

Part 1. American Nuclear Society

Part 2. Nuclear, It's Criminalization, and LNT

A stylized graphic of an atomic symbol, consisting of three intersecting elliptical orbits and two circular nuclei, rendered in a light blue color against the dark blue background.

**American Nuclear Society**

# Mary Lou Dunzik-Gougar

President American Nuclear Society

Associate Dean College of Science & Engineering

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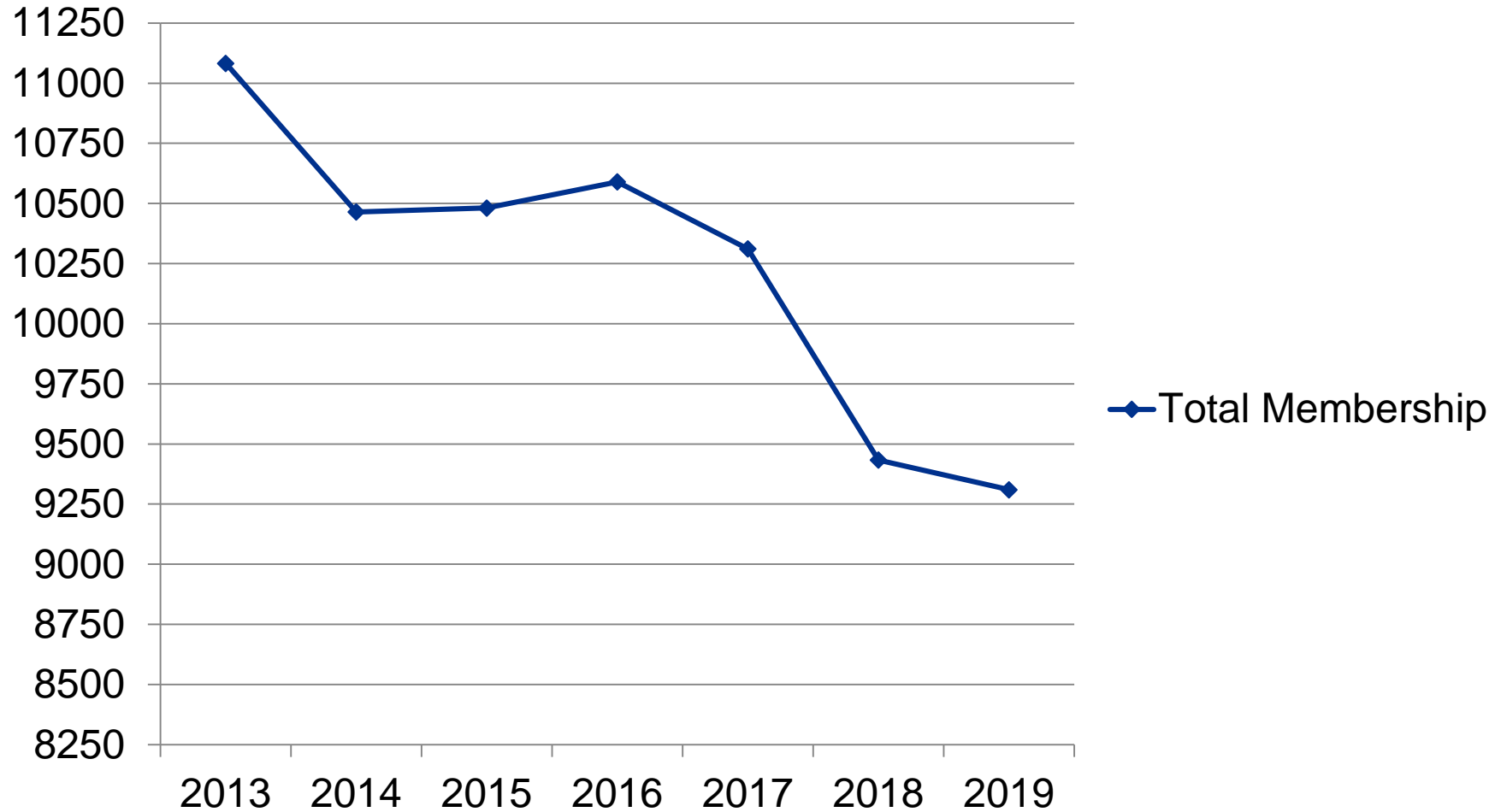
5 November 2020

# ANS Change Plan 2020

- Continuing downward trend in membership and upward trend in budget deficit demanded change

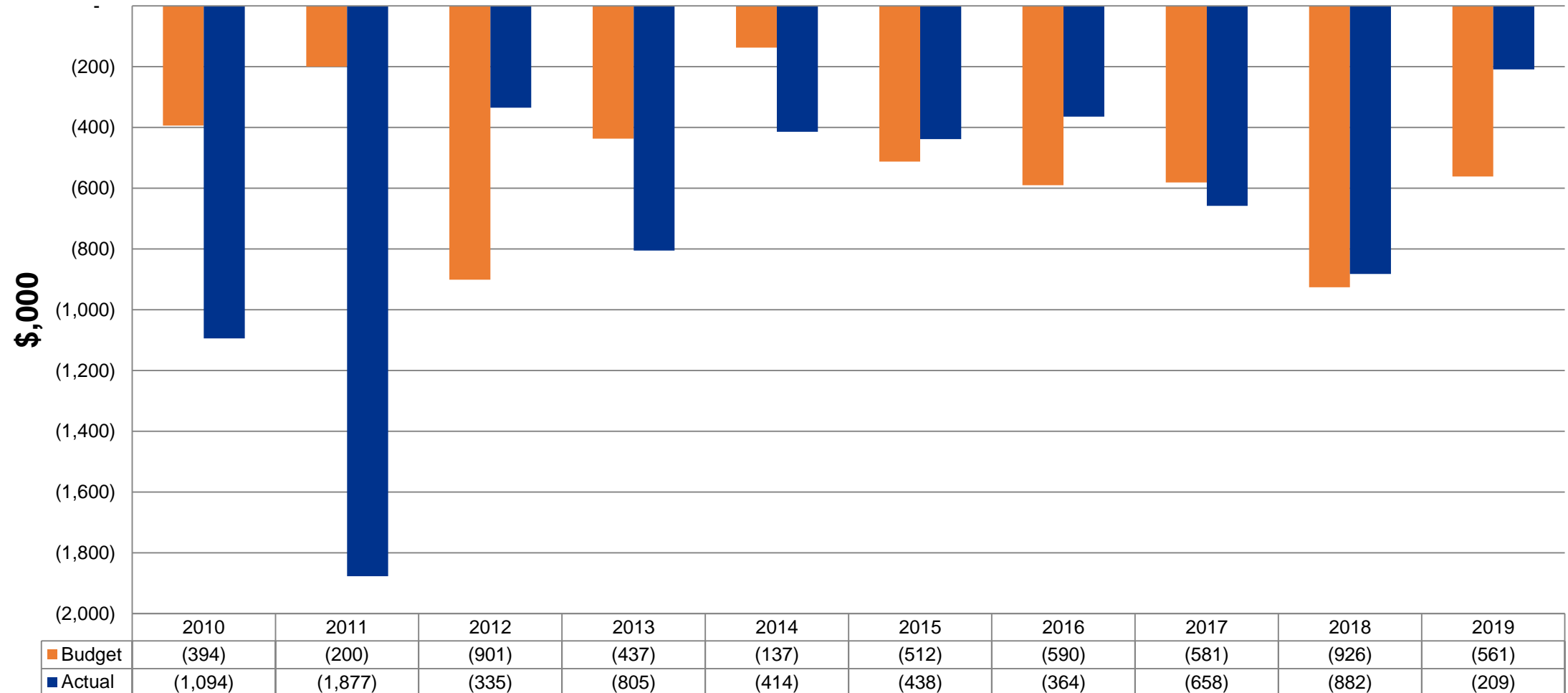
# Membership Trends - Overall

## Total Membership as of December 31, 2019



# Operating Deficits

## ANS Operations - (Budget, Actual) 2010 - 2019



# ANS Change Plan 2020

- Continuing downward trend in membership and upward trend in budget deficit demanded change
- Change Plan 2020 developed by group of past Presidents and Board members
- Board of Directors passed Change Plan in June 2019 and Implementation Plan in November 2019
- Overall objectives
  - More strategic fundraising and targeted spending to serve members
  - Stabilize and grow membership numbers
  - Improve member benefits (e.g. new member service center)
- New Executive Director/CEO, Craig Piercy, hired late 2019
  - HQ operational review January-February
  - Reorganization/IT upgrades

# 2020 Annual Meeting (June 2020)

- COVID-19 pandemic required cancellation of in-person meeting (including hotel contract cancellation penalty)
- Had to go virtual or go dark
- Heroic staff put together completely virtual, very successful meeting
  - More than 2300 registrants!
  - Would have generated revenue, but for hotel contract cancellation fee
  - Numerous institutions asked how we did it after the fact (e.g. HPS)
- Plenary and technical sessions recorded for later viewing by registrants
- Kudos to staff, who did all of this after an emotional reorganization and while working remotely due to COVID!

# 2020 Winter Meeting (November 16-18, 2020)

- Will be virtual and even better than June meeting!
- Already more registrants than at this time before the June meeting.
- 3 big plenaries
  - Opening plenary: unlike any before! Provocative and engaging. Alex Epstein, the moral case for nuclear power
  - General chairs plenary (Paul Kearns, ANL Director and Bryan Hanson, Exec VP and CGO at Exelon): Nuclear science and industry: The next transformation
  - President's special plenary: As Low As Reasonably Achievable? How reasonable are our dose regulations? What do we know about effects of low dose and how can we effectively communicate it?
- Over 150 technical sessions



# Going forward . . .

**Inward facing (members and societal function)**

Dual mode (in-person/virtual) meeting organization

Continuing implementation of Change Plan 2020

**Outward facing (members and the public)**

Changing the way nuclear is viewed, starting by changing the way we, as members, *think about nuclear*

## Part 2. Nuclear: Why the Resistance?

Nuclear energy has become the cleanest, safest, most reliable and scalable source of energy on the planet.

Even in the age of Climate Alarmism, nuclear is not considered THE answer . . . WHY????

# Some quotes....

## NASA

Although NASA's main focus is not on energy-technology research and development, work is being done around the agency and by/with various partners and collaborators to find viable alternative sources of energy to power our needs. These sources of energy include the *wind, waves, the Sun and biofuels*.

<https://climate.nasa.gov/solutions/adaptation-mitigation/>

## EPA

- Green Power Partnership
- Coal, oil, natural gas, nuclear are “**least beneficial**” to the environment (interesting standard)
- Solar, wind, geothermal, biogas, biomass, and low-impact hydropower are “most beneficial” to the environment

(<https://www.epa.gov/greenpower/what-green-power>)

## And not just government

### **Google**

Committed to buy “enough wind and solar electricity annually to account for every unit of electricity our operations consume, globally”

(<https://sustainability.google/projects/announcement-100/>)

### **Amazon**

“Committed to using 100% renewable energy across our global infrastructure”

Supports 70 renewable energy projects

- Solar
- Wind

(<https://sustainability.aboutamazon.com/environment/sustainable-operations/renewable-energy>)

## And of course

### **Sierra Club**

“Ready for 100” campaign advocates for communities to commit to “transition to 100% clean, renewable sources of energy, like wind, solar, and battery storage.”

<https://www.sierraclub.org/ready-for-100>

### **Greenpeace**

Recommends, “The path forward is an immediate halt to new oil, gas, and coal development in the U.S. and a managed phase out of existing fossil fuel production consistent with safe climate limits.”

<https://www.greenpeace.org/usa/reports/fossil-fuel-phaseout/>

# What's going on? What's behind the animosity?

Consider the environmentalist premise . . .

The natural world is good.

Changing the natural world is bad.

Humans change the natural world, so *humans are bad*.

Premise evidenced by statements such as . . .

Humankind “would not rest content until the earth is covered completely, and to a considerable depth, with a writhing mass of human beings, much as a dead cow is covered with a pulsating mass of maggots” (Harrison Brown, *The Challenge of Man’s Future* in 1950)

<https://www.forbes.com/sites/michaelshellenberger/2018/06/11/if-nuclear-power-is-so-safe-why-are-we-so-afraid-of-it/#3e1cd4c96385>

<https://play.google.com/store/books/details?id=OUfHLQ84KjMC&rdid=book-OUfHLQ84KjMC&rdot=1>

Premise evidenced by statements such as . . .

Brown's view was an extension of the ideas of 19th Century economist Thomas Malthus who lusted for the extermination of his fellow man, particularly the poor and the Irish. "Instead of recommending cleanliness to the poor," Malthus argued, "we should encourage contrary habits...and court the return of the plague."

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Premise evidenced by statements such as . . .

Such anti-humanist ideas came full bloom in Stanford biologist Paul Ehrlich's 1967 Sierra Club pamphlet, *The Population Bomb*, which depicted poor people in India as animals "screaming...begging...defecating and urinating."

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Premise evidenced by statements such as . . .

The small-world, zero-population-growth, soft-energy-path faction of the environmental movement that emerged across the 1960s and 1970s knowingly or unknowingly incorporated the antihumanist ideology of the neo-Malthusians into its arguments... “more power plants create more industry,” [the Sierra Club’s executive director complained,] “that in turn invites greater population density.” (From Richard Rhodes’ in *Energy: A Human History*, 2018)

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Premise evidenced by statements such as . . .

”Our campaign stressing the hazards of nuclear power will supply a rationale for increasing regulation and add to the cost of the industry.” Sierra Club President (1974)

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<https://play.google.com/store/books/details?id=OUfHLQ84KjMC&rdid=book-OUfHLQ84KjMC&rdot=1>

## Premise evidenced by statements such as . . .

David Graber, biologist with National Park Service, “Human happiness, and certainly human fecundity, are not as important as a wild and healthy planet. I know social scientists who remind me that people are a part of nature, but that isn’t true. Somewhere along the line – at about a million years ago, maybe half that – we quit the contract and became a cancer. We have become a plague upon ourselves and upon the Earth. Until such time as Homo Sapeins should decide to rejoin nature, some of us can only hope for the right virus to come along.

<https://www.forbes.com/sites/michaelshellenberger/2018/06/11/if-nuclear-power-is-so-safe-why-are-we-so-afraid-of-it/#3e1cd4c96385>

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# Which stands in stark contrast to promise of nuclear

“Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power-starved areas of the world.”

President Eisenhower, Atoms for Peace speech (1953)

## But aren't humans natural, too?

- We are part of this world
- We evolved over time, along with other species
- However, different from other species, our evolution included developing the capability to reason, to think
- THAT is why we thrive
- We don't have the physical attributes to thrive and nature doesn't provide what we need to thrive
- We understand and harness nature to create benefits
- We thrive because we are able to “change nature”

# “Changing nature” is what scientists and engineers do!

- Harness otherwise useless resources and change them to make them useful (Alex Epstein, [industrialprogress.com](http://industrialprogress.com))
- Extract coal/oil/natural gas and uranium to make electricity
- Wind, solar and hydropower also not possible without resource extraction
  - petroleum for wind turbines
  - rare earth elements for solar panels
  - iron for hydroturbines
- Wind and solar not viable without backup from hydro, fossil, nuclear

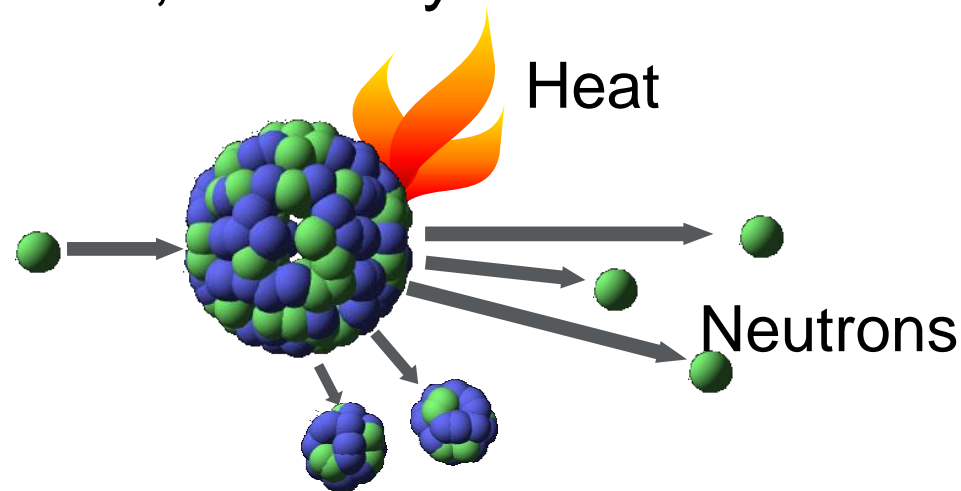
# The anti-human flourishing worldview leads to . . .

Pressure to increase regulations

Associated litigation

The “criminalization of nuclear”\*

- Nuclear is offensive to some because we understand and exploit the energy of the nucleus, the very foundation of all matter



(\*Alex Epstein, Industrial Progress)



# If Mary Lou were Empress

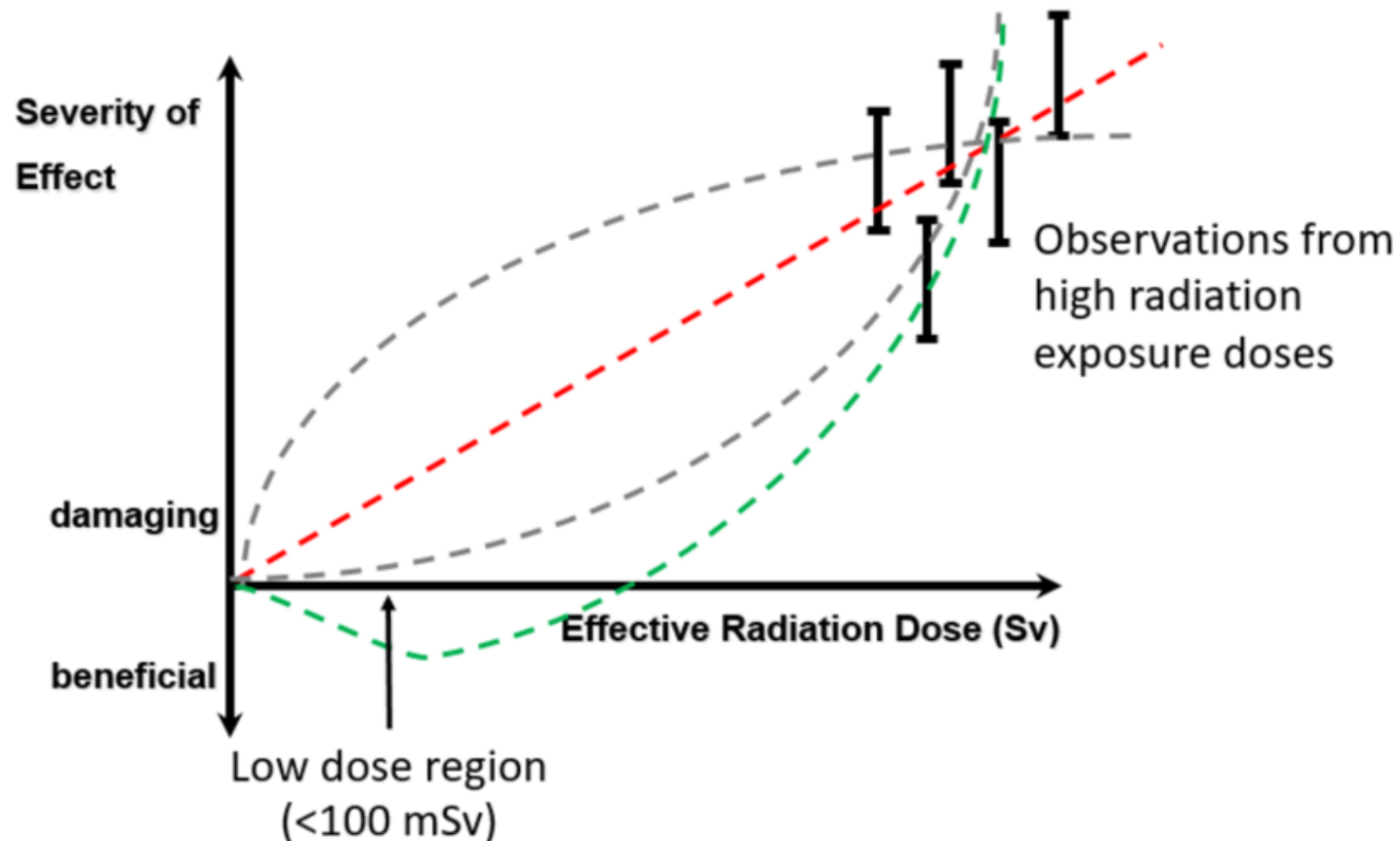
(Disclaimer: not ANS views) . . .

1. No more subsidies for any kind of power production
  - Get rid of “feed through tariffs” (guaranteeing above market price for renewable feed to grid)
2. Truly free energy market with consumer choice of power source and associated cost
  - Get rid of “renewable portfolio standards” (requiring some % renewable)
3. Privatize nuclear waste management
4. Make regulations commensurate with risk, rather than based on Linear No Threshold (LNT) hypothesis, which is unsubstantiated for low doses at which we regulate, and As Low As Reasonably Achievable (ALARA)

# Today, let's focus on LNT/ALARA

## Linear No Threshold hypothesis

- 0 dose = zero risk
- Therefore 0 is the goal, because we want 0 risk (As Low As Reasonably Achievable)



- Unsubstantiated at low doses
- “Low-dose responses are non-linear at all levels of biological organization (molecular, cellular, tissue, organism) and suggest that LNT overestimates risk” (Tony Brooks, radiation oncologist)

# LNT/ALARA

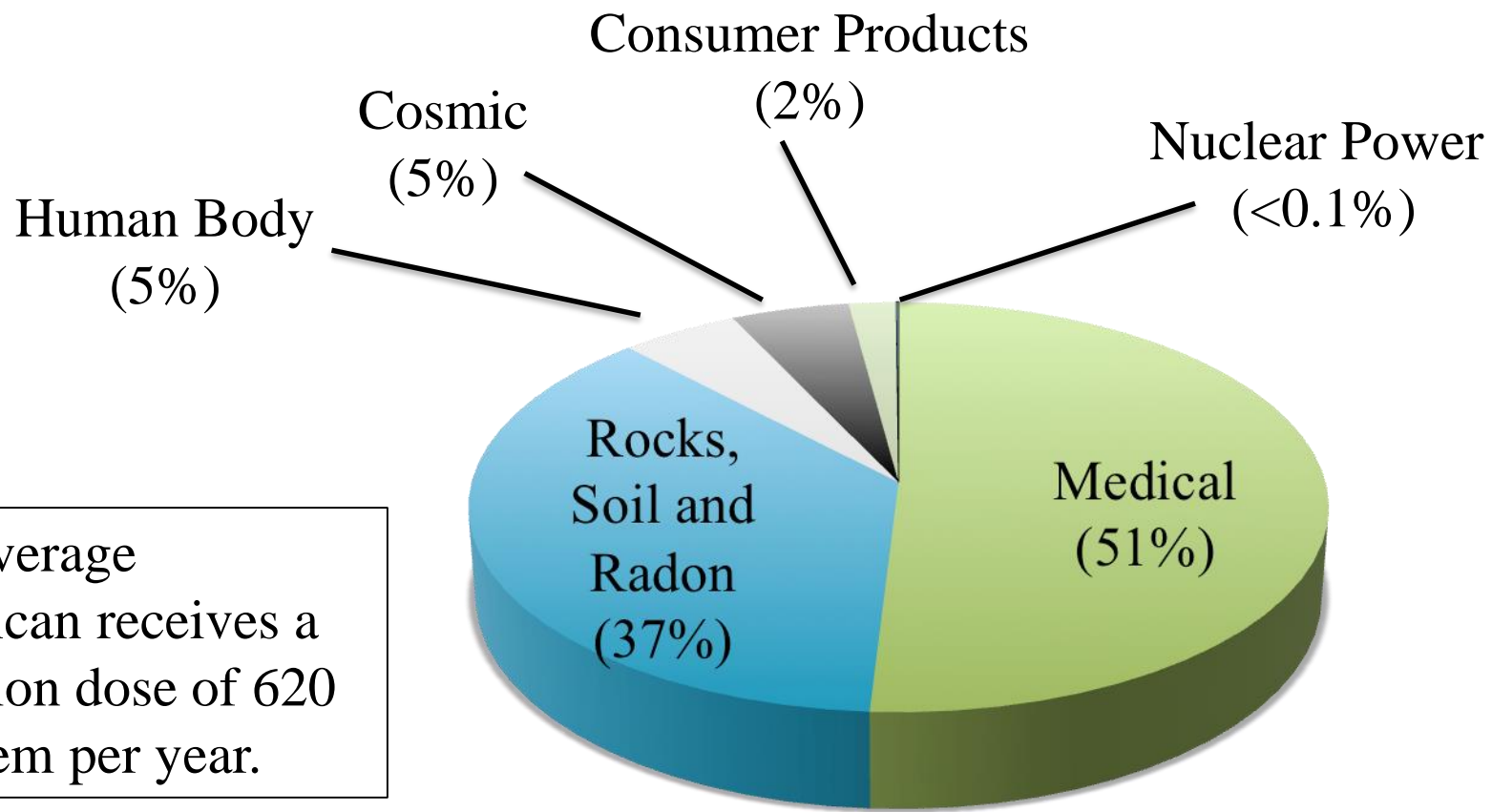
Though scientifically unsubstantiated at all but very high doses, still forms the basis for ALL nuclear-related legislation

Increased regulation → increased cost with no added benefit

- Regulated dose limit to general public from nuclear power must be less than 100 mrem/yr
- Our average dose from natural background is ~ 300 mrem/yr, with another ~ 300 mrem/yr from medical procedures

Is this “reasonable”?

# Sources of average radiation dose in the US



The average American receives a radiation dose of 620 millirem per year.

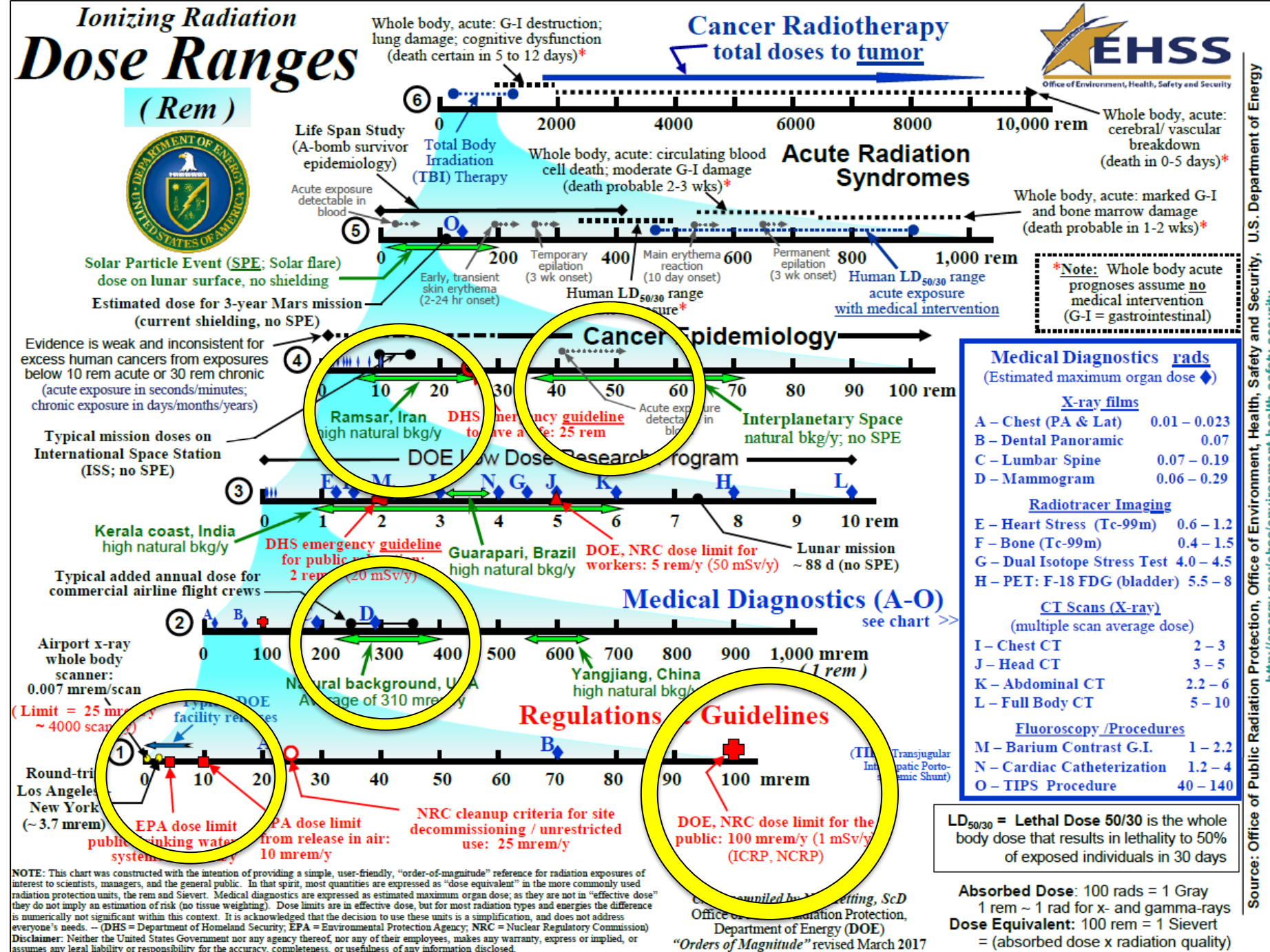
# LNT/ALARA

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# Ionizing Radiation Dose Ranges (Rem)



NOTE: This chart was constructed with the intention of providing a simple, user-friendly, "order-of-magnitude" reference for radiation exposures of interest to scientists, managers, and the general public. In that spirit, most quantities are expressed as "dose equivalent" in the more commonly used radiation protection units, the rem and Sievert. Medical diagnostics are expressed as estimated maximum organ dose; as they are not in "effective dose" they do not imply an estimation of risk (no tissue weighting). Dose limits are in effective dose, but for most radiation types and energies the difference is numerically not significant within this context. It is acknowledged that the decision to use these units is a simplification, and does not address everyone's needs. -- (DHS = Department of Homeland Security; EPA = Environmental Protection Agency; NRC = Nuclear Regulatory Commission)

Disclaimer: Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information disclosed.

LD<sub>50/30</sub> = Lethal Dose 50/30 is the whole body dose that results in lethality to 50% of exposed individuals in 30 days

Absorbed Dose: 100 rads = 1 Gray  
 1 rem ~ 1 rad for x- and gamma-rays  
 Dose Equivalent: 100 rem = 1 Sievert  
 = (absorbed dose x radiation quality)

Source: Office of Public Radiation Protection, Office of Environment, Health, Safety and Security, U.S. Department of Energy  
<http://energy.gov/ehss/environment-health-safety-security>

# LNT/ALARA

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- According to Health Physics Society, average person's cancer risk from adding 50-100 mrem to annual radiation exposure is "not statistically different from zero"
- Significant resources go into getting doses lower than natural background

Is this reasonable?

# Minimization vs. Optimization

## Minimization

Unfortunately, ALARA has been interpreted and implemented as getting dose as low as possible

## Optimization

The intention of ALARA is for consideration of what is reasonable in an optimized radiation protection program



# Case study: Impacts of implementing overly conservative dose limits, rather than considering reasonableness and optimization

<b>Public</b>	<b>Dirty Harry weapons test (1953)</b>	<b>Fukushima accident (2011)</b>
Regulated dose limit (mrem/yr)	3900	100
Dose limit for considering evacuation	250,000-500,000 mrem	100 – 2000 mrem/yr
Max dose rate from event (mrem/h)	340	4.5
Projected dose from event if no evacuation (mrem/yr)	3000	1000 -5000
Dose impact	None	None
Other impact	Occasional “shelter in place” orders	Evacuation of > 100,000 people ~2300 deaths due to evacuation ~20,000 deaths due to earthquake & tsunami Significant mental/emotional strain

# Why the difference?

## Then

- Higher dose limits for the public
- Less knowledge about effects of low dose

[www.youtube.com/watch?v=lf5msUhcOUQ](http://www.youtube.com/watch?v=lf5msUhcOUQ)

<https://www.youtube.com/watch?v=UfS53M-KqwY>

## Now

- Lower dose limits for the public
- Much more knowledge about effects of low dose (Tony Brooks, Radiation Oncologist)
  - LNT is scientifically dead for low-dose risk assessment
  - Radiation is a poor mutagen and carcinogen
  - Low dose and dose rate radiation cancer risk is very small and very difficult to detect
  - Fear of low dose radiation and radiation protection kills people and is very expensive

# Current implementation of LNT and ALARA – an *impediment* to expansion of nuclear power and therefore inhibiting human flourishing

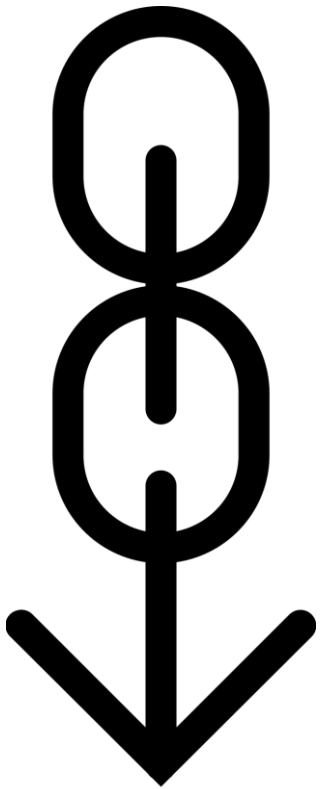
Historically, human life on earth is *better than ever for many of us*

Humans thrive when they have access to *plentiful, safe, and reliable* energy

Nuclear excels at all of these

Nuclear has become expensive for various reasons: *one* of them is regulation of potential radiation dose to levels well below natural background levels (adding considerable expense and no benefit)

Much of this is due to misinterpretation and misapplication of the ALARA principle (focusing on ~~minimization~~ instead of optimization)



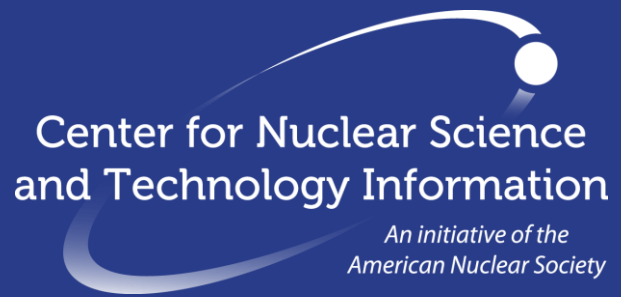
# What can you and I do?

- Alas, I am not the Empress
- We understand why nuclear is not favored
  - Let that understanding inform your interactions with those open to considering nuclear
- We know that current LNT/ALARA practices are not reasonable
  - Use your voice to communicate about the benefits of nuclear, the actual risk of radiation, and the need for optimization, not minimization
  - Tell stories rather than cite statistics



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and Technology Information

*An initiative of the  
American Nuclear Society*

[NuclearConnect.org](http://NuclearConnect.org)