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Operating Cost Optimisation: Importance & Approach

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Summary

The producing life of any oil and gas field is a dynamic process, involving interplay of geology, geo politics, technology, and market forces. Once the capital investment have been made with the wells drilled, platforms installed facilities commissioned and pipelines placed in service, much more remains to be done and the commensurate revenue checks as the operating expenses are key to maintaining production and stay long in business.

The nature of operating cost varies with the stage of the field maturity e.g. New, Mature, Old fields. Big offshore basin in India, umbai offshore has already entered into mature age. This maturity also has its challenges. The reservoir performance is much better assessed, considerable infrastructure exists although aging, gives these fields a head start in an environment where so many projects may be vying with one another for incremental investment. This also consists of intangible ones such as thousands of skilled people who have built and maintained the tangible part of infrastructure.

Later mature fields are characterized by declining production due to loss of pressure and/or increased water production. Pressure maintenance by water injection or gas lift injection is required at considerable cost, resulting in the drilling of water injection wells as well as the rejuvenation of surface facilities and pipelines. Increased water production increases costs due to added separation, disposal requirements and drilling of wells to maintain field production, thus increasing the operating costs considerably.

Inductions of new technologies are must to enhance production from such fields resulting in huge investments, needs optimization.

Compliance with the State Regulatory, Environment and Safety legislation requires to perform, report on a wide range of tasks, including field/well actual/test volumes, well casing mechanical integrity tests, flow lines , pipeline corrosion prevention and monitoring, carbons gas releases and disposal of drilling fluids, Oil spills management etc. Maritime policy in vogue, abandonment costs have to be provided for well in advance as 80% of the offshore structures have to be brought to shore.

Also inevitably the wells as well as processing equipment suffer mechanical deterioration and breakdowns, requiring partial/total replacement, particularly in aging operations after more than 25 years of service. Ongoing maintenance programs for equipments/systems etc. are as necessary.

Thus from the aforesaid it can be inferred that the Operating Costs manifests in many ways and making the Maximum Efficient Rate (MER) Operating Costs a vital key for maintaining production for any field. Analysis brings out some key issues for optimizing opex in offshore operations.



Introduction

The producing life of any oil and gas field is a dynamic process, involving interplay of geology, geo politics, technology, and market forces. Once the capital investment have been made with the wells drilled, platforms installed facilities commissioned and pipelines placed in service, much more remains to be done and the commensurate revenue checks as the operating expenses are key to maintaining production and stay long in business.

The nature of operating cost varies with the stage of the field maturity e.g. New, Mature, Old fields. In Western Offshore basin, Mumbai offshore fields have already entered into mature age. This maturity also has its challenges. The reservoir performance is much better assessed, considerable infrastructure exists although aging,

175 are about 3,35,000 BOPD and 16MMSCMD of gas.

The age of process complexes and platforms are + 30 years to 10 years and still some new well platforms and process complexes are being installed based on re-development studies.

Aging of the facilities including pipelines has initiated many brown field project jobs where revamping and replacement are being done in phased manner in a big way since 2001-02.

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Phases of Development

Initially ,most of expenditures were in Capex category and Opex was low. However with ageing of field, many new initiatives were taken up ,wherein Opex shows increasing trend. In early eighties to nineties the production levels have reached a peak level and the same started to decline as a natural phenomena with augment of inputs in the early twentieth century the production level have shown a trend

gives these fields a head start in an environment where so many projects may be vying with one another for incremental investment. This also consists of intangible ones such as thousands of skilled people who have built and maintained the tangible part of infrastructure.

Mumbai Offshore Fields

Mumbai Offshore fields are mature fields with over 30+ years of production history.

There are 13 offshore process complexes and about 135 unmanned platforms. The major oil and gas producers are Mumbai High, Neelam & Heera and Bassein Fields. The present production rate from these fields B and D-1 fields with some marginal fields like B-173 and B-

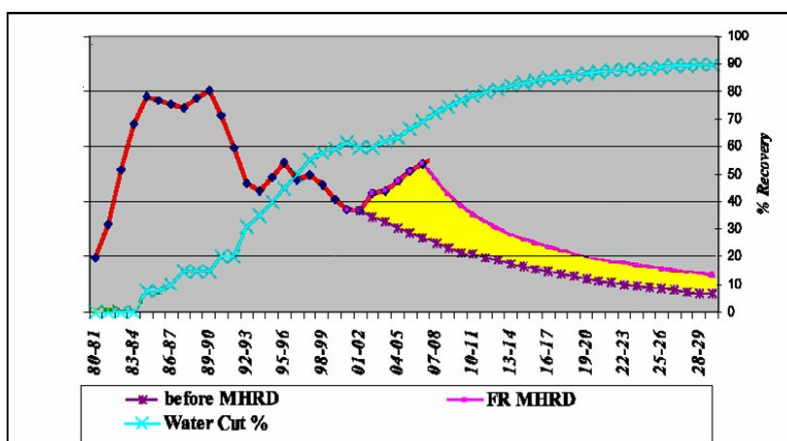
of increase but these trends will have its natural decline due to pressure drops and increased water cuts. In order to maintain the reservoir pressure the water injection activity has to be carried out. All such jobs will have impact on the operating cost on account of water injection.

Capex investment is for creating new process complex well platforms and wells. More of such investment are planned then the scale of operations are on increase which is associated with more operating expenditure. But this expenditure can be optimized by using the existing facilities thereby reduction in operating expenditure.

New technologies

Inductions of new technologies are must to enhance production from such fields resulting in huge investments, needs optimization.

In order to enhance the productivity in the mature field the induction of new technology is essential and ONGC has not lagged behind in acquiring the best in class technologies like well placement and online tracking through SCADA. Further to enhance productivity the normal conventional vertical drilling has been replaced with horizontal drilling. Apart from this ONGC has switch to multilateral and MRDH drilling. The induction of new technologies have resulted in additional expenditure along with

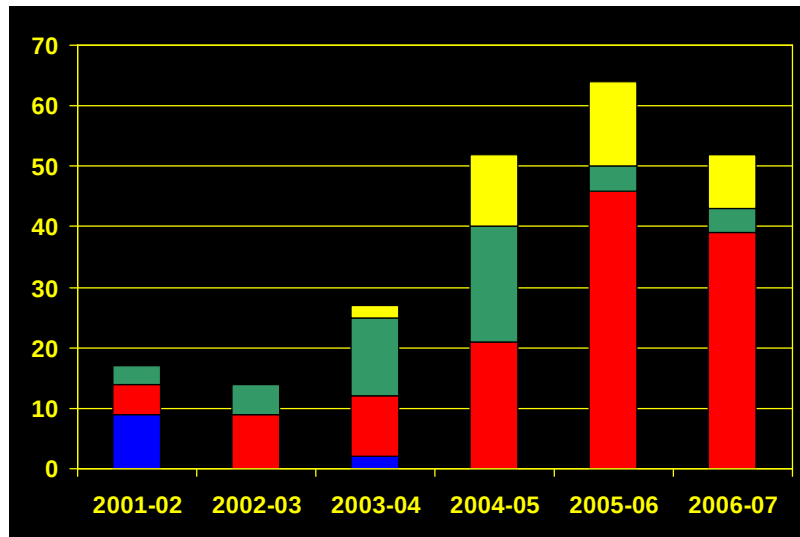




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Technology

- Well placement in sweet zone, online tracking through SCADA
- Large nos of Horizontal / Multilateral / MRDH result in improved productivity (350 bopd to 1000 bopd / well)
- Application of LWD, MWD, RSS, MRDH, SRDH



Inclined wells

Multilaterals

MRDH

Horizontal Wells

Improved Productivity of Wells – Improves Recovery



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the hiring of rig rates have trebled due to catastrophe happening in USA like Katrina, Rita which pushed the rig rates upwards and these have continued further with the boom in E& P market due to the peaking of crude prices. From the table below it can be seen that the no. of wells done with new technology has increased many times. All these increases have impacted the cost of work over.

ONGC has adopted the best in practices of the production technologies thereby improving the rate of production and at the same time it has optimized the operating expenditure to a significant level. Further efforts are being made to explore newer technologies to be put in place thereby improving the productivity of the depleted fields and also focusing on the operating expenditure is kept at the desired level.

Statutory requirements

ONGC gives top most priority for the safety and environmental issues, thus the deployment of multi support vessels with best in class services are pressed in service for off shore activities. These services are available at high charter rates due to the demand of these vessels in the market on account of booming E&P activities on account of peaking of crude prices. The expenditure on sub sea and pollution control had suddenly dropped in the year 2004-05 primarily on account of accident of Samudra Suraksha. Since then ONGC is not able to acquired MSVs on charter to meet the requirements, hence it shows a decline in expenditures in the subsequent periods.

Compliance with the State Regulatory, Environment and Safety legislation requires to perform, report on a wide range of tasks, including field/well actual/test volumes, well casing mechanical integrity tests, flow lines , pipeline corrosion prevention and monitoring, carbons gas releases and disposal of drilling fluids, Oil spills management etc. Maritime policy in vogue, abandonment costs have to be provided for well in advance as 80% of the offshore structures have to be brought to shore.

Revamping of Facilities

Initially the capital investments are made and after a period of time the facilities tend to worn out due to the usage and weather conditions in particular for offshore due to its salinity. In offshore the investments have been made since early eighties and over two decades the facilities have outlived its life. In order to process the well fluids facilities will have to be made available on continual basis, since this being the backbone of the entire off shore operations. ONGC had taken up the revamping of the facilities such as Equipments on process platform, unmanned well platforms and Flow lines in the last 5 years periods. The projects undertaken are BHN revamping along with living quarters, 26 well platform revamping, SH revamping and replacement of flow lines (PRP-I) New projects which are being undertaken for revamping in the coming years are NQO revamping, 33 well platforms and replacement of flow lines (PRP-I).Thus resulting in increased expenditure

in the head of maintenance in the past and planned for future.

The maintenance expenditure is usually the normal expenditure which is required to be incurred for preventive maintenance. But the philosophy followed in looking to the expenditure under this head is all the expenditure towards replacements, revamp which does not agument the capacity charged to P&L account. The expenditure which is incurred for enhancing the life of the asset but it does not increase the capacity booked under the R&M. Since the facilities in offshore are 20+ years need to be revamped and ONGC has taken up this activity in a big way so that the facilities are available to meet the production from the existing fields upto the period 2030.

Also inevitably the wells as well as processing equipment suffer mechanical deterioration and breakdowns, requiring partial/total replacement, particularly in aging operations after more than 25 years of service. Ongoing maintenance programs for equipments/systems etc. are also necessary.

Investments in last 5 years

The capital investments in Offshore have increased from the level of Rs 20,975 Cr in the year 2000 to Rs. 44,351 Cr as on Year ending 2007. In the last five years the capital investment has increased more than what it has been invested in the 20 years. The major part of the investment was on account of creating new facilities amounting to Rs. 18,455 Cr. and Rs.4, 921 Cr towards drilling. This magnitude of investment has primarily been due to brown field development undertaken to improve the recovery factor from the existing level of 28% to 32%. Apart from this, the trunk line for oil and gas has also been replaced during this period.

Operating expenditure

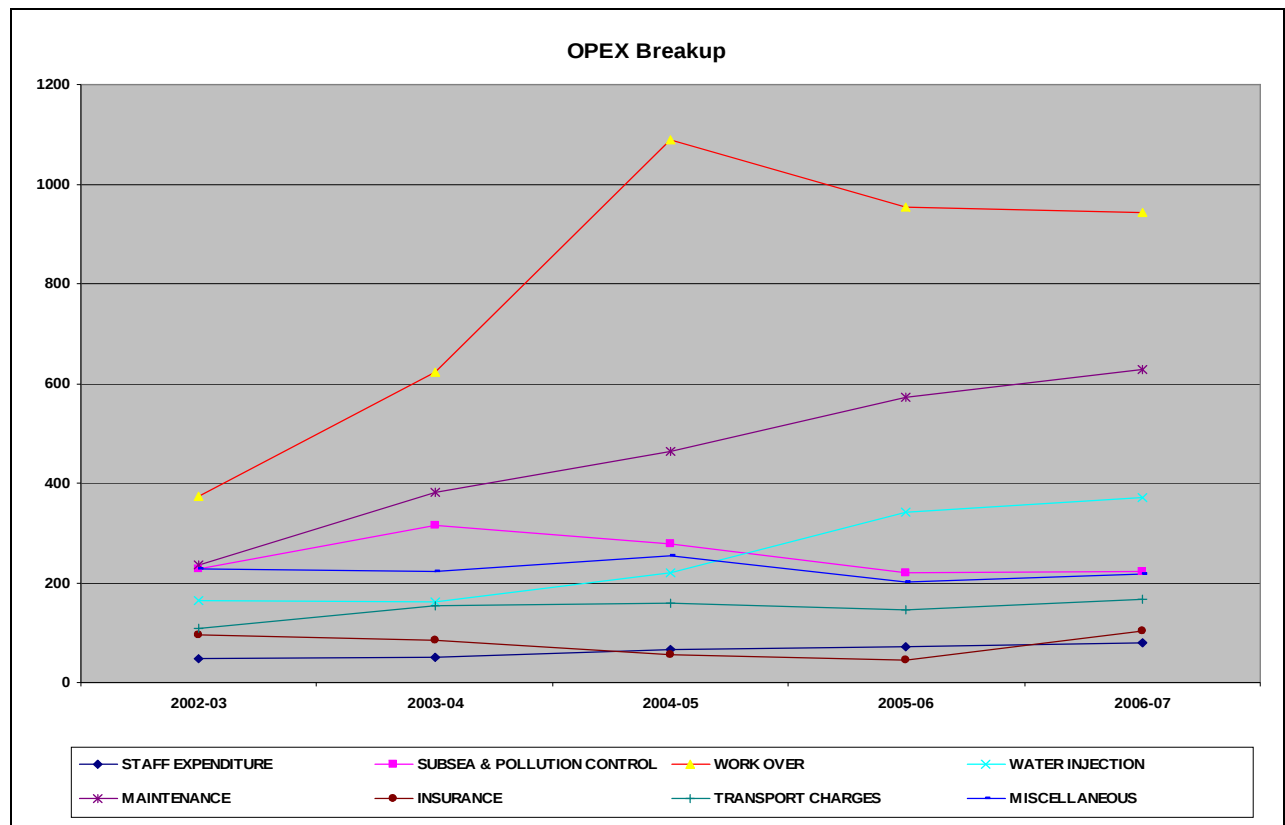
The operating expenditure which has been incurred during the last 5 years is given in table below: From the above, it is seen that the operating expenditure is increasing on year to year basis primarily on account of work over expenditure and maintenance expenditure. The work over expenditure also includes the expenditure incurred on side tracking. Since this expenditure is considered as per accounting policy as part of revenue expenditure



Operating Expenditure

(Rs. In Cr.)

YEAR	2002-03	2003-04	2004-05	2005-06	2006-07
OPERATING & MAINTENANCE EXPENSES					
STAFF EXPENDITURE	49	51	67	71	79
SUBSEA & POLLUTION CONTROL	229	315	277	220	222
WORK OVER	374	622	1088	954	943
WATER INJECTION	163	161	220	342	372
MAINTENANCE	235	382	465	573	628
INSURANCE	96	85	55	46	103
TRANSPORT CHARGES	110	153	159	146	167
MISCELLANEOUS	227	221	255	202	216
TOTAL	1483	1989	2585	2553	2730





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Thus, from the aforesaid it can be inferred that the Operating Costs manifests in many ways and making the Maximum Efficient Rate (MER) Operating Costs a vital key for maintaining production for any field. The maximum efficient rate is the parameter which governs the level of operating cost needed for maintaining the production from any field. At the outset the expenditure cost needs to be clearly spelled out under two heads (1) controllable and (2) optimization. At the outset of implementation of any project the nature of operating expenditure which can be controlled and optimized need to be identified. These identification can be done by better analysis namely the new strategies for field development and selective engineering towards low energy high reliability components. The optimum operating expenditure is the minimum expenditure which need to be incurred for production. These expenditure if controlled will lead to better gross margin. It is very difficult to define what should be the level of opex in a field and very difficult to have any benchmark comparison due to each field may have its own characteristics for operation.

However, the level of opex which is incurred in Western Offshore with reference to the revenue generated is as under for last 5 years :

2002-03	2003-04	2004-05	2005-06	2006-07
12%	9%	8.2%	8.5%	7.6%

Analysis brings out some key issues for optimizing Opex in offshore operations.

Conclusions :

1. The major opex parameters are
 - ❖ Subsea & Pollution Control
 - ❖ Work Over
 - ❖ Water Injection
 - ❖ Maintenance
2. Major influencing factor on OPEX is observed to be
 - ❖ Increase input costs
 - ❖ Drilling of increased side track wells.
3. The opex works out to Rs.8831/tonnes and during last five years it has increased from Rs. 4614 to Rs. 8831 i.e. 191% on YTY basis. However, the major contribution is the cost of side track wells in the last five years.
4. There is only marginal increase in manpower cost, while reduction in safety and environmental management is mainly due to less nos. of MSV's in the field during 2004-05 onwards.

Recommendations :

1. Benchmarking of OPEX parameters to be done for better analysis.
2. Mechanism to link OPEX with Input cost and revenue to be worked out for better monitoring and optimization of OPEC.
3. OPEX needs to be optimized and 'not minimized'. Increased Opex needs to be curbed, while lower Opex also should not be encouraged. Optimum Opex to be worked out for analysis purposes.
4. Less than optimum OPEX is not a healthy sign and reason for less expenditure on Opex need to be analyzed for better life cycle management of any Asset.
5. Minimum Opex for an Asset has to be worked out for future viability and investment decisions.
6. Revamping/Re-construction Projects – the activities are essential part of Asset management. About 25% of Opex need to be spent on such projects and accordingly the costs need to be considered for analysis in future.
7. For viability of revamping / re-construction project, the project should be linked to optimum Opex concept for better future health of facilities.
8. De-commissioning expenditure to be considered while calculating OPEX, as it is huge expenditure at the end of project life in offshore.



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