Climate Change

Gaby & Nancy

Buzz Words - Nancy

BUZZWORDS A Republican pollster advised the party, 20 years ago, to say “climate change” instead of “global warming.”. It sounded less alarming. Here’s some more jargon:

NET ZERO The goal of reducing greenhouse gas (GHG) emissions as much as possible. No greenhouse gases will then be added to the atmosphere, because the GHG residue is offset.

SUSTAINABILITY U.N. defines it as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”. Includes individual actions and also the societal changes that will be required.

CARBON FOOTPRINT The amount of GHG emissions an activity, a person or a nation causes, measured by the warming potential of CO2.
In 2014 the World Bank figured the global average household carbon footprint was 4.97 metric tons; U.S. was 5x that.

MITIGATION
Anything that reduces emissions of GHGs. (Not disaster mitigation, which means protection)

ADAPTATION
Making changes to prepare for worsening climate. For example, helping people move from the beachfront after repeated hurricanes. A hard sell.

NATURE BASED SOLUTIONS
Using nature to solve climate problems, like planting trees, which are carbon sinks, or stopping deforestation. Trees can’t store all the CO2 being emitted; drastic reductions in fossil fuel emissions are required too.

CARBON CAPTURE
Removing the CO2 from the air, while still burning fossil fuels.
Capturing CO2 while it’s coming from a smokestack, then burying it, which has costs, or carbon removal, sucking it from the air with giant fans, at even greater cost, which is still experimental.

GEOENGINEERING
An attempt to modify the atmosphere as an emergency stopgap. Cheaper, **very** controversial, possibly creating devastating weather pattern changes. At the research stage.

CARBON PRICING
Charge companies and consumers for emissions they produce through taxing or permits and regulation. Labeling to show the CO2 that goes into the making and transporting of products.

CLEAN ENERGY
Energy that doesn’t add GHGs to atmosphere. This mostly refers to renewable energy like wind and solar. Nuclear energy is also considered clean, no GHGs, but there is radioactive waste.

IPCC Glascow Agreements

Basics:

1. The Physical Science Basis (WGI)
2. Impacts, Adaptation and Vulnerability (WGII)
3. Mitigation of Climate Change (WGIII).

Of these, the first study was published in 2021, the second report February 2022, and the third in April 2022. The final synthesis report is due to be finished by late 2022.

I

intensity of extreme events with global warming

Name of event	Climate in 1850 - 1900	1 °C warming	1.5 °C warming	2 °C warming	4 °C warming
10 years heatwave	Normal	2.8 times more often, 1.2 °C hotter	4.1 times more often, 1.9 °C hotter	5.6 times more often, 2.6 °C hotter	9.4 times more often, 5.1 °C hotter
50 years heatwave	Normal	4.8 times more often, 1.2 °C hotter	8.6 times more often, 2.0 °C hotter	13.9 times more often, 2.7 °C hotter	39.2 times more often, 5.3 °C hotter
10 years heavy cipitation event	Normal	1.3 times more often, 6.7% wetter	1.5 times more often, 10.5% wetter	1.7 times more often, 14.0% wetter	2.7 times more often, 30.2% wetter

Question 1 - Nancy

According to an April 2021 poll, the number of Americans concerned with climate change has increased in recent years. What can we attribute the rise in concern to?

Angry youth pressure

The Internet & Media

Physical events, economic effects

Environmental Groups

(slide)

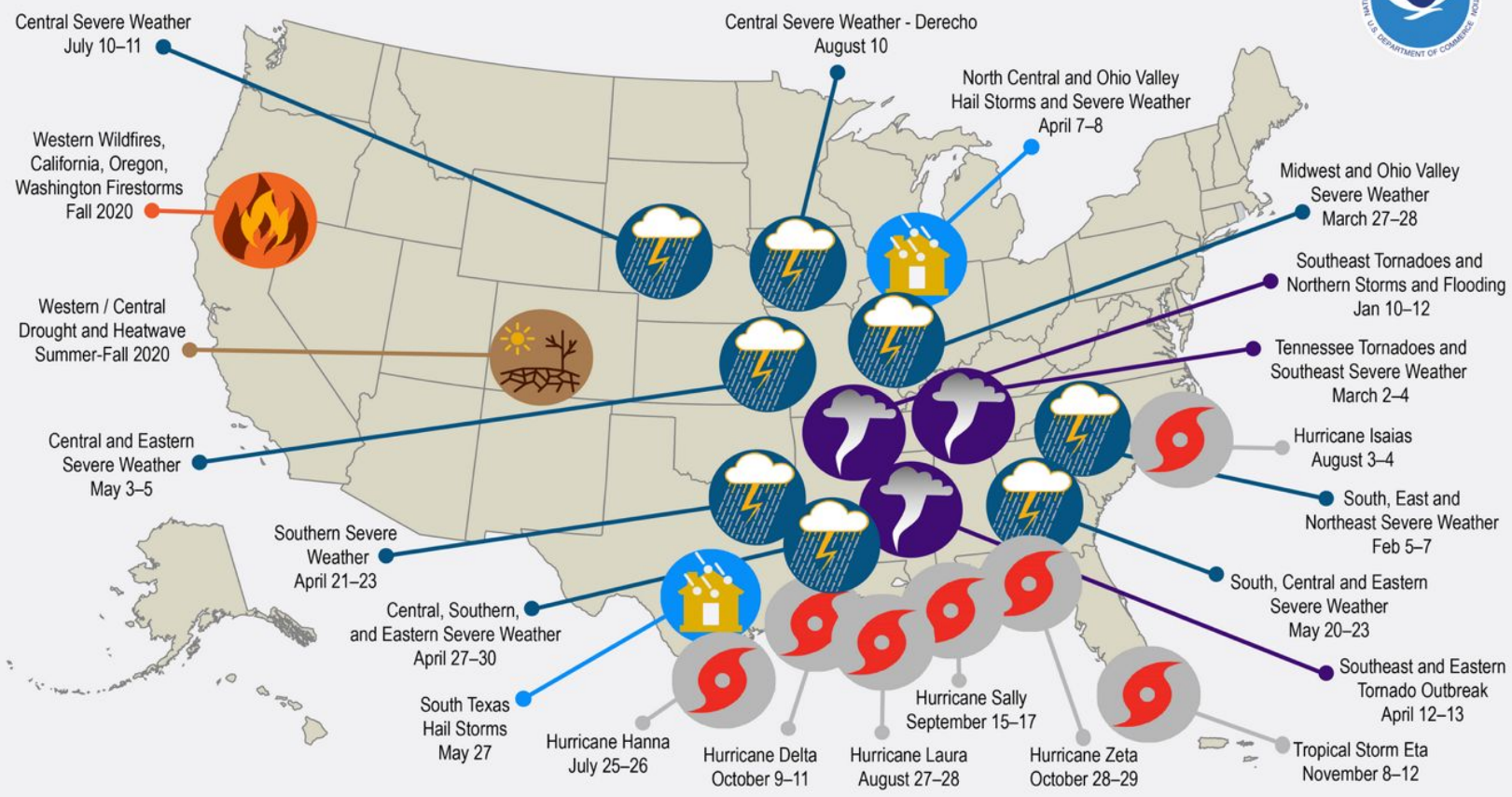
Rise in concern about Climate - Why?

Because the message has finally gotten attention through

Pressure from angry young activists and from scientists

Student Strike, Sept. 20, 2019 - Capetown South Africa, and around the world

U.S. 2020 Billion-Dollar Weather and Climate Disasters



*This map denotes the approximate location for each of the **22 separate billion-dollar weather and climate disasters that impacted the United States during 2020**.*

Question 2 - Gaby

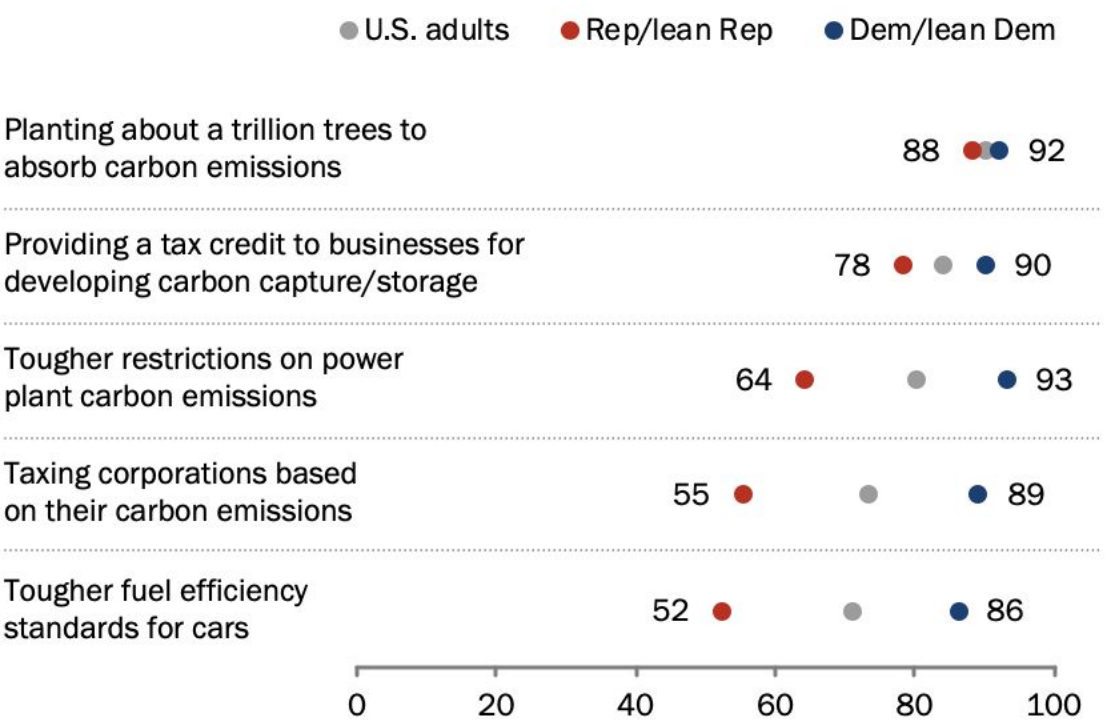
Democratic presidents are much more likely to make combating climate change part of their platform than Republican Presidents are. Why is the issue of climate change more of a political issue than a scientific one.

Governmental interpretation, priorities

Economic interests of citizens

Politics control funds for scientific research and development

% of U.S. adults who favor each of the following proposals to reduce the effects of global climate change



Note: Respondents who gave other responses or did not give an answer are not shown.
Source: Survey conducted April 29-May 5, 2020.
"Two-Thirds of Americans Think Government Should Do More on Climate"

PEW RESEARCH CENTER

Question 3 - Nancy

How has President Biden incorporated tackling climate change into his foreign policy agenda?

Biden, Climate & Foreign Policy

One of Biden's foreign policy goals is to restore US climate leadership.

Biden's immediately took many executive actions on climate
- Most overturn Trump's actions
- Rejoined Paris Climate Accord and WHO
- Stopped Keystone pipeline

Biden appointed John Kerry as Special Envoy for Climate, a new position

Biden held virtual summit with 17 leaders of the largest economies on Earth Day 2021

Kerry visited China, India to improve climate cooperation. Rebuffed by China. Some agreement in India

Biden, Kerry and others attended UN Climate meeting in Glasgow, Nov. 2021
- Russia and China did not
- Little progress- methane agreement

Biden's major climate legislation "Build Back Better" was blocked by Senator Manchin

Inaction in Washington undermines Kerry. Little global trust in America's commitment to climate goals.

Question 4-Gaby

The transition to green energy will be economically difficult for many. How can this transition be made so as to avoid massive job loss and economic hardship?

Broader vision - long term planning

Developing new materials

Mass education and training, adaptation, being more effecient

Waste management systems, recycle, reuse methods

Cost factor

Question 5 - Nancy

There are multiple decarbonization options that are present, such as wind power, solar power and hydrogen to name a few. Which of these is the best option.

Reforestation

Decarbonize the Grid,

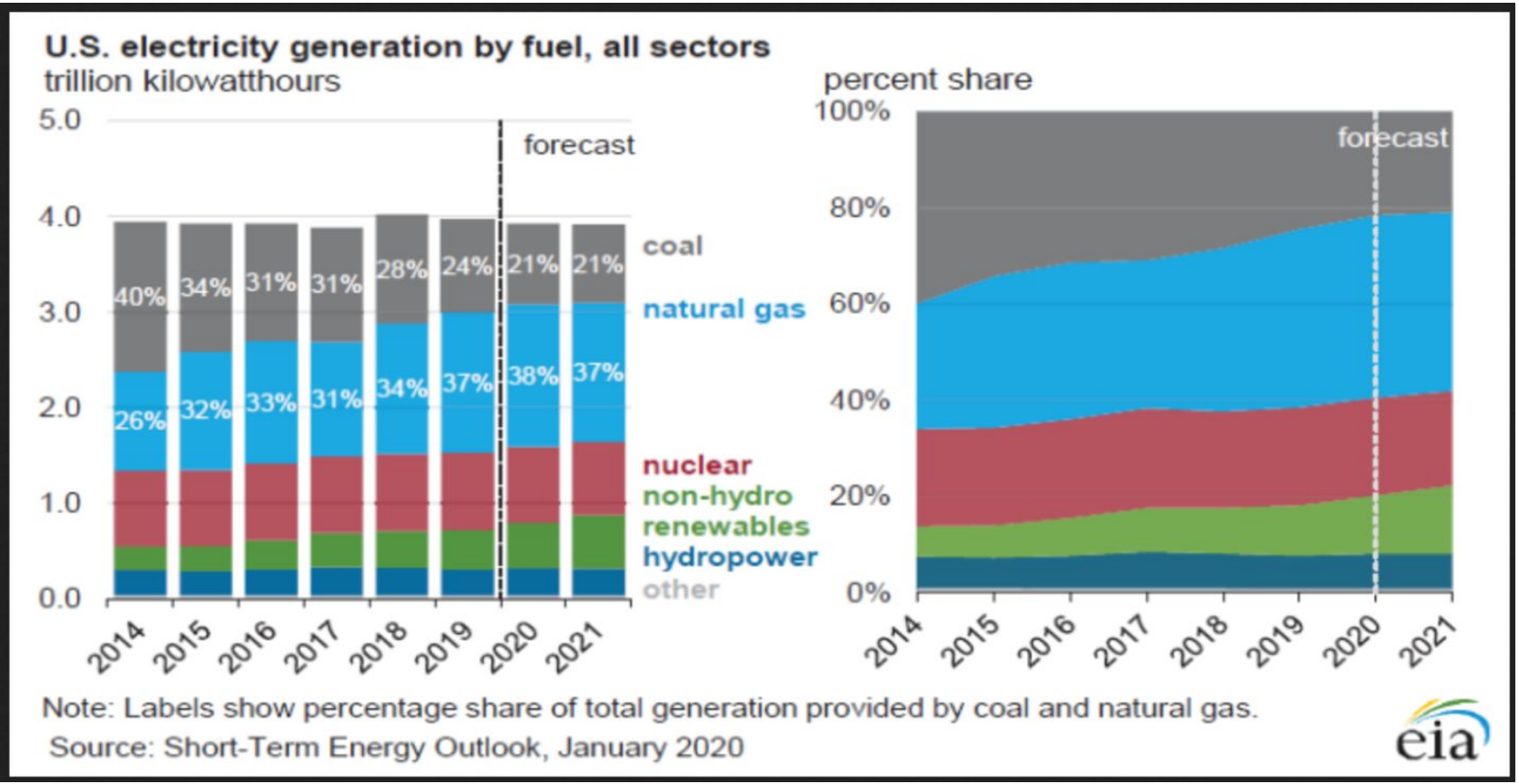
Electrified Transportation

Methane Reduction

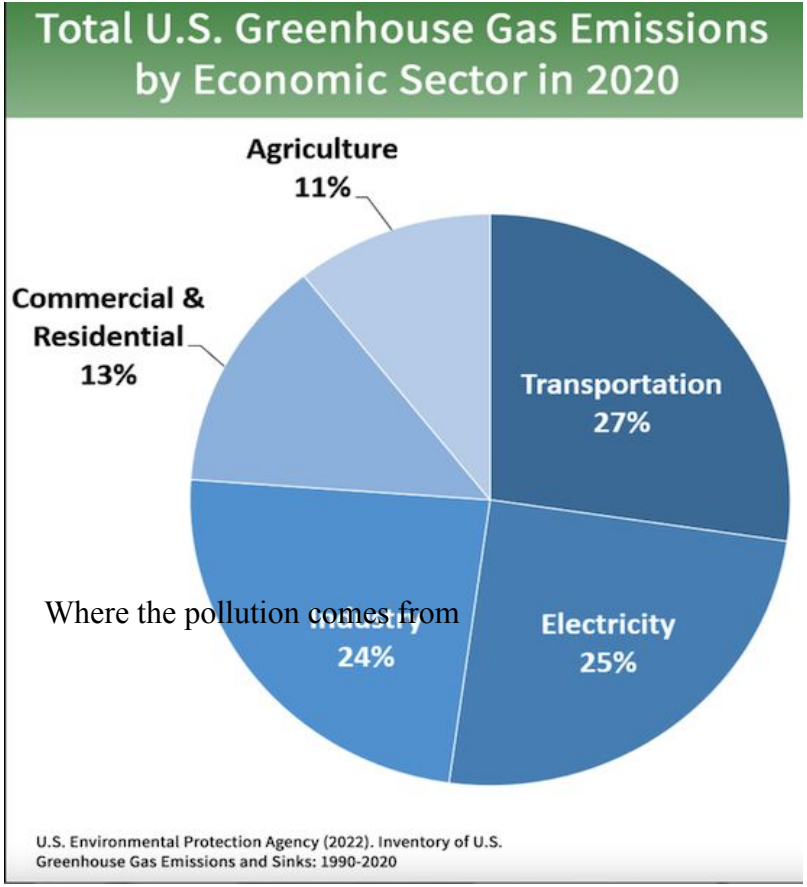
Carbon Capture

Nuclear

Investment and Financial incentives - Net zero bank and insurance


U.S. electricity generation by fuel, all sectors
trillion kilowatthours
5.0
4.0
3.0
2.0
1.0
0.0
forecast
40%
34%
31%
31%
28%
24%
21%
21%
26%
32%
33%
31%
34%
37%
38%
37%
2014
2015
2016
2017
2018
2019
2020
2021
coal
natural gas
nuclear
non-hydro
renewables
hydropower
other
percent share
100%
80%
60%
40%
20%
0%
forecast
Note: Labels show percentage share of total generation provided by coal and natural gas.
Source: Short-Term Energy Outlook, January 2020
eia

Where energy comes from



Where the pollution comes from

Where we will use renewables in energy generation and in transportation

S

Wind, Water, Solar (WWS) Solution

Electrify or Provide Direct Heat For All Sectors and Provide the Electricity and Heat with 100% WWS

ELECTRICITY	TRANSPORTATION	HEATING/COOLING	INDUSTRY
Wind	Battery-electric	Electric heat pumps	Electric arc furnaces
Solar PV/CSP	HFC-BE hybrids	Solar water preheat	Induction furnaces
Geothermal			Dielectric heating
Hydro			
Tidal/Wave			

1)generate electricity

Solar
Clean and now cheaper than coal
Battery storage is getting better and cheaper
Intermittent
To scale up requires much land

Wind
Cheap and quick to build
Intermittent
Problem of noise and visual impact
Offshoring improves speed and reduces environmental impact
Environmental restrictions

Hydropower
Environmental impact
Social impact- displace people
Initial cost

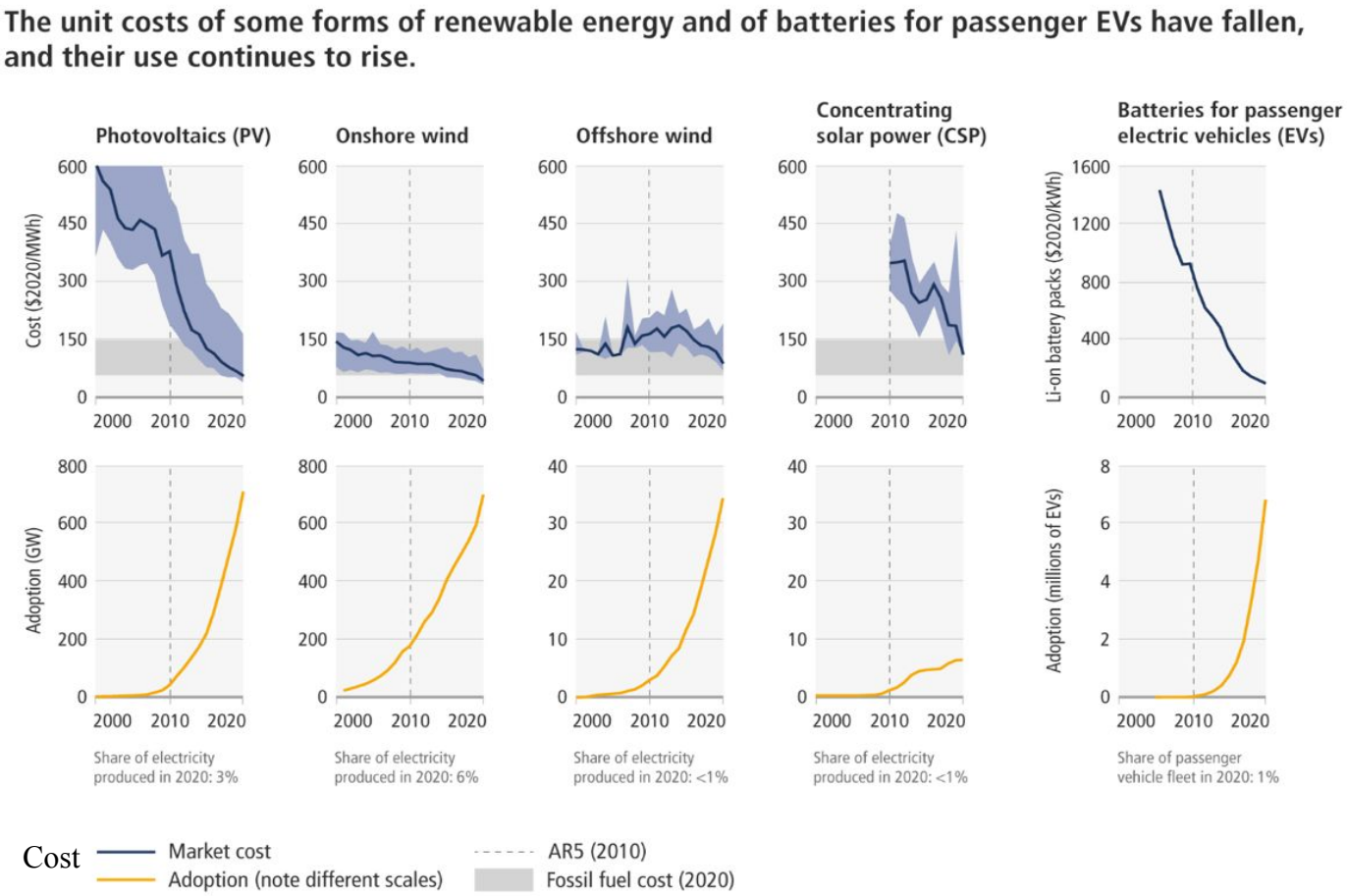
Nuclear
Greater energy density
Gen IV still in the future
High cost. Long construction time.
Safety concerns.
Nuclear waste (some can be reused partially)

2) for Transportation

Electricity
Higher initial cost. (For big rigs, 3x diesel truck cost)
Long term savings on fuel and maintenance
Batteries are getting better and cheaper
Problems of weight and charging time in big rigs
Require charging networks

Hydrogen Cells
Initial cost even higher
Lighter weight, faster refuel (important in big rigs)
Hydrogen production cost
Hydrogen infrastructure (pipeline, tankers)

Synthetic fuels



Decreasing Cost of Renewable and Increasing Use.
Source: IPCC Report

Question 6 - Gaby

To what extent does cost remain the biggest factor in the way of combating climate change? How can this be countered?

Political Will

Personal sacrifice

Education