



# Overview of Global and Regional Wind Energy Policy

November 17, 2015

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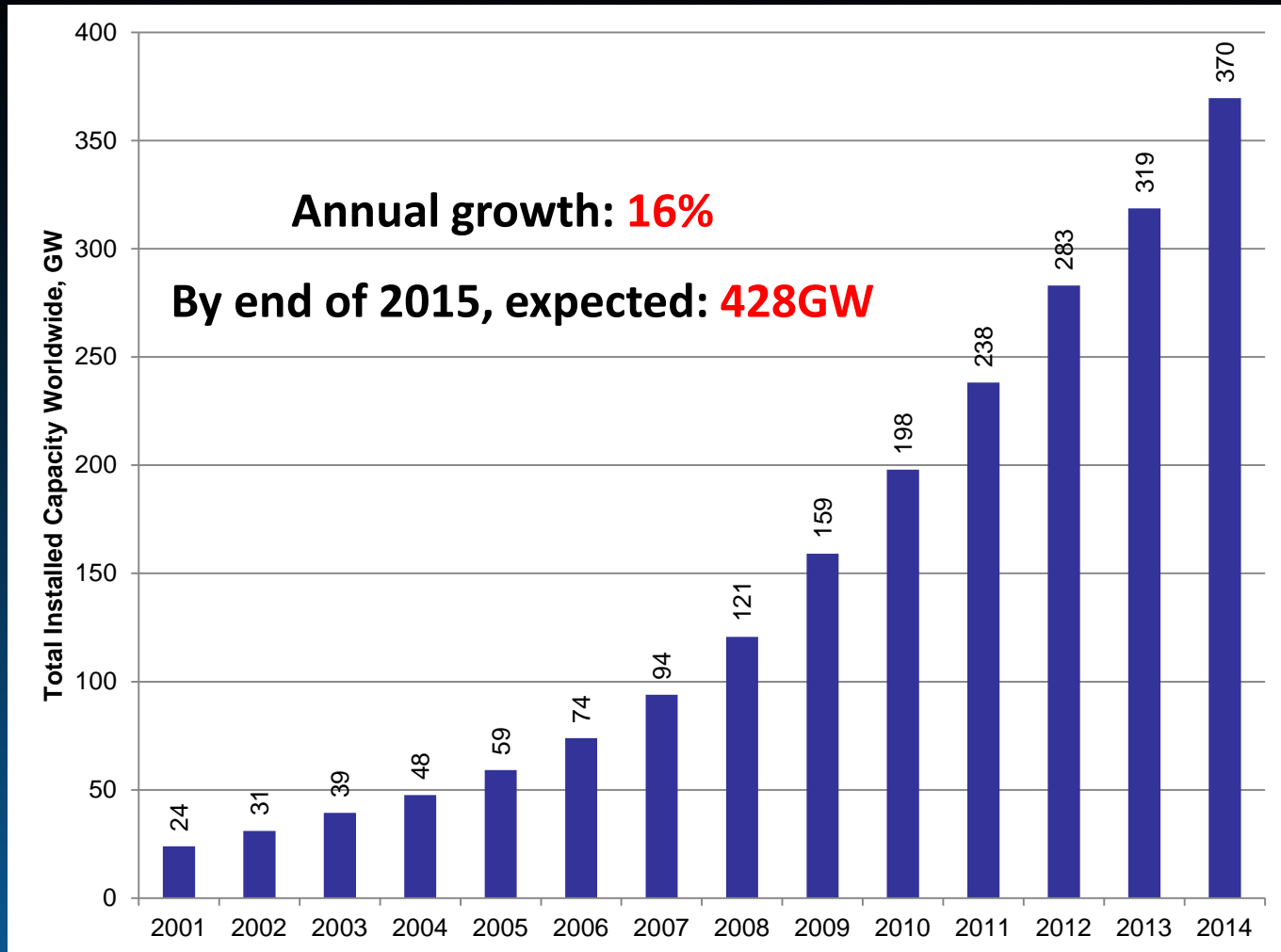
# Quotes

- “Wind energy is the **least-cost option for new power** generating capacity in an increasing number of locations.” REN21, *Renewable 2014 Global Status Report*
- “Wind energy has emerged as the **lowest cost generation option for reducing emissions.**” EIA, 2015
- In 2014 wind energy was an **99.5 billion USD** business in terms of global new investments and it **employed about 1,027,000 people** around the world. GWEC, Global Wind Statistics 2014.





# Worldwide installed capacity of wind power (GW)

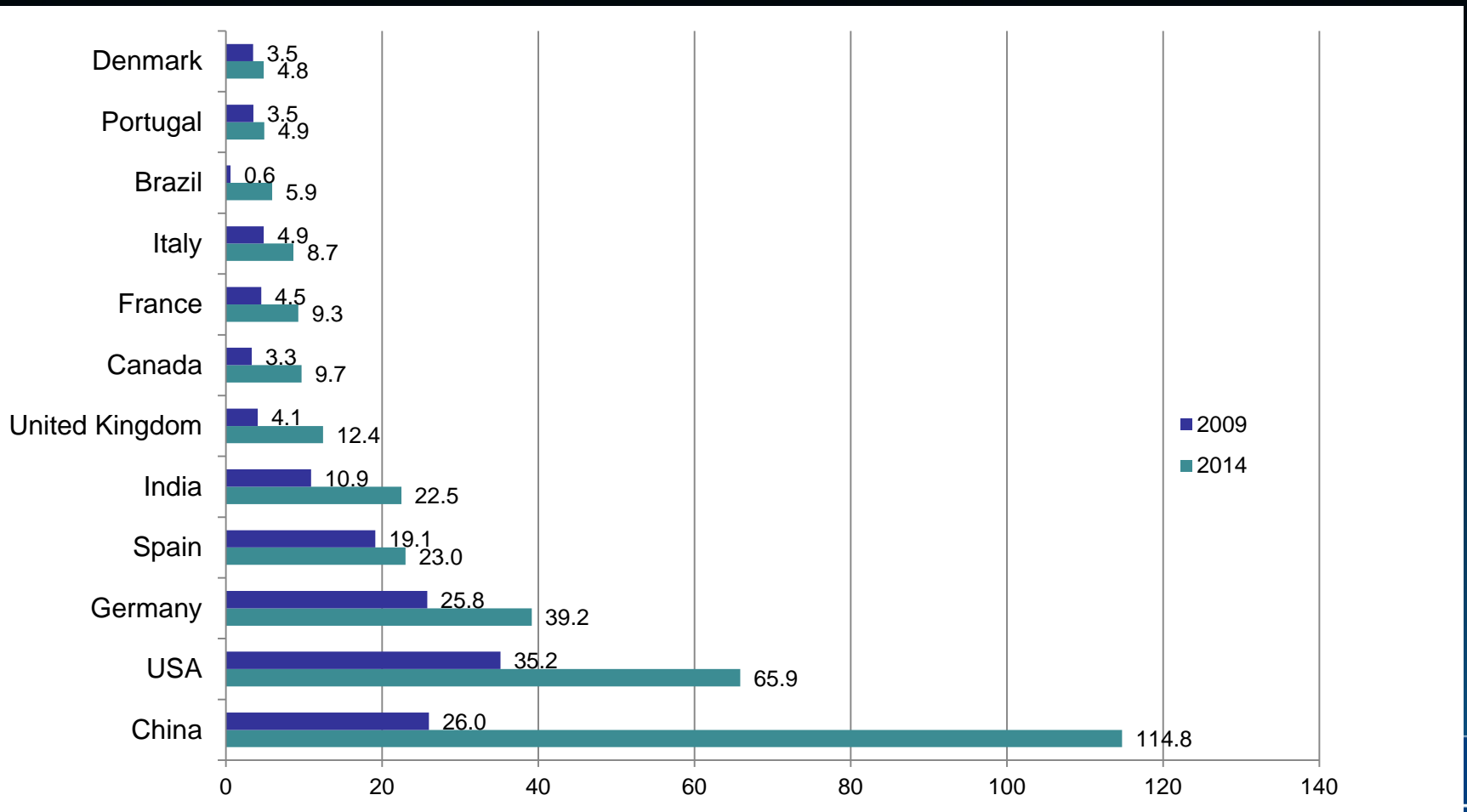


Source: Global Wind Energy Council. Global Wind Statistics 2014.  
February 2015





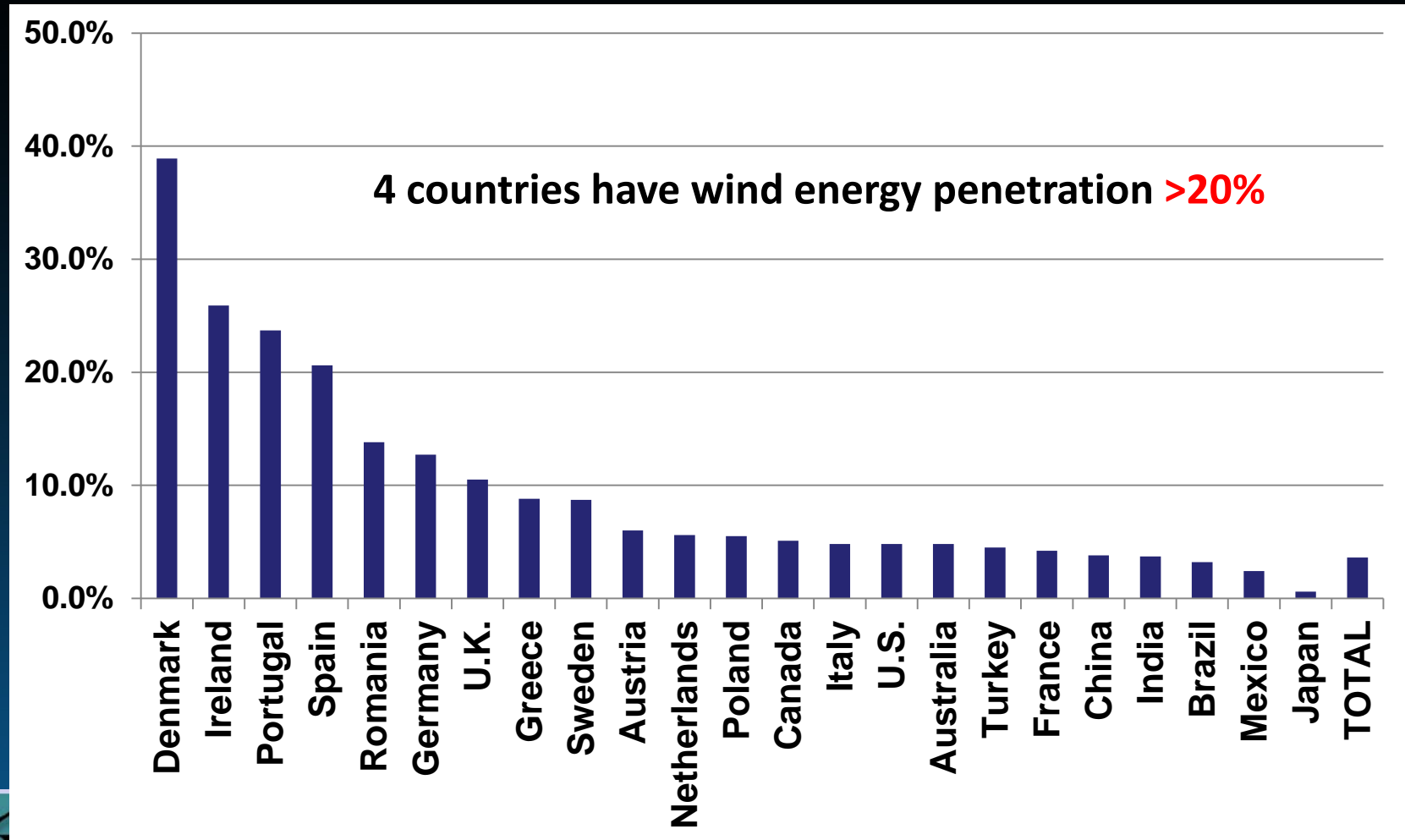
# Wind power installations by country



Source: Global Wind Energy Council. Global Wind Statistics 2014.  
February 2015



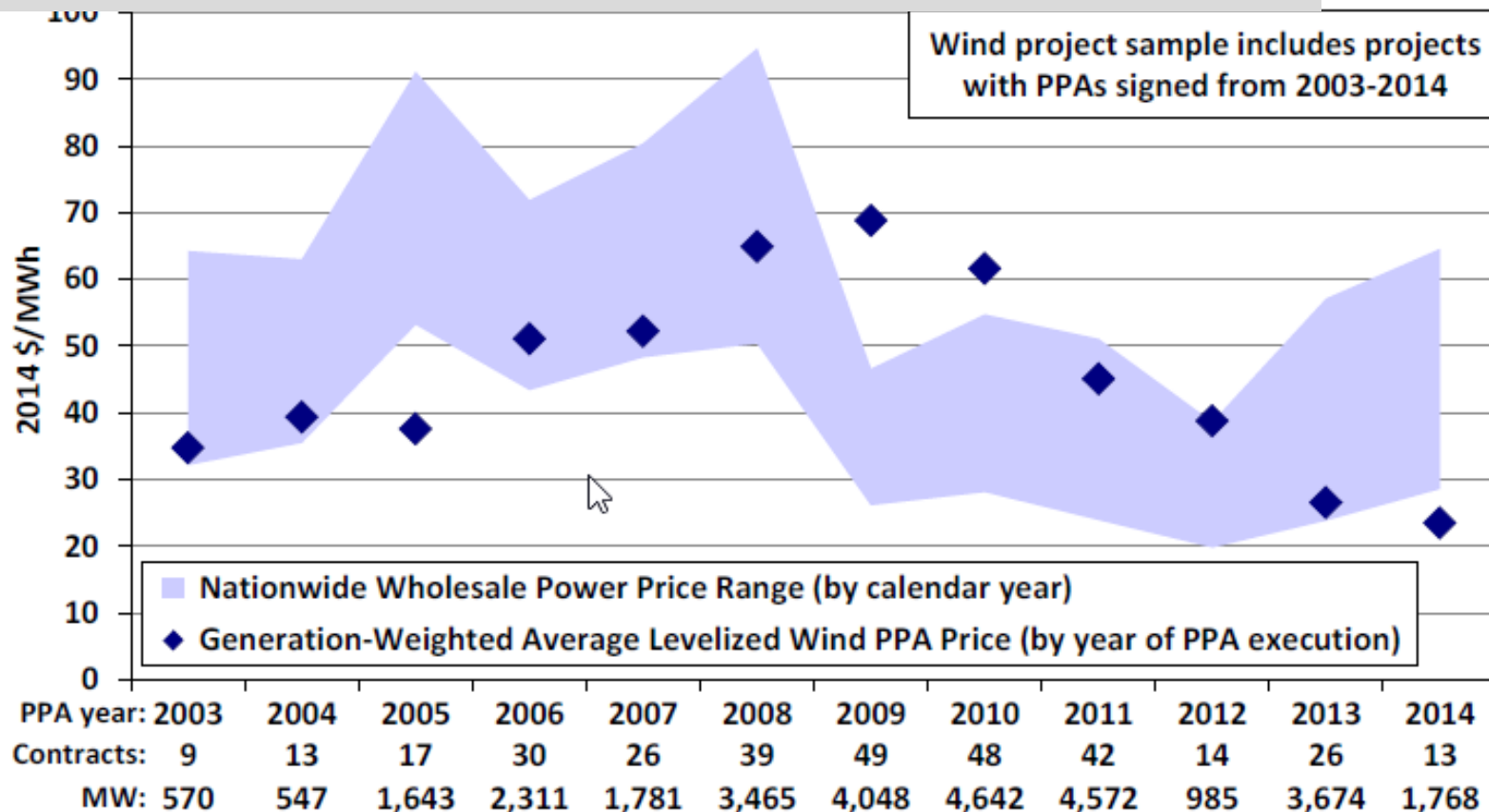
# Wind energy penetration, 2014





# Average levelized long-term PPA in US

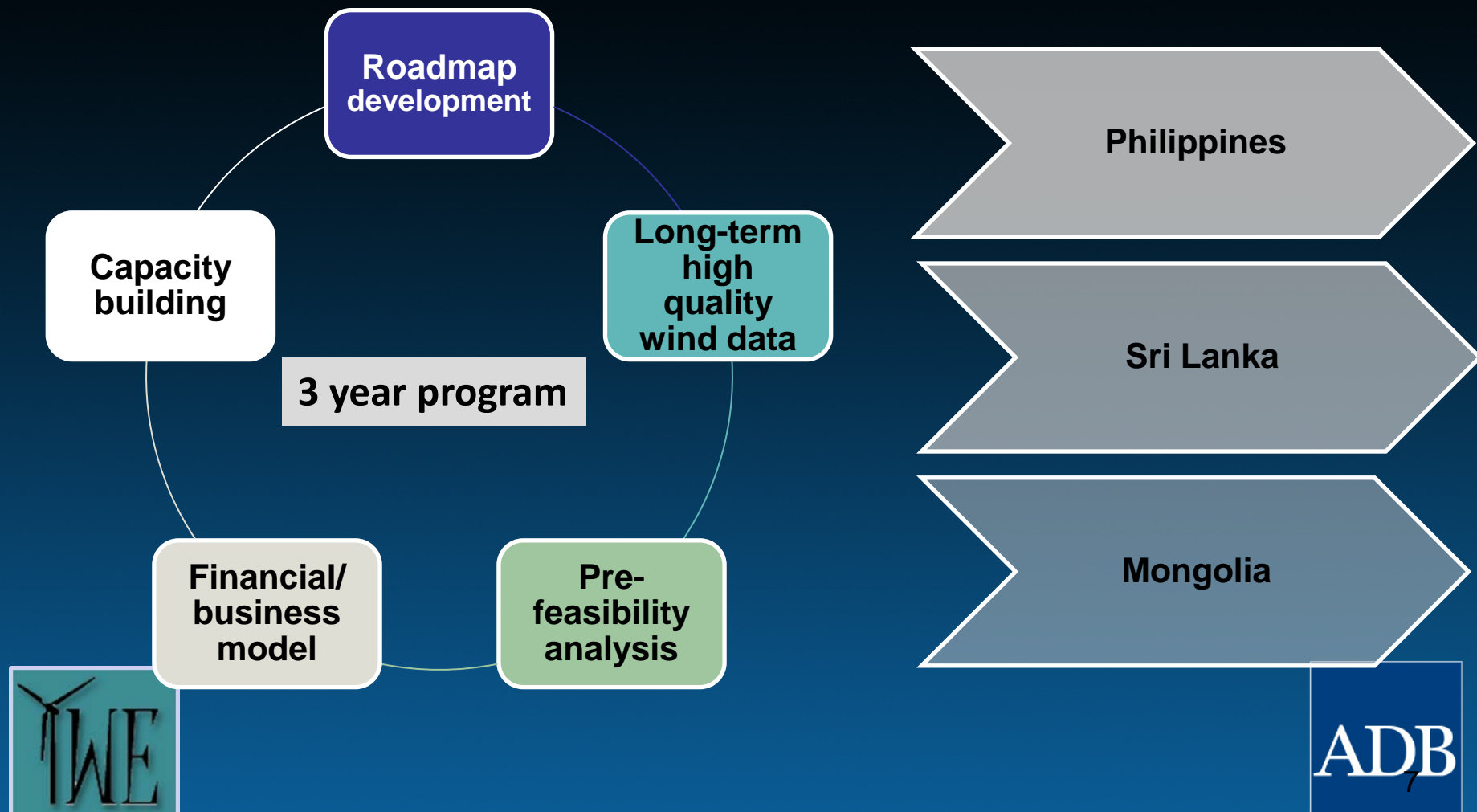
- Average PPA in 2014 was 2.4 USc/kWh, less than wholesale price
- Average revenue in 2014 less than 5 USc/kWh



Source: Berkeley Lab, FERC, Ventyx, IntercontinentalExchange



# ADB's Quantum Leap in Wind program

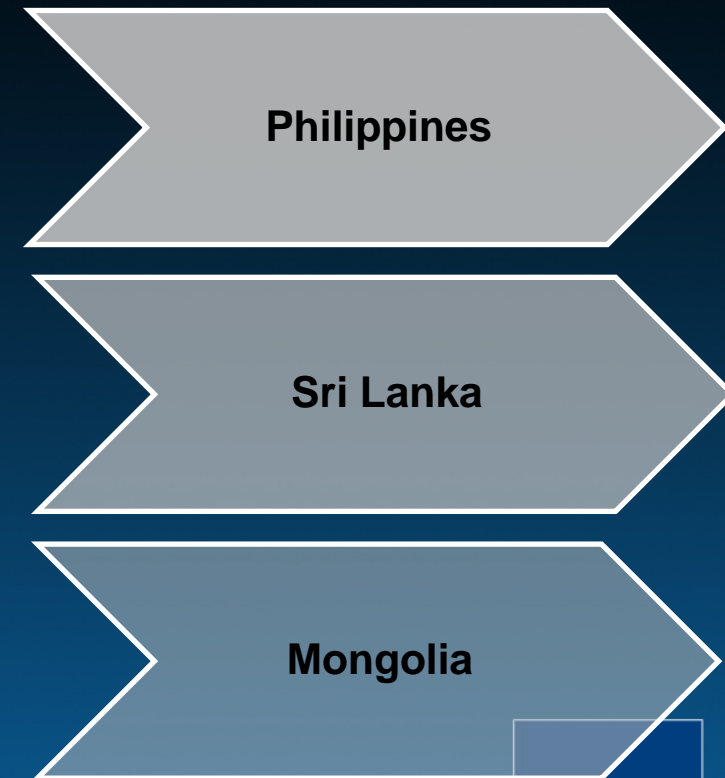




# What is wind energy policy?



## Three case studies







# What are the components of effective wind energy policy?

Policy	Description
Tariff/Incentives	Supply-side: How much producer get paid? Demand-side: How is the buyer incentivized?
Wind resource exploitation	How can we optimize total system cost? How can policy help reduce lead time and cost of wind development? Preferred wind project zones, or wind corridors.
Grid integration	Guaranteed interconnection, priority dispatch Grid code for interconnection of variable power Upgrade transmission, substations, dispatch systems
Licensing	One-stop-shop that coordinates all licensing, approvals and permits
Public relations and human resource	Public awareness campaign to increase acceptance and counter myths Universities and training institutes so work is done by in-country personnel



# What leads to effective wind energy policy?

Characteristics	Description
Comprehensive	Each component of policy must balance the competing needs for stakeholders for the policy to be effective.
Certainty for long-term	Wind projects may take several years from concept to commissioning, therefore certainty in policy for the long-term is an imperative.
Continuous improvement	In order to address changes in technology, ground realities and financial environment





# Wind energy policy framework

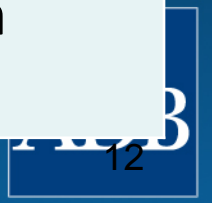
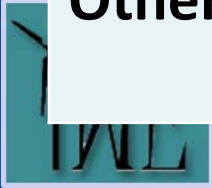
Policy Components	Comprehensive	Certainty for Long-term	Continuous Improvement
Incentives	Demand- and Supply-side incentives	At least 10 year horizon	Update to FiT model and other incentives
Wind resource exploitation	Country-wide wind resource map	Wind energy corridors	Long-term measurement
Grid integration	Integrated energy master plan	Five, ten and twenty year scenarios	Responsive to congestion and curtailment.
Licensing guidelines	One-stop shop to manage myriad of licenses/permits	Transparent with clear requirements and criteria	Adjustments
Public awareness & human resource development	All key issues are addressed	Long-term communications and research program	Adjustments





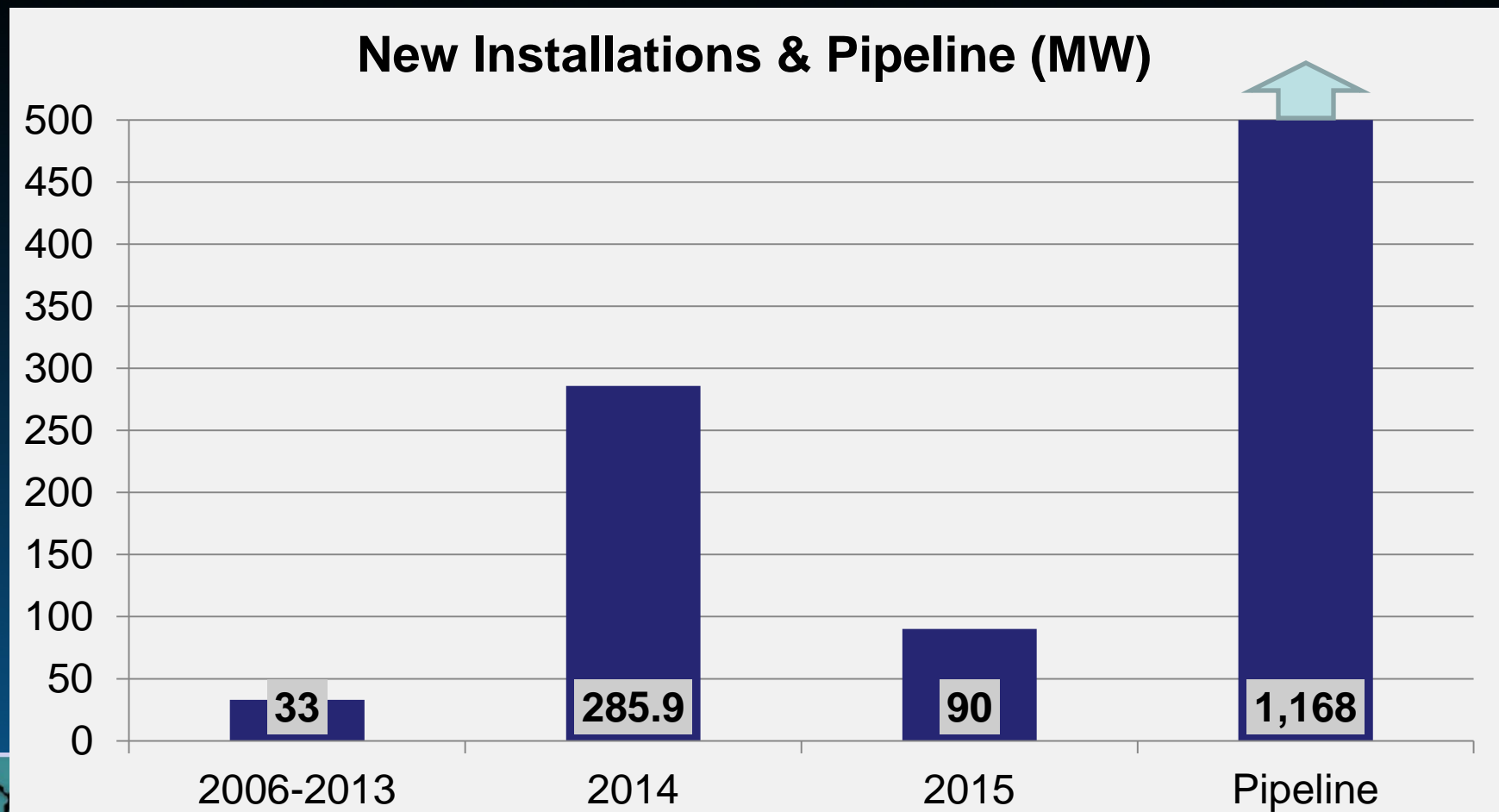
# Wind energy policy in the Philippines

Policy	Description
<b>Tariff</b>	<ul style="list-style-type: none"><li>❖ FiT1: P8.53, ~19 USc, cap of 200MW. July '13</li><li>❖ FiT2: P7.40, ~16 USc, cap of 200MW. Oct.'15</li><li>❖ Tariff awarded after Electromechanical completion--80% of construction is complete</li></ul>
<b>Renewable Energy Fund</b>	Surcharge is collected from most consumers, P0.04
<b>Licensing</b>	Energy license Declaration of Commerciality
<b>Grid</b>	No major issues
<b>Others</b>	<ul style="list-style-type: none"><li>❖ PR: Bangui wind farm is a tourist attraction</li><li>❖ HR: Renewable energy institute floated</li></ul>





# Outcome in Philippines: Growth in past 2 years



**Grade: A-**

- First to complete, first to be awarded



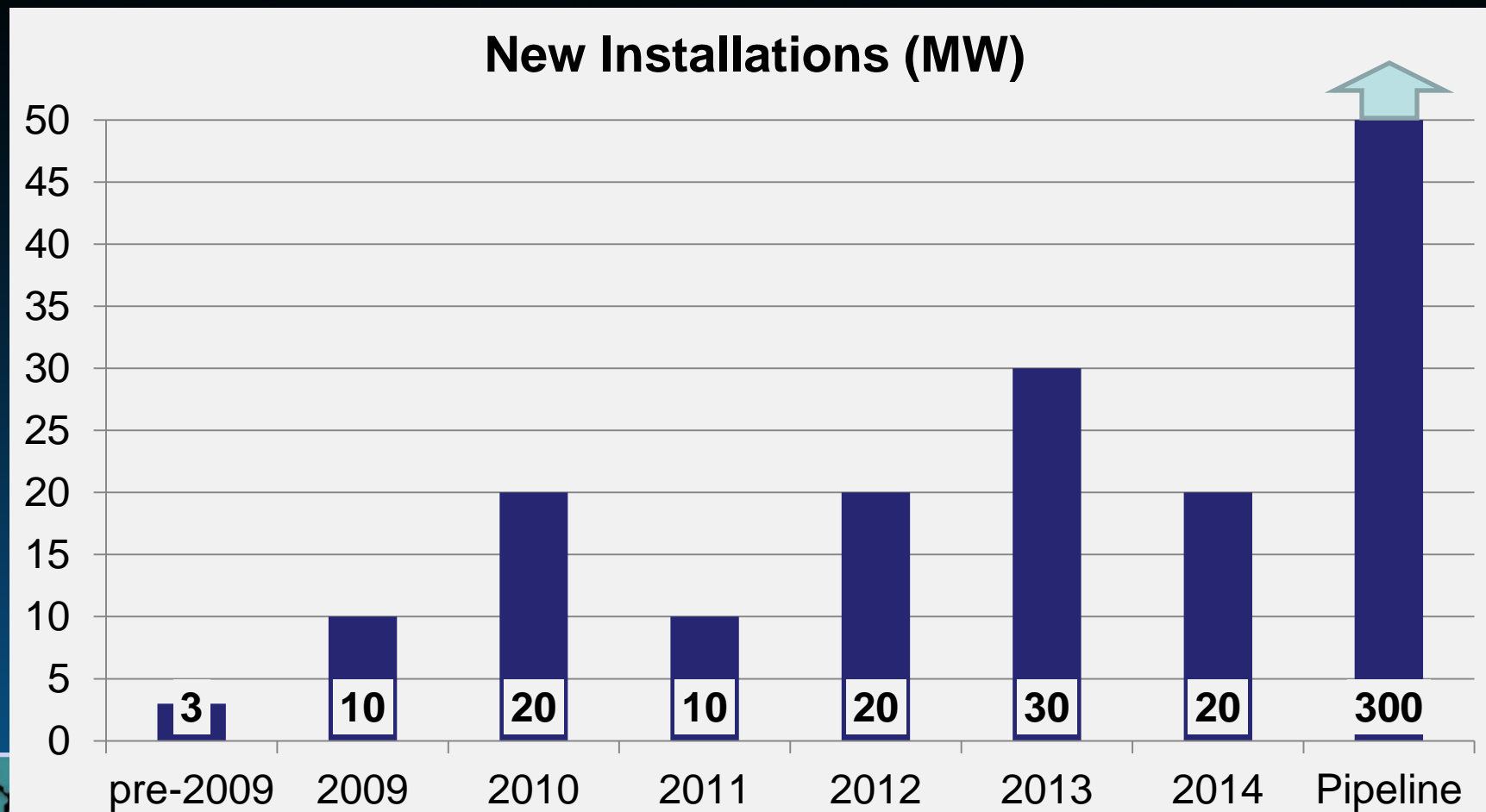


# Wind energy policy in Sri Lanka

Policy	Description
<b>Tariff</b>	FiT1: Rs 19.97, ~17.5 USc, 2008 FiT2: Rs 20.62, ~15 USc, 2014 ❖ Project size $\leq 10\text{MW}$ ❖ Reverse auction planned for larger projects
<b>Renewable Energy Fund</b>	Empty
<b>Licensing</b>	License is issued by SEA Interconnection is issued by CEB
<b>Grid</b>	Major bottleneck
<b>Others</b>	❖ PR: Not effective ❖ HR: Universities have good programs



# Outcome in Sri Lanka: Growth in 6 years



**Grade: B-**

- No demand-side incentive
- Grid policy has lagged

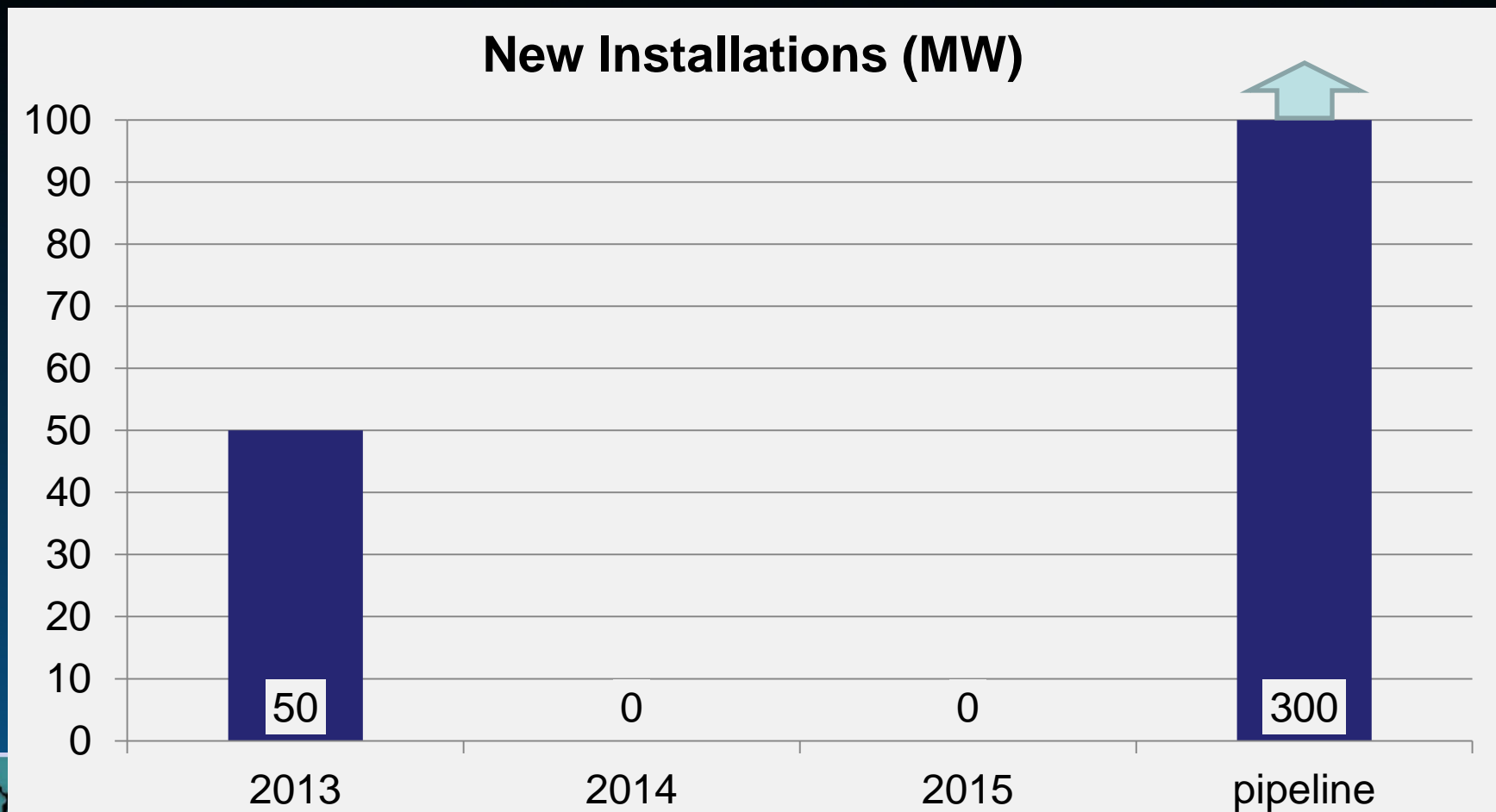


# Wind energy policy in Mongolia

Policy	Description
<b>Tariff</b>	FiT: 8 to 9.5 USc
<b>Renewable Energy Fund</b>	Empty Very high wind potential
<b>Licensing</b>	Energy regulatory commission issues construction license and energy license
<b>Grid</b>	Major bottleneck High level of curtailment of output from first wind farm 90+% coal-based inflexible power plants
<b>Others</b>	PR: Pollution is high, dense smog in winters HR: minimal



# Outcome in Mongolia



**Grade: C**

- No demand-side incentive
- Grid policy has lagged
- High curtailment



# Wind energy policy global best practices: Tariffs and incentives

Policy	Best practices
Supply-side	<ul style="list-style-type: none"><li>❖ Benefit-based feed-in tariff</li><li>❖ Competitive bidding with FiT as ceiling</li></ul>
Demand-side	<ul style="list-style-type: none"><li>❖ Differential (cost in excess of avoided cost) should be paid to buyer<ul style="list-style-type: none"><li>❖ Renewable Energy Fund</li></ul></li><li>❖ Renewable Portfolio Obligation</li><li>❖ Demand-side management</li></ul>
Incentive/tariffs	<ul style="list-style-type: none"><li>❖ Certainty: Provide annual schedule for competitive bidding</li></ul>
	<ul style="list-style-type: none"><li>❖ Continuous improvement: Update tariff, update process of bidding and update policies. Based on uptake, crude prices and others</li></ul>







# Wind energy policy global best practices: Wind resource exploitation

Policy	Best practices
Comprehensive	System-wide least-cost wind resource exploitation plan should be developed: <ul style="list-style-type: none"><li>❖ Wind project zones or wind corridors</li><li>❖ Detailed wind resource map</li><li>❖ Support infrastructure</li><li>❖ EIA</li><li>❖ Land access</li></ul>
Certainty for long-term	Long-term high quality wind measurement
Continuous improvement	Frequent update of meso-scale wind resource maps





# Wind energy policy global best practices: Grid

Policy	Best practices
Comprehensive	<ul style="list-style-type: none"><li>❖ Align with Energy (electricity) master plan for country-- should be consistent with RE goals</li><li>❖ Least-cost RE integration plan should be developed</li><li>❖ Analysis should look at: cost of transmission, losses, curtailment, storage requirements, cost of cycling thermal power plants, and others</li></ul>
Certainty for long-term	Long-term plan should be in place to enhance flexibility of grid: Higher ramp rate plants, more transmission in areas with wind resource, enhanced system operations
Continuous improvement	Annual review of acceptable levels of wind energy penetration in grid





# Wind energy policy global best practices: Licensing

Policy	Best practices
Comprehensive	One-shop-shop for all licensing and permitting: <ul style="list-style-type: none"><li>❖ Remove redundant activities</li><li>❖ Remove conflicting requirements</li><li>❖ Transparent inter-agency work flow</li><li>❖ Reporting on status of applications</li></ul>
Certainty for long-term	Rigorous and transparent criteria for issuing licenses
Continuous improvement	Simplifying the process





# ADB's wind & rooftop solar PV tariff for Indonesia

## Benefits-based tariff

Avoided cost of generation

GHG benefit

Energy security

Local benefits

- Added costs



## Policy guidelines\*

Region-specific tariff

$\leq 10\text{MW} \Rightarrow \text{tariff} = \text{FiT}$   
 $> 10\text{MW} \Rightarrow \text{tariff} \leq \text{FiT}$

$> 10\text{MW}$  competitive tender

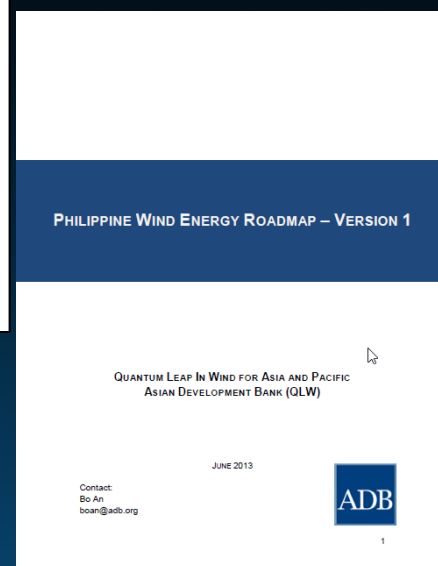
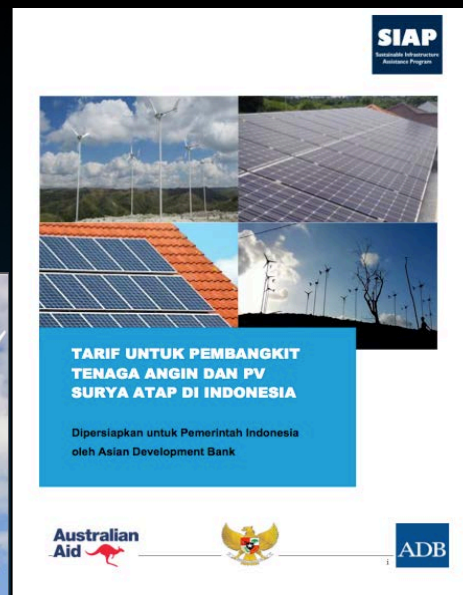
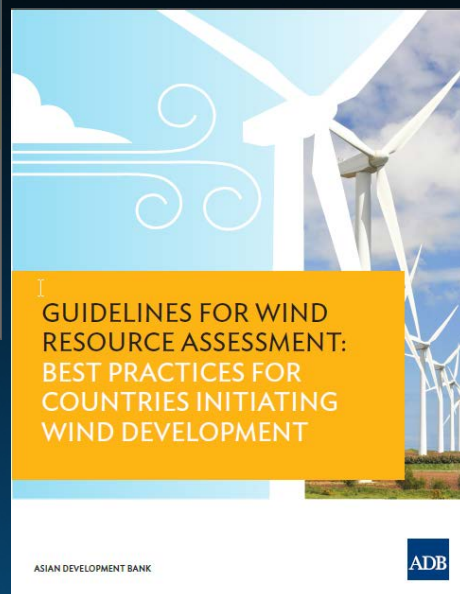
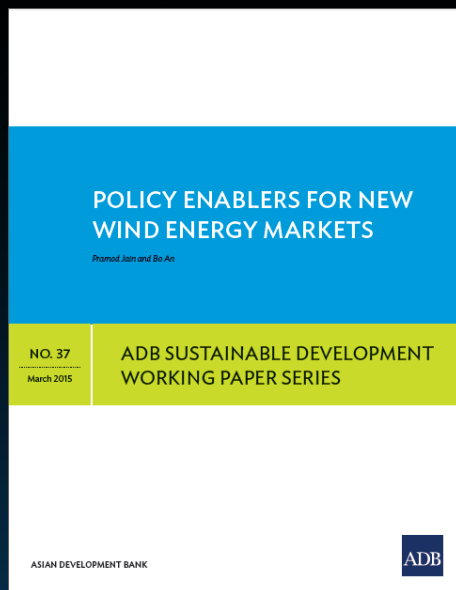
Pre-qual technical criteria

Security deposit for non-performance



\* These are proposed; Regulations will be based on views of all stakeholders

# Knowledge Products Published by ADB



**Upcoming: Grid integration of wind power**



*Copies of these and other reports are available from:  
Pradeep Tharakan (ptharakan@adb.org)*







# ADB's Scaling-Up Renewable Energy Access in Eastern Indonesia

## Sumba Iconic Island

- Original targets for 2025: 95% electrification rate, 100% renewable energy
  - Recent ministerial decree: 95% renewable by 2020
- Least cost electrification plan has identified 10MW of wind power
- 60m met-mast was commissioned in Oct 2014 in Hambapraing
- Wind resource assessment and financial assessment study concludes that 10MW of wind power is viable





# THANK YOU

[www.adb.org](http://www.adb.org)

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