

Human Capital for Green Economies The case of Enel Green Power

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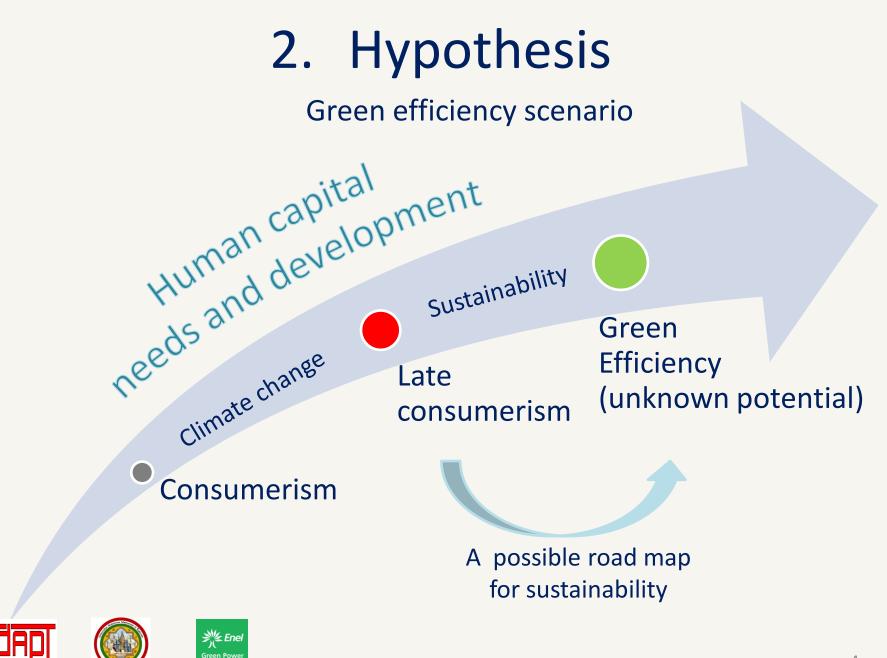
- 1. Skills for green efficiency
- 2. Hypothesis
- 3. The case of Enel Green Power
- 4. Conclusions



1. Skills for green efficiency

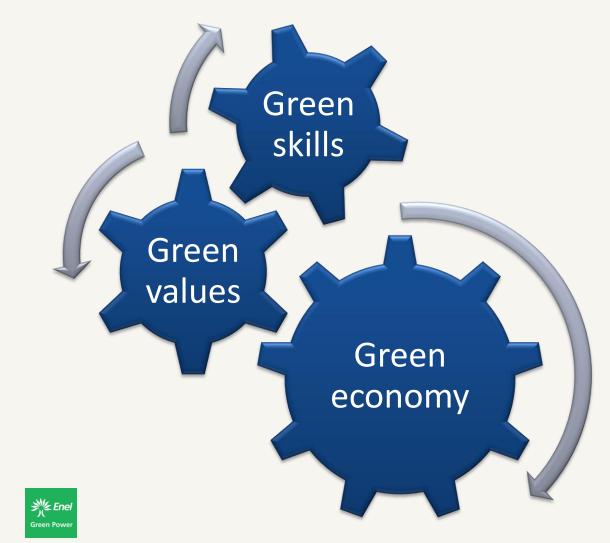
- "Job churn" effect \rightarrow change in skill needs
- New skills for new jobs (economic rationale)
- Definitions across:
 - Time: Traditional (OECD) vs. New (CEDEFOP)
 - Content: Technical vs. Transversal/Soft
 - Levels: bipolarization (EU) vs. middle skills (USA)
 - Sectors (how are green jobs defined?)





2. Hypothesis

Triggering green economy



2. Hypothesis

Sustainability = social need

> Socio-economic levers = green skills

Green values = social awareness

Education and training Economy Legislation Technology Industry

Possible scenario = green efficiency





3. The case of Enel Green Power

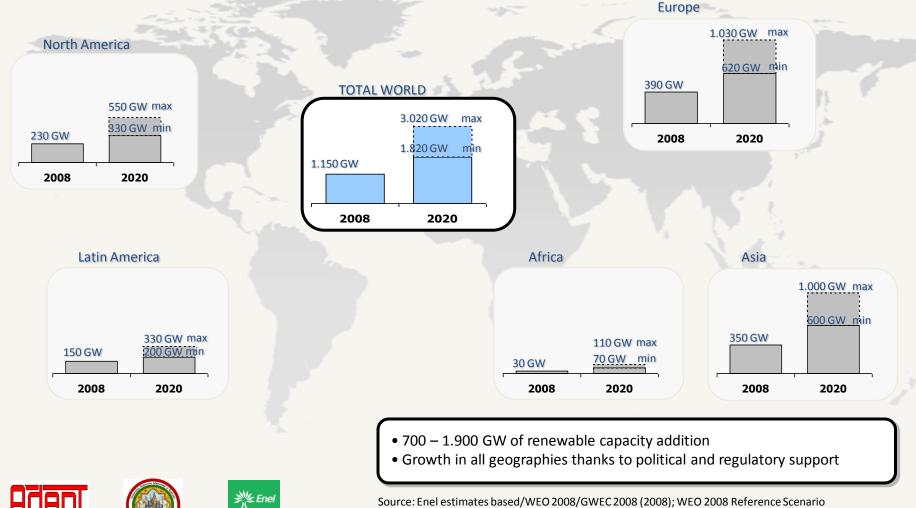
How to concretely measure human capital effectiveness in a renewable energy company?

- 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



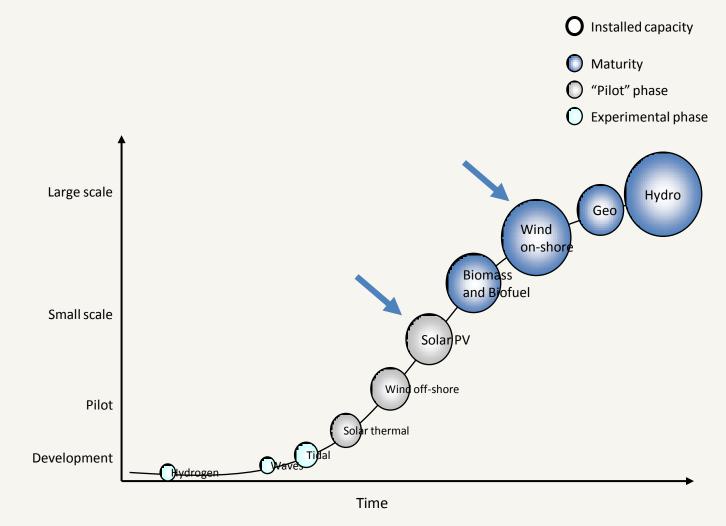
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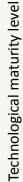
Source: Enel estimates based/WEO 2008/GWEC 2008 (2008); WEO 2008 Reference Scenario (2020 min); Industry reports/McKinsey (2020 max)

Strong fundamentals for renewable energies in all technologies

Technology	Global installed base	Global installed base	Δ capacity	CAGR	Technological mat	turity
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) Low (Thin Film) Low	<pre>Solar PV Concentrated solar power</pre>
TOTAL	1.150 GW	3.020 GW	+1.870 GW	8%		
 Different growth rates and maturity stages All technologies have potential for major capacity additional states and maturity stages 						
HORPI	Green Power	Sou	rce: Enel estimates based,	/WEO 2008/GWE0	C2008 (2008); Industry repor	ts/McKinsey (2020) 9

Maturity level of renewable technologies

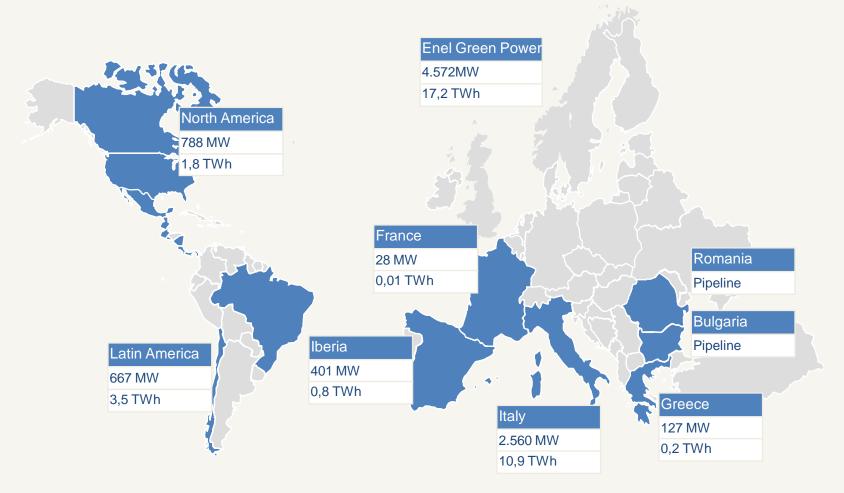








Enel Green Power: large renewable player well positioned in growth geographies, 2009 – first half







EGP presence

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	1.304MW	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

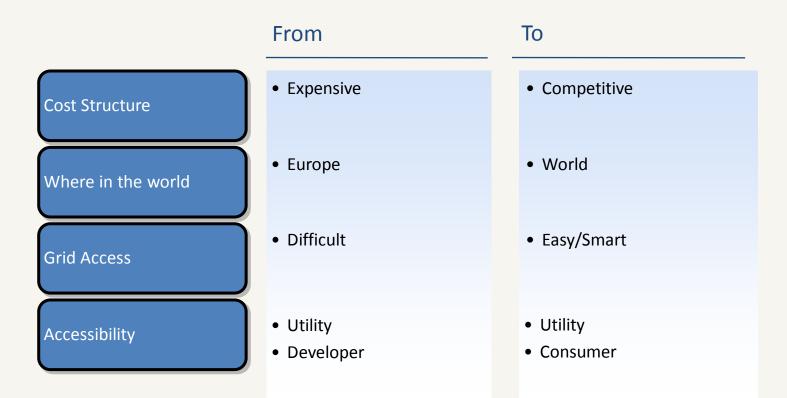
Hydro 2.5 GW installed globally	Geothermal 0.7 GW installed globally	Wind 1.2 GW installed globally	Solar PV Strong position in the fast growing Italian market
 Long lasting competencies Skills ranging from development to operation and maintenance Project pipeline in Italy and Latin America 	 Skills in development, exploration, engineering and construction, O&M Development of new projects in Latin America and North America 	 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) 	 Leading retail network in Italy (Enel.si) Competence Centre (within R&D Division) in Italy Upstream integration into cell/module manufacturing (in progress)
Established competencies in development and O&M	Fully integrated geothermal operator	Well positioned to take advantage of sector shake-up	Unique position in the solar PV value chain

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Leveraging competencies across all geographies

Renewable energies in the future...

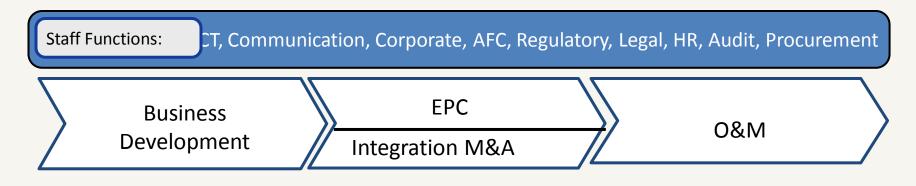


A significant milestone was reached in 2008 when added power capacity from renewables in both the United States and the European Union exceeded added power capacity from conventional power (including gas, coal, oil, and nuclear)





Enel Green Power Value Chain and Development Model



- 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

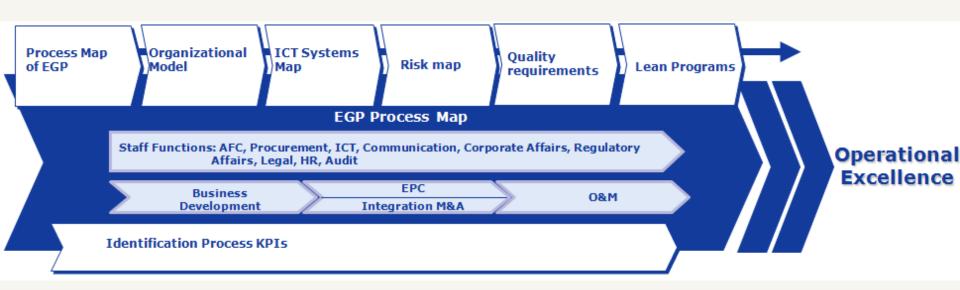
Industrial approach to value creation

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









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





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
 - 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, <u>www.adapt.it</u>





Thank you for your kind attention

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