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How2Guide for Wind

Road Mapping in India

New Delhi, September 16th 2015

H2G for Wind – Indian Implementation

1. Indian context
2. Key resources
3. Scope & objectives
4. Barriers & actions

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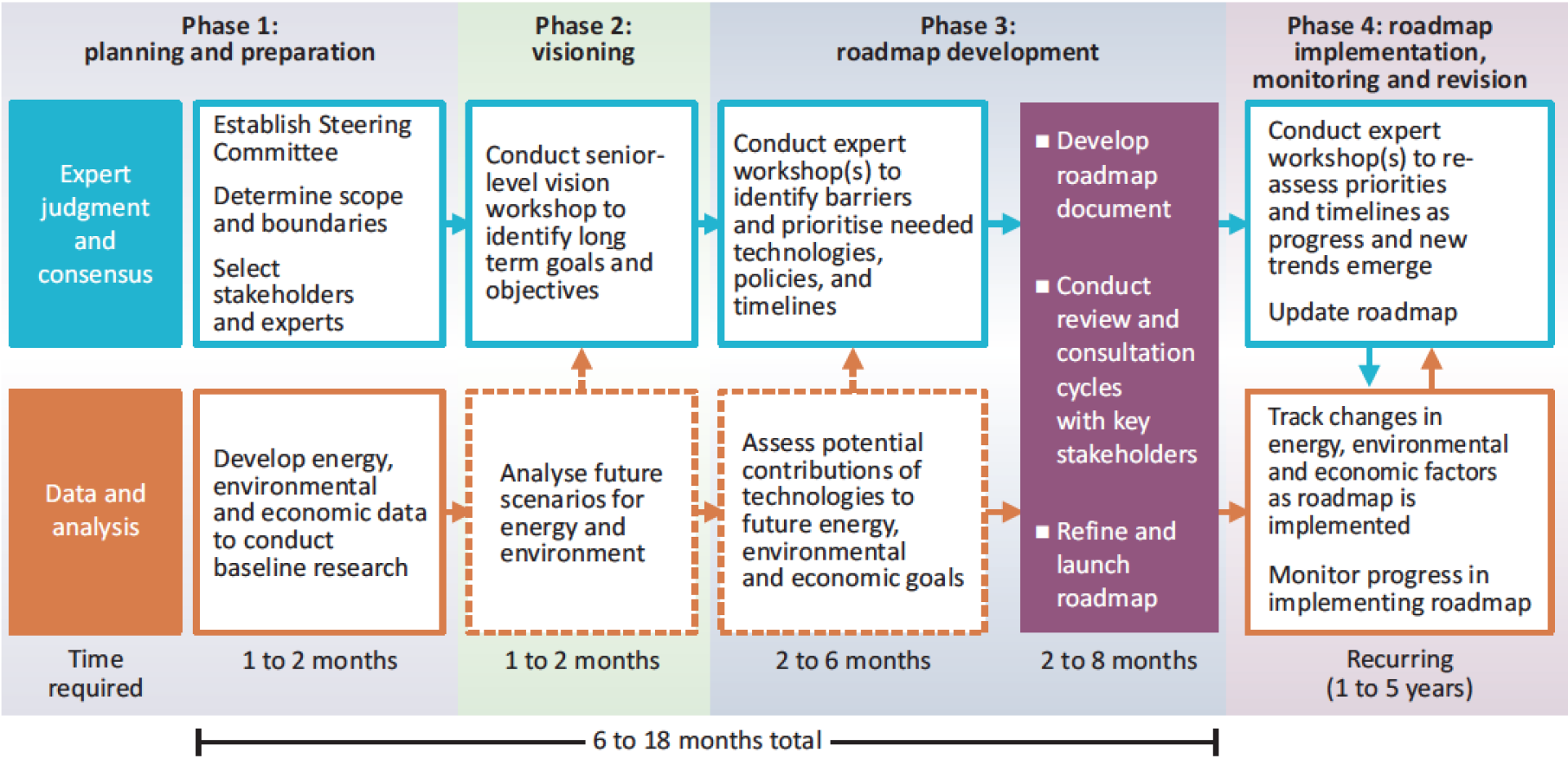
The Roadmap Process



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Road Mapping - Indian Context

- Build on wind deployment to date – exceeds 23 GW nationally
- Offshore wind strategy announced – September 2015
- Proposed National Wind Energy Mission
- NITI Aayog has published in February 2015, a report on India's Renewable Electricity Roadmap to 2030
  - Multi-technology (solar PV and wind)
  - National scope
- Sets strong foundation for more specific road mapping
- This could take several forms -
  - National wind roadmap
  - Regional (multi-state) wind roadmaps
  - Multi-technology roadmaps

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From Strategy to Tactics

Roadmap Options	**Complexity** (depth of analysis vs. geographical coverage)	**Specificity** (of challenges and actions)	**Actionable?** (e.g. for integrated planning of capacity & transmission)
National	High (many states)	Broad (more strategic)	Low (low resolution)
Regional (inter-state)	High (detailed substance)	Focused (more tactical)	Medium (can relate to existing infrastructure)
Multi-technology	High	Focused (e.g. wind and PV have much in common)	High (complementarity)

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Thoughts on Who and When

- Government of India as convenor
  - MNRE, NITI Aayog
  - Institutional buy-in at federal and state level
    - POSOCO, PGCIL, CERC, State Energy Sec'ies, SERCs, SLDCs, SNAs
- Roadmap Team
  - MNRE, Industry, Indian think-tanks, International input
- Participation
  - Private sector (e.g. developers), investors and think tanks
- Adequate time
  - 12-18 months

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Scope & objectives

- Planning deployment
  - Environmental constraints mapped, wind resource assessment available to potential developers / investors, one-stop shop approach to planning permitting
- Development aspects
  - Land availability & access transparent, clear grid connection processes & responsibilities, pragmatic local content requirements
- Electricity market and system aspects
  - Variability issues addressed, curtailment progressively reduced, offtake certainty for IPPs
- Financial and economic aspects
  - Currency risks addressed, cost of debt reduced, long-term investment pipeline identified, support mechanisms stable and well managed
- Infrastructure
  - Transmission upgrades funded, road & ports improved to facilitate access to high resource areas, coordinated investments in dedicated development zones

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Action Options, e.g. project development

Barrier	Details	Action options
Inaccurate or inaccessible mesoscale data on the strength and distribution of wind resources	• Absence of public data on energy content of wind resource limits attractiveness to developers • Absence of data on resource quality; i.e. climatic conditions limit attractiveness to investors and developers	• Develop or procure publicly available national wind atlas, including long-term mean wind speeds and direction data and time-series data if possible • Establish national platform for anonymous data-sharing to improve access to and accuracy of wind data • Make accessible all existing meteorological and wind resource assessment data
Obstacles to WPP siting (additional to those under "Planning" in Table 4)	• Data on land or seabed topography and geology are inaccurate or unavailable • Desirable sites are inaccessible to construction and maintenance teams • Opposition of local population affected by the new wind power installations	• Undertake geological and topographical survey in priority areas; ensure public access to existing data • Develop new access infrastructure if appropriate • Implement communications strategy targeting local population and media with factual information about the positive impact of wind energy on jobs, the economy and the environment*

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Action options, e.g. planning

Imbalance between environmental protection and development	• Cumulative impacts of multiple WPPs not considered • Ecology in the vicinity of the WPP disturbed/damaged during development and operation • Environmental regulation or lack of baseline environmental data may place excessively onerous requirements on developers	• Conduct Strategic Environmental Assessment (SEA) on regional/national basis • Develop national research projects to address general concerns • Assign national body to resolving disputes • Maintain balance between pragmatism and environmental considerations
Planning process may be overly burdensome	• Involvement of multiple and conflicting government bodies makes licensing process overly complex and lengthy • Institutions lack capacity to manage applications • Wind project developers lack competence in preparing planning application	• Rationalise and align policies at every level of government. Co-ordinate between authorities and make sure all authorities have adequate information for processing applications • Modify planning system to manage conflicts between developers and local population • Establish one-stop shop to streamline planning processes • Educate and train developers in application process

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Conclusions

- It starts with a manageable group spanning the renewables sector, with clear roles
- Road mapping should account for overlaps between available RE technologies
- To be implementable, the geographic resolution needs to be relatively fine
  - This may necessitate multiple roadmaps in a country as large as India

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For more information, contact:

Nick Gibbins: nick**@newresourcepartners.com; +44 7791 083 482**

For Governments and for Investors

For governments: New Resource Partners assists with transition to modern energy systems and with green infrastructure development more generally.

For investors: we identify new investment opportunities in the renewable energy space, and provide market analysis in OECD, middle income and developing countries.