



**European Parliament Greens/EFA Group
& Heinrich Böll Stiftung**

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World Nuclear Industry Status Report - 2019

Commentary

Aviel Verbruggen
University of Antwerp
www.avielverbruggen.be

Research motto:

**Prefer to speak true words receiving blame,
above deceiving advice in soliciting praise.**



Overview

- 1. Praise WNISR-2019**
- 2. Energy reversal: end of the steam power era**
- 3. IPCC's rotten low-carbon mantra "RE, nuclear, CCS"**



Laudato si' : Praise be to you WNISR founder & contributors

A commentary is always difficult, because the study is

- **Either junk, & commenter must be polite (ask an Englishman)**
- **Or too marvelous for words (ask nobody)**

Tonight I am mr. nobody as the WNISR is marvelous.

Diana Üрге-Vorsatz's Forword already cuts the grass of praise:

- **"Authoritative report"**
- **"International reputation beyond doubt"**
- **"Single most important reference document"**
- **"All concerned parties should read the WNISR to understand the real issues the nuclear industry is facing"**

Concluding recommendation:

"READ THIS REPORT PRIOR TO MAKING DECISIONS"



Laudato si' : Praise be to you Let me focus on 3 attributes

FACTUAL

- ❖ **Based on numbers, documents, fully referenced**
⇒ **nuclear sector story telling, fake news, mirages, ...**
- ❖ **Accessible: clear language & excellent informative graphs**
⇒ **fig. 38, 39 investment volumes RE & NP are pro-nuclear biased ("nobody is perfect" (WNISR-2019, p.3))**

COMPREHENSIVE

- ❖ **All countries: up-to-date information & quick-view pictures**
- ❖ **All plants: old, new, LTOs, decommissioning list, ...**
- ❖ **Temporal: begin to (forecasted) end of insane NP, all NP**

PERSEVERANCE

- ❖ **Of first author Mycle, & other oldies Amory, Steve, Walt, ...**
 - ❖ **Annually, robust & fresh (as BP Stat. Review, not the budget)**
 - ❖ **Sustainability direction (as IRENA, also free access)**
- I.e.: all energy is covered: nuclear, fossil, renewables**

Do we need more International Energy Agencies?
[expensive reports, mostly 5 years behind new trends]



1° Transition Strain of the energy reversal: Electricity as major energy vector

Electric energy is a non-storable flow

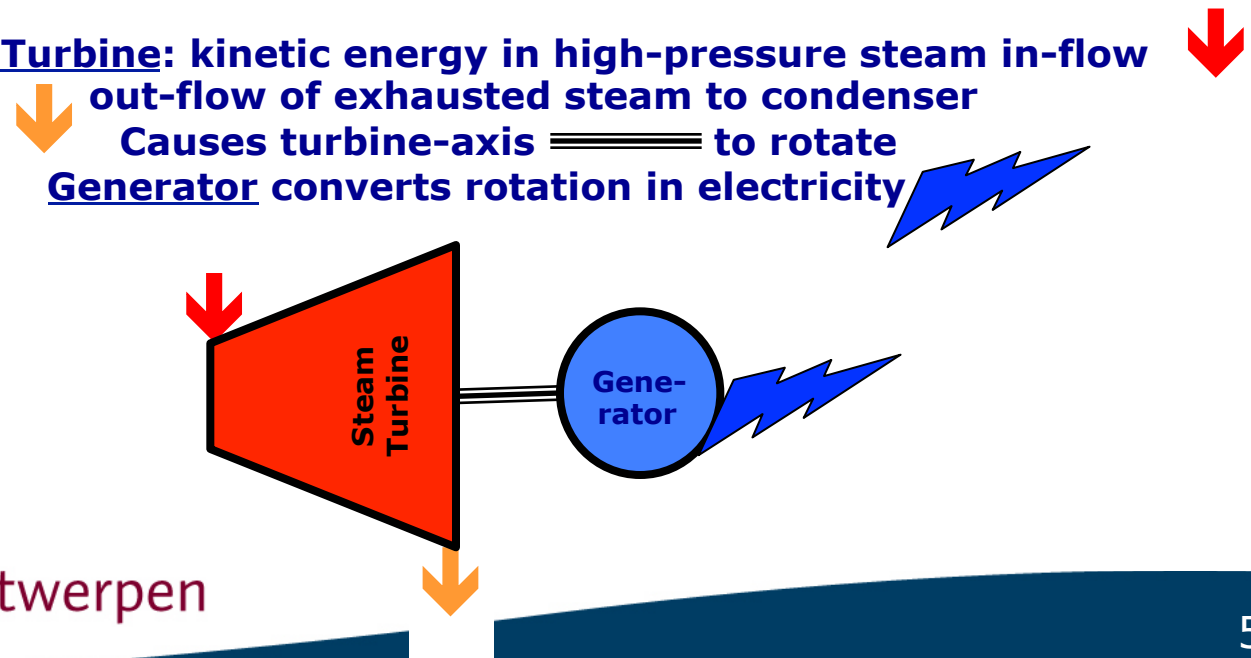
- Not available in nature for human use (lightning is not useful)
- Needed conversion of other energy flows
- Supply flows (2019): ca. 80% steam / 20% natural currents

Steam era (18th – 20th century)

- Geothermal steam at some locations (e.g., Iceland), low pressure, polluted, ...
- Steam from fossil (+ some bio) fuels, and atoms fission

CORE of steam power generation plant:

SteamTurbine: kinetic energy in high-pressure steam in-flow
↓ out-flow of exhausted steam to condenser
Causes turbine-axis $\equiv \equiv \equiv$ to rotate
Generator converts rotation in electricity



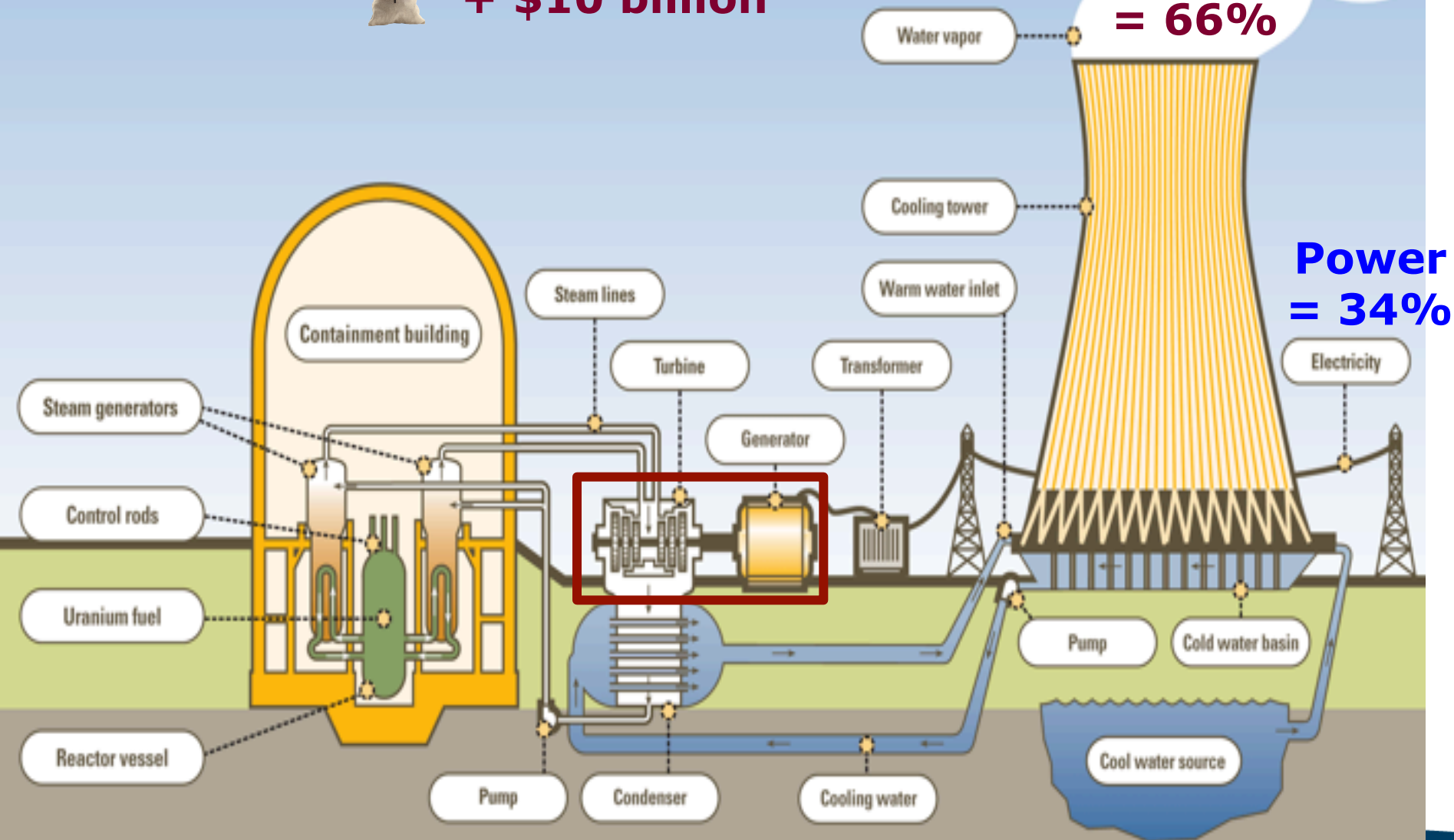
Nuclear plant as 'should' (Walt Disney picture)



**Construction
+ \$10 billion**

**Waste heat
= 66%**

**Power
= 34%**



Steam electricity generation needs many costly and polluting flab activities to source steam and to sink waste and waste heat (non-exhaustive enumeration)

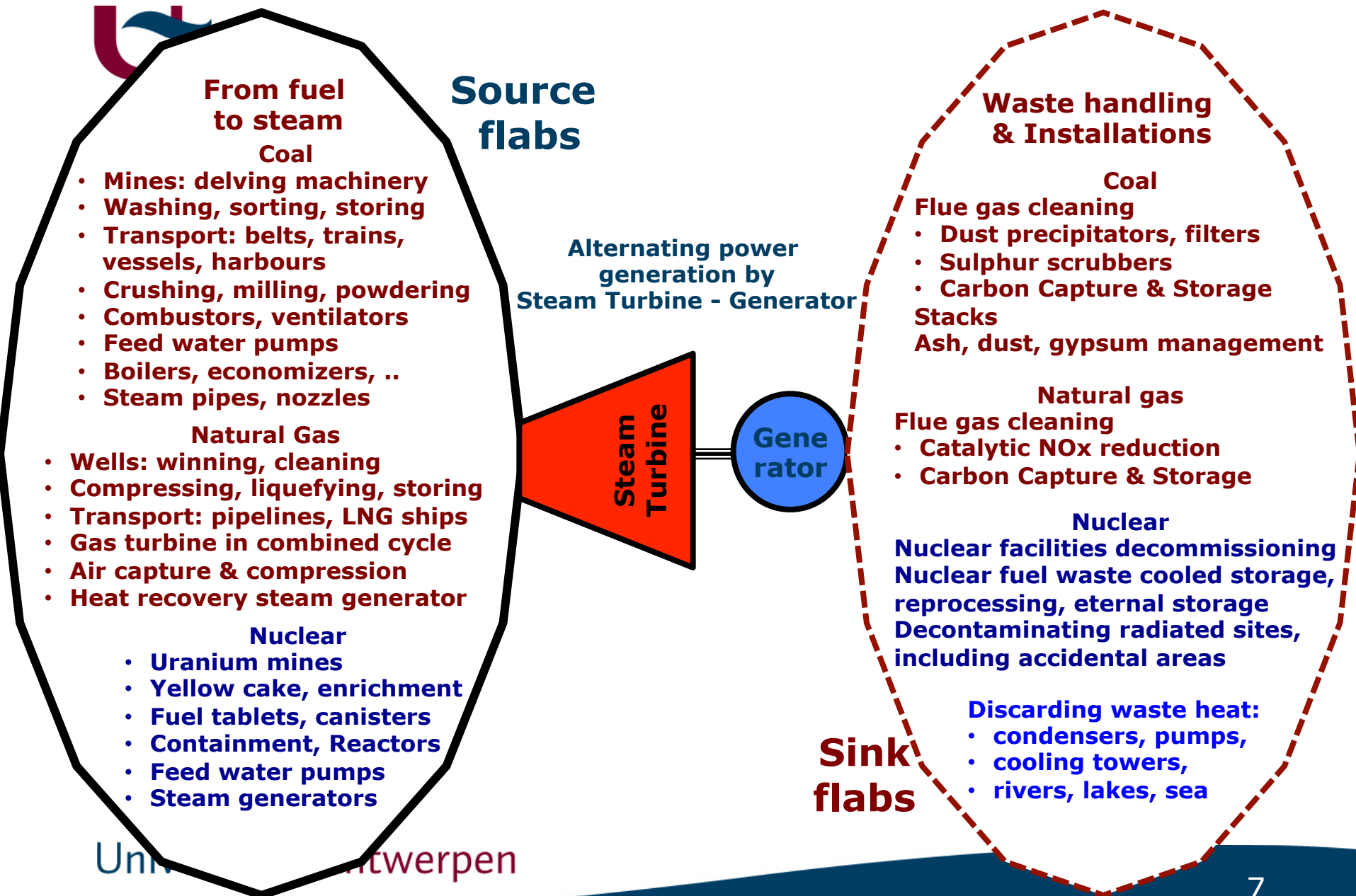
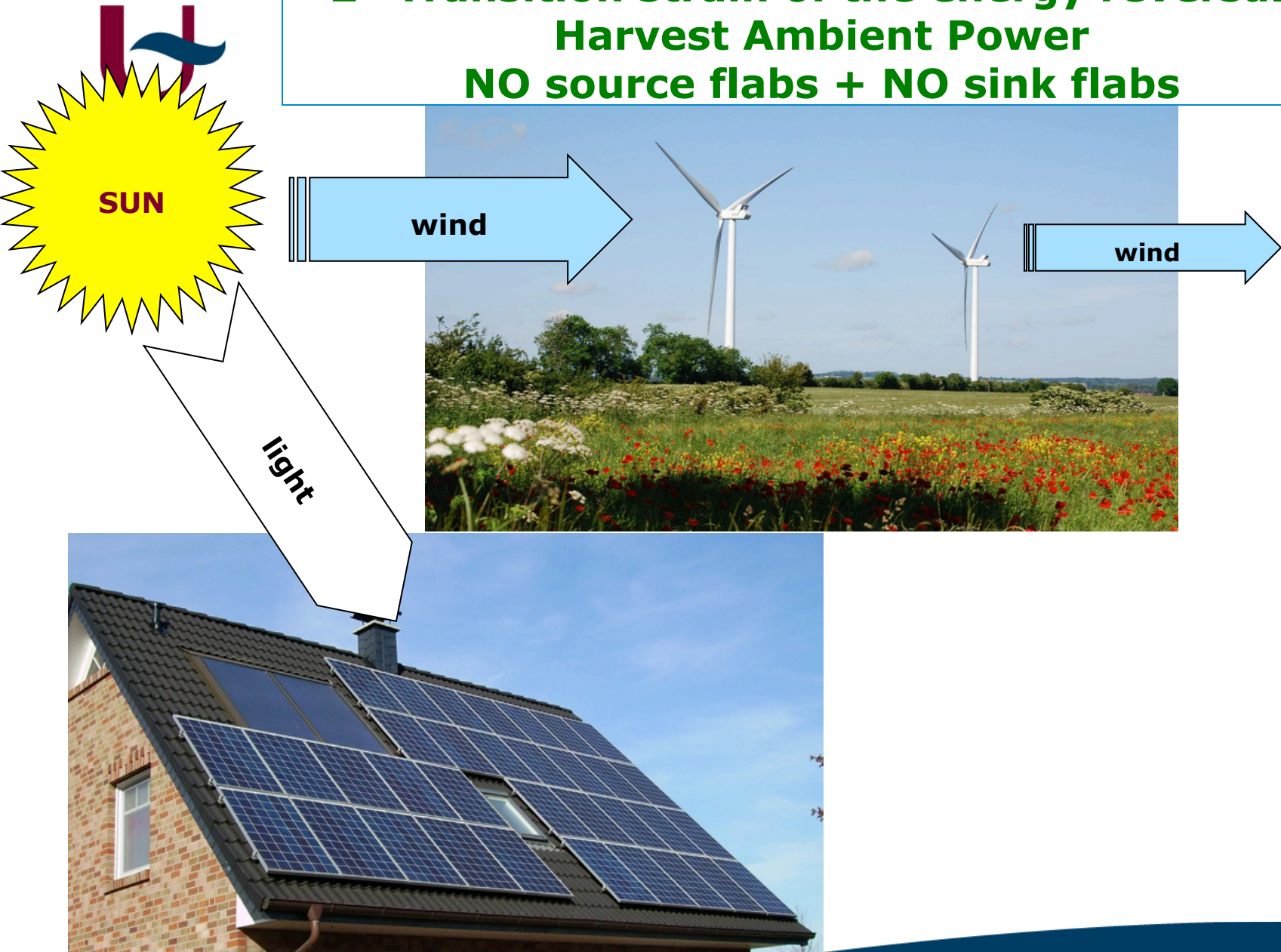


Illustration sink flab atomic power Fukushima Daiichi destroyed (photo)

**Clean area and cooling water stocks
+ \$500 billion?**



**2° Transition strain of the energy reversal:
Harvest Ambient Power
NO source flabs + NO sink flabs**





Global climate policy discourse & nuclear power

See: WNISR-2019 chapters 'CC & NP' (pp. 228-256)
and 'NP vs. RE deployment' (pp210-227)

Nuclear power relation to CC is framed by

- Acceptance of the triptych mantra 'RE, nuclear, CCS'
- Attention to 'carbon, cost, and time'

Lacking is: incompatibility RE - NP in power systems

- **Mr. nobody ends with a sad, factual experience**

IPCC AR5 (2014) & IPCC SR1.5°C (2018)

- Author nuclear sections: H.-Holger Rogner (IIASA, IAEA) as contributing author ch.7 Energy Systems in 2014
- Excluding critical publications, by silencing or misrepresenting

⇔ **IPCC's mission is assessing ALL peer-reviewed literature, i.e. not an IPCC gate but an IPCC canyon (where is the press??)**

Berlin, April 2014: AR5 WG3 SPM draft: 'NP expansion limited by barriers of public concern about safety' = nuclear problem is not its risks, but adverse public opinion

I opposed in full plenary; Rogner took over the meeting's chair!



IPCC & nuclear: 'nobody is perfect'

The perverse mantra 'RE, nuclear, CCS'

- Following IEA (energy industry friendly)
- Life-essential for nuclear interests to go on
- IAEA is also an 'intergovernmental UN body'

The Integrated Assessment Models (IAM) are coarse, flawed

- Electricity is a transient phenomenon
- Electricity generation modeling needs hourly chronology
- IAMs juxtapose yearly volumes

Hence: incompatibility flow RE / nuclear power concealed

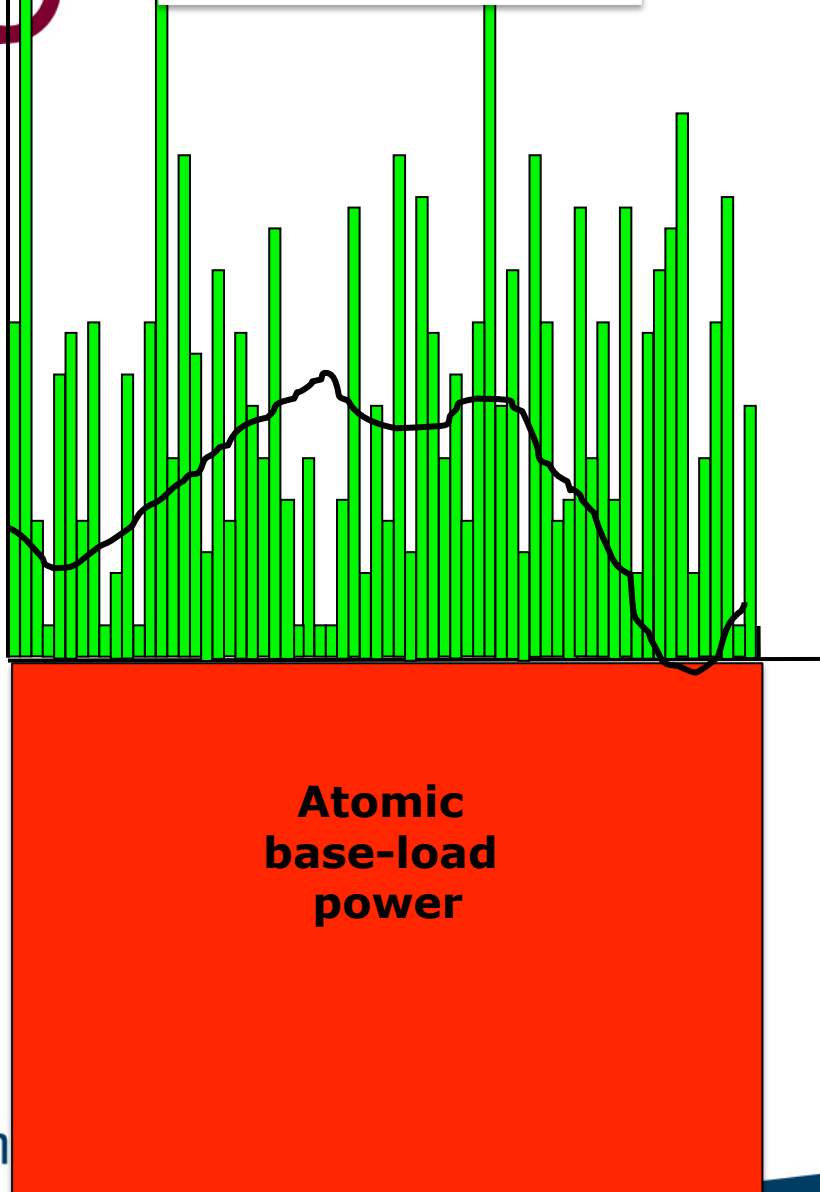
Next graphs represent how the two contenders RE and NP

- Are both inflexible (for different reasons)
- Both claim the first place in the merit-order ranking
 - They ruin each other business case

Hence: they are incompatible

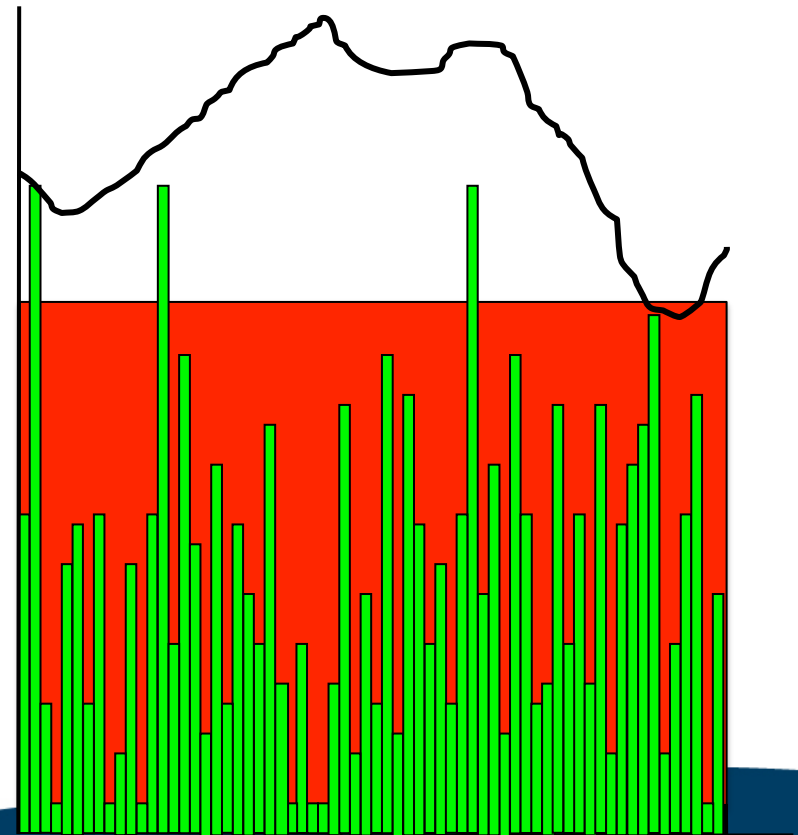


**Priority for Atomic
base-load power**



**Priority for one ruins the
business case of the other**

**Priority for Flow
renewable power**





Thanks for listening & some homework

Reading about incompatibility RE-NP:

Aviel Verbruggen (2008). Renewable and nuclear power: A common future? Energy Policy 36: 4036-47

Aviel Verbruggen and Yuliya Yurchenko (2017). Positioning Nuclear Power in the Low-Carbon Electricity Transition. Sustainability 9, 163 (14p.)

Reading about nuclear discourse:

Aviel Verbruggen and Erik Laes (2015). Sustainability assessment of nuclear power: Discourse analysis of IAEA and IPCC frameworks. Environmental Science & Policy 51: 170-180

Remind:

- 1. Steam power era is ending**
- 2. Reject the rotten triptych mantra 'RE, nuclear, CCS'**
- 3. Resist further spending on nuclear power projects & mirages**
- 4. Unveil flawed paradigms, hidden interests, dishonest science**