

The NYS Climate Leadership and Climate Protection Act

CLS Marist GS4 & SS4 Poughkeepsie NY Sept. 21, 2022 Lect3: NYS Sept. 28 Lect4: can Economics save climate?

- **Astonishing drop in renewables prices and Renewables Explosion. Can Economics Save the Climate? This lecture explores New York State implications**
- World 3C likely Future – 40C heat waves rise till achieve Net Zero CO2
 - Spectacularly Small Response past 40 years <0.3% of Gross Domestic Product (US & others)
 - **After 40 years, the NYS and Global renewables train has moved out of the station**
- NY State Climate Leadership Act of 2019
 - “Scoping Plan” highlights of one of world’s most ambitious plans
- NY State renewables – Do numbers add up? Yes they do
 - Solar
 - Offshore Wind
 - Transmission lines - Quebec hydroelectric Upstate Solar
- Heat pumps -- 600gal oil/household maybe comparable in importance to electric cars
- NET: NY State Climate Leadership Act – Electrification & Renewables

Greatly Exceeds Expectation

Marist CLS Climate Mitigation GS4 SS4 Fall 2022 - NYS Climate Act & Astonishing Renewables Price Drop Version 29Sep2022

C. Parks

For Personal Scholarship Only



“The 3C Future”

Likely outcome under policies in place

<https://www.economist.com/briefing/2021/07/24/three-degrees-of-global-warming-is-quite-plausible-and-truly-disastrous>

Economist’s projected impact at 3C:

*Accelerated heating 3.5-5C Arctic, Russia, India, China

*Tropical nights America, Europe, Asia

Drives deaths from heatwaves

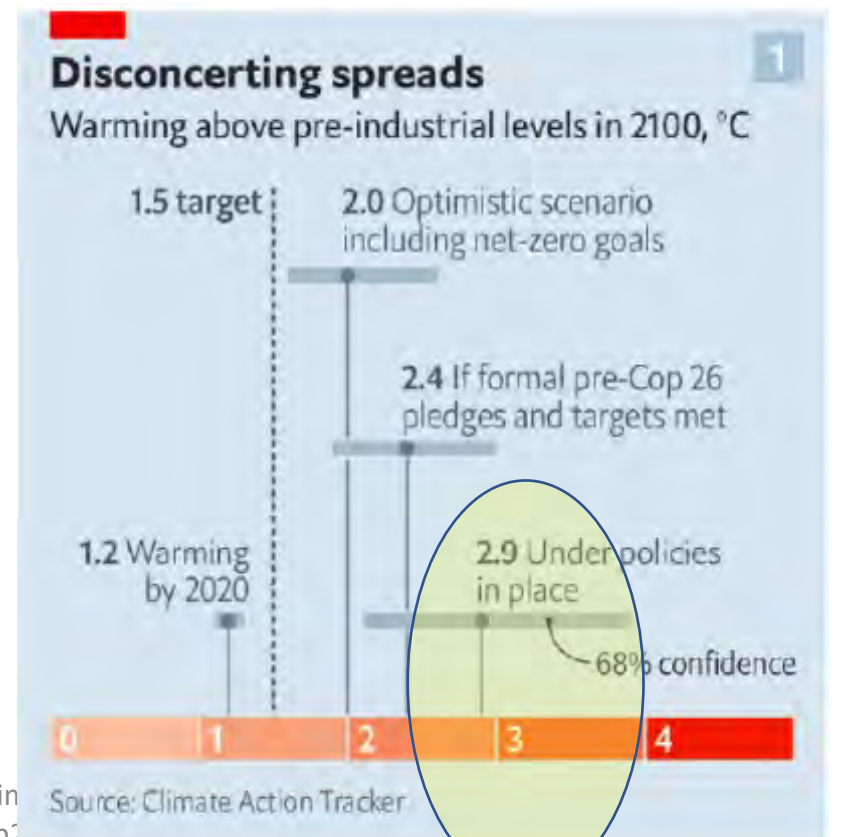
*Wet bulb temperatures become more common → 35C

*Exceptional 100 year drying → every 2-5 years

glimpsed by California’s megadrought

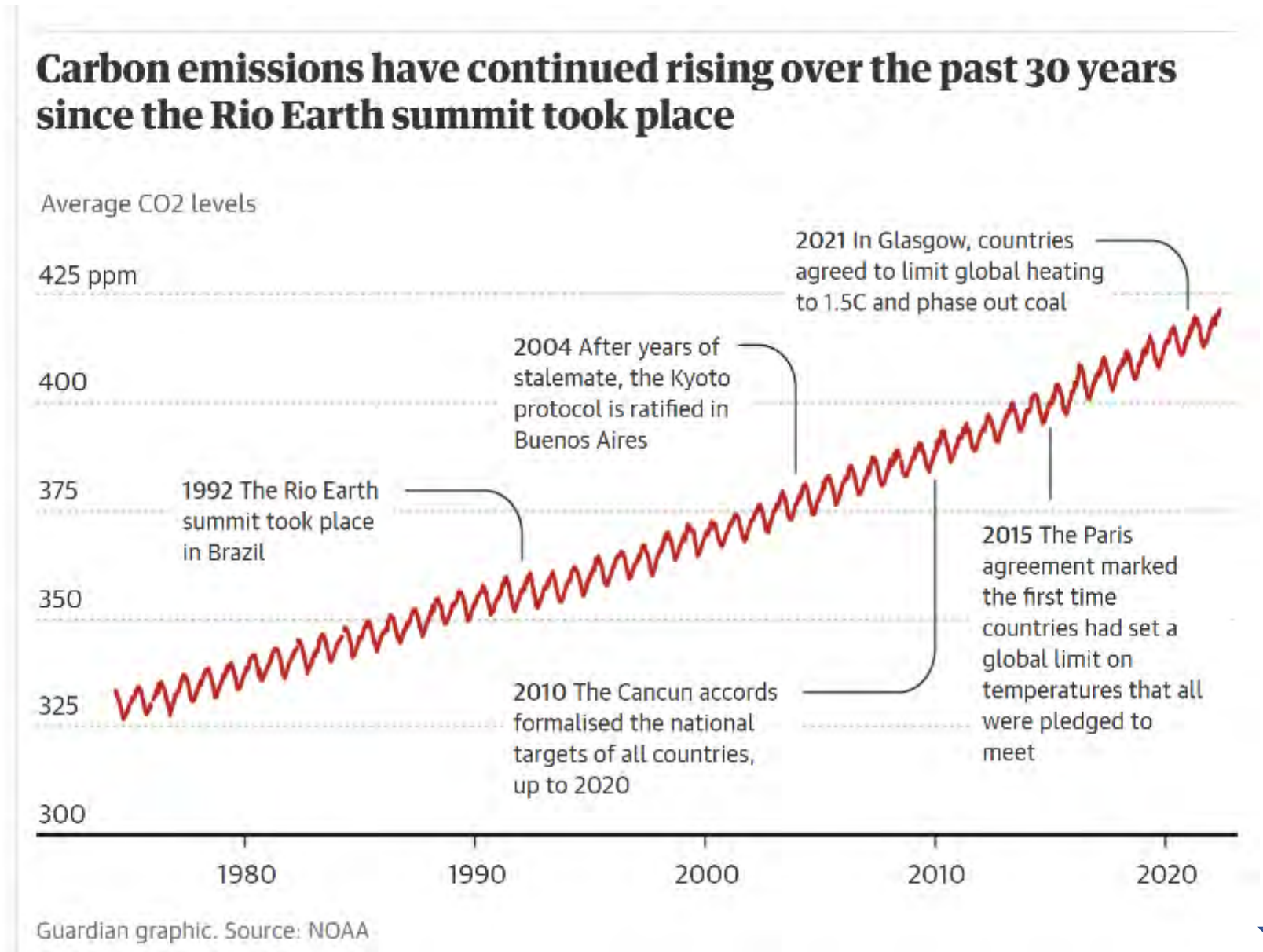
3C West Antarctica & Greenland, could break down quickly

Disappearance of coral reefs, of Amazon rainforest



CO2 Levels since 1975 No Progress at All

<https://www.theguardian.com/environment/2022/jun/11/cop-climate-change-conference-30-years-highlights-lowlights>

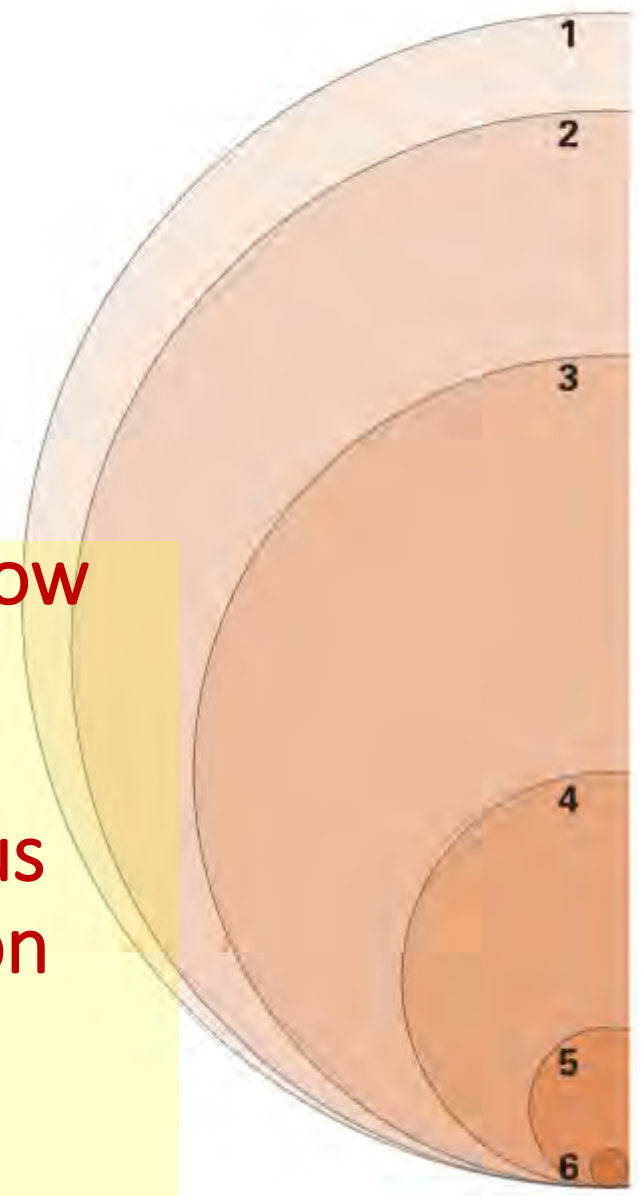


ONE BILLION CHILDREN AT 'EXTREMELY HIGH RISK' OF THE IMPACTS OF THE CLIMATE CRISIS –UNICEF

<https://www.unicef.org.uk/press-releases/onebillion-children-at-extremely-high-risk-of-the-impacts-of-the-climate-crisis-unicef/>
20Aug2021 'The Climate Crisis Is a Child Rights Crisis: Introducing the Children's Climate Risk Index'

It is not given to us to know what will happen a generation from now. Instead, projections tell us what problems to work on

We are called on to change the world



Almost every child on earth (>99 per cent) is exposed to **at least 1** of these major climate and environmental hazards, shocks and stresses.

2.2 billion children are exposed to **at least 2** of these overlapping climate and environmental hazards, shocks and stresses.

1.7 billion children are exposed to **at least 3** of these overlapping climate and environmental hazards, shocks and stresses.

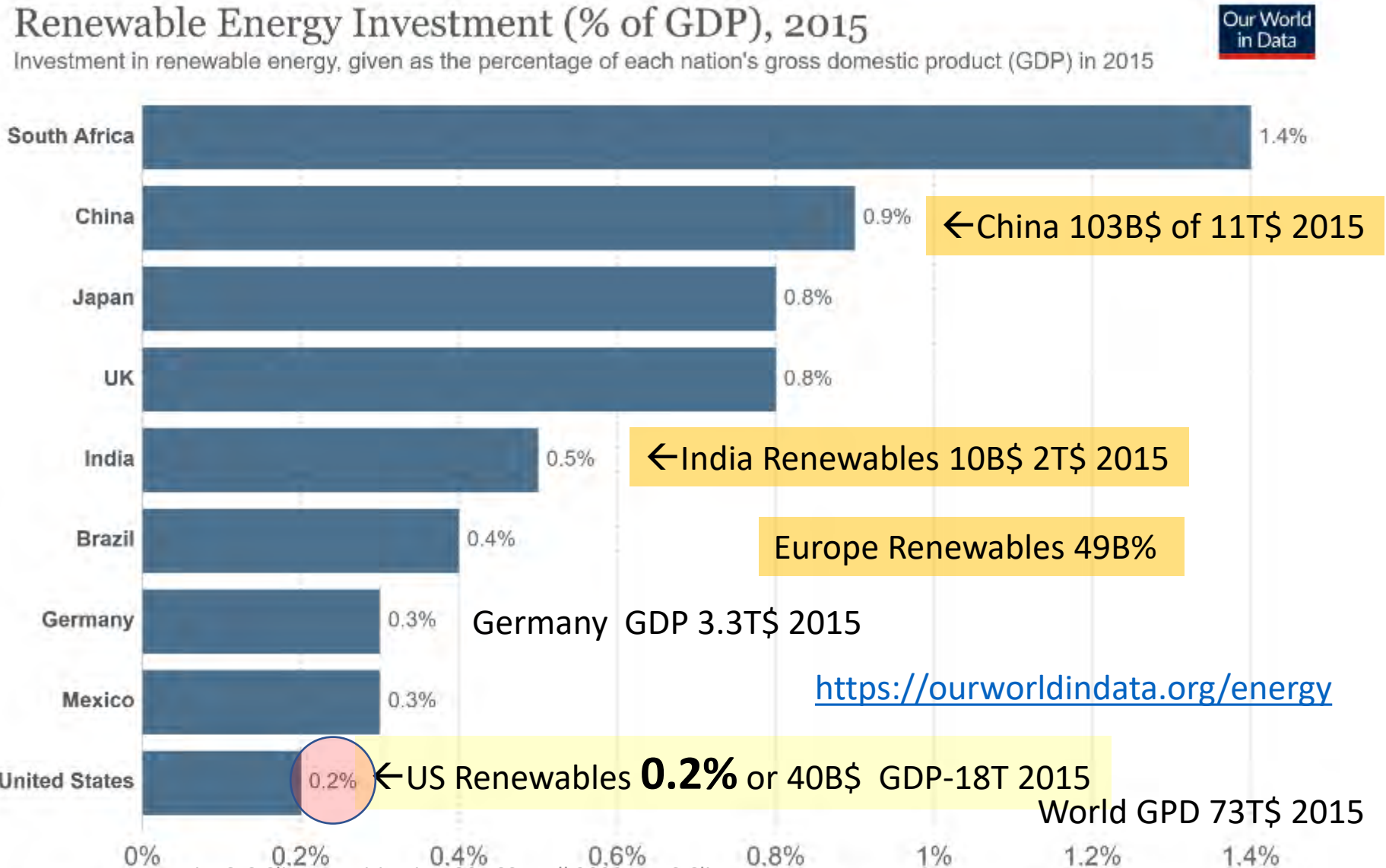
850 million children are exposed to **at least 4** of these overlapping climate and environmental hazards, shocks and stresses.

330 million children are exposed to **at least 5** of these overlapping climate and environmental hazards, shocks and stresses.

80 million children are exposed to **at least 6** of these overlapping climate and environmental hazards, shocks and stresses.



Point of this slide: show tiny (0.3% GDP) world investment in renewables over past 40 years



Source: Bloomberg New Energy Finance, World Bank, OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY



Climate efforts past 40 years tiny relative to economy size

All renewables efforts of past 40 years extremely tiny compared to economy size

in 2015 as percentages of GDP: **Germany-0.3%** **US-0.2%** **China-0.9%**

Inflation Reduction Act IRA of Aug. 2022 – tiny compared to economy size

0.19% of Gross Domestic Product of 20 trillion

3% of US Energy Expenditure's of 1.2T\$ in 2017 from EIA

New York State Climate Plan – also tiny compared to NY State economy size

- **Net costs are small relative to economy's size:** \$15 billion, or **.6% - .7%** of Gross State Product (GSP) in 2030; \$45 billion, or **1.4% of GSP** in 2050. Net costs are small relative to economy's size.

McKinsey report 26Jan2022, unflinching about costs needed for Net Zero 9.2 T\$ or 10% of world GDP

Disruptive Factor: Stunning drop in Renewables Prices;
Explosion of investment in renewables, way beyond spending in past 40 years.



Disruptive Factor: Stunning drop in Renewables Prices;
Explosion of investment in renewables. We are following a new path

Cost vs. Installed Capacity

Miracle of astonishing drop in renewable prices

Learning curve – price drops with installed capacity

<https://ourworldindata.org/cheap-renewables-growth>

Dec. 2020 **Max Roser**

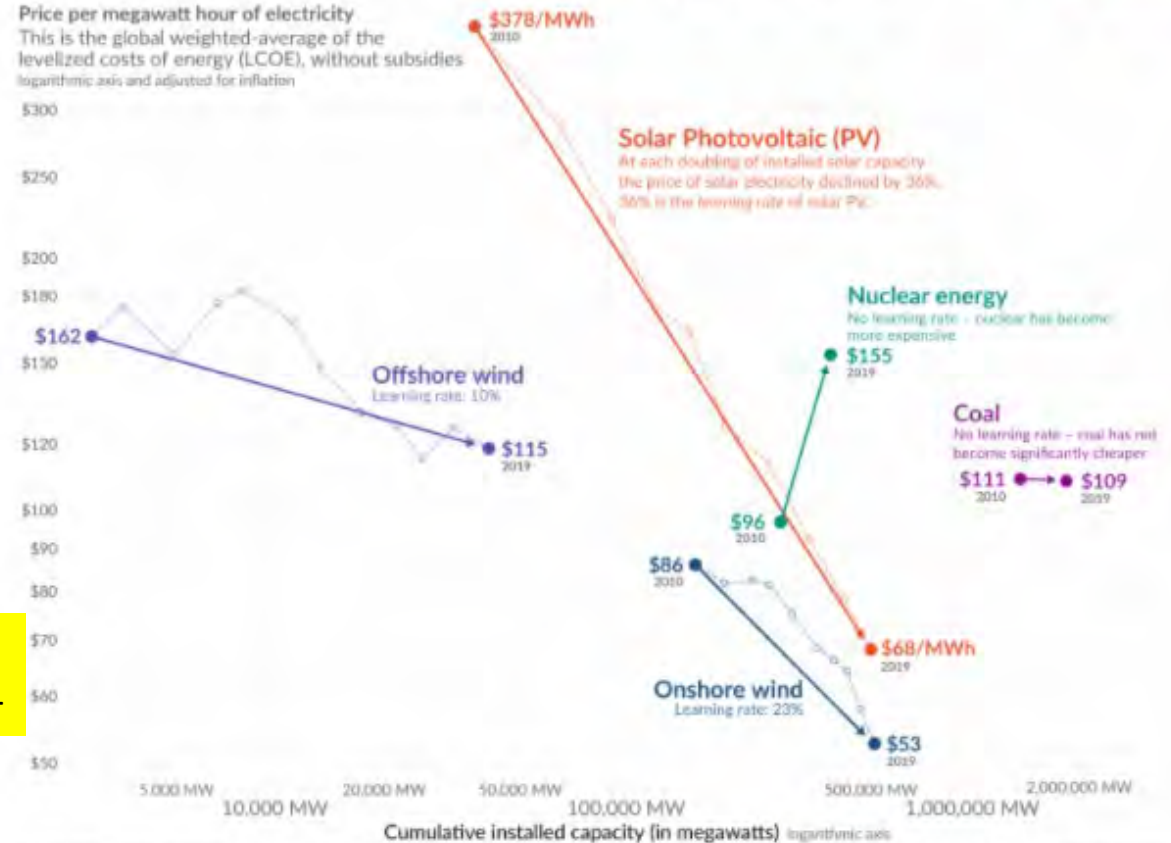
Very clear and important article – I suggest that you read, especially if you want a more positive outlook!

PRICE
\$378-----

PRICE
\$68-----

Electricity from renewables became cheaper as we increased capacity – electricity from nuclear and coal did not

Our World in Data



-----CUMULATIVE INSTALLED CAPACITY-----log scale-----
| 5000MW | 1000000 MW



New York State: Our Climate Act – scoping plan 2022

<https://climate.ny.gov/Our-Climate-Act/Draft-Scoping-Plan>

Climate Leadership and Community Protection Act (CLCPA) – Overview

Carbon neutral economy, mandating at least an 85% reduction in emissions below 1990 levels

40% reduction in emissions by 2030

100% zero-carbon electricity by 2040

70% renewable electricity by 2030

9,000 MW of offshore wind by 2035

6,000 MW of distributed solar by 2025

3,000 MW of energy storage by 2030

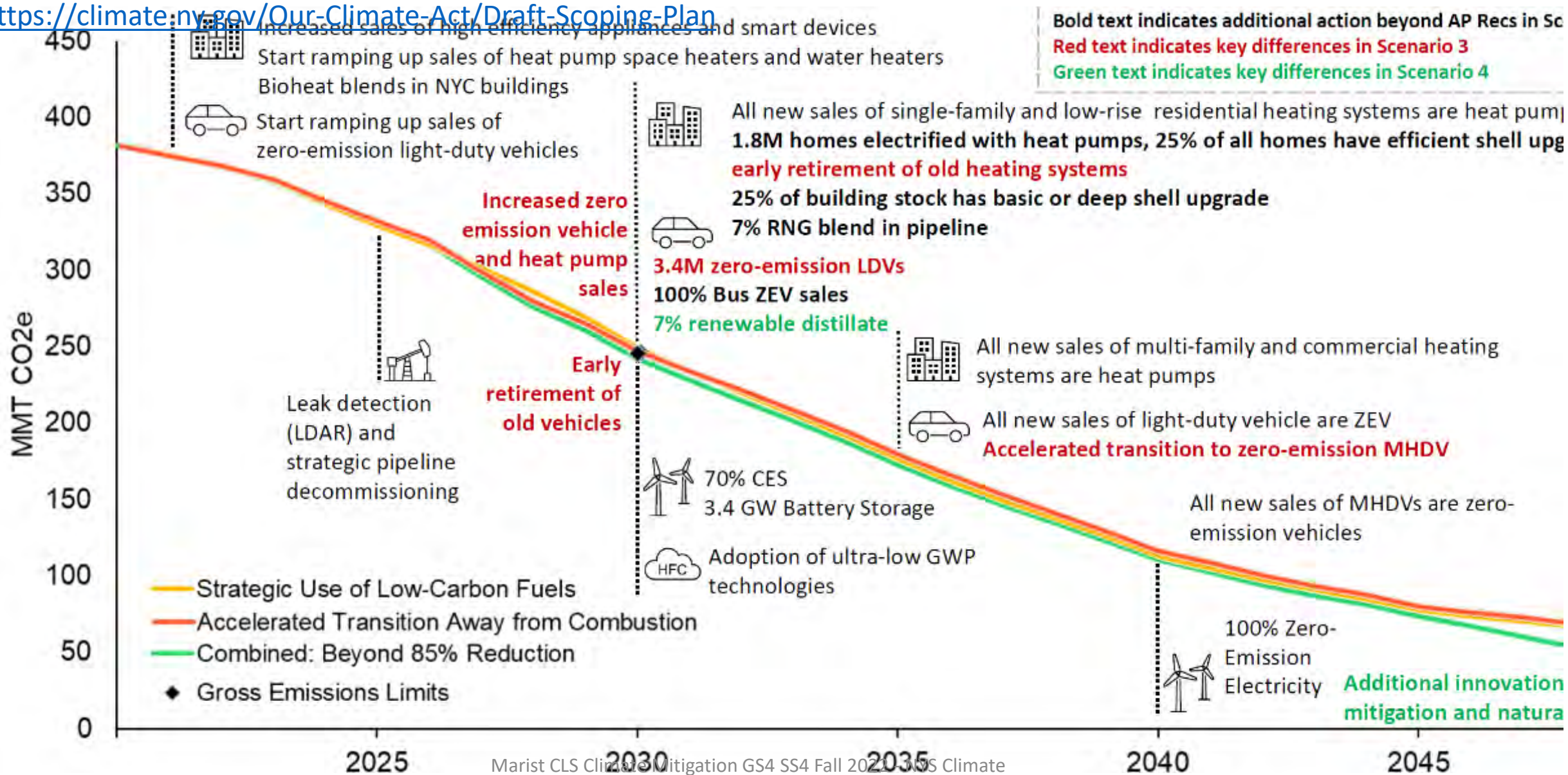
185 TBtu on-site energy savings by 2025

Commitments to climate justice and just transition



New York State: Our Climate Act – scoping plan 2022

<https://climate.ny.gov/Our-Climate-Act/Draft-Scoping-Plan>



NYSRDA New York State Energy Research and Development Authority – selected grants pulled from a very large list

<https://www.nyserdera.ny.gov/-/media/Files/Publications/Annual-Reports-and-Financial-Statements/2021-december-nyserdera-semi-annual-report.pdf> April 1 to Sept 30, 2021 1Dec2021 – sampling of some programs

12.5M\$ long duration energy storage

NYSERDA is helping to stimulate and grow long duration energy storage solutions in New York State by making up to \$12.5 million available. This funding will support innovative and under-utilized long duration energy storage solutions, devices, software, controls, and other complimentary technologies that decrease energy storage total hardware and installation costs, improve performance, and demonstrate integration with the power grid.

61M\$ energy efficiency

The Commercial and Industrial (C&I) Carbon Challenge program provides grant funding between \$500k and 5 million to fund single projects or project portfolios that reduce carbon emissions for large commercial and industrial customers. Projects can include energy efficiency or process efficiency measures, on-site generation, battery storage, beneficial electrification, carbon capture, or other proven efficiency or renewable energy technologies.

15M\$ community heat pump

The goal of NYSERDA's Community Heat Pump Systems Program is to prove the value proposition of connecting a cluster of buildings via a community-style heat pump system, as compared to serving buildings individually via "thermally islanded" heat pumps.

24.5M\$ electric truck

The Electric Truck and Bus Challenge aims to identify and demonstrate ways to reduce the cost, system and operational challenges of further deployment of medium- and heavy-duty (MD/HD) electric vehicles (EVs), including minimizing the costs of charging and grid integration infrastructure for MD/HD EVs; improve the quality of life in disadvantaged and other impacted communities; and demonstrate clear potential for replication and scale

2.5 billion \$ Very large indeed??? !!! electricity generation certificates

RESRFP21-1	□ 2021 RES Purchase of New York Tier 1 Eligible Renewable Energy Certificates	NYSERDA seeks to purchase Tier 1 Renewable Energy Certificates (refer to the RESRFP21-1 Summary for full details) associated with electricity generated from eligible facilities that enter commercial operation on or after January 1, 2015 and on or before November 30, 2023, unless extended to November 30, 2026.	4/22/2021	6/30/2021	\$2,500,000,000.00
------------	--	--	-----------	-----------	--------------------

Scoping Plan and NYSERDA: level of detail is incredible

NYSERDA released 2021 GHG Emissions report Question asked 21 April 2022

<https://www.dec.ny.gov/energy/99223.html#Report>

https://www.dec.ny.gov/docs/administration_pdf/ghgsumrpt21.pdf summary report pdf

Table ES.2: 2019 New York State GHG Emissions, by IPCC Sector

CLCPA Format (mmtCO2e GWP20)	CO ₂ *	CH ₄	N ₂ O	PFC	HFC	SF ₆	NF ₃	Total	% of Total	UNFCCC Total**
Energy	216.07	72.46	0.92	-	-	0.13	-	289.58	76%	164.75
Fuel Combustion	168.67	2.02	0.76	-	-	-	-	171.45	45%	159.31
<i>Electric Power</i>	22.03	0.04	0.05	-	-	-	-	22.12	6%	21.51
<i>Residential</i>	39.38	1.27	0.07	-	-	-	-	40.72	11%	36.18
<i>Commercial</i>	22.35	0.33	0.02	-	-	-	-	22.70	6%	21.94
<i>Industrial</i>	9.08	0.07	0.03	-	-	-	-	9.18	2%	7.38
<i>Transportation</i>	75.84	0.31	0.59	-	-	-	-	76.73	20%	72.29

Exported waste	0.00	10.94	0.00	0.00	0.00	0.00	0.00	10.94	3%	0.00
Gross Total	221.89	133.07	3.35	0.10	20.89	0.13	+	379.43		194.56
% Gross Total	58%	35%	1%	+	6%	+	+			
Net Emission Removals	(29.11)							(29.11)		(29.11)
Net Total*	180.98	133.07	3.35	0.10	20.89	0.13	+	338.53		165.46
% Net Total	53%	39%	1%	+	6%	+	+			

Small sampling of New York State Climate Smart Activities in my town

<https://www.townofpoughkeepsie.com/AgendaCenter/ViewFile/Agenda/02032022-525>



Town of Poughkeepsie
Climate Smart Communities Task Force

April 7, 2022 at 7 pm on Zoom

<https://zoom.us/j/91995613444?pwd=d1dacndyNzI0VEF3ZXlicFJkb1JCQT09>
Meeting ID: 919 9561 3444
Passcode: 866909
One tap mobile: +19292056099,91995613444#

AGENDA

Discussion topics:

- Green fleet - inventory and policy
- Waste management - information from director of recycling facility
- Green business challenge
- Potential projects for grants resulting from Solar Campaign - update on NYSERDA approval of action
- Electric rates and CGA - information from HV Community Power
- ECET
- Leaf blower laws

Updates:

- Dutchess CAPI - Supervisor approval for Climate Adaptation Chapter
- Comprehensive Plan points determination and overall points status
- NRI/Open Space Plan status
- Brochure
- Earth Day Cleanup (CAC)

Town of Poughkeepsie

Climate Smart Communities Task Force

February 3, 2022 at 7 pm on Zoom

<https://zoom.us/j/91995613444?pwd=d1dacndyNzI0VEF3ZXlicFJkb1JCQT09>

Meeting ID: 919 9561 3444

Passcode: 866909

One tap mobile: +19292056099,,91995613444#

Agenda

- Welcoming new member of the Task Force, Feza Oktay
- Items related to the town fleet:
 - Fleet inventory update
 - Planning an approach to discussion regarding a green fleet policy
- NRI/Open Space Plan status
- Recycling for Town Hall
 - Report of meeting with DC Recycling Coordinator and plan for follow up
- Solar for All status
 - Temporary change in personnel at HVRC
- Comprehensive Plan points determination
 - Have we made any headway in reviewing the documents?
- Updated brochure
- Status of Eastdale for revisit of PE7 action
- CAPI status
 - Availability of Climate Adaptation chapter
- Charger grant status
- Outreach to business community re: charging and/or other elements of a Green Business Challenge

Next meeting: Thursday, May 5, 2022 at 7 pm

Marist CLS Climate Mitigation GS4 SS4 Fall 2022 - NYS Climate Act & Astonishing Renewables Price Drop Version 29Sep2022

C. Parks

For Personal Scholarship Only



New York Electricity NYSEERDA plan 2030

<https://www.nysed.gov/About/Publications/New-York-Power-Grid-Study/Story-of-Our-Grid> document not dated, accessed 2022



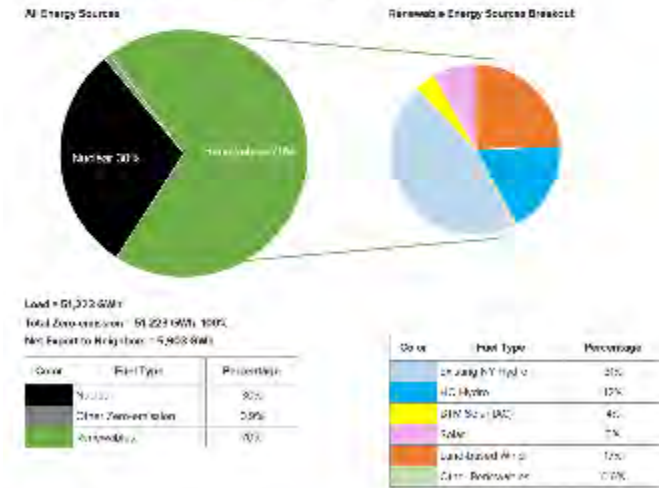
Story of Our Grid

The entire New York state electric system will need to undergo changes to meet the demand for a new energy supply by 2030. By the year 2030, the state's electricity demand is projected to increase by 20% from 2010. The New York State Energy Research and Development Authority (NYSERDA) is leading the effort to plan for this increase. The Power Grid Study is a key component of the Power Grid Study. This study provides a detailed forecast of the state's electricity demand and the state's electricity supply resources for the years 2010, 2020, 2030 and 2040.

Key Takeaways:

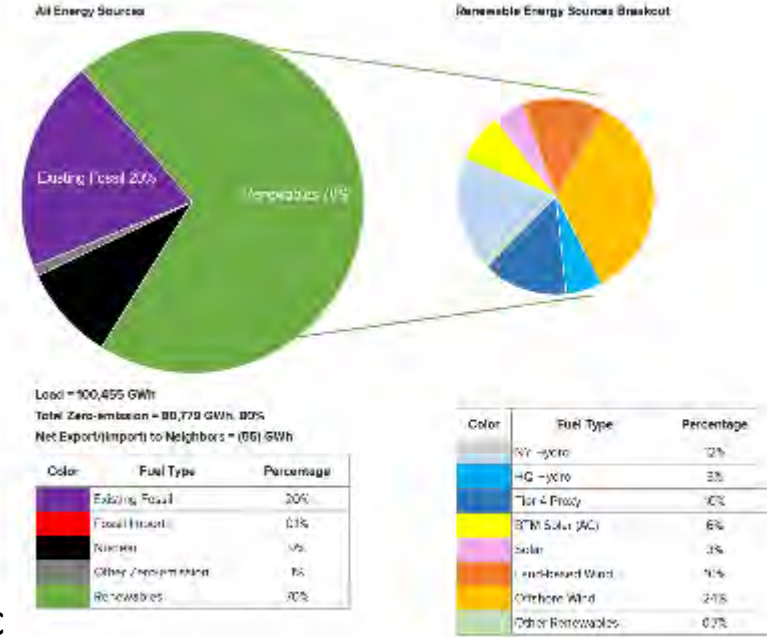
NYS is on track to meet 100% renewable energy by 2030 and 100% clean energy by 2040. The state will have a renewable energy portfolio that includes wind, solar, hydro, and other clean energy resources.

Upstate (Zones A-E) Generation to Serve Load 2030



NYS Hydro significant
 HQ Hydro Quebec
 huge resource in Quebec

Downstate (Zones F-K) Generation to Serve Load 2030



80% of downstate load is met with zero-emissions resources in 2030. 70% of this electricity comes from renewable resources, 26% from existing New York and Quebec hydroelectric generation and an illustrative 14% from renewable energy projects, 24% from offshore wind generation, 28% from solar and land-based wind and other renewables while the other 10% comes from zero-emission resources that include gas peakers.

2030: 51,223 GWH /365/24 -> 5.8 GW Upstate

upstate nuclear 30% or 1.7 GW
 upstate renewables 70% or 4.06 GW

Whole state 15 GW instantaneous

2040: 74,905 GWH

Whole state 23 GW instantaneous

Renewables-75%=6.4GW nuclear-24% = 2GW

2030: 80,779 GWH /365/24 ->9.2 GW Downstate

downstate nuclear 9% or 0.83 GW
 downstate renewable 70% or 6.44GW
 downstate fossil 20% or 1.84GW

2040: 132,602

Renewables 90%=13.6GW, nuclear 7%=1GW



Making sense of electrical energy units: GWatts and GWh

GWatt → power for 1 million people

New York State about 19 GWatts for 19 million people

US electricity usage 452 GWatts for 330 million people @1400Watts/person

World electricity usage 3000 GWatts (lowball value, will rise dramatically)

People are assumed to use 1000 Watts of electrical power; “homes” about 3000 Watts

1 GWatt = 1,000,000,000 Watts = 1E9 Watts = 1000MWatt = 0.001 TWatt

1 GWatt x 365 x 24 = 1 x 8760 = 8760 GWatt-Hours

Indian Point former nuclear 2 units – 2 GWatts → 2 million people or 670,000 homes “25% of NYC usage”

2022 Offshore Wind off Long Island 7 GWatts → press release 2 million homes @3500watts/home

2022 Large Scale Solar Upstate 2 GWatts → press release 67,000 homes @3000watts/home

2025 planned distributed solar NYS 6 GWatts → NYS plan for 2025 10 Gwatts by 2030

East Coast Wind Planned by US 30 GWatts → 30 million people or 10 million homes

New York State population 20 million → x1000 watts = 20E6 x 1E3 = 20E9 20 GWatts

US Population 330 million → x 1000 watts = 330E6 x 1E3 = 330E9 330 actually higher 452 Gwatts

World electricity 3000 Gwatts or 3 TWatt



NY State Has Creditable Plan for Going Renewable – big plays in 2022

my (ccp) own estimates, pulling together many references, outlook changing fast

- New York State uses about 18GWatts electricity, or about 1000 watts for each of 20 million people
- NYSERDA: claims needs of 15GWatts for 2030; 23GWatts for 2040
(other sources always give somewhat different estimates, have to convert units)
- NET: State has creditable plan for going renewable
Hydro 6 + Nuclear 1.7 + Wind 6 + Solar 6 + Quebec 2
21.7 GWatts



NY Governor Hochul: 10 Gigawatts of Distributed Solar Energy by 2030

<https://cleantechnica.com/2022/04/15/ny-governor-hochul-10-gigawatts-of-distributed-solar-energy-by-2030/>

Governor Kathy Hochul, in advance of Earth Week, yesterday announced that the State Public Service Commission has approved a new framework for the State to achieve at least 10 gigawatts of distributed solar by 2030, enough to annually power nearly 700,000 average-sized homes.



Substantial Offshore Wind Farm Leases

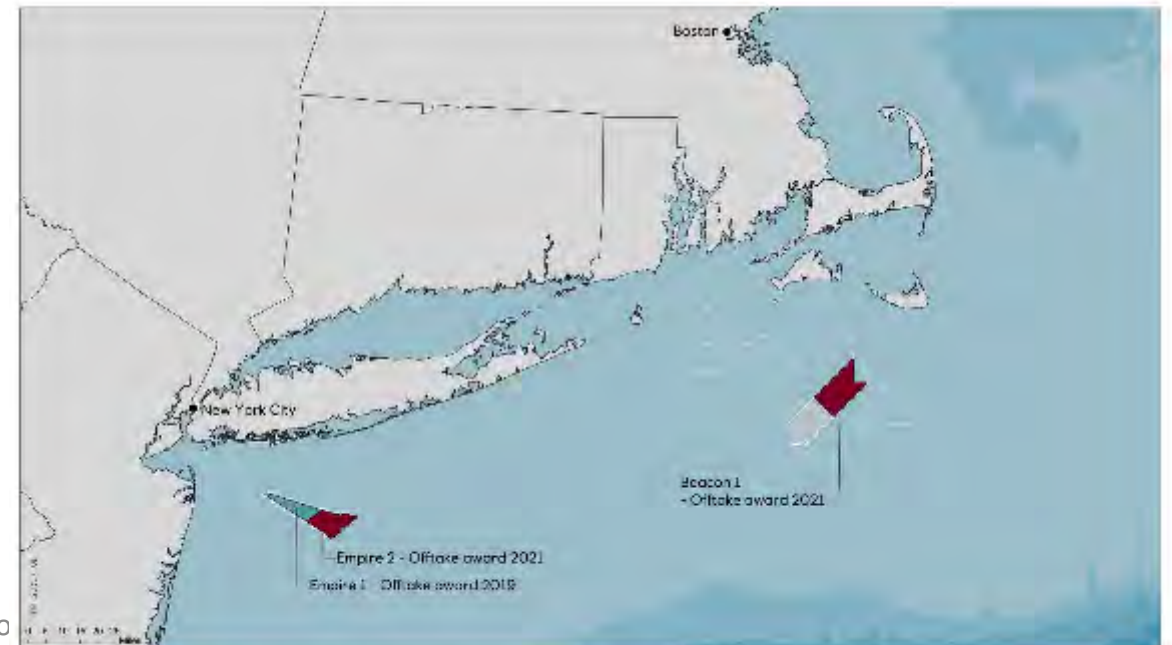
<https://gothamist.com/news/ny-expands-offshore-wind-projects-bringing-wind-hub-brooklyn> 17Jan2021

<https://www.nytimes.com/2022/02/25/climate/new-york-offshore-wind-auction.html> more than \$4B raised

The New York Times | <https://www.nytimes.com/2022/02/25/climate/new-york-offshore-wind-auction.html>

Sale of Leases for Wind Farms Off New York Raises More Than \$4 Billion

The auctioned areas are expected to generate enough power for nearly 2 million homes once turbines are built.

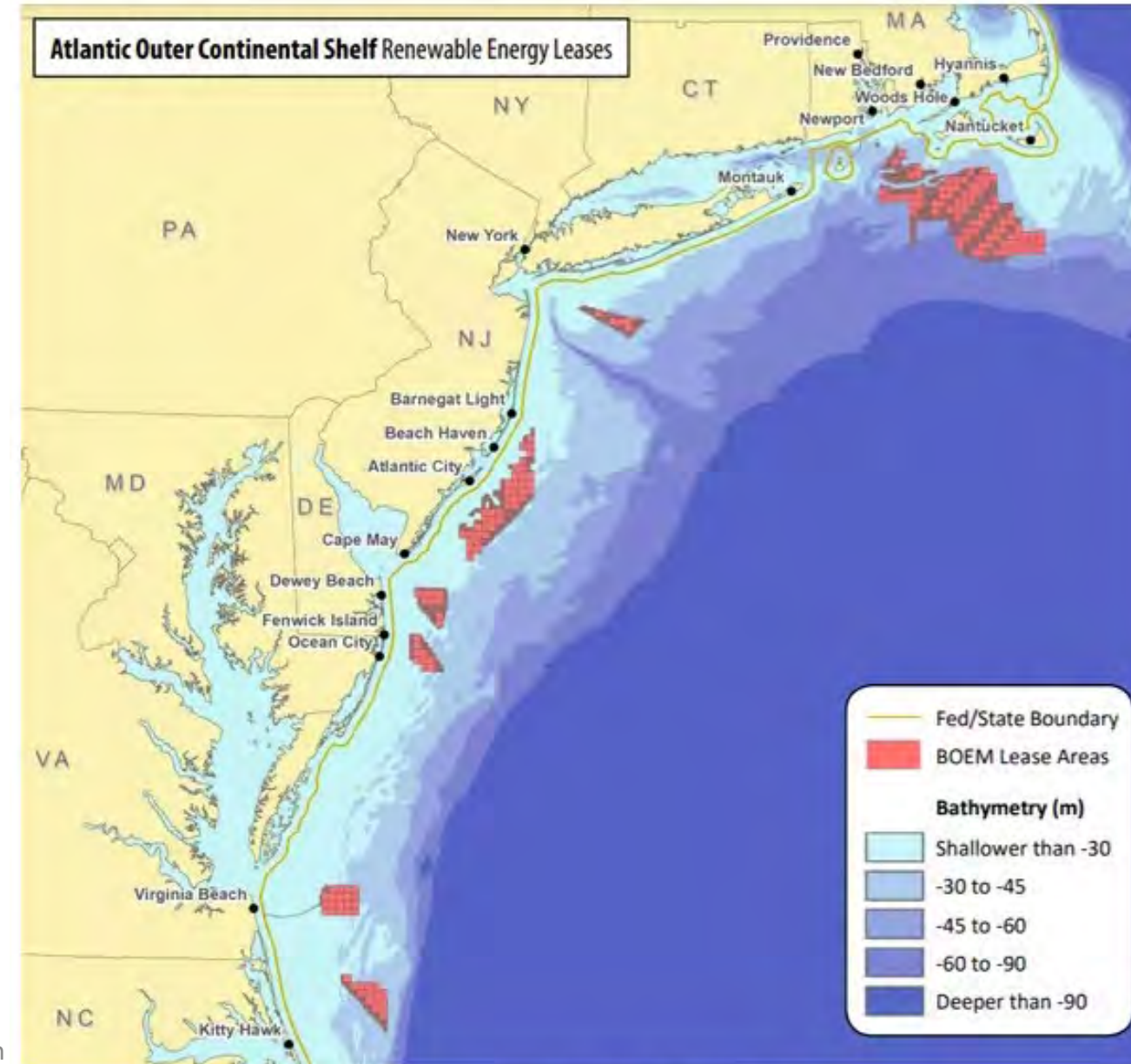


Marist CLS Climate Mitigation
Act & Astonishing Renewables
C. Parks

Map offshore wind farm locations that Equinor will develop. EQUINOR
For personal scholarship only

East Coast Offshore Wind, 30 or 40 GWatts by 2030

<https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/23/fact-sheet-biden-administration-launches-new-federal-state-offshore-wind-partnership-to-grow-american-made-clean-energy/> 23jun2022



Marist CLS Climate Mitigation
Act & Astonishing Renewables
C. Parks

Developers already hold wind energy leases for several areas off the East Coast. BOEM
FO: Personal Scholarship City



US electricity usage 2020

452 GWatts or 1400 Watts per US person

Renewables was 95 GWatt

Renewables growth explosive

Substantial Offshore Wind after almost nothing

30-40 GWatts up-coming Offshore Wind East Coast

27 GWatts Midwest Wind 2020

28 GWatts Texas 2020

US 118 GWatts by end of 2020 (eia)

25 GWatts California deep water offshore by 2045

<https://cleantechnica.com/2022/08/04/the-u-s-power-grid-added-15-gw-of-capacity-in-1st-half-of-2022/>

<https://www.eia.gov/todayinenergy/detail.php?id=48896> 834 billion kilowatthours (kWh) of electricity, or about 95 GWatts renewables in 2020

Operable utility-scale generating units (June 2022)



Data source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*, June 2022. Note: Utility generating units are those with at least 1 megawatt of nameplate capacity

New York Clears \$4.5 Billion Plan to Bring Hydropower to Big Apple

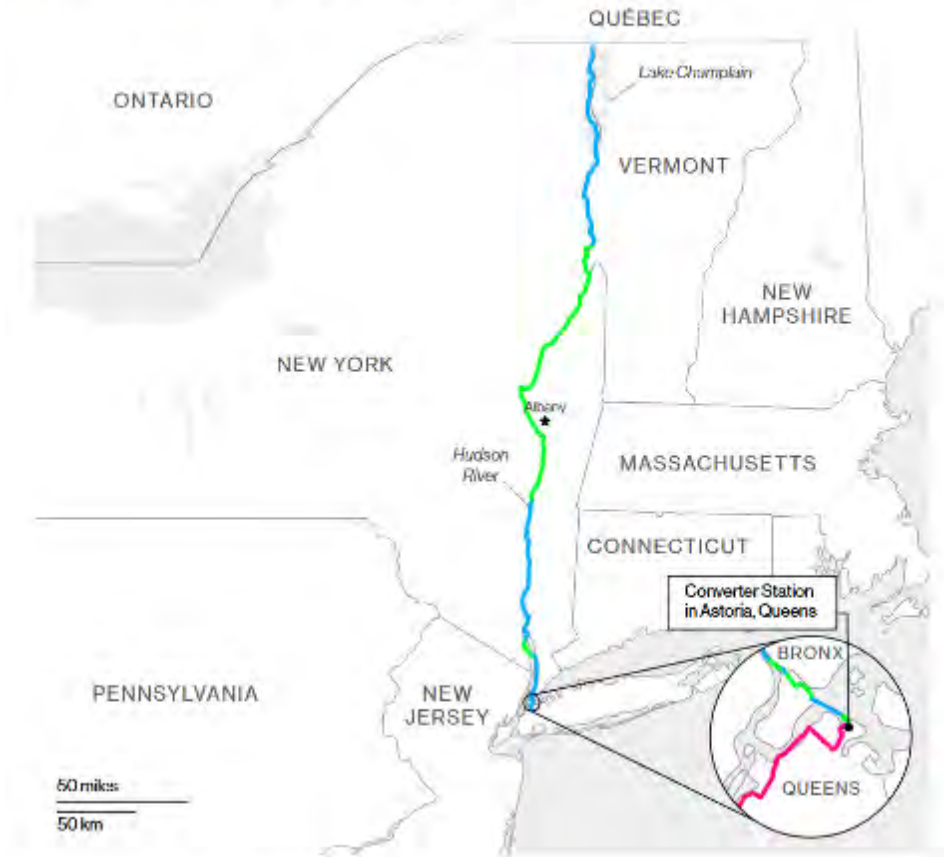
<https://www.bloomberg.com/news/articles/2022-04-14/new-york-approves-4-5-billion-plan-to-bring-hydropower-to-nyc>

The Champlain Hudson line will carry **1,250 megawatts** of electricity from hydropower facilities in Canada owned by Hydro-Quebec, enough for more than 1 million New York homes.

New Power

Planned transmission line would supply New York City with hydropower

Underwater Underground Astoria-Underground



Source: Champlain Hudson Power Express



Maine voters block transmission line from Quebec Hydro to Massachusetts (But state Court just reinstated project 30Aug2022)

<https://www.nytimes.com/2022/05/06/climate/hydro-quebec-maine-clean-energy.html>

<https://www.eenews.net/articles/maine-supreme-court-revives-contentious-transmission-project/> Aug 30, 2022 Court reinstates transmission line



According to [a major study](#) by Princeton University, the country must triple its transmission capacity by 2050 to have a chance at reaching its goal of not adding any more carbon dioxide to the atmosphere by that point.

Complex weighing of priorities and values!

... an unlikely coalition of residents, conservationists and Native Americans waged a rowdy campaign funded by rival energy companies to quash the effort ...

Quebec Hydroelectricity – 37 GWatts - **Enormous**

New York – plans to import about 2 GWatts, transmission lines critical

Hydroelectric to back up intermittent Wind and Solar

Dramatic Quebec & NE US Regional Thinking potential

<https://en.m.wikipedia.org/wiki/Hydro-Qu%C3%A9bec>

<https://www.nytimes.com/2022/05/06/climate/hydro-quebec-maine-clean-energy.html>

<https://climate.mit.edu/posts/mit-study-highlights-benefits-two-way-exchange-electricity-between-us-northeast-and-quebec>

12Feb2022 As the study shows, expanding transmission lines between Canada and the U.S. can substantially decrease power system costs as the region decarbonizes. The authors estimate that the addition of 4 GW of new transmission between New England and Quebec **would lower the costs of a zero-carbon electricity system in these regions by 17-28%.**

Importance of regional thinking

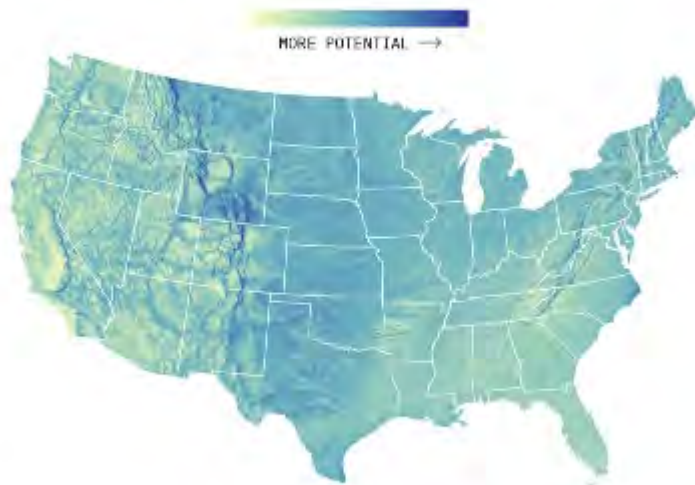


Strategic Transmission line from super windy Wyoming to Los Angeles

<https://finance.yahoo.com/news/power-line-could-save-california-160031068.html> 22Aug2022

U.S. wind resource strength

The Rocky Mountain region has some of the nation's strongest wind energy potential.



Wind speeds at 80 meters above surface level
National Renewable Energy Laboratory

Anschutz power line route



Point of this slide: Electrification everywhere beneficial all the way down to home equipment

Electrification of lawn mowers and leaf blowers: Surprisingly beneficial in minimizing air pollution

<http://www.peoplepoweredmachines.com/faq-environment.htm> undated **Cleaner Air : Gas Mower Pollution Facts**

<https://news.yahoo.com/leaf-blowers-lawn-mowers-and-fertilizer-how-lawns-contribute-to-climate-change-190726545.html?guccounter=1>

22Jun2022 **Leaf blowers, lawn mowers and fertilizer: How lawns contribute to climate change**

EPA Statistics: Gas Mowers represent 5% of U.S. Air Pollution

Each weekend, about 54 million Americans mow their lawns, using 800 million gallons of gas per year and producing tons of air pollutants. Garden equipment engines, which have had unregulated emissions until the late 1990's, emit high levels of [carbon monoxide, volatile organic compounds and nitrogen oxides](#), producing up to 5% of the nation's air pollution and a good deal more in metropolitan areas.

According to the U.S. Environmental Protection Agency (EPA), a new gas powered lawn mower produces volatile organic compounds and nitrogen oxides emissions air pollution in in in one hour of operation as 11 new cars each being driven for one hour.



My 2022 electric lawn mower gets whole lawn done, is light weight maneuvering on steep slopes, minimum maintenance having no spark plugs. Quiet. No fumes, No oil.

Heating oil, dominant in Northeast US

<https://www.eia.gov/energyexplained/heating-oil/use-of-heating-oil.php>

Who uses heating oil?

In the winter of 2020–2021, about 5.3 million households in the United States used heating oil (distillate fuel oil) as their main space heating fuel, and about 82% of those households were in the U.S. [Northeast Census Region](#).¹

In 2020, residential consumers in the Northeast used about **2.6 billion gallons of heating oil**, equal to about 85% of total U.S. residential heating oil sales.²

Size of benefit of Heat Pump Conversion from Oil is enormous:

Significant cost benefit for homeowner over a decade or two. But large for CO2 reduction:

US home average 500 gallons CO2 Weight of 60 people

2020 Northeast 2.6 Billion gallons of heating oil,

CO2 Weight of 400 million people



Texas company develops more efficient home heating and cooling technology to cut utility bills by 60%

17June2022

U.S. Secretary of Energy Jennifer Granholm visited Carrollton to offer congratulations

<https://www.wfaa.com/article/tech/science/climate-change/texas-company-more-efficient-home-heating-cooling-technology-cut-utility-bills/287-39d83cd5-d482-4195-82f0-41ac079c0bb5>

<https://www.energy.gov/eere/buildings/residential-cold-climate-heat-pump-challenge>

Air Source Heat Pumps (as well as Ground Source Heat pumps) have advanced beyond recognition. They can now replace an oil furnace in our NY Climate.

“Congratulations to your team for successfully having navigated this challenge,” Granholm said. One way the Biden Administration is tackling climate change is by reducing the amount of energy we use to heat and cool our homes, which includes better heat pump technology. While pumps are already more efficient than most A/C units or furnaces, what Lennox did was make them efficient in even the most extreme cases, like the five-degree conditions inside its Carrollton testing facility, by participating in the Department of Energy’s Cold Climate Heat Pump Challenge.

Heat Pump sellers,
experts, home owners
have Zoom meeting
June 2022 in my
county

EVERYTHING YOU COULD POSSIBLY NEED TO KNOW ABOUT HEAT PUMPS

An In-Depth Webinar



From mini-splits to geothermal systems, come learn about these high-efficiency ways to heat and cool buildings that can be powered by renewable energy.

- Where they make sense;
- How to select a system and contractor;
- Design questions that matter;
- What to look for in a warranty;
- Costs, financing and incentives to save money for your home or business.

Featuring:



TOM KACANDES
Sr. Consultant, Vermont Energy Investment Corp.
"Thinking Through Your Heat Pump Options"



DANDELION
Dandelion Geothermal
"The Why and How of Geothermal"



RYCOR HVAC



Central Hudson

ROB PENNEY
RYCOR HVAC
"The Why and How of Air Source Heat Pumps"

RAY COTTO
Central Hudson
"Choosing a Contractor and Maximizing Savings"

June, 22nd | 6:30 pm
Free webinar registration:
tinyurl.com/SHVheatpump



Substantial heat pumps/clean heat incentives 2021-2023

<https://www.cenhud.com/en/my-energy/save-energy-money/residential-incentives/heatpumpincentives/> 2020-2023
<https://cleanheat.ny.gov/>

Comparing Heat Pump efficiencies from estimated energy savings, for reference:

Air Source \$ 900
 Ground Source \$1500

Ground source uses 55 degree F ground reservoir,
 Air source uses whatever the outside temp is

Ground-Source Heat Pump

1) Central Hudson/Clean Heat Rebate:

-Up to \$2,000 per Btuh of full load AHRI capacity. \$500 of total incentive may be allocated to the contractor.

2) Federal Tax Credit:

-Percentage off the total cost of the GSHP system.



GSHP	
(All figures are estimates, shown for sample purposes only. Rebate amounts subject to change.)	
GSHP and Installation	\$25,000*
Central Hudson/Clean Heat Rebate You must use a certified clean heat contractor to receive the rebate.	-\$9,100*
Federal Tax Credit (Investment Tax Credit. (Check with your tax advisor for current tax incentives.)	-\$6,500
Total Estimated Cost	\$9,400
Estimated Annual Energy Savings	\$1,500*** (up to)

Cost varies with region, installation complexity, installer, system size and manufacturer. Work with a certified clean heat contractor to determine what size unit you will need for your home or business. **\$500 may be allocated to the contractor. *Efficiency calculated by comparing heating performance of an ENERGY STAR-certified closed loop water-to-air geothermal heat pump to an ENERGY STAR-certified oil furnace.*



NY State Has Creditable Plan for Going Renewable – big plays in 2022

my (ccp) own estimates, pulling together many references, outlook changing fast

- New York State uses about 18GWatts electricity, or about 1000 watts for each of 20 million people
- NYSERDA: claims needs of 15GWatts for 2030; 23GWatts for 2040
(other sources always give somewhat different estimates, have to convert units)
- NET: State has creditable plan for going renewable
Hydro 6 + Nuclear 1.7 + Wind 6 + Solar 6 + Quebec 2
21.7 GWatts



The NYS Climate Leadership and Climate Protection Act

CLS Marist GS4 & SS4 Poughkeepsie NY Sept. 21, 2022 Lect3: NYS Sept. 28 Lect4: can Economics save climate?

- **Astonishing drop in renewables prices and Renewables Explosion. Can Economics Save the Climate? This lecture explores New York State implications**
- World 3C likely Future – 40C heat waves rise till achieve Net Zero CO2
 - Spectacularly Small Response past 40 years <0.3% of Gross Domestic Product (US & others)
 - **After 40 years, the NYS and Global renewables train has moved out of the station**
- NY State Climate Leadership Act of 2019
 - “Scoping Plan” highlights of one of world’s most ambitious plans
- NY State renewables – Do numbers add up? Yes they do
 - Solar
 - Offshore Wind
 - Transmission lines - Quebec hydroelectric Upstate Solar
- Heat pumps -- 600gal oil/household maybe comparable in importance to electric cars
- NET: NY State Climate Leadership Act – Electrification & Renewables

Our State Greatly Exceeds Expectation

Marist CLS Climate Mitigation GS4 SS4 Fall 2022 - NYS Climate Act & Astonishing Renewables Price Drop Version 29Sep2022

C. Parks

For Personal Scholarship Only

