

# Sustainability: Managing The Triple Bottom Lines

**Marc Karell, P.E., CEM**  
**Climate Change & Environmental Services**

**AIChE NYC Metro Section**  
**New York, NY**  
**July 13, 2015**



# Who Am I?

Marc Karell, P.E., CEM  
Climate Change & Environmental Services, LLC

Member AIChE, on Editorial Board of CEP

Website: [www.CCESworld.com](http://www.CCESworld.com)

E-mail: [Karell@CCESworld.com](mailto:Karell@CCESworld.com)

Tel.: 914-584-6720





CCES is an experienced firm dedicated to help companies turn climate change, energy, sustainability, and environmental compliance to your advantage, meeting goals and realizing tangible financial gains. We have experience in all technical and policy areas.



CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES

# What is “Sustainability”?

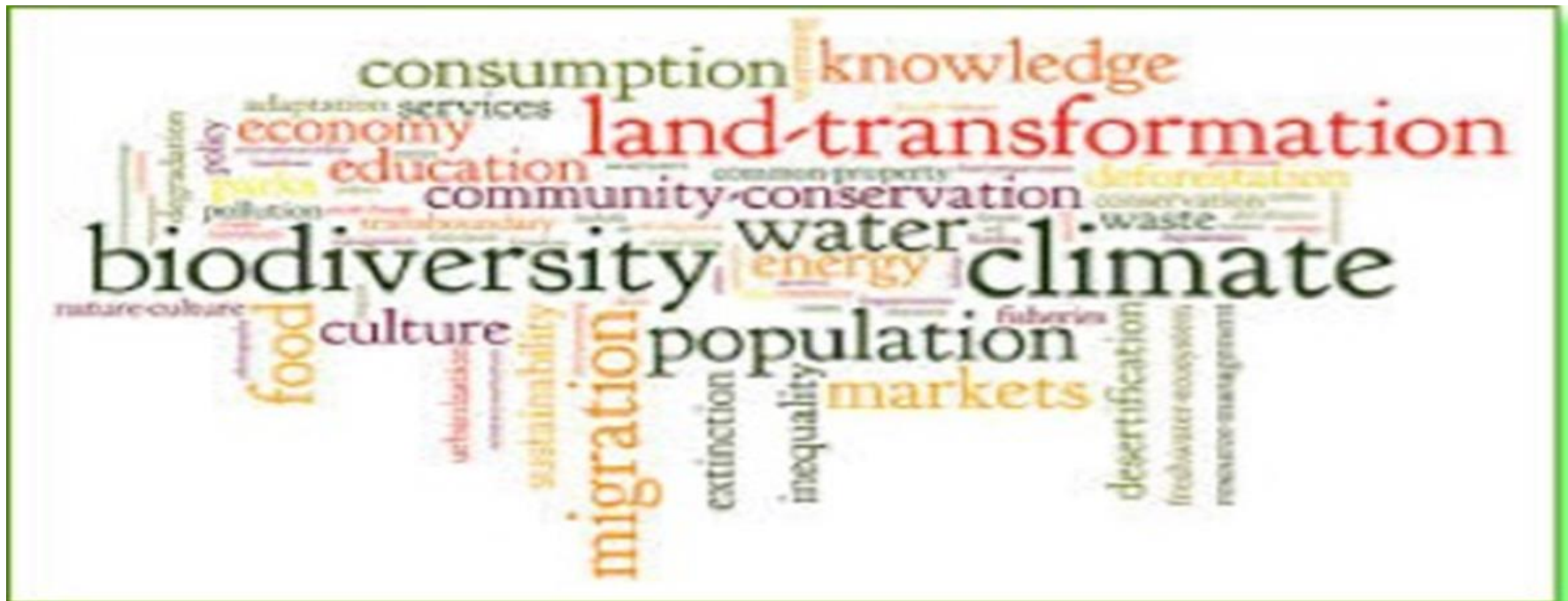
- Ability for a business to thrive and make money while, at the same time, conserving resources and land for future generations to enjoy.
- “Going Green” is composed of:
  - Climate change and energy concerns
  - Water
  - Land
  - Resources (i.e., recycle, reduce waste)



# Sustainability Is Also Called:

The “triple bottom line”:

**People, Profits, Planet**





# Why is Sustainability Important?

- 💧 We live in a time when resources, such as energy and clean water, are more scarce and expensive.
- 💧 And we can no longer just dump our wastes where it is most convenient and suits us.
- 💧 The ability to function with fewer resources and to produce less waste products, hmmm....
  - 💧 That's exactly what we engineers do – and always done!
- 💧 Sustainability was made for us to help contribute.



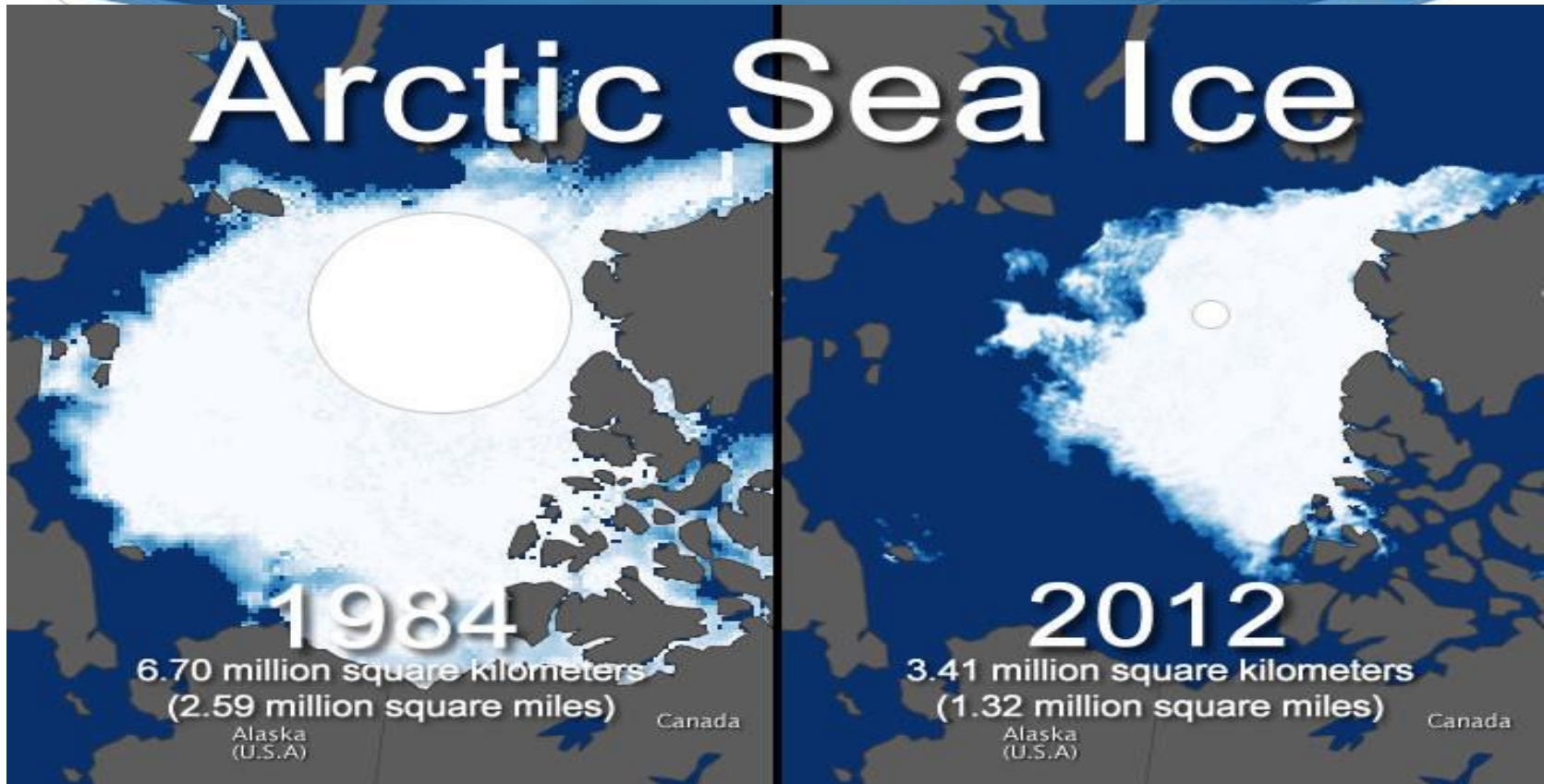
# Why We're Concerned with Climate Change

## *Global Warming Is Happening!*

- ◆ Global temp. ↑ 1.5°F from 1880 - 2012. Statistically real.
  - ◆ Another 4°F - 11°F rise by 2100.
- ◆ If warming continues, there will be long-term effects on:
  - ◆ our climate; our ecosystems,
  - ◆ oceans,
  - ◆ diseases, and
  - ◆ our markets (agricultural, tourist, insurance & oil)
- ◆ **OUR ECONOMY AND WAY OF LIFE**
- ◆ Cumulatively these effects are called:  
**“Climate Change”**



# The Arctic is Melting

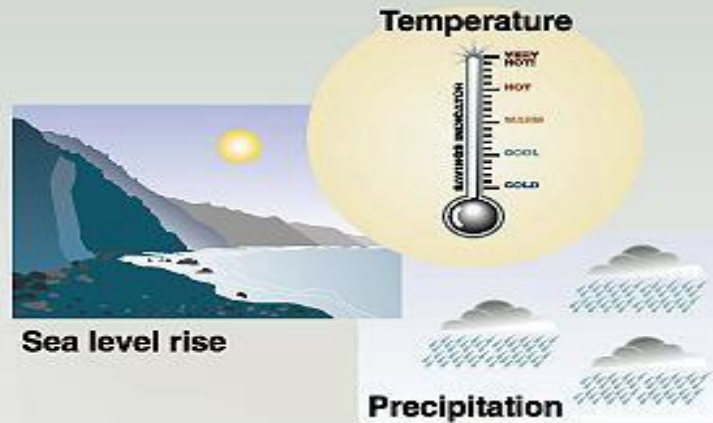


CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES



# Potential Climate Change Impacts

## Potential climate changes impact



## Impacts on...

### Health



Weather-related mortality  
Infectious diseases  
Air-quality respiratory illnesses

### Agriculture



Crop yields  
Irrigation demands

### Forest



Forest composition  
Geographic range of forest  
Forest health and productivity

### Water resources



Water supply  
Water quality  
Competition for water

### coastal areas



Erosion of beaches  
Inundation of coastal lands  
additional costs to protect coastal communities

### Species and natural areas



Loss of habitat and species  
Cryosphere: diminishing glaciers

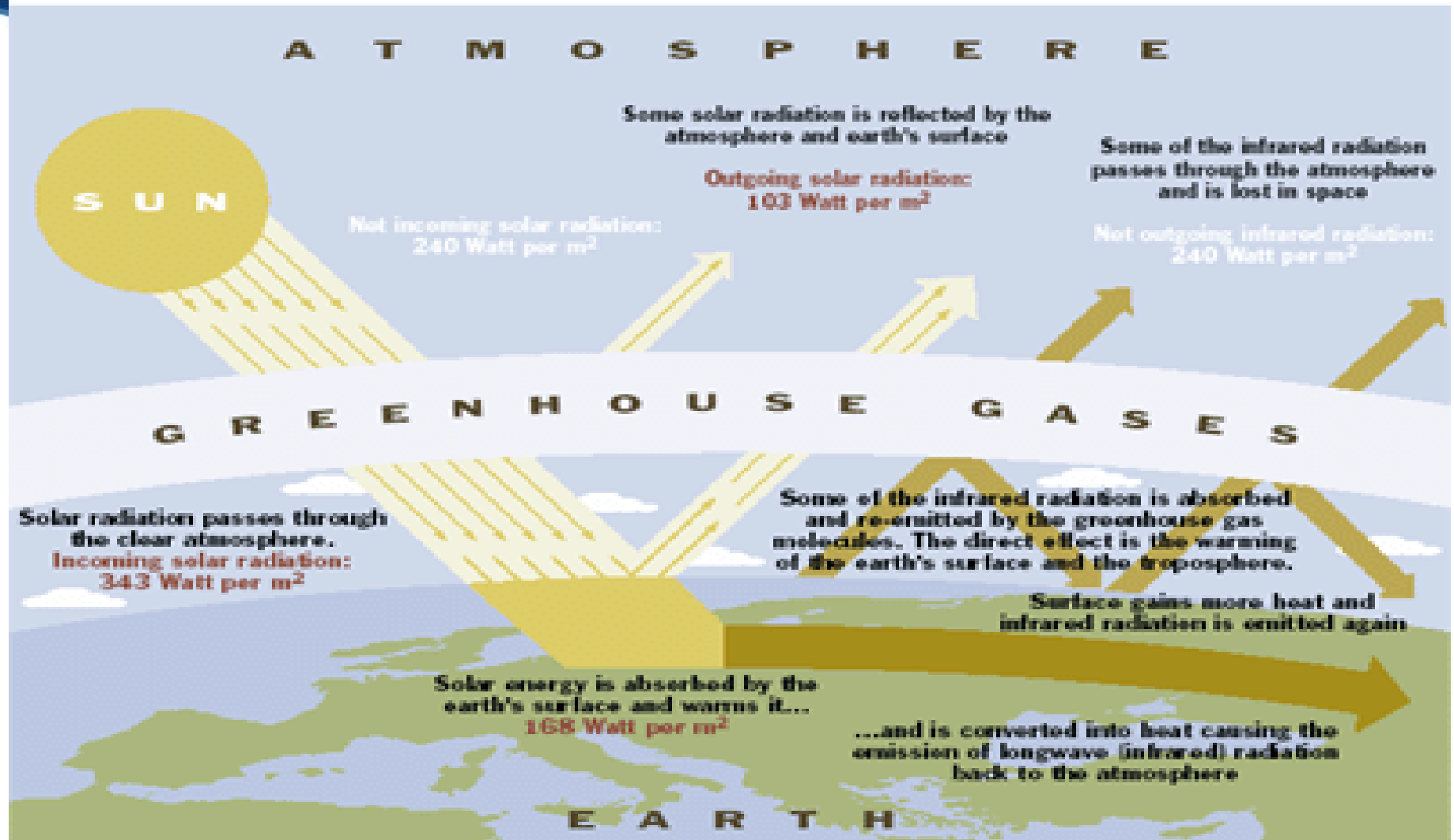
# Greenhouse Gases And Climate Change (“CC”)

- 💧 Certain compounds in our atmosphere are able to trap heat: “Greenhouse gases” or GHGs.
- 💧 From natural & man-made sources.
  - 💧 CO<sub>2</sub> levels have risen by over 40% in last 130 years (280 ppm to 400.3 ppm as of Feb. 2015)
  - 💧 Global temp. rise correlates with rise of CO<sub>2</sub> levels and increased use of fossil fuels: combustion releases CO<sub>2</sub>
- 💧 Virtual unanimity - scientists in the field believe that man-made emissions of GHGs contributes significantly to CC.



# From the Pew Center on Global Climate Change

## The Greenhouse Effect



# So, What Do We Have To Do?

- Major CC impacts can be avoided if we can reduce GHG emiss. by 70% from 1990 baseline by 2050.
- The demographic time bomb! Now: of >7 billion people, >1 billion live “like us” (use electricity, a car, home heat/AC, TVs, etc.). High energy users!
  - By 2050, >9 billion people, >3 billion will live “like us”.  
**2 billion more high energy users!**
- How can we have 2 billion more such people and reduce GHG emissions by 70%?



# Greenhouse Gas Reduction Philosophy

- ◆ Global problem requires a global reduction in GHGs.
- ◆ Different reduction goals for different nations, “Developed” and “Developing” nations
- ◆ Progress wherever the GHG emission reductions occur, Manhattan or Honolulu or Timbuktu or .....
- ◆ Market-based. GHG emission goals may be achieved by actual reductions or purchase of reduction “credits” from others.





# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## 1. *Making the Monetary Case*

- 💧 **\$\$\$\$:** Actions that reduce your electricity and fuel usage will directly reduce GHG emissions and ...
  - 💧 Given rising cost of energy will also save you a lot of \$\$.
- 💧 **Value:** If you save \$100K/yr in energy costs, that's \$\$ in your pocket. What is equivalent in sales? At 10% profit: \$1 million/yr increase. Which is easier?
- 💧 **Example:** DuPont spent \$200 million in energy upgrades in the 1990's. Cost savings: >\$300 million/year.



# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## 2. *Create New Products / Re-brand*

- 💧 Sustainability offers new product options.
- 💧 Or re-brand existing products to address the changing consumer interest in “green”.
- 💧 **Example:** GE Ecomagination
  - 💧 What is Ecomagination? It is simply the re-branding of old products to appear more “green” and to sell to the “green” market.
  - 💧 These products doubled in sales within 3 years after being re-branded.



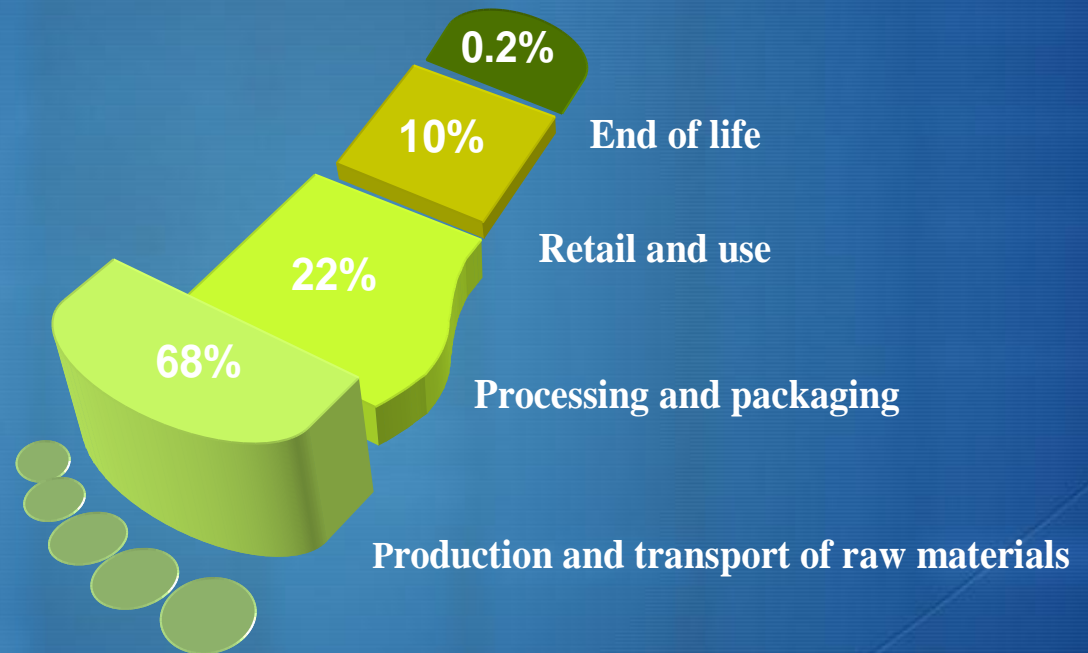
# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *3. Impress Customers and Suppliers*

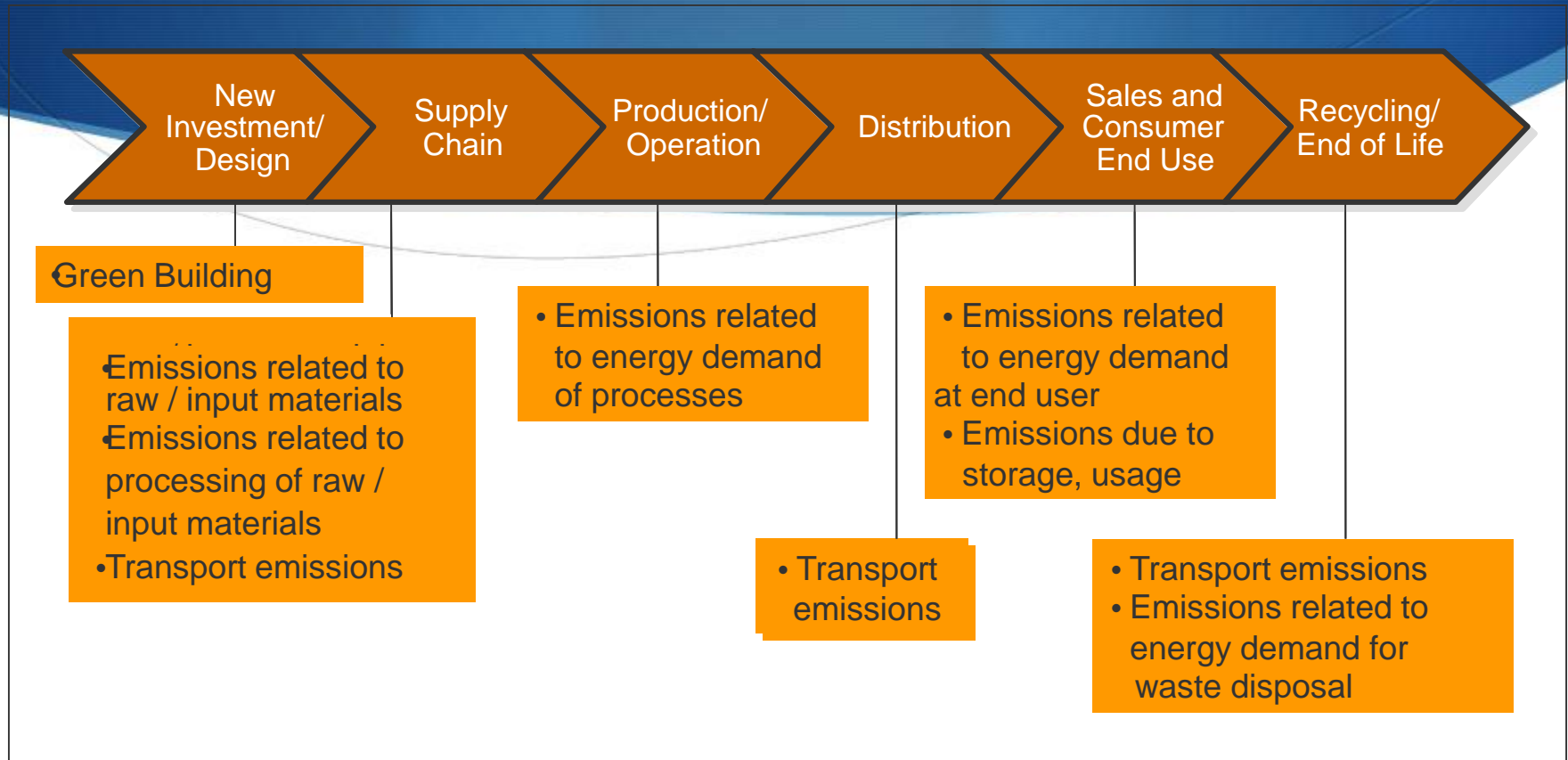
- 💧 A growing number of customers want to know the environmental, other impacts of products they sell
  - 💧 “Carbon footprint” – amount of GHGs emitted in the “life cycle” of a product is a common metric
  - 💧 May put your products in a more competitive sales position.
- 💧 **Example:** Walmart is in the process of asking their suppliers for their GHG emissions during part of product life cycle and put info. up on shelves. And when Walmart speaks, ....



# “Carbon Footprint”



# GHG Emissions Along Product Life Cycle





# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *4. Raise Employee Morale*

- Significant cost of replacing a worker who leaves.
  - Finding a replacement, training, lost productivity
- “Green” pgm. gives workers new devotion to firm.
- In addition, research shows that “green buildings” result in greater productivity and lower turnover.
- Example:** Ray Anderson, Founder, Interface, “I have never seen anything equal to sustainability as far as attracting, motivating, and bringing people together.”



CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES

# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *5. Fast Track Important Projects*

- Simply put, a sustainability program gives a company the moral high ground for developing new projects which some groups may object to.
- Example:** PlanNYC 2030 is a plan that by 2030 will have NYC grow in population by over 1 million people. While this is something many people strongly oppose, it is not being argued about because the Plan also calls for citywide reduction in GHG emissions by 30%.



# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *6. Improve Efficiency, Flexibility*

- Using less fuel or electricity to sell or to make a product improves efficiency in terms of cost and in terms of quality and timing of operation.
- In addition, fuel flexibility reduces your risk should there be future fuel shortages.
- Example:** Colonial Needle, NY warehouse / office / light industrial, underwent total energy upgrade (boilers, windows, lights, solar PV/hot water, etc.)
  - Reduced energy usage by over 60%
  - Major upgrade in worker productivity
  - Re-utilized space for greater income



# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *7. Climate Change Risks*

- How may potential effects of CC (sea level rise, heat, more severe storms) impact business?
  - Major change in philosophy. Used to be concerns with how a company affects the environment. Now we're concerned with how the environment affects business.
  - Both business risks and opportunities.
- Example:** European company used computer model to predict future temperatures, concluding that current farmers would no longer be able to produce raw product in 20 years.





# Physical Climate Change Effects?



**CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES**



# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

## *8. Improve Company's Image*

- 💧 A company's image is of growing importance as more of the public uses perception to buy or reject products in the market. Plus it affects stock price.
- 💧 Environment and climate change are two strong factors affecting image. Be on the right side!
- 💧 **Example:** Toyota's hybrid Prius has helped to counter the bad publicity around their other, poorer performing cars.
- 💧 **Example:** BP. Need I say more?



# 9 Purely Business Reasons to Have a Robust “Sustainability” Program

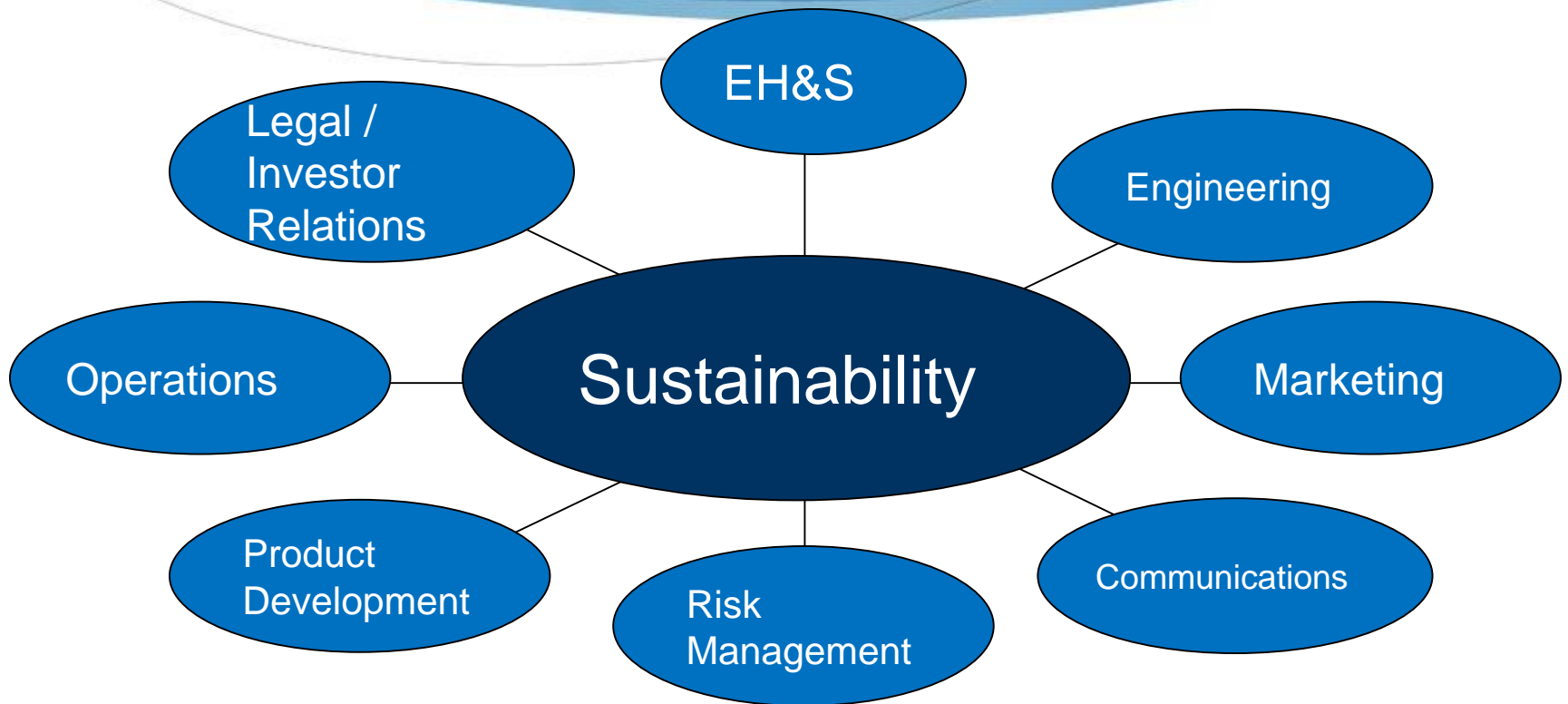
## *9. Company's Stock Value*

- Recent major study of S&P 500 companies shows that for each metric ton of GHGs emitted, the value based on stock price drops by over \$200.
- Interesting because value of a metric ton of GHGs in the European market is rarely >\$40 / metric ton.
- Markets are speaking about risk and higher value of companies that reduce GHG emissions (use less fuel).



# Effects on Business

***Sustainability is a multifaceted issue that affects every area of a firm's business***



**CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES**

# Develop a Sustainability Infrastructure

- 💧 Develop a Group focused on these issues
- 💧 Need leadership from the top – from the CEO
  - 💧 Why? There will be some “vetoers” within management who can only be stopped by those in the C Suite.
- 💧 Should have participation from:
  - EH&S
  - Communications
  - Finance/Procurement
  - Legal
  - Product Development
  - Engineering
  - Operations & Maintenance



# Initial Self-evaluation

- ◆ Perform initial evaluation of where you are vs. desired position in terms of a perspective “Sustainability” program. Which of the 9 purely business reasons are most attractive to you?
- ◆ Review elements of your program
  - ◆ Rank status of where you stand right now on them
  - ◆ And where you’re likely to be given normal business constraints in the near future (say, 2 years)
  - ◆ Diagnostics exist to do this review





# Initial Self-evaluation

- Enable you to plan your program and focus on the elements that the group feels has the most barriers to success
- What is your ultimate goal vis-à-vis sustainability?
  - To be the leader in your industry?
  - To be cautious: “middle of the pack”?
  - Do little, wait for others to fail, then learn from their mistakes and pounce?



# Next Steps: The Technical Work

## *Establish Your Carbon Footprint, Then Develop Specific Goals*

- 💧 You can't manage what you don't measure!
- 💧 Perform a baseline GHG emissions inventory
  - 💧 **Critical: data quality!!** Must be sure data collected to determine GHG emissions is complete, thorough, consistent, and accurate!
- 💧 Benchmark different divisions, facilities, operations
  - 💧 Benchmark your facilities vs. your competitors
- 💧 Establish where you spend the most money on energy, then look for ways to reduce energy usage



# Next Steps: Technical

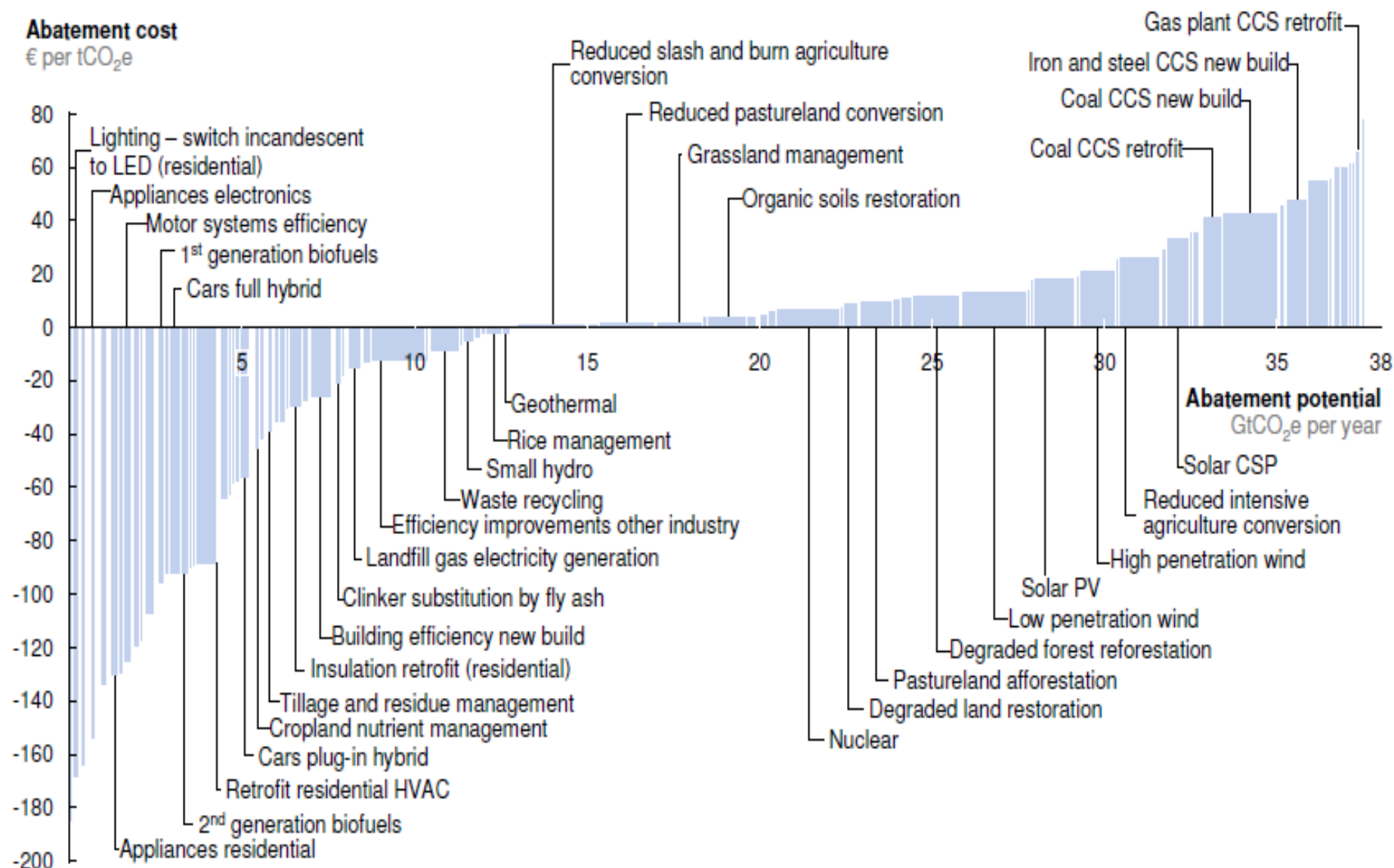
## *Establish Carbon Footprint, Then Specific Goals*

- 💧 Calculate and rank ROI, paybacks. Look for “low hanging fruit”.
- 💧 Manage growth. While reducing GHGs in some places, it may grow significantly in others.
- 💧 Don’t just go for the singles; go for the home runs (big energy reductions) to give your firm a signature project to talk about.
- 💧 Establish GHG emission reduction goals and track them.



## Abatement cost

€ per tCO<sub>2</sub>e



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €80 per tCO<sub>2</sub>e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

Source: Global GHG Abatement Cost Curve v2.1

# The Green Building Revolution

- 💧 Much resource usage and GHG emissions are passive – in our homes, schools, offices daily
- 💧 Features can be built into these buildings to minimize our environmental impact, increase sustainability. “**Better performing buildings**”
- 💧 US Green Building Council: LEED Program
- 💧 Energy savings: 30%      GHG reduction: 35%
- 💧 Water cost savings: 35-50%
- 💧 Waste cost savings: 50-90%





# External GHG Emission Reduction Projects

- Given global nature of climate change, any success in GHG reductions - even outside your facility - will make a difference. “Offsets”
- Example: German energy firm built a hydroelectric plant in rural area in Guatemala. It was cheaper to build overseas than reduce GHGs at their plants.
- Example: Shaklee “carbon neutral” firm. They paid ½ the cost to local (Portland, OR) school system to replace coal-fired boilers with cleaner units.
- Effort resulted in wonderful publicity.



# Climate Change – Business Risks and Opportunities

There are 4 types of climate change risk that could affect a business:

## 1. Competitive (cost) risks

- 💧 generated by a possible decline in consumer demand for energy intensive products
- 💧 rise in costs for energy intensive processes
- 💧 rise in costs for transportation fuels

## 2. Reputational risks from perceived inaction on climate change



# Climate Change – business risks and opportunities

3. Regulatory risks from tightening legislation
4. Physical risks from climate change events (i.e., extreme weather, rising sea levels, etc.) :
  - 💧 Asset damage
  - 💧 Inability to make or transport product, raw materials
  - 💧 Health and safety risks
  - 💧 Project delays
  - 💧 Crop damage or agricultural transition as certain crops no longer are viable in certain areas and new supply chains become necessary



# Why Should a Firm Invest in Sustainability?

- ◆ Direct economic benefits of GHG, energy and water use reductions; reductions of waste generation
- ◆ Integrate sustainability metrics into business and environmental reporting
- ◆ Respond to stakeholders and social benefits of doing the “right” thing before having to do so
- ◆ Better position to examine risk issues



# Why Should a Firm Invest in Sustainability?

Sustainability, in these times of shrinking and more expensive resources, is a **VALUE, not a LIABILITY.**

**Triple Bottom Line:  
People, Profits, Planet**



CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES



**“The best way to predict  
the future is to invent it.”**

- Alan Kay



**CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES**

# Thank you. Questions?

Marc Karell, P.E., CEM  
Climate Change & Environmental Services  
website: [www.CCESworld.com](http://www.CCESworld.com)

Tel.: 914-584-6720

E-mail: [Karell@CCESworld.com](mailto:Karell@CCESworld.com)



CLIMATE CHANGE &  
ENVIRONMENTAL SERVICES

