

Alstom Renewable Power Analyst Day

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Nantes

28th February 2013

ALSTOM

Agenda

I. Renewable Power within Alstom

II. Renewable market

III. Financials

IV. Hydro

V. Wind

VI. New Energies

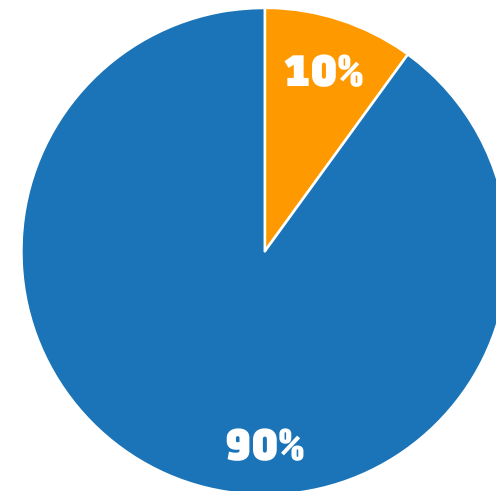
VII. Conclusion

Renewable Power Sector creation

- Sector created in July 2011
- Agile organisation with empowerment and leaner decision-making processes

Renewable Power Sales within Alstom Group

Renewable Power



Rest of Alstom

Renewable Power Sector organisation

ACTIVITY DESCRIPTION

HEADCOUNT



HYDRO

Comprehensive range of hydro power generation equipment and services

- Designs to services
- Small to large stations
- Run-of-river to pump storage
- Individual equipment to turnkey sites
- New and retrofit projects

~8,000



WIND

Integrated wind farm solutions

- System or key component design and manufacturing
- Assembly
- Installation
- Services

Onshore: 1,67-3 MW

Offshore: 6 MW

~1,300



NEW ENERGIES

3 activities

- Renewable Steam Plants offers fuel-tailored turnkey solutions for Solar CSP (with BrightSource Energy), Geothermal and Biomass
- Industrial steam turbines for the renewable energy markets
- Ocean (tidal and wave)

~200

Full spectrum of Renewable Energy technologies covered (excluding PV)

Synergies with Thermal Power and Grid

ALSTOM | THERMAL POWER

- Joint commercial network (Global Power Sales) with Renewable Power
- Hybrid generation technology offering combining solar with gas & coal plants (ISCC/Boost)
- Increased flexibility of product portfolio to incorporate intermittency of renewables on network (ex: GT 24/26 and KA 24/26 plants)
- Production of turbines for New Energies



ALSTOM | GRID

- HVDC solutions for Offshore Wind
- Smart grids to incorporate the intermittency of renewable power generation
- Power Conversion solutions with battery storage adapted to new modes of energy production and consumption
- Network Management Solutions to manage generation resources
- Inverters for solar & wind farms

Renewable Power strategy



Maintain leadership in Hydro

- Keep leading technological edge
- Seize growth opportunities in terms of geographies (i.e. Russia), markets (i.e. increase presence in Service/Rehabilitation market) and products (i.e. VarSpeed Pump Storage)
- Continue strong focus on cost competitiveness and performance (Quality, On-time delivery)



Grow Wind profitably

- Selectively grow in onshore where Alstom has assets/presence to leverage (i.e. Brazil with existing Hydro presence)
- Develop leadership position in offshore
- Reduce product platform cost



Capture medium term growth in New Energies

- Leverage partnership with BrightSource Energy in Solar CSP (Tower technology)
- Become a Tier 1 company in the field of marine energy

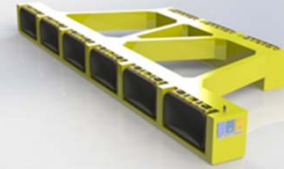
Recent footprint developments



GTC Opening in Sorel-Tracy



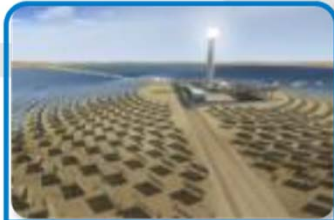
JV with SSE in Wave



Significant share in AWS



RusHydro JV



>20% in BrightSource



First stone St-Nazaire offshore Wind



Acquisition of TGL



Tianjin II The biggest Alstom factory in the World



Bahia nacelle assembly Unit in Brazil



GTC first stone in Taubaté



Service JV in Bhutan

Key recent commercial successes



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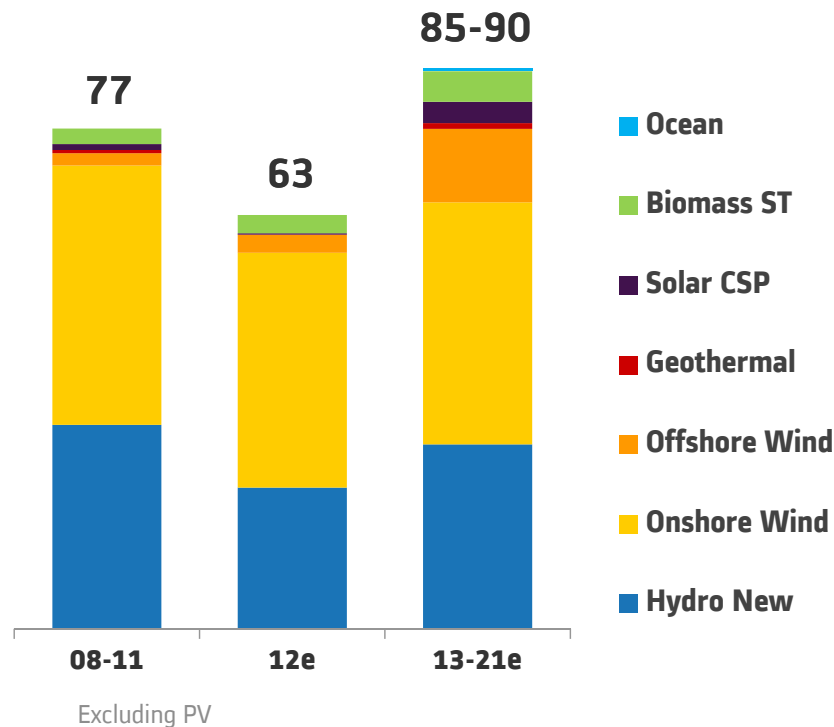
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Renewable Energy market by technology

[Avg. GW / year; 2008-2021]

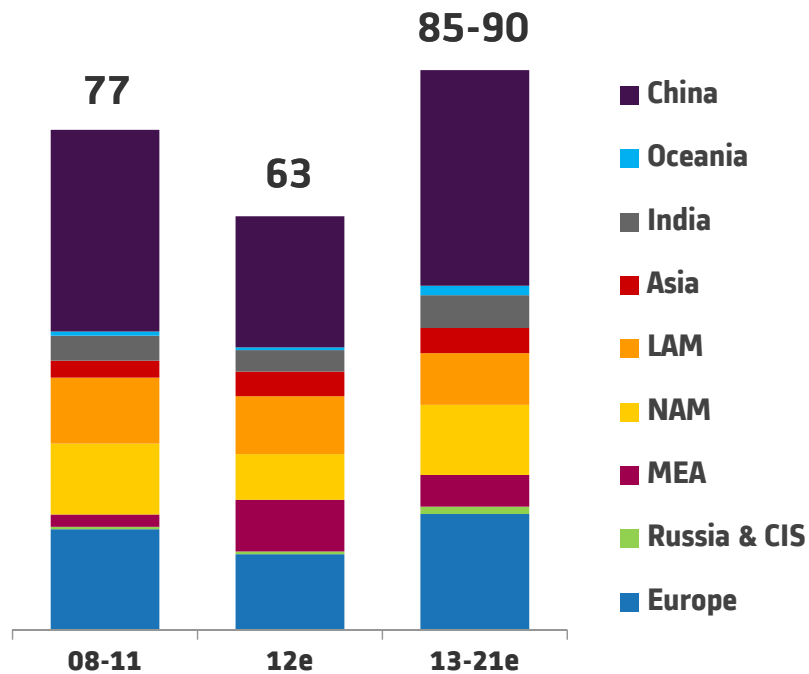


- Low point in 2012 but demand expected to rebound
- Hydro New overall stable, most of growth driven by ageing & growing Installed Base
- Wind onshore nearly stable, while offshore to grow strongly
- Solar CSP to triple, geothermal and biomass expected at least to double in the next decade
- Ocean market emerging

Renewable Energy market to be primarily driven by growth in Offshore Wind and Solar CSP

Renewable Energy market by geography

[Avg. GW / year; 2008-2021]



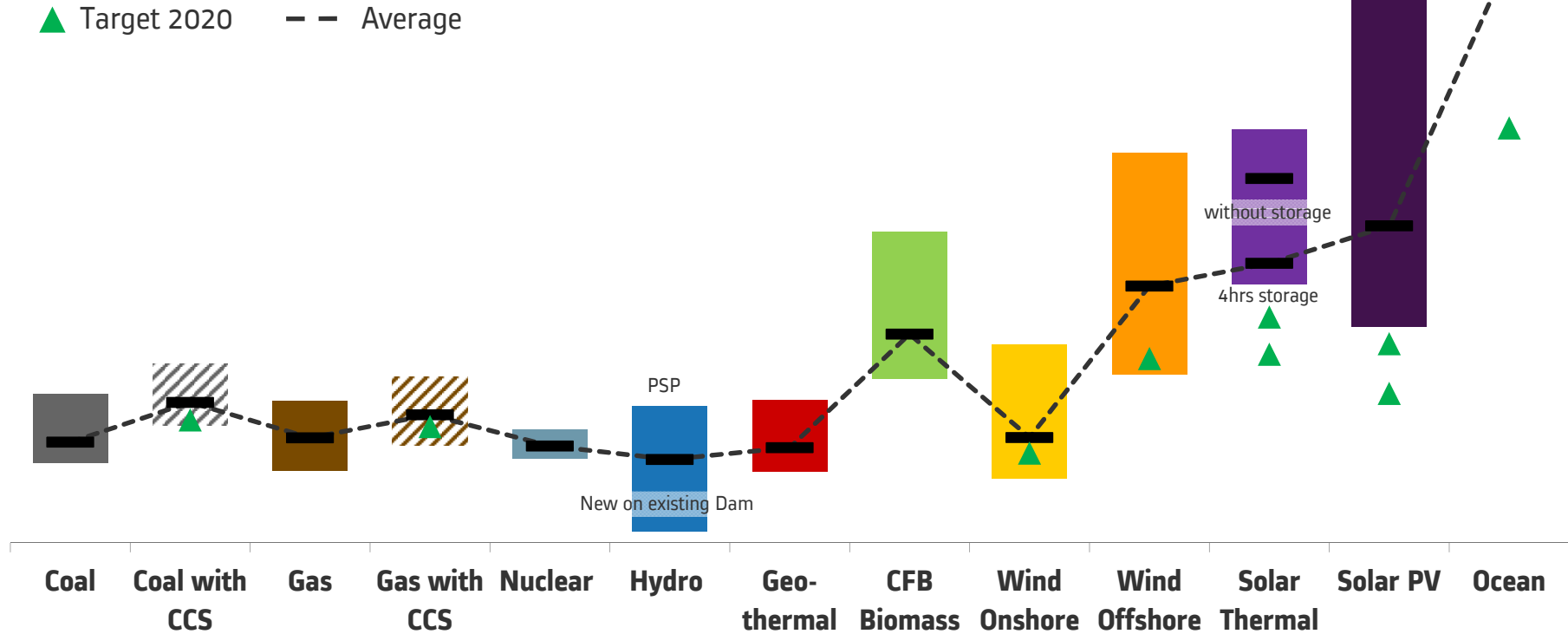
Excluding PV

- Most regions to increase
- China to sustain growth and represent almost half of the market
- Fewer very large hydro projects in LAM but more wind to come
- Europe growth driven by offshore wind

Growth to come largely from Europe, MEA and China

Renewable Energy LCOE

Typical cost of electricity for European new plant construction



Onshore wind already within conventional technologies cost range

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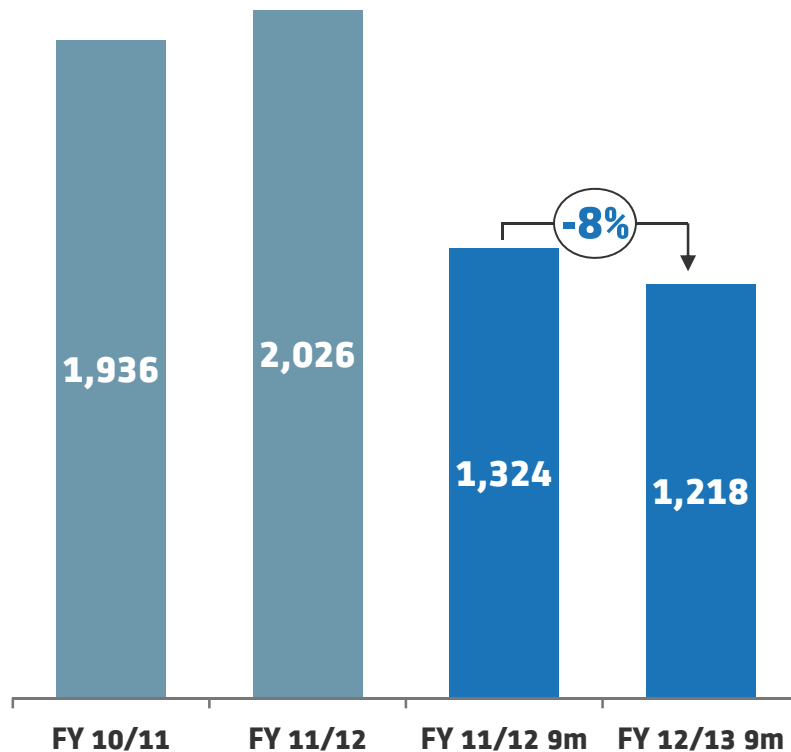
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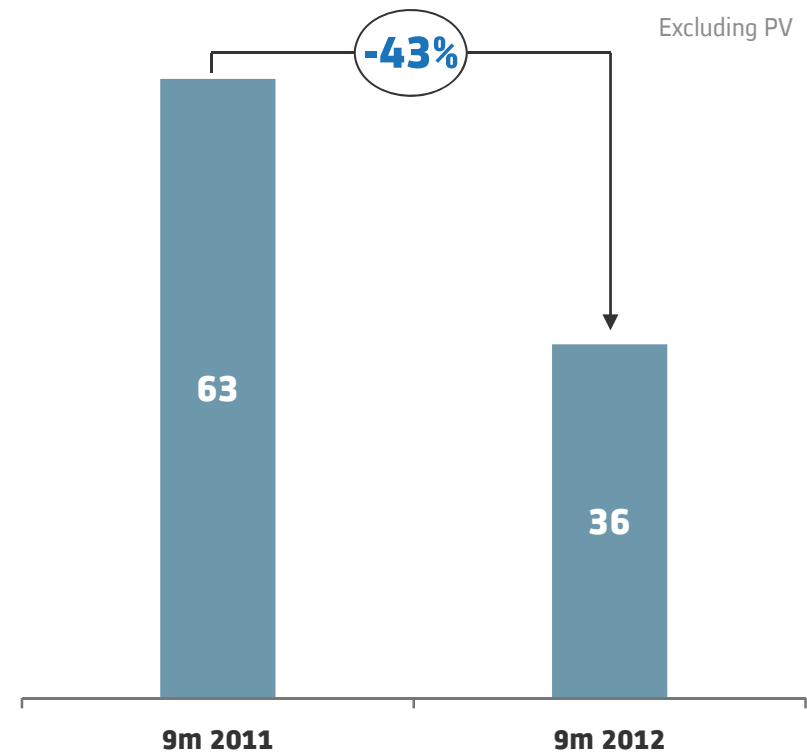
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Order growth vs. market growth

Orders [€ million]



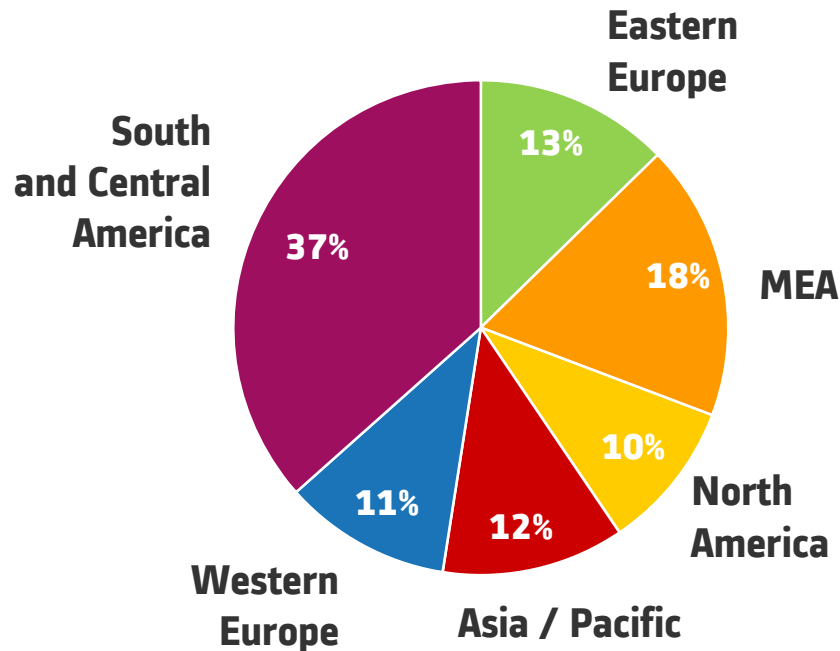
Renewable Power market [GW]



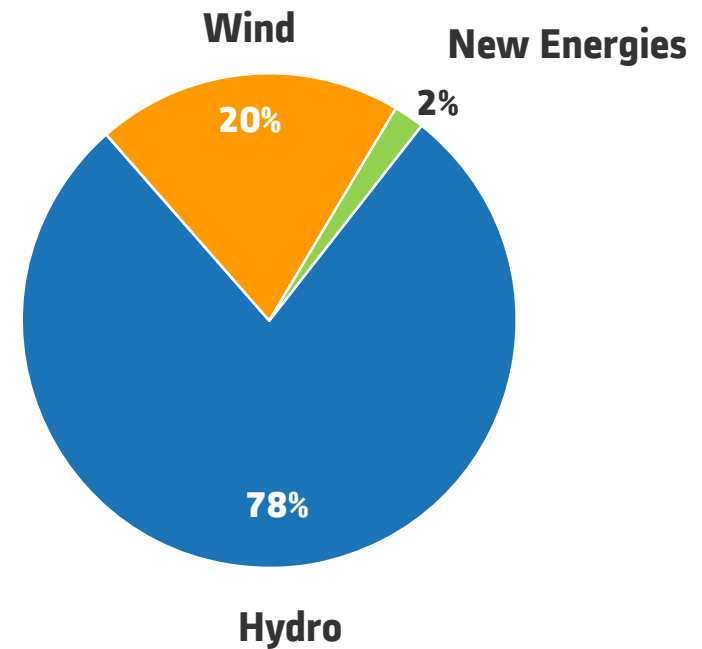
Low level of market due to project delays (permitting ,etc ...)
Good resistance of the order book in a difficult market environment

Orders by geography and business

Orders by geography [FY 11/12]



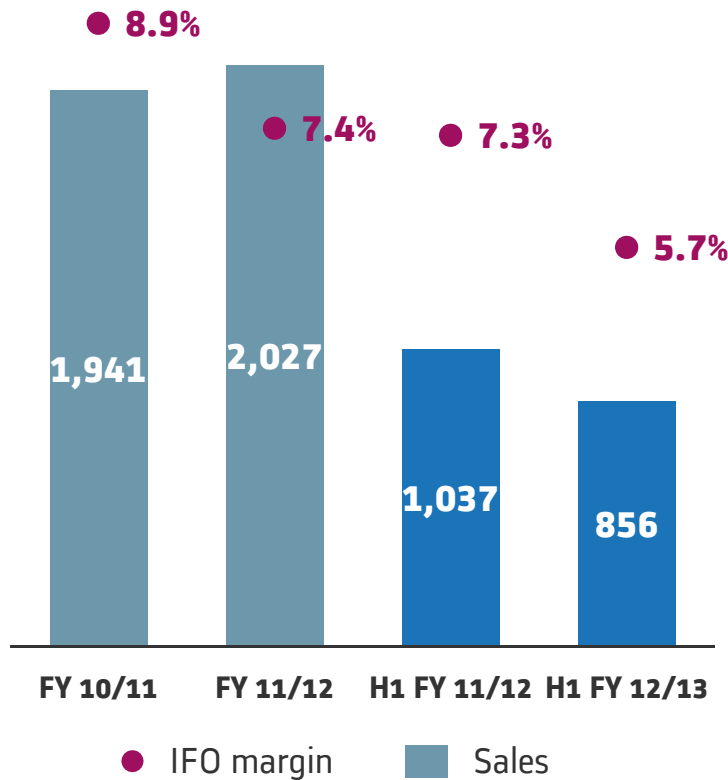
Orders by business [FY 11/12]



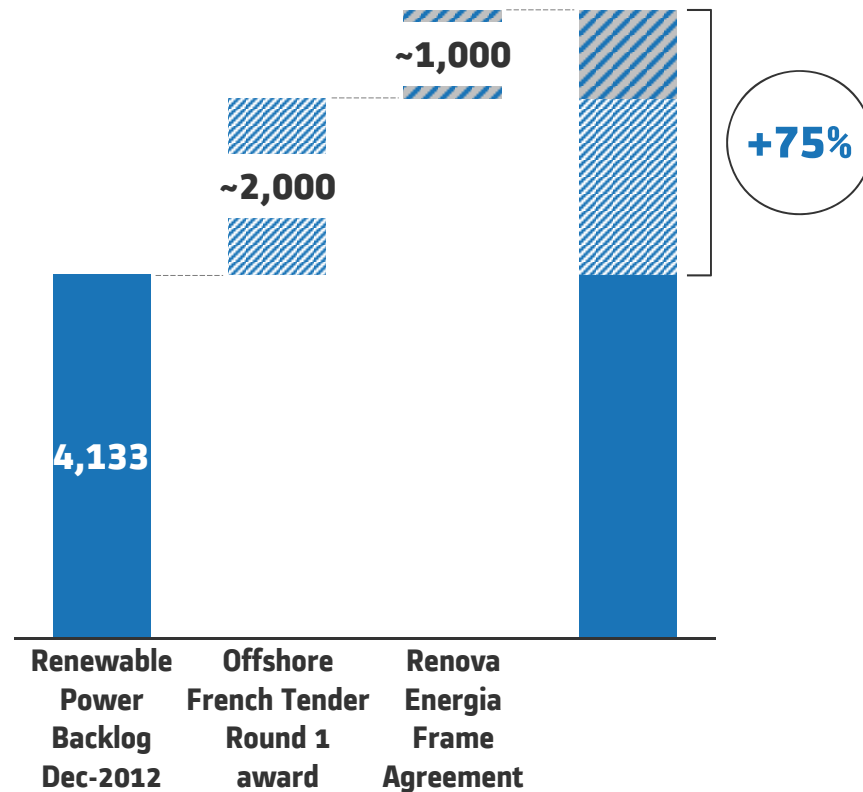
Geographical and technological diversity allowing better resistance to specific market downturns

Sales, IFO margin and Backlog

Sales [€ million]
& IFO margin [% of sales]



Backlog + awarded projects
[€ million]



Current backlog: >2X years of sales

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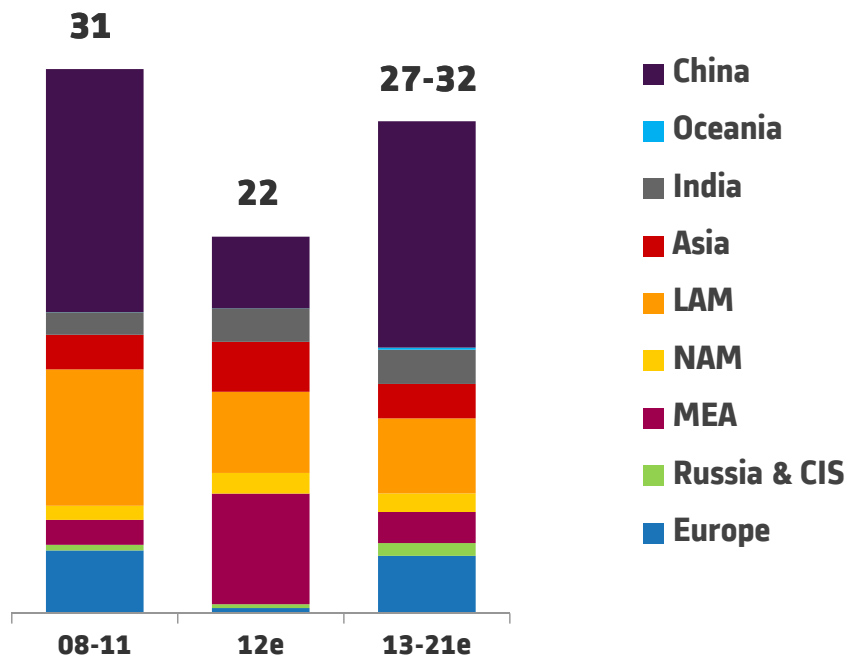
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Hydro market

Hydro market by region – New market [Avg. GW / year; 2008-2021]



New market

- “Incentive free” and self sustainable new build market, except a few mini-hydro
- Short-term slowdown to be overcome with China resuming large projects
- China by far the largest market
- Fewer very large projects in LAM, but still a strong market
- Pump-Storage to increase in Europe & China

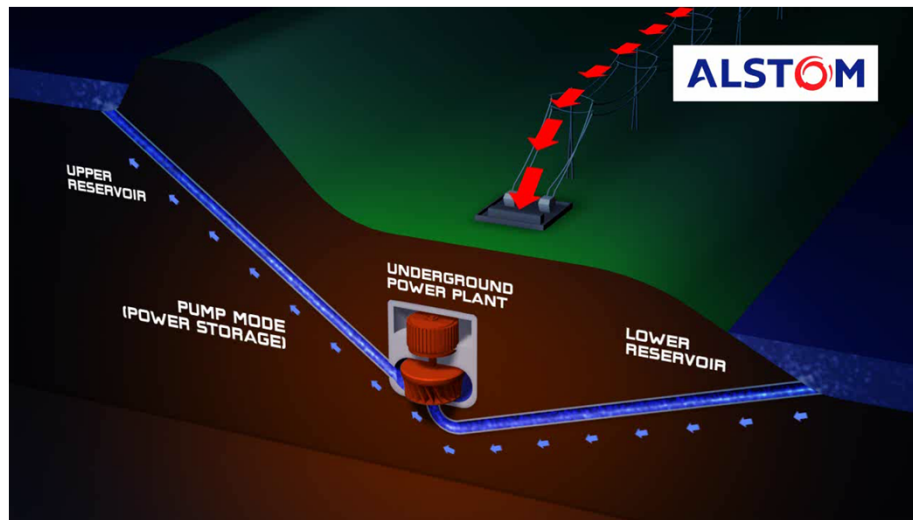
Installed Base

- Need for rehabilitations driven by ageing Installed Base (NAM, Europe, Russia & CIS)
- Growing IB and increasing trend for O&M outsourcing pushing for a solid service market
- Half of the overall Hydro Market in value coming from IB

Strong Hydro market potential in both New build & Retrofit

Zoom on Pump-Storage technology

How does a Pump-Storage Plant work ?



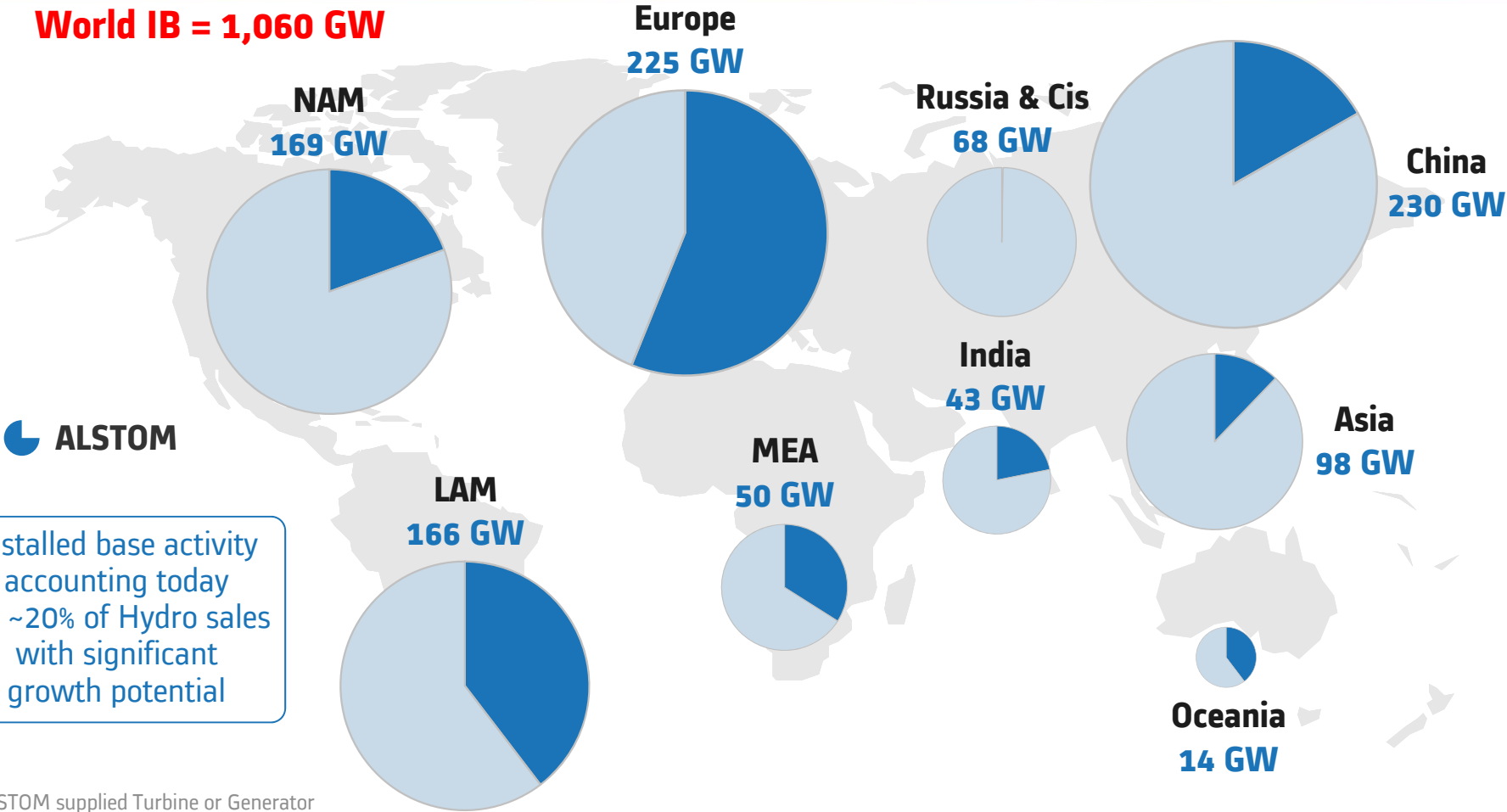
Key benefits

- Increase in grid stability
- Optimisation of power plant fleet and electrical network infrastructures
- High cycle efficiency (~80%)
- Quick response for peak load energy supply
- Environmentally friendly



Alstom Hydro installed base market share

World IB = 1,060 GW



**Half of the Hydro Market in value driven by Installed Base
Alstom has # 1 Hydro fleet - ~30 % of World Installed Base***

Recent commercial successes in Hydro

LAM

Ituango, Colombia

- **2,400 MW**
- 8x300 MW Francis
- November 2012

Baixo Iguacu, Brazil

- **350 MW**
- (3x119 MW Kaplan)
- December 2012

2,750 MW

ASIA

Lai Chau, Vietnam

- **1,200 MW**
- 3x400 MW Francis
- December 2012

Dong Nai 5, Vietnam

- **150 MW**
- 2x77 MW
(Turbines+Generators)
- January 2013

1,350 MW

EMEA

Grand Renaissance, Ethiopia

- **3,000 MW**
- 8x375 MW Francis
- June 2012

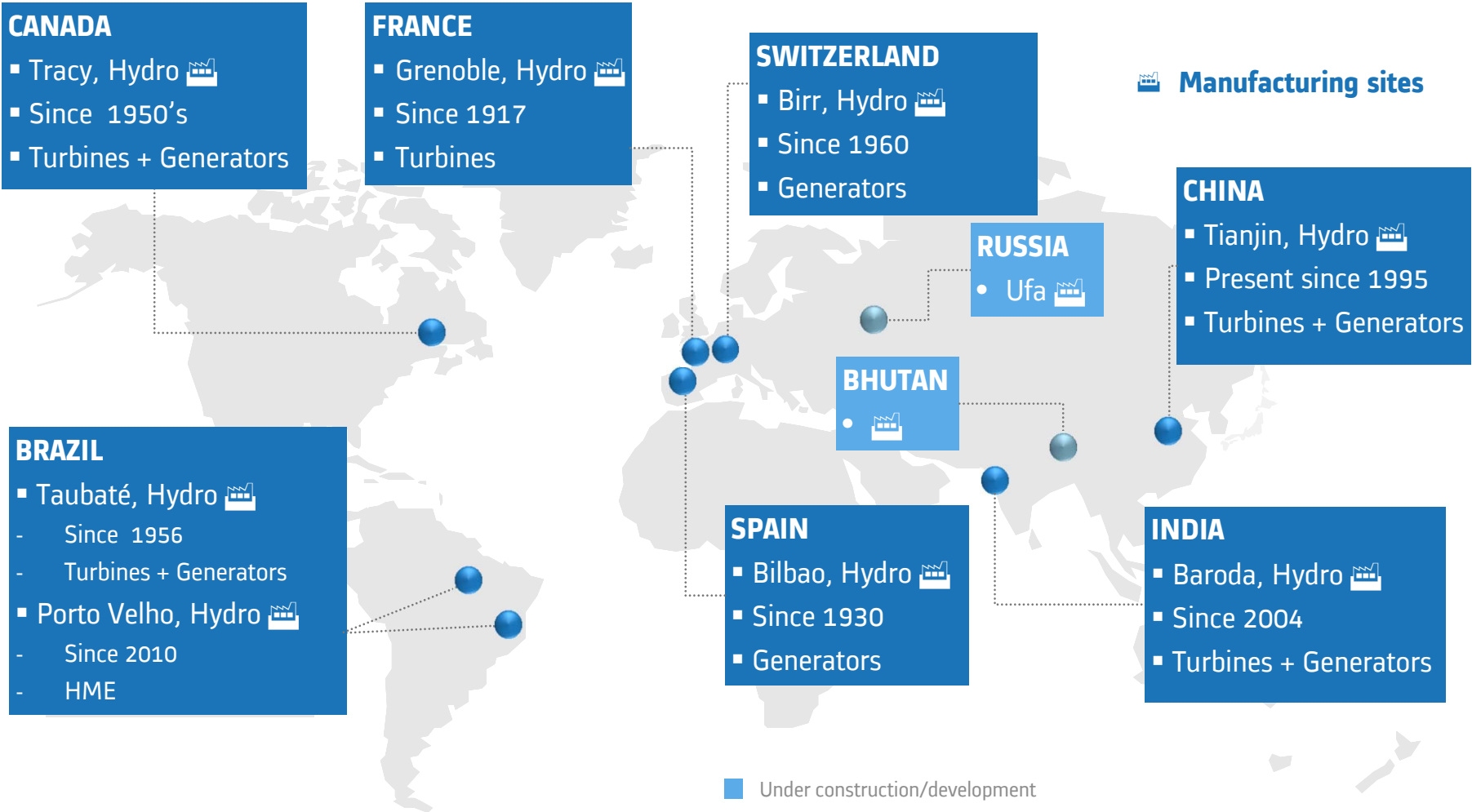
Mapragg and Sarelli, Switzerland

- **100 MW**
- Generators Refurbishment
- 2x50 MW
- October 2012

3,100 MW

Leadership position reinforced in a difficult new build market environment

Alstom Hydro industrial base



Good market coverage in key Hydro regions

Partnership with RusHydro

AlstomRusHydroEnergy (JV)

- JV announced in a strategic cooperation agreement in December 2010 with a mission to produce hydropower and auxiliary equipment in Russia
- Shareholders Agreement signed in June 2011 to establish the JV (50% -1 share for Alstom)
- Ufa factory: part of AlstomRusHydroEnergy JV, to be managed by Alstom
- JV to employ over 500 people by 2015
- Strong potential, notably for large refurbishment works



Unique opportunity to expand in Russian and CIS markets

Alstom Hydro products & services offering



BULB

- Head: 3 – 25 m
- Max. Diameter: 8 m
- Axial flow
- Horizontal axis
- Output < 80 MW



PUMP TURBINE

- Head: from 10 to 1,200 m
- Reversible single, double or multi- stage centrifugal units
- Axial, mixed or centrifugal flow
- Output < 500 MW



KAPLAN

- Head: 10 – 50 m
- Max. Diameter: 11 m
- Axial flow
- Vertical axis
- Output < 250 MW



PELTON

- Head: 200 – 1,800 m
- Runner in air
- Tangential jet inlet
- Vertical or horizontal axis
- Output < 350 MW



FRANCIS

- Head: 30 – 800 m
- Runner dia. < 10.6 m
- Tangential inlet flow, axial outlet flow
- Vertical or horizontal axis
- Output < 1,000 MW



OTHER

- Small, medium and large generators (up to 1,000 MVA)
- Hydro Mechanical Equipment (valves, gates, penstocks, lifting equipment, pipes, pumps)
- Control systems (>250 references)
- Balance of Plant, Electrical/Mechanical engineering/ systems

Full spectrum of the hydro market covered

Adapting to market environment

- Price pressure since 2010 with some limited recent signs of stabilisation
- Rationalisation of the European footprint launched, starting with the grouping of most French Hydro engineering and support activities in Grenoble
- Initiatives launched to optimise the full hydro cost base: focus on sourcing, product management, engineering, manufacturing, reduction of non quality costs and S&A
- Continued investment in R&D/Innovation with technical centres in Grenoble (turbines) and Birr (generators) and regional outfits in all worldwide production locations



**Ongoing cost optimisation to deal with challenging market environment
and progressively improve margin levels**

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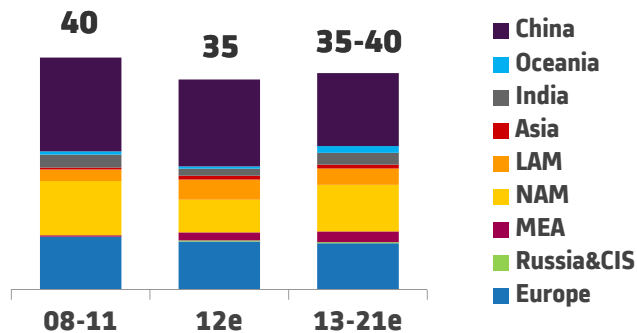
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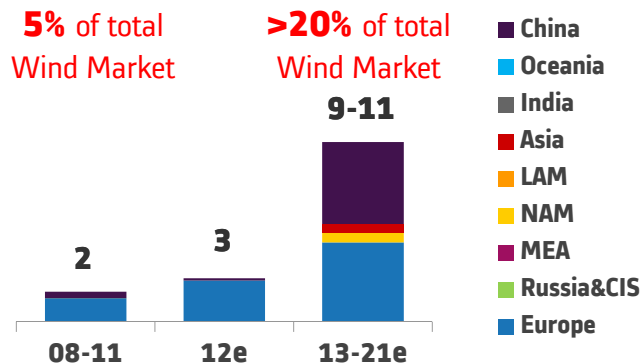
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Wind market

Onshore Wind market by region [Avg. GW / year; 2008-2021]



Offshore Wind market by region [Avg. GW / year; 2008-2021]



Onshore

- Tightening market & overcapacity
- Local content requirement in emerging markets (Brazil, Morocco, Saudi Arabia, South Africa,...)
- Repowering opportunities in mature markets (Germany, USA, Spain)
- Push for larger & more efficient products (high towers, large rotors)
- Wind O&M market size growing (x3 by 2021)

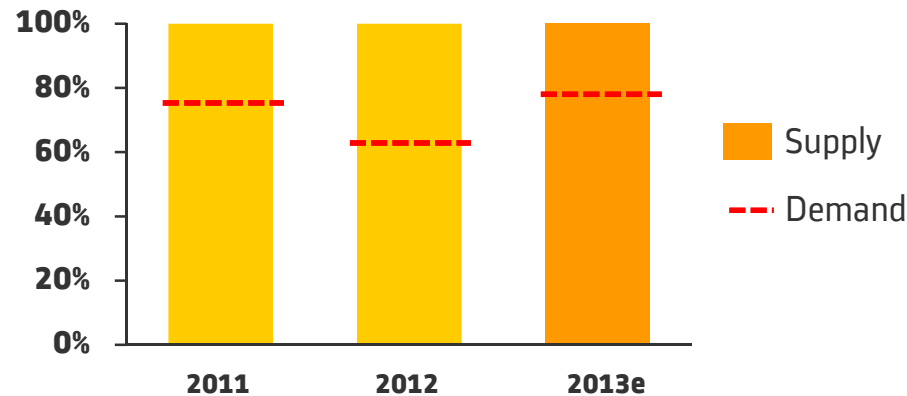
Offshore

- Europe (UK, North Sea, France) & China on the forefront of offshore developments
- Few players with ready-to-market products

Offshore to drive market growth, local opportunities in Onshore

Wind market current dynamics

Nacelle capacity vs. Demand [2011 - 2013]

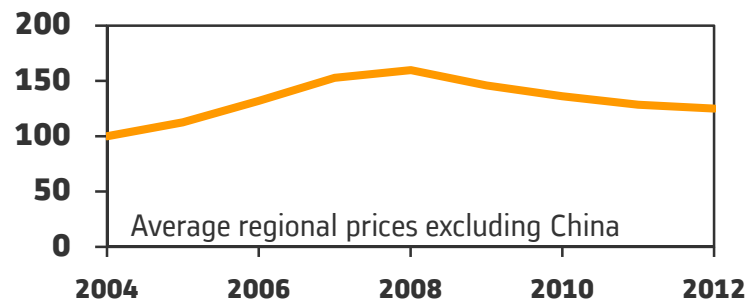


Increase in overcapacity in 2012

- Uncertain/revamped renewables support policies (e.g. Spain, Italy, UK, USA)
- Tight financing conditions

Local content requirement in new countries (Brazil, Morocco, KSA, RSA,...) likely to contribute to global capacity build-up

Price evolution [2004-2012; BASE 100 = 2004]



Supply-demand gap expected to narrow thanks to increasing demand and decisions to take some capacity out

Overcapacity still putting pressure on prices but some recent stabilisation observed

Alstom well positioned to address Wind market

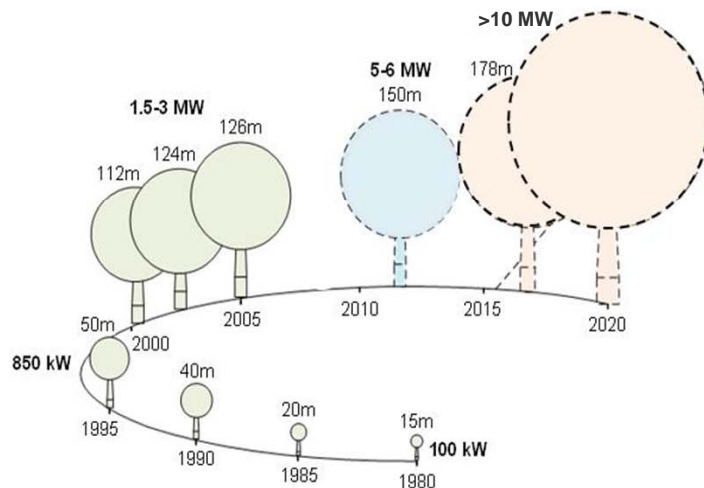
Fit with Alstom's core competencies

- Designer-integrator business
- Innovation business
- Increasing technological content
- Strong project management competencies
- Developing service activity

Success factors

- Global commercial network
- Access to a broad range of Utilities clients worldwide
- Strong global mastery of technology at the heart of Alstom's know-how (generators with/without gearboxes, control systems, ...)
- Basis for a global service network
- Synergies with Alstom Grid, particularly in HVDC activities
- Leverage Hydro commercial and operational footprint

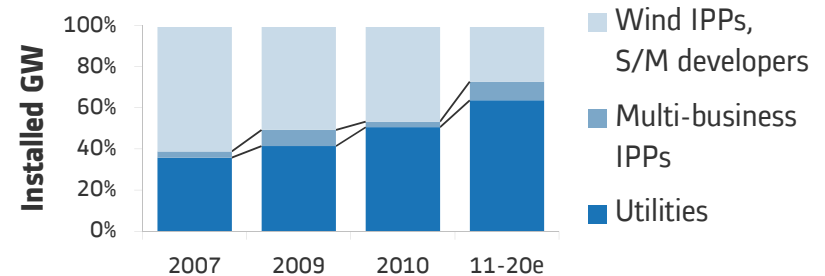
Evolution of wind turbine characteristics



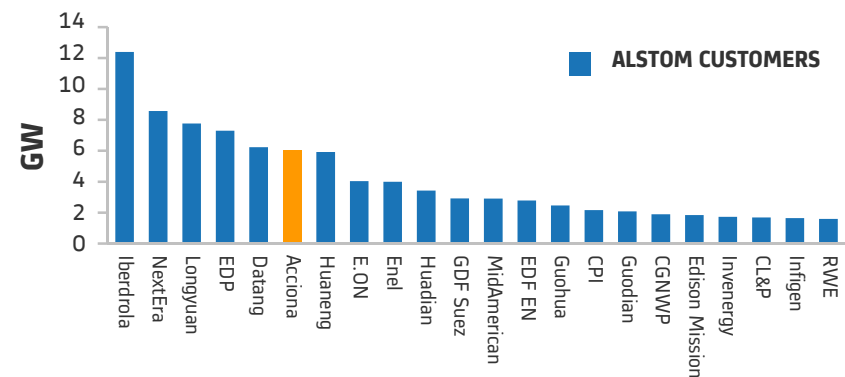
Alstom's traditional customers active in Wind

- Two primary client types: large Utilities and IPPs, both traditional Alstom customers
- Large Utilities looking to optimise their energy portfolio and progressively increasing their market share at the expense of IPPs
 - working with a limited number of “preferred suppliers”, often within the context of multi-year “frame agreements”
 - requiring global suppliers with adapted local products, local industrial presence and service network, etc...

Added Wind capacity in the USA & Europe [by client segment type]



Cumulative wind capacity of the main players [end 2011]



Alstom's traditional Utilities/IPP customers also active in Wind with growing ambitions

Strategy in Wind

1 Develop leadership position in Offshore

- Top technology available in the market
- Good platform with French tender
- Opportunities in Europe and beyond

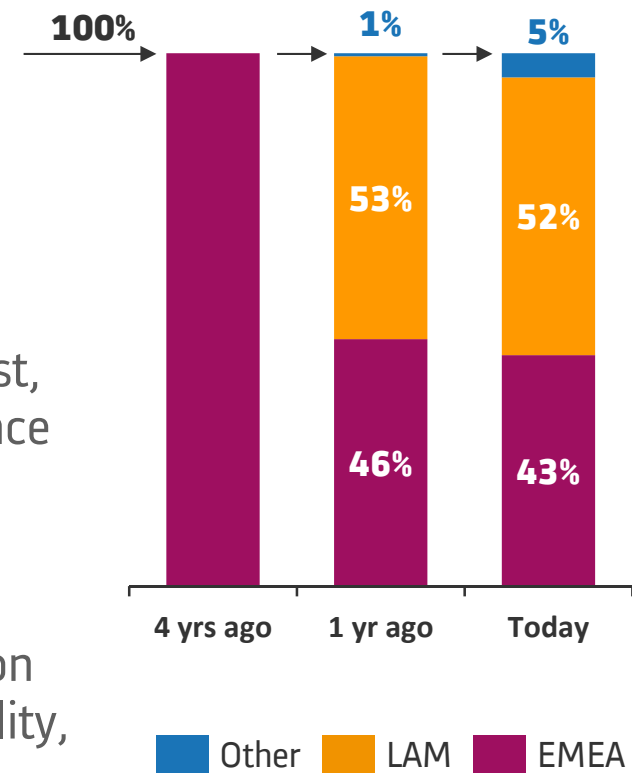
2 Grow selectively in Onshore

- Focus on LAM with strong volume growth
- Selective expansion in new markets (e.g. North Africa, South Africa, Middle East, Japan), leveraging on Alstom's local presence and customer contacts

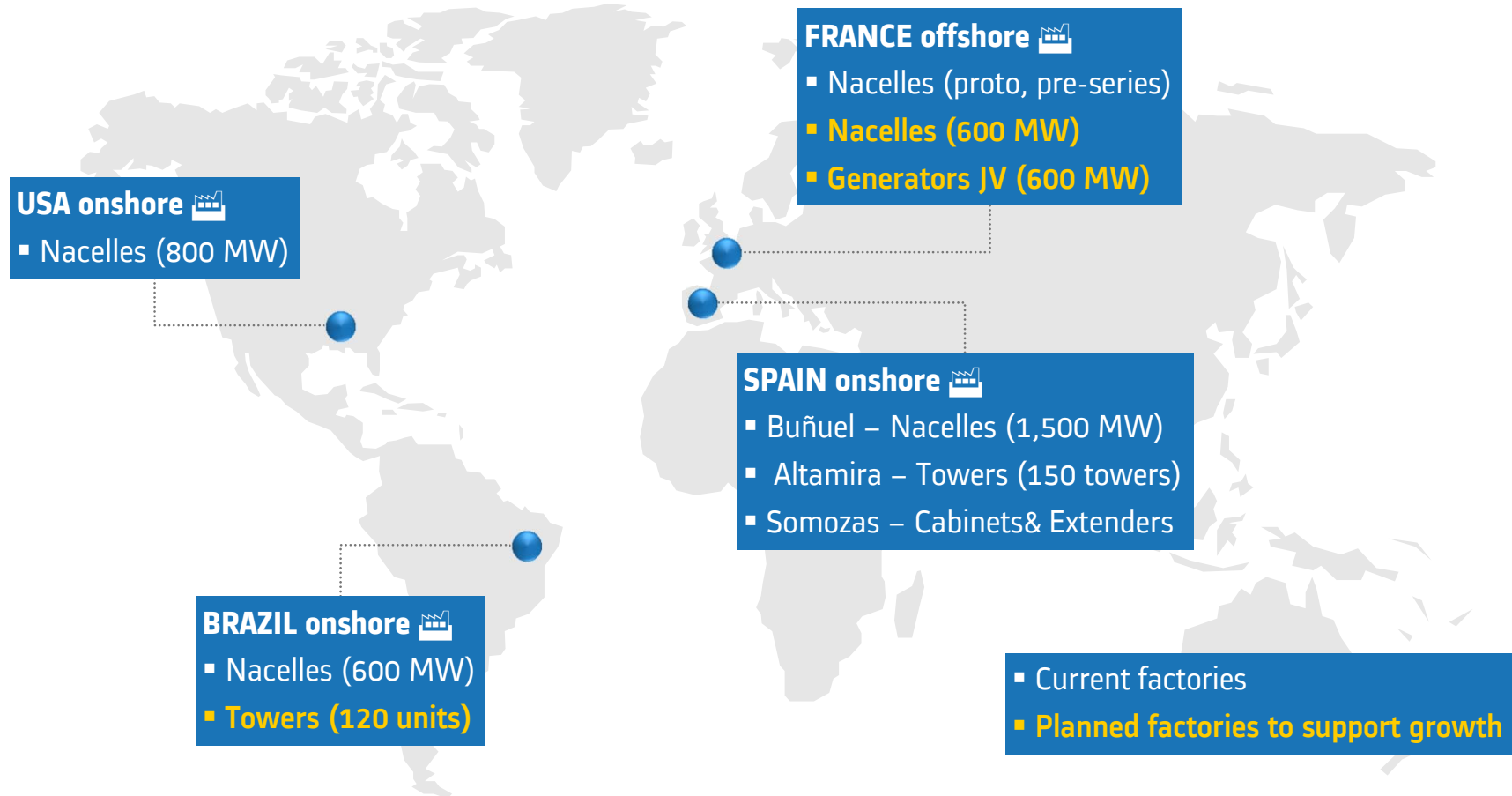
3 Focus on competitiveness

- Cost optimisation with continuous efforts on sourcing, engineering, manufacturing, quality, project execution, etc...

Historical Alstom Wind Orders by geography



Industrial footprint in Wind

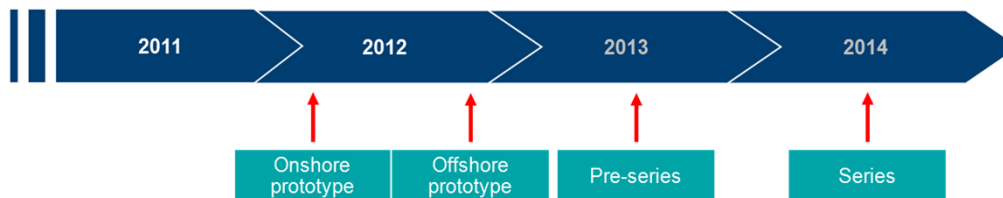


Wind industrial footprint prudently sized, expected to develop based on order intake

Haliade-150: a technological edge in the market



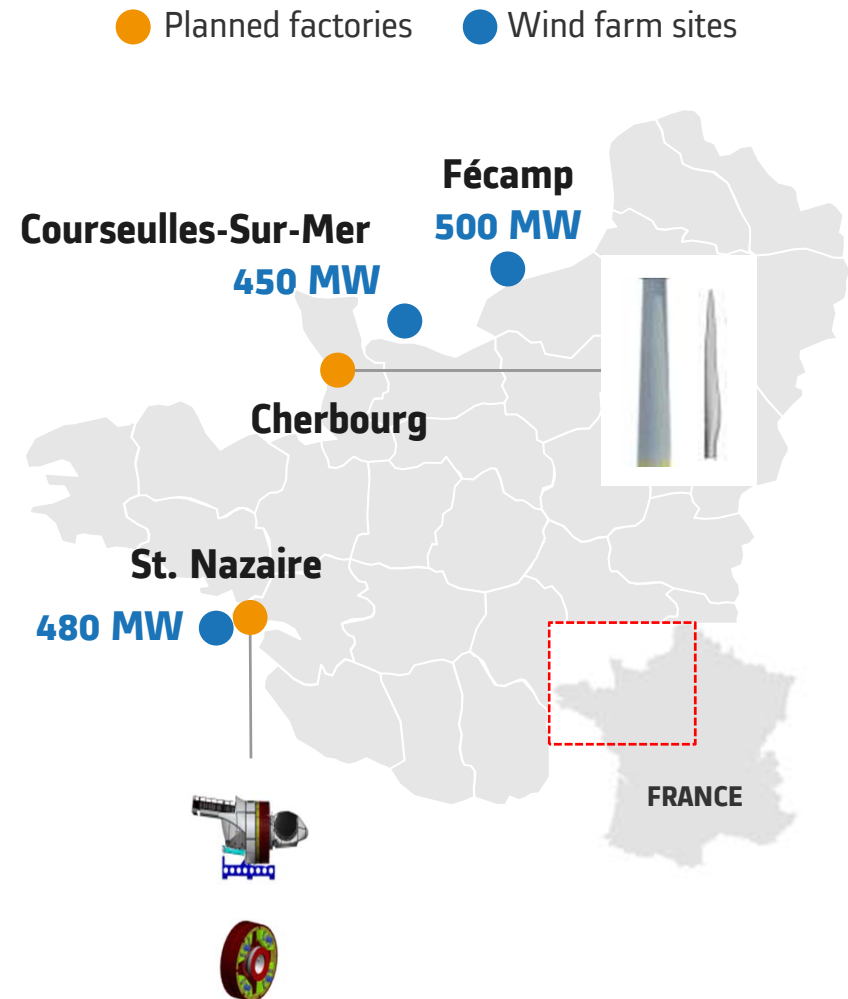
Product roadmap



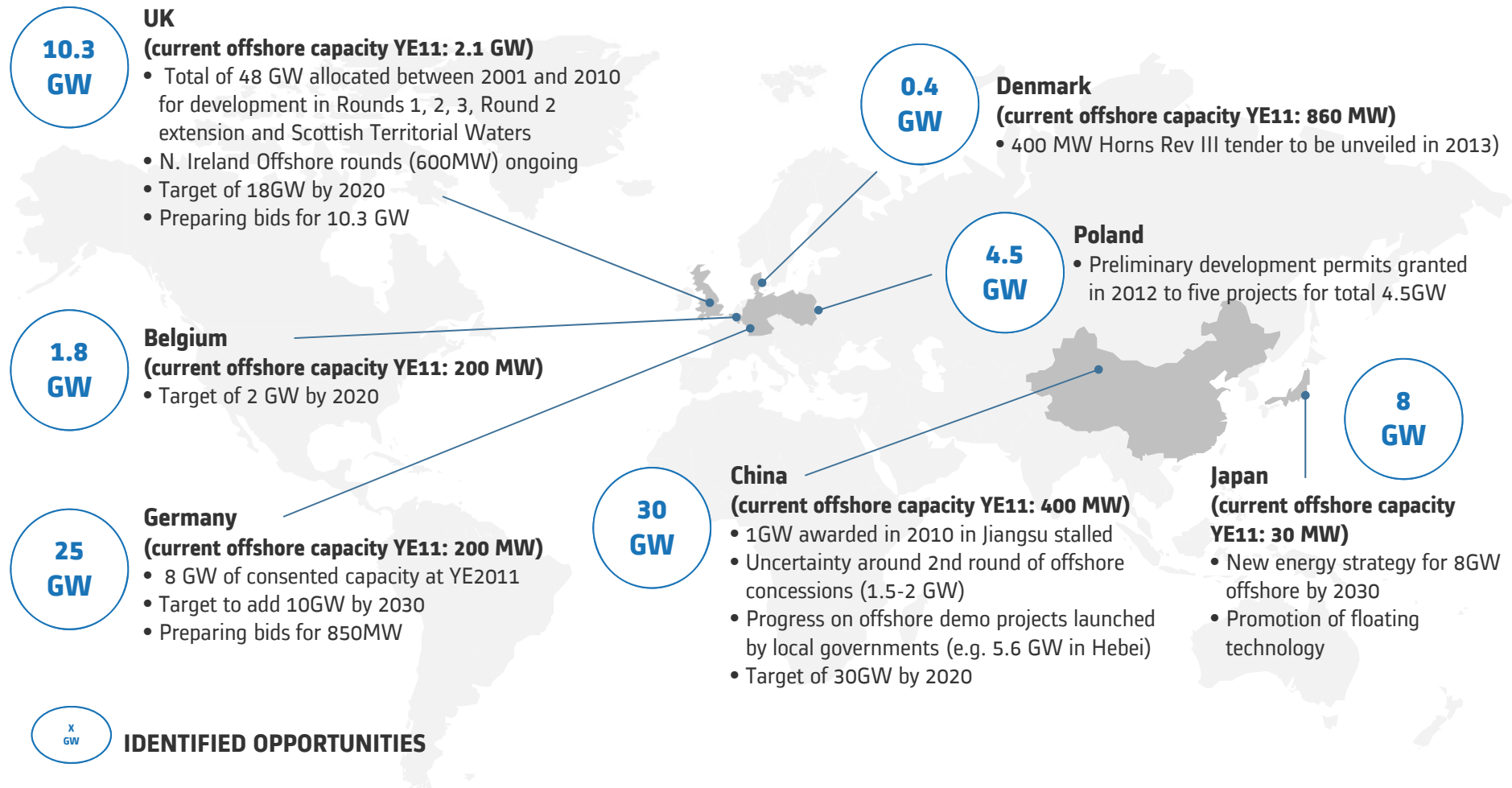
- **Simple**
increasing reliability whilst lowering maintenance
 - Direct drive (few moving parts, low rotation speed, proven technology)
 - Permanent magnets (no excitation of rotor required, less electrical parts)
- **Efficient**
Large rotor giving higher yield (+15% vs. current generation)
- **Robust**
Generator rotor receiving only PURE TORQUE®
 - Separation between the main rotor and the generator rotor protecting the drive train and increasing reliability

Offshore French tender – Round 1

- Three zones awarded in April 2012 to a consortium led by EDF (Alstom, Dong Energy, Nass & Wind and WPD Offshore): Saint-Nazaire, Courseulles-sur-Mer and Fécamp
- Alstom exclusive turbine supplier to EDF for these orders worth over €2 billion (240 turbines)
- Orders to be booked over 2-3 years starting in FY15/16
- Related revenues to be booked over at least 5 years starting in FY15/16
- Industrial plan with the setup of 4 factories for a total investment of ~ € 100 million
 - Production ramp-up starting in 2014
- Announcement by the French Government in January 2013 of the Round 2 offshore tender for ~1 GW (two wind farms) with tender awards expected January 2014



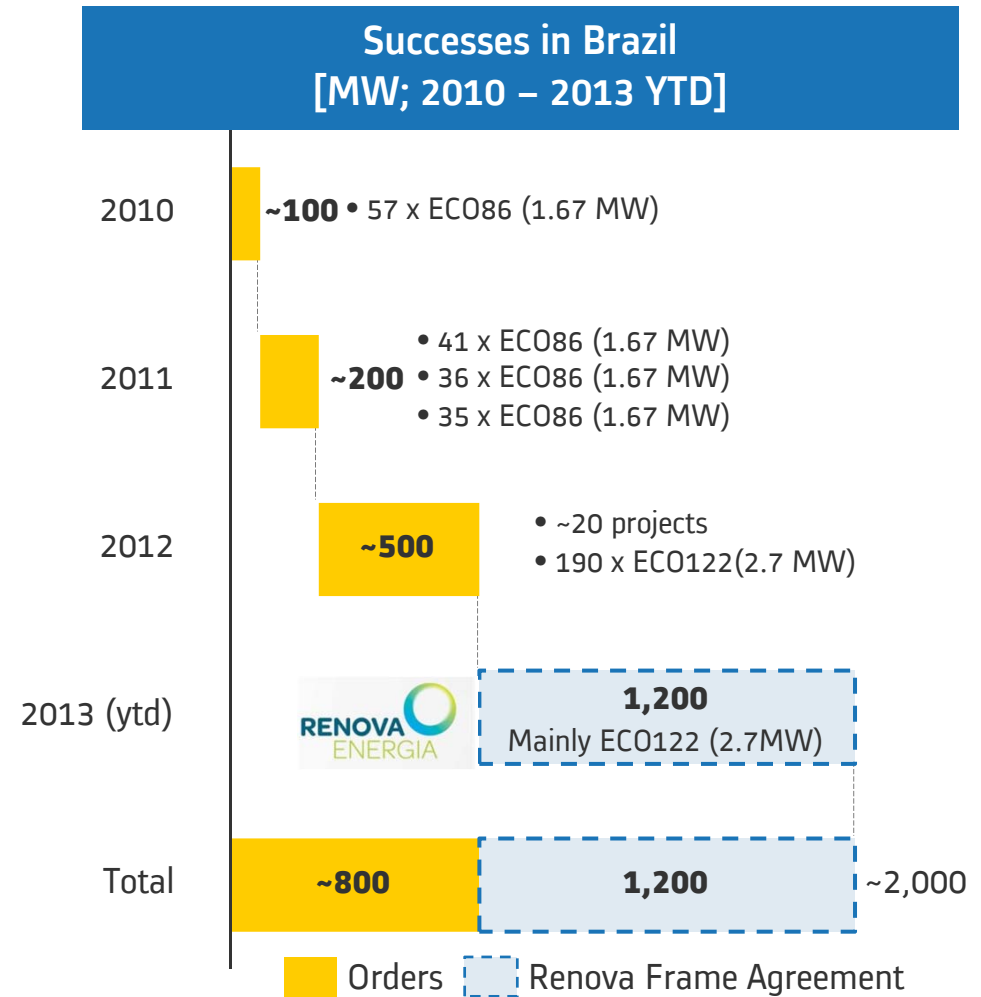
Offshore opportunities worldwide



Targeting a number of opportunities primarily in Europe, but also globally

Commercial success in Brazil for Wind Onshore

- Brazilian wind market expected to be ~2GW / year through 2020
- Entry in the Wind market in Brazil leveraging a strong historical presence through Hydro
- Key successes:
 - First project: 96 MW Brotas, installed in 2011
 - ~300 MW under construction
 - ~400 MW additional contracts signed recently
 - Frame agreement with Renova Energia for 1.2 GW

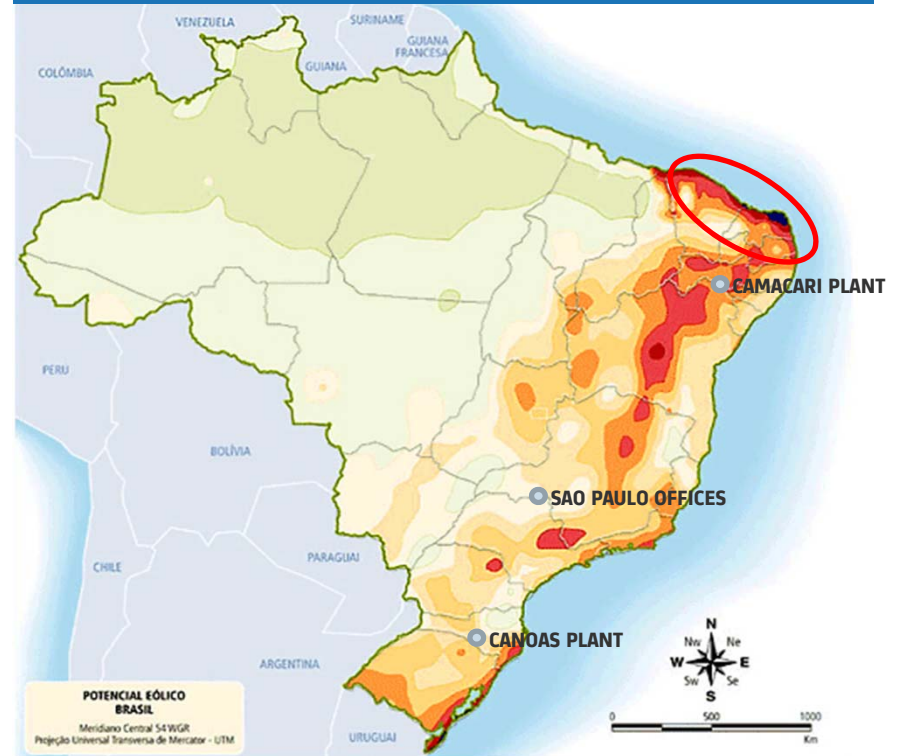


Recent successes in Brazil validating a selective growth strategy

Zoom on Renova Energia Frame Agreement

- Renova Energia: the largest wind power generation company in Latin America
- Signature of a Frame Agreement (FA) between Renova Energia and Alstom for the supply of 1.2 GW of Wind turbines (mainly ECO-122)
- FA part of a larger plan for Renova Energia (~2.4 GW until 2020)
- Projects to be developed in the Bahia interior region, the #1 wind region in Brazil which represents ~45% of the market
- Commissioning expected to take place in 2015 through 2018
- Key components to be sourced locally

Brazilian Wind market overview



Velocidade média do vento (m/s)
50 m acima do nível da superfície

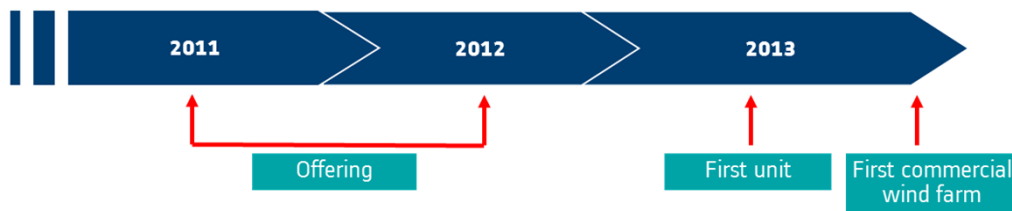
	Mata	Campo Aberto	Zona Costeira	Morro	Montanha
4	> 6,0	> 7,0	> 8,0	> 9,0	> 11,0
3	4,5 - 6,0	6,0 - 7,0	6,0 - 7,0	7,5 - 9,0	8,5 - 11,0
2	3,0 - 4,5	4,5 - 6,0	4,5 - 6,0	6,0 - 7,5	7,0 - 8,5
1	< 3,0	< 4,5	< 4,5	< 6,0	< 7,0

ECO-122 well positioned to capture future growth



- Complements our product offering for **low-wind sites**
- **High power**
 - Rotor diameter of 122m
 - Nominal power of 2.7 MW
- **Higher Capacity Factor:** up to 42% or over 3,600 hours per year
- **Land optimisation:** up to 25% increased wind farm yield compared with today's 1.5-2 MW turbines
- **CAPEX optimisation:** 10-15% lower balance of plant cost
- **Increased reliability:** PURE TORQUE™ transmitting only the torque to the drive train for higher reliability

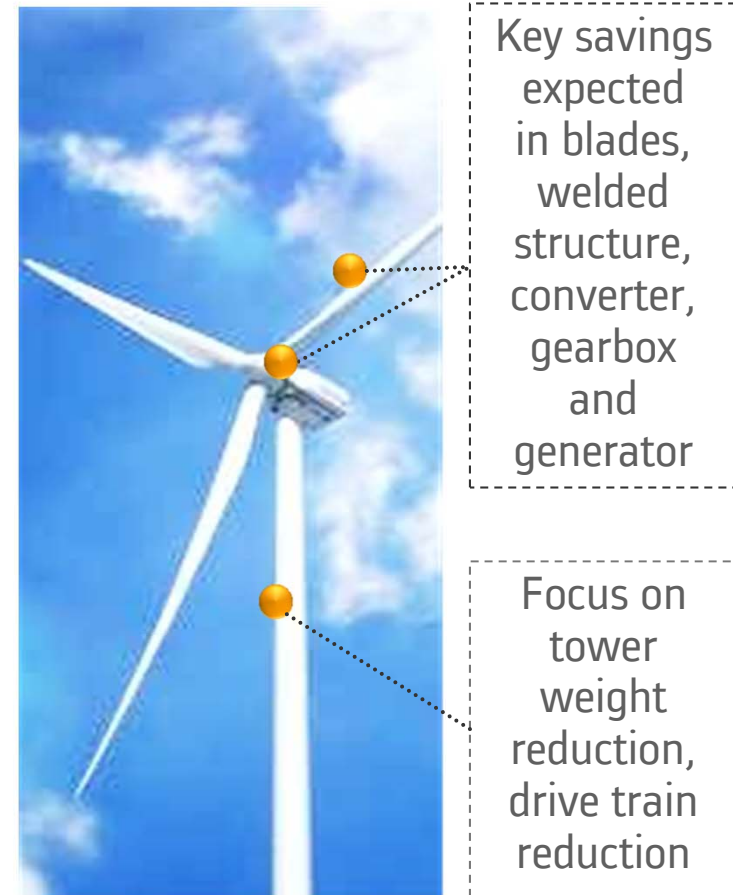
Product roadmap



Adapting to market environment

- Reduction in platform costs to deal with pressure on market prices
- Increased volumes, particularly in LAM, allowing for greater economies of scale
- Optimisations made in design & process as well as manufacturing, transport and installation
- Additional restructuring actions necessary to adapt the European operational footprint to the reality of the market

Key competitiveness focus areas



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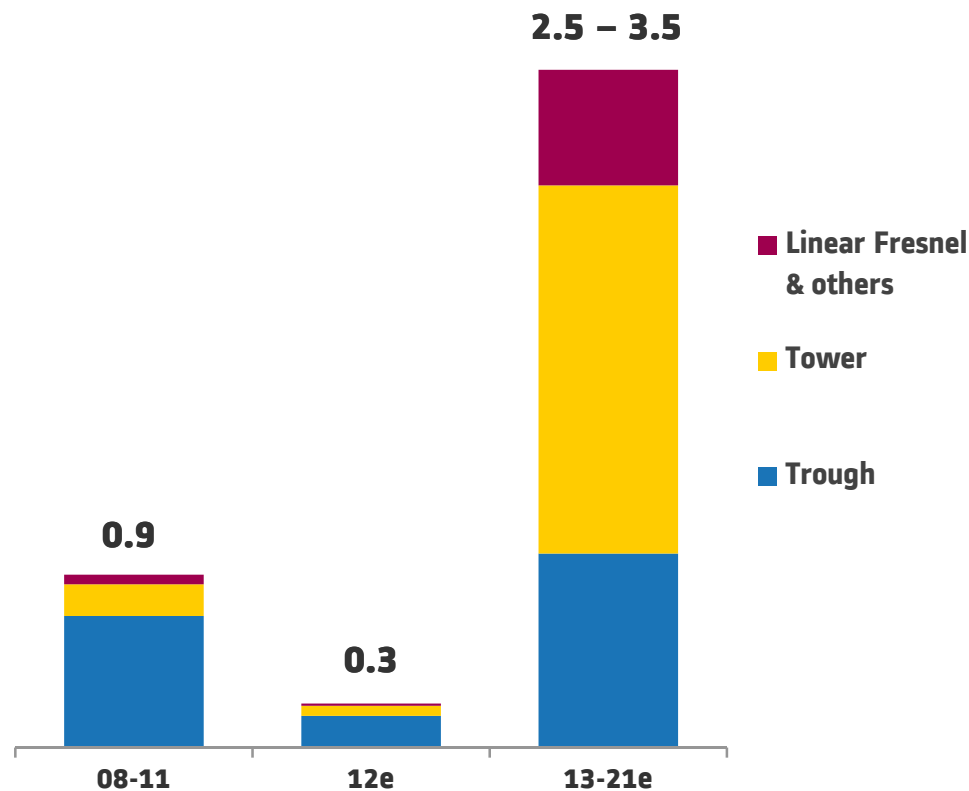
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Solar CSP market

Solar CSP market by technology [Avg. GW / year; 2008-2021]

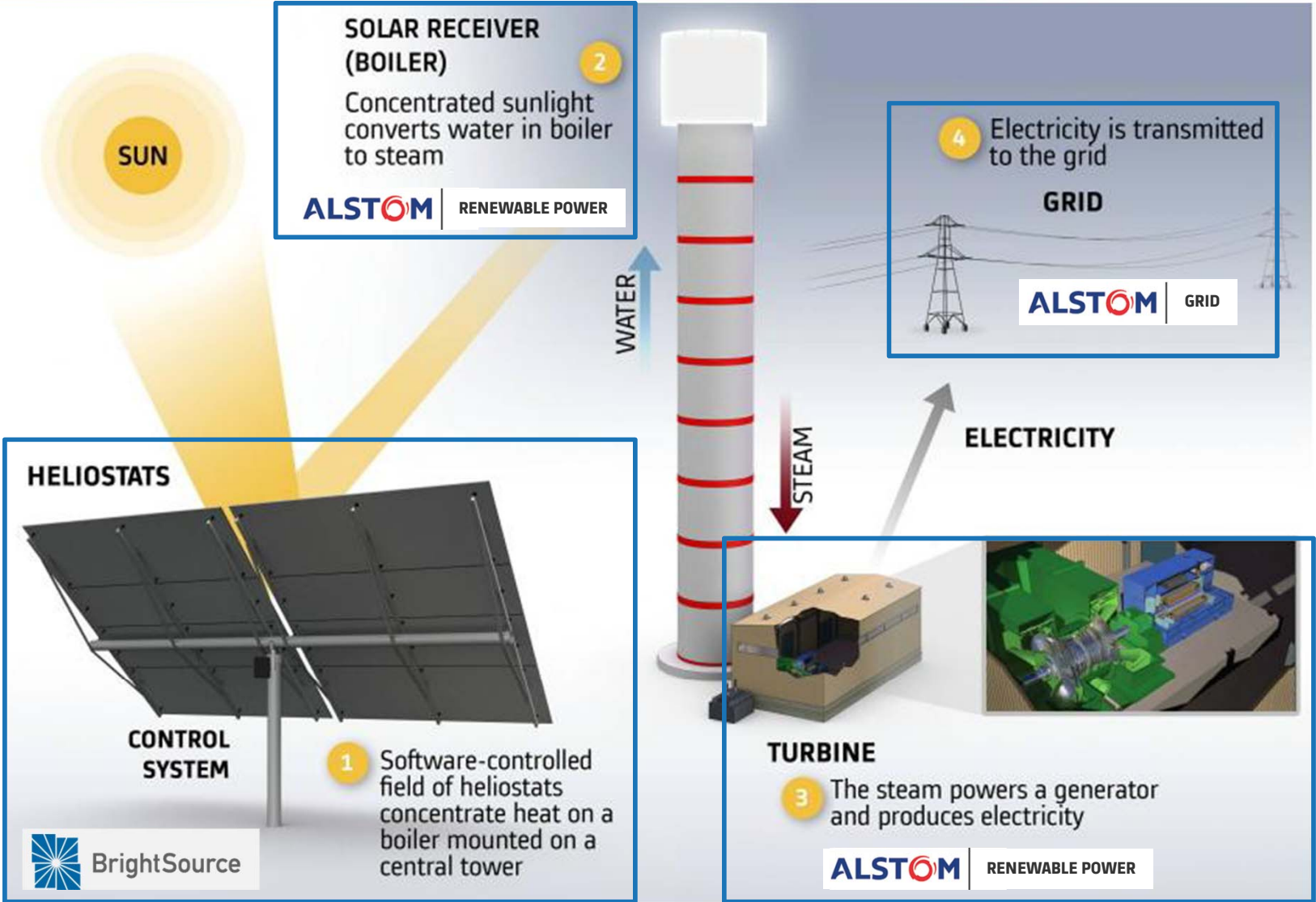


Mid-term outlook

- Tower technology with the largest growth potential
- Storage-based CSP technology becoming dominant segment, supported by feed-in tariff (FIT)
- Hybrids (subject to regulation) gaining momentum mid-term (ISCC, Boost)
- MENA, USA, South Africa, India main markets for CSP


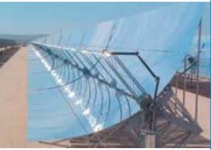



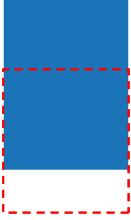
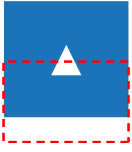




Tower CSP with storage to become the leading thermal solar technology

Tower technology overview



Scope

Solar technology comparison

	PV	Parabolic Trough	Linear Fresnel	Dish	Tower
					
Utility Scale Experience	✓	✓	✗	✗	✓
Bankable	✓	✓	✓	✗	✓
Storage	(✓) short-term only	✓	✗	✗	✓
Value chain Localisation	✗	✗	✓	✗	✓
Hybridisation potential	(✓) limited synergies	(✓) expensive	✓	✗	✓
LCOE				To be proven	
2018 expected LCOE evolution					

- + Higher efficiency today, with potential for further efficiency improvement
- + Low specific costs vs. Through (less piping, flat mirrors)
- + Highest thermal storage effectiveness
- + Most suitable for large scale hybridisation
- + Large scale projects >125MW under construction and bankable technology
- + Growing differentiation vs. PV considering dispatchability
- Limited operational experience to date

Tower technology combining key advantages

Partnership with BrightSource Energy (BSE)



BrightSource

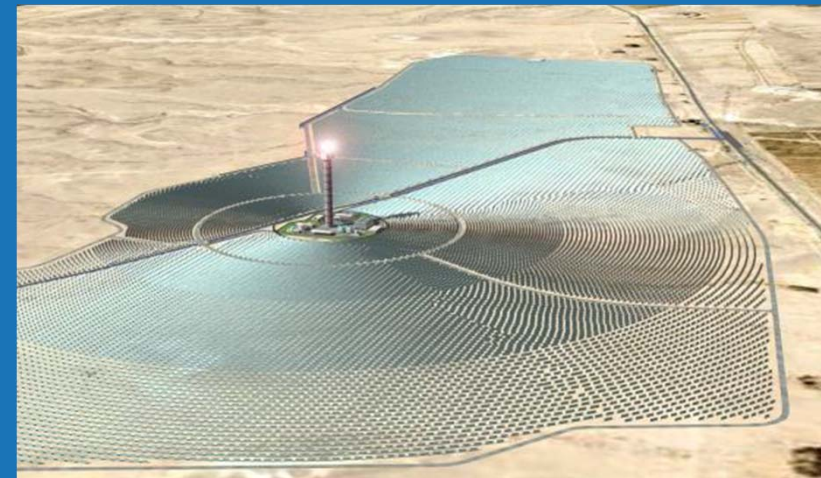
- Founded in 2006, ~ 300 employees worldwide
- Development and building of large-scale solar steam and power generation plants
- Headquartered in California, with technology teams in Israel
- Developing 400MW solar tower project to start in Q2 2013 (Ivanpah)

ALSTOM

RENEWABLE POWER

- Alstom total investment in BSE \$170m – owning currently >20% of shares
- A number of technological and commercial agreements
 - Development of 250MW subcritical SRSG (Solar Receiver Steam Generator)
 - Preferred Equipment Supply Agreement for SRSG & STG
 - Geographical commercial and business development agreements (i.e. India, MEA, China, Australia)

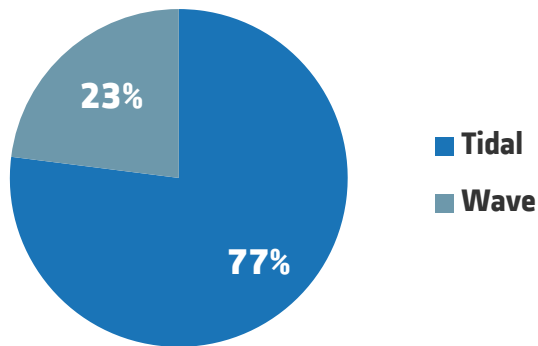
Zoom on Ashalim project



- **Solar Field:** 55,000 heliostats
- **Tower height (incl. receiver):** 240m
- **Area:** 3.15 km²
- **Nominal Capacity:** 110 MWe (126 MWe max)
- **Yearly Electrical Output:** 305 GWh/year
- **Integrated Gas boiler:** 100 tons of steam/hour
- **Concession agreement signed in December 2012** (25 year PPA for 100% output)
- **Financial Closing expected:** December 2013
- **Construction schedule:** 34 months

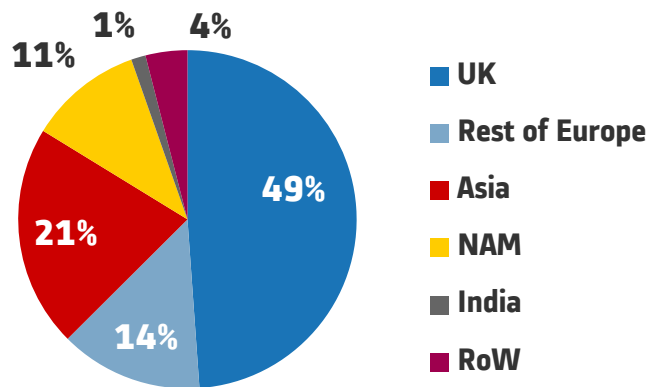
Ocean Energy market

Ocean energy by technology [2020]



- Global Market to reach ~1 GW per year in 2020
- Tidal to dominate and first to come
- Wave technology taking off later (no technological convergence yet)

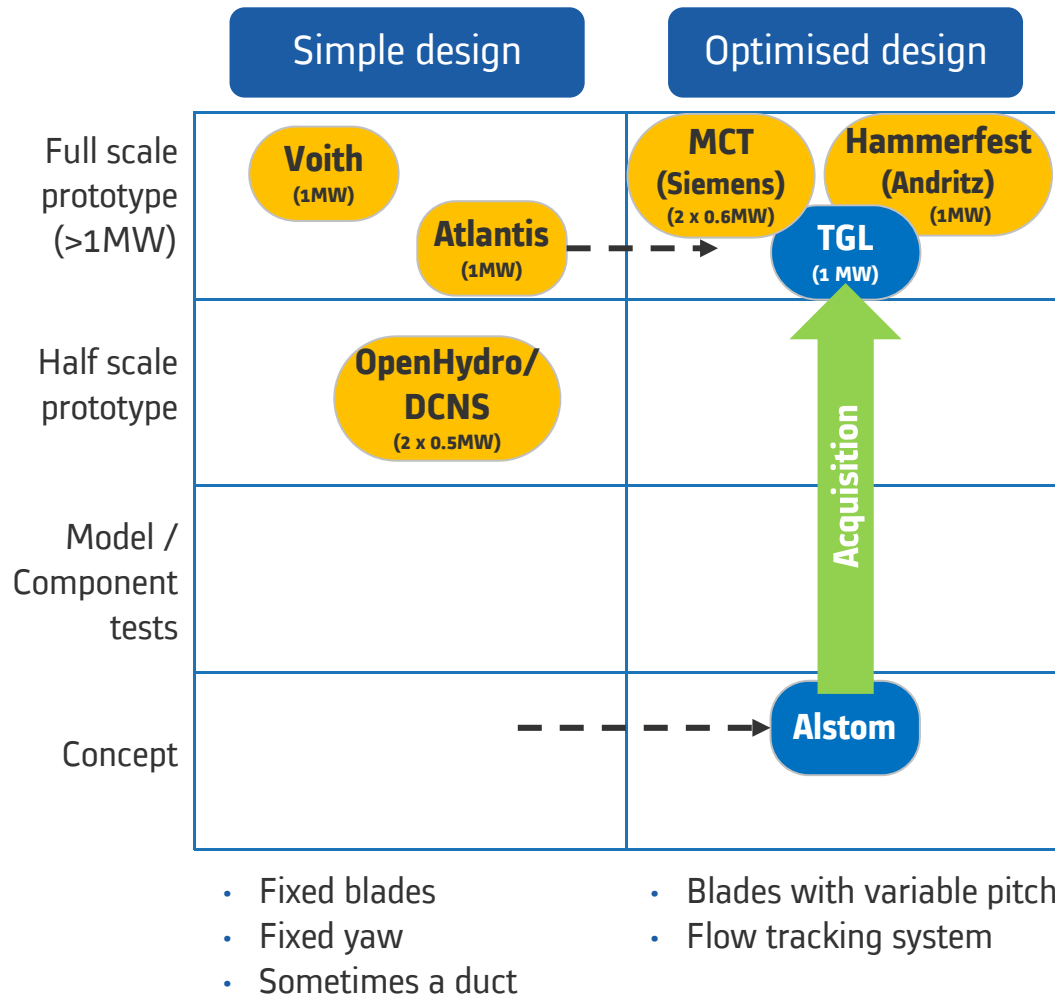
Ocean energy by geography [2020]



- UK to lead the market, followed by France
 - UK: Feed-in-tariff in place, leased sites for 1 GW of Tidal & 0.6 GW of Wave
 - France: call for tender expected by 2015
- Beyond Europe
 - Multi GW potential in Canada
 - Potential in Korea, India, Indonesia, and to a lower extent Philippines and Japan

Ocean energy expected to reach ~1 GW p.a. by 2020 – European tenders expected soon

Acquisition of Tidal Generation Limited (TGL)



- **Two types of design**

- **Simple design:**

finally tending to have more technical issues (heavy) resulting in higher costs

- **Optimised design:**

ensuring high performance, preferred by most technology developers (incl. the ones having produced electricity on the UK grid)

- **Impact of TGL acquisition**

- Time-to-market shortened to benefit from upcoming tenders
 - In-house technology upgraded

TGL securing technological leadership position in Tidal

TGL technology overview

Better hydrodynamic performance

- Uses unidirectional blades rather than bidirectional blades

Better capacity factor

- Variable pitch blades to control rotor speed, loads, and power



More cost efficient and easier maintenance

- Buoyant nacelle, allowing turbine to be towed to and from the foundation site
- Detachable from tripod for easy maintenance
- Ability to yaw to any heading

More cost efficient and easier installation

- Lightweight structure, installed using Dynamically Positioned (DP) vessels from Oil & Gas industry
- Attached to the seabed using piles
- Able to accept different sized turbines

Easier installation & maintenance allowing better performance and lower operation costs

Agenda

I. Renewable Power within Alstom

II. Renewable market

III. Financials

IV. Hydro

V. Wind

VI. New Energies

VII. Conclusion

Conclusion

- Ambition to grow in profitable Renewable Energy segments
 - Build on Hydro worldwide leadership and generate more Service revenues
 - Succeed in Offshore Wind industrial and commercial ramp up
- Pursue selective growth in Onshore
- Improve cost competitiveness and operational performance across the product lines
- Prepare longer term profitable growth in New Energies by building offering portfolio

Expected rebound of operating margin from current low point