

The World Nuclear Industry Status Report 2015-16

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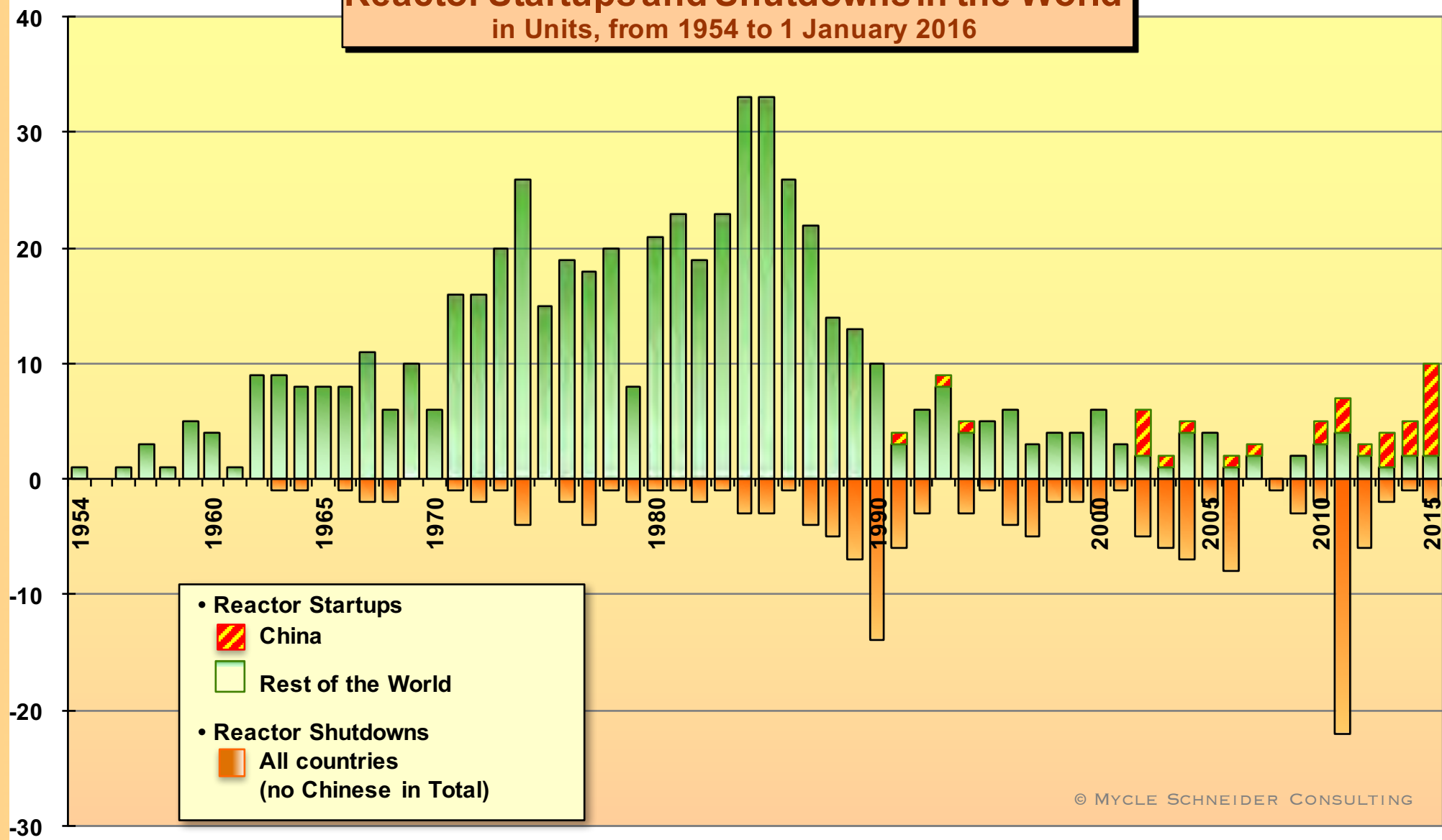
Mycle Schneider

International Consultant on Energy and Nuclear Policy, Paris, France

Convening Lead Author of the World Nuclear Industry Status Report (WNISR)

Fachgespräch zum Thema „Perspektiven der weltweiten Entwicklung der Atomenergie sowie der Erneuerbaren Energien“, Ausschuss für Umwelt, Naturschutz, Bau und Reaktorsicherheit
Deutscher Bundestag, Berlin, 16. März 2016

Reactor Startups and Shutdowns in the World in Units, from 1954 to 1 January 2016

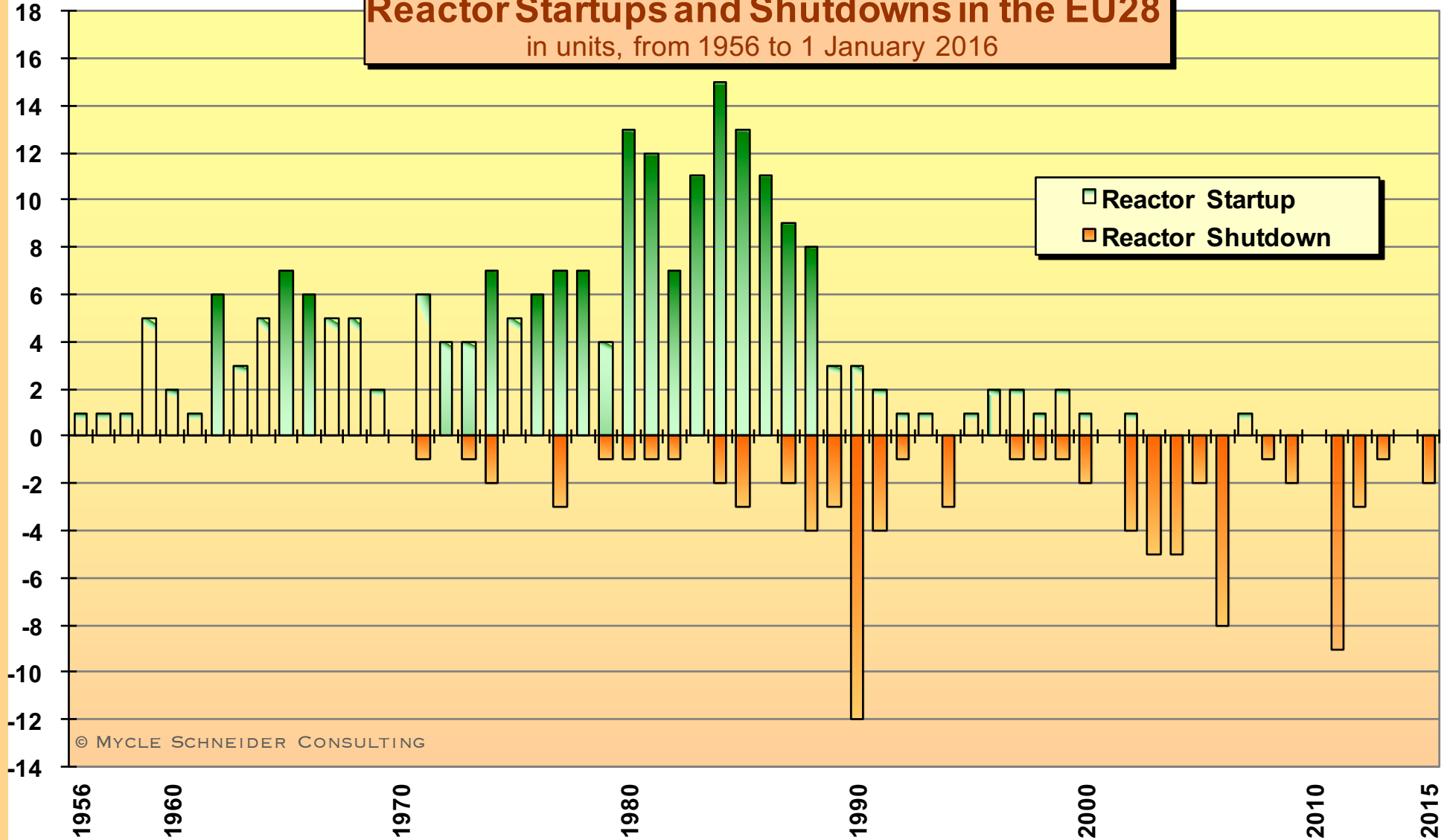


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Source: IAEA-PRIS, MSC, 2016

Reactor Startups and Shutdowns in the EU28

in units, from 1956 to 1 January 2016

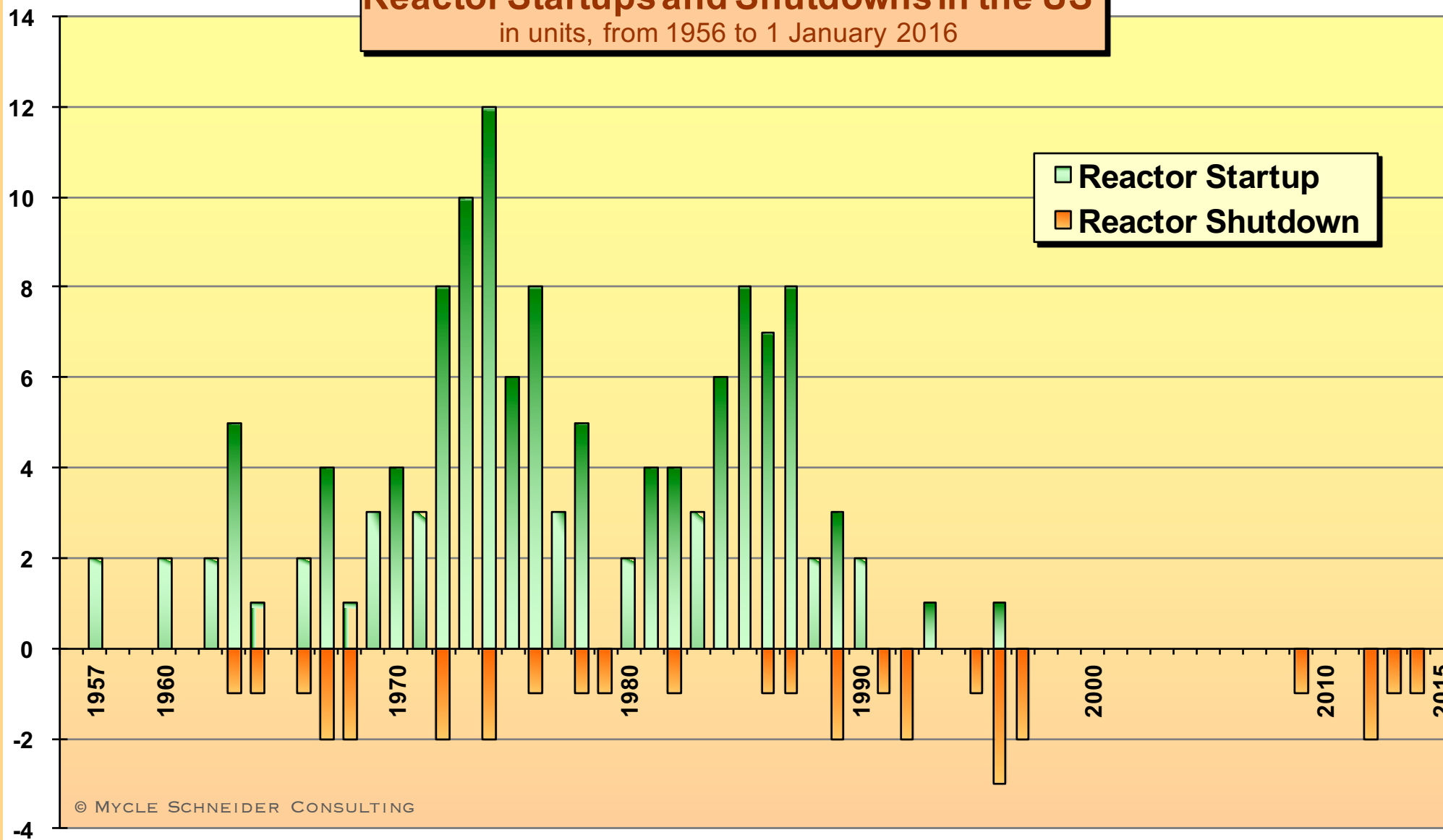


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Source: IAEA-PRIS, MSC, 2016

Reactor Startups and Shutdowns in the US

in units, from 1956 to 1 January 2016



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Source: IAEA-PRIS, MSC, 2015

Irreführende offizielle Informationen über die weltweite Atomkraftwerksflotte

PRIS



The Database on Nuclear Power Reactors

The Power Reactor Information System (PRIS), developed and maintained by the IAEA for over four decades, is a comprehensive database focusing on nuclear power plants worldwide. PRIS contains information on power reactors in operation, under construction, or those being... [READ MORE »](#)

Registered User ENTRY

How to Register

SHORTCUTS

Select Country

Select Reactor

- [Nuclear Power Reactors in the World...](#)
- [Operating Experience with NPP \(OPEX\)](#)
- [PRIS-WEDAS User's Manual](#)

OVERVIEW

Current Status:

442 NUCLEAR POWER REACTORS
IN OPERATION

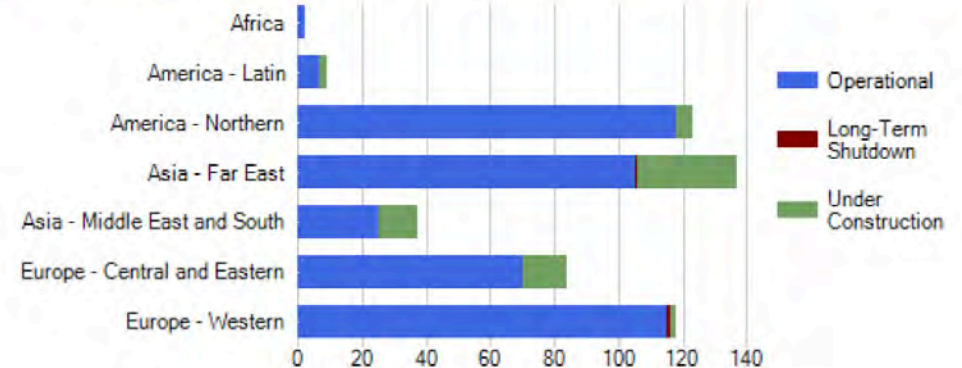
384 081 MWe TOTAL NET INSTALLED
CAPACITY

2 NUCLEAR POWER REACTORS
IN LONG-TERM SHUTDOWN

66 NUCLEAR POWER REACTORS
UNDER CONSTRUCTION

Regional Distribution of Nuclear Power Plants

(Click on the chart for more statistics)



Source: IAEA-PRIS, Screenshot, 15 March 2016

Irreführende offizielle Informationen über die japanische Atomkraftwerksflotte



IAEA | PRIS Power Reactor Information System

World Statistics

Country Statistics

Publications

Glossary

About PRIS

COUNTRIES

Argentina
Armenia
Belarus
Belgium
Brazil
Bulgaria
Canada
China
Czech Republic
Finland
France
Germany
Hungary



Japan

SUMMARY

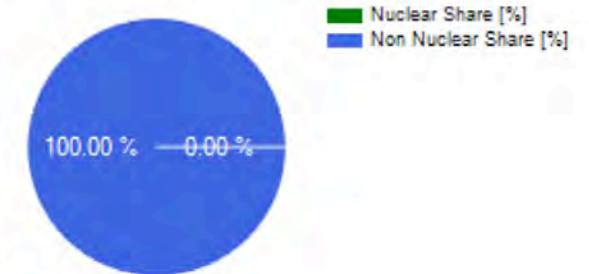
Nuclear Power Reactors

Under Construction	Operational	Long-Term Shutdown	Permanent Shutdown
2	43	1	16

Annual Electrical Power Production

Total Electricity Production (including Nuclear) 795936.00 GW.h (Net, 2014)	Nuclear Electricity Production 0.00 GW.h (Net, 2014)
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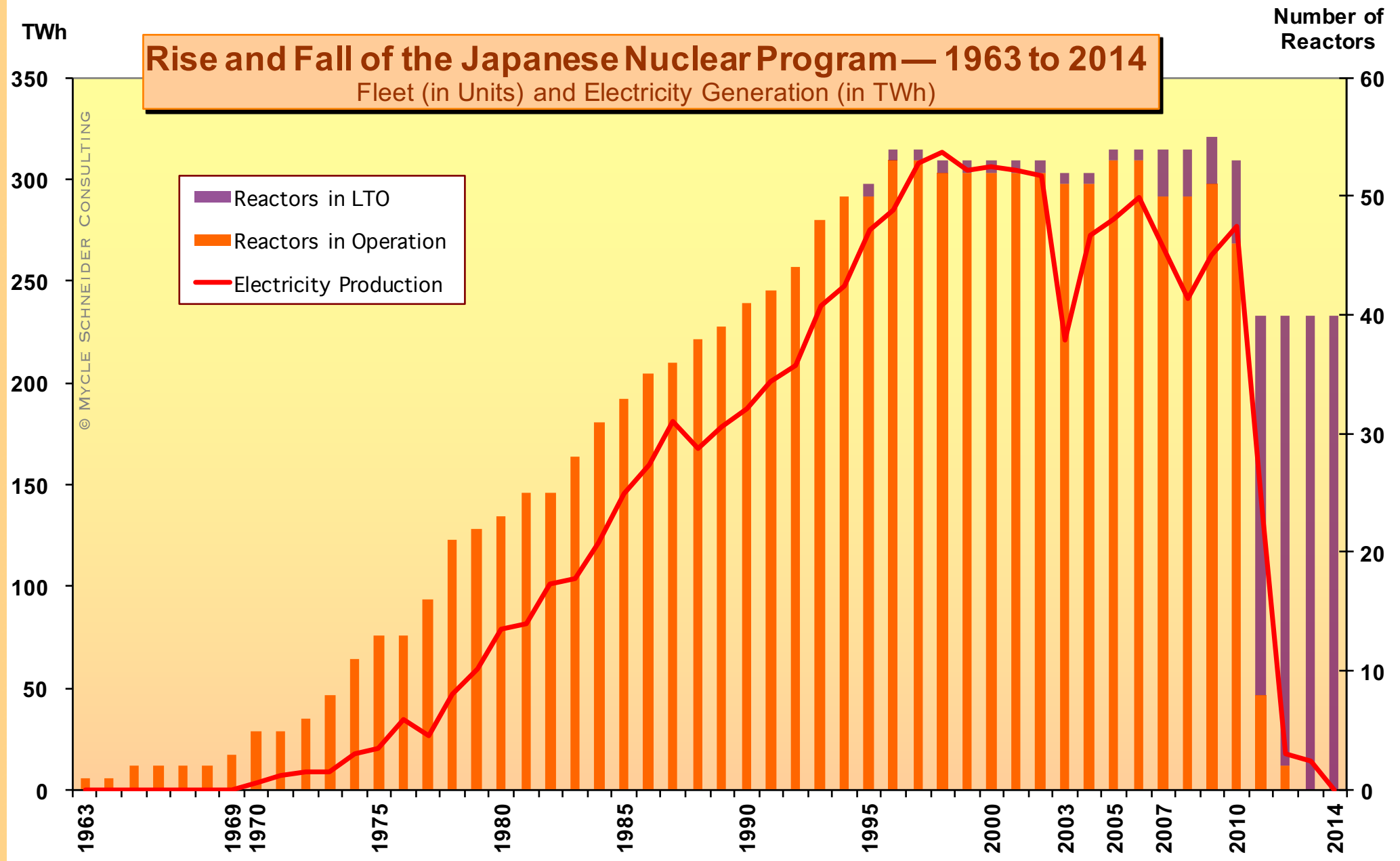
Electricity Production Share in 2014



Source: IAEA-PRIS, Screenshot, 15. März 2016

Rise and Fall of the Japanese Nuclear Program — 1963 to 2014

Fleet (in Units) and Electricity Generation (in TWh)



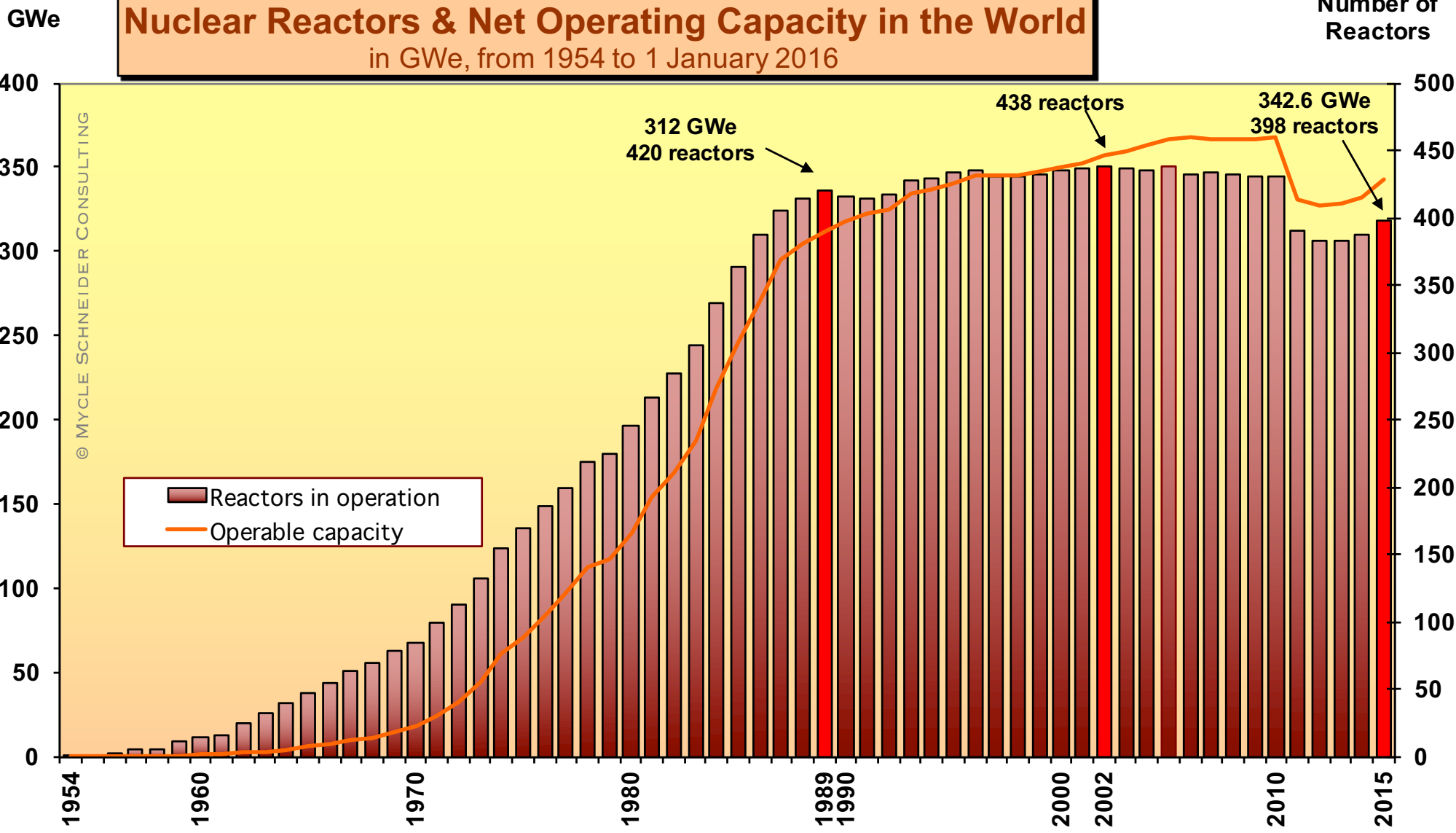
Source: IAEA-PRIS, MSC, 2015

Der WNISR2014 definiert eine neue Kategorie für den Betriebsstatus der Reaktoren:

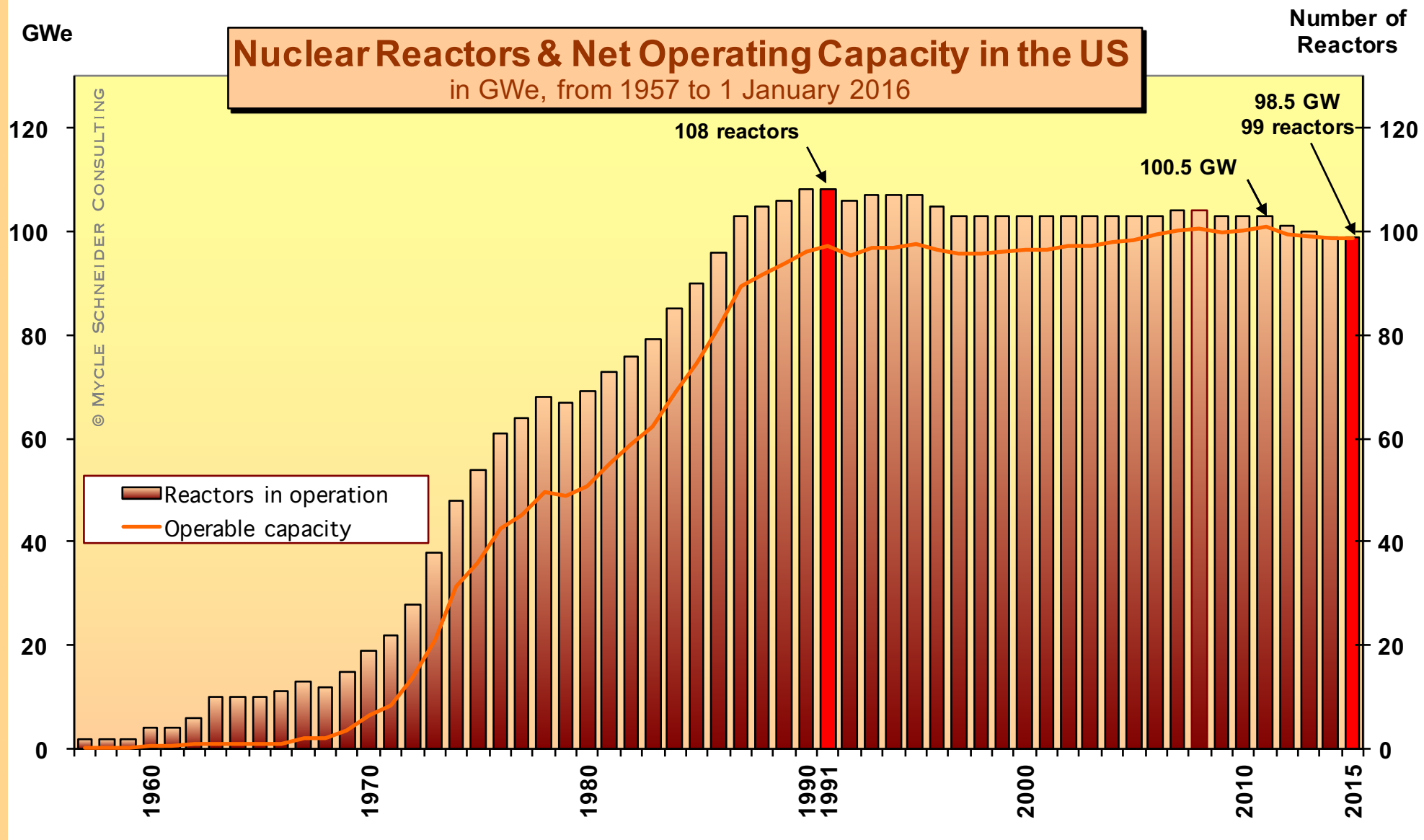
Long-Term Outage (LTO) – Langfristiger Betriebsausfall

“Ein Atomkraftwerk befindet sich in der Kategorie ‚langfristiger Betriebsausfall‘ (LTO) wenn es im vorangegangenen Kalenderjahr und im ersten Semester des laufenden Jahres keinen Strom erzeugt hat.“

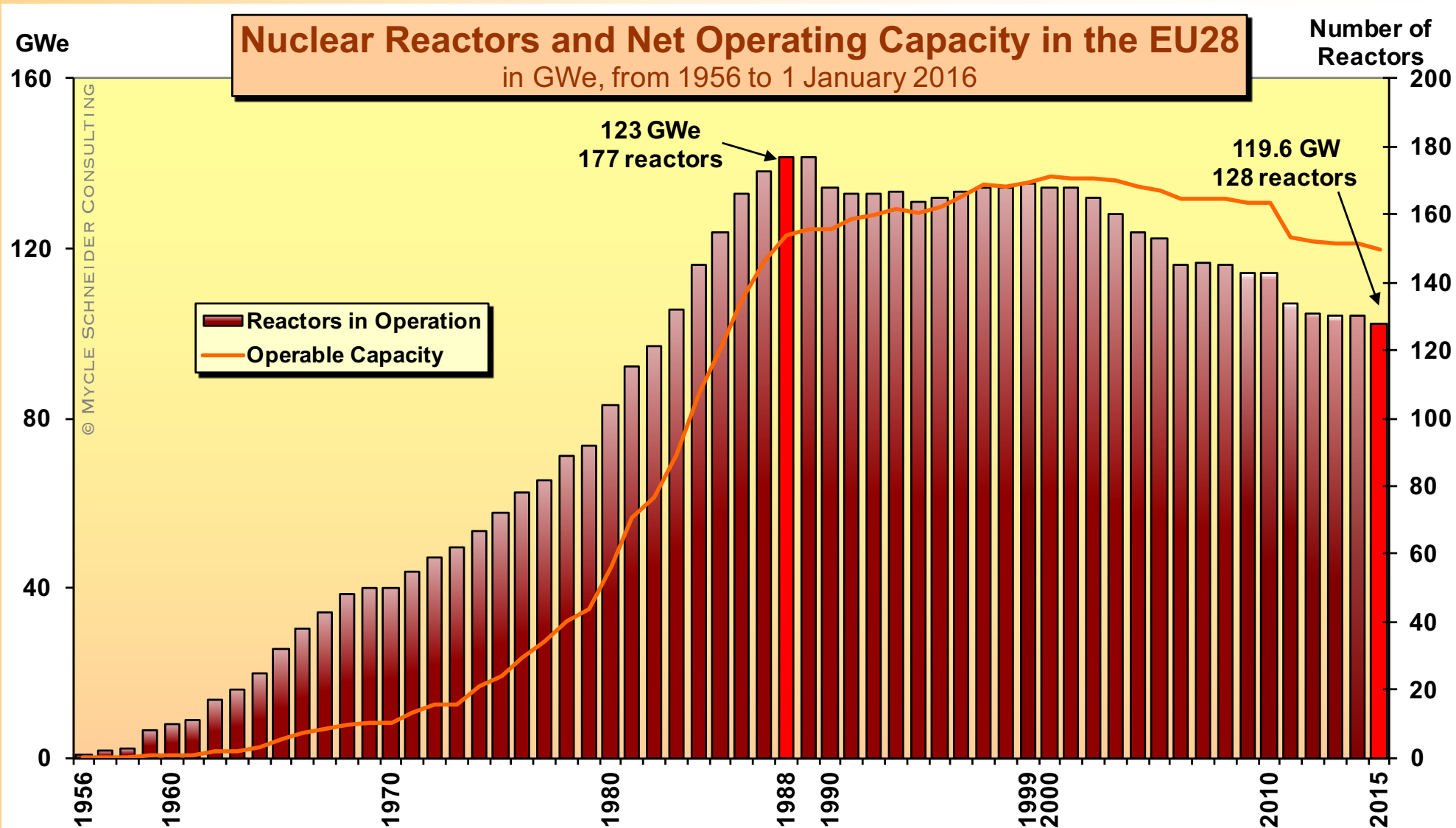
38 Reaktoren in Japan in LTO (Stand März 2016)



Source: IAEA-PRIS, MSC, 2016



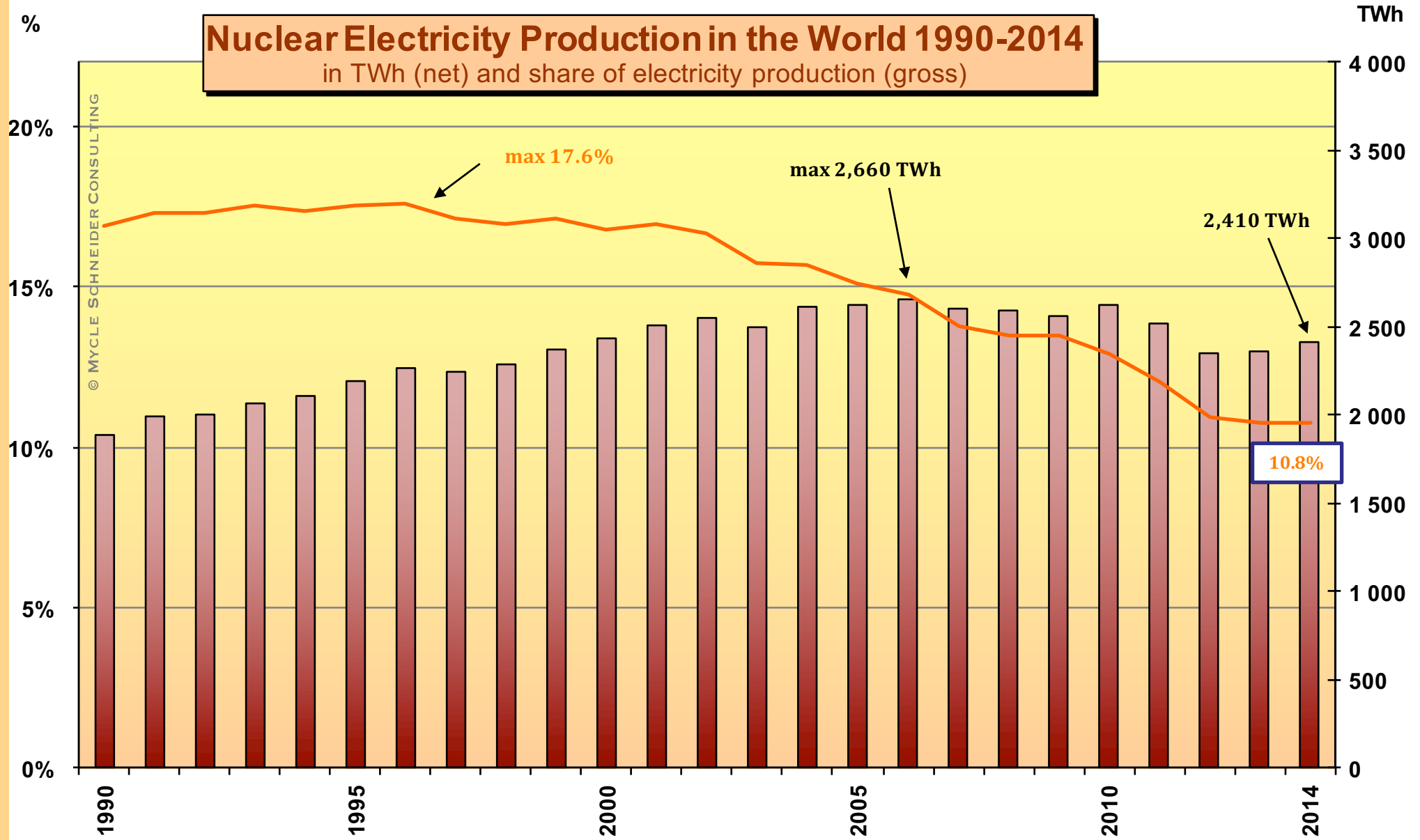
Source: IAEA-PRIS, MSC, 2015



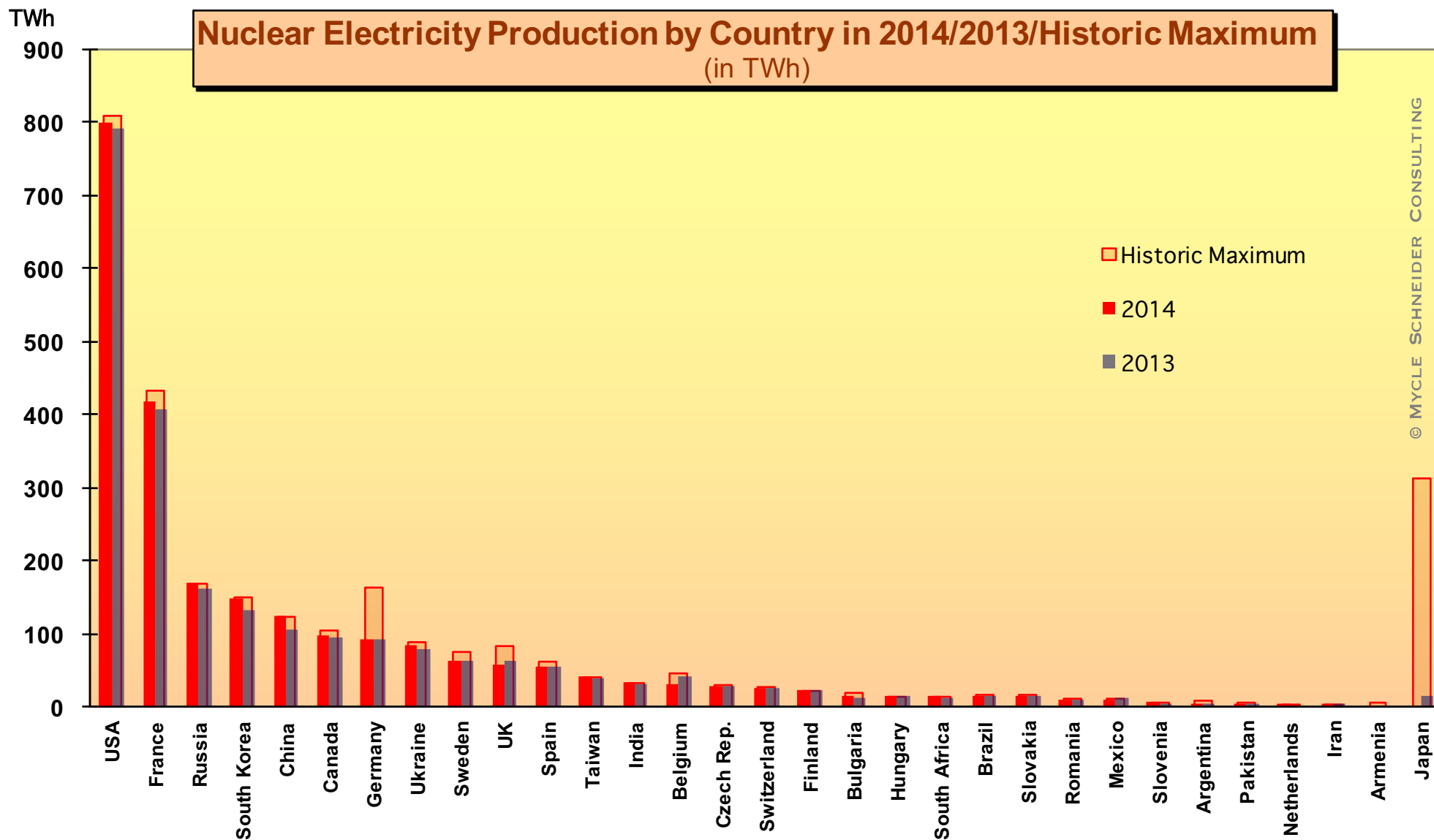
Source: IAEA-PRIS, MSC, 2016

Nuclear Electricity Production in the World 1990-2014

in TWh (net) and share of electricity production (gross)



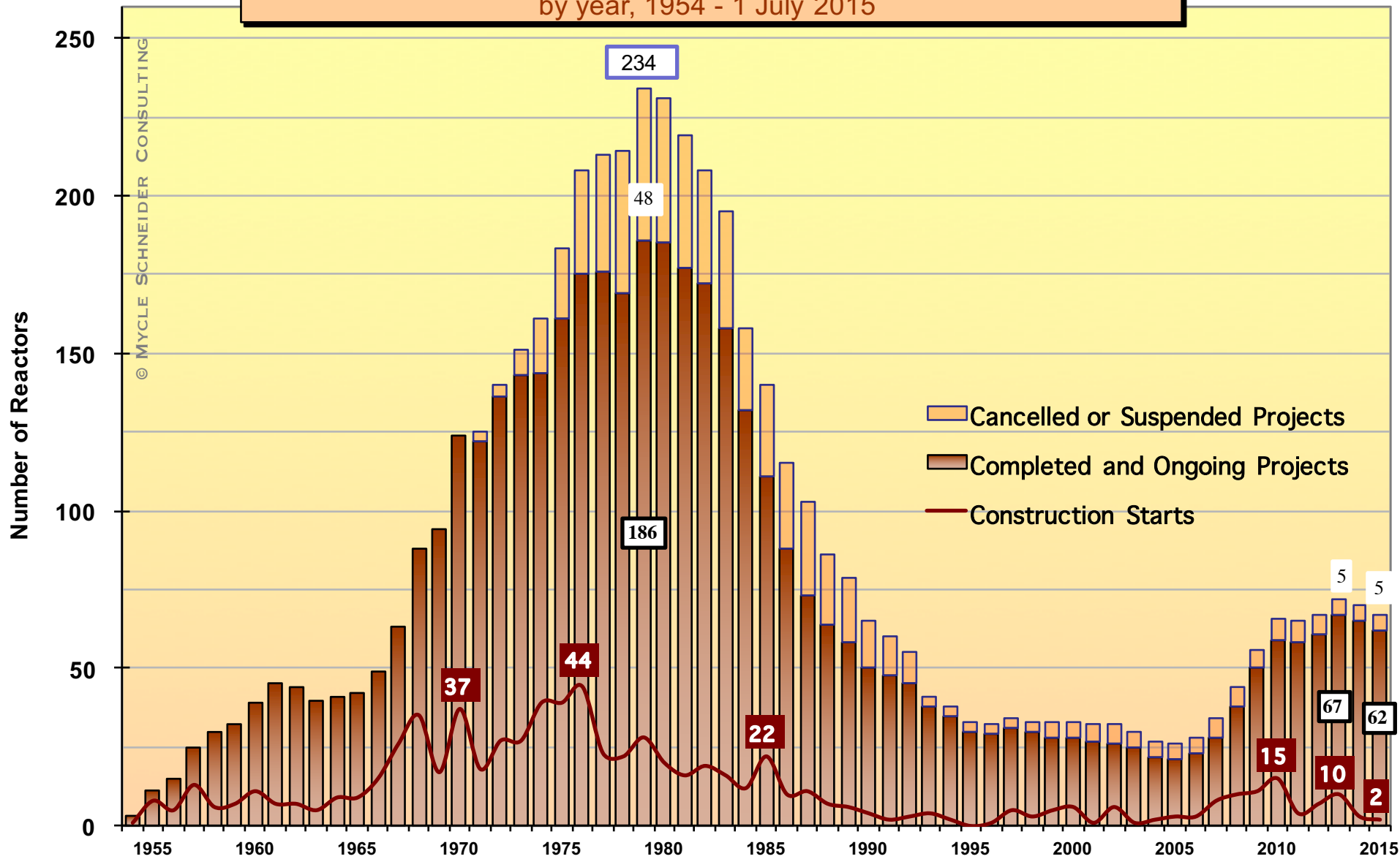
Source: IAEA-PRIS, MSC, 2015



Source: IAEA-PRIS, MSC 2015

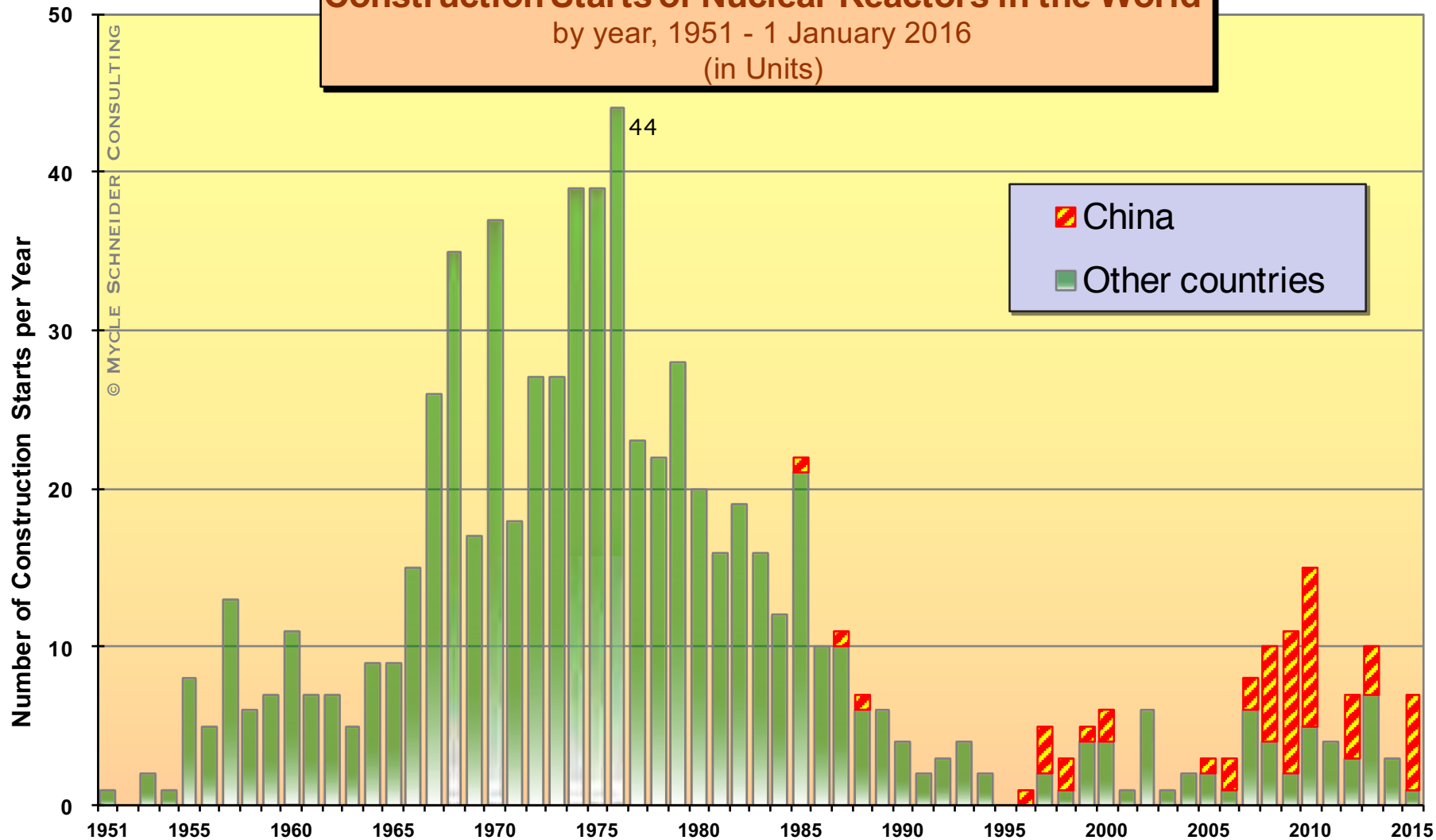
Number of Nuclear Reactors Listed as "Under Construction"

by year, 1954 - 1 July 2015



Source: IAEA-PRIS, MSC, 2014

Construction Starts of Nuclear Reactors in the World by year, 1951 - 1 January 2016 (in Units)



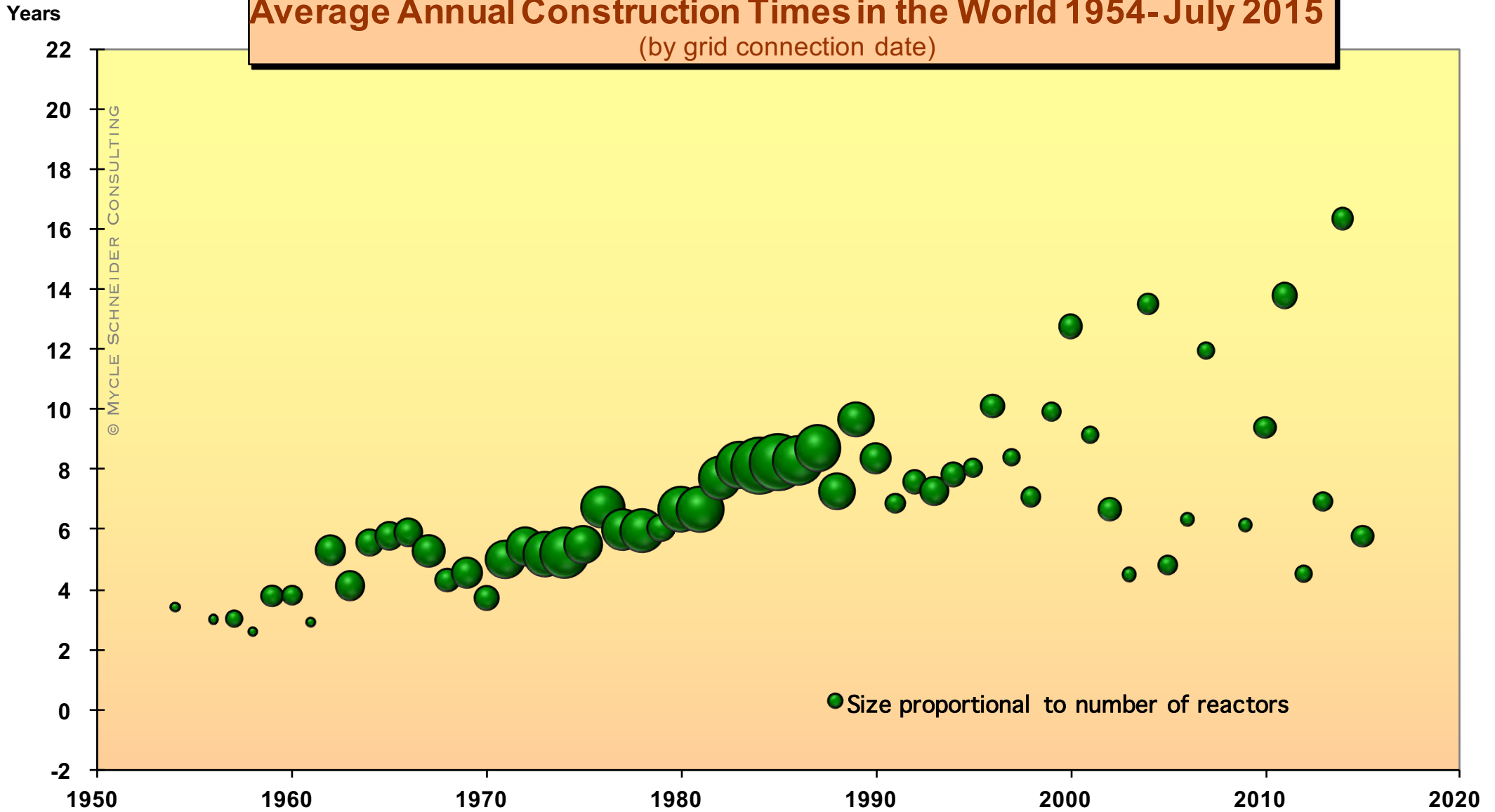
Source: IAEA-PRIS, MSC, 2016

Reaktoren weltweit “im Bau” (1. Juli 2015)

Country	Units	MWe (net)	Construction Start	Planned Grid Connection	Delayed Startup (Units)
China	24	23,738	2009-2015	2015-2021	15
Russia	8	6,262	1983-2010	2015-2019	8
India	6	3,907	2002-2011	2015-2019	6
USA	5	5,633	1972-2013	2016-2020	5
South Korea	4	5,360	2008-2013	2016-2018	4
UAE	3	4,035	2012-2014	2017-2019	?
Belarus	2	2,218	2013-2014	2019-2020	?
Pakistan	2	630	2011	2016-2017	2
Slovakia	2	880	1985	2016-2017	2
Ukraine	2	1,900	1986-1987	2019	2
Argentina	1	25	2014	2018	?
Brazil	1	1,245	2010	2018	1
Finland	1	1,600	2005	2018	1
France	1	1,600	2007	2017	1
Total	62	59,033	1972-2015	2015-2021	47

Source: IAEA-PRIS, MSC, 2015

Average Annual Construction Times in the World 1954-July 2015 (by grid connection date)



Source: IAEA-PRIS, MSC, 2015

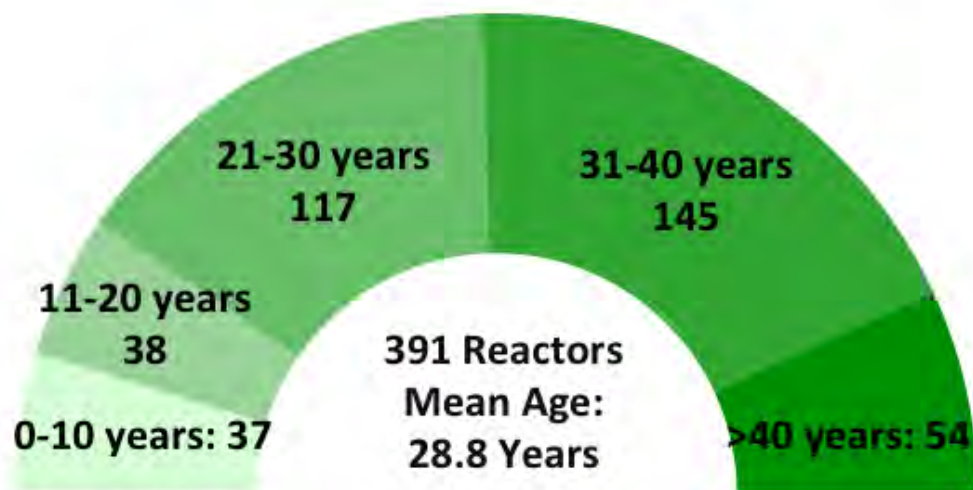
Construction Times (in years)

Startups between 2005 and July 2015

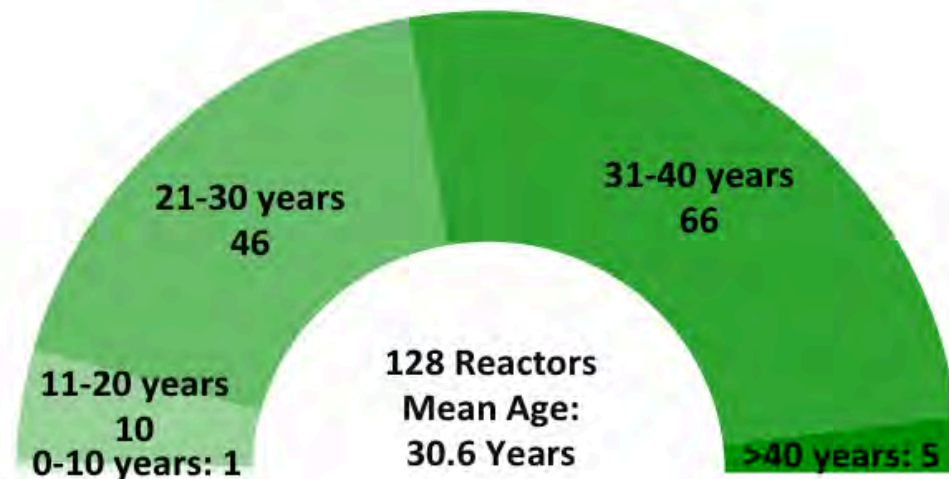
<i>Country</i>	<i>Units</i>	<i>Mean Time</i>	<i>Min</i>	<i>Max</i>
China	18	5.7	4.4	11.2
India	7	7.3	5.1	11.6
South Korea	5	4.9	4	6.4
Japan	3	4.6	3.9	5.1
Russia	3	28.0	25.3	31.9
Argentina	1	32.9	32.9	32.9
Iran	1	36.3	36.3	36.3
Pakistan	1	5.3	5.3	5.3
Romania	1	24.1	24.1	24.1
Total	40	9.4	3.9	36.3

Sources: IAEA-PRIS, MSC, 2015

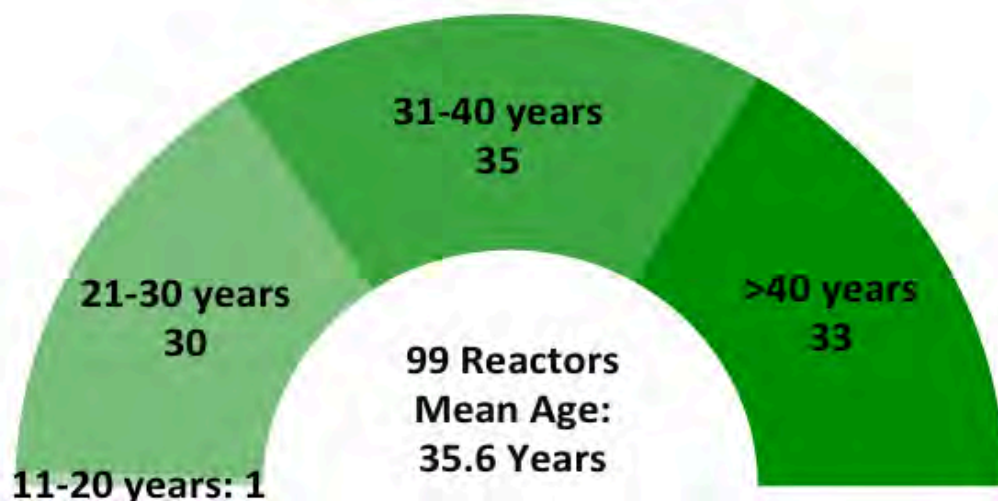
Age of World Nuclear Fleet as of 1 July 2015



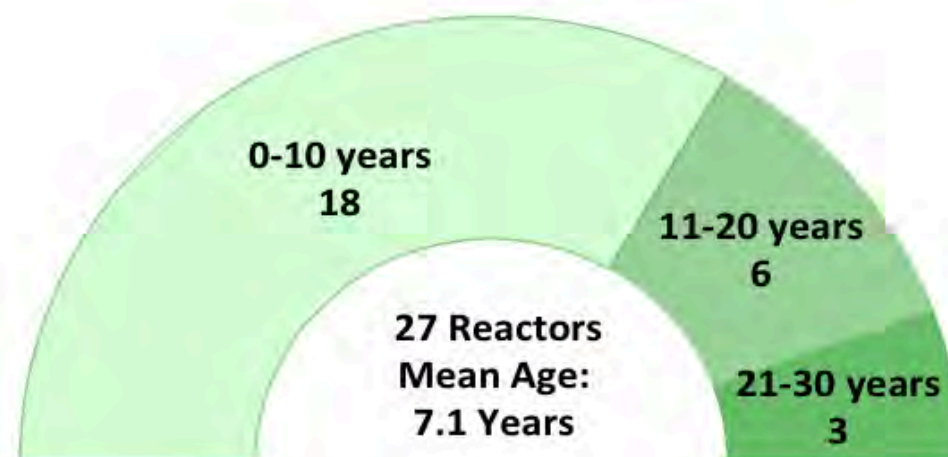
Age of EU Nuclear Fleet as of 1 July 2015



Age of US Nuclear Fleet as of 1 July 2015



Age of Chinese Nuclear Fleet as of 1 July 2015



“Ist Reaktorabriss die Zukunft von Westinghouse?”*

Frühabschaltungen – Fallstudien aus den USA und Schweden

	Abschaltung	Laufzeitverlängerung	Grund	Alter
USA				
Crystal River-3:	2009	beantragt	Berstschutzschaden	22
San Onofre-2 and -3:	2012	genehmigt	Dampferzeugerschaden	28/29
Kewaunee	2013	genehmigt	unwirtschaftlich	39
Vermont Yankee	2014	genehmigt	unwirtschaftlich	42
Pilgrim	2017?	genehmigt	unwirtschaftlich	(45)
Fitzpatrick	2016/17	genehmigt	unwirtschaftlich	(41/42)
Schweden				
Oskarshamn-1	2015?	nachgerüstet	unwirtschaftlich	(44)
Oskarshamn-2	2013	Nachrüst. abgebr.	unwirtschaftlich	39
Ringhals-1	2020	nachgerüstet	unwirtschaftlich	(46)
Ringhals-2	2019	nachgerüstet	unwirtschaftlich	(45)

Indien nächster Kandidat?

Tarapur-1 and -2

*Sources: Various, compiled by MSC; *bizjournals.com, 2 Nov. 2015*

Französische Atomunternehmen in großen Schwierigkeiten

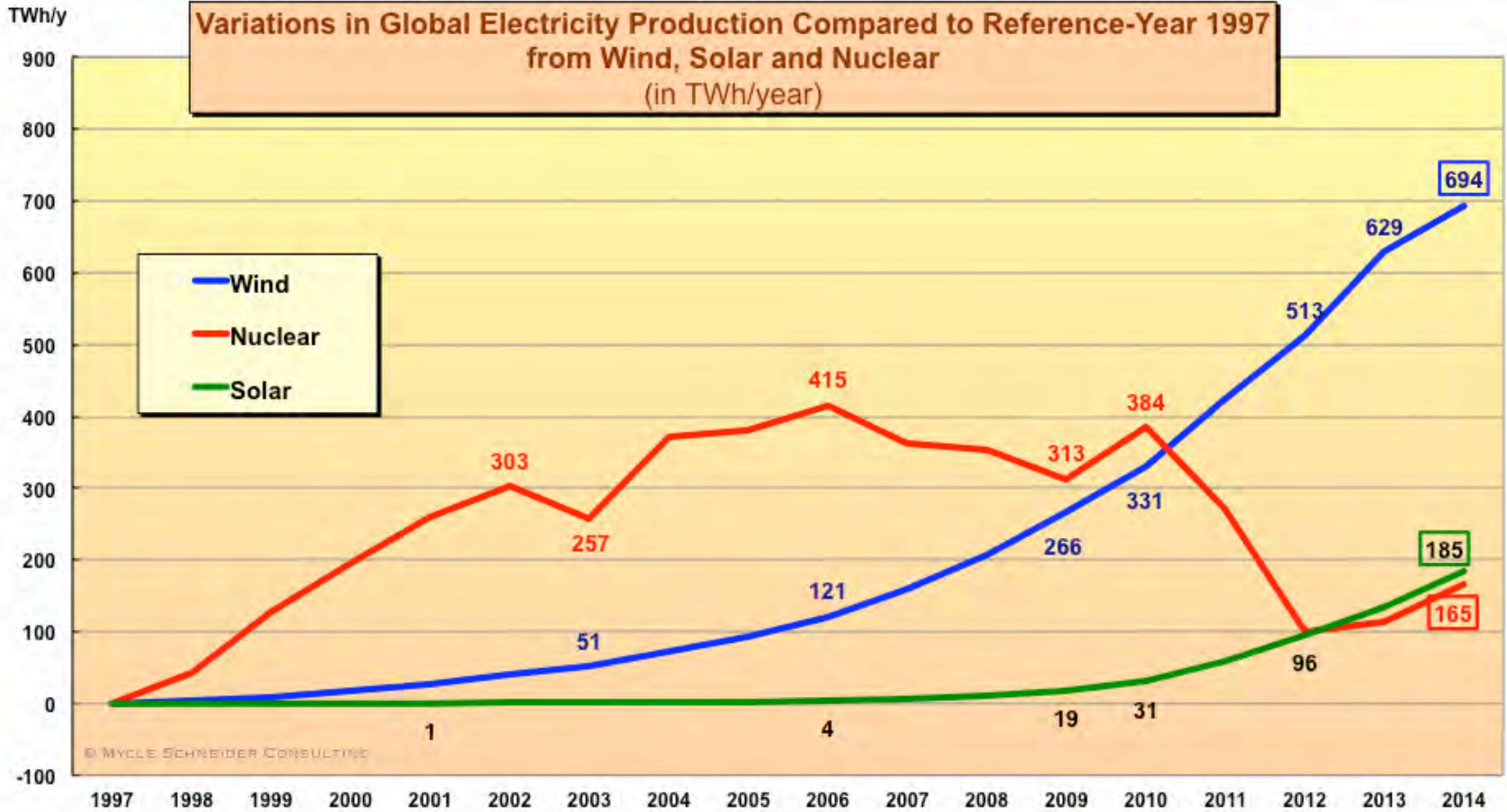
EDF — Der größte Atomkraftwerksbetreiber in der Welt

- Betriebskosten außer Kontrolle:
 - +4.5%/a 2007-2012 (laut Energieregulierungsbehörde)
 - +16% 2010-2013 (laut Rechnungshof)
 - Drastische Tariferhöhungen unabdingbar
- Aktienwert stürzte seit 2007 um 89% ab
- Hohe Schuldenlast von 37,4 Mrd. € bei 75 Mrd. € Umsatz

AREVA — selbsterklärter “Global Leader in Nuclear Energy”

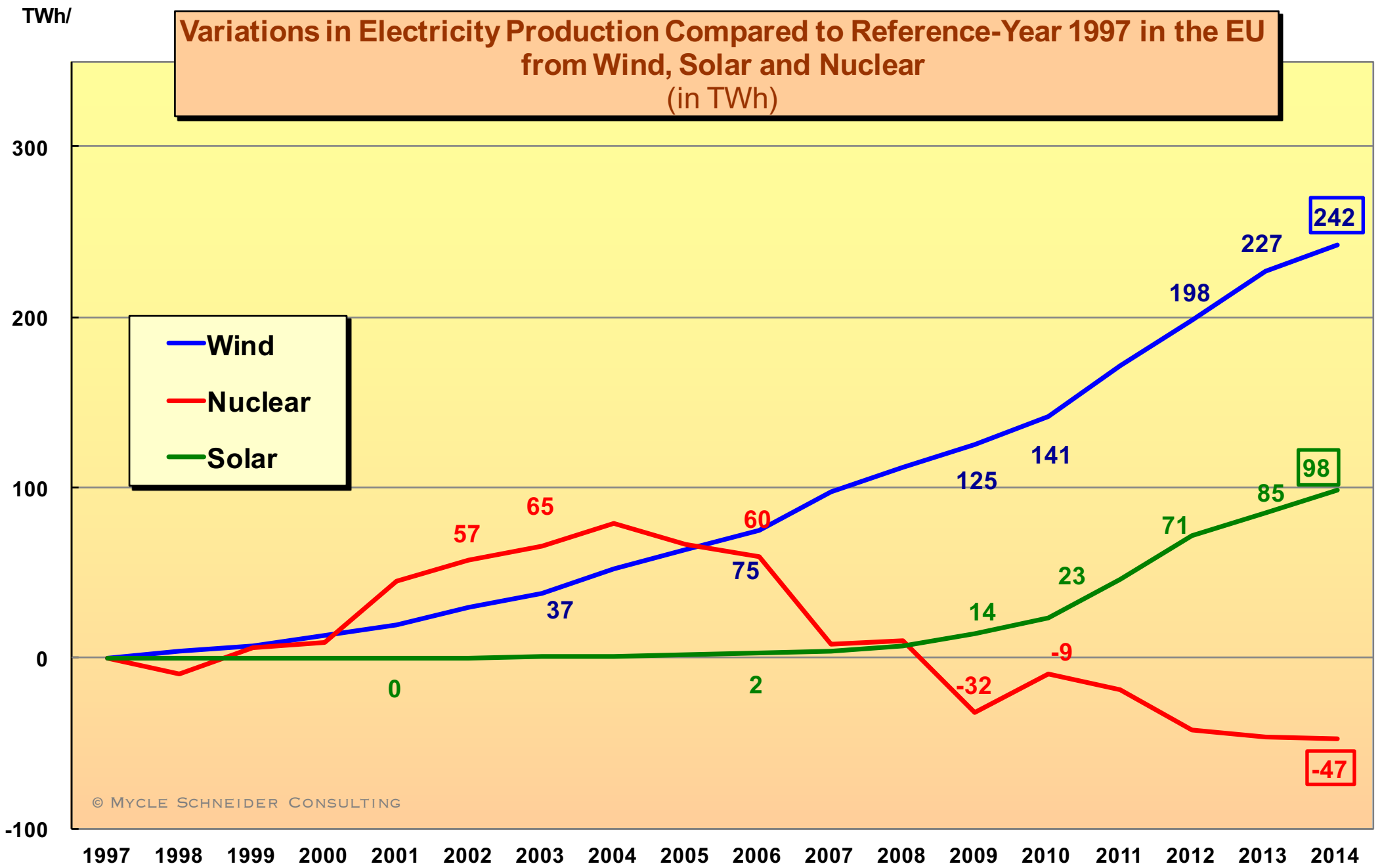
- Technisch bankrott
- Verluste von kumuliert 10 Mrd. € in 5 Jahren
- Hohe Schuldenlast von 6,3 Mrd. € bei 4.2 Mrd. € Umsatz
- Aktienwert stürzte seit 2007 um 95% ab
- Standard & Poor’s werteten AREVA im November 2014 auf BB+ (“junk”) runter und im März 2015 auf BB-

Sources: Company websites; Standard & Poor’s



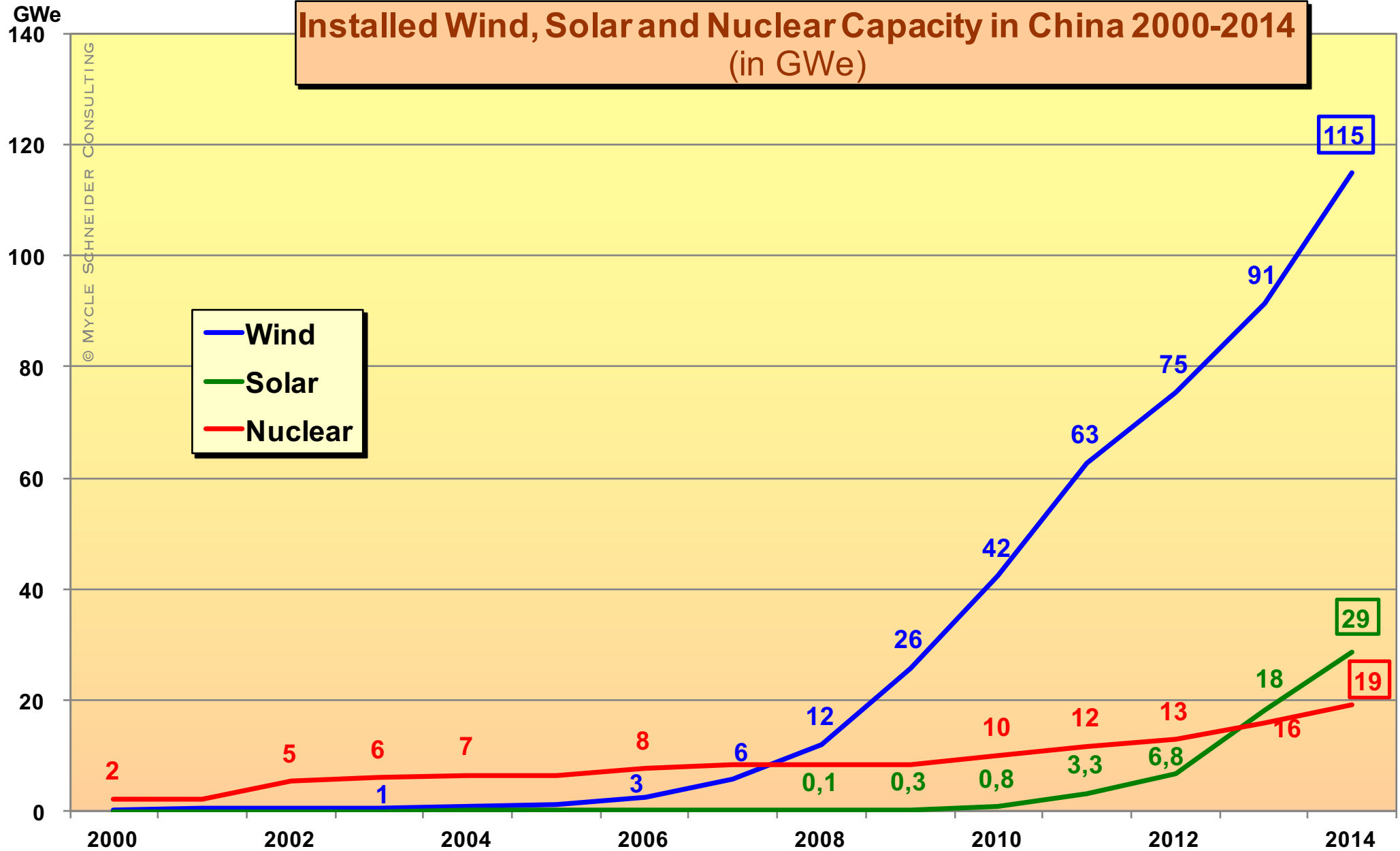
Sources: BP, IAEA-PRIS, MSC, 2015

**Variations in Electricity Production Compared to Reference-Year 1997 in the EU
from Wind, Solar and Nuclear
(in TWh)**

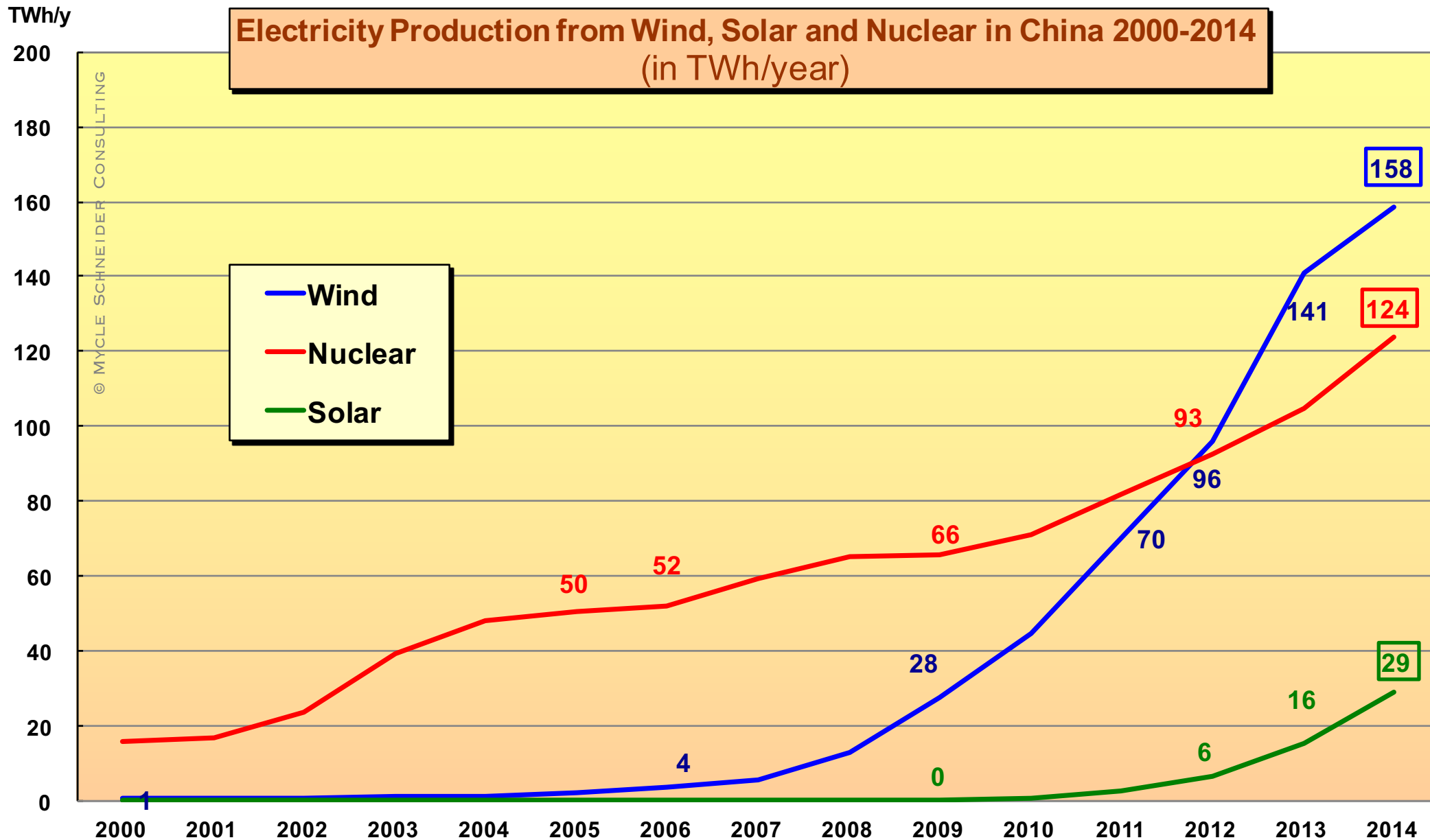


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Source: IAEA-PRIS, BP, MSC 2015

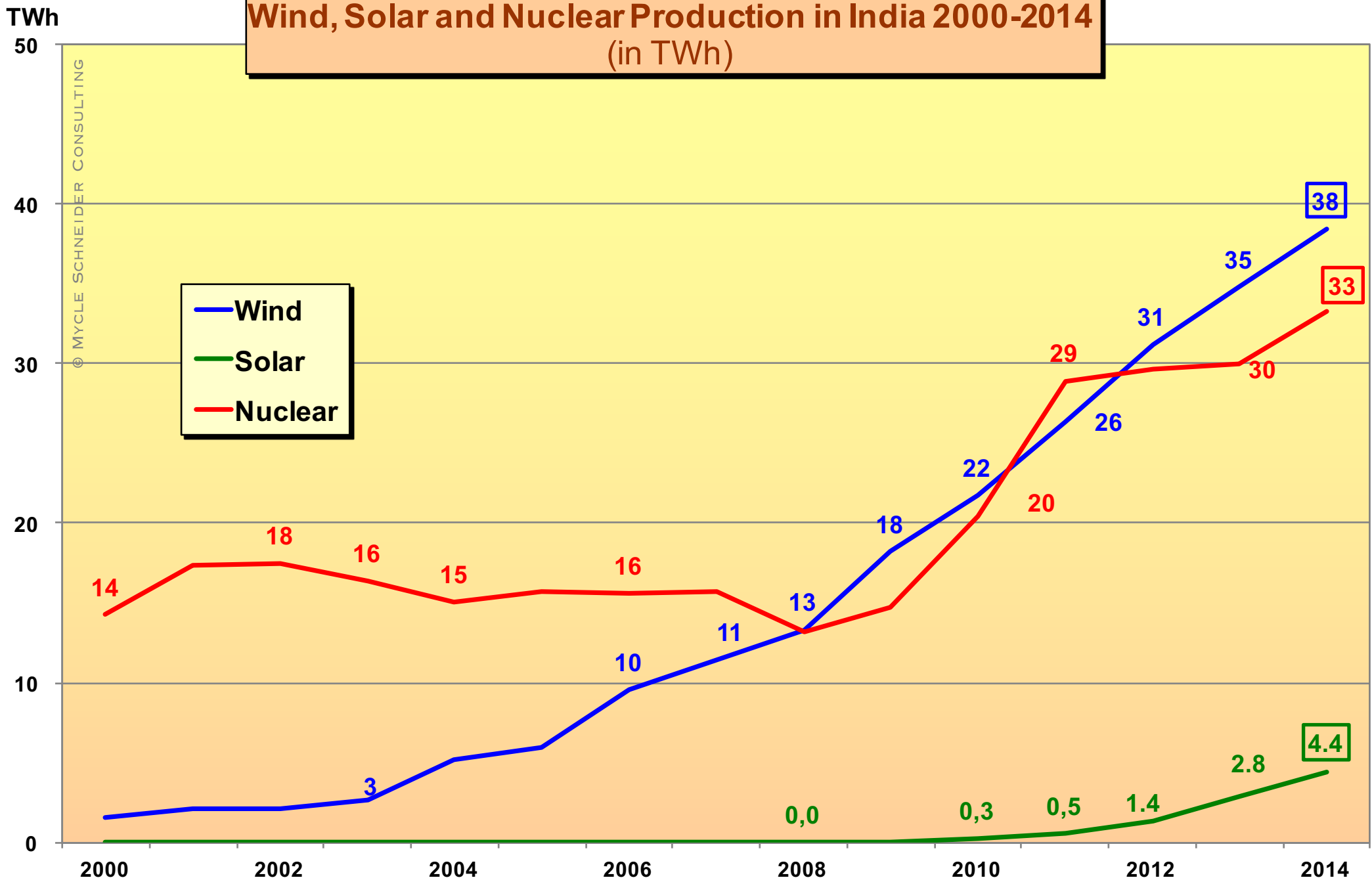


Source: EPIC, IAEA-PRIS, GWEC 2015



Source: BP 2015, IAEA-PRIS 2015

Wind, Solar and Nuclear Production in India 2000-2014 (in TWh)



Schlussbemerkungen

- Die Atomkraftnutzung in der Welt hat nach den meisten Kriterien – Stromproduktion (2006), Reaktoren im Betrieb (2002), Anteil am Strommix (1996), Reaktoren im Bau (1979) – ihren historischen Höchststand bereits seit vielen Jahren überschritten. Fukushima hat diese Dauerkrise erheblich verschärft, aber keineswegs ausgelöst.
- Die Situation der Atomkraft in den Strommärkten ist zunehmend gefährdet durch die schrumpfende Kundenbasis der Betreiberunternehmen, steigende Produktionskosten, stagnierender oder sinkender Stromverbrauch, und unerbittliche Konkurrenz, vor allem durch die Erneuerbaren.
- Atomindustrie- und Betreiberunternehmen kämpfen mit hohen Schuldenlasten, schwindenden Profitmargen und stark gesunkenen Großhandelspreisen.

Anhang

Hinkley Point C: EDF's Waterloo in the Making?

UK ENERGY POLICY

Bloomberg
NEW ENERGY FINANCE



Michael Liebreich @MLiebreich · Jun 28

Breaking! First picture of the UK's #HinkleyC #nuclear power station...



77 50

Image: Wikimedia Commons

Michael Liebreich

BNEF EMEA Summit, London, 12 October 2015

@MLiebreich

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Investment bank Investec has advised clients to sell shares in French energy group EDF amid fears that its connection with the nuclear plant at Hinkley Point C could put payouts to shareholders under threat.

This is Money, 25 October 2015

EDF Actionnariat salarié (EAS) said in a statement that the interests of EDF are gravely threatened by the Hinkley Point project, which it calls "a financial catastrophe foretold" (...). EAS asks the management of EDF to stop this risky project, whose financial risks are too big for our company and which could put EDF's very survival at risk."

Reuters, 12 November 2015

FINANCIAL TIMES

March 7, 2016 7:12 pm

A blow to Britain's plan for nuclear renaissance

Print Clip

A shock resignation makes it harder to defend the Hinkley Point project

“EDF’s response to these concerns, and that of the governments backing the projects, has essentially been: ‘Trust us’. But it is no longer enough simply to assert confidence in the project’s merits. It is time for both EDF and the British government to face up to the difficulties besetting Hinkley Point and to outline alternatives. (...) Mr Piquemal’s resignation makes it ever harder to defend a deal whose flaws have become increasingly apparent. It is time to move on.”