STATUS OF GLOBAL RENEWABLES DEPLOYMENT

The importance of conformity assessment

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Energy Breakfast Club
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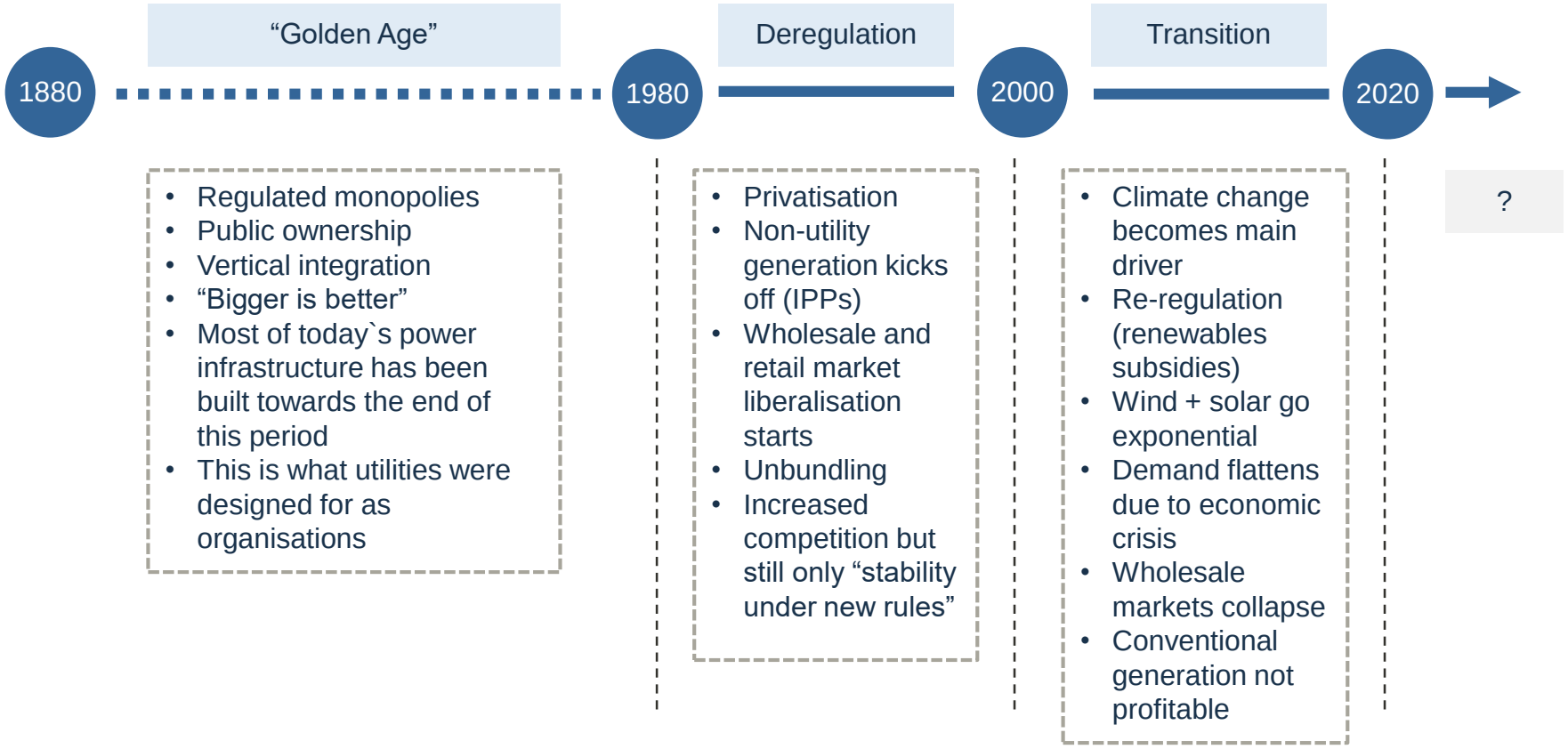
CONTENT

1. Global industry snapshot

GLOBAL INDUSTRY SNAPSHOT

A brief history

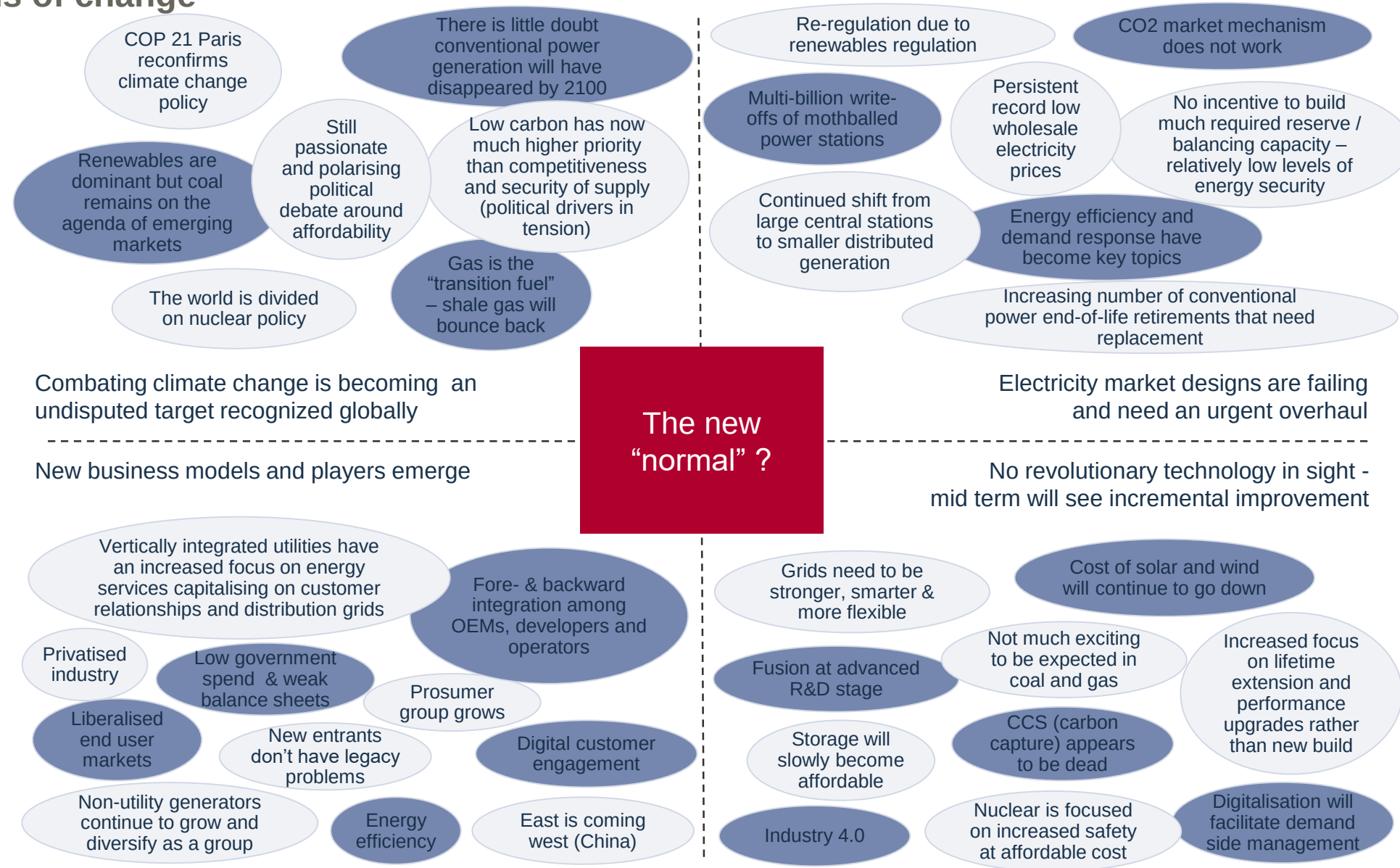
- The industry is in the midst of its most disruptive moment since the start of electrification



- Utilities have been struggling for some years now to find their place in the new market environment; new players with new business models are constantly emerging

GLOBAL INDUSTRY SNAPSHOT

The patterns of change



GLOBAL INDUSTRY SNAPSHOT

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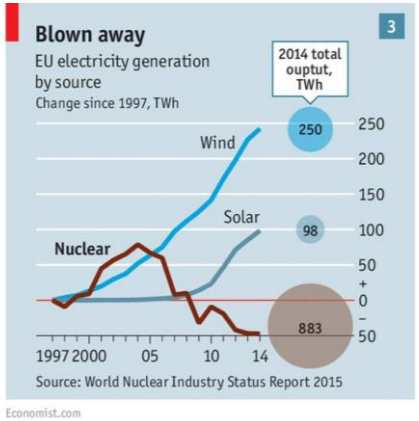
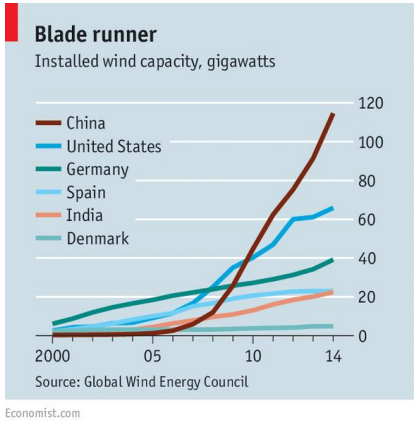
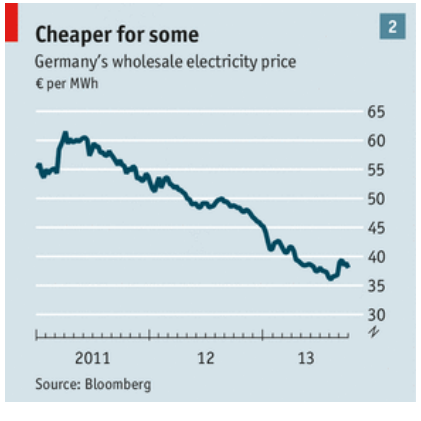
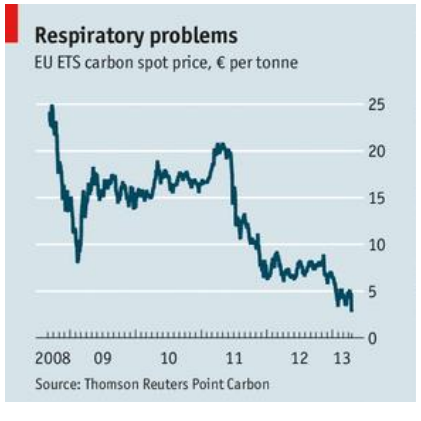








Combating climate change is becoming an Undisputed target recognized globally

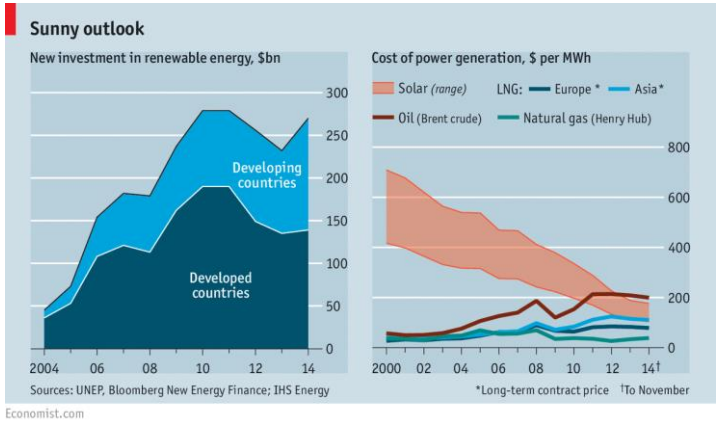
New business models and players emerge

The new "normal" ?

Electricity market designs are failing and need an urgent overhaul

No revolutionary technology in sight - mid term will see incremental improvement

IPPs
Intelligent customers
Smart
Decentral
Data
Developers
Cloud
Google et al
Efficiency



GLOBAL INDUSTRY SNAPSHOT

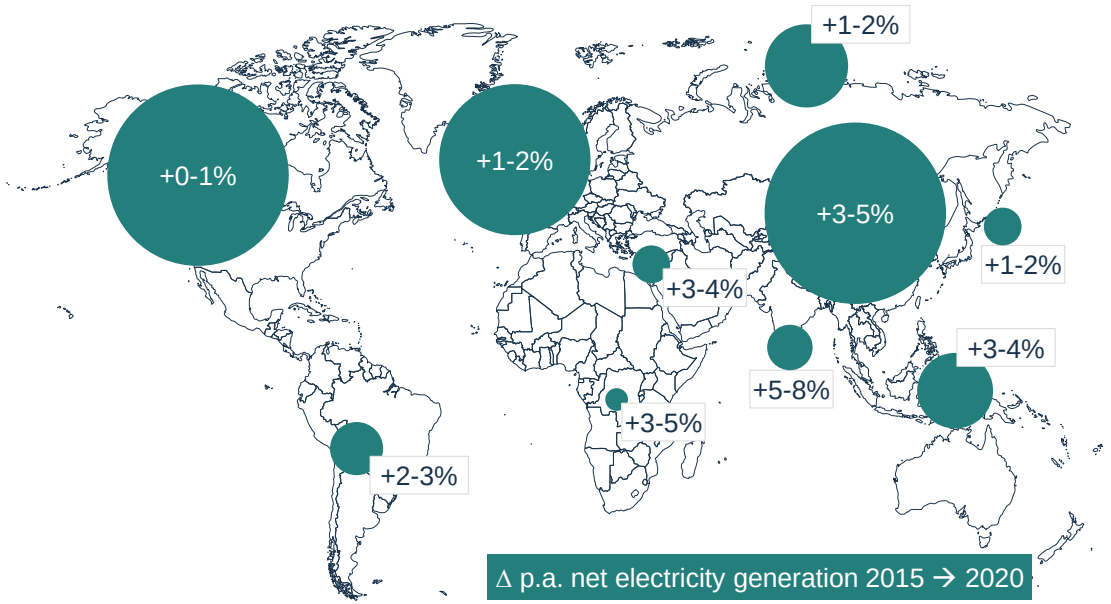
Still a lot of regional disparities in the global landscape….

EUROPE:
- *Acute market failure*
- *Renewables dominant*
- *Conventional virtually dead*

RUSSIA, CIS & TURKEY:
- *Gas/coal heavy, some hydro*
- *Nuclear export campaign*

JAPAN:
- *Driven by Fukushima*
- *Policy debate - coal, LNG & renewables?*

NORTH AMERICA:
- *Better than Europe with private investment*
- *Renewables have significantly gained momentum*



CHINA:
- *Biggest investor in coal in last decade*
- *Now on dual track policy with focus on renewables*
- *Going global*

SOUTH AMERICA:
- *Very strong in hydro*
- *Renewables gaining momentum*
- *Again more private investment – targeted by China*

INDIA:
- *Coal - centric*
- *The next China?*

SUB SAHARA AFRICA:
- *Lately increased investor focus*
- *Broad technology/policy mix*
- *Targeted by China*

MIDDLE EAST / NORTH AFRICA:
- *Government dominated*
- *Gas/oil heavy, big hopes on renewables*

(OTHER) ASIA PACIFIC:
- *Heavy positions in coal/gas*
- *Diverse in ownership & business models*

GLOBAL INDUSTRY SNAPSHOT

… although there are some macro-trends

1. *Disruptive changes in the energy mix*

- The world has set itself up for phasing out fossils by 2100
- Political consensus after Paris COP 21
- Renewables have already gone exponential
- Gas will grow, Coal will lose momentum, nuclear remains flat

2. *Non-OECD takes the lead*

- Most of new power generation will be added in non-OECD countries
- Emerging markets will be the primary drivers on nuclear and coal
- They will however also lead on wind and solar

3. *Market re-design*

- The incentive system will be corrected to channel funds into desired policy outcomes
- Carbon markets will be revived
- Less regulation, more market

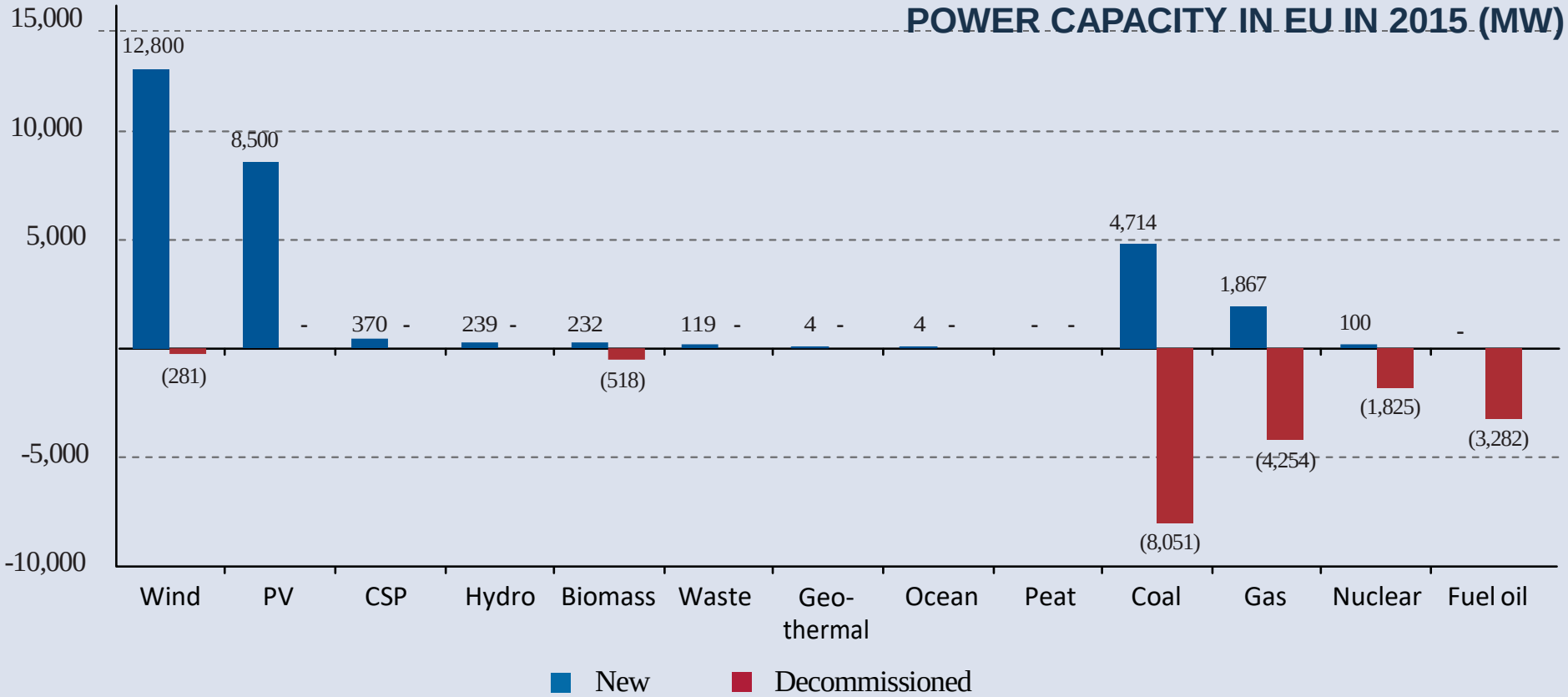
4. *Changing patterns of market players*

- The character and purpose of utilities will change significantly
- New players and new business models will be in place

2. Renewables in Europe

RENEWABLES IN EUROPE

Not any more so much the center of gravity for CAPEX as it used to be …..



Source: Wind in Power – 2015 European Statistics (EWEA)

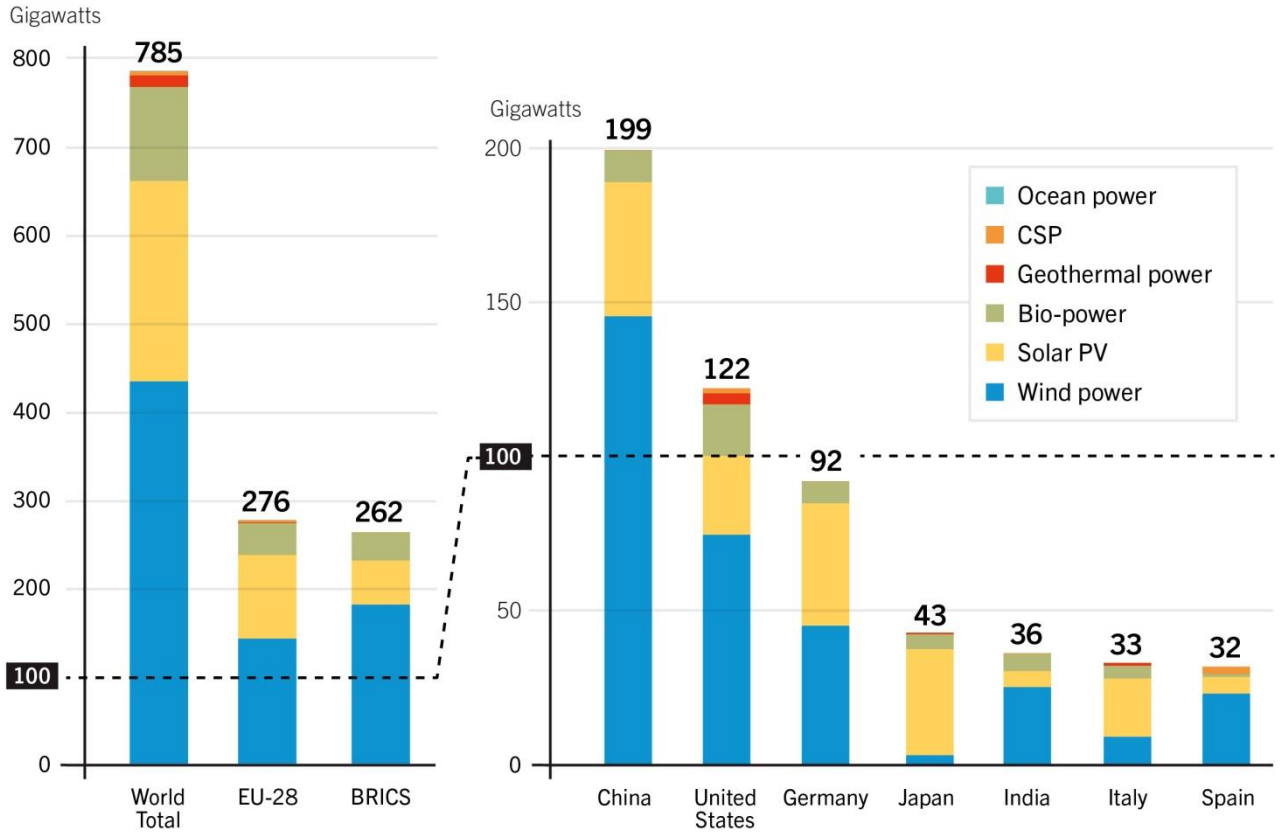
Wind Global TOP 6:

- China: 30.7 GW
- US: 8.5 GW
- Germany: 6.0 GW
- Brazil: 2.8 GW
- India: 2.6 GW
- Canada: 1.5 GW

- The renewables industry is increasingly focusing on outside Europe in terms of new installed capacity
- Not much happens outside Wind and PV

RENEWABLES IN EUROPE

…. but certainly still at the forefront of taking renewables deployment to the next stage



Note: The five BRICS countries are Brazil, the Russian Federation, India, China and South Africa.
Not including hydropower.

REN21 *Renewables 2016 Global Status Report*

Europe remains with the biggest problems to be solved and will act as a blue print for the rest of the world:

- Market failure most acute: a re-design will happen with again more market, less subsidies (CO2-revival?)
- Significant investment in grid infrastructure is necessary – digitalisation will have strong impact (Utility 4.0)
- Aging fleet: the majority of installed wind turbines will get to end of design life within the next years
- Changes in the O&M supply chain pending – what will be the future role of OEMs?

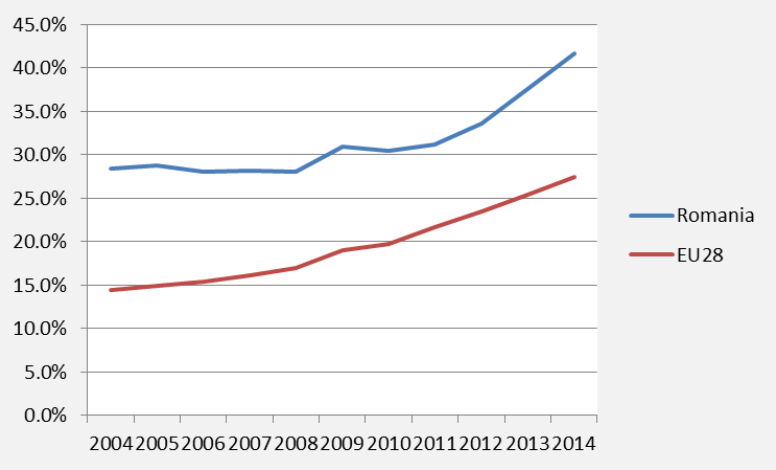
3. What does it mean for Romania?

WHAT DOES IT MEAN FOR ROMANIA?

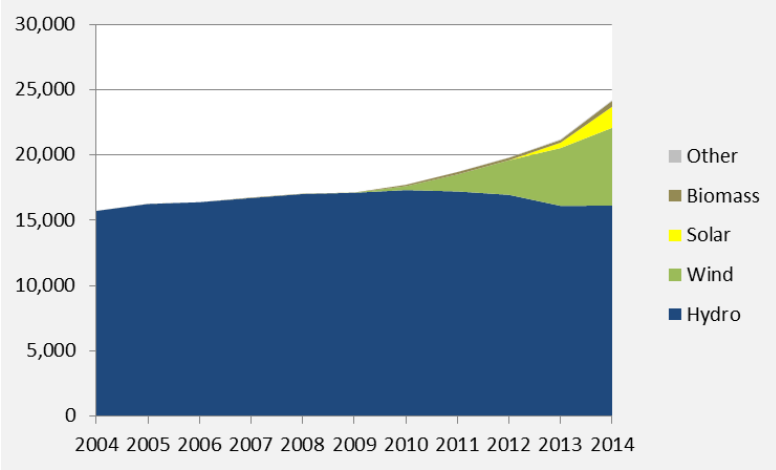
Not a great time for the industry? Or only a fair adjustment to past failures in law making?

INSTALLED CAPACITY [GW]	2013	2014	2015
Wind	2.8	3.2	3.1
Solar	1.3	1.0	1.3
Hydro	0.6	0.5	0.6
Biomass	0.1	0.1	0.1

Projects receiving Green Certificates. Source: Transelectrica



Renewables in Total Electricty Generation [%]



Total installed renewables capacity [MW]

The industry had a great boom in 2010 to 2013

- A record 3 GW of wind farms were put in place in very little time
- >6bn EUR of investment

The industry has been struggling since then:

- Unclear legislation and policy making
- Ex post facto law making
- Lack of predictability

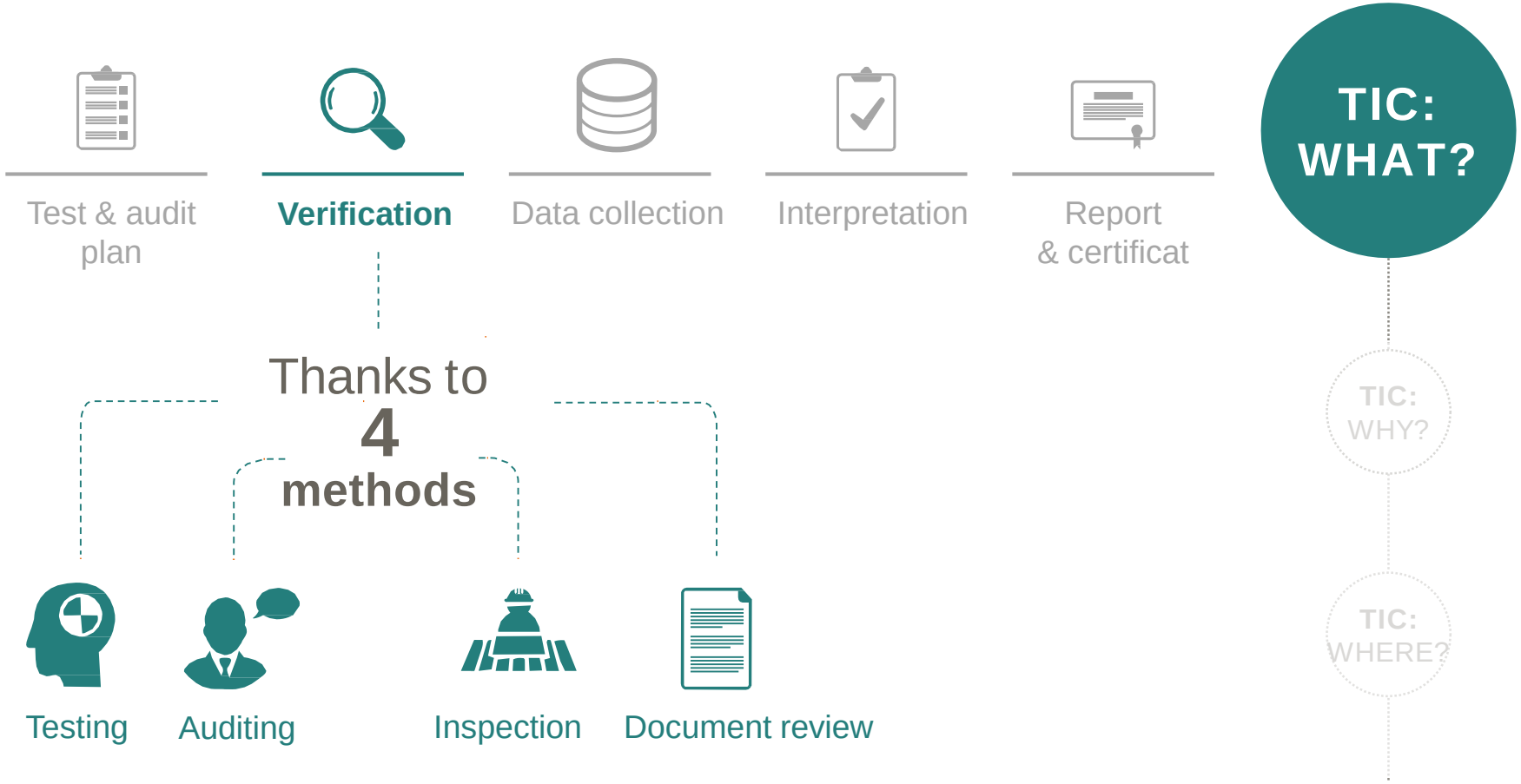
→ Some of the investments made face bankruptcy

→ New investment practically came to a total halt

4. The importance of conformity assessment

THE IMPORTANCE OF CONFORMITY ASSESSMENT

Facilitation of trade and reduction of transaction cost



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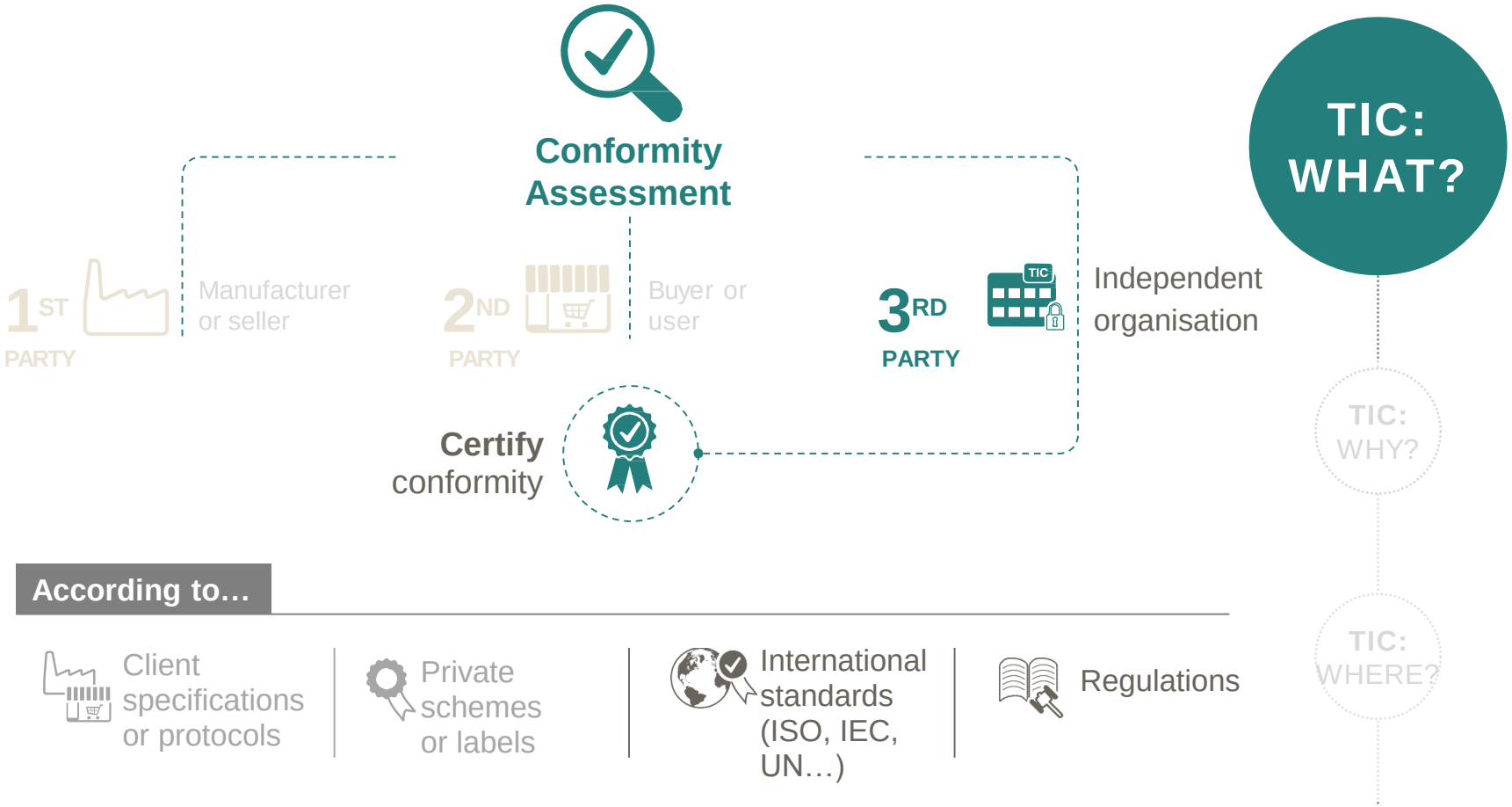

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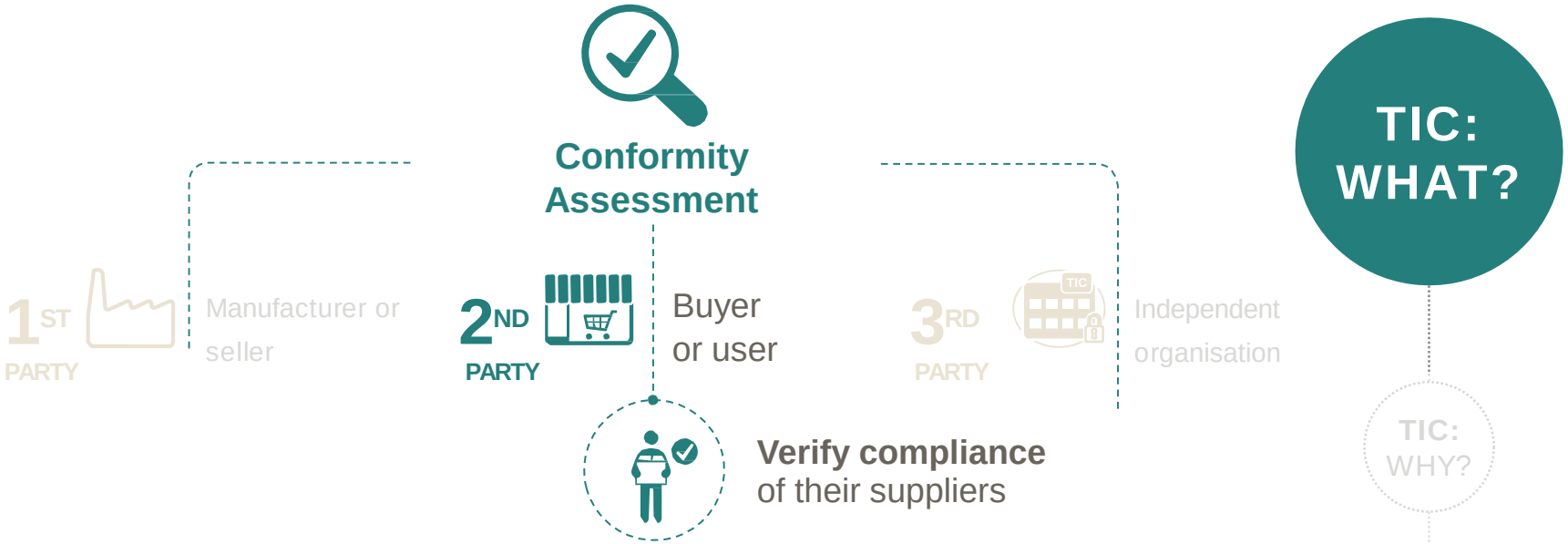

According to…

- Client specifications or protocols
- Private schemes or labels
- International standards (ISO, IEC, UN…)
- Regulations

TIC: WHAT?

TIC: WHY?

TIC: WHERE?

THE IMPORTANCE OF CONFORMITY ASSESSMENT

Facilitation of trade and reduction of transaction cost

Conformity Assessment

1ST PARTY — Manufacturer or seller

2ND PARTY — Buyer or user

3RD PARTY — Independent organisation

Verify compliance of their products, assets, and system

According to…

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TIC: WHAT?

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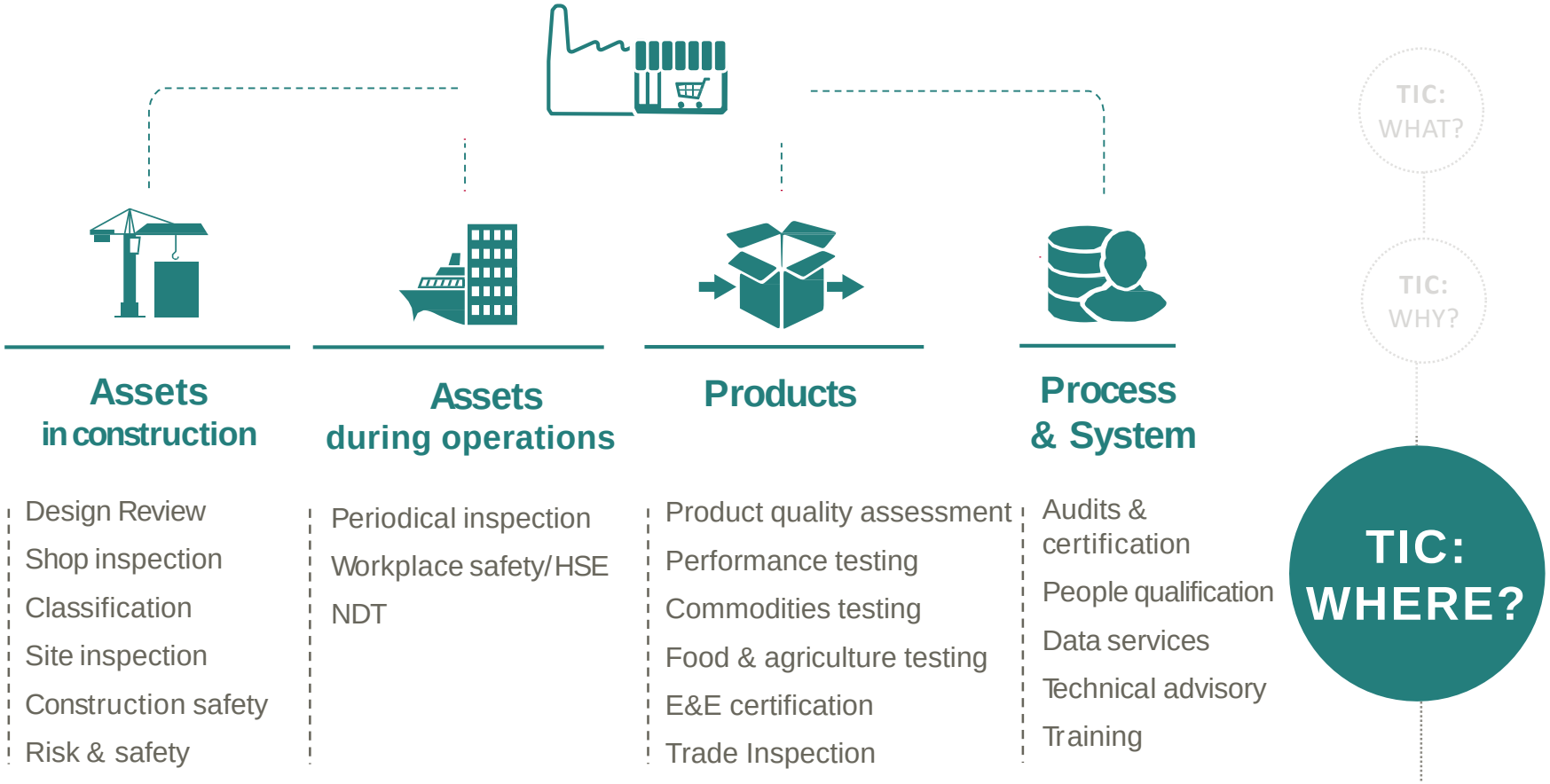

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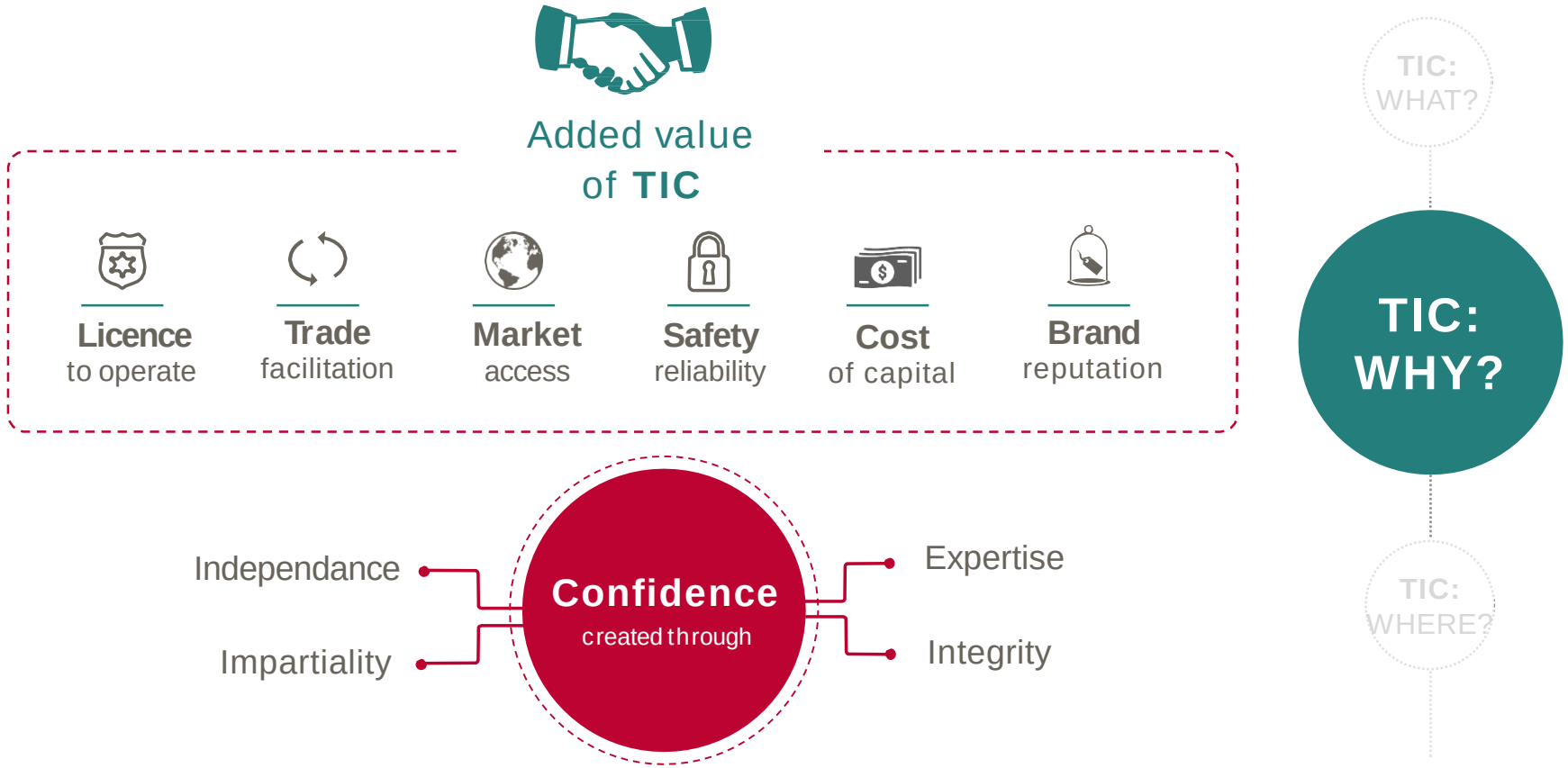


THE IMPORTANCE OF CONFORMITY ASSESSMENT

Facilitation of trade and reduction of transaction cost

1. *Product manufacturing & procurement*	Access to a global, but reliable supply chain	► Supplier technical assessment ► 2nd / 3rd party inspections ► Expediting ► Product & system certification
2. *EPC delivery & system integration*	Keep quality at spec, cost to budget & time to schedule	► Design review ► On site QA/QC, HSE, Construction Mgt. ► Commissioning support
3. *Installed product maintenance*	Shorten outage time	► Risk based inspections ► On site QA/QC, HSE, Outage Mgt. ► Sub contractor technical assessment
4. *Installed product optimisation*	Extend the life time Improve performance Ensure availability	► Asset integrity management ► Condition monitoring ► Remaining life assessment

THE IMPORTANCE OF CONFORMITY ASSESSMENT

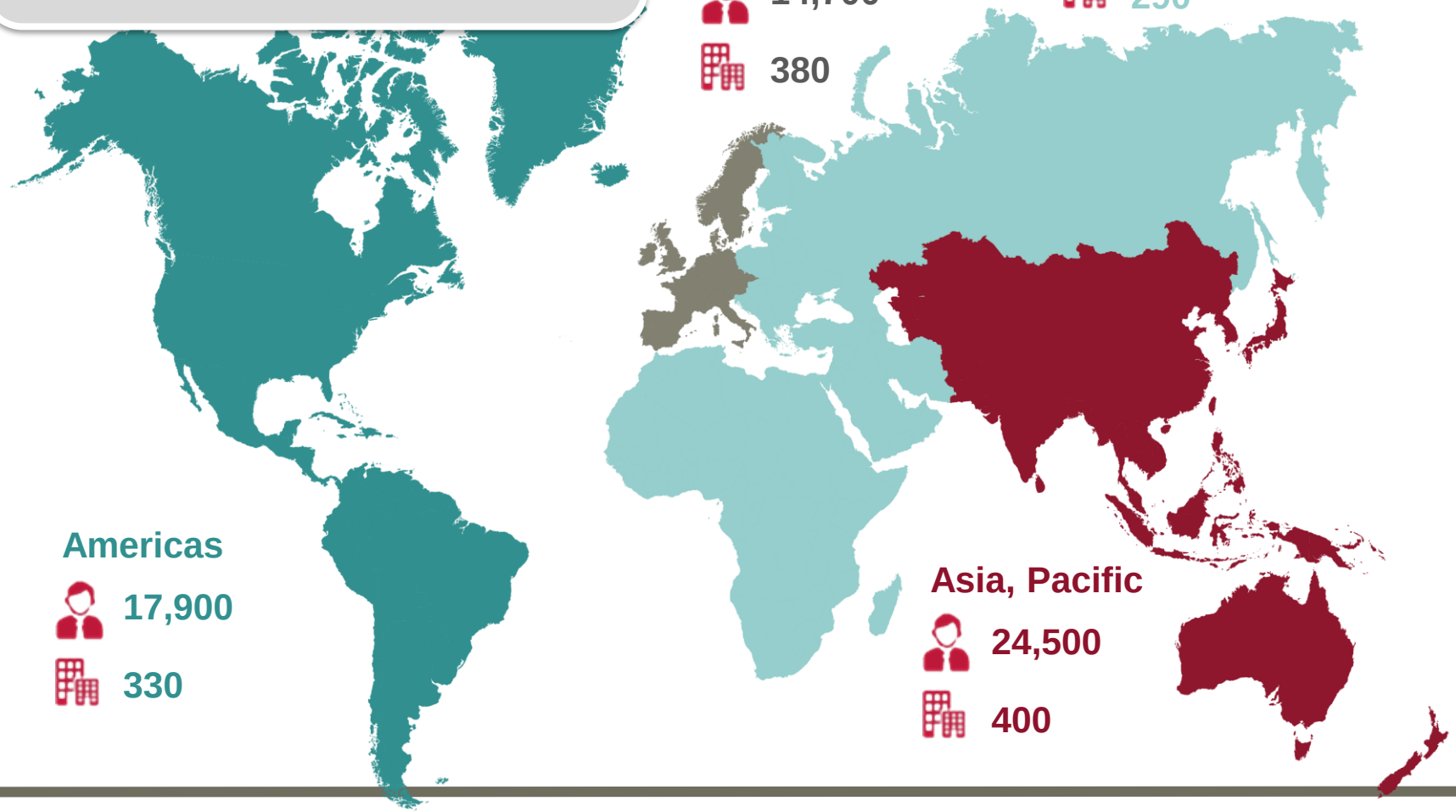
Bureau Veritas at a glance

- Testing
- Inspection
- Certification
- Technical assistance

- Conventional Power
- Renewables
- T&D

66,000 employees

1,400 offices and laboratories in **140** countries



Move Forward with Confidence