

The Post-Scarcity World of 2050–2075

The world economy will experience scarcities of natural resources from now until the middle of the twenty-first century, when a post-scarcity world becomes a reality, according to an international team of futurists.

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The world between 2010 and 2050 is likely to be characterized by scarcities: a scarcity of credit, a scarcity of food, a scarcity of energy, a scarcity of water, and a scarcity of mineral resources. While it is important to understand the nature of these scarcities, their causes, and their cures, our main emphasis in this article rests upon what comes after the period of scarcity.

In developing our thinking about this issue, we have found it useful to develop a view from four perspectives—the post-scarcity company, post-scarcity society, post-scarcity geopolitics, and post-scarcity financial system. Together, they provide a picture of what the world may look like between 2050 and 2075. It will not be a world without scarcity, but one that has learned to cope with constricted resources.

From Scarcity to Post-Scarcity: 2010–2050

Human history fluctuates through periods of relative scarcity and of relative abundance. The period from 1975 to 2005 was one of relative abundance, which came to an end after 2005, culminating with a recession to mark the transition from a world of abundance to a world of scarcity. The speculative asset bubbles in property and stocks started to burst in 2007, with the result that banks stopped lending to each other, and the flow of credit simply dried up. The credit crunch was upon us.

As a consequence of the credit crunch, two key elements of the modern economy—credit and business confidence—became very scarce. In order to keep the financial system working, governments responded by bailing out their respective national banks, generally by taking equity stakes in them. Some banks were nationalized outright, while others were

only partially nationalized. Either way, the banking system across the world became subject to greater state intervention and supervision, resulting in more stringently imposed reserve requirements, which restricted credit even further.

The next 10 years will be dominated by the aftereffects of the credit crunch. Business finance, generally speaking, will not be as freely available as it was in the previous decade. This will hamper economic growth in the 30 member nations of the Organization for Economic Co-Operation and Development (Australia, Japan, South Korea, the United States, and most of Europe) and have ripple effects upon the entire world economy.

According to UN estimates, the global population in 2000 was about 6 billion. By 2025, it will be about 8 billion, and by 2050, it will reach about 9 billion. As the global financial system starts to stabilize by about 2020, the impact of a growing population and a stagnant economy will start to be felt across the world.

There will likely be rising expectations to accommodate, as well. For example, the number of mouths to feed may increase by a third. On top of that, the demand for improved diets is likely to heighten, giving rise to further demand for foodstuffs. Rising aspirations will also lead to demands for better housing, better education, and better health care. Around the world, people will want to share in material prosperity—a TV, a car, and a better life for their children.

These rising aspirations are likely to trigger the second aspect of the age of scarcity—“Peak Just About Everything.” We are all accustomed to the concept of peak oil—the point at which historical global production of oil will peak and thereafter diminish. No one knows precisely when peak oil will occur—there are many forecasts, ranging from about 2015 to

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2040. The important point is that peak oil will occur at some point during the age of scarcity.

At the same time, there will be other peaks in many of the minerals that are now essential to the global economy. For example, antimony (essential to the production of semiconductors) will peak between 2020 and 2040. Tantalum (essential to the production of capacitors and resistors) will peak between 2025 and 2035. Zinc (an important metal in the production of batteries) will peak between 2025 and 2035. And so the list could go on. The point is that our current lifestyles are likely to become ever more unsustainable in the third and fourth decades of this century.

These developments define the age of scarcity. Growing demand pressures that originate from a rising global population—which has increasing aspirations for life—will combine with a situation where the resources necessary to satisfy that demand are heading toward the point of exhaustion. The result will be a period in which resource scarcity could become quite acute.

This period of resource scarcity is likely to manifest itself as a period of increasing and volatile prices. However, once price increases become commonplace, the price mechanism will stimulate new technologies to

address resource efficiency. Resource usage—getting more out from putting less in—is likely to be the defining technology of the age of scarcity. Whether it is getting more miles per gallon from motor cars, more food per acre from arable land, or reducing the mineral content of electronic components, the price mechanism is likely to focus our attention on achieving a more sustainable economy. The aftereffects of the credit crunch are likely to inhibit this feature until the third decade of the century, but once the process starts, we could see developments occurring well into the 2050s.

Where would we be then? The global economy will likely be much greener than it is today. Although peak production in many resources is likely to have been reached, the point of resource exhaustion could be considerably delayed by improving resource efficiency. After a period of scarcity, aspirations of living standards may well be reduced from their present levels. Some nations may respond to scarcity by taking protectionist measures, in which case the levels of global trade would be much lower than they are today. The period following the age of scarcity may well be one when aspirations start to rise and world trade starts to increase again. The process of global-

ization—inhibited in the age of scarcity—would start to accelerate again. The best place to start to examine this process is through the post-scarcity company.

The Post-Scarcity Company

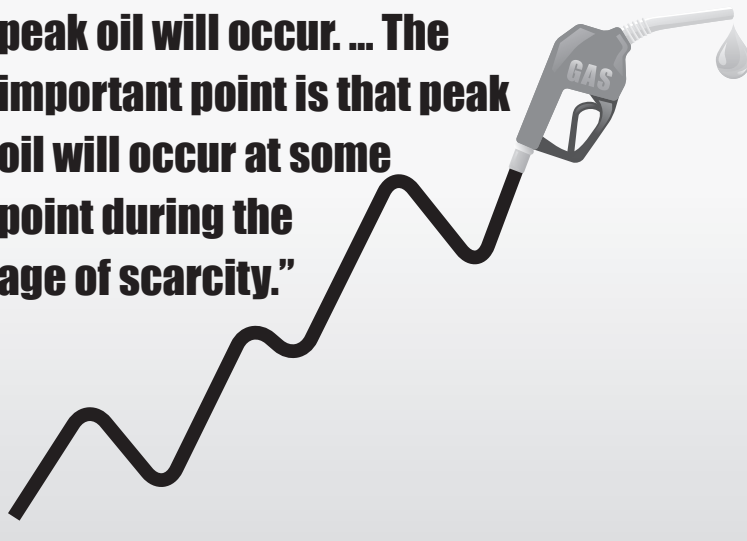
As we enter into the post-scarcity world, we will also be entering a time of significant challenge to the traditional capitalist business models, concepts, and assumptions that have developed over the past 200 years. The assumption of scarcity is fundamental to traditional business, as it enables producers to charge a price for the goods and services they provide, thus generating revenue.

In the post-scarcity world, technological advances will facilitate decreasing costs until conceivably almost everything is free to the consumer, an idea well-explored by *Wired* editor Chris Anderson in *Free* (Hyperion, 2009). Scarcity will no longer exist in this world, and, without scarcity, the concept of charging a price to consumers as a means of generating revenue will be unworkable. The post-scarcity world will put tremendous pressure on current business models, potentially rendering them irrelevant and obsolete in the future. If traditional businesses do not adapt to this emerging world of free goods, many of the strong, traditional organizations of the early twenty-first century will cease to exist over the next 50 years.

Free goods and lack of scarcity are difficult, counterintuitive concepts to grasp, and many in business will find them easy to deny. But the evolution toward free goods and a lack of scarcity is, in fact, already under way, thanks primarily to technologies (such as computers and the Internet) that have enabled and driven the growth of digitization over the last 20 years.

The ability to digitize, or “convert atoms to bits,” is increasingly removing scarcity from the business equation. Traditional scarcity theory posits that, when one item is used, there is one less item available (thus increasing scarcity); in the digital world, however, when one item is used (copied, connected to another) there is at least one more item avail-

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able (thus decreasing scarcity). The logic is completely reversed but explains exactly how digitization is driving an age of free goods and removing scarcity. As Michael Masnick, president and CEO of TechDirt, says, "In digital goods, scarcity doesn't exist."

We see this post-scarcity evolution in a variety of businesses and industries that are being driven toward (and struggling with) free products. For example, a wide variety and volume of news and information is now free; the *Wall Street Journal*, Wikipedia, and Craigslist are all free online news and information sources. Literature and books can be downloaded free from authors such as Cory Doctorow and Stephen King. Open-source software from Linux is free; VOIP (Voice Over Internet Protocol) calling can be had for free via Skype; Yahoo e-mail with unlimited storage is free; games such as those from Perfect World are free; photo-sharing services are free from Flickr; and music downloads are free, often from the artists themselves.

In some respects, "free" as part of the business equation is not a radical idea. In the 1930s, Gillette began giving away free razor handles to develop a market for disposable blades. Today, wireless companies are following the Gillette example, giving away essentially free phone hardware to sell service plans. This is not really about providing free products, but rather cost shifting. Cost shifting will become irrelevant because the actual cost of the products will fall potentially to nothing; "free" will really mean free, at least for the majority.

There is considerable debate among economists, technologists, and businesspeople over whether or not any product can ever really be free. Those arguing in support of the idea reference historical precedents that show continued deflationary economics and decreasing costs as the result of technological advancements. They argue that digitization (along with other technological advancements, such as nanotechnology, molecular manufacturing, robotics, and artificial intelligence) will continue to increase efficiencies in re-

sourcing, production, transportation, and overall operations that will drive away costs in the future. Evidence is already available, they say, in decreasing costs of clothing, furniture, fast food, and of course computer hardware. Basing their estimates on Moore's law—a 1965 forecast by Intel co-founder Gordon Moore that the number of transistors on a chip will double every two years—technological advancements will drive the cost of a laptop computer to \$10, and within 20 years to only \$1. Essentially, within 20 years, laptops could be free.

On the other side of the argument are those who believe nothing is ever entirely free. At a minimum, the first version of anything, whether a laptop or digitized song, will always have a cost. They argue that ideas, materials, innovation, and time are all necessary to produce the first of anything, and that these are costs to creators. Since these inputs and resources can never be eliminated (or nothing would ever be produced), costs can never be fully eliminated. "Free" is a misnomer; only "at cost" is possible.

There is evidence, however, that the transition to the "free" business model is already being made, and made successfully. Companies such as Google, eBay, Amazon, and Craigslist are all making money from free goods. Alternatively, the Recording Industry Association of America (RIAA) is the poster child for refusing to make the transition and is fiercely fighting to hang on to the current scarcity-inducing business model. The RIAA is losing, however: losing members, losing potential revenue, losing credibility, and losing prestige.

The answer to making money in the "free" post-scarcity world for businesses is to adapt, and to do so quickly, whether employing an entirely "free" or a blended business model, such as charging fees for premium versions of free goods and services.

The Post-Scarcity Society

It is difficult to conceive of a society without some form of individual ownership, where goods and

services are abundant and largely free. A world in which all goods, services, and accommodation are provided by the government or by corporations seems unlikely. However, it is possible to conceive of one in which what individuals own, and how goods are consumed, changes due to both the availability of resources and to the materials used.

Cradle-to-cradle manufacturing—a closed-cycle manufacturing process where nothing is wasted—may become more commonplace. Planned obsolescence in manufactured goods may become a thing of the past. Leasing of goods, where the manufacturer is responsible for repair or replacement and recycling of the item, may become more common. Innovation efforts are likely to focus on these types of efforts as resource availability begins to peak, yet demand continues to increase.

While many fantasize about reduced workweeks and more leisure time, for the foreseeable future people will continue to work outside the home to earn an income. Where changes may occur is in the nature and quantity of the work.

Statistics indicate that, as many countries develop economically, working hours increase. Resource shortages may mean this will eventually begin to show more balance. As the focus turns to efficiency and resource reuse, people are likely to buy less, which means less is produced, although it may be at a higher cost.

Population growth means more adults available to work. This may lead to the elimination of child labor. Access to education for women as well as children may also assist in reducing the number of children working outside the home.

Advances in health care and improvements in life span and the quality of life may help people to remain in the workforce longer; this will be especially beneficial for developed countries, where the birthrate typically declines as the country advances economically.

Greater numbers of people may enter or remain in the workforce. Reduced working hours may be mandated in order to create more jobs. More people might work part time.

Greater self-reliance may mean more need for time outside of work to spend growing food and tending to other essential activities. The time and activities performed at work are likely to change.

Leisure activities are also likely to shift, with physical activities becoming more local and distance interactions done virtually through the use of technology. The cost and resources available to enable global leisure travel are likely to experience shortages in the age of scarcity. By 2075, perhaps, new technologies to enable low-cost, low-impact travel may be developed. The desire to do so, however, is more a question of geopolitics, an issue to which we shall now turn.

Post-Scarcity Geopolitics

The most plausible scenario of the development of a post-scarcity society suggests that it would be driven by advances in nanotechnology or other extensions of materials sciences. So, based on the current infrastructure, the breakthrough developments would most likely take place in western Europe, the United States, Japan, or South Korea, although China or India, or even one of the oil-wealthy Gulf nations, cannot entirely be ruled out.

By the time we build a post-scarcity capacity that is sufficient to build a post-scarcity economy, there will still be widespread poverty in many nations, particularly those that were still developing at the time of “peak everything” and the many that reverted to developing-nation status under the hardships of climate change, scarcity of potable water, wars, and environmental degradation. Whether led by a spirit of philanthropy, capitalism, or enlightened self-interest, it seems likely that the originating nations would ensure that other nations would receive at least some of the benefits fairly soon.

Much geopolitical conflict derives from scarcity or perceived scarcity of land, water, energy sources, mineral wealth, or other physical resources, which would be greatly alleviated by a post-scarcity economy. Eliminating or reducing these causes for conflict would be a great step toward inter-

national peace. However, it would not create total peace, largely because the capacity to mount deadly attacks would increase at the same time that some reasons for conflict will remain or perhaps even worsen.

Some scholars posit that all historical conflict has been driven by competition over resources, and that even wars ostensibly over ideologies were truly about scarcity. Political or ideological dominance was a means

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to an end, rather than the end itself. However, conflicts due to scarcity may still capture hearts, minds, and resources by the enticing trappings of politics, religion, and simple historical grudges. If, as other scholars believe, humans are inherently a warlike species, a post-scarcity economy will enhance leaders’ ability to create war over causes that might have seemed trivial during a time when there was scarcity to worry about.

The status of the natural world is another area that could create conflict. Many arguments for environmental protection are based on the direct and indirect human benefit of natural land and species conservation. The world’s forests act to sequester carbon, clean the air, regulate the temperature, and house animals and plants of current or potential benefit to humankind. In a post-scarcity society where technology can replace all of those functions, there could well be conflict over the appropriate use of whatever wild areas are left.

So far, we have looked at the questions in terms of today’s nations and assumed that today’s nation-states will be more or less intact by the time of the post-scarcity society. However,

the post-scarcity society may well make both today’s states and the idea of a nation-state obsolete. The twentieth- and twenty-first-century creation of international groups and agencies from mutual interests rather than shared borders could replace today’s states in some different way.

For example, the European Union formed, as an economic union, the European Economic Community, which itself arose from the European

Coal and Steel Community. It has broadened its objectives from beyond the purely economic or closely related (e.g., free movement of labor) to include social justice (e.g., its powers to legislate against discrimination), environmental policy, foreign policy, and security issues. If it were to change its charter to be one of shared values and common history, such an organization might not only include Turkey, thus adding part of Asia to its scope, but also traditional allies, such as the United States. It might even transcend geography and history to become an alliance of democracies, bringing all of North America and large parts of South America, Asia, Africa, and even parts of the Middle East. Of course, the shadows of colonialism may create too great a barrier for some time, and continental alliances, rather than intercontinental, may come first.

Some alliances would be unlikely to continue. OPEC, based on commodity production, would likely disappear. The existing Non-Aligned Movement, originally formed as a response to NATO and the Warsaw Pact nations, has struggled to define itself and its purpose since the end of the Cold War; even now, its members have little in common. One remain-

ing unifying theme has been fair and sustainable development, but in a mature post-scarcity world, development would be moot for virtually all nations.

On the other hand, a post-scarcity society in which the means of living could be created at a micro level, or even at a household level, could make it possible for small, self-selected communities to exist either as mostly autonomous parts of a nation-state or as entirely independent nation-states of their own.

History suggests that most of these entities would benefit their members, and at worst be harmless to others. However, history also gives us darker warnings of cults and militant groups that attacked other groups or destroyed themselves and took innocents with them. The ability of such organizations to operate with all the capacities of an autonomous nation in a post-scarcity society is a sobering thought. On the other hand, if these groups control themselves and their members without need for control from the outside world, we might find that post-scarcity geopolitics is the road to a lasting peace.

Ultimately, the geopolitics of a post-scarcity world depends upon the interactions of humans and groups. While human nature is a constant, human ethics has grown through most of the world's history, viewed over a long time span. For example, things considered tolerable by the majority of society, such as slavery and indiscriminate slaughter during war, are now mostly condemned—in principle, at least, if not always in practice—and are now greatly reduced. Perhaps this is what has enabled us to survive so far—that, while our technical capacities always run ahead of our ethical development, our ethics keep up just enough.

In order for a post-scarcity society to develop in such a way that it adds to net human freedom, justice, and well-being, we need more than ever to reinforce the principles of equality, generosity, tolerance, compassion, and mutual interdependence in what we teach and in what we model before those who will build the post-scarcity world. These values, or their

lack thereof, will shape whether the post-scarcity world fulfills its promise or creates the seeds of the destruction of civilization.

Post-Scarcity Financial System

What happens to money in the free-goods world? It is difficult to conceive of a barter economy. While the age of scarcity might induce greater self-sufficiency, even in the medieval era, when self-sufficiency was highly prevalent, a degree of monetization and trade within the economy was also present. It is reasonable for us to conclude that the post-scarcity economy will not be one of barter, and that the key functions of money—a unit of account, a medium of exchange, a store of wealth, and a standard for deferred payment—will continue. If so, the role of finance does seem to be secure for the long future.

Of course, if money continues to exist, then there will have to be an issuer of money—an institution that will guarantee the promissory element of the currency and who will act as the lender of last resort to the financial system. In other words, there needs to be a central bank. The issue of currency is generally linked to sovereignty and government. Here, the future is less certain on two counts.

First, there is the question of where the locus of sovereignty might lie in a post-scarcity world. It is reasonable to expect that the industrialized states will continue to develop over the course of the twenty-first century. These supranational entities, such as the EU, are likely to have developed a more mature financial system and will have sufficient authority to be able to issue their own currency, such as the euro. We could also expect the category of modern states, those that we now call nation-states, to still be in existence. In this case, we should continue to see national currencies.

There is a current debate over the degree to which digital cash—electronic funds transfer, direct deposit, and other forms of paperless exchange—will replace physical cash. In some economies—such as Japan and South Korea—physical cash has now been virtually eliminated and

the banking systems have become mostly digitized. Digital cash is not a perfect alternative to physical cash, however. It leaves an audit trail that many do not wish others to follow. We could reasonably expect both physical cash and digital cash to be present in the post-scarcity financial system, but in possibly different degrees than at present.

The second area of uncertainty is the institutional arrangements that surround the management of the currency. We can expect the continued operation of central banks, but the interface between the general population and the central bank, generally speaking, is quite minimal. At present, there is a raft of institutions that, under the supervision of the central bank, manage the interface between the monetary authorities and the general population.

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The key institutions are the banks and the banking system, and they play an important role in the economy. The role of the bank is to act as a mediator between savers and borrowers, either in cash terms (overdraft finance, mortgage lending, corporate loans, etc.) or through financial instruments in the securities markets (stocks, shares, bonds, etc.).

There is some debate about the extent to which these institutions are likely to be corporeal or digital. At present, we have a mixture of the two. On the one hand, the digitization of the financial system has allowed it to become far more efficient and to extend its reach farther and

faster than it had previously. On the other hand, the financial system is based on trust and confidence, which is created through interpersonal relationships in the corporeal world. It is reasonable to expect this mixed approach to continue into the post-scarcity world, although exactly where the balance between the two will lie is a matter of conjecture.

As long as we do not spend everything that we earn, and as long as some show a preference for money in the present as opposed to money in the future, there will be this saving and lending dimension to the financial system, irrespective of whether it is conducted face-to-face or online. The institutions could well be different from today's. For example, supermarkets currently act as banks to their customers; mobile phone companies operate digital banking facilities for their customers. Are these the banking institutions of the future? It doesn't really matter what form the banks take, as long as they fulfill the functions of a banking institution.

In the scarcity economy, financial institutions are likely to be quite regulated. We are likely to see greater supervision of the banks as institutions, even to the point of public ownership of the retail banks. The involvement of the state is likely to be extensive. The post-scarcity financial system is likely to react against this. It is reasonable to expect to see a period of deregulation and privatization as we move from the scarcity economy to the post-scarcity world. Lending is likely to become more liberal. As credit eases, economic growth will accelerate, international trade will increase, and speculation in the financial markets will increase. Eventually, the bubble will burst, but that is a tale for the phase beyond the post-scarcity world as the cycle continues.

Prospects for a World Without Scarcity

As we write, the world is now entering into a transition phase from a period of abundance to a period of scarcity. Our concern in this piece has been to view how the world might be shaped when it emerges

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from the period of scarcity and into the following period of post-scarcity.

We have seen that corporate life is likely to be quite different from the present. The resumption of globalization—in abeyance during the age of scarcity—is likely to accelerate the digitization of the economy. Such digitization could lead to vast economies of scale on a global level. It could lead to economics as we know it—the dismal science of allocating scarce resources—being turned on its head.

Post-scarcity companies will reflect the post-scarcity society. In many ways, it will bring a resumption of trends that have been evident for some time but are now likely to be interrupted by the age of scarcity. The development of a global middle class with its concerns about the work/life balance could well be the dominant features toward the end of this century.

As companies and society become more global in their approach, this trend is likely to result in a growing internationalism in the field of geopolitics. The age of scarcity is likely to fuel a new nationalism as nations seek to hoard and protect their resources. As we move away from this scarcity mentality, we are likely to see a greater willingness to act cooperatively in the international field.

Nowhere will this cooperation be clearer than in the international financial system. The age of scarcity may place institutions under great strain, but as we move into the post-scarcity world, we can expect more cooperation and coordination.

It is difficult, as we write, to remember that the sun rises as well as sets. Our present era is dominated by financial crises and economic recessions, which could well give way to political turbulence and great change

in the world. As futurists, we feel that we need to point out that this is a natural undulation and that beyond the coming age of scarcity lies a post-scarcity world, where a better future lies. It is up to us to embrace that future and to work toward it coming sooner rather than later. □

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