

HOW TO AVOID A CLIMATE DISASTER BY BILL GATES

Why zero ?

51 Billion Tons of greenhouse gases to the atmosphere per year

"near net zero"

We are here today → What we need to aim for

- 1°C increase since preindustrial times
- Mid-century : between 1.5°C and 3°C
- End of century : between 4°C and 8°C

Trouble getting clean water
Twice as many people

2-degree rise wouldn't be 33 percent worse than 1.5
Could be 100 percent worse

Heatstroke
Because of humidity

Mosquitoes will start living in new places
Malaria

By 2100 could be **FIVE** times as deadly than COVID 19

"The climate is like a bathtub that's slowly filling up with water. Even if we slow the flow of water to a trickle, the tub will eventually fill up and water will come spilling out onto the floor."

Give a sense of how much is a lot / a little

Build your mental framework

How much of the 51 are we talking about ?
Convert numbers into a percentage of the annual total of 51 billion tons

What's your plan for Cement ?
• A shorthand reminder that emissions come from 5 different activities
• We need solutions in all of them

How much power are we talking about?

How much space do you need ?
• How much space will be required to produce that much energy
◦ Wind : 1-2 Watts per square meter
◦ Fossil Fuels : 500-10,000 Watts per Square Meter



Most of the zero-carbon solutions are **more expensive** than fossil-fuel ones



The difference between the 2 prices : **GREEN PREMIUMS**

Prices **don't** reflect the environmental damage they inflict

It can be negative : green can be cheaper

"We need the premiums to be so low that everyone will be able to decarbonize."

Green Premiums
Difference in cost between a product that involves emitting carbon and an alternative that doesn't

5 types of activity

How We Plug In
27 %
• Electricity : A cheap source of energy always available
• Getting all the world's electricity from clean source won't be easy

Fossil fuels account for **two-thirds** of all electricity worldwide

Make Carbon-free electricity

- Nuclear fission**
 - Getting energy by splitting atoms apart
 - Only carbon-free energy source that can reliably deliver power day / night
- Nuclear fusion**
 - Getting energy by pushing atoms together / fusing them
 - At least a decade away from supplying electricity to consumers

- Offshore wind**
 - Putting wind turbines in an ocean or other body of water
- Geothermal**
 - Deep underground : hot rocks that can be used to generate electricity
 - Amount of energy we get per square meter is quite low

- Store electricity**
- Batteries**
 - Hard to improve on them
 - Can improve by a factor of 3 but not by a factor of 50
 - Pumped hydro**
 - When electricity is cheap : pump water up a hill into a reservoir
 - When demand goes up : let the water flow back down the hill
 - Thermal storage**
 - When electricity is cheap use it to heat up some material

31 % **How we make things**
Use tons of steel, cement, glass, plastic

Making 1 ton of steel produces 1.8 tons of CO₂

96 Millions tons of cement produced every year in America
600 pounds for every person in the country

Bring the premium **down**

- Public policies to create demand for clean products
- Create incentives to buy zero-carbon cement / steel

19 % **How we grow things**
70% agriculture / 30% deforestation

Global population is headed toward **10 billion** people by 2100

- 40% more people**
 - We'll need more than 40% more food too
 - As people get richer, they eat more calories
- Methane : main agriculture culprit**
 - 28 times more warming per molecule than CO₂ over the course of a century
 - Nitrous oxide causes 265 times more warming

- Food thrown away**
 - 20% : Europe / Industrialized parts of Asia, Sub-Saharan Africa
 - 40% in the US
- Wasting less of it**
- Behavior change**

- We can cut down on meat eating** while still enjoying the taste of meat :
 - Plant based meat
 - Artificial meats
 - Cell based meat
- Stop deforestation**
 - Incentives to cut down trees are stronger than the ones to leave them alone
 - We need political / economic solutions

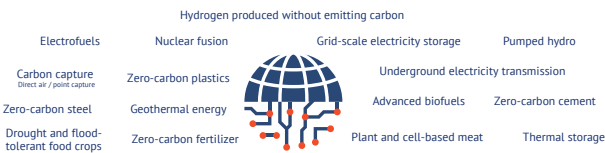
"The cruel injustice is that even though the world's poor are doing essentially nothing to cause climate change, they're going to suffer the most from it"

7 % **How we keep cool and stay warm**
Heating / cooling / refrigeration

4 tons over the course of 40 years the CO₂ that a tree can absorb in its lifetime

A plan for getting to Zero

Science tells us that in order to avoid a climate catastrophe, rich countries should reach **net-zero emissions by 2050**



Technologies needed

Quintuple clean energy / climate-related R&D over the next decade

Make bigger bets on high-risk R&D projects



Match R&D with our greatest needs

Work with the industry from the beginning

Expand the supply of Innovation

To get these technologies ready soon

Accelerate the demand for Innovation

Create incentives that lower costs
And reduce risk

Put a price on carbon : eliminate Green Premiums

Clean standards
• Electricity
• Fuel
• Product

Build the infrastructure
Bring new technologies to market

Change the rules
so new technologies can compete

Set standards in procurement programs for example

What each of us can do ?

"The market is ruled by supply and demand : we can have a huge impact on the demand side"



Personal action : important for the signals

Elected officials will adopt specific plans if their voters demand it

- Make calls, write letters, attend town halls
- Run for office

As a citizen



As a customer

- Sign up for a **green pricing program** : electricity utility
- Reduce** your home's emissions
- Buy an **electric car**
- Try a **plant-based burger**

"We need to make it possible for low-income people to climb the ladder without making climate change worse."



As an employee or employer

Push your company to do its part :

- Set up an internal carbon tax
- Prioritize innovation in low-carbon solutions
- Be an early adopter
- Engage in the policy-making process
- Help early-stage innovators get across the valley of death

