Stimulating Domestic Exploration and Production in India- Policy Recommendations

An industry study by PetroFed in Knowledge Partnership with IHS Energy

Petroleum Federation of India

May 2015

Acknowledgements

Petroleum Federation of India (PetroFed) is presenting this study in Knowledge Partnership with **IHS Energy**. This study includes views of the industry. We are appreciative of the participation and responsiveness of **Oil & Gas companies and other experts** and thankful to IHS Energy for their efforts.

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Study Context and Overview

Given the magnitude of the oil and gas sector impact on the growth of the overall economy of India, the current state of the Indian E&P sector requires a re-think of appropriate policies tailored to reflect and respond to its present status of a net energy importer. This re-think is required to drive the necessary boost to stimulate domestic exploration and production. The need to address the following issues requires utmost urgency to respond to the call given by the Hon'ble Prime Minister Shri Narendra Modi of reducing import dependency by 10% by 2022:

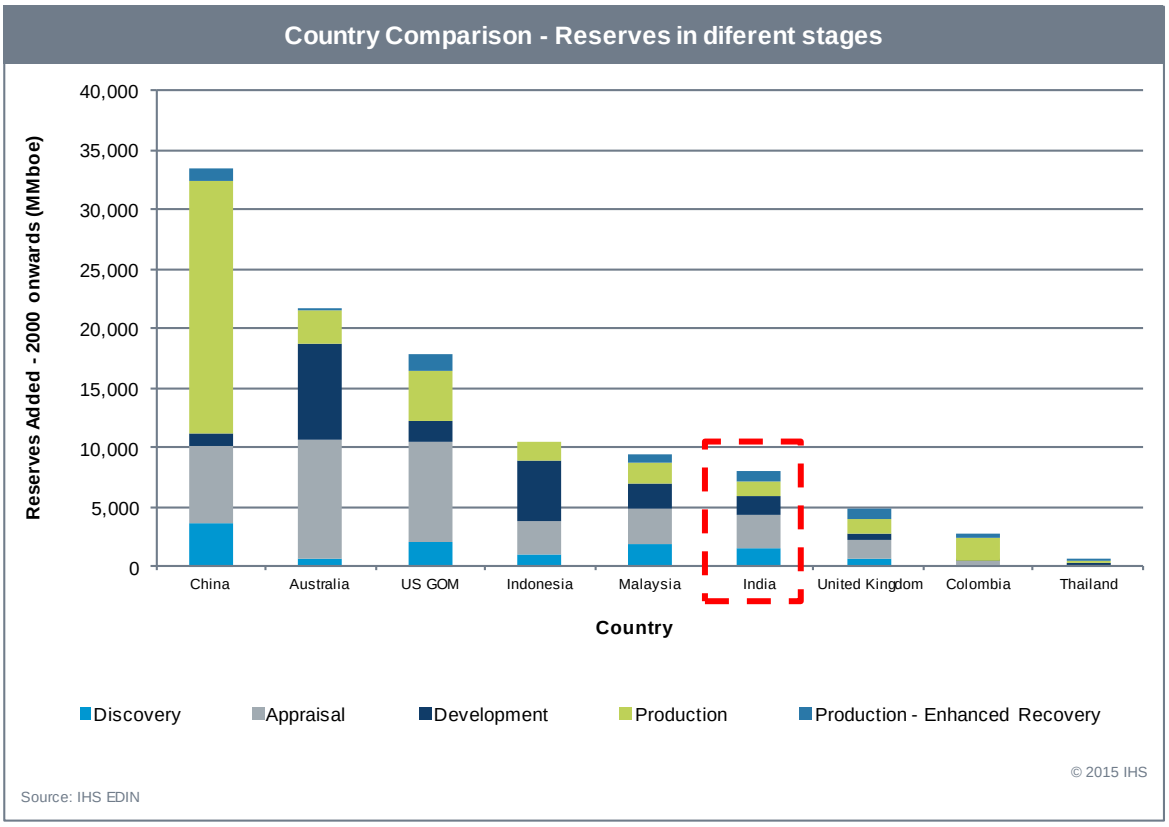
1. Accelerate oil & gas discoveries into production
2. Maximize recovery from existing oil & gas fields
3. Increase flow of Investor risk capital in exploration of oil & gas significantly
4. Incentivize oil & gas exploration to maintain equitable risk-reward balance

As highlighted in Point 1, India's focus must now be geared towards accelerating fields from discovery/appraisal into production stage at a pace much faster than hitherto. Assessment of a number of countries including India was undertaken so as to determine reserves accretion between 2000 and 2015, and what percentage of those reserves are in production.

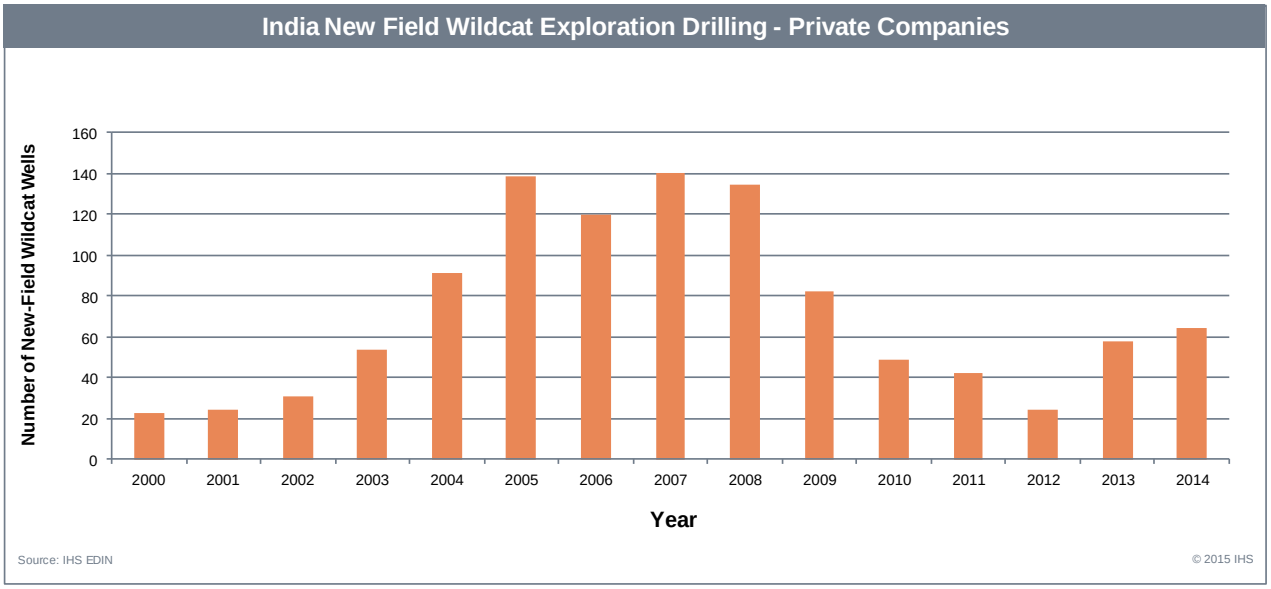
The analysis showed that only 26% of reserves discovered in India are in production versus an average of 40% for the countries shown in the graph for the period 2000-2015. The number for other country reserves in production increases to 46% if Australia is excluded, as it is dominated by gas discoveries and lead-time for fructifying LNG projects is considerably longer in comparison with conventional pipeline based gas evacuation projects.

Hence, accelerating discoveries into production is utmost important both for increasing and sustaining production given majority of India's current oil & gas production is maturing and declining. This decline will need production from 2P/3P reserves from Deep Waters (DW), Ultra Deep Waters (UDW), High Pressure High Temperature (HPHT) and infrastructure-challenged offshore and onshore. DW/UDW alone comprises 65% of remaining gas reserves yet to be put on production, and will continue to have a great influence given industry focus in that area. As these projects take 4+ years to develop, and are going to form key components on new source domestic oil & gas production, priority on developing and monitoring these projects should be the highest.

In addition, the maturing production environment coupled with the challenging development of projects warrants greater emphasis on enabling E&P companies to deploy the latest technology and technical-cum-business expertise.



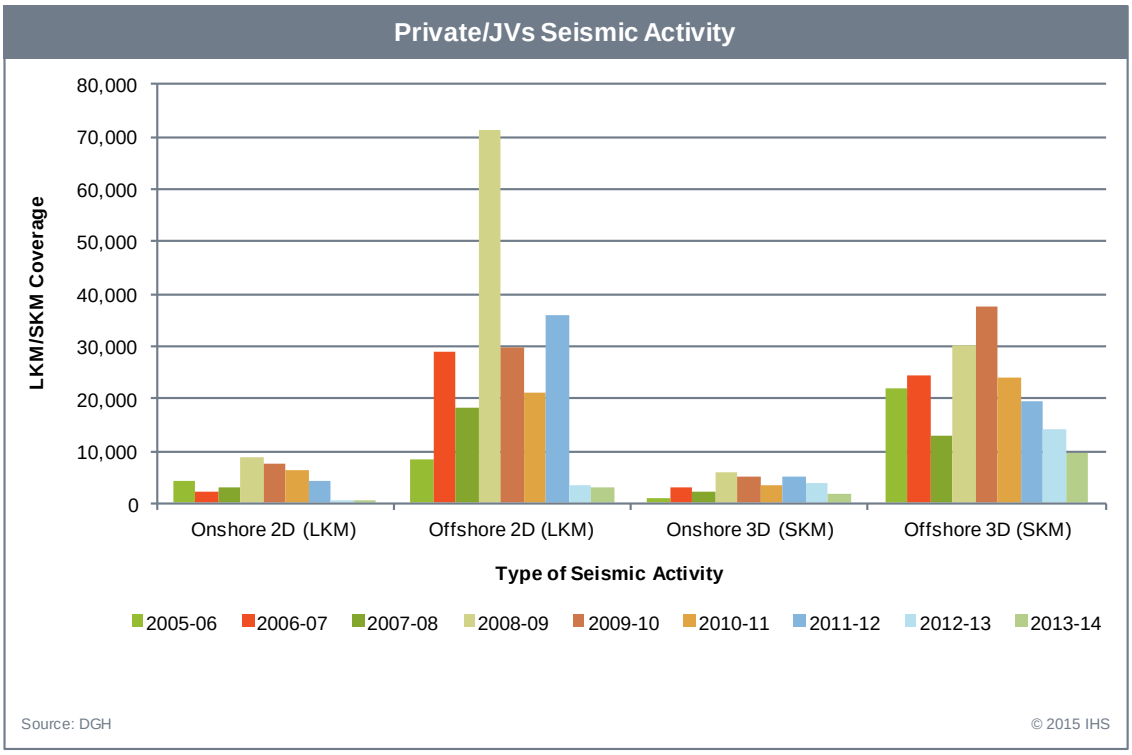
Another area that necessitates attention is that flow of private risk capital in domestic exploration must be enabled to increase significantly. Long term exploration technical success continues to be 3 in 10, whereby IHS defines technical success as wells that have had oil/gas shows during drilling but will require further appraisal drilling to assess field commerciality. Commercial chances of success, which relate to making discoveries that are economical and will move into production, still stand at less than 1 in 10.



India's E&P still remains largely untapped with ~80% of the sedimentary basins still considered underexplored/unexplored. In order to stimulate exploration**, India needs a strategy to incentivize private/JVs so as to undertake more seismic activity**. Seismic activity across the

board is on a steep downward trend since a peak in 2008-09 and since this is the start of the E&P project lifecycle, this alarming trend needs to be reversed.

Without investment in large-scale seismic programmes, the road towards increased exploration will not take place as **investor risk capital moves towards less riskier opportunities across the globe, especially in the current oil & gas price climate**.



To summarise, as listed out in the beginning, there are four key issues that require a reset so as to respond to the Hon'ble Prime Minister's call of 10% reduction in import dependency by 2022 and sustaining the same. In order to move towards that goal, the study efforts have been directed towards identifying specific action areas after collective discussion and analysis by Petrofed Industry Members and IHS.

The following sections expand on focus areas with specific actions recommended that would provide the necessary stimulus in boosting domestic exploration and production:

1. Adherence to sanctity of PSC contracts & capacity building
2. Clarity and alignment of policy intent and guidelines based on India's high risk geology & varying play types
3. Ease of Access to acreage via NELP, OALP and faster churn of awarded acreage by strict adherence to timelines
4. Realignment of objectives between investor and government

In order to move towards that goal of reducing import dependency, *4 focus areas* have been identified and corresponding specific actions have been recommended

Focus Areas	Specific Actions Recommended
Adherence to sanctity of contracts and capacity building	1. Create a formal dispute resolution forum 2. Empower DGH to act on behalf of the MOP&NG 3. Implement a Mindset change via human resource capacity building 4. Clarity of best practices for undefined and ambiguous areas on Good International Petroleum Industry Practices 5. Resolving contract extension early ensures that all parties are aligned in the end objective of production maximization
Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types	1. Road map and timeline for de-regulation of gas price 2. Conduct Periodic Stakeholder Alignment Workshops 3. Joint Industry-government consultations recommended to promote a partnership and dialogue 4. Tailor-made policies/incentives recommended for unexplored acreage, marginal fields, mature fields, deepwater, EOR, HPHT, tight formation and unconventionals 5. Incentives/tax advantages to be extended to Service companies to encourage "Make in India" 6. Allow exploration and exploitation of Unconventional Hydrocarbons in all pre-NELP and NELP blocks 7. Allow Exploration in Mining Lease as a normal activity without Ring Fence 8. Secondary market (Farm-in and Farm-out) should be encouraged
Ease of Access to acreage via NELP, OALP and faster churn of awarded acreage by strict adherence to timelines	1. Via NELP 2. Via OALP 3. Via technology driven partnerships to unlock full potential of non-NELP blocks held by NOCs
Realignment of objectives between investor and government	1. Measure and benchmark Industry and DGH effectiveness of tasks through 5 lenses at specific project stage gates – pre FDP, during FDP, post FDP, production 2. Establish a framework for timely communication between all parties, schedule timely and regular meetings and with an Empowered group for conflict resolution at the Ministry level

Key Focus Areas

Focus Area 1: Adherence to sanctity of PSC contract and capacity building

The IHS definition of sanctity of contract is assessed by **measuring the strength of a country's historical willingness to abide by contractual agreements**. Utilising the IHS Oil and Gas Risk Service which assesses over 131 countries, the results show India at a rank of 67 out of 131 from a contract sanctity perspective. Another ranking and one that is highly respected is the World Bank's Easy of Business Ranking for 189 countries. In their latest ranking for 2015, India came in at 142 out of 189 countries, which indicates that India is not a favored investment destination even though the fundamentals exist for strong growth for decades.

Another issue and one that is equally important is capacity building across the various institutions, as well as empowering key stakeholders such as DGH to undertake key decisions. When assessing other regulatory agencies in this study, two key best practices were identified, which centered around empowering regulators with greater decision-making but also implementing a bottom-up mindset change via capacity building of industry professionals in a range of disciplines.

Given these two issues of adherence to sanctity of PSC contract and capacity building, the following recommendations have been proposed for your review and retention:

I. **Create a formal dispute resolution forum:** In case of disagreements between host government and investor, arbitration should be the last resort with greater strengthening of a pre-arbitration mechanism:

- Strengthen the PSC Framework for dispute resolution and create framework that enables effective functioning
- Decision to be taken keeping objective of NELP – maximize activities to discover and produce
- Use of empanelled expert assessors where appropriate – expert panel should represent a wider perspective via inclusion of members from diverse sources
- Create an empowered group at Ministry that clears a monthly / quarterly backlog of issues disputed at the MC level using advice of empanelled experts.
- 80% Issues to be resolved at MC level where the final decision should be respected and adhered by all
- Difference of opinion should be sorted out through discussion rather than through written communications
- An atmosphere where regulator/ministry can take objective decision without worrying about his decision being reviewed in the hindsight

- If an amicable solution cannot be achieved and arbitration is the only remaining route, then it should be resolved in a **time-bound manner.**

II. **Empower DGH to act on behalf of the MOP&NG** in areas of ambiguity and interpretation of the PSC contract rather than only to administer the PSC contract:

- MOP&NG needs to work as a partner with industry for policy formulation, and investor to be strictly compliant with the provisions of the PSC.
- All policy guidelines should be implemented exclusively by the DGH and followed by the Investors.
- Consider review function as advisory and not binding to allow activities to progress in a timely manner.
- Reassess need to provide more autonomy to DGH so as to ensure policy implementation lies with DGH and cases are not sent back to MOPNG
- ***Case study:*** Colombia ANH supports the government in the formulation of petroleum policy – ANH are focused towards exploration & production optimization, rather than being "just an administrator"
- ***Case study:*** UK regulators Oil & Gas Authority (OGA) in addition to its role of supervising licensing; is empowered to develop broader skills and experience, remove bureaucracy and enhance levels of coordination /collaboration.

III. **Implement a Mindset change via human resource capacity building** of industry professionals in a range of disciplines is recommended at the DGH.

- Decisions that support fast track development should be ***incentivized in performance contracts of DGH personnel.***
- Create a panel of expert advisors that have geographical and play type experience to promote continuous knowledge transfer
- Diversify and globalize sourcing of best-in-class expertise with the **right financial incentives** for DGH (Global MNCs, Consultants, NOCs of other countries, Service Providers, Academicians)
- ***Case study:*** In order to build a regulator with greater autonomy and leadership, the *UK* industry is to become a source of funding to build personnel capacity – however, they equally expect quality of service and delivery. The head of UK regulator Oil and Gas Authority (OGA) has just been announced as Mr. Andy Samuel (previously Managing Director of BG Group)
- ***Case study:*** US Bureau of Ocean Energy Management (BOEM) transparency on personnel requirements is available on their website – the required budget for each full-time resource is in line with industry pay so as to attract the right talent

IV. **Clarity of best practices** for undefined and ambiguous areas on Good International Petroleum Industry Practices, recognizing the uncertainty, risk and changing technologies in the Indian E&P sector.

- Database of best practices, once defined, should be refreshed continuously via a standing mechanism as techno-commercial changes happen in the global industry
- Defined best practices should provide options rather than guidelines that potentially become restrictive (GIPIP should continue to be reference point and not binding)
- Ministry / DGH should create an annual platform (e.g Worldwide Upstream Regulators Forum) to ensure continuous global learning and dialogue of regulatory best practices
- ***Case study:*** US BOEM for example regularly provides notice to Lessees and operators advising them on relevant changes
- ***Case study:*** In UK, industry consultation is essential before formulation of any new best practice

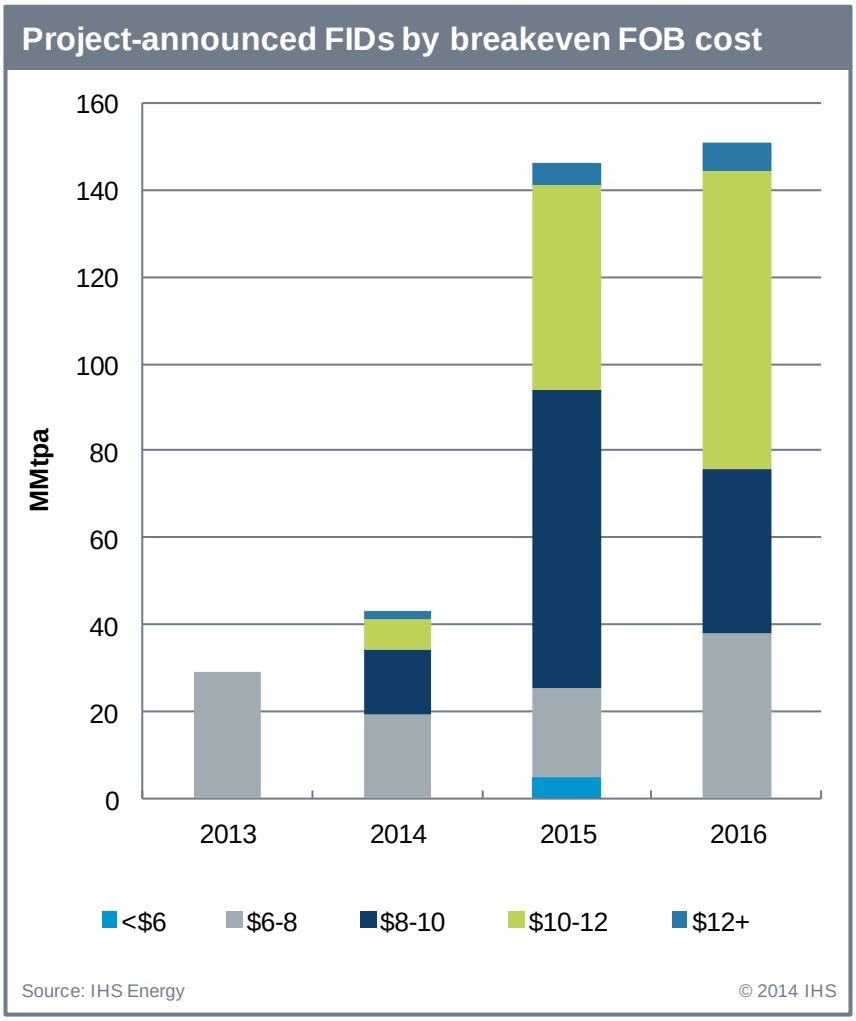
V. **Resolving contract extension** early ensures that all parties are aligned in the end objective of production maximization.

- Institution of a well-defined process for contract extension with clearly identified timelines, roles and responsibilities, criteria etc.
- Allow contract extension up to the end of the economic life of the asset with an equal focus on appropriate fiscal terms to ensure that production is maximized
- ***Case study:*** PETRONAS and Shell signed the Baram Delta EOR PSC and North Sabah EOR PSC. The projects, with a combined investment of US$12 billion, target to increase oil recovery from 36% to ~50%, translating to additional reserves of 750 MMbo.
- ***Case study:*** PETRONAS continued its collaboration with ExxonMobil with the signing of a new PSC for extension of the 1995 PSC in 2009. The contract covers seven offshore fields in Peninsular Malaysia.
- ***Case study:*** US BOEM end-of-life category essentially grants producing leases that have reached their economic limit and royalty relief suspension subject to the field's condition. End-of-life royalty relief is not restricted to a certain water depth, allowing application to a wider range of leases.

Focus Area 2: Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

In the development of Focus Area 2, it must first be understood that the global E&P industry has gone a significant transformation to where it was even just fifteen years ago. In a relatively short period of time, the impact of a completely new set of play types will have a significant impact on global oil production but comes at varying breakeven costs given the complexity and cost of development of new play types as highlighted below. Deepwater Liquid projects have a breakeven range of between USD 40-100 $/bbl)

From a gas perspective, the mobility of gas resources via LNG has increased significantly over the past twenty years. The challenge going forward is that new gas resources moving into the global LNG markets will increasingly come from deepwater as material conventional onshore/shallow-water gas resources diminish. The majority of new volumes as can be seen from the chart below will require much higher gas prices, which means that India domestic gas development to enhance gas production is needed to be stimulated with an appropriate move towards market pricing to reduce imports.



As India looks to boost exploration and production activity, the next wave of volume growth may not come from traditional sources such as conventional **shallow-water and onshore conventional**, that come at a lower cost and have a low breakeven range. The next sources of volume growth in India are expected to come from play types such as Deepwater, Ultra Deepwater, High-Pressure High-Temperature, EOR, Tight formation and unconventional etc. These play types invariably come at a higher cost base and longer delivery times to production.

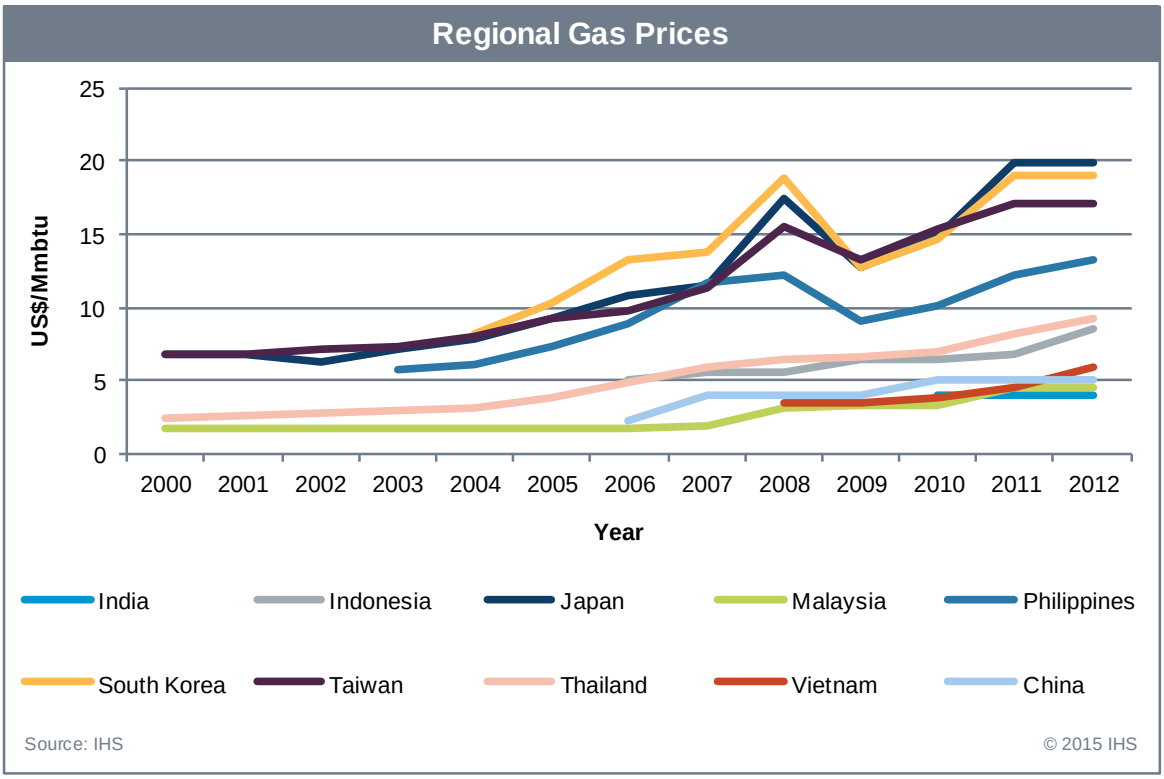
Another aspect that is equally important is that India's current inventory of reserves is limited and majority of reserves of oil are currently in production and would be classified as mature production. However, there are considerable undeveloped gas reserves in difficult areas with potential to at least double gas production and considerable reduce import dependence. Besides these gas resources, the next wave of volume growth will also need to come from exploration and given that 80% of the remaining sedimentary basins are still largely underexplored / unexplored, and are considered high-risk from a geology perspective, much work needs doing so as to attract investor risk capital.

Hence, it is critical that India's policies evolve with clarity and alignment in regards to the varying play types that will form a growing part of India's production, as well as the high risk geology from an exploration perspective. The following recommendations have been proposed:

I. **Road map and timeline for de-regulation of gas price** –given India's increasing complex play types, maturing production and frontier nature of unexplored acreage - underexplored, high-risk and potentially low chance of success:

- Recognise price anomaly between crude oil and gas price, as well as the much higher development and production costs for gas, in particular the transportation aspect
- Most resources in deep water, ultra deep water, HPHT and difficult frontier area development (like unconventionals) are highly capital intensive – both for existing/ new discoveries. Existing discoveries have potential to double India's production.
- Road map and timeline for de-regulation of gas price on the basis of diesel price reform success in India.
- India is unique where gas pricing formula is derived from hubs that do not reflect India's net importer status and its domestic E&P environment
- ***Case studies***: Regional countries that are net importers such as China, Thailand and Indonesia are persistently moving towards market pricing (refer supporting evidence slides)
    - Indonesia is a prime example where upwards gas price movement is resulting in a greater number of stalled/stranded gas projects moving into development
    - Domestic gas production growth in Indonesia in turn provides returns for both investor and government under the PSC regime

Some supplementary information to support this recommendation is that net importers such as China, Indonesia and Thailand are persistently moving towards market pricing. Recent projects in Thailand and Indonesia have agreed prices in excess of 10 USD$/MMBtu. From a regional perspective, India's current domestic gas price is the lowest between regional peers even if the graph is extended to 2015 – put simply, **risk capital will not enter India where competing countries have more attractive geology and pricing environment**

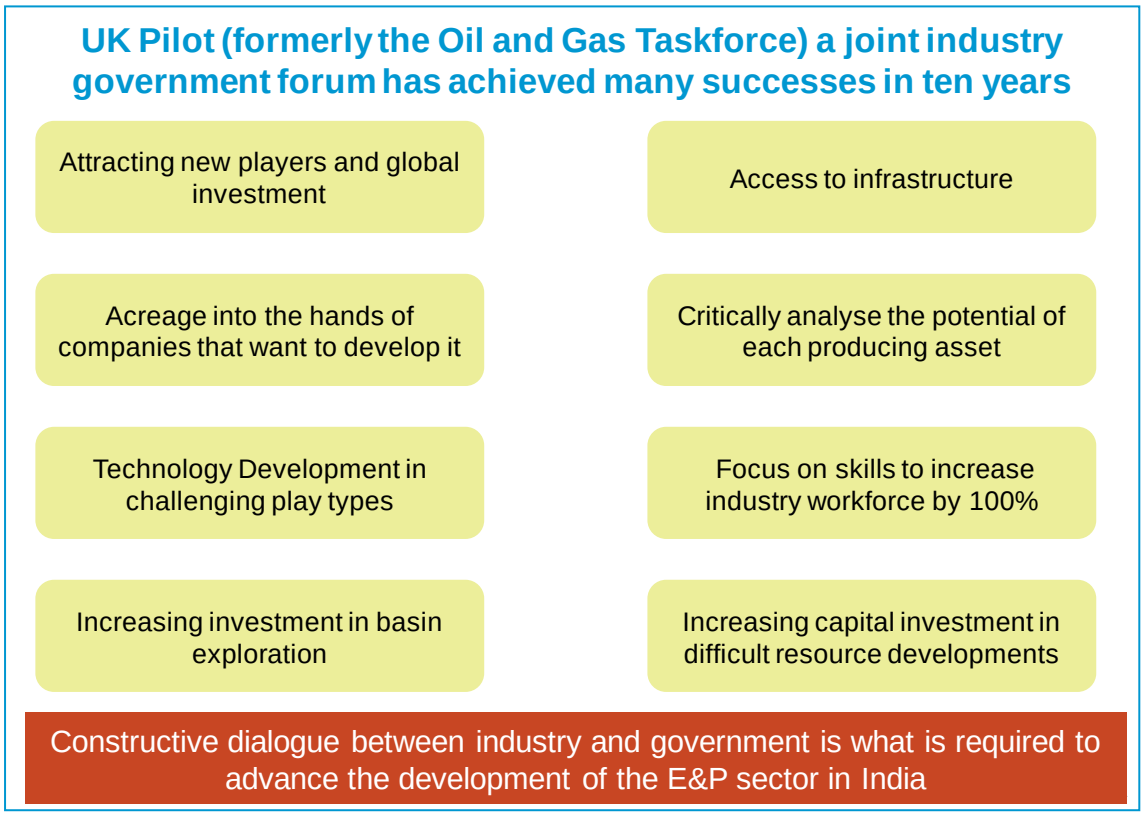


II. **Conduct Periodic Brainstorming Stakeholder Alignment Workshops** to align all key stakeholders (DGH, MOPNG, Industry) towards key objectives of being "production maximization" for a large net importer like India.

III. **Joint Industry-government consultations recommended to promote a partnership and dialogue** to share international best practices and industry concerns

- ***Case study*:** UK Oil and Gas Industry Council has 23 members including 6 Government representatives, 1 Trade Union representative, 14 industry representatives and 2 representatives from Oil & Gas UK. Meets three times a year to focus on safety, supply chain: domestic and international growth, access to finance, technology, skills, awareness of the industry, engaging with other industries, decommissioning & fiscal regime

- ***Case Study***: UK Pilot (formerly the Oil and Gas Taskforce) chaired by the Secretary of State for Energy & Climate Change includes around 13 industry and relevant government representatives (refer next page on what PILOT collaboration has achieved)



IV. **Tailor-made policies/incentives recommended** for unexplored acreage, marginal fields, mature fields, deepwater, EOR, HPHT, tight formation and unconventionals to address the specific risk-reward balance of each play type (refer supporting evidence: Incentives_Tax Allowances Supplement Presentation)

V. **Incentives/tax advantages to be extended to service companies** to encourage their existence/furtherance in India – leverage India's skilled technical talent to further a service sector hub capabilities

VI. **Allow exploration and exploitation of unconventional Hydrocarbons** in all pre-NELP and NELP blocks – currently not a provision and one that would accelerate activities given the growth the unconventionals as play type globally.

VII. Allow Exploration in Mining Lease as normal activity without Ring Fence. Replace February and October 2013 Early monetization of discoveries policy with a policy which is simple and implementable and maximizes exploration in producing area in order to maintain healthy reserve replacement ratio.

VIII. Secondary market (Farm-in and Farm-out) should be encouraged to help investors maintain their risk/reward balance and entry of niche players

Focus Area 3: Access to Acreage via NELP, OALP or other potential routes

As highlighted earlier, the need to stimulate exploration activity in India is imperative. This takes more importance given the declining mature production coupled with the high-risk geology of the 80% of sedimentary basins of India.

New Exploration Licensing Policy (NELP) as well as the planned introduction of the Open Acreage Licensing Policy (OALP) is expected to assist in attracting new companies. However, some key recommendations have been formulated after review of global best practices, which have been presented and divided into three categories:

- Access to Acreage via NELP
- Access to Acreage via OALP
- Access to Acreage via other means

Access to Acreage via NELP

I. Re-focusing on critical issues such as high quality data, attractive contractual terms coupled with a **clear road map to move to** gas market pricing are need to ensure NELP X success

II. Providing acreage scale (eg. Material block size) in NELP X is essential to attract larger companies that bring technological experience, in particular for challenging plays such as deep water, HPHT, unconventional, tight formation etc..

III. Continuity of PSC framework for new block awards, in particular for difficult plays such as deepwater, HPHT, tight formation and unconventionals

IV. Immediately address some of the ongoing issues – PSC extension, continued exploration, easy relinquishments etc to build investor confidence.

V. **Ensure fiscal stability clause in new policy guidelines: It** is paramount so as to attract investor risk capital into exploration

- ***Case study:*** PSCs signed with foreign companies in Azerbaijan have comprehensive stabilization provisions, reflecting the need for assurance felt by oil companies entering into an oil sector without a mature body of laws and practices.
- ***Case Study:*** Concession regimes usually do not have stabilization provisions but Thailand has a stabilization clause in its model contract, which emphasizes its respect to fiscal terms and overall sanctity of contracts.

Access to acreage via OALP

I. For OALP to be a success, high quality data is imperative.

- Expedite mapping of all basins.
- Measures such as encouraging multi-client surveys coordinated by DGH or GOI underwriting surveys are all necessary steps that need to be implemented to build data for prospective contractor access
- To ensure OALP and future NELP round success, there is a need to ensure that national data repository (NDR) programme is implemented in a timely manner

II. Create focused, strategic partnerships: Joint Study Agreements should be encouraged between contractor and DGH for areas that have not been reserved for a formal bid round process (refer Indonesia example hereunder).

Indonesia direct offer approach is gaining greater traction and success

A prospective contractor can only propose an open area that has not been reserved as an open area to be offered via a tendering process

If Director General (DG) approves the proposal, the prospective contracts must conduct a joint study over a period of 6-12 months, at the expense of the prospective contract. If DG evaluates the results of the joint study as acceptable, the MoEMR will allocate the proposed areas as a working area

After the working areas has been allocated, the DG can conduct a tender (bid round) over the working area. The prospective contractor who was involved in the joint study will receive the right to match the highest bidder of the tender round – if it cannot it surrenders all data to the Director General

Access to acreage via other means

I. Create a mechanism to encourage technology driven partnerships through innovative contractual model by attracting international players having access to advanced technologies to unlock full potential of non-NELP blocks held by NOCs

II. Continuity of PSC framework for new block awards, in particular for difficult plays such as deepwater, HPHT, tight formation and unconventionals

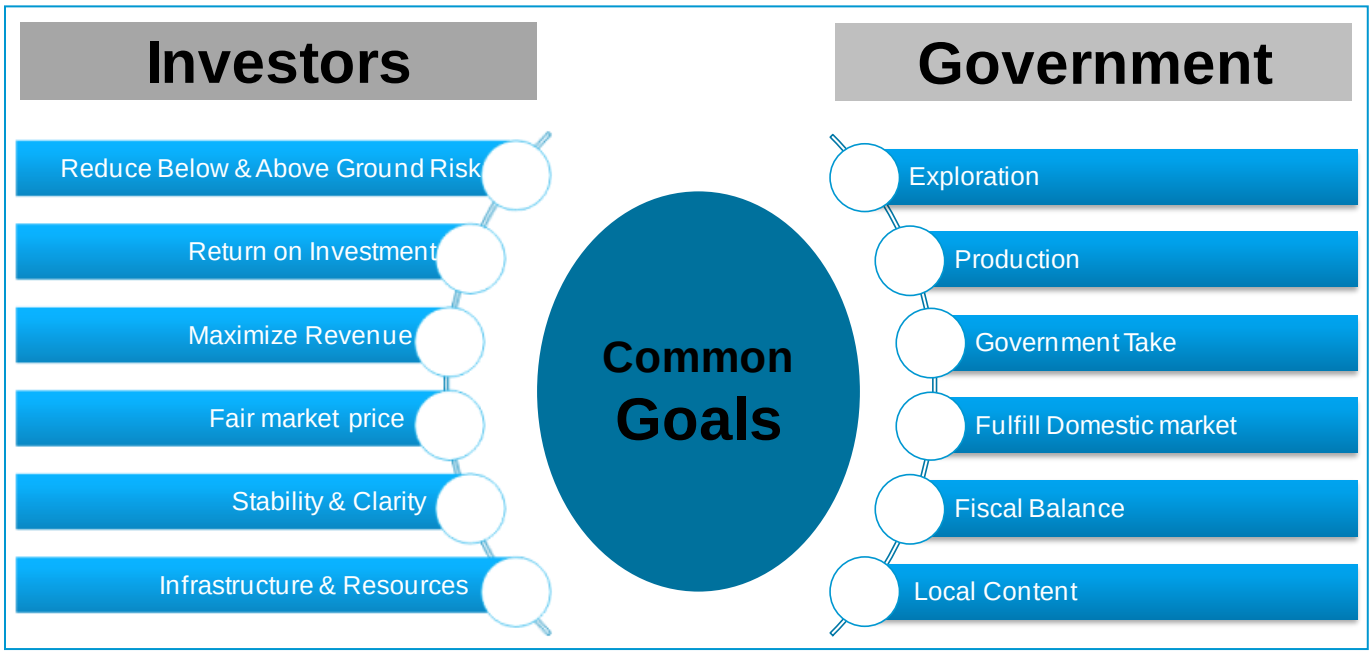
III. Consider the Technical Evaluation Agreement (TEA) approach introduced by Colombia in the 2014 licensing round for blocks that have limited or no geological information. Such blocks allow companies to study an area with minimum exploration commitments before carving out an area to commit to a concession contract.

Focus Area 4: Realignment of objectives between investor and government

Finally, the last focus area identified was the requirement to realign objectives between investor and government. The oil and gas industry is a highly capital intensive industry, where investors are exposed to significant exploration risks where probability of achieving a commercial investment is very low (one in ten). Contractors are faced with capital risk given high probability of failure in exploration activity and the low probability of monetizing these discoveries. For the past two decades, the numbers of dry holes in India are nearly 70%, which means that 30% have had some form of oil and gas shows during drilling. Of these 30%, further appraisal work leads to only one in ten that moves into commercial production.

For an investor looking to make an entry into a country, their prime objective is to maximise revenue given they are assuming higher capital risk – specifically in exploration where failure could mean pack-up your bags and return home. The objective of maximising revenue can only be achieved if production is optimized and costs managed effectively. The standard valuation matrix of NPV and IRR are the industry standard yardsticks to measure profitability and rate of return on investment in allocating limited capital resources:

- **Optimum Production:** A development plan considers the optimum production level valued at fair market price that can deliver maximum revenue, without putting the reservoir quality at risk.
- **Managing Cost Effectively:** An additional dollar spent is a capital risk to the investors. Cost Recovery terms under PSC are an important element to reduce capital risk. Notwithstanding of the “blanket” terms on cost recovery, an additional dollar spent is a hit to the investors’ bottom line as it reduces the Profit Share pool.



The end goal of an investor is to optimize development, manage costs so as to maximise return on investment, if a commercial discovery has been made. The Petroleum Sharing Contract (PSC) is a framework that allows the Government and Investors to re-align their goals to reach to common objectives. So as to bring re-alignment, the following recommendations are proposed:

I. Measure and benchmark Industry and DGH effectiveness of tasks through 5 lenses:

- Speed of progress, pre-FDP
- Deliver robust development plans, during FDP
- Fast track development to first production, post-FDP
- Production maximization and optimization, through cutting edge technologies
- Maintain good RR Ratio to sustain/ increase production

II. Establish a framework for timely communication between all parties, schedule timely and regular meetings and with an Empowered group for conflict resolution at the Ministry level.

Key Conclusions

In summary, this joint initiative of Petrofed, Industry Members and IHS addresses some of the key issues identified at the Hon'ble Prime Minister Sh. Narendra Modi's address during the Urja Sangam on 27th March 2015. This initiative has examined those issues and formulated some key focus areas coupled with targeted recommendations.

The ultimate aim of these targeted recommendations is to achieve the common goal of increasing the much needed capital inflow towards domestic exploration and production leading to accelerated and enhanced production of oil & gas in the country.

Part 2

Presentation

Petroleum Federation of India

Stimulating Domestic Exploration and Production in India – A PetroFed Initiative in Knowledge Partnership with IHS Energy

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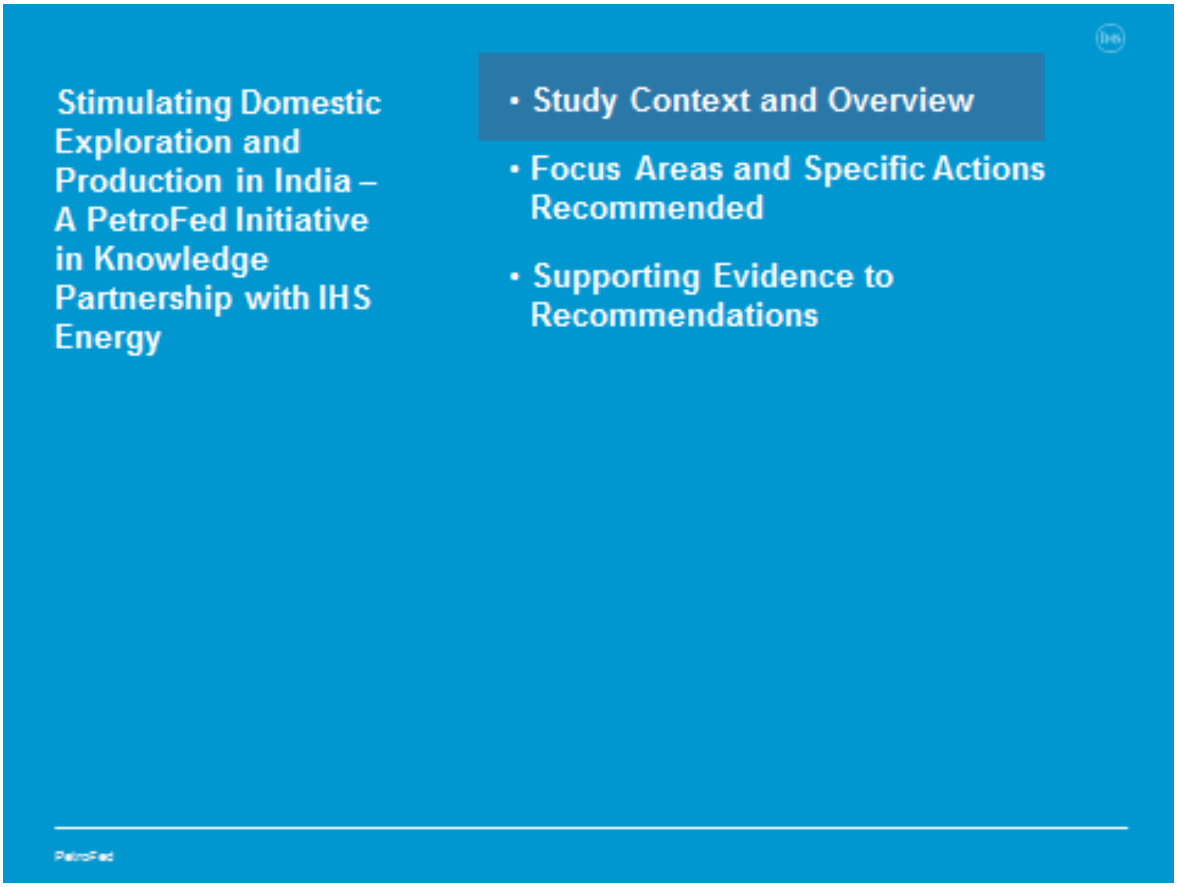
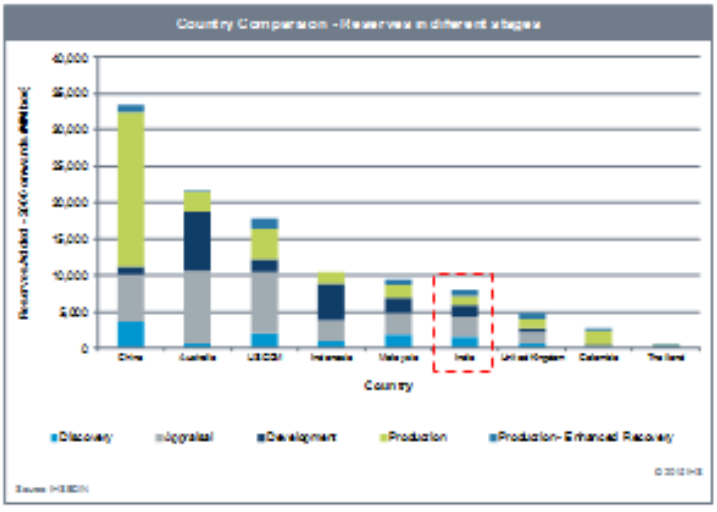


Prime Minister's new mandate of 10% reduction in import dependency by 2022 requires addressing four key issues in India

1. Accelerate discoveries into production in upstream
2. Maximize recovery from existing fields
3. Increase flow of Investor risk capital in exploration of oil & gas significantly
4. Incentivize oil & gas exploration to maintain equitable risk-reward balance

PetroFed

1 India's focus must be on accelerating fields from discovery into production stage



Specific challenges in India

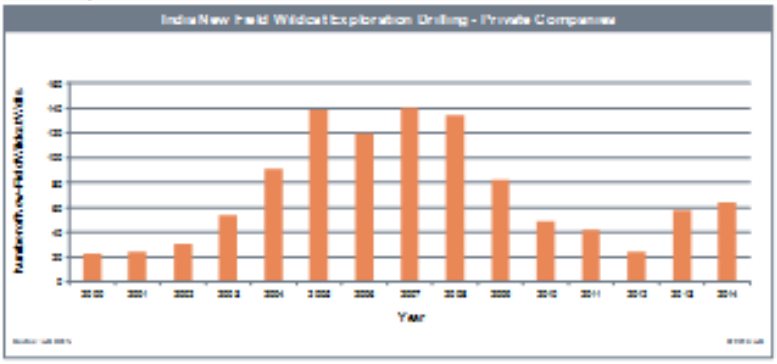
- Between 2000-15, only 26% of reserves discovered in India are in production versus an average of 40% for the countries shown in the graph.
- The number increases to 46% if Australia is excluded, as monetisation of LNG projects takes considerably longer.
- Majority of current production is from matured fields where production is in decline.
- This decline will need production from 2P reserves from DW, UDW, HPHT and infrastructure challenged offshore. DW/UDW alone comprise of 45% of remaining reserves not in production.
- India needs to partner with or encourage FOCs that bring technology and technical expertise to accelerate production growth

Recommended Focus Areas:

1. Adherence to sanctity of contracts and capacity building
2. Clarity and alignment of policy intent and guidelines based on India's high risk geology & varying play types
3. Realignment of objectives between investor and government

2 New Field Wildcat Exploration Drilling in India by Private Companies must increase significantly..

- An average of only 47 new field wildcat exploration wells per year have been drilled in the past five years versus an average of 84 per year for the preceding ten years by the private E&P companies.
- Long term exploration technical success continues be 3 in 10. Technical success is defined as wells that have had oil/gas shows during drilling but still requires further appraisal drilling to assess field commerciality.
- Commercial chances of success, which relates to making discoveries that are economical and will move into production, still stands at less than 1 in 10.



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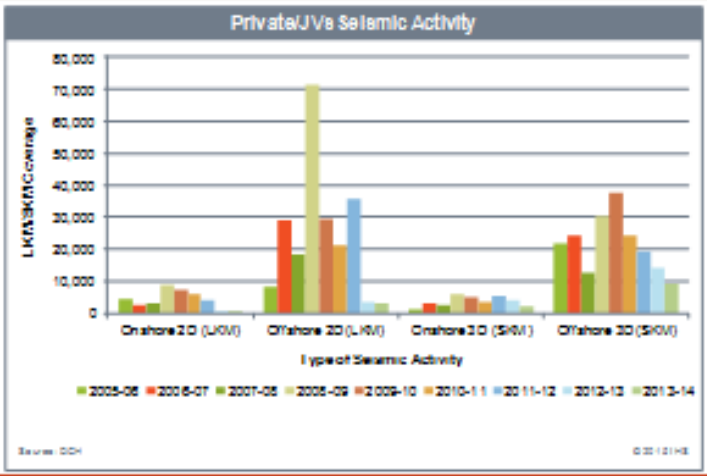
1. Adherence to sanctity of contracts and capacity building
2. Clarity and alignment of policy intent and guidelines based on India's high risk geology & varying play types
3. Access to acreage through different channels

PetroFed Note: IHS definition of a new-field wildcat is the first well drilled on a structure (also called a prospect). If this well does not discover hydrocarbons, the operator can then decide to drill another well on the same structure. It will still be designated as a new-field wildcat, and so on until one of them gets positive results.

3 India needs a strategy to incentivize private/JVs to undertake more seismic activity

- Seismic activity across the board is on a steep downward trend since a peak in 2008-09
- Seismic activity has a direct correlation to exploration - current data shows that exploration risk capital is moving elsewhere in the globe



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3. Access to acreage through different channels

Stimulating Domestic Exploration and Production in India – A PetroFed Initiative in Knowledge Partnership with IHS Energy

- Study Context and Overview
- Focus Areas and Specific Actions Recommended
- Supporting Evidence to Recommendations

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In order to move towards that goal of reducing import dependency, *4 focus areas* have been identified and corresponding specific actions recommended

Focus Areas	Specific Actions Recommended
Adherence to sanctity of contracts and capacity building	1. Create a formal dispute resolution forum 2. Empower DGH to act on behalf of the MOP&NG 3. Implement a Mindset change via human resource capacity building 4. Clarity of best practices for undefined and ambiguous areas on Good International Petroleum Industry Practices 5. Resolving contract extension early ensures that all parties are aligned in the end objective of production maximization
Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types	1. Road map and timeline for de-regulation of gas price 2. Conduct Periodic Stakeholder Alignment Workshops 3. Joint Industry-government consultations recommended to promote a partnership and dialogue 4. Tailor-made policies/incentives recommended for unexplored acreage, marginal fields, mature fields, deepwater, EOR, HPHT, tight formation and unconventionals 5. Incentives/tax advantages to be extended to Service companies to encourage "Make in India" 6. Allow exploration and exploitation of Unconventional Hydrocarbons in all pre-NELP and NELP blocks 7. Allow Exploration in Mining Lease as a normal activity without Ring Fence 8. Secondary market (Farm-in and Farm-out) should be encouraged
Ease of Access to acreage via NELP, OALP and faster churn of awarded acreage by strict adherence to timelines	1. Via NELP 2. Via OALP 3. Via technology driven partnerships to unlock full potential of non-NELP blocks held by NOCs
Realignment of objectives between investor and government	1. Measure and benchmark industry and DGH effectiveness of tasks through 5 lenses at specific project stage gates – pre FDP, during FDP, post FDP, production 2. Establish a framework for timely communication between all parties, schedule timely and regular meetings and with an Empowered group for conflict resolution at the Ministry level

Focus Area 1 Adherence to sanctity of PSC contracts & capacity building – Proposed Recommendations

1. **Create a formal dispute resolution forum:** In case of disagreements between host government and investor, arbitration should be the last resort with greater strengthening of pre-arbitration mechanism:
   - Decision to be taken keeping objective of NELP – maximize activities to discover and produce
   - Use of empaneled expert assessors where appropriate – expert panel should represent a wider perspective via inclusion of members from diverse sources
   - Create an empowered group at Ministry that clears a monthly / quarterly backlog of issues disputed at the MC level using advise of empanelled experts
   - 80% Issues to be resolved at MC level - MC should be respected and adhered by all
   - Difference of opinion should be sorted out through discussion rather than through written communications
   - An atmosphere where regulator/ministry can take objective decision without worrying about his decision being reviewed in the hindsight.
   - If an amicable solution cannot be achieved and arbitration is the only remaining route, then it should be resolved in a **time-bound manner**.

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Focus Area 1 Adherence to sanctity of PSC contracts & capacity building – Proposed Recommendations

2. **Empower DGH to act on behalf of the MOP&NG** in areas of ambiguity and interpretation of the PSC contract rather than only to administer the PSC contract:
   - MOP&NG needs to work as a partner with industry for policy formulation with investor to be strictly compliant with the provisions of the PSC.
   - All policy guidelines should be implemented exclusively by the DGH and followed by the Investors.
   - Consider review function as advisory and not binding to allow activities to progress in a timely manner.
   - Reassess need to provide more autonomy to DGH so as to ensure policy implementation lies with DGH and cases are not sent back to MOPNG
   - Case study: Colombia ANH supports the government in the formulation of petroleum policy – ANH are focused towards exploration & production optimization, rather than being "just an administrator"
   - Case study: UK regulator Oil & Gas Authority (OGA) in addition to its role of supervising licensing; is empowered to develop broader skills and experience, remove bureaucracy and enhance level of coordination /collaboration.

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Focus Area 1 Adherence to sanctity of PSC contracts & capacity building – Proposed Recommendations

3. **Implement a Mindset change via human resource capacity building** of industry professionals in a range of disciplines is recommended at the DGH.

- Decisions that support fast track development ***should be incentivized in performance* contracts of DGH personnel**.
- Create a panel of expert advisors that have geographical and play type experience to promote continuous knowledge transfer
- Diversify and globalise sourcing of best-in-class expertise with the **right financial incentives** for DGH (Global MNCs, Consultants, NOCs of other countries, Service Providers, Academicians)
- Case study: In order to build a regulator with greater autonomy and leadership, the *UK* industry is to become a source of funding to build personnel capacity – however, they equally expect quality of service and delivery. The head of UK regulator Oil and Gas Authority (OGA) has just been announced as Mr. Andy Samuel (previously Managing Director of BG Group)
- *Case study*: *US BOEM* transparency on personnel requirements is available on their website – the required budget for each full-time resource is in line with industry pay so as to attract the right talent

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Focus Area 1 Adherence to sanctity of PSC contracts & capacity building – Proposed Recommendations

4. **Clarity of best practices for** undefined and ambiguous areas on Good International Petroleum Industry Practices, recognizing the uncertainty, risk and changing technologies in the Indian E&P sector.

- Database of practices, once defined, should be **refreshed continuously** via a **standing mechanism as techno-commercial changes happen in the global industry**
- Defined best practices should **provide options** rather than guidelines that potentially become restrictive (GIPIP should continue to be reference point and not binding)
- Ministry / DGH should create an annual platform (e.g Worldwide Upstream Regulators Forum) to ensure continuous global learning and dialogue of regulatory best practices
- *Case study*: US BOEM for example regularly provides notice to Lessees and operators advising them on relevant changes
- *Case study*: In UK, industry consultation is essential before formulation of any new best practice

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Focus Area 1 — Adherence to sanctity of PSC contracts & capacity building – Proposed Recommendations

5. **Resolving contract extension** early ensures that all parties are aligned in the end objective of production maximization.
   - Institution of a well-defined process for contract extension with clearly identified timelines, roles and responsibilities, criteria etc.
   - Allow contract extension up to the end of the economic life of the asset with an equal focus on appropriate fiscal terms, considering the capex requirements and the risks associated with mature assets, to ensure that production is maximized
   - *Case study*: PETRONAS and Shell signed the Baram Delta EOR PSC and North Sabah EOR PSC. The projects, with a combined investment of US$12 billion, target to increase oil recovery from 36% to ~50%, translating to an additional reserves of 750 MMbo.
   - *Case study*: PETRONAS continued its collaboration with ExxonMobil with the signing of a new PSC for extension of the 1995 PSC in 2009. The contract covers seven offshore field in Peninsular Malaysia.
   - *Case study*: US BOEM end-of-life category essentially grants producing leases that have reached their economic limit and royalty relief suspension subject to the field's condition. End-of-life royalty relief is not restricted to a certain water depth, allowing application to a wider range of leases.

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Focus Area 2 — Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types - Proposed Recommendations

1. **Road map and timeline for de-regulation of gas price** –given India's increasing complex play types, maturing production and frontier nature of unexplored acreage - underexplored, high-risk and potentially low chance of success:
   - Recognise price anomaly between crude oil and gas price, as well as the much higher development and production costs for gas, in particular transportation costs.
   - Most resources in deep water, ultra deep water, HPHT and difficult frontier area development (like unconventionals) are highly capital intensive – both for existing /new discoveries. Existing discoveries have potential to double India's production.
   - Road map and timeline for de-regulation of gas price on the basis of diesel price reform success in India.
   - India is unique where gas pricing formula is derived from hubs that do not reflect India's net importer status and its domestic E&P environment
   - *Case studies*: Regional countries that are net importers such as China, Thailand and Indonesia are persistently moving towards market pricing (refer supporting evidence slides)
     - Indonesia is a prime example where upwards gas price movement is resulting in a greater number of stalled/stranded gas projects moving into development
     - Domestic gas production growth in Indonesia in turn provides returns for both investor and government under the PSC regime

Focus Area 2 — Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types - Proposed Recommendations

2. ***Conduct Periodic Brainstorming Stakeholder Alignment Workshops*** to align all key stakeholders (DGH, MOPNG, Industry) towards a key objectives of being "production maximization" for a large net importer like India.
3. **Joint Industry-government consultations recommended to promote a partnership and dialogue** to share international best practices and industry concerns
   - *Case study:* UK Oil and Gas Industry Council has 23 members including 6 Government representatives, 1 Trade Union representative, 14 industry representatives and 2 representatives from Oil & Gas UK. Meets three times a year to focus on safety, supply chain: domestic and international growth, access to finance, technology, skills, awareness of the industry, engaging with other industries, decommissioning & fiscal regime
   - *Case Study:* UK Pilot (formerly the Oil and Gas Taskforce) chaired by the Secretary of State for Energy & Climate Change includes around 13 industry and relevant government representatives (refer supporting evidence section on what PILOT collaboration has achieved)
   - *Case Study:* One of the key features of Columbia 2014 licensing round was the Technical Evaluation Agreement (TEA), which was offered for acreage with limited or no geological information. Such blocks were awarded Technical Evaluation Agreements (TEA), which allow companies to study an area with minimum exploration commitments before carving out an area to commit to a concession contract.

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Focus Area 2 — Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types - Proposed Recommendations

4. ***Tailor-made policies/incentives recommended*** for unexplored acreage, marginal fields, mature fields, deepwater, EOR, HPHT, tight formation and unconventionals to address the specific risk-reward balance of each play type (refer supporting evidence: Incentives_Tax Allowances Supplement Presentation)
5. Incentives/tax advantages to be extended to Service companies to encourage their existence/furtherance in India – leverage India's skilled technical talent to further a service sector hub capability
6. Allow exploration and exploitation of Unconventional Hydrocarbons in all pre-NELP and NELP blocks – currently not a provision and one that would accelerate activities given the growth the unconventionals as play type globally.
7. Allow Exploration in Mining Lease as normal activity without Ring Fence. Replace February and October 2013 Early monetization of discoveries policy with a policy which is simple and implementable and maximizes exploration in producing area in order to maintain healthy reserve replacement ratio.
8. Secondary market (Farm-in and Farm-out) should be encouraged to help investors maintain their risk/reward balance and entry of niche players

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Focus Area 3 — Access to Acreage via NELP – Proposed Recommendations

1. Re-focusing on critical issues such as high quality data, attractive contractual terms coupled with **a clear road map to move** to gas market pricing are need to ensure NELP X success
2. Providing acreage scale (eg. Material block size) in NELP X is essential to attract larger companies that bring technological experience, in particular for challenging plays such as deep water, HPHT, unconventional, tight formation etc..
3. Continuity of PSC framework for new block awards, in particular for difficult plays such as deepwater, HPHT, tight formation and unconventionals
4. Immediately address some of the ongoing issues – PSC extension, continued exploration, easy relinquishments etc to build investor confidence.
5. Ensure fiscal stability clause in new policy guidelines: It is paramount so as to attract investor risk capital into exploration
   - *Case study*: PSCs signed with foreign companies in Azerbaijan have comprehensive stabilization provisions, reflecting the need for assurance felt by oil companies entering into an oil sector without a mature body of laws and practices.
   - *Case Study*: Concession regimes usually do not have stabilization provisions but Thailand has a stabilization clause in its model contract, which emphasizes its respect to fiscal terms and overall sanctity of contracts.

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Focus Area 3 — Access to Acreage via OLAP – Proposed Recommendations

1 For OALP to be a success, high quality data is imperative.
   - Expedite mapping of all basins.
   - Measures such as encouraging multi-client surveys coordinated by DGH or GOI underwriting surveys are all necessary steps that need to be implemented to build data for prospective contractor access
   - To ensure OALP and future NELP round success, there is a need to ensure that the national data repository (NDR) programme is implemented in a timely manner

2. Create focused, strategic partnerships: Joint Study Agreements should be encouraged between contractor and DGH for areas that have not been reserved for a formal bid round process (refer supporting evidence example for Indonesia).

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Focus Area 3 — Access to Acreage via other means – Proposed Recommendations

1. Create a mechanism to encourage technology driven partnerships to unlock full potential of non-NELP blocks held by NOCs
2. Continuity of PSC framework for new block awards, in particular for difficult plays such as deepwater, HPHT, tight formation and unconventionals
3. Consider the Technical Evaluation Agreement (TEA) approach introduced by Colombia in the 2014 licensing round for blocks that have limited or no geological information. Such blocks allow companies to study an area with minimum exploration commitments before carving out an area to commit to a concession

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Focus Area 4 — Realignment of objectives between investor and government - Proposed Recommendations

1. Measure and benchmark Industry and DGH effectiveness of tasks through 5 lenses:
   - Speed of progress, pre-FDP
   - Deliver robust development plans, during FDP
   - Fast track development to first production, post-FDP
   - Production maximization and optimization, through cutting edge technologies
   - Maintain good RR Ratio to sustain/ increase production
2. Establish a framework for timely communication between all parties, schedule timely and regular meetings and with an Empowered group for conflict resolution at the Ministry level.

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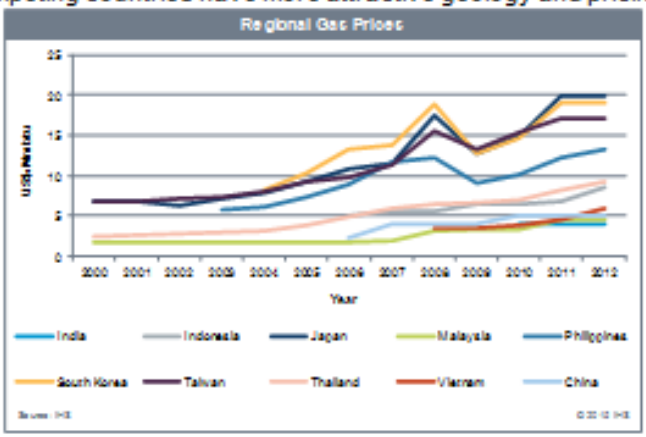
Focus Area 2 Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

Net importers have a greater need to move to market pricing – this in turn will boost exploration and production

- Net importers such as China, Indonesia and Thailand are persistently moving towards market pricing. Recent projects in Thailand and Indonesia have agreed prices in excess of 10 USD$/MMbtu
- From a regional perspective, India's currently administered gas price is the lowest between regional peers even if the graph is extended to 2015 – risk capital will not enter India where competing countries have more attractive geology and pricing



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Focus Area 2 Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

UK Pilot (formerly the Oil and Gas Taskforce) a joint industry government forum has achieved many successes in ten years

- Attracting new players and global investment
- Access to infrastructure
- Acreage into the hands of companies that want to develop it
- Critically analyse the potential of each producing asset
- Technology Development in challenging play types
- Focus on skills to increase industry workforce by 100%
- Increasing investment in basin exploration
- Increasing capital investment in difficult resource developments

Constructive dialogue between industry and government is what is required to advance the development of the E&P sector in India

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Focus Area 2 Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

Range of contract types have driven Malaysia production growth

- Under the Petroleum Income Tax Act (2010), **marginal field incentives** are such petroleum income tax rate at 25% compared to current rate of 38%, accelerated capital allowance from 10 years to 5 years, export duty exemption; The Malaysian government also provides and approves an investment tax allowance of between 60% to 100% of qualifying capital expenditure incurred within five years from the date the first qualifying capital expenditure is incurred.
- **Deepwater PSC:** As shallow water discoveries got smaller, the Deepwater PSC was introduced to incentivize deep water exploration. Less "tough" compared to shallow-water terms due to the removal of Threshold Volume and lower Supplementary Payment Rate
- PETRONAS introduced a new **risk sharing contract (RSC)** in order to spur development of marginal fields. This RSC provided new incentives for development of marginal fields (< 30 mmboe). The compulsory inclusion of one or more local entity to hold equity of 30-40% also promotes technology transfer to develop domestic capabilities
- **Progressive Volume-Based (PVB):** The PSC is not aimed at exploration, but rather continued production, further development, and improved recovery of the fields. The new terms are designed to provide incentives to improved oil recovery from mature fields.

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Focus Area 2 — Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

UK has undertaken a number of tax break and field allowances for new resource categories

- A reduction of the Supplementary Charge from 30% to 20%;
- A reduction in the rate of Petroleum Revenue Tax from 50% to 35% (applicable to certain, older, fields), effective from 1 January 2016
- The introduction of a simplified 'Investment Allowance' (covering the whole UK Continental Shelf), to exempt an amount of taxable income from the Supplementary Charge equivalent to 62.5% of the qualifying capital expenditure incurred in relation to a given field, effective from 1 April 2015
- An immediate extension of the ring fence expenditure supplement from six to ten accounting periods;
- Financial support for seismic surveys in under-explored areas of the UKCS – GB 20million
- Specific field allowances for small fields (£150Mn), ultra-heavy oil (£800Mn), ultra high pressure high temperature (£150Mn), deepwater field (up to £3Bn), sizeable reserves field, shallow-water gas field (£500Mn) and brownfield development (£250Mn for non PRT fields and £500Mn for PRT fields)

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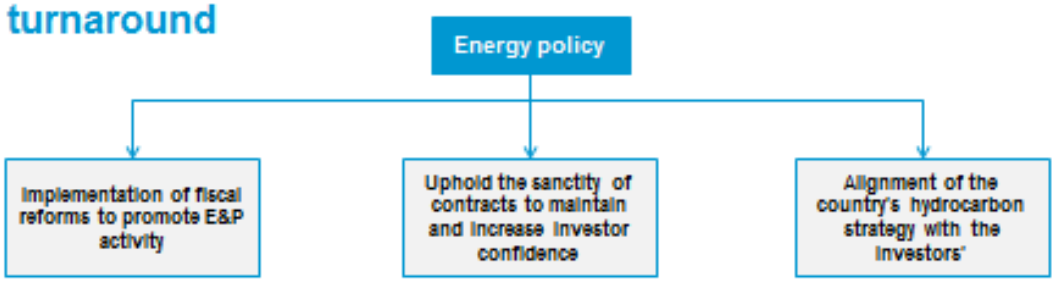
Focus Area 2 — Clarity and alignment of policy intent and guidelines based on India's perceived high risk geology & varying play types

For Colombia reform was key in its production turnaround



Examples

- The government began its fiscal reform in 1999, culminating in a sliding-scale royalty tax rate ranging between 8% to 25% - vary royalty depending on production levels achieved
- Colombia has a flexible government take with regards to profitability, output, and capital costs.
- The ANH was established as an independent regulator in lieu of Ecopetrol's total control.
- The partial privatization of Ecopetrol, through the offering of company shares to the public. The government currently holds a 88.5% stake.

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Focus Area 3 Ease of Access to acreage via NELP, OALP and faster churn of awarded acreage by strict adherence to timelines

Indonesia direct offer approach is gaining greater traction and success

A prospective contractor can only propose an open area that has not been reserved as an open area to be offered via a tendering process

If Director General (DG) approves the proposal, the prospective contracts must conduct a joint study over a period of 6-12 months, at the expense of the prospective contract. If DG evaluates the results of the joint study as acceptable, the MoEMR will allocate the proposed areas as a working area

After the working areas has been allocated, the DG can conduct a tender (bid round) over the working area. The prospective contractor who was involved in the joint study will receive the right to match the highest bidder of the tender round – if it cannot it surrenders all data to the Director General

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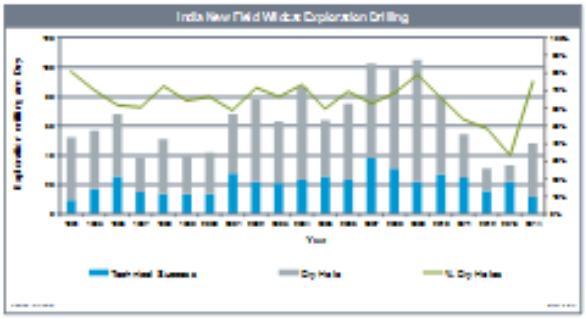
Focus Area 4 Re-alignment of objectives between investor and government

Capital Risk: Exploration & Development Uncertainties

- **High capital risk given the challenge to monetize discoveries**. Contractor are faced with capital risk given high probability of failure in exploration activity and the low probability to monetize the discoveries. For the past two decades, the number of dry holes are nearly 70%.
- **Low probability to achieve a successful investment.** Out of the discoveries made, the average size and number is on a downward trend. This means that out of the 30% that are successful, majority are non commercial
- **Discoveries translated into production are small give number of non commercial discoveries.** This is supplemented by the fact that on 16% of the reserves discovered made in the past 15 years are not in production.



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Focus Area 4 | Re-alignment of objectives between investor and government

Investors Perspective: Require Maximum Revenue In Return Given Higher Capital Risk

- **Investors require maximum revenue** it can achieve as they assume higher capital risk. This is done by achieving optimum production and managing its cost effectively. The standard valuation matrix of NPV and IRR are the industry standard yardsticks to measure profitability and rate of return on investment in allocating limited capital resources.
  - **Optimum Production**. A development plan considers the optimum production level valued at fair market price that can deliver maximum revenue, without putting the reservoir quality at risk.
  - **Managing Cost Effectively**. An additional dollar spent is a capital risk to the investors. Cost Recovery terms under PSC is an important element to reduce capital risk. Notwithstanding of the "blanket" terms on cost recovery, an additional dollar spent is a hit to the investors' bottom line as it reduces the Profit Share pool.
- **Ease of project execution**. The clarity in the processes and requirements by the regulatory bodies would ease the project executions for the company to move forward with development plans and achieve its production targets and revenue generation.

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Focus Area 4 | Re-alignment of objectives between investor and government

Alignment of Government & Investors Objectives

- The Petroleum Sharing Contracts (PSC) allow the Government and Investors to re-aligned their goals to reach to a common objectives.

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