



Work 2020: The Effect of Higher Oil Prices on the Future of Work

By: The New Ways of Working Network, Dec. 2010

How would the ways we work, what we work on, the tools we use, and where we work change over the next ten years if the price of oil increases significantly? How would organizations adapt? This summary explores probable scenarios for the working world in 2020 and beyond, assuming the following four trends continue:

1. Dramatic increases in the price of oil
2. Innovation in computer and communication sciences
3. Global climate change
4. Evolution of the diverse, post-Baby-Boom workforce

SECTION 1: THE SETTING

DRAMATIC INCREASES IN THE PRICE OF OIL

According to predictions in two recent books—Jeff Rubin's *Why Your World is About to Get a Whole Lot Smaller: Oil and the End of Civilization* (Random House, 2009), and Christopher Steiner's *\$20 Per Gallon: How the Inevitable Rise in the Price of Gasoline Will Change Our Lives for the Better* (Grand Central Publishing, 2009)—oil production has peaked and is now in decline. At the same time, there is likely to be a dramatic increase in refining costs, as well as increased demand for oil from developing countries. As a result, we can anticipate several things:^{1,2}

- Air transportation will become considerably more expensive, many airlines will shut down, and parts of the world will become essentially inaccessible for normal travel.
- The cost of transportation may wipe out the financial savings of production in lower-wage countries. A “distance equals money” reality will

affect goods and food imported from distant states and countries so items will need to be procured locally.

- Oil will be cost-prohibitive for many, so energy will need to be produced locally with wind, hydro, and nuclear power becoming the primary options.
- With higher costs for auto fuel, public transit needs will surge and cities will become more concentrated, with increased density and fewer long-distance commuters.
- Remaining auto consumers and industries, including the military, will continue to transition to electric cars, such as plug-in hybrids and compressed-air cars, and a major new industry will form to handle battery recharging and the use of battery loaners, since the grid won't be able to handle everybody plugging in at once.

INNOVATION IN COMPUTER AND COMMUNICATION SCIENCES

Companies will continue to turn to collaborative technology as a partial answer to higher fuel prices. For example:

- Moore's Law—a prediction that the number of transistors that can be placed on a chip will double every 18 months without an increase in cost—will “hit a wall” by 2020 based on existing chip manufacturing approaches (the use of a complementary metal oxide semiconductor). However, by that time storage capacity will have moved down to the molecular level and nanotechnology and quantum computing will allow massive increases in processing capabilities.

- Microprocessors invisible to the naked eye may be embedded in buildings (and bodies) to provide real-time diagnostic and management capabilities.
- Micro-miniature sensors will be integrated into a wide range of products, providing monitoring for automated processing and management.
- Diagnostic devices will convey real-time carbon production measurements, permitting instant adjustment.
- Lighting, heating, and ventilation adjustments can all be performed instantly and automatically, based on data from sensors.

By 2020, it will be possible to use avatars to stand in for workers in teleconferences.³ People will access and interact with their offices, files, and family in both physical and virtual worlds. There will be dramatic improvements in self-learning systems, as constant learning will be an essential requirement for continued employment.

The web has the potential for changing how we collaborate with each other in the future. Collaborative tools and trends have seeded new emergent social software platforms (ESSPs) that “enable people to rendezvous, connect, or collaborate through computer-mediated communication and to form online communities.” These platforms have the potential to connect people, not only to people they already know, but to others with whom they share a common interest. Perhaps more important, they can help connect networks of people via the weak ties of mutual acquaintances. These kinds of networking options can help solve problems and synergize new ideas.⁴

GLOBAL WARMING AND CLIMATE CHANGE

A report by the Intergovernmental Panel on Climate Change (IPCC), released in April 2007, warned that global warming could lead to large-scale food and

water shortages and have catastrophic effects on wildlife.⁵ Strong hurricanes, droughts, heat waves, wildfires and other natural disasters may become commonplace in many parts of the world. The growth of deserts may also cause food shortages in many places. More than a million species face extinction from disappearing habitats, changing ecosystems, and acidifying oceans. The oceans’ circulation system, known as the ocean conveyor belt, could be permanently altered, causing a mini ice age in Western Europe. Glaciers around the world could melt, causing sea levels to rise while creating water shortages in regions dependent on runoff for fresh water.

DEMOGRAPHICS

The demographic trends that will affect Work 2020 have already been set in motion based on the births occurring prior to 2002, and assuming that workers enter the workforce at approximately 18 years of age.⁶

Global Trends

Worldwide, demographic trends have recently undergone some of the most dramatic changes in centuries:

- By 2020, less than half of the world will be producing enough children to replace their populations. That is, the fertility rate of half the world will be 2.1% or lower. Countries that have fallen below the replacement level include Russia, Japan, Brazil, Indonesia, China, and South India.⁷
- Asian and Latin American countries are experiencing the benefits of the demographic dividend, in which there are relatively fewer children and grandparents (due to their generation’s high mortality) but a large surge of working-age adults, similar to the Baby Boomer generation in the United States and Europe.

- The Middle East is growing at 2 percent a year—one of the highest growth rates in the world. The Middle East will double in population in the next 20 years.
- In the next decade, 1.2 billion people worldwide—those who are currently children—will come into the age of employability,⁸ with 90 percent in emerging or developing markets.
- The Middle East and North Africa have the highest rates of under-18 unemployment in the world, therefore, countries in those regions need to create 100 to 200 million new jobs in the next 20 years⁹ Managing the transition of these children into productive, working adults will require investments in job creation, skills training, and education, as well as different kinds of investment and banking policies. Especially important will be access to capital for small- and medium-sized businesses for those youth who have the drive and encouragement to start their own company.
- The United States is somewhat unique among the developed countries in that its population

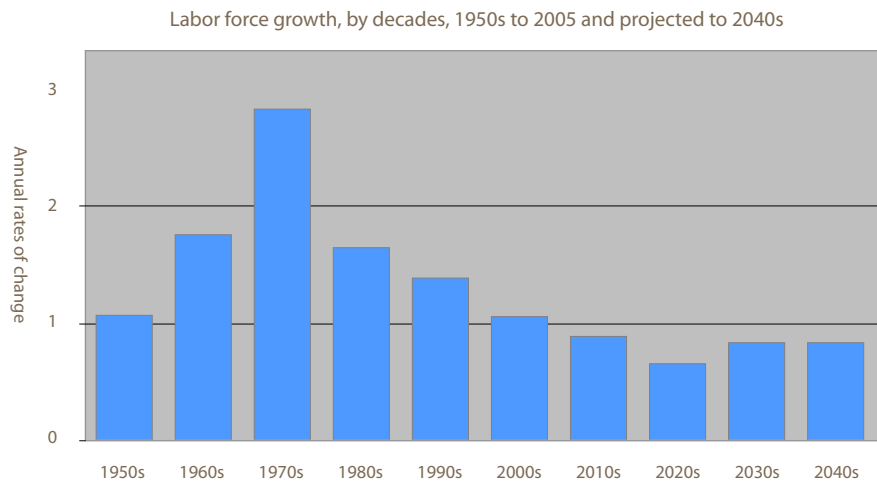
will continue to grow, fueled not by replacement births but by immigration.

U.S. Trends

The trend toward slower growth in the U.S. labor force will peak around 2020.

According to the Bureau of Labor Statistics, there have been three key drivers for the U.S. labor pool:

- *The Baby-Boom generation.* Seventy-six million American babies were born between 1946 and 1960, creating a dramatic increase in the American workforce beginning in the late 1960s. In 2020, the 55-and-older age group will reach 39.6 million and represent a 23.8 percent share of the labor force.¹⁰ By 2020, virtually all the Baby Boomers will have reached the normal retirement age of 65.¹¹
- *Participation of women in the labor force.* The U.S. saw a dramatic increase in the number of women in the labor force during the 1970s and 1980s. However, women’s labor force participation rates appear to have peaked at 60 percent in 1999. There have been slight



Source: U.S. Bureau of Labor Statistics, November 2006

decreases since then, with the participation rate in 2005 at 59.5 percent.

- *Increasing racial and ethnic diversity.* The U.S. Bureau of Labor Statistics states that “The labor force is expected to become even more diverse than it is now. Minorities, with higher population growth through immigration, higher fertility rates, and higher labor force participation rates, are projected to expand their share of the workforce considerably in the future.”¹²

SECTION 2: CURRENT AND FUTURE WORK TRENDS

Much is changing about the way we work—how companies are managed, impacts of corporate social responsibility, the types of work people perform, shifts in management practices, and the significance of sustainability and energy costs on business travel, commuting, and land use patterns. And the workplace is evolving, too. Some of these trends pull in opposing directions. There are a few future scenarios to consider—even without changes in oil prices—related to what companies will look like in the future and the tendency towards urbanization or suburbanization.

WHAT WILL COMPANIES LOOK LIKE IN THE FUTURE?

In recent years, we have witnessed many experiments and fashions in the way organizations are managed. Management styles are changing, and some current trends include:

- Companies are increasingly employing just-in-time strategies that allow the business to manage peaks and valleys in business cycles, such as temporary contracts or allowing staff to use down time for personal ends. This will reinforce the value of flexible working arrangements.¹³

- According to the Chartered Management Institute, there will be a proliferation of virtual companies.¹⁴ Enterprises would have to compete for employees, who will become more footloose and less inclined to work for an organization that does not allow individuals to tailor the working day to meet their personal requirements. Organizations will have to address the growing power of the employee.¹⁵
- A 2009 survey of human resources managers and directors by the Egremont Group on behalf of HR Magazine found that having “knowledge marketplaces” where people can share ideas and give each other advice is a rarity today (25 percent), but 89 percent of respondents predicted that in 2014, such marketplaces will be widely adopted.¹⁶
- Currently in the United States, 18 to 24-year-olds are starting companies at a faster rate than 35 to 44-year-olds. Seventy percent of today’s U.S. high school students intend to start their own companies, 80 percent of U.S. colleges and universities offer courses on entrepreneurship, and 60 percent of Gen Y business owners consider themselves to be serial entrepreneurs.¹⁷

A 2009 report by PriceWaterhouseCoopers presents three potential images of the future corporation and how it relates to employees. These images are built upon three basic demands upon the modern corporation, including the need for:

- Greater transparency and social responsibility in business
- Doing more with less, resulting in an increased focus on hard people-metrics
- Radical new ways of working enabled by collaborative technology

In the PWC report, each of these trends has been taken to its logical conclusion to produce three disparate images of what the future could be.^{18,19}

1. The Green Business World: *Sustainable Business is Good Business*. Companies will have a powerful social conscience intrinsic to the brand and a green sense of responsibility. Company behaviors are aligned with employee values, and compensation is likely to be moderate and linked to performance measures that include social as well as financial goals.
2. The Blue Business World: *Corporate Capitalism is King*. Entrepreneurial behavior is rewarded and individual preferences override social responsibility. The staff works in a competitive atmosphere where under-performing employees are redeployed or terminated.
3. The Orange Business World: *Tribes Thrive*. Companies are usually small, lean, and nimble with about 100 core employees and a network of approximately 1,500 contractors or “team workers.” About 50 percent of the core employees work remotely from around the world, so constant investments in technology are a must.

Within these three predictions for the future business world is the question of the social contract between the organization and the worker. This is of particular concern in the United States because according to the 2007 Census Bureau, nearly 60 percent of employees receive health plans, life insurance, retirement, and other benefits from their employers, unlike in European Union countries, where these benefits are provided by the government.

CORPORATE SOCIAL RESPONSIBILITY

Corporate social responsibility is the idea that companies must be responsible not just for profits, but for the wellness of their workers and the planet.

This will become more accepted and regulated in the coming years. The social accounting of the effects of a company’s actions on the larger community will become a means for consumers and investors to evaluate a company’s performance and will become an increasingly important influence on how work is organized and conducted. This is also referred to as the “triple bottom line,” which demands that a company be responsible to anyone who is influenced directly or indirectly by the actions of the firm.

Ethical consumerism, or the purchase of social, ethical, and environmental products, will parallel the growth of corporate social responsibility. Social businesses and enterprises (SBE’s) are organizations seeking to generate social, ethical, and environmental (often described as “social”) returns. They attract capital on a preferential basis from social investors.²⁰

WHAT WORK WILL WE BE DOING?

In early 2010, unemployment in the United States was at 10.2 percent—a 26 year high. Once employment picks up, economists and futurists expect significant shifts in the job market. What changes will the next ten years bring to the world of work? What kinds of jobs will show growth? For answers, we turned to two documents: *Skill Needs in Europe: Focus on 2020*, a publication of the European Centre for the Development of Vocational Training,²¹ and the U.S. Bureau of Labor Statistics’ *Occupational Outlook Handbook*.²²

Predictions for Europe: European Union countries expect 20.3 million new jobs by 2020. This, plus another 85 million replacement jobs, will result in a total number of 223.6 million jobs. Based on demographic developments, specifically the declining birthrate, Europe may experience a major workforce shortage by the end of the decade. Predictions for the US: The civilian labor force is projected to reach 166.9 million by 2018, an increase of 8.2 percent. Major job growth is expected in the following sectors:

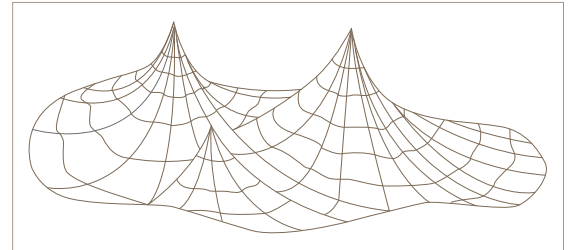
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- Education and Health Services: These areas are projected to grow 18.8 percent by 2016.²³
- Green Employment: According to predictions by the U.S. Conference of Mayors, green employment could provide up to ten percent of all job growth for the next 30 years.²⁴
- Knowledge Work: The number of jobs in the information-technology sector is expected to grow 24 percent by 2016, twice the overall job growth rate. Close to 85 percent of new jobs created between 1998 and 2006 involved complex knowledge work like problem-solving and planning corporate strategy, says a McKinsey & Company report.²⁵
- Skilled Manufacturing: “Highly skilled workers creating high-value products in high-stakes industries... is the sweet spot for manufacturing workers in coming years,” claims an article in Time Magazine.²⁶ Many U.S. companies are making a distinction between exportable jobs and jobs that should stay home. Jobs that require complicated processes or trade secrets are better kept onshore.
- Temporary Workers: In 2009, 31 percent of the U.S. workforce was freelance, temporary, or self-employed. This contingent workforce is predicted to rise to 40 percent by 2019, according to an article in Money Magazine.²⁷

CHANGES IN HOW PEOPLE ARE MANAGED

Trends in management practices, such as the fishnet, gaming, and minimalist organizations, and process and practice networks are having an impact on the workplace of tomorrow.

- The Fishnet Organization: In the 1990s, Robert Johansen and Rob Swigard in their book, *Upsizing the Individual in the Downsized Organization: Managing in the Wake of Reengineering, Globalization and Overwhelming Technological*



Organizational structures are beginning to look like fishnets

Change proposed that the organization of the future would resemble a fishnet, where parts of the organization could be “pulled up”—given priority, authority, and resources—to address a particular challenge, only to become just another node in the network when that challenge was completed.²⁸

- Gaming: Another organizational analogy is from the game world, particularly World of Warcraft®. This game, which many Gen Yers learned as teens, is intensely collaborative, constantly demanding, and often surprising. According to Rob Carter, Chief Information Officer at FedEx, “It takes exactly the same skill set people will need more of in the future to collaborate on work projects.”²⁹
- Minimalism—Core Company: This organizational model is to pare the core company down to the fewest people possible, with many or most services performed by a network of contractors. Process and Practice Networks: This organizational model utilizes collaboration methods involving participants from similar skill areas—and different companies—working together, resulting in increased creativity and learning for everyone.

BUSINESS TRAVEL AND SUSTAINABILITY

The World Wildlife Fund reports that 89 percent of the 350 companies they surveyed predicted that they will fly less over the next 10 years. What’s more,

85 percent believe that videoconferencing has the potential to reduce business flying needs.³⁰

Assuming increased oil prices, air travel will either become too expensive after sustainability taxes and tariffs, or it will be restricted by corporate policies. The majority of meetings will have to be conducted virtually via videoconference. Technology will make this experience more realistic than it is today. In addition to being more sustainable, reduced business travel can save millions of dollars per year in travel costs for hotels, transportation, etc.

As workers become more attached to globally dispersed work teams, there will be fewer coworkers in the same location, and workers will have to start relying more on videoconferencing technologies and other new social network tools to keep in touch. This may create a challenge for how to build and maintain relationships between coworkers and collaborators who may never meet in person. Interestingly, no one knows whether the need for face-to-face communication somehow is an inherent need in human interaction or simply a learned behavior that can be unlearned with practice.

CHANGES IN COMMUTING

Commuting behavior will be affected as the cost of energy rises. It's likely that there will be an increase in mobile work, efforts to find work closer to home, greater use of energy-efficient vehicles, and a migration to mass transit.

In 2008, *Forrester's Mobile User Forecast* report indicated that mobile information workers who travel frequently or telecommute represented 20 percent of the workforce. By 2012, this number is predicted to rise to 34 percent.³¹ Additional studies indicate that over the next five years, white-collar workers plan to increase their time working remotely by 50 percent, resulting in average white-collar workers spending 30 percent of their time working out of the office.³²

Commuters, especially in the United States, are greatly affected by fuel prices. According to the U.S. Bureau of Labor Statistics, transportation is the second-largest expenditure for United States households, accounting for 17 percent of all annual spending.³³

WHAT WILL COMMUNITIES LOOK LIKE IN THE FUTURE

Is urban growth and urbanization sustainable? Consider two views of the future—dense urban growth and virtual dispersion.

In 1900, the world's largest city was London, with a population of 6.5 million. Today we don't consider a city a "mega-city" unless it has at least 10 million inhabitants. In 1900, every city in the top ten—except Tokyo—was located in the U.S. or Europe. By 2015, the only U.S. city in the top ten will be New York. More than half of the people in the world will live in mega-cities.

Increased urbanization may also affect commuters. The rapid expansion of suburban development after 1950 was fueled by cheap oil prices. These developments led to costly commutes and required an auto-dependent life, with shops, amenities, and conveniences too far away for walking or bicycling, and with poor or non-existent public transit. These developments will be difficult to impossible to sustain as oil prices escalate.³⁴

World's Largest Cities

Urban Area	Population 1900 (in millions)	Urban Area	Population 2000 (in millions)	Urban Area	Population 2015 Projected (in millions)
London	6.5	Tokyo	26.4	Tokyo	26.4
New York	4.2	Mexico City	18.1	Mumbai	26.1
Paris	3.3	Mumbai	18.1	Lagos	23.2
Berlin	2.7	Sao Paolo	17.8	Dhaka	21.1
Chicago	1.7	Shanghai	17	Sao Paolo	20.4
Vienna	1.7	New York	16.6	Karachi	19.2
Tokyo	1.5	Lagos	13.4	Mexico City	19.2
St. Petersburg	1.4	Los Angeles	13.1	New York	17.4
Manchester	1.4	Kolkata	12.9	Jakarta	17.3
Philadelphia	1.4	Buenos Aires	12.6	Kolkata	17.3

Source: State of the World Population 2001, Chapter 3, UNFPA

WHAT WILL HAPPEN TO OFFICES?

Organizations will continue to reduce traditional office space to decrease occupancy costs and push work out to lower-cost locations. This will also reduce the costs of construction, leasing, furnishing, and maintenance. Millions of square feet of office space, much of it presently used for assigned workstations, will be eliminated, and more workers will work in unassigned workstations or other locations away from the office. Improvements in computer and information technologies will not only enable knowledge workers to work anywhere, but will become more similar to face-to-face interaction. Trends toward alternative work places away from the office—at home, at customer locations, on the road, or other places—will continue to increase.

When feasible, companies will continue to outsource to lower labor-cost countries with well-educated workers. Most likely, the percentage of people working for companies will shrink as they outsource more non-core functions, such as human resources, IT, accounting, and purchasing. As companies do this, they may end up with large portfolios of existing buildings in high-cost locations and will be challenged with how to repurpose or dispose of them effectively.

The core workers that do remain will demand flexibility in when, where, and how to work. A 2009 Deloitte compensation survey of 1400 CFOs found that 46 percent of respondents believed that telecommuting is second only to salary as the best way to attract top talent, and 33 percent said that telecommuting was the top draw.³⁵ Therefore, organizations will have to offer less-traditional options for working to attract and retain the best talent. Workers will look for jobs that give them flexibility with their work hours and places so they can accommodate extended schedules. This is especially important for workers who have global contacts in different time zones.

As mobility and technology improve, the office will transition to a meeting or collaboration center for occasional, critical face-to-face meetings, such as customer sales and training, intensive work sessions, and social events. While most offices today devote about 70 percent of their space to offices and workstations, and 30 percent to communal spaces, it is predicted that that ratio will be reversed in the future with smaller offices and workstations designed for drop-in use. Spaces, furniture, and systems will be easily reconfigurable to support different types of collaboration needs.

SECTION 3: OIL PRICE SCENARIOS

Among Jeffrey Rubin's predictions, which assume there will be a significant increase in the price of oil, several could have a dramatic impact on work in 2020. These include:

- “Densification” or things going local, meaning denser communities, dramatically reduced commutes, fewer cars, and increased demand for public transportation
- Manufacturing will come back onshore
- Outer suburbs will reconvert to farm production
- Markets will be smaller—instead of highly specialized products shipped around the world, a wider range of products will be produced for regional markets
- Just-in-time supply systems will no longer be viable
- Many parts of the world that cheap oil made accessible will no longer be as easy to reach, impacting tourism in less-developed parts of the world

These predictions are based primarily on the costs of transporting goods and people, which weigh a

lot. If the cost—whether in dollars or sustainability impacts—of moving goods and people begins to equal or exceed the benefits of cheaper labor, then the possibility of densification is reasonable. Meanwhile, the cost of transporting knowledge is, if anything, getting cheaper and cheaper.

Because knowledge work is becoming an ever-larger share of the economy, particularly in the developing world, some portions of the economy may not be subject to densification. In fact, the impact of dramatic innovation in computer and communication technology may permit the knowledge economy to be an anyplace economy.

We believe there are two very different versions of how society might respond to high fuel prices:

- **DENSELY URBAN.** This scenario assumes that in order for society to provide essential services despite dramatic increases in the cost of transportation, services will need to be provided much more locally. This includes heavy reliance on public transportation and the production of most goods and services in the vicinity of the consumer. Companies will be faced with the constraints of working virtually. All the challenges of establishing and maintaining corporate affiliation and identity will be magnified. It will be more difficult to establish and maintain a corporate culture, and there will be a tendency for fiefdoms to develop.
- **VIRTUALLY DISPERSED.** This scenario assumes that society's response to higher fuel prices will be to accomplish most work—or at least most knowledge work—virtually via technology. In this scenario, technology will allow knowledge workers to move away from urban centers to suburbs, villages, and even rural areas, while staying connected with co-workers through collaborative technology. A pandemic, such as a more virulent version of H1N1, could escalate this scenario, as diseases transmit more rapidly in

dense urban environments. Companies that have already established distributed work programs and management practices to support them will have a major competitive advantage.

In reality, society's response will be a mixture of these two scenarios. Both will occur in varying degrees. Cities will continue to become more densely developed and populated, with conventional offices. And other workers will work in dispersed communities, collaborating with team members who may be in conventional offices or also similarly dispersed. Each of these scenarios makes sense for different kinds of companies, work and workers. But new suburban office complexes, like the ones that characterized much of the development over the last 25 years, are unlikely. These complexes and the suburban paradigm are increasingly untenable in an age of higher oil prices, new technologies, global warming and demographic changes.

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