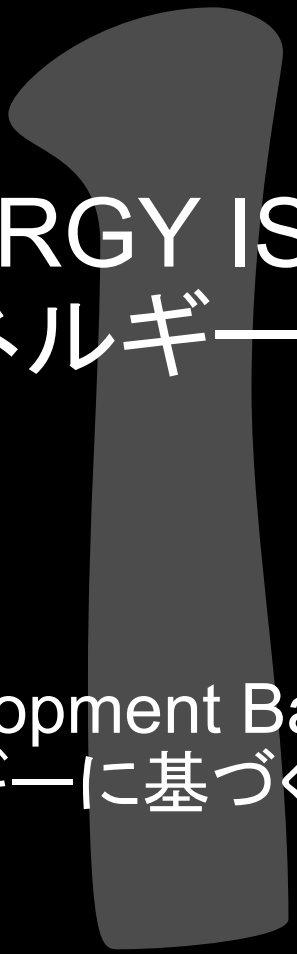
三重県伊賀市で公開講座のお知らせ
2012年8月25日（土）
14：00～16：00（開場13：30）
場所：ハイトピア伊賀 3F

「伊賀発エネルギーの地産地消
～子供たちの未来のために～」

第一部 「環境先進国ドイツと太陽光について」
Some thoughts about Energy, Power Generation and the Power to Do
~Past, Present and Future~
エネルギー、発電、ちからつくりなどに関するいくつかの思考 ～過去·現在·未来～
講師 Robert BAUM 氏 ロベルト バウム
ドイツ人 建築家 東京大学大学院博士修了

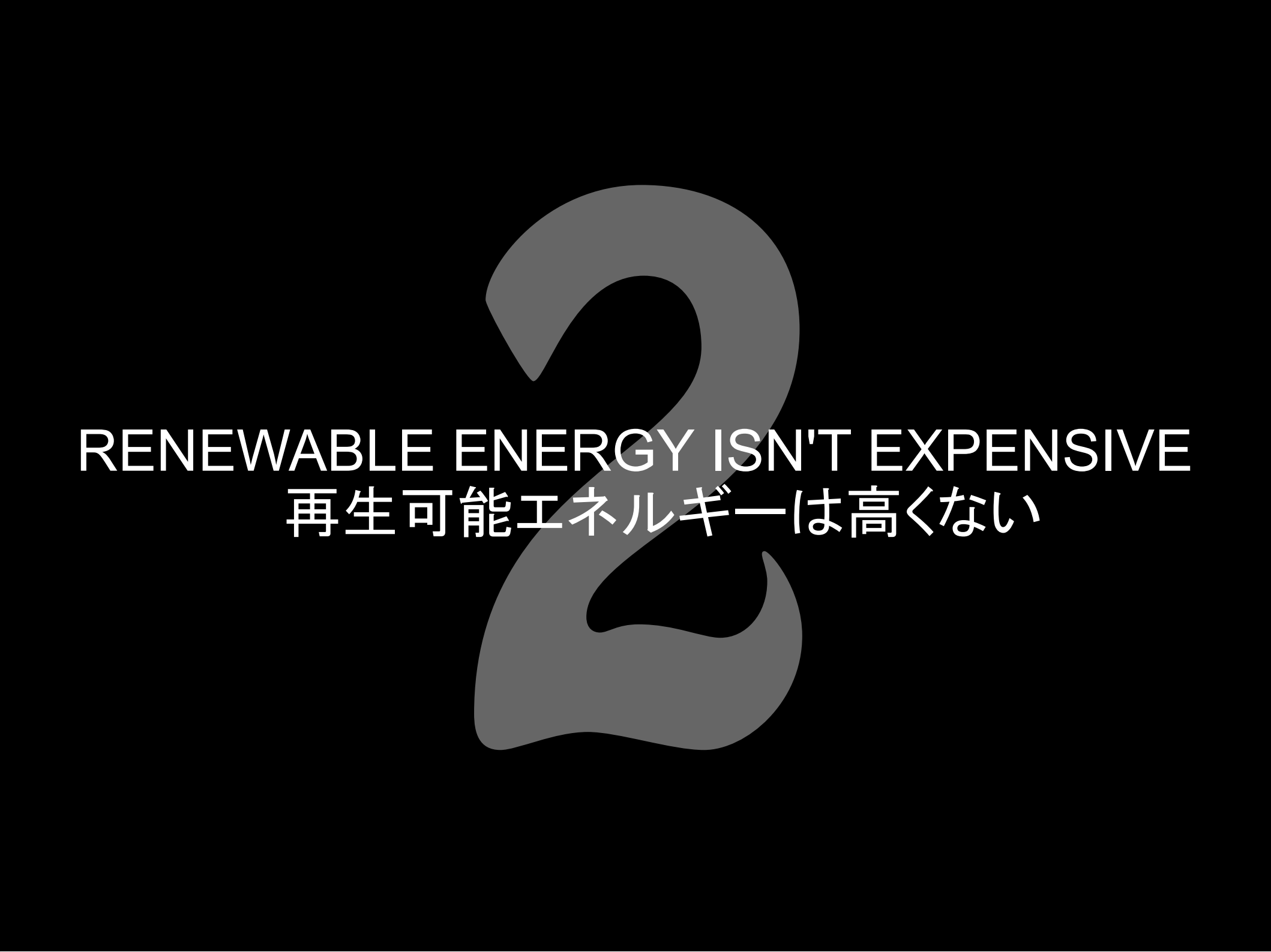
第二部 「市民出資で始める創エネルギーとまちつくり」
講師 谷口 彰 氏 タニグチ アキラ
おひさま進歩エネルギー㈱

主催 三重あおぞらエネルギー
担当 大田 雅美 おおた まさみ
TEL 080-3665-0468



ENERGY IS LIFE
エネルギーは命

Human Development Based on Energy
エネルギーに基づく人類発達

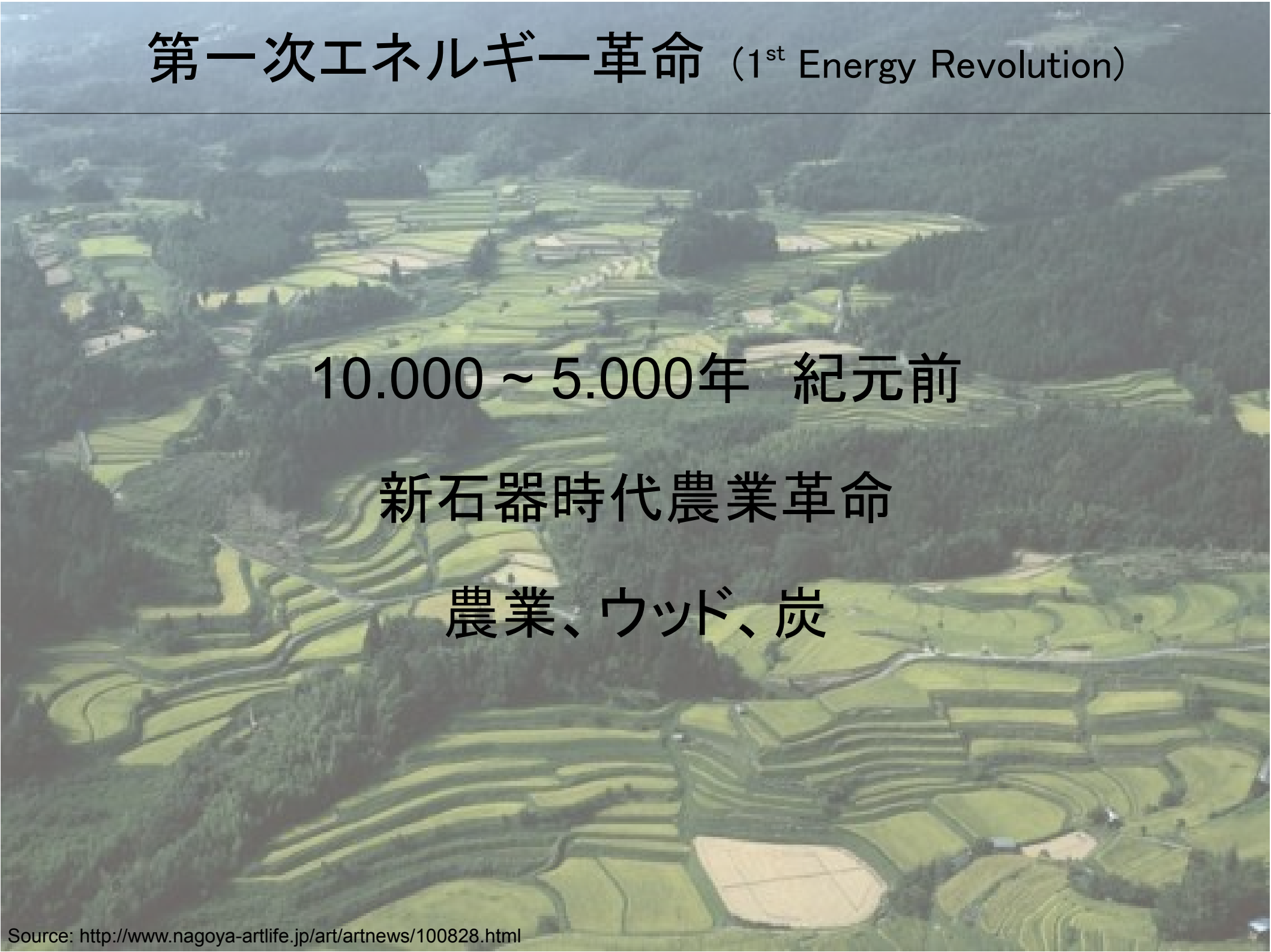

2
RENEWABLE ENERGY ISN'T EXPENSIVE
再生可能エネルギーは高くない

3

ENERGY IS OUR LOVELY POWER

エネルギーは、私達の素敵な力

第一次エネルギー革命 (1st Energy Revolution)



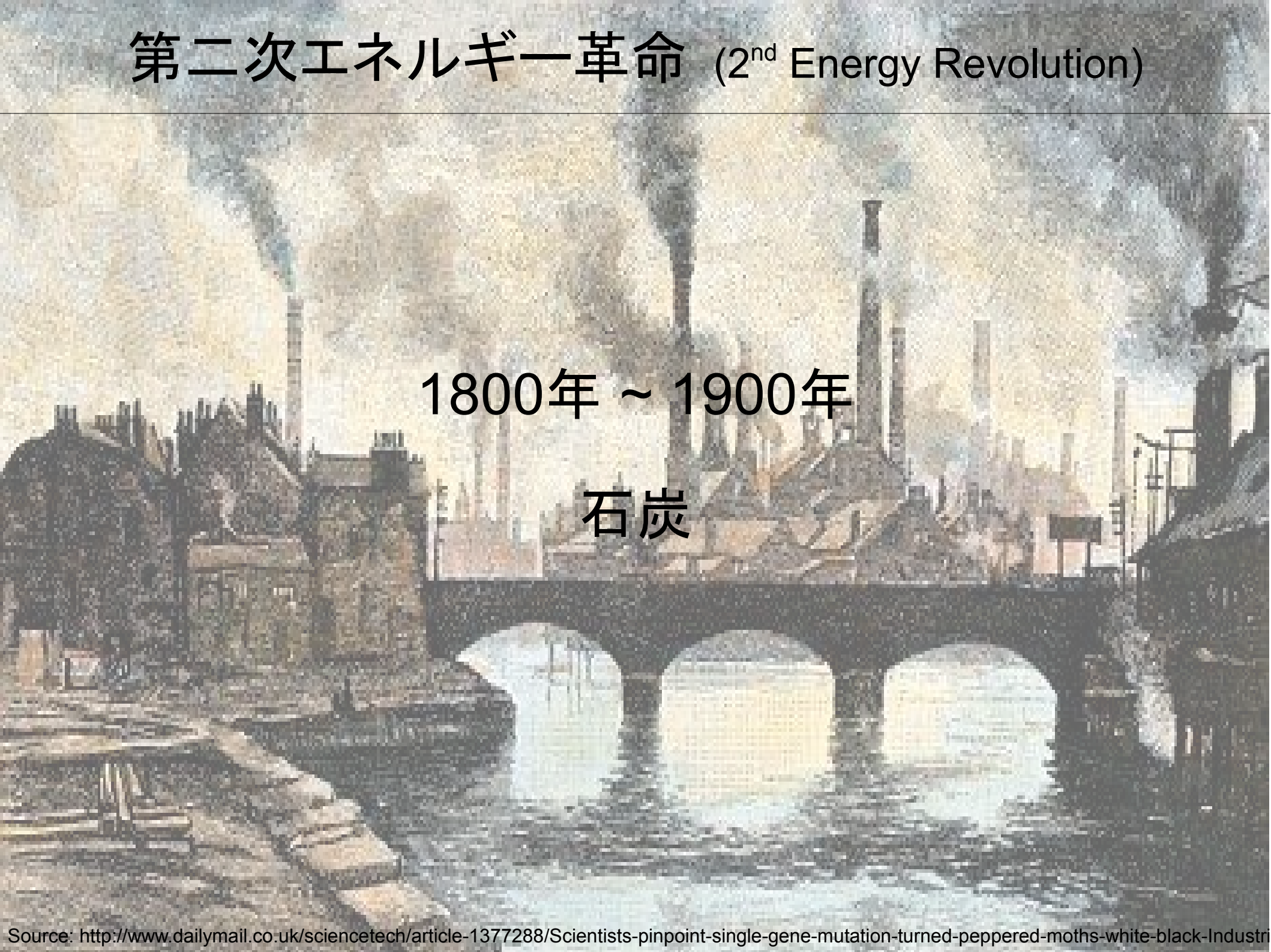
10.000 ~ 5.000年　紀元前

新石器時代農業革命

農業、ウッド、炭

Source: http://www.nagoya-artlife.jp/art/artnews/100828.html

第二次エネルギー革命 (2nd Energy Revolution)



1800年 ~ 1900年

石炭

Source: http://www.dailymail.co.uk/sciencetech/article-1377288/Scientists-pinpoint-single-gene-mutation-turned-peppered-moths-white-black-Industri

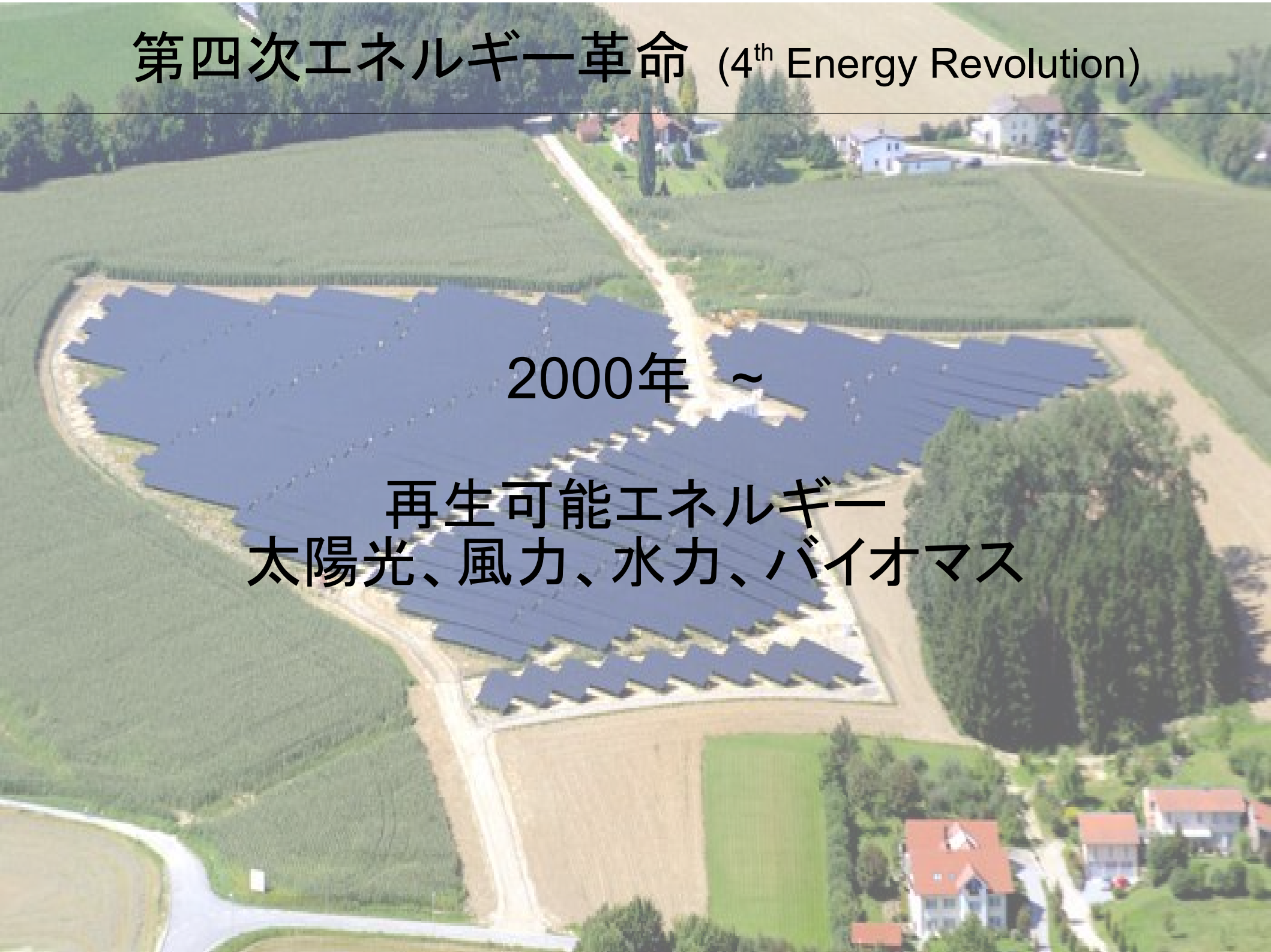
第三次エネルギー革命 (3rd Energy Revolution)

1900年 ~ 2000年

石油

Source: http://ocvarsity.freedomblogging.com/tag/freeway-league-traffic-jam/

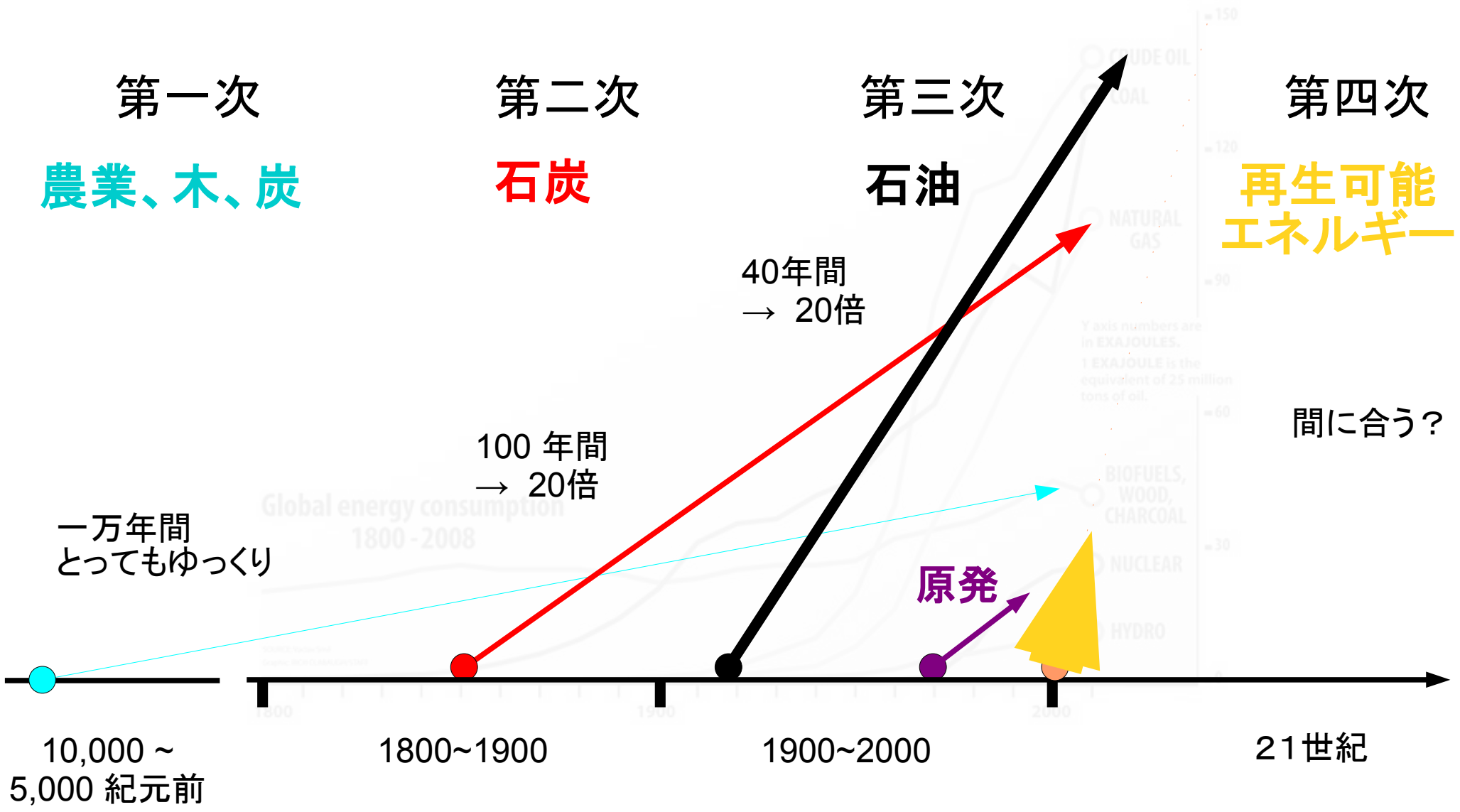
第四次エネルギー革命 (4th Energy Revolution)



2000年 ~

再生可能エネルギー
太陽光、風力、水力、バイオマス

エネルギー革命（Energy Revolutions）



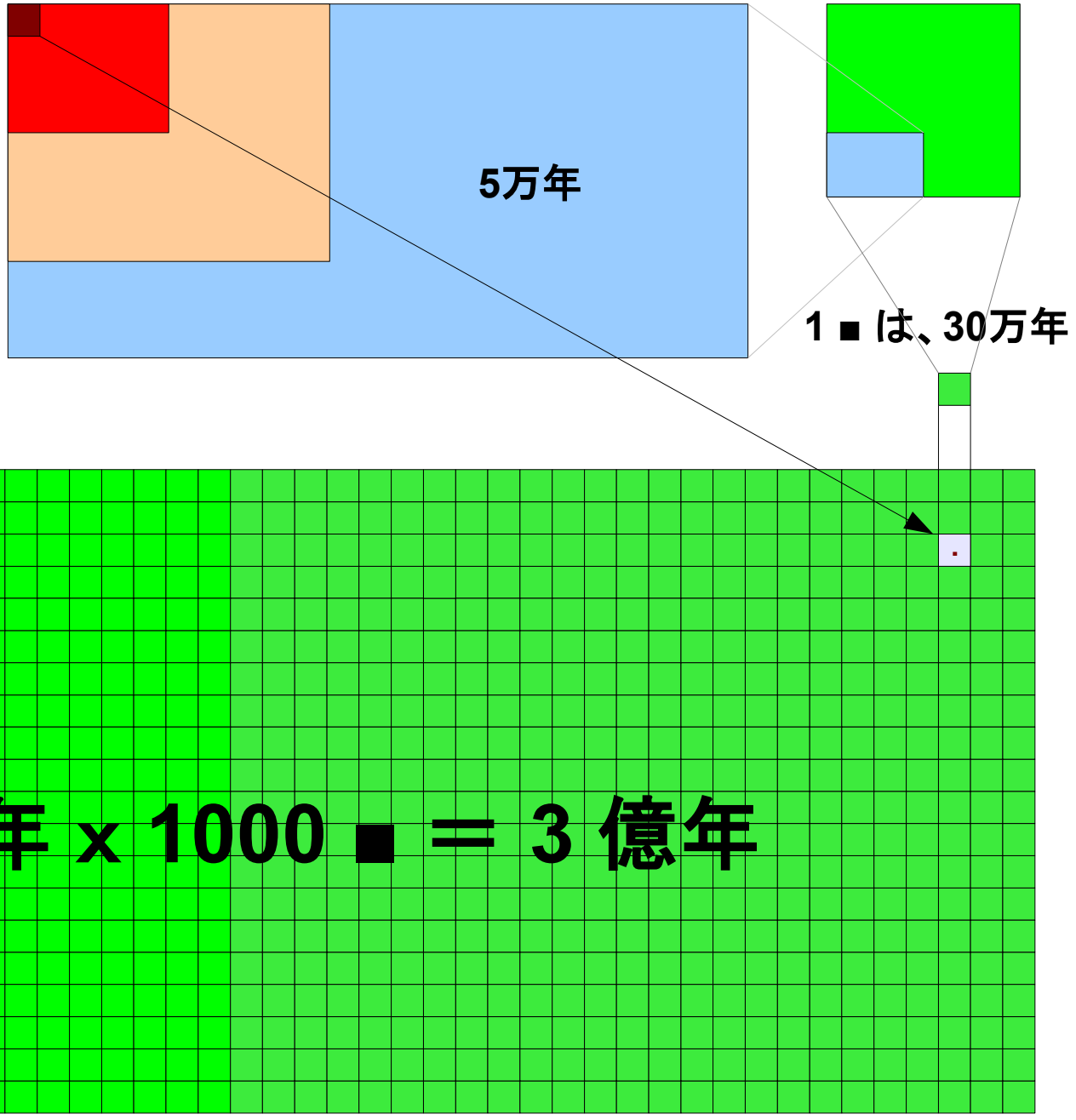
Source: http://www.csmonitor.com/Environment/2010/1108/New-energy-climate-change-and-sustainability-shape-a-new-era

150万倍率 (Factor 1.5 million)

200 年間　ー　化石燃料時代

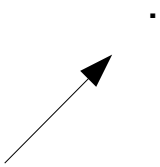
5,000 年前　ー　エジプト:ピラミッド

16,000 年前　ー　縄文時代



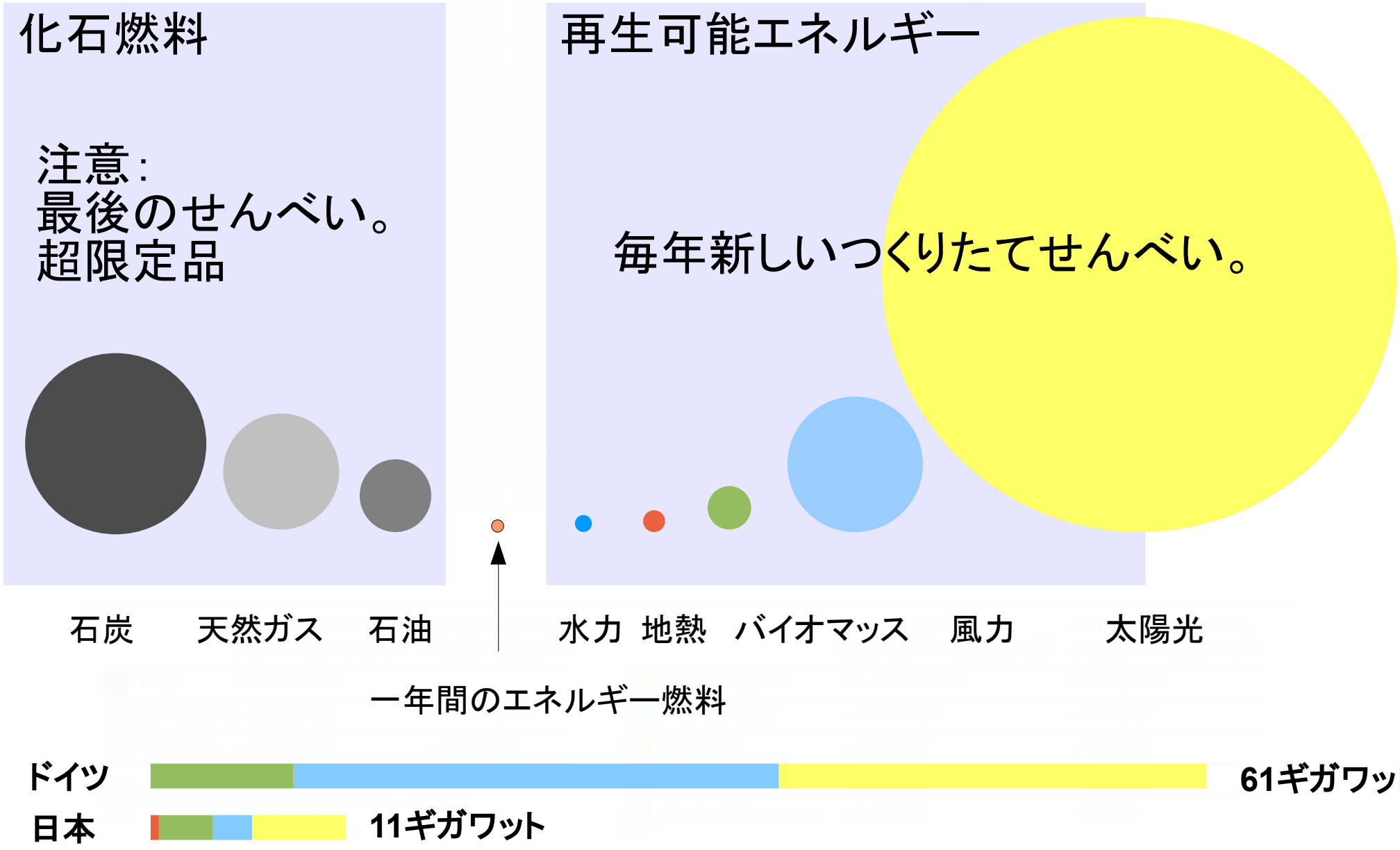
1分の為の2年半 (2.5 years – 24/7 - for 1 minute)

150万倍率 (Factor 1.5 million)



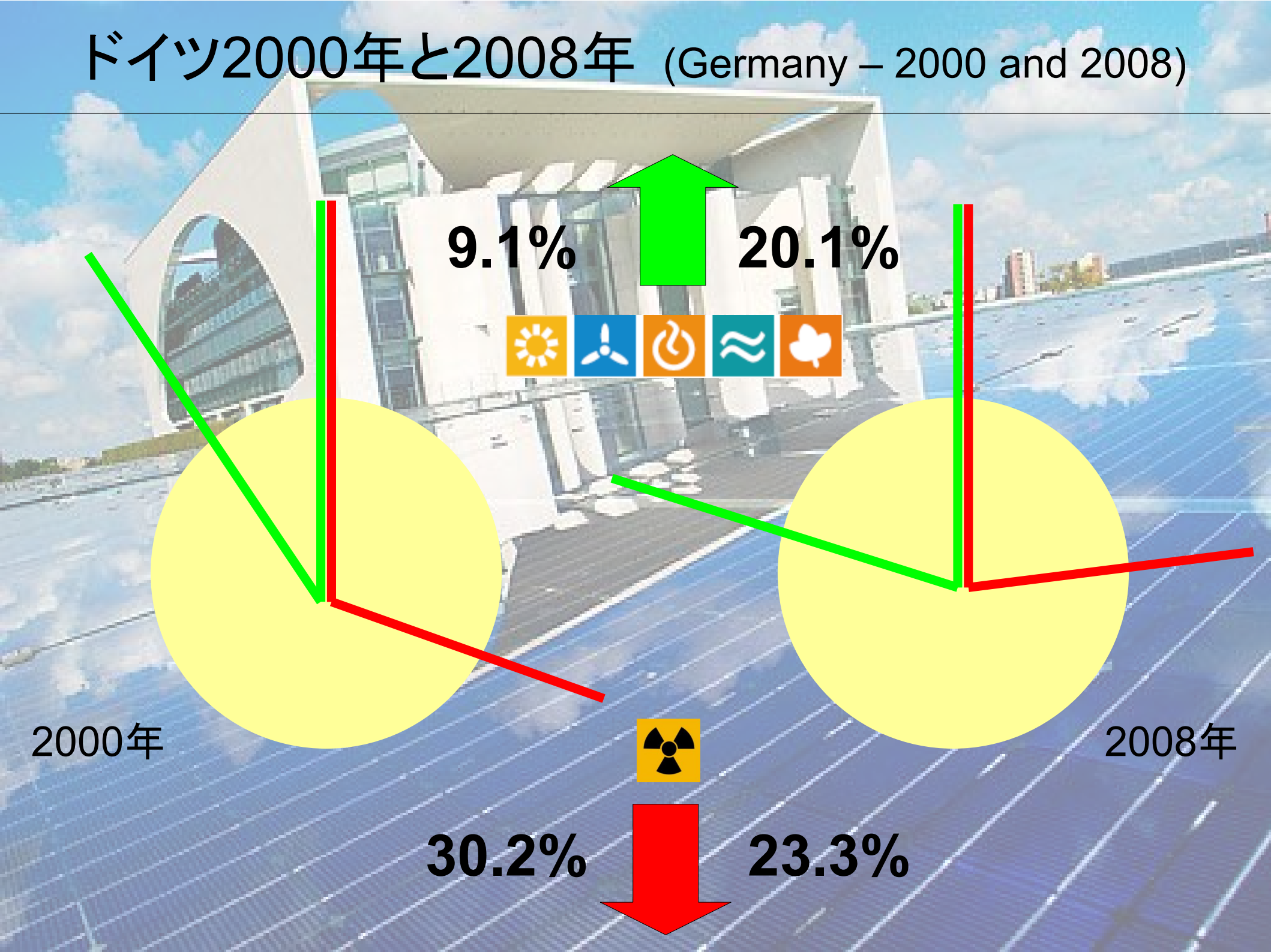
点は、見えますか？

再生可能エネルギー革命 (Renewable Energy Revolution)

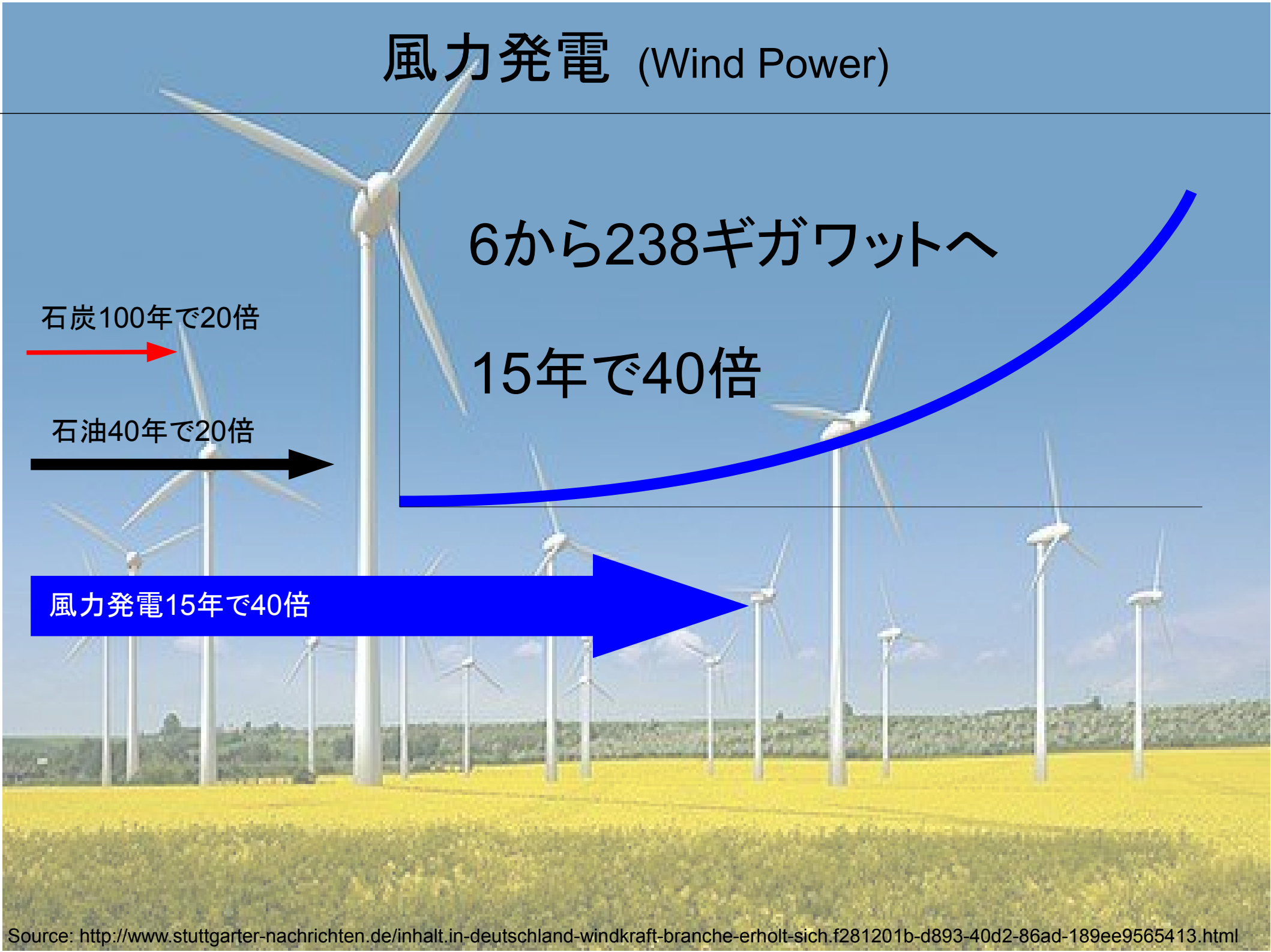


Source: Hessen-Nanotech (2008); http://www.utwente.nl/mesaplus/nme/Introduction/

ドイツ2000年と2008年 (Germany – 2000 and 2008)

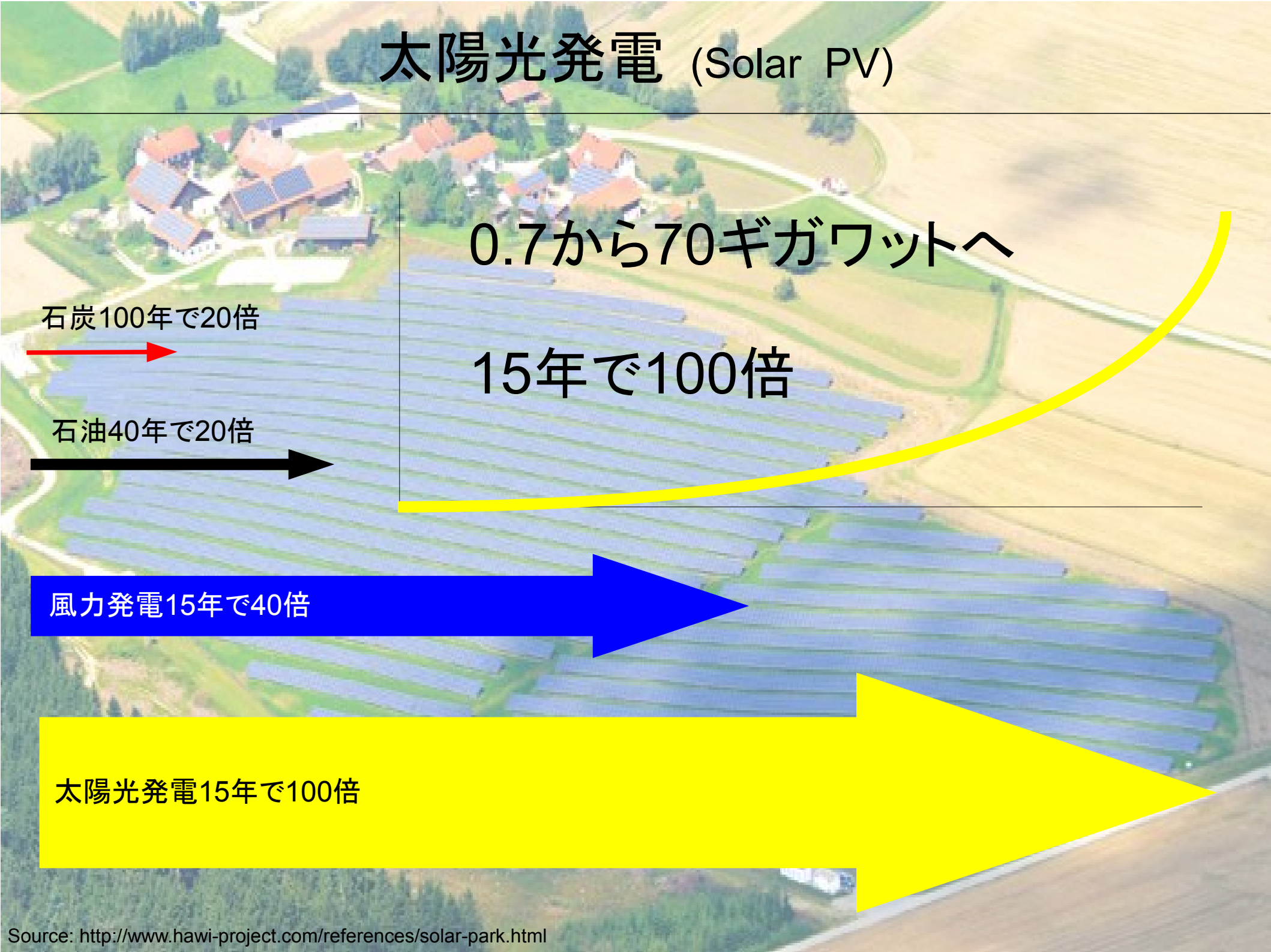


風力発電 (Wind Power)



Source: http://www.stuttgarter-nachrichten.de/inhalt.in-deutschland-windkraft-branche-erholt-sich.f281201b-d893-40d2-86ad-189ee9565413.html

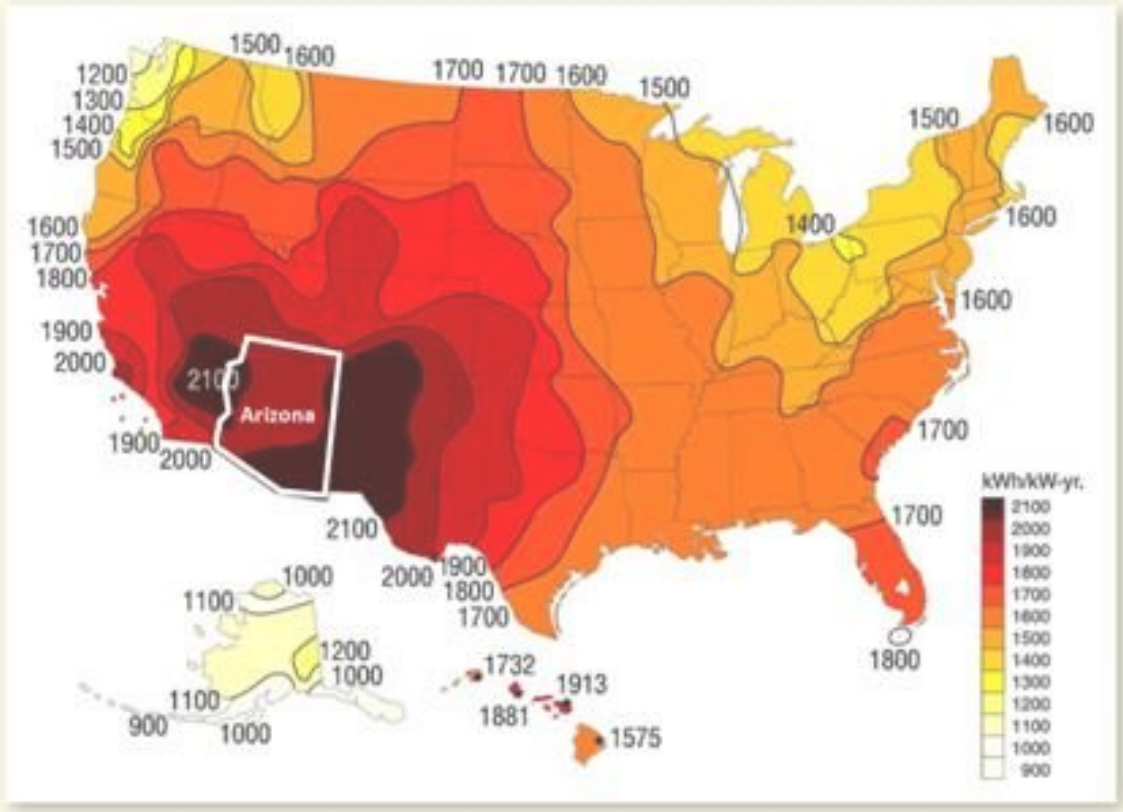
太陽光発電 (Solar PV)



Source: http://www.hawi-project.com/references/solar-park.html

ドイツは太陽の国のか？ (Germany – a solar country?)

アメリカ　　ドイツ　　日本



Germany and Japan are among countries with highest installed solar capacity, yet have solar conditions far inferior to Arizona

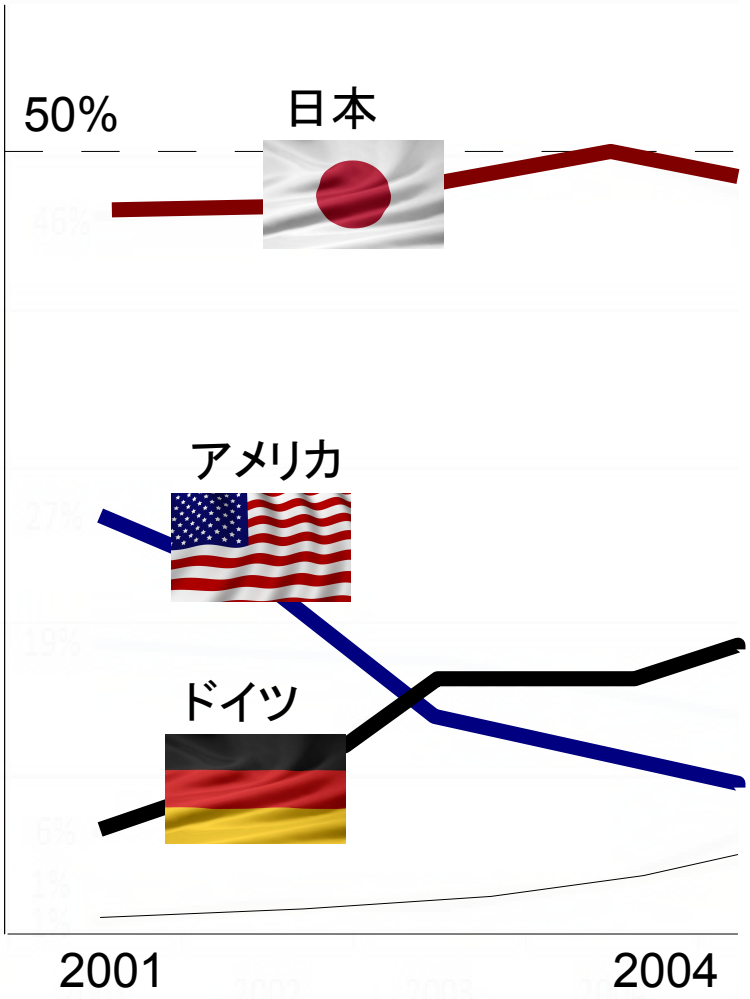
カリフォルニア州、アリゾナ州、ニューメキシコ州

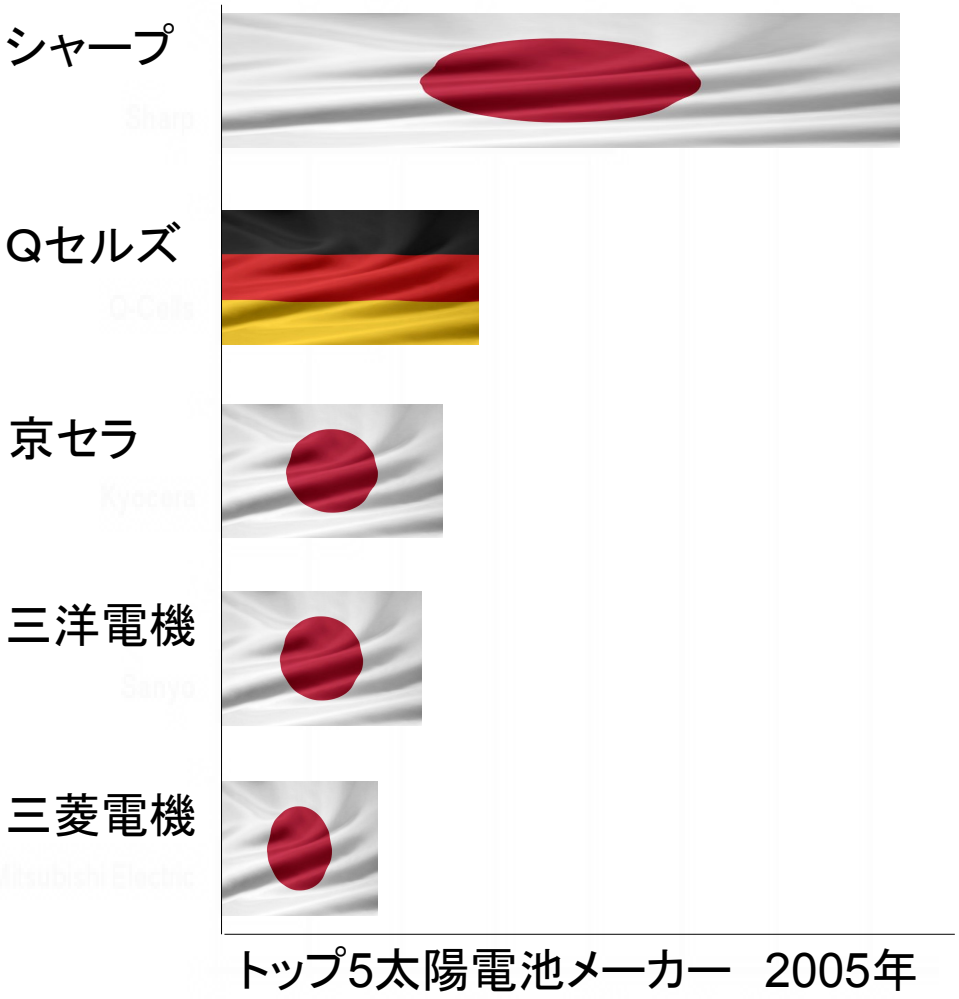
ドイツと日本は、米国アリゾナ州よりも日照時間は恵まれていませんが、
高いレベルで太陽光発電を積極的に取り入れている国です。

Source: http://www.faqs.org/sec-filings/110601/ARIZONA-PUBLIC-SERVICE-CO_8-K/a11-13387_1ex99d1.htm

日本、日本、日本 (Japan, Japan, Japan)

2007年まで世界No.1の太陽電池の国は、



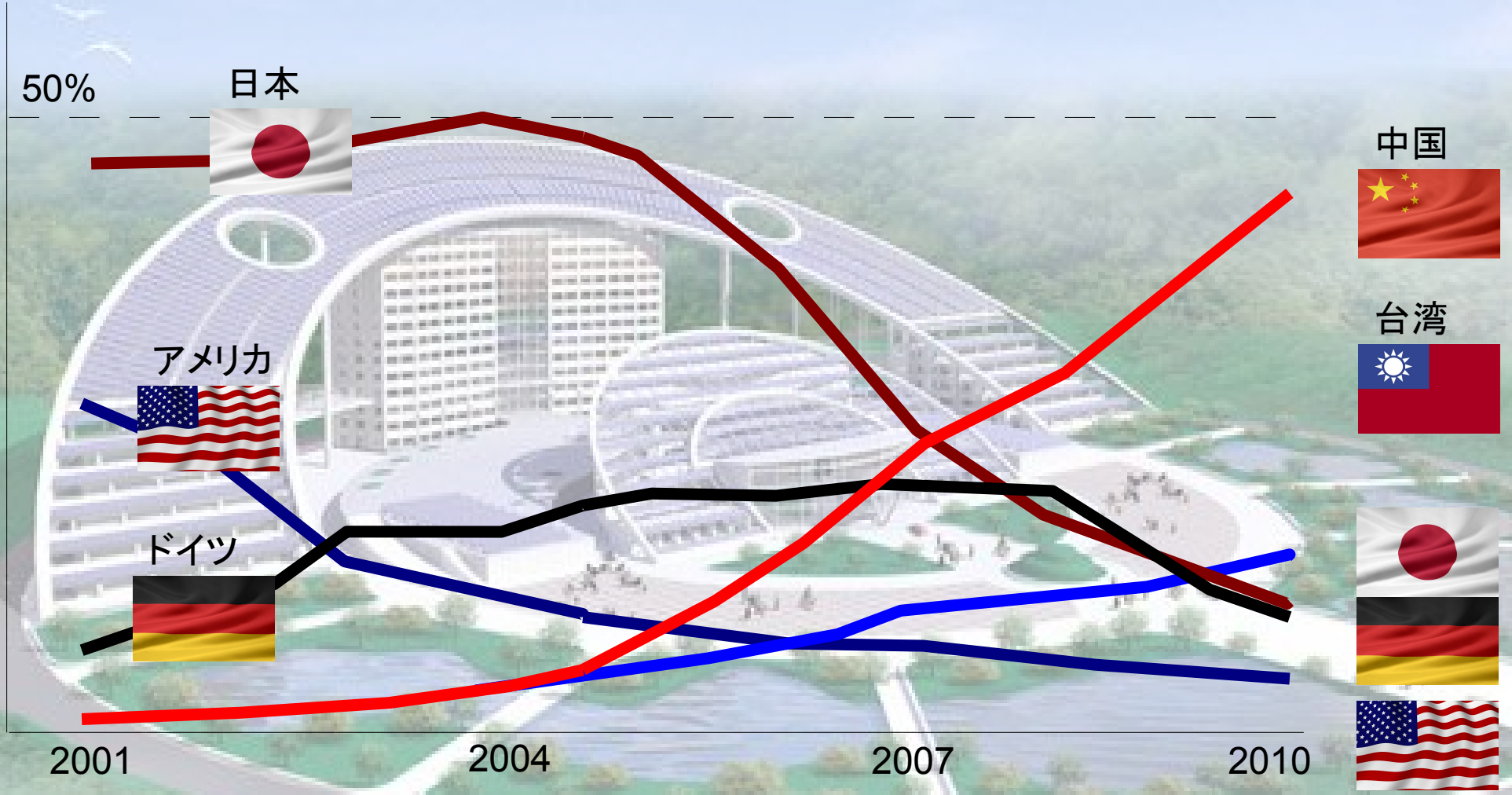


Source: http://en.wikipedia.org/wiki/List_of_photovoltaics_companies

Source: http://www.renewableenergyworld.com/rea/blog/post/2010/05/branding-only-works-on-cattle-just-ask-sharp-solar

中国、台湾 (China – Taiwan)

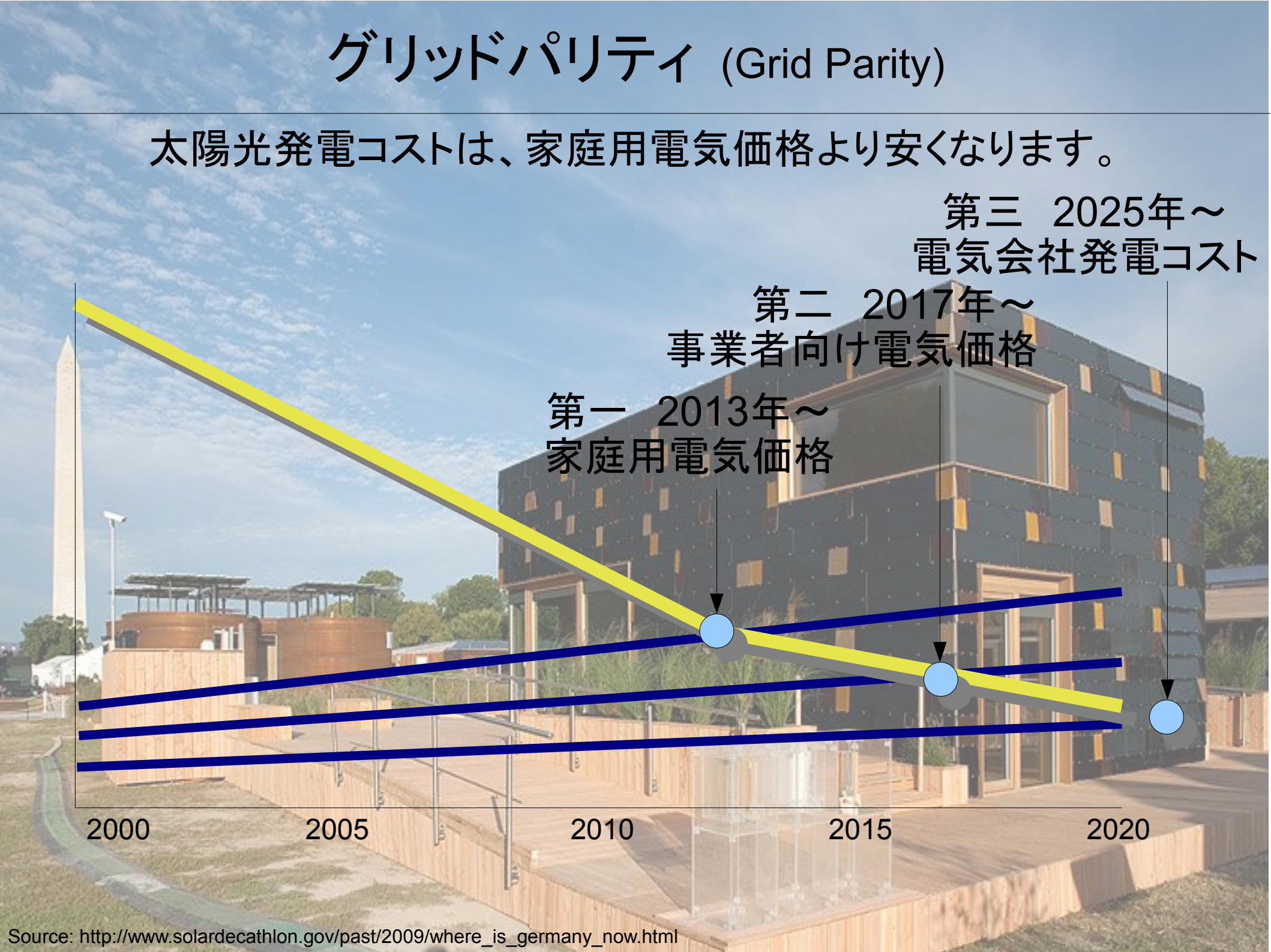
2007年から世界No.1の太陽電池の国は変わりました。



Source: http://solar.calfinder.com/blog/solar-politics/is-china-making-any-real-progress-in-solar-energy/

グリッドパリティ (Grid Parity)

太陽光発電コストは、家庭用電気価格より安くなります。

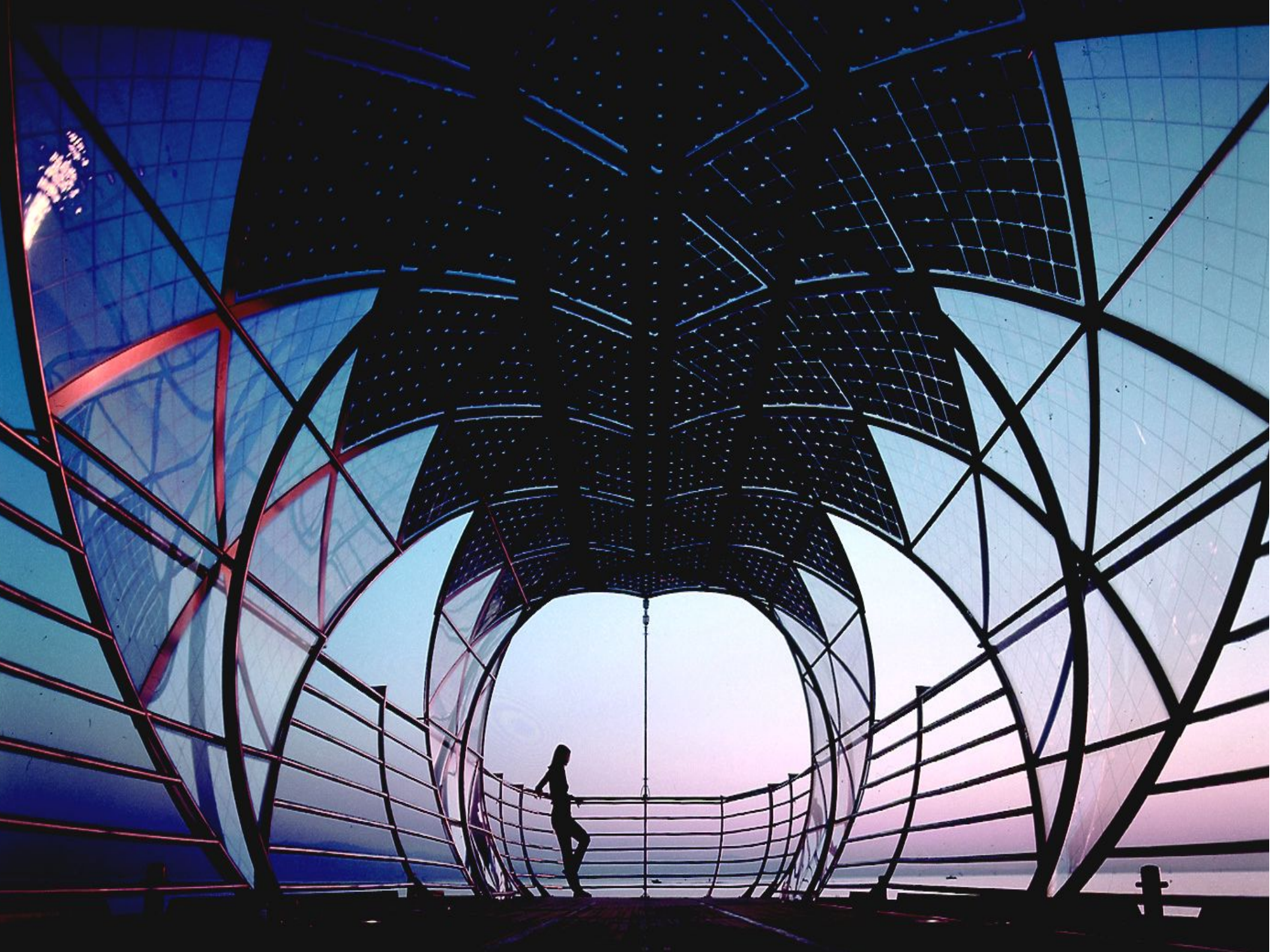


Source: http://www.solardecathlon.gov/past/2009/where_is_germany_now.html

Source: http://www.solardecathlon.gov/past/2009/where_is_germany_now.html

Source: SUNWAYS AG; http://www.sunways.eu/de/referenzen/gebaeudeintegration/plus-energie-haus/

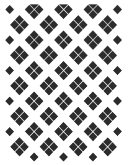
Source: SCHEUTEN SOLAR; http://www.scheutensolar.de/references/berliner-hauptbahnhof



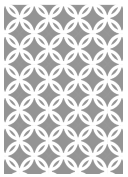
Source: SUNWAYS AG, http://www.sunways.eu/it/referenze/grandi-impianti/waldshut/

Family crest

Solar cells



Print

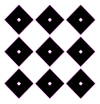


Case study A

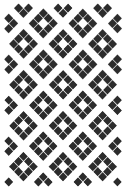
Maru ni yottsu-wari-ishi

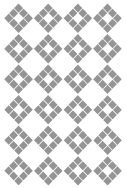
Family crest

Solar cells



Print

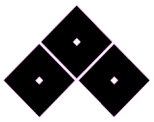




Case study B

Nanatsu-wari sumi-tate yottsu-me
+ Tsunagi kokonotsu-me

Family crest



Solar cells

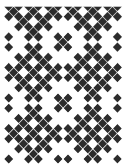
Print

Case study C

Mittsu-me

Family crest

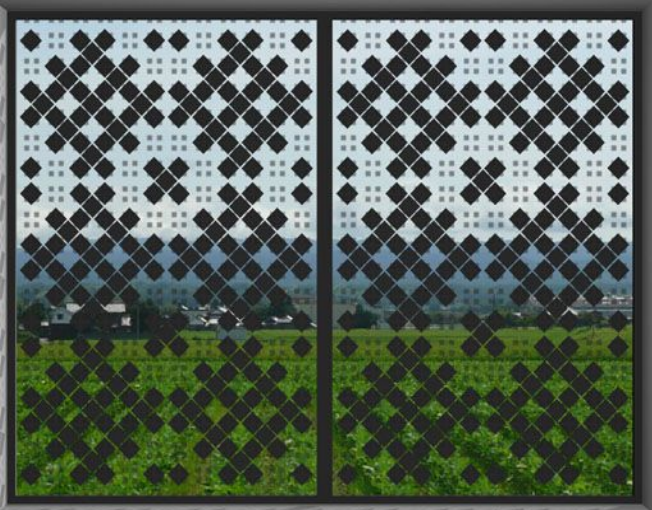
Solar cells



Print

Case study D

Muttsu kumi sujichigai



今、今日 (Now and today)

私達は、他から供給された電気を買います。

WE

buy energy and electricity as commodity, that

SOMEONE ELSE

provided.

Source: http://www.skogar.de/aus-fur-isar-1-das-akw-isar-1-nahe-landshut-wird-abgeschaltet/

明日 (Tomorrow)

東京農工大学：黒川教授

パラダイムシフト (Paradigm Shift)

誰もが、自分達で作った電気やエネルギーを

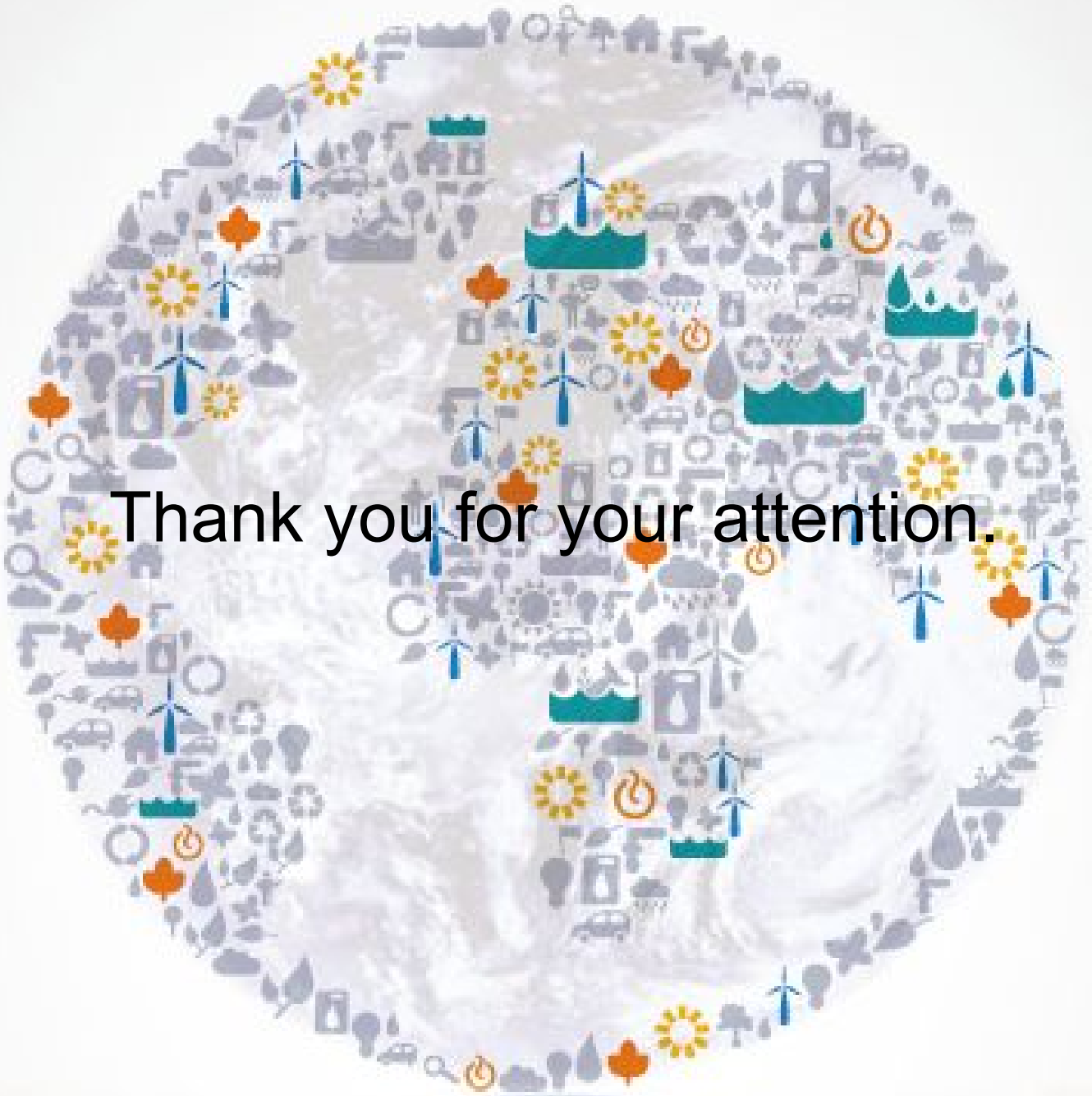
交換したり売買できます。

EVERYONE

generates his/her own energy or electricity, that

WE can trade and exchange.

Source: NREL; http://dodfuelcell.cecer.army.mil/rd/NZE_Workshop/1c_Warner.pdf



Source: REN21, “Renewables 2011 Global Status Report”, p.1

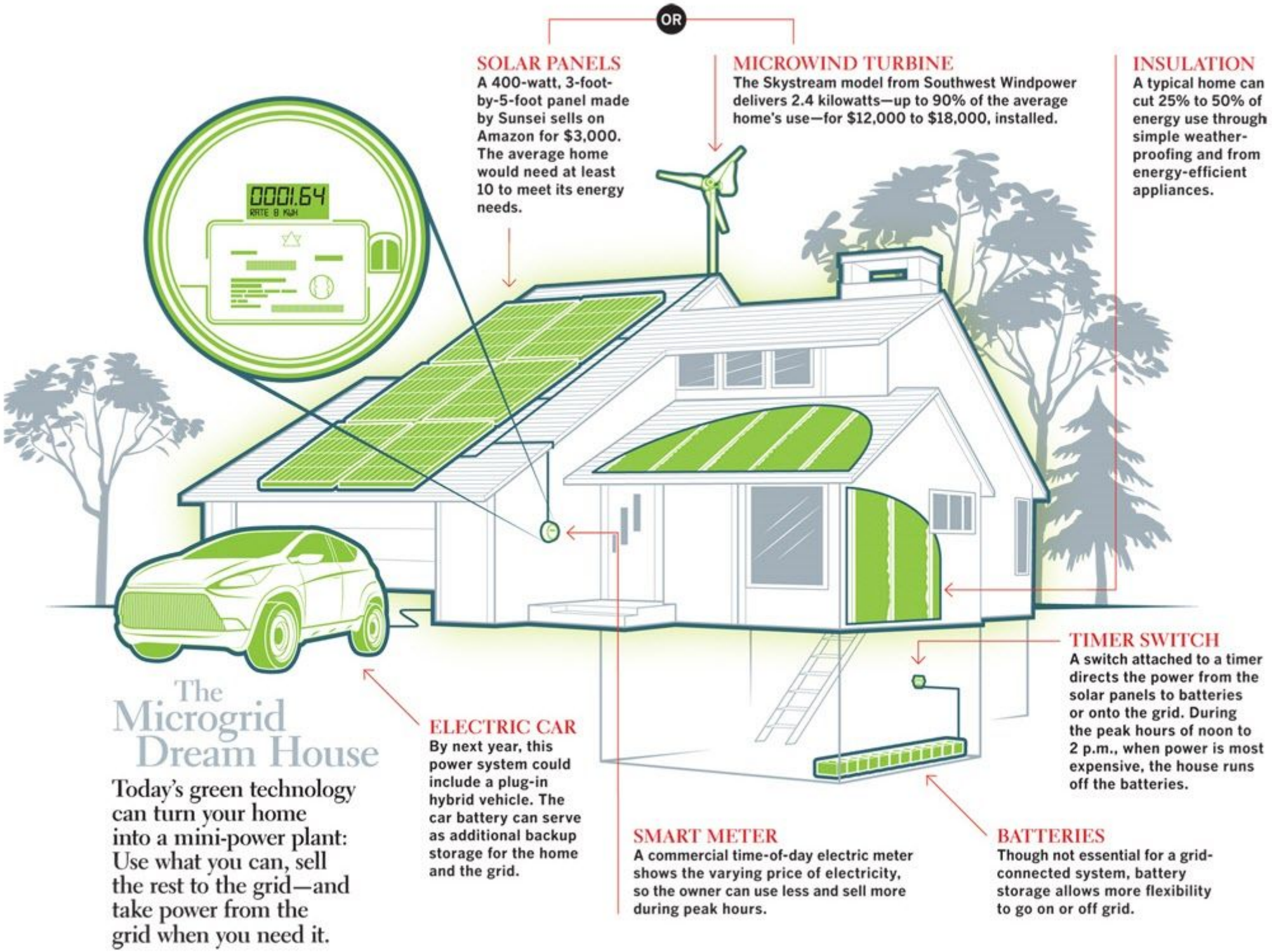
additional slides

Fig. © BSW-Solar

Fig. © Kaneka Corporation

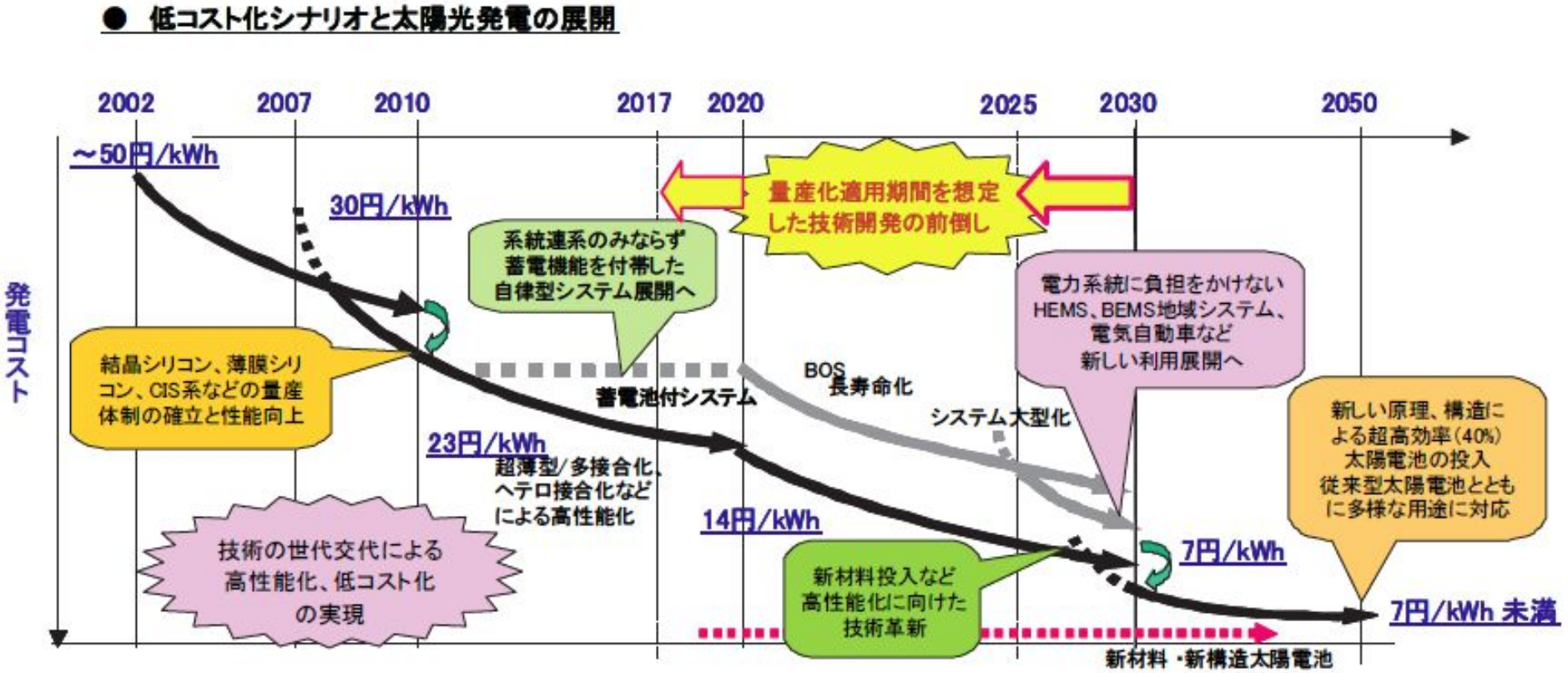
Fig. © BSW-Solar

Source: SUNWAYS AG; http://www.sunways.eu/de/referenzen/gebaeudeintegration/gehry-building-basel/



Source: http://austinspc.com/2011/04/10/what-is-a-microgrid/

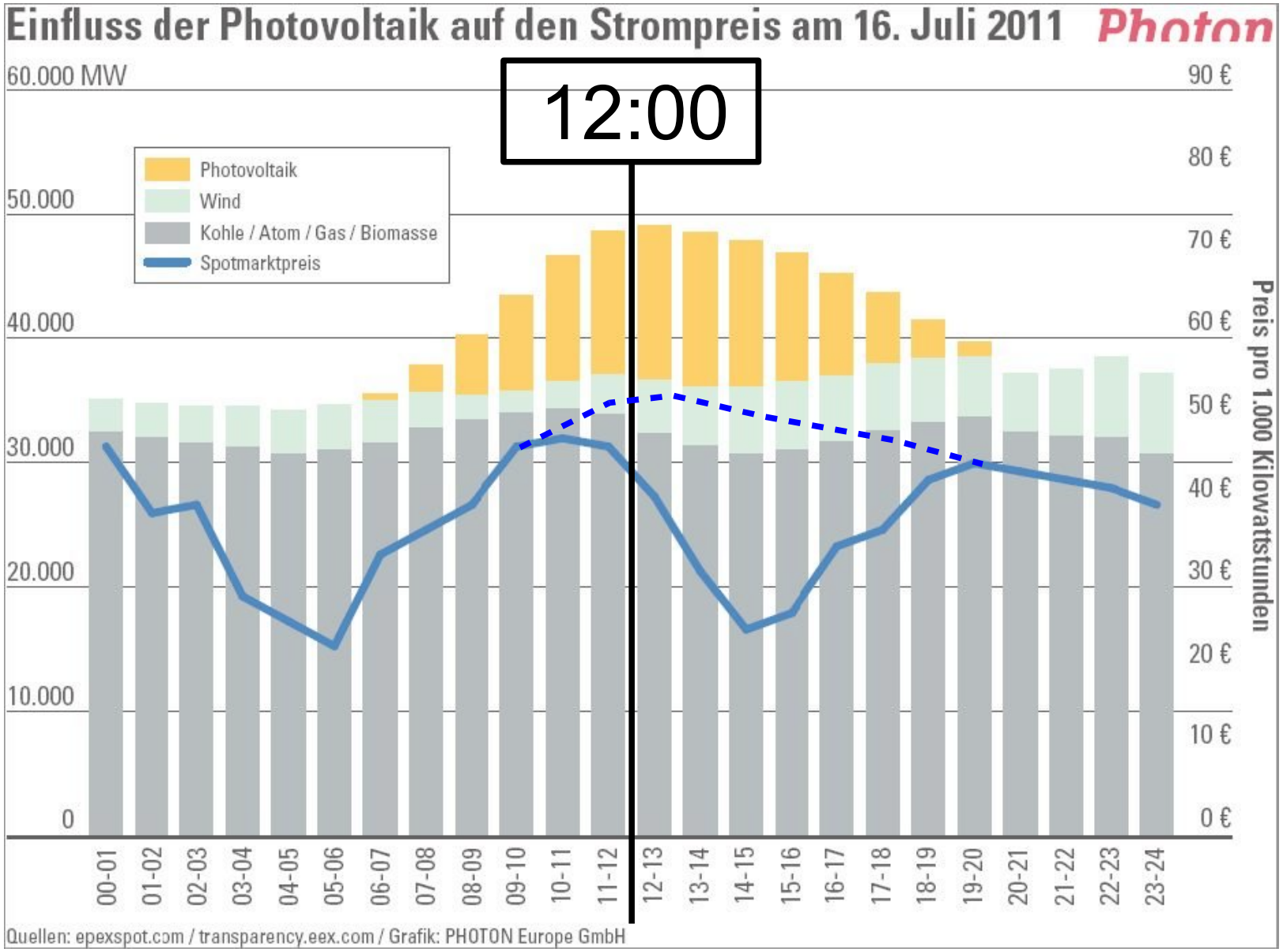
NEDO's PV Roadmap “PV2030+”



実現時期(開発完了)	2010年～2020年	2020年(2017年)	2030年(2025年)	2050年
発電コスト	家庭用電力並 23円/kWh程度	業務用電力並 14円/kWh程度	汎用電源並み 7円/kWh程度	汎用電源未満 7円/kWh未満
モジュール変換効率 (研究レベル)	実用モジュール16% (研究セル20%)	実用モジュール20% (研究セル25%)	実用モジュール25% (研究セル30%)	超高効率モジュール 40%
国内向生産量(GW/年)	0.5～1	2～3	6～12	25～35
(海外市場向け(GW/年))	～1	～3	30～35	～300
主な用途	戸建住宅、公共施設	住宅(戸建、集合) 公共施設、事務所など	住宅(戸建、集合)、 公共施設、民生業務用、 電気自動車など充電	民生用途全般 産業用、運輸用、 農業他、独立電源

Source: NEDO, “PV2030+”

Influence of PV on price for electricity



Source: http://solarinnovativ.wordpress.com/page/4/

EROI – Energy Return On Investment

U.S. oil and gas
1930 → 100
2000 → 20

U.S. coal
1950 → 100
2000 → 80

PV
thin-film → 14
silicon → 7

Tab.6: EROI for Various Energy Sources/Systems
Source: Randolph and Masters (2008) p.175

Source / System	EROI
U.S. oil and gas production, 1930	100
U.S. oil and gas production, 2000	20
U.S. gasoline production	7
U.S. coal production, 1950	100
U.S. coal production, 2000	80
Electricity from hydro with reservoir	205
Electricity from wind	80
Electricity from sawmill wastes	27
Electricity from nuclear	16
Electricity from PV modules	9
Electricity from coal (with CO_2 scrubbers)	5
Electricity from natural gas CC (2000 km del)	5
Electricity from biomass plantation	5
Electricity from fuel cell, H_2 from NG reform	2
PV modules (thin-film CIS)	14
PV modules (crystalline silicon)	7
U.S. ethanol fuel from corn	0.78 ~ 1.67
U.S. ethanol fuel from switchgrass	0.79 ~ 10.3
U.S. biodiesel from soybeans	0.67 ~ 3.20

Source: Randolph and Masters (2008), p.175

Feed-In Tariff

1978
No. 1 - USA

1990
No. 2 - Germany

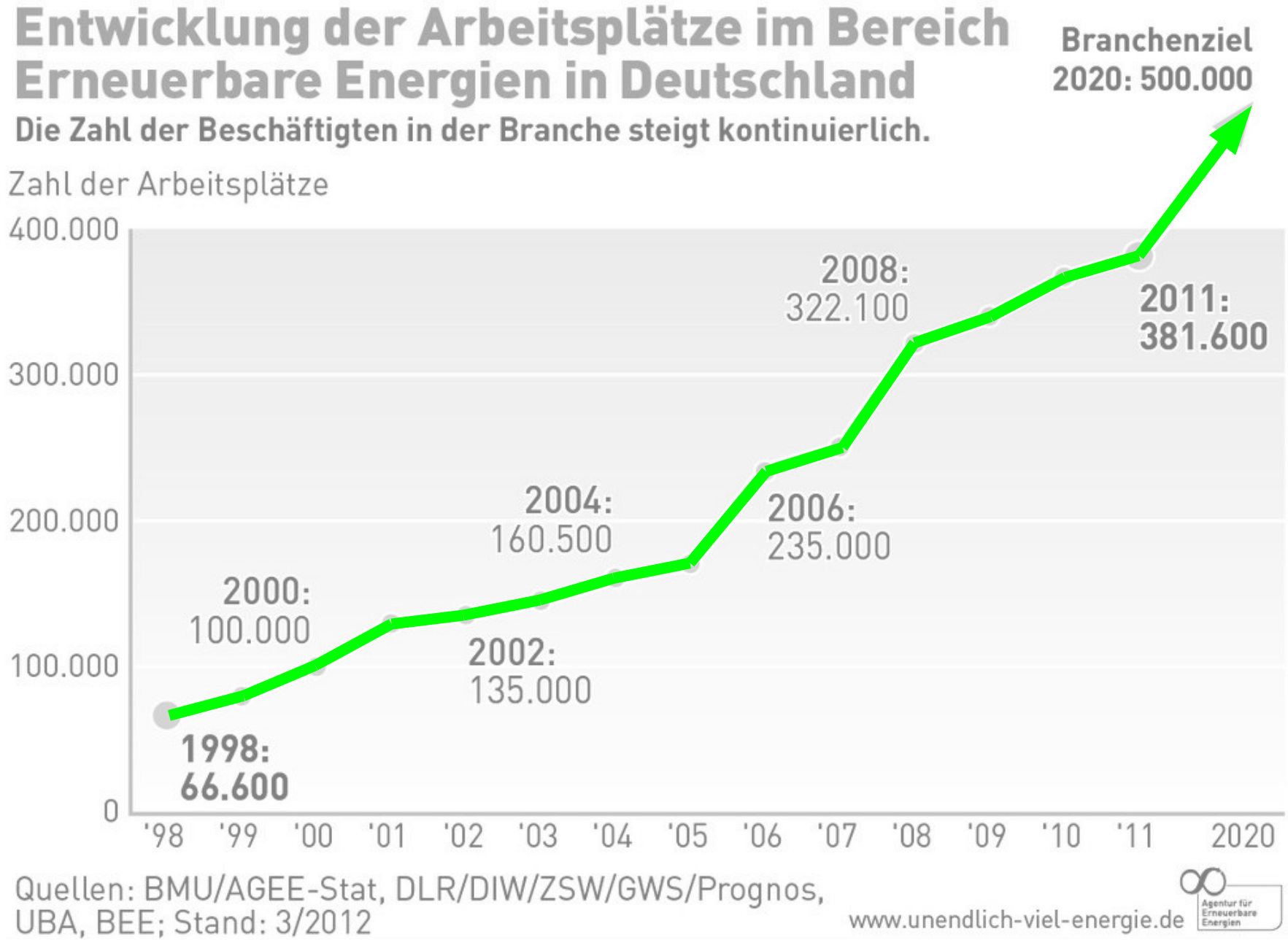
2012
No. 88 - Japan

Table R10. Cumulative Number of Countries/States/Provinces Enacting Feed-in Policies

Year	Cumulative Number	Countries/States/Provinces Added That Year
1978	1	United States
1990	2	Germany
1991	3	Switzerland
1992	4	Italy
1993	6	Denmark, India
1994	9	Luxembourg, Spain, Greece
1997	10	Sri Lanka
1998	11	Sweden
1999	14	Portugal, Norway, Slovenia
2000	14	—
2001	17	Armenia, France, Latvia
2002	23	Algeria, Austria, Brazil, Czech Republic, Indonesia, Lithuania
2003	29	Cyprus, Estonia, Hungary, South Korea, Slovak Republic, Maharashtra (India)
2004	34	Israel, Nicaragua, Prince Edward Island (Canada), Andhra Pradesh and Madhya Pradesh (India)
2005	41	Karnataka, Uttaranchal, and Uttar Pradesh (India); China, Turkey, Ecuador, Ireland
2006	46	Ontario (Canada), Kerala (India), Argentina, Pakistan, Thailand
2007	56	South Australia (Australia), Albania, Bulgaria, Croatia, Dominican Republic, Finland, Macedonia, Moldova, Mongolia, Uganda
2008	69	Queensland (Australia); California (USA); Chattisgarh, Gujarat, Haryana, Punjab, Rajasthan, Tamil Nadu, and West Bengal (India); Kenya; the Philippines; Tanzania; Ukraine
2009	80	Australian Capital Territory, New South Wales and Victoria (Australia); Hawaii, Oregon, and Vermont (USA); Japan; Kazakhstan; Serbia; South Africa; Taiwan
2010	84	Bosnia and Herzegovina, Malaysia, Malta, United Kingdom
2011 (early)	85	Louisiana (USA)
Total existing	87	**See note below**

Source: REN21, “Renewables 2012 Global Status Report”, p.84

Jobs for Renewable Energy



Source: http://www.fes-japan.org/?page_id=4320

Germany : Japan – 9 : 4 (max 13)

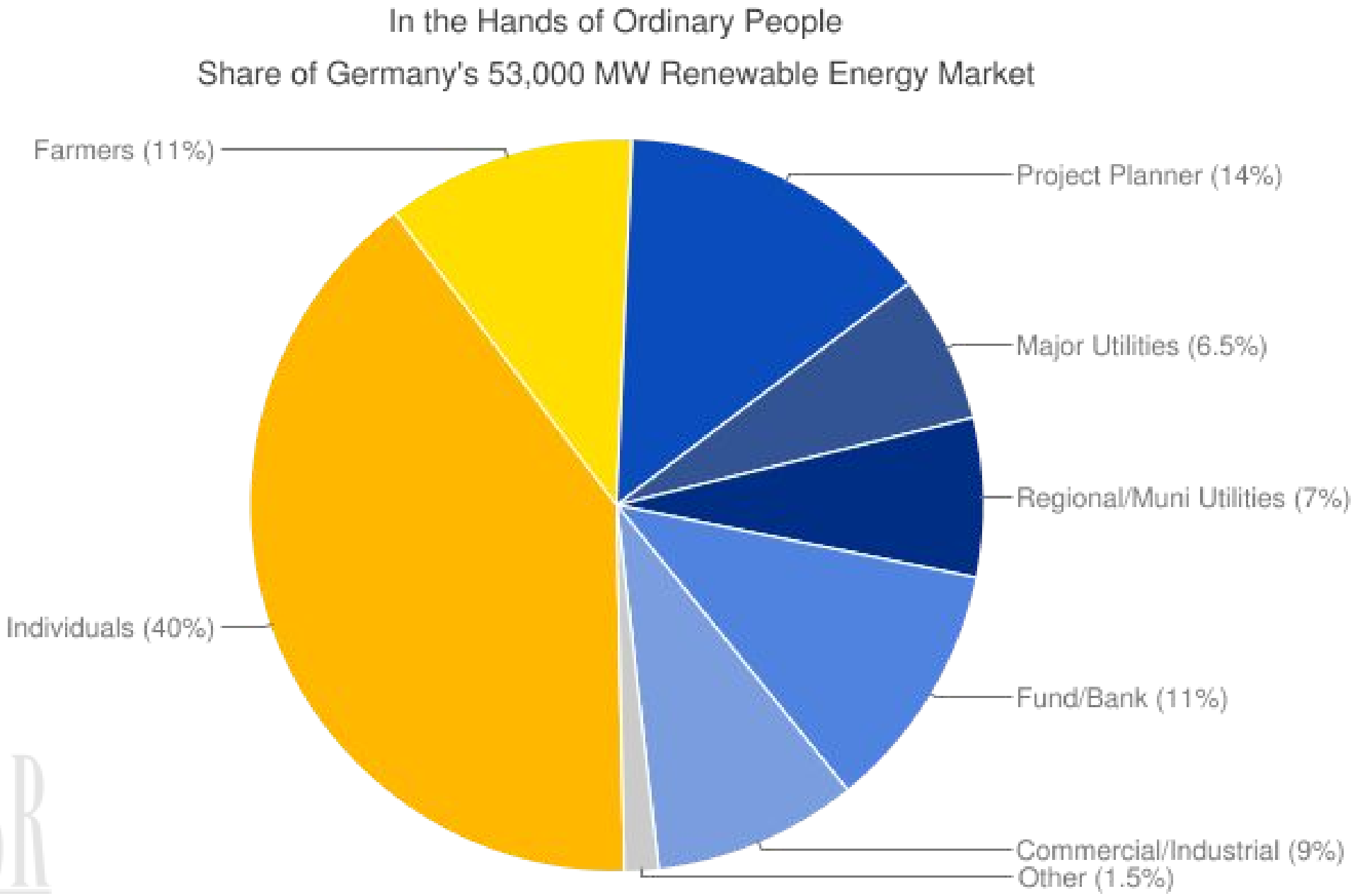
TOTAL CAPACITY AS OF END-2011

USA : China – 9 : 8

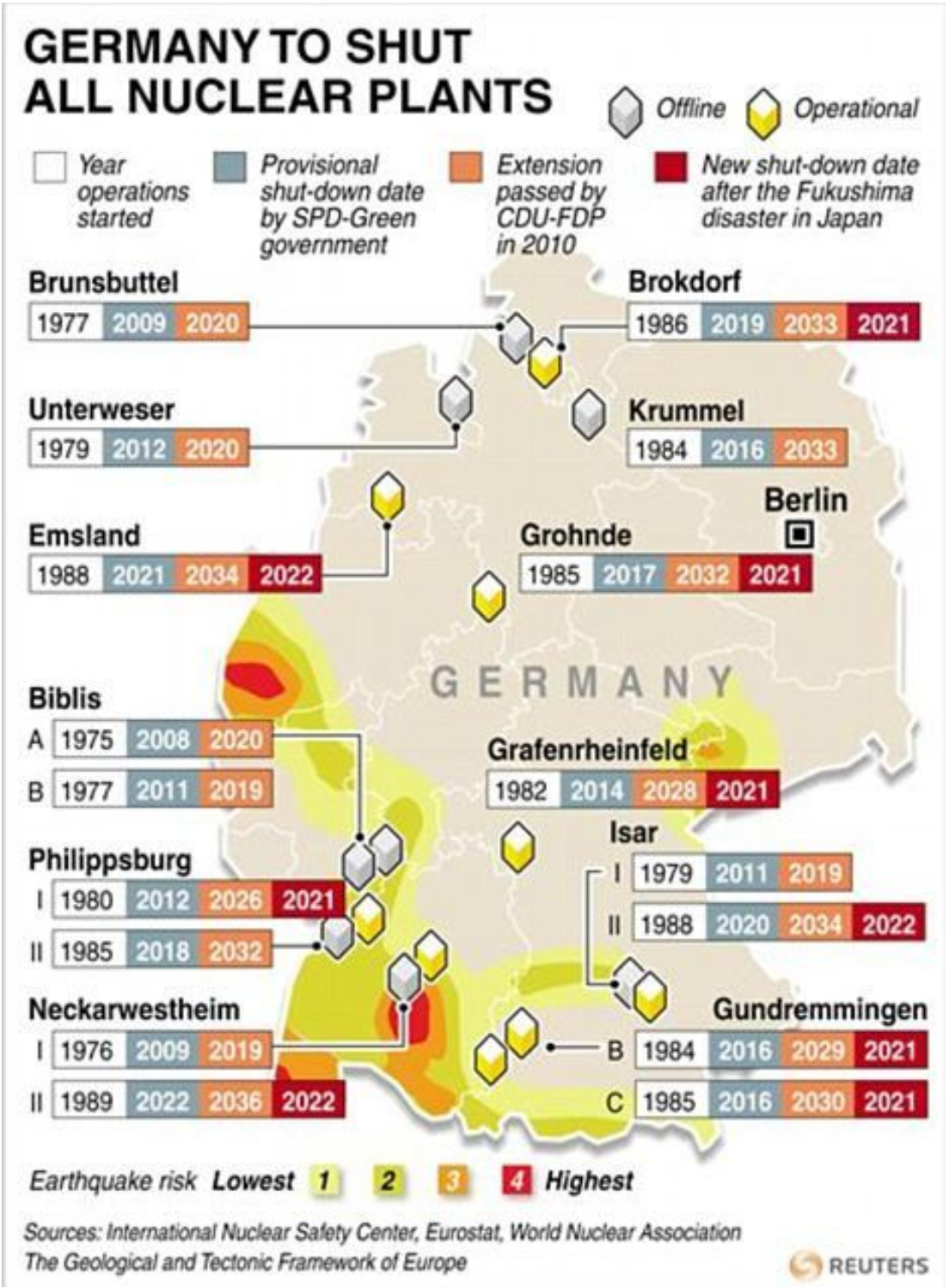
	Renewable power capacity (incl. hydro)	Renewable power capacity (not incl. hydro)	Renewable power capacity per capita (not incl. hydro)[2]	Biomass power capacity	Geothermal power capacity	Hydropower capacity
1	China	China	Germany	United States	United States	China
2	United States	United States	Spain	Brazil	Philippines	Brazil
3	Brazil	Germany	Italy	Germany	Indonesia	United States
4	Canada	Spain	United States	China	Mexico	Canada
5	Germany	Italy	Japan	Sweden	Italy	Russia

	Solar PV capacity	Solar PV capacity per capita	Wind power capacity	Solar hot water/heat capacity[1]	Solar hot water/heat capacity per capita[1]	Geothermal heat installed capacity	Geothermal direct heat use[3]
1	Germany	Germany	China	China	Cyprus	United States	China
2	Italy	Italy	United States	Turkey	Israel	China	United States
3	Japan	Czech Rep.	Germany	Germany	Austria	Sweden	Sweden
4	Spain	Belgium	Spain	Japan	Barbados	Germany	Turkey
5	United States	Spain	India	Brazil	Greece	Japan	Japan

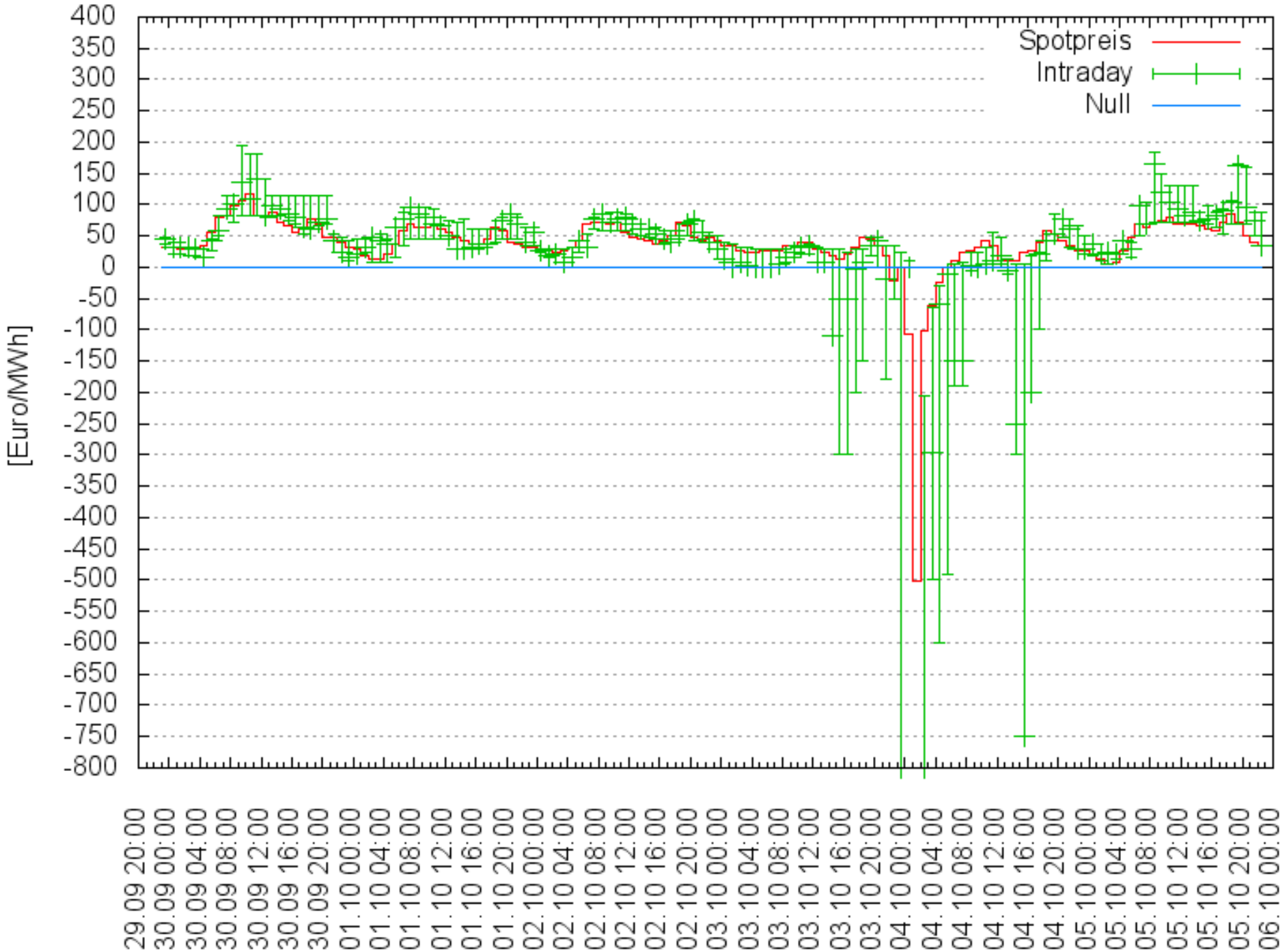
Source: REN21, “Renewables 2012 Global Status Report”, p.19



Source: http://www.ilsr.org/tag/germany_energy_tag/page/2/

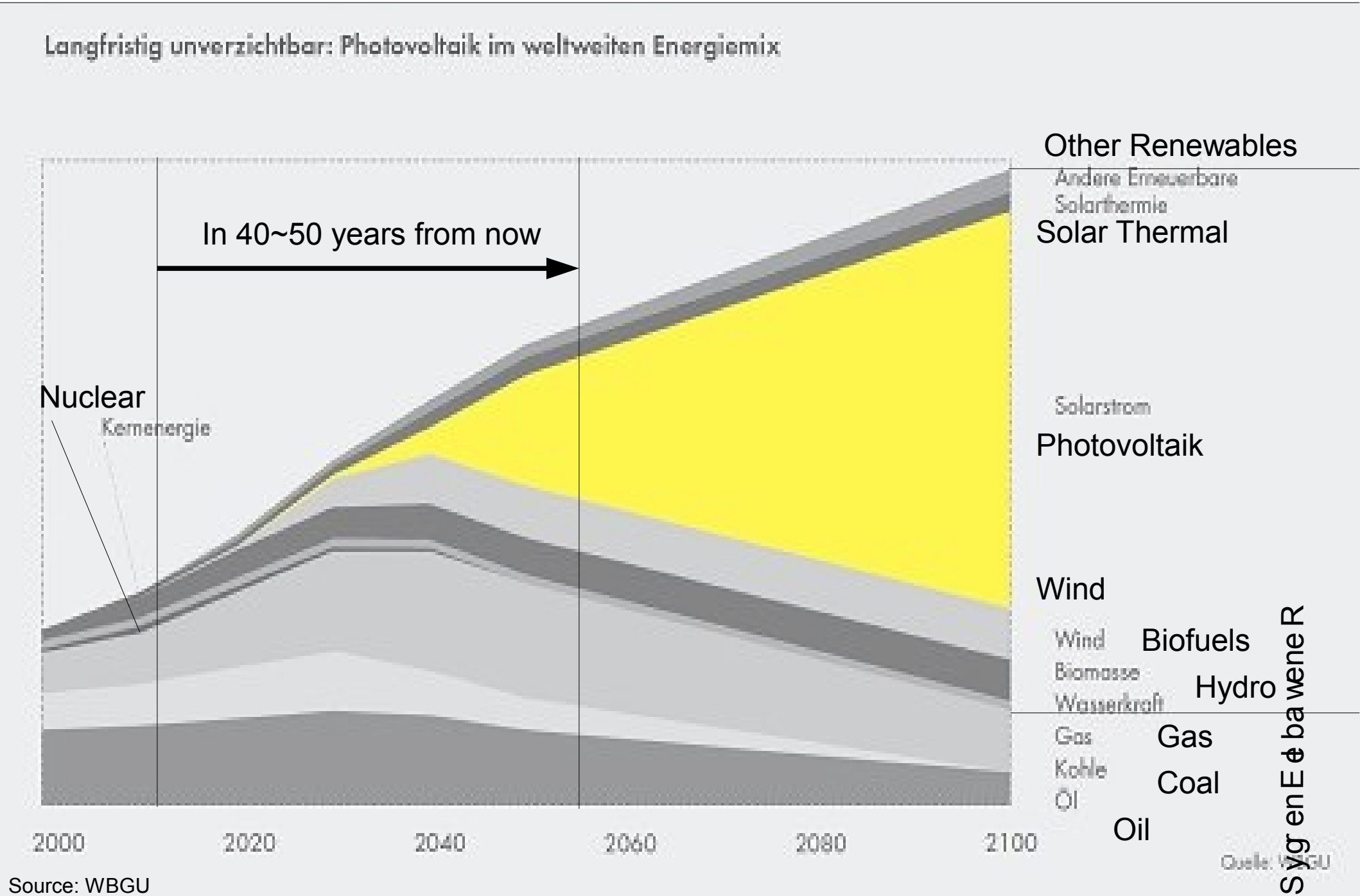


Source: http://www.dailymail.co.uk/sciencetech/article-1392359/Germany-pledges-nuclear-shutdown-2022-following-Fukushima-disaster.html



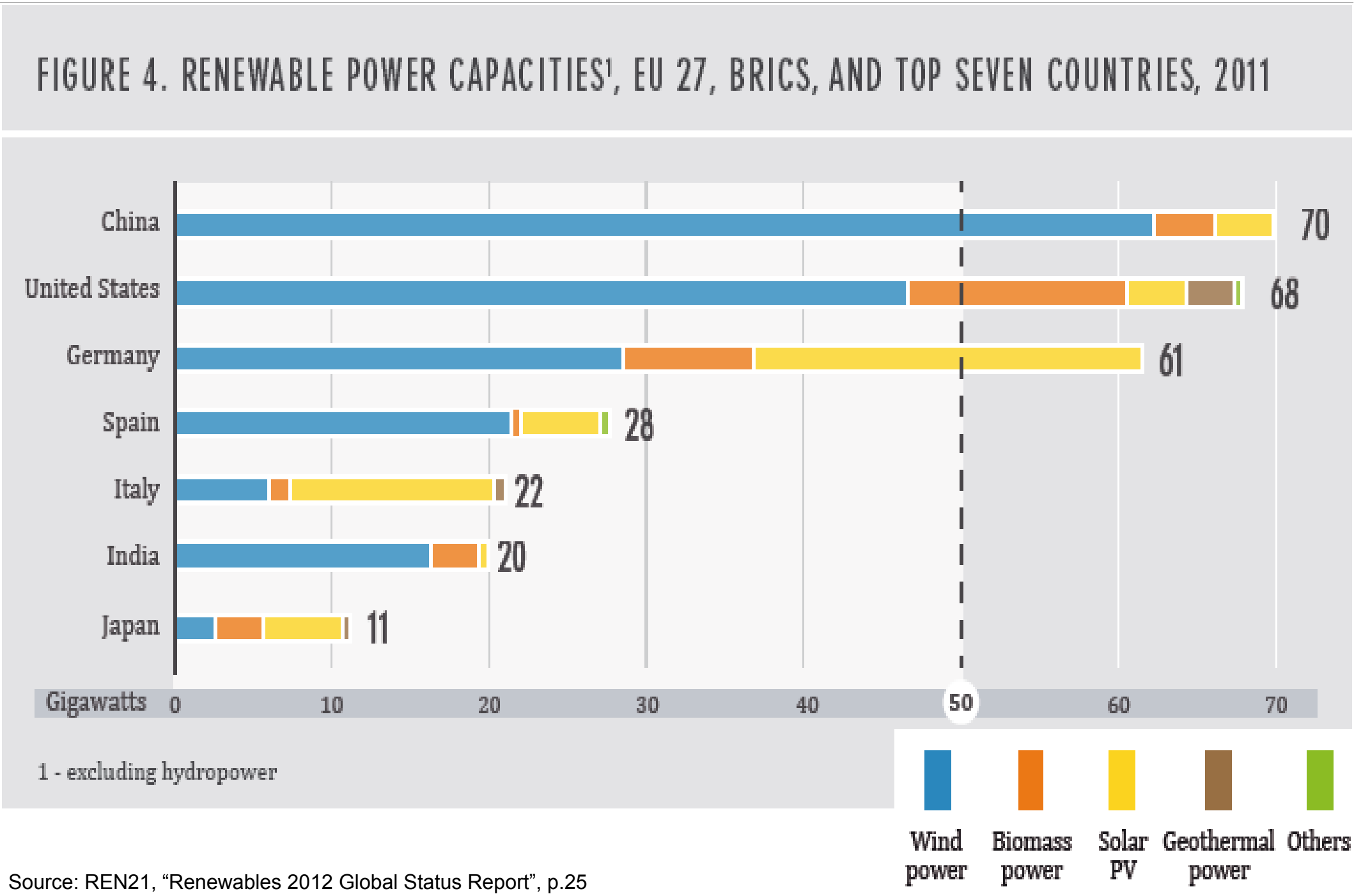
Source: http://www.ensys.tu-berlin.de/

Towards Renewable Energies



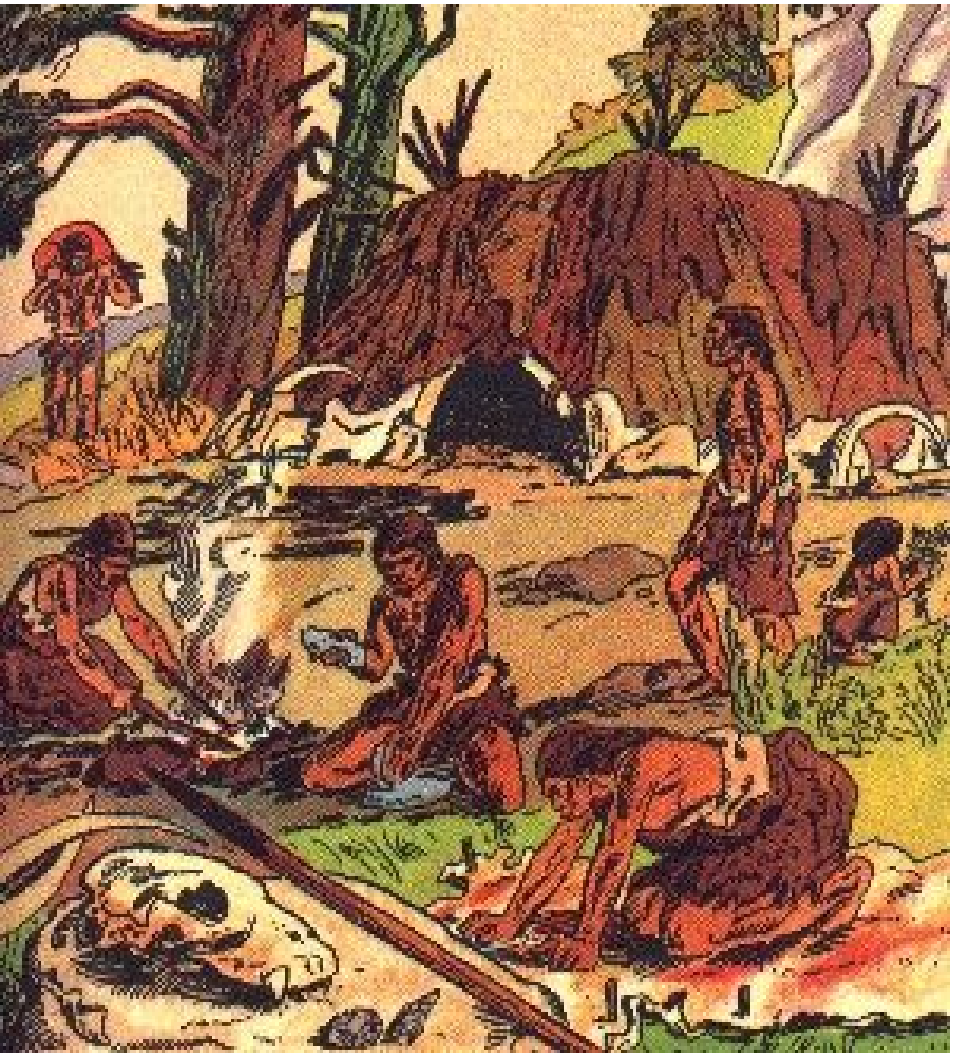
Source: WBGU

Germany : Japan



Source: REN21, “Renewables 2012 Global Status Report”, p.25

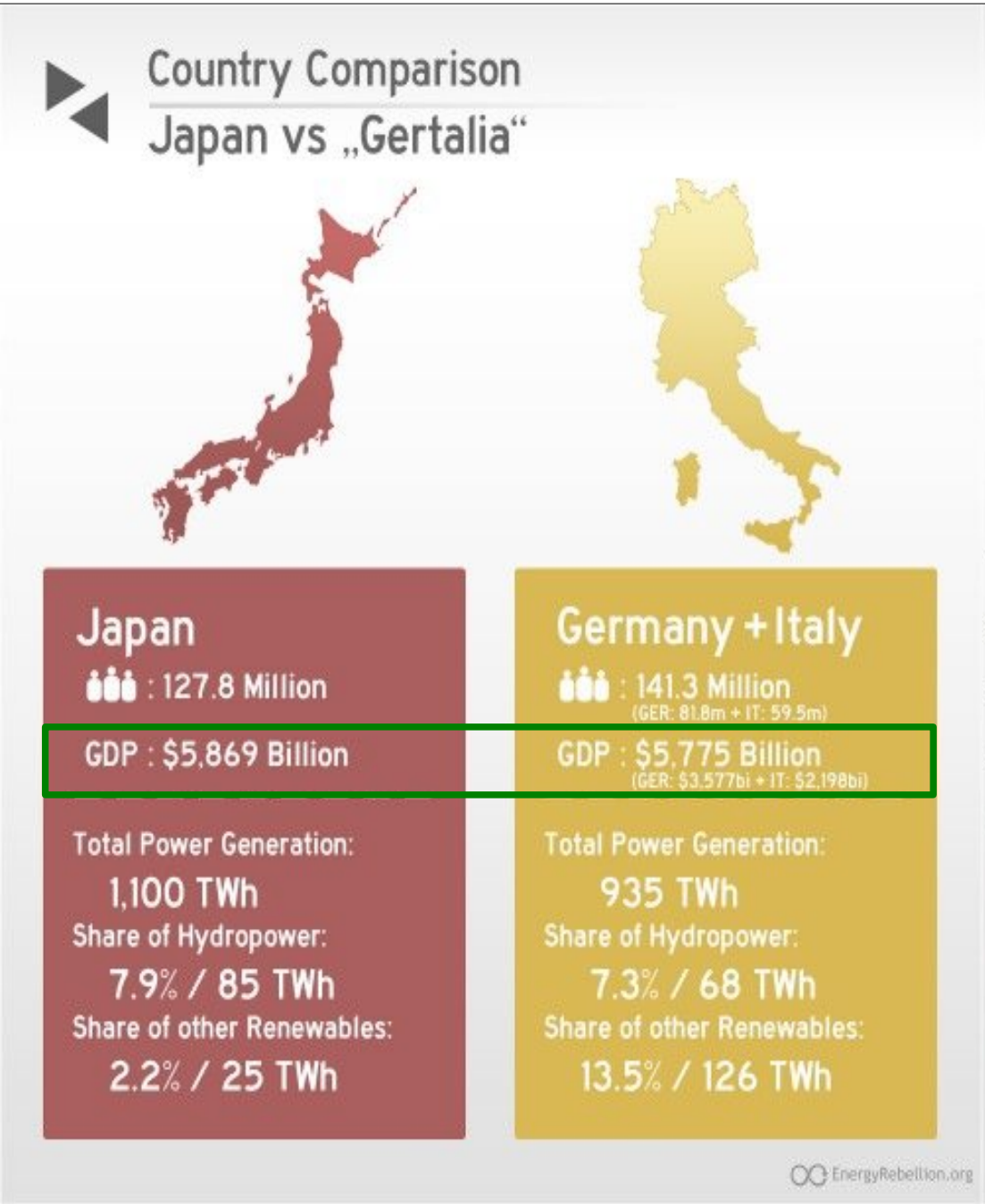
We have barely started

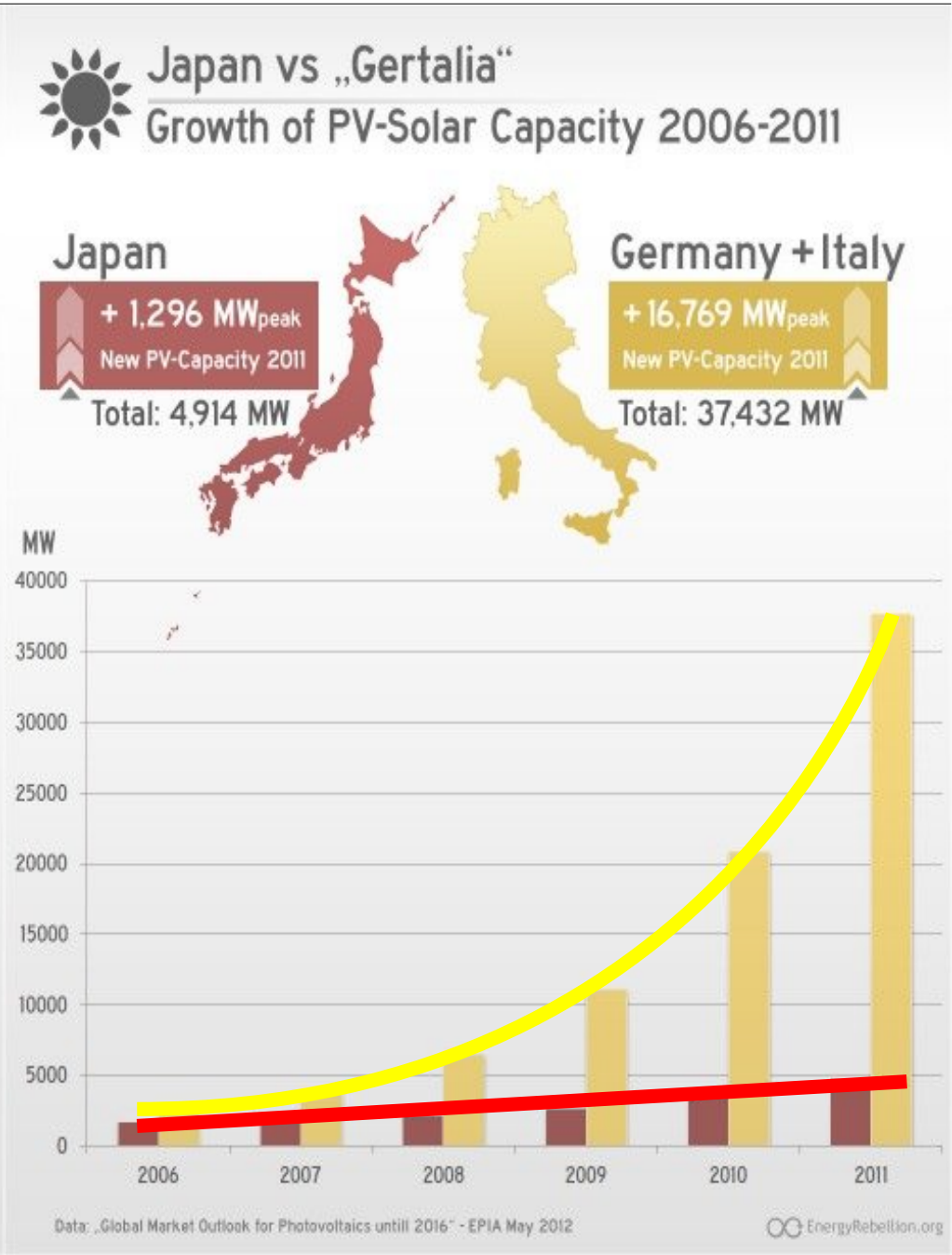


Source: http://www.palkan.de/sbeitrag-g.htm

Source: http://www.traktorpool.de/details/Modelltraktoren-geraete/Komatsu-PC21

Japan vs “Germany – Italy”





Source: http://cleantechnica.com/2012/06/22/japan-vs-gertalia-a-solar-country-comparison/

Thank you for your attention.

Source: http://grist.org/climate-energy/auction-yer-roof-and-other-ways-of-streamlining-distributed-energy/