The World Nuclear Industry Status Report

(See www.WorldNuclearReport.org)

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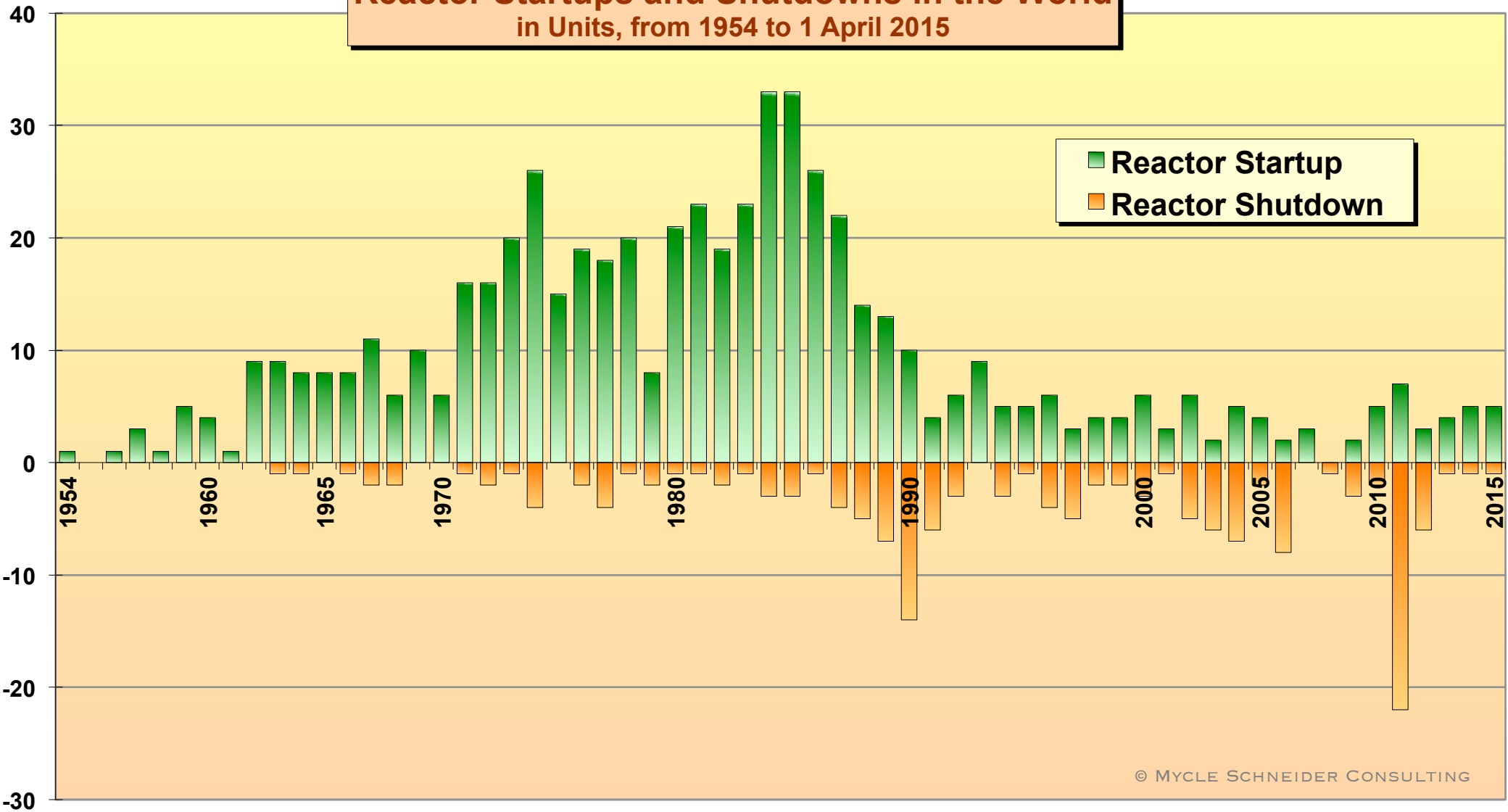
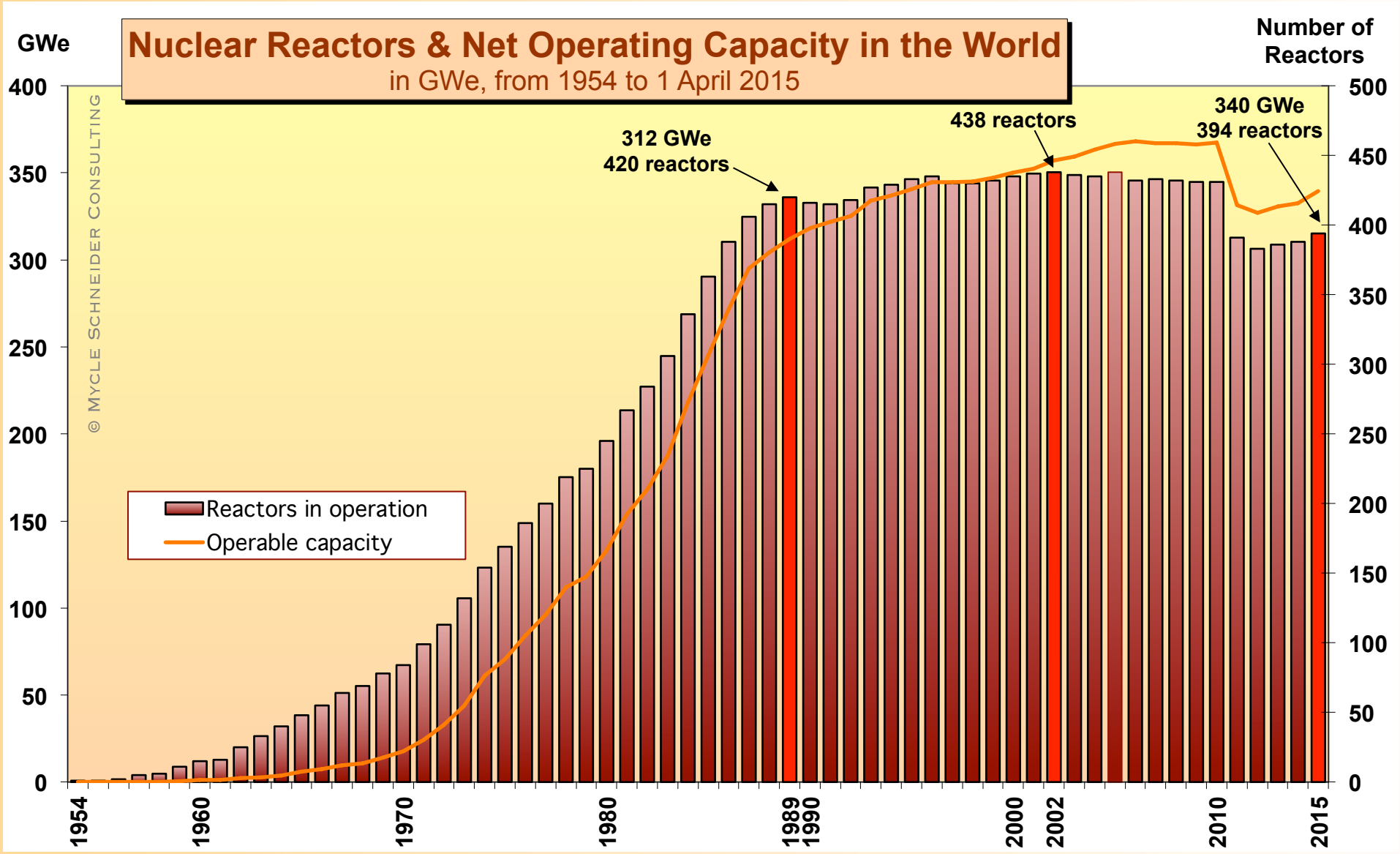
World Uranium *Symposium* Mondial sur l'Uranium

Québec City, 14-16 April 2015

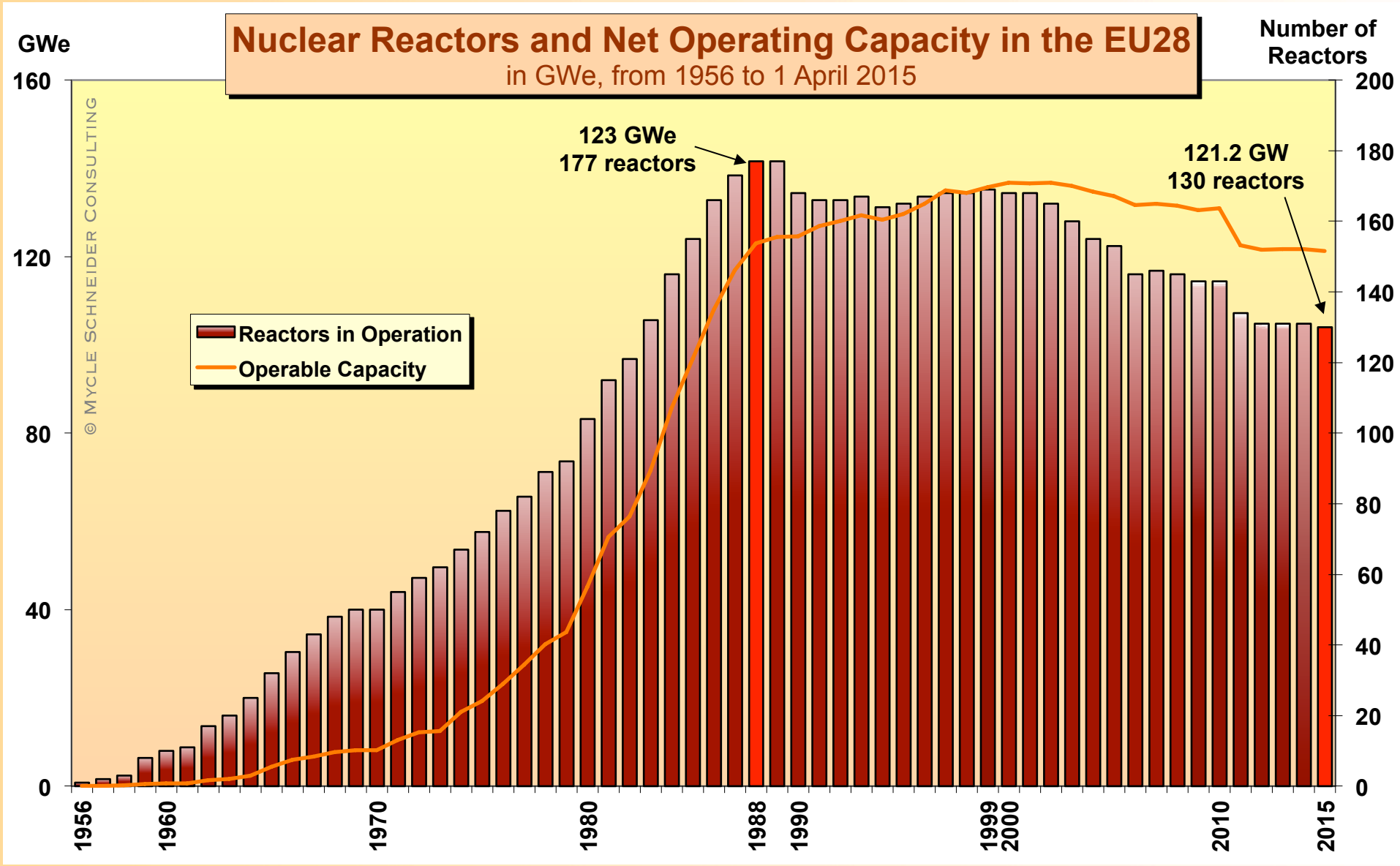
Reactor Startups and Shutdowns in the World
in Units, from 1954 to 1 April 2015



Source: IAEA-PRIS, MSC, 2015



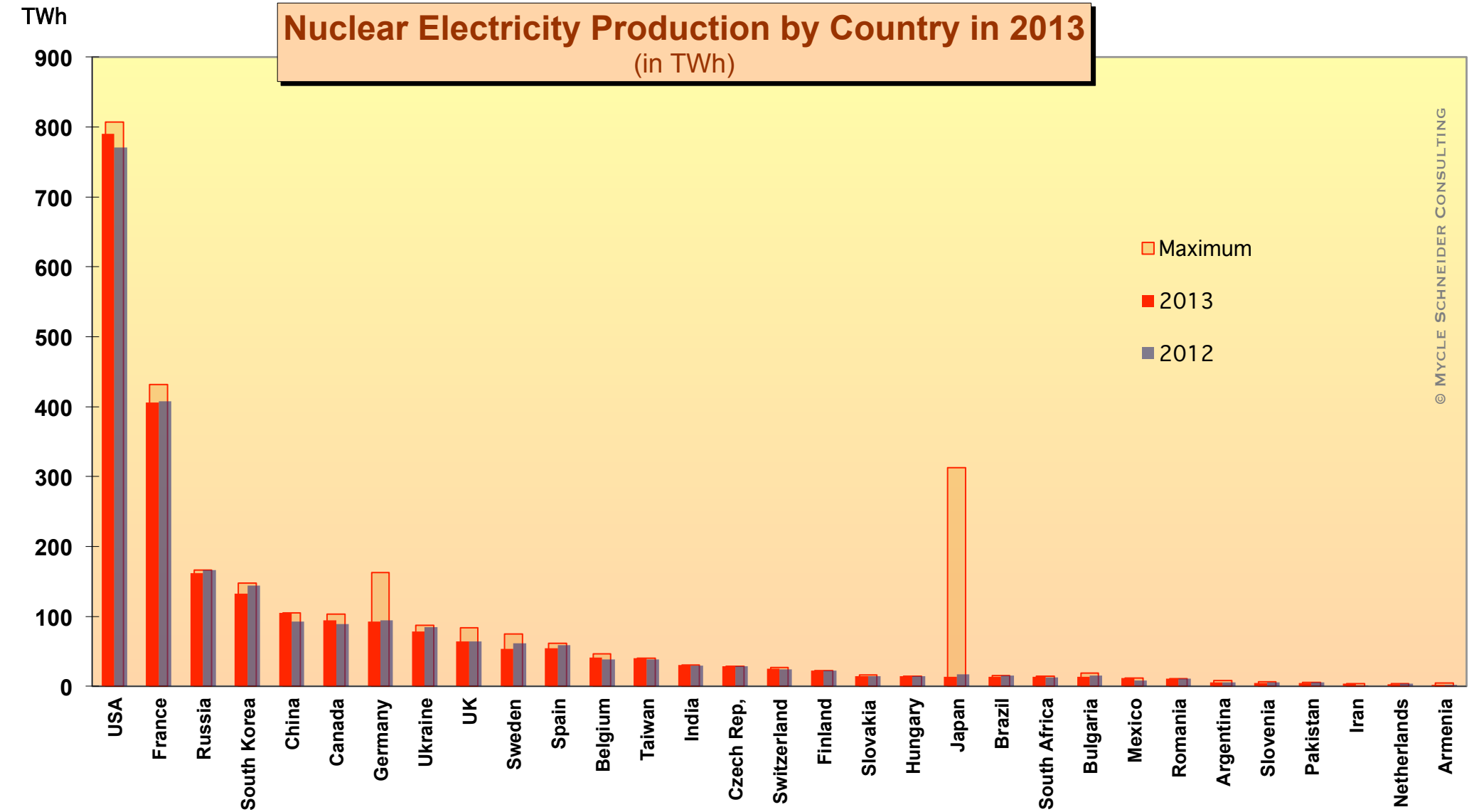
Source: IAEA-PRIS, MSC, 2015



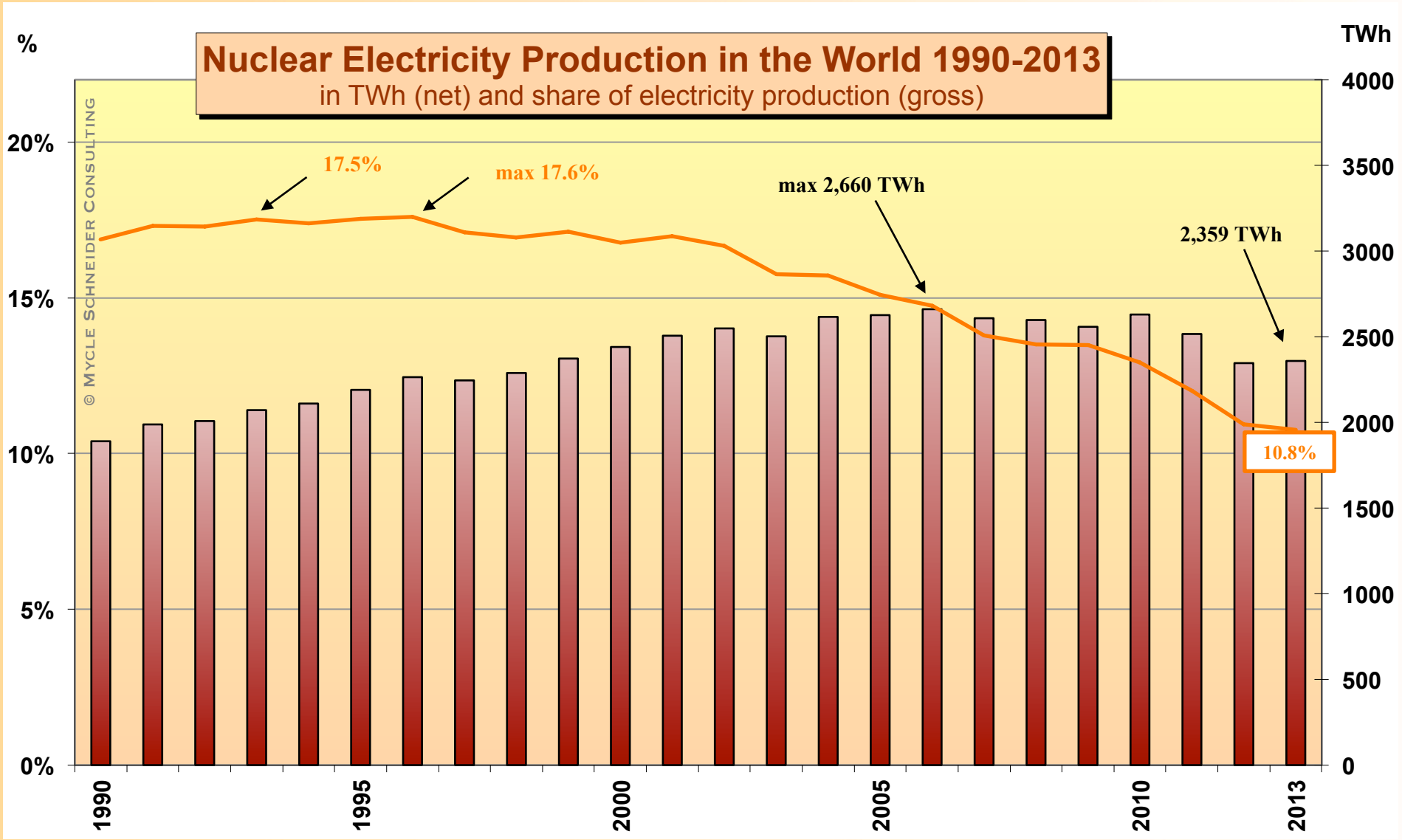
Source: IAEA-PRIS, MSC, 2015

Nuclear Electricity Production by Country in 2013

(in TWh)



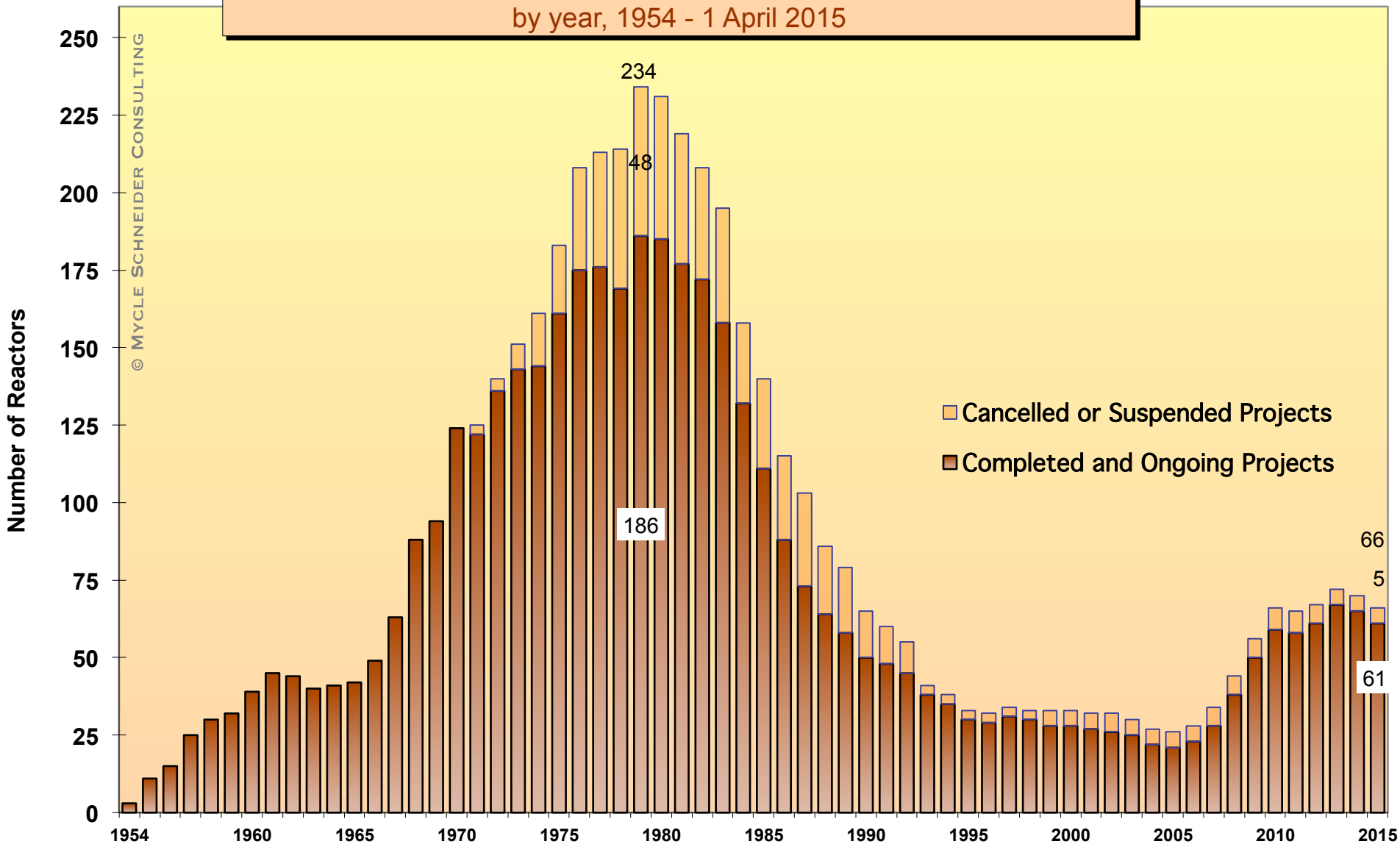
Source: IAEA-PRIS, MSC, 2015



Source: IAEA-PRIS, MSC, 2015

Number of Nuclear Reactors Listed as "Under Construction"

by year, 1954 - 1 April 2015

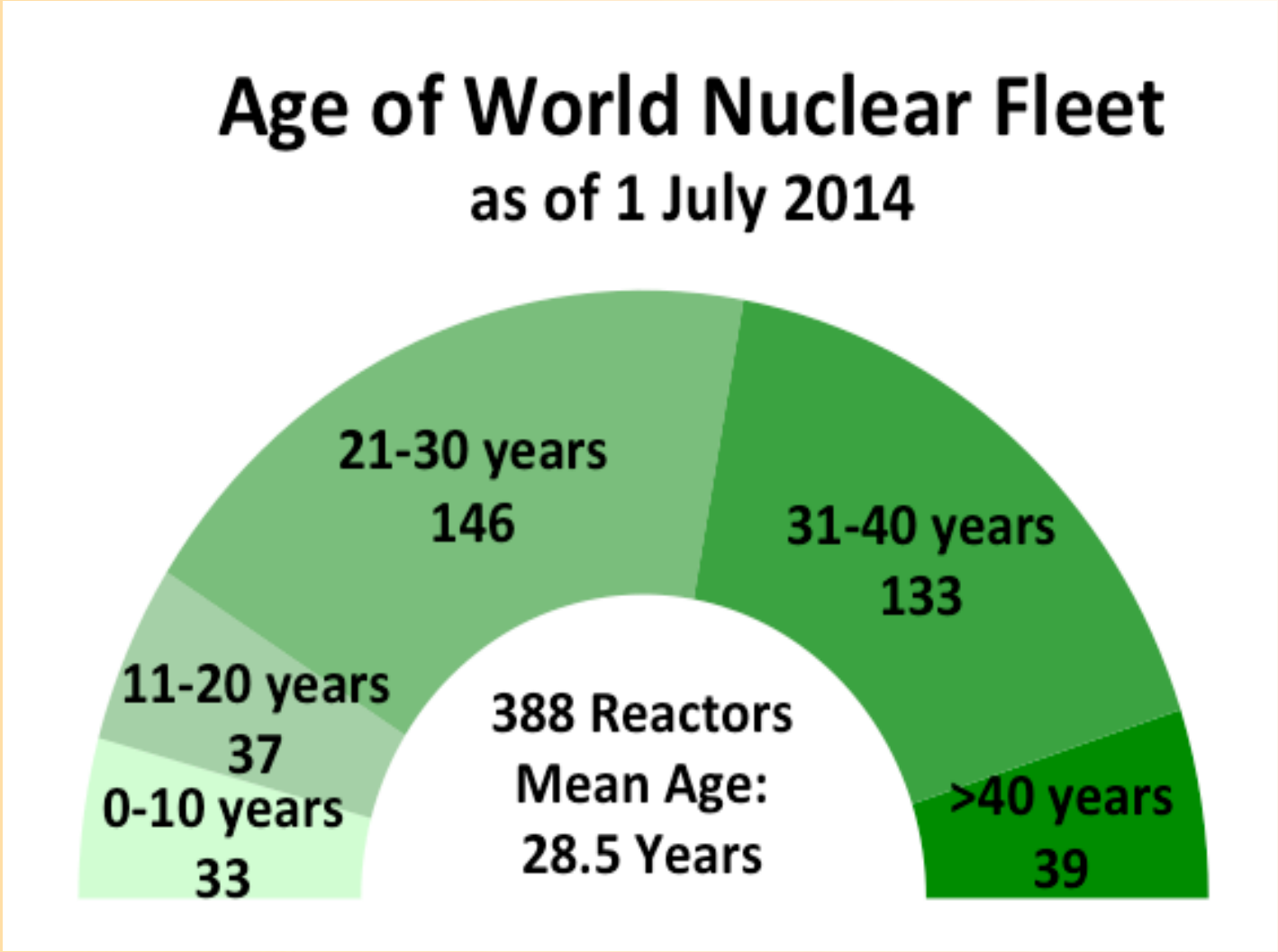


Source: IAEA-PRIS, MSC, 2015

Reactors « Under Construction » in the World (1 April 2015)

Country	Units	MWe (net)	Construction Start	Grid Connection	Delayed
China	23	22,738	2009-2015	2015-2021	20
Russia	8	6,262	1983-2009	2015-2019	8
India	6	3,907	2002-2011	2015-2016	2
USA	5	5,633	1972-2013	2015-2020	5
South Korea	4	5,360	2008-2013	2015-2018	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	2015-2016	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	**61**	**58,033**	**1972-2015**	**2015-2021**	**49**

Source: IAEA-PRIS, MSC, 2015



Source: IAEA-PRIS, MSC, 2015

Operating Costs and Markets

- ***Market Prices Barely Cover Costs***

• **Belgium**: GDF-Suez lost court case against fuel tax

--> Now "considers all options" for its 7 reactors

• **Sweden**: at least 3 reactors operated at loss in 2 of 4 past years

--> New 17% tax increase might lead to earlier shutdowns

- ***Forcing Shutdowns***

• **Germany**: E.ON decides to shut down Grafenrheinfeld in May 2015,

--> seven months earlier than required by law

• **USA**: Five shutdown decisions, incl. 2 reactors licensed to operate beyond 2030

Traditional Utilities Under Pressure

The 20 largest European energy utilities lost over half of the €1 trillion stock market value since 2008, some a lot more.

Europe's electricity providers face an existential threat.

The Economist, London, October 2013

Utility business models are threatened by the dramatic growth in the deployment of technologies that generate electricity onsite or at the distribution grid level.

Navigant Research, Boulder, USA, August 2014

A new technological paradigm in electricity and the end of the reign of the large-scale utilities.

Institute for Public Policy Research, London, September 2014

The French Case: Nuclear Companies in Trouble

EDF (2014)

- 4.5%/a operating cost increase 2007-2012
  - → Loss of €1.5 billion in 2012
  - → Need for significant tariff increases
- Stock value plunged >70% (up to 85%) since 2007
- High debt €34.2bn for turnover of €73bn

AREVA (2014)

- Loss of €4.8bn (almost €8bn in 4 years = annual turnover)
- High debt €5.8bn for turnover of €8.3bn
- Stock value plunged by > 85% since 2007
- Standard & Poor's downgraded AREVA shares to BB+ ("junk") in November 2014 and again to BB- in March 2015

Sources: Company websites; Standard & Poor's

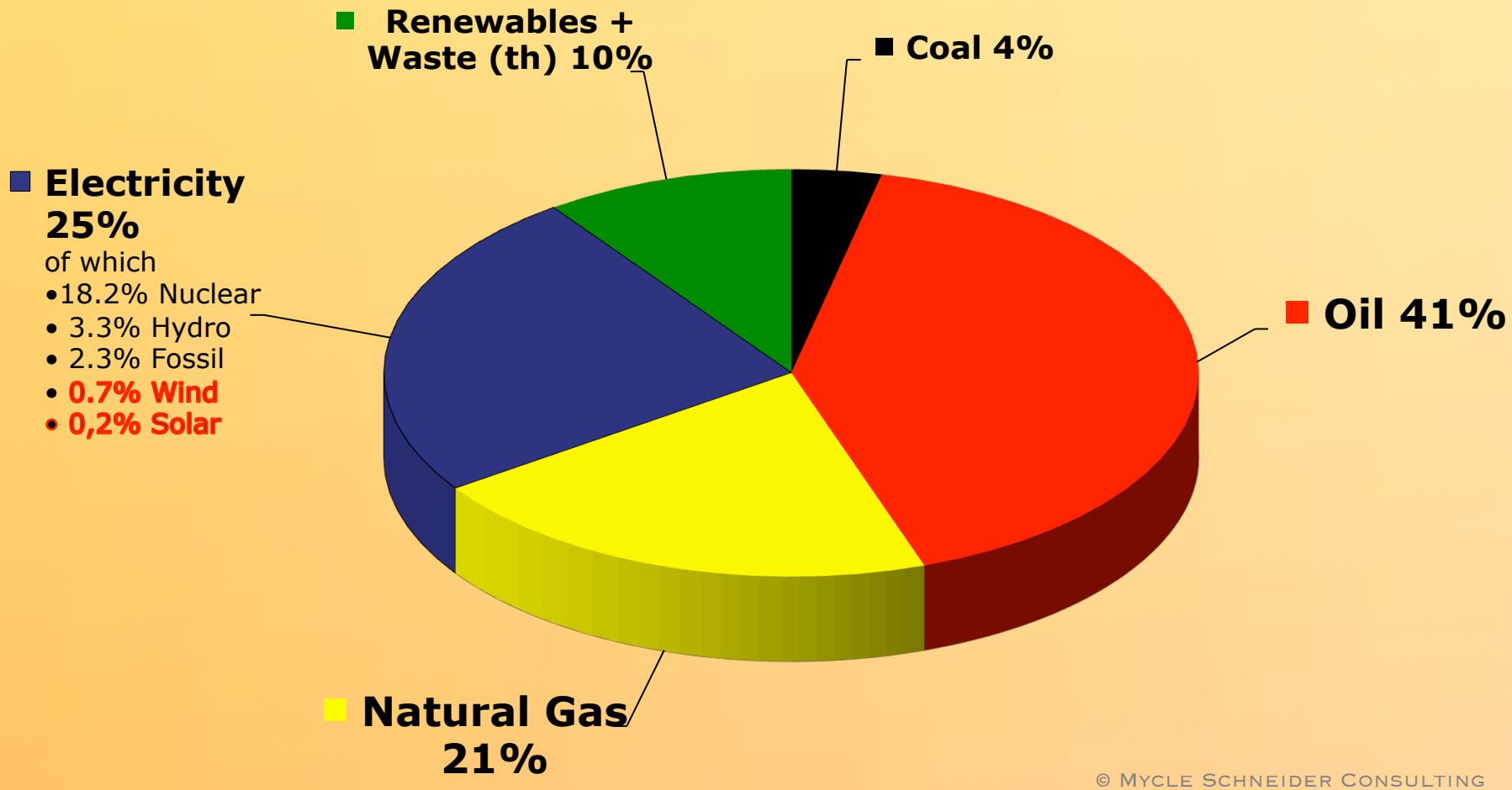
Stock Price Development EDF vs. CAC40

Source: http://finance.yahoo.com, 13 March 2015

Stock Price Development AREVA vs. CAC40

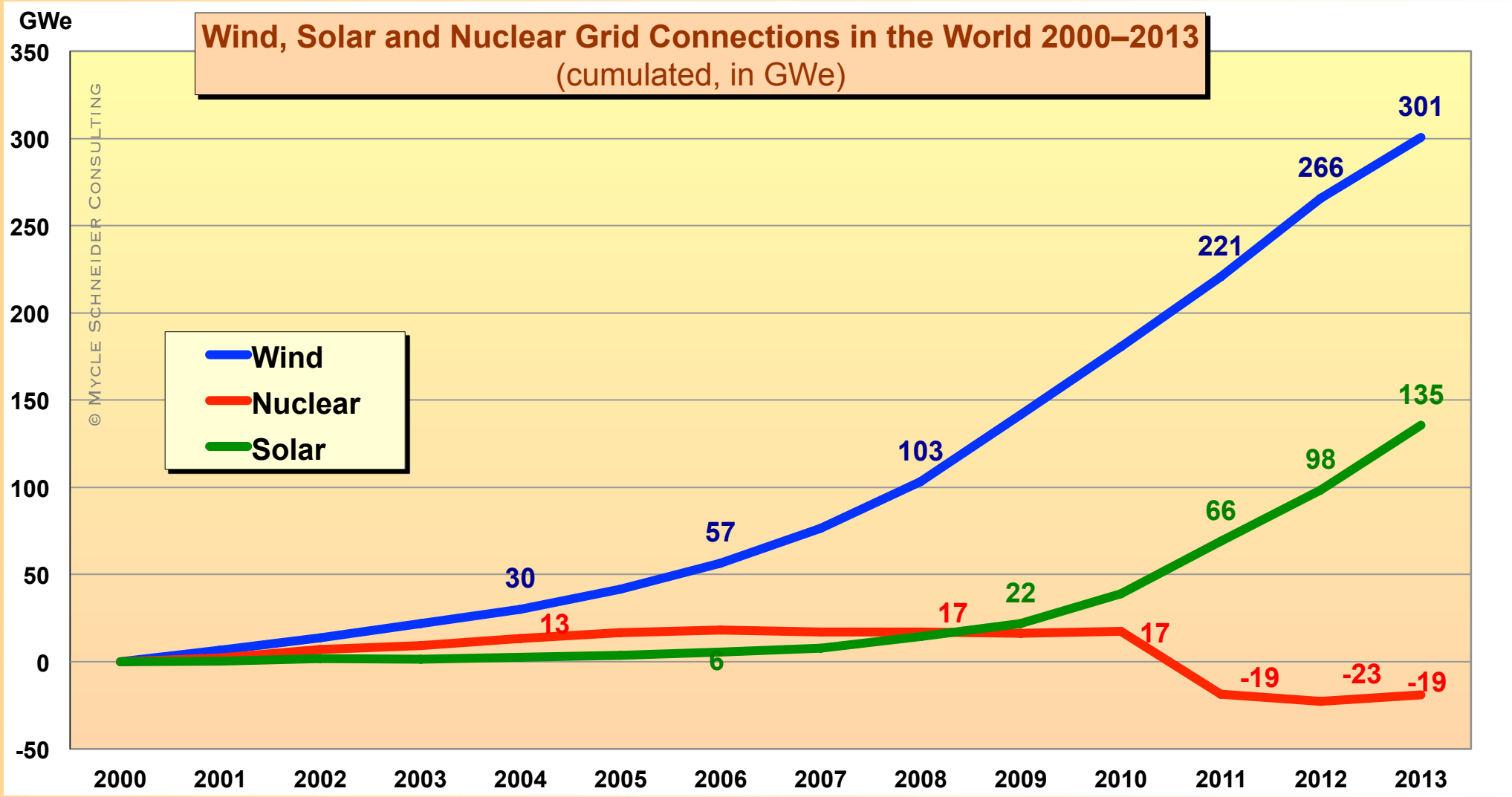
Source: Le Figaro – Bourse, 13 March 2015

Final Energy Consumption in France in 2013
69% Fossil Fuels, 18% Nuclear

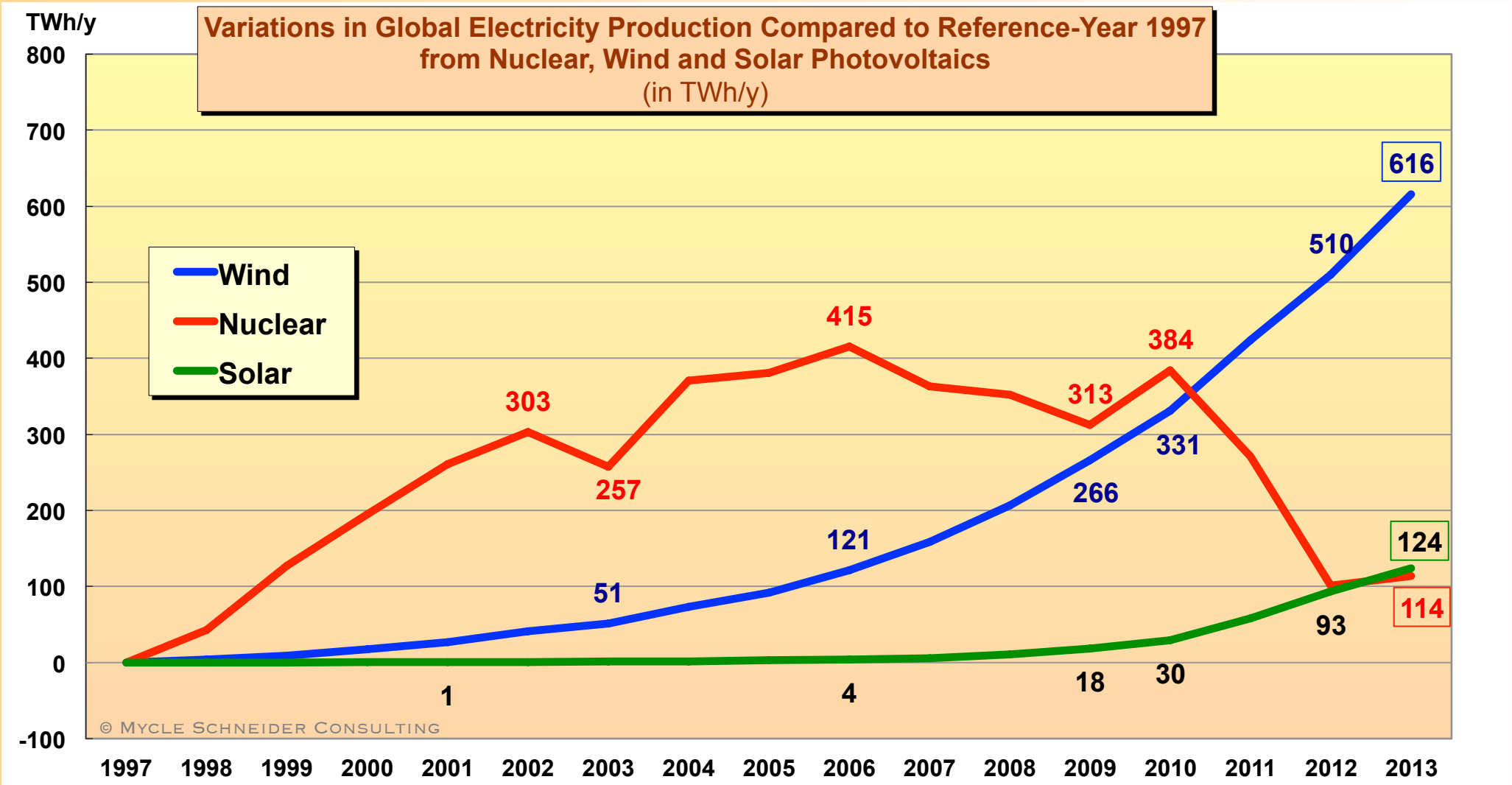


Source: French Ministry of Ecology, Energy and Sustainable Development, "Bilan Energétique de la France 2013", 2014; MSC 2015

Nuclear vs. Renewable Energy Development

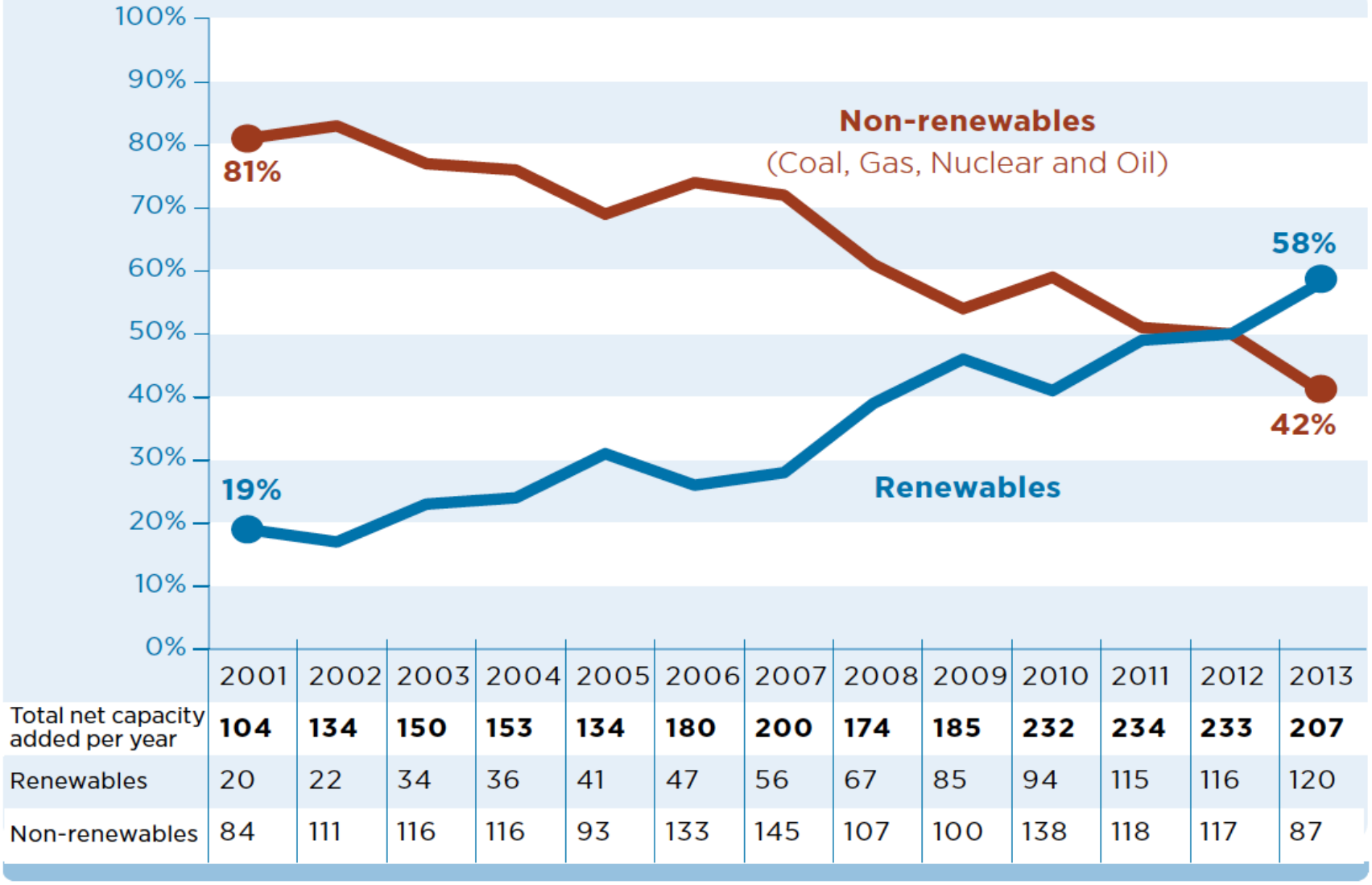


Source: IAEA-PRIS, EPIA, GWEC 2014



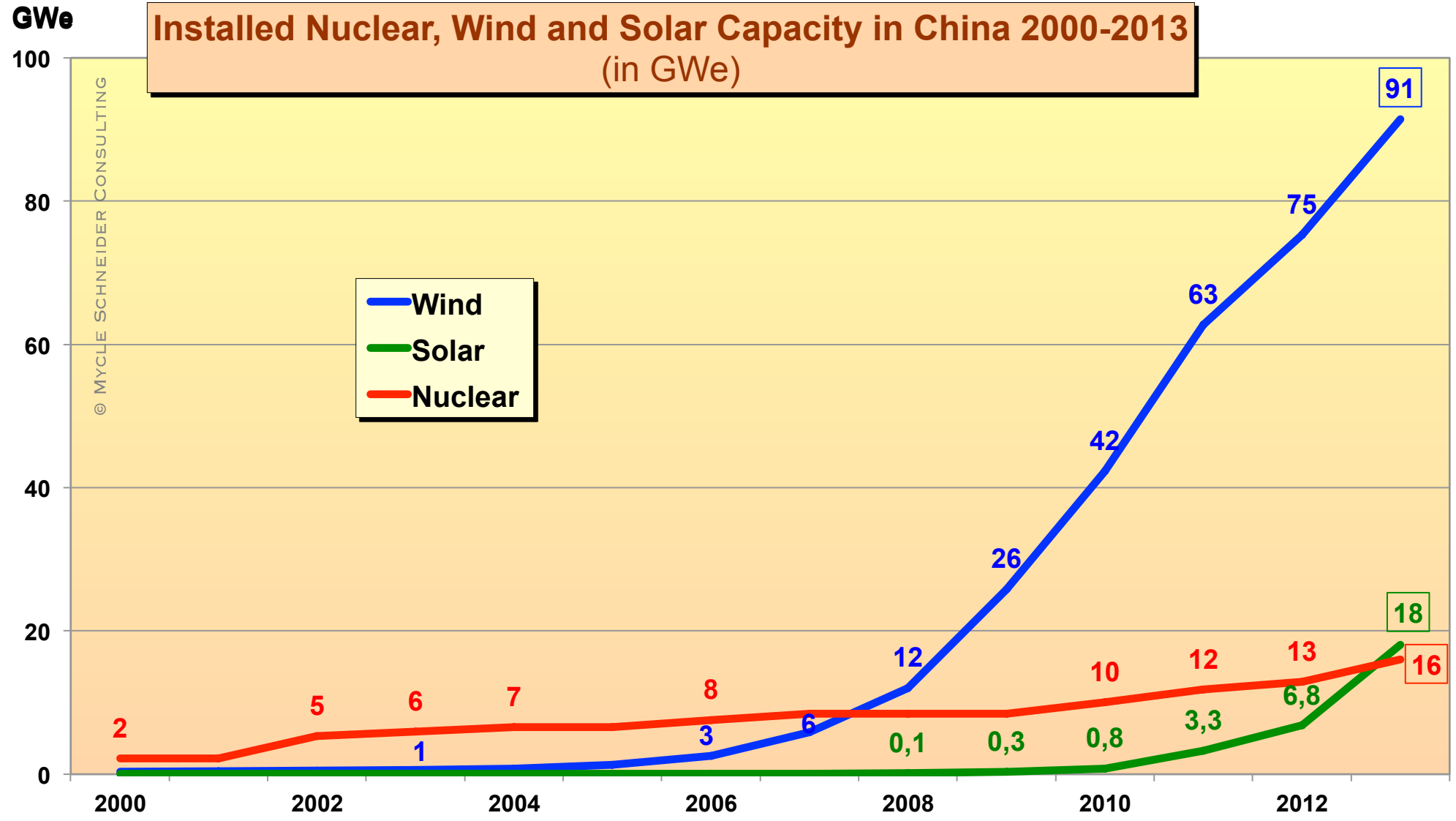
Sources: BP, IAEA-PRIS, MSC, 2014

Renewables Share of Global Electricity Generating Capacity Additions



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total net capacity added per year	**104**	**134**	**150**	**153**	**134**	**180**	**200**	**174**	**185**	**232**	**234**	**233**	**207**
Renewables	20	22	34	36	41	47	56	67	85	94	115	116	120
Non-renewables	84	111	116	116	93	133	145	107	100	138	118	117	87

Source: IRENA, Rethinking Energy, 2014


GWe
Installed Nuclear, Wind and Solar Capacity in China 2000-2013
(in GWe)
© Mycle Schneider Consulting
Wind
Solar
Nuclear
100
80
60
40
20
0
2000
2002
2004
2006
2008
2010
2012
91
75
63
42
26
12
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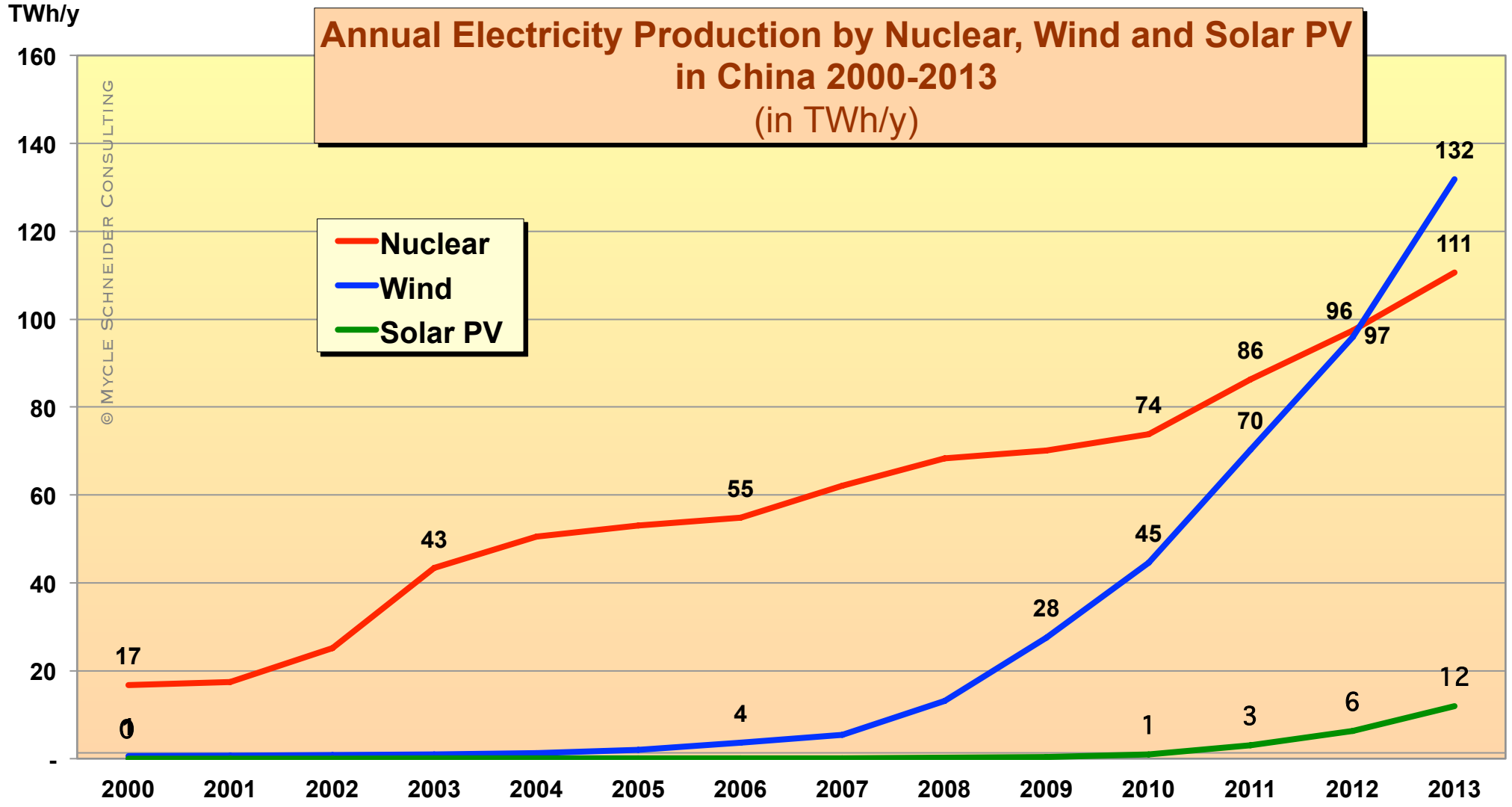

Source: BP 2014

Concluding Remarks

- Global nuclear industry remains on the decline, losing share of electricity market.
- Two countries produce half the world's nuclear electricity, in the EU France produces half the total.
- Nuclear construction dominated by China, three quarters of all projects delayed.
- Increasing pressure on operators: aging reactors becoming more expensive to operate, just as market price of electricity is falling, client base and consumption are shrinking.
- Investment in new renewable energy far exceeds that of nuclear leading to significantly higher newly installed capacity.
- Since signing of Kyoto in 1997, power generation added from solar and nuclear is similar, while wind is 4 times greater.
- Traditional utilities are facing rough times: "nuclear champions" in trouble with high debts, degraded credit-rating, destroyed share value, upcoming large upgrading *and* decommissioning costs.

Thank You! Contact: mycle@orange.fr **www.WorldNuclearReport.org**

About the Author

Mycle Schneider works as independent international consultant on energy and nuclear policy. He is the initiator and Convening Lead Author of the World Nuclear Industry Status Reports and the Coordinator of the Seoul International Energy Advisory Council (SIEAC). He is a member of the International Panel on Fissile Materials (IPFM), based at Princeton University, USA. In 2010-2011, he acted as Lead Consultant for the Asia Clean Energy Policy Exchange, implemented by IRG, funded by USAID, with the focus of developing a policy framework to boost energy efficiency and renewable energies. Between 2004 and 2009 he has been in charge of the Environment and Energy Strategies Lecture of the International Master of Science for Project Management for Environmental and Energy Engineering at the *Ecole des Mines* in Nantes, France. From 2000 to 2010 he was an occasional advisor to the German Environment Ministry. 1998-2003 he was an advisor to the French Environment Minister's Office and to the Belgian Minister for Energy and Sustainable Development.
Mycle Schneider has given evidence or held briefings at national Parliaments in 14 countries and at the European Parliament. He has advised Members of the European Parliament from four different groups over the past 26 years. He has given lectures or had teaching appointments at 20 universities and engineering schools in 10 countries.
Mycle Schneider has provided information and consulting services to a large variety of clients including international institutions and organizations, think tanks and NGOs.
In 1997 he was honoured with the *Right Livelihood Award* ("Alternative Nobel Prize").