

## CHAPTER – 13

### CONCLUSIONS AND RECOMMENDATIONS

From this research it is concluded that Asian Gas Grid covering Kazakhstan, Uzbekistan, Turkmenistan, Afghanistan, Iran, Pakistan, India, Bangladesh, Myanmar, China will have the following features:

1. Optimum Length of AGG: 13825 km.
2. Diameter of pipeline : 56"/48"
3. Gas flow through AGG from reserves: 565 MMSCMD
4. Cost of the Project: \$ 44996 Million (approx. Rs 2,25,000 cr @ 1\$=Rs50)
5. Internal rate of Return of the Project :12%
6. Transportation Charges : approximately 1.5 US\$/MMBTU

As per the techno-commercial feasibility study done, the proposed overall AGG Route map is shown in Exhibit 13.1.

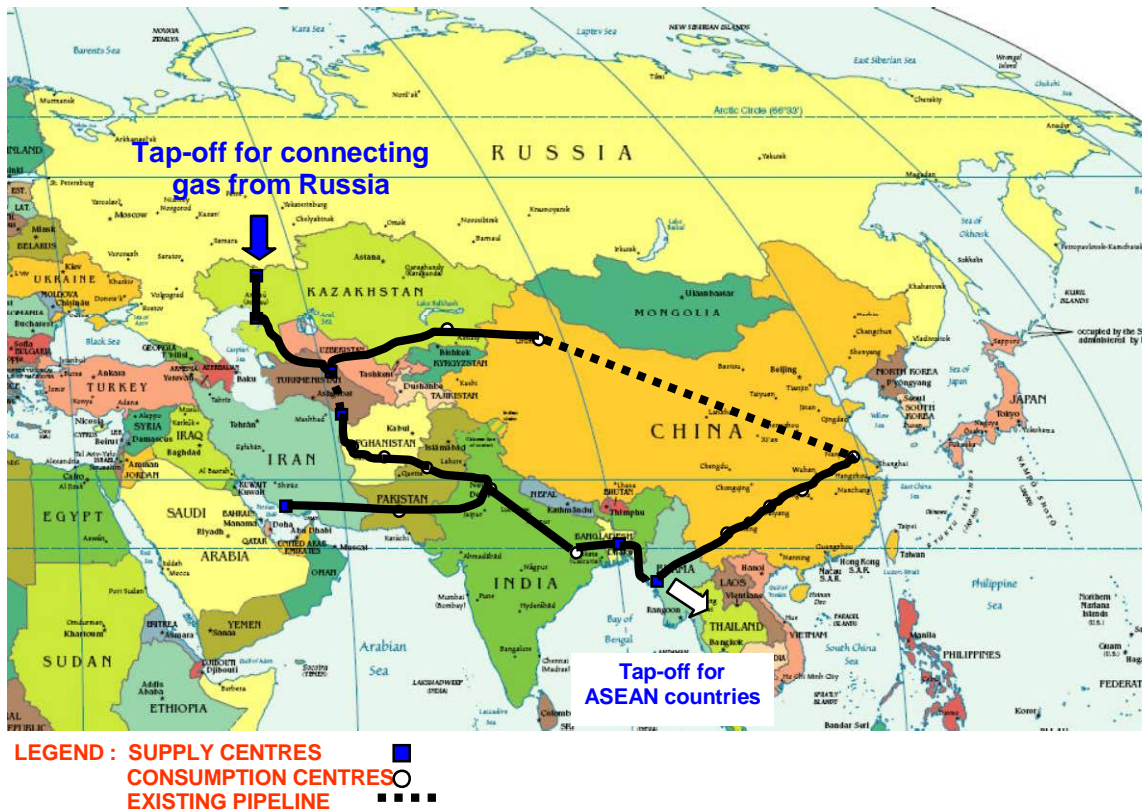


Exhibit 13.1 Overall AGG Route Map

### 13.1 GAS PRICING & REVENUE

Gas pricing will be one of the major issues of negotiation in AGG among supply countries and consuming countries under the regulatory ambit of Energy Charter.

Gas price is calculated based on the following thumb-rule formulae, accepted in the recent gas market:

Gas Cost (US\$/MMBTU) = 13% of JCC (In \$/barrel), where JCC refers to Japanese Crude Cocktail, taken as US\$ 60 per barrel

Transit fee is taken as US\$ 0.25/ MMBTU for each transit country in a limb, based on figures ranging from 0.15 to 0.40 prevailing in recent talks on IPI pipeline.

Gas price, transportation charges and transit fees are tabulated in Table 13.1.

Limb	Gas Cost (A)	Transit Fees (B)	Transport Charges (C )	Total Cost (A+B+C)	IRR on Investment	Viability
	USD/MMBTU	USD/MMBTU	USD/MMBTU	USD/MMBTU	%	Yes
Iran Pakistan India	7.8	0.25	1.14	9.19	12	Yes
Turkmenistan Afghanistan Pakistan India	7.8	0.5	0.905	9.205	12	Yes
Turkmenistan Link Pipeline		0.25	0.25		12	Yes
Kazakhstan Uzbekistan China	7.8	0.5	1.47	9.77	12	Yes
India Bangladesh Myanmar	7.8	0.5	1.27	9.57	12	Yes
Myanmar China	7.8	0.25	2.08	10.13	12	Yes

Table 13.1 Gas price, Transportation Charges and Transit fees in AGG

The above gas cost is comparable to the recent LNG prices and hence should be affordable to participating countries, as continuous uninterrupted supply can be ensured through pipelines. The various countries forming part of AGG will

be financially benefited in any or combination of the following factors by investing in the project:

- Revenue from gas sales by export of supply countries
- Revenue from gas transportation
- Revenue from transit fee
- Fulfillment of the energy demands and subsequent economic growth of consuming countries

As discussed in the study on Project Financing and Project Management of AGG, a Special Purpose Vehicle (SPV) is proposed to be formed for each limb. This would look after the purchase of gas from gas supply countries and also carry out the necessary billing from other member countries for gas cost, transportation and transit fees for collection and distribution of revenue.

Based on the estimated gas cost, transportation charges and transit fee, the contributions and revenue for each country in the AGG limbs are as produced in the following Tables 13.2 to 13.5:

## IPI - COUNTRY CONTRIBUTIONS & REVENUE

Total Investment: 8788 million US\$

### Transportation Revenue

	Iran	Pak	India	Total
Gas Qty, MMSCMD	15	60	90	165
Gas Qty, MMSCM/ Annum	4950	19800	29700	54450
Tpt Rate , \$/MMBTU	0.3672	0.725	1.142	
Tpt Rate, M\$/MMSCM	0.0146	0.0288	0.045	
Tpt Revenue, M\$/ Annum	72	570	1346	<b>1988</b>

Country	Length of Limb, km	Project Cost, Million \$	Gas Source	Gas Contribution , MMSCM / Annum	Revenue of Gas Exporting Country, Million \$ / Annum	Consumption, MMSCMD	Transportation Revenue *, Million \$ / Annum	Transit Fee Revenue, Million \$ / Annum
Iran	954	3174	Yes	54450	16854	15	718	
Pakistan	925	3078				60	696	295
India	762	2536				90	574	
<b>Total</b>	<b>2641</b>	<b>8788</b>		<b>54450</b>	<b>16854</b>	<b>165</b>	<b>1988</b>	

Note \*: Transportation revenue is proportionate to project cost

Table 13.2 IPI - Country Contributions & Revenue

## TAPI - COUNTRY CONTRIBUTIONS & REVENUE

Total Investment: 6926 million US\$

### Transportation Revenue

	Afgh	Afgh	Pak	India	Total
Gas Qty, MMSCMD	10	5	35	100	150
Gas Qty, MMSCM/ Annum	3300	1650	11550	33000	49500
Tpt Rate, \$/MMBTU	0.0622	0.3539	0.631	0.9051	
Tpt Rate, M\$/MMSCM	0.0025	0.014	0.025	0.0359	
Tpt Revenue, M\$/ Annum	8.15	23.17	289.3	1185.3	<b>1505.82</b>

Country	Length Of Limb, km	Project Cost, Million \$	Gas Source	Gas Contribution, MMSCM / Annum	Revenue Of Gas Exporting Country, million \$ / annum	Consumption, MMSCMD	Transportation Revenue *, million \$ / annum	Transit Fee Revenue , million \$ / annum
Turkmenistan	100	352	YES	49500	15321	0	76	
Afghanistan	800	2813				15	612	442
Pakistan	670	2356				35	512	327
India	400	1406				100	306	
<b>Total</b>	<b>1970</b>	<b>6926</b>		<b>49500</b>	<b>15321</b>	<b>150</b>	<b>1506</b>	

Note \*: Transportation revenue is proportionate to project cost

Table 13.3 TAPI - Country Contributions & Revenue

## KaUzChi- COUNTRY CONTRIBUTIONS & REVENUE

Total Investment 16682 million US\$

### Transportation Revenue

	Kazak	China	Total
Gas Qty, MMSCMD	20	180	200
Gas Qty, MMSCM/ Annum	6600	59400	66000
Tpt Rate , \$/MMBTU	1.033	0.4322	
Tpt Rate, M\$/MMSCM	0.041	0.0172	
Tpt Revenue, M\$/ Annum	270.55	1018.76	<b>1289</b>

Country	Length of Limb, km	Project Cost, Million \$	Gas Source	Gas Contribution , MMSCM / Annum	Revenue of Gas Exporting Country, million \$ / annum	Consumption , MMSCMD	Transportation Revenue *, million \$ / annum	Transit Fee Revenue, million \$ / annum
Kazakhstan	2069	9836	YES	49500	15321	0	760	
Turkmenistan	390	1854	YES	16500	5107	20	143	655
Uzbekistan	490	2329					180	655
China	560	2662				180	206	
<b>Total</b>	<b>3509</b>	<b>16682</b>		<b>66000</b>	<b>20429</b>	<b>200</b>	<b>1289</b>	

*Note \*: Transportation revenue is proportionate to project cost*

Table 13.4 KaUzChi - Country Contributions & Revenue

## IBMC- COUNTRY CONTRIBUTIONS & REVENUE

Total Investment 11808 million US\$

### Transportation Revenue

	India	China	China	China	Total
Gas Qty, MMSCMD	50	20	10	70	150
Gas Qty, MMSCM/ Annum	16500	6600	3300	23100	49500
Tpt Rate , \$/MMBTU	0.482	1.2787	1.665	2.0817	
Tpt Rate , M\$/MMSCM	0.0191	0.0507	0.066	0.0826	
Tpt Revenue, M\$/ Annum	315.6	334.9	218	1908.2	<b>2776.7</b>

Country	Length Of Limb, km	Project Cost, Million \$	Gas Source	Gas Contribution, MMSCM / Annum	Revenue Of Gas Exporting Country, million \$ / annum	Consumption, MMSCMD	Transportation Revenue *, million \$ / annum	Transit Fee Revenue, million \$ / annum
India	1500	3406				50	801	65
Bangladesh	400	908	Yes	6600	2043		214	65
Myanmar	750	1703	Yes	16500	5107		400	229
China	2550	5790				100	1362	
<b>Total</b>	<b>5200</b>	<b>11808</b>		<b>23100</b>	<b>7150</b>	<b>150</b>	<b>2777</b>	

Note \*: Transportation revenue is proportionate to project cost

Table 13.5 IBMC - Country Contributions & Revenue

It can be seen that the entire gas demand of China can be met through the proposed AGG thereby avoiding costlier alternative viz: shipment through LNG. AGG will also benefit ASEAN countries as Tap-offs can be given to them in Myanmar. Meeting the gas demand of major gas deficit Asian countries from proposed AGG is as shown in Table 13.6 below.

Country	Projected Gas Deficit By 2025 (MMSCMD)	Gas Supply from AGG (MMSCMD)
China	217	280
India	194	140
Pakistan	42	95

Table 13.6 Meeting Gas Demand of Major deficit countries

AGG is a very costly project; therefore it needs to be executed in phases. As such, work on IPI, TAPI and Myanmar-China and West-East line of China is already in progress. Efforts have to be made to interconnect these lines by executing other limbs so that AGG is complete.

AGG will be beneficial to all the participating countries and will have the following tangible benefits:

- Energy security to all countries
- Gas sales revenue for supply countries
- Huge amounts of earnings on account of transit fee to transit countries
- Economical development in all countries, increase in GDP
- Fostering of better relationship among countries due to mutual dependence
- Increase in mutual trade among countries
- Parallel to AGG, countries may lay optical fiber for communication
- Countries may establish power plants en-route and connect all the power plants through a power grid, which may give rise to development of Asian Power Grid

### **13.2 FUTURE SCOPE OF STUDY**

The AGG can also be connected at Kazakhstan from various gas fields of Russia. The Western Siberian gas source can be connected directly to East-West Pipeline of China.

The ASEAN countries namely Thailand, Indonesia, Malaysia, Singapore can be connected to the AGG at Myanmar. This limb can have the provision for bi-directional flow to supply gas as well as take gas from gas rich countries like Malaysia and Indonesia.

In case of non-realization of IPI project, gas to India can be obtained from the Dolphin Project, where Iran's gas is supplied to Oman and a sub-sea pipeline can be laid from Oman to India. The offshore pipeline technology has advanced tremendously and hence laying the sub-sea pipeline may be feasible.

In case of deficit of gas for TAPI line, additional option of gas sources can be



1. Caspian field in Kazakhstan
2. Daulatabad field of Iran

### 13.3 VISION 2025: GREEN (GLOBAL) GAS GRID (GGG)

Energy will become a binding force among all the countries in the future, and it will foster good relationships amongst each other. The need will be to transfer energy from supply country to demand country. In lieu of this, the countries will have formal agreements which will bind them. Payment may be in the form of money or services as prevalent in primitive ages when barter trade was in vogue.

It is my Ultimate Vision that by 2025 all countries of Asia and Europe would be connected by a grid and even connectivity to American countries would be made possible. This would give rise to “Global Gas Grid (GGG)” – A journey from AGG to GGG.

This vision can be visualized as shown in the following Exhibit 13.2.

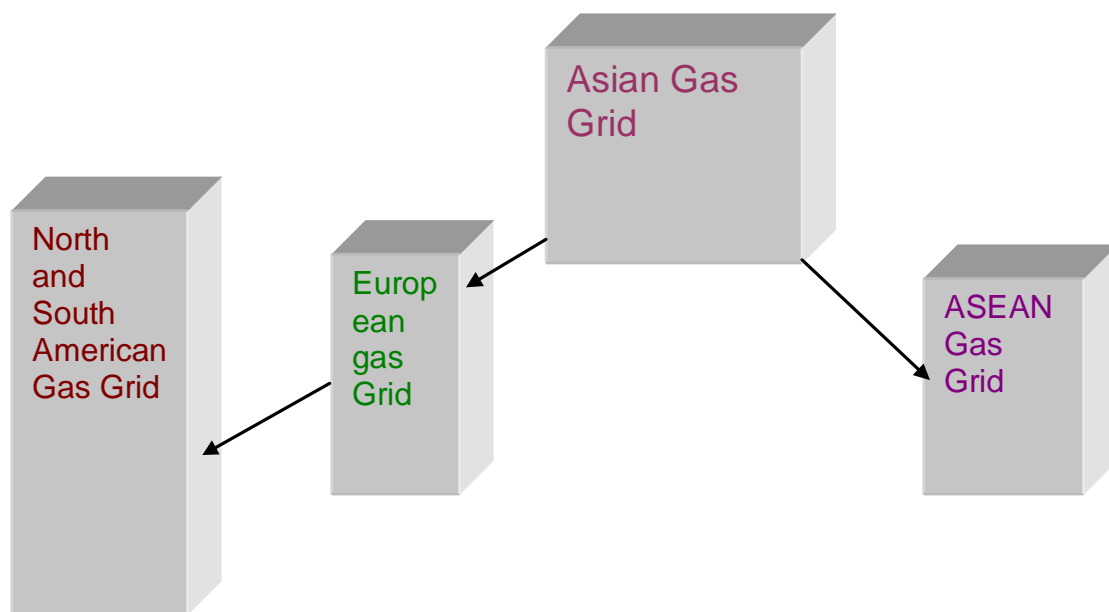


Exhibit 13.2 Global Gas Grid (GGG)

**Today, it seems to be a dream, but tomorrow it can be reality.**