MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MIT JOINT PROGRAM ON THE SCIENCE AND POLICY of GLOBAL CHANGE

2012 Energy and Climate Outlook

The MIT Joint Program on the Science and Policy of Global Change combines cutting-edge scientific research with independent policy analysis to provide a solid foundation for the public and private decisions needed to mitigate and adapt to unavoidable global environmental changes. Being data-driven, the Program uses extensive earth system and economic data and models to produce quantitative analysis and predictions of the risks of climate change and the challenges of limiting human influence on the environment – essential knowledge for the international dialogue toward a global response to climate change.

To this end, the Program brings together an interdisciplinary group from two established MIT research centers: the Center for Global Change Science (CGCS) and the Center for Energy and Environmental Policy Research (CEEPR). These two centers – along with collaborators from the Marine Biology Laboratory (MBL) at Woods Hole and short- and long-term visitors – provide the united vision needed to solve global challenges.

At the heart of much of the Program's work lies MIT's Integrated Global System Model. Through this integrated model, the Program seeks to: discover new interactions among natural and human climate system components; objectively assess uncertainty in economic and climate projections; critically and quantitatively analyze environmental management and policy proposals; understand complex connections among the many forces that will shape our future; and improve methods to model, monitor and verify greenhouse gas emissions and climatic impacts.

This Outlook report is intended to communicate research results and improve public understanding of global environment and energy challenges, thereby contributing to informed debate about climate change and the economic and social implications of policy alternatives.

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Confronting Energy and Climate Challenges

The world faces immense environmental challenges in the 21st century – climate change, food and energy security, water scarcity, ecosystem protection, and the problems that come with urbanization – as it grapples with fulfilling the needs of a projected total population of 10 billion. Any projection of the future is full of uncertainty. But to better understand how decisions made today will affect the future, we need to thread together what we know about how the Earth responds to changes we make to it and the interconnections between human activities and environmental change.

The 2012 Energy and Climate Outlook uses a projection modeling system developed by MIT's Joint Program on the Science and Policy of Global Change: the Integrated Global System Model (IGSM). While there have been additions and improvements to the framework the basic structure is described in Sokolov *et al*. (2005), with more detail on the economic component in Paltsev *et al*. (2005). Here, we report the results of using the IGSM to look at the world's current development path and to determine the associated energy, climate, atmosphere, ocean, and land-use implications. These findings are a projection – not a prediction, as it is within our power as a society to change the current path if we do not like its implications.

This Outlook incorporates the emissions targets that G20 nations made at the 2009 *Conference of Parties to the UN Framework Convention on Climate Change* (*i.e.*, Copenhagen pledges) to reduce greenhouse gases, as well as a limited set of other policies put forth by individual countries. (The pledges are summarized by Climate Interactive [2011].) It assumes there will be no additional policy changes beyond those pledges. By some estimates, achieving these 2020 targets may be difficult. However, most countries recognize that the 2020 targets are only a first step toward stabilizing greenhouse gas concentrations in the atmosphere and limiting global warming to levels that we hope will sufficiently avoid dangerous consequences. Our objective is to show how far the 2020 pledges take us, and what is at risk if we fail to push beyond these emissions reduction goals.

A principal product of this Outlook is a set of economic, energy, land use, and emissions projections for each of the 16 major countries or regions of the world. The detailed projection data tables are available at: http://globalchange.mit.edu/Outlook2012. In this brief summary, we report results for 3 broad groups: developed countries (USA, Canada, Europe, Japan, Australia and New Zealand), an approximation of other G20 nations (China, India, Russia, Brazil, Mexico, and several fast-growing Asian economies [see note on next page]), and the rest of the world. We base our results on the UN's most recent population projection that forecasts a global population of more than 10 billion people by the end of the century. Though our detailed projections stop at the year 2050, we show global projections through 2100, which are needed to project the long-term implications of our current course.

The major findings in the 2012 Outlook are as follows:

- The Copenhagen pledges will nearly stabilize emissions in the developed countries, but global emissions will continue to grow rapidly.
- Global change will accelerate with changes in global and regional temperatures, precipitation and land use, and the world's oceans will warm and acidify.
- Population and income growth will fuel a significant rise in the motorized vehicle fleet and increase CO_2 and other pollutant emissions, especially in developing regions.
- While further emissions cuts in developed countries would be useful, such cuts will have less impact on global emissions over time.
- The Copenhagen pledges begin a transition to alternative energy in developed countries and China, but they do not provide enough incentive to create the full transformation needed within the energy system (*i.e.*, wide-scale adoption of renewables, carbon capture and storage, nuclear or alternative propulsion systems in vehicles) to avert dangerous levels of climate change.
- While emissions from fossil fuels are sizeable, other greenhouse gas and land use emissions are also important and cannot be ignored if more stringent stabilization and temperature goals are to be achieved. Reductions in these emissions are often the most cost-effective. If policies to reduce them fail, a major opportunity to limit climate change may be missed.

As difficult as the progress made in Copenhagen was to achieve, far more effort is needed to limit atmospheric greenhouse gas concentrations to levels that avoid dangerous climatic consequences. While the amount of temperature increase and associated greenhouse gas concentrations generally considered "dangerous" remain open to much debate and uncertainty, few would argue that the increases projected in our study – ranging from 3.5° to near 7°C or more by 2100 – constitute danger.

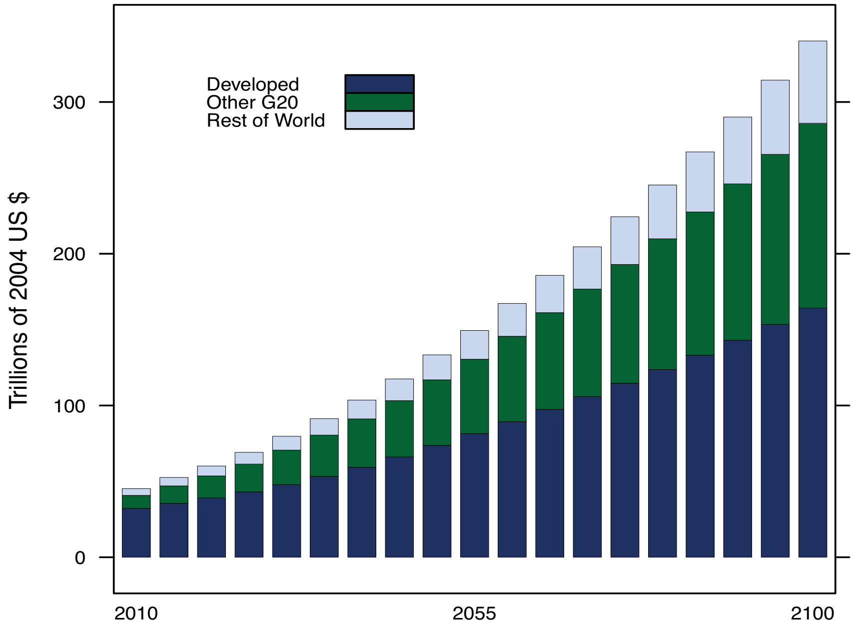

Figure 2. World GDP

The Changing World

Over the next century, a growing population will spur changes throughout the world. According to UN estimates released last year (UN, 2011), the world's population is projected to surge past 9 billion before 2050 and reach 10.1 billion by the end of the century if current trends in fertility rates continue. The UN projections indicate that much of the growth will happen in developing regions like the Middle East, Africa and Latin America (**Figure 1**).

We project that labor productivity across the world will continue to grow and will be a source of continued growth in gross domestic product (GDP), even taking into consideration the impact of resource depletion and higher energy costs on our economy (**Figure 2**).

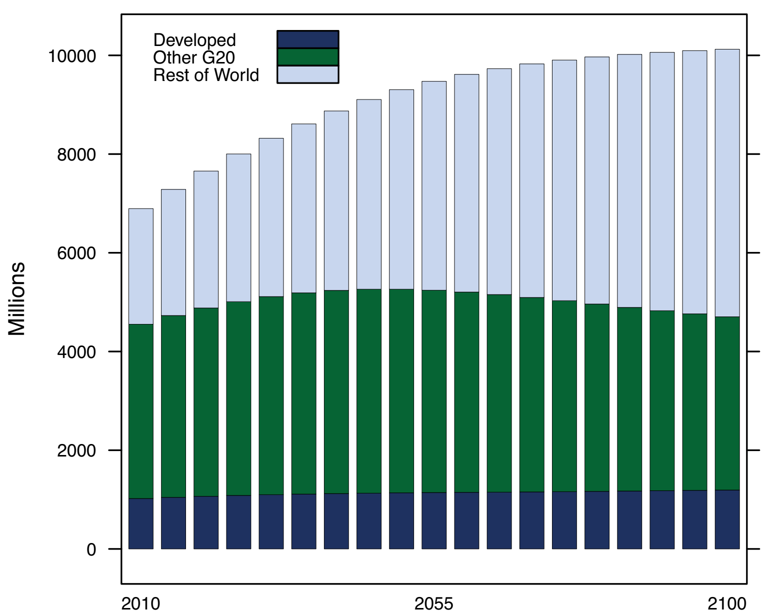

Figure 1. World Population

A note about the regional classification used in this Outlook

The IGSM modeling system used to generate the projections in this Outlook divides the global economy into 16 regions. These regions do not align exactly with the memberships of international organizations such as the G20. In particular, the *Other G20* grouping includes a *Dynamic Asia* region, comprised of Indonesia and the Republic of Korea (both G20 members) as well as Malaysia, the Philippines, Singapore, Taiwan, and Thailand. Conversely, South Africa, Argentina, Saudi Arabia, and Turkey are G20 countries but are part of other regions in our model, and thus are included in the *Rest of the World* grouping.

Several other regions deserve further explanation as well. *EU+* is the EU-27, plus Norway, Switzerland, Iceland and Liechtenstein. The *Middle East* starts (in the west) from Israel, Lebanon and Syria and continues (to the east) as far as Iran. Egypt, Libya, Tunisia, Algeria and Morocco are included in *Africa*.

Note that a full list of the countries included in each region is provided on the inside back cover, and in the projection data tables.

Global GDP is projected to grow 7.5 times between 2010 and 2100, corresponding to an average annual real GDP growth rate of 2.3 percent. While *per capita* income will grow in all regions, this income growth is projected to be more rapid in the developing regions. Meanwhile, income in these regions will still generally remain well below the level of developed countries. The continuation of disparate income levels reflects a simple mathematical calculation: unless growth rates differ dramatically, it takes decades (if not centuries) for poorer countries to catch up to high and rising income levels in richer countries.

As the world's population grows, motorized vehicle use is also projected to increase (**Figure 3**). Vehicle use expands, especially in other G20 nations – including China and India – where population and attendant incomes are growing rapidly. Four times more automobiles are projected to be on the roadways in other G20 nations by 2050 than at the present time. Meanwhile, a slight growth in vehicle use in developed countries is projected, and vehicle use in the rest of the world rises moderately to more than double present-day levels by 2050 (**Figure 4**). Our projection of future vehicle fleets is based on model developments described in Karplus (2011).

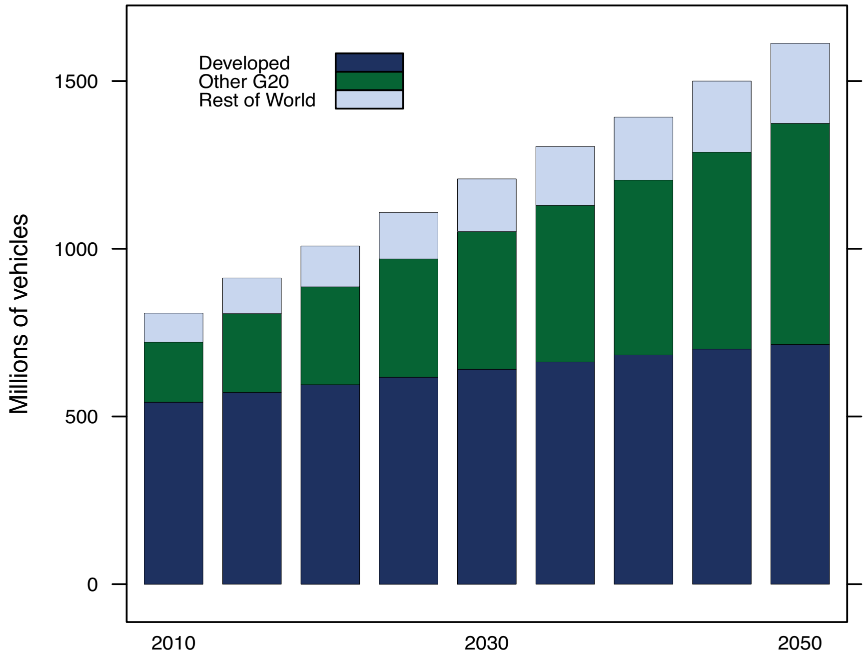

Figure 3. World Private Vehicle Stock (millions of private cars and light trucks)

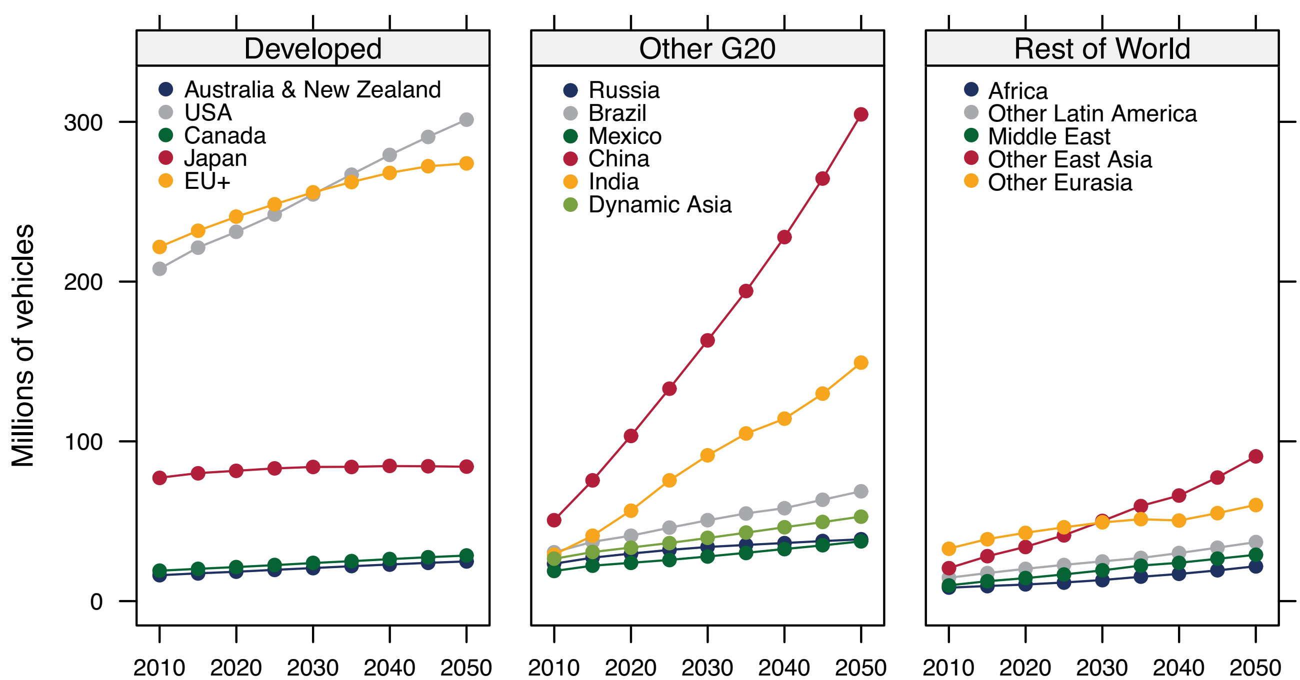

Figure 4. Vehicle Stock by Region

To support the increasing global population, there will be a concurrent increasing need for cropland (**Figure 5**). Most land conversion to agricultural usage (and other land-use changes over the next century) is projected to occur in the less-developed regions. For example, Africa and Latin America currently have significant amounts of natural forest and grassland that could be used for crops (**Figure 6**).

Although biofuel use has been associated with rising food prices, that connection seems negligible given that only about 1% of land is currently used for biofuel production. If, however, biofuels take a larger share of energy demand, the impacts could be much larger. These land use change projections make use of model developments described in Gurgel *et al.* (2007).

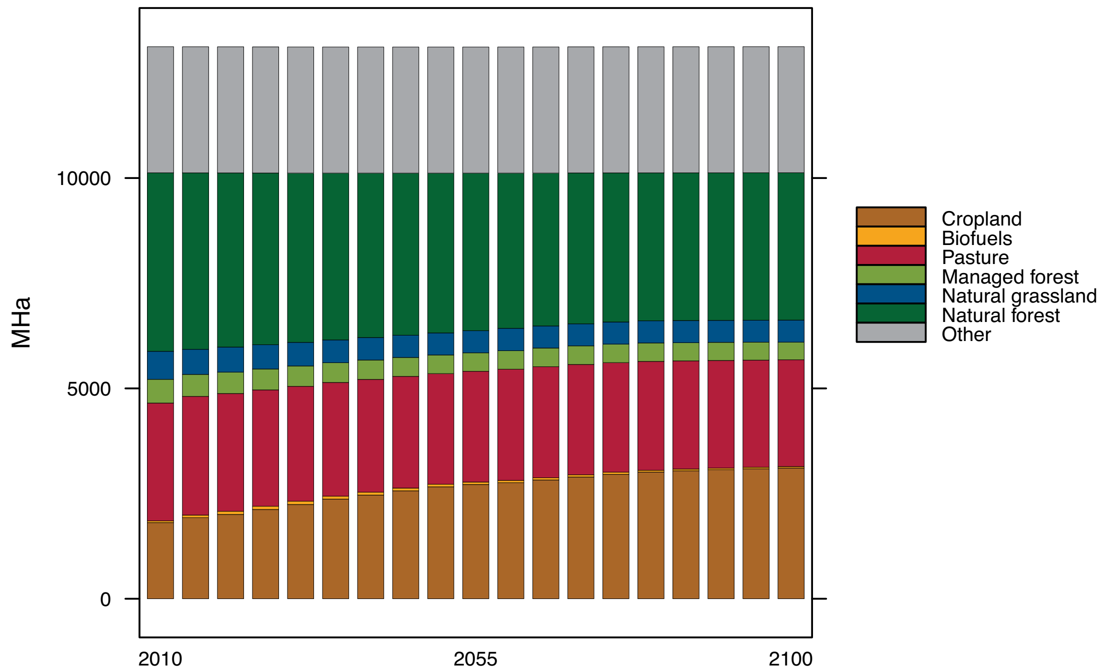

Figure 5. Global Land Use (megahectares)

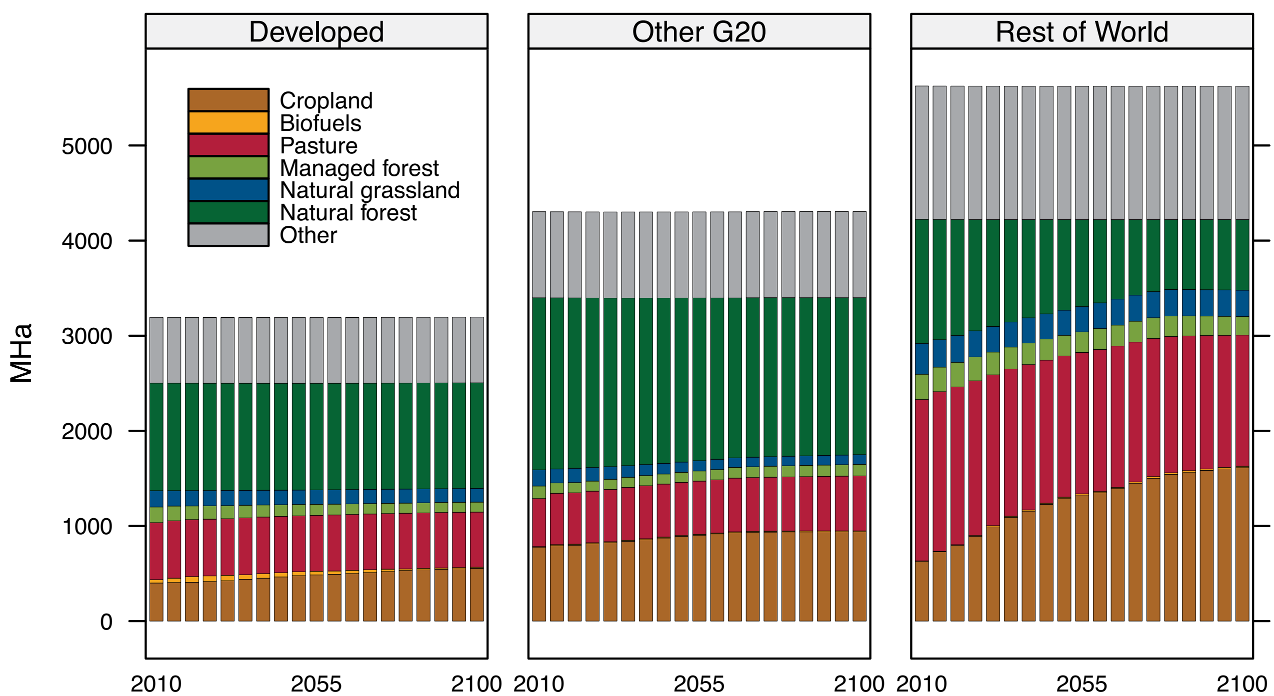

Figure 6. Land Use by Major Group (megahectares)

As global population increases, energy needs will likewise increase. Additionally, with higher incomes, more people can afford to expand their needs and further satisfy their material desires – such as buying a car. In our projections, global energy use almost doubles by 2050 (**Figure 7**). This growth occurs despite assumptions of substantial improvements in energy efficiency and conservation spurred by higher energy prices. Energy use in developed countries stabilizes, partly due to the assumption that these countries will meet their Copenhagen pledges. The most substantial growth is projected in the other G20 nations (**Figure 8**). These countries currently use slightly less energy than the developed world, but by 2050 their energy use exceeds the amount presently consumed by the entire world (nearly 500 exajoules). Growth in the rest of the world is also projected, with energy use in 2050 approaching the amount presently used in the developed world.

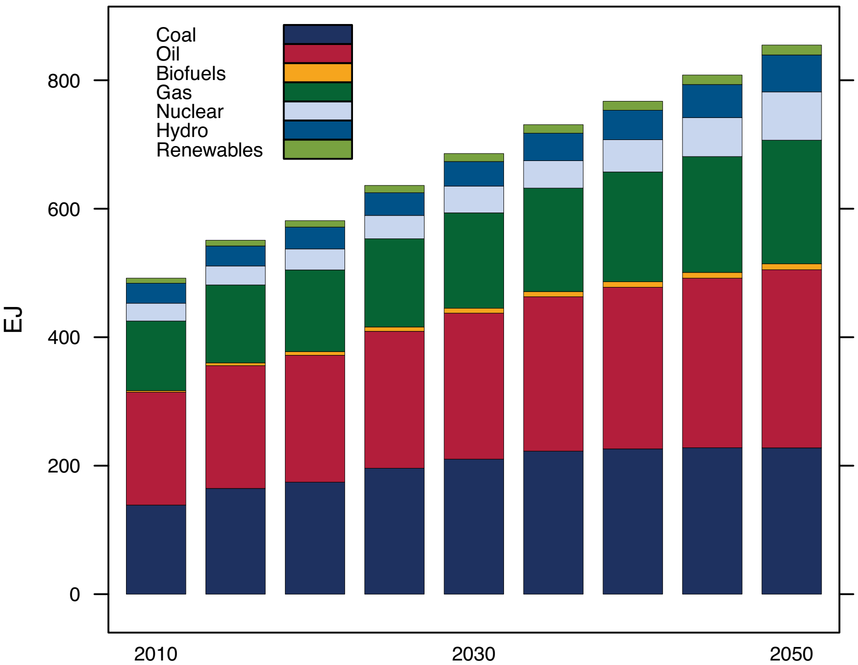

Figure 7. Global Energy Use

While energy consumption is projected to increase over time, energy use per unit of GDP generally decreases about 40 percent across the globe from 2010 to 2050 (**Figure 9**). This trend reflects the continuing improvement in energy use per unit of output that we have observed for decades for much of the world, as well as reductions from rising energy prices caused by resource depletion and carbon policies.

Over the next 50 years, even with the Copenhagen pledges, the majority of the world's energy is projected to continue to come from the same sources currently utilized: coal, oil and natural gas. Coal use levels off with time, and oil and natural gas use increases (see Figure 7). Meanwhile, nuclear and hydro-power use increases mostly in developing nations; however, without substantial mandates (or more widespread and tighter climate policies), those potential sources are not projected to significantly increase.

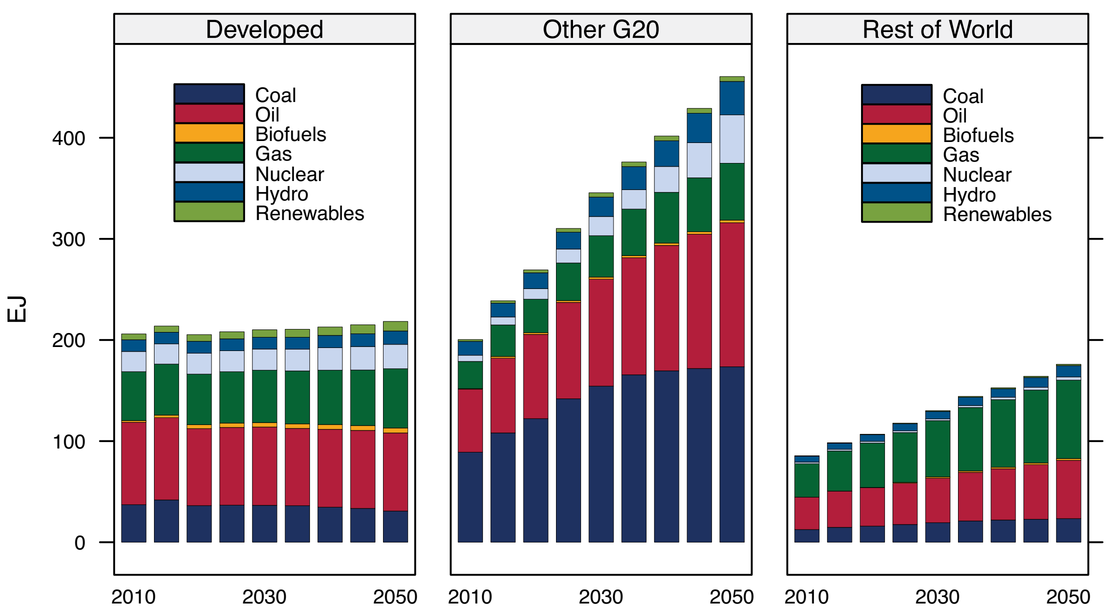

Figure 8. Energy Use by Major Group

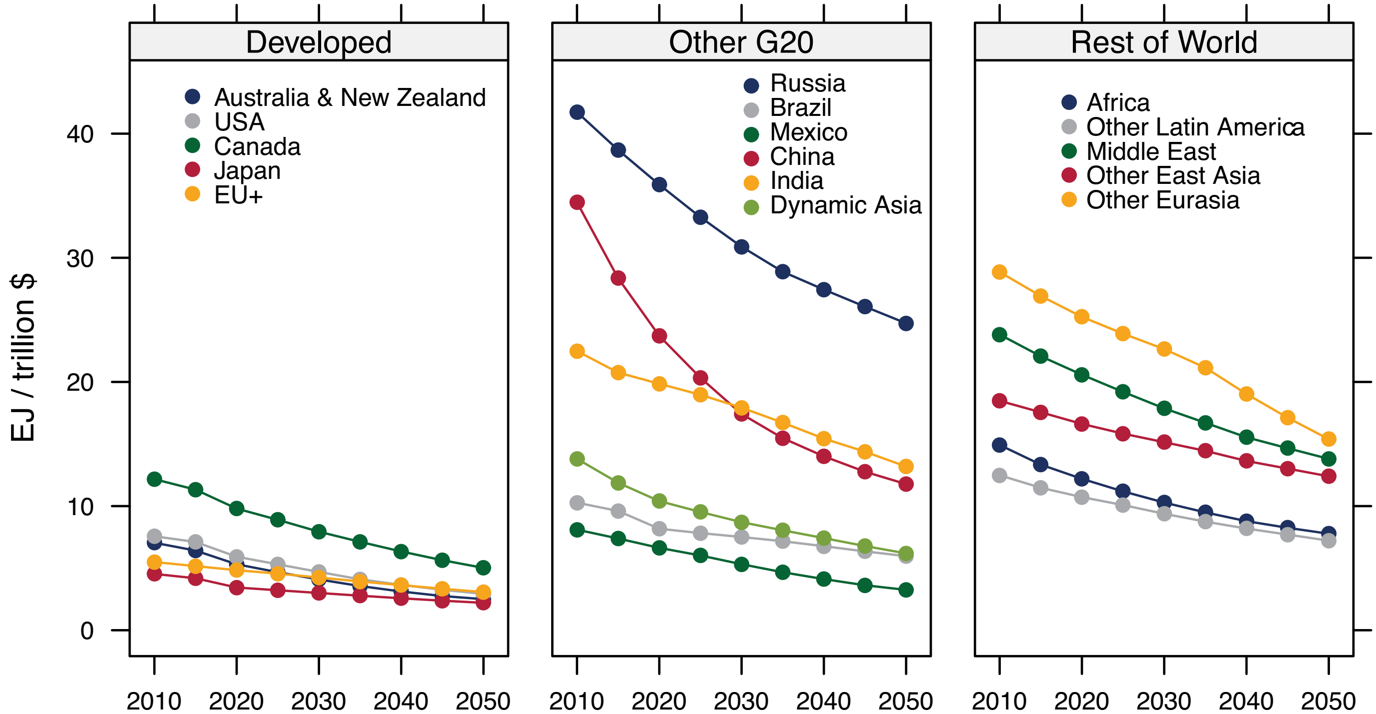

Figure 9. Energy Intensity by Region

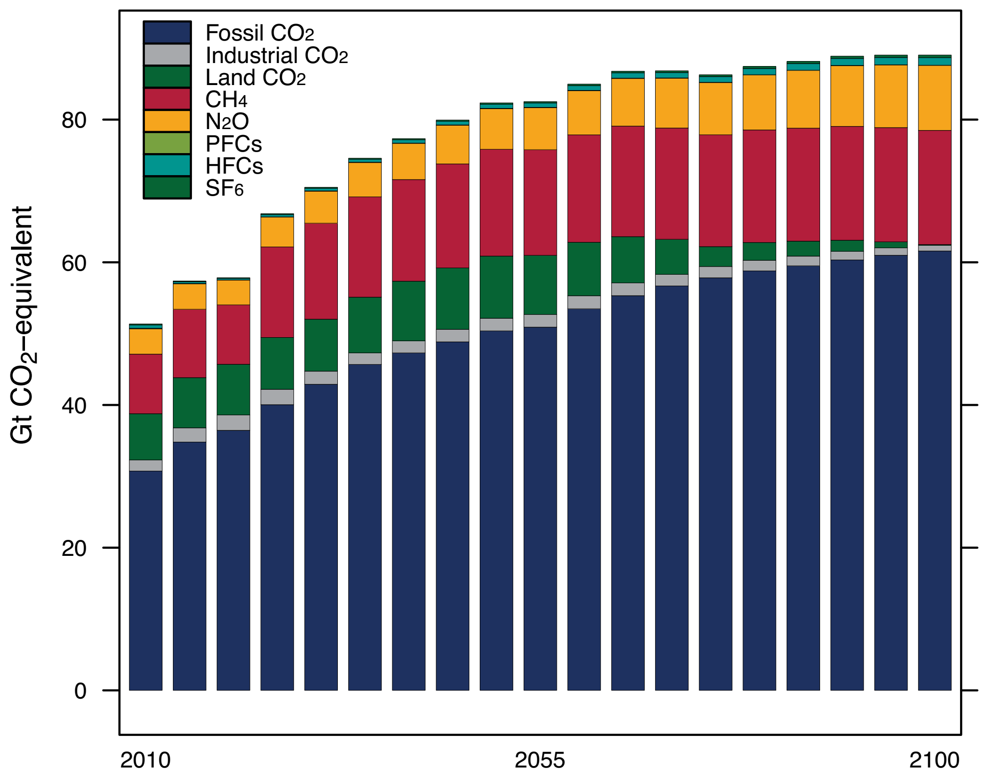

Figure 10. Global Greenhouse Gas Emissions

GHG Emissions and the Warming Planet

With more power plants and industrial activity, more cars and trucks on the road, and more cropland and livestock, growth is projected in most sources of long-lived greenhouse gases (**Figure 10**). Fossil-fuel CO_2 emissions at the end of this century still constitute – as they do today – about two-thirds of total emissions on a CO_2-equivalent basis. The projected increases are primarily attributed to uncontrolled emissions from agricultural activities (more nitrogen fertilizer use and nitrous oxide emissions, increased livestock production and associated methane emissions), energy production and methane emissions (*e.g.*, from natural gas extraction), and other industrial activities especially in areas without greenhouse gas emission limits.

Differentiating emissions by region (**Figure 11**), the projected emissions in developed countries dip slightly (about 1 percent) in the near term because of their Copenhagen pledges, then remain constant after 2020 (reflecting our policy assumptions). In the other G20 nations, slow growth in emissions under the Copenhagen commitments is projected. However, unless targets are extended and increased, emissions increase 25 percent over the century. As the world's largest energy users by the end of the century, these nations also become the world's largest source of emissions – contributing about 50 percent of global emissions by 2100 (up from 40 percent of the total in 2010). At the same time, due to factors like population growth in places such as the Middle East and Africa, and the absence of any climate policy, the rest of the world's emissions are projected to increase by about 18 percent.

Our projections for the other G20 regions are partially a result of how the Copenhagen pledges are extended in our analysis. Since the pledges are emissions-intensity targets, the commitments become non-binding as improvements in energy efficiency occur. Over time, countries may subsequently decide to lower their intensity targets. Our results demonstrate the importance of lowering these intensity targets, along with eventually making the targets more stringent, so that – rather than simply slowing emissions growth – their emissions will begin to decline absolutely.

Even if developed nations reduce their emissions to zero, global emissions are still projected to increase (Figure 11). The global share of both fossil fuel and greenhouse gas emissions released by developed nations are cut in half – from 40 to 20 percent for carbon dioxide, and from 30 to 15 percent for other greenhouse gases. Nonetheless, further emissions reduction efforts in developed countries still have less of an impact on lowering global emissions over time.

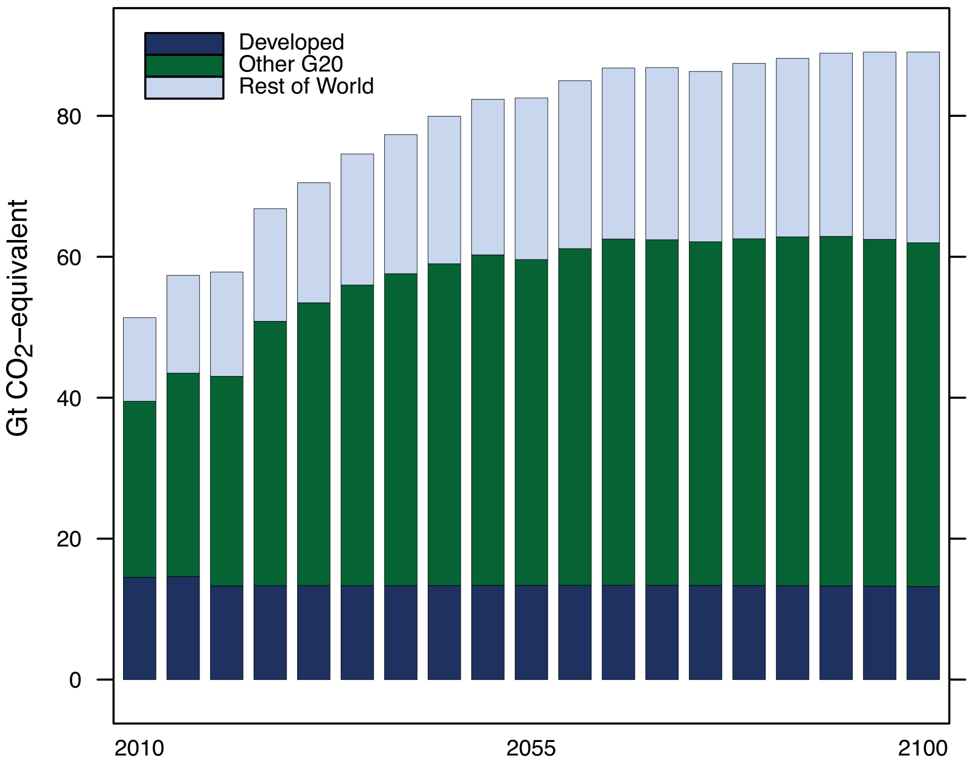

Figure 11. Greenhouse Gas Emissions by Major Group

To meet the temperature and concentration goals discussed broadly amongst nations, global emissions need to peak very soon – if not immediately. Our research suggests this will not be the case. **Figure 12(a)** shows the greenhouse gas concentrations in our atmosphere. The well known seasonal cycle, due largely to strong effects of northern hemisphere vegetation on CO_2, is smoothed to show the underlying trend. (For details, see Huang *et al*. [2009], from which Figure 12a is updated.) **Figure 12(b)** shows our projections of future concentrations of greenhouse gases. Based on our current global emissions pathway, the concentration of CO_2 and other greenhouse gases in the atmosphere will rise substantially as emissions rise – from a CO_2 concentration of 390 ppm at present to 816 ppm in 2100, and from 474 ppm CO_2-equivalent at present to 1226 ppm CO_2-equivalent in 2100.

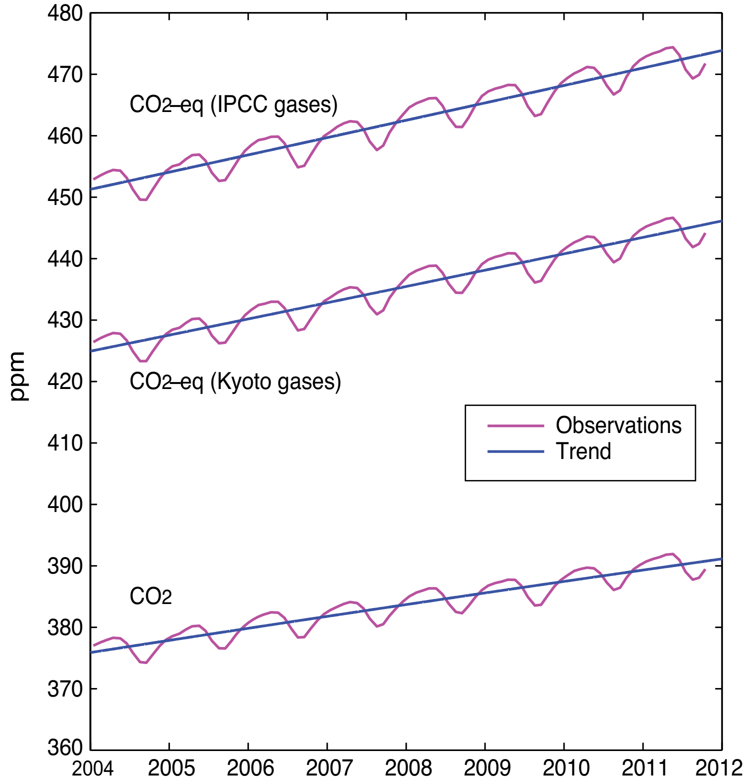

Figure 12a. Current Greenhouse Gas Concentrations

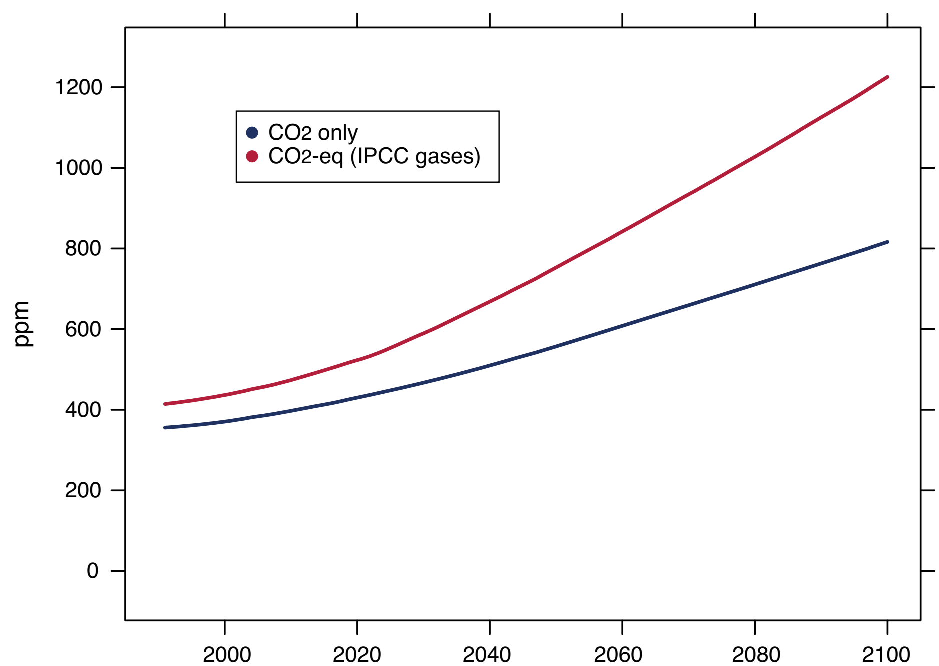

Figure 12b. Projected CO_2 and GHG Concentrations

What does this mean for the world's climate? To answer this critical question, we developed three climate scenarios that capture the uncertainty in the Earth's response to the cooling from aerosols (airborne particles) and warming from greenhouse gases. These counterbalancing effects need to be considered jointly. If the aerosols have a strong cooling effect, then the Earth's sensitivity to greenhouse gases must be greater in order to explain the climate of the past century. The climate scenarios we developed reflect three sets of aerosol and greenhouse gas climate sensitivities. **Figure 13** shows our estimates of the joint probability distribution of climate sensitivity and the strength of aerosol forcing based on observed 20th century climate. The probability of these values falling in the white region is 50 percent. The probability is 90 percent for the light blue plus the white region, and 99 percent for the medium blue plus light blue plus white region.

The red dots in Figure 13 denote the combinations of aerosol and climate sensitivities we used for the 3 climate scenarios shown in **Figure 14**. The median case has a climate sensitivity of about 2.5K and net aerosol forcing of about $-0.5 Wm^{-2}$. The ranges used for climate sensitivity are very similar to those used by the Intergovernmental Panel on Climate Change (IPCC) when describing upper and lower bounds.

The climate results indicate an additional global mean surface warming above present of about 1.7° to 2.9°C by 2050 with a median value of about 2°C. By 2100 the range is about 3.5° to 6.7°C with a median of about 4.3°C.

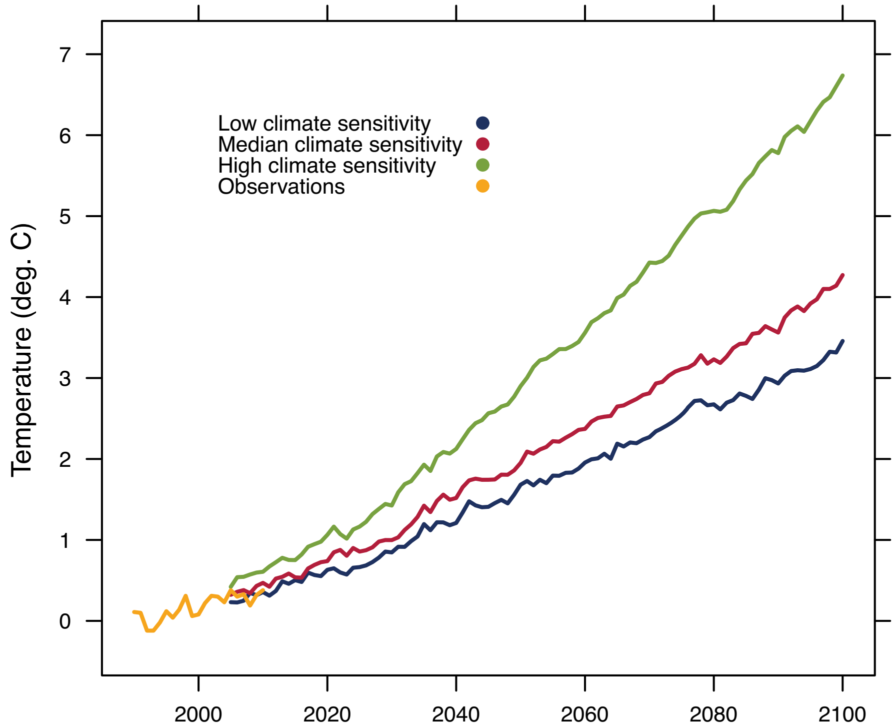

Figure 14. Projected mean surface temperature increase relative to 2000

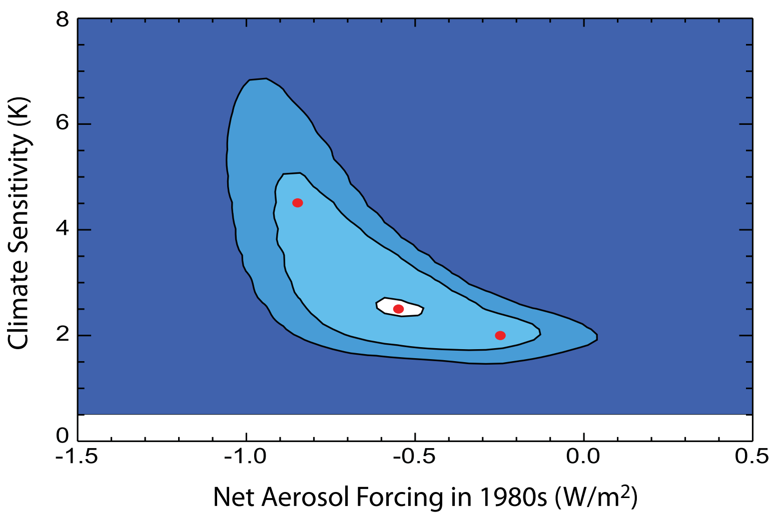

Figure 13. Probability Distribution of Climate Model Parameters. This probability diagram was developed using a similar method as described in Forest *et al.* (2008) but with an updated climate model (Monier *et al.*, 2011) and a fixed value of ocean heat uptake. The areas circumscribed by the black lines are the 50, 90, and 99 percent likelihood regions and the red dots are the values used for climate scenarios.

Along with rising temperatures, as atmospheric CO_2 concentrations increase, oceans become more acidic. This acidity is measured by seawater pH, with lower pH indicating higher acidity. Currently, the pH of the ocean's surface ranges from about 8 to 8.2. The oceans are absorbing about a third of the CO_2 emitted into the atmosphere (Sabine and Feely, 2007) – leading to a 0.1 pH drop since pre-industrial times (Royal Society, 2005). A further decrease of 0.3 pH over the course of this century is projected (**Figure 15**). The reduced pH would strongly affect marine organisms (Doney *et al*., 2009) and have economic implications for fisheries (Cooley and Doney, 2009). Calcifying organism like corals and mollusks are particularly vulnerable to these changes. Corals are likely to cease to exist with pH around 7.7, which is reached in many areas of the ocean in our projections, but they will change in type and diversity with even small pH changes (Fabricius *et al*., 2011).

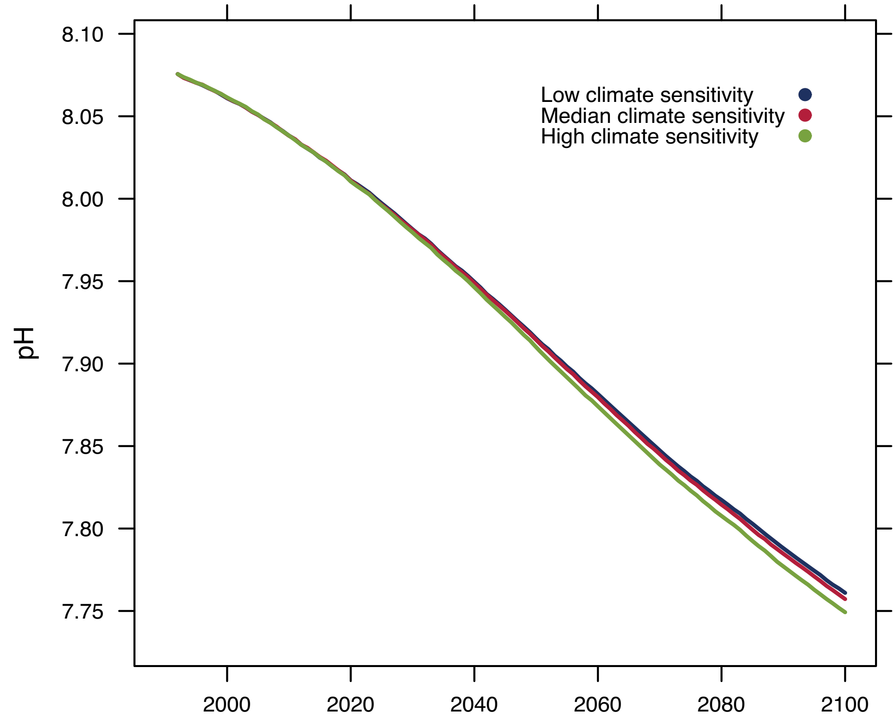

Figure 15. Projected Mean Ocean Surface Level pH

Preparing for Tomorrow Today

This Outlook provides a window into the future as we view it in 2012. While the world has made progress, much more effort is needed to avoid dangerous climate change. From this research effort, it is clear that the Copenhagen pledges do not take us very far in the energy transformation ultimately needed to avoid the risk of dangerous warming. Even if policy efforts in developed countries are successful in holding emissions constant, the emission increases of other nations – growing and industrializing – will contribute to further increases in greenhouse gas concentrations and climate change.

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Appendix

This appendix contains projections for global economic growth, energy use, emissions, and other variables to 2050. Similar tables for 16 regions of the world are available online at: http://globalchange.mit.edu/Outlook2012

MIT Joint Program Energy and Climate Outlook 2012 — **Projection Data Tables**

Region: **World**

	Units	2010	2015	2020	2025	2030	2035	2040	2045	2050
Economic Indicators										
GDP	(bil 2004 $)	45,233	52,575	60,050	69,054	79,627	91,211	103,434	117,338	133,242
Consumption	(bil 2004 $)	27,706	32,473	36,942	42,256	48,494	55,505	62,846	71,325	81,028
GDP growth	(% / yr)	1.9	3.1	2.7	2.8	2.9	2.8	2.5	2.6	2.6
Population	(millions)	6,895.3	7,283.8	7,655.8	8,002.3	8,320.6	8,611.0	8,873.1	9,105.2	9,305.0
GDP per capita	(2004 $)	6,560	7,218	7,844	8,629	9,570	10,592	11,657	12,887	14,319
GHG Emissions										
CO2 -- fossil	(Mt CO2)	30,740	34,803	36,442	40,043	42,896	45,686	47,305	48,845	50,388
CO2 -- industrial	(Mt CO2)	1562	1993	2166	2154	1843	1619	1700	1752	1768
CO2 -- land use change	(Mt CO2)	6478	7036	7093	7267	7287	7805	8346	8616	8716
CH4	(Mt)	397.5	456.5	396.9	604.3	640.8	669.8	678.3	693.9	713.0
N2O	(Mt)	11.41	11.54	11.21	13.52	14.48	15.52	16.35	17.48	18.36
PFCs	(kt CF4)	14.61	4.43	3.66	5.44	6.03	6.42	6.53	6.53	6.59
SF6	(kt)	6.34	3.85	3.95	5.16	5.77	6.29	6.79	7.14	8.20
HFCs	(kt HFC-134a)	349	192	162	242	281	317	359	404	439
Primary Energy Use	(EJ)									
Coal		138.7	164.6	174.4	196.0	210.2	222.7	226.1	227.9	227.7
Oil		175.8	191.2	197.5	213.1	227.3	240.3	251.6	264.1	277.3
Biofuels		2.3	4.3	5.7	6.8	7.6	8.1	8.6	8.9	9.3
Gas		108.4	121.3	127.1	137.3	148.5	161.1	170.9	180.4	192.5
Nuclear		27.6	29.6	32.7	36.3	41.7	42.7	50.2	60.6	75.1
Hydro		31.3	31.1	34.0	35.4	38.2	42.8	45.9	51.5	57.5
Renewables		8.0	8.9	10.1	11.3	12.5	13.3	14.0	14.8	15.5
Electricity Production	(TWh)									
Coal		8,141	9,927	10,817	12,204	13,161	14,138	14,448	14,568	14,263
Oil		1,426	1,644	1,733	1,890	2,012	2,103	2,162	2,228	2,260
Gas		4,972	5,456	5,910	6,430	7,105	7,989	8,846	9,533	10,548
Nuclear		3,198	3,383	3,665	3,950	4,371	4,509	5,135	5,989	7,147
Hydro		3,301	3,308	3,559	3,679	3,902	4,270	4,530	5,007	5,520
Renewables		866	959	1,063	1,186	1,294	1,383	1,461	1,547	1,630
Household Transportation										
Number of vehicles	(millions)	808	911	1003	1103	1202	1297	1384	1490	1603
Vehicle miles traveled	(trillions)	6.67	7.73	8.76	9.90	11.01	12.11	13.13	14.34	15.67
Miles per gallon	(mpg)	22.7	22.9	23.2	23.6	23.8	24.1	24.2	24.4	24.5
Land Use	(Mha)									
Cropland		1808.4	1927.9	2003.9	2121.2	2239.5	2367.9	2463.6	2565.0	2659.9
Biofuels		43.2	60.2	75.1	77.5	78.8	70.7	69.7	65.4	61.5
Pasture		2800.3	2821.7	2798.8	2765.2	2730.3	2702.3	2680.1	2654.9	2631.0
Managed forest		563.1	522.3	509.5	496.8	484.4	469.8	460.7	449.8	441.8
Natural grassland		665.9	596.6	594.7	577.1	560.7	541.3	534.9	529.1	524.2
Natural forest		4243.6	4194.4	4139.8	4082.0	4024.9	3966.0	3908.8	3853.3	3799.0
Other		2997.0	2997.0	2997.0	2997.0	2997.0	2997.0	2997.0	2997.0	2997.0
Air Pollutant Emissions	(Tg)									
SO2		102.29	109.26	110.04	113.66	114.56	114.53	111.09	106.90	103.81
NOx		101.21	117.20	129.95	147.48	163.53	180.08	193.24	205.82	220.80
Ammonia		59.83	70.41	77.17	83.84	89.95	98.52	104.79	111.49	118.34
Volatile organic compounds		132.32	148.97	161.77	181.62	200.52	219.46	235.45	253.04	271.19
Black carbon		7.16	7.50	7.47	7.72	7.96	8.27	8.22	8.22	8.21
Organic particulates		34.01	36.12	36.17	37.92	39.85	42.40	42.56	43.12	43.61
Carbon monoxide		695.25	782.36	889.46	1021.49	1161.34	1311.26	1454.98	1606.35	1766.16

16 regions:

AFR	Africa
ANZ	Australia and New Zealand
ASI	Dynamic Asia
BRA	Brazil
CAN	Canada
CHN	China
EUR	Europe (EU+)
IND	India
JPN	Japan
LAM	Other Latin America
MES	Middle East
MEX	Mexico
REA	Other East Asia
ROE	Other Eurasia
RUS	Russia
USA	USA

Regional data tables are available at: http://globalchange.mit.edu/Outlook2012

Country	Region
Afghanistan	REA
Albania	ROE
Algeria	AFR
American Samoa	ANZ
Andorra	ROE
Angola	AFR
Anguilla	LAM
Antigua & Barbuda	LAM
Argentina	LAM
Armenia	ROE
Aruba	LAM
Australia	ANZ
Austria	EUR
Azerbaijan	ROE
Bahamas	LAM
Bahrain	MES
Bangladesh	REA
Barbados	LAM
Belarus	ROE
Belgium	EUR
Belize	LAM
Benin	AFR
Bermuda	LAM
Bhutan	REA
Bolivia	LAM
Bosnia and Herzogovina	ROE
Botswana	AFR
Brazil	BRA
Brunei	REA
Bulgaria	EUR
Burkina Faso	AFR
Burundi	AFR
Cambodia	REA
Cameroon	AFR
Canada	CAN

Country	Region
Cape Verde	AFR
Cayman Islands	LAM
Central African Republic	AFR
Chad	AFR
Chile	LAM
China	CHN
Coe d'Ivoire	AFR
Colombia	LAM
Comoros	AFR
Congo`	AFR
Congo, Dem. Rep. (Zaire)	AFR
Cook Islands	ANZ
Costa Rica	LAM
Croatia	ROE
Cuba	LAM
Cyprus	EUR
Czech Republic	EUR
Denmark	EUR
Djibouti	AFR
Dominica	LAM
Dominican Republic	LAM
Egypt	AFR
El Salvador	LAM
Equador	LAM
Equatorial Guinea	AFR
Eritrea	AFR
Estonia	EUR
Ethiopia	AFR
Falkland Islands	LAM
Faroe Islands	ROE
Fiji	ANZ
Finland	EUR
France	EUR
French Guiana	LAM
French Polynesia	ANZ
Gabon	AFR
Gambia	AFR
Georgia	ROE
Germany	EUR
Ghana	AFR
Giblartar	ROE
Greece	EUR
Greenland	LAM
Grenada	LAM
Guadeloupe	LAM
Guam	ANZ
Guatemala	LAM
Guinea	AFR
Guinea-Bissau	AFR
Guyana	LAM
Haiti	LAM
Honduras	LAM
Hong Kong	CHN
Hungary	EUR
Iceland	EUR
India	IND
Indonesia	ASI
Iran	MES
Iraq	MES
Ireland	EUR
Israel	MES
Italy	EUR
Jamaica	LAM
Japan	JPN

Country	Region
Jordan	MES
Kazakhstan	ROE
Kenya	AFR
Kiribati	ANZ
Korea	ASI
Korea, Dem. Ppl. Rep.	REA
Kuwait	MES
Kyrgyzstan	ROE
Laos	REA
Latvia	EUR
Lebanon	MES
Lesotho	AFR
Liberia	AFR
Liechtenstein	EUR
Lithuania	EUR
Luxembourg	EUR
Lybia	AFR
Macau	REA
Macedonia	ROE
Madagascar	AFR
Malawi	AFR
Malaysia	ASI
Maldives	REA
Mali	AFR
Malta	EUR
Marshall Islands	ANZ
Martinique	LAM
Mauritania	AFR
Mauritius	AFR
Mayotte	AFR
Mexico	MEX
Micronesia	ANZ
Moldova	ROE
Monaco	ROE
Mongolia	REA
Monserrat	LAM
Morocco	AFR
Mozambique	AFR
Myanmar	REA
Namibia	AFR
Nauru	ANZ
Nepal	REA
Netherlands	EUR
Netherlands Antilles	LAM
New Caledonia	ANZ
New Zealand	ANZ
Nicaragua	LAM
Niger	AFR
Nigeria	AFR
Niue	ANZ
Norfolk Islands	ANZ
Northern Mariana Islands	ANZ
Norway	EUR
Oman	MES
Pakistan	REA
Palestine	MES
Panama	LAM
Papua New Guinea	ANZ
Paraguay	LAM
Peru	LAM
Philippines	ASI
Poland	EUR
Portugal	EUR
Puerto Rico	LAM

Country	Region
Qatar	MES
Reunion	AFR
Romania	EUR
Russian Federation	RUS
Rwanda	AFR
Saint Helena	AFR
Saint Kitts and Nevis	LAM
Saint Lucia	LAM
Saint Pierre and Miquelon	LAM
Saint Vincent & the Grenadines	LAM
Samoa	ANZ
San Marino	ROE
Sao Tome and Principe	AFR
Saudi Arabia	MES
Senegal	AFR
Serbia and Montenegro	ROE
Seychells	AFR
Sierra Leone	AFR
Singapore	ASI
Slovakia	EUR
Slovenia	EUR
Solomon Islands	ANZ
Somalia	AFR
South African Republic	AFR
Spain	EUR
Sri Lanka	REA
Sudan	AFR
Suriname	LAM
Swaziland	AFR
Sweden	EUR
Switzerland	EUR
Syria	MES
Taiwan	ASI
Tajikistan	ROE
Tanzania	AFR
Thailand	ASI
Timor Leste	REA
Togo	AFR
Tokelau	ANZ
Tonga	ANZ
Trinidad and Tobago	LAM
Tunisia	AFR
Turkey	ROE
Turkmenistan	ROE
Turks and Caicos	LAM
Tuvalu	ANZ
Uganda	AFR
Ukraine	ROE
United Arab Emirates	MES
United Kingdom	EUR
United States	USA
Uruguay	LAM
Uzbekistan	ROE
Vanuatu	ANZ
Venezuela	LAM
Vietnam	REA
Virgin Islands, British	LAM
Virgin Islands, U.S	LAM
Wallis and Futuna	ANZ
Yemen	MES
Zambia	AFR
Zimbabwe	AFR

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