ORACLE FOR THE FUTURE OF SUSTAINABLE ENERGY:
Designing a Delphi Approach to Predict Future Trends through a Panel of Global Experts

American Evaluation Association - Evaluation 2019 | November 11-16, 2019

EXAMPLE FROM THE POWER TO RENEW
AGENDA

1. What is Delphi?
2. Application in Renewable Energy Evaluation
3. Delphi Process
4. Participant Activity – Round 1
5. Renewable Energy Case Example
6. Participant Activity – Round 2
7. Results from Renewable Energy Evaluation
METHOD: DELPHI TECHNIQUE OVERVIEW

- Developed in the 1950s (Rand Corp.), named for Ancient Greek ‘Oracle’ who predicted future

- Emphasizes **forecasting** – *looks at “what could/should be”*

- Solicits anonymous/confidential **opinions** and information from subject matter **experts** – “[More] heads are better than one”

- Uses **systematic** and **iterative** approach through multi-stage questionnaires/templates
EVALUATION: WBG SUPPORT TO RENEWABLE ENERGY DEVELOPMENT

DELPHI QUESTIONS:

What are emerging
1) CHALLENGES and
2) OPPORTUNITIES to developing RE, and what may be
3) WBG’S ROLE in helping clients address challenges and seize opportunities

• Renewable Energy (RE) for meeting energy demand in an environmentally sustainable way
• SDGs and Paris Agreement stresses RE as a key solution
• Theory of Change: WBG’s key contribution is helping address key barriers to investments in RE → leads to ↑ electricity supply → avoided CO₂
• Dynamically evolving sector expected to continue to disrupt
• Learning from past may not always be lessons for future
EVALUATION: MULTI-METHOD APPROACH

Structured Literature Review
- RE Market Review
- SLR Barriers to RE
- SLR Benefits/Impacts of RE

Portfolio Review & Analysis
- 546 RE Projects/Investments
- 245 ASA/AS
- CAS/CPF Strategies
- CBA/In-Depth Hydro Review

Comparative Case Studies
- 9 In-Depth Country Studies
- 19 PPARs
- QCA Causal Analysis

Semi Structured Interviews
- Public & Private WBG Clients
- WBG Staff Survey/Interviews
- Other Partners

Global Expert Panel
- Delphi Panel of Global Experts on RE
<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>President &amp; CEO</td>
<td>Investor</td>
</tr>
<tr>
<td>GE Renewable Energy</td>
<td>Berkeley Energy and Chairman of Catalyst Principle Partners</td>
</tr>
<tr>
<td>President</td>
<td>Chief Economist</td>
</tr>
<tr>
<td>Chinese Renewable Energy</td>
<td>International Energy Agency</td>
</tr>
<tr>
<td>Association, China</td>
<td>(former) Minister</td>
</tr>
<tr>
<td></td>
<td>Public Service, Sustainable Development, Energy, Science and Technology, Saint Lucia</td>
</tr>
<tr>
<td>Professor, University of</td>
<td>Chief Economist</td>
</tr>
<tr>
<td>Maryland, Fellow, Brookings</td>
<td>Director General</td>
</tr>
<tr>
<td>Institute</td>
<td>The Energy &amp; Resources Institute (TERI), India</td>
</tr>
<tr>
<td>Professor, Basque Center</td>
<td>Professor</td>
</tr>
<tr>
<td>for Climate Change</td>
<td>Basque Center</td>
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</tbody>
</table>
APPROACH: IDEA GENERATION AND PRIORITIZATION (ROUND #1)

Expert Panelists:
- “Blank slate” with confidential idea generation
- Score items for prioritization
- Return completed templates to Facilitators

Facilitators:
- Review and compile main themes and scores from panelists
- Seek clarifications from individual panelists, as needed
- Prepare a synthesis for sharing an updated template in Round 2
APPROACH: REVIEW, SYNTHESIS, RE-SCORE (RE-PRIORITIZE), CLOSURE (ROUNDS #2…n)

Expert Panelists:
- **Review** synthesis
- **Rescore** to indicate updated priorities
- Add any additional **comments**
- Return confidential completed templates to Facilitators

Facilitators: Same as Round 1

**NOTE:** Iterative rounds can continue as needed, but requires more time

**CLOSURE:** Complete synthesis report with analytical findings (themes, priorities) including methodological approach used
- Disseminate (if stand-alone document) or utilize findings (in evaluations to triangulate conclusions).
Panel: You all are experts on program evaluations.

Question: If we talked to clients who procure evaluations, what would they say is the single most important area for improving the utilization of evaluation results?

Submit only one priority answer at: www.pollev.com/iegnow
TEMPLATES: DESIGN AND STRUCTURE

- 2 Templates w/instructions
- Priority Ranking by Score and Likert-Scale
- Completed templates submitted to Facilitators

A. Sector Opportunities & Challenges
   - Emerging Opportunities
   - Emerging Challenges

B. Client Solutions
   - Client Activities/Actions

C. WBG Role
   - WBG Position
   - WBG Intervention
   - WBG Capacity

D. Completed templates submitted to Facilitators

• 2 Templates w/ instructions
• Priority Ranking by Score and Likert-Scale
• Completed templates submitted to Facilitators
RESPONSE TEMPLATE 1 OF 2: OPPORTUNITIES

<table>
<thead>
<tr>
<th>#</th>
<th>Main emerging opportunities to further develop RE in developing countries (Please be concise)</th>
<th>Rationale for selection of opportunities (Why?) (Please provide details)</th>
<th>Priority Score: Between 0 - 100 (Column total must add to 100)</th>
<th>What action(s) should be taken by developing countries to seize the opportunity?</th>
<th>How well do you think is the WBIG positioned to help clients successfully carry out the action(s) to seize the opportunity? (Using the 4-point scale in the drop-down list)</th>
<th>What intervention(s) should the WBIG undertake to help clients implement the action? (Please be specific and provide details)</th>
<th>How do you assess the current capacity of the WBIG to successfully implement each intervention? (Using the 4-point scale in the drop-down list)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Click here to enter an opportunity.</td>
<td>Click here to enter your rationale.</td>
<td>Click here to enter your score.</td>
<td>Click here to enter an action.</td>
<td>Choose an item.</td>
<td>Click here to enter a WBIG intervention.</td>
<td>Choose an item.</td>
</tr>
<tr>
<td>2</td>
<td>Click here to enter an opportunity.</td>
<td>Click here to enter your rationale.</td>
<td>Click here to enter your score.</td>
<td>Click here to enter an action.</td>
<td>Choose an item.</td>
<td>Click here to enter a WBIG intervention.</td>
<td>Choose an item.</td>
</tr>
</tbody>
</table>
Participant Activity

Round 2

Based on your input previously, we have narrowed down to the top most frequent responses.

**Question:** Can you rank this list as to what you see are as the most important to improving evaluation utilization, in priority order (top being the highest priority)?

Provide your answer by clicking on options and using up or down arrows to reorder your list

www.pollev.com/iegnow
### RANKING OF CHALLENGES BASED ON DELPHI RESULTS

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>1. Existing interests that may hinder development of RE</td>
</tr>
<tr>
<td>P</td>
<td>2. Inadequate and unstable policy and regulatory infrastructure</td>
</tr>
<tr>
<td>I</td>
<td>3. Lack of “real” commitment to Decarbonize power system</td>
</tr>
<tr>
<td>I</td>
<td>4. Need Bankable projects and PPAs</td>
</tr>
<tr>
<td>C</td>
<td>5. Difficult to integrate large amounts of RE, especially those of variable/intermittent nature</td>
</tr>
<tr>
<td>C</td>
<td>6. Need Local industry to create strong interest in RE promotion</td>
</tr>
<tr>
<td>C</td>
<td>7. Need champion to drive RE development Process</td>
</tr>
<tr>
<td>F</td>
<td>8. Strengthen capacity for transparency and accountability to address corruption and governance</td>
</tr>
<tr>
<td>F</td>
<td>9. Improve systems and capacity to reduce project delays</td>
</tr>
<tr>
<td>C</td>
<td>10. Capacity within government agencies to support and develop RE</td>
</tr>
<tr>
<td>F</td>
<td>11. Vulnerability of RE systems to extreme weather and climatic events</td>
</tr>
<tr>
<td>O</td>
<td>12. Affordability of off-grid equipment and aftersales care for poorer populations</td>
</tr>
<tr>
<td>F</td>
<td>13. Difficulty mobilizing financing for RE in smaller countries/markets that may be less lucrative for developers</td>
</tr>
<tr>
<td>C</td>
<td>14. Regulatory and counterparty risk keep cost of capital high</td>
</tr>
<tr>
<td>F</td>
<td>15. Rapid decline in technology costs could lead to slower uptake as utilities &amp; developers take wait-and-see approach</td>
</tr>
</tbody>
</table>

#### RE Barrier Classification
- **P** Policy and regulatory
- **I** Integration into power system
- **C** Improvement to design & technical standards
- **F** Strengthen institutional capacity
- **C** Mitigate investment risks
- **F** Mobilizing financing
- **O** Others

#### Importance Score
- **Very High=5**
- **High=4**
- **Moderate=3**
- **Low=2**
- **Very Low=1**
## NESTED RANKINGS OF ACTIONS/SOLUTIONS

<table>
<thead>
<tr>
<th>No.</th>
<th>Challenge</th>
<th>Actions/Solutions</th>
</tr>
</thead>
</table>
| 1   | Existing (vested) interests | - Phase-out fossil fuel power plants over time, starting with the most polluting ones  
- Legislate clear long-term RE targets and agree with utility how to achieve these targets  
- Create alternative employment for areas impacted by removing fossil electricity production  
- Legislate market liberalization to allow RPPs  
- Stop building fossil fuel based power plants  
- Bring on-grid options into long term electrification plan  
- Learn from successes of other countries  
- Remove subsidies on kerosene  
- Increase awareness on job creation potential of RE  
- Experiment with off-grid electrification concessions  
- Provide incentives to convert conventional power plants into RE and/or storage  
- Remove VAT and import duty on solar |
| 2   | Policy and regulatory infrastructure | - Develop stable policy frameworks that support RE development  
- Establish Independent Electricity Regulator  
- Undertake Electricity sector restructuring  
- Develop national RE strategies and Long-Term Plans |
| 3   | Commitment to decarbonize power system | - Developing countries should insist domestic coordinate their assistance for RE  
- Countries should use their voice as WBG shareholders and demand change |
| 4   | Bankable projects and PPAs | - Streamline permitting process to speed-up approvals  
- Improve Transmission and Distribution network  
- Integration of grid systems  
- Strengthen capacity of grid operators  
- Promote pumped storage hydro and battery storage  
- Undertake Long-Range Transmission Planning  
- Unlock flexibility in generation and the demand side by creating appropriate market incentives  
- Reconfigure electricity markets to provide for price discovery of balancing power  
- Develop Smart Grids  
- Develop risk guarantee mechanism to provide fossil-based plants with capacity cost  
- Progressively move to reflect full RE costs, especially as their share in energy generation rises |
| 5   | Integration of large amounts of RE | - Technologies transfer, Obtain manufacturing capabilities.  
- Support manufacturing of renewable energy equipment  
- Develop and maintain manufacturing facilities  
- Promote local manufacturing of RE equipment  
- Develop local RE material industries |
| 6   | Local RE industry | - Support the development of local renewable energy industries  
- Increase the adoption of local renewable energy solutions  
- Promote local renewable energy entrepreneurship  
- Increase the number of local renewable energy businesses |
| 7   | Champion to drive RE | - Training on RE for business people, managers and engineers  
- Encourage local RE entrepreneurs and investors  
- Support the development of local renewable energy solutions  
- Promote local renewable energy entrepreneurship  
- Increase the number of local renewable energy businesses |
| 8   | Anti-corruption and governance | - Encourage the rule of law through strong anti-corruption laws and robust, consistent enforcement  
- Implement regulatory framework and enforcement measures to ensure transparency and accountability  
- Strengthen regulatory bodies and institutions  
- Promote international cooperation on anti-corruption efforts  
- Address political factors that can impede RE deployment  
- Address institutional factors that can impede RE deployment  |
| 9   | Implementation delay of RE projects | - Streamline permitting and development processes, including adequate environment review and land acquisition  
- Simplify the regulatory framework for RE projects  
- Reduce red tape and bureaucratic obstacles to RE development  
- Increase the predictability and reliability of permits and approvals  
- Improve the quality and efficiency of RE project development  
- Increase the availability of financing for RE projects  |
| 10  | Capacity within government agencies | - Training on RE for business people, managers and engineers  
- Support the development of local renewable energy industries  
- Increase the adoption of local renewable energy solutions  
- Promote local renewable energy entrepreneurship  
- Increase the number of local renewable energy businesses |
| 11  | Vulnerability of RE systems to extreme weather events | - Make RE systems more climate resilient  
- Strengthen the resilience of RE systems to extreme weather events  
- Increase the adaptability of RE systems to climate change  
- Strengthen the capacity of RE systems to respond to extreme weather events  
- Increase the preparedness of RE systems to extreme weather events  |
| 12  | Affordability of off-grid equipment and alternatives | - Support PAYGO Systems with intermediaries who rent and service equipment that depends on RE  
- Provide targeted subsidies to poor households to be able to rent RE-related equipment  
- Provide grants or loans to low-income households for RE equipment  
- Increase the affordability of RE technologies for low-income households  
- Reduce the cost of purchasing and installing RE equipment  |
| 13  | Mobilizing financing in country small markets | - Explore opportunities for de-risking some investments, through the use of grant or concessional financing  
- Organize small countries to pool similar projects in the same region  
- Increase the availability of financing for RE projects  
- Increase the predictability and reliability of permits and approvals  
- Improve the quality and efficiency of RE project development  |
| 14  | Risks keeping cost of capital high | - Create a clear and robust investment framework  
- Minimize counterparty risk  
- Reduce the cost of capital for RE projects  
- Increase the predictability and reliability of permits and approvals  
- Improve the quality and efficiency of RE project development  |
| 15  | Rapid decline in RE costs causing utilities to delay | - Introduce pooled prices for RE electricity  
- Increase the adoption of local renewable energy solutions  
- Promote local renewable energy entrepreneurship  
- Increase the number of local renewable energy businesses  
- Reduce the cost of purchasing and installing RE equipment  |
| 16  | Large land requirement for RE | - Require that the design of large hydro dams must be more environmentally sensitive  
- Require resettlement with full engagement of stakeholders and flowing the state of the art guidelines  
- Create a licensing regime that balances renewable development with legitimate land use concerns  
- Do not allow biomass expansion at the expense of good agricultural land  
- Limit the area of land use for RE systems  
- Create an investment framework which creates incentives for renewable developers  
- Retention of older (and higher) tariffs for repowered RE plants |
APPROACH: APPLICATION IN EVALUATION

• Policy and regulatory framework one of top impediments to scaling-up RE (reinforced as essential barrier by QCA)

• Integration of RE is top 3 priority (90 percent = ‘high’ or ‘v. high’ importance), but WBG ‘moderately well’ positioned to address, (including due to limited experience with emerging area of electricity storage)

• Mitigating investment risks assessed as ‘highly important’ by 2/3 of panel

• 90% of panel identified training of government officials as ‘very important’

• Vested interests w/ stakeholder is top challenge, providing justification for WBG systematic and coordinated engagement to address barriers

• Distributed Generation (approach fast-gaining traction) had mixed opinions (40% important by panel, although 80% of staff saw it as very important)
CONTACT IEG
ieg.worldbank.org