

# CHAPTER – 10 PROJECT MANAGEMENT OF AGG

## 10.1 WHAT IS THE PROJECT?

### Objective of AGG

Asian Gas grid is a proposed gas pipeline that will connect various Asian countries for gas transportation. The proposed Asian Gas Grid would connect India with neighboring countries. Sourced from Russia and Turkmenistan and delivered to India, Myanmar, China and ASEAN countries, it would be able to fulfill the need of fuel in Asian countries,

Asian economies including China, India and South Korea are currently growing at rates far higher than the US and Western Europe. This trend is likely to continue in the future. Asian countries particularly China and India are expected to account for a major portion of the incremental energy requirements of the world. China, India and other emerging Asian economies are together expected to account for 47 percent of the world total incremental energy requirement between 2000 and 2020. The route of the Proposed Asian Gas grid is shown in Exhibit 10.1.

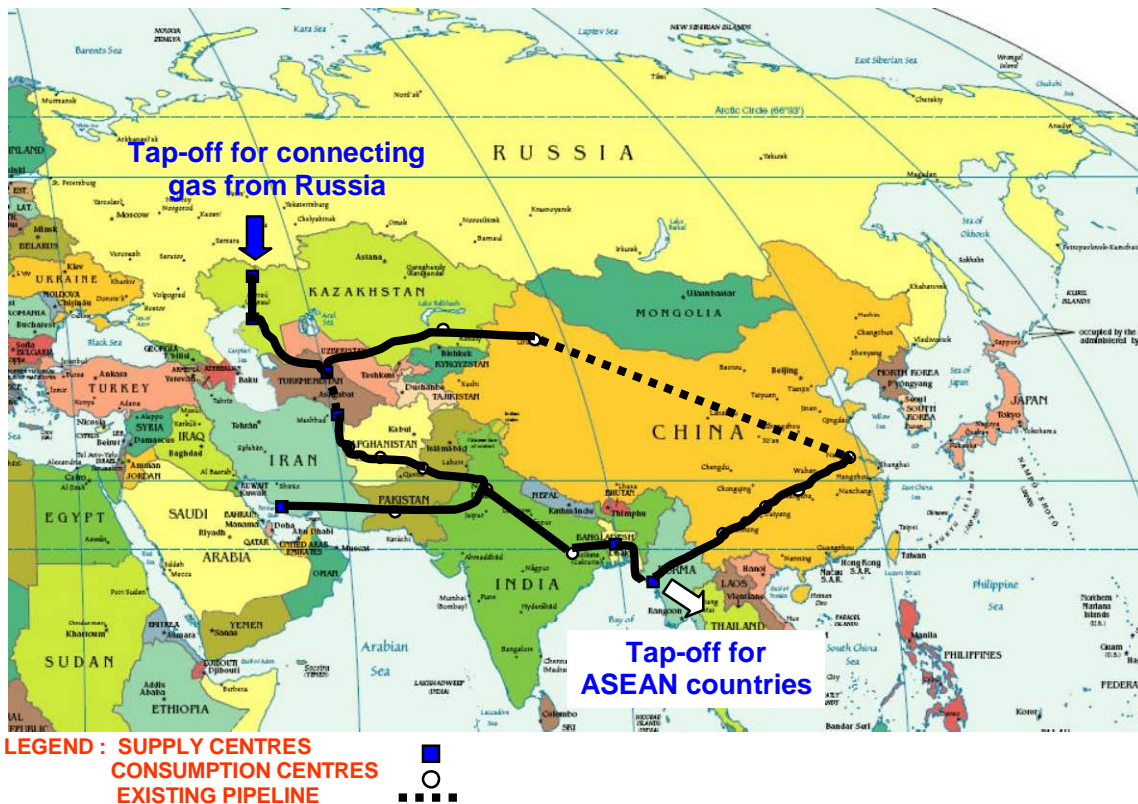


Exhibit: 10.1 Proposed AGG Network

## Limbs of AGG

AGG will have the following limbs for execution of connecting source centers to demand centers:

- India-Pakistan-India (IPI)
- Turkmenistan -Afghanistan-Pakistan-India (TAPI)
- Turkmenistan Link Pipeline (TL)
- Kazakhstan-Uzbekistan-China(Kazuchi)
- India- Bangladesh-Myanmar (IBM)
- Myanmar-China (MC)

Project management of AGG will be a challenging task. The proposed Asian Gas Grid will traverse countries having different geography which would have many techno-political challenges. Being a project of very high magnitude, the financing of the project will be a big question. Time will be the essence for this project, as work on different limbs will be carried out simultaneously or in phased manner , which will require astute Project Management techniques.

Since many countries will be participating in formation of the grid, it is necessary to form a body which can control all the participating as well as the influencing countries. Therefore, an Empowered Co-ordination Group (ECG) of participating countries (like UNO) is required to be formed which will formulate the guidelines and regulations for the AGG. Being an international project, it needs to be managed by a team of international project engineers, which will be controlled by a core team comprising of project managers or project sponsors of different countries. The following issues broadly need attention in project management of AGG.

- Having proper organization structure
- Defined goals / milestones
- Deployment of required resources at required time
- Execution methodology and phasing of schedule of implementation
- Addressing of geo-political risks
- Addressing of different obstacles in execution of the project
- Financing of the project, which is the major issue being highly capital intensive
- Issues related to gas supply, transportation and distribution
- Monitoring the project
- Adequate knowledge and vigil on probable risks

## Understanding International Project Management

Project management tasks are defined as the planning, controlling and organizing of projects. Points of consideration of project management are the scope, the schedule and the costs. These activities are accomplished through the application and integration of the project management processes for initiating, planning, executing, monitoring, controlling and closing phases. The person responsible for accomplishing the overall project objectives is the project manager.

International project management is an extension of national project management. Being a cross border grid which will traverse through many countries, it has additional implications apart from technical issues which are as under:

- Agreement of different countries to lay this grid
- Availability of competent project management consultant
- Ensuring standard specifications throughout the project
- Legal aspects among countries, impact of their relationship on the project
- Impact of influencing countries
- Gas supply, transportation and distribution contact among countries
- Financing of the project by different countries. Issues of guarantees by host countries to lending banks etc.
- Competent project management team.
- Availability of steel for line pipe and of other material
- Timely availability of ROU in different countries and local rules and regulations
- Monitoring of different projects

All the countries have become more conscious about project management so that the project is completed on time. The trend of modern project management is as follows:

- Standardization of processes and tools
- Greater use of web technologies for enterprise communications and collaborations
- More emphasis on risk management for project managers on the risk identification, contingency planning, risk mitigation and managing risk events
- Increased focus on communication and communication planning, particularly as it relates to stakeholder management and communication in times of project crisis

## Phases of AGG Project

Any project has a cycle, i.e. from start to end of project with different stages, and the complexities at different phases are different. A typical project has the following four phases as shown in Exhibit 10.2:

1. Conception Stage
2. Pre-project stage
3. Project execution stage
4. Operation stage
5. Project closure stage

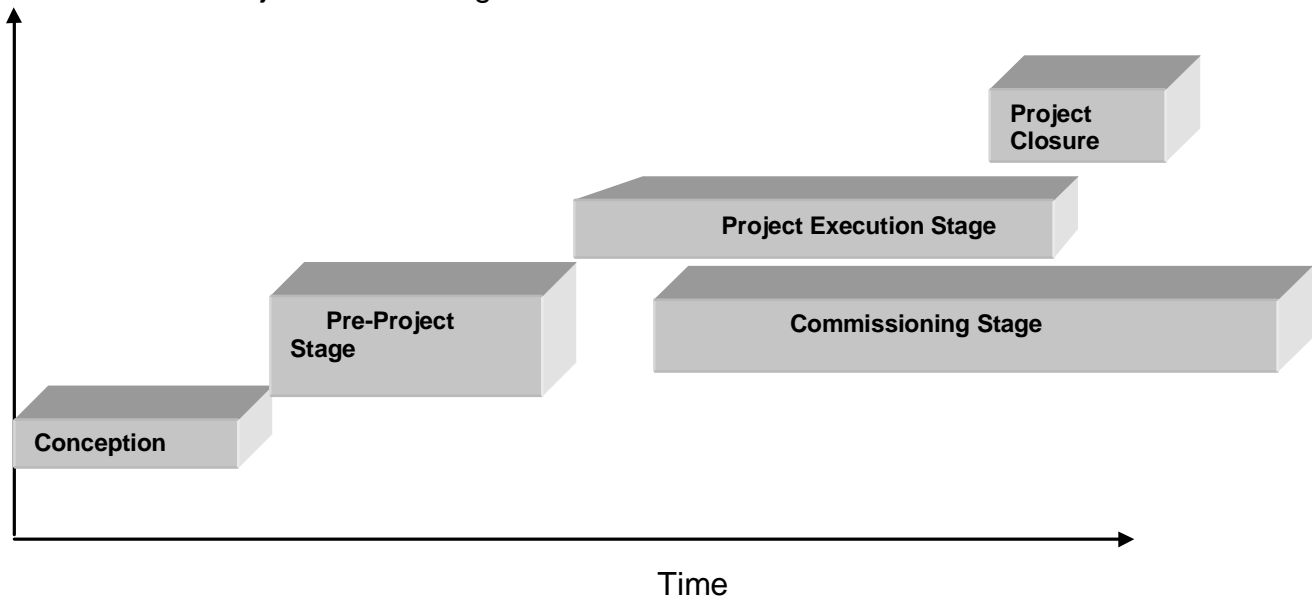


Exhibit 10.2 Project Phases

### a) Conceptual stage

This is like sowing seed in the ground. The project is conceived during this stage. This thesis can be considered as a conceptual study/report, which has considered the following aspects.

- a. Demand and supply analysis of participating countries
- b. Identification of supply and demand centers of gas
- c. Security of supply from the surplus sources
- d. Geo-political analysis of the participating countries and implications thereof
- e. Techno-economic analysis of different limbs of the grid
- f. Project Management of the grid
- g. Project financing of the project, different methodology thereof.
- h. Benefit to participating countries
- i. Anticipate risk and their remedy

These above factors are sufficient in conceiving the idea of the pipeline project. The techno-economic feasibility gives sufficient idea about the technical suitability as well as financial viability of the project, which in the case of AGG has been already established in the Techno-Commercial Analysis chapter. Further, any country before venturing into this project would like to undertake this study. After establishing feasibility, action is taken for proceeding with pre-project/ project activities. This would take time as it is a matter involving different countries. Legal issues are also required to be settled along with the project financing.

### **b) Pre-Project Stage**

Pre-project activities are of paramount importance for any project, and involve several activities to be done during this period. It has direct impact on the completion schedule of the project, as zero date of the project starts from the date of approval of the full project. It would be ideal to undertake around 20 percent of the activities in the pre-project stage, by the time one gets approval of complete project execution. This would reduce the work pressure at a later date.

The AGG is as such, techno-commercially viable. Therefore all other issues which generally occur in the cross-border pipeline are required to be addressed in pre-project stage. The issues are as under:

- 1) Experiences of past projects as concluded in chapter-4
- 2) Geo-political issues of different countries as concluded in chapter -6
- 3) L1 schedule of different limbs
- 4) Identification of Project Manager and his team
- 5) Survey of the pipeline route
- 6) Application for environmental clearance
- 7) Acquisition of ROU (right of Use) for laying pipeline
- 8) Application for different crossing permissions like road, railway, canal etc with respective authorities
- 9) Appointment of project management consultants
- 10) Preparation of tenders for long lead project materials like line pipes, valves etc
- 11) Preliminary arrangements for infrastructure facilities like communication, camps, vehicles etc for the project personnel.
- 12) Manpower planning of required core competencies and their placement

### **c) Execution Phase**

Action for execution will be based on the execution plan of different limbs. During this phase all the major orders are placed, manufacturing/ inspection / transportation of materials take place, project construction at site takes-off and the pipeline is finally commissioned. While the pre-project activities are still

continuing, project activities also start with finalization of Project Management Consultant (PMC) for those organizations who work with the help of consultants. After appointment of PMC, activities like finalization of design basis, basic and detail engineering, procurement, construction, commissioning are carried out with astute monitoring and with prescribed quality norms. After construction, the Project Execution group hands it over to the Operation & Maintenance (O&M) group.

The execution of the AGG will be done phase-wise, depending on whether all conditions are met before start of the project.

Typically the following are the criteria for beginning execution of the cross-border pipelines:

- 1) Signing of the agreement by all the participating countries of that particular limb
- 2) Signing of the agreement with the gas suppliers so that supply source is confirmed
- 3) Identification of the company/companies who will construct the line
- 4) Identification and agreement with the financiers who would finance this project
- 5) Identification of the company who will operate and maintain the line
- 6) Identification of the company who will take gas from the gas supplier/s and deliver it to the company who will distribute the gas to different consumers

The brief activities during execution phase are as under:

- 1) Establishment of different execution offices including a centre co-ordination group.
- 2) Arrangement of funds from financing agency
- 3) Design and detail engineering
- 4) Planning and scheduling
- 5) Establishing a project monitoring group
- 6) Project cost control, management and monitoring
- 7) Establishing "risk assessment group" for continuous monitoring of risk, and suggesting a mitigation plan
- 8) Tendering and ordering including purchase of all equipment and materials, custom clearance, transportation of materials/ equipments to site etc.
- 9) Inspection / expediting of equipment / materials being manufactured by vendors including contractor supplied items
- 10) Management of construction stores and stores accounting
- 11) Construction management and supervision
- 12) Commissioning and handing over to operation and maintenance group / company

#### **d) Operation and Maintenance Phase**

This phase is very important for any project. The AGG will be commissioned phase-wise based on the interest of the country as well as the financing of the project. The construction company after commissioning of the project will hand it over to the O&M Company. The transfer needs to be smooth. It is always preferable if O&M is taken care only at the construction stage, so that there is least trouble while handing over.

#### **e) Project Close-Out**

Generally not much emphasis is accorded to this part of the project. Most of the resources are retrenched at this stage for other projects. PMC and contractors also start tapering off their resources. However, for a project manager, project close-out is equally important, though it lacks the enthusiasm, which people have at the beginning of the project. It rightly termed as “Evening of the project”.

AGG will be a mammoth project, to be executed in different countries, thus close out will also be done by different companies working in different countries. All the countries will be accountable for their jurisdiction. However the responsibility of the same will lie with company who will be controlling the entire project.

During the project close-out period broadly the following activities are undertaken:

- Complete payment of the vendors/contractors.
- Processing cases of contractor’s change orders
- Issuing completion certificate and performance analysis of the vendors /contractors.
- Materials reconciliation
- Submissions of project close-out report.
- Total documentation of the project.
- Vendor grievance redressal
- Compilation of lessons learnt

AGG project close out will be a historical event for the Asian countries as they would be “Energy Secure” from that day, and it would pave way for the development of all Asian countries.

### **10.2 ORGANIZATION STRUCTURE**

Organization can be defined as a group of people who must co-ordinate their activities in order to meet organizational objectives. The coordination function

requires strong communication and a clear understanding of the relationship and interdependencies among people. As such, there is no organizational structure, but the structure must be appropriate to meet the objectives of the company. However, any form of organization structure is necessary along with defined role and responsibilities.

The success of the project depends mainly on the type of personnel who are involved. It is not the quantity but the quality that would drive the project. It is often seen that only few of the executives lead or drive a project. It is most important who is driving the project, who is named as “Project Manager”. The project is his show only, and it is he who would generally face the wrath of vendors, contractors, superiors, sub-ordinates and members of cross functional departments. The project manager is supported by a team of project engineers, who help him to get desired results. This project team works in a synergetic manner so that their combined efficiency is much more than the summation of individual efficiency.

### **Structure of the project**

A multicultural, international core project team will be formed, which will have total responsibility of project management and will be located at one of the major cities. It will manage the project in totality, including finance for the project. While the work within the country will be done by the respective country team, one or more representatives will be in the core international team. Since this project will have to handle multicultural people, it is desirable and a requirement to build high performance project culture and awareness of cross cultural differences.

There will be several project management related challenges due to increased complexity of the project. Some of them are:

- Changing requirement owing to customer expectations
- Managing global contract for multiple nations.
- Maintaining a virtual workplace for the project team
- Managing total risks for global operation.
- Monitoring and scheduling activities
- Controlling and tracking progress.

A global project is very complex and may include many teams and team members from different countries. Each country may have different regulations governing its business entities and organizational structures. The global project



team members are supposed to share the same project mission and resources all over, under slightly different circumstances, keeping in mind culture, infrastructure, regulations and support, which vary from country to country.

Managers have to deal with differences in languages, time zones, organizational and personal cultures, policies, regulations, business processes and political climate. Project leaders have to rely on information and judgments by their local team leaders and their members who take higher levels of responsibility, authority and control for project results.

The salient features of the proposed AGG limbs are shown in Table 10.1

LIMB	GAS SOURCES CONSIDERED	DESIGN GAS FLOW	TOTAL DISTANCE	PROJECT DETAILS	ESTIMATED COST
		MMSCMD	KM		MILLION US\$
IRAN PAKISTAN INDIA	IRAN ASSAYULLAH FIELD	165	2625 KM (UPTO DELHI)	TWIN PIPELINE OF 48 & 56 INCH DIA FROM SOURCE TO 1550 KM AND 56" DIA X 1075 KM. COMPRESSORS - 936 MW	8788
TURKMENIST AN AFGHANISTA N PAKISTAN INDIA	DAUALATABAD FIELD IN TURKMENISTAN	150	1950 KM (UPTO DELHI)	TWIN PIPELINE OF 48 & 56 INCH DIA X 1400 KM , 56" DIA X 550 KM. COMPRESSORS - 936 MW	6926
TURKMENIST AN LINK PIPELINE	TURK - UZBEK BORDER FIELD	50	550 KM	48" - 250 KM , 42" - 200 KM WITH 1 COMP.OF 33 MW	792
KAZAKASTAN UZBEKISTAN CHINA	KAZAKISTAN: KARACHANGNAK, KASPIAN OFFSORE; TURK UZBEK BORDER	200	3500	TWIN PIPELINE OF 56" X 3500 KM, COMPRESSORS - 1600 MW	16682
INDIA BANGLADESH MYANMAR	DELHI (FROM TAPI), CHITTAGONG (BANGLA)	100	2050	56" X 2050 KM FROM DELHI TO MYANMAR AND COMPRESSORS : 413MW	4627
MYANMAR CHINA	IBM P/L AND SITWE (MYANMAR)	100	3150 KM (UPTO SANGHAI)	56" X 3150 KM, COMPRESSORS : 654 MW	7181
<b>TOTAL</b>			<b>13825</b>		<b>44996</b>

Table: 10.1 Salient Features of Proposed AGG Limbs

All the countries directly or indirectly linked with the proposed "Asian Gas Grid" are suggested to form an "Asian Energy Charter (AEC)" in the same lines of Energy Charter of European Countries. This charter will act as "Regulator" for Asian countries.

All the countries can their own structure for implementation of the project. Since, the participating countries will have different priorities for wanting to join in this project, a country-wise structure needs to be developed, based on the experience of the other completed cross-border projects. In order to execute AGG, it is suggested that the following Special Purpose Vehicle be formed for each limb. This will be under the control of AEC (Asian Energy Charter ) as shown in Exhibit 10.3.

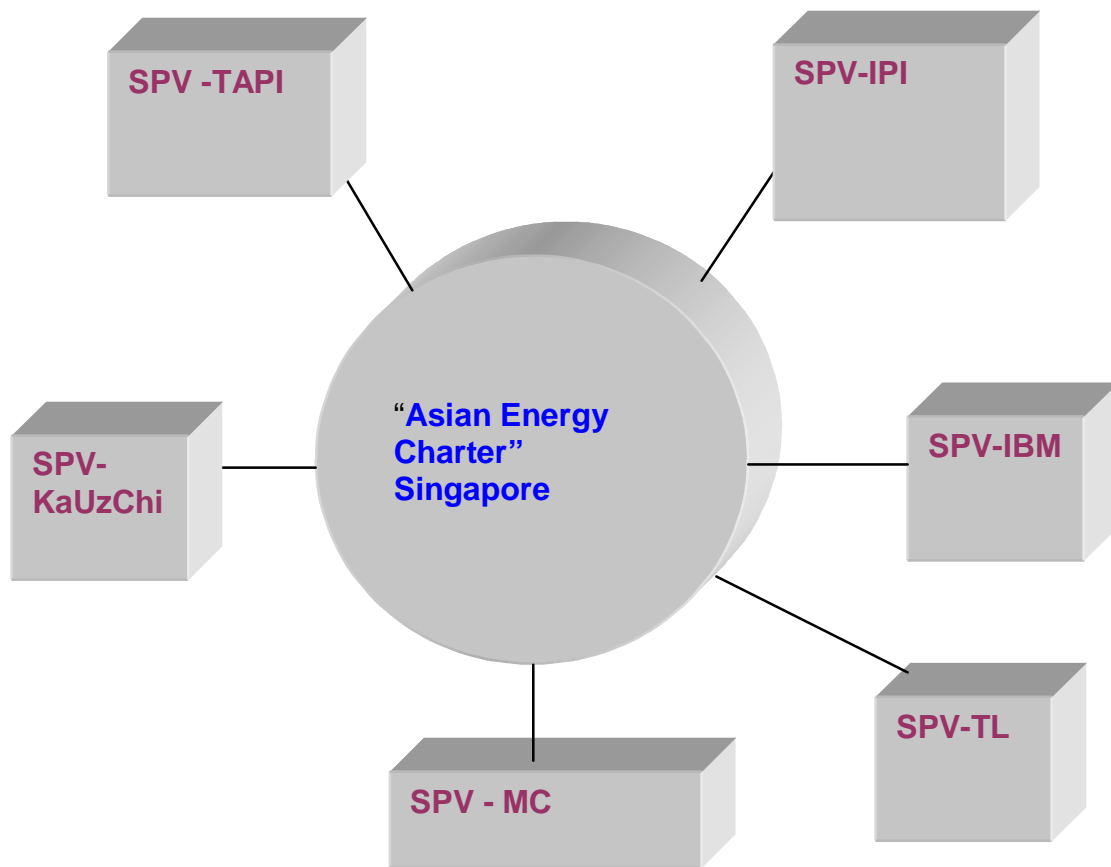


Exhibit:10.3 Asian Energy Charter

IP	- Iran-Pakistan-India
IBM	- India-Bangladesh-Myanmar
MC	- Myanmar-China
KaUzChi	- Kazakhstan-Uzbekistan-China
TAPI	- Turkmenistan-Afghanistan-Pakistan-India
TL	- Turkmenistan Link Pipeline

### Who Would Lead

As explained above, AGG will be the effort of many countries aspiring to have energy security for their country, as well as for the Asian region. Further, this

grid will have connection within and around countries, thus all the countries in the region can have synergetic effort for accomplishment.

As per the demand supply chart, major countries that will drive this grid are as under:

**Supply Centers:** Russia, Iran, Turkmenistan, Kazakhstan

**Demand Centers:** India, China, Japan, Korea

AGG will be the product of negotiations at different stages between and among countries, as different interests of the interested countries are to be satiated. It may be gas prices, transit fee, political issues or other reasons. The need is to keep all the important countries in the same boat so that interests of all the countries are met. If some country is not interested in this grid, then interest is to be generated on the same. The probable interests of different countries are shown in Table 10.2.

<b>Country</b>	<b>Likely Interest of the Country</b>
Russia	Asian gas leader , gas sale price
Kazakhstan	Improvement in economy after selling gas to countries other than Russia
Uzbekistan	Improvement in economy after selling gas to countries other than Russia
Turkmenistan	Improvement in economy after selling gas to countries other than Russia
Azerbaijan	Improvement in economy after selling gas to countries other than Russia
Iran	Wants to have own energy power in the region to have less impact of U.S.
Afghanistan	Economy badly shattered. Improvement in economy by allowing gas to transit through their country, demand centre also for development of industry and growth
Bangladesh	Improvement in economy after selling gas to other countries, gas supply cost as well as transit fee
Myanmar	Improvement in economy after selling gas to other countries, gas supply cost as well as transit fee
India	Developing country needs gas for development. Wants to be self sufficient in energy
Turkey	Improvement in economy after selling gas to other countries, gas supply cost as well as transit fee

Pakistan	Developing country needs gas for development. Wants to earn a lot by having transit fee, as the gas line has to pass through Pakistan before reaching India
China	Energy starved country, wants to become super power of east. Wants to have many energy sources so that development programs are not stalled due to energy shortage.
Bangladesh	Wants to improve economy by selling gas, as well as by getting transit fee, but under pressure of US
Taiwan	Needs gas for development
Japan	Highly gas starved country, wants to have less dependence on LNG being sourced from Indonesia, Australia etc.
Korea	Needs gas for development, presently highly dependent on imported gas
Singapore	Having no source of energy, depends upon gas supply from Malaysia.
Malaysia	Although it has gas sources, but wants to have dominance over ASEAN countries
Indonesia	Major supplier of gas to ASEAN countries

Table: 10.2 Interests of various Countries in AGG

From the above it is clear that most of the countries in Asian region are starving for energy. Thus it's an emergence of common cause for all these countries, which they would all agree to.

Now the question is who should take the lead. Leader /group of leaders will be those who can influence each other as well as others.

Since China, India, Japan are the biggest of the energy hungry countries, they should jointly take the lead as "Energy Harbingers" for Asian countries, and ensure the implementation of the Asian Gas Grid. They should be able to garner the support of other countries directly or indirectly. Some of the countries where decisions have impact of the US need to involve this power group for negotiations with the U.S.

The Energy Charter can be summarized as under:

The roots of the Energy Charter date back to a political initiative launched in Europe in the early 1990s, at a time when the end of the Cold War offered an unprecedented opportunity to overcome previous economic divisions. Nowhere were the prospects for mutually beneficial cooperation clearer than in the energy sector. There was a recognized need to ensure that a commonly accepted foundation was established for developing energy cooperation among the states of Eurasia. On the basis of these considerations, the Energy Charter process was born.

In a world of increasing interdependence between net exporters of energy and net importers, it is widely recognized that multilateral rules can provide a more balanced and efficient framework for international cooperation than is offered by bilateral agreements alone, or by non-legislative instruments. Based on the principles of open, competitive markets and sustainable development, the Energy Charter Treaty therefore plays an important role as part of an international effort to build a legal foundation for energy security.

The *Energy Charter Treaty* and the *Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects* were signed in December 1994 and came into legal force in April 1998. The Treaty was developed on the basis of the 1991 Energy Charter. While the latter document was drawn up as a declaration of political intent to promote energy cooperation, the Energy Charter Treaty is a legally-binding multilateral instrument. Till date, the Treaty has been signed or acceded to by 51 states, the European Community and Euratom (the total number of its members is therefore 53).

The fundamental aim of the Energy Charter Treaty is to strengthen the rule of law on energy issues by creating a level playing field of rules to be observed by all participating governments, thereby mitigating risks associated with energy-related investment and trade.

### **Energy Charter for AGG**

The members of the Asian Energy Charter will be Russia, Kazakhstan, Uzbekistan, Turkmenistan, Azerbaijan, Turkey, Iran, Afghanistan, Pakistan, India, Bangladesh, Myanmar, China, Taiwan, Japan, Korea, Singapore, Malaysia and Indonesia. They will frame rules and regulations for operation of this energy charter which will have the provision of Host Government Agreement (HGA) and Inter-government agreement (IGA). This energy charter should have qualified negotiators as they will have to negotiate with supply, transit and consumption countries on many issues. AEC will have different functions to handle and will have a typical organizational structure as shown in Exhibit 10.4.

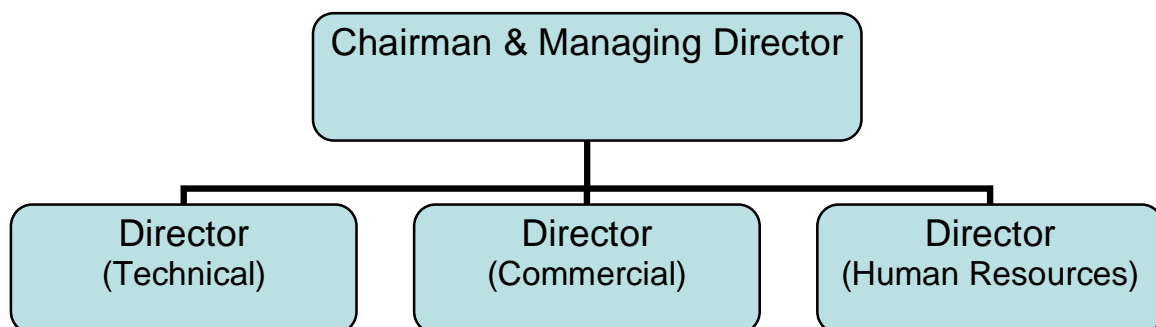


Exhibit:10.4 Various Functions in AEC

### ***Host Government Agreement***

This is an agreement between the government of the nation (host country) within whose boundaries some or the entire project will be constructed and operated, and the project sponsor or project company.

### ***Inter-government Agreement***

This agreement defines the mutual responsibilities and principles of support by the host countries. The objective of this agreement is to demonstrate political, legal and commercial support for the project.

Broadly, the objectives of such agreements are as under:

- It would promote energy security in the member country and promote long term co-operation in the field of energy
- It would reduce the political risk of countries on executing of this project
- It would be a forum promoting cooperation among member countries
- It would facilitate the creation of a base to provide technical support of all member countries
- It would foster a negotiating forum for countries for development of bilateral trade

### **Country wise structure**

Since, the member will have different priorities to participate in this project, the country wise structure needs to be developed on the basis of experience of the other completed cross border projects. Some of the experiences are as under:

#### **1) IPI Pipeline**

Iran has already intimated that it would build the pipeline in its own territory and will not allow participation of India or Pakistan in their project. This position has been de-facto agreed by Pakistan with the two sides reaching agreement on pricing formula. India does not have much option but to agree to the same. It is understood that Pakistan also wants to build the pipeline in their territory, and so does India.

With this approach there will be three different projects in three countries to be implemented by their nominated agencies and there will not be any cross holdings.

- a. The project would be implemented in a segmented manner by each country constructing the pipeline within its own territory; coordination

would be provided by tripartite working groups at technical, official and Ministerial-level; or,

- b. India would be an investor in the project, i.e., the project would have at its apex an international consortium made up of the companies of the three countries.

## 2) *Bolivia – Brazil Pipeline*

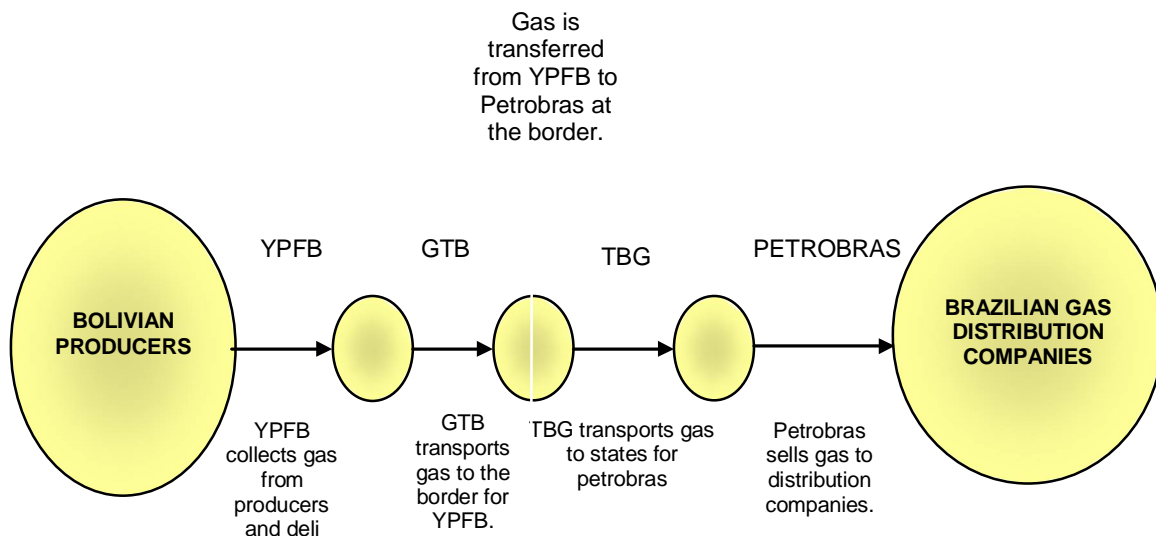


Exhibit 10.5 Bolivia-Brazil Pipeline Arrangement

The structure of the Bolivia–Brazil pipeline shown in Exhibit 10.5 can be applied in most cases.

The Iran- Pakistan-India will traverse from Iran to India through Pakistan. So it would have the involvement of three countries. Iran would be the supplier of the gas, whereas Pakistan and India would be both transit and consumer countries.

The country's structure will depend on the model of execution of the project. In the proposed model it is assumed that the respective country would take care of the construction, besides operation and maintenance of the portion of the limb in its territory. This arrangement for construction, operation and maintenance of the pipeline would be ideal, keeping in view the peculiarity of each government, security and other related problems, since each individual country can take care of its interests, but it would find it difficult to abide by the rules and regulations of another country.

The construction and execution of any limb will involve the following:

- 1) Gas supplier

- 2) Country/company who will do the execution in that country, who will take care of the construction, and operation and maintenance of the line up to the custody transfer point to the next country

When gas is being transported through various countries, the custody transfer point is proposed to be the exit point of the country, whereas succeeding country can have check metering system at the entry point of that country.

The typical country structure is as shown in the following Tables for various AGG limbs:

Pipeline Section	Gas Supplier	Construction	Transporter	Operation & Maintenance	Gas Custody Transfer (CT)Point	Check Metering Point
Iran- CT point for Pakistan	Iran	Iran	Iran	Iran	Exit point of Iran	Entry Point of Pakistan
CT point for Pakistan- CT point for India		Pakistan	Pakistan	Pakistan	Exit point of Pakistan	Entry point of India
India- Bangladesh	India	India	India	India	Exit point of India	Entry point of Bangladesh

Table 10.3: Limb: Iran- Pakistan-India:

Pipeline Section	Gas Supplier	Construction	Transporter	Operation & Maintenance	Gas Custody Transfer (CT)Point	Check Metering Point
Turkmenistan- CT point for Afghanistan	Turkmenistan		Turkmenistan	Turkmenistan	Exit point of Turkmenistan	Entry point of Afghanistan
CT point for Afghanistan- CT point for Pakistan			Afghanistan	Afghanistan	Exit point of Afghanistan	Entry point of Pakistan
CT point for Pakistan-CT point for India		Pakistan	Pakistan	Pakistan	Exit point of Pakistan	Entry point of India
India-India		India				

Table 10.4: Limb: Turkmenistan-Afghanistan-Pakistan-India



Pipeline Section	Gas Supplier	Construction	Transporter	Operation & Maintenance	Gas Custody Transfer (CT)Point	Check Metering Point
India- CT point for Bangladesh	Balance gas of IPI &TAPI after consumption by India + Surplus gas of India (If Any )	India	India	India	Boundary of India	Entry Point of Bangladesh
Entry Point of Bangladesh- CT point for Myanmar	Bangladesh	Bangladesh	Bangladesh	Bangladesh	Boundary of Bangladesh	Entry Point of Myanmar
Myanmar- Myanmar		India	India	India		

Table 10.5: Limb: India – Bangladesh – Myanmar

### Steps to Make AGG a Reality

AGG will become a reality, only if governments of all the countries have common vision and goal for achievement. As explained above, these countries require a common acceptable plan for achieving the goal. Some of the efforts required are indicated as under:

- All governments should work together while deciding the use of energy resources of each country, and try to complement each other
- All countries are required to accept each others needs
- Governments of all member countries need to have more equity to start with, so that finance for the project is ensured
- All countries should be ready to allow transportation of gas through their territory
- Negotiations on gas prices and transit fee should be done in a fair manner
- Countries should take guarantee of security of pipeline passing through their territory
- Respective governments must ensure payment to the lending banks as per the requirement

- Being highly capital intensive projects, governments should also encourage private participation
- Protection should be ensured for investments in each host country, including provisions concerning expropriation and nationalization
- The governments should create additional mechanisms to co-ordinate investments
- There should be commitment from each host country for implementation of the project
- Each host country should commit itself to take the steps necessary to satisfy its obligation to ratify the treaty, make enabling laws, and take any other step necessary in accordance with local laws, so as to make their promises legally binding under international and domestic laws
- There should also be respective commitments of the host countries, to guarantee performance by their state entities and agencies
- Granting of land rights and necessary consents, permits, permissions, and authorizations should be in place
- There should be commitment to ensure freedom of transit and the free movement of project personnel and goods associated with project activities
- Governments are required to give tax benefit to participating countries on importing material for use in the project. A mutual treaty in this regard should be mentioned in the proposed Asian Energy Charter
- Government should ensure provision of safety and security of the project and the personnel engaged in the project's activities
- Environmental, health and safety standards which promote integrated pipeline operations should be in place in all host jurisdictions
- Financing of the project by multilateral and export credit banks and agencies should be facilitated
- The host countries should ensure creation and maintenance of an agreed fiscal regime in relation to taxes, tariffs and regulation. This includes agreement of the host countries to respect tax allocation principles, and assure there is no double taxation of the project
- Governments must have "Single Window System" for all statutory permissions and RoU related activities

- Human Rights must be safeguarded in respect of the project and project activities
- The territory of each of the participating countries must be identified, including matters of boundaries and other territorial disputes
- An intergovernmental commission or administrative committee should be established as the forum for government-to-government communications, and the coordinated implementation of the project
- There should be agreement to resolve any disputes that may arise

### Selection of Project Team

Finalization of the project team (Exhibit 10.6) depends on the magnitude and severity of the project.

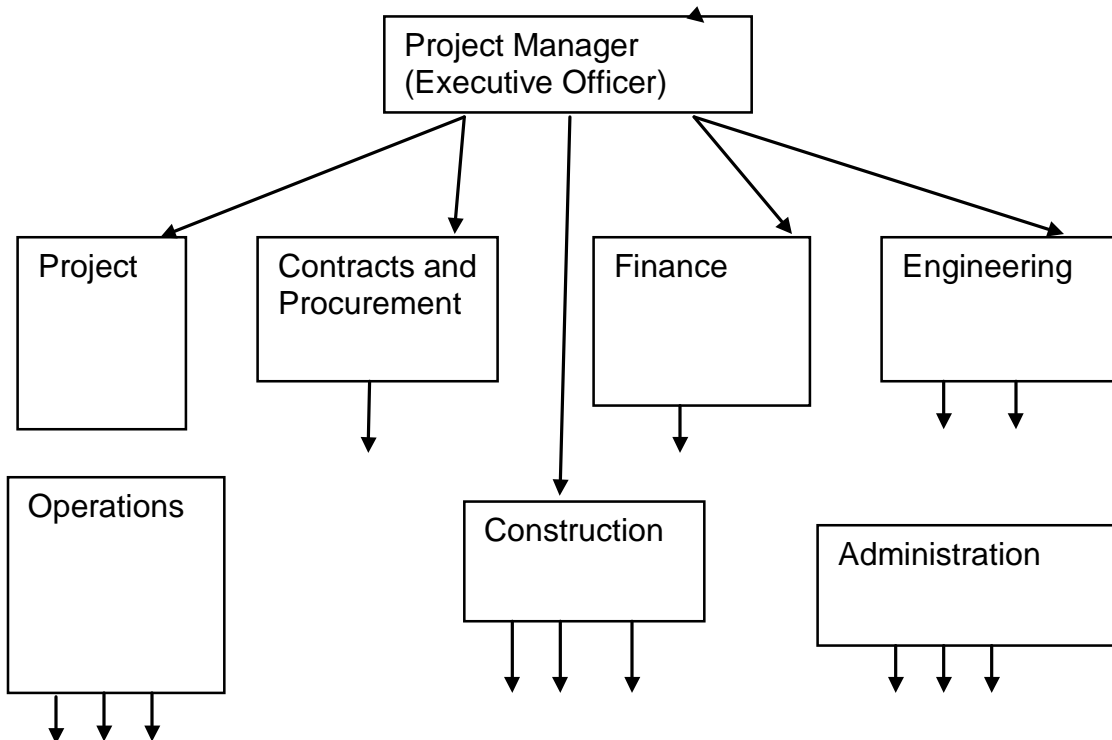


Exhibit: 10.6 Project Organogram

The following minimum team would be required:

1. Project Manager /Deputy Project Manager
2. Materials coordinator

3. Work Contracts co-coordinator
4. MIS, Project scheduler and controller
5. Construction Manager and his team
6. Finance Manager
7. Contract and Procurement Manager
8. Human Resource manager

### **Broad Responsibilities of Project Members**

a) *Project Manager*. He is like a contractor of management who has been awarded a contract for completion of the project within the given time, cost and quality.

- To produce the end results with the available resources and within the constraints of time, cost and quality
- To meet approved project schedule and cost as approved by the management
- To act as customer (external) and upper level and functional management (internal) communication focal points
- To negotiate with all functional disciplines for accomplishment of necessary work packages within time, cost, performance/quality
- To resolve conflicts amicably
- Contract administration ,technical administration, material management
- Construction work, performance evaluation, project close out etc.

b) *Material Coordinator*

- Responsible for all activities related to procurement of project materials
- Pre-order and Post order monitoring activities
- Submission of material status reports
- Monitoring of bills/ invoices

- Surplus material utilization etc

c) *Works Coordinator*

- Responsible for all activities related to work contracts of project
- Pre-order and post order monitoring
- Coordinating site related issues, permissions, procurement of land etc
- Monitoring of bills/ invoices
- Management of infrastructure facilities like camps, vehicles for construction
- Coordinating with construction in-charge etc

d) *MIS, Scheduler/ Controller*

- Preparation of periodic reports
- Budgeting
- Scheduling and Monitoring of project activities in Primavera etc
- PMC coordination
- Arrangement of different review meetings and preparation, issuing and documenting the minutes
- Preparation of presentation slides
- Time and cost monitoring, developing of look ahead model as per requirement of the project
- Documentation of the project team etc

### **10.3 PRE PROJECT PHASE**

#### **Key Activities in Pre-Project Phase**

Since this project will involve many countries, its execution will have to be planned in a meticulous manner as it would involve many pre-project activities. The flow of activities will be as shown in Exhibit 10.7:

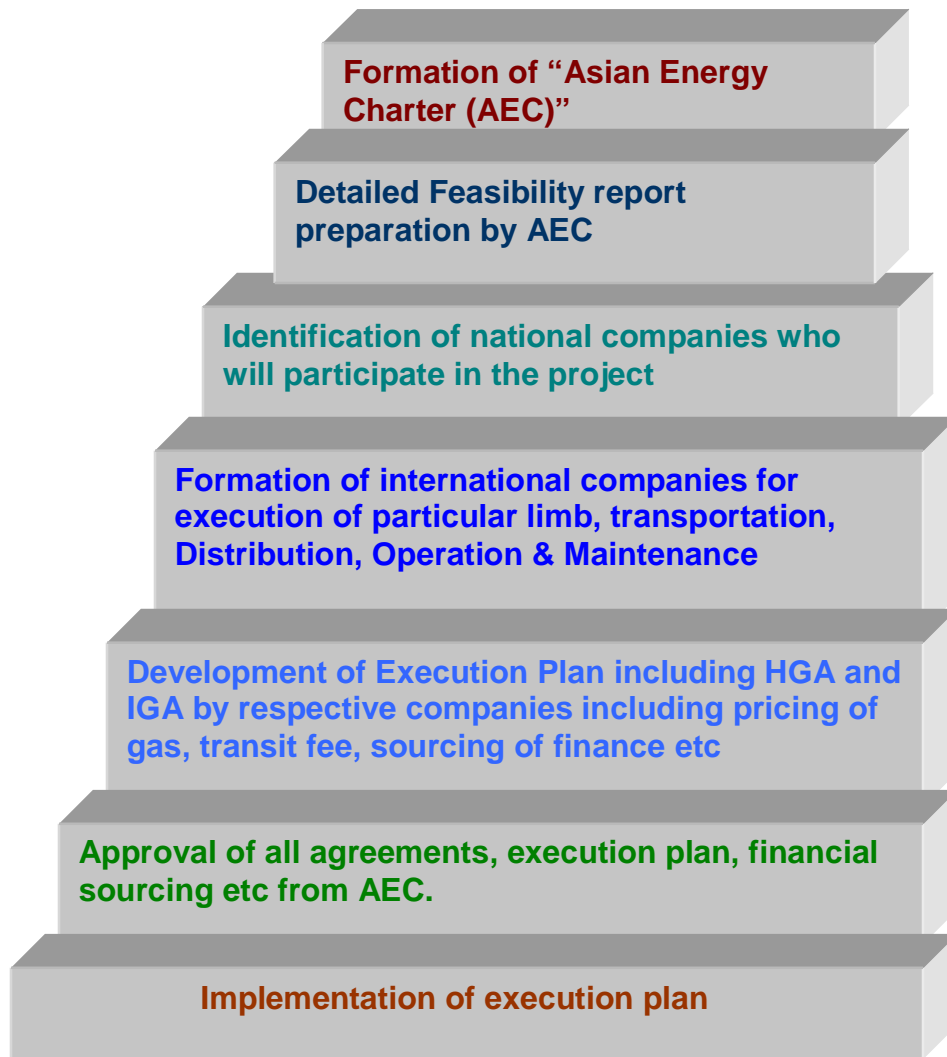


Exhibit: 10.7 Flow of Activities in Pre-Project Phase

### **Project Feasibility Study**

Any project can be undertaken only if it is techno-commercially viable to the company. Project Feasibility in a gas pipeline project generally comprises of the following:

1. Introduction of the Project
2. Project Benefits:  
This generally specifies a broad description of benefits the company is going to achieve after implementation of the project.
3. Project Phasing
4. System Optimization

5. Environment Impact Assessment
6. Design Philosophy
7. Methodology
8. Facility considered
9. Broad equipment along with specifications and data sheet
10. Scheme to be implemented along with route, including type of terrain of the pipeline like plain ,hilly, rocky, forest etc with number and type of crossings like river, railway, road etc
11. Number of terminals
12. Pipeline design
13. Pipeline material like line pipe, pipeline fittings and flanges, flow tees, insulating joints sectionalizing valves, scrapper traps
14. Construction methodology along with crossing methodology
17. Preliminary drawings /P&IDs
18. Cost Estimates:  
It takes into account of total estimate of the project, taking into account each component of the project like contingencies, margin money, financing charges etc. Based on the cost estimate, IRR of the project is determined which is the key figure in determining the financial viability of the project. Risk and Sensitivity Analysis is also done to identify the risks and its impact on project and project costing along with their sensitivity towards the project
19. Project Schedule:  
A schedule is also given in the DFR, which gives a fair idea on the activities and their respective time schedule.

After DFR is prepared, the following actions are contemplated:

1. AEC will convene a meeting for discussions with all the participating countries wherein issues of gas prices, transit fee, HGA, IGA and other legal and financial issues will be discussed in detail.
2. Project proposal will be put up limb-wise for approval of management committee of AEC.

3. Before approval, AEC will ensure techno-economic suitability of the limb, source of gas including size of gas reserves, settlement of gas price, transit fee, structure of the companies, financing arrangement of the project, modus operandi for dealing with disputes, for different responsibilities, confirmation of downstream consumers.
4. AEC will issue authorization to particular consortium for specified countries for a particular limb.

#### **10.4 PROJECT EXECUTION PHASE**

Once the project is approved by AEC, the respective countries will start executing the project without waste of time. Many activities will start simultaneously as under:

##### **Appointment of Project Manager and Team**

In anticipation of approval of the project by AEC, member countries would appoint a suitable project manager along with the team for their country, so that project activities start. The project team would be located at the corporate office, whereas the construction office would be located near the construction sites. The project manager is responsible for the project in its entirety. Hence, the selection of project manager is required to be done with care. The different project managers of a particular limb in each country have to work in tandem, and have a good working relationship with each other.

##### **Survey of Pipeline**

The detailed route survey of the pipeline route is carried out through specialized agencies to identify the population density, route alignment, crossing details, soil investigation etc. This is a major input for designing the pipeline and for procurement of line pipe, as class identification is decided only after the survey.

##### **Environmental Clearance**

Different countries have different guidelines on the subject. However, all the countries participating in the AGG project would have to definitely face this regulation. As per regulations of each participative country, applications need to be filed with the country's authorities who deal with environment related issues and are competent to accord the permission. This permission takes around six months to procure. Hence, it is necessary to apply for this permission immediately after survey etc is carried out. The Project Manager is required to follow up with the authorities constantly. Any query from them should be answered immediately. Special clearance will also have to be arranged if the pipeline is to pass through sensitive and notified areas like national parks,



sanctuaries, coral reefs etc and other restricted areas, if the permission is required as per the country's regulations.

An application should also be separately processed if any forest land is en-route the pipeline.

Environmental issues are a matter of concern for all the countries as per Kyoto Protocol. Development and environment are co-related. Developing countries are more prone to environmental issues. Therefore AGG will also have a tough time in getting clearance from respective governments. As this permission also takes a long time, a dedicated group by all the countries needs to be deployed to get faster clearance from respective environment ministries.

### **ROU Acquisition**

The pipeline project is sensitive to ROU acquisition, line pipe and composite laying contract. The project execution department has to understand clearly that ROU acquisition is as important to the project as procurement of critical items like line pipes, valves etc, or awarding the laying contract. Projects of the magnitude of AGG would be highly sensitive to acquisition of ROU. It should be kept in mind that any delay in handing over the project to the laying contractor can adversely delay the construction activities. It is necessary for project managers of all countries to realize that, due to industrialization and increased pipeline laying activities, farmers and others stakeholders are nowadays well aware about this activity. They have become more aware about their rights, and also understood that it would be to their advantage to negotiate with the companies for maximum money before allowing the project work to start.

### **Acquisition of Permanent Land**

Permanent land is required for installation of compressor stations, sectionalizing valves and IP stations as they would be permanent installations of the company. Thus, action for permanent land acquisition is required to be taken well in advance, so that by the time construction work is awarded, the land is available.

The total acquisition generally takes around one to two years if the land is acquired through state government by Land Acquisition Act. However, nowadays it is prudent to negotiate directly with the land owners for either outright purchase or initially taking it on lease before permanent acquisition. This method has yielded better results for timely availability of land. However, here the role of different countries becomes more important. In order to assist, the government needs to ensure timely availability of permanent land for the project. Compressor erection itself takes around 20 months for constructing and commissioning, and before that the acquisition of land and enabling work for installation of the compressors is to be done.

## **Geotechnical/ Hydrological/ Topographical Surveys**

While traversing long distances in a country, the pipeline may have to cross major rivers, and for this generally Horizontal Directional Drilling (HDD) or open cut method is employed. It is preferable to know the profiles of the rivers before floating construction tenders. This can be done through Geotechnical/ Hydrological surveys. Further, it is also necessary to do topographical survey of permanent land in advance, so that the Project management Consultant (PMC) can prepare the engineering drawings required by the construction contractor.

## **Application for Permissions**

The survey results give clear information on the number and type of crossings like Road, Canal, and Railways etc which are required to be crossed while laying the pipeline. These require permissions which involve co-ordination with various agencies. The lead time for obtaining these permissions ranges from 6 to 12 months. The project department will have to apply for the permissions based on the survey data. Here accuracy of survey data becomes very important as the permission is taken for specific crossing at particular chainage. While obtaining such permissions the concerned authorities may ask for deposits, reinstatement charges etc. Since AGG will deal with laying lines of long lengths, this activity is very crucial for execution of the project. Therefore country-wise dedicate groups need to be deployed, who can hire agencies to do the liaison work with the statutory authorities.

## **Appointment of Project Management Consultant**

After getting the approval from AEC, respective countries will start work on appointment of Project Management Consultant (PMC), who would be responsible for executing the project work in entirety from start to the end. Hence the PMC should have adequate experience of handling international projects.

Since AGG will be executed by different countries, and probably at different times, all PMCs are required to be in tandem particularly on technical specifications. Varying specifications may lead to different spare parts, which may become a problem during operation and maintenance phase due to non-interchangeability. Further, the contractors would find it easier to follow identical specifications. Particularly, for line pipe, common API standard should be followed instead of unique Chinese or Russian codes. It is better for all PMCs to standardize the codes and standards to be followed, so there is similarity in the specifications.

## **Appointment of Third Party Inspection Agency (TPIA)**

It is important to ensure quality while executing the project. For this, it is necessary to line up a "Third Party". This responsibility can be shouldered by the technical wing of AEC so that the quality and consistency in quality is ensured throughout the project. Some of the personnel of TPIA can be located in respective countries. A Quality Assurance Plan is drawn for all the items of procurement as well for construction, which will be approved by the Project Management Consultant.

Project groups of all the countries are responsible for quality of the work as per standards. Difference in quality is bound to be there due to difference in attitude and culture, but a competent TPIA can bridge this gap and help in maintaining the quality of the project.

## **Infrastructure Facilities**

In order to carry out construction work, infrastructure facilities like camp, communication, vehicles etc will be required by site construction personnel. All member countries will have to take necessary action to ensure the same. Generally, within 10 months after approval of the project, construction activities start for cross country pipeline projects.

**Camps:** This is a place where site personnel including senior level officials stay during construction activities. The camps are selected in such a way that movement of site engineers is optimum. In a project of 500 km pipeline, three to four camps at intervals of 100 to 150 km are sufficient. These camps can also have office rooms where, daily at the end of a day's work, meetings can be held between the client, contractor and PMC to plan out the next day's schedule of work. The camps are generally hired in local hotels.

**Communication:** Communication is the key to success of any project. Therefore necessary facilities like computers, internet connection, Video-conferencing and mobile phones will have to be made available. In fact, nowadays some companies started have using INMARSAT for communication where no telecom service providers are available. Video-conferencing is a very effective tool, which can be used for conferencing between different spreads, project office, etc instead of physically moving to the place.

**Vehicles:** For movement from place to place, vehicle requirement will have to be calculated and lined up. The requirement of the vehicles depends on the work load. The required vehicle-months needs to be calculated and tenders for hiring the vehicles should be floated.

## Immediate Activities of PMC

After appointment of the PMC, the activities of the project starts and the following actions need to be taken immediately:

1. Identification of project manager from PMC
2. Kick-off meeting with PMC
3. Finalization of packages
4. Finalization of level-1 (L-1) schedule
5. Basic design basis
6. Finalization of P and IDs
7. Execution Methodology

Brief description of each activity is as under:

1. *Identification of project manager from PMC:*  
PMC appoints project manager to co-ordinate all the activities of the project, and who would be responsible for all the technical as well as commercial activities of the project. He has to coordinate with client, vendors, and contractors and within his department.
2. *Kick-off meeting:*  
In order to start any project, the first step is to hold a kick-off meeting between the client and the PMC, wherein both decide critical issues of the project. This will also be the first official meeting with PMC to start the project work. At this stage the client and PMC share their views about the project with each other.
3. *Finalization of packages:*  
Any project execution constitutes of different packages for procurement and works, and these have to be decided before execution. Broadly, the following packages are followed in a pipeline project:
  - Line pipes
  - Ball Valves
  - Metering Skids
  - Scrapper launcher
  - Station Valves
  - SCADA
  - Telecom
  - EPC package for Laying works
  - Power source
4. *Finalization of Level-1 (L-1) schedule:*  
Time is the essence of the project, and the schedule is its soul. This is sacrosanct and all project team members are bound to follow it. At the

beginning of the project, Level-1 schedule is drawn which becomes a broad guideline for taking necessary action. The schedule is drawn in such a way that most of the activities will run parallel and sequential activities are minimal. If at all there are sequential activities, the preceding activity must be completed by that time.

Based on the L1 schedule, L2 and L3 schedules are developed for the purpose of execution.

#### *5. Basic Design Basis:*

Any project would have its unique technical parameters and other related issues. In order to freeze various technical parameters of the project, a design basis package is prepared by the Project Management Consultant, which should be approved by the client. The comments of concerned departments like Process, Operation and Maintenance etc will also have to be incorporated in the Design Basis.

Basic design basis is the key document for any project; therefore the project manager and his team must take this activity very seriously. It is like a foundation of any building on which the structure is build. Hence it should be frozen only after discussing it thoroughly with the project management consultant.

#### *6. Finalization of Process and Instrumentation Diagrams (P and IDs)*

Based on finalized design basis, Process and Instrumentation diagrams are prepared based on the control philosophy. Comments of other concern departments like Process Operation and Maintenance etc have to be incorporated before finalization. Hazard and Operability (Hazop) study recommendations are also to be incorporated in the P&IDs. The final P&ID needs to be signed by project managers of the client and consultant.

#### *7. Execution Methodology:*

Execution Methodology for implementing the project needs to be finalized in consultation with the PMC. The PMC of each country will write his own execution methodology which is like a road map to reach the goal. Generally, the methodology covers the aspects like:

- Technology selection etc
- Number of procurement/ work packages
- Number of spreads for pipe laying
- Communication procedure
- Payment methodology
- Monitoring System

Since the project is to be executed by different diverse countries it is essential to decide on a proper execution methodology which will be driven by the following:

- Diversities of countries.
- Consistency in codes and specifications.
- Cost effective procurement and contracts
- Ease in disposal of arbitration cases

Since all the countries will be doing their part of execution, the following execution methodology is proposed for AGG:

- All countries have their own PMCs but their scope and terms and conditions will remain the same
- Technical specifications for major procurement packages can remain the same like material of line pipe like API 5L X-70 or 80
- Custody transfer methodology and specification can remain the same, i.e. the custody transfer of gas from one country to other will be done at the exit point of preceding country, and type of meter should be ultrasonic type following AGA – 9 code
- Procurement and construction can be done by the respective PMC
- The pipeline can be capitalized country wise, which will decide final tariff/transit fee calculations

## **10.5 PROJECT SCHEDULE**

PMC of all the countries will develop Level-1(L1) schedule for completion of the work and then synchronize it each other, so that grid formation is made within time. In case schedules are not synchronized, then one limb may be ready and another may not, this leads to defeat of purpose. Further, these schedules are also required to be synchronized with development of gas fields. Broadly the following factors are required to be taken care while preparing Base L1 schedule.

- 1) Development of the gas field and availability of gas.
- 2) Construction of pipelines from the off-take points to respective custody transfer points
- 3) Availability of financial sources
- 4) Inter-country gas distribution network.

Following are the various scheduling activities that should be done:

### 1) Task Identification:

Broad tasks are identified for the project as under :

- Survey work
- ROU acquisition
- Statutory Permissions
- Land acquisition
- Arrangement of financial packages
- Line pipe procurement
- Long lead items procurement
- Award of EPC/Laying Contract
- Commissioning
- Close out

### 2) Developing Work Breakdown Structure (WBS)

The work breakdown structure represents a systematic and logical breakdown of the project into its component part. It is constructed by dividing the project into its major parts, which further divided into sub-parts along with the resources and responsibility. The successful accomplishment of the project requires a plan that assigns responsibility to a specially identified organizational element, establishes schedules and budget for accomplishing of the work. This is the responsibility of the project Manger along with the project team who takes help of Work Break down Structure (WBS).

The WBS weightage generally followed for overall project scheduling and physical progress monitoring is as shown in Table 10.6 and Exhibit 10.8:

<b>Sl.No.</b>	<b>WBS Element</b>	<b>Weightage</b>
i.	Process Design	2
ii.	Detail Engineering	10
iii.	Tendering	1
iv.	Ordering	2
v.	Manufacturing and Delivery	60
vi.	Construction and Commissioning	25
	<b>Total</b>	<b>100</b>

Table: 10.6 WBS Weightage

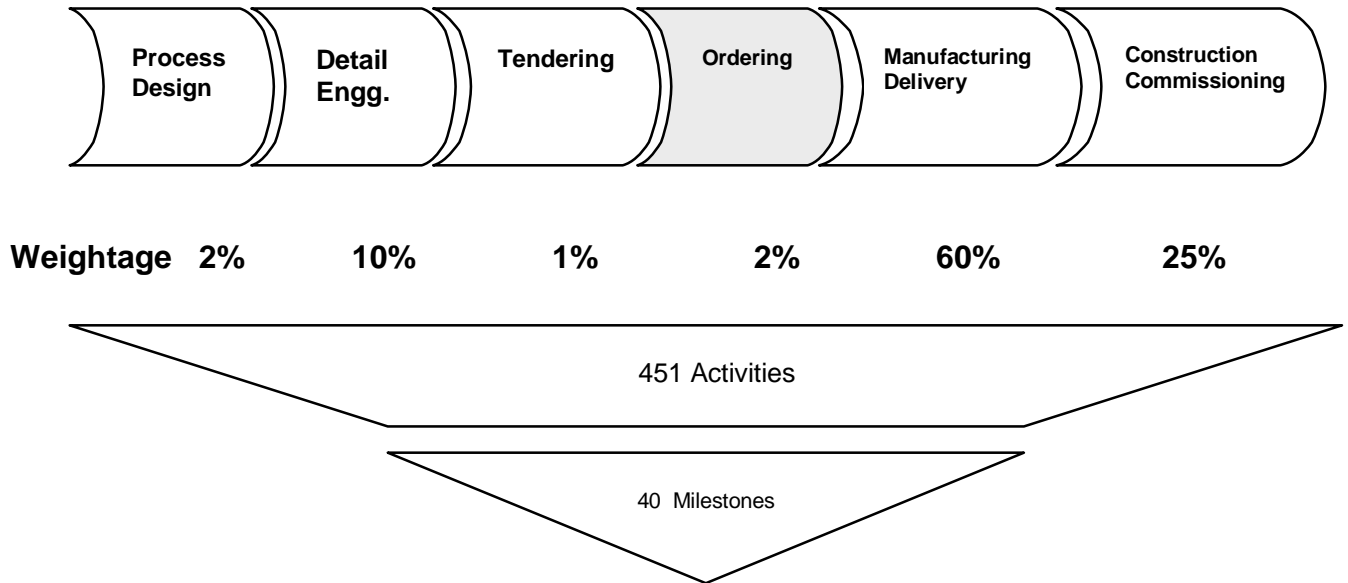


Exhibit: 10.8 WBS Weightage and Activities/Milestones

Based on the L1 schedule and with the help of respective WBS elements, Level-2 and 3 (L2, L3) schedules can be developed for monitoring at micro-level.

### Planning Asian Gas Grid Project

AGG project involves managing different pipeline projects at different time periods and at different geographical locations. Hence, to minimize efforts, standard project plans can be developed for managing repetitive projects. Project plans that can be standardized are work breakdown structures, work package specifications, milestone lists, project organization charts and project responsibility matrices.

By deploying the same supplier or the same technology for several projects, economies of scale and learning potential can be used, which will reflect in lower project costs. There will be multitude of projects performed simultaneously. To comply with integration tasks, projects can be clustered into project portfolios, networks of projects and chain of projects. Thus synergies can be created among the projects. Asian Gas Grid involves larger projects being active at the same time. They would need a software tool with real-time, online status to help monitor project execution.

### L1 Schedule of AGG

If we suppose that countries begin the AGG, say by the end of 2009, the schedule for executing the project will take around 5 years to complete, as shown in Exhibit 10.9:



	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
<b><u>Limb/Activities</u></b>					
Formation of AEC	■				
Formation of consortium of countries		■			
Initial activities by consortium of contractors		■			
Submission of proposal by consortium to AEC		○			
Approval of authorization by AEC			○		
Project Implementation			■	■	■
Project Closure					■

Exhibit: 10.9 L1 Schedule of AGG

## 10.6 PROJECT BUDGETING

### Project Costing

Project costing is complimentary to project financing. The project costing has to commensurate with project finances. In case of increase in project cost, finances may be in jeopardy. Therefore, project costing has to be done with care. Cash outflow in the project is determined by budgeting. Hence, financing, costing and budgeting are co-related for any project

### Cost Estimation

Cost estimation determines the commercial viability of the project. All calculations are based on this estimate. Therefore, caution is required while working out estimates.

Any pipeline project is approved with cost broadly comprising the following elements:

#### *Hard costs*

- Direct Costs (Pipeline, Terminals, Laying, Telecom, SCADA costs etc.)
- Indirect Costs
- Excise Duty, CST, Service Tax, WCT, Freight, Insurance, Customs duty etc)
- Designer Expenses (PMC)
- Owner Management Expenses

- Commissioning expenses
- Contingencies

**Soft Costs**

- Margin Money
- Interest During Construction (IDC)
- Financing Charges

Estimate of the final cost of the project would be based on the data available with the PMC/client which becomes a part of the Detailed Feasibility Report (DFR). The magnitude of the estimation at the time of DFR is arrived at without any detailed engineering and is +/- 20 percent within the scope of the project. The accuracy of this estimate not only determines the viability but also requirement of funds for the project. However, nowadays accuracy of the estimates at DFR stage is itself under question, as the gap between DFR and awarded cost tends to be very high due to volatility in the market.

It is worth mentioning here that there is conceptual difference between estimate and quoted price. The estimate is simple multiplication of number of items and unit cost, whereas quoted price is the pricing of the contractor, not the costing. The vendor/contractor after determining the cost loads/unloads the price with strategic cost/opportunity cost/competitive cost etc. This point needs to be understood properly. Therefore the DFR estimate can be termed as the benchmark estimate for the project. The said estimate is improvised later at different stages.

Based on experience, it can be concluded that estimation is an art and it depends on the person who is preparing it. He should have knowledge of prospective bidders, market condition of the item, competitiveness of bidders and their strategy of quoting cost, loading of bidders, predictive strategy of bidders, schedule of the package etc. Estimated cost of different limbs is as shown in Table 10.7 based on techno-commercial analysis:

<b>Limb</b>	<b>Estimated Cost (Million US\$)</b>
IPI- Iran-Pakistan-India	8788
IBM- India-Bangladesh-Myanmar	4627
MC- Myanmar-China	7181
KaUzChi- Kazakhstan-Uzbekistan-China	16682
TAPI- Turkmenistan-Afghanistan-Pakistan-India	6926
Turkmenistan Link Pipeline	792
<b>Total Cost</b>	<b>44996</b>

Table: 10.7 Estimated cost of AGG Limbs

## **Cost Monitoring Mechanism**

The project is approved with the cost to be spent during execution of the project. The amount of money is distributed as per the requirement, and is driven from the schedule of the project. Project manager works out the cash flow required for the project. The financing should match the budget allocation, so that at no point of time should the project be affected for want of finances.

- Budget should be based on Work Breakdown Structure for accuracy
- Instead of more optimistic, it should be a little conservative

## **Cost Control**

Being a project of large size, it is essential to employ proper cost control measures. In case the cost of the project increases, its viability will be questionable. Cost of the project has direct impact on revenue of the project as well as on the transit fee for countries. The company should also control the project cost through value engineering.

It would be imperative for each government to have a cost monitoring cell that would also send a report to AEC whose role is very significant. Following action can be taken for monitoring cost:

- Thorough review of specifications, replacing rich specifications with adequate specifications and finalization of the same by PMC of all countries. This will be issued by technical directorate of AEC ( Asian Energy Charter )
- Bid Evaluation Criteria should not be restrictive but should lead to more competition
- Proper estimation using WBS approach
- Correct basis and methodology of estimation
- Timely award and completion of package
- Adhering to schedule of work
- Insertion of bonus clause in the contract instead of penalty clause
- Timely payment to vendors and contractors
- Proper planning and scheduling

## **10.7 PROJECT MONITORING**

Every project has a start and end date with certain allocated cost. After approval of the Board of Directors or competent authority, the project is given to the Project Execution Department. In the case of AGG, after approval by the AEC, the respective countries will start Project Execution work. The zero date of project execution starts from the date of approval. For example, if a limb of this project is approved on 1 January 2010, and has a project execution time

and cost of 36 months and Rs. 4400 crores (\$1000 million), then the project will be identified as:

1. Project initiation Date : 01.01.2010
2. Project Completion Date : 31.12.2012
3. Project Duration : 36 Months
4. Project Cost : \$ 1000 million

### **Project Monitoring System**

After the project is taken up for execution, meticulous planning is carried out by breaking the complete project work into a large number of activities. The activities are linked either by “finish to start”, or “start to finish” relation. The complex network of such relations leads to the time scheduling of all activities. If the project has to be completed within planned time, it is essential to complete all activities in the project by the scheduled dates. The process of monitoring the execution of inter-related activities is termed as “Project Monitoring system”.

Whatever the complexity or type the project is, its execution requires constant, regular and systematic monitoring, to ensure planned/targeted completion. Project monitoring primarily keeps track of:

- All major project variables – time, cost, scope and quality
- Accomplishment of different milestones of the project
- Review of constraints
- Visualization of risk areas

Monitoring consequently provides visibility into progress as the project execution proceeds, so that the project team and management can take timely corrective action.

### **Project Monitoring Process**

Project Monitoring of AGG will be typical monitoring of its own kind ,wherein activities will be done at country level of particular limb as well as at corporate level i.e. at AEC level. The Project monitoring process may be carried out through meetings “one to one (OTO)” or “one to many (OTM)” and MIS reports.

The structure proposed for monitoring of AGG is shown in Exhibit 10.10.

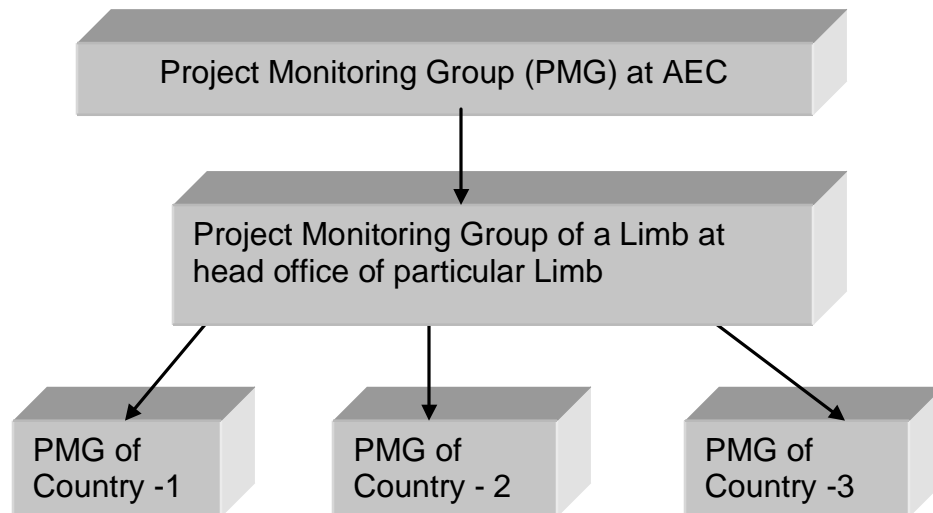


Exhibit: 10.10 Structure for AGG Monitoring

As per the diagram the project needs to be monitored at 3 levels.

- **Level -1:** At corporate level of AEC, wherein Project Monitoring Group (PMG) will monitor the projects of all countries with respect to time, cost and quality. They will seek reports as per desired frequency from PMG of a particular limb.
- **Level-2:** It would be done at the corporate level of the particular limb. Let's suppose that the corporate office for Iran-Pakistan-India Line is in India, then the monitoring of the total project would to be done in India and monitored by PMG located in India.
- **Level-3:** It would be done at the country level by the company which is executing part of the limb within its country. For IPI line, individual limb monitoring will be done at Iran, Pakistan and India respectively.

### Review Meetings

A successful project would have many review meetings. These review meetings are the forum where not only progress figures are discussed along with the progress of the project, but area of constraints is also deliberated upon. A good monitoring system requires less paper/formal communication and more meetings among concerned parties. Subsequently, the record notes (Minutes of Meetings) of such meetings are used to facilitate decision taking or scheduling further such meetings. Such Minutes of Meeting (MOM) are called revolving MOMs as the issue revolves till it is resolved. The structure of many such meetings is shown in Table 10.8:

<b>Meeting</b>	<b>Type</b>	<b>Chaired By</b>	<b>Interval</b>	<b>Scope</b>
Corporate Project Review	OTM <sup>1</sup>	Director at AEC Headquarter	Monthly	Comprehensive progress review, wherein vital decisions are taken for expediting project progress
Construction review	OTM	Director at country level	Requirement based	Comprehensive construction expediting review
Weekly meeting	OTM	Project Manager (Country Level)	Weekly	For weekly closure of project issues
Daily Meeting	OTO <sup>2</sup>	Project Manager (Country Level)	Daily	Micro monitoring of activities and setting priority for today's work
Fortnightly Procurement Review	OTO	Project Manager (County Level)	Fort-nightly	Review of manufacturing and delivery progress with vendors.

Table:10.8 Structure of Review Meetings

Note:

<sup>1</sup> OTM: One to Many

<sup>2</sup> OTO: One to One

### **Corporate Project Review Meeting**

This meeting is conducted regularly in every month wherein comprehensive review is taken by official at top management level of Asian Energy Charter's headquarters which would be chaired by the Chairman of AEC ,wherein all the Directors of AEC and concerned Director (Projects) along with the country team will participate to review the progress and constraints . This is one to many type of meeting wherein Project Manager with officials from site office, engineering consultant, informs on progress statistics and bottlenecks. Such meetings get importance because:

- A medium to inform management on progress details physical as well as financial.
- A forum to take crucial decisions
- Risk areas gets identified and known to everybody.
- Discussion on catch –up plan including additional resources required by contractor/PMC and Client.

## Construction Review Meeting

This meeting, chaired by Director (Project) of the respective country conducted at site office for review and expediting construction progress at Micro level. These review meetings are generally started after award of laying contract till the closing of the contract. Such meetings are very important as different site issues get quick solution as the distance between the problem and management gets shortened. It's a forum of solution, which needs to be used constructively. It gains importance because:

- It provides status of mobilization of manpower, equipment, Drawing approval and bought out items by the contractor.
- Detailed status of permissions and other statutory requirements are also discussed.
- Issues of contractor related to client/PMC and others are discussed and solutions are found.
- RoU acquisitions, handing over to contractors and other related problems are discussed.
- Contractor's problems are also discussed like payments etc.

## Weekly Monitoring System

This mode of monitoring is required for having close eye on the various subjects being undertaken by Project Manager with the project department at micro level. It averts the danger of slippage in activities, because by weekly monitoring, one is able to identify the slippages within a range of 7 days only. It is a very effective way of monitoring. Project Manager with support of his team undertakes this review. Broadly, the areas that can be covered are given in Table 10.9:

<b>Weekly Review Format</b>		
<b>Sl. No.</b>	<b>Issues to be Reviewed</b>	<b>Status</b>
<b>1</b>	Reply of Letters received	
<b>2</b>	Audit/Ministry/VIP queries	
<b>3</b>	File Approval status	
<b>4</b>	Weekly Progress and Constraint Report	
<b>5</b>	<b>Site related issues</b>	
<b>6</b>	<b>Pre project activities review</b>	
	a) Permissions	
	b) Land acquisitions	
	c) Environment permissions	
	d) ROU acquisitions	
<b>7</b>	<b>Review of cost/cash flow and Fund Requirement</b>	

<b>8</b>	<b>Review of Schedule</b>	
<b>9</b>	<b>PMC related activities</b>	
	a) Review with PMC	
	b) Reply of all letters of PMC	
	c) Performance Analysis	
<b>10</b>	<b>Review Pre ordering status</b>	
<b>11</b>	<b>Review Post ordering status</b>	
<b>12</b>	<b>Anticipated risk areas</b>	
<b>13</b>	<b>Progress monitoring (Physical/Financial)</b>	
<b>14</b>	<b>Release of Due report to Country head/AEC headquarters</b>	
	- Weekly	

Table 10.9 Weekly Review Format

The above format is for guidelines, there may be other related issues also .Such weekly review has another advantage that the project manager along with the team has total knowledge of the project activities.

### **Procurement progress review**

Timely project execution is sensitive to availability of material for construction work. This is true for any type of project. Therefore, review of material from the very beginning of the project is essential. Procurement is one of the major activities. This starts from material requisition (MR) to delivery of materials at the site. The intermediate activities are:

- Preparation of Material Requisition (MR)
- Formulation of bid evaluation criteria (BEC)
- Preparation and approval of tender
- Tender floating and receipt of bids
- Bids evaluation and award of Purchase Order on L-1 (Lowest Cost) bidder
- Meeting contractual obligations by vendor like submission PO acceptance, bank guarantee and signed contract
- Manufacturing process, documents approval and expediting of manufacturing
- Manufacturing review
- Dispatch and receipt of material in client's store
- Release of payments
- Closing of purchase orders



All the above activities require the resolution of various issues at every stage; therefore constant review of the activities is carried out on weekly basis. Further for better control, order for supply of line pipe, which is a major order in any pipeline project, can be reviewed separately from other materials order, as the supply of line pipe is most vital for construction for the project. Generally a procurement coordinator monitors these activities in three phases:

- **Pre-Order Status:** This broadly consists of detailed status of procurement from floating of enquires to award of the work. It would show schedule date, forecast date and actual date of completion of the activity. With this the coordinator would be able to identify any delay in accomplishment of any activity.
- **Post Order Status:** After placement of the order, post award activity starts and the procurement coordinator would monitor different activities like approval of drawings, identification of purchased material, orders etc. Progress is monitored against the schedule date of activity. Any delay in any activity may raise an alarm for the management. The procurement coordinator would have to ensure delivery of the material within scheduled delivery date. He would have to identify all those activities which could be expedited and have consequent impact on the completion schedule.
- **Closing status:** This is also very important feature and will have to be done by respective coordinators. This activity starts after the arrival of materials at the site. It involves release of payment, submission of operational manual by the suppliers, payment status, completion certificate, performance analysis of the vendors and closing of the order. A weekly status needs to be generated by the procurement coordinator as soon as the delivery of orders starts.

### **Daily Progress Reports**

Being a mammoth project, necessary skill for meticulous project management is essential, and everybody has to dedicate himself to the project .The project manager will have to meet his team every morning and allocate the work as per the priority of the day. Based on this, the team members decide their course of action. As projects are full of uncertainties, there is always a chance that whatever is planned in the morning may not get completed by the end of the day. In this case the project manager will have to decide the priority, and advise his team members on future course of action.

Daily Progress Reports from line pipe manufacturer and laying contractor are reviewed the next morning for taking action, and work is distributed by Project Manager among team members on priority basis.

## **Timely Procurement of Material**

Construction at the site is possible only when material is made available on time at the site. Timely procurement of material is the essence for any project. Procurement coordinator needs to review requirement of materials, and synchronize with the laying contractor at the site. For such a mammoth project, an expediting group can be formed who will be totally responsible for just expediting the material. The group would call review/constraint meetings with the vendors and sort out any problem. Since most projects will run concurrently, it may also be difficult for vendors to supply the material on time, as there are only limited big vendors. These meetings make the vendors understand the needs of the client. It helps better performance and timely supply of materials. Broadly the following subjects are discussed:

- Progress on Engineering by Vendor
- Approvals of Engineering, drawings etc of vendor by PMC of owner organization
- Status of ordering of bought out materials, if any, by vendor
- Status of progress of manufacturing
- Status of inspection clearance
- Status of delivery of materials to owner organization
- Transportation arrangements of materials
- Constraints in execution of the order

## **10.8 PROJECT PROCUREMENT**

The success of AGG will largely depend on timely availability of material when required. This would be applicable for all the countries. After the project starts, the first work to be done after design basis, is finalization of first MTO (material take-off). In this, different items are listed, based on the finalized P&IDs (Process and Instrumentation Diagram). Based on this MTO the procurement action will be started by PMC/client. As per the size of the project and accuracy of design, the number of MTOs gets varied.

AGG will be constructed by different countries. As per the execution methodology explained above, each country will construct their part of the section i.e. from the custody transfer point to exit point of the country as shown in Exhibit. 10.11.

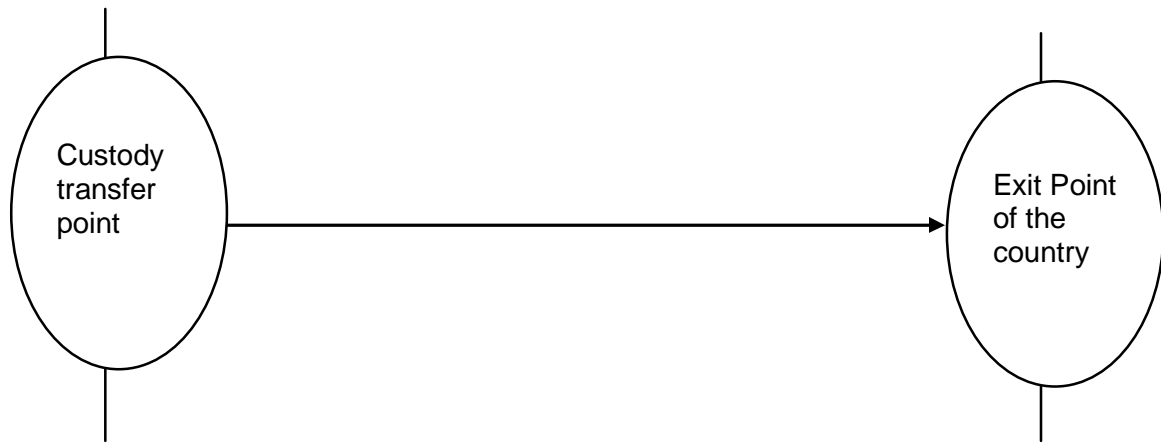


Exhibit: 10.11 Scope of Construction by each Country

Since the contracts and procurement action will be taken up by respective countries, the following issues will have to be sorted out during execution.

- **Contracts and Procurement Procedures:**

Since more than 10 countries will participate in the contracts and procurement activities, and every country will have their own system of procurement, it is necessary for AEC to finalize a combined procedure for the sake of consistency. Further, this would aid all the countries to avoid any difference in their approach.

- **Mode of Procurement:**

It needs to be clarified what the tendering mode would be, whether ICB (International Competitive Bidding), LICB (Limited International Competitive Bidding), e-tendering, reverse auction etc. These issues will bother all the countries before taking any procurement action.

- **Taxes and Duties:**

These components have a major impact on the project cost. AEC needs to decide on exemption on movement of goods from one country to another, if the materials are required to transit from one country to the other.

Nowadays, in order to promote more transparency in the system, e-tendering or reverse auction is promoted for tenders.

### **e-Tendering**

This is also referred to as e-procurement. Since most of the participating countries have computer system, the procurement can be done through e-tendering as it reduces handling of the physical form of the bid and reduces human interference. It also has the ability to handle single/two stage bidding for limited/open bids. The salient features are:

- Tendering process fully secured, transparent and ensures confidentiality
- Time and date digital locking/opening of electronic tender
- Better sourcing and more competitive prices
- Tender opening by authorized officials
- Ability to submit on-line technical bids and price bids in standard format
- Digitally signed tender and bid documents for user authentication
- User friendly work screens
- Free vendor registration login with password protection
- Round the clock on-line access to tender information and documents
- Reduced cycle time of tendering.
- More transparent system

### **Reverse Auction (RA)**

The Oxford dictionary, defines an auction as “a public sale in which articles are sold to the highest bidder.” Auctions have been a part of history and can be traced back to 500 BC.

Today auctions fall under the broader heading of dynamic pricing, where pricing is allowed to vary based on market conditions, sales channel, and buyer’s needs. Now, online auctions are moving us into a new era of negotiated pricing. The most important reason for buying at an auction is because you can buy it immediately for smoother project execution/operations.

The two types of Auctions are:

#### **1. Reverse Auction (RA)**

An auction used for procurement in which the suppliers bid progressively lower prices in real time, while the auction is open, for the right to supply Goods or Service.

#### **2. Forward Auction**

An auction used for sale of goods or service in which participants bid progressively higher prices in real time, while the auction is open, for the right to purchase the item in play.

In India, both public and private sector companies have embarked on procurement through online Reverse Auctions. The government, including CVC, encourages the use of the same. The modalities of implementation have been left to individual companies so long as the process is fair and transparent.

RA is a process in which bidders participate in an open competitive bidding event in real time and have insight into the bids of other suppliers. This is not so

in the traditional bidding process. Using a web based application; bidders receive a login and use a web browser to access the application. Once logged in, the software gives them the following tools to assist in their bidding:

- An area to place bids
- Summary of information indicating the status of auction and bidder's competitive position in the market
- Online help facility. This could be in the form of a chat box through which the bidders can chat, records of which are maintained in the system

Auctions generally occur in a compressed time frame, anywhere from 20 minutes to 2 hours. Typically, the auction provider also offers a telephone hotline to the bidders to call if they have questions during the live auction.

## **10.9 CONTRACT MANAGEMENT**

Any project consists of two major contracts i.e procurement contract and work contract. Work contracts are equally important as procurement contracts. The execution of the work using procured items is done with the help of the work contract.

Generally in the pipeline industry the following contracts is awarded:

- Pipe laying tenders and construction of associated facilities.
- Cathodic protection tender.
- Composite construction tenders for plant related works like compressor installations etc.

There are two types of contracts prevailing in this category:

- Engineering, Procurement and Construction contract (EPC)
- Construction contract (CC)

### **Engineering, Procurement and Construction Contract (EPC)**

For bigger projects like construction of refinery, LNG gasification plant or pipeline projects, EPC model is followed. This is a contract wherein the total responsibility of engineering, procurement and construction lies with the contractors. They have an organization set up according to requirement for carrying out all the detailed engineering, finalization of material requirement,

procurement thereof, and later in execution of the project. This has both advantages and disadvantages:

### ***Advantages***

- One point co-ordination
- Client becomes slightly unburdened and uses less manpower
- Client has distinct advantage of getting rid of botheration of placing orders, mentoring and closing of the same. Only one EPC contract is required to be managed by the client and even the cost of PMC could be reduced up to a great extent.

### ***Disadvantages***

- In case of any failure of the contractor, it may become difficult for the client to manage. Had there been multi contactors then the client would consider off loading one of the contacts, but in this case it becomes a problem for the client.
- EPC contractor loads his cost in every procurement or outsourced item.
- In case the contractor does not have all the requirements and adequate number of personal, then it becomes difficult for the client to control the project.

### **Construction Contract (CC)**

This is the conventional method of contracting for construction works. Engineering and procurement activities are done by the client or their representative i.e. Project Management consultant (PMC). This method has the following features:

### ***Advantages***

- In case the contractor fails, the client finds it easy to off-load the work.
- Comparatively costs less than EPC.
- The owner is responsible for the material and being the client, he does not have to depend on the contractor or monitor his actions. The client can use his own contacts and influence to get the delivery faster.

### ***Disadvantages***

- Multi-point coordination has to be done by the client i.e. with PMC, with different vendors and sub-contractors.
- The major disadvantage of this contract is that the client has to pass through all the procedures before placing the order. The client has also to face any dispute arising out of the contract at a later date.

### **Procedure for Contract Management**

Most organizations dealing with procurement and contracting do so as per the specified norms called “Contract and Purchase Procedure “. It is considered the base book to be followed during the entire execution. As mentioned in the execution methodology, AEC can develop its own contract and procurement procedure, which can be implemented throughout the project. It illustrates the procedure for purchase or contract, from start to closure of the contracts. All the project managers including their project teams will have proper training before implementation of the procedures.

### **Execution of Work**

- **Kick-off Meeting**

After award of the construction work, the first step in the execution is to have a kick-off meeting with the contractor.

- **Signing of Contract & Submission of Performance Bank Guarantee:**

As per definition of the contract, it is an agreement between parties which are involved in the job. Therefore after award of the contract, the primary task of the contractor is to sign the contract agreement, which is further supplemented by submission of bank guarantee as specified in the tender document. It is required to take care of the interest of the company and is kept valid up to 12 months after completion of the job. This is in case the contractors fail to take care of any defect after completion of the work, and do not respond, then their bank guarantee can be invoked and the work can be done at their risk and cost.

- **Schedule finalization:**

It is the most important activity before start of the project execution. The schedule comprises all the activities which are required for accomplishing the work. Casting of schedule is an art and requires to be done by an expert, as identification of different activities, their timing and mutual linking is very important. All the stakeholders like PMC, client and contractor have to complete the task as per requirement of the schedule. There will be two schedules:

1. **Contractual Schedule:**  
It is used for the purpose of determining liquidated damages, if work is not executed as per contractual time
  2. **Best Effort Schedule( BES) or 80 % Schedule**  
This schedule is prepared with an intention that all the activities of the project would be scheduled to be completed within 80 percent of original time i.e. if a contractual schedule is 10 months, then for 80 percent schedule it would be completed within 8 months. Achievement of 80 percent schedule is advantageous to all parties. For client the project is completed within time. For the contractor as well as the PMC, the cost is reduced in overheads etc and their performance rating too improves. Further in case of any slippage on account of any factor, the float of 20 percent of time is available to catch up. It is a tested formula and it can be used for any package.
- **Number of Fronts to be Opened**  
Depending on the schedule completion of project, the number of fronts to be opened has to be finalized. Typically two fronts can be opened in the spread length of pipeline, so that work can be executed simultaneously from both ends of the spread. The contractor will have to mobilize two separate crews if two fronts are opened.
  - **Mobilization Plan of Equipments**  
Normally after award of work, time of one to two months is provided to the contractor to gradually build up the required number of peak level equipments. Similarly the contractor can gradually taper down the number equipments at the completion stage of construction. Such mobilization plans of equipments are discussed in the meeting, including the status of those critical machineries which may be required to be brought from overseas.
  - **Mobilization Plan of Manpower**  
The mobilization plan of the contractor for engaging various skilled/unskilled and supervisory/managerial persons is discussed in the kick-off meeting.
  - **Location of Camps**  
The camp is the place where construction workers stay during construction period. It is preferable to locate the camps of the contractor at the same site as the camps of the client and PMC. This facilitates in better interaction among all the parties.
  - **Drawing schedule**  
In order to have control over the project one should control the drawing schedule. Timely issuance of drawing to the contractor is very essential.



In case of EPC contract, the contractor has to prepare all the drawings. If case they have a weak engineering cell, the project would be badly affected. Hence this point needs more deliberation during kick-off meetings. Sometimes the contractor outsources this activity to another engineering company, then the coordination points increase. The efficiency of this item is totally dependent on that outsourced company.

- **Materials Procurement Plan**

After finalization of the drawings, the MTO -1 (Material Take Off) is finalized and the contractor is required to start taking procurement action of the same. A schedule is requested from the contractor for the same. The project manager will have to take control of the schedule and should ensure the availability of bought-out materials. A list would have to be prepared of the material procured by the client as well as by the contractor, so as to have control over the material. This requires regular review and updation.

### **Arbitration**

In international contracts, probability of disputes are more, hence arbitration related matters and their documentation are to be kept carefully. This clause is used to settle disputes between the contractor and the client, if any of the issues are not settled during execution/contract closure. Either party can invoke this clause by appointment of an independent arbitrator who is acceptable to both the parties. The arbitrator would be a qualified person - either retired judges of courts or any similarly qualified person. In AGG, all disputes can be solved as per International Arbitration Act.

## **10.10 CONSTRUCTION MANAGEMENT**

Construction activities have 30 to 35 percent weightage in any project, particularly in pipeline projects. Construction of AGG will be challenging as it has to cross many borders, different terrain, several crossing etc. The completion of laying work is directly linked with revenue generation, which also gets delayed in case of any delay in completing the work. Construction work is fraught with many problems; it may be from contractor, farmers, local leaders etc. Every day a new problem is encountered, which has to be solved by the next day. In short, construction management is complex but challenging, which requires competent and experienced persons.

### **Role of Construction Managers**

The role of good construction management is very essential, and largely depends on the construction manager of the client, PMC and contractor. Therefore their selection should be done on merit. Their ability to work in

tandem is most essential for the project. All of them have to understand each other. Here the role of the client construction manager gains importance, as he has to lead the total team. The selection of the construction manager (CM) should also be done in a similar way as that of Project Manager. Here the CM is required to have adequate experience of welding, construction, contact management, problem solving attitude etc. In AGG different construction managers have to interact with each other for sharing of information during the construction process.

The construction manager will be supported by a team of persons as per the following organogram:

### Construction Organogram

Qualified, skilled and experienced manpower has to be deployed for RoU opening, construction supervision and inspection. Adequate number of personnel will have to be deployed at various fronts. One Spread-in-charge would be responsible for managing a spread of around 100 km.

It is essential to understand various activities related to laying of the pipeline. They are as per the flow chart shown in Exhibit 10.12:

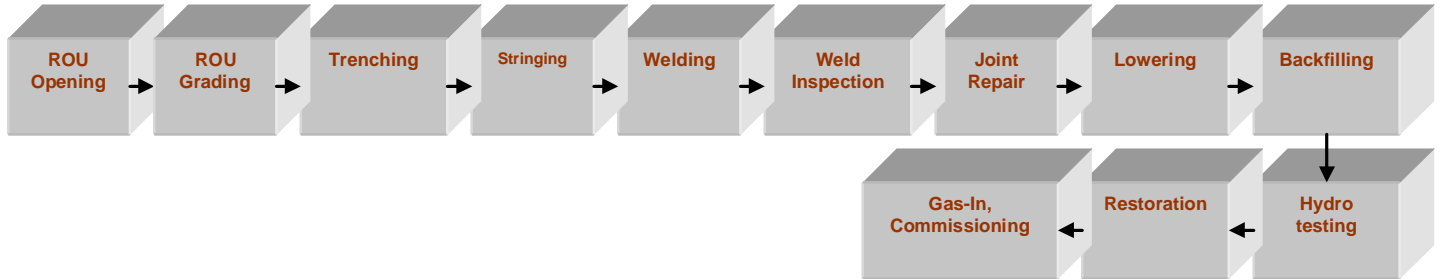
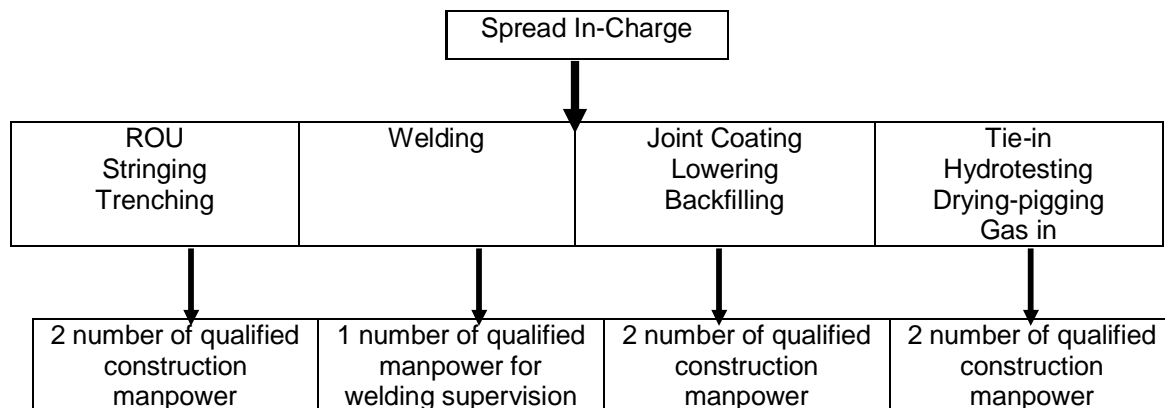


Exhibit: 10.12 Activities in Pipeline Laying

Typical Site Construction Office Organization Chart can be as shown in Exhibit 10.13



### Terminal Works

Sl.No.	Activity	Manpower
1	Civil Works and Construction Activities	1
2	Installation of Gas Metering System, PCVs, SDVs, Filtration System, Gas Chromatograph, including	2

Exhibit: 10.13 Construction Team Organization Chart

### ROU Acquisition and Competent Authority

ROU is a term used in the pipeline laying industry. This is the first activity for pipeline laying. Pipeline is laid in the RoU (Right of Use) area which is temporarily taken for this work. Since the cross country pipelines pass through fields etc, permission of land owners is essential, which is done as per acts prevailing in different countries. Generally, this activity is done by the competent authority. He is the person duly appointed by the state government for ROU related activities and is vested with different authorities. His version or award is final as far as compensation related issues are concerned. If a farmer does not agree with the award and wants to challenge it, he has to appeal to the court, where the case is heard by a judge and verdict is given.

As per the system prevailing in India, a Panchnama process will have to be done before finalization of compensation award. This process has to be done after publication of 6(1). A representative of the competent authority, the client and two prominent persons visit the farmer's field and note down details of the number of the trees, crop and other details to calculate for compensation. The rates of different trees, crops etc are fixed by the competent authority.

Based on the Panchnama, the award is prepared and declared by the competent authority. The amount required for the compensation then transferred to the account of the competent authority by the company/client before the award is distributed. The competent authority then submits the reconciliation of the money after completion of all the awards.

## Opening of ROU

Once the ROU is acquired by the client, it means the contractor has got the site to start the work. They can start their machinery for grading. The width of ROU taken is normally 30 meters.

## Mobilization of Equipments and Manpower

AGG will be sensitive to construction equipments. It will require a lot of high capacity equipments like sidebooms, trenchers etc .Construction of pipeline is very sensitive to equipment mobilization by the contractor. It has often been seen that contractors take the order but do not mobilize equipments as per requirement of the contract. This puts to the client into difficulty as he would have to chase the contractor for the work. Hence it is essential to mention penal clauses in the tender so that the contractor is contractually bound to deploy the equipments. Otherwise, as per the penal clauses, deductions could be made from his payments for not deploying the equipment. A specified amount (rate/day) can be deducted from the contractor till the equipment is deployed. Generally for a construction period of 10 months, 1½ to 2 months are given to the contractor to mobilize the equipments in a phased manner. This could of course vary depending on the schedule of the project. With this clause in the contract, contractors become serious on deployment of the equipment, and are required to mobilize equipments within the specified time.

## Engineering, Procedures, Drawing Approvals

In an EPC contract, basic as well as detailed engineering is to be done by the contractor. Hence after award of the work, the contractor has to start basic engineering of the project followed by detailed engineering. Parallely, the contractor at the site starts deploying the equipments, and activities of approval of different work procedures starts. All the activities are required to be done as per approved procedure, which is primarily based on the contract conditions and relevant codes and standards.

Following are the stages of document approval:

- **Code 3:** With this approval the contractor can not start the work, as PMC has many comments on the document submitted by the contractor. The contractor is required to re-submit the document after incorporating comments.
- **Code 2:** With this approval, the contractor can start the work but there are still some points which are required to be corrected.
- **Code 1:** This is the final approval of the document, which is issued for construction etc. It is the contractor's ingenuity to ensure that his

engineering department gets the documents approved under code-1 at the first submission.

There are also several other drawings like plot plan, general arrangement drawing, mechanical piping, instrumentation and electrical drawing which are to be approved by the authorized person before implementation.

### **Owner's Obligations**

Since the EPC contractor should start work immediately after the award and will ask for the construction site immediately, the following documents need to be handed over to the contractor on the day of kick-off meeting. This would ensure that the obligations of the client are over and there is no claim of the contractor on this account. These obligations are:

- ROU ( Right of Use )
- All statutory permission of crossings, railway, road etc
- All permanent lands are in hand
- All procedures are approved under code –1.

### **Pipeline Information Management system (PIMS)**

This is a software solution to daily track construction progress of the project on real time basis. It requires tie-up with a software solution provider. The progress is displayed electronically on a web-based format. Proper secured access is provided to the consultant and client to enables review of construction progress. All pipeline construction related documentation (QA/QC and audit compliance documentation), including the pipe-book and weld-book are handed over to the client in an electronic format in appropriate formats and systems.

Apart from storing all paper documentation, the software has requisite features and ability to generate as-built alignment sheets from varying points of the pipeline ROU. All NDT tests (including weld x-rays or UT) are obtained in an electronic format, duly geo-referenced, as part of the software's archival feature. Project Information Management System (PIMS) is a software tool which gives the correct picture of project construction activities on a real time basis. It can also be extended to other packages.

Data that is entered on daily basis is indexed using complex algorithms that leave no scope for discrepancies. Reports are generated in a telescopic format that helps browsing from the route map for details of each pipe laid. The solution is designed to provide real time information about pipeline laying progress during three stages viz: Project Planning, Project Execution/Construction, Operation and Maintenance.

In short, the Pipeline Information Management System is a web based solution, designed for

- Acting as a monitoring system
- Planning purpose and helping in making decisions
- Online solution with real time progress
- Online report generation
- Centralized database
- Archiving documents online
- Using in Asset management system after construction of pipeline
- Satisfying the needs across different stages of life cycle
- Project planning
- Project execution/construction
- Operation and maintenance

In AGG, this tool can be extended for the entire project.

### **Payment of Contractors**

Payment to different vendors/contractors will be done from respective country offices who will seek funds from their head office. Therefore a proper system is necessary for all such companies so as to ensure timely payment to vendors/contractors. This is one area that most often does not get priority by companies. However, this outlook needs to change as most vendors/contractors are very busy people, and in order to procure the material/services on time, timely payment is essential. It is also necessary to realize that vendors/contractors are partners of the project and without their support the project cannot be completed. In lieu of their services the vendor/contractor expects payment as per contract conditions. Hence, it is paramount on the part of the company to make in timely payment. The Project Manager/Construction Manager should regularly monitor payments of contractors.

### **Offloading the Contract**

Big contracts are fraught with risks due to various reasons like lack of resources, lack of funds, or the contractor not being able implement the project as per requirements of the project schedule. Therefore, in the interest of the project and in the interest of the client, certain clauses should be incorporated in the tender document itself, so that no contractor can hold the client to ransom and in case of exigency this clause can be invoked for offloading work. There have been cases when the contractors do not pay adequate attention to completing the work due to one reason or another, leading to the project getting delayed. This would require offloading some of the work to another contractor in spite of having to face a lot of complications.

Normally the offloading option is not required to be used, but it is essential that the project manager keeps an eye on the progress of the project. Let us suppose there are three contractors and their progress figures are as shown in Table 10.10:

Contractor	Schedule Progress	Actual Progress	Predicted time of completion
A	80%	70%	Three Months from today
B	80%	67%	Three Months from today
C	80%	40%	Six Months from today

Table: 10.10 Construction Progress of 3 Contractors

Based on the above, it is clear that contractor C is lagging behind the other contractors. The construction manager is required to review and ascertain the capability of the contractor to complete the work within the stipulated time by enhancement of resources. If this is not possible, then a harsh step should be taken for offloading the work to another contractor at the risk and cost of the original contractor.

### **Contract Closure**

Contract closure carries the same weightage as completion of the project, but it is generally a neglected part of the project. By the time this activity starts, most of the key members of the project team get transferred to the other projects. After completion of each contract of AGG, it is required to be closed within 3 months.

Order/contract closure means:

- Work has been completed as per specifications and there is no balance of work
- All the payments have been made, including recovery of liquidated damages, if any
- All free issue material to the contractor has been reconciled, and any excess material issued have been returned to the stores and duly accounted for
- Shortages and damages of the material has been notified, necessary replacement either received or claims have been lodged with the insurance company

- All extra work and deviations have been duly accounted for as per procedure and systems

After confirmation of the above the order/contract can be closed as per the prevailing procedure of the company.

### **Handing over to Operation & Maintenance**

This activity is to be done after commissioning of the limb. All construction companies will handover the project to respective Operation & Maintenance Company and send a report to the respective country, head office of the limb and AEC. This is a major milestone of the project. From this point onwards, the checklist points of construction are liquidated, and the O&M group takes over their responsibility.

## **10.11 STAKEHOLDER MANAGEMENT**

### **Stakeholder Analysis**

Project leaders should pay attention to the needs of project stakeholders. Early identification of stakeholders leads to better stakeholder management throughout the project. A stakeholder is anyone who has a “stake in the ground” and cares about the effort in the project, or someone “who could stop this effort”. Stakeholder analysis can be approached using the following steps:

- Who are the stakeholders?
- What are stakeholder expectations?
- How does the project affect stakeholders?
- What information do stakeholders need?

The typical stakeholder for AGG project is shown in Table 10.11:



<b>Sl. No.</b>	<b>Major stake holders</b>	<b>Parties under these stake holders</b>
a.	Board of Directors in Asian Energy Charter (AEC)	i Full time Directors
		ii Government nominated Directors – Part time
		iii Independent Directors – Part Time representing industry and public
b.	Constitutional Authorities of Governments of respective countries	i Oil & Gas Ministry
		ii Environmental Ministry
		iii Taxation Department
c.	Statutory Authorities/Departments	i Forest Department
		ii Revenue Department
		iii Railway Department
		iv Irrigation Department
		v Road Authorities viz. National Highways, State Highways & other Roads
		vi District Authorities
		vii Municipal Corporation
d.	Clients – Gas Suppliers	i Various Oil & Gas exploration companies
		ii Companies importing the oil & gas through ships etc
e.	Gas Consumers – end users	Power Plants, Fertilizer Plants, Commercial & domestic consumers in various Asian countries connected by AGG
f.	External Service Providers	i Consultants
		ii Vendors
		iii Contractors
g.	Internal Service Providers	i Management
		ii Project Team
		iii Operation & Maintenance
		iv Other Employees
h.	Other Stake holders	i Land Owners
		ii NGOs
		iii Commercial Banks
		iv Media
		v Politicians

Table: 10.11 Stakeholders of AGG Project

The stakeholders have their own expectations, demands, degree of influence, participation and criticality on the project. The expectation and demands of each group are to be identified and interfaced for achieving the project objectives.

The expectations and demand of each of the interested groups are as under:

### **1. Board of Directors**

The diverse composition of the Board of Directors ensures that all key stakeholder groups are represented. The Board's expectations are that the project is completed within the approved cost and time frame.

### **2. Government of the Countries**

Each country expects to achieve all-round economic growth by using natural gas for industrial development in power, fertilizer and commercial sectors. Construction of a pipeline system to connect the gas source to the consumers would ensure uninterrupted gas supply. The pipeline system should be designed to protect the environment and natural resources as per the international codes, standards and guidelines.

### **3. Statutory Departments**

The statutory departments expect that their infrastructure facilities like highways, canals, rails, roads, public utilities etc. which fall along the pipeline route are not disturbed during the project construction phase, as these facilities cater to public use. These departments also expect that there is minimal damage to natural reserves like forest, species, flora and fauna, populace etc. The statutory departments demand that the company takes prior clearance/NOC from them, as per their acts/rules.

### **4. Gas Suppliers/Gas Consumers**

The clients expect the company to complete the project to supply/evacuate the gas as per planned schedule. In order to fulfill the expectation, they demand that the company should sign the contractual agreements and commission the project as per contractual schedule without any Take-or-Pay or Supply-or-Pay liability.

### **5. External Service Providers**

External service providers expect that the project should associate them as partners in the design and execution of the project. This would help them to

promote their brand image globally. In order to fulfill their expectations, they demand that the company should follow a transparent system and procedure for awarding the work and procurement packages required for the construction of the pipeline project. At the same time, they also demand that the company strictly follows all contractual obligations detailed in the various contracts.

## **6. Internal Service Providers**

The internal service provider expects the pipeline system to be designed and constructed as per international standards fulfilling quality, operational and safety requirements in line with the laid down systems, thereby increasing the gas sales turnover and brand image. The project team expects to learn new technological development in pipeline construction, promotion to higher grade, appreciation, empowerment, team work and association in future projects.

## **7. Other Stake Holders**

The land owners and NGOs who were directly affected by the project expect the company to provide compensation towards the acquisition of their land and damage caused, if any, during project construction stage. The commercial banks expect the company to finance money from them for project execution and also with associate them for commercial transactions. The media expects the company to share the project achievements with them so that the public is made aware of the progress of the project. The politicians hope that the public money and resources which had been invested in the project by company is optimally utilized in the interest of the country.

## **10.12 QUALITY ASSURANCE**

For a project where it is necessary to control time and cost, the third dimension of "Quality" also needs attention. Rather, it is this which needs more attention, as bad quality of work may lead to redoing the work, thus causing time and cost over run. Therefore all companies have quality assurance departments. They either check the quality themselves or get it outsourced. In some companies, as part of implementing the Quality Policy, the company has a *Third Party Quality Surveillance Agency*. This will be in addition to the Project Management Consultant for ensuring quality of its projects.

The objective of appointing Third Party Surveillance Agency is:

- Total conformation to the specifications, procedures, quality plans etc. for various activities during the pipeline construction
- Compliance to safe engineering practices

- To carry out technical audits, if required
- To strengthen the feed forward and feedback control mechanism
- Adherence to high quality management standards
- To apprise regarding the best engineering practices followed by similar companies across the globe

The sole objective of the Quality Surveillance Agency is to assist in continual improvement of the overall efficiency and the effectiveness of the project execution system in-line with the approved procedures, specifications and standards.

Generally the Quality Surveillance process involves the following parties

**1. 1<sup>st</sup> Party (Contractor)**

The 1<sup>st</sup> party is the contractor who is primarily responsible for timely execution of the project in line with the requirement of work-order/purchase-order with acceptance level of agreed quality parameters.

**2. 2<sup>nd</sup> Party (Project Management Consultant i.e. PMC)**

The 2<sup>nd</sup> party is the Project Management Consultant (PMC) who is primarily responsible for timely execution of the project in line with the requirement of work-order/purchase-order with acceptance level of agreed quality parameters. The PMC prepares all the project completion schedules at the macro/micro level in accordance with the client's requirement. While preparing the project schedules at the micro-level, they should not be unrealistic in nature so that all the project activities are completed with agreed quality parameters.

**3. 3<sup>rd</sup> Party (Quality Surveillance Agency i.e. QSA)**

The 3<sup>rd</sup> party is the quality surveillance agency who is primarily responsible for highlighting the shortcomings mainly related to quality in line with the requirement of work-order/purchase-order issued to the various contractors. The agency has to work in a pro-active manner so that any shortcomings in the system can be either recorded or visualized in advance and thereby timely corrective/preventive action can be taken.

## **10.13 RISK MANAGEMENT**

### **Anticipating Risks**

This is the most important aspect of management for the project as well as for construction. For AGG project to be successful, it is necessary to anticipate

risks in advance. It is pertinent on the part of the Project manager/construction manager to visualize the whole project and look for anticipated pitfalls which may require corrective action. Project manager is required to anticipate such risk activities in advance so that corrective actions can be taken. He should also have adequate information from different resources i.e. he should have his own intelligence system so that one should assimilate different views and take corrective action.

### Risk Monitoring

Risk management comprises reviewing, suitable updates, reporting risks and implementing mitigation plans to reduce the propensity of the occurrence of risks in projects. The various risks anticipated in project execution are required to be identified and can be listed in the form of a register. The risks are classified as shown in Exhibit 10.14.

- Each risk can be assigned an “impact” value either High, Medium or Low
- For each risk, its likelihood of occurrence can be assigned with a “probability” of High, Medium or Low.

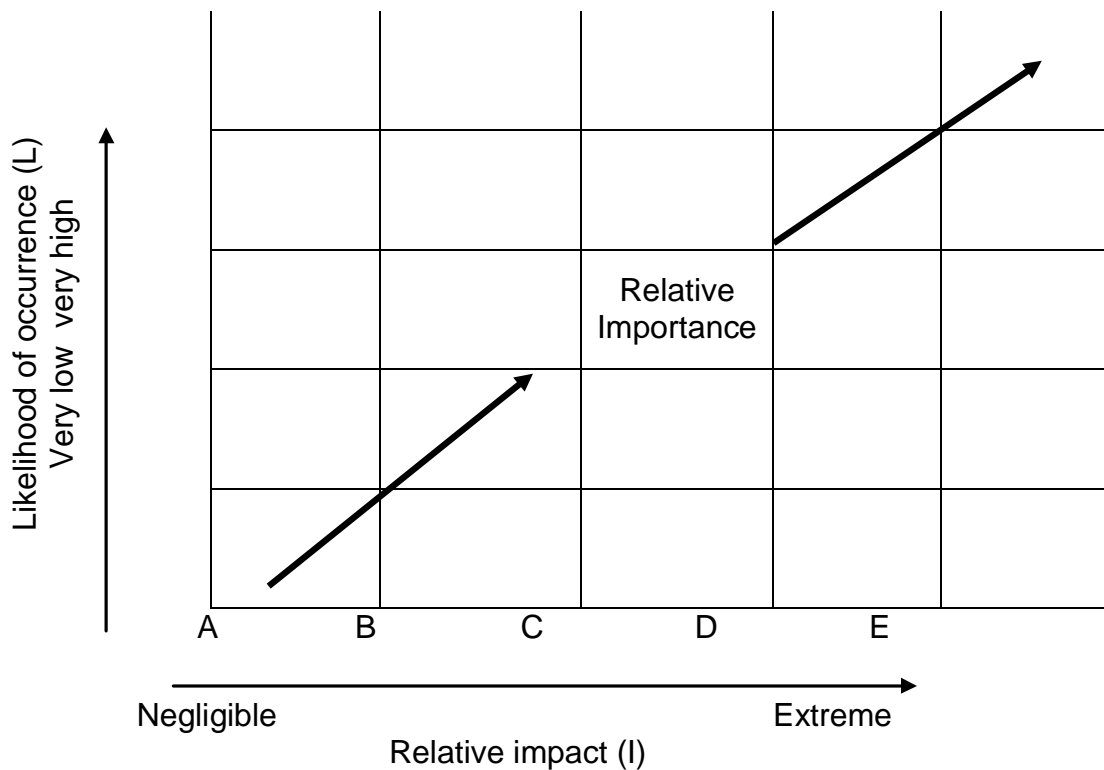


Exhibit: 10.14 Classification of Risk

Based on the above two factors, all the risks can be categorized from very high risks to very low risks.

Risks associated with AGG project can be divided into following categories depending on the phase of the project in which it is likely to occur:

- 1) Risks during Pre –Project stage
- 2) Risks during Project Execution
- 3) Post- Project Risks

Further these risks may be related to geographical, political, commercial, technical, construction, financing and operational factors. The risk matrix along with proposed mitigation measures are presented in Tables 10.12, Table 10.13 and Table 10.14.

<b>Risk Description</b>	<b>Impact</b>	<b>Probability</b>	<b>Risk Mitigation Measures</b>
The pipeline will traverse through geographical diversity in terrains such as plains, rock, marsh, mountains, forest etc. Thus non-optimal pipeline route can result in increased length of pipeline, difficulty in pipeline laying and improper location of suitable input/ offtake points for the gas.	Medium	High	A thorough route study to be done to select optimal pipeline route considering the technical factors of laying pipeline.
AGG is designed based on the quantity of gas estimated in the reserve. Inaccuracy in gas reserve estimation and its authentication may result in gas supply risk in AGG.	High	Low	Gas Reserve to be assessed by the source countries and authenticated by a third party. Periodical validation of estimated reserve is also recommended.
International LNG producers & suppliers may lobby against the AGG project to overcome their business risks	Low	Medium	AGG may be designed in a way to supplement the gas supply already being received through LNG and also in a cost competitive way. LNG can also be a source of gas supply in the project.
Gas Supply countries may form cartel on the factors like gas price, price stability and quantity of supply.	High	High	A transparent system to be developed to arrive at the gas pricing formula and internationally accepted benchmark methods to be adopted. Energy Charter should have qualified negotiators as they will have to negotiate with supply, transit and consumption countries on many issues.

<b>Risk Description</b>	<b>Impact</b>	<b>Probability</b>	<b>Risk Mitigation Measures</b>
Political instability of a country may be risky to the project.	High	Medium	Efforts to be made to bring in stable political regime ruled by a stable government. Provision of suitable guarantee by the government against political risk to the project company.
Relationship of a country with its neighboring countries may be detrimental to the project.	High	Medium	Efforts to be made to bring regional stability/cooperation. Governments should come together for realization of the project on common interests. A Special Purpose Vehicle can be formed in which the countries become members.
Opposition of superpowers like US and Russia to extend blessing for fructification of the project.	High	High	Efforts to improve relations and investment of major powers in the AGG countries. Also make the super powers to have stake in the project.
High transit fees & transportation tariffs that may be demanded by the member countries through which pipeline traverses.	Medium	Medium	Improve better understanding between sellers, buyers and transit countries through regional co-operation. Create a clear and transparent institutional and regulatory framework for gas production, trade and transit, and consumption. Individual governments must also move toward a market-based pricing system and away from practices, such as price intervention and tax distortions, that lead to inefficient pricing.

Table 10.12: Risks during Pre –Project stage

<b>Risk Description</b>	<b>Impact</b>	<b>Probability</b>	<b>Risk Mitigation Measures</b>
Risk of uncontrolled terrorist activities in the vicinity of pipeline route.	High	High	Stat of the art surveillance technology, helicopter patrolling and adequate protection to pipeline facility.
The project is to have "Hybrid Model" of financing i.e financing by respective governments and by private institutes. As huge amount is involved, there is risk of obtaining finance from private institutions.	High	High	Adequate risk protection coverage to be provided to the private lenders. Create a clear and stable investment regime that attracts private (domestic or foreign) investment
Being highly capital intensive project, there is risk of availability of low cost funds for the project.	Medium	Medium	Developing energy policy favorable to gas development and that reinforces gas market potential. Partnering with the private investors in project financing.
Risk of multiple arbitration cases that may arise, as it involves many contracts/ agreements between the countries, contractors and other related agencies in project.	Low	High	Better understanding between sellers, buyers and transit countries. Implementing flexible contractual terms with provisions for future review. Rules of the game are required to be clearly defined.
Risk of non-availability of the line pipes of required quantity and in time at reasonable cost.	Medium	Low	Capacity/ capability assessment of international steel suppliers and pipe manufacturers can be done prior to award of line pipe contracts.
As pipeline traverses to different countries of diverse climate & geography. Hence there is risk of not applying a standard design throughout the project. Each country may apply their own technical standard.	Medium	Medium	Common technical standards may be centrally regulated through Energy Charter for design and construction, operation and maintenance, safety, etc.
Risk of work stoppage due to non-availability Right of Works to the pipe laying contractor. The land owners/ farmers may resist laying of pipeline and may demand high compensation.	Medium	High	Adequate compensation cost may be included in the project cost. Public hearings may be organized to emphasize the importance of project and



<b>Risk Description</b>	<b>Impact</b>	<b>Probability</b>	<b>Risk Mitigation Measures</b>
			maintain good public relations. The assistance of administrative machinery of respective government can be taken.
As the project involves laying of higher diameter pipeline, there is risk of non-availability of sufficient contractors with required equipment and resources.	Medium	Medium	A Consortium of companies can be formed by which their resources and experience can be pooled for project specific purpose.
Risk of non-availability of funds timely for cash outflow/ payment during project execution, as project financing is to be done by different agencies.	Medium	Low	Timely planning and requisition of funds from the financing agencies.
Risk of slow progress by contractors in pipeline laying works that may necessitate offloading of works from the contractor and get executed through different contractor to meet the time schedule.	Low	Low	Selection of the contractor meeting the specified qualification criteria and project requirement. Stringent penalty clauses for non-performing contractors.

Table 10.13 : Risks during Project Execution

<b>Risk Description</b>	<b>Impact</b>	<b>Probability</b>	<b>Risk Mitigation Measures</b>
Risk of overdraw of gas by a consuming country thereby impacting legitimate share of gas to other countries.	Low	Low	Suitable penalty clauses for overdraw may have to be drawn up in the agreement.
Risk of non-agreement among the countries on the issue of sharing of profits that will be generated during operation of the pipeline.	Medium	High	Create a clear and transparent institutional and regulatory framework for gas production, trade and transit, and consumption. Asian Energy Charter (AEC) to be established which will regulate the financial transactions among the AGG countries.
Sudden stoppage of gas supply by source country due to intervention of a third party country not involved in the project. E.g US could intervene in Iran or Pakistan that would disrupt gas supply.	High	Low	All the countries forming part of AGG to form members of Energy Charter. Fostering better relations with third party country that will ensure uninterrupted pipeline operation.

Risk Description	Impact	Probability	Risk Mitigation Measures
Risk of improper gas balancing and reconciliation, as gas will be taken from different sources and many countries will be using the gas. Gas inflow, consumption and gas outflow are required to match. Any negative gas balance may lead to financial loss to that particular country.	Medium	High	Each country to have points where the custody transfer to the grid will take place. Adequate metering system to be provided. Metering system should be of same type having same accuracy level.
Risk of less pipeline capacity utilization in the initial phase due to gas supply or demand constraints.	Low	High	AGG project can be completed in phases and in synchronization with meeting the supply/demand requirements.
Risk of handling gas leakages/repairs, and disaster management of pipeline failures especially that traverse through densely populated areas.	High	Low	Create an appropriate disaster management plan and adequate contingency measures to meet the eventuality. Clear-cut responsibilities are to be assigned to countries doing Construction, Operation & Maintenance. Round the clock communication, leak detection system and supervisory control system. A good quality control measures during design and construction of pipeline.
Risk of Third party access to the pipeline grid in a particular country.	Low	Low	Construction and operation & maintenance of pipeline can be done by respective country thereby minimizing involvement of third party.

Table 10.14 : Post-Project Risks

## 10.14 PROJECT CLOSURE

### Activities in Project Closure

At this phase of the project, the project of the company has been completed and people who have performed would have been rewarded. The project manager has to perform the duty of project closure, which is as important as project execution. The beginning of the project is always exciting in anticipation, as even though the execution would be tedious it would be challenging. However, the closure is boring and not very interesting.

It has been seen that companies are not very interested in such closeouts because the project had been commissioned, which was the primary objective of the company. Hence close-out gets a back seat. However, closeout is very important for the project group, as it has the following distinct advantages:

- **Documentation of project documents:** Proper documentation of the project helps the group to refer to them in case of post project complications like arbitration, audit etc. In this case the project group has to compile all the documents and correspondence related to the project. Files from the site, PMC are also required to be taken by the project manager. After listing the same in a proper manner, they will have to be sent to document control cell (DCC), which would preserve them. In case of need, the documents can be requisitioned from DCC.
- **Payments:** All payments to the contractor and vendors should be completed. Otherwise, if the project team gets dismantled after commissioning and ownership of the project ends, some payments may remain unattended. Therefore, as a system it should be ensured by the management that all balance payments are made within 3 months of commissioning and all the purchase and work orders are to be closed within the same period.
- **Summary of the project:** This document has all the required details of the project and lessons learnt during the execution. It is a good document to refer to while implementing future projects.
- **Performance evaluation of vendors/contractors/consultants:** This provides a fair idea about the performance of vendors/contractors and even PMC. The company can devise their own format for the evaluation.

### **Project Capitalization**

As soon as the pipeline project is commissioned and is ready for use it is required to be capitalized in the books of accounts. The expenditures incurred in project execution are capital in nature. After commissioning, the project enters into operation phase and it starts generating revenue. When capitalization of the project is done, the actual executed cost of the project needs to be derived including all liabilities. The project manager will also have to issue a commissioning certificate.

### **10.15 FORMULAE FOR SUCCESS IN PROJECT MANAGEMENT OF AGG**

AGG will not be a project for laying 3000 km line in a single country where things can be within control. It is a project involving several countries with diversity in various issues like technical, commercial, legal etc. Such projects

abound in uncertainties and ambiguities. Despite our best efforts it would be difficult to anticipate when and which type of problem would emerge. While everyone wants to take credit in success, it is not the case with failure. In this case a scapegoat would be made of the most insignificant person on the job. But his should not be criteria not to perform. One should always endeavor to do his best for successful completion of the project. Some of the tested formulas are as under:

1. Ownership
2. Common objective of the team
3. Daily planning and action on the common objectives
4. Anticipating problems
5. Capacity to tolerate
6. Negotiating skills
7. Better rapport with cross functional members, PMC, Vendor and contractors
8. Training of project personnel
9. Rigorous follow up with vendors
10. Clearly defined rules and procedure
11. Setting priorities
12. Self -actualization in team members
13. Clear communication at all levels
14. Quality front end planning
15. Right time right material
16. Proper documentation and standardization
17. Right person at the right place
18. Emphasis on development of core competence
19. Effective presentations
20. Problem solving attitude of everyone
21. Prompt action, no procrastination
22. Good data bank
23. Team work
24. Work with a target
25. Improved listening capability
26. Recording lesson learnt and dissemination of the same
27. Ready for improvement and taking corrective action

Project engineers can take advantage of these formulae and achieve success during project execution.

### **Innovation to be Employed in the AGG project**

- Constraint Management
- Pipeline Information Management System (PIMS)
- Standardization of specifications, drawings and Quality Assurance

- Common AGG contract and procurement, work contract procedure
- Web based project reporting system including lesson learnt and FAQs

### **Key Success Factors (KSF)**

The key success factors for AGG would be

- Strong support from respective governments
- Support from World Bank and ADB
- Support from US and Russia
- Experienced contractors
- LNG supplier should inject their surplus gas in this grid
- Private investors should come forward
- Local governments should ensure security during construction and operation phase.