

China – Latin America towards 2030, strategic & sustainable colaboration in the energy sector

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Global drivers...



- There is a global consensus among experts and opinion leaders with respect to three major drivers that augment the need to diversify energy generation sources:

- 1) **Demographic change**, today around 7 billion people (1.6 billion more than in 1990), by 2030 we might surpass 8.4 billion;
- 2) **Growing scarcity and irresponsible exploitation of natural resources**, including hydrocarbons;
- 3) **Climate change** and the adoption of agreements / protocols to control certain emissions and global warming.

- These elements, combined, will be translated into an electricity demand of over 36 thousands TWh by 2030.



... towards 2030

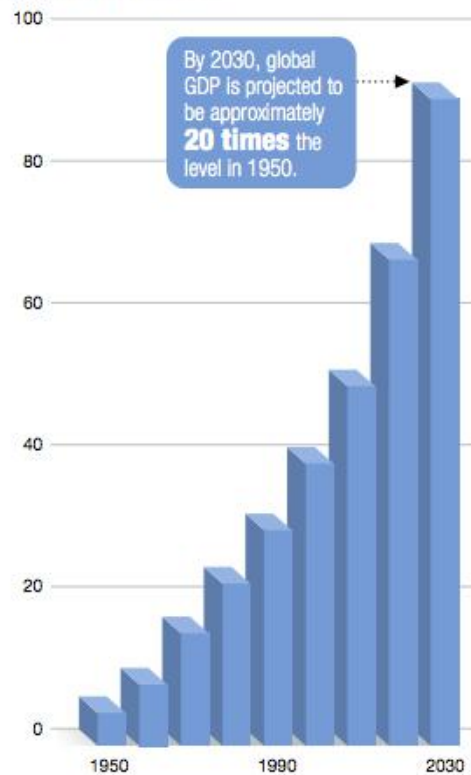
- From ExxonMobil Report, by 2030...

global GDP is projected to be 20 times the level in 1950;

global energy demand is projected to be 6 times the level in 1950, with an increasingly diverse energy mix.

Global gross domestic product

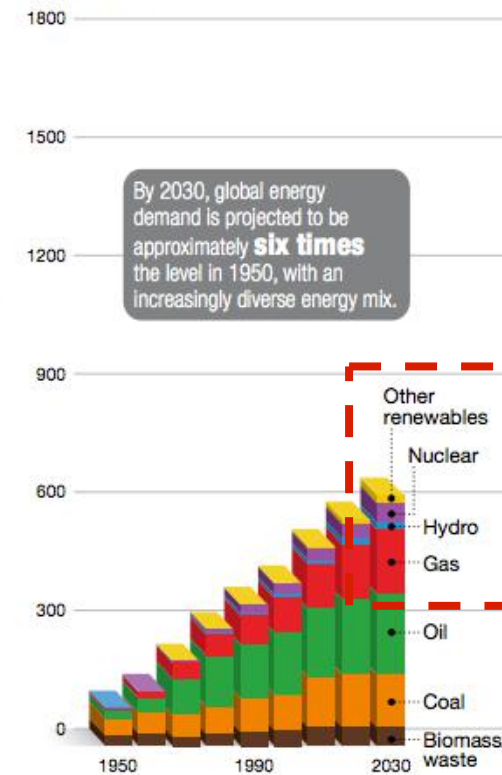
Trillions of 2005 dollars



Source: Maddison, *The World Economy: The Millennial Perspective*; ExxonMobil

Global demand by fuel

Quadrillion BTUs



Source: Smil, *Energy Transitions*; ExxonMobil

Source: 2010, *The Outlook for Energy: A view to 2030*:
http://www.exxonmobil.com/Corporate/files/news_pub_eo_2010.pdf

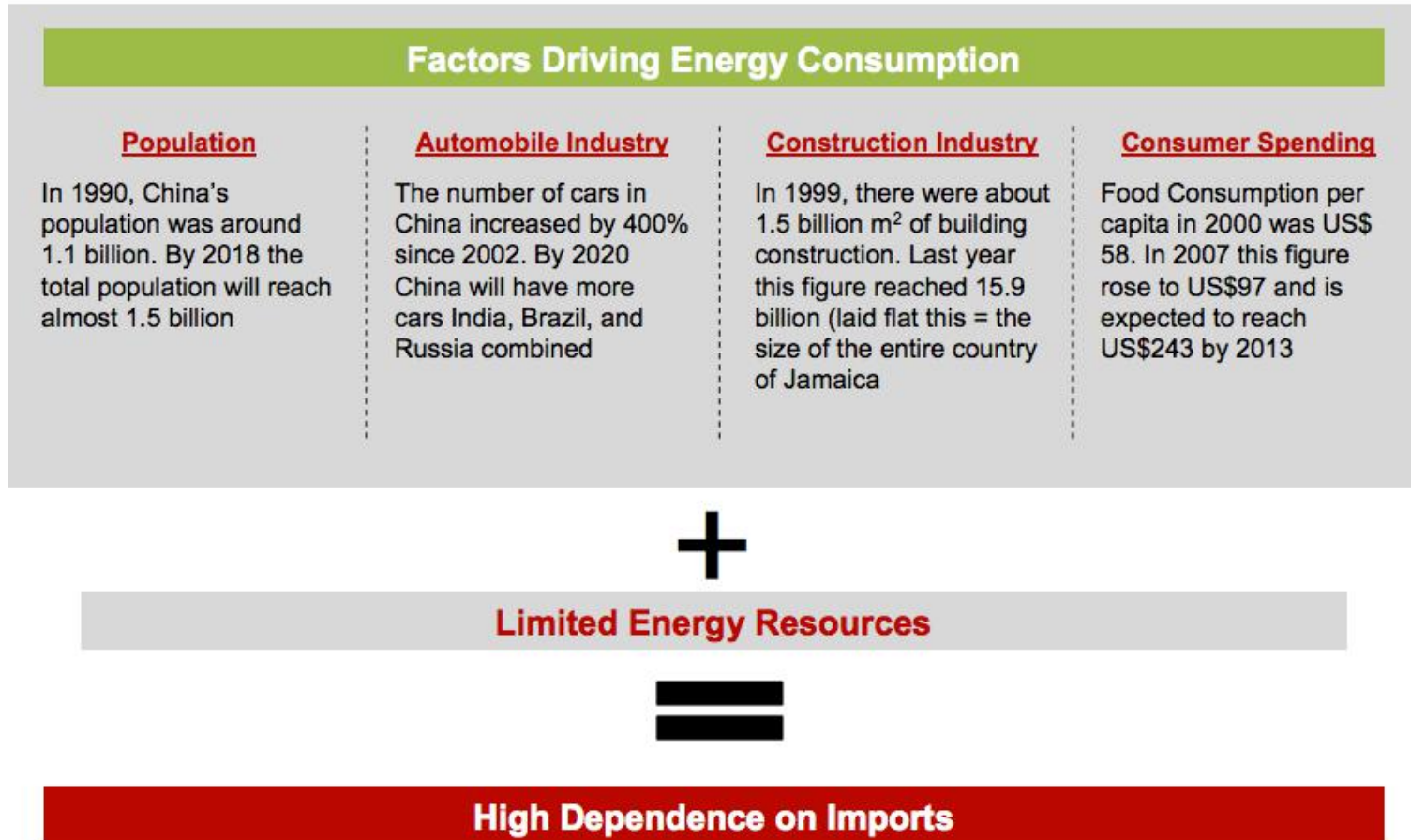


What about China?

- Whereas coal, followed by oil, will continue being the most commonly used fuel in the US, India and China, **growth and diversification will take place in emerging markets;**
- Thermo and hydroelectric centrals will maintain a mayor share but **renewable sources are catching up, surpassing electricity generation from natural gas in the near future;**
- Europe and the US will maintain a leading role (by installed capacity) but not for long. Today, **China is adding up more wind power capacity annually than the rest of the world combined.**



What is driving its energy consumption?

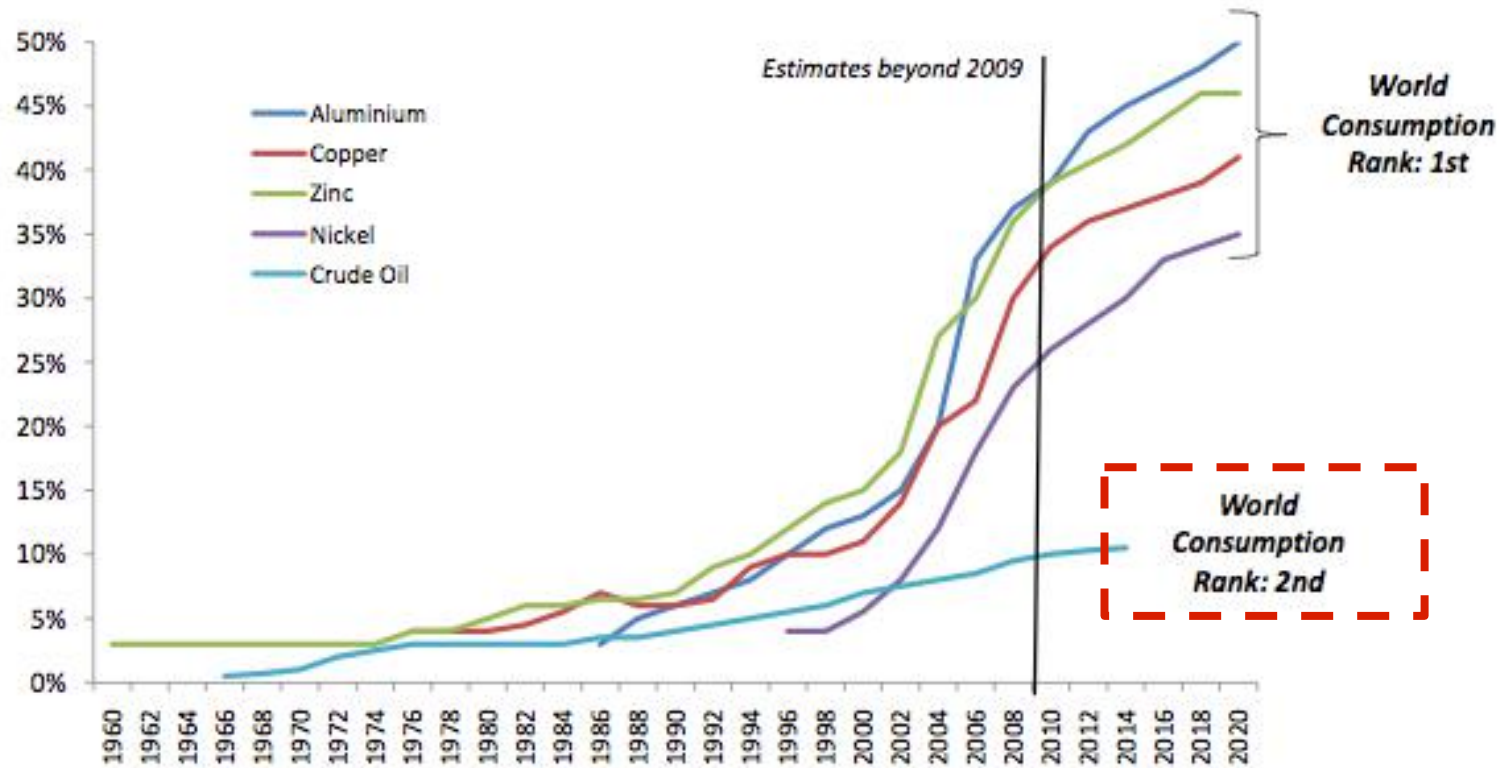


Source: SinoLatin Capital, http://www.iamericas.org/presentations/energy/lj2011/Erick_Bethel.pdf



China's share of commodity use...

China's Share of the World Commodity Usage (%)

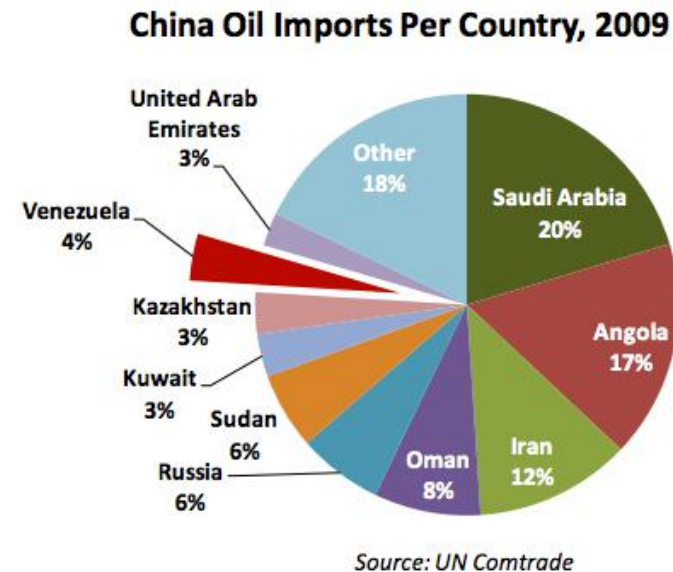
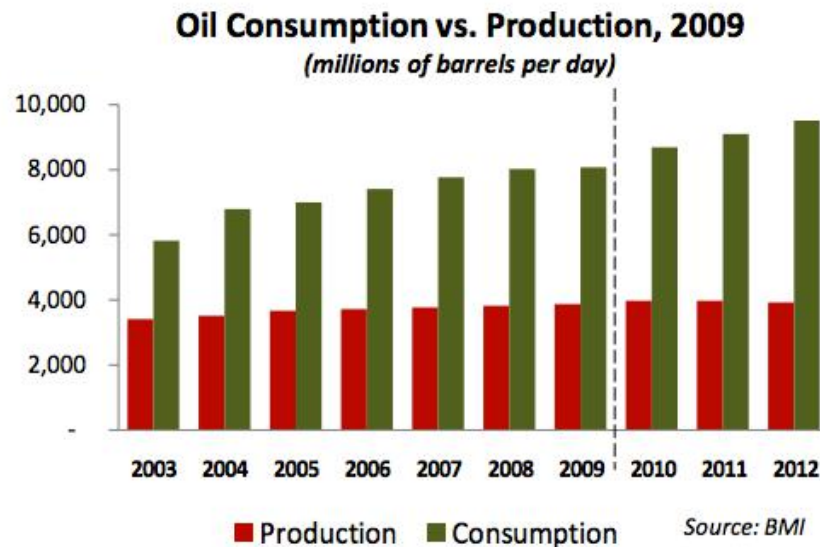


Source: UN Comtrade & SinoLatin Capital: <http://www.sinolatincapital.com/Upload/20101122135446.pdf>



Let's look at oil...

- Essential, **China has 20% of global population, and only 1% of the world's proven reserves of oil.** Countries' such as Venezuela, Brazil or Argentina are becoming important suppliers;
- These and other Latin American countries (i.e. Colombia) are gradually positioned within China's main investment destinations and trading partners.



Source: China, Oil & Latin America: NOC's positioning and beyond:
<http://www.sinolatincapital.cn/Upload/2010114102529.pdf>



What are the implications for LatAm?

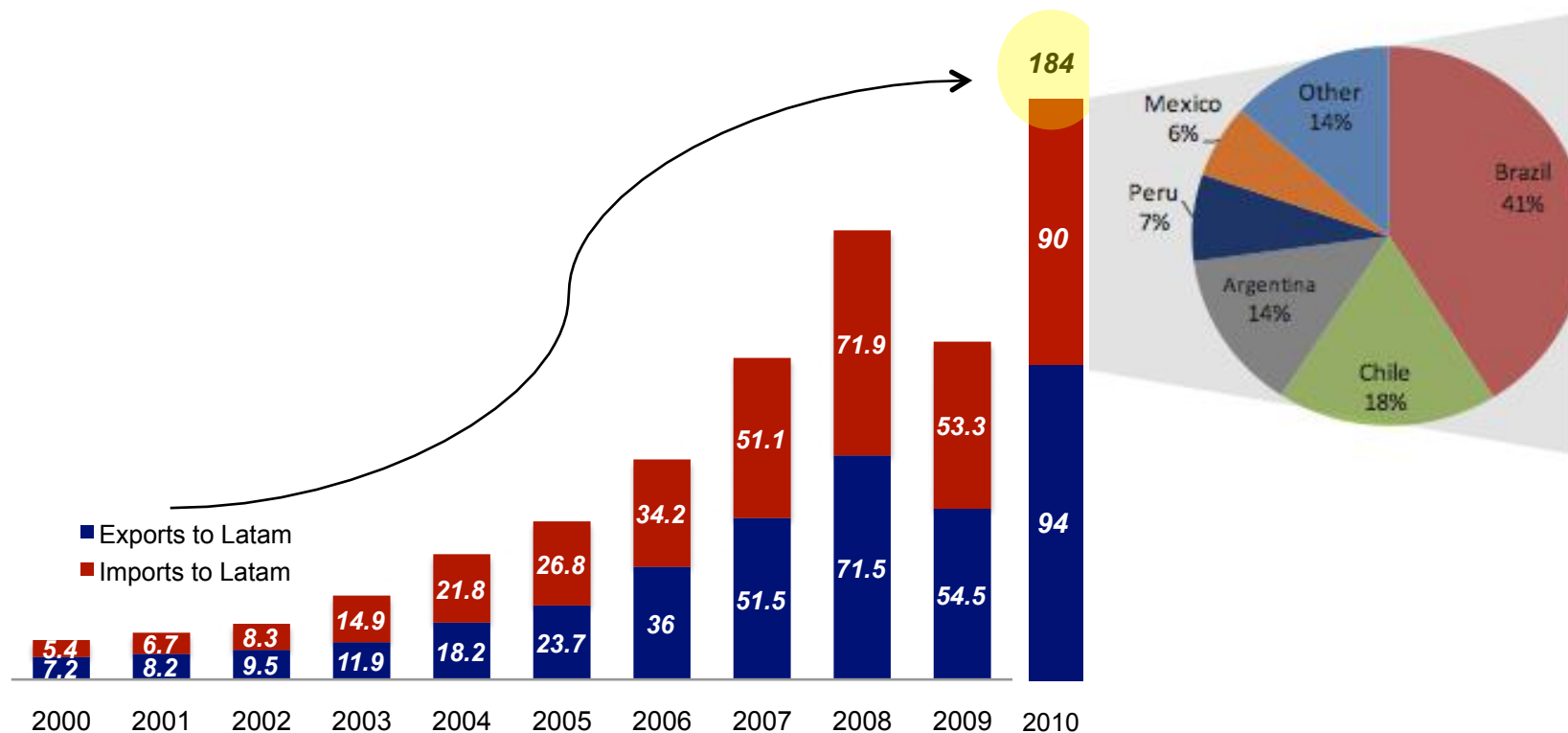


- Even more so after the 2008 financial crisis, **Latin America is today one of China's long term suppliers of natural resources** and a premier investment destination;
- According to ECLAC, by the end of **2011, China's accumulated and announced investment in the region surpassed USD 45 billion**, 60% in the energy sector;
- Main transactions include **CNOOC's** investments in Argentina, **Sinochem's** in Colombia & Brasil, as well as a number of exploration activities conducted by **CNPC** and **Sinopec** in Peru, Ecuador & Venezuela;
- Various **cooperation agreements and lines of credit** were granted in the last few years to countries like Venezuela, including a USD 20 billion credit from CDB to PDVSA.



Let's look at the trade balance...

Trade Balance China – Latin America 2000 – 2010
US\$ billions

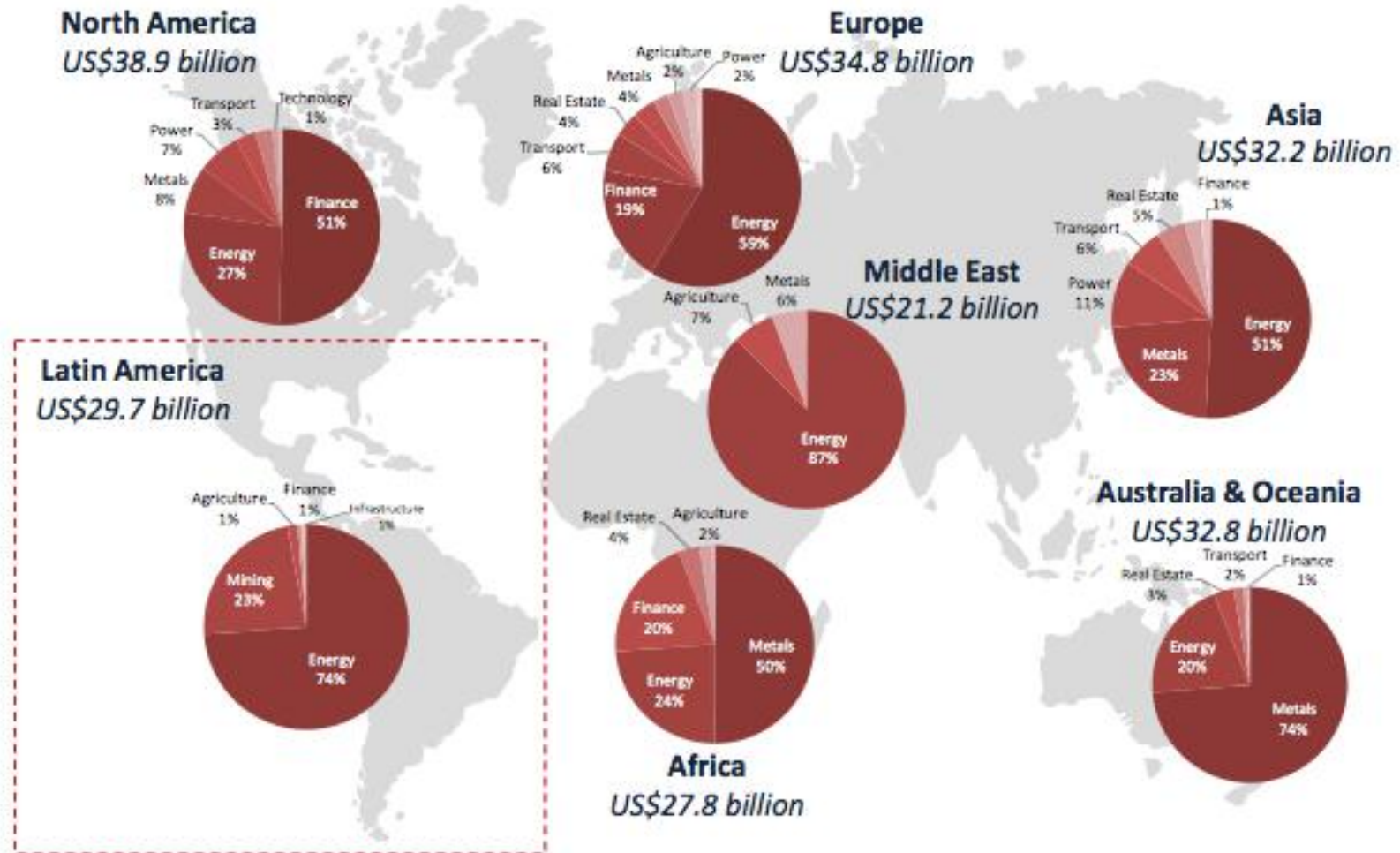


Source: SinoLatin Capital, IMF & China National Bureau of Statistics



... and China's FDI in the region

Chinese Overseas Investments by Region 2005 - 2010



Source: SinoLatin Capital & The Heritage Foundation



... accumulated & announced (2011)

Inversión Extranjera Directa (IED) de China en algunos países de América Latina y el Caribe (mdd)

	Inversión 1990-2009	Confirmada 2,010	Inversión Anunciada 2011 en adelante	Total
Argentina	143	5,550	3,530	9,223
Brasil	255	9,563	9,870	19,688
Colombia	1,677	3		1,680
Costarica	13	5	700	718
Ecuador	1,619	41		1,660
Guayana	1,000			1,000
México	127	5		132
Perú	2,262	84	8,640	10,986
Venezuela	240			
TOTAL	7,336	15,251	22,740	45,087

Fuente: Comisión Económica para América Latina y el Caribe (ECLAC) con base en información de Thomson Reuters, fDi Markets (online), fuentes oficiales y entrevistas a empresas.¹⁴



Source: 40 de la Relación entre México y China, acuerdos, desencuentros y futuro
<http://dusselpeters.com/53.pdf>



CONCLUSION:

- **China will continue its path to become the world's largest consumer and importer of traditional and non-traditional fuels,** increasingly relying from Latin America;
- **Imports of hydrocarbons will intensify** not only from those countries that have been recipients of Chinese FDI from also from other countries such as Mexico that recently started exporting such commodity;
- This is the **first strategic, not yet sustainable conclusion** with respect to the China – Latin America 2030 agenda.



Renewable energy, priority or reality?



China 2030

- Indeed, **China's interest in developing renewable energy sources is a reality**, demonstrated by technology improvements and recently installed capacity in sectors such as wind, solar and biomass, as well as in large hydroelectric plants (i.e. Three Gorges);
- What are the energy policies towards 2030? What are the main drivers? **On one side, China's emerging and vibrant middle class; on the other, technology, capital but most importantly, political will in long term planning.**
- Energy production by 2030 is expected to rely increasingly in renewable energy sources, around 20%. Consumption is expected to reach 1050Mtce, compared to 300Mtce before 2010.

Cuadro 1 | Potencial de Energía Renovable en China

Tipo de Energía	Potencial Teórico (cientos de millones kW)	Potencial Económico (cientos de millones kW)	Producción Anual de Energía (cientos de millones tce/año)
Eólica	43	7 ~ 12	5 ~ 8
Solar	1700 billion tce	22	11 ~ 14
Biomasa	-	-	8.9
Hidro	6	5	8.6
Geotermica	462.65 billion tce	0.2	0.5
Oceanica	6100	9.9	5.5
Total	-	59	40 ~ 46

Fuente: Estrategia de Energías Renovables, Academia China de Ingeniería, 2008¹



China's XII Five Year Plan (2011-2015)



- The Plan specifies that **from China's total energy consumption, 15% shall be generated by renewable sources** (today 11.4%), and CO2 emissions by unit of GDP shall be reduced to 17%.
- It also promotes international cooperation and to support not only NOCs expansion but also the development of **joint infrastructure and construction projects (i.e. wind farms, hydroelectric plants, etc)**;
- It also seek to **reduce CO2 emissions 40%** by 2020 (compared to 2005).



What is there for Latin America?

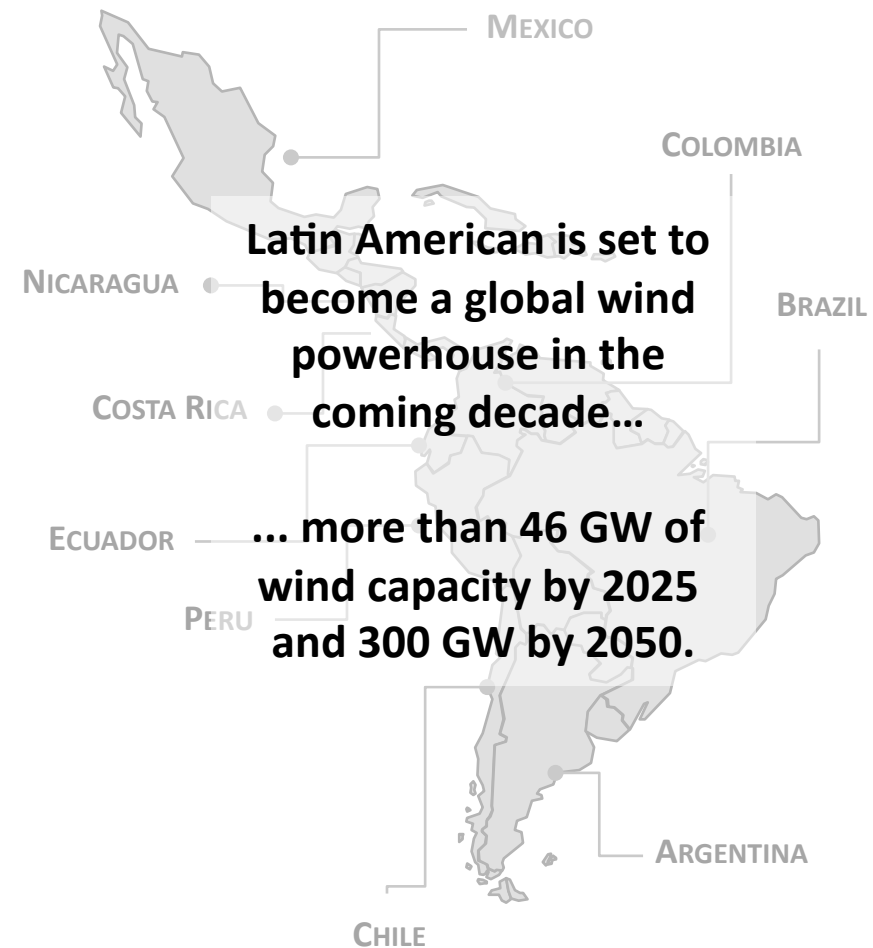
- **Opportunity to leverage China's technology, capital and economies of scale** given an increasing importance in Latin America for renewable sources;
- **By 2011, China had a 62 GW installed capacity compared to less than 2 GW in Mexico** (out of the 70 GW potential estimated by the government);
- By 2015, it is expected that China's installed capacity surpass 100 GW, generating 190 billion KWh per year;
- Out of China's 80+ **wind turbine manufacturers 10 are actively participating in domestic and international tenders**, including Sinovel, Goldwind, DongFang Electric and Envision Energy;



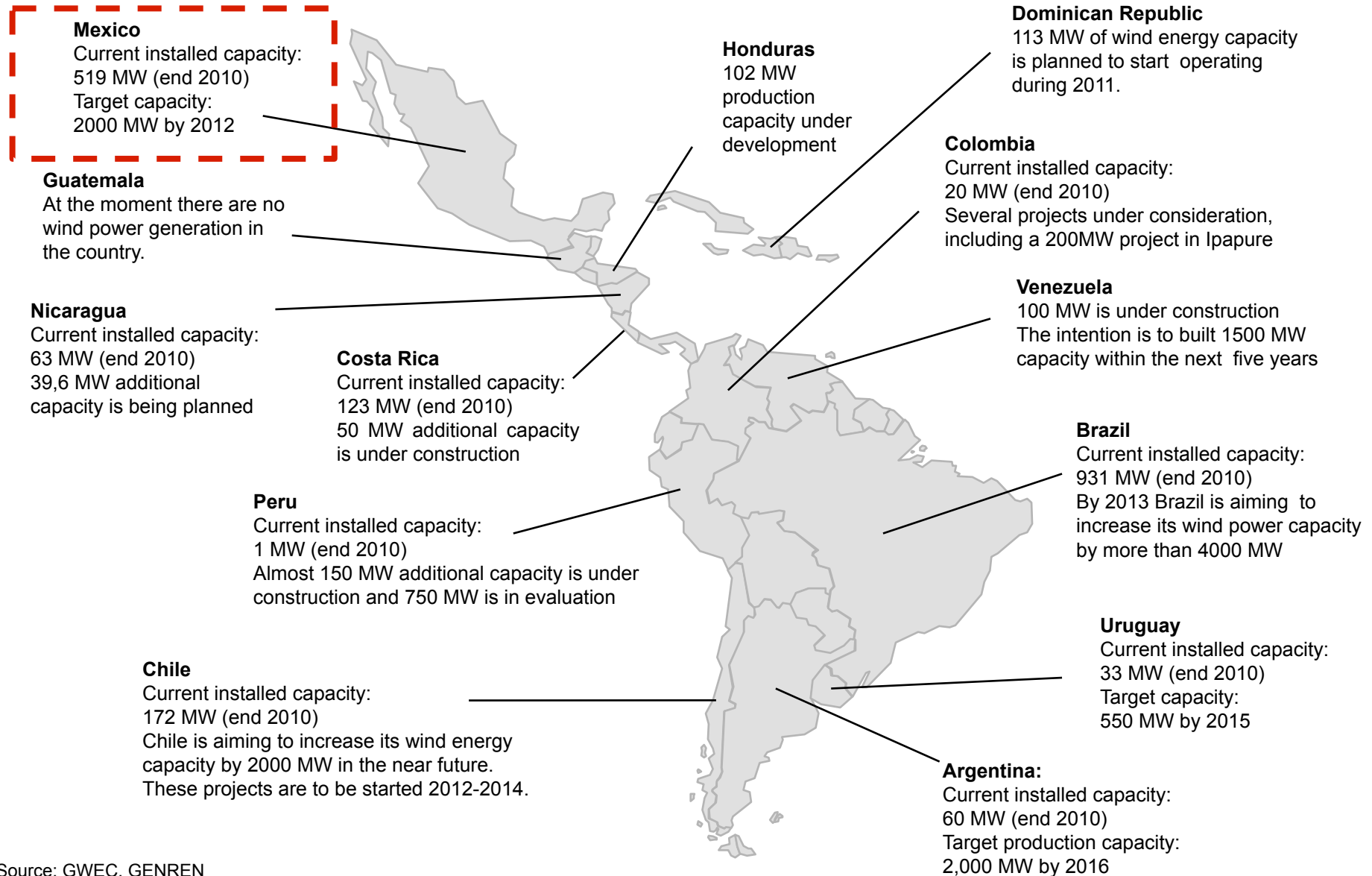
the basics...

Why Latin America?

- Wind Power is considered the most **promising source of renewable energy**. Smaller projects if compared to China & the USA, but attractive margins;
- **Policy and regulation is in place** allowing private investment in co-generation. Governments seeking proven and cost-competitive technologies;
- **Leading European wind turbine manufacturers are gaining terrain**. Few Asian based suppliers are coming in;
- **Envision uniquely positioned** to sell high quality / cost efficient turbines and to participate as co-developer in domestic or cross-border operations.



Where is Latin America in wind?



key drivers...

- Reliance on hydro and fossil fuels has led to a **constrained supply**;
- **Wind is a clear favorite**, along with geothermal, biomass and mini-hydro;
- Wind power has **prominent growth opportunities** to build capacity. Initiatives are led by Brazil, Mexico and Chile;
- Maturing of technology development and know-how along with the **possibility to reduce costs through local manufacturing**;
- Rising profile of environmental concerns, especially climate change. **No geo-political risk**.
- Wind energy makes **sound economic sense** in contrast to other generation sources.



growth potential...

Hydro

Roughly 70% of the total energy generated in Latin America comes from hydroelectricity

Wind

Wind energy has become the fastest growing energy source over the last 20 years

Solar (PV)

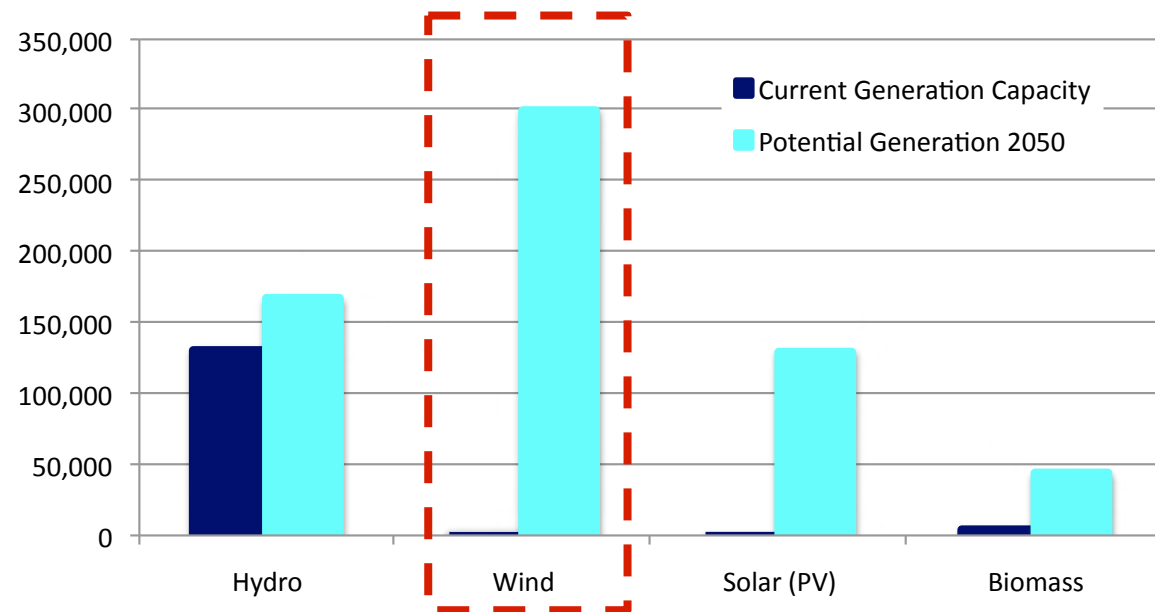
Around half of Latin America's land receives enough radiation to generate solar energy

Biomass

There are a number of processes that can be used to convert energy from biomass

+ Traditional reliance on hydro and fossil fuels
+ recent periods of unusually low precipitation,
amid volatile oil prices

= **constrained supply and necessity to diversify energy sources;**



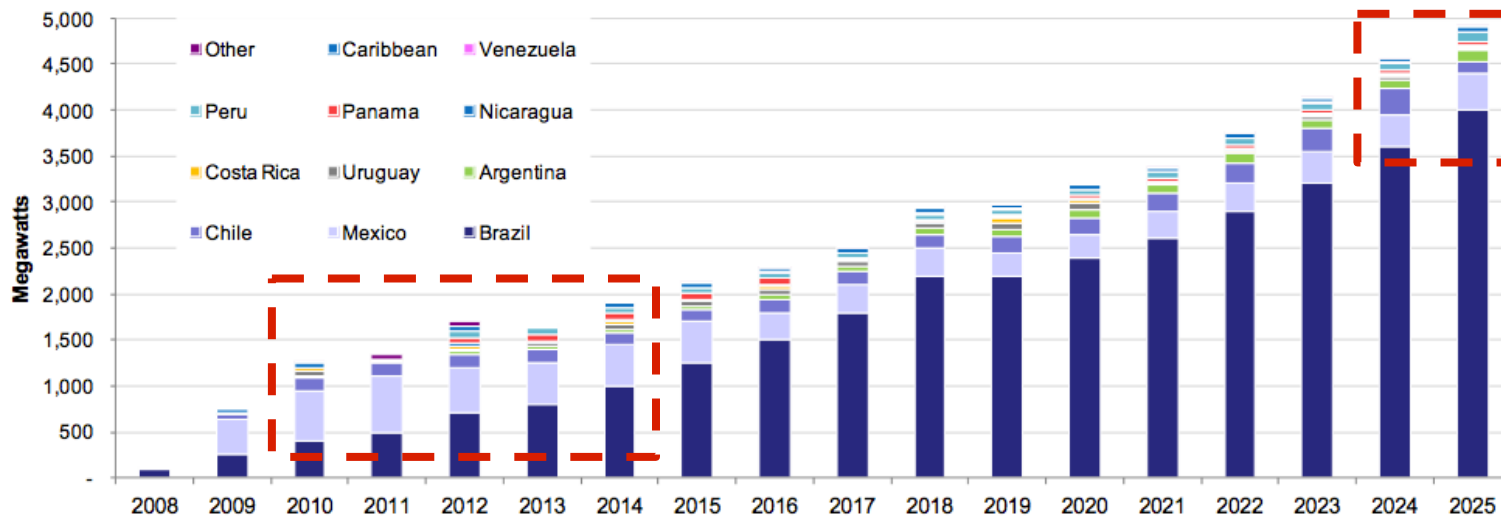
Source: European Renewable Energy council & Greenpeace



... towards 2030 & beyond

- **In most Latin American countries, wind power can still be regarded as nascent.** In 2010 Asia accounted for 54.6% of the world's capacity, Latin America only 1%;
- Total installed capacity **is expected to grow 12.6% CAGR, from 1,983 MW in 2010 to 46 GW in 2025** according to IHS Emerging Energy Research (EER). By 2050, capacity may reach 300 GW;
- In 2010, Brazil accounted for 47% and Mexico 26% (703 MW were installed that year). Other countries such as Chile and Argentina present favorable wind conditions (above average) and unique opportunities to grow capacity.

Latin America Base-Case Scenario, Megawatts Added by Country: 2010–2025



Source: Emerging Energy Research



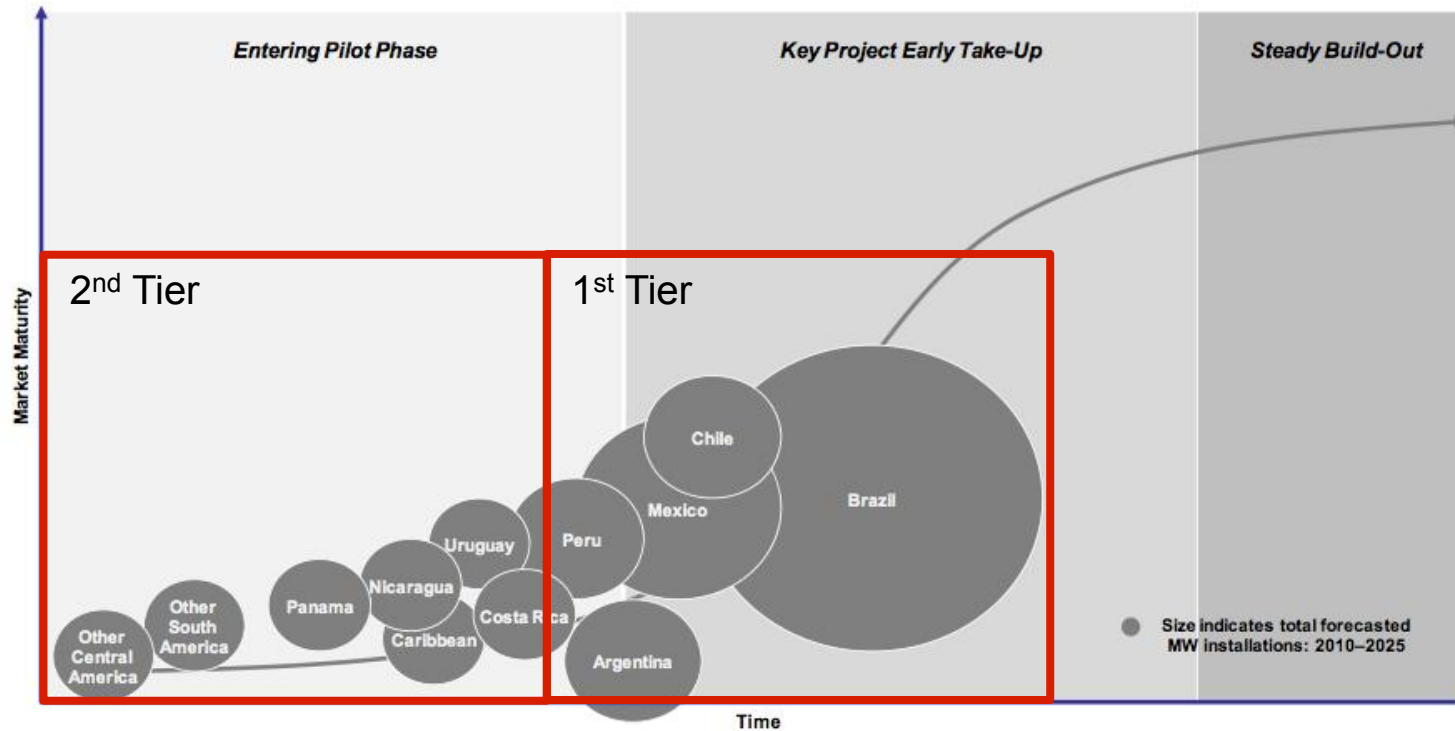
... some challenges / concerns

- Main obstacle (primarily in South America) are **long and insufficient transmission lines** and power losses;
- In Argentina and Bolivia, electric **power prices can be low due to vast natural gas resources**. Protective provisions in Brazil limit exports of Chinese equipment;
- Electric power in the region is primarily generated in **by private companies** (i.e. ENEL, Iberdrola, Union Fenosa, Acciona). No room for small players;
- Although wind power plants have little impact on environment, **concerns have been raised** over noise, visual impacts, and deaths of birds / bats.



Where and When?

Latin America Market Maturity Curve



Year	2005	2006	2007	2008	2009	2010
Brazil	29	237	247	341	606	931
Mexico	3	85	85	85	202	519
Chile		2	20	20	168	172
Other					304	361
Total					1,280	1,983



Source: Emerging Energy Research

Envision's gradual approach

Multiple speeds of market development point to select opportunities in different countries:

- **1st tier countries**

Brazil, Mexico and Chile have set the policy and industrial framework that will sustain market growth. Peru and Argentina also have wind resources and face supply concerns, though lack efficient policy;

- **2nd tier countries**

Colombia, Nicaragua, Panama, Uruguay and Costa Rica indicate political will for renewable, but lack consistency and scale;

- **Other markets**

Include Venezuela, Cuba, Bolivia and the Dominican Republic. Growth potential but implementation plans remain vague.



CONCLUSION:

- **For China as well as for Latin America, energy savings / conservation together with the development of renewable sources**, specifically wind, are within the regions' most important public and energy policies;
- This is the 2nd conclusion being a strategic and sustainable area of cooperation. **As China continue developing technology and exporting capital, Latin America will have the possibility to diversify its energy basket** and reach 2030 goals.



facts & figures



1st tier: Mexico, Chile, Argentina & Peru

- **Whereas Brazil is the largest market** for wind power in terms of installed capacity and potential, **domestic policies** aimed at protecting local manufacturers imposes tariffs that **jeopardize exports of Chinese turbines**;
- **Mexico and Chile are the main and immediate markets.** Both have policy and regulation in place encouraging wind power generation. Several projects under development.
- Argentina and Peru are on an earlier stage but will follow a similar path.

	Brasil	Mexico	Chile	Argentina	Peru
Total Installed Capacity (MW)	920	521	170	50	0.7
Added Capacity (MW)	320	104.15	2.55	25.3	0
Growth Rate	53.30%	29.60%	1.50%	82.1	0.00%
Share of wind energy in electricity consumption (%)	N/A	0.68%	0.12%	N/A	N/A
Rank in LA	1	2	3	5	16
Rank Worldwide	21	27	35	45	75
Market Share	N/A	48% Acciona 38% Gamesa 13% Clipper Wind 0.3% Vestas 0.3% Others	65% Vestas 35% Acciona 1.4% Hewind 0.6% Bonus	N/A	N/A

Source: GWEC



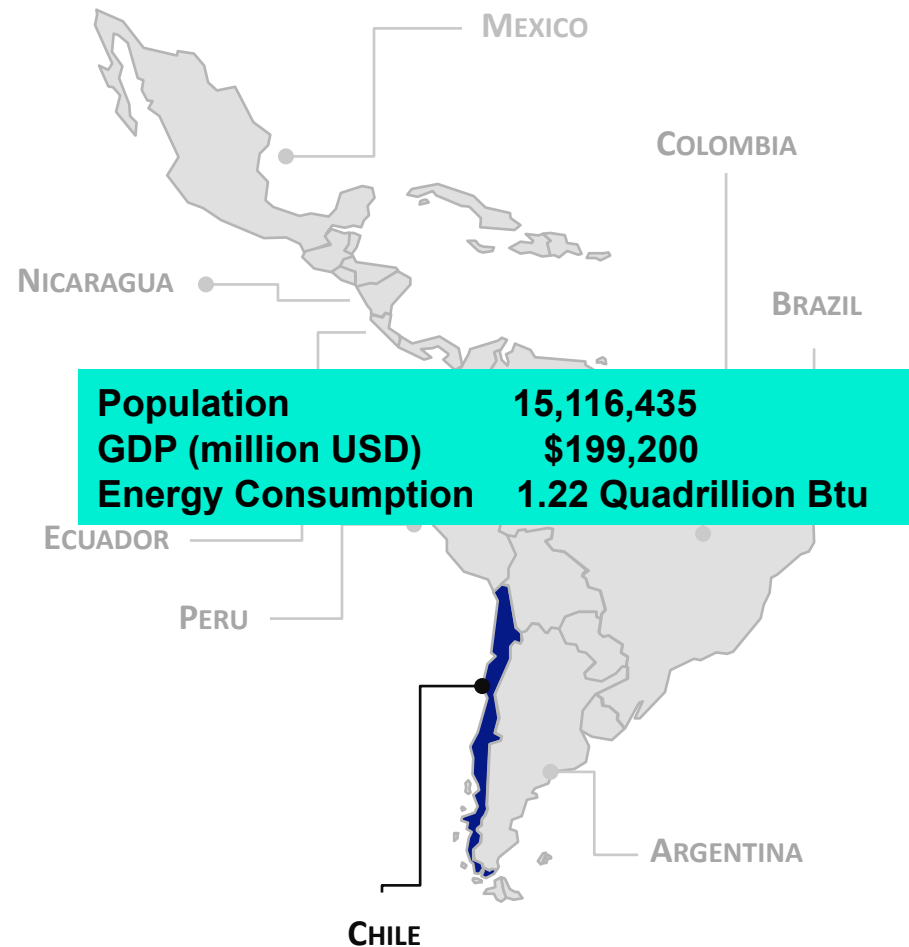
Mexico

- Attractive market given its economic activity and population. **Wind power potential at around 71 GW.**
- **650 MW operational, 500 under work, 2,000 MW projects authorized.** By 2020, additional 5,000+ MW will be installed.
- In 2010, RE accounted for 27% of Mexico's 55,000 MW capacity (mainly large hydro) ~ wind only 519 MW. **By 2025, RE shall reach 25%**, mainly wind and solar;
- **Workable framework for CFE, allowing co-generation** and self-consumption;
- Proximity and connectivity to the USA (California ~ prime market for win power);
- **Tax incentives** (i.e. 100% first year depreciation, no property tax, no sales tax, VAT fully recovered in Y1);



Chile

- **Limited fossil energy resources** has created dependence on imports (i.e. gas), and caused electricity shortages. Energy prices have tripled in 5 years;
- 561 MW of non-hydro renewable energy capacity (3.7% of the country's total installed capacity); 172 MW is wind power. **Large projects under development;**
- 65% of Chile's electricity generated by thermal (natural gas & coal); 34% hydro. **Wind energy potential estimated at around 40 GW;**
- Good wind resources, including the south-central zone, 80% of Chile's population and 2/3 of its industry.



Argentina

- Argentina has the potential to create a strong wind power industry. Home of **“La Patagonia” with average wind speed from 5 to 10 m/s at 10 m height**,
- Other promising regions include Comahue, Córdoba, La Rioja and the province of Buenos Aires;
- Despite this wind resource, **Argentina has a mere 60 MW of wind power installed**, mostly erected by small local electricity service cooperatives. It targets 2,000 MW by 2016;
- Larger scale projects have been announced, some have interconnection permits but are still looking for investors and/or negotiating PPAs.
- **Capacity factors over 35% are achievable in over 50% of the territory;**



Peru

- **Abundant wind energy potential, mainly along the coastline** (Piura in the northwest and Ica in the South of Lima) and mountain range (Cajamarca) ~ wind speeds of 7.5 m/sec @ 80m);
- At present, Peru has **150 MW projects under construction** (Energia Eolica, 110 MW and Cobra Peru, 32 MW);
- Technologically feasible **potential is estimated at 22 GW** by the Ministry of Energy and Mining.
- The general instruments for the promotion of renewable energy are defined in the Law N° 100, outlining:
 - i) **share of renewable energy** (wind, solar, tidal, geothermal, biomass and hydro) of **at least 5 % from 2008-2012.**



an strategic & sustainable agenda towards 2030



What are the main challenges?

- Whereas **some cultural as well as business practices and differences in economic and political systems prevail** between China & Latin America, commercial and investment complementarities in the last decade have grown exponentially;
- However, there is a **need to collaborate in more advanced and value added segments**, specially in the energy sector given a strong dependency on oil related transactions;
- **Political and diplomatic relationships are certainly a prerequisite but are not sufficient to impulse a strategic and sustainable agenda**. We need to devise and implement viable mechanisms of collaboration, co-invest and get the private sector involved;

Cuadro 1 | Inversión estimada al 2030 per capita en varios países [EWG; 2008]

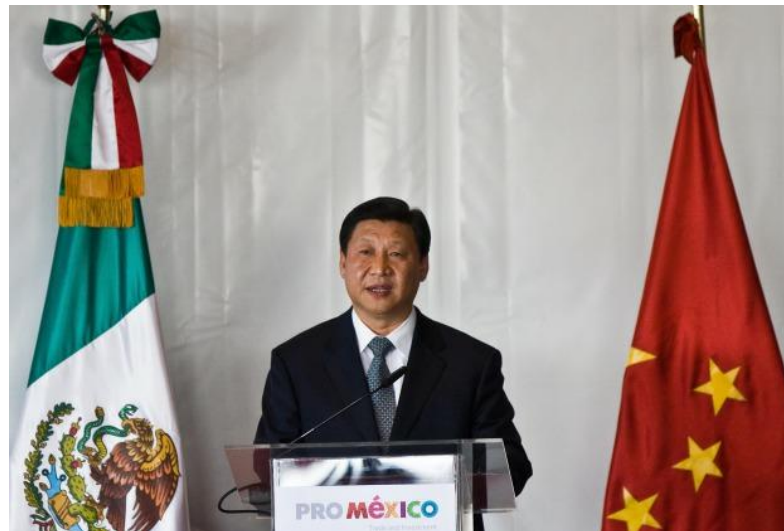
Regiones del Mundo	Inversion per capita por año al 2030 (E2600/cap*a)		Inversion total en 2030 (billion E2600)	
	Variante inferior	Variante Alta	Variante inferior	Variante Alta
OECD Europa	111	223	60	121
OECD Norteamerica	110	220	59	118
OECD Pacifico	112	224	22	44
Economias en Transicion	91	180	31	60
China	102	204	149	299
Este de Asia	41	81	33	66
Sur de Asia	35	71	73	147
America Latina	46	91	26	52
Africa	20	41	30	59
Medio Oriente	101	202	28	55
Escala Global	62	124	510	1021

Fuente: Renewable Energy Outlook 2030



... and expected outcomes?

- **Latin America can and ought to leverage China's development, technology and capital** in renewable sources as it modernizes its energy sector;
- **Cooperation between the regions has been more sporadic than planned**, mainly sponsored by governments with little private sector intervention;
- **China's leading wind turbine manufactures has targeted Latin America** within their top priority in their internationalization efforts. Joint ventures and strategic alliances with local developers and service providers are desired;
- **Latin America has also committed to guarantee energy sustainability by 2030**, working and partnering with Chinese companies could be the decisive factor.



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