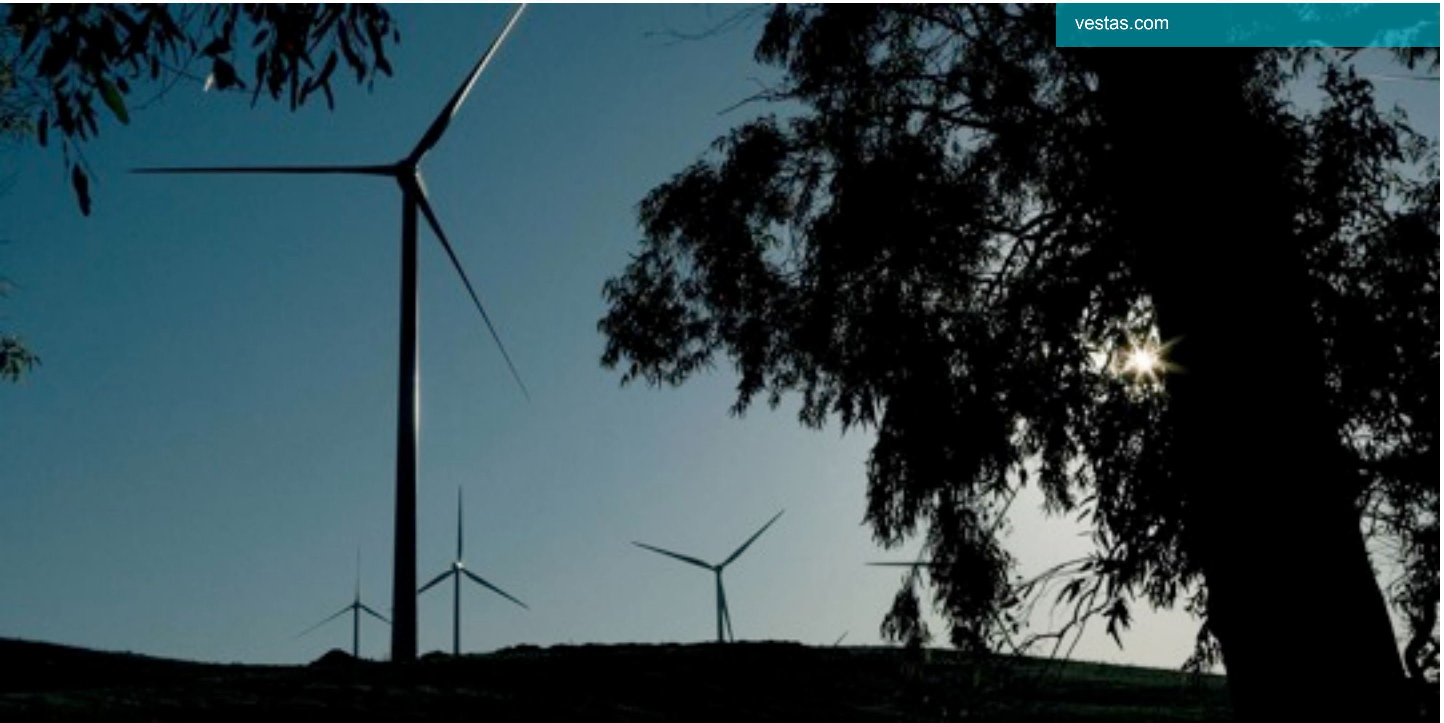
No. 1 in Modern Energy

CleanPower 2009
Wind Power Generation Potential

By Peter C. Brun, Senior Vice president, Vestas Wind Systems A/S



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We are standing in front of **a global climate- and energy crisis**, which will make the financial crisis look inferior.

Recession is 'nothing' compared to climate change crisis, Prince Charles warns

By DAILY MAIL REPORTER
Last updated at 7:14 PM on 12th March 2009

The Prince of Wales today warned the world risked bequeathing future generations a 'poisoned chalice' if leaders fail to seize the opportunity to tackle climate change.

In an impassioned plea to business leaders in Brazil, Prince Charles highlighted how we had only '100 months to act' to alter our behaviour or risk 'catastrophic' environmental damage to the world.

He said that global greenhouse emissions were still rising inexorably despite the evidence of the damage they were causing to the planet - disappearing glaciers, melting icecaps and more extreme weather.

The Prince described this failure to adequately tackle the causes of the problem as 'gambling away our future'.

But he added the global economic downturn offered the world an opportunity as it told us that sustainable development would be the primary driver of economic prosperity in the future.

Speaking in Rio de Janeiro ahead of a visit to the heart of Brazil's Amazon rainforest

© EPA

Dire warning: Prince Charles urges leaders to act now on climate change

COP15 COPENHAGEN
UNITED NATIONS
CLIMATE CHANGE
CONFERENCE
DEC 7-DEC 18
2009

"Any difficulties which the world faces today ***will be nothing compared to the full effects which global warming will have*** *on the worldwide economy"*

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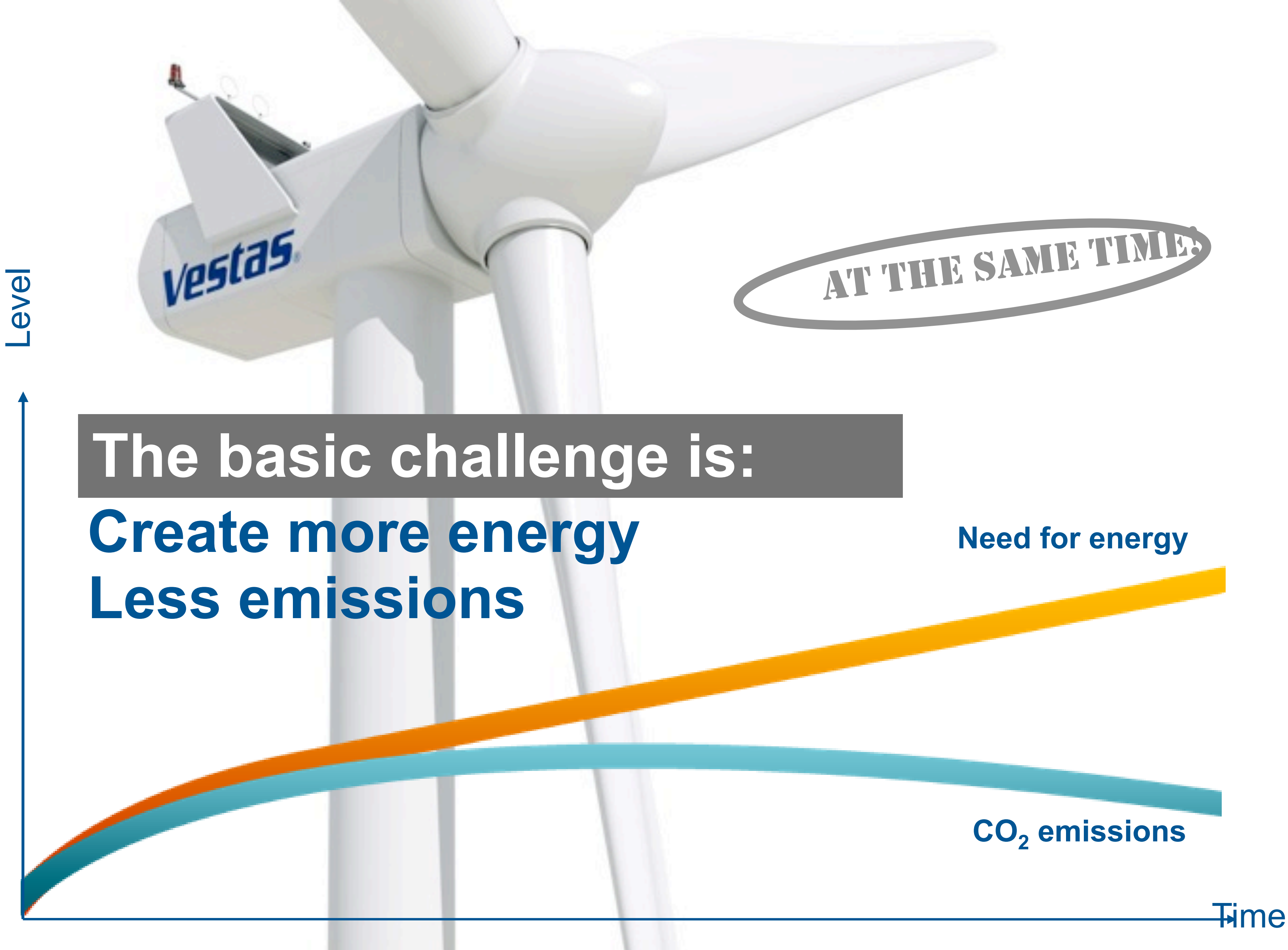
The basic challenge is:

Create more energy
Less emissions



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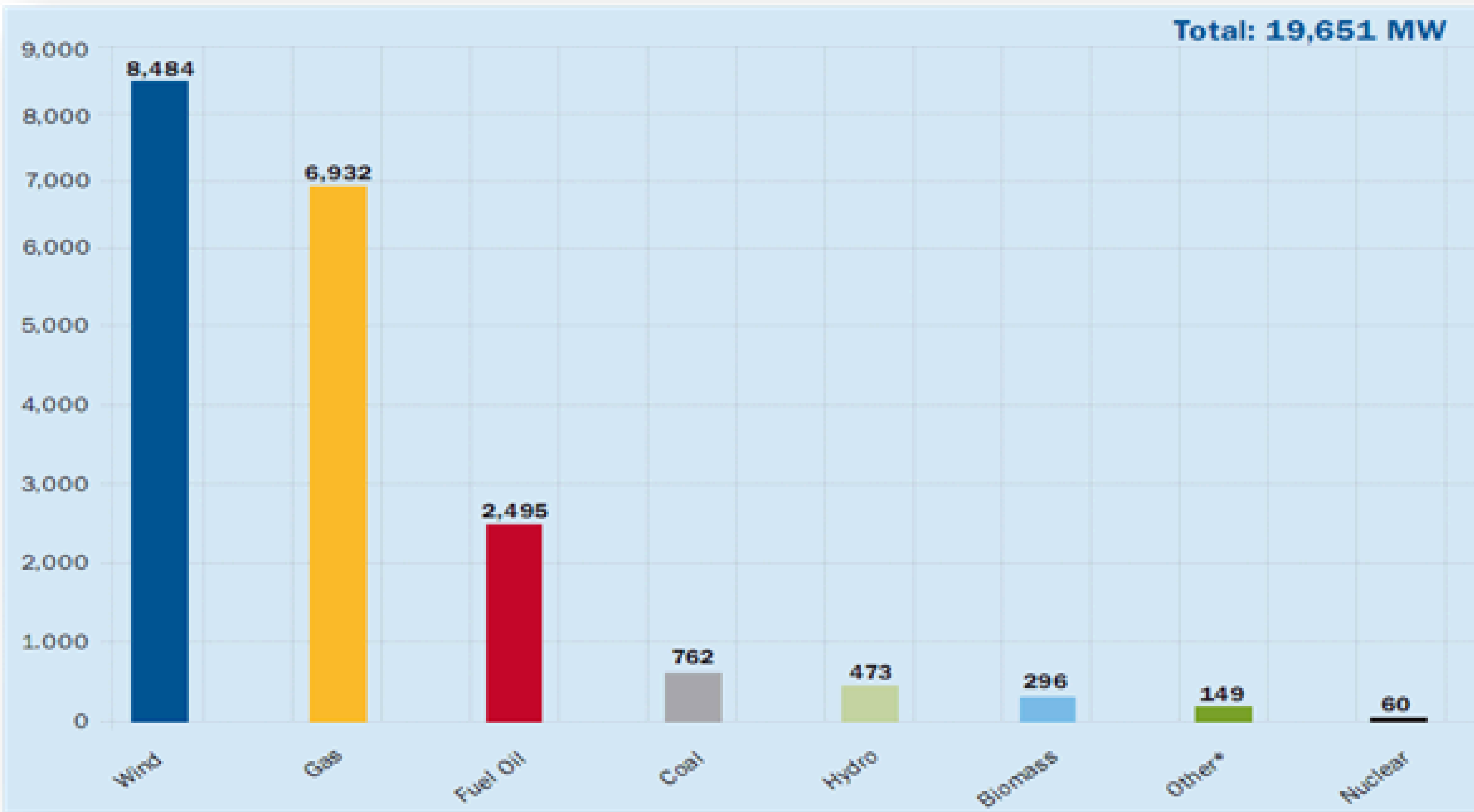
1. Competitive
2. Independent
3. Predictable
4. Fast
5. Clean

- No emission of CO_2, So_x or No_x
- No H_2O consumption
- No waste ~ 80 per cent recyclable

Net increase in EU 2008



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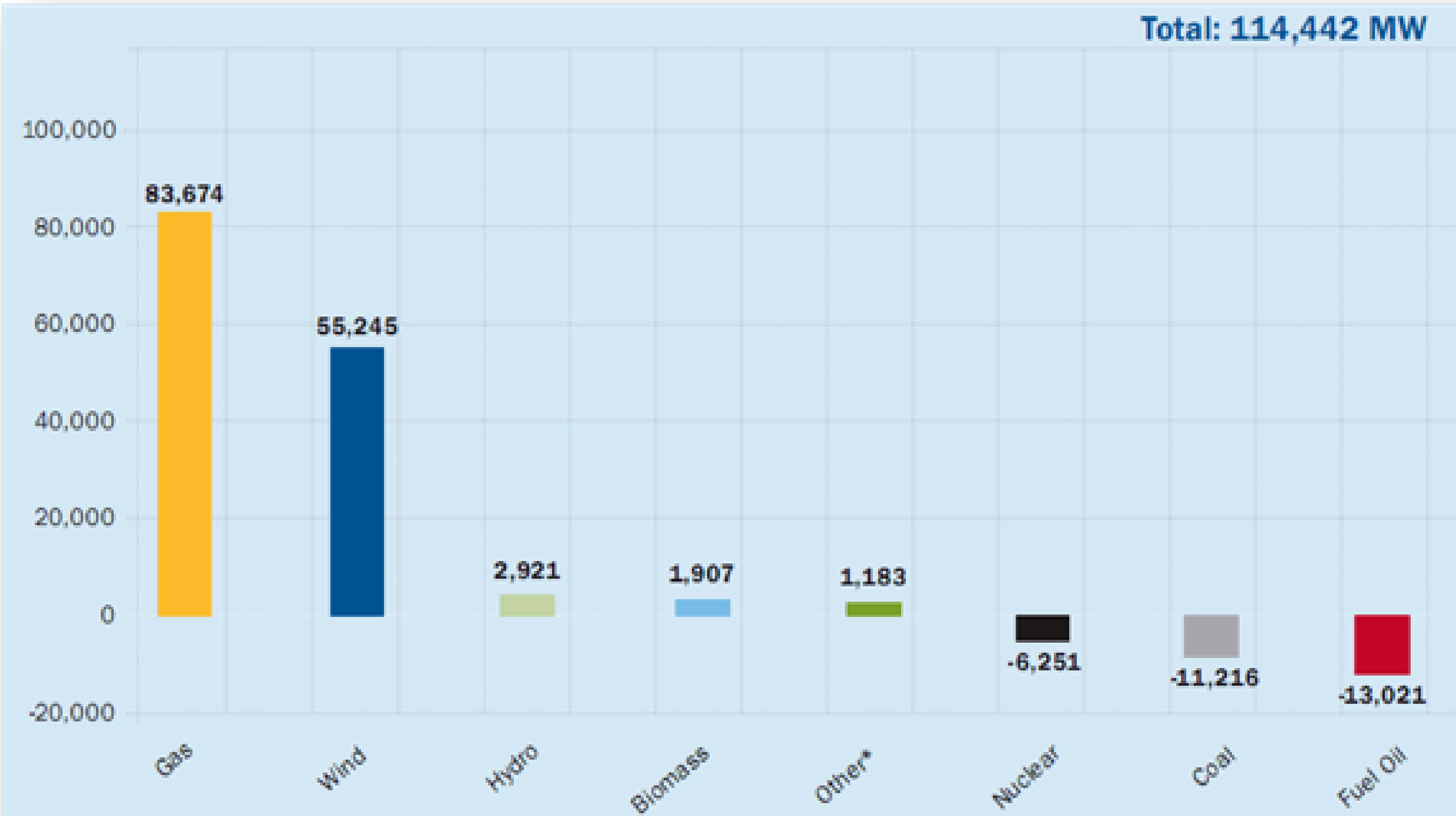
Net increase in EU last 10 years



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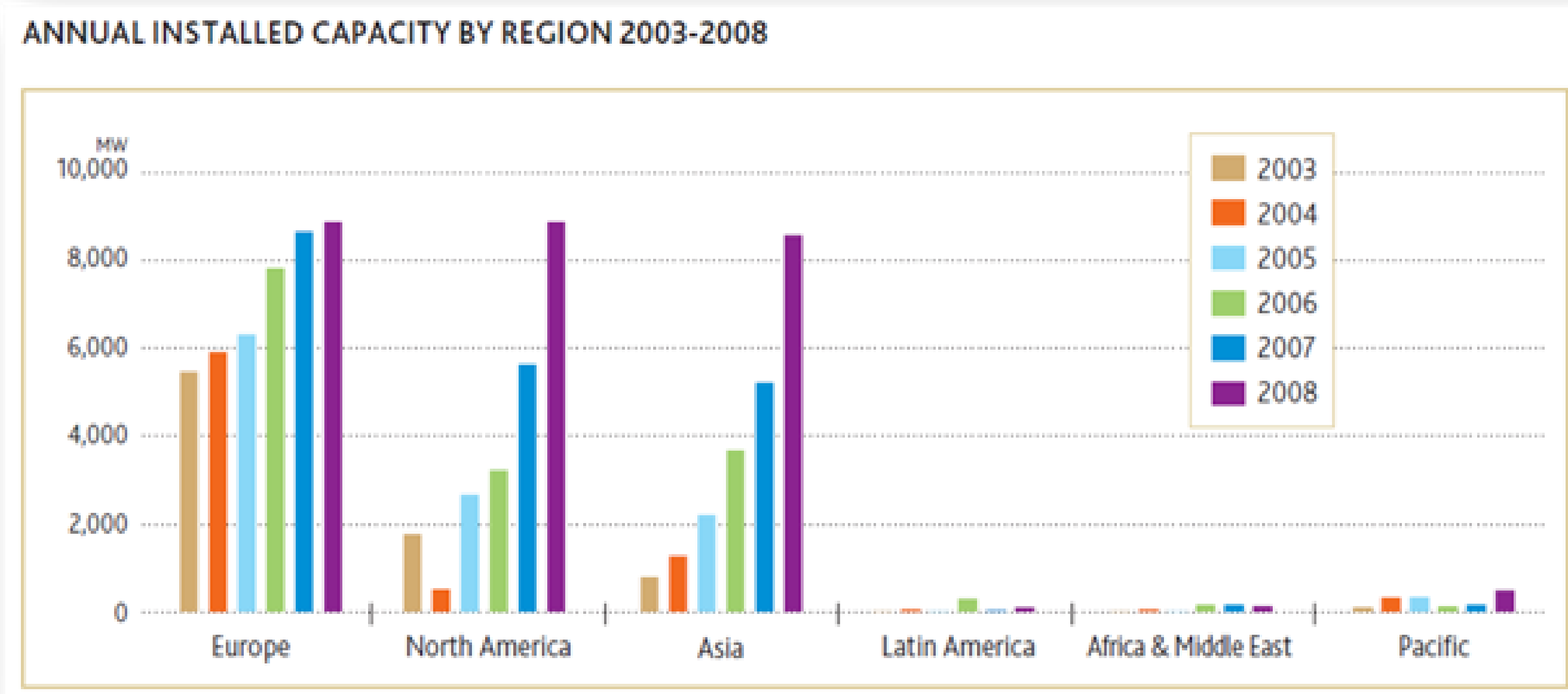
Structual changes in markets ?

EU stagnating – high growth in Asia og North Amerika



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World is talking – like ever before - about

Renewables and Wind Power

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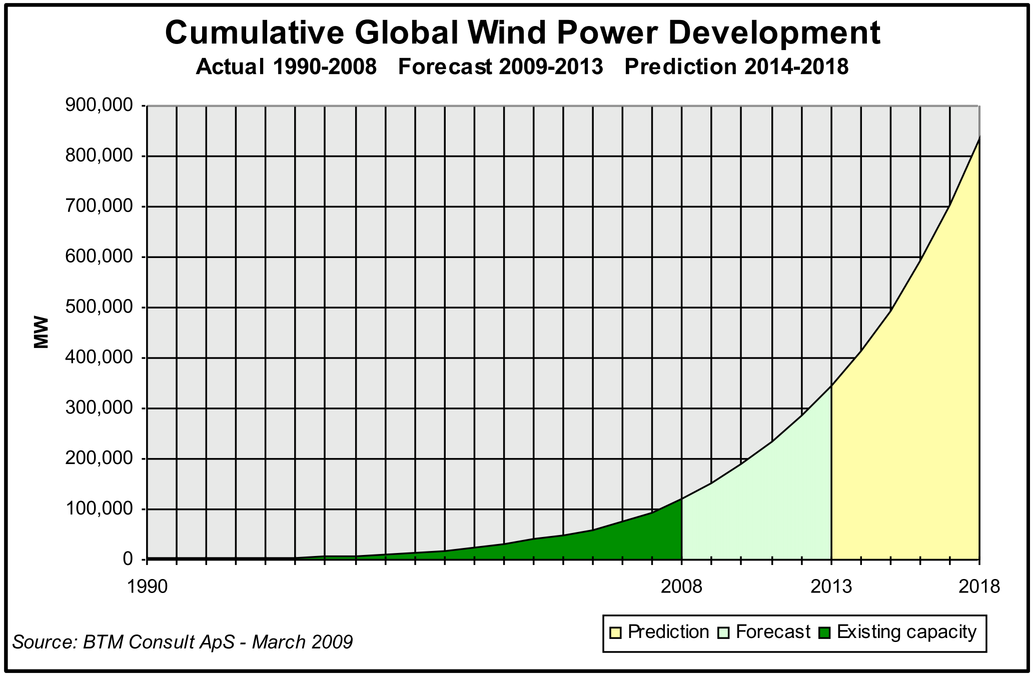

After 2009 – Huge growth potential

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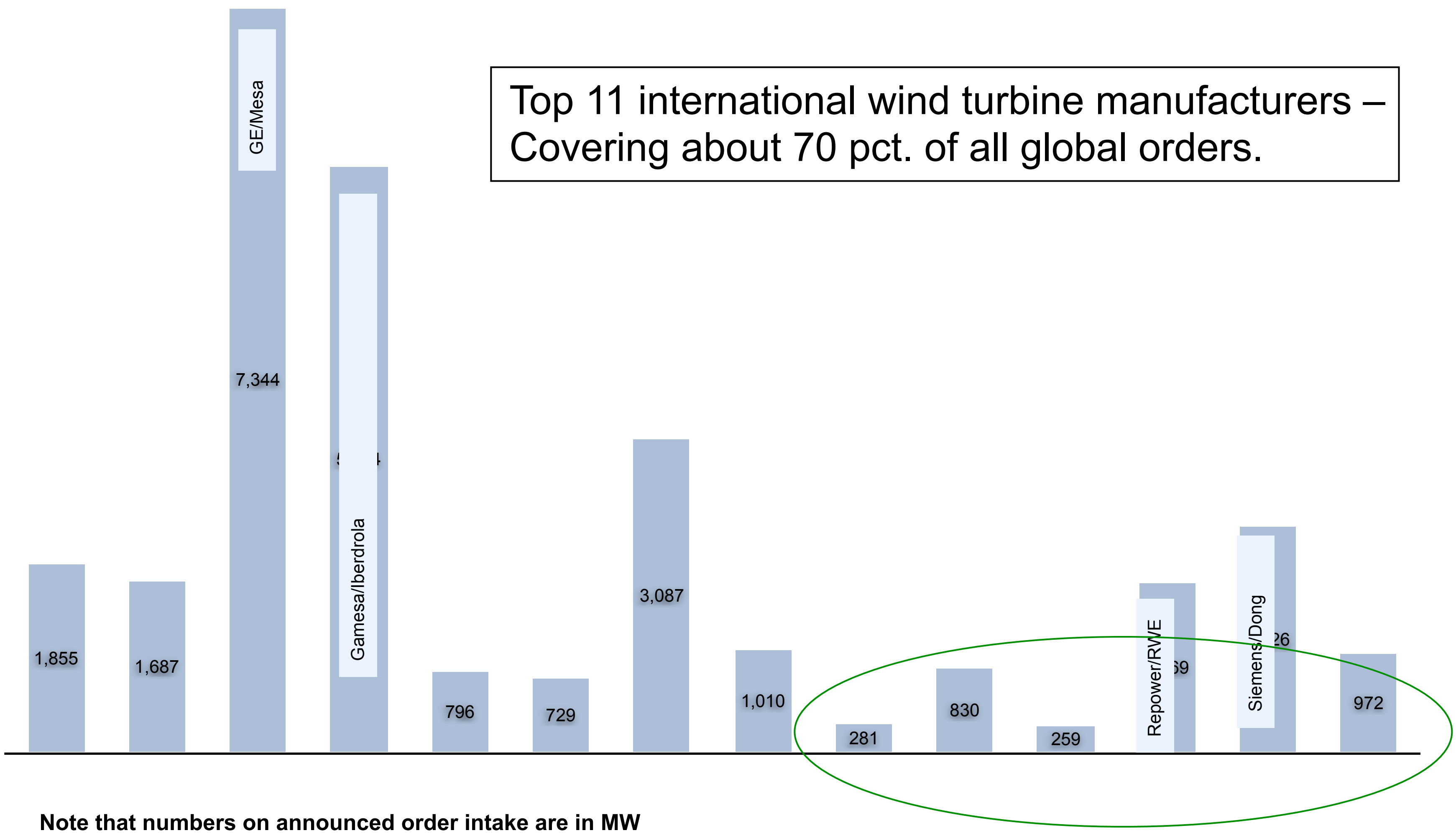
Financial crisis high impact on Industry

A remarkable slow down of 67 pct. in announced order intake (MW) in the last six months compared to the previous six months



Note that numbers on announced order intake are in MW

Source: Press releases

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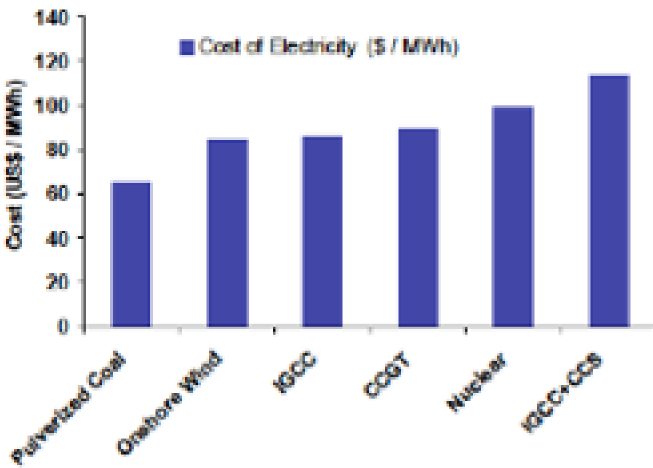
”Driver” # 1 for Wind: Cost of Energy

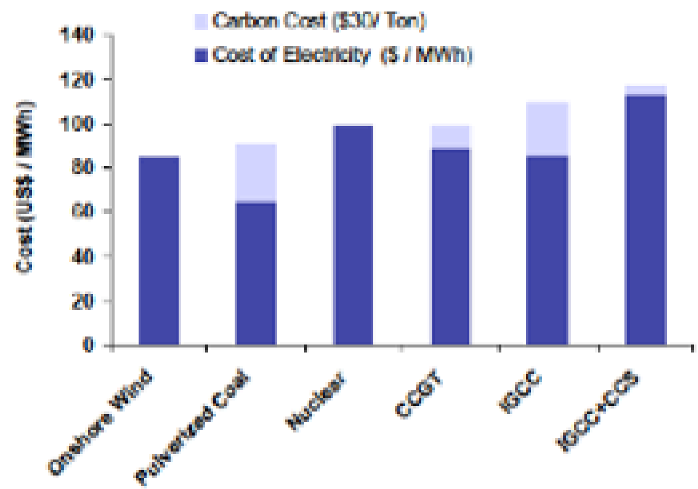
Comparative Costs of New Build Power Generation in the US

Average Cost Comparison of New Build Power Generation

EER's Average Levelized Cost to Produce Power From New Build Power Generation . . .



. . . If a $30 Cost of CO_2 is Applied to EER's 'Average' Case Scenario



Source: Emerging Energy Research

In the absence of a cost of carbon, supercritical coal remains the lowest-cost form of power generation. However, planning opposition prohibit its use in a growing number of states

If a $30 cost of carbon is applied to current cost averages, onshore wind becomes a lower cost generation option than all fossil fuel-based power generation

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emerging energy research

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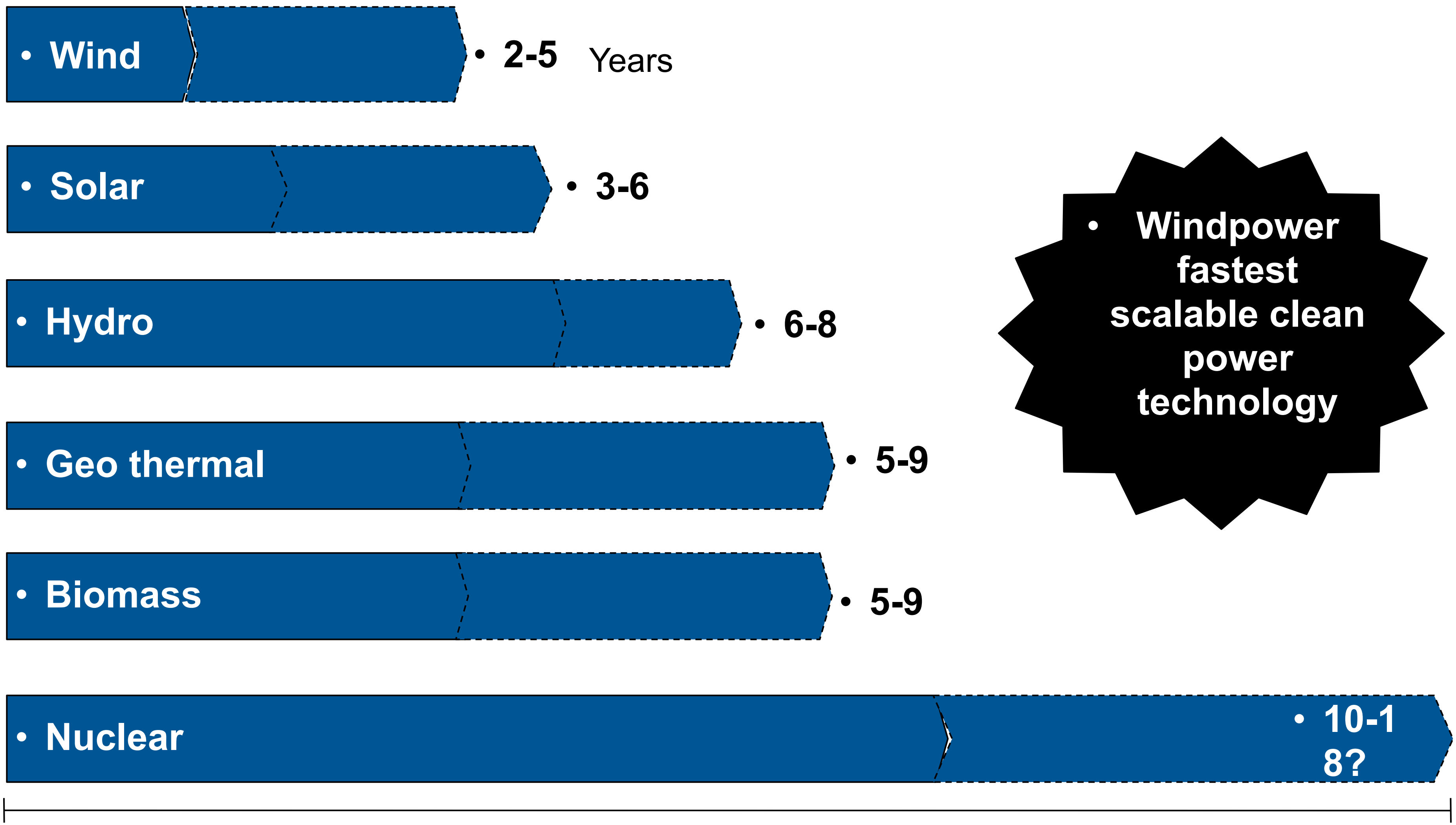
"Driver" # 2 for Wind: Installation time

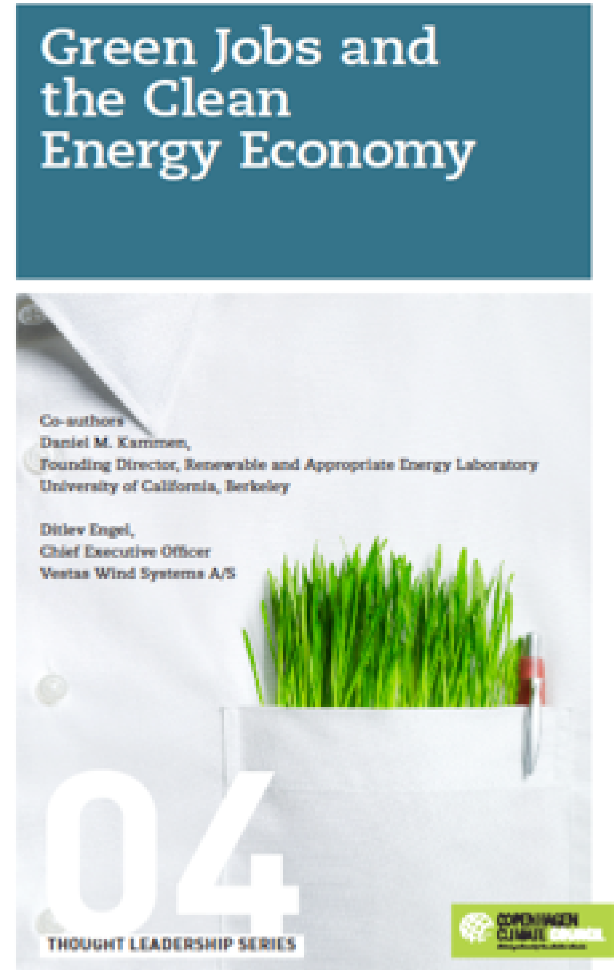


- # of years

- Windpower fastest scalable clean power technology

Source: FPL; IEA; Press clips;

A new market driver - Green Jobs



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Job creation in the wind power industry

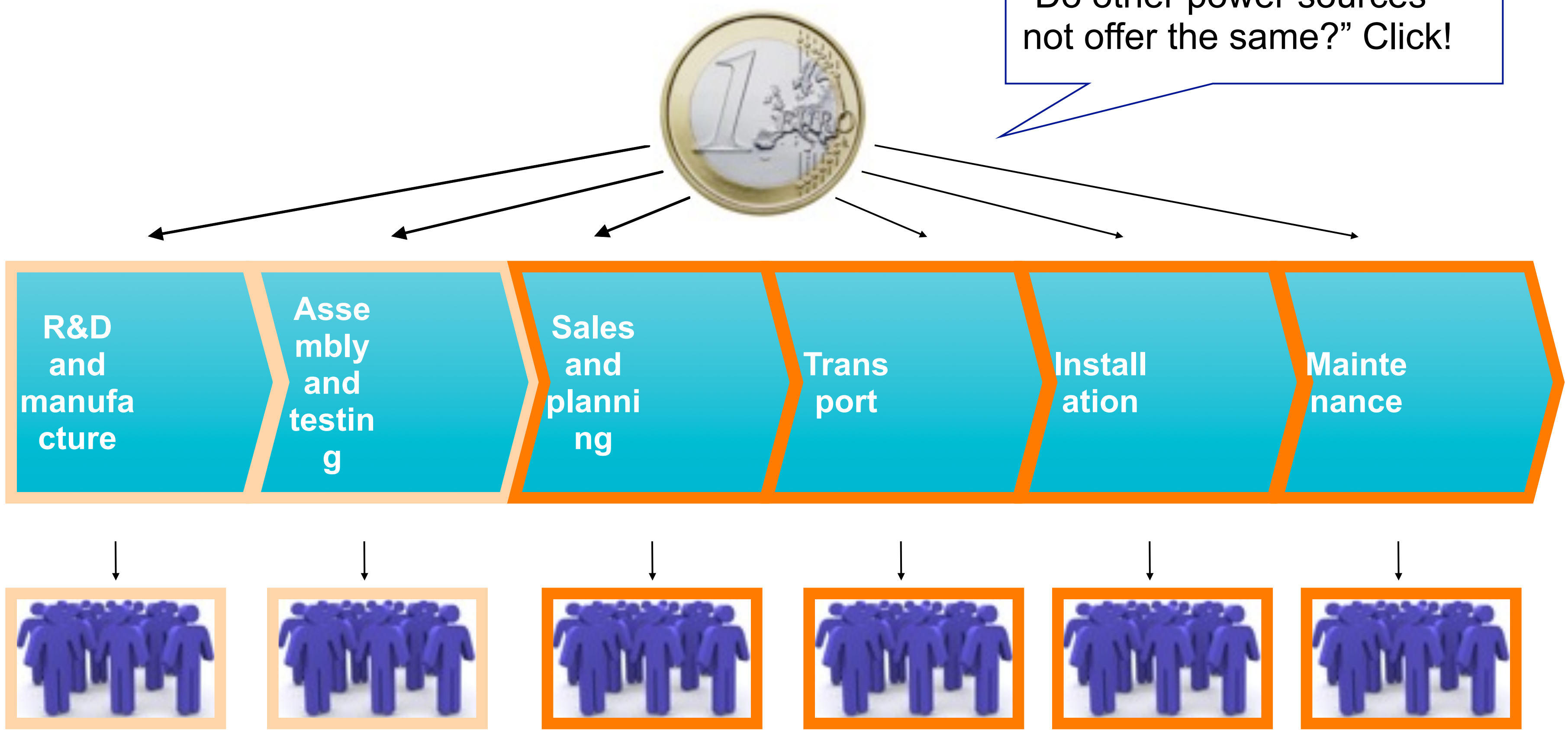
1 MW wind
energy capacity
installed
= 15.1 Wind Jobs
+ 0.4 for O&M
(direct & indirect)*

*example Europe, total number of locally created jobs depends on where production is based.

Source: EWEA (2009)

Wind Power generation can create more local jobs

”Do other power sources not offer the same?” Click!

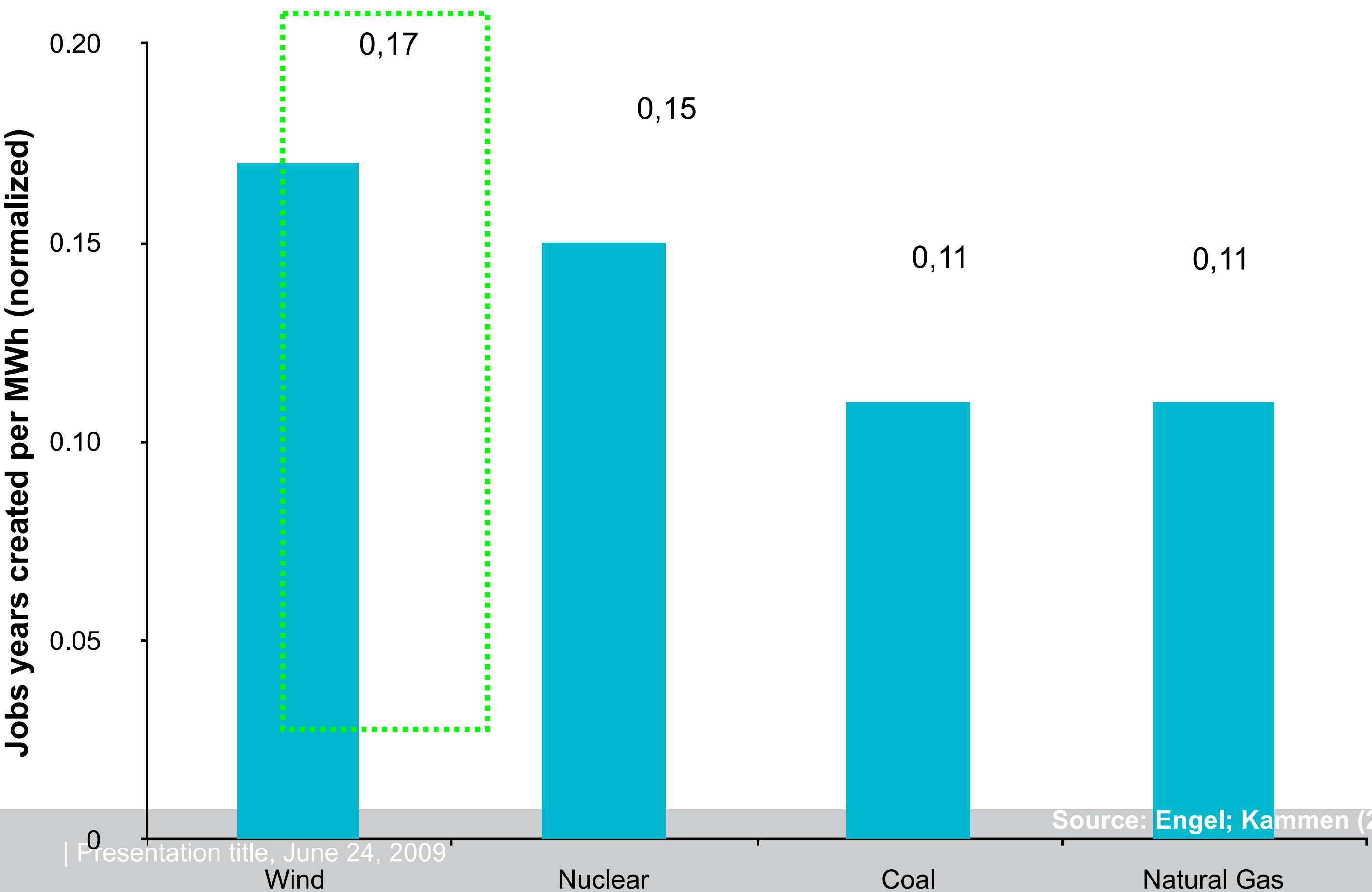


Preferrably local

Naturally local

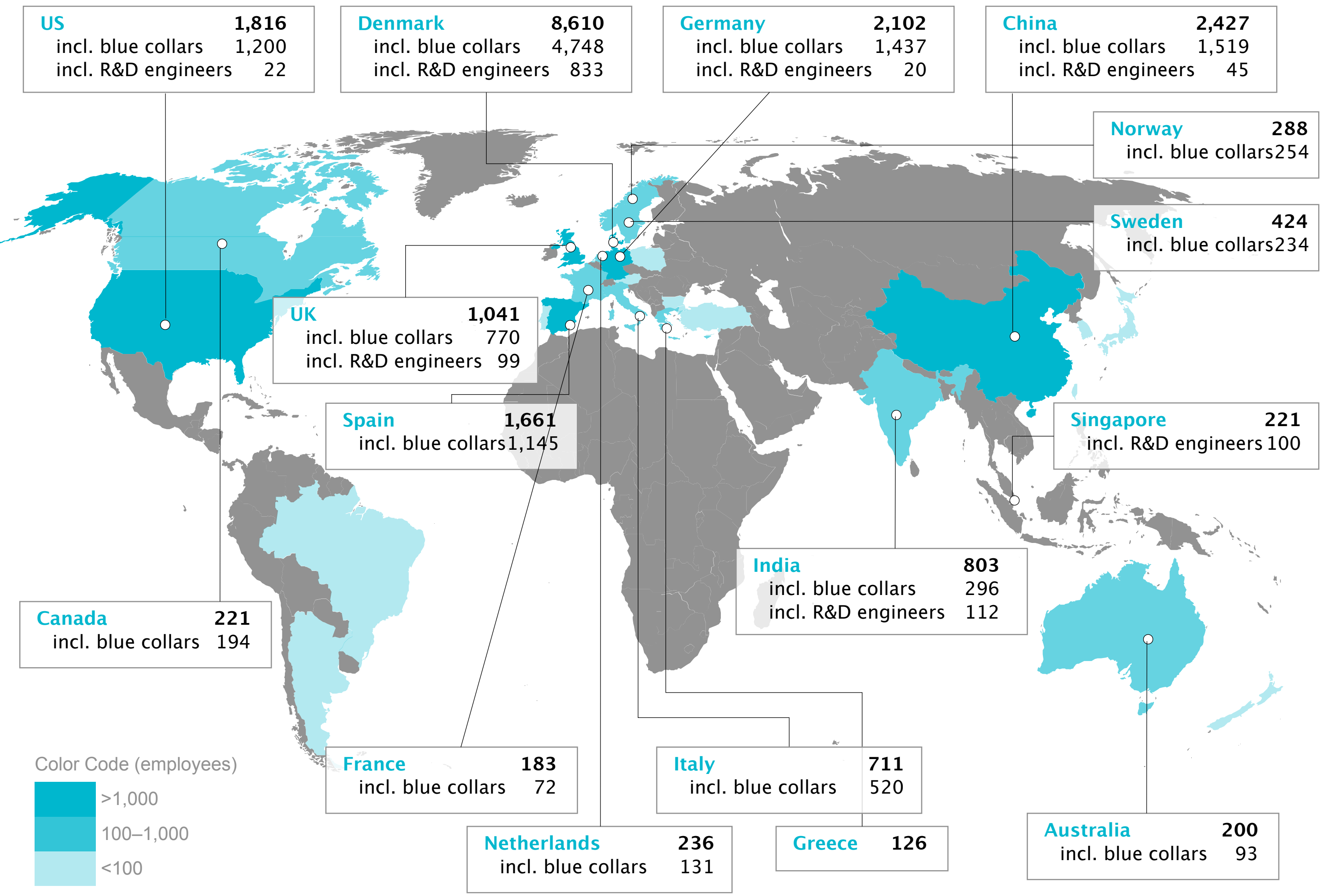
Wind creates many new, local jobs per MWh

Average employment for wind and non-renewable energy technologies, normalized to the amount of energy produced



Source: Engel; Kammen (2009)

Vestas’ contribution to Green Jobs Worldwide

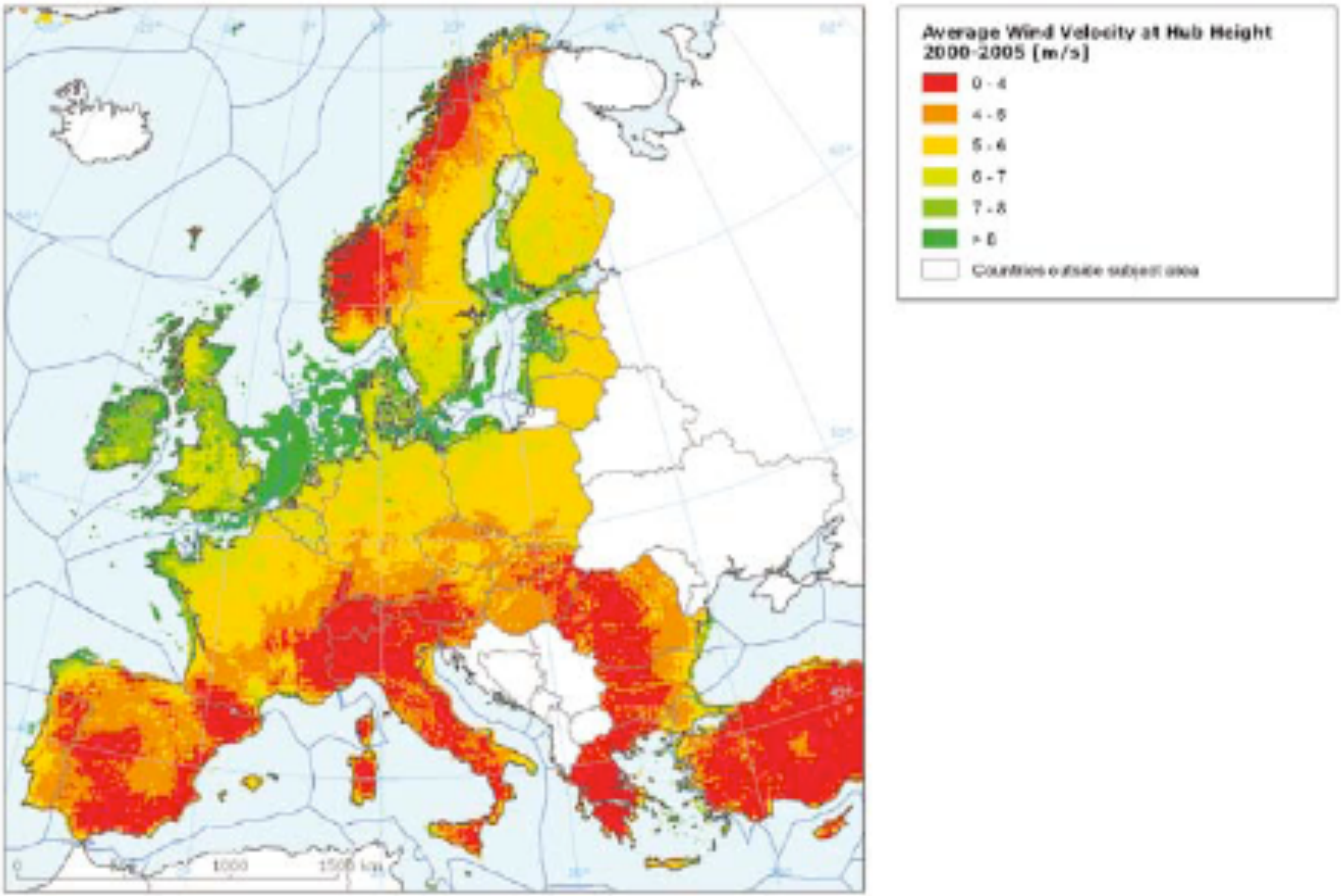


Country	Employee
Denmark	8,610
China	2,445
Germany	2,102
USA	1,816
Spain	1,661
UK	1,041
India	803
Italy	711
Sweden	424
Norway	288
Netherlands	236
Canada	221
Singapore	221
Australia	200
France	183
Greece	126
Portugal	82
Austria	82
Poland	59
Japan	51
New Zealand	43
Turkey	36
Argentina	26
South Korea	26
Bulgaria	18
Taiwan	10
Brazil	8
Total*	21,511

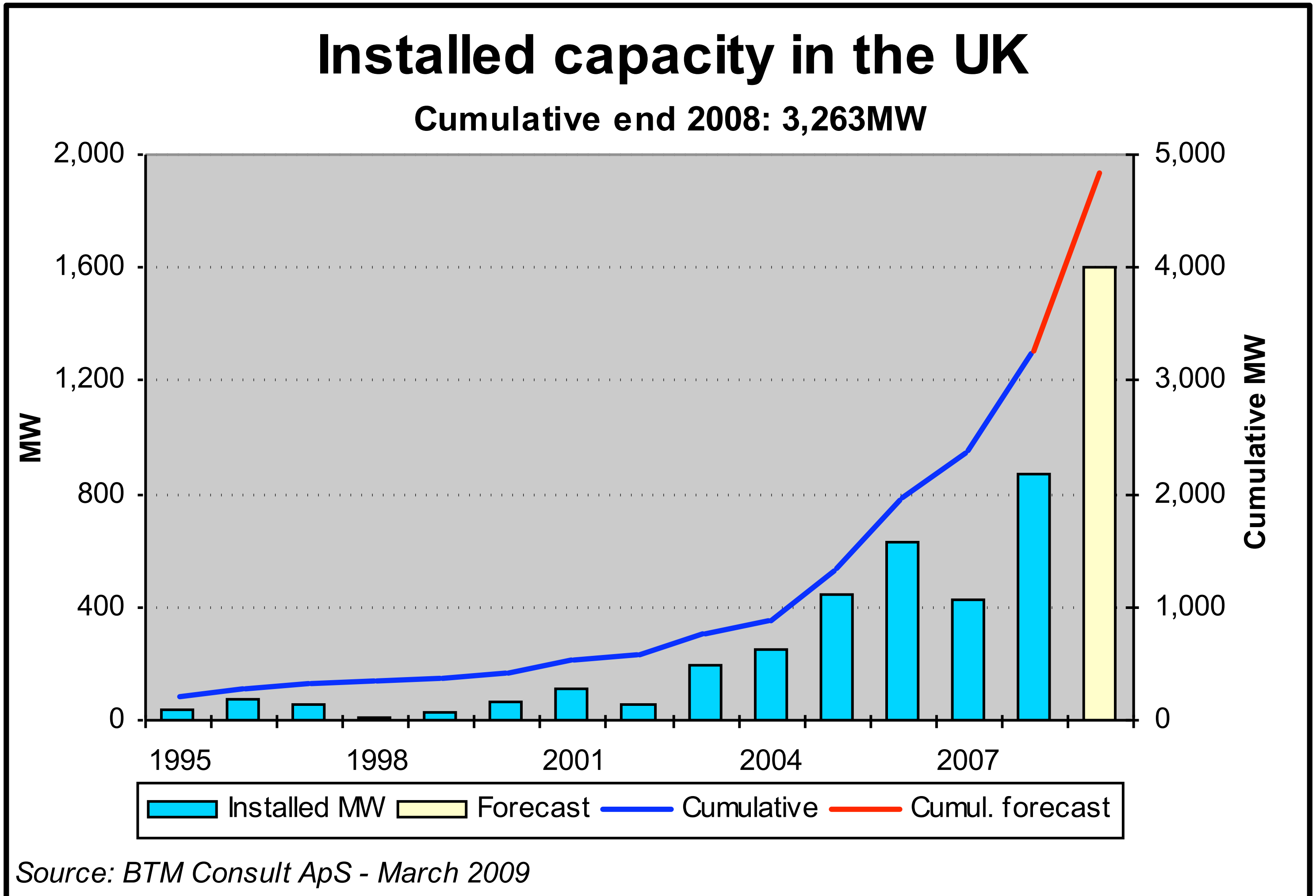
* Approximate figures as of June 2009

Some UK remarks

UK has one the World's best wind potential

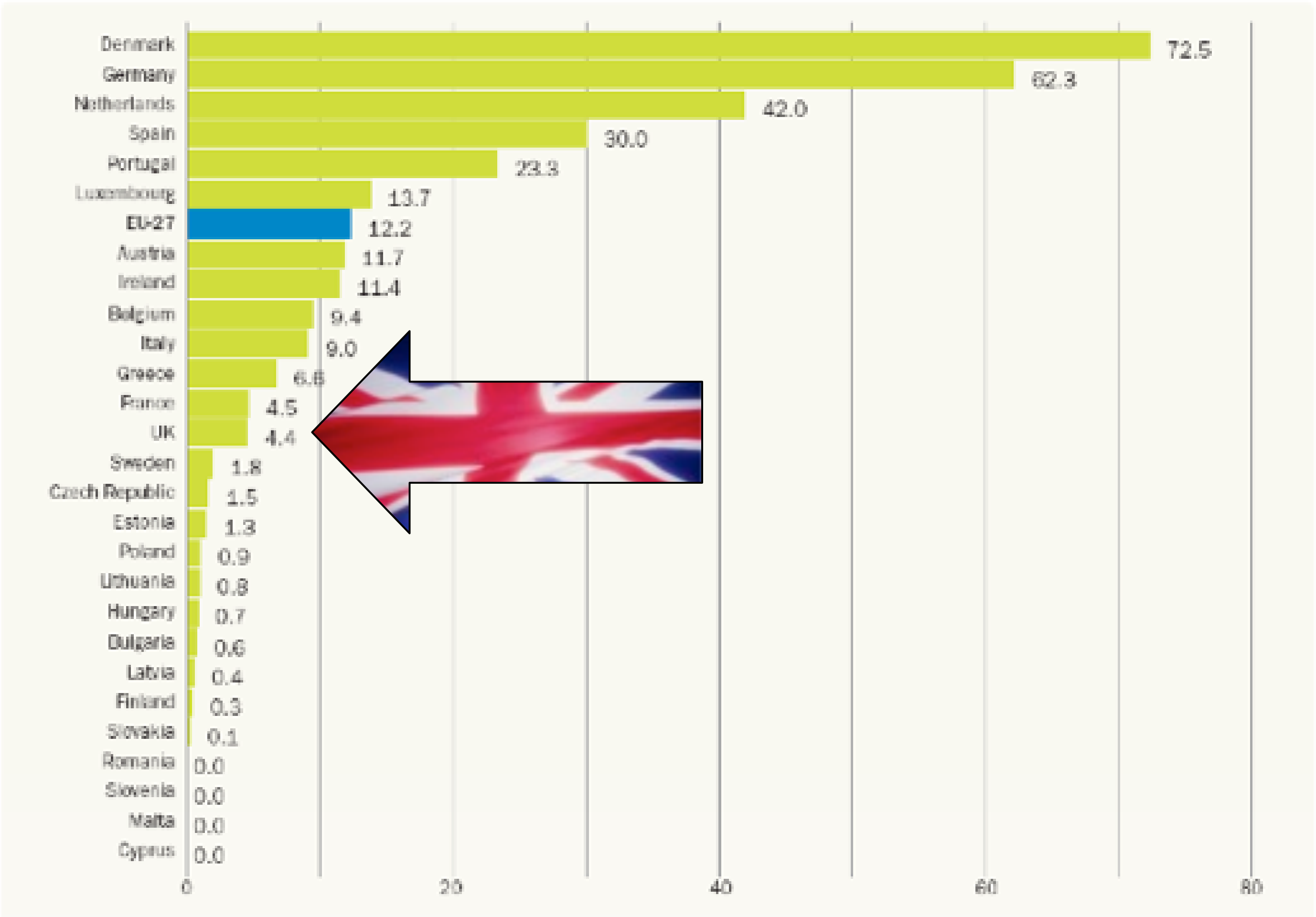


Disappointing market development in the UK so far



Onshore wind in the UK. Are we out of space?

FIG 2.12: Wind installation MW/1,000 km²



Numbers as of end 2007. Source: EWEA Pure Power, March 2008

Lately strong political support and attention in the UK

- Climate Change Act puts the UK at the forefront of international efforts
- UK RE strategy to meet 15% target. Presently only 2%
- 35-40% electricity generation from renewables by 2020
  - Bulk of this from wind
- 14 GW onshore / potentially 33 GW offshore
- UK - enormous, untapped wind potential

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Discrepancy between intensions and action ?

What is actually being delivered in the UK?

- 6 Energy Ministers and 5 Secretary of States in the last 5 years
- 33 UK Government consultations since last May
- Ca 200 Ofgem consultations since last May
- 4 years talking about grid access (still going)

What is getting in the way?

- We’re not moving towards the vision because we keep talking about it

Solution

- Halve the talk
- Double the delivery

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Focus areas for elimination of barrieres

Planning

- Renewable targets should be moved higher up the priority list at local level and included in performance indicators for Local Planning Authorities.
- Carrot / stick mechanisms needed for proposals that go beyond the 16 week planning approval period.
- Planning authorities and statutory consultees must be better trained and resourced.

Grid

- Government must accelerate back bone grid investments, maintaining onshore momentum by sorting out onshore grid issues, in particular Beauly Denny
- Grid reinforcement must be accelerated in parallel with connection dates.
- Granting further grid access will drive up constraint costs, so this issue must be dealt with.

Aviation

- Government should accelerate the development of technical mitigation solutions to the Radar/Aviation issue and financially back up the industry's initiative

Government should accelerate the process of how funding available under the Low carbon Investment Fund and other budget allocations will be deployed.

Realisation of EU <u>2020</u> targets is heavily dependent on implementing solutions to above. Ambitous trajectory targets need to be set to avoid backloading and bottleneck constraints occuring between 2016 - 2020

7 Actions to create a UK-based supply chain

1. Requirement for a stable and positive policy framework – including extension of RO

2. Government could appoint and support the development of a limited number of strategically ideal harbours for installation of offshore turbines

3. Support required to de-risk manufacturing investments

4. Continuous flow of projects required to encourage competition and prevent continued high price levels 'strangling' the market

5. Government strategy needed to increase availability and lower price of cables and vessels

6. Central Government should steer Regional Development Agencies to ramp up regional infrastructure. Must be coordinated.

7. Supply chain requires long-term business and regulatory certainty to

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Supergrid vision – with potential strong UK footprint/role

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Thank you for your attention

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