

Safety & Security Concerns of Climate Change

By Joel Hershkowitz, Idesco Corporation

In the normal course of our lives, we generally wake up in the morning, knowing the sun will come up as it always does—to the point that we really do not think of it. We go to our jobs, do work around the house, and send the kids off to school. We could remember a particular year in our lives, perhaps by an unusually big storm—say a hurricane or tornado. Or there may have been a prolonged drought or a particularly large snow storm. These are things that are bound to happen as the seasons change. Spring is followed by summer, then autumn, then winter.

As we experience our lives, day in and day out, year in and year out, we really do not consider or even perceive the dynamic changes that are taking place on the planet and how they affect our safety and security, and always have.

To understand many of the phenomena we experience today, it is important to understand just a little bit of where we are coming from. At a point some 250 million years ago, there was only one continent—Pangaea. Through the ongoing process of plate tectonics, Pangaea would slowly break up into the seven continents we have today. But this movement of these great continents has not stopped. It continues its slow but steady trek even today. We may not see or feel it, but it is most definitely happening. For example, the North American plate and the Eurasian plate are moving apart by approximately one inch per year. Just imagine what a world map may look like 10,000 or even 20,000 years from now. Imagine how it looked some 35,000 years ago when humans first ventured out looking for food, shelter—the things that today fall under the umbrella of Safety and Security. But it is not just the location of the continents. The spacing between them partly determines the amount and direction of the water (oceans) between them. And this in turn affects the water temperature, the temperature and pressure of the air above the water and the direction of the wind. All of which, of course, affects the changing climate. The warmer the ocean temperature, the lower the pressure, the greater chance for very significant hurricanes. Similarly, on land, the lower the pressure, the more unstable

the air becomes and the greater the chance for a damaging tornado.

But it is not only the continents that are moving. Earth itself also is experiencing slow, dynamic change. For example, the eccentricity of Earth's elliptical orbit around the sun changes over a period of some 95,000 years. During the ice age, the peak eccentricity reached 0.05-0.06. At this point in time it is 0.02. These subtle changes ultimately affect the length of the seasons and water temperature and wind movements. (The fact that there is evidence that Earth has experienced

The average temperature in the Northern Hemisphere in the year 2007 was the second highest ever in the 127 years of recordkeeping.

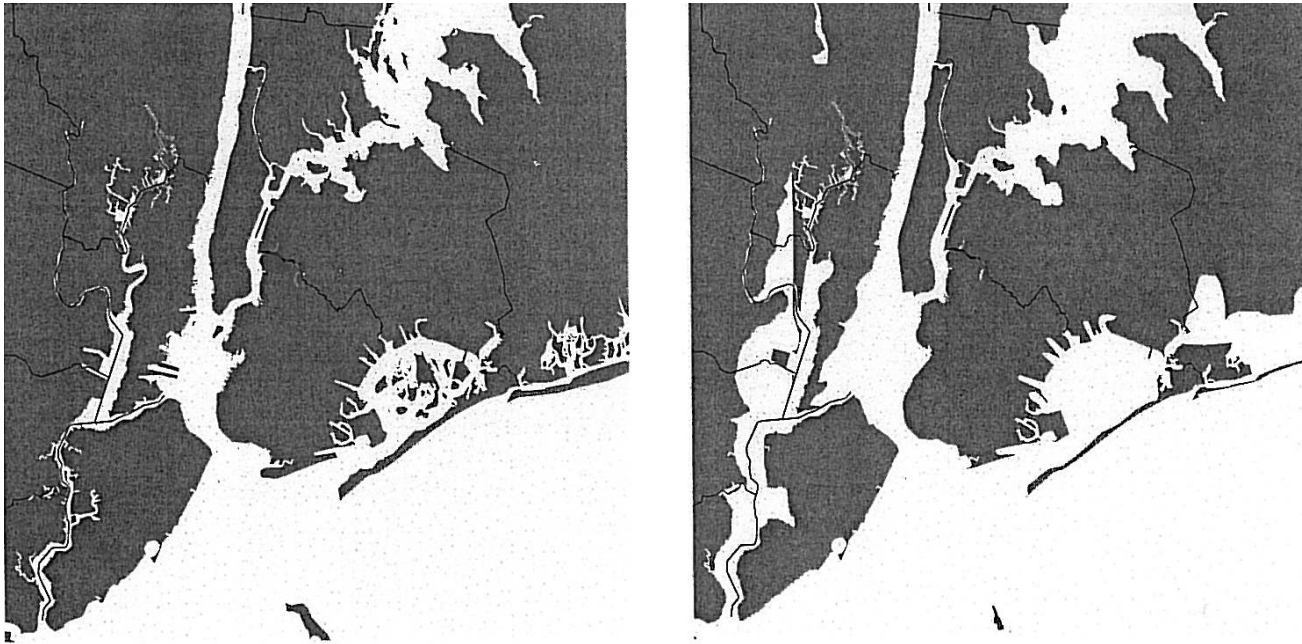
many ice ages is proof that climate change is not a one-directional arrow.) Once again, the extended length of seasons coupled with the slowly moving continents has *always* affected *where* humans live as well as *how* they live to insure their ability to gain food and shelter, that by which we ultimately call safety and security. Then there is the “wobble” of Earth as it spins on its 23 degree axis. To understand that, think of a top spinning and the way it wobbles as it spins. Earth's wobble changes its axis very slightly but enough to affect the amount of light and heat received from the sun. Again, this slight wobble effect ultimately affects weather conditions.

Of course, as humans have evolved (slowly) over the centuries, we have become much better technologically at understanding our environment and much more efficient in developing effective methods of farming, shelter and the defense of our particular area of land where our food is grown. And we have been able to “deal” with the weather conditions, especially in the United States.

But as our technology has developed, so has the amount of carbon dioxide found in our air. Some main reasons for the tremendous increase

into our environment of this gas is 1) the purposeful destruction of rain forests and 2) the tremendous increase in the use of gas-powered engines, such as the type that powers our automobiles. Simple sentences to read. Not so easy to understand.

I will try to make this GREENHOUSE EFFECT understandable. Water vapor is responsible for up to 95 percent of the absorbed heat from the sun in our atmosphere. However, the ever increasing amount of carbon dioxide in the atmosphere has now become a major factor in heat absorption. Very basically, it is the “short wave” ultraviolet radiation that heats the earth, that passes through the carbon dioxide (and other gases) in the atmosphere. However, when this heat is to be reradiated back into space, via the “long wave” infrared radiation, the carbon dioxide “blocks” that long wave radiation from escaping. In effect, it is transparent for the heat coming in and opaque for the heat trying to escape. The result is that the atmosphere gets warmer. Now trees are an excellent avenue for absorbing carbon dioxide gases, removing the gas from the atmosphere, storing it while releasing oxygen back into the atmosphere. Automobiles, ever increasing in number throughout the world, emit carbon dioxide gases into the atmosphere. So, if you add more and more carbon dioxide gas into the atmosphere and remove more and more trees, a key source of its removal, you keep increasing the amount of carbon dioxide into the atmosphere. It is estimated that an acre of mature trees absorbs the amount of carbon dioxide an automobile emits about every two years—approximately 26,000 miles. But why is that important? And can that really affect our climate? After all, 95 percent of our heat is caused by water vapor. I have just explained some of the steady but sure natural factors concerning our climate. Can the greenhouse effect, debated by many, be such a key factor? If we received a report from our doctor that our high blood pressure was a hereditary problem, should we then go out and eat salty and fatty foods and blame our continued high blood pressure solely on our ancestors? We would be only kidding ourselves. This is not



Map on the left shows the New York metropolitan area as it is today. Map on the right shows the New York metropolitan area as it might appear in approximately 150 years from now. Note the lower portion of Manhattan Island—the area of the main financial district has virtually disappeared.

about the politics. In fact, more and more, all political parties are coming to a similar understanding. We have to be realistic. The significant increase in ocean temperatures, in melting polar icecaps, rising ocean levels, drought and the dramatic number of tornados and hurricanes go far beyond just the recorded or researched information on the ever evolving Earth. And it really can affect our safety and security.

It can affect us in our daily working lives because of the change in temperature with which we have to deal. And it can affect the overall world conditions—handing us the real possibility of people fleeing their homes, searching for food and shelter, causing their governments to do the same. In May of 2007, researchers with the National Aeronautics and Space Administration (NASA) and Columbia University's Earth Institute stated that human-made greenhouse gases have brought Earth's climate close to the critical tipping point with potentially dangerous consequences.

In bipartisan legislation introduced in both the Senate and House, the Global Climate Security Oversight Act was introduced. The goal was to assess the security challenges presented by climate change. According to the bill, "The consequences of global climate change represent a clear and present danger to the security and economy of the United States." In addition, "failure to recognize, plan for and mitigate the

strategic, social, political and economic effects of a changing climate will have an adverse impact on the national security interests of the United States. A 2003 report prepared for the U.S. Department of Defense entitled "An Abrupt Climate Change Scenario and Its Implications for United States National Security" states that "military confrontation may be triggered by a desperate need for natural resources such as energy, food and water" surprisingly enough "rather than by conflicts over ideology, religion or national honor. Also, the Pentagon will be closing three of the 20 NORAD (North American Aerospace Defense Command) Early Warning Radar Sites in northern Alaska. This is due to waves of water that were previously held back by the thick ice layer in that area. As a result of the melted ice, the water has been able to cause severe soil erosion to the point that the sites are no longer to be operated safely.

Here is another effect of global warming. Our own U.S. coastlines from the Gulf Coast, to the South Atlantic Coast, to the Mid-Atlantic Coast to the Northeast Coast face the real possibility of not only considerable flooding, but the actual reshaping, with a resulting significant loss of land. This is due to the at least partial melting of the polar icecaps. The coast of New York City is not immune to this danger. Ironically, the formation of Manhattan Island and the adjacent Hudson River were formed

during the previous ice age. With so much possible coastline loss, many serious (security) questions must be asked (and answered).

What happens to the large populations living there? Will they have to be moved? How quickly? Where will they resettle? Where will they find employment? What happens to the industries there? Food production, oil production, clothing, manufacturing? How and where can they be relocated? And how will these factors affect all of us? With less U.S. farming, will there be enough food for all of the U.S. population?

Just a few short years ago, the United States faced a serious challenge with Hurricane Katrina. It involved the National Guard, FEMA, and many other public and private agencies. We all know the results. What we face with global warming and the shrinking of these coastlines would be a Katrina-type environment that seemingly never ends.

The lack of food and fresh water, unemployment, panic—we will be facing riots and crime of mass proportions. I do not think this is an exaggeration. How would this tax our police forces, our National Guard? How would we be able to keep supplying fresh troops in their actions overseas?

These may seem like doomsday scenarios. However, even if we factor out a dramatic sea level rise, let's examine other problems and dangers we face on an everyday basis at our jobs and at

our homes. In order to help reduce, or slow down, the increase in the overall temperature, we are going to rely more and more on nuclear power, solar power and the new cellular power to supply energy to our homes, offices and workplaces. And with higher temperatures, the use of air conditioning will not be limited to our usual "summer" conditions.

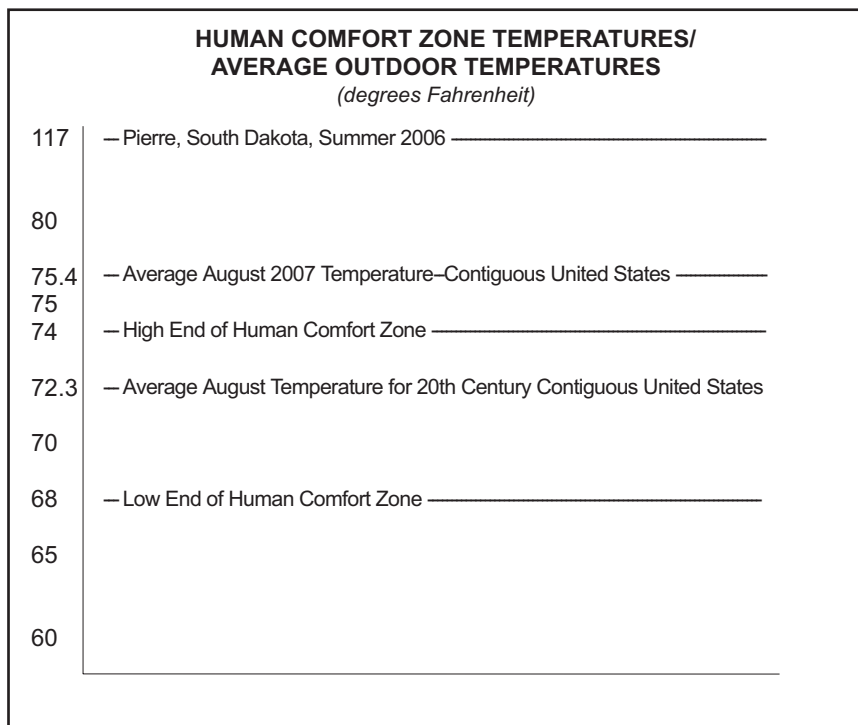
No matter where you live (in the United States), a way of life will surely change. And if you live in, say, Phoenix, Arizona, an increase in temperature can really affect a way of life that already is heavily taxed. Can one imagine living on Mars? Perhaps later this century, we can see an indoor complex where no one can or would leave that enclosed area-which is supplying the atmosphere required to live. Just north of our border, in many Canadian cities, people can venture from one place to another without going out into the cold during the winter months. Parts of the city centers have been enclosed. But it may be that with the slow but steady temperature increase, those cities may become ideal for growing citrus fruits. And how can that area or any other area be converted from their present use to another function, say farming? How much of an increase of temperature can be withstood there before other steps will be necessary to live and work there? What about the comfort zone for all humans. How long can one work on an outdoor job, i.e., construction, if the average temperature is higher than one normally expects, even during the summer. A person's summer comfort zone temperature is between 20 and 24 degrees Celsius (68 to 75 degrees Fahrenheit). Areas with that comfort zone will decrease dramatically in the next few years. As Phoenix moves further off the acceptable temperature range, other cities will move closer to the current average Phoenix temperature. Not only will it be more difficult to do work (labor) or any kind, but also, atherosclerosis develops much more quickly in very warm temperatures. The result is likely to be many more heart attacks on the job. A person's body needs to rid itself of the excess heat that it creates from doing physical work. Otherwise body temperature can increase as much as one degree Celsius every 10 minutes. For people who work outdoors, this means a somewhat less ability to produce. Reports from China indicate that in that country, which is very labor intensive,

as many as 685 people per million per year currently die from ailments related to global warming. This statistic will most certainly rise. The North American heat wave of 2006 beginning in mid-July and lasting through the end of August killed at least 225 people. There was a recorded temperature of 117 degrees F (47 degrees C) in Pierre, South Dakota. And during that time period over 25,000 cattle and 700,000 fowl died due to the severe heat. A warning to us once again that our "abundant" food supply here in the United States, generally taken for granted, even during periods of minor shortages, has to be examined carefully going forward. The workplace will also experience an increase in missed days due to increases in allergy, asthma and disease-related illnesses caused by flourishing mold, ragweed, mosquitoes, ticks and other carriers. The United Steel Workers are pushing for much more regulation with regard to all matters that affect the warming of the environment that can be somewhat controlled, such as the use of power plants and fuel efficiency to energy efficiency. They see it as a way not only to get a grip on the growing warming trend and worsening environmental conditions, but also as a way to create more and better jobs. Jobs that may themselves help to reduce global warming effects. The Green Jobs Act of 2007 authorized up to \$125 million in funding

for establishing both national and state job programs that would be administered by the U.S. Department of Labor. The goal is to help create jobs in "green" industries. Many of these jobs would be using new methods and new technologies. They will help the economy and the environment but would also require new skills and therefore an understanding of the safety requirements of the new jobs themselves. It will be the job of OSHA to insure that the necessary safety steps be taken in response to these new technologies.

Let's examine some of the pros and cons of nuclear energy and their effects on our safety. On the positive side, with the earth having a finite and somewhat limited amount of coal and oil, nuclear power plants can produce electricity for perhaps all of our time on Earth. One ton of uranium can produce as equivalent an amount of energy as several million tons of coal and oil, without polluting the environment.

However, there is an inherent danger in the use of atomic power: while atomic power may be very efficient and while the chances of a serious accident are quite small, they are nevertheless not at zero. It only takes one accident to cause a major catastrophe. Potentially dangerous radiation spreads throughout the area immediately. Then it quickly spreads via the prevailing winds, causing even more contamination. How does one escape this either being at



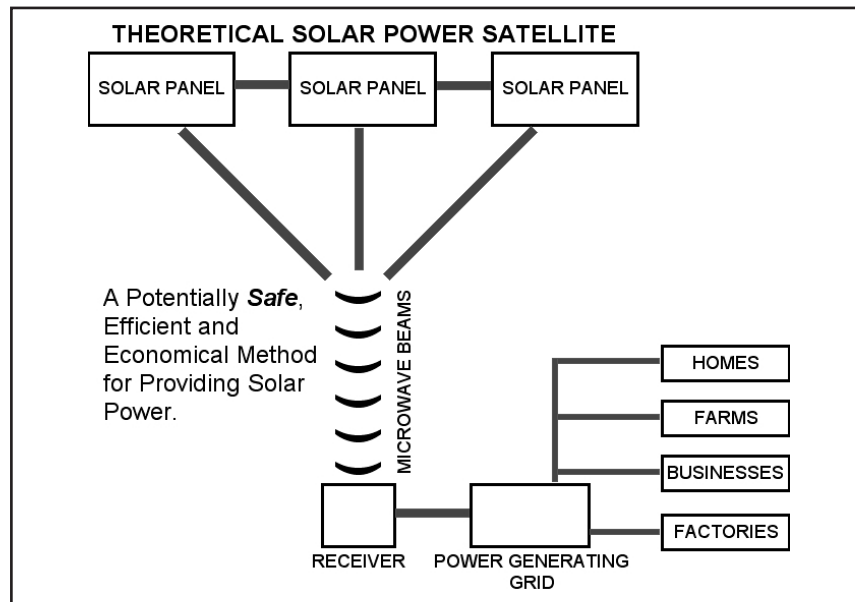
work or at home? Even with preplanned highway escape routes, can an efficient escape be orchestrated? And with the radiation spreading so quickly, where can one escape to?

Solar energy as well has a number of advantages and disadvantages: on the positive side, solar energy is a renewable resource. The sun will be converting hydrogen into helium, producing the light and heat that it does for approximately another 4,5 billion years. (Although my introduction states that the sun will always be there when we wake up in the morning, that will also change one day a very long time from now when all of the sun's hydrogen is used up.) Another advantage is that the light and energy we receive from the sun is free. In addition, solar cells can last a lifetime, with very little maintenance.

However solar power does not deliver a perfect world. There are some dangers associated with solar energy. Just as there is and will continue to be a shortage of oil in this country and throughout the world, there is also a shortage of silicone-necessary for the production of solar cells. So we are likely to face the paradox of not being able to use either very efficiently. Solar power also requires a great deal of equipment to make it work. For a manufacturing facility to use it as its sole source of power will likely mean the use of a virtual power plant right at the facility. In addition, the wide expanse of solar panels on rooftops of buildings of all types makes it difficult to gain access to the roof. A small fire can begin to rage out of control as firefighters struggle to get to and onto the roof.

The future of solar power may be in its transmission from a satellite orbiting the planet. Known as SPS or Powerstat, the satellite would be built in high Earth orbit. It would use microwave power transmission to beam solar power to a large antenna situated on Earth, presumably in the United States. There are major advantages of placing solar collectors in space.

- An unobstructed view of the sun, with no concern of a limited day/night cycle, the weather or temperature.
- It would be a renewable energy source with zero emission and no waste.
- If all countries could take advantage of this type of energy source, it could lead to less conflict, such as countries today



competing for the (limited) supply of future available oil.

Realistically, this technology is years away. While some of the technology is available today, the cost of launching the satellite is very high. And some of the technology involves getting raw material from the moon. This is going to require space-based manufacturing. Again the costs will be very high. And in the real world, the development of that kind of manufacturing will have to compete with our current energy sources. In a reminder of the old "guns vs. butter" economic scenerio, what do we do? Invest heavily in this new technology-or stay with our current earthly energy sources where we to a certain extent know our costs and somehow manage them?

Then there is the danger of such a technology. While it would be in a high stable orbit, the technology is there for a foreign power to reach it and destroy it. Had this satellite, or even satellites, become our main source of power, the country could become effectively paralyzed.

Fuel cell power is yet another clean energy power source. According to the U.S. Department of Energy, fuel cells are an important enabling technology for the hydrogen economy and have the potential to revolutionize the way the United States is powered. It offers cleaner, more efficient alternatives to the combustion of gasoline and other fossil fuels. Fuel cells potentially can replace the automobile internal combustion engine and provide power in stationary and portable power applications. The Department of Energy is cur-

rently working with national laboratories, universities and industry partners to overcome the technical barriers to the commercialization of fuel cells.

A fuel cell is similar to a battery in that an electrochemical reaction is used to create an electric current. However, unlike a battery, the hydrogen and oxygen gases (the reactants) are combined in a catalytic process. As the gas reactants can be fed into the fuel cell and be constantly replenished, the unit never runs down as a battery does. But, is fuel cell technology safer? Not necessarily. Hydrogen is highly explosive and one of the most flammable substances. So its storage must be very well protected from accidental penetration. Furthermore, 98 percent of hydrogen is produced from fossil fuel sources. So while hydrogen burns clean, it requires production of the very type of pollution we would be trying to eliminate. So there is still much research that must be done before it can safely and efficiently become a viable energy resource.

Just as the conditions on our planet have changed slowly, so have humans. It has taken us

over 10,000 years to reach our current stage of technology and knowledge. Going forward, we will have to use it-not more than ever, but certainly as much as ever-in our jobs, in our everyday lives, in our interactions with peoples and countries throughout the world.

Joel Hershkovitz is Director of Marketing at Idesco Corporation. He has 26 years experience in the security industry and holds a degree in Business Management from Fairleigh Dickinson University. For more information please visit www.idesco.com.