

Use of Quality Tools to Prevent Damage Due to Climate Change

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ASQ Baltimore Section

September 8, 2020

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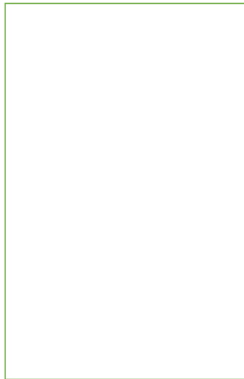
- NOTE: THIS WILL BE USED AS THE INTRO TO RICHARD EMORY
- Hello,
- I'm David Saunders, I've been a member of ASQ for over 35 years.
- I'd like to introduce my friend Richard Emory and tell a quick story from his book.
- Richard Emory served as our nation's top lawyer for all EPA criminal investigations of pollution crime. During the last 17 years of his EPA career, he worked internationally in foreign assistance to many other nations wanting clean water and clean air. Before coming to EPA, in Maryland he was an Assistant Attorney General prosecuting environmental offenders statewide. In one case [David, here you can tell the story of the polluting ship....]
- When Richard was a young attorney working for the State of Maryland his office received a report that a large ship was polluting the Chesapeake Bay.
- His office called the ship owners in NY and got no response. The Coast Guard was on station monitoring the mess.
- So Richard and the other lawyers took bold action. They had the Department of Natural Resources police – sort of like park rangers – take their little patrol boat out to this giant ship, they arrested the captain, put him in handcuffs, and brought him to the Annapolis City jail. The pollution quickly stopped.
- Richard was one of the highest-ranking attorneys at the Environmental Protection

Agency. If your company got a letter from him, it would get attention. He's the real deal – and I think we are fortunate to get his perspective first-hand.

Brainstorm Risks Due to Climate Change

(floods, sea-level rise, intense storms, heat, infrastructure failure...)

My Suppliers



My Organization



My Customers



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Before this session we gave you a simple worksheet like this to take notes.
During my talk you can use this worksheet to think about how climate change will impact you and your organization.
At the end, during the Q&A, you might want to refer back to your notes to ask questions.

Talk with a Climate Change Professional (CC-P)

- Director of Sustainability for large mid-western university
- Improving Vehicle Optimization
- Improving Tree Maintenance



These sure
sound like
quality
improvement
projects.

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- Let me begin with a little story.
- I met a young woman who had just received certification as a Climate Change Professional.
- She said she was the Director of Sustainability for a large mid-western university and she was working on two projects.
- Project one was improving vehicle optimization.
- Project two was improving tree maintenance.
- Everything she did sounded like what we do in quality improvement.

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- So I checked out the Association of Climate Change Professionals and found that much of what they do is what we call Quality Improvement Projects.
- I'm taking their certification classes because I think that we can play a key role as our organizations face climate change.

Agenda

- ☐ Dr. W. Edwards Deming
- ☐ Vulnerability Assessments
- ☐ CO₂ Mitigation
- ☐ GHG (Greenhouse Gas) Reporting
- ☐ Solar Panels
- ☐ Taking Action
- ☐ Good News

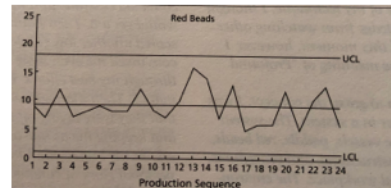
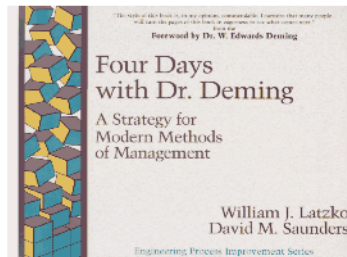
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Today's agenda is aimed at giving you a look at what I think is coming.
Here is our plan.

A few words about Dr. W. Edwards Deming

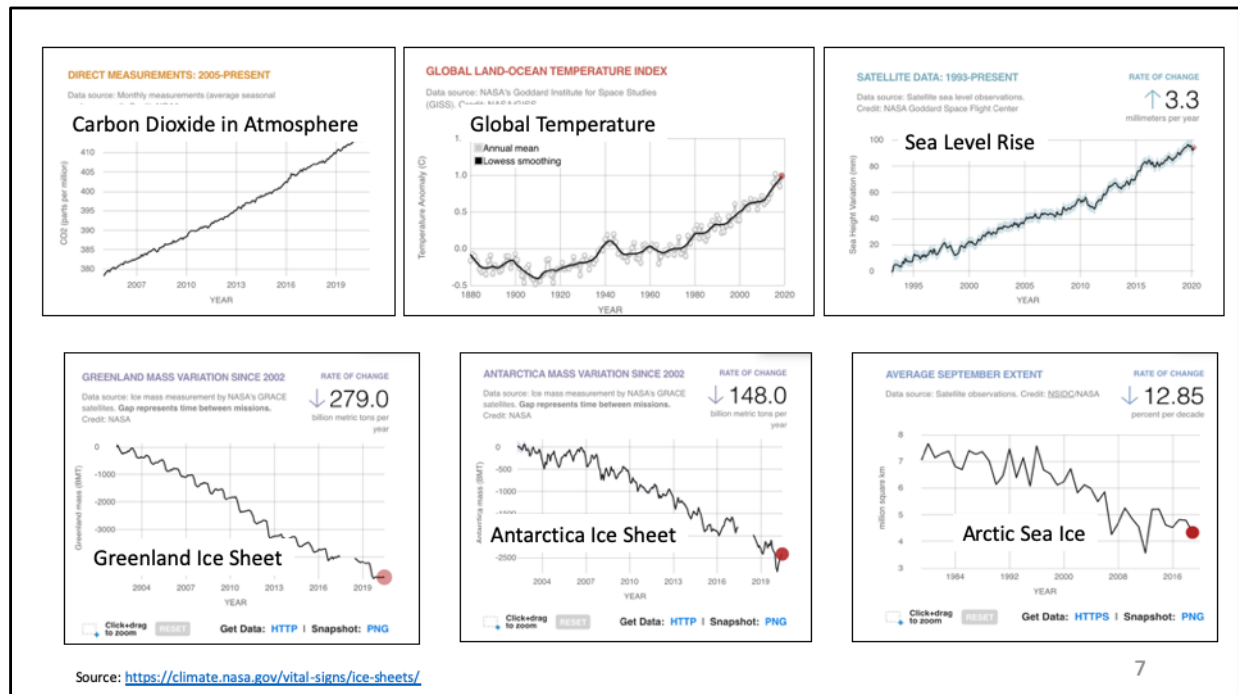
- ☐ Vulnerability Assessments
- ☐ CO₂ Mitigation
- ☐ GHG Reporting
- ☐ Solar Panels
- ☐ Taking Action
- ☐ Finally some Good News

Dr. W. Edwards Deming



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- In the 1980s I had the good luck to study with Dr. W. Edwards Deming – who is often credited with being the father of modern quality methods.
- During his four-day lecture he did a simulation called the Red Bead Experiment which introduced me to control charts.
- I then apprenticed with Dr. Bill Latzko and eventually became a coach at Dr. Deming's famous lectures.



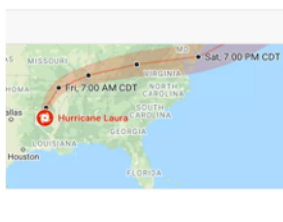
- When I began to study climate change, I was already ahead of the class because I knew control charts, improvement methods, facilitation skills, document control, and how to use ISO standards.
- Putting together a dashboard like this was second nature to me.
- I'm sure everyone in ASQ can readily see the top three charts demonstrate increases in CO2, global temperature, and sea level.
- The bottom charts shows ice melting in Greenland, Antarctica, and the Arctic Sea.
- We all know that 7 to 9 points is a row all going in the same direction are a special cause of variation – they are not random. These charts all show a trend.
- As I said, as quality professionals we can play a critical role in fighting climate change for the benefit of our organizations because we know how to read the charts.

Have any of you been asked:

1. To conduct **vulnerability assessment**.

2. To develop a **CO₂ mitigation plan**.

3. To **report progress** on environmental issues.



INFORMATION ON EMISSIONS
The table below refers to emissions independent of any GHG trades such as sales, purchases, transfers, and offsets of emissions.

SCOPE	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

Grand total emissions from business operations (tCO₂e)

BASIC YEAR

Has changed in last year

Clarification of company determined policy for making base year emissions recalculations

Consent for any significant emissions changes that trigger base year emissions recalculations

SCOPE	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

Mandatory Reporting Requirements in the U.S.

Regulator	Threshold	Who must report?	Coverage
EPA GHG Reporting Program	25,000 mt CO ₂ /yr	• Direct emission facilities • Fossil fuel/gas suppliers • CO ₂ injection sites	• 8000+ facilities • 85-90% emissions • 50% total US emissions
California Air Resources Board / SB 32	25,000 mt CO ₂ /yr	• Industrial facilities • Fuel suppliers • Electricity importers	• 775 facilities and fuel suppliers
Massachusetts GHG Registry	5,000 mt CO ₂ /yr	• Facilities emitting > 5000 mt CO ₂ /yr +/or regulated under MA Clean Air Act • Retail sellers of electricity	Roughly 300 facilities
EPA Clean Power Plan		• Electricity Generating Units	Hourly CO ₂ emissions and net energy output

Use Online CC-PF Prep Program #3
GHG-101: Basics of GHG Accounting, Reporting & Disclosure (GHG Institute July 27, 2020)



Author has permission to use ACCO charts.

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Have any of you been asked to

1. To conduct **vulnerability assessment for climate change**
2. To develop a **CO₂ mitigation plan**.
3. To **report progress** on environmental issues.

- If YES, click “yes” on the participant window
- If you haven't been asked yet, I think you will be asked soon, or someone else in your organization will be given the assignment.
- This is a chance for you to add value to your organization.

1. How to conduct a vulnerability assessment



National Oceanic and
Atmospheric Administration
(NOAA)

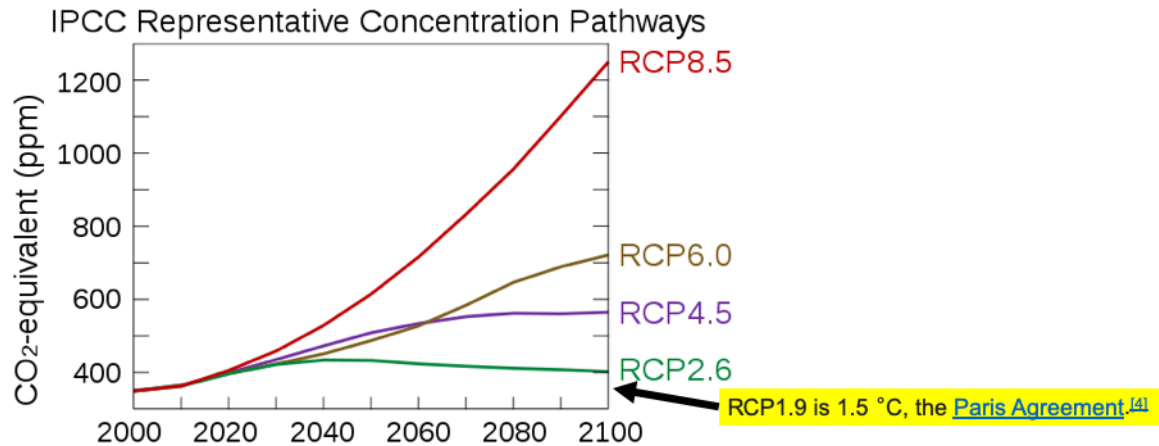


Source: <https://toolkit.climate.gov/>

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- The National Oceanic and Atmospheric Administration, NOAA, has produced this wonderful website called the US Climate Resilience Toolkit.
- It's used by all Federal Agencies.
- And they walk you through a five-step process
- 1. Explore Hazards
- 2. Assess Vulnerability & Risks
- 3. Investigate Options
- 4. Prioritize & Plan
- 5. Take Action
- Sounds to me like a quality improvement project.
- This website is superb and contains a wealth of climate science.

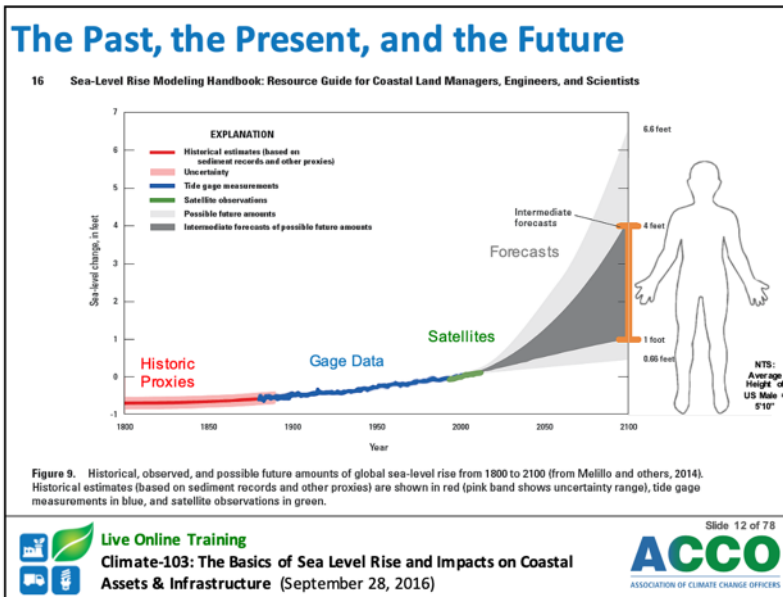
The Intergovernmental Panel on Climate Change (IPCC)



Source: https://en.wikipedia.org/wiki/Representative_Concentration_Pathway

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- So if you are asked to do a vulnerability assessment for facilities, roads, or transportation hubs, you will need to use the RCP scenarios developed by the IPCC. I'll explain all of this.
- IPCC is the Intergovernmental Panel on Climate Change.
- It is a scientific body that has established the Representative Concentration Pathway (RCP).
- RCP is the warmth per square meter of earth's surface as measured in watts.
- Basically RCP 6 represents the heat of 6 watts per square meter hitting the entire surface of the earth.
- You will see RCP scenarios used in Climate Change literature worldwide.
- RCP 1.9 will result in only a 1.5 C degree rise, which is the target for the Paris Agreement.
- So you can see a wide variation in scenarios.
- An RCP 8.5 projects that CO₂ in the atmosphere will reach over 1200 parts per million by the end of this century.
- This will result in the melting of the ice caps as Richard described.

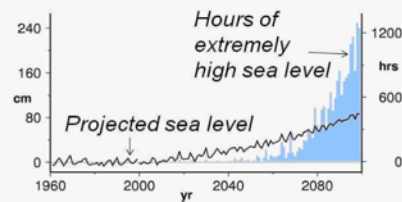


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- Here is how the RCP is converted into sea level rise.
- An intermediate RCP 4.5 would raise sea levels four feet.
- A rise of four feet will probably impact every organization represented in this room.
- You will be asked to develop different adaptation plans for several RCPs.

Sea Level Rise Alone is Only Half the Answer

Sea-level rise will magnify the adverse impact of storm surges and high waves on the coast



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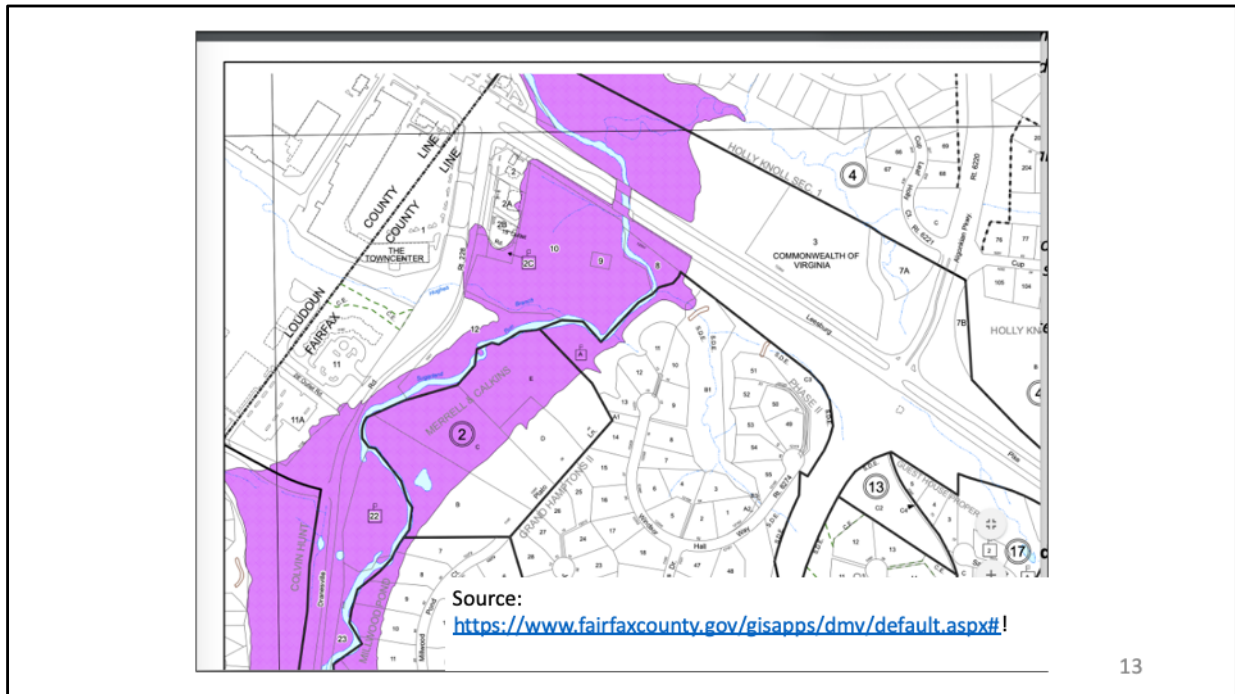
Live Online Training

Climate-103: The Basics of Sea Level Rise and Impacts on Coastal Assets & Infrastructure (September 28, 2016)

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- As I learned in class, models of sea-level rise are not enough.
- We must also consider high tides and storm surge.
- Hurricane Laura is a good example.



- One of our homework assignments was to check the vulnerability of a residential community in Fairfax County.
- If you go to the website shown, you can create a flood plain map.
- There are a good number of such mapping tools available and you may use several as you do a vulnerability assessment.

ECOLOGY

- [illegible]



Climate-103: The Basics of Sea Level Rise and Impacts on Coastal Assets & Infrastructure (September 28, 2016)

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- 14

What are the Impacts of Climate Hazards on Systems upon Which you are Dependant?

ELECTRICITY DEMAND



WILD FIRE



INTENSIFICATION OF HEAT WAVES



WINE INDUSTRY



LOSS OF WINTER RECREATION



RIISING TEMPERATURES IN AGRICULTURE



From Our Own California (pdf)
The agriculture most diverse is and half of the temperatures rise on the water is diseases and is
Many fruit and changes. As the



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Climate-201: Identifying Climate Hazards &
Conducting Vulnerability Assessments (July 16, 2020)

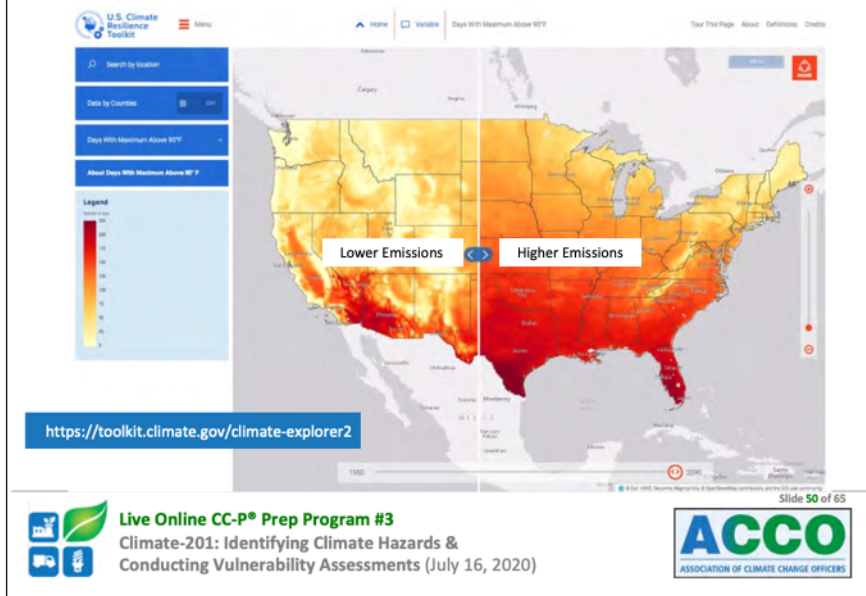
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- I don't want to leave the impression that sea-level rise is the only risk.
- We also have to consider wildfires, floods, and intense heat.
- In the next slide I'll show you a mapping tool for intense heat.

Mapping & Graphing Tool: Climate Explorer



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- What would it be like living somewhere with 100 days per year above 95 degrees?
- What happens if we have a facility in that region?
- What if we have suppliers in the red zone on the map?
- Will they be able to operate? Will their workforce remain intact?
- The NOAA website has many tools for determining future sea-level rise and temperature.

1. How to conduct a vulnerability assessment

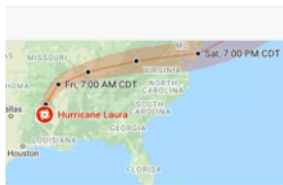


Source: <https://toolkit.climate.gov/>

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- So once we determine the risk, then comes investigation of options, prioritization, planning, and action.
- So my point is that we, as quality professionals, are well suited to conduct vulnerability assessments and follow-up action projects.
- You don't have to be a climate scientist to fight climate change.

1. To conduct vulnerability assessment.



2. To develop a CO₂ mitigation plan.

INFORMATION ON EMISSIONS
The table below refers to emissions independent of any GHG trades such as sales, purchases, transfers, and offsets of allowances.

	EMISSIONS (tCO ₂ e)	TOTAL (tCO ₂ e)	CO ₂	CH ₄	N ₂ O	HFC	PFC	GHG
Scope 1								
Scope 2								
Scope 3 (OPTIONAL)								

Direct CO₂ emissions from business combustion (tCO₂e)

	EMISSIONS (tCO ₂ e)	TOTAL (tCO ₂ e)	CO ₂	CH ₄	N ₂ O	HFC	PFC	GHG
Scope 1								
Scope 2								
Scope 3 (OPTIONAL)								

BASE YEAR
Has changed in base year

Clarification of company determined policy for setting base year emissions recalculations

Clarification for any significant emissions changes that trigger base year emissions recalculations

Base year emissions

	EMISSIONS (tCO ₂ e)	TOTAL (tCO ₂ e)	CO ₂	CH ₄	N ₂ O	HFC	PFC	GHG
Scope 1								
Scope 2								
Scope 3 (OPTIONAL)								

3. To report progress on environmental issues.

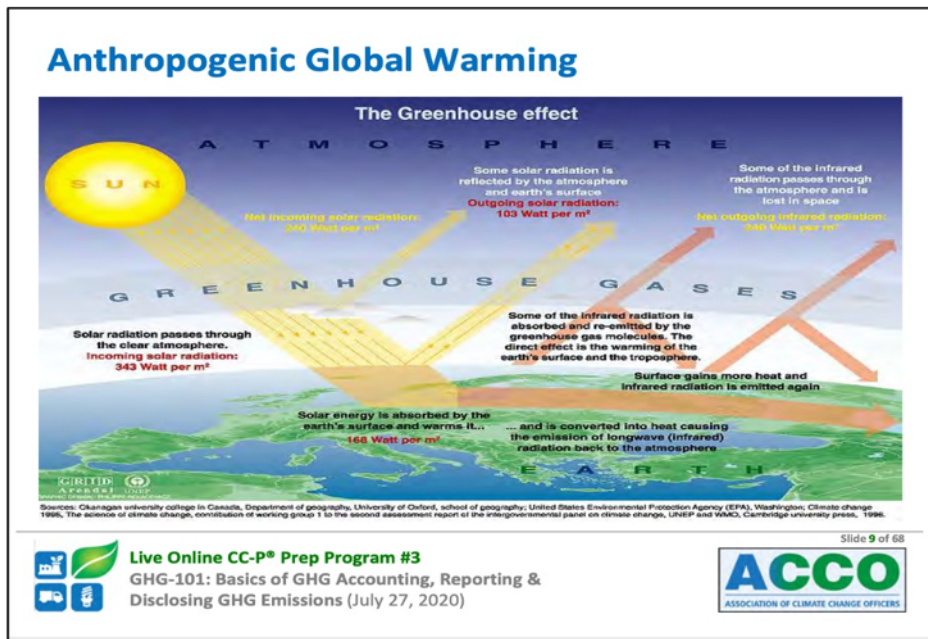
Mandatory Reporting Requirements in the U.S.

Regulator	Threshold	Who must report?	Coverage
EPA GHG Reporting Program	25,000 mt CO ₂ /yr	• Direct emission facilities • Fossil fuel/gas suppliers • CO ₂ injection sites	• 8000+ facilities • 85-90% emissions • 50% total US emissions
California Air Resources Board / SB 32	25,000 mt CO ₂ /yr	• Industrial facilities • Fuel suppliers • Electricity importers	• 775 facilities and fuel suppliers
Massachusetts GHG Registry	5,000 mt CO ₂ /yr	• Facilities emitting > 5000 mt CO ₂ /yr - or regulated under MA Clean Air Act • Retail sellers of electricity	Roughly 300 facilities
EPA Clean Power Plan		• Electricity Generating Units	Hourly CO ₂ emissions and net energy output

Use Online CC-PF Prep Program #3
GHG-101: Basics of GHG Accounting, Reporting & Disclosure (GHG Institute July 27, 2020)



- Let's next discuss how to develop a CO₂ mitigation plan.
- How to stop emitting carbon dioxide and other greenhouse gases, to prevent disaster.



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- Anthro-po-genic global warming is a fancy word for man-made global warming.
- For example, as we burn coal, the carbon atom combines with two oxygen atoms, to form carbon-dioxide – CO₂.
- The carbon dioxide molecule then floats to the troposphere where it stays for about 100 years.
- When CO₂ is hit by a photon, it vibrates and creates heat.
- Some heat escapes into space, but some heat radiates back to earth.
- This has been going on for millions of years.
- However, since the start of the industrial age, about 1880, mankind has burned enough carbon to generate an extra 300 billion tons of CO₂ gas.
- The additional CO₂ acts as a blanket.
- The result is that earth has warmed about one-degree centigrade.

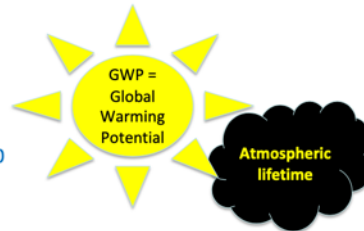
Greenhouse Gases (GHGs)

Kyoto Gases:

- Carbon dioxide (CO_2) GWP 1
- Methane (CH_4) GWP 21
- Nitrous oxide (N_2O) GWP 310
- Hydrofluorocarbons (HFCs)
(HFC 134a) GWP 1,300 → 1,430
- Perfluorocarbons (PFCs)
(CF_4) GWP 6,500
- Sulphur hexafluoride (SF_6) GWP 23,900

+

- Nitrogen trifluoride (NF_3)
GWP 17,200
- Hydrofluorinated ethers (HFEs)
GWP 11 → 14,900



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Disclosing GHG Emissions (July 27, 2020)



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- In 1992 the [United Nations \(Framework\) Convention on Climate Change](#) (UNFCCC) met in Kyoto (key-o-tow) Japan.
- Six Greenhouse Gases were identified as the predominate cause of global warming.
- Here is how the model works.
- One ton of carbon dioxide in the air, for 100 years, has a Global Warming Potential of one.
- So all GHGs are compared to one ton of carbon dioxide.
- Methane (natural gas) has a Global Warming Potential of 21. It is 21 times more damaging than CO_2 .
- Nitrous oxide has a GWP of 310. It's 310 times more damaging than CO_2 .

Design Consideration: Common Protocols & Standards

➤ WRI/WBCSD - The GHG Protocol

- Corporate Accounting and Reporting Standard
- Corporate Value Chain (Scope 3) Standard
- Project Protocol
- GHG Protocol for Cities



World Business Council
for Sustainable
Development (WBCSD)

➤ The Climate Registry "TCR"

(General Reporting Protocol, Local Government Operations Protocol, Electric Power Sector, etc.)



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Disclosing GHG Emissions (July 27, 2020)



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- There are several worldwide protocols and standards for measuring and tracking greenhouse gas emissions.
- Depending upon your industry, you will be asked to use the proper standard.
- Each agency that issues standards has specialized training in their application.
- Someone in your organization will have to research these standards and learn to use them.
- This is another opportunity to provide value to your organization.

INFORMATION ON EMISSIONS

The table below refers to emissions independent of any GHG trades such as sales, purchases, transfers, or banking of allowances

EMISSIONS	TOTAL (mtCO ₂ e)	CO ₂ (mt)	CH ₄ (mt)	N ₂ O (mt)	HFCs (mt)	PFCs (mt)	SF ₆ (mt)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

+

Direct CO₂ emissions from Biogenic combustion (mtCO₂)

BASE YEAR

Year chosen as base year

Clarification of company-determined policy for making base year emissions recalculations

Context for any significant emissions changes that trigger base year emissions recalculations

Base year emissions

EMISSIONS	TOTAL (mtCO ₂ e)	CO ₂ (mt)	CH ₄ (mt)	N ₂ O (mt)	HFCs (mt)	PFCs (mt)	SF ₆ (mt)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

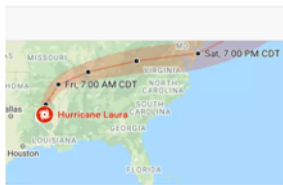
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- Here is a fairly typical database for recording GHG emissions.
- It goes chemical-by-chemical and automatically does the calculations.
- The data is located in many places in you company.
- Someone will have to organize a way to collect and manage the data.
- This is something that ASQ members are well suited to do, and to do well.
- The data manager needs to like data and pay attention to details.
- Knowledge of greenhouse gases can be learned.
- I suspect there are probably very few people in your entire organization who can name the six critical Kyoto (key-o-tow) greenhouse gases.
- With some practice you can be the first to know these chemicals – and then to identify where they are emitted.

1. To conduct vulnerability assessment.

2. To develop a CO₂ mitigation plan.

3. To report progress on environmental issues.



INFORMATION ON EMISSIONS
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Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

BASE YEAR
Has changed in base year

Clarification of company determined policy for setting base year emissions recalculations

Clarification for any significant emissions changes that trigger base year emissions recalculations

Base year emissions

EMISSIONS	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

Mandatory Reporting Requirements in the U.S.

Regulator	Threshold	Who must report?	Coverage
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- Let's look at reporting.

Mandatory Reporting Requirements in the U.S.

Regulator	Threshold	Who must report?	Coverage
EPA GHG Reporting Program	25,000 mT CO ₂ /yr	<ul style="list-style-type: none"> Direct emission facilities Fossil fuel/gas suppliers CO₂ injection sites 	<ul style="list-style-type: none"> 8000+ facilities 85-90% emissions ~50% total US emissions
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EPA Clean Power Plan		<ul style="list-style-type: none"> Electricity Generating Units 	Hourly CO ₂ emissions and net energy output



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- So far, the EPA requires reporting from facilities that emit more than 25,000 metric tons per year.
- California and Massachusetts have more stringent requirements.
- I expect that more and more states will require GHG reporting.
- I believe your organization will eventually be required to report.

Design Consideration: Common Protocols & Standards

- Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC)
- ICLEI Greenhouse Gas Protocols (4 total)
 - US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (ICLEI version of the GPC)
 - Local Government Operations Protocol (LGOP)
 - Global Protocol for Community Scale Emissions
 - Recycling and Composting Emissions Protocol
- ISO 14064-1:2018 Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals



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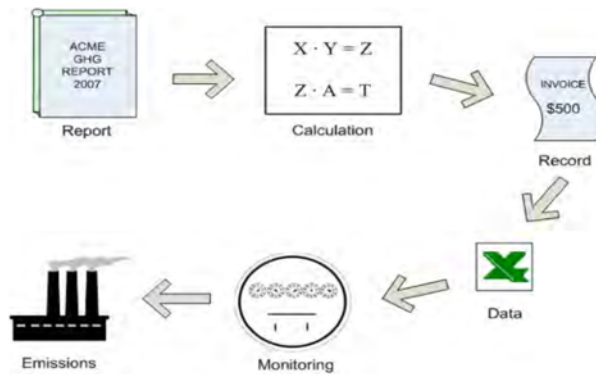


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There are several standards for measuring and reporting greenhouse gases, including ISO 14064 (fourteen thousand, sixty-four).

Following the Audit Trail



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- Emission measurements and results of mitigation activities are often subject to audits.
- Here is another skill we have, to either conduct audits or to interact with auditors.

Voluntary Reporting & Disclosure

Securities and
Exchange
Commission
(SEC)
Guidance on
Climate
Change
Disclosure for
Publicly-traded
Companies

SEC INTERPRETIVE GUIDANCE ON CLIMATE CHANGE DISCLOSURE	
Section of Guidance	Examples of Potential Disclosure Items
Impact of Legislation & Regulation International Accords	<ul style="list-style-type: none"> • Cost to purchase credits in a cap and trade system • Costs to improve facilities to comply with regulatory limits of a cap and trade system • Changes to profit/loss from changed demand for goods and services
Indirect Consequences of Regulation or Business Trends	<ul style="list-style-type: none"> • Decreased demands for goods with significant GHG emissions, or increased demand for those with lower emissions • Increased demand for energy from alternative energy sources • Decreased demand for services related to fossil fuels, such as drilling services or equipment maintenance
Physical Impacts	<ul style="list-style-type: none"> • Disruption of manufacturing or transport for registrants with operations on coastlines • Indirect impacts to major customers or suppliers from severe weather, such as hurricanes or floods • Increased claims and liabilities for insurance and reinsurance companies • Decreased agricultural production due to drought or other weather changes



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GHG-101: Basics of GHG Accounting, Reporting &
Disclosing GHG Emissions (July 27, 2020)

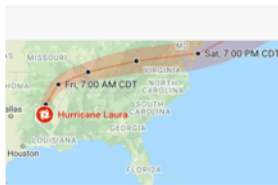
Slide 61 of 68



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- More and more, investors are asking for data on GHG emissions.
- The SEC has issued a Guidance on potential disclosure items.
- You can help the lawyers in your company do the reporting.

1. To conduct **vulnerability assessment.**



2. To develop a **CO₂ mitigation plan.**

INFORMATION ON EMISSIONS
The table below refers to emissions independent of any GHG trades such as sales, purchases, transfers, and offsets of emissions.

SCOPE	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

BASED ON EMISSIONS FROM REGIONS (tCO₂e)

SCOPE	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

BASED ON EMISSIONS FROM REGIONS (tCO₂e)

Has a plan to reduce its base year emissions

Clarification of company determined policy for setting base year emissions recalculations

Clarification for any significant emissions changes that trigger base year emissions recalculations

Base year emissions

SCOPE	TOTAL (tCO ₂ e)	CO ₂ (t)	CH ₄ (t)	N ₂ O (t)	HFC (t)	PFC (t)	GHG (tCO ₂ e)
Scope 1							
Scope 2							
Scope 3 (OPTIONAL)							

3. To **report progress** on environmental issues.

Mandatory Reporting Requirements in the U.S.

Regulator	Threshold	Who must report?	Coverage
EPA GHG Reporting Program	25,000 mt CO ₂ /yr	• Direct emission facilities • Fossil fuel/gas suppliers • CO ₂ injection sites	• 8000+ facilities • 85-90% emissions • 50% total US emissions
California Air Resource Board / SB 32	25,000 mt CO ₂ /yr	• Industrial facilities • Fuel suppliers • Electricity importers	• 775 facilities and fuel suppliers
Massachusetts GHG Registry	5,000 mt CO ₂ /yr	• Facilities emitting > 5000 mt CO ₂ /yr - or regulated under MA Clean Air Act • Retail sellers of electricity	Roughly 300 facilities
EPA Clean Power Plan		• Electricity Generating Units	Hourly CO ₂ emissions and net energy output

Use Online CC-PF Prep Program #3
GHG-101: Basics of GHG Accounting, Reporting & Disclosure (GHG Institute July 27, 2020)

ACCO

- My point is that this is coming to your organization and I think that we in the quality professions are especially well qualified to lead the climate change team.
- So a few more points before questions.

ACCO
ASSOCIATION OF CLIMATE CHANGE OFFICERS

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<p>Daytime Program (Cohort V)</p> <p>Classes Begin: September 14, 2020</p> <p>Last Class: October 28, 2020</p>	<p>Evening Program (Cohort VI)</p> <p>Classes Begin: October 6, 2020</p> <p>Last Class: November 19, 2020</p>	<p>Tuition</p> <p>ACCO Members: \$470</p> <p>Non-member registrants must join ACCO: \$1 per month for 6 months</p> <p>Scholarships now available!</p>
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- To become a certified Climate Change Professional, there are eight required classes and four exams, along with other requirements.
- If any of you are interested, the next daytime class begins on September 14, and the next evening class starts on October 6.
- I believe it is far easier than becoming a Certified Quality Engineer.
- The total cost of classes and exams is under \$500.
- I hope that one day ASQ and ACCO will have a joint certification program.

Maryland Climate Leadership Academy

- <https://www.mdclimateacademy.org/>
- Sponsored by Department of Natural Resources for Maryland
- Tuition paid if you qualify and live in Maryland.



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- The State of Maryland, Department of Natural Resources will pay tuition for participants who are Maryland residents.
- Go to the Maryland Climate Academy website to apply.
- Or contact me for more information.

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For more info: <http://energyprograms.civicworks.com/>

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- For your personal efforts at fighting climate change, if you are interested in installing solar panels on your home, go to the Civic Works Energy Program website.
- They have a rep who will talk you through the process and show you how credits work for kilowatts you don't use that can be sold back to the grid.



The screenshot shows the Neighborhood Sun website. At the top left is the logo, which includes a sun, houses, and the text "NEIGHBORHOOD sun". To the right of the logo are three navigation links: "HOW IT WORKS", "OUR COMMUNITY", and "FIND YOUR SOLAR PLAN", each followed by a downward arrow. The main image is a photograph of a solar farm with rows of blue solar panels in a green field. A yellow callout bubble with the text "This one has your name on it" is overlaid on the image, with a yellow arrow pointing to one of the solar panels. Below the image, the text "For more info:" is followed by the URL <https://neighborhoodsun.solar/>. The number "32" is in the bottom right corner of the screenshot area.

For more info: <https://neighborhoodsun.solar/>

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- If you want solar, but not on your roof, then you can join a community solar farm.
- Google Neighborhood Solar to get more info.
- The White March solar farm is fully subscribed.
- But they are actively looking for subscribers which will open soon.



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- And you can also look to your public utility for renewable energy.
- I currently buy wind power from Washington Gas and Electric that is delivered by BGE.

Chesapeake Climate Action Network (CCAN)



For more info: <https://chesapeakeclimate.org/>

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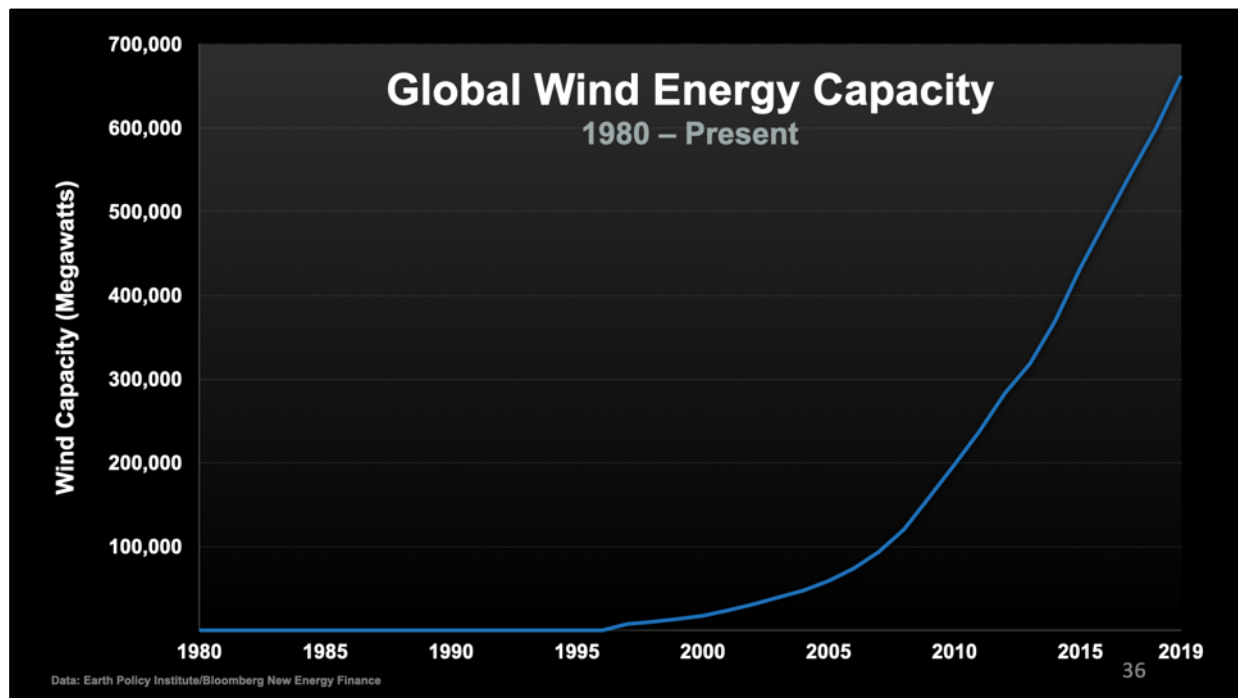
- In terms of policy, I'm a volunteer with the Chesapeake Climate Action Network referred to as CCAN.
- We aim to influence the Maryland State Legislature.
- A major project is to stop the construction of a methane pipeline through the Eastern Shore.
- If you are interested in stopping fossil fuels, I urge you to join.
- There are many other similar organizations including the Sierra Club.

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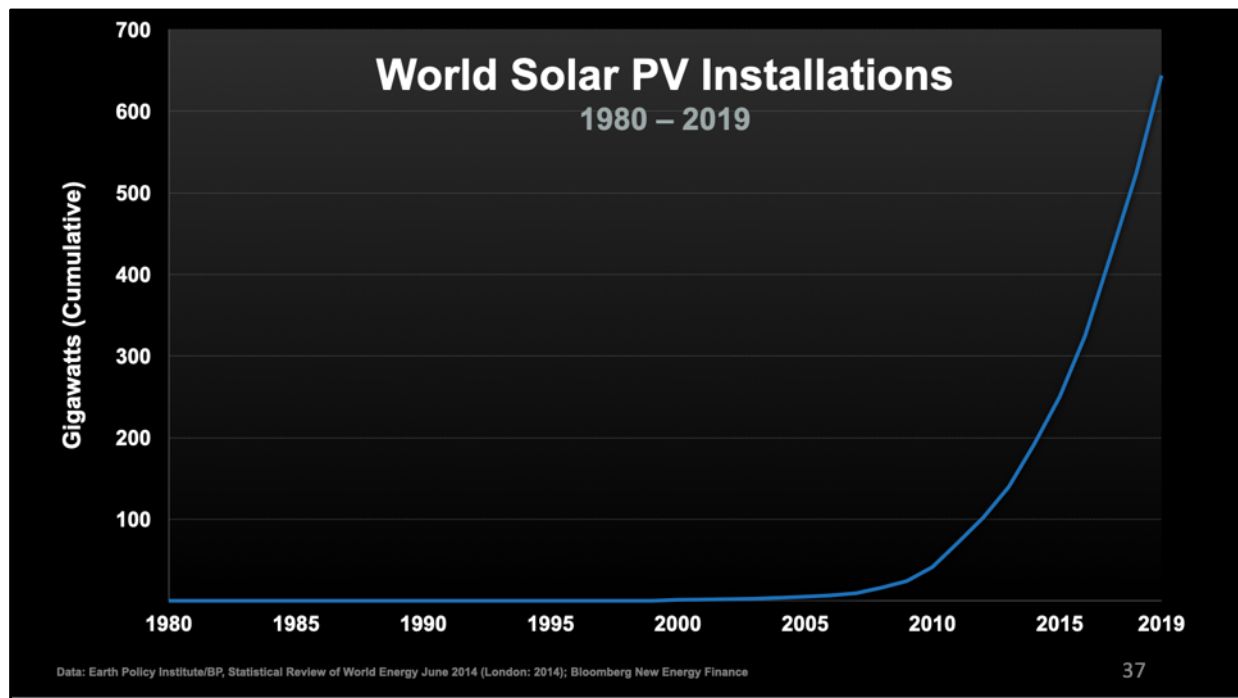
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- In conclusion, you may be asking if there's any hope, especially given Richard's talk.
- If you attend VP Al Gore's training, he does a bit of what we did today.
- He gives the bad news first – doom and gloom – then at the end, he gives you hope.
- Now I'm going to show you signs of hope.

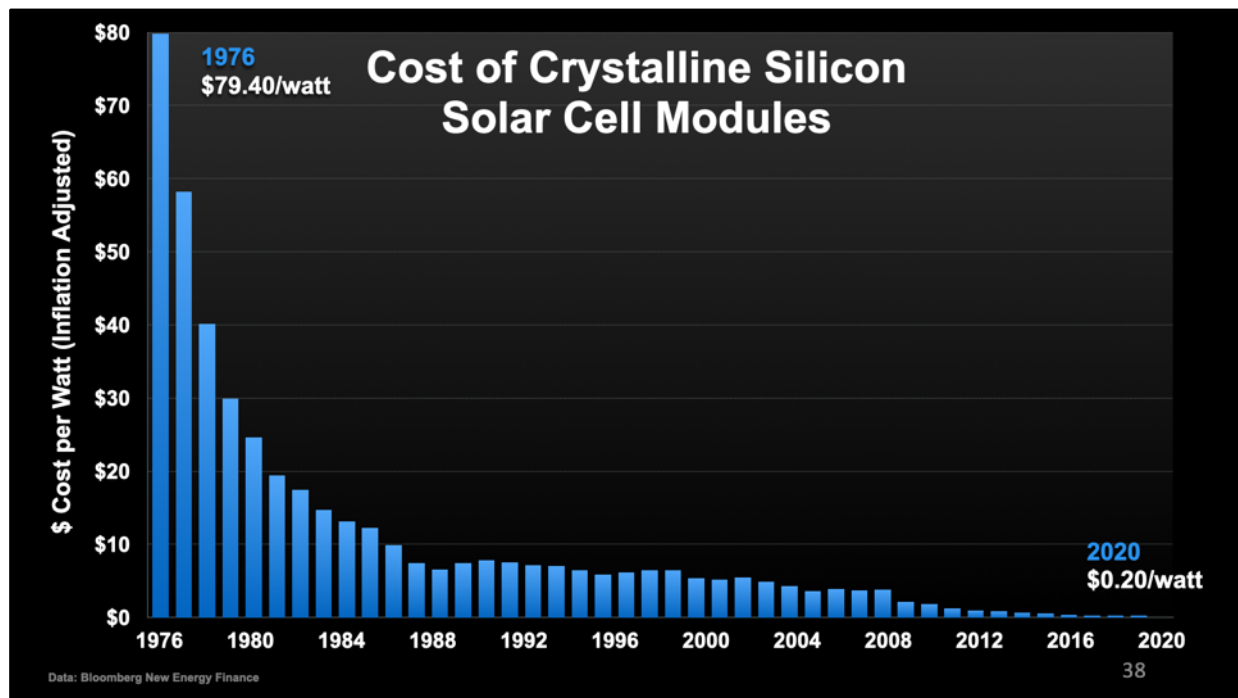


Al Gore pointed out that the use of Global Wind Energy has skyrocketed in the past 20 years.

This slide accompanied with pictures of hundreds of windmills (many from the European Union).

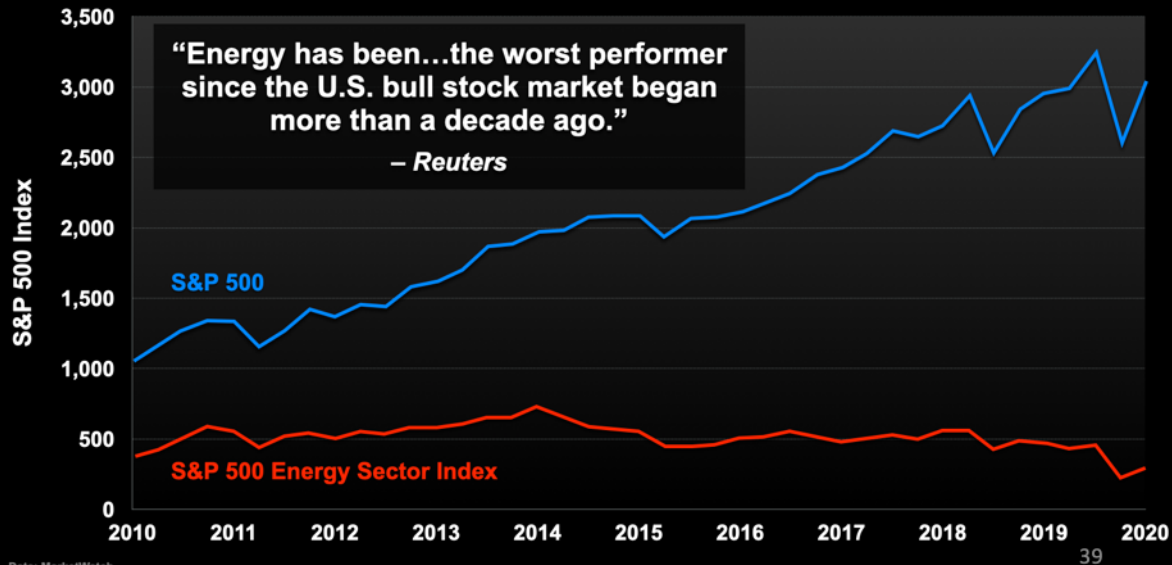


Also the installation of solar panels is on a similar rise.
Al Gore showed an amazing chart from Chile that demonstrated growth that went right off the page.



The cost of solar is in a steady decline.
Solar panels will soon be cheaper than burning coal.

Conventional Energy Stocks Are the Worst Investments



- And best of all, Wall Street is finally recognizing climate change.
- Fossil fuel stocks shown in red have not grown at all in the past decade.
- Oil companies have already started to write off billions of dollars for oil they will never pump and burn.
- They even have a name for it.
- Oil in the ground is called a "stranded asset."
- I bet that in fifteen years you won't be able to buy a new car with an internal combustion engine anywhere on planet earth.
- But electric cars will be readily available.

How to drive fossil fuels out of the US economy, quickly

The US has everything it needs to decarbonize by 2035.

By David Roberts | @dvox | david@vox.com | Aug 6, 2020, 10:50am EDT

f t SHARE



The roof of the 95,000-square-foot "Cirrus" building on Platte Street in the Lower Highland neighborhood in Denver.

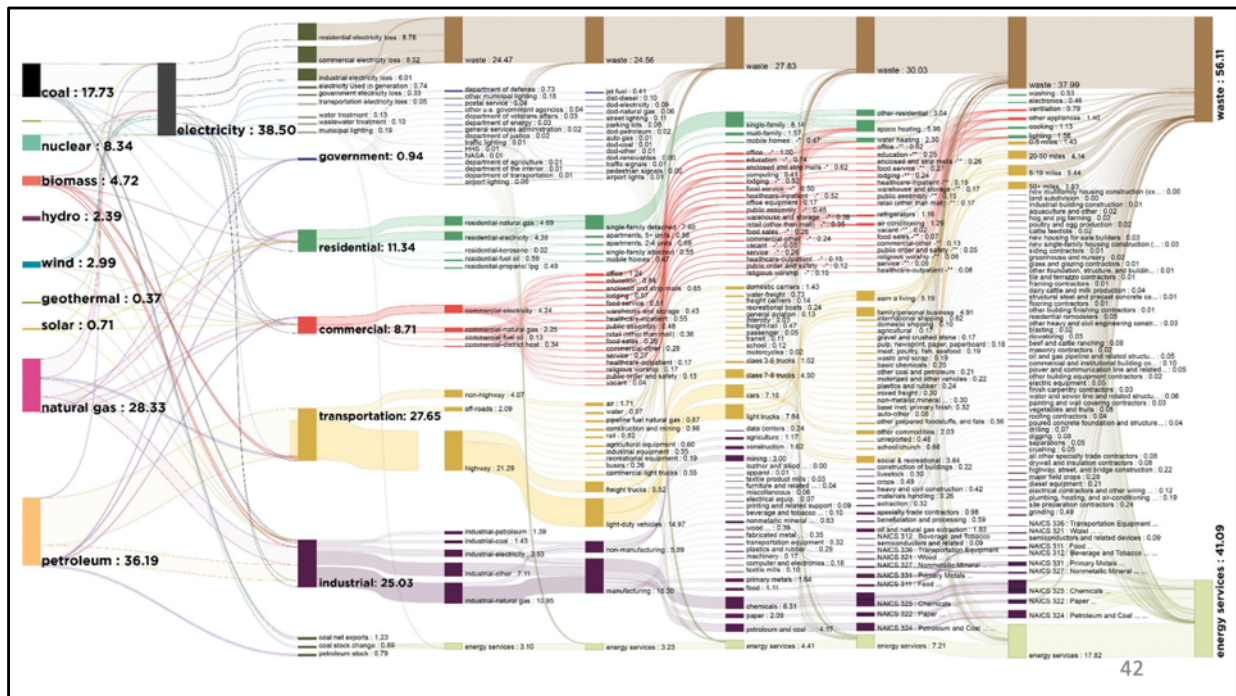
In the runup to World War II, President Franklin Delano Roosevelt enlisted the entire US economy in an effort to scale up production of war material. All of the country's resources were bent to the task. In 1939, the US had 1,700 aircraft; in 1945, it had 300,000 military aircraft and 18,500 B-24 bombers.

Source: <https://www.vox.com/energy-and-environment/21349200/climate-change-fossil-fuels-rewiring-america-electrify>

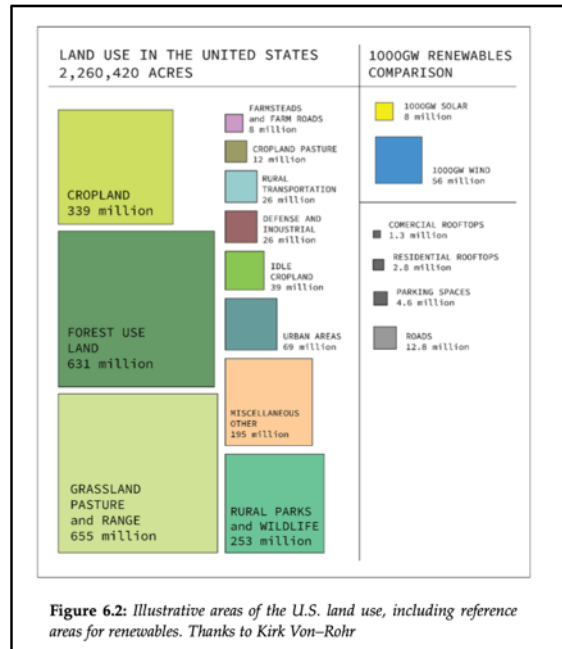
- Another optimistic approach is described in the book *Rewiring America*.
- The authors basically argue that we need a WWII Arsenal of Democracy all-hands approach.
- For example in 1939 the US had 1,700 aircraft: in 1945 we had 300,000 military aircraft and over 18,000 B-24 bombers.
- So when the whole country gets involved, we can get a lot done.
- If the entire nation focuses on building solar panels, batteries, windmills, heat pumps, and a smart grid, we can bend the curve.



The book is available as a free download. Just Google *Rewiring America*

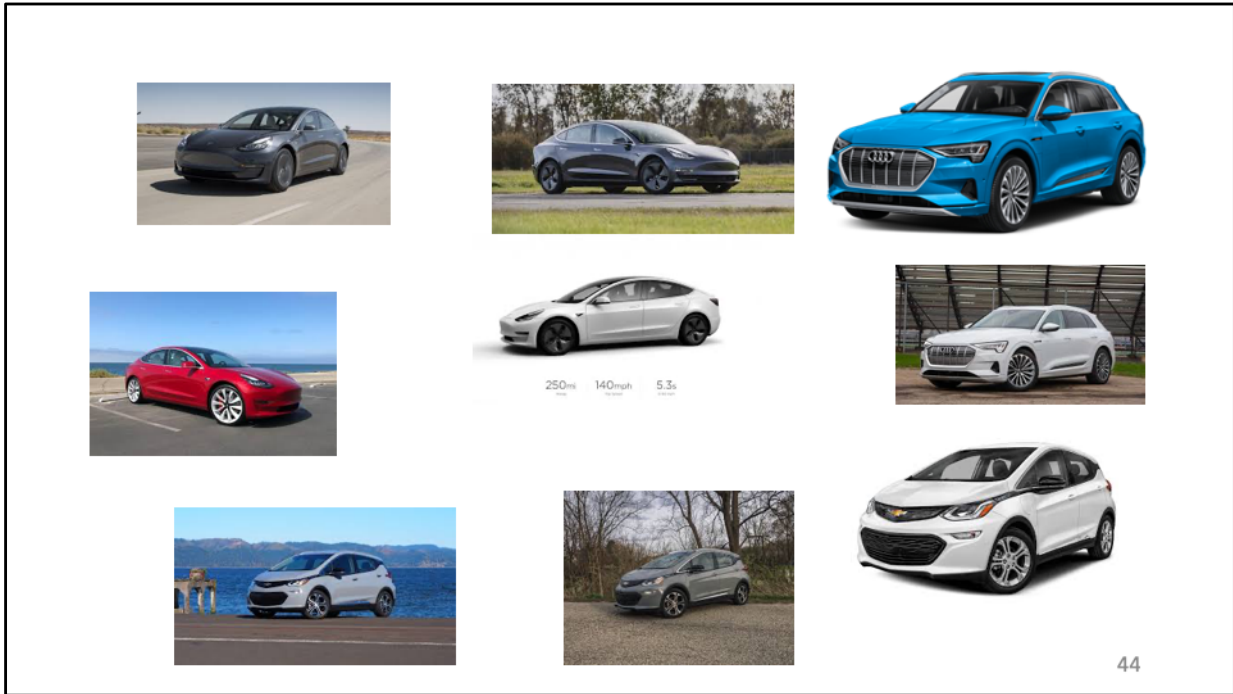


- The authors have mapped the entire energy usage of the United States.
- By the way, almost half the energy is wasted.
- For example, if you place your hand on the hood of your car and feel the engine heat – that's wasted energy.
- Internal combustion engines are very inefficient, especially compared to solar powered electric vehicles.



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- The authors even calculate the amount of land that would be needed for windmills and solar panels.
- We have enough land; we just need the will to use it.
- And best of all...



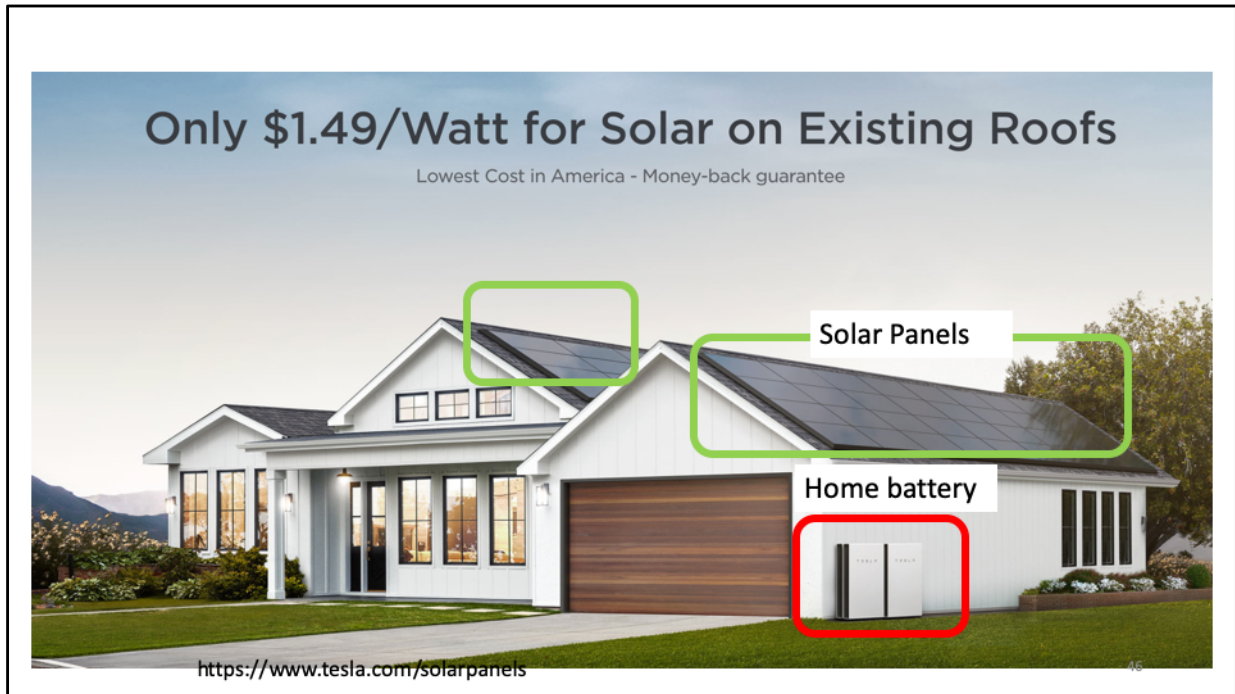
- A world of electric cars, powered by solar farms will be quiet.
- No more constant drone of internal combustion engines.



Source: <https://civicworks.com/introducing-solar-installation-initiative-baltimore-city/>

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Here is a rooftop solar panel on top of a Baltimore business.
It won't be long until every building has rooftop solar panels.



- Soon we'll see solar panels paired with large batteries.
- To pay for it, the authors of *Rewiring America* say we should use tried and true financial instruments.
- America can't afford solar panels, batteries and heat pumps if they have to use credit cards with 12 to 15% interest rates.
- But they can better afford 30-year low interest government-backed climate loans at 2 to 3%.

Agenda

- ✓ Dr. W. Edwards Deming
- ✓ Vulnerability Assessments
- ✓ CO₂ Mitigation
- ✓ GHG Reporting
- ✓ Solar Panels
- ✓ Taking Action
- ✓ Good News

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So I hope I've given you food for thought and an interest in thinking about how you can add value to your company by learning to fight climate change. Thank you very much, I'll now take questions.