

Innovative Implementation Strategies at Visakhapatnam Oil Storage Facility - A Case Study

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Ministry Of Statistics and Programme
Implementation



Leveraging project management for excellence, growth and transformation

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1.1 Synopsis


This paper is based on live on-going project in Petroleum & Natural Gas Sector in India. Keeping in view the oil security concern, arising out of short term disruption of petroleum products, the Government of India decided to set up strategic crude oil storage of 5 MMT in underground rock cavern/concrete structure at 3 locations – Mangalore, Vishakhapatnam and Padur at an estimated cost of Rs 2397 crore. The project has been undertaken through a SPV (Special Purpose Vehicle) Indian Strategic Petroleum Reserve Ltd. (ISPRL) as subsidiary of Oil Industry Development Board (OIDB) which is funding the project. It is the second project of its kind in India; the first one was the LPG Storage Facility for HPCL. This paper examines the strategies adopted by ISPRL for implementation of Vishakhapatnam Unit with original cost Rs 672 crore at different stages from single LSTK contract to two contracts concerning underground works and above the ground works and its impact on cost and time frame. It examines the Strategic decision to increase capacity with minimum increase in capital cost. It also examines the uses of unique Project Management techniques and design concepts for timely completion of projects at an optimum cost and time-frame. One of the key features of the project is the contract management in which application of Reverse Auction Technique has been adopted to avoid disputes and minimize project risks on account of possible large variations in quantities and geological surprises during excavation of the cavern and underground approaches. The presentation features of this paper would include; and a power-point presentation with some actual site photographs depicting the complexity of the project, innovative techniques and design aspects of Project Management challenges and adopted strategies, impact of strategies and lessons learnt for dissemination of knowledge among practicing Project Managers and Engineers.

1.2 Presenter

Shri J.L. Narayan, Adviser, Infrastructure and Project Monitoring Division of the Ministry of Statistics and Programme Implementation, with wide experience in Project Formulation, Implementation, Planning, Appraisal, Management and Control. He is B.Sc. Engineering, Mechanical, Msc. Economics and MBA. He served the Industry in Public Sector for 6½ years, Government of India for 28 years, and UNDP for 2 years as Management Expert and Commonwealth for 2 years as Economic Adviser. He has presented several papers in International forums, trained over 4000 Project Managers in last 10 years. He has been instrumental in preparation of Standard Contract Clauses and Bidding documents for Domestic Bidding. He authored the Project Implementation Manual released by the Government of India in 1989 and revised in June, 2010. Mr. Narayan has been the Member of PMI, USA and he is a founder of PMI North India Chapter. He is a qualified Project Manager and also an Institutional Member of International Project Management Association.

1.3 Project Background

This paper is based on live on-going project in Petroleum & Natural Gas Sector in India. Keeping in view the oil security concern, arising out of short-term disruption of petroleum products, the Government of India decided to set up a strategic crude oil storage of 5 MMT in underground rock cavern/concrete structure at 3 locations – Mangalore (1.5 MMT), Vishakhapatnam (1.03 MMT) and Padur (2.5 MMT) at an estimated cost of ₹ 2397 crore. The project has been undertaken through a SPV (Special Purpose Vehicle) Indian Strategic Petroleum Reserve Ltd. (ISPRL) as a subsidiary of Oil Industry Development Board (OIDB) which is funding the project. It is



the second project of its kind in India, the first one was the LPG Storage Facility for HPCL. The Visakhapatnam Oil Storage Facility of 1.33 MMT capacity is one of the three units of the overall oil storage project of 5 MMT. This paper examines implementation strategies adopted to reduce project risks, costs, time and cost overruns and increase the utility of the facility at a lower cost in the Visakhapatnam Oil Storage Facility.

1.4 Project Parameters

1.4.1 Original Cost Estimates

The original cost estimates of Visakhapatnam Oil Storage Project for 1 MMT capacity were prepared by Engineers India Ltd. (EIL), a premier consultancy institution of the Government of India at ₹ 672 crore (at September, 2005) price level. Original estimates were prepared on the assumption that land would be made available free of cost, the imports would be subjected to exchange rate variations, it will have implications due to change in technology, prices of products and services may go up due to escalation, geological surprises may increase the cost, exemption of customs duty, change in strategy may have additional cost (i.e.increase in PMC, Engg. & procurement costs) and increase in salaries of the owner organization as well of that of the PMC consultant.

1.4.2 Original Completion Schedule

The mechanical completion schedule of project estimated in November, 2011. The crude fill is expected to start by January, 2012. Originally it was revised to implement the entire project in EPC mode by a single contract with EIL as the Project Management Consultant.

1.4.3 Revised Parameters


- ♦ The project capacity has been increased from 1.03 MMT to 1.33 MMT (to the maximum feasible capacity on economic and commercial considerations). The excess capacity is being shared with Hindustan Petroleum Corporation (HPCL). The marginal cost for additional capacity is generally low as the fixed cost gets spread over the longer volumes.
- ♦ Revised cost ₹ 1038 cores is primarily based on the awarded costs. After supplementary investigations it was found that 33% increase in capacity can be achieved with 15% increase in project capital cost.

1.5 Implementation Arrangements

Engineers India Ltd. is one of the top consultancy firm under the Ministry of Petroleum & Natural Gas has been engaged as the Project Management Consultant (PMC) WITH SWECO of Sweden as the back up consultant.

1.5.1 Original Assumptions

Assumptions made at the time of original cost estimates were based on the primary investigations normally carried out for creation of an underground facility below the sea level (EL (-) 57.0). However, one cannot be sure of the rock conditions all through due to heavy overburden and variations in the rock strata. Rock may require stitching,



shotcrete and steel belting and even concreting leading to increase in costs during actual implementation.

1.5.2 Revised Assumptions

Before implementing the project supplementary investigations were carried out to provide further details/design inputs for basic design of the facility. In the underground storage cavern the geological and other surprises cannot be ruled out unfavorable conditions such as presence of dykes and other faults can necessitate rock support/grouting/ shotcrete etc. However, conditions were found to be more favorable for creation of additional capacity of 0.30 MMT at a lower additional cost.

1.5.3 Innovative Implementation Strategies

The innovative implementation strategies have been adopted to achieve the following objectives:

- a. to reduce project risks,
- b. to achieve the revised objectives of the project at the minimum cost,
- c. increase utility of the facility at a comparatively lower cost and
- d. complete the project in prescribed time-limit

The innovative strategies which have been adopted to achieve the above objectives are discussed at length in this paper.

1.5.4 Innovative Strategy to Address Project Risks

To address the project risks in the project application of a combination of contractual arrangements have been utilized instead of a turnkey contract. The turnkey contract originally envisaged has been broken down into two main parts one for underground facilities and second for the above ground facilities with two major objectives - one is to utilize the capacities for excavation and tunneling available in the country at a much lower price and secondly to have a very competitive bidding process to achieve the tunneling and execution at a minimum cost and within the given time frame.

The underground cavern at Vishakhapatnam would be as tall as ten story building at some locations and will go as deep as EL (-57) below the sea level and have a total length of approximately 3.3 km. Although the considerable amount of survey has been done, it is very difficult to predict the type of rock that should be encountered in various underground sections. Owing to unpredictable underground nature of works and large number of identified items it was decided to go in for a rate contract rather than a lump sum contract (LSTK) using reverse auction method. Although the reverse auction for lumpsum job for projects of equipments and goods have been done in the past but there is no known civil works case of reverse auction for the item-rate contract job as large as this.



1.5.5 Traditional Auction Method¹

The traditional process does not provide the bidders with an instant feedback about the market price for his goods/services and thus does not compel him to lower his price in relation to the market.

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In case of procurements of the goods and/or services by public authorities, in case all the bidders, on account of various risk perceptions (right or wrong), quote a high price, and the buyer is able to establish that exceptional circumstances exist, the said public authority can resort to negotiations with the L1 bidder only, as per Central vigilance Commission (CVC) of India guidelines. In such a case, the price at which the purchase is made would depend on the negotiating skills of the buyer. The risk of such a methodology is that the buyer may not have the requisite knowledge of the market to conduct the negotiations. Thus, there is a risk that the buyer could end up paying a higher price than the market price for the goods or services sought.

¹ Auction is a tool which is said to have originated as far back as 500 B. C (Wikipedia). In a Normal Auction (also known as forward auction) many buyers compete for purchase of item(s) put up for sale by single seller. The prospective buyers compete amongst themselves by offering multiple quotes, each higher in value than previous quote, and ultimately the highest bidder purchases the item. The auctions are demand driven and help the seller in maximizing his gains. The efficacy of the method is time tested and major auction houses have been in existence for centuries. Stockholms Auktionsverk, the world's oldest auction house was established in 1674, in Sweden and some of the famous auction houses in the world include Christie's, Sotheby's, Lyon & Turnbull and Bonhams.



1.5.6 Net-based Reverse Auction Method^{2,3}

Indian Strategic Petroleum Reserves Limited (ISPRL) has made use of this tool in a very innovative manner for finalizing the Civil Works Contracts for all its three cavern projects and has proved that this tool can also be successfully used for item-rate contract jobs also. In the process, it has not only saved over Rs 300 crores (approx \$66.66 million) on the initial bid opening prices, but also saved considerable time in finalizing the contracts for these projects of national importance.

In the Net based Reverse Auction, the process is initiated with initial bid opening price provided by the buyer of goods and/or services. The entire process of bidding is made dynamic and more than one bid with pre-determined decrements is permitted from each bidder. Bidders are permitted to revise their bids any number of times within a given time-frame. A bidder can submit his bids from the comfort of his office (within the country or abroad). The process permits the bidder to remain anonymous but all bidders have an equal opportunity to see the lowest bid at any particular point of time.

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In this process, the prices are free to move downwards in very competitive and dynamic conditions. The vendors begin competing with each other. *This brings about a high level of profitability, control and simplicity to the corporate procurement process. No negotiations are required between the buyer and the seller to bring down the price. Also the buyer can be sure that the price offered by the L1 bidder is the most favorable that the market could offer. The process ensures that no single bidder is given an unfair advantage. Reverse Auction process also speeds up the contract award process.*

1.5.7 Increased Utility of the Facility at Lower Costs

To address the issue of increased utility of the facility at comparatively lower cost, a detailed survey was carried out to explore the possibility of creation of additional capacity which will be open up for commercial application. After supplementary

² Difference between traditional purchase and reverse auction: In traditional purchase the buyer obtains offers from vendors (through single or two bid process) and based on well established corporate procedures, places order on the lowest technically acceptable bidder. The price at which the goods and services are procured would depend to a large extent on the number of bidders in the process, the market conditions and the availability of resources. A bidder is expected to submit his best offer and does not know what the other bidders have quoted and has no opportunity to correct his offer after the price-bid submission date, unless post-bid negotiations are resorted to. In the government sector in India negotiations are usually discouraged by Central Vigilance Commission and permitted only under exceptional circumstances.

³ With the growth of the internet in 1990's, e-purchase became a popular tool and today it is being used by a large number of individuals for procurement of goods and services. In the mid nineties the internet based Reverse Auction process was developed. Unlike Normal Auction, in Reverse Auction, many sellers of goods and services compete amongst themselves for providing goods and services that a buyer requests for. Thus it is supply driven. Reverse Auction started gaining popularity and has developed into a remarkable contracting tool. However this tool is mainly being used for the purchase of articles and goods by the corporate world.



investigations, it was found that only 15% increase in capital cost can increase the capacity by 33% of the same location without even increase in the time frame.

The company was successful in creating this opportunity by increasing the capacity of the cavern by 0.3 MMT. This has a separate compartment which will be utilized by Hindustan Petroleum Corporation as a storage facility distinct from their commercial reserves. The HPCL has already in place a single point mooring (SPM) system to facilitate uploading of large crude parcel of around 300 TMT from very large crude carriers (VLCCs). In the context of sharing of HPCL's infrastructure by ISPRL, HPCL has proposed a revised scheme, under which it would use the additional capacity in the ISPRL caverns (0.3 MMT cavern compartment) as its storage. Here one can see double advantage of using this HPCL's facilities, one is, HPCL will use its own SPM transportation and also for filling the ISPRL storage facility. To that extent the risk for not using the storage regularly will be reduced further and its maintenance cost also gets shared between HPCL and ISPRL.

1.6 Value Additions of this Innovative Strategy

It gives three stake holders a huge return in many ways:

1.6.1 Advantage to ISPRL

The ISPRL will have to spent about Rs. 21.07 crore annually as operation cost which includes manpower for operation and maintenance of the storage, even if the facility remains idle. The manpower can be gainfully utilized if the facility, or a part of it, is utilized regularly and the additional capacity which will be commercially utilized by HPCL is the opportunity for reducing this cost.

The facility would be better prepared to deal with any emergency if it is under regular operations. The ISPRL will get to use HPCL's proposed SPM system, thus reducing the freight and wharfage charges for ISPRL.


1.6.2 Advantage to HPCL

Need for three crude tanks, envisaged earlier in the refinery, for receipt of crude from VLCC will not be required, thereby releasing substantial amount of precious land for other uses. Public sector funds in the oil sector would be saved as HPCL will not have to spend on construction of the tanks.

Safety risk in the bowl of Visakhapatnam can be lowered by reducing the quantum of above ground storage (especially near the airport). The length of 48" onshore pipeline can be reduced by approximately 8.5 km (part of its runs through congested areas). A high rate or discharge from tankers would be achieved since discharge would be to a single storage and demurrages could be avoided.

1.7 Advantages to the Government

The Government will not need to fill the additional storage of 3 MMT capacity and could save approximately Rs. 772 crore (based on crude price of \$77/barrel and exchange rate Rs. 45.61/\$-Average crude price/average exchange rate in March, 2010).



Since HPCL will regularly use the compartment, additional crude oil will be available in the country, in case of emergencies.

The total investment in oil in Visakhapatnam can be brought down by this synergic approach.

Besides the cost containment measures through the different contractual arrangements, the aspects of value engineering and commercial sharing of the additional capacity beyond the anticipated capacity has reduced the equity contribution of the owner organization and also loan component of the project.

1.8 Innovative Strategy to complete project in Time

The objective of completing the project within the prescribed time-limit is being achieved in this project by the application of:

- a. achievable packaging of the contracts underground work which is the most critical item of the project so that work could be awarded to India based contractors,
- b. The most of contractors have the requisite capacity available in the country and therefore there is no loss of time in mobilization of resources as well as in getting right kind of equipment and persons to complete the jobs ahead of schedule,
- c. the Project Management Team for the project of ISPRL is very small, as small as 14 persons of all categories, and
- d. the monitoring mechanism adopted by the company is also quite unique which provides a good coverage in reducing the manpower requirement on one hand and keeping a very tight control on the sequence of the underground activities of the project.

1.8.1 Visakhapatnam Oil Storage, ISPRL- Case Study

The first time the process was successfully used by ISPRL was when it finalized the order for its Underground Civil works at Visakhapatnam. The project involves construction of an underground rock cavern for storage of 1.33 million tons of crude oil. This involves creating huge underground cavities. The underground caverns at Visakhapatnam would be as tall as a ten storey building (at some locations) and have a total length of approx 3.3 kilometers. Although considerable amount of survey has been done, it is very difficult to predict the type of rock that could be encountered in various underground sections. Thus the quantum of rock supports required, the amount of grouting, quantum of water seepage to be handled etc could vary. Even though the substantial amount of expenditure is accounted for by few items like shotcrete, grouting, rock support, excavation, muck removal etc. a large number of items in addition to one lump sum item along with rates were identified to be part of the Schedule of Rates (SOR). The number increased because the anticipated expenditure even for items like rock excavation varies depending upon the location where excavation is to be carried out and the type of the rock. Owing to unpredictable nature of underground works and large number of identified items, it was decided to go in for a rate contract rather than a lump-sum contract (LSTK).

ISPRL had appointed Engineers India Limited (EIL) as its Project Management Consultant. As there was no expertise in the design of underground crude caverns in

the country, EIL had appointed SWECO of Sweden as their back up consultant for the Visakhapatnam project.

Based on a suggestion made by the then Joint Secretary-Refineries, MoP&NG, Mr. Prabh Das, ISPRIL along with EIL explored the possibility of trying out Reverse Auction for the civil works contract. Although EIL had conducted Reverse Auction for lump-sum jobs and for purchase of equipment and goods there was no known civil works case of Reverse Auction for an item-rate contract job as large as this. However, before Reverse Auction could be finalized it was necessary to address the following issues:

- ◆ Will the net based reverse auction process be secure, reliable and feasible for civil works of such magnitude pre-dominantly proposed to be carried out on item rate basis.
- ◆ Who would do it and whether the procedures of this agency are robust, free from security risks and time tested?
- ◆ Was process approved by CVC?
- ◆ Would the bidders agree to participate?
- ◆ The bidders from different countries would participate in the net based reverse auction and there may be expectations of bidders to receive amounts in foreign currencies. There may also be deviations proposed by the bidders. In such a case, how do we ensure that the process of evaluation involving loading of the bids is ruled out and the L1 Bidder is determined solely based on the price quoted on the net.
- ◆ How to ensure that the speculative items are kept to the minimum so that the bidders can quote most competitive bids.
- ◆ How to meet the concerns that in case the bidders are given freedom to quote rates for each item, there could be abnormally high value rates for some items that may lead to unreasonable payments to contractor in cases of substantial increase in the quantities.

Each of the above mentioned queries were answered before the process was used and the answers to each of them are provided below.

1.8.2 Approval by CVC for Reverse Auction

It was ascertained that Reverse Auction was an approved method. CVC had vide Office Order No 46/9/03 dated September 11 2003, given approval to the Reverse Auction process. The CVC order stated that “The departments/organization may themselves decide on e-procurement /reverse auction for purchases and work out a detailed procedure and conduct the same in a transparent manner”

Methodology of making bidders quotes only one figure on the net.

To address the issue of having only one figure against which the bidders would be required to quote, and also to ensure that there are no abnormally high value rates for some items. it was decided that the detailed SOR would be prepared and given to the bidders. The SOR would be in the format given in table below:

Fixed Rate item – This is for all those items like detailed engineering, mobilization and de-mobilization and all such items which	Rs. X_1 (lump sum)
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are not covered in the item rates.			
Variable Rate items			
Item	Qty	Rate	
Item Y_1	A_1	B_1	Rs x_1 ($A_1 \times B_1$)
Item Y_2	A_2	B_2	Rs x_2
Item Y_3	A_3	B_3	Rs x_3
:	:	:	:
:	:	:	:
:	:	:	:
Item Y_n	A_n	B_n	Rs x_n
Sub -Total of Variable Items			Rs. X_2
Total Initial Contract Price			Rs ($X_1 + X_2$)

The bidders would then be required to quote a decrement on the 'Total Initial Bid Opening Price and the order would be placed on the lowest bidder with the item rates and the lump-sum item rate apportioned proportionately in relation to the price quoted.


It was recognized that unless the SOR reflected workable rates and that unless cash flow for the Contractor was at a comfortable level during the construction stage, the bidders would be reluctant to quote and the Reverse Auction would be a failure. It was a challenge for ISPRL/EIL to get the SOR right. It was decided that after the SOR was finalized, it would be given to the technically acceptable bidders at least 10 days before the Reverse Auction and their view would be sought. ISPRL had the option of modifying the SOR rates based on the comments from the bidders. But the Reserve price for the start of the Reverse Auction would be decided by ISPRL. The decrement amount was also to be decided by ISPRL.

To remove all speculative items of expenditure so that bidders could quote competitive rates the following decisions were taken.

1. To take care of Geological surprises during execution, if any, "Geotechnical Reference Frames" were introduced for determining realistic compensation.
2. To take care of increase in steel prices after the bid date, formula for enhanced compensation was prescribed.
3. Diesel was made a free supply item up to a predetermined limit.
4. Bids in only Indian Rupees were to be quoted.
5. No deviations were accepted. Need for loading of the quoted price was done away with.

With the excellent experience and data bank that SWECO had with respect to underground tunneling/cavern works and with the experience from recent underground projects in India like the SALPG cavern project and other hydro projects, an SOR was developed by EIL/SWECO.

Party for Conducting the Reverse Auction & Security Features



While there are a number of parties in India to conduct net based reverse auction, EIL had conducted Reverse Auction in the past through a party called C1 India. The credentials of the party were impressive as the party had conducted E-Procurement /Reverse Auction for clients like RBI, SBI, IOCL, HPCL & BPCL. As EIL already had a rate contract with C1 India, it was decided to conduct the Reverse Auction through C1 India.

The Party provided all the details with respect to the security features that they had developed. They included the following:-

- ✦ Two Factor Authentications
- ✦ Bid Encryption at the Database
- ✦ Online Antivirus Scanning
- ✦ Secured by verysign seal with 128 bit SSL Encryption
- ✦ Digital Notarization
- ✦ Audit Trail of each activity
- ✦ Privilege based User Access
- ✦ Firewall for screening the System Access
- ✦ Intrusion detection system

It was also confirmed that their processes were audited by Standard Testing Quality Certification (STQC), an agency under Ministry of Information Technology.

C1 India had also confirmed that their application security features were further strengthened by introducing stringent Control Measures. The website is secured by Verisign seal with 128 bit SSL, Encryption.

1.8.3 Bidder Preparation & Training

The bidders were informed at the pre-bid stage itself, that they would be required to participate in a Reverse Auction. They were informed during the pre-bid meeting that an SOR would be issued to all the technically acceptable bidders and that their comments would be sought on the workability of the rates. They were requested to do their own home-work to see their bottom line at which they could carry out the job. They were given the assurance that all technically acceptable bidders would be given training on Reverse Auction and that they could quote from the comfort of the office.

The concerns with respect to failure of the internet during Reverse Auction and the methodology for continuing the process were clarified. It was made clear to them that in case of a failure of the internet, C1 agency would be accessible through mobile phones and they would have to send their offer by fax and the same would be accepted. Compliance was obtained from the bidders after completion of the training and before the start of the Reverse Auction process.

1.8.4 Actual Process

Based on a global NIT, 10 parties were prequalified and on August 24, 2007 tenders were issued to them. The pre-qualification was, based on their past performance, ascertained through the NIT. Pre-qualified bidders were required to submit only their techno-commercial bids incorporating their methodology for execution of the cavern

project. Priced bids were not sought from the bidders. Six bidders submitted their techno-commercial bids on 16.10.2007. EIL/SWECO based on their Techno-commercial evaluation, made a presentation to the ISPRL Board on 17.12.2007 wherein they recommended four bidders out of six, and the Board approved the same.

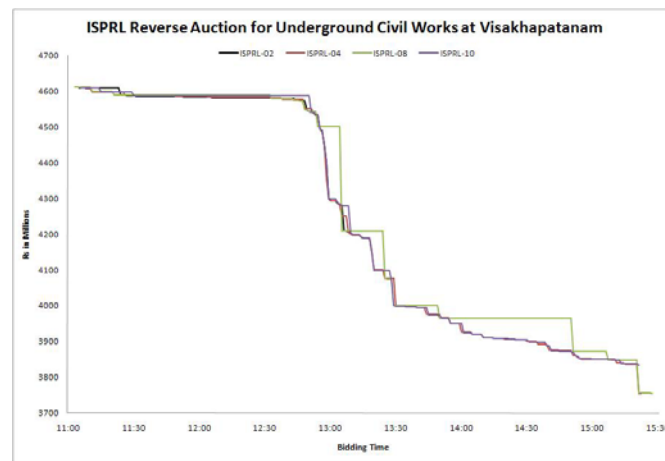
The SOR was issued on 28.12.2007 to all the four techno-commercially qualified bidders and they were requested to submit their comments by 03.01.2008. The Total Initial Contract Price as per the SOR was Rs.456.51 crores.

Prior to the Reverse Auction, the comments of all bidders with respect to the SOR were reviewed. Those items which emerged as unworkable on cross checking were modified and bidders informed accordingly. With this the Total Initial Contract Price was Rs 461.27 crores (an increase of approx. Rs.4 crores). The decrement was decided as Rs 10 lakhs.

Training was organized for all four bidders and they were made comfortable with respect to the Reverse Auction process. Each bidder was given an identity and a password. Their identities were not known to anybody other than C1 India administrator. Bidder was required to modify the password issued by the administrator to ensure security. It was informed to the bidders that the bidding window was 2 hours but in case a bid was received within the last 5 minutes, the software was designed to automatically extend the process by 5 minutes so that the other bidders had at least clear 5 minutes to respond. In case another bid was received within the extended time period, the software would automatically extend the time by another 5 minutes. Thus the process would continue until no bid was received during last 5 minutes in the extended time.

On January 11, 2008, the day of the Reverse Auction, CFO from ISPRL and AGM C&P from EIL were present in C1 India control room along with the administrator to ensure that the process moved on as planned.

The process commenced as planned at 11.00 am. Arrangements were made to witness the whole process online through a big screen in the conference room of Oil Industry Development Board.



The parties had identification numbers ISPRL-02, ISPRL-04 ISPRL-08 ISPRL-10. As stated earlier, the identity of the parties who were bidding, were not known to all those witnessing it on the screens. All four parties submitted their offers within the first 8 minutes of the start of the process. As expected the process heated up towards the end of the two hour period. A graph shows how the bidders responded and at what time the process ended. The competition was extremely intense and the Reverse

Auction continued till 3.27 pm (a period of 4 hours 27 minutes). In all 189 bids were received from the bidders.

The closing figure was Rs 375.378 crores and ISPRL-08 emerged as the lowest bidder. Except for ISPRL-02 (whose last offer was Rs 419.78 crores), all other bidders continued to compete almost till the very end. ISPRL-10's last offer was Rs 383.38 crores. ISPRL-04's last offer was Rs 375.478 crores. The total reduction was 18.62 % as compared to the Start price. ISPRL-08 (as was agreed with the bidders prior to the process) immediately sent a confirmatory fax with respect to the last price offered by them.

Approvals were taken for order placement within the next two working days and Letter of Acceptance was issued to the lowest bidder on January 16, 2007. **The whole process of finalization of a Contractor was completed within 5 months of release of the tender and with a savings of over 18%, an incredible achievement, for a job of such a large magnitude.**

1.9 ANNEXURE 1

1.9.1 Revised Cost Estimates of Visakhapatnam Oil Storage Facility of ISPRL

Revised estimates are based on the contracts already awarded and under implementation, and trend of rock classification being encountered etc, the revised estimated capital cost is projected at Rs.1038.00 crore as compared to the original cost of Rs.671.83 crore. The following table indicates a comparative statement of the original cost (based on September 2005 prices) and revised cost:

(Rs. In crore)				
Sl.No.	Capital Heads	Visakhapatnam		
		Sept. 2005 For 1 MMT	Revised Cost June, 2010 For 1.33 MMT	Variation (%)
1.	Land	0.00	32.00	32.00 (Add)
2.	Construction site facilities, Rock Cavern Storage, pipelines& pump station	579.48	882.00*	302.52 (52%)
3.	Basic Engg. & Backup Consult, Detailed Engg, Project Mgmt, procurement services etc	43.21	95.00 [@]	51.79 (120%)

4.	Owners cost	8.25	12.00	3.75 (45%)
5.	Start up, Commissioning & other Contingency	40.89	17.00**	-23.89 (-58%)
Total		671.83	1038.00	366.17 (55%)

* The awarded costs for underground works and aboveground works in addition to the cost of diesel as free supply item, taxes, cost of surveys etc.

@ This includes service taxes of Rs.12 crore which was not taken care of in September, 2005 prices. The increase is also due to FBC charges getting increased due to the scope of critical item design being added and taken out from the contractor's scope.

** These are reduced due to awarded costs being taken into account in sl.no.2 above. As there is presently lack of clarity on the exact requirements during the Start up and Commissioning of the project, ISPRL cannot rule out additional contingencies on this account.

1.10 ANNEXURE 2

1.10.1 Factors Causing Cost Increase

The factors, which have led to an increase of Rs.366.17 crore over sanctioned cost, are indicated in the table below:-

Sl. No	Cost elements	Additional impact	Reasons
1	Escalations	Rs.123.61 crore	The price escalations for underground civil works are based on the changes in the Consumer Price Index, as the works are labour intensive. The escalations for aboveground works are based on Wholesale Price Index, as the works are material intensive. Escalations on PMC fee are on account of revisions in man month rates (salary revision, etc).
2.	Exchange rate variation	Rs.2.50 crore	
3.	Change in scope	Rs.97.69 crore	It was estimated that an increase in capacity by 33% would lead to only 15% increase in project capital cost. Since the excess capacity is shared

			with HPCL, ISPRL would be paid back Rs 234 crore from HPCL.
2.	Statutory levies	Rs.35.04 crore	The rates envisaged in DPR have undergone changes- (Service Tax is a new tax). Against nil custom duty envisaged earlier, Rs 15 Crore shall have to borne by ISPRL.
5.	Additional/deletions (Additions were made to take care of site conditions and technological improvements)	Rs.75.33 crore	This relates to more effective arrangements for dewaxing around submersible pumps; better crude oil flow rates; concreting in shaft to prevent corrosions; inertization at construction stage instead of operation phase; new electric line for 33 KVA power load during operation; change in plot plan as per safety norms; LPG bullet, non-plant buildings, additional items due to changes in geology, additional site supervisions etc.
6.	Under estimation	Rs.32 crore	Land & Land development cost was not provided in DPR.
7.	Others:	Nil	
Total		Rs.366.17 crore	

The above variance analysis reveals that the major contributing factors for the increase of Rs.366.17 crore have been (a) Increase in cavern capacity from 1 MMT to 1.33 MMT, (b) additional material/ supplies, based on refined engineering keeping in view the site conditions and technological improvements (c) some assumptions made during DFR also did not materialise-these relate to free land cost; nil custom duty; availability of 33 KVA electricity from existing lines etc. Some requirements were also added due to conditions imposed under the environmental clearance.

1.11 ANNEXURE 3

1.11.1 Savings from Innovative Strategies

- Contribution of HPCL for 0.30 MMT storage capacity Rs 234 crore –less cost incurred on creation of additional capacity of 0.30MMT Rs 97.69 crore=**Rs 136.31 crore**
- The Government will not need to fill the additional storage of 3 MMT capacity and could save approximately **Rs. 772 crore** (based on crude price of \$77/barrel and exchange rate Rs. 45.61/\$-Average crude price/average exchange rate in March, 2010).

3. Savings due to reverse auction- Against the bid price of Rs 461.27 crore, the order was secured at price of Rs 375.37 Crore i.e. a saving of **Rs 85.90 crore**.
4. Savings for the use of HPCL's infrastructure for unloading crude oil from the storage to HPCL's refinery and also to load tankers at the jetty for dispatch to CPCL, Haldia other refineries.
5. Saving due to use of Single Point Mooring (SPM) facility of HPCL for unloading of 300TMT VLCC Tankers. Due to this substantial amount of land is available for other uses.
6. Saving of 8.5 Km of 48" pipeline running through the congested areas of the city.
7. Savings from demurrages as discharge would to a single storage at a very high rate discharge.

One can easily see that benefits derived through adoption of better implementation strategies.


1.12 References and Acknowledgements

1. Auction tools –Wikipedia
2. Net-based Reverse Auction- An effective contracting tool- Mr Rajan K Pillai, CEO, ISPRL
3. Background papers of the Ministry of Petroleum and Natural Gas, govt of India.
4. Photographs and Presentations of my visit to project Site
5. Discussions with EIL, Hindustan Construction Co. Ltd.
6. Please note that **Rs2 crore=Rs10 million**

1.13 Author(s) Profile



Shri J.L. Narayan, Adviser, Infrastructure and Project Monitoring Division of the Ministry of Statistics and Programme Implementation, with wide experience in Project Formulation, Implementation, Planning, Appraisal, Management and Control. He is B.Sc. Engineering, Mechanical, Msc. Economics and MBA. He served the Industry in Public Sector for 6½ years, Government of India for 28 years, and UNDP for 2 years as Management Expert and Commonwealth for 2 years as Economic Adviser. He has presented several papers in International forums, trained over 4000 Project Managers in last 10 years. He has been instrumental in preparation of Standard Contract Clauses and Bidding documents for Domestic Bidding. He authored the Project



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