

A Catholic Response to Global Warming

The Catholic Voice



(Photo courtesy of Catholic Relief Services annual report 2013)

Survivors shown amid the aftermath of Typhoon Haiyan in the Philippines, November 2013.

The Science



Scientist Albert Behar of NASA's Jet Propulsion Laboratory in Greenland, July 2012, with the robotic boat he designed to study melt water runoff.

The Solution



A non-polluting power generating wind turbine in Texas illustrates Pope Francis' call for "substituting for fossil fuels and developing sources of renewable energy." [26]

By Steven J. Coleman

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An electronic copy of this document may be downloaded from <http://bit.ly/catholic-ccl>

INTRODUCTION

This publication is designed to provide a basic understanding of Catholic Social teaching on care of creation, the science of Global Warming and the actions we can take to fight climate change. It may be read in an hour. There are references at each step if the reader wishes to go into greater depth on the topic. Please read the Encyclical, *Laudato Si'*.

Section 1 – The Catholic Voice, explores Catholic Social Teaching on Care of Creation. We start with two pages of quote from the Pope Francis' encyclical, *Laudato Si'* on Care for our Common Home. We focus on global warming and climate change. There are selections from statements written by Bishops, Popes and Vatican study groups. Links to the complete statements are provided. The message is clear and strong: We have a moral responsibility to act to prevent further degradation of God's creation. It calls for urgent action.

Section 2 – is a summary of the **Science of Global Warming**, and the impact it is having on the earth. We start by explaining the basic chemistry and physics of global warming; continue with the data that demonstrates its effects over time; share the consequences and “costs”; and end with projections for the future if we continue to use fossil fuels at our current rate.

Section 3 – The Solution, describes what can be done: How we as Catholics can make a difference. And how we as church are called to make the Catholic Voice heard

– in the parish and throughout our community; with family, neighbors, lawmakers, and business and corporate leaders.

The issue of global warming is complex but the message is simple:

- Global warming is real. Human activity is the major cause.
- Global warming is changing the world around us today.
- Urgent action is called for.
- If we do nothing new (business as usual), the consequences are dire.

Collectively, the popes have spoken:

- In his 1990 World Day of Peace Message Pope John Paul II said: "...the ecological crisis is a moral issue."¹
- In his 2010 World Day of Peace Message Pope Benedict said: "If you want to cultivate peace, protect creation." (see page 7)
- In his 2015 Encyclical, Pope Francis said: "If present trends continue, this century may well witness extraordinary climate change and unprecedented destruction of ecosystems, with serious consequences for all of us." (see page 4)

Take a moment to quiet your mind and soul, and to be open. Offer this simple and powerful prayer: *Come, Holy Spirit, Come.*

You may access a video an early presentation of this material <http://youtu.be/SGPCJzKiAuk>

¹ http://www.vatican.va/holy_father/john_paul_ii/messages/peace/documents/hf_jp-ii_mes_19891208_xxiii-world-day-for-peace_en.html

Pope Francis writes not just to Catholics but, "In this Encyclical, I would like to enter into dialogue with all people about our common home." [3]



"It is my hope that this Encyclical Letter, which is now added to the body of the Church's social teaching, can help us to acknowledge the appeal, immensity and **urgency of the challenge we face**. I will begin by briefly reviewing several aspects of the present ecological crisis, with the aim of drawing on the results of the best scientific research available today, letting them touch us deeply and provide a concrete foundation for the ethical and spiritual itinerary that follows." [15]

"We see growing sensitivity to the environment and the need to protect nature, along with a growing concern, both genuine and distressing, for what is happening to our planet." [19]

"The climate is a common good, belonging to all and meant for all. At the global level, it is a complex system linked to many of the essential conditions for human life. **A very solid scientific consensus indi-**

cates that we are presently witnessing a disturbing warming of the climatic system. In recent decades this warming has been accompanied by a constant rise in the sea level and, it would appear, by an increase of extreme weather events, even if a scientifically determinable cause cannot be assigned to each particular phenomenon. Humanity is called to recognize the need for changes of lifestyle, production and consumption, in order to combat this warming or at least the human causes which produce or aggravate it. ...yet a number of scientific studies indicate that most global warming in recent decades is due to the great concentration of greenhouse gases (carbon dioxide, methane, nitrogen oxides and others) released mainly as a result of human activity. Concentrated in the atmosphere, these gases do not allow the warmth of the sun's rays reflected on the earth to be dispersed in space. The problem is aggravated by a model of development based on the intensive use of fossil fuels, which is at the heart of the worldwide energy system. Another determining factor has been an increase in changed uses of the soil, principally deforestation for agricultural purposes." [23]

"Warming has effects on the carbon cycle. It creates a vicious circle which aggravates the situation even more, affecting the availability of essential resources like drinking water, energy and agricultural production in warmer regions, and leading to the extinction of part of the planet's bio-

diversity. The melting in the polar ice caps and in high altitude plains can lead to the dangerous release of methane gas, while the decomposition of frozen organic material can further increase the emission of carbon dioxide. Things are made worse by the loss of tropical forests which would otherwise help to mitigate climate change. Carbon dioxide pollution increases the acidification of the oceans and compromises the marine food chain. **If present trends continue, this century may well witness extraordinary climate change and an unprecedented destruction of ecosystems, with serious consequences for all of us.** A rise in the sea level, for example, can create extremely serious situations, if we consider that a quarter of the world's population lives on the coast or nearby, and that the majority of our megacities are situated in coastal areas.”[24]

“The work of the Church seeks not only to remind everyone of the duty to care for nature, but at the same time “she must above all protect mankind from self-destruction”.[79]

“Climate change is a global problem with serious implications, environmental, social, economic, political and for the distribution of goods; **it represents one of the principal challenges facing humanity in our day.** There has been a tragic rise in the number of migrants seeking to flee from the growing poverty caused by environmental degradation.” [25]

“There is an urgent need to develop policies so that, in the next few years, the emission of carbon dioxide and other highly polluting gases can be drastically reduced, for example, substituting for fossil fuels and developing sources of renewable energy.” [26]

“...the ecological crisis is ... a summons to profound interior conversion. It must be said that some committed and prayerful Christians, with the excuse of realism and pragmatism, tend to ridicule expressions of concern for the environment. Others are passive; they choose not to change their habits and thus become inconsistent. So what they all need is an “ecological conversion”, whereby the effects of their encounter with Jesus Christ become evident in their relationship with the world around them. **Living our vocation to be protectors of God’s handiwork is essential to a life of virtue; it is not an optional or a secondary aspect of our Christian experience.”**[217]

Authors notes: *Laudato Si'* is much more than a conversation about the pollution of the atmosphere and environment. It calls us to care for creation and care for the poor. But there is an urgent (the Popes choice of words) message about climate change that we must get right and we must start now. This booklet tries to bring the moral call, the science and the social action together to respond to this urgent need. Please read the entire Encyclical.

NOTE: Numbers in brackets indicate corresponding paragraph numbers in the encyclical. **Bold** have been added for emphasis.

Link: http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Global Climate Change: A Plea for Dialogue, Prudence and the Common Good

A statement of the United States Conference of Catholic Bishops, June 15, 2001

"As people of faith, we are convinced that 'the earth is the Lord's and all it holds' (Ps 24:1). Our Creator has given us the gift of creation: the air we breathe, the water that sustains life, the fruits of the land that nourish us, and the entire web of life without which human life cannot flourish. All of this God created and found "very good." We believe our response to global climate change should be a sign of our respect for God's creation...

At its core, global climate change is not about economic theory or political platforms, nor about partisan advantage or interest group pressures. It is about the future of God's creation and the one human family...

As Catholic bishops, we make no independent judgment on the plausibility of "global warming." Rather, we accept the consensus findings of so many scientists and the conclusions of the Intergovernmental Panel on Climate Change (IPCC) as a basis for continued research and prudent action...

In facing climate change, what we already know requires a response; it cannot be easily dismissed. Significant levels of scientific consensus – even in a situation with less than full certainty, where the consequences of not acting are serious – justifies, indeed can

oblige, our taking action intended to avert potential dangers. In other words, if enough evidence indicates that the present course of action could jeopardize humankind's well being, **prudence** dictates taking mitigating or preventative action...

According to reports of the IPCC, significant delays in addressing climate change may compound the problem and make future remedies more difficult, painful, and costly. On the other hand, the impact of prudent actions today can potentially improve the situation over time, avoiding more sweeping action in the future...

Now we face two central moral questions:

- How are we to fulfill God's call to be stewards of creation in an age when we may have the capacity to alter that creation significantly, and perhaps irrevocably?
- How can we as a "family of nations" exercise stewardship in a way that respects and protects the integrity of God's creation and provides for the common good, as well as for economic and social progress based on justice?...

The common good calls us to extend our concern to future generations. Climate change poses the question: What does our generation owe to generations yet unborn?"

Link: <http://www.usccb.org/issues-and-action/human-life-and-dignity/environment/global-climate-change-a-plea-for-dialogue-prudence-and-the-common-good.cfm>

If You Want to Cultivate Peace, Protect Creation

Pope Benedict XVI: Message for the Celebration of the World Day of Peace 2010, **January 1, 2010**

The report is also available in booklet form from the USCCB, Publication No. 5-431

“...Respect for creation is of immense consequence, not least because ‘creation is the beginning and the foundation of all God’s works’, and its preservation has now become essential for the pacific coexistence of mankind...

The environment must be seen as God’s gift to all people, and the use we make of it entails a shared responsibility for all humanity, especially the poor and future generations...

Can we remain indifferent before the problems associated with such realities as climate change, desertification, the deterioration and loss of productivity in vast agricultural areas, the pollution of rivers and aquifers, the loss of biodiversity, the increase of natural catastrophes and the deforestation of equatorial and tropical regions? Can we disregard the growing phenomenon of “environmental refugees...”? Can we remain impassive in the face of actual and potential conflicts involving access to natural resources? All these are issues with a profound impact on the exercise of human rights, such as the right to life, food, health and development...

Man thus has a duty to exercise responsible stewardship over creation, to care for it and to cultivate it...

Sad to say, it is all too evident that

large numbers of people in different countries and areas of our planet are experiencing increased hardship because of the negligence or refusal of many others to exercise responsible stewardship over the environment...

This means that technologically advanced societies must be prepared to encourage more sober lifestyles, while reducing their energy consumption and improving its efficiency.

Encouragement needs to be given, for example, to research into effective ways of exploiting the immense potential of solar energy. Similar attention also needs to be paid to the world-wide problem of water and to the global water cycle system, which is of prime importance for life on earth and whose stability could be seriously jeopardized by climate change...

The Church has a responsibility towards creation, and she considers it her duty to exercise that responsibility in public life, in order to protect earth, water and air as gifts of God the Creator meant for everyone, and above all to save mankind from the danger of self-destruction...

There exists a certain reciprocity: as we care for creation, we realize that God, through creation, cares for us..."

Link:

http://www.vatican.va/holy_father/benedict_xvi/messages/peace/documents/hf_ben-xvi_mes_20091208_xliii-world-day-peace_en.html

The Global Retreat of Mountain Glaciers

A report by the Working Group Commissioned by the Pontifical Academy of Science, May 11, 2011

The Pontifical Academy of Sciences, one of the oldest scientific institutes in the world, issued a sobering report on the impacts for humankind as a result of the global retreat of mountain glaciers as a result of human activity leading to climate change.

In their declaration, the working group calls, “on all people and nations to recognize the serious and potentially irreversible impacts of global warming caused by the anthropogenic (resulting from human activity) emissions of greenhouse gases and other pollutants, and by changes in forests, wetlands, grasslands, and other land uses. We appeal to all nations to develop and implement, without delay, effective and fair policies to reduce the causes and impacts of climate change on communities and ecosystems, including mountain glaciers and their watersheds, aware that we all live in the same home. By acting now, in the spirit of common but differentiated responsibility, we accept our duty to one another and to the stewardship of a planet blessed with the gift of life.”

... “The temperature guardrail for avoiding “dangerous anthropogenic interference” is now proposed to be at 2° C warming (above the pre-industrial level), although many scientists argue and many nations agree that 1.5° C is a safer upper limit. Scientific,

political, and economic considerations have contributed to the identification of this threshold, which has been adopted by the international climate negotiations.”

Three Recommended Measures:

Human-caused changes in the composition of the air and air quality result in more than 2 million premature deaths worldwide every year and threaten water and food security

1. “Reduce worldwide carbon dioxide emissions without delay, using all means possible to meet ambitious international global warming targets and ensure the long-term stability of the climate system. ...These actions must be accomplished within a few decades.”

2. “Reduce the concentrations of warming air pollutants (dark soot, methane, lower atmosphere ozone, and hydrofluorocarbons) by as much as 50%, to slow down climate change during this century while preventing millions of premature deaths from respiratory disease and millions of tons of crop damages every year.”

3. “Prepare to adapt to the climatic changes, both chronic and abrupt, that society will be unable to mitigate.”

Stabilizing the Climate and Giving Energy Access to All with an Inclusive Economy

Statement of the Joint Pontifical Academy of Sciences/Pontifical Academy of Social Sciences Workshop on Sustainable Humanity, Sustainable Nature: Our Responsibility, **May 6, 2014**

Humanity has entered a new era.

Our technological prowess has brought humanity to a crossroads...

“... Today we have changed our natural environment to such an extent that scientists are redefining the current period as the Age of the Anthropocene, that is to say an age when human action, through the use of fossil fuels, is having a decisive impact on the planet. If current trends continue, **this century will witness unprecedented climate changes and ecosystem destruction that will severely impact us all...**”

“...About fifty-percent (50%) of available energy is accessed by just one billion people, yet the negative impacts on the environment are being felt by the three billion who have no access to that energy. Three billion have so little access to modern energy that they are forced to cook, heat, and light their homes with methods dangerous to their health.”

“The massive fossil fuel use at the heart of the global energy system deeply disrupts the Earth’s climate and acidifies the world’s oceans. The warming and associated extreme weather will reach unprecedented levels in our children’s life times and 40% of the world’s poor, who have a minimal role in generating global pollution, are likely to suffer the most.”

“Most importantly, inequality, global injustice, and corruption are undermining our ethical values, personal dignity and human rights. We need, above all, to change our convictions and attitudes, and combat the **globalization of indifference** with its culture of waste and idolatry of money...”

“Our message is one of urgent warning, for the dangers of the Anthropocene are real and the injustice of globalization of indifference is serious. Yet our message is also one of hope and joy. A healthier, safer, more just, more prosperous and sustainable world is within reach.”

Link:

<http://www.casinapioiv.va/content/accademia/en/events/2014/sustainable/statement.html>

THE SCIENCE OF GLOBAL WARMING

This section summarizes the **Facts about our world** and the impact it is having on the earth.

- We start by looking at increasing global temperature, melting of Arctic Sea ice and sea level rise alongside the increase in the concentration of carbon dioxide in the atmosphere.
- We then study the basic chemistry and physics of global warming;
- continue with the data that demonstrates its effects over time;
- share the consequences and “costs”;
- and end with projections for the future if we continue to use fossil fuels at our current rate.

The Historical Data of Global Warming

Pope Francis says “....*Drawing on the results of the best scientific research available today, letting them touch us deeply and provide a concrete foundation for the ethical and spiritual itinerary that follows.*”[15]

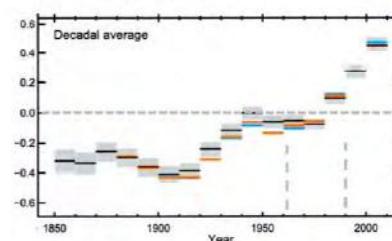
Let's begin with four charts that illustrate the profile – the telling fingerprint, if you will – of global warming. They are simple, straightforward, measurements taken over decades – and are not disputed:

1. Average Global Surface Temperature
2. September Arctic Sea Ice Coverage
3. Observed Sea Level Rise
4. Atmospheric CO₂

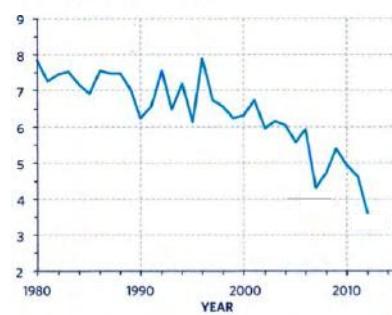
We see increasing average global temperatures, melting of Artic Sea ice and rising sea levels. The fourth chart shows increasing concentrations of carbon dioxide in the atmosphere.

On the following pages we'll examine each chart in detail, and then look at the chemistry and physics as it relates to the charts.

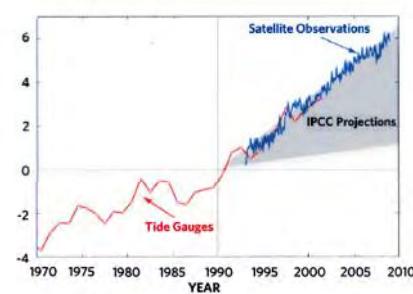
1. Temperature



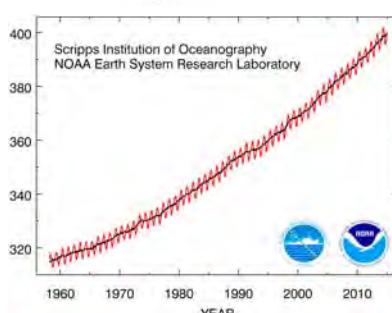
2. Arctic Sea Ice

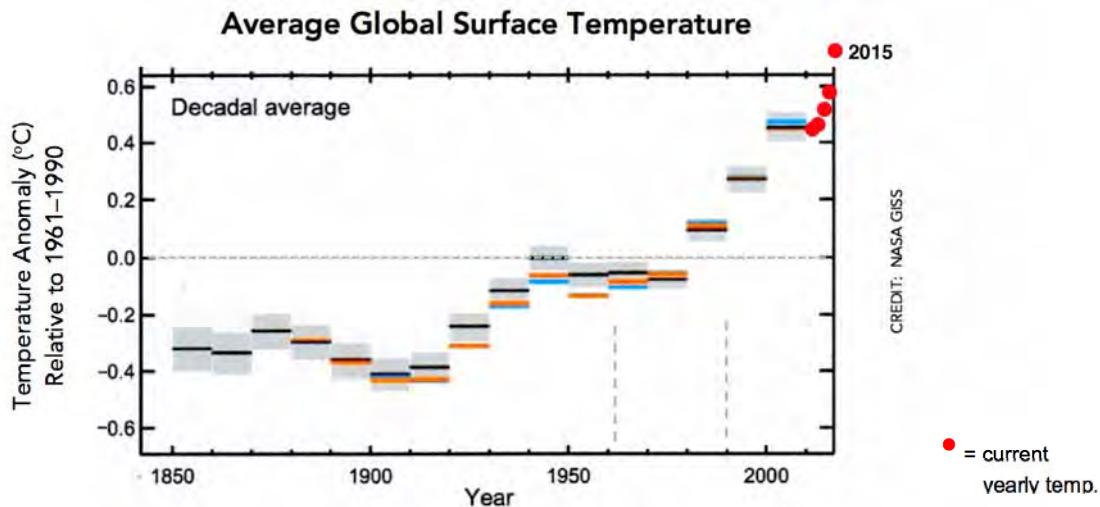


3. Sea Level Rise



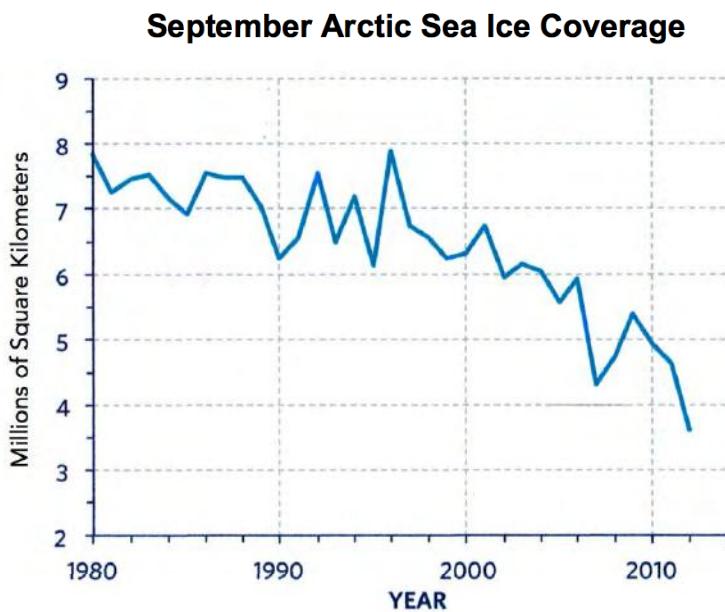
4. Atmospheric CO₂





The chart above shows a temperature increase of about one degree Celsius (1.8 degrees Fahrenheit) over the last 160 years. Half of that increase has happened in the last 40 years. Note that the data is presented in decade averages, taking out

the year-to-year variations that sometimes confuse the conversation. We are interested in Climate. Climate is measured in 20-, 50-, and 100-year increments. Climate is different from weather. Weather is what we experience today, this week and this year.



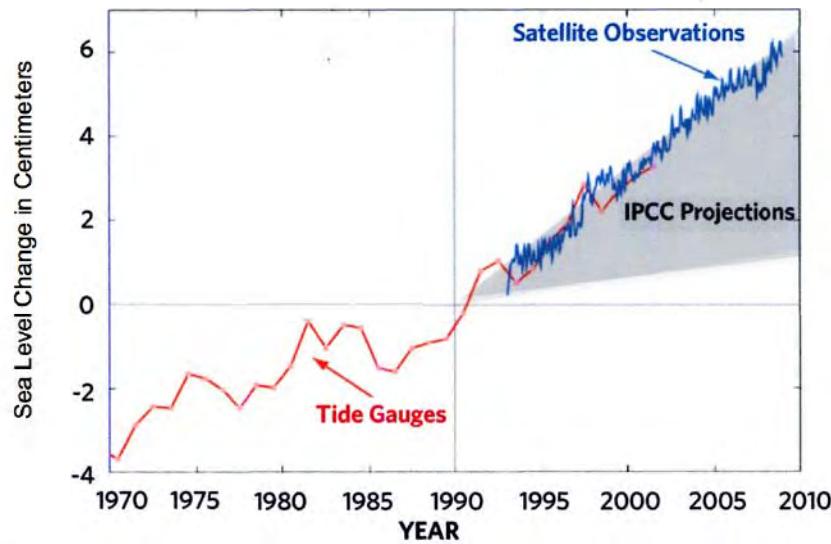
In summer some of the Arctic Sea ice melts and in winter the ice-covered area increases. Arctic ice reaches its yearly minimum in September. In the last 35 years

the Arctic Sea ice has decreased by approximately 50%. This change affects weather patterns most significantly in the Northern Hemisphere.

THE SCIENCE OF GLOBAL WARMING

Observed Sea Level Rise vs. IPCC Projections

The worldwide ocean levels have been rising rapidly and steadily over the last 40 years. The red line is data from tidal gauges and the blue line is from satellite measurements. The shaded area was the forecast made in 1990. The actual is at the top extreme of that forecast. A major cause of sea level rise is the heating of the oceans by global warming and the thermal expansion of the water. When something gets hotter it gets bigger. Note the melting of sea ice has very little effect

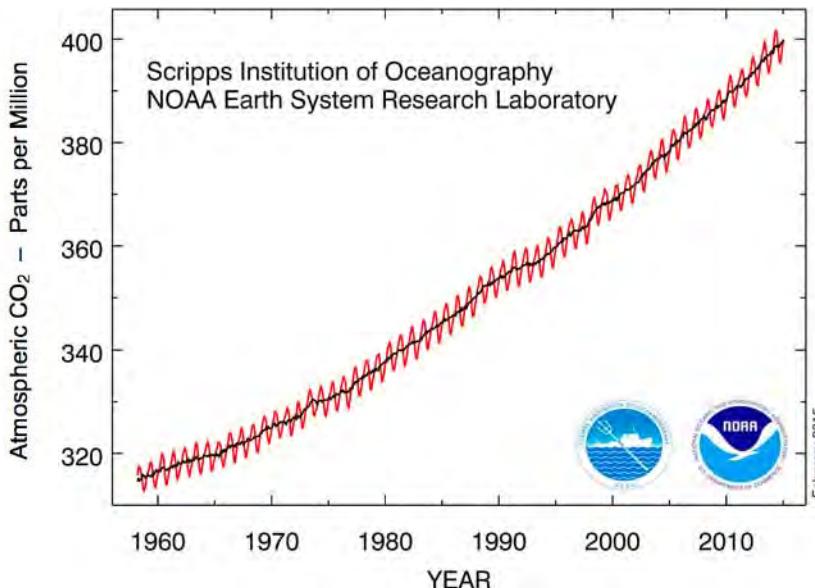


CREDIT: COPENHAGEN DIAGNOSIS 2009 [HTTP://SK5.TO/M0DEL](http://sk5.to/m0deL)

on sea level rise. A second major cause of ocean rise is melting of land ice, glaciers and ice in Greenland and Antarctica does raise the sea level.

Atmospheric CO₂ at Mauna Loa Observatory

This chart shows the steady increase in the amount of CO₂ (carbon dioxide) found in the atmosphere in parts per million. Over the past 60 years, the amount of CO₂ in the atmosphere has increased by more than 80 parts per million, a 25% increase. The red line that bounces up and down each year affects the growing season in the Northern Hemisphere. In the summer there is increased plant growth, which decreases CO₂. In the winter plant matter



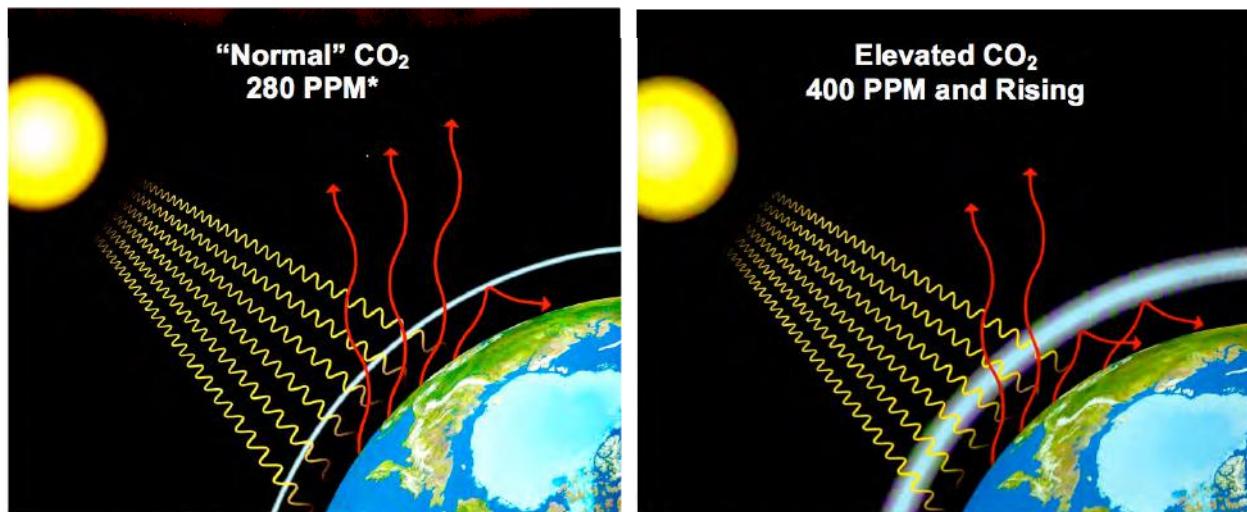
CREDIT: NOAA EARTH SYSTEMS RESEARCH LABORATORY

is oxidized, increasing carbon dioxide. Compare the increase in CO₂ with the temperature increase seen in the first chart.

Next, let's look at the role CO₂ plays in global warming.

Basic Chemistry and Physics

Greenhouse Gases in the Atmosphere



*PPM = parts per million

Increased CO₂ in the atmosphere is the main cause of global warming. As CO₂ increases, the “blanket” gets thicker and the earth gets warmer. Over the last 6000 years the atmospheric CO₂ was 270 to 280 parts per million (PPM). Since the Industrial Revolution atmospheric CO₂ has increased dramatically. The chart on page 12 shows the increase over the last 60 years. In 2014 we hit 400 ppm.

Greenhouse gases have special chemistry. They allow visible light from the sun to pass through but they partially block infrared radiation from the earth back into space. Infrared radiation is how the earth cools. The higher the concentration of greenhouse gases the more the blockage, creating a thicker and thicker blanket around the earth’s surface. Carbon dioxide, methane and water vapor are all greenhouse gases. CO₂ is the most prolific greenhouse gas.

There are three basic facts about climate change and humanity’s role in it:

1. Carbon dioxide (CO₂), a byproduct of burning carbon-based fuels (coal, oil and natural gas), traps heat.
2. The concentration of CO₂ is rising.
3. We’ve burned twice the amount of fossil fuels as needed to account for the observed rise. The rest has gone into the ocean and is causing ocean acidification, or it is taken up by vegetation and the soil.

We have known about the heat trapping property of CO₂ for over 150 years, ever since Irish scientist John Tyndall in 1859 stuck some CO₂ in a tube, shone light through it, and found that the temperature rose higher when there was more CO₂.

Burning of long-buried fossil fuel causes the increase in atmospheric CO₂, and the increase in CO₂ causes the earth’s temperature to rise. The increased global temperature is affecting our climate. This is global warming.

CREDIT: AN INCONVENIENT TRUTH; GORE

THE SCIENCE OF GLOBAL WARMING

The Consequences of Global Warming



What does climate change look like? From the illustrations on this page one can see a multitude of effects: stronger storms, more flooding, deeper droughts, frequent wildfires, massive snowstorms. These are weather effects, but weather is not climate. Climate is measured over long time periods – 30-, 40-, 100-years. Weather is what we experience now and next week.

Tracking climate change over time enables scientists to predict the probability of these weather events happening. For example, in August of 2011 Hurricane Irene spun through ...parts of the eastern US. Many hurricane analysts suggested it was a “100-year storm event”. In February 2012



researchers at MIT and Princeton found that with climate change, such a devastating storm could hit that area every three to 20 years². The “100-year flood”, an event that used to happen only once every 100 years, may now be expected to happen

² Lin, Ning et al. “Physically Based Assessment of Hurricane Surge Threat Under Climate Change.” Nature Climate Change 2, 462–467 (2012)

more often. Some ask whether a particular flood or storm is a result of global warming. The answer is, “not directly”. But the impacts of global warming on climate enable scientists to predict increased probability of extreme weather events.

Melting of Arctic ice is a direct result of global warming. Loss of ice changes the reflectivity of the region as more of the sun’s energy is absorbed by the ocean. This cyclical pattern exacerbates the problem. Warming of polar regions decreases the driving force of the jet stream. This causes the jet stream to slow down, wander and wiggle. This results in a weather pattern known as the polar vortex. This wiggle affects the temperatures in the northern parts of the US and drought in the Southwest.

Rising sea levels, as a result of thermal expansion and of land ice melt increase the likelihood of storm damage during hurricanes. The storm-surge of a large weather system sits on top of an elevated ocean level. Superstorm Sandy was not necessarily attributed to climate change, but the damage and flooding was certainly made worse by the fact that the sea level had risen. Global warming directly caused the sea level to rise.

Increasing temperatures and changes in rainfall patterns have an incredible impact on people and the economy. The results of global warming are evidenced in species extinction, changes in pest population, the spread of disease, agricultural losses and increases in allergies. The impact on people and the economy is severe.

The report, *Forum 2009: Climate Change*, outlines the magnitude of the human cost of climate change. From page 12 of the report we read:

“...In addition to the increased severity of weather events, the sheer number of weather-related disasters (storms, hurricanes, floods, heat waves, droughts) has

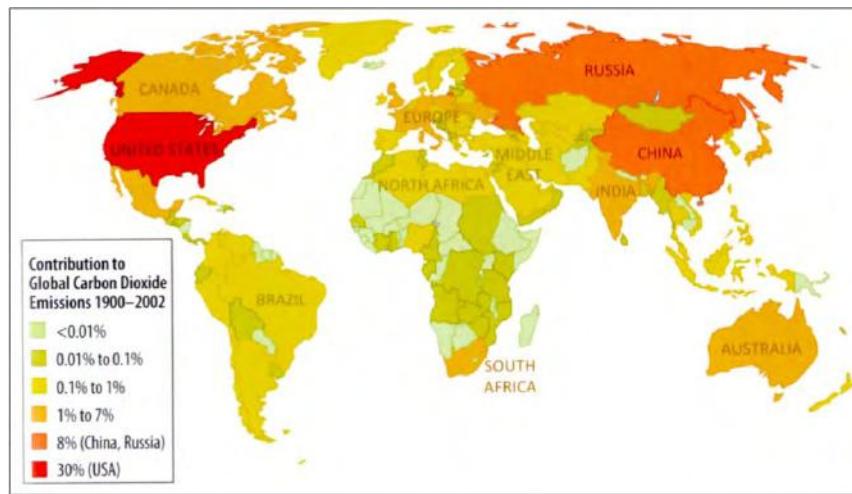
more than doubled over the last 20 years. Today, the world experiences over 400 weather-related disasters per year. They leave a frightening toll in their wake: almost 90 million people requiring immediate assistance due to personal injury, property loss, exposure to epidemics, disease or shortages of food and fresh water.”

“The main gradual changes are rising earth surface temperatures, rising sea levels, desertification, changes in local rainfall and river run-off patterns with increased precipitation in high latitudes and decreased precipitation in sub-tropical latitudes, salinization of river deltas, accelerated species extinction rates, loss of biodiversity and a weakening of ecosystems. The impact of this gradual change is considerable. It reduces access to fresh and safe drinking water, negatively affects health and poses a real threat to food security in many countries in Africa, Asia and Latin America. In some areas where employment and crop choices are limited, decreasing crop yields have led to famines. Desertification and other forms of land degradation have led to migration... Gradual environmental degradation due to climate change has also affected long-term water quality and quantity in some parts of the world, and triggered increases in hunger, insect-borne diseases such as malaria, other health problems such as diarrhea and respiratory illnesses. It is a contributing factor to poverty, and forces people from their homes, sometimes permanently.... Likewise, health outcomes and food insecurity lead to displacement and poverty which might result in competition for scarce resources and strains on mostly already limited government capacity to deal with deteriorating conditions and might ultimately lead to conflict... [the] WHO Global Burden of Disease study shows that long term consequences of climate change affect over 325 million people today.”³

³ *Forum 2009: Climate Change – The Anatomy of a Silent Crisis*

Link: <http://www.gsdrc.org/document-library/human-impact-report-climate-change-the-anatomy-of-a-silent-crisis/>

100 Years of Carbon Dioxide Emissions

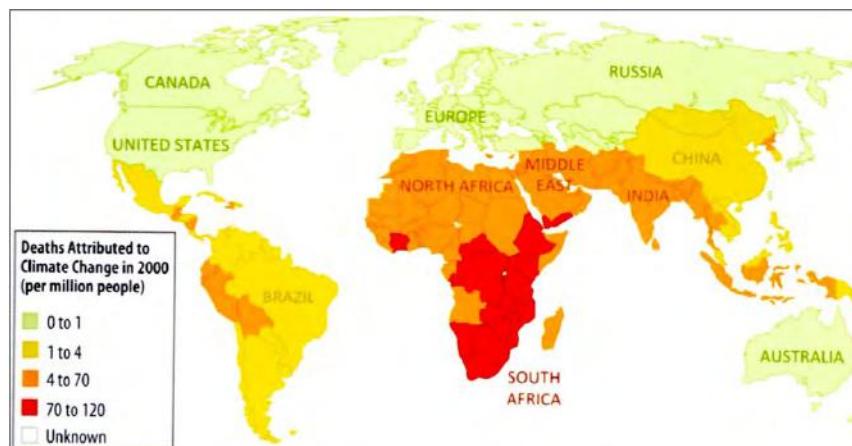


When we add up each nation's production of carbon dioxide over the last century, it is obvious that certain countries have contributed more than others to the buildup of carbon dioxide in the atmosphere.

From 1900 to 2004 the United States has

contributed 30% of the global total of carbon dioxide. China and Russia each contributed less than 8%. Most countries in Africa and Latin America contributed less than 1% each.⁴

Climate Change Deaths: an Average of 150,000 per Year



The World Health Organization estimates that 150,000 people die each year from illnesses and injuries related to climate change. The effects of climate change fall disproportionately on the poor and vulnerable who cannot protect themselves from extreme temperatures, flooding, and disruptions to their food and water supplies.⁴

Look closely at the two maps. The sources of global warming are in the developed countries in the Northern Hemisphere (top chart – red and orange indicate the greatest contributors). The damage is being felt in the developing countries of the Global South (bottom chart – red and orange indicate the highest death rates). The Church speaks out against this injustice.

⁴A Climate for Change by Katherine Hayhoe and Andrew Farley

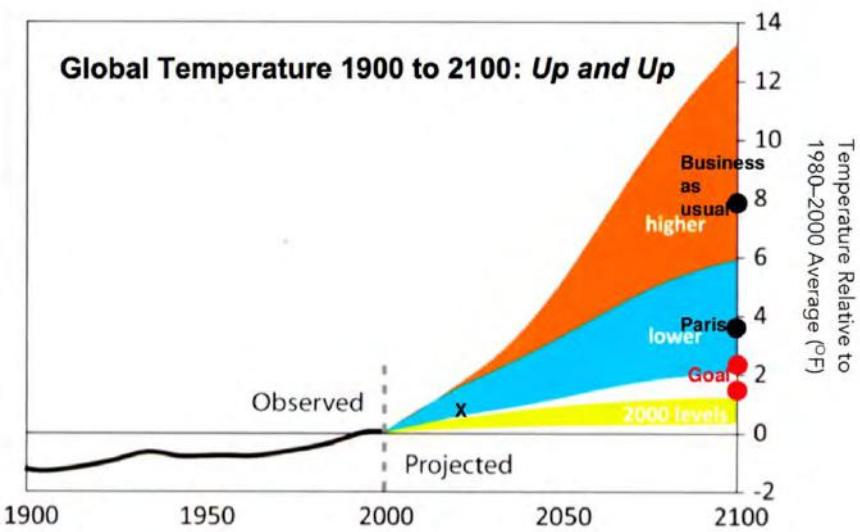
THE SCIENCE OF GLOBAL WARMING

Predictions for the Future

"If present trends continue, this century may well witness extraordinary climate change and an unprecedented destruction of ecosystems, with serious consequences for all of us." *Laudato Si'* [24]

Global temperatures

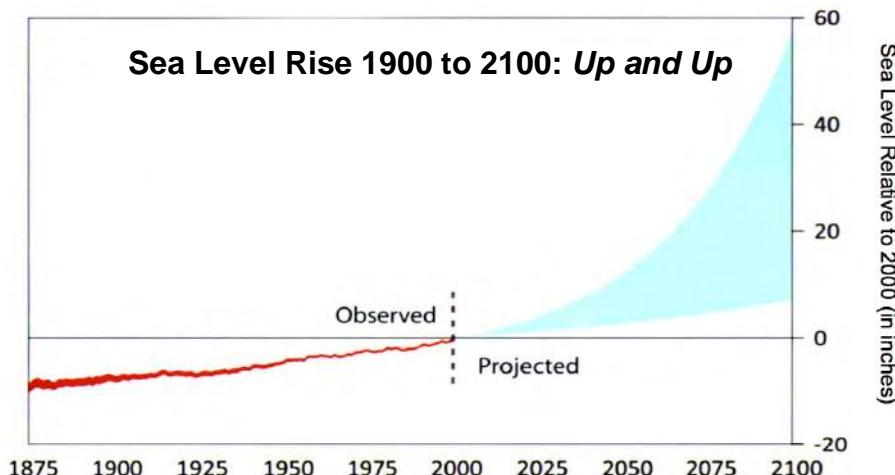
have already risen by 1.4°F [now 1.8°F] since the beginning of the Industrial Era. However, much greater changes are expected over the rest of this century. If [CO₂ levels could] be frozen at 2000 levels (yellow area), we would still see an additional 0.5 to 1°F warming. If our production of heat-trapping gases is significantly reduced (blue area), we can still



expect a warming on the order of two to 6°F. If we continue to depend on fossil fuels for our energy (orange area), temperature changes are likely to be... on the order of six to 13°F.

Sea level has risen ten inches over the past century, mostly due to the expansion of warming ocean water. Over the last few decades, sea level rise has accelerated. This acceleration is happening because land-based ice sheets and glaciers are melting faster, adding more water to the world's oceans.

During this century, sea level could rise from seven to nearly 60 inches, depending on how quickly Greenland and other ice sheets melt.⁵



"A rise in the sea level, for example, can create extremely serious situations, if we consider that a quarter of the world's population lives on the coast or nearby ..." *Laudato Si'* [24]

⁵ *A Climate for Change* by Katherine Hayhoe and Andrew Farley

THE SOLUTION

A Path Forward

"The blame, if we fail to stand up and demand a change of course, will fall on us, the current generation of adults. Our parents honestly did not know that their actions could harm future generations. We, the current generation, can only pretend that we did not know."

— Dr. James Hansen⁶

Now that we know, what do we do?

On a personal level and on a parish level we are talking about conversion – a change of heart. A change of heart that is inspired by God's call to be good stewards of the earth; a change of heart that comes from compassion for our brothers and sisters around the world whose very survival is threatened by climate change.

We need to adopt a new mindset – a mindset that recognizes that this problem is ours to solve. This new mindset leads to changes in our daily living patterns. It inspires us to use our Catholic Voice to become advocates for creation.

A conversion, a new mindset, leads to new behaviors. We can make lifestyle changes: using the most efficient light bulbs, adding insulation and replacing windows in our homes, driving and flying less, taking public transportation, making miles per gallon a priority when purchasing a newer car.

We can make changes at our Church. The first step is to conduct an energy audit. Next is to follow through with the recommendations when energy savings become a

priority in the parish budget. We can be mindful in our use of disposables, recycle more, consider composting, encourage carpooling and or biking to church functions, etc. These changes are important because of the message we send, the symbolic presence, as well as the carbon pollution saved.

We can become a clear voice for change using our Catholic teachings as a foundation. The laity can form a Care of Creation team. Pastors can speak from the pulpit about our call to be good stewards. All can write to their members of Congress advocating for legislation that will lower our carbon emissions and provide incentives to replace fossil fuels with renewable energy options.

So how do we get started?

Grounded in our faith, we can join the Catholic Climate Covenant and take the St. Francis pledge – <http://catholicclimatecovenant.org/about-us/>. The St. Francis Pledge is a promise and a commitment by Catholic individuals, families, parishes, organizations and institutions to live our faith by protecting God's Creation and advocating on behalf of people in poverty who face the harshest impacts of global climate change. We can pray, learn more about climate change, assess how to make changes, act on those findings and advocate for systemic change. The parish can include a prayer for creation in the prayers of the faithful.

(continued on next page)

⁶ *The Case for Young People and Nature: A Path to a Healthy, Natural, Prosperous Future*, p. 22
Link: http://www.columbia.edu/~jeh1/mailings/2011/20110505_CaseForYoungPeople.pdf

How to not become discouraged!

Often as we learn of the severity and magnitude of climate change and its effects on God's creation we can become discouraged. This is a very big, complex issue. The use of fossil fuels has been an integral part of our society for the last century. It can seem impossible to come up with solutions. But we, as people of faith, are called to be beacons of hope and a voice for the voiceless. In the past, we have taken on what appeared to be insurmountable challenges (e.g. ending slavery). We can do it again. We can offer the moral framework for addressing this issue. We can provide the initiative, energy and strength to make the needed changes. Inspired and guided by the Holy Spirit, we can make a difference.

Prayer is essential if we are to be beacons of hope and agents of change. Use simple prayers. One small but powerful prayer is: *Come, Holy Spirit, Come*. That's it, just four heartfelt words. Another prayer is to Mary. A single Hail Mary reminds us we are not alone. And finally, pray the Our Father, the prayer that Jesus taught us.

Finding companions for the journey is key to maintaining hope. Jesus sends his followers out two by two. We all need partners and supportive communities, particularly when we are feeling overwhelmed. We can find those partners in our family, friends and neighbors as well as in our Church – a Church called to take Christ's teaching out into the world. We can create our own community by joining or forming a Care of Creation team in our parish. We can find others to journey with us at the Catholic Climate Covenant (as mentioned above); Citizens Climate Lobby (explained on the next page); and/or with a myriad of faith-focused and local environmental groups.

Finally when the problem seems too big or too far advanced, we can reminder to light one candle rather than curse the darkness. Be that light.

CO₂ is not Red or Blue

Nature does not care what politicians say. Nature cares about the laws of physics and the amount of CO₂ in the atmosphere. We need to remember: Politicians do not create political will, they follow it. The Catholic Voice can influence our politicians. We need to speak for God's creation, we need to speak for the poor. We need to speak for future generations – for our grandchildren and their children.

There is a great deal of noise in the public discussion. Part of the noise is funded by political contributions from the fossil fuel industry. That noise fosters uncertainty. It says the science is unclear. The science, in fact, is very clear – global warming is happening and it is primarily caused by human activity. **Surveys of the peer-reviewed scientific literature (from 1991 to 2012) and the opinions of experts consistently show a 97–98% consensus that humans are causing global warming.⁷**

The Catholic advantage is that we have wise council to sort through the noise. We are Republican, Democrat, and Independent, conservative and liberal. We can act together to find common solutions to protect future generations. We can wake up our politicians so they hear the Catholic Voice. "In this Encyclical, I would like to enter into dialogue with all people about our common home." [3]

There are solutions. There are ways to decrease carbon dioxide pollution. The next section looks at one such solution.

⁷ Link: <http://www.skepticalscience.com/global-warming-scientific-consensus-advanced.htm>

THE SOLUTION

The Need to Put a Price on Carbon

"There is an **urgent need to develop policies** so that, in the next few years, the emission of carbon dioxide and other highly polluting gases can be drastically reduced, for example, substituting for fossil fuels and developing sources of renewable energy." [26]

To date the Catholic Church does not propose a specific solution. There are several solutions that are possible, they include: a) regulation, b) Cap and Trade, and c) Revenue Neutral Carbon Fee and Dividend.

As an engineer, a businessman and a Catholic, I have looked for a solution to global warming. Stating the problem is not enough. For hope to remain alive, to enable us to focus our energy and intent, we need to work toward an effective solution. I have found one that gives me hope.

There is a conflict:

- Burning of fossil fuels is an integral part of our society and our economy.
- Burning of fossil fuels is the major cause of global warming. If we put a price on the burning of fossil fuels, we will engage the whole economy in solving the problem. Most of our daily decisions are affected by cost. With a price on carbon, as we experience increased costs, we will decrease our carbon use. We are a very creative society. The free market will find the right balance between conservation and carbon-free energy alternatives.

A Revenue Neutral Carbon Fee would provide a comprehensive solution. Here is how it would work.

1. We collect a carbon fee (sales tax) at the wellhead. The fee is based on the amount of carbon emissions of the fuel.

2. The cost of carbon will be built into everything and passed on to the consumer.
3. All of the revenues generated by the fee will be returned directly to individual households to compensate for higher prices. This is to ensure that we do not weigh down the economy.
4. The producers and consumers will then be motivated to reduce carbon in everything

A Revenue Neutral Carbon Fee will provide a comprehensive solution.

1. The fee would start at \$15 per ton of CO₂ (that would be about 13c/gal of gasoline).
2. The fee increases by \$10 per ton every year.
3. The low and middle-income household's dividend will be equal to or greater than their increased costs.
4. Border adjustments will protect US business and encourage other countries to put a price on carbon.

A Revenue Neutral Carbon Fee will provide a comprehensive solution. It will not kill jobs. A study by Regional Economic Models Inc. (REMI), an independent company, was commissioned by Citizens Climate Lobby (a non-partisan, non-profit organization). The study found that the fee and dividend would significantly cut CO₂ emissions and create jobs. How is this possible? By returning the fee to individual households, the money is not removed from the economy. The study shows that the dividend to a family of four will be \$288 per month in the tenth year. In twenty years the CO₂ emissions are projected to be cut by 52% and 2.8 million jobs will be added to the economy.

Grounding Principles

- Global warming is real. Human activity is the major cause.
- Global warming is changing the world around us today.
- If we do nothing new (business as usual), the consequences are dire.

Catholic Social Teaching supports these findings and encourages action to mitigate climate change. Pope John Paul II says: "...the ecological crisis is a moral issue." Pope Francis says: "If we destroy Creation, Creation will destroy us." Pope Benedict tells us: "If you want to cultivate peace, protect creation."

Action Plans

- Pray: *Come, Holy Spirit, Come* (or your own prayer)
- Take the St. Francis Pledge
- Change mindset
- Make lifestyle changes
- Influence change at your parish
- Use your Catholic Voice to influence politicians

One Solution

- The need to put a price on carbon
- As we establish a price for CO₂ pollution, we will engage the whole economy in solving the problem

Resources:

- **Book:** *Laudato Si' On Care for our Common Home* by Pope Francis, Our Sunday Visitor Publishing Division, Copyright 2015.
- **Book:** *A Climate for Change* by Katharine Hayhoe and Andrew Farley, Faith-Words/Hachette Book Group, Copyright 2009.
- **Explaining climate change science** & rebutting global warming misinformation. Link: <http://www.skepticalscience.com>
- **Group Study:** Climate Change: Our Call to Conversion. A Four-Session Process for Faith Communities. Link: <http://ipjc.org/publications/index.htm>
- **In-depth Scientific Information:** Intergovernmental Panel on Climate Change (IPCC) Summary for Policymakers. Link <http://ar5-syr.ipcc.ch/index.php>
- **Revenue Neutral Carbon Fee and Dividend:** Citizens' Climate Lobby. Link: <http://citizensclimatelobby.org>
- **Catholic Climate Covenant:** Link: <http://catholicclimatecovenant.org/about-us/>
- **An Action Plan for The Roman Catholic Archdiocese of Atlanta:** <http://www.archatl.com/catholic-life/refreshatl/>
- **Prayers of the Faithful:** Link: <http://bit.ly/pof-ccl>

Special thanks to Trudi Jenny and Larry Coleman for their many contributions to this publication.

ABOUT THE AUTHOR

Steven J. Coleman graduated from the University of Dayton with a Bachelor of Mechanical Engineering. He pursued graduate study in Biomedical Engineering at the University of Dayton and Worcester Polytechnic Institute.

Steve worked for over 30 years for Thermo Electron Corporation and Thermo Affiliated companies. He held various positions with the company working as an engineer, strategic planner, new-venture start-ups leader, acquisitions analyst, and manager. He retired from his position as Vice President of Research and Development in 2005.

His Catholic faith has always been very important to him. He received a Master Teacher Certificate from the Diocese of Boston and worked as a Master Teacher for



High School and Adult Education Programs at Immaculate Conception Parish, Marlboro, MA. His current focus is learning about and keeping current on Catholic Social Teaching on Care of Creation.

He developed his knowledge of the science of climate change through extensive private study. In 2013 He took a college level an on-line Coursera course entitled “Climate Literacy; Navigating Climate Conversation” offered by the University of British Columbia. (See Coursera.org). In 2015 he continued his on-line study with an intensive course from the World Bank.

Eager to share his knowledge, Steve presented “A Catholic Response to Global Warming” twice in 2014 at his parish, St. Dennis Catholic Parish in Madison, WI. Steve followed up on his presentations with a three-week intensive study on the issues, providing participants with ideas on how they could act on their calling to care for God’s creation. The result of Steve’s efforts was the formation of a Care of Creation Team at St. Dennis. By December of 2015 he has made 17 presentations, in Wisconsin, Illinois, and Florida.

Steve lives on a farm in Marshall, Wisconsin, with his wife Kathy, their daughter, son-in-law, and two of their grandchildren. The solar panels on his home are the energy source for his home and car. Steve may be contacted at catholic.ccl@gmail.com. Steve’s favorite prayer *Come, Holy Spirit, Come* guides all he does as he strives to care for our common home.