic. By 2020 to 2030 such an idea may not be a wild card at all.

Think more broadly than transportation systems. The future economy depends on the interlinking of transportation, information, and energy infrastructure, along with community development aimed at supporting a creative lifestyle. The electric energy grid in the U.S. is very antiquated and the electric energy industry is gearing up for major investments to move to a "smart grid." Important to this work on a smart grid is the substitution of natural gas for coal and the integration of alternative energy sources—wind and solar in the near term, nuclear in the longer term—in an information-intensive grid. But even more fundamental is the assumption of the electricity industry that the transportation system will aggressively "electrify" in the coming two decades, and it's ready to partner in that development. The point is this: Get everyone in the room at the same time—transportation, community development, communications and information technology, the energy industry and even vehicle manufacturers —when planning.



Section Six

Case Studies

Here we present three case studies of communities and regions that have looked at the long-term future and asked how their infrastructure, broadly defined, can promote positive economic growth.

Atlanta Regional Commission Livable Centers Initiative

The Atlanta Regional Commission (ARC) is the regional planning and intergovernmental coordination agency for the 10-county area surrounding and including the city of Atlanta, Georgia. Its mission is to serve as a catalyst for regional progress by focusing leadership, attention and planning resources on key regional issues. As the designated Metropolitan Area Planning and Development Commission as well as a Regional Commission, the ARC is responsible for community-wide, long-range infrastructure planning. The planning purview of the ARC includes comprehensive planning for the region, and specific plans for transportation and water resources.

One program undertaken by the ARC is the Livable Centers Initiative. Through this project, in 2010 the ARC awarded five local governments a total

of \$440,000 in grants. The intent is to assist each community in creating quality growth plans in specific locations that will enhance the livability of those areas.

The LCI grants, given annually to local governments in the Atlanta region, will help DeKalb County and the cities of Doraville, Dunwoody, Hampton and Morrow design plans that will better link transportation improvements with land use strategies. Once plans are completed, these communities are eligible for a larger pot of federal funding to implement their projects.

“THE INTENT IS TO ASSIST EACH COMMUNITY IN CREATING QUALITY GROWTH PLANS IN SPECIFIC LOCATIONS THAT WILL ENHANCE THE LIVABILITY OF THOSE AREAS.”

“Over the years, LCI has helped communities across metro Atlanta re-tool and redesign to become places that attract residents and businesses alike,” said Tad Leithead, ARC chairman. “Our local government partners have used these grants to the benefit of the entire region. Because of that, LCI has become a national, award-winning model.”

The goal of the LCI program, created in 1999, is to help local governments devise strategies that reduce traffic congestion and improve air quality by better connecting homes, shops, and offices; enhancing streetscapes and pedestrian amenities; and improving access to transit options. With this latest round of grants, LCI has assisted 107 communities with more than \$141 million in grant awards.



Here are five examples of projects receiving awards in early 2010.

- The City of Doraville will focus a study on the redevelopment of the now-shuttered General Motors Assembly Plant, the adjacent MARTA station, and the ripple effect on existing businesses within the area.
- The newly incorporated City of Dunwoody will prepare an LCI study focusing on Dunwoody Village, which has long represented the historic center of the community. This study will develop strategies for transforming Dunwoody Village into a vibrant town center, including a mix of uses and improved traffic circulation throughout the area.
- The city of Hampton will use the LCI planning process and its current plans and projects to create an economically feasible strategy to achieve mixed-use, higher-density, and diverse transportation-related development.
- The city of Morrow will focus the LCI grant on a study of the Southlake Mall area. The study area is a location that has traditionally been a significant economic district for the City of Morrow and the greater Clayton County community, but has declined in recent years. The study will build on recent city initiatives to create an activity center based on higher residential densities, a mix of uses, pedestrian connectivity, and improved traffic circulation.
- The Wesley Chapel Activity Center area of DeKalb County was once a thriving area of commercial and residential development, but has experienced a significant amount of disinvestment over the past 20 years. The area has a number of big-box retail spaces and strip malls that have remained vacant. The LCI study will guide the transformation of the Wesley Chapel Activity Center area into a mixed-use district with improved corridor mobility that encourages economic development, establishes a foundation for transit development, and offers a safe pedestrian experience. This planned center will encourage walkable communities and provide employment, housing, and recreation choices for a mix of residents.

For more information,
<http://www.atlantaregional.com/>

Ohio Third Frontier

In 1999 Ohio leaders looked longingly skyward as venture capital flowed from California to New England start-ups and Harvard-trained Bostonian investors looked to the Silicon Valley for the next great thing. The region began to call itself the “flyover state” as capital went from coast to coast

“WE HAVE THE OPPORTUNITY TO CREATE A TRULY NEW FUTURE,
 NOT JUST A MORE EFFICIENT PAST.” -GLEN HIEMSTRA



while Ohio, a state with deep university research talent and a legacy of life science technology in Cleveland was training a generation of engineers who seldom settled in the state.

A close look revealed that pension funds and endowments were investing in the venture capital funds, which in turn were investing in the coastal technology hotbeds. Ohio was exporting capital and engineers and struggling to transform its economy to take advantage of its inherent research and industrial strengths.

This environment gave birth to the Ohio Third Frontier, a visionary initiative created in 2002 within the Ohio Department of Development to establish the state as an innovation leader, to attract investment capital, and to provide training and resources to support the state's high-tech research capabilities. With bipartisan support, the state committed over \$1 billion in focused investments to encourage and sustain the research and commercialization of technological innovation.

The Ohio Third Frontier provides resources to targeted areas of technology that take advantage

of the state's historical resources. For example, it provides capital through loans and training to entrepreneurs in life science-related startups that leverage off the presence of the Cleveland Clinic, a private provider of medical care and research in Cleveland founded in 1921 and which today employs over 2,000 doctors and researchers. Other technology areas are also supported through grants, loans, and training.

Since its inception through December, 2009 the Ohio Third Frontier has committed over \$900 million in funds, has actually disbursed over \$500 million, and has created, attracted, and expanded over 600 companies directly and indirectly employing over 55,000. Even more importantly, the jobs created are in areas of innovation and new technology, and in the midst of a recession Ohio jobs created by Ohio Third Frontier private companies increased from 41,000 in December 2008 to 55,000 in December 2009.

"Each time we review the progress of the Ohio Third Frontier, we see the number of good jobs for Ohioans grow," said Eric Fingerhut, chancellor of the Ohio Board of Regents and chair of the Ohio Third Frontier Commission. "But even more than creating jobs, the program is training skilled workers of the future and helping companies compete in a wide range of high-tech industries."

For more information:
<http://www.ohiothirdfrontier.com/>

Tulsa 2025

In early 2002 the city of Tulsa and the surrounding area faced a bleak and declining economic future. Walking the streets of the city often felt like wandering through a ghost town. In May of 2002 Tulsa County sponsored a "Dialogue 2025"

session, bringing representatives of all the Tulsa area municipalities together. In July 2002, 1,100 people jammed the civic center for a one-day Mayor’s Vision Summit. Typically the ideas created at such an event die away, but in this case a series of follow-on meetings, summits, and conferences followed. A nonprofit citizens organization called TulsaNow sponsored a “Battle of the Plans” meeting in the fall of 2002, and ideas began to merge.

A little over a year later, on September 9, 2003, years of hard work came to fruition as voters of Tulsa County approved a one-penny, 13-year increase in the county sales tax for regional economic development and capital improvements. The package called “Vision 2025: Foresight 4 Greater Tulsa” was the culmination of a long and arduous effort to grow economic and community infrastructure for future generations.

The four propositions approved by voters were:

- 1. Economic Development-Boeing: a proposal to financially support the location of a Boeing plant in Tulsa. When this later did not happen,

40 percent of the tax increase was rescinded, a move built into the vote.

- 2. Capital improvements related to an American Airlines maintenance facility.
- 3. Education, health care and events facilities, including money for local universities and schools, expansion of a health center, and modernization of the regional convention center.
- 4. Community enrichment, including money for parks, trails and community centers.

What made this project unique is not just the perseverance it took, or the fact that it continues after seven years. The uniqueness of this effort is in the fact that a public-private effort to create the future laid out four initial programs and put them to the vote. The voters chose to increase their own taxes when the vision for economic growth was clear, and the strategies made sense.

For more information,
<http://www.vision2025.info/index.php>



Conclusion

Shaping the future will require thinking that goes beyond current assumptions and even ideology. Transportation that enhances safety and mobility while growing the economy is the challenge.

We have attempted here to offer a provocation. Some of what we suggest as an attractive economic future for Idaho is historical—agriculture, technology, recreation. Some of what we suggest is on the drawing boards or in early stages of development but must reach world-class level if Idaho is to become a leader in next-generation energy technology. Some of what we suggest is not really on the radar such as investing more rather than less in world-class higher education.

None of what we suggest will happen automatically in the dynamic and competitive economic

“NONE OF WHAT WE SUGGEST WILL HAPPEN AUTOMATICALLY IN THE DYNAMIC AND COMPETITIVE ECONOMIC ENVIRONMENT OF THE FUTURE.”

environment of the future. Global and national economics may be not a zero-sum game, where one region’s accomplishment is another region’s loss. But

it is certainly a competitive world.

Developed and developing nations around the world are building transportation systems including highways, high-speed rail, and state-of-the-art airports that literally make the U.S. look antiquated. China plans to be the leader in 21st-century energy. Brazil aims to join the top three as an information technology center. Virtually every economic region of the United States has its eye on biotechnology and energy technology. Cities are pouring effort into making themselves more attractive as

places to live and to conduct business, even in a tight economic climate.

Growing the Idaho economy while improving mobility and safety is not an option. It is an imperative.



Credits

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Glen Hiemstra is the founder and owner of Futurist.com, a company that focuses on the dissemination of information about future trends and strategic and long-range planning. An internationally respected writer, futurist, consultant and expert on future trends and long-range planning, Glen has advised professional, business, and governmental organizations for two decades. These include national and state transportation agencies, advanced research projects, and private sector companies in transportation, engineering, energy, information technology, agriculture, manufacturing, and retail. He is the author of *Turning the Future into Revenue: What Businesses and Individuals Need to Know to Shape Their Futures*, from John Wiley & Sons, 2006. Previously he co-authored *Strategic Leadership: Achieving Your Preferred Future*. Glen was born in Nampa, Idaho, and spent the first decade of his life in New Plymouth. Since then he has lived in Oregon and Washington, and is currently based in Kirkland, Washington.

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