



# Wind Travelling Ahead in Asia Pacific: Underlying Opportunities and Challenges

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November 2010

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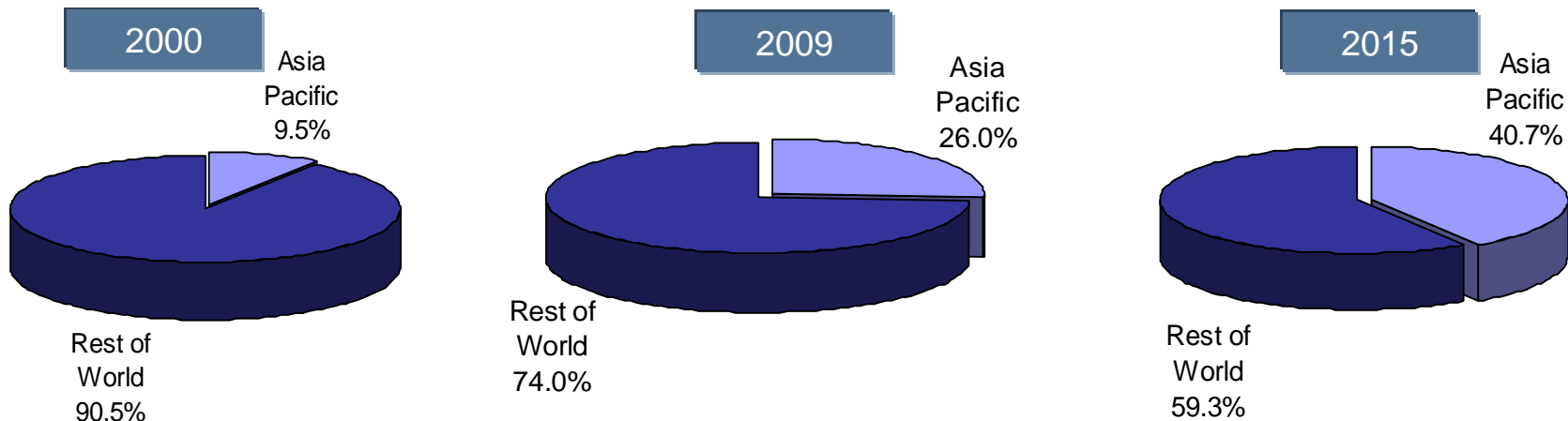
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# Wind Travelling Ahead in Asia Pacific: Underlying Opportunities and Challenges

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# Asia Pacific Region Redefining the Global Demand for Wind Power

## Wind Energy Market: Cumulative Installed Capacity by Geographic Region (World), 2000-2015



## Wind Energy Market: Key Figures (World and Asia Pacific), 2009 and 2015

	World		Asia Pacific	
	2009	2015	2009	2015
Total Installed Capacity (MW)	157,900	~491,000	41,130	~200,000
Market Growth Rate (2008-2009)	30.2%	21.3%	57.8%	25.0%
Market Stage	Growth	Growth	Growth	Growth
New Capacity Additions (MW)	37,446	~86,000	15,216	~40,000
Incremental Capacity Leader	China	China	China	China

Source: Frost & Sullivan

# Asia Pacific Region Redefining the Global Demand for Wind Power (Contd...)

## Wind Energy Market: Total Installed Capacity Share (World), 2008-2009

Region	North America		Europe		Asia Pacific		Rest of World	
	2008	2009	2008	2009	2008	2009	2008	2009
Share of Installations	22.3%	22.2%	53.7%	48.2%	21.4%	26.1%	2.6%	3.5%
Year-on-year Growth	↓	↔	↓	↓	↑	↑	NA	↑



Increase over previous year's share



Decrease from previous year's share



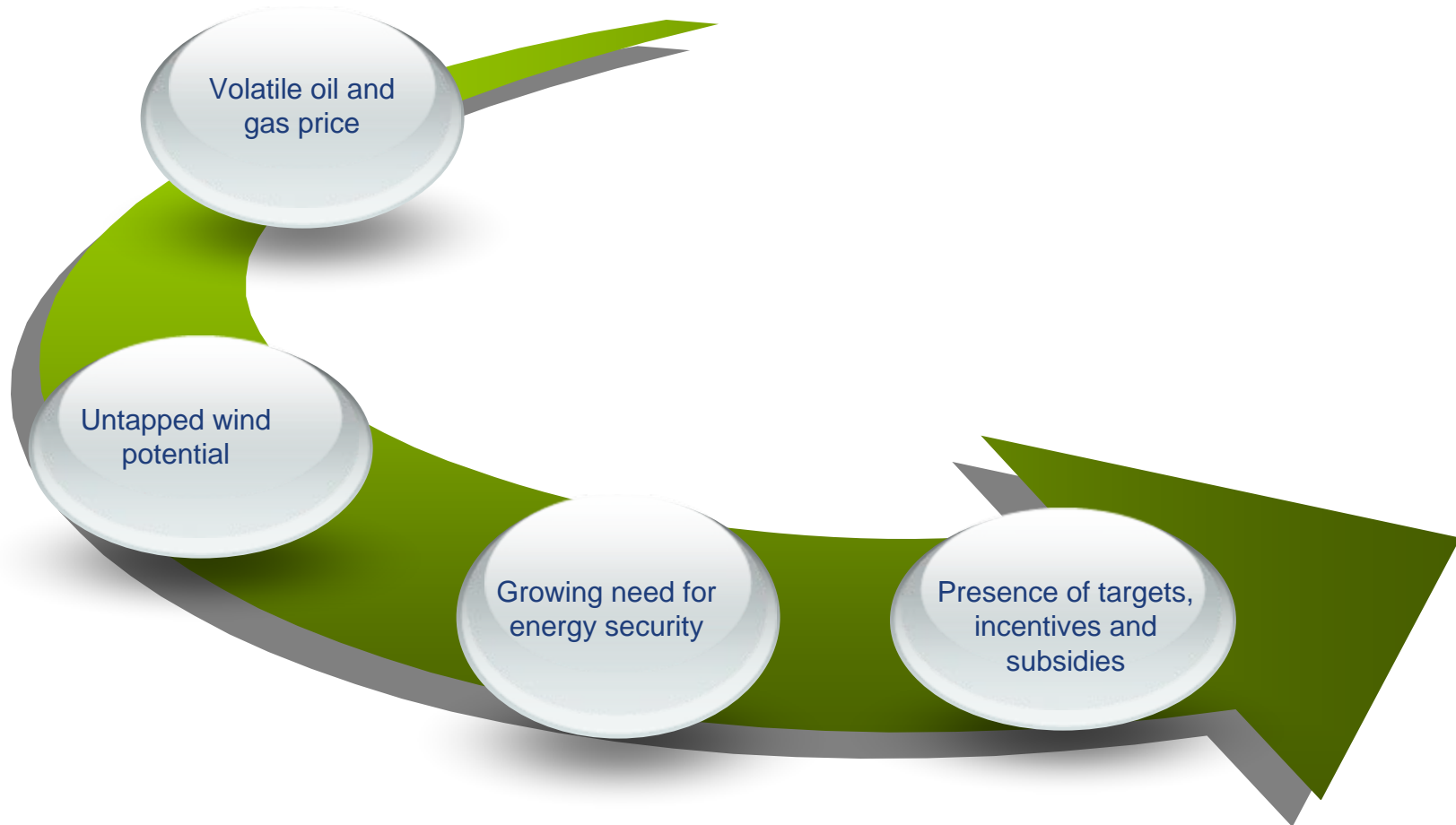
No change



### Growth Continued

Asia Pacific wind energy market was largely immune to the economic downturn as most of the funding for wind power projects was obtained through government-aided institutions and local utilities. Significant growth in Chinese installations uplifted the global wind power market in 2009.

## Wind Energy Market: Market Drivers (Asia Pacific), 2010-2015



Source: Frost & Sullivan

### 3 Major Challenges Restricting Growth

#### Wind Energy Market: Industry Challenges (Asia Pacific), 2010-2015

Grid  
interconnection  
issues

High initial  
investment outlay

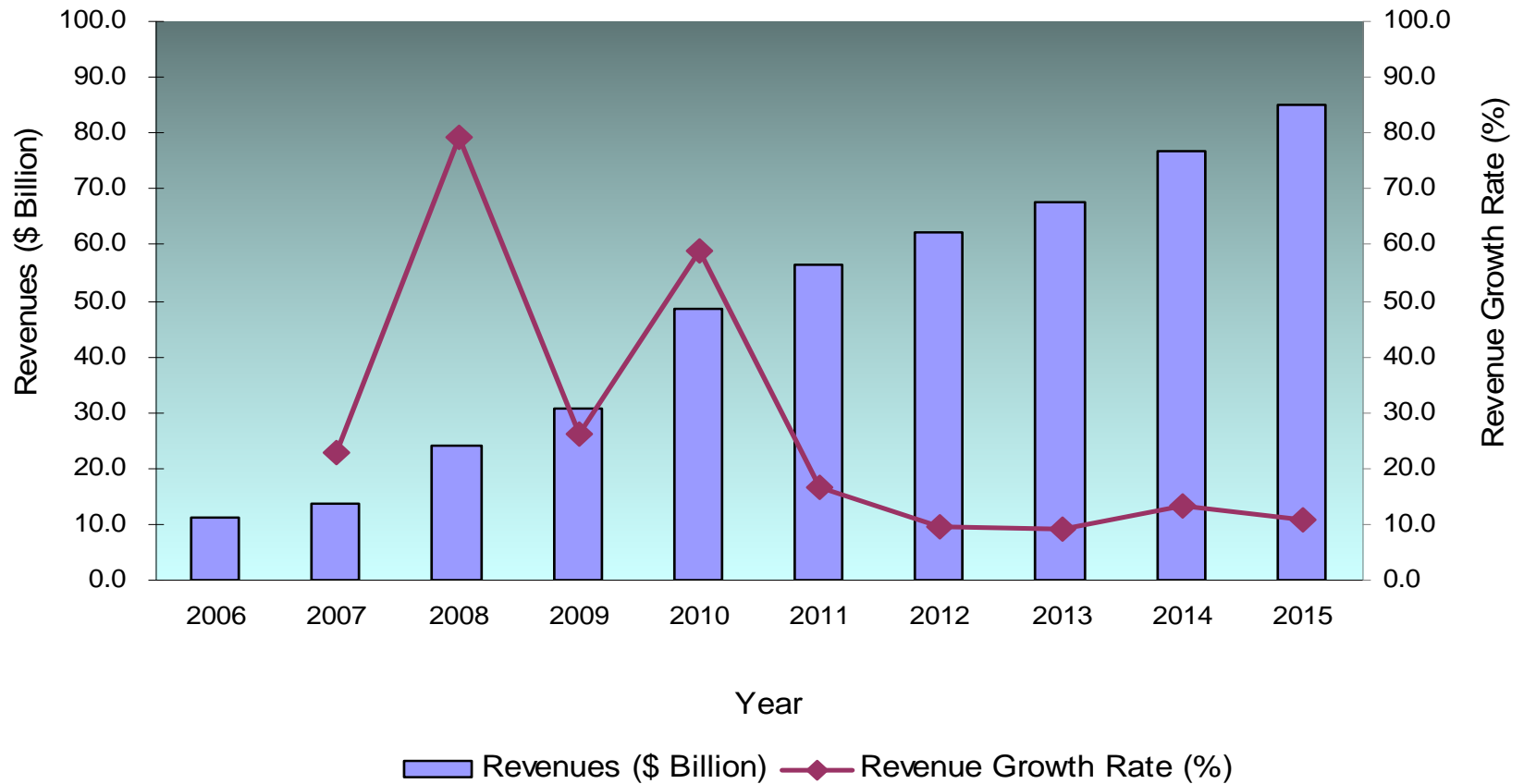
Zoning and  
permitting issues

Growing popularity of  
small hydro and solar  
energy

High dependence  
on government  
support

Source: Frost & Sullivan

## Wind Energy Market: Market Forecasts (Asia Pacific), 2006-2015



**CAGR (2009-2015): 18.6%**

Source: Frost & Sullivan

## 4 Asia Pacific Market Forecasts (Contd...)

### Wind Energy Market: Market Forecasts Assumptions (Asia Pacific), 2010-2015

2010 to 2013

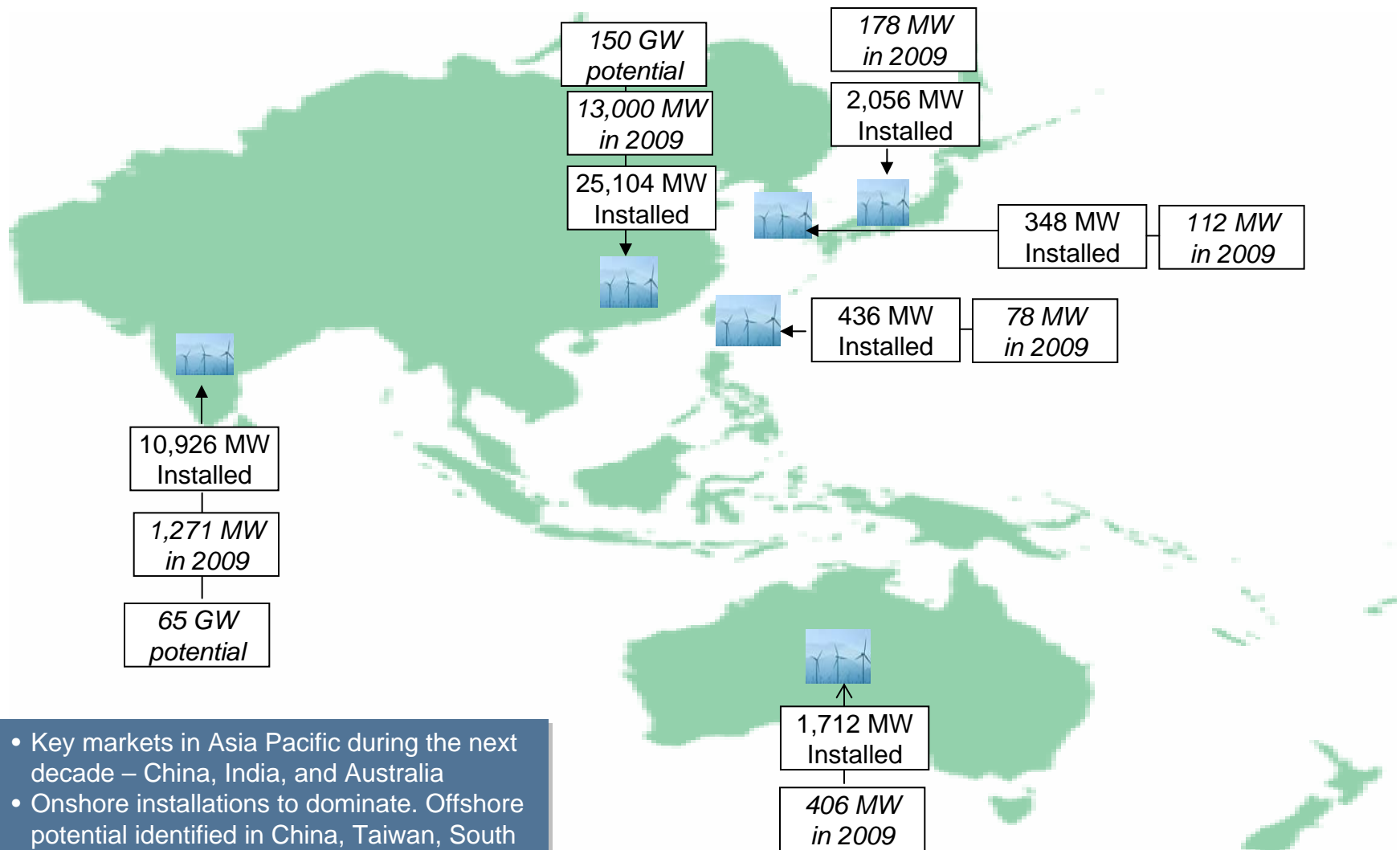
- China continues to grow at a rapid pace and spearheads Asia Pacific growth.
- The Indian market grows on account of Generation based Incentives (GBI).
- Australia grows due to \$20-billion investment in renewables and the Mandatory Renewable Energy Target (MRET).
- New Zealand market is expected to decline in 2010, but is forecast to pick up once the hydropower sites reach saturation.
- Japan to experience slow growth because key regions rich in wind potential are battered by typhoons and land available for development is limited.
- Growth is anticipated in Thailand, The Philippines and South Korea.

2014 and beyond

- Growth in China is likely to decline as the effect of stimulus package subsides and due to lack of infrastructure support.
- Growth is anticipated in Vietnam, Taiwan, and South Korea.
- As solar energy approaches large-scale commercialization, its attractiveness may overshadow wind.



## 5 Hot Spots for Wind Power in Asia Pacific



































- Key markets in Asia Pacific during the next decade – China, India, and Australia
- Onshore installations to dominate. Offshore potential identified in China, Taiwan, South Korea, and Japan.

Source: Compiled by Frost & Sullivan

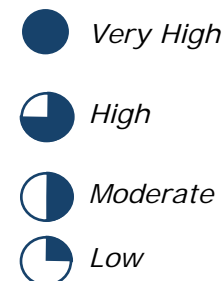
## Hot Spots for Wind Power in Asia Pacific (Contd...)

### Wind Energy Market: Market Attractiveness (Asia Pacific), 2010-2015

Country	1-2 Years	3-4 Years	> 5 Years
China			
India			
Japan			
South Korea			
Taiwan			
Malaysia	--	--	--
Indonesia	--		
The Philippines			
Vietnam			
Thailand			
Australia			
New Zealand			

Market attractiveness for wind projects have been given based on the existing policies, government support in the form of incentives and subsidies, untapped wind potential, technology availability, and private sector participation.

Key:

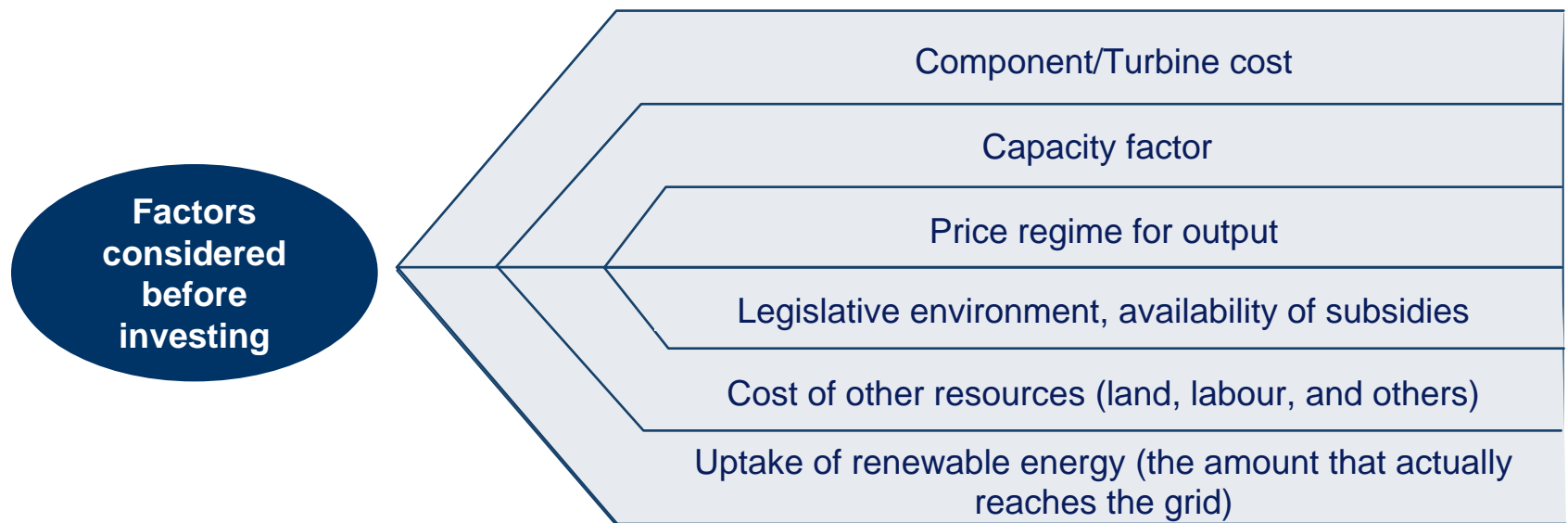


Source: Frost & Sullivan

## 6 Investment Patterns in Asia Pacific

- Historically - venture capital and private equity have been limited. Largely undertaken through the CDM initiative and by government bodies.
- Recently - inflow of funds from foreign investors and utilities.

### Wind Energy Market: Factors Influencing Investment Decisions (Asia Pacific), 2009



Source: Frost & Sullivan

## 6 Investment Patterns in Asia Pacific (Contd...)

### China

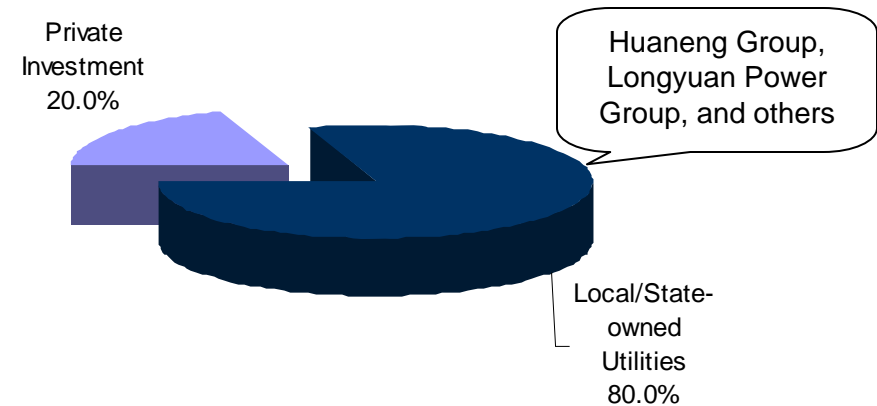
#### 2009:

- Investments in China's wind energy market unaffected by recession.

#### Outlook beyond 2009:

- Foreign investments to expand 'from a trickle to a waterfall'.
- Removal of restrictions wherein 70.0% of the components were to be sourced from domestic suppliers.
- Improves scope for acquisitions of/partnerships with domestic component manufacturers.
- Domestic investment to continue in the development of indigenous wind turbine manufacturing as companies target overseas markets.

Wind Energy Market: Investment Contribution (China), 2009



Source: Frost & Sullivan

**FDI to improve as restrictions on foreign investment is relaxed; however, domestic investment is likely to dominate**

## 6 Investment Patterns in Asia Pacific (Contd...)

### India

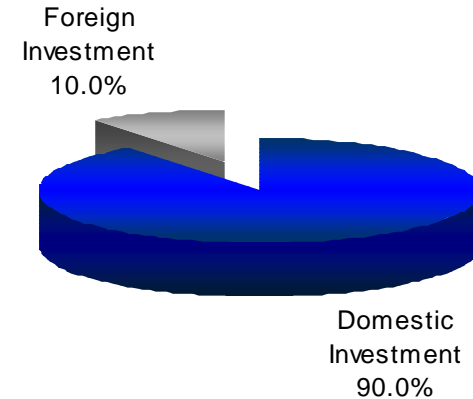
#### 2009:

- Hardest hit by recession. Several wind energy projects shelved.

#### Outlook beyond 2009:

- Generation based incentives (GBIs) to drive investments from foreign project developers.
- IREDA would continue to fund most of the projects developed by local companies.
- Investments to increase in single-megawatt projects and retrofits.
- Offshore wind potential along the western coastline to attract investments.

#### Wind Energy Market: Investment Contribution (India), 2009



Source: Frost & Sullivan

**Foreign collaborations to increase as favourable regulations and need for technological advancements are likely to develop potential in low-wind/offshore locations**

## 6 Investment Patterns in Asia Pacific (Contd...)

### Australia

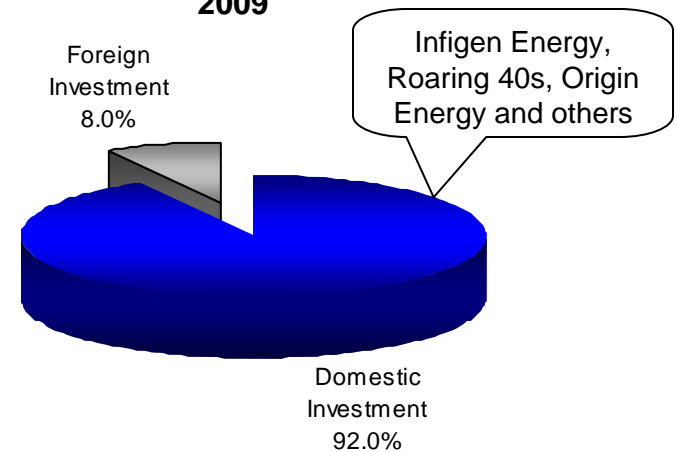
#### 2009:

- Investments largely from domestic utilities and independent power producers; FDI was low.

#### Outlook beyond 2009:

- Investment from European companies likely to increase.
- Continued preference for project finance; 70.0-80.0% debt and remaining through equity.
- Developing large-scale wind farms is becoming an attractive investment option.
- Local project developers have an appetite for foreign wind markets.

#### Wind Energy Market: Investment Contribution (Australia), 2009



Source: Frost & Sullivan

**Mandatory target and penalties associated with MRET drives investment**

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