



Human Capital for Green Economies

The case of Enel Green Power

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Human capital needs and development for green economies

1. Skills for green efficiency
2. Hypothesis
3. The case of Enel Green Power
4. Conclusions

1. Skills for green efficiency

- “Job churn” effect → change in skill needs
- New skills for new jobs (economic rationale)
- Definitions across:
 - Time: Traditional (OECD) vs. New (CEDEFOP)
 - Content: Technical vs. Transversal/Soft
 - Levels: bipolarization (EU) vs. middle skills (USA)
 - Sectors (how are green jobs defined?)

2. Hypothesis

Green efficiency scenario

Human capital
needs and development

Consumerism

Climate change



Late
consumerism

Sustainability



Green
Efficiency
(unknown potential)

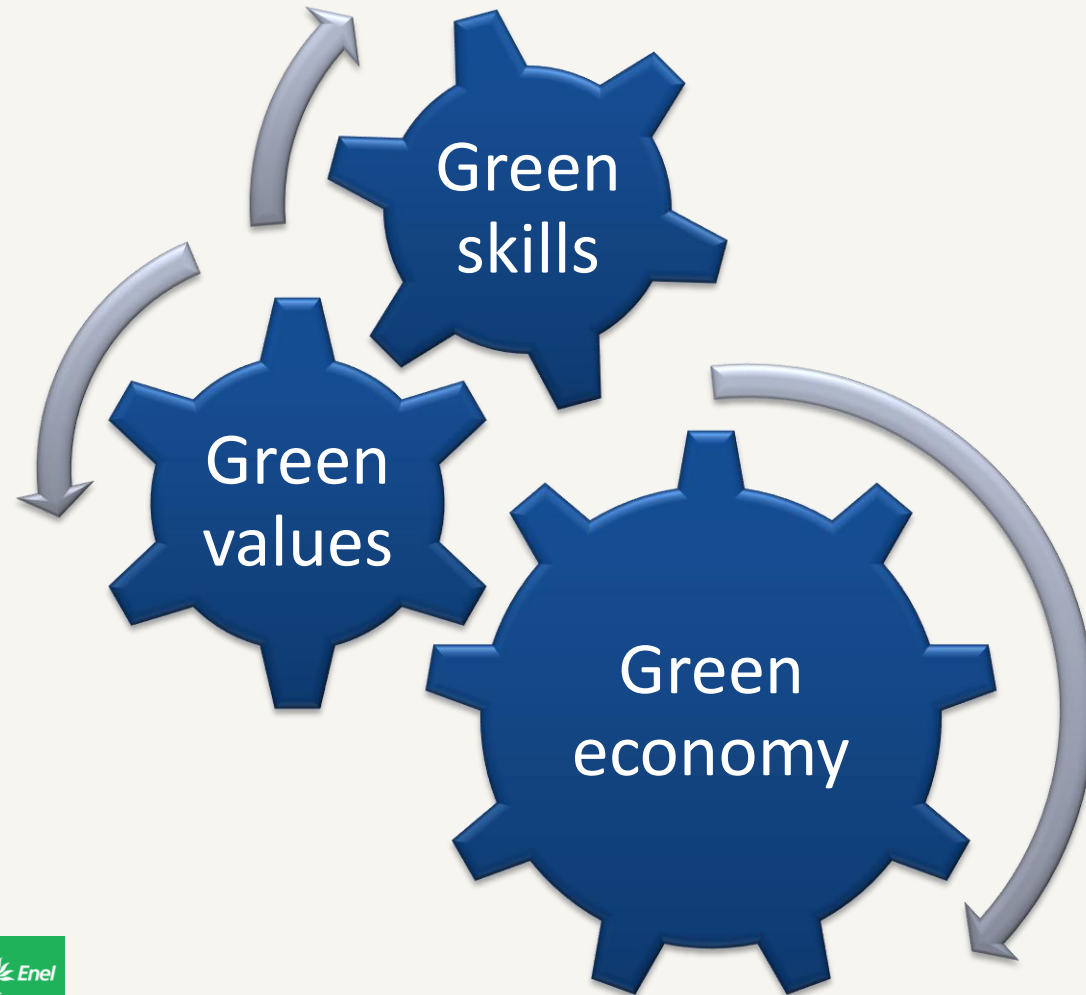


A possible road map
for sustainability

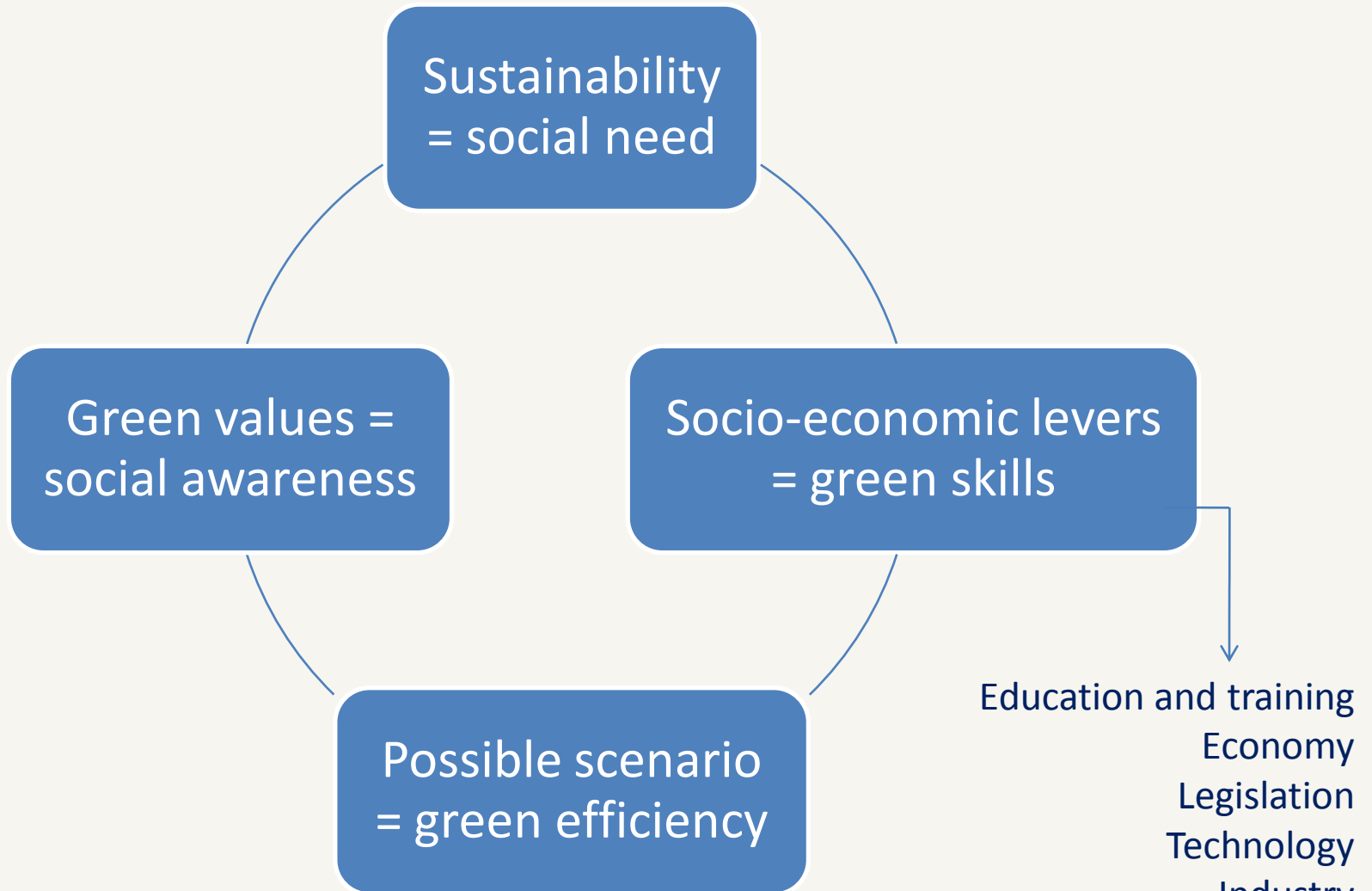


2. Hypothesis

Triggering green economy



2. Hypothesis



3. The case of Enel Green Power

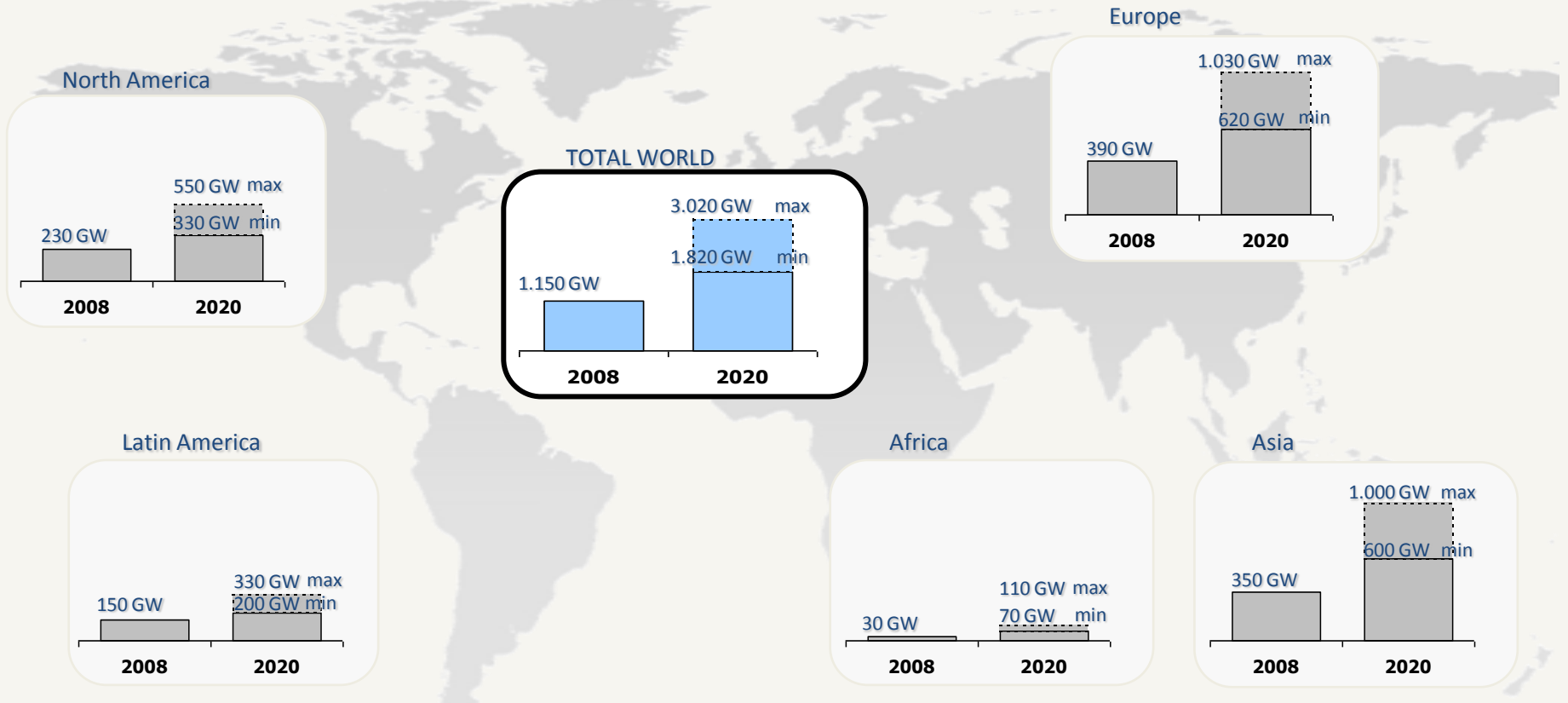
How to concretely measure human capital effectiveness in a renewable energy company?

- Analysis of the industry and definition of the main business drivers.
- Analysis of the value chain.
- Proposal of a measurement model (EVA).
- Overview of EBPM tools.

3. The case of Enel Green Power

Strong fundamentals for renewable energies in all geographies

Estimates of renewables installed capacity



- 700 – 1.900 GW of renewable capacity addition
- Growth in all geographies thanks to political and regulatory support



Source: Enel estimates based/WEO 2008/GWEC 2008 (2008); WEO 2008 Reference Scenario (2020 min); Industry reports/McKinsey (2020 max)

Strong fundamentals for renewable energies in all technologies

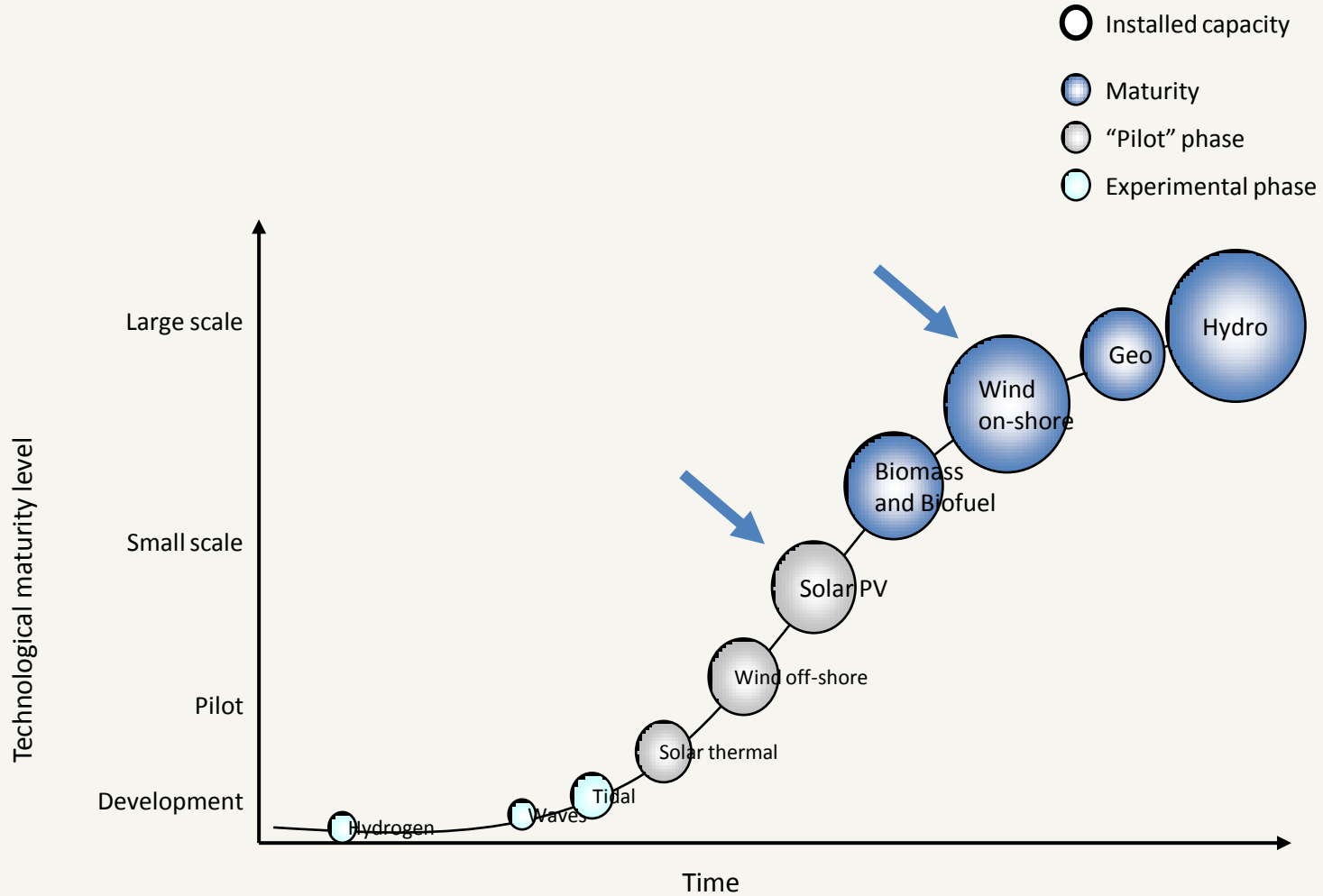
Technology	Global installed base 2008	Global installed base 2020	Δ capacity	CAGR	Technological maturity	
Hydro	960 GW	1.280 GW	+320 GW	2%	Very high	
Biomass	50 GW	470 GW	+420 GW	20%	Very high	
Geothermal	10 GW	30 GW	+20 GW	10%	High	
Wind	120 GW	800 GW	+680 GW	17%	High (on-shore) Low (off-shore)	
Solar	10 GW	440 GW	+430 GW	37%	Medium (c-SI)	} Solar PV
					Low (Thin Film)	
					Low	} Concentrated solar power
TOTAL	1.150 GW	3.020 GW	+1.870 GW	8%		

- Different growth rates and maturity stages
- All technologies have potential for major capacity additions



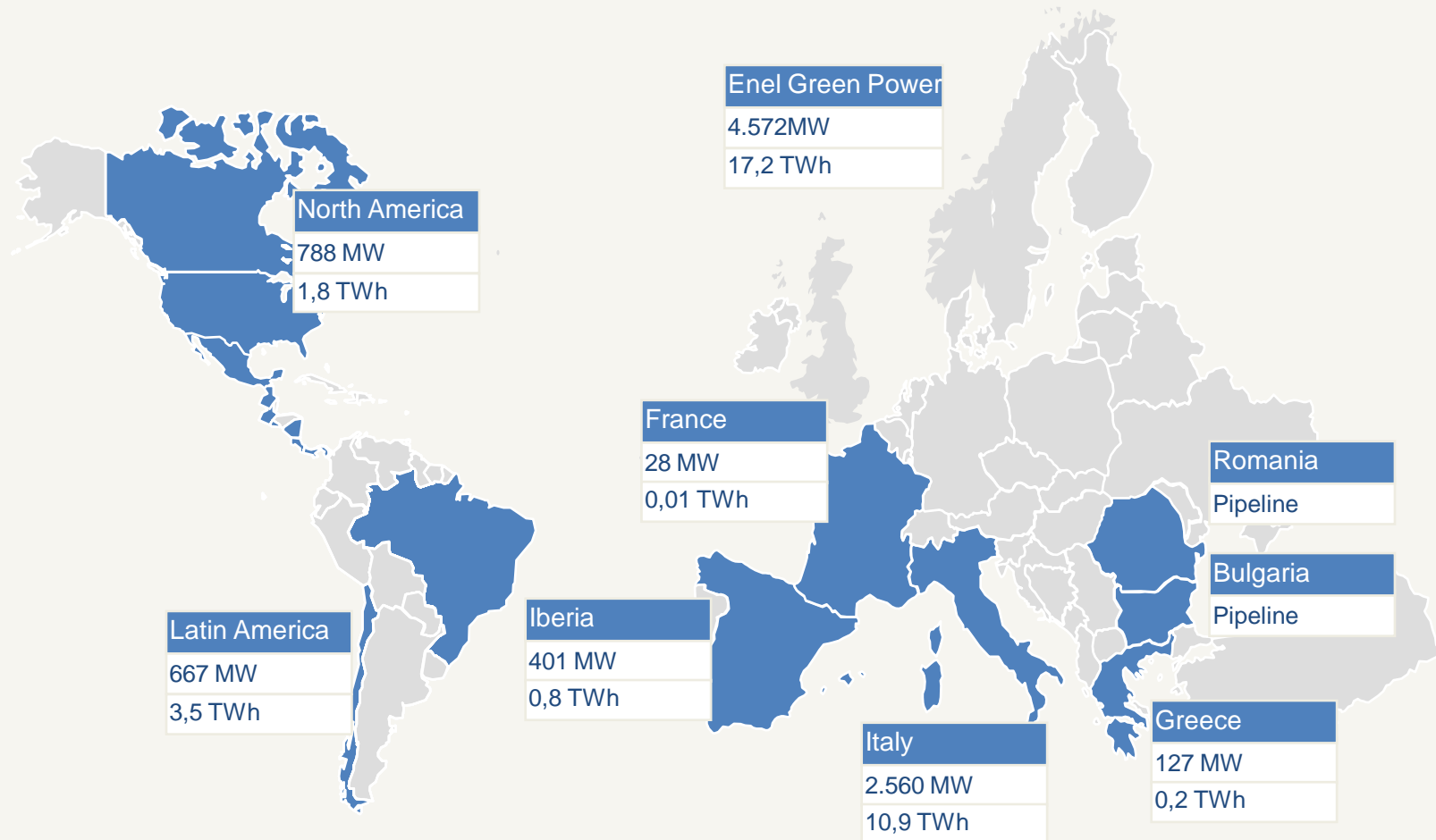
Source: Enel estimates based/WEO 2008/GWEC 2008 (2008); Industry reports/McKinsey (2020)

Maturity level of renewable technologies



Enel Green Power: large renewable player well positioned in growth geographies, 2009 – first half

EGP presence



Note: Endesa installed capacity is 1.026 MW (799 MW in Iberia and 227 MW in Latin America)

Enel Green Power is active in all four key technologies

Enel Green Power

Technology	Net installed capacity	Net production	Key areas
	2009 – 1 H	2008	
Hydro	2.504 MW	9,6 TWh	Italy – Iberia – Europe – North America – Latin America
Geothermal	712 MW	5,2 TWh	Italy – North America
Wind	1.304 MW	2,1 TWh	Italy – Iberia – Europe – North America – Latin America
Solar	4 MW	~0,0 TWh	Italy (retail and module manufacturing)
Biomass and other	48 MW	0,3 TWh	Iberia – North America
TOTAL	4.572 MW	17,2 TWh	



Leveraging on competencies

Hydro

2.5 GW installed globally

- Long lasting competencies
- Skills ranging from development to operation and maintenance
- Project pipeline in Italy and Latin America

Established competencies in development and O&M

Geothermal

0.7 GW installed globally

- Skills in development, exploration, engineering and construction, O&M
- Development of new projects in Latin America and North America

Fully integrated geothermal operator

Wind

1.2 GW installed globally

- Large pipeline, split among geographies to maximize optionality and return on investment
- Flexibility in turbines procurement, taking advantage of industry shake-up (overcapacity, cost reduction)

Well positioned to take advantage of sector shake-up

Solar PV

Strong position in the fast growing Italian market

- Leading retail network in Italy (Enel.si)
- Competence Centre (within R&D Division) in Italy
- Upstream integration into cell/module manufacturing (in progress)

Unique position in the solar PV value chain

Leveraging competencies across all geographies



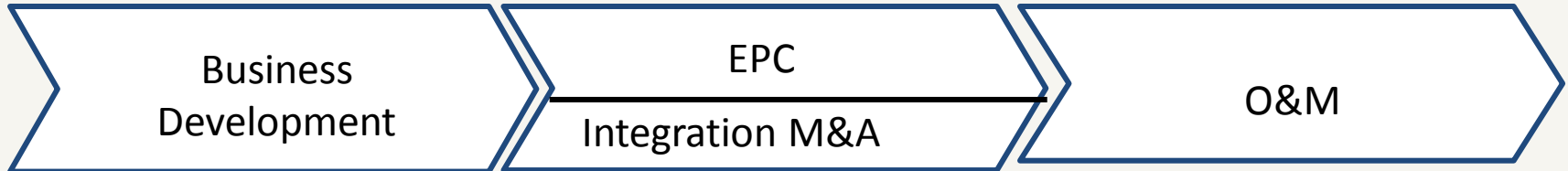
Renewable energies in the future...

	From	To
Cost Structure	<ul style="list-style-type: none">• Expensive	<ul style="list-style-type: none">• Competitive
Where in the world	<ul style="list-style-type: none">• Europe	<ul style="list-style-type: none">• World
Grid Access	<ul style="list-style-type: none">• Difficult	<ul style="list-style-type: none">• Easy/Smart
Accessibility	<ul style="list-style-type: none">• Utility• Developer	<ul style="list-style-type: none">• Utility• Consumer

A significant milestone was reached in 2008 when added power capacity from renewables in both the United States and the European Union exceeded added power capacity from conventional power (including gas, coal, oil, and nuclear)

Enel Green Power Value Chain and Development Model

Staff Functions: ICT, Communication, Corporate, AFC, Regulatory, Legal, HR, Audit, Procurement



- Project identification
 - Screening
 - Valuation
 - Permitting
 - Approval process
 - CapEx allocation
- Realization of approved projects
 - Integration of acquisitions
 - CapEx expenditure
- Plant operation
 - Production optimization
 - Continuous improvement
 - EBITDA generation

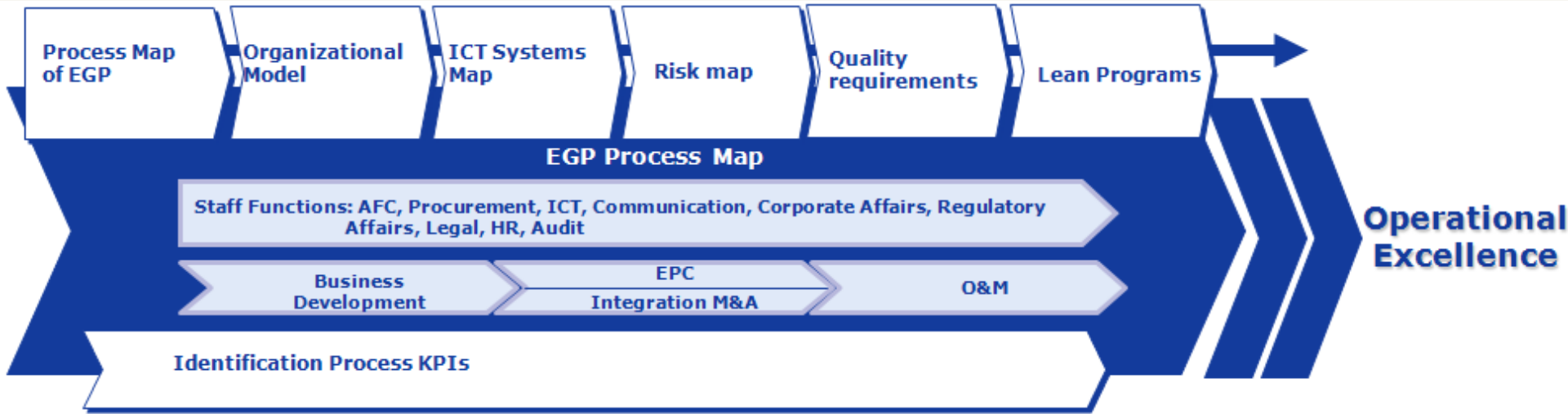
Industrial approach to value creation



Typical operational and strategic drivers in RES

- Investment selection (Geographical and Technological dimension)
- Development costs
- Cost and time delivery of equipments
- Cost, time and quality of E&C
- Electricity price and incentive
- Operational costs
- Useful life
- Load factor
- Efficiency (f.i. solar)
- Quality drivers (safety; environment; quality)

A path to Operational Excellence



The process map is the starting point for developing an integrated model for process optimization:

- organizational model
- ICT systems map
- risk map
- quality management
- KPIs related to the value chain
- Lean programs

Integrated
approach to
Operational
Excellence

Green jobs profiles in a RE company

Based on value chain business drivers and value creation, main profiles are:

- Business Developer
- Project Manager
- Procurement Manager/Buyer
- Plant Manager/Operation Manager/Maintenance Manager
- Staff functions: ICT, Communication, Corporate, AFC, Regulatory, Legal, HR, Audit

In the actual development phase of the industry following transversal skills are crucial:

- Develop adequate legislative frameworks
- Communicate effectively with local communities
- Develop economic-industrial capacities to develop and sell products
- Develop Innovation and R&D capabilities



Green awareness should be diffused and superior

4. Conclusions

- Our hypothesis seems to be confirmed: if those competences, which are crucial to create value along the value chain in RES, ground on green awareness, they are likely to support society in shifting towards green efficiency.
- Education and training are crucial for spreading such values.
- Green skills: something completely new ... to be developed all life long.

4. Conclusions

- Policy recommendations
 1. Holistic and strategic approach
 2. Integration between education and training and work
 3. Modernize vocational and general courses
 4. Role of social partners and other stakeholders
 5. Anticipating and forecasting skills gap
 6. Formal and informal learning
 7. Innovative work organization solutions

4. Conclusions

«at the end of the day, we can have the most dedicated teachers, the most supportive parents, and the best schools in the world – and none of it will matter unless all of you fulfill your responsibilities».

Barack Obama, Back to School Event, Arlington, Virginia, 8th September 2009, in Adapt newsletter, 2009, n. 25, www.adapt.it

Thank you
for your kind attention

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