

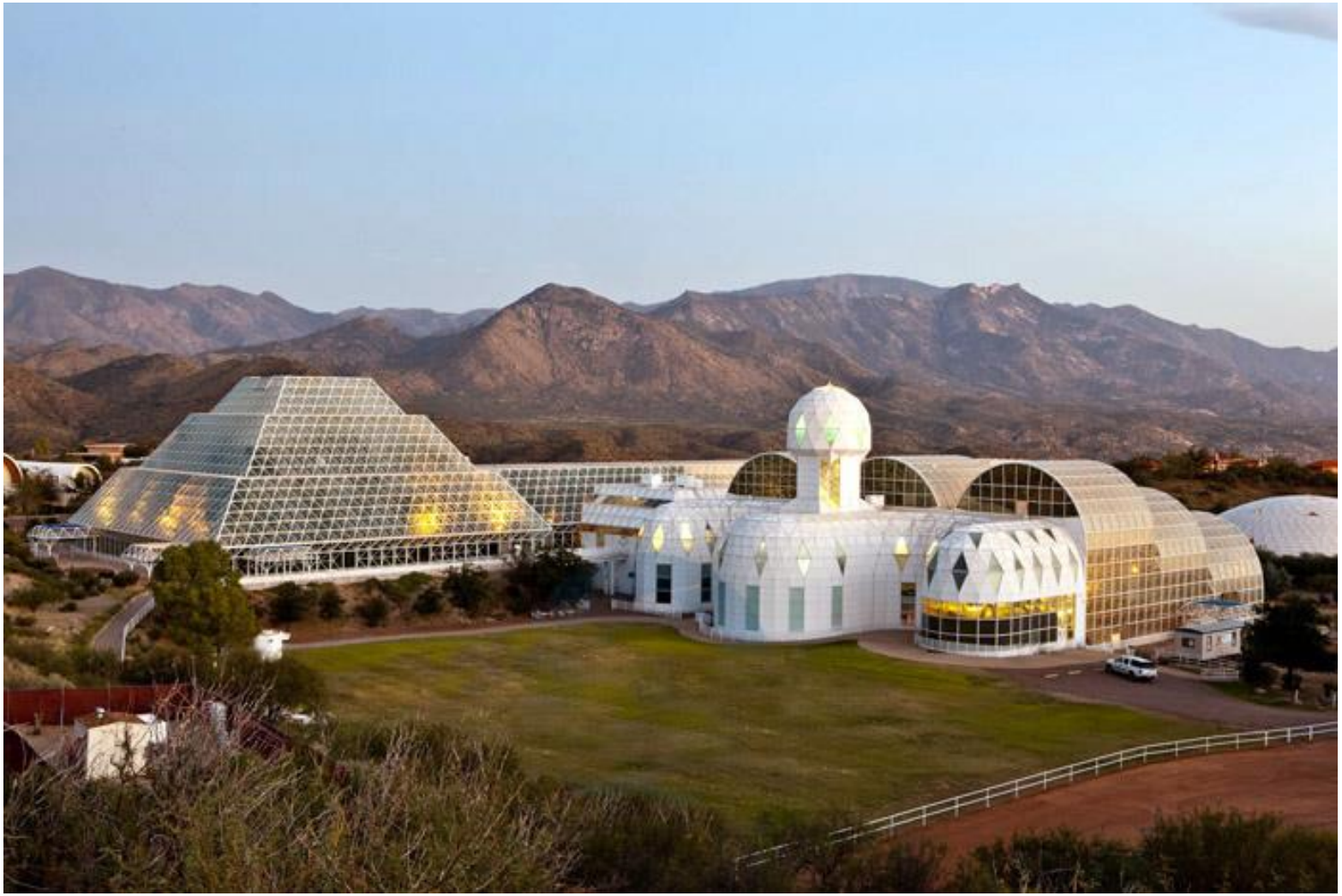

Institute for Advanced Sustainability Studies
IASS in Potsdam

Germany's energy transition:
National climate and energy policy from a grassroots social movement

Craig Morris, Senior Fellow, @PPchef

EnergyTransition.org

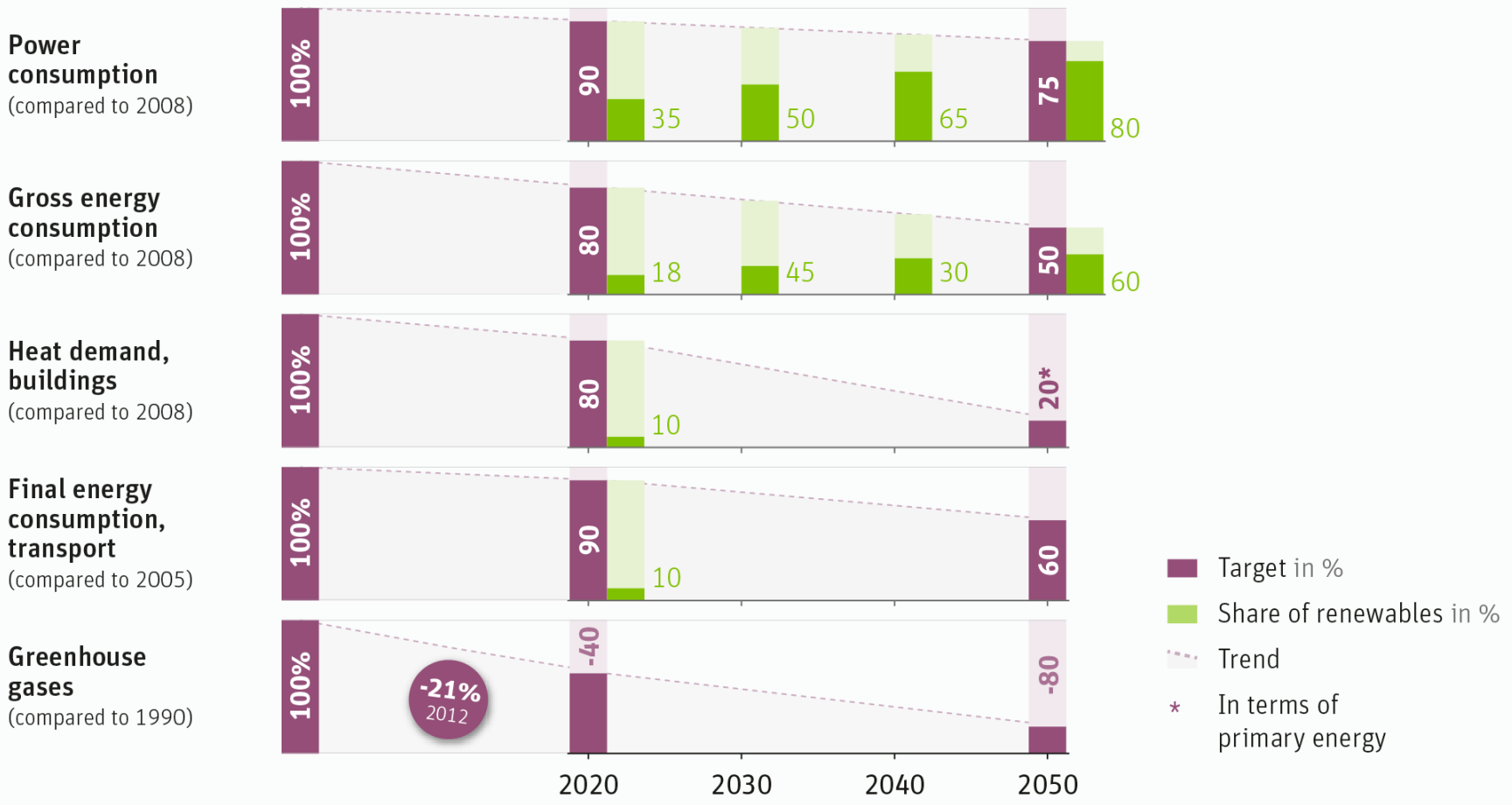
Biosphere 2: why we need social sciences



German energy transition: high certainty with long-term targets

Long-term, comprehensive energy and climate targets set by the German government

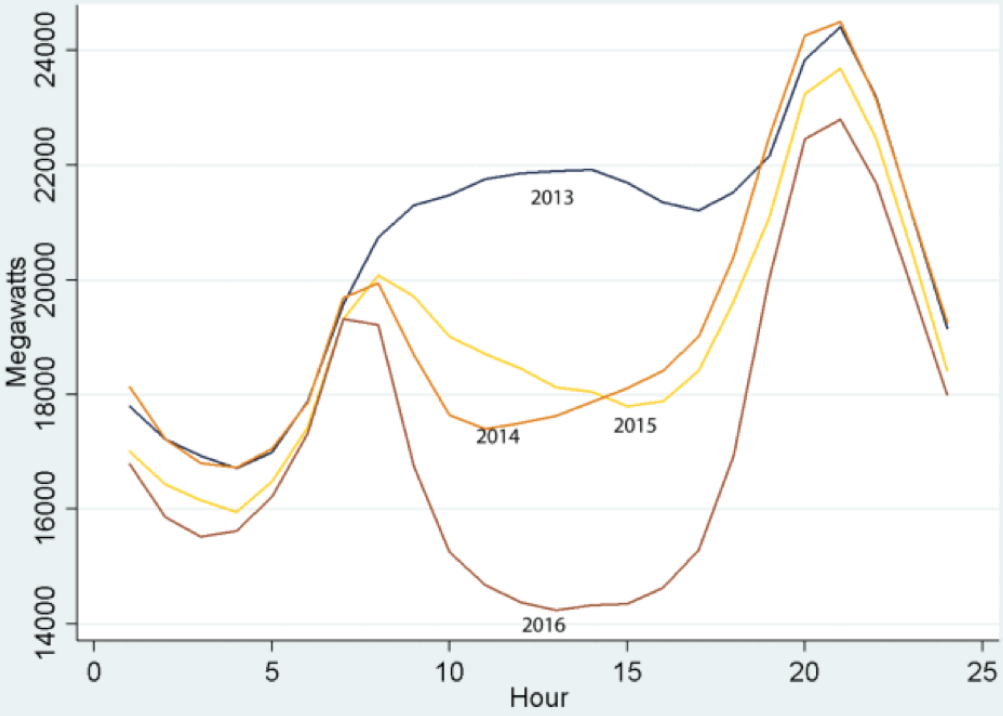
Source: BMU

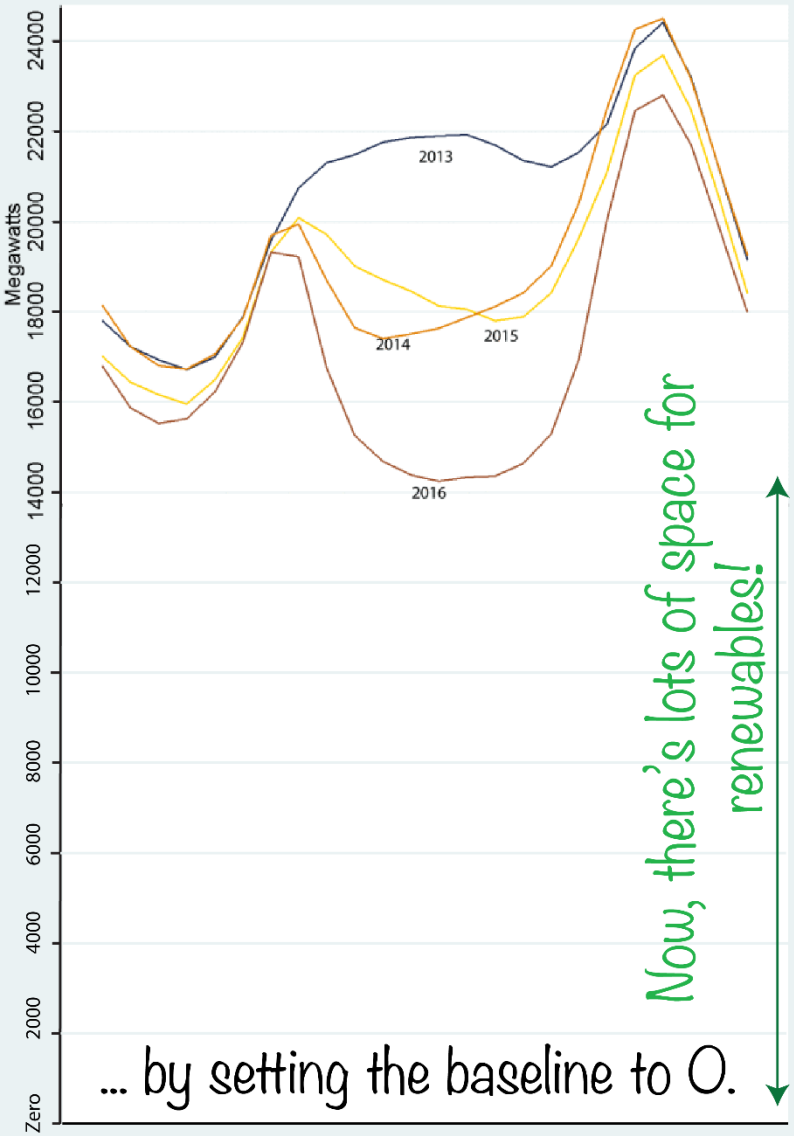


NYPSC supports nuclear

"New York can look to another leader in renewable power—Germany—for a lesson in the unintended consequences of losing zero-emissions attributes from all its nuclear plants. Germany's abrupt closure of all (sic) its nuclear plants resulted in a large increase in the use of coal, causing total carbon emissions to rise despite an aggressive increase in solar generation."

CAISO, we rescued your duck...

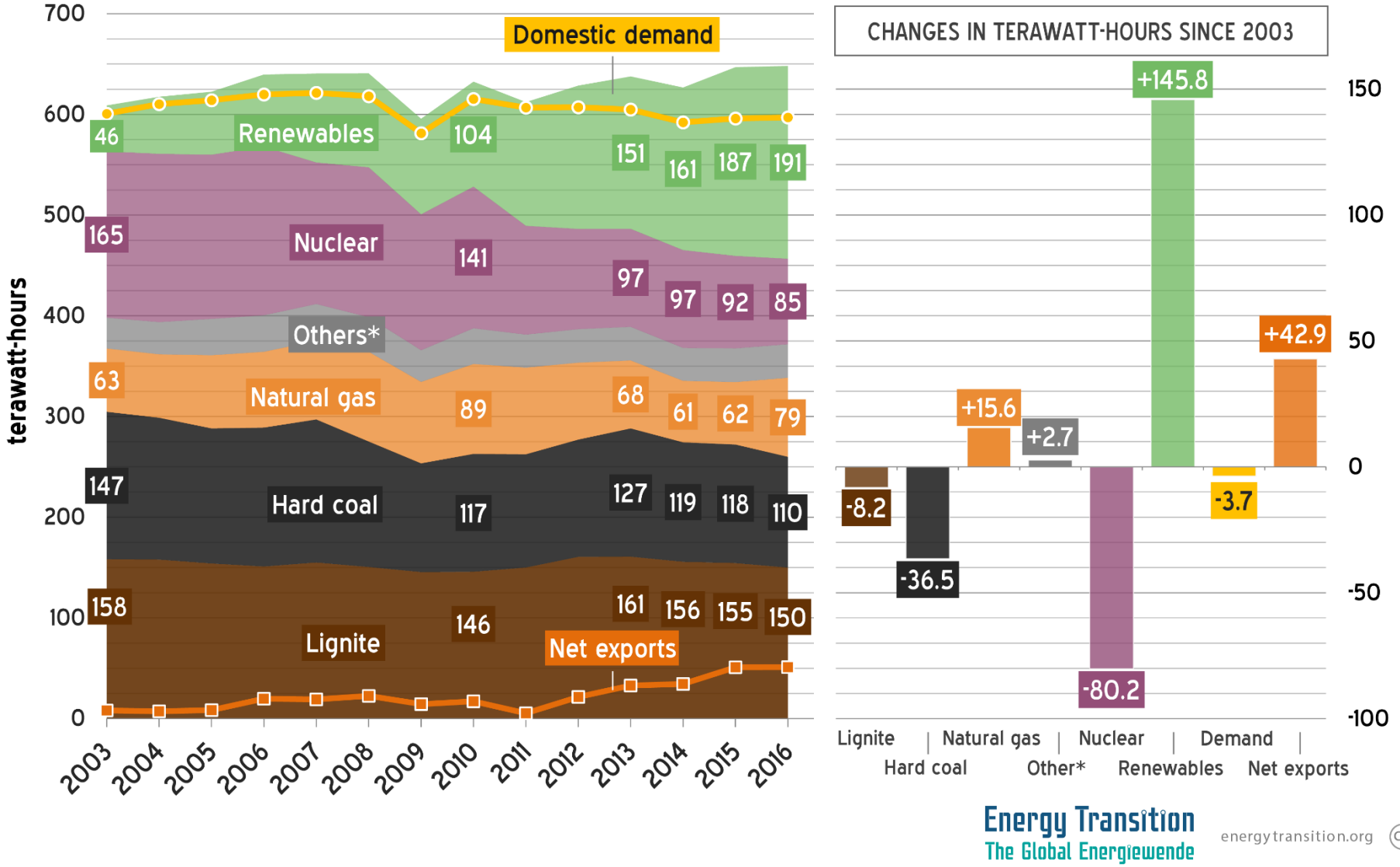




Renewables and power exports hit record high in 2016

Electricity generation, demand & exports in Germany, 2003-2016

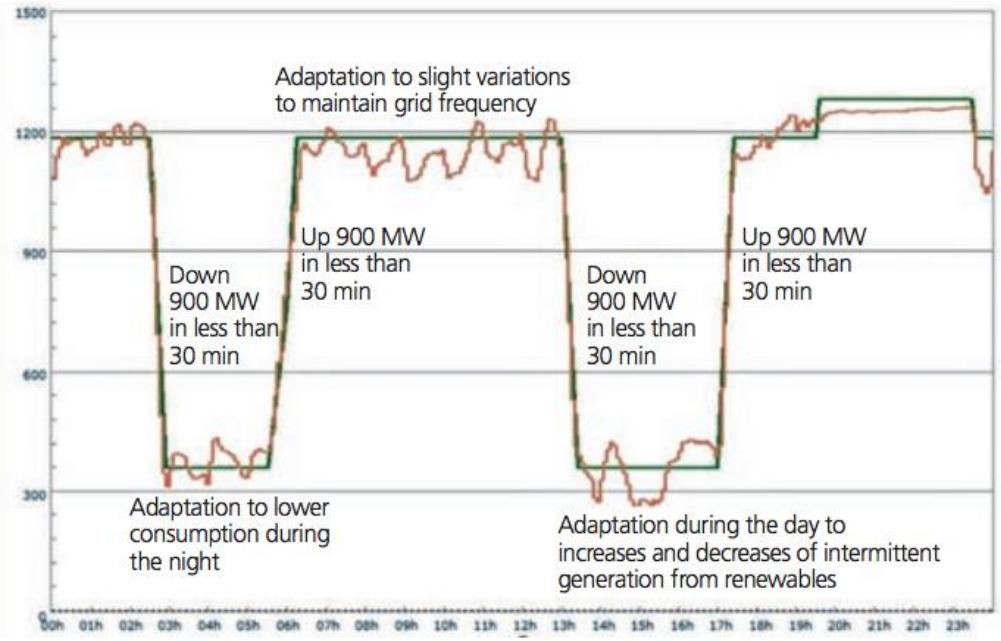
*Source: AGEB (January 2017) | *Oil, waste, etc*



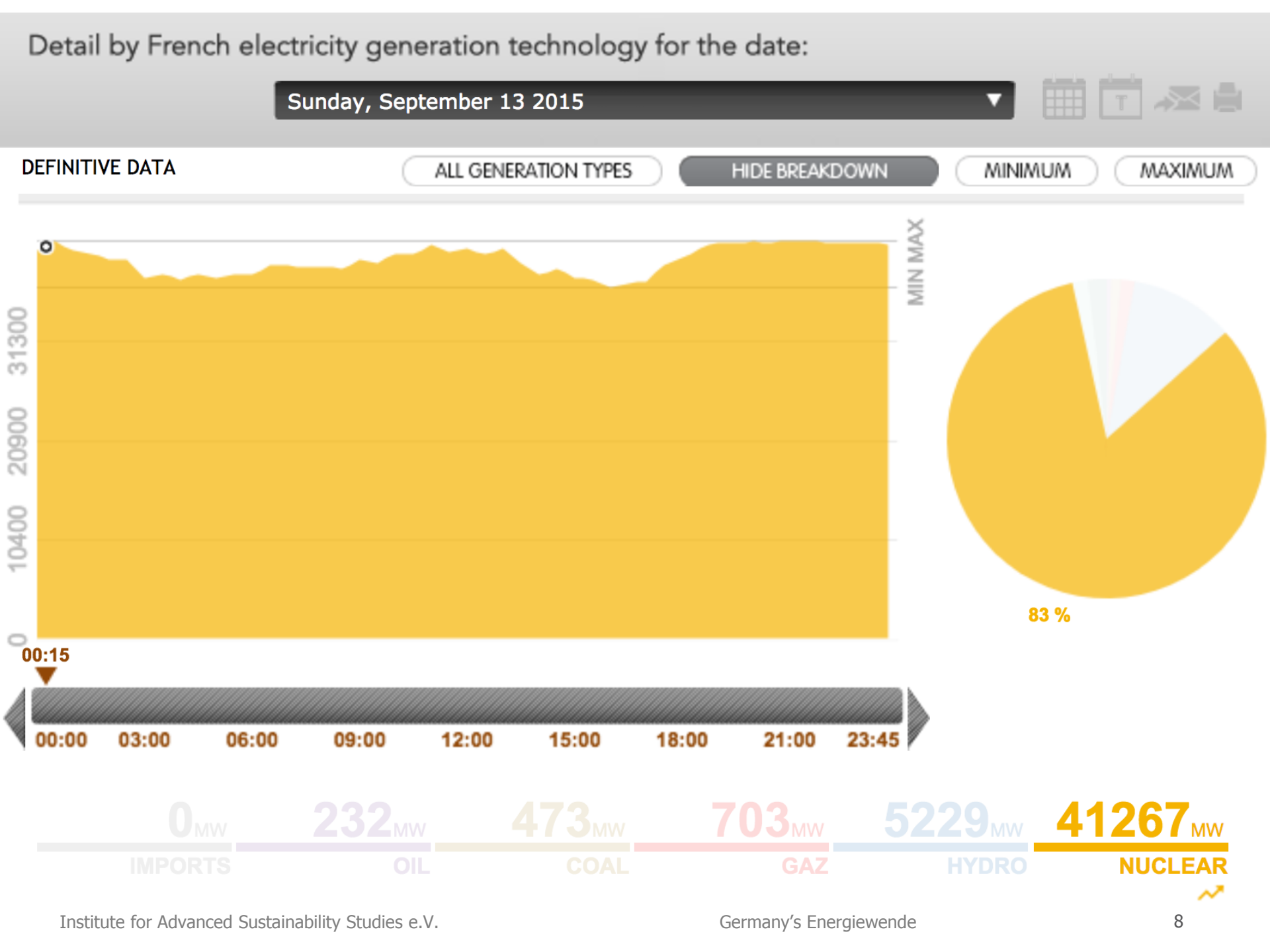
Energy Transition
The Global Energiewende

energytransition.org CC BY SA

THE POWER GENERATED BY ONE OF THE REACTORS (1,300 MW) AT THE GOLFECH NUCLEAR PLANT OVER A 24-HOUR PERIOD, ONE DAY IN SEPTEMBER 2015, IN RESPONSE TO VARIATIONS IN ELECTRICITY CONSUMPTION AND GENERATION FROM INTERMITTENT RENEWABLES:

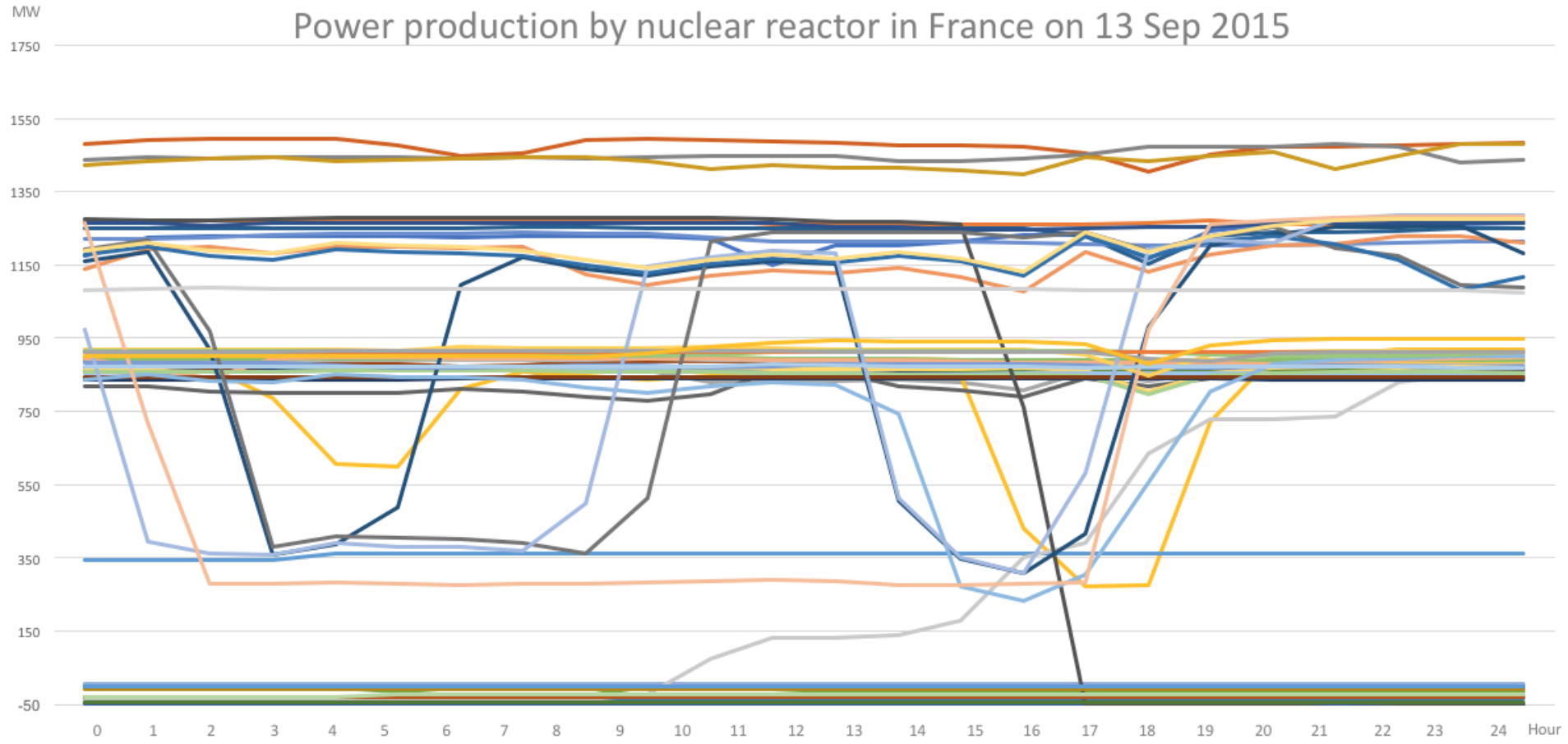


In the latter case, it must be possible to rapidly reduce generation when wind and solar begin to generate their "unavoidable" energy or, conversely, rapidly start up generation when solar or wind production drops. These adjustments are especially important when intermittent generation from renewables is substantial.


Detail by French electricity generation technology for the date:
Sunday, September 13 2015
DEFINITIVE DATA
ALL GENERATION TYPES
HIDE BREAKDOWN
MINIMUM
MAXIMUM
MIN MAX
0
10400
20900
31300
00:15
00:00
03:00
06:00
09:00
12:00
15:00
18:00
21:00
23:45
83 %
0 MW
IMPORTS
232 MW
OIL
473 MW
COAL
703 MW
GAZ
5229 MW
HYDRO
41267 MW
NUCLEAR

Does France's nuclear fleet ramp to follow loads?

Power production by nuclear reactor in France on 13 Sep 2015



Source of data: RTE

German Energy Transition

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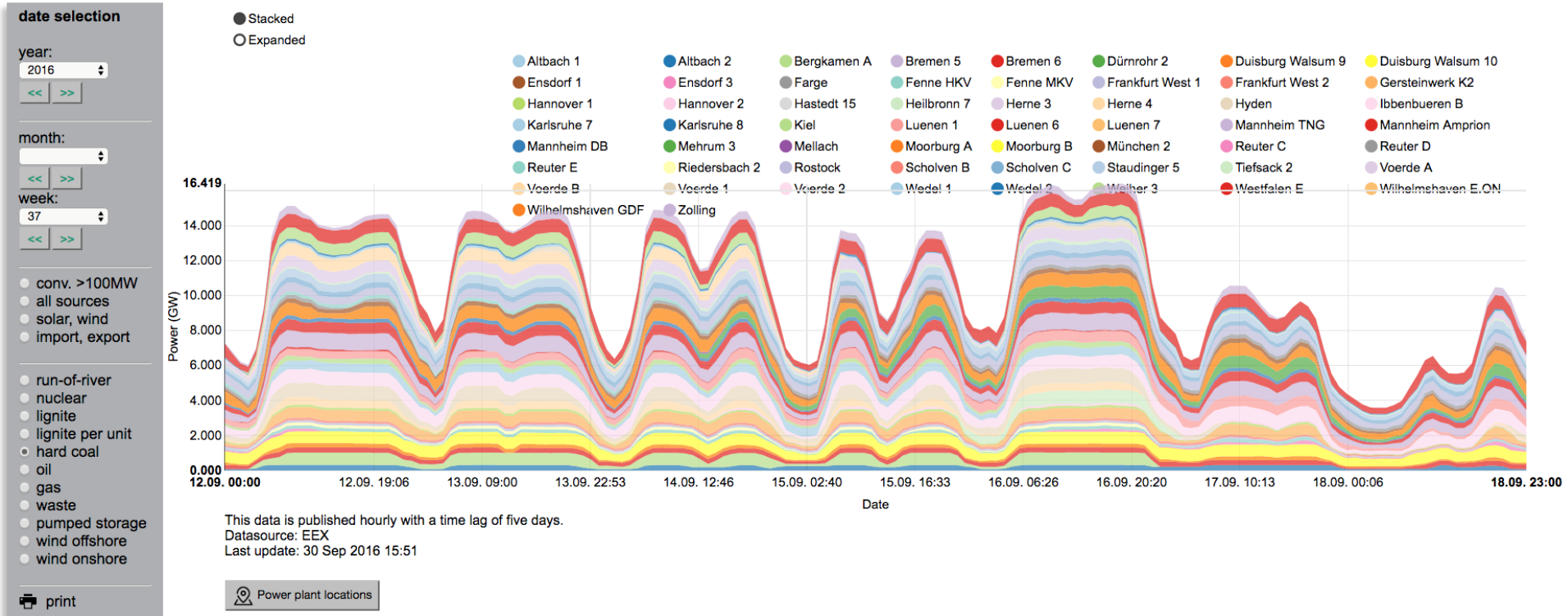
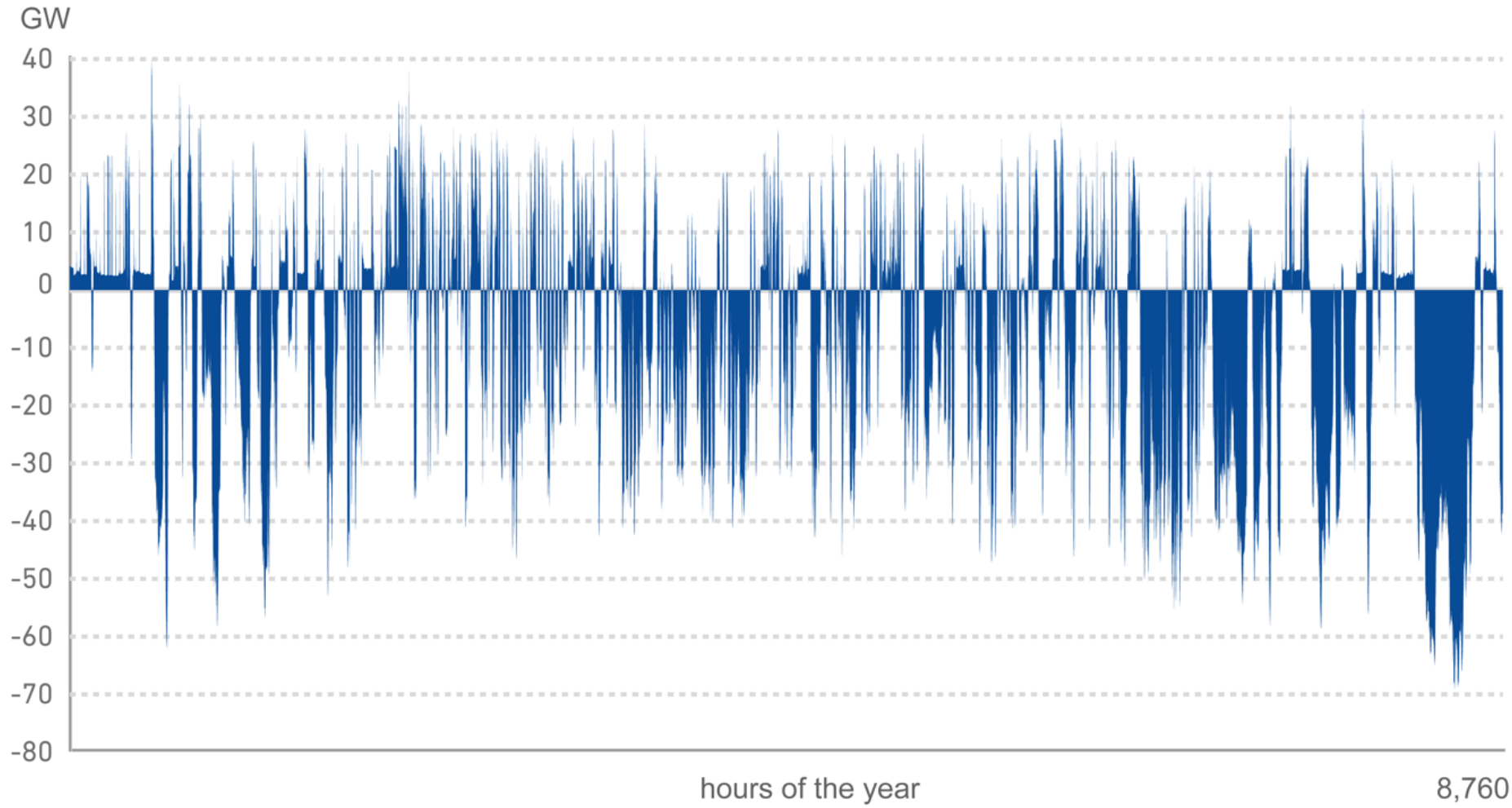
Unitwise electricity production from hard coal in Germany in week 37 2016



The residual load in 2050 with 100% renewable energy



The area below the baseline shows the amount of renewable electricity stored or curtailed (i.e., excess), while the area above shows the need for flexible dispatch.

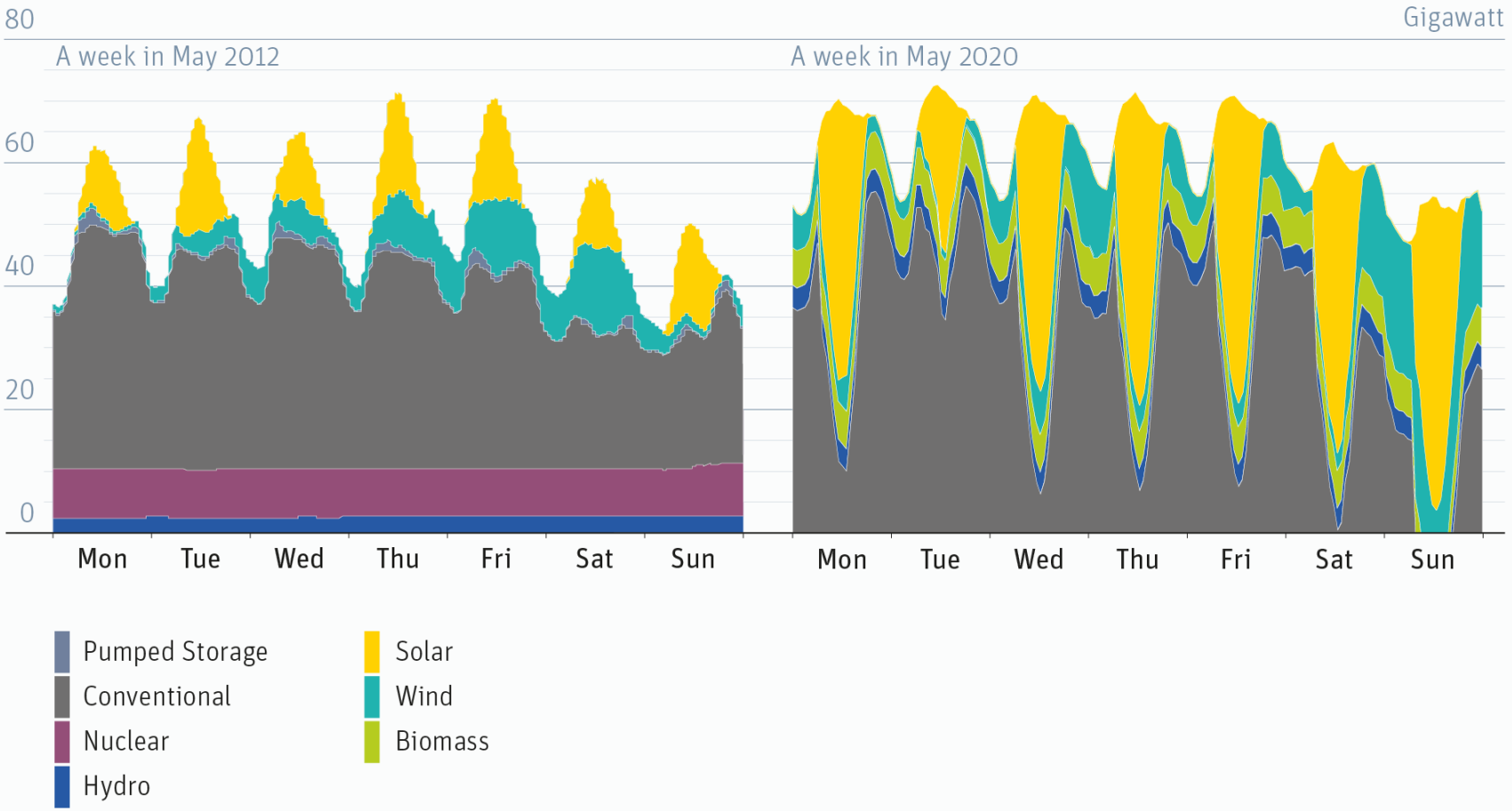
IASS POTSDAM

Source: Kombikraftwerk, 2014

Renewables need flexible backup, not baseload

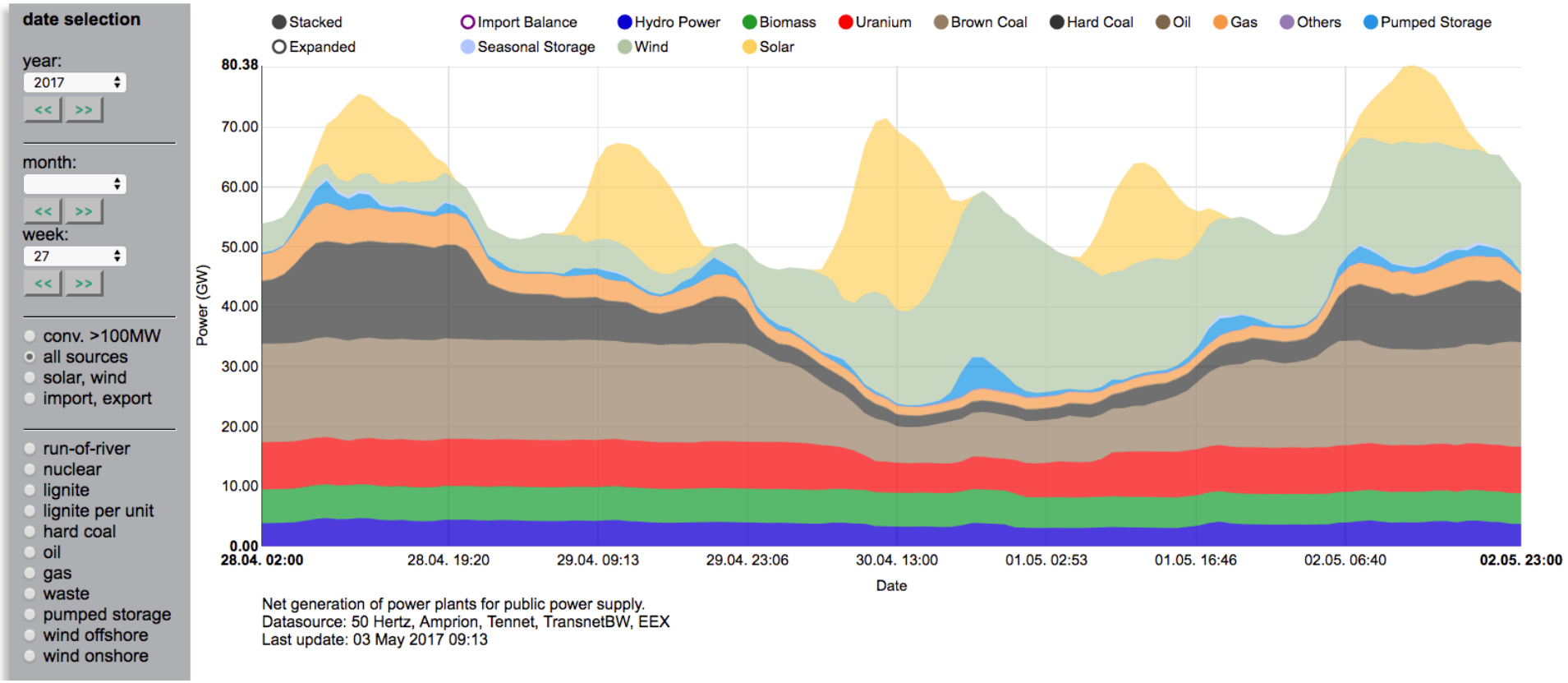
Estimated power demand over a week in 2012 and 2020, Germany

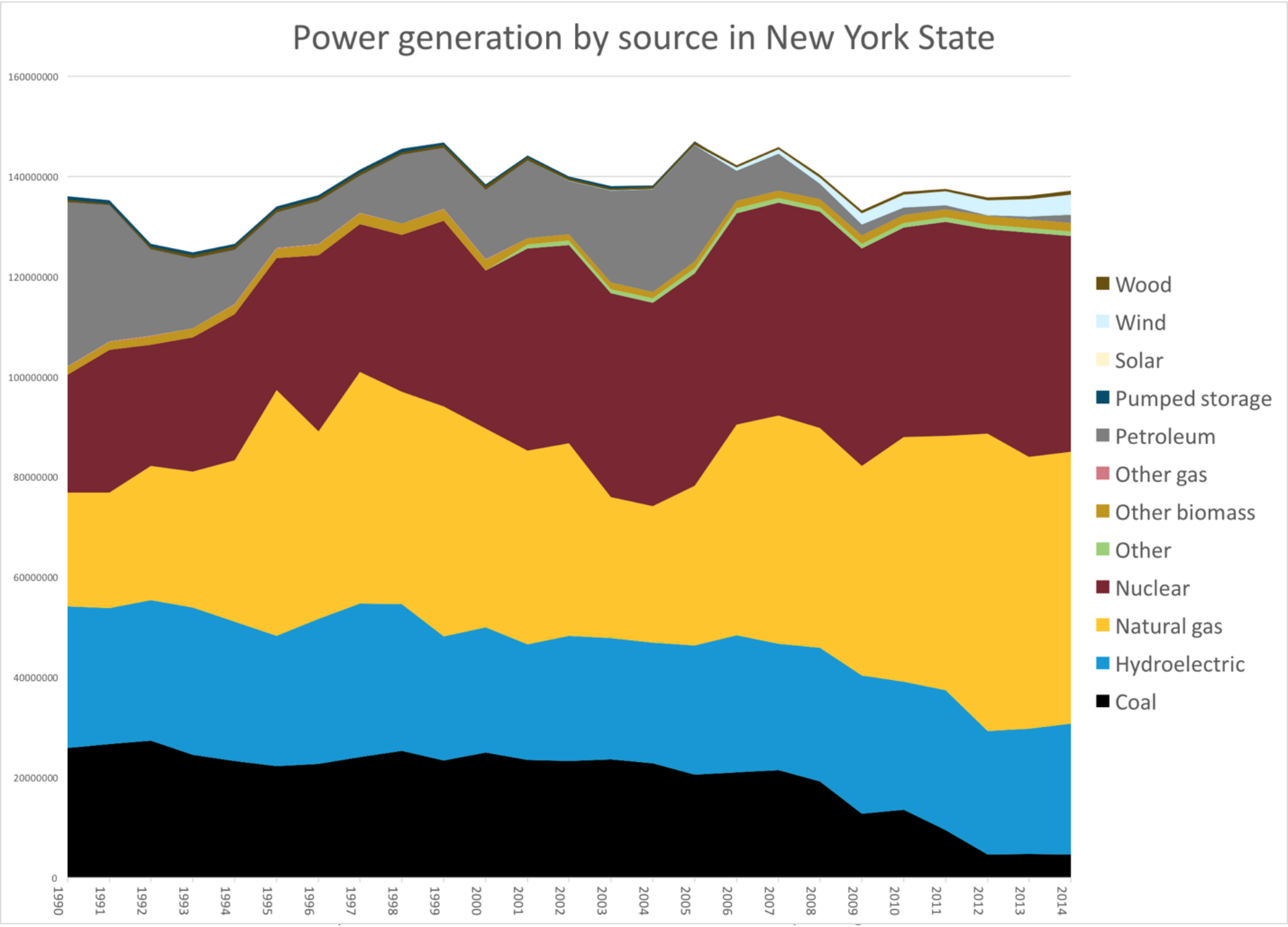
Source: Volker Quaschning, HTW Berlin



Baseload has to go: long weekend of Apr 30 – May 1

Electricity production in Germany in 2017




Power generation by source in New York State
160000000
140000000
120000000
100000000
80000000
60000000
40000000
20000000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Wood
Wind
Solar
Pumped storage
Petroleum
Other gas
Other biomass
Other
Nuclear
Natural gas
Hydroelectric
Coal

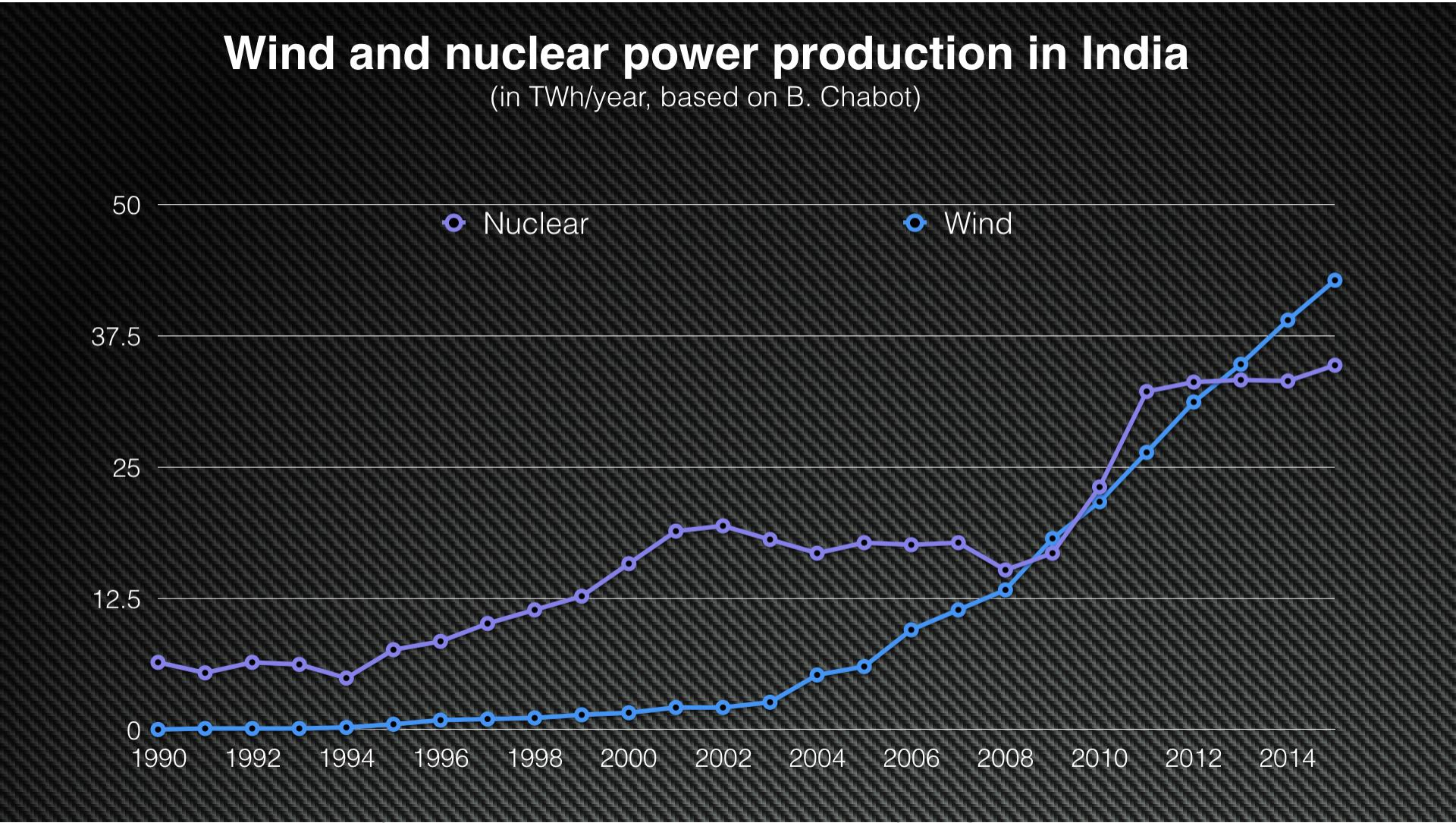
Obstacles to coal phaseout

- Hard coal subsidies expire next year
- Lignite cannot be exported (power can)
- Focus now on transitioning lignite communities (social aspects)
- Greens want it by 2030, probable before 2050

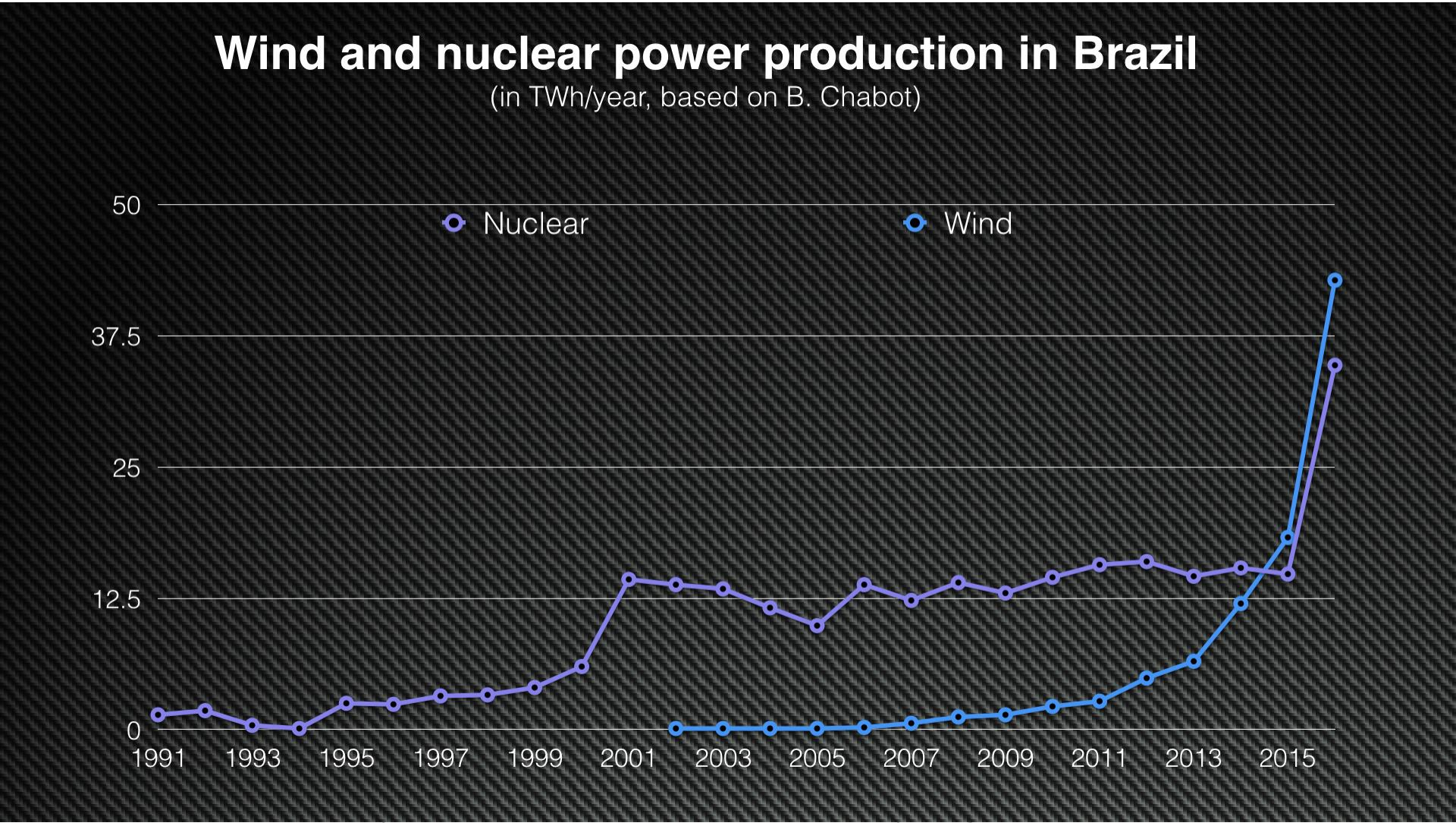
Why a nuclear, but no coal phaseout?

- Coal grew gradually, big nuclear appeared suddenly
- Nuclear is big biz, coal can be municipal
- Risks are different: like planes and cars
- Nuclear never delivered
    - France: 170 reactors planned, got 58
    - Germany: 45 reactors planned, got 19

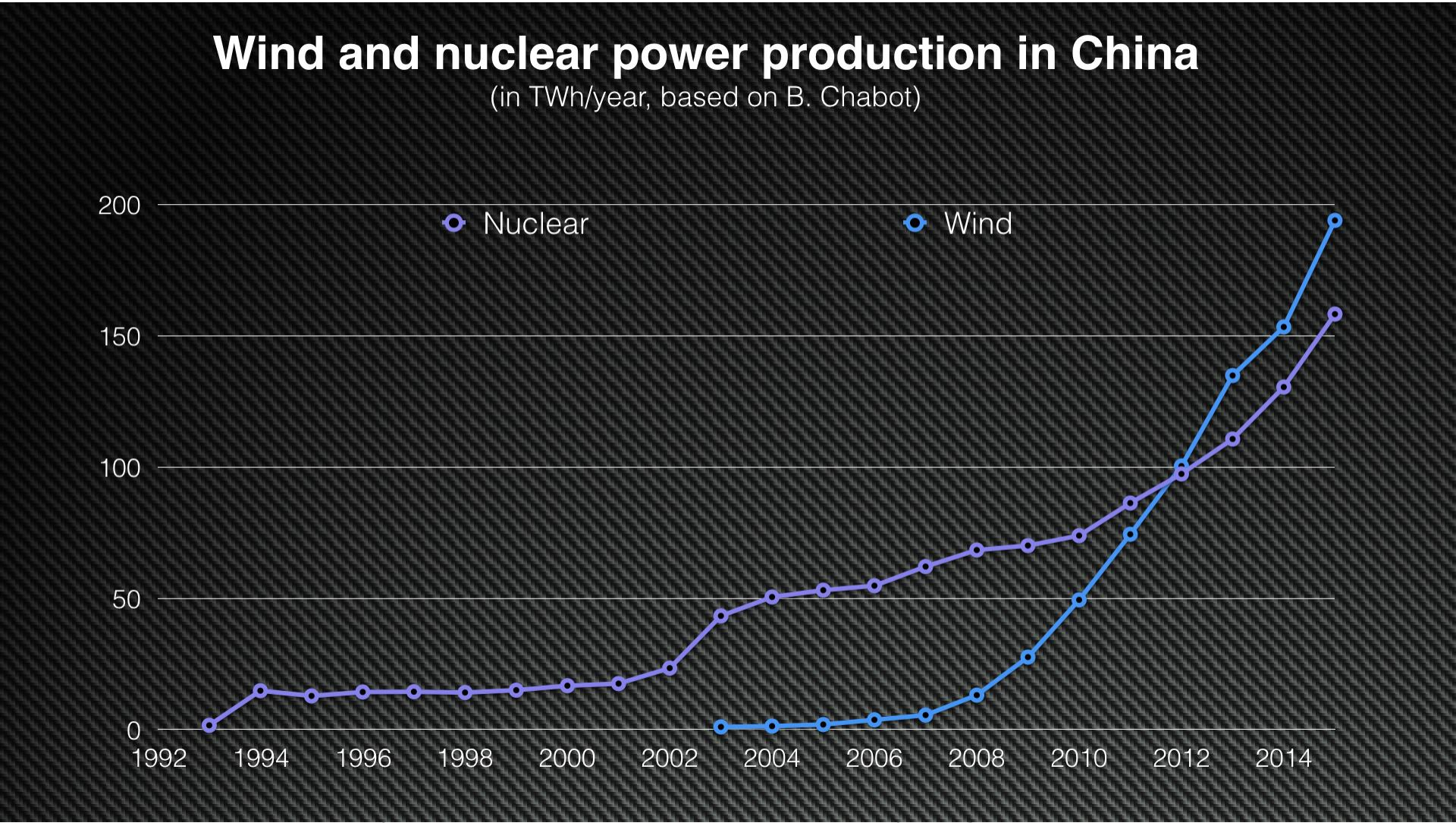
Nuclear never delivered



Nuclear never delivered



Nuclear never delivered



"You cannot store carbon underground against will of the population."

Germany environmental minister Peter Altmaier, 2012

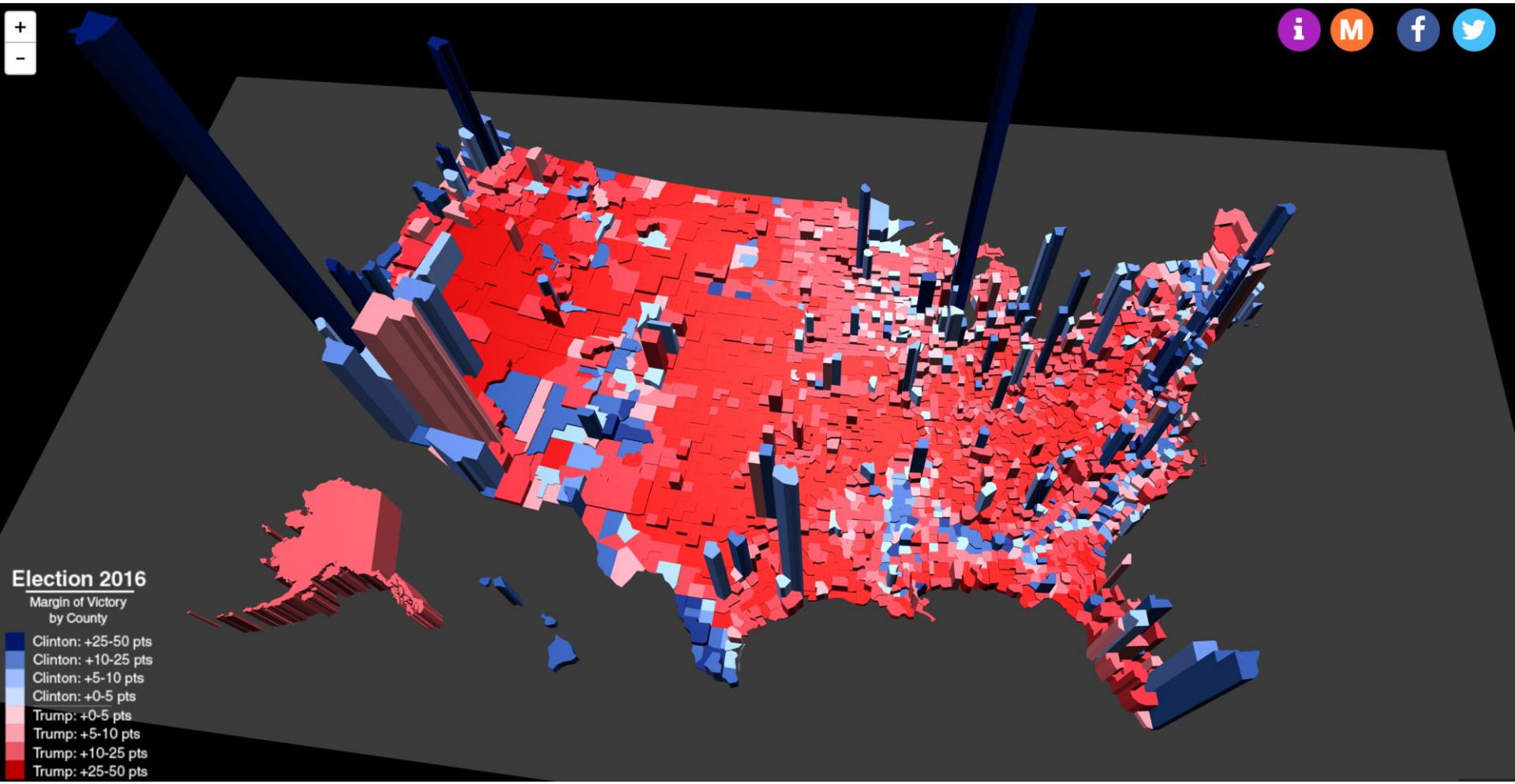
Merkel's Ethics Committee:

- three bishops,
- a sociologist,
- a philosopher,
- an education expert,
- the president of Germany's UNESCO commission,
- and a political scientist –
- along with the head of BASF (the only businessperson) and some scientific researchers.

Weightman Committee (UK):

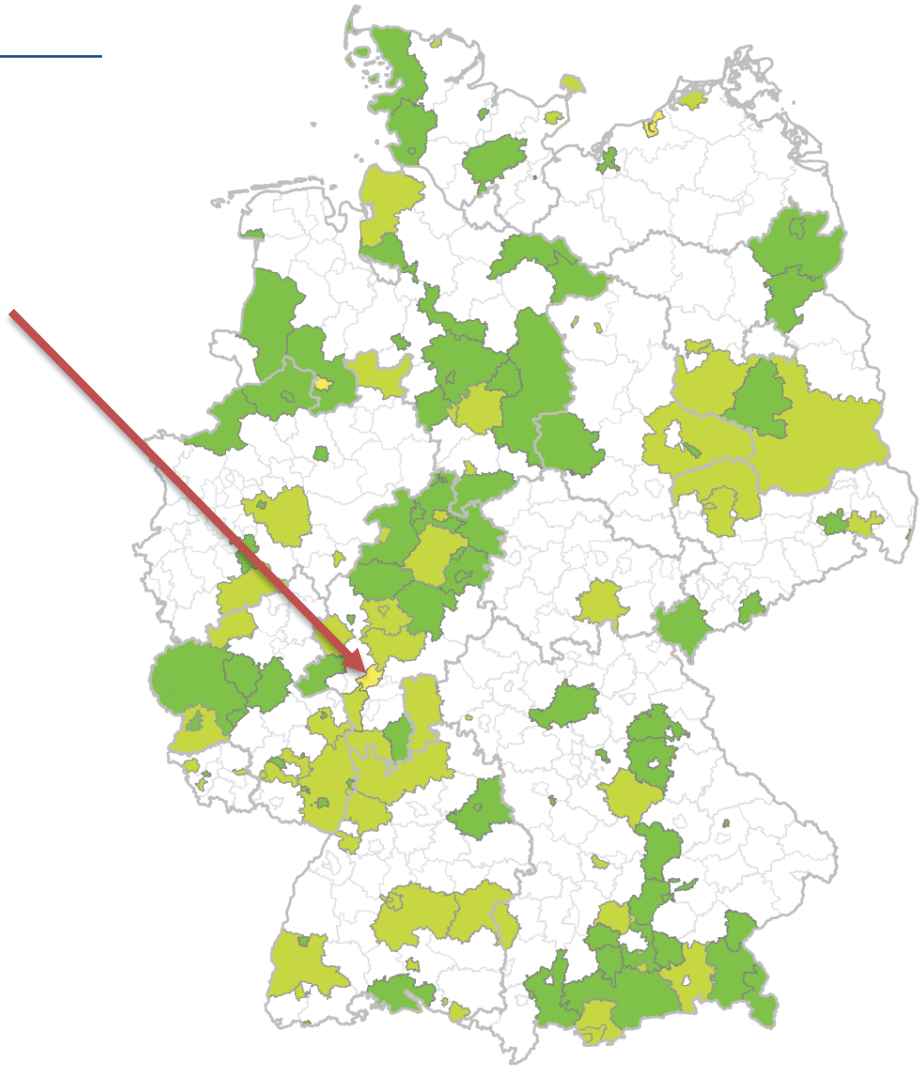
- by the Office for Nuclear Regulation
- consisted only of technical experts
- civil society didn't have a seat at the table

Community renewables good for rural areas



100% renewable regions

City of Frankfurt!



Citizens want to save the community first, the planet second

Expert reasons for energy transition:

1) Climate change
2) Future jobs
3) Energy security

Rating 1-5 of reasons why citizens join energy co-ops:

1)	Support transition	4.5
2)	Conservation	4.5
3)	Participation	4.5
4)	Local added value	4.2
5)	Community member	3.4
6)	Personal profit	2.6
7)	Energy security	2.6

The Energiewende predates awareness of climate change and radiation.

Die Bürgerinitiativen informieren:

Was sind die Garantien des Ministerpräsidenten für das Klima wert?

[redacted]

Mit zu den übelsten Folgen des KKW Wyhl *wird der Wasserdampf gehören, der aus den Kühltürmen in einer Menge von 5,6 Millionen Liter Wasser stündlich aufsteigen wird. In Südbaden herrschen* **Inversionswetterlagen** *vor, d. h., in großer Höhe befinden sich warme Luftsperrschichten. Unter dieser Luftsperrschicht sammelt sich die aufsteigende Feuchtigkeit als Nebel. Diese Nebelbildung wird die Sonneneinstrahlung herabsetzen und den Weinbau schädigen.*

KKW's sind also nicht nur deshalb umweltfeindlich, weil sie durch radioaktive Strahlen das Leben der Umgebung gefährden, **sondern sie schaden auch durch die Veränderung des lokalen Klimas und der Natur.** *Deshalb wehren sich besonders die Bauern und Winzer gegen das geplante KKW, da es mitten in ein Naturschutzgebiet gebaut werden soll und in der weiteren Umgebung Sonderkulturen gedeihen, wie Wein, Obst und Tabak.*

The Energiewende began in conservative, rural communities

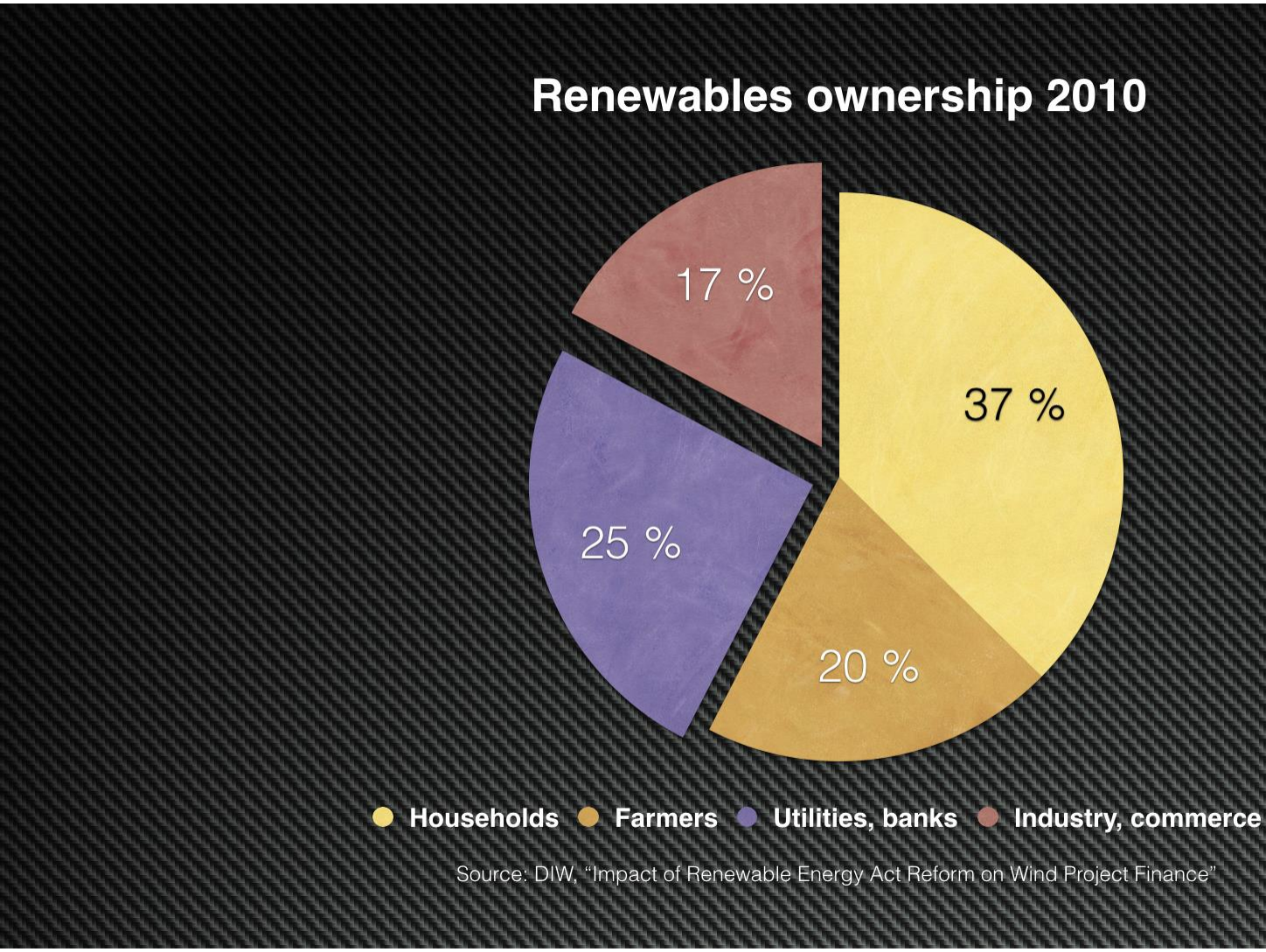
The Energiewende began in conservative, rural communities

Photo: Bernd Nössler, Wyhl

Sternmarsch am 25.08.1974 gegen Bleichemiewerk in Marckolsheim und KKW-Wyhl in den Wyhler Wald

Screenshot from the 2013 documentary:
"Welcome to the Energiewende"

Citizens will opt for renewables and efficiency



Thanks for listening!

Conclusion:

We need everyone involved – utilities, businesses, communities, and citizens!

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