Transport infrastructure in South Gobi

Workshop on infrastructure PPPs in South Gobi

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The World Bank
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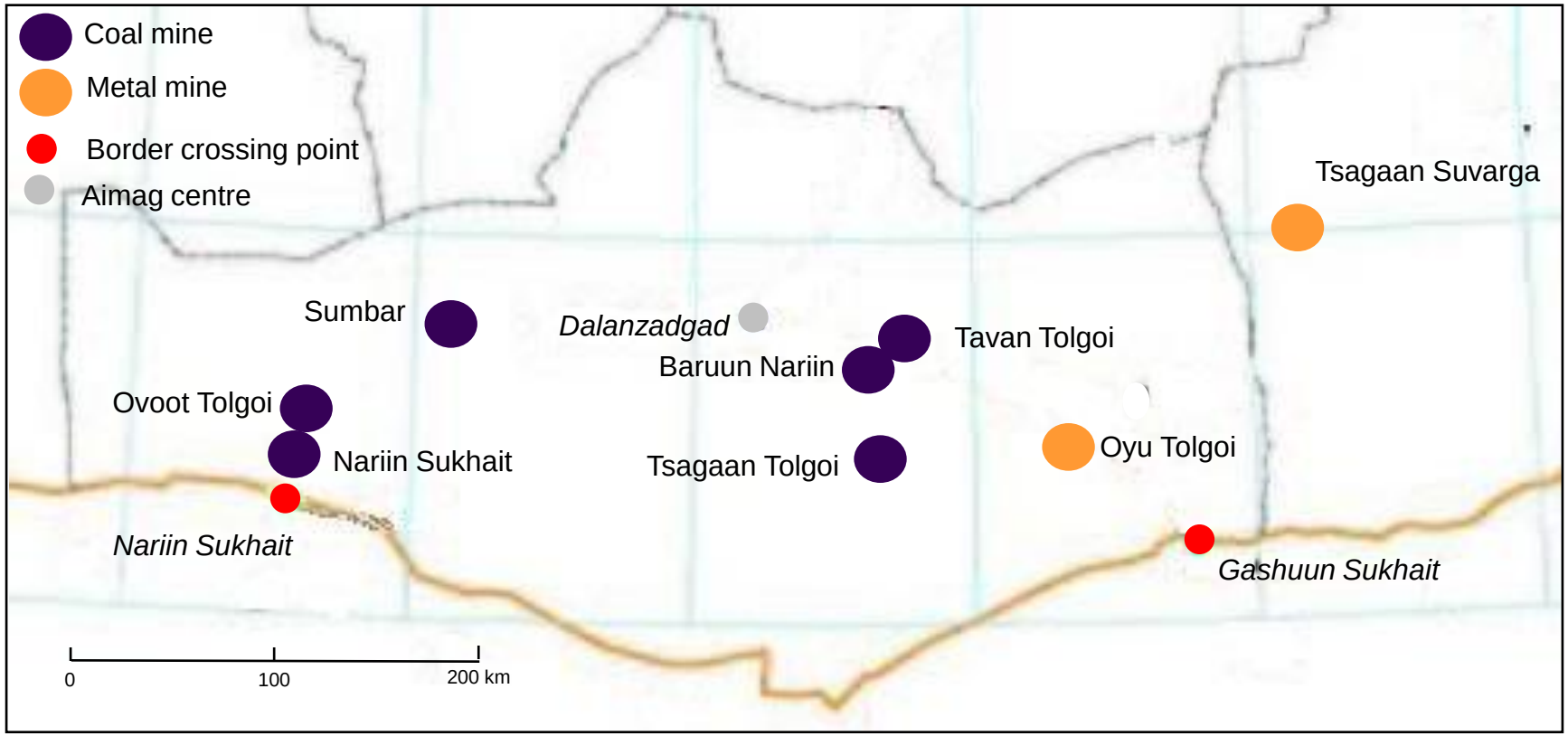
Contents

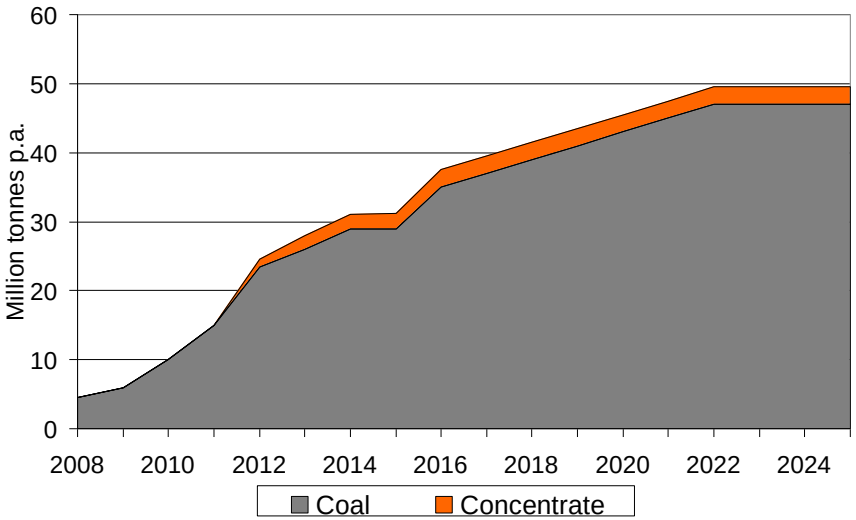
Several potential projects which will generate large volumes of minerals have been identified in or near South Gobi



Excludes mines which produce small physical quantities of output, such as gold

Several of these projects will come on-stream in the near future

Mine	Mineral	Life (years)	Production (mtpa)	Full production		
				Pre-2008	2009-2013	2014 on
Tavan Tolgoi	Coal	100+	15		●	
Nariin Sukhait	Coal	40	2	●		
Ovoot Tolgoi	Coal	50	5		●	
Sumbar	Coal	50	5			●
Baruun Naran	Coal	20	6		●	
Tsagaan Tolgoi	Coal	20	2		●	
Oyu Tolgoi	Copper	15-50	1		●	
Tsagaan Suvraga	Copper	30	0.15			●



Note: Copper production is in tonnes of metal. It is likely to be transported as concentrates, which are typically 30% copper

Coal and mineral exports from the region are likely to be over 25 million tonnes by 2015 and double that by 2025

Passenger volumes and the demand for mining supplies and general freight will be limited

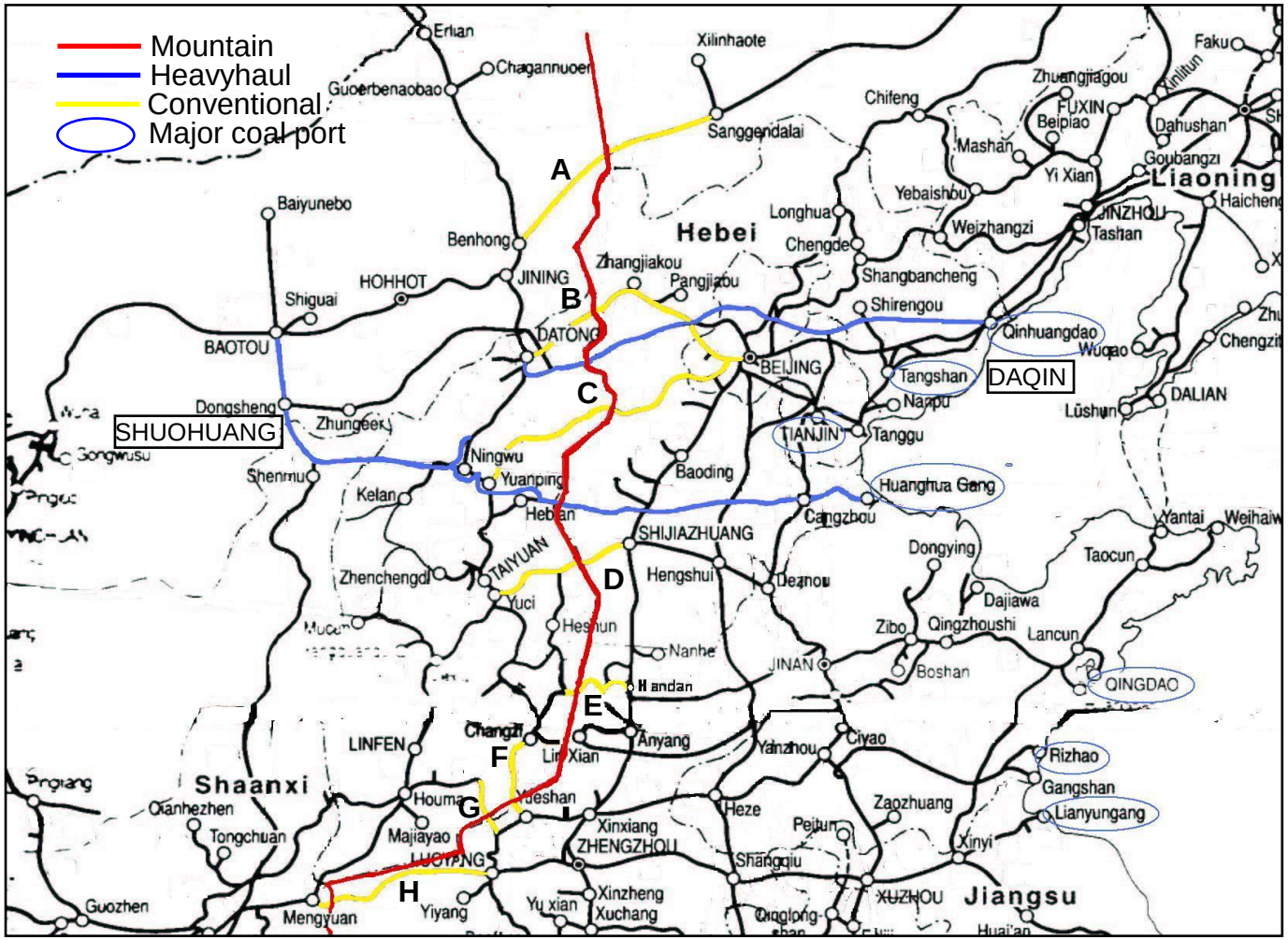
- Mining supplies, other than fuel, are generally transported by road as mixed loads and are typically no more than 5-10% of the output volume, unless there is a smelter attached to the mine

- Passenger demand for travel by public transport to and from Ulaan Baatar is unlikely to exceed 200-300,000 trips p.a. (i.e. 2-3 per person living in the aimag); this only requires around ten bus trips daily for the aimag as a whole.
  - and by road the distance is about half that by rail unless a direct link to UB is constructed

- General freight in such situations is typically about 0.5-1 tonnes/head p.a.. This can be easily handled by 10 – 20 trucks per day (or by a general freight train once or twice a week)

While all these traffics may use a railway to some extent if one is built, none is large enough to justify construction of a line unless there is other traffic

The key network constraint for CR is west-east movement through the mountains

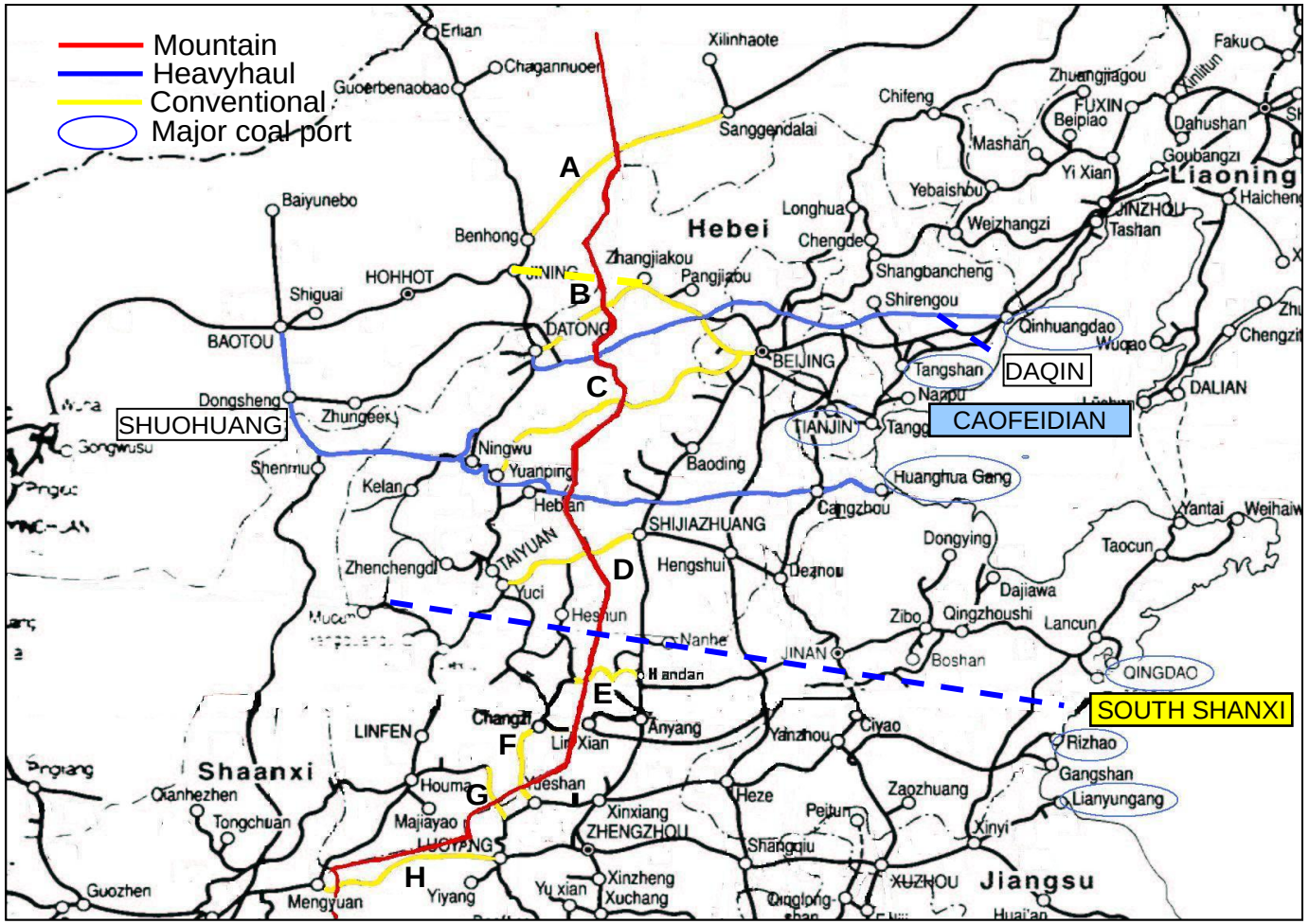


2005 rail and port capacities and throughput

Line		Capacity (mtpa)		Traffic (mtpa)
		Freight	Coal	
A	Jitong	19	12	5
B	Fengshada	68	43	38
	Daqin	200	200	202
C	Jingyuan	22	16	14
	Huanghua	130	130	94
D	Shitai	75	50	68
E	Hanzhan	30	18	5
F	Taijiao	50	39	40
G	Houyue	100	65	52
H	Longhai	50	19	9
	Ningxi/Xikan	43	17	8
	Total	787	609	535

Port	Coal (mtpa)	
	Capacity	Traffic
Qinhuangdao	137	145
Tangshan	30	14
Tianjin	73	80
Huanghua	75	67
Qingdao	23	9
Rizhao	25	20
Lianyungang	22	15
Total	385	350

Development plans for the CR coal network include new lines, electrification, duplication and a new port



Line		Coal capacity (mtpa)		Project
		Medium-term	Long-term	
A	Jitong	16	20	E
B	Fengshada	63	100	New
	Daqin	400	400	
C	Jingyuan	21	21	
	Huanghua	200	300	C
D	Shitai	67	100	PDL
	South Shanxi		200	New
E	Hanzhan	49	100	DE
F	Taijiao	71	100	E
G	Houyue	65	80	C
H	Longhai	38	100	PDL
	Ningxi/Xikan	48	120	D
	Total	1038	1641	

E Electrification
C Capacity increase
PDL Passenger-dedicated line
D Duplication
New New line construction

Port	Coal capacity (mtpa)	
	Medium-term	Long-term
Qinhuangdao	187	200
Tangshan	110	200
Tianjin	100	100
Huanghua	110	200
Qingdao	23	25
Rizhao	35	80
Lianyungang	40	50
Total	605	855

Source: MTLDP, 11FYP and consultant estimates

Other CR network development plans include new feeder lines to the Mongolian border

BY 2020 (IN ORIGINAL MLTP)
BY 2020 (IN REVISEDMLTP)
LONGER-TERM (IN REVISED MLTP)
ELECTRIFICATION

The cost of carriage from the border to Chinese ports is $20-25/tonne

Indicative rates (assuming CR wagons)

Rmb 161/tonne ($US 23.50) from Gashuun Sukhait to Huanghua via Baotou and Shuohuang

Rmb 170/tonne ($US 24.80) from Gashuun Sukhait to Qinhuangdao via Daqin

Rmb 123/tonne ($US 18) from Erlian to Qinghuangdao via Jining and Daqin

Tariffs for private wagons would need to be negotiated.

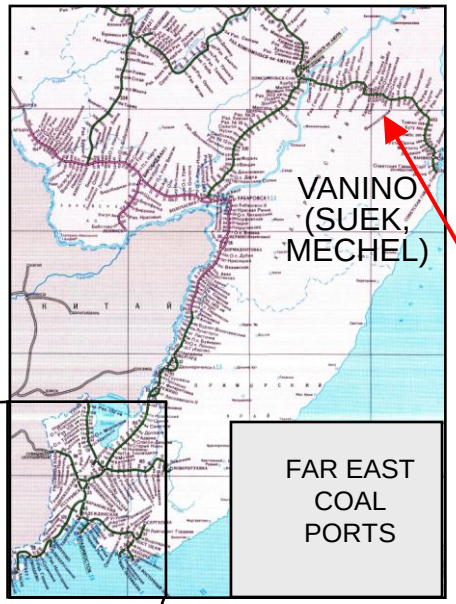
Tariff structure

- On MOR lines coal is either Class 4 (unwashed) or Class 5 (washed). The tariff has two elements:
  - a flagfall per tonne (Rmb 9.30 for Class 4 and Rmb 10.20 for Class 5)
  - a rate per tonne-kilometre (Rmb 0.434 for Class 4 and Rmb .0491 for Class 5)
  - and two surcharges:

    a 'Railway Construction Fund surcharge' (currently .033 per ntkm i.e. Rmb 66 for 2000 km)

    .an 'electrification surcharge' of Rmb .012 per ntkm charged for electrified lines.
- Tariffs on joint venture and ‘local’ lines are generally set locally on a cost-recovery basis, so may easily be two or three times those on the national network (but without any surcharges):
  - the Shouhuang tariffs have maxima ranging from 12 fen/ntkm to 18 fen/ntkm
- The Daqin line also has a tariff set to recover the capital cost of construction (Rmb 0.12/ntkm average in 2007).

The rail network in Far East Russia has no major capacity problems but port access may be a problem



RAIL ROUTES

- Coal to the new Vanino terminal will probably use the BAM
  - but the planned volume will need a tunnel on the branch upgraded at Kuznetsovsky
- Other coal exports use the TSR
  - it is understood there is ample capacity on this route

PORTS AND TERMINALS

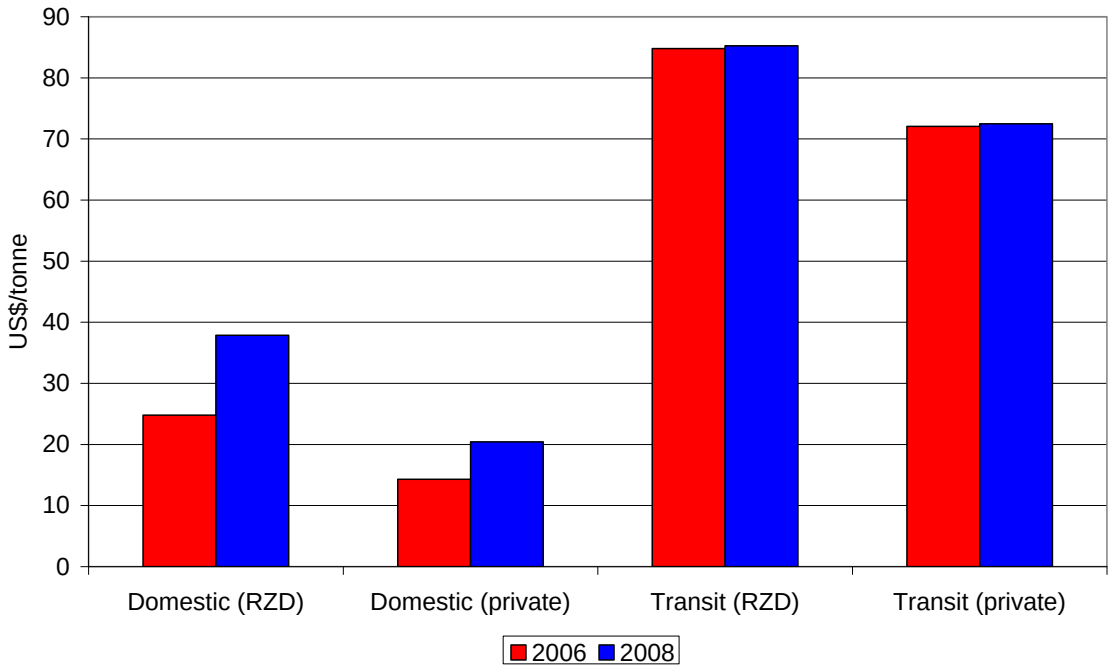
Almost all coal export capacity in the Far East is through either private terminals or ports owned by affiliates of coal miners

	Terminal owner	Mtpa		
		2007 volume	Planned capacity	
Vostochnoy	Krutrade	15.6		Phase III
Vanino	SUEK	0.4	12	2009
	Mechel		15	2012
Posyet	Mechel	1.6	10	Replaced ?
Nakhodka		0.1		
Sukhodal	Sibuglemet	-	8	On hold
Total		17.7		

RZhD tariffs for transit coal are comparatively high

Two key features of RZhD tariffs

- third-party operators can provide wagons and (more rarely) locomotives
  - but they pay commodity-based rates with discounts, NOT flat access rates
  - and the return of the empty wagons also has to be paid for
- Different tariffs for domestic traffic and transit traffic
  - and major producers also have special rates

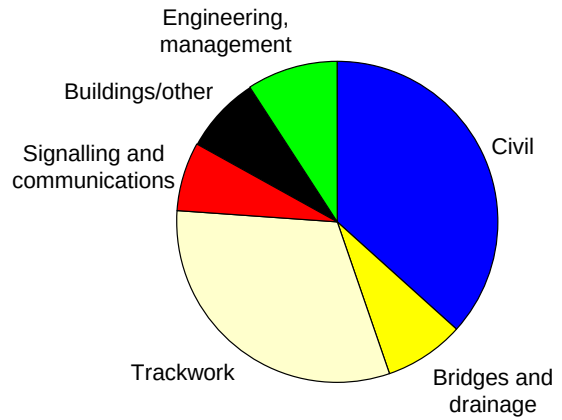


Tariff Naushki – Vostochnoy

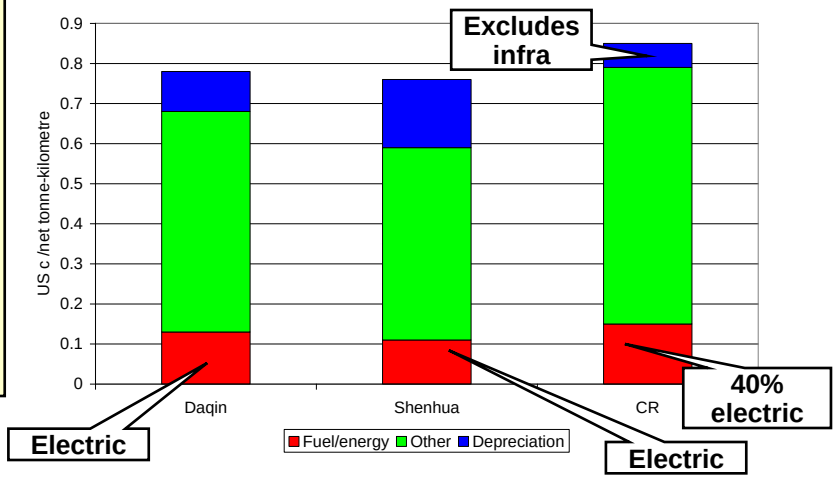
- 4047 km
- Universal gondola (60 tonne/wagon)
- Coal code 161202
- Tariffs from Solievski (3483 km) are 10% less for transit
- Tariffs to Vanino (3872 km ex Naushki and 3308 km ex Solievski) are 3% less

The route analysis used the following assumptions

- **Construction cost**
  - **23 kg/rail, concrete sleepers, single-track diesel operation, 10 km sections, 0.9% ruling grade**
  - **estimated cost $1.8 - 2 million/km, excluding loading facilities etc but this could be higher in hilly terrain**
- **Operating cost**
  - **1.2 c/ntkm including annualised rollingstock costs, based on current Daqin, Shenhua and CR operating cost,**
  - **of this, 0.5c/ntkm is for fuel (assumed 2.8 l/000 gtkm at $1/litre and gtkm:ntkm of 1.7)**
- **Discount rate**
  - **A commercial discount rate of 10% has been used for the route options**

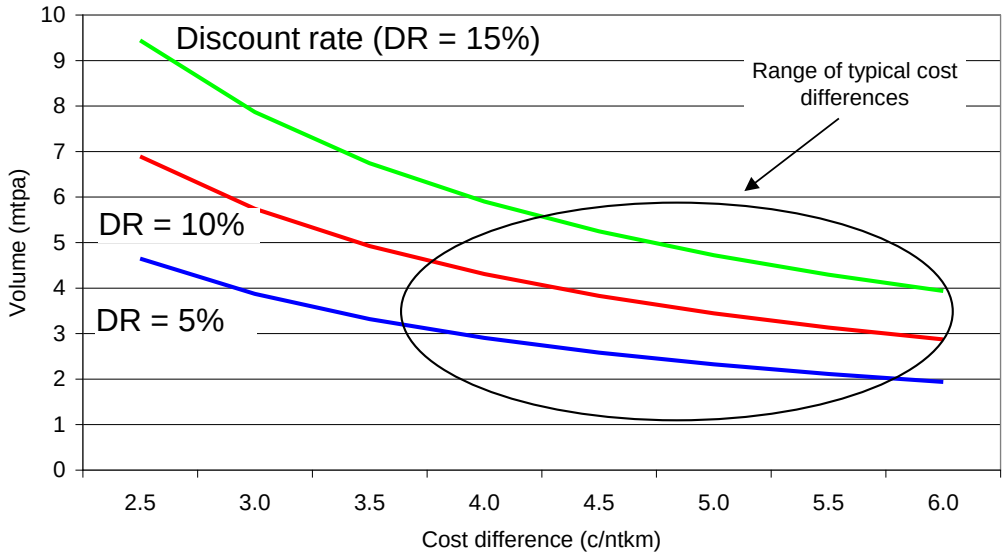


Rail operating costs 2007 (c/ntkm)



Mines will typically wish to build a railway when output reaches 5 million tonnes p.a.

42 tonnes tare
102 tonnes net
147 tonnes GCM
9.2 tonnes/axle



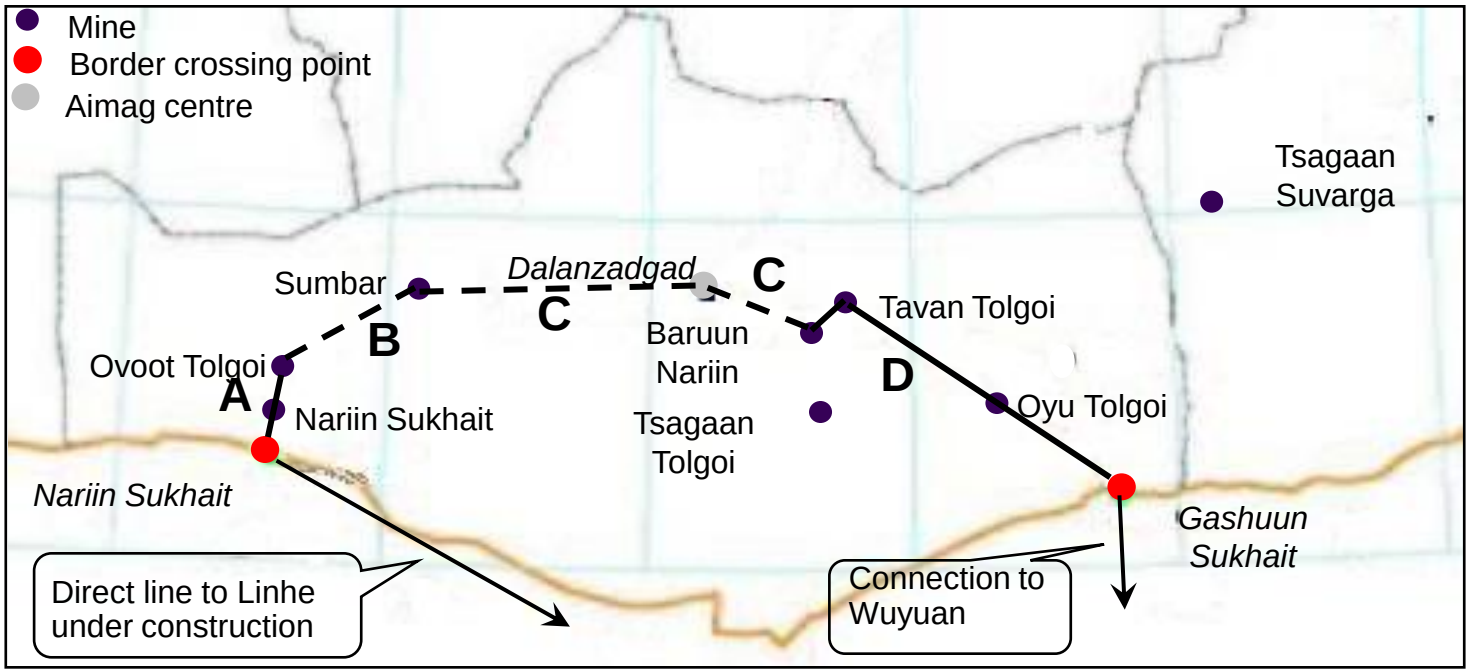
- Road costs depend on length of haul, road condition, terminal arrangements etc
  - but examples for 100 km shuttle runs are 4 – 7 c/ntkm (China) and 9c/ntkm in South Africa
- Breakeven tonnages can be calculated in terms of the difference in rail and road operating cost
  - But depend on the commercial discount rate used

South Gobi developments and rail connections

Mine	Output (mtpa)	Rail connection
Tavan Tolgoi	15000	Yes
Nariin Sukhait	2000	Unlikely(1)
Ovoot Tolgoi	5000	Probable
Sumbar	5000	Probable
Baruun Naran	6000	Probable
Tsagaan Tolgoi	2000	Unlikely
Oyu Tolgoi	2000	Unlikely(1)
Tsagaan Suvraga	500	No

(1) But rail connection will be justified in combination with adjacent developments

Ovoot Tolgoi – Tavan Tolgoi is only required for exports via Russia – for at least the medium - term



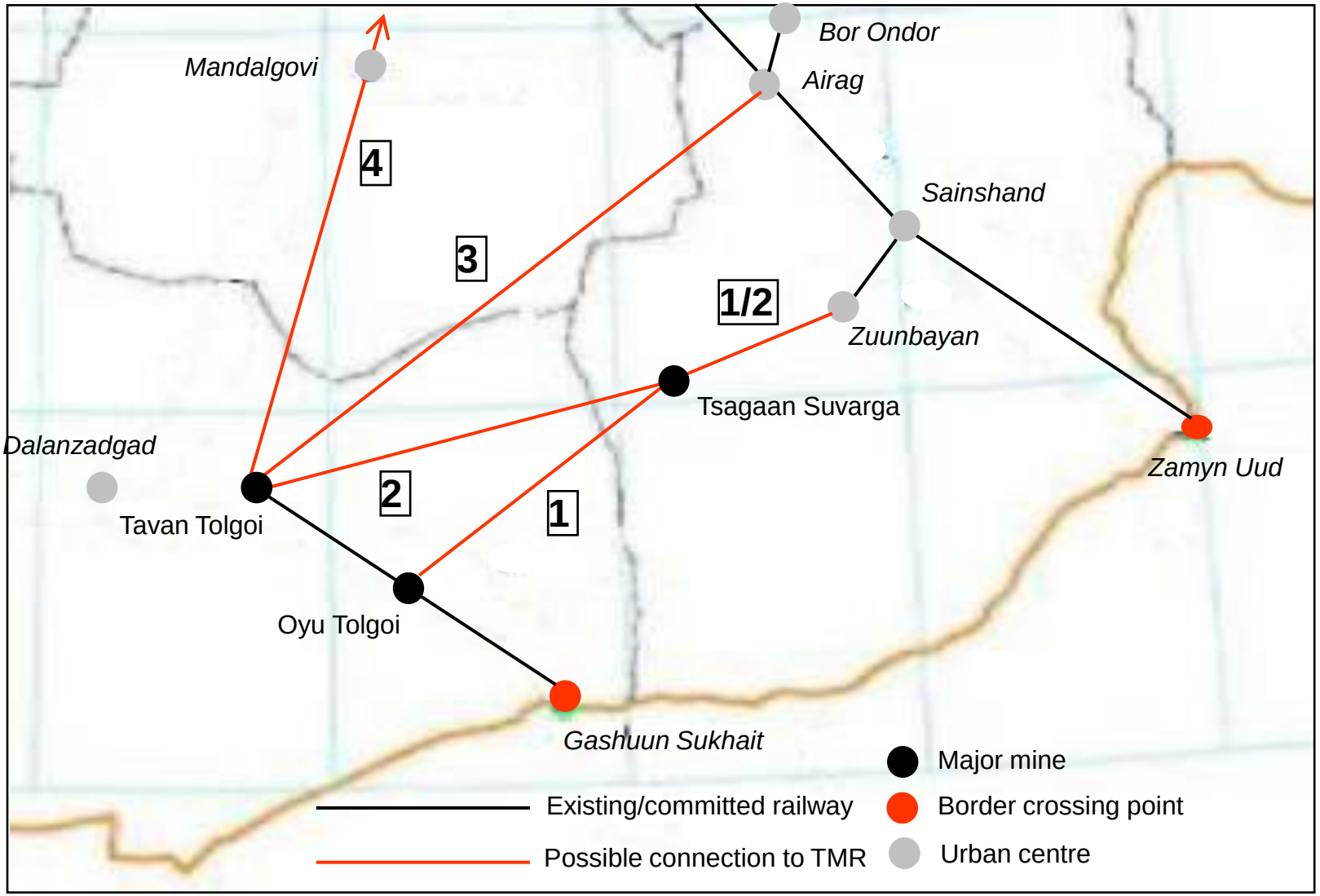
A – will probably be constructed when output from Ovoot Tolgoi and Nariin Sukhait reaches 4-5 million tonnes p.a.

B – will probably be constructed in the medium/long-term as Sumbar is developed to complement Ovoot Tolgoi

C – connects Dalzangadbad and Sumbar/Ovoot Tolgoi to Line D but to nowhere else unless a TMR connection is built. Sumbar can access the China network just as easily through Lines A and B) and the only reason to ship product on line C would be to access the TMR and Russia

D – will be constructed as soon as Tavan Tolgoi production ramps up

There are four options for connecting to the TMR



OPTIONS

1 – Oyu Tolgoi – Sainshand – uses Zuunbayan branch and also serves Tsagaan Suvarga

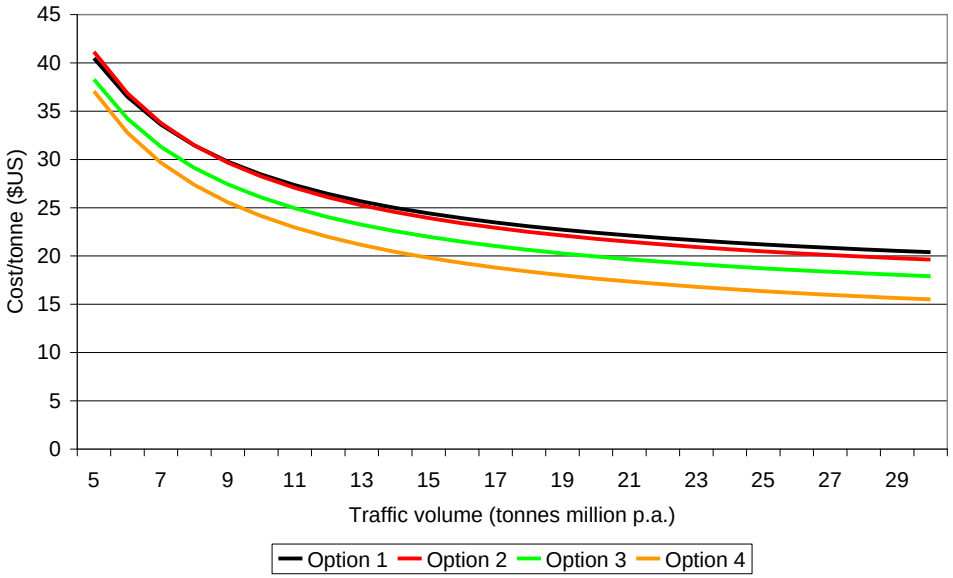
2 – Tavan Tolgoi – Tsagaan Suvarga – Zuunbayan – Sainshand (shorter route for largest mine)

3 – Tavan Tolgoi – Airag (shortest route to TMR for largest mine). Also Phase 1 of Option 5 to Choibalsan

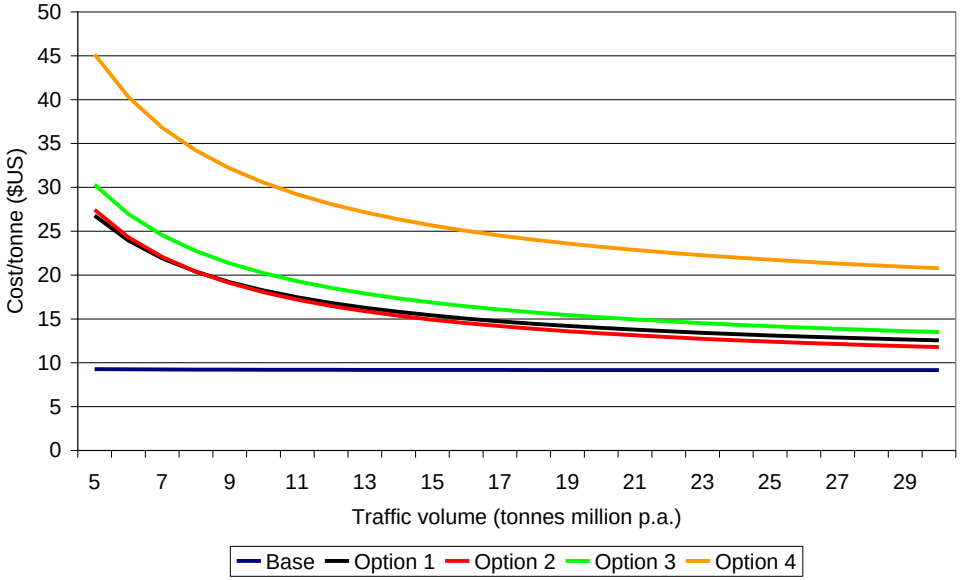
4 – Tavan Tolgoi – Mandalgovi – Ulaan Baatar (shortest route to Russia)

ALL ROUTES TO BE RUSSIAN GAUGE

Ulaanbaatar (Option 4) is the best option for northbound flows and the direct Sainshand route (Option 2) is generally the best for southbound flows



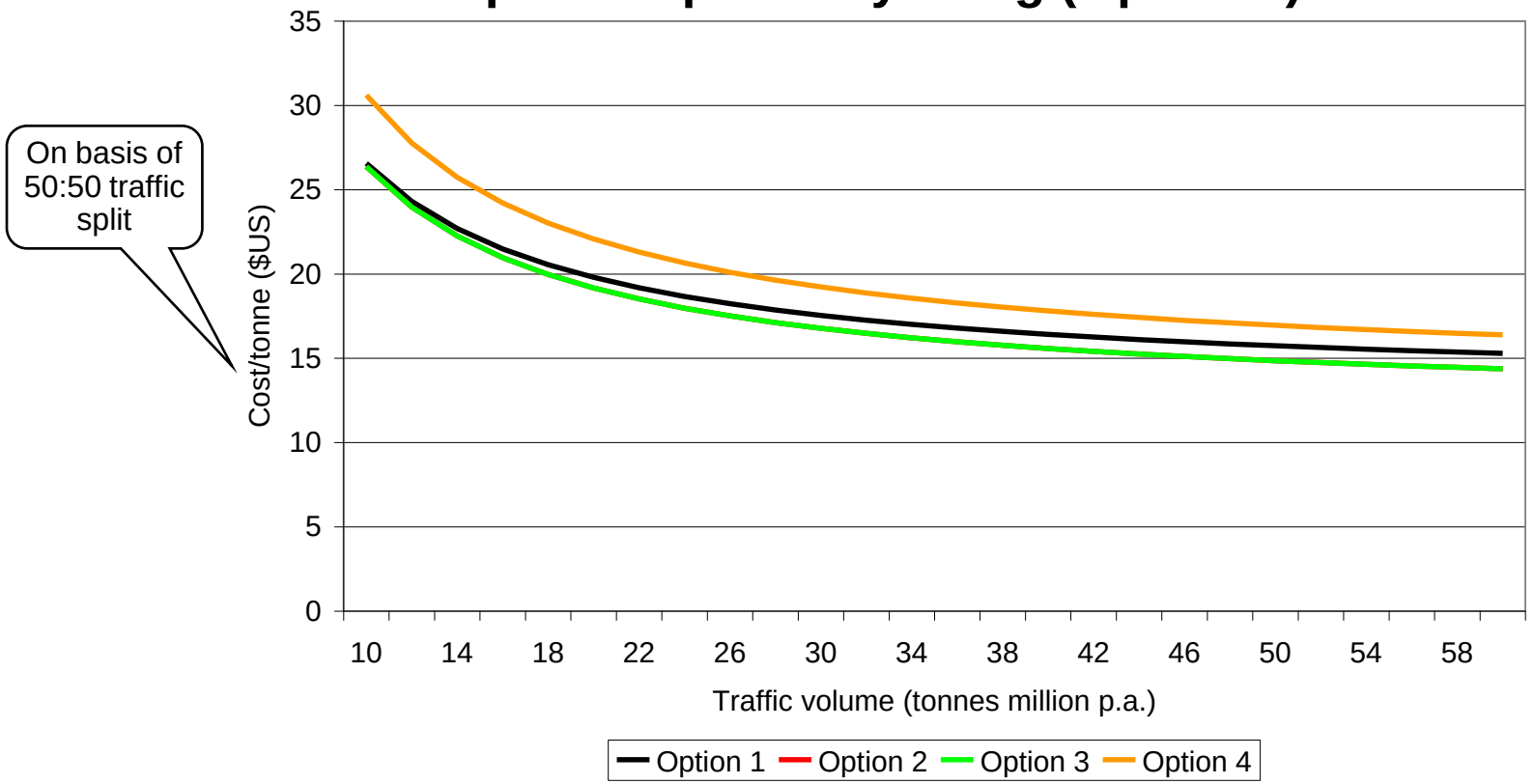
Northbound traffic



Southbound traffic

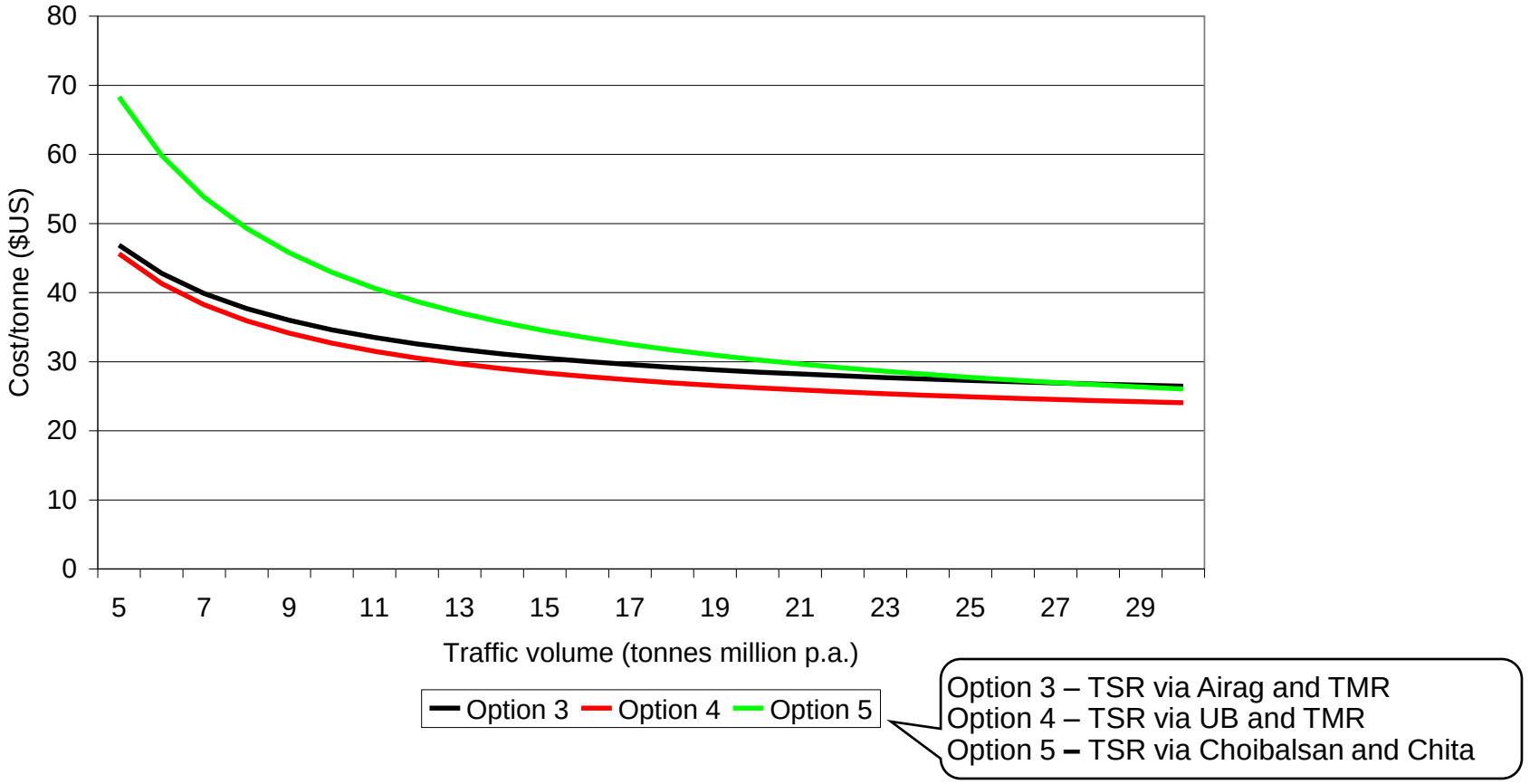
But Gashuun Sukhait remains better than any route via TMR for southbound flows – by nearly $20/tonne for flows up to 10 million tonnes p.a. – as the construction cost is sunk

The best all-round option is probably Airag (Option 3)



If traffic splits 50:50 northbound and southbound then Options 2 and 3 are the best
But Option 3 is never more than $2 worse than the optimum choice for volumes over 10 million tonnes whereas Option 2 is sometimes the best but can also be up to $4 worse

The Choibalsan route is a long-term option at best



- Option 5 is a shorter distance to Vostochny than Option 4 – but only just (about 40 km)
- It would probably be used if it was available
- But the operating cost savings are so small that, even at 30 million tonnes, Option 4 (via Ulaanbaatar) is still cheaper overall

The choice of gauge is straightforward on the basis of operational considerations

- Transhipment is a relatively simple operation (see Dostyk transfer – 6 million tonnes in 2007)
- However, it is better avoided if possible as rollingstock utilisation is reduced and imbalances are a recurring problem
- As the cross-border routes will almost exclusively handle traffic to China, they should be standard-gauge
- The other routes will all connect with the Russian-gauge TMR at some point; gauge transfer can be minimised by providing major sources such as Tavan Tolgoi with two gauges.
- Broad-gauge traffic from other origins can either be transported by road or transhipped at, for example, Tavan Tolgoi.
- Transhipment cost will depend on circumstances but $1/tonne is probably reasonable for bulk traffics

Main forms of PPP for new railway projects…..

	Finance & build rail line	Operate & maintain rail line	Finance & maintain trains	Operate train services
Train availability contract	Public	Public	Private	Public/private (hire payments to private)
Train operating concession	Public	Public	Private	Private (pay access charges to public)
Infrastructure build concession	Private	Public/private (lease payments to private)	Public/private	Public/private
Infrastructure build & operate concession	Private	Private	Public/private (pay access charges to private)	Public/private
Integrated concession	Private	Private	Private	Private

….in all cases, defined assets transfer to public sector at end of concession

Is the railway to be single-user or multiple-user?

- If it is single-user, small mines whose production does not make building their own line worthwhile will be handicapped in marketing their production
- If it is to be multiple-user, is this to be with multiple train operators or by requiring the line operators to haul other mines wagons?
- In any event, a regulatory framework should be established to set the rules giving the rights and obligations of all parties
  - including charges, whether these are haulage charges or access charges
- Monopoly rights should only be considered for genuine third-party infrastructure providers with an unconditional access policy

Is the railway to be operated in perpetuity or handed back at the end of a defined time period

- Standards will need to be established which the construction of any new line must conform with
- If the line is to handed back, the condition at handback needs to be defined and a mechanism established to check that condition
- Procedures may also need to be established to check on the condition of the line at intermediate times (say, every five years) and remedies defined if the line condition is below standard

In summary, the key features needed to encourage railway PPPs are …..

- Creation of necessary policy and legislative basis for active encouragement of PPP approaches:
  - may permit national, provincial and municipal PPP initiatives.
- Creation of new institutions, separate from Mongolia Rail, to administer and encourage PPPs in the national railway industry.
- Development of tools for implementing policy: procurement procedures, standard types of bidding documents, methods for evaluating the value of bids, PPP Agreement templates etc.
- Establishment of regulations setting out, on a fair and transparent basis, the interlining and revenue sharing arrangements between different operators (including between PPP operators and Mongolia Rail and between PPP operators and third-party users).
- Establishment of regulatory and enforcement mechanisms fair to both sides but independent of each.

The potential for PPP in South Gobi depends on the projects

- The cross-border connecting lines make commercial sense for the volume of coal likely to be exported
  - ➢ Private funding should therefore be straightforward to obtain
  - ➢ But GOM should ensure access for smaller producers wishing to export is both explicitly included in the agreement and likely to be available in practice (e.g. by avoiding any 'priority' or 'preference' clauses in the agreements)

- Any commercial case for connections to TMR depends on the forecast volume of exports using such routes. This will not happen until
  - – there are reliable long-term agreements for exports through Russia
  - – or the cross-border routes, which will be by far the cheapest route to China and Chinese ports, are full

- Even then, any private investor who is not a major shipper is likely to want some Government guarantee

While access roads and cross-border can be allowed almost as a matter of course, major network proposals such as the connections to TMR should only be endorsed when suitable long-term arrangements are in place to ensure the sustainability of the projected traffic flows

Outline decision framework

Issue	Decision	Comments
Road access to new mines	Privately-funded as far as public network	Determine threshold volumes above which access roads must be sealed to preserve environment. Specify construction standards
Use of public roads for hauling product	Allow up to specified volume subject to loading standards and charges	Volume limit will depend on level of other usage. Loading should be enforced at corporate level. Charges must be sufficient to cover long-run maintenance and renewal costs
Rail access to new lines	Allow	Require access to third parties under specified conditions. Develop standard procedures and charging methodology. Specify handback requirements.
Connection to TMR	Allow if privately-financed. Otherwise defer until there is clear evidence of long-term demand	Undertake marketing and operations study to establish long-term potential for export to Russia. May require commercial agreement with RZhD and ports to obtain reduced long-term access and rate for export coal transitting from Mongolia. Given China's natural advantage, a better option may be to develop alternative customers in China; the ownership of the connecting border lines in China should be monitored to ensure continuing access.
Conection between Ovoot Tolgoi and Tavan Tolgoi	Allow if privately-funded.	Any Government funding should be restricted to the Tavan Tolgoi – Dalzangadbad section and only considered after a connection to TMR has been constructed.
Connection to Choibalsan	Long-term option only	Monitor progress of proposed Chinese line through Choibalsan