

Submitted  
11/31/2005

## Climate Change

# A new reality

Mark van Soestbergen  
Gainesville City Commission 013105

10,000 years ago, man walked out of his cave, not because he thought it was a great idea, but because the climate permitted him to. He walked out of his cave, where he found a bounty of plants, grains, fruits, fish and game he could stalk and cultivate at his leisure.

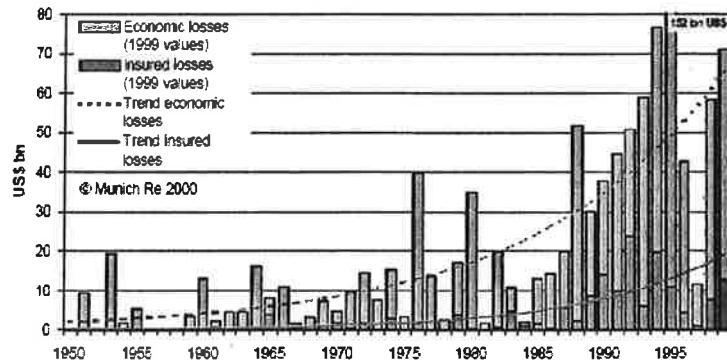
Man settled on the plains, near rivers, along the coast, built communities out of mud, developed a society, shared a culture, and traded with others. All the while, he did not pay for the air he breathed, the water that fell out of the sky, that replenished the soil, that grew the tree that bore the fruit, that filled the well and fed the spring. He did not pay for spring to come, the flower to bloom, the bee to pollinate, the warm summer rays, and the clear autumn skies.

Man shared his life with millions of friends, some small and unnamed, each taking and giving, building up and breaking down, in an endless song of rhythmical motion, one beautiful form changing into another. Five thousand years later he built the pyramids, and 400 years ago, rejoined his cousins in the new world. Today he flies around in space, all the while still not having paid for the tree to grow, the soil to be moist, the ocean to be calm, and the winds to be fair.

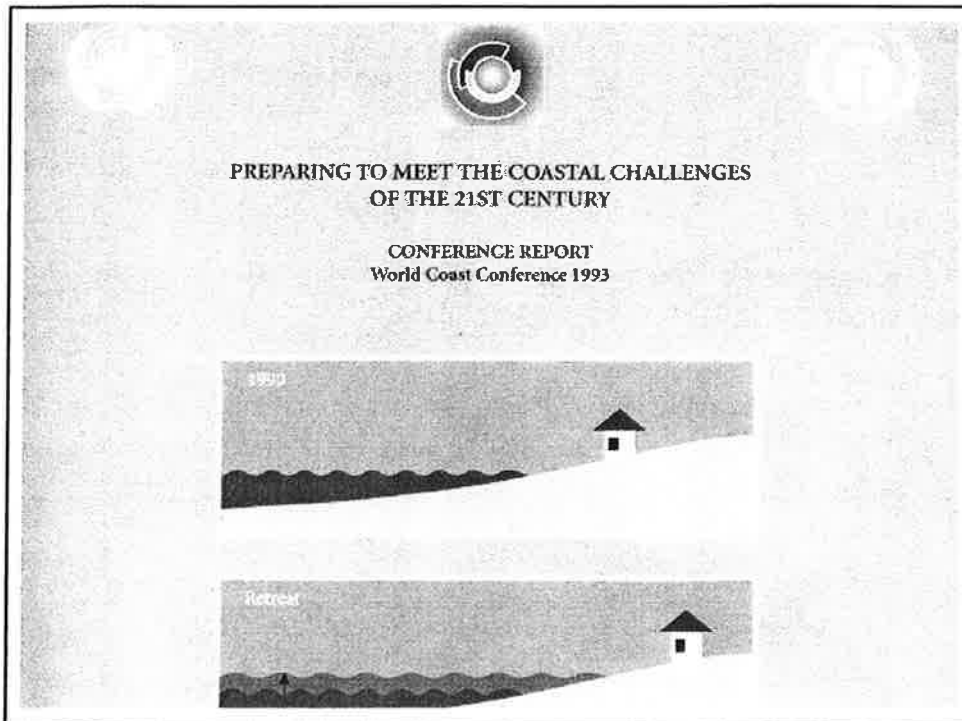
We have managed to create a \$27trillion/yr society, without ever paying a penny for rent. That is about to change. The value of the climate system must be infinitely greater than 7cents per KWh, or \$27trillion/yr, considering it has allowed all of man, all the animals, all the plants, all the fish, and all the trees to flourish for thousands of years, and surely we hope, for thousands more years to come.

# Climate change

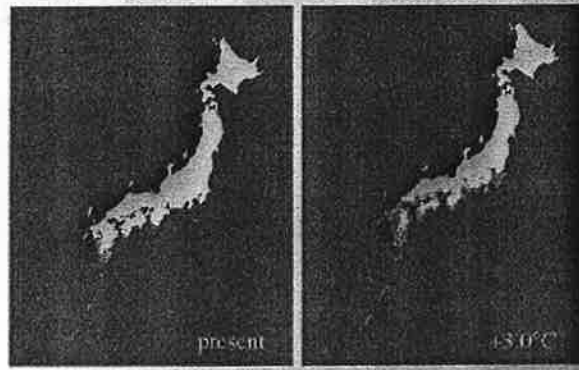
## Losses due to Natural Disasters 1950-1999



Source: Munich Reinsurance



# *The Potential Effects of Climate Change in Japan*



## **CLIMATE CHANGE IMPACTS ON THE UNITED STATES**

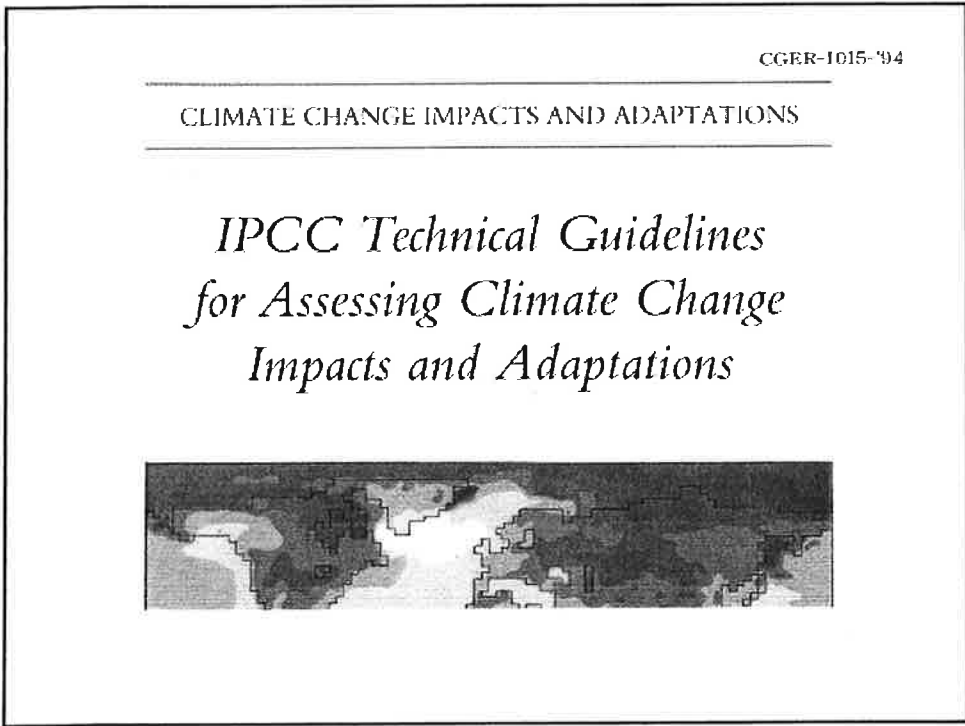
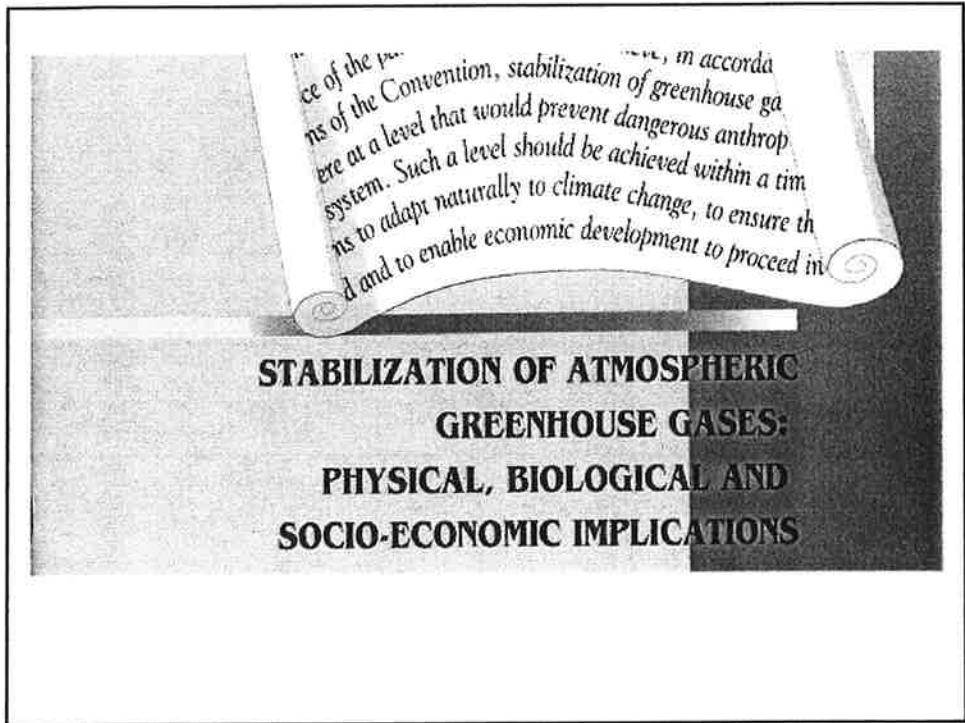
THE POTENTIAL CONSEQUENCES OF CLIMATE VARIABILITY AND CHANGE

### Overview


National Assessment  
Synthesis Team

US Global Change  
Research Program


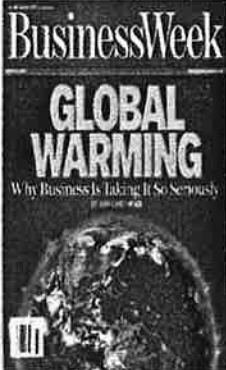





Swiss Re



## Managing Risk in a Carbon Constrained World

**Presentation of**  
**Christian Mumenthaler,**  
**Chief Risk Officer, Swiss Re**  
**Ruschlikon, Switzerland**  
**5 November 04**

### 3. Risk management tools from the insurance perspective

The response of the insurance and reinsurance industries to the challenge of providing their clients with solutions to enable compliance with emissions trading requirements has been gathering pace over the last few years. A number of the solutions provided are adaptations of classic risk transfer solutions whilst others break new ground, in some cases blending insurance and financial products.



“The financial sector has a key role to play in delivering market solutions to climate change.”

#### Directors and Officers

Directors & Officers (D&O) insurance products offer cover to senior executives for their professional liability as company leaders. As soon as there is a legal obligation to reduce GHG emissions, new liabilities are likely to be faced by companies and their top executives. Whilst fines or penalties resulting from a breach of law would not be covered under a D&O policy, inappropriate or inadequate management of climate risks, resulting in a failure to protect a company's interests, could potentially lead to proceedings being taken against senior decision-makers. A possible cause for action could arise if shareholder value was perceived as being damaged due to such a failure of management.

#### Professional Indemnity

As part of the process of creating emission certificates, a pivotal contribution will be made by those who verify that certificates meet the required standards. Those conducting validation, verification and certification work, such as auditing organisations, will carry additional responsibilities. These roles will require professional indemnity policies to cover the new areas of practice.

## New products and services: Swiss Re and the GHG emissions<sup>iii</sup> market

Swiss Re

- Greenhouse Gas Risk Solutions
- Developing financial tools to mitigate/hedge market and performance risks
  - Third Party Asset Management/Investment related solutions
  - Renewable/alternative energy (reinsurance/structured finance
    - wind, geothermal etc.
  - Clearing and delivery guaranty insurance
- Evolutionary: Development ecosystem services markets
  - Footprint neutral products – consumer/company offsets

## Linking Climate Change to corporate governance

Swiss Re

iii

- Climate as a corporate board risk management issue
  - Preparation for the impacts of climate change?
  - Reporting - "material events and uncertainties"; Sarbanes-Oxley
  - Carbon Disclosure Project (institutional investors representing ca. USD \$9 trillion in assets) in 2003:
    - 80% Global 500 CEOs acknowledge risk; 35-40% acting
  - Shareholder resolutions
    - In 2003 - 32% at Chevron, 22% at Exxon, 27% at AEP etc.
    - For 2004; >25 in energy, utilities, automotive sector as well as *the insurance industry*
- Implications for D&O insurance
  - Non-action potentially affects shareholder value
  - Swiss Re policy (upon policy renewal):

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# Climate Change

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## Climate Change

Climate change has emerged as a key concern for the World Bank and its clients in the 21st century. Sea level rise, warming temperatures, uncertain effects on forest and agricultural systems, and increased variability and volatility in weather patterns are expected to have a significant and disproportionate impact in the developing world, where the world's poor remain most susceptible to the potential damages and uncertainties inherent in a changing climate.

The Bank is increasingly incorporating these considerations into its development operations, advising clients on options, helping promote sectoral efficiency and clean energy alternatives, and assisting its clients in adapting to foreseeable impacts while seeking globally equitable responses to the challenge.

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# Tyndall°Centre

for Climate Change Research

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**Adapting to Climate Change**  
Research Theme 3


other sections in this area:

**Theme 3: Adapting to Climate Change**  
[Theme 3 home page](#)  
[Introduction](#)  
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**Tyndall projects:**  
[Theme 3 Flagship Project](#)  
[Theme 3 project list](#)

**Other activities:**

... examining ways to adapt to unavoidable climate change, whether gradual changes in average conditions, rapid changes as have happened in the past, or increases in extreme weather events



© The Yorkshire Post

**Table 3.2 Rough estimate of the impact of carbon-dioxide-equivalent doubling on agriculture, selected countries**

Country	GDP, 1988 (billions of dollars)		Yield change (percentages)	Implied value change	
	Total	Agriculture		$\alpha\beta = 0.75$	$\alpha\beta = 1.25$
	Australia	205		8.2	-10.0 <sup>a</sup>
Belgium	145	3.0	7.0	0.2	0.3
Canada	440	17.6	-18.0	-2.4	-4.0
China	360	120.8	10.0 <sup>a</sup>	9.1	-15.2
Denmark	95	4.1	10.0	0.3	0.5
Finland	90	5.2	15.0	0.6	1.0
France	900	30.8	-11.0	-2.5	-4.2
Germany	1,130	16.5	-5.0	-0.6	-1.0
Iceland	5	2.0 <sup>b</sup>	50.0	0.8	1.3
Italy <sup>c</sup>	765	31.1	-10.0	-2.3	-3.8
Japan	2,850	65.4	-5.0 <sup>d</sup>	-2.5	-4.2
Netherlands	215	8.5	1.0	0.1	0.2
Soviet Union	1,000 <sup>e</sup>	200.0 <sup>e</sup>	0.0	0.0	0.0
United States <sup>f</sup>	4,885	89.8	-20.0	-13.1	-21.9
Total	12,815	603.0	-6.9	-31.1	-52.0



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A Carbon Finance Product of the World Bank

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- > [12.22.04](#) World Bank Ready To Allocate Grants For Ecological Projects In Russia
- > [12.21.04](#) Ecuador Enters the Greenhouse Gas Reductions Era with Two Run-of-River Hydropower Projects
- > [12.17.04](#) European Investment Bank and World Bank Agree to Develop the Asian-European Carbon Fund: [link](#)

Welcome to the BioCarbon Fund



Harnessing the Carbon Market to Sustain Ecosystems and Reduce Poverty

The World Bank has mobilized a new fund to demonstrate projects that sequester or conserve carbon in forest and agro-ecosystems. The Fund, a public/private initiative administered by the World Bank, aims to deliver cost-effective emission reductions, while promoting biodiversity conservation and poverty alleviation. The Fund started operations in May 2004 and has a capital of \$33.3 million as of January 2005.

> [About BioCF](#)

▶ **VIDEO**

▶ **Featured BioCarbon Fund Documents**

- > [Basics of the BioCarbon Fund](#)
- > [BioCarbon Fund brochure](#)





## Environmental futures versus carbon cash products

Combined physical and financial carbon hedging

*London, November 23, 2004*  
*Seb Waltham*



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**BUSINESS FINANCE**

**FINANCING RENEWABLES**

Triodos Bank offers debt finance for renewable energy projects. We have expertise financing smaller-scale wind power developments in the UK and Ireland with requirements from £500,000 to £5 million.

Triodos Bank has a unique understanding of these enterprises, financing a number of projects, benefiting developers and communities alike, from hill-farmers in rural Wales to crofters in Scotland. A core priority emerging from our experience is the need to reduce costs for all parties by developing a more standardised approach to arranging project finance.

We aim to improve understanding by developers of our procedures and requirements by using standardised legal documentation to avoid the costs of 'going back to square one'. We also gather and prepare technical data and legal documents in ways which reduce the costs of the due diligence process.

Merrill Lynch New Energy Technology plc  
Annual Report 31 October 2004



**The Financial Sector Viewpoint**



- Evidence is mounting that the financial implications of climate change for both industry and finance could be profound.
- The level of carbon risk varies among different industrial sectors and among individual companies within those sectors.
- Innovest found that company PV of future GHG reduction costs as a % of market capitalization ranges from 5% to 30%.
- Climate change issue has already negatively affected the valuation of coal-based electric utilities.
- Growing number of shareholder resolutions being tabled
- European-based investment houses are closely tracking matters



# climate CHANGE + power GENERATION

## Contents

- Power generation is an effective yardstick for abating GHG emissions

## Hitting the Coal Face

The consensus today is that unprecedented amounts of man-made greenhouse gas (GHG) emissions are causing the climate to change. The phenomenon is characterised by increasing average temperature of the globe, melting ice caps, sea level rise and potential disruption to ocean currents, changing rainfall and wind patterns and more frequent catastrophic events

IIGCC represents \$700 Billion in Managed Assets

## Market Growth in Renewables



Clean energy technologies

Innovative power generation capabilities

Climate change mitigation emissions trading techniques

Digital and e-commerce based energy solutions

Fuel cells and low emissions fuel/engine designs

Energy management outsourcing opportunities

- The World Energy Council report that the market for renewable energy is likely to be in the range \$234 to \$625 billion by 2010 and \$1.9 trillion by 2020.
- Europe has already surpassed its plans to generate 6% of its energy needs from renewables by 2010 and 50% by 2050. At an average of \$1-\$1.5m per MW to install, this constitutes an investment of some \$90-\$135 billion.
- Australia is moving towards 2% renewables by 2010, equivalent to approximately A\$6 billion.
- The US renewables market is forecast to grow 34% by 2020.

THOMSON  
VENTURE ECONOMICS

European Venture Capital  
Incorporating

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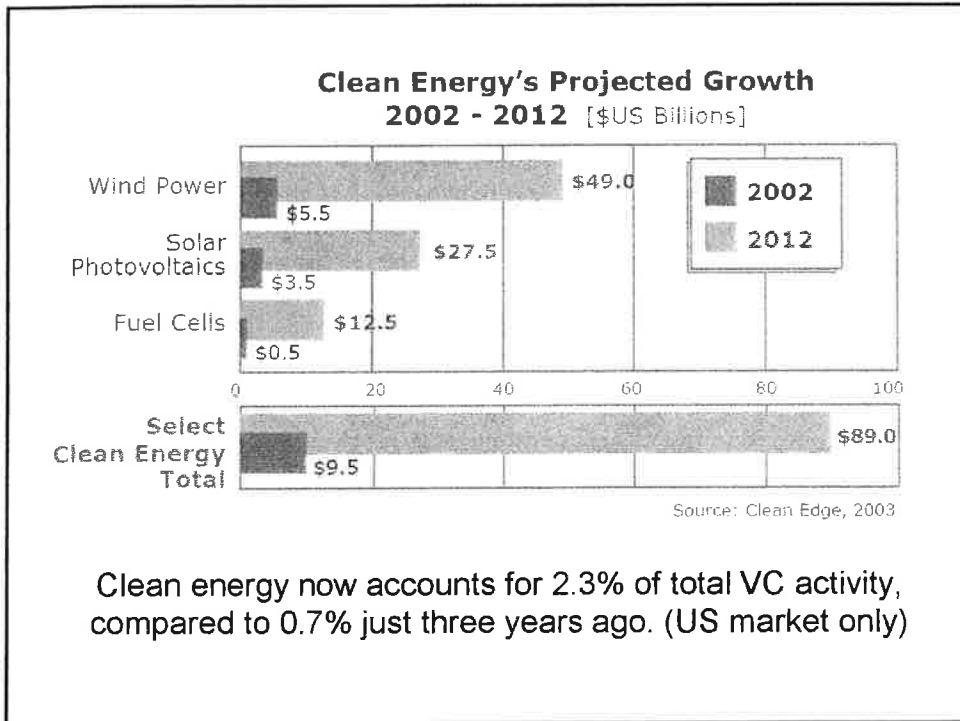
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**Ventus VCT launched**  
*Angela Sormani*  
Nov 5, 2004

Jumping on the venture capital trust (VCT) bandwagon is Climate Change Capital, a group which provides financial services and products to organisations affected by climate change policy. The group is differentiating itself from the other generalist and AIM VCTs in the market by offering a specialist niche in investments in wind projects.

Ventus will invest in a portfolio of companies that will develop, construct and operate small on-shore UK wind projects typically consisting of between one and six wind turbines. Investments will generally be in companies developing community projects, projects initiated by specialist small scale developers, small industrial sites and small projects which are not of interest to large development companies and utilities.

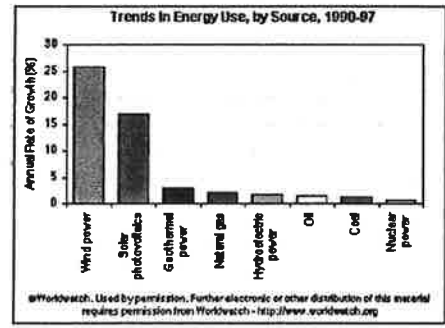
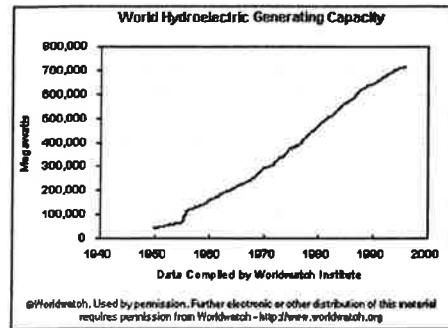
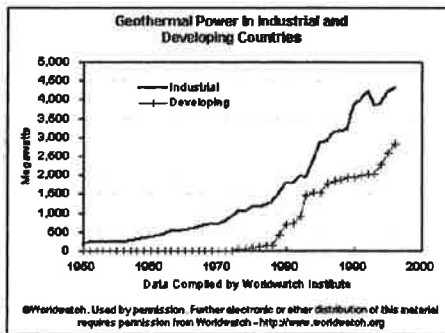
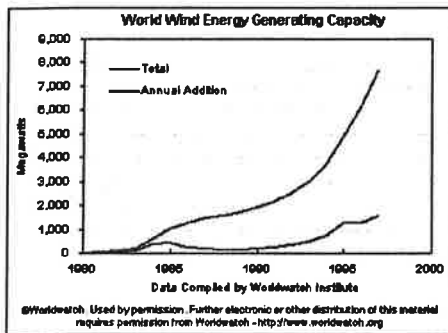
EURO VC & PE STATS  
EURO VC & PE NEWS  
US VC NEWS  
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ANNOUNCED DEALS

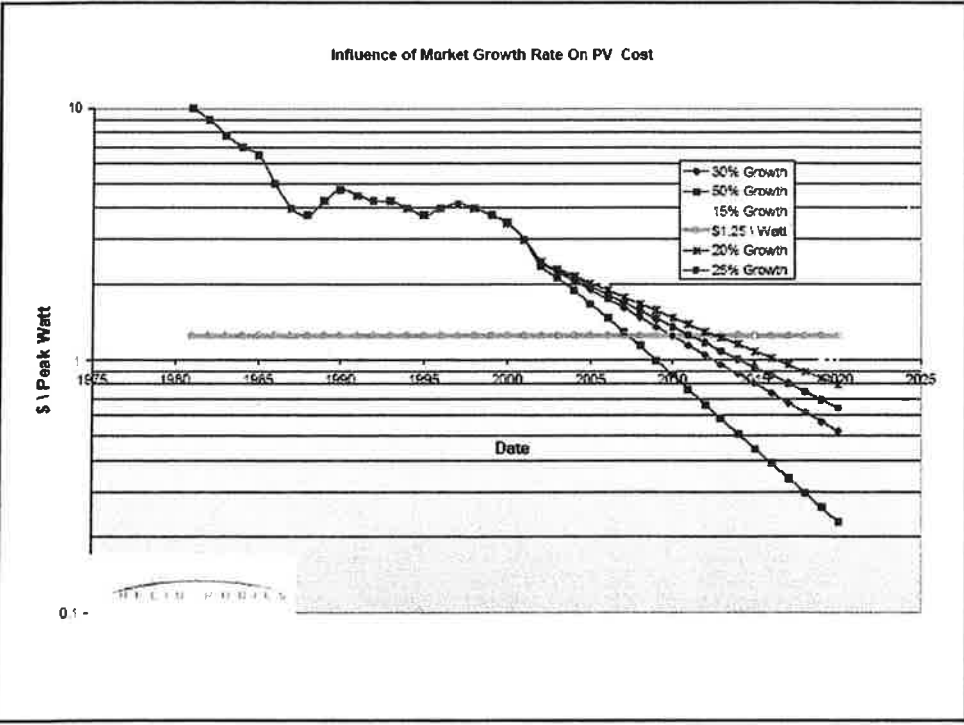
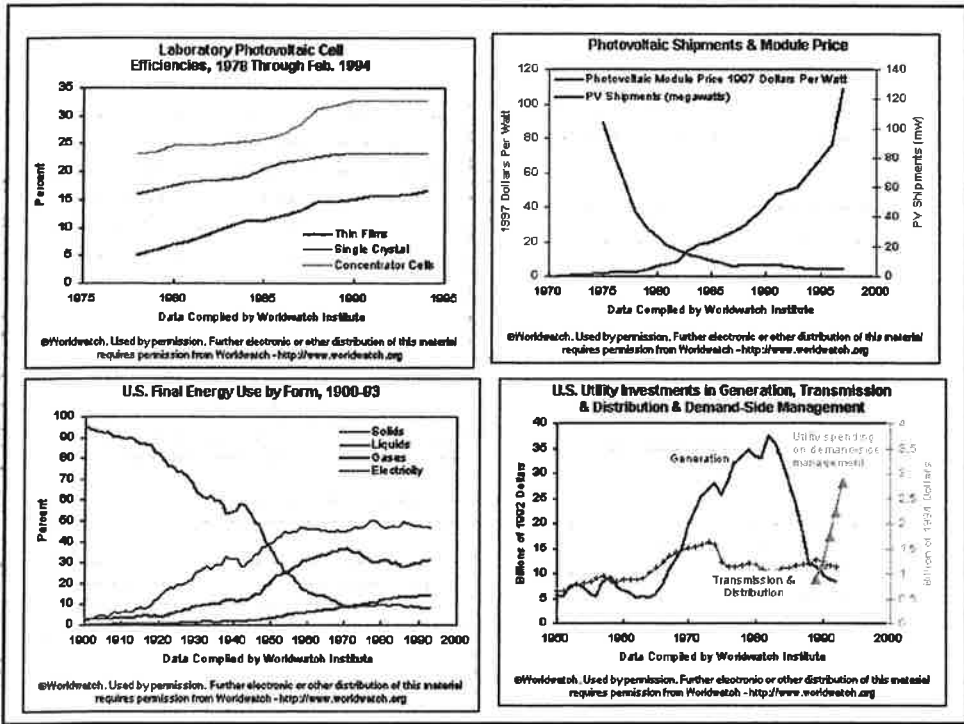


**platts** EU's installed wind power capacity rises 22% in 2004 to 34,205MW

London (Platts)—28Jan2005

Wind power capacity in the European union rose by 22% to 34,205MW at the end of 2004, up from 28,567MW at the end of 2003, the European Wind Energy Association said Thursday. 5,703 MW of wind power capacity were installed last year in the 25 EU countries, the Brussels-based industry organization said. "Renewed political initiatives by the G8 could boost wind power. The industry is well positioned and ready for a more rapid roll out given the right political signals," Corin Millais, EWEA Chief Executive, said. The European market for wind energy has seen an average annual growth of 22% over the past six years. Two countries, Italy and the Netherlands, passed the 1,000MW threshold in 2004, indicating that important new European markets are emerging, Millais said. The top five EU countries in terms of adding new capacity in 2004 were Spain (2065MW), Germany (2037MW), UK (240MW), Portugal (224) and Italy (221). The 34,205MW installed in the EU by the end of 2004 will, in an average wind year, produce some 73TWh of electricity.

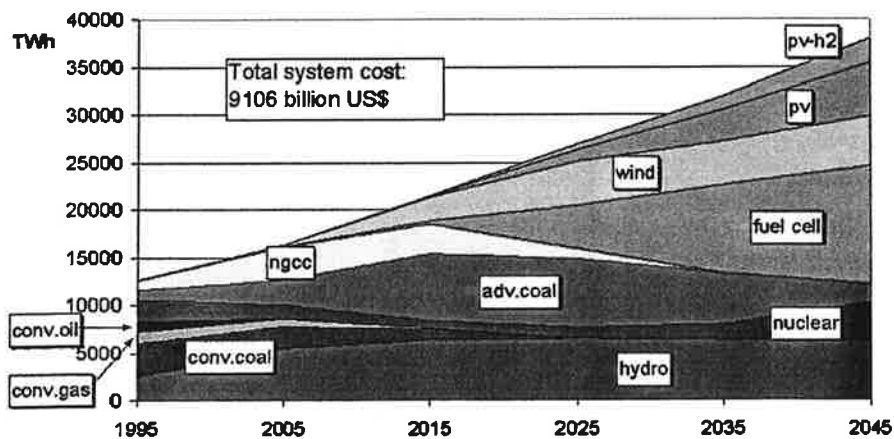




### Japan

TECHNOLOGY	FY 1996	FY 2000	FY 2010
PV Power Generation	55 MW	200 MW	5,000 MW
Wind Power Generation	14 MW	100 MW	300 MW
Thermal Energy Conversion	33,000 kd	n.a.	580,000 kd
Waste Power Generation	890 MW	1,080 MW	5,000 MW
Solar Heat Utilisation	1,040,000 kd	1,400,000 kd	5,920,000 kd
Fuel Cells	16 MW	13 MW	2,200 MW
Others (e.g. paper manufacturing waste)	4,900,000 kd	n.a.	5,920,000 kd
Co-generation	3,850 MW	4,300 MW	
(of which using natural gas)		1,200 MW	5,550 MW
<b>TOTAL</b>	6850000 kd		19,100,000 kd
Combined share of total primary energy	1.1%	1.2%	3.1%
Hydropower	82,000 MW		105,000 MW
Geothermal	1,200,000 kd		3,800,000 kd
<b>Total Renewable</b>	4.7%		7.5%

With Learning Investments for PV and Fuel Cells  
(Breakaway Path)



The global economy is decarbonizing....  
position yourself accordingly.

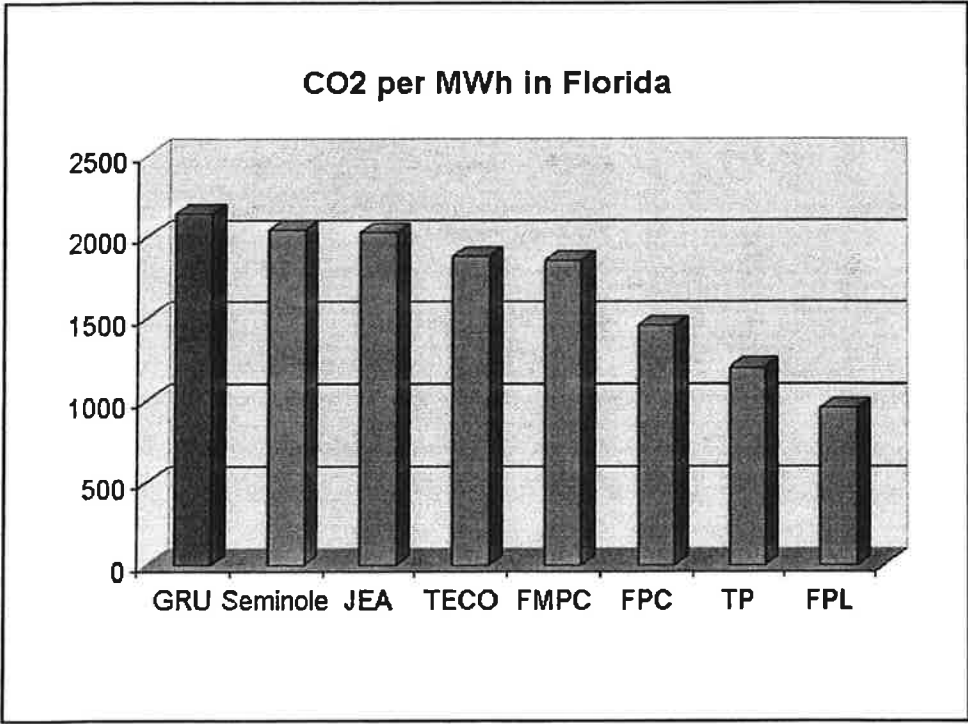
Entity	Target	Notes and source
<b>United States:</b>		
<b>State and Regional</b>		
Maine: State-wide	1990 levels by 2010 10% below 1990 by 2020	LD 845 (HP 622)
Massachusetts: State-wide	1990 levels by 2010 10% below 1990 by 2020	Massachusetts Climate Protection Plan of 2004
Massachusetts: Electric Utilities	10% below 1997-1999	CO <sub>2</sub> target only. 310 CMR 7.29
New Hampshire: Electric Utilities	1990 levels by 2006	CO <sub>2</sub> target only. HB 284
New Jersey: State-wide	3.5% below 1990 by 2005	Administrative Order 1998-09
New York: State-wide	5% below 1990 by 2010 10% below 1990 by 2020	State Energy Plan of 2002
New England Governors and Eastern Canadian Premiers: Regional economy-wide	1990 levels by 2010 10% below 1990 by 2020 75-85% below 2000 long-term	Climate Change Action Plan of 2001
<b>Bush Administration Target (Voluntary)</b>	18% below 2002 intensity levels by 2012	Announced 2/14/2002 Pew Center Analysis
<b>Proposed Federal Legislation</b>		
Climate Stewardship Act of 2003 (McCain-Lieberman) SA. 2028	2000 levels by 2010	As voted on 8/2003 Pew Center Analysis
Climate Stewardship Act of 2003 (McCain-Lieberman) S. 139	2000 levels by 2010 1990 levels by 2016	As introduced 1/2003
<b>International:</b>		
Australia	8% above 1990 by 2008-2012	Kyoto Target
Canada	6% below 1990 by 2008-2012	Kyoto Target
European Community	8% below 1990 by 2008-2012	Kyoto Target
Japan	6% below 1990 by 2008-2012	Kyoto Target
New Zealand	1990 levels by 2008-2012	Kyoto Target
United Kingdom	20% below 1990 by 2020 60% below 1990 by 2050	CO <sub>2</sub> target only. Energy White Paper of 2003

Contributions to Temperature Increase from 1950 to 2000						
CO <sub>2</sub> (energy)						
	Index Rank		% of World Total	Per Capita Index Rank		
Country	Index	Rank	% of World Total	Index	Rank	
United States of America	100.0	(1)	26.90%	53.3	(3)	
European Union (25)	83.8	(2)	22.55%	28.5	(21)	
Russian Federation	37.2	(3)	10.01%	39.6	(10)	
China	32.3	(4)	8.68%	3.9	(90)	
Germany	22.6	(5)	6.07%	42.3	(7)	
Japan	17.5	(6)	4.70%	21.2	(35)	
United Kingdom	14.2	(7)	3.82%	37.0	(11)	
Total GHG Emissions in 2000 (excludes land use change)						
CO <sub>2</sub>						
	MtcO <sub>2</sub> Rank		% of World Total	Tons CO <sub>2</sub> Per Person Rank		
Country	MtcO <sub>2</sub>	Rank	% of World Total	Tons CO <sub>2</sub> Per Person	Rank	
Qatar	35.1	(65)	0.15%	58.7	(1)	
Kuwait	58.5	(49)	0.24%	25.7	(2)	
United Arab Emirates	72.3	(42)	0.30%	24.1	(3)	
Bahrain	13.8	(85)	0.06%	20.2	(4)	
United States of America	5,762.1	(1)	24.11%	19.9	(5)	

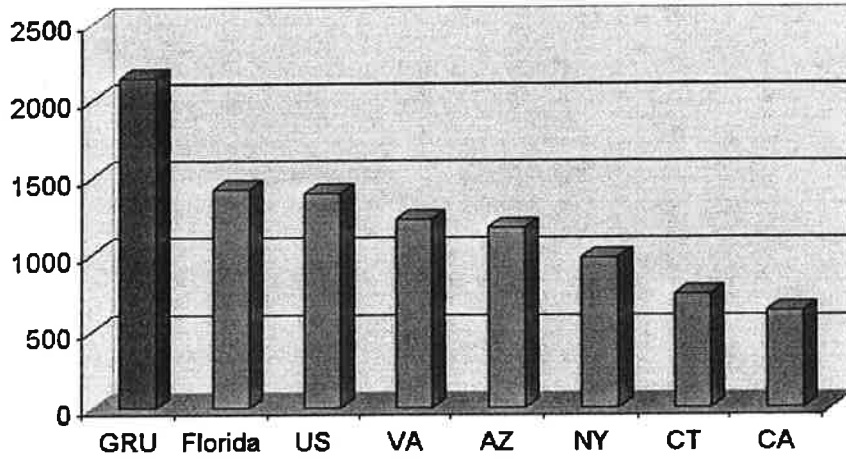


GHG Emissions from Electricity & Heat in 2000					
CO2					
Country	MtCO2	Rank	% of World Total	Tons CO2 Per Person	Rank
Qatar	21.1	(53)	0.23%	35.3	(1)
Kuwait	35.8	(37)	0.39%	15.7	(2)
Brunei*	4.0	(84)	0.04%	11.7	(3)
Bahrain	6.0	(73)	0.09%	11.7	(4)
United Arab Emirates	33.2	(40)	0.36%	11.0	(5)
Australia	181.2	(9)	1.95%	9.3	(6)
United States of America	2,537.4	(1)	27.38%	8.8	(7)

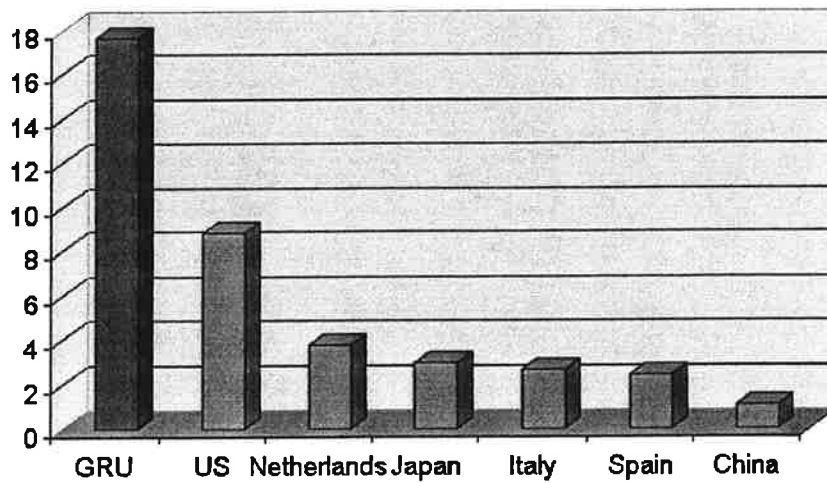
Citizens of Gainesville rank between Qatar and Kuwait with 17.6 tCO2 per citizen, rising to 24.6 tCO2 in 2012.

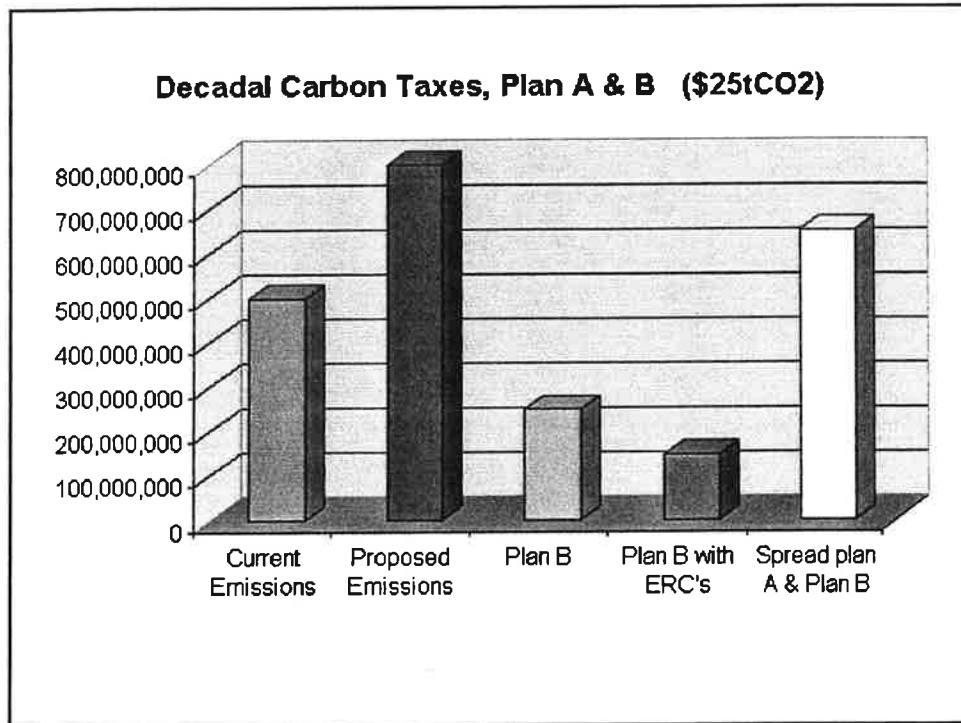
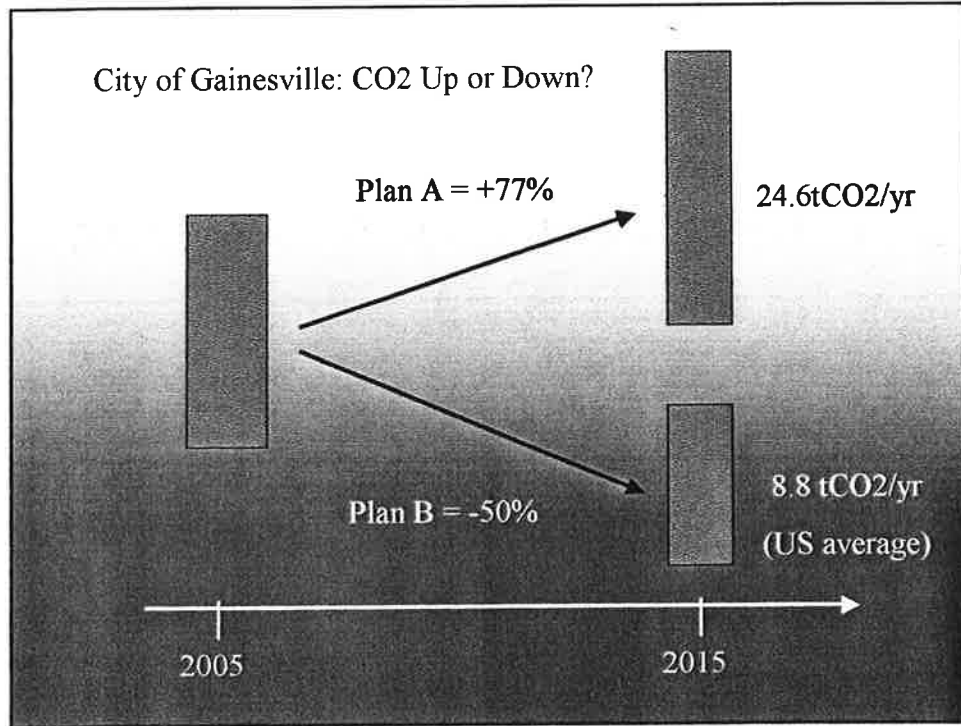


**GRU vs State Averages**



**CO2 per Citizen, Global (Electric Only)**





Various issues converge:

- Exposure
- Changing Industry
- Legislation
- Increased Global Competition for Resources

Requires a fundamental change in utility management.

We need somebody who can meet our business objectives during a growing population, while lowering greenhouse emissions and reshaping our assets in line with future regulation.

We need somebody with experience, somebody who can change the corporate culture over from traditional generation to conservation and clean energy, somebody who has done this before.

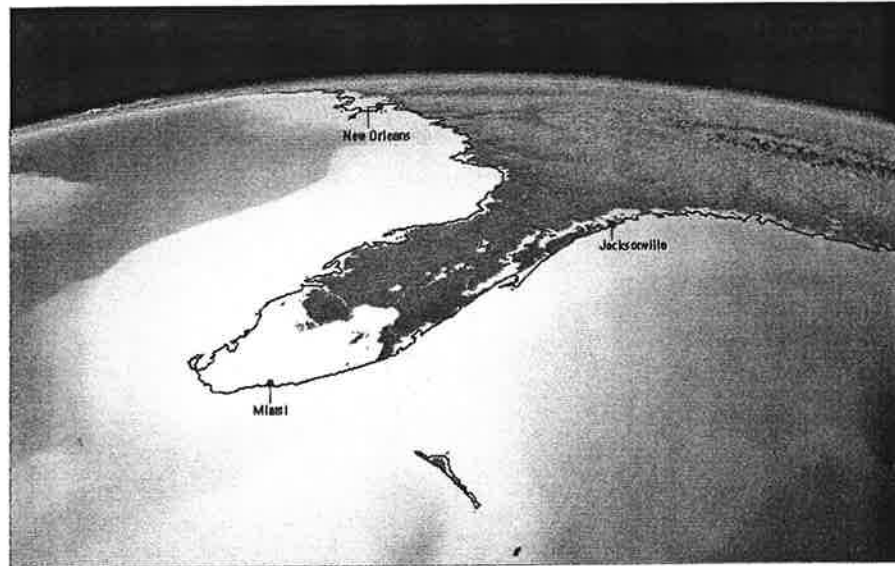
We need somebody who can excite the potential in the existing workforce, somebody open to collaborate with the knowledge base present in the community, somebody who can combine utility strength with local talent and natural resources to deliver results at an affordable cost. We need somebody with a proven track record.

We need to reposition our physical and human assets so that the carbon constrained future presents an opportunity, not a risk, to the City of Gainesville, its Citizens and rate payers.

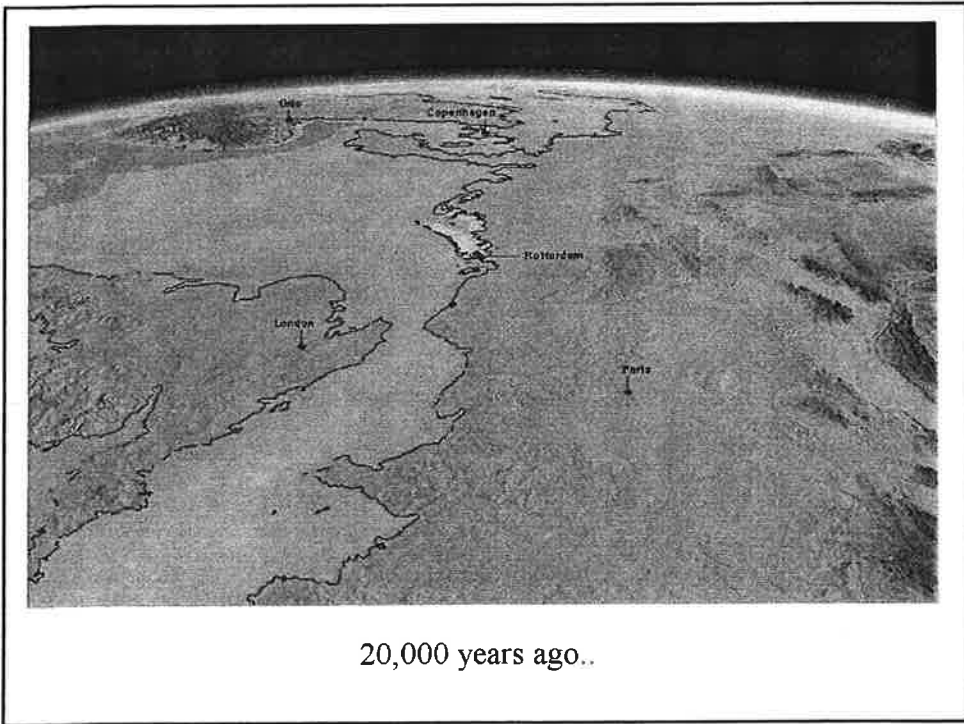
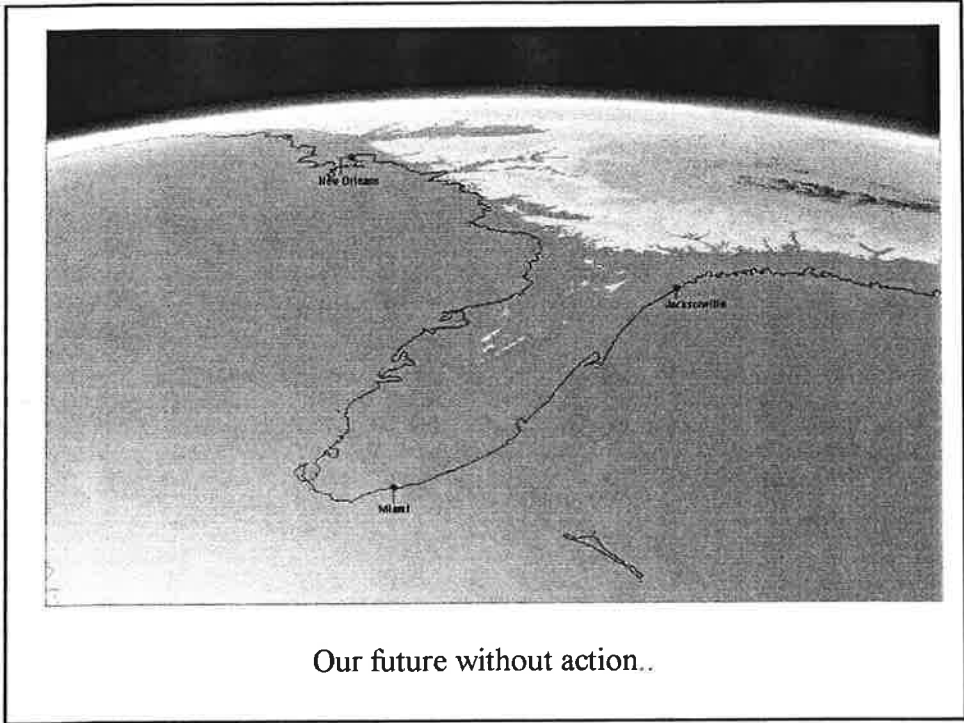
We need a different management philosophy, one that is New School, not Old School. We need a team that believes they can achieve these goals, one that inspires others that they can as well.

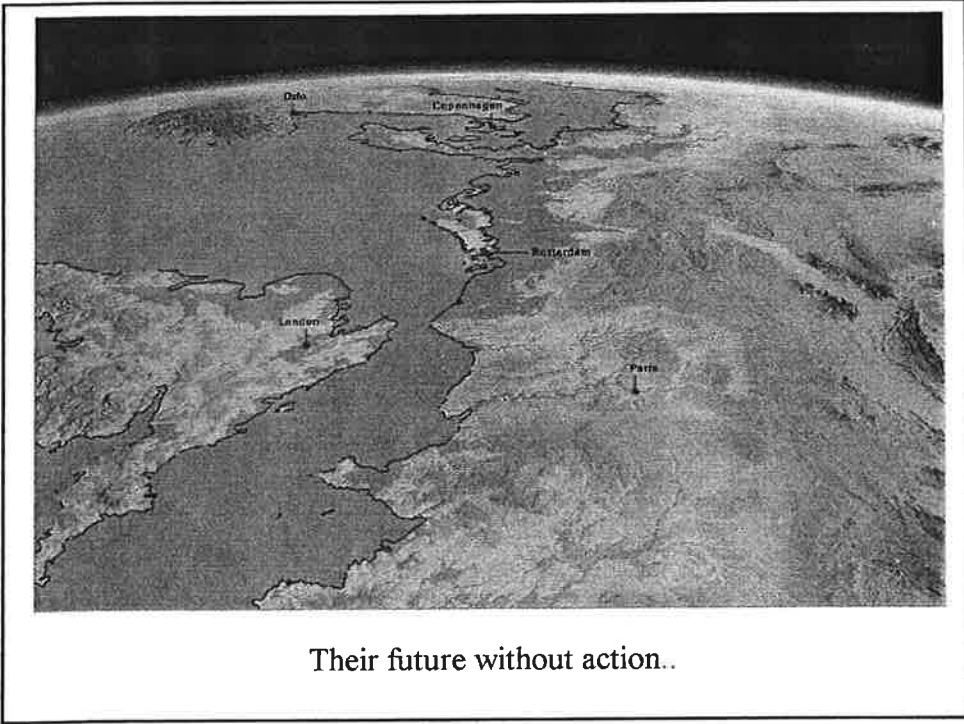
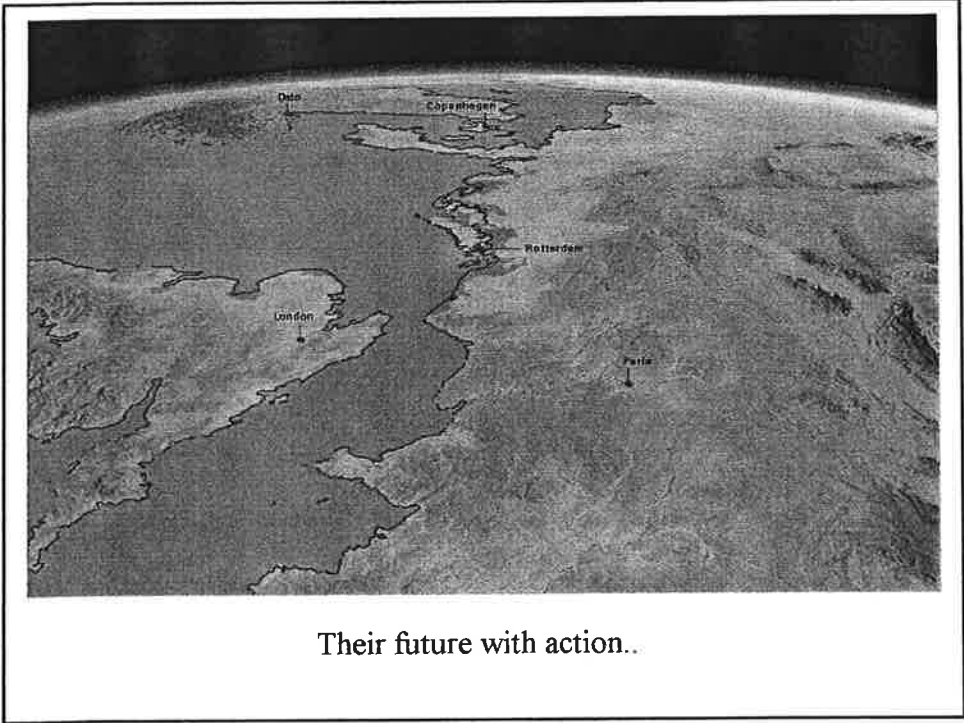


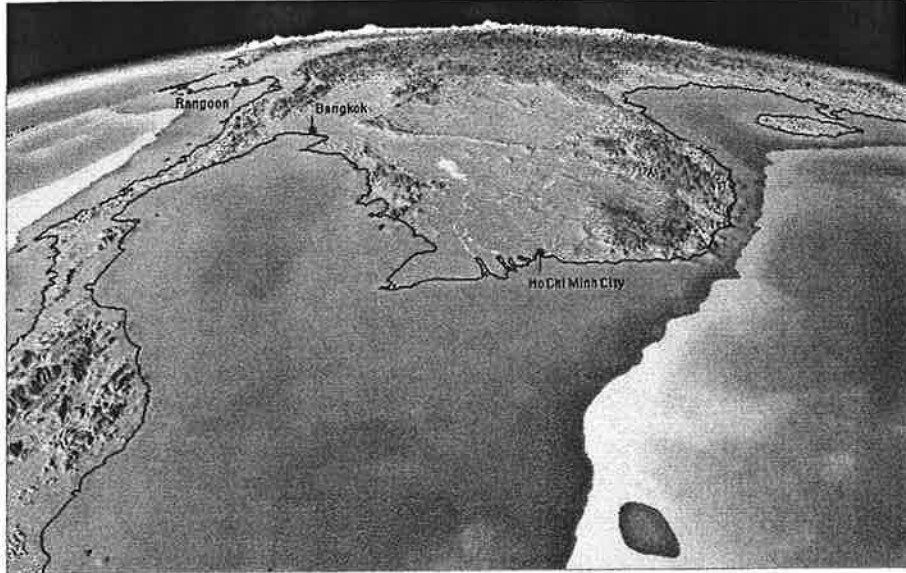
20,000 years ago..



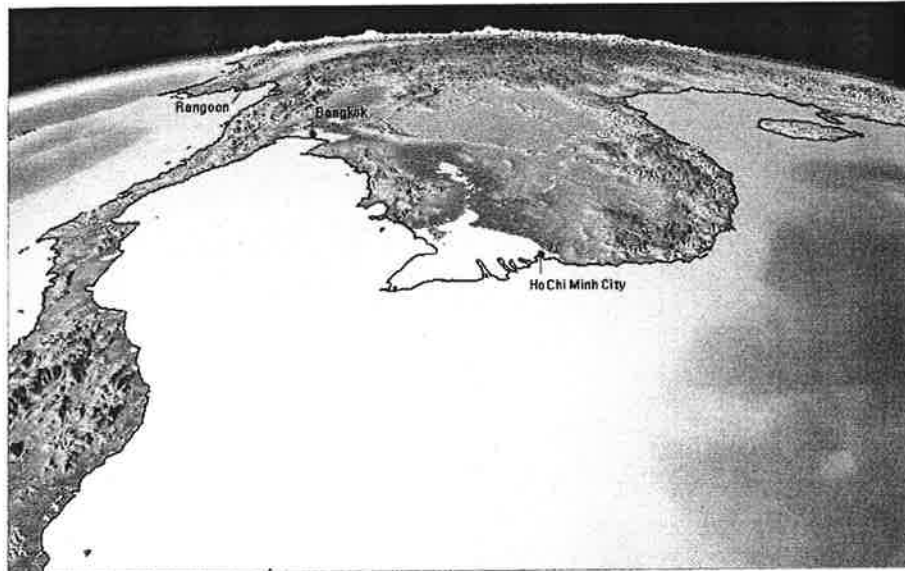
Our future with action..





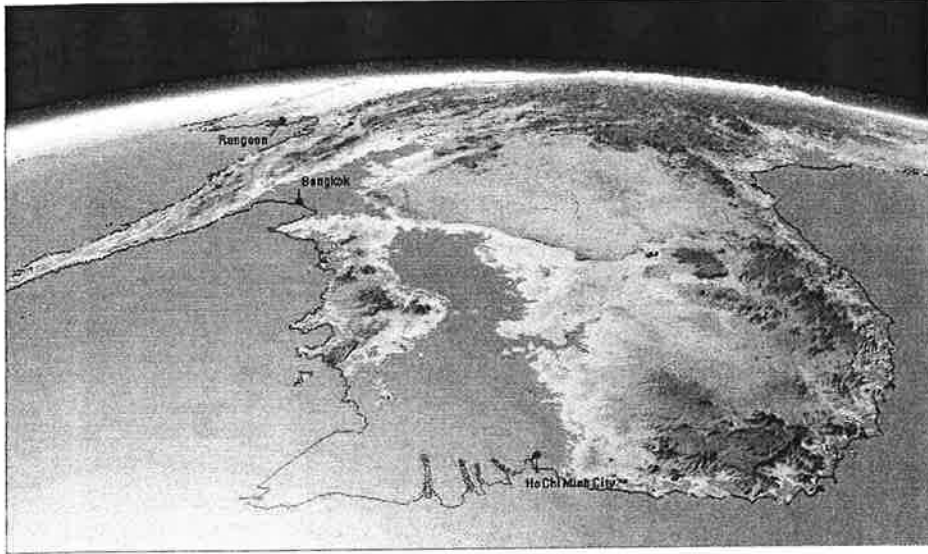


20,000 years ago..



Their future with action..





Their future without action..

British Thermal Unit is a unit of energy (energy is the ability to do work). The definition for Btu is the amount of energy required to raise the temperature of 1 pound of water 1 degree Fahrenheit ( $^{\circ}\text{F}$ ). Practically speaking, a Btu is equivalent to about the heat from a kitchen match and it takes about 2,000 Btu to make a pot of coffee.

The term was figured out by a bunch of British dudes who calculated how much energy it took to melt 1 ton of ice, by changing it from its solid state ( $32^{\circ}\text{F}$ ) to its liquid state ( $33^{\circ}\text{F}$ ). The reverse is also true. The origin of this term suggests the early history of refrigeration in ice plants: 1 ton refrigeration capacity ice plant could freeze 2,000 pounds (or 1 ton) of ice, corresponding to 12,000 BTU per hour.

For example, in comparison, over the last 40 years, the largest warming has occurred in the upper 300 meters of the world ocean on average by 0.56 degrees Fahrenheit. The water in the upper 3000 meters of the world ocean warmed on average by 0.11 degrees Fahrenheit. These findings represent the first time scientists have quantified temperature changes in all of the world's oceans from the surface to 3000 meters depth.

Q: How many pounds of water are there in the upper 3000 meters of the world ocean?

Climate Change

# A new reality

Preparing the leaders of today for the challenges of tomorrow.