Research on investment model of power cable about big data

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Abstract: To meet power cable construction underground in the city, it is necessary to ensure the normal operation of power cable. In this paper, we do the research about the compensation mode of cable line construction in Henan province, that is the difference mode and the construction mode, and analyzed with the actual project. We get the conclusion that difference fee compare to the construction fee is increased the difference between the cable fee and overhead cost. And we analysis the reasons based on “State grid corporation on General cost of transmission and transformation engineering” and the actual engineering.

Keywords: Big Data; Power cable; Difference fee

Along with the sustained development of the urbanization of our province, in order to strength the management about urban underground pipeline construction，guarantee the safe operation of the city, and improve the quality of the comprehensive combined load capacity and urbanization development. Planning requirements of electric line cable is put forward around the city and the new urban area[1].

Normal power lines are invested by electricity companies. Because the cable line has characteristics of one-time investment, long recovery period construction cost and high maintenance cost, which is compare to the overhead line. Based on the principle of "who advocates, who pays", Power Company negotiated with the government: the government for the cable line construction pay for the corresponding compensation[2]. Current compensation patterns in Henan province is mainly divided into two kinds: one is the price spread compensation mode provide by government between cable plan and overhead plan. (referred to as "differential mode", costs as price difference). The other is use free of charge that the cable construction is pad by the government (for short " civil construction "). This paper analyzes the two investment modes from the theory and the practical engineering[3].

1.Theoretical Analysis

(1).Cost analysis of price difference mode

Under price differential mode price margin generated by cable plan and overhead plan，short for difference fee.

Spread fee = (cable electricity cost + cable construction expenses) - overhead.

(2).Cost calculation of construction model:

Governments offer the cable construction fee only in construction model. So we only calculate the cable construction, cable electrical charge does not belong to the scope of government investment, not included in the investment.

Land cost = cable construction cost.

(3). Difference pattern compared to civil model cost

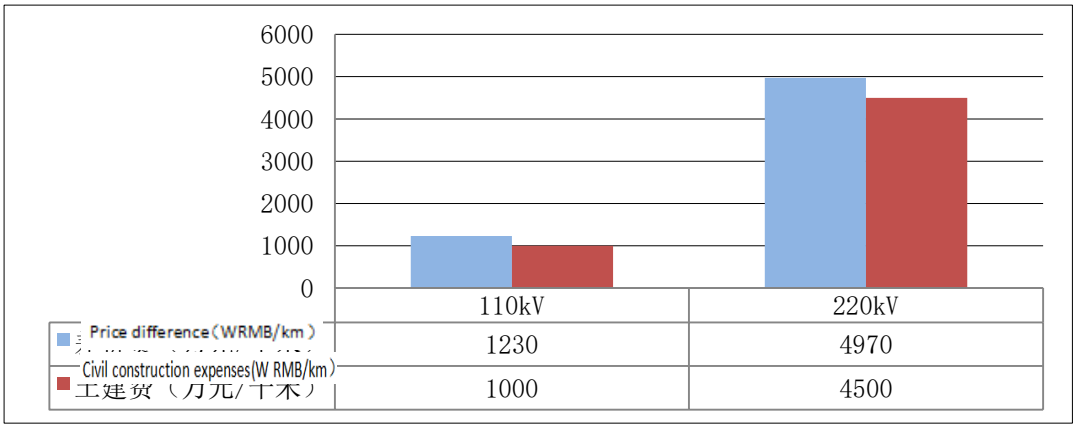
Difference fee - civil construction cost = [(electricity cost + cable construction expenses) -

overhead charges]- cable cost = cable cost - overhead expense.

From the above we can see the difference between the cable cost and the overhead cost is increased, which compare to the construction cost. Refer to "general cost of power transmission project of state grid corporation", as follows[4]:

Table 1: Contrast table

Voltage grade	Difference mode				Construction mode	Difference (spread pattern - civil model) (Ten thousand yuan/km) F
	Overhead plan	Cable plan		Difference Fee(Ten thousand yuan/km)D= B+C-A	Construction Fee(Ten thousand yuan/km)E	
	Overhead Fee(Ten thousand yuan/km)A	Cable electrical charge (Ten thousand yuan/km) B	Cable construction cost(Ten thousand yuan/km) C			
110kV	120	350	1000	1230	1000	230
220kV	160	630	4500	4970	4500	470



Graph 1：Comparison between difference fee model and construction cost model

As we can see from the chart above, 110kV line price difference is increased 2.3 million yuan per kilometer compare to construction mode. 220kV line price difference is 4.7 million yuan per kilometer compare to construction mode.

Theoretical analysis[5]:

（1）For the government, it is more advantage to reduce the cost of investment by adopting

construction model to difference model.

（2）For electric power company, adopting difference mode can get more government subsidies, and reduce the power companies construction cost undertake cable entry project.

（3）The bigger project scale the more difference between the two modes，it is more carefully to choose the investment.

2. Actual engineering analysis

（1）110kV cost analysis on power line compensation method:

Based on the actual engineering situation, this paper collects the investment situation adopted the two compensation models of 110kv power lines in the city in recent years.

Table 2:Two compensation models Investment

Serial Number	Voltage Grade	Differential Mode				Construction mode	Difference mode (¥10,000 / km) F
		Overhead plan	Cable package plan		Difference Fee (¥10,000 / km) D = B + c-a	Cable construction cost(¥10,000 / km)E	
		Overhead (¥10,000 / km) A	Cable costs (¥10,000 / km)B	Cable Construction Cost(¥10,000 / km)C			
1	TX Line	179	418	1013	1252	1013	239
2	GC Line	161	376	898	1113	898	215
3	WK Line	157	437	941	1221	941	280
4	XL Line	149	387	1000	1238	1000	238
5	DG Line	148	363	799	1014	799	215
6	ZT Line	138	380	1026	1268	1026	242
7	JW Line	136	365	1293	1522	1293	229
8	WY Send Out	129	360	4232	4463	4232	232
9	MS	128	353	1487	1712	1487	225

	Line						
10	LH Send Out	118	384	4555	4821	4555	266
11	LH Line	112	348	1168	1404	1168	236
12	Average	135	369	1677	1911	1677	234

By above you can see, 110kV projects adopt difference mode and construction mode to analysis. All the projects difference fees are higher than construction fee 215 ~ 267 million yuan/km, the average height of 2.34 million yuan/km.

（2）220kV power line compensation method about cost analysis:

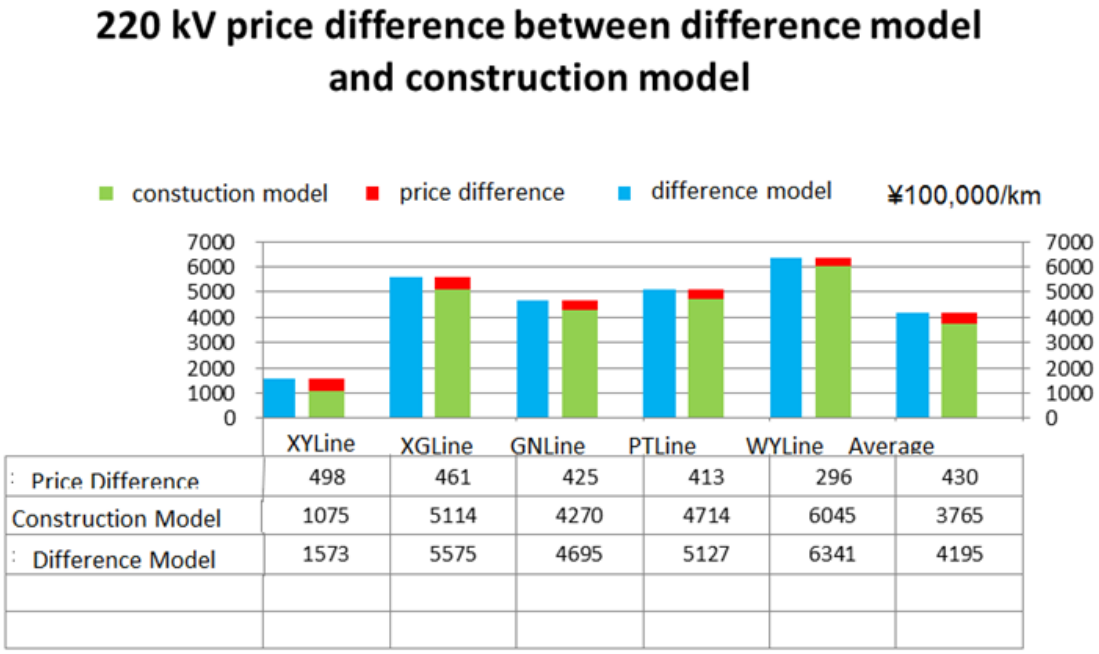
Based on the actual engineering situation, this paper collects the investment situation of the two compensation models about110kv power lines in the city in recent years.

Table 3：Two compensation models Investment

Serial Number	Voltage Grade	Differential Mode				Construction mode	Difference mode (¥10,000 / km) F
		Overhead plan	Cable package plan		Difference Fee (¥10,000 / km) D = B + c-a	Cable construction cost(¥10,000 / km)E	
		Overhead (¥10,000 / km) A	Cable costs (¥10,000 / km)B	Cable Construction Cost(¥10,000 / km)C			
1	Xiangying Line	212	711	1075	1573	1075	498
	Xiongguan Line	191	652	5114	5575	5114	461
2	Gangnan Line	157	583	4270	4695	4270	425
3	Punan Line	203	617	4714	5127	4714	413

12	Weiyang Line	262	558	6045	6341	6045	296
	Average	187	617	3765	4195	3765	430

Above you can see, 220kV projects adopt difference mode and construction mode to analysis. All the projects difference fees are higher than construction fee ¥2.96~2.98 million /km, the average height of ¥4.30 million /km.



Graph 2：220 kV Comparison between difference mode and construction mode

3. Conclusion

(1) All the projects can be estimated by the actual cost. 110kV、220kV line difference model is compared to the construction mode increased ¥2.34 million /km, 4.3 million yuan/km, respectively, that compare to theoretical calculation is worth ¥2.3 million /km, ¥4.7 million /km.

(2) Distinction between difference model and construction model is about the complexity of the actual project. If the actual project overhead solutions is simpler than theory, then difference is over the theoretical calculation values. If the actual project is more complicated than the theoretical project, the difference is lower than the theoretical calculation.

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