

Channel computing resources from the east to the west ——Why the west is the best choice?

Contact us:
ibsgkh@gmail.com

Abstract:

Chinese capital market reacted actively to the theme, where the most of events happened in the ChiNext Market. Combined with policy and practice, we discuss the feasibility of Channel computing resources from the east to the west under optimal resource allocation.

Content:

1. Introduction and thinking from capital perspective.....	3
2. What are the advantages of the west?	10
2.1 design at the national level	10
2.2 cost.....	10
2.2.1 land cost.....	10
2.2.3 energy cost.....	11
2.2.3 labor cost	13
2.3 pue and cooling system	14
3. Conclusion	15

1. Introduction and thinking from capital perspective

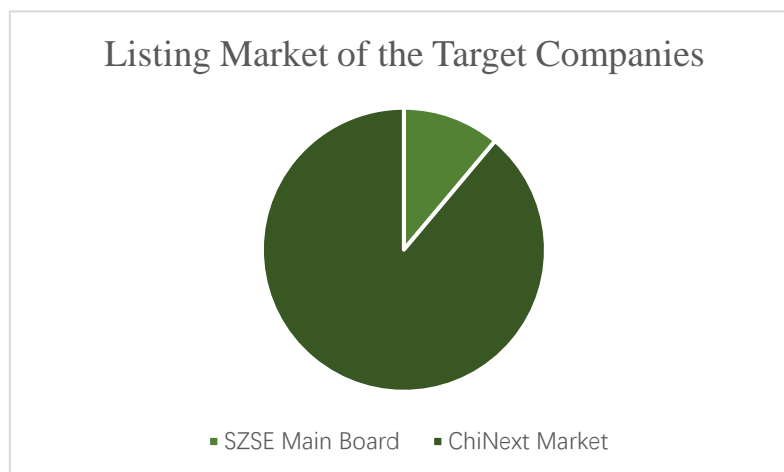
“Channel computing resources from the east to the west” is a thematic action of China. It has already become one of the hottest themes in the capital market. We collect information about the companies which include the theme in their announcement. We found that the state-owned companies react to the policy at the operational level. Private companies raise capital to expand in the wave and we collect the data of their capital operation. The way of responding conforms to the scale of the companies. The research companies are as follows:

Attribute	Comp. Name	Ticker Code	Events
State-Owned Companies	China Mobile	A: 600941.SH	Operations
		H: 0941.HK	
	China Telecom	A: 601782.SH	Operations
		H: 0728.HK	
	China Unicom	A: 600050.SH	Operations
		H: 0762.HK	
Private Companies	Eaglerise Electric & Electronic (China) Co., Ltd.	002922.SZ	Capital Operation
	Beijing E-HUALU INFORMATION Technology Co., Ltd.	300212.SZ	Capital Operation
	NanJing Research Institute of Surveying, Mapping&Geotechnical Investigation, Co., Ltd.	300826.SZ	Capital Operation
	Beijing Asiacom Information Technology Co., Ltd.	301085.SZ	Capital Operation
	Thunder Software Technology Co., Ltd.	300496.SZ	Capital Operation
	LEON Technology Co., Ltd.	300603.SZ	Capital Operation

	Shanghai Precise Packaging Co., Ltd.	300442.SZ	Capital Operation
	Guangdong Shenling Environmental Systems Co., Ltd.	301018.SZ	Capital Operation
	AMSKY Technology Co., Ltd.	300521.SZ	Capital Operation

The State-Owned Companies operate actively in response to the theme. As the one who gains least in the IDC business among the "big three" telecom carriers, China Mobile will not let go of the opportunity. China Mobile raise the layout of "4+3+X", representing four hot point area, three cross-province low-cost centers, and multiple provincial business centers.

Another interesting finding is that all of the private companies which raise capital with the theme are listed in Shenzhen, and 89% of them are listed in the ChiNext market.



Source: Data from IBSG

Following is the detail of the actions. Another interesting finding is that the first initiated back-door listing and the first permitted back-door listing in ChiNext Market happened in these companies. Given the current policy, firms should follow the same compliance standards as IPO to get back-door listed on the ChiNext Market, reflecting that the companies are willing to pay for time. They would like to give a part of the raised capital to the shell companies' shareholders in exchange for a quicker reaction to the policy.

NO.	Company name	Ticker Code	Industry	Transaction Type	Progress	Purpose of Fund-Raising	Transaction Size (¥ B)	Listing Market
1	Eaglerise Electric & Electronic (China) Co., Ltd.	002922.SZ	Transformer	Private Placement	Preplan of board of Directors	In response to the call of the State, the fund was raised for 1.Intelligent manufacturing construction project of the medium voltage DC power supply system; 2. Digital factory construction project of intelligent box transformer and energy storage products; 3. R&d Center construction project; 4. Replenish liquidity.	1.25	SZSE Main Board
2	Beijing E-HUALU INFORMATION Technology Co., Ltd.	300212.SZ	Data Lake (Big Data)	Private Placement	Preplan of board of Directors	Actively land the data lake and raise funds for 1. Super storage R&D project; 2. Key technology R&D and industrialization project of government-enterprise digital transformation platform; 3. Artificial intelligence training resource library and global video awareness service platform, 4. Supplement liquidity.	2.91	ChiNext Market
3	NanJing Research Institute of Surveying, Mapping&Geotechnical Investigation, Co., Ltd.	300826.SZ	Geographic information technology services	CB	Approved by the general meeting of shareholders	In response to the call of state to promote the "Channel computing resources from the east to the west", the fund raised for 1. The construction project of urban lifeline security monitoring platform for municipal infrastructure; 2. Construction project of computing power center and production base for digital twin; 3. Replenish liquidity.	0.41	ChiNext Market

4	Beijing Asiacom Information Technology Co., Ltd.	301085. SZ	Internet data center	CB	Approved by the general meeting of shareholders	To expand and strengthen the scale of "Channel computing resources from the east to the west", the raised funds will be used for the construction of the national integrated new computing power network system , supporting the construction project of service system.	0.26	ChiNext Market
5	Thunder Software Technology Co., Ltd.	300496. SZ	Intellige nt platfor m technol ogy	Private Placeme nt	Approved by the general meeting of shareholders	To improve the level of inter-regional computing power dispatching, speed up the implementation of the project of "Channel computing resources from the east to the west", and raise funds for 1. Vehicle operating system research and development project; 2. Edge computing station r&d and industrialization project; 3. Extended Reality (XR) R&D and industrialization projects; 4. Distributed computing power network technology R&D project; 5. Replenish liquidity.	3.10	ChiNext Market
6	LEON Technology Co., Ltd.	300603. SZ	Informa tion Technol ogy Services (Comm unicatio ns)	Private Placeme nt	Approved by the general meeting of shareholders	To further expand the scale of the company's data center business and raise funds for 1. Lyon Cloud Data (Chengdu) No.1 Base Phase I Construction Project (Phase I) 2. Lyon Cloud Data (Chengdu) No.1 Base Phase II Construction Project (Phase II), 3. Replenish working capital.	1.88	ChiNext Market

7	Shanghai Precise Packaging Co., Ltd.	300442. SZ	Food Packagi ng (Shell Compan y) Data center (backdo or side)	Back- door Listing	Agree to register	Help IDC industry leader Runze technology to achieve asset securitization and financing	4.70	ChiNext Market
8	Guangdong Shenling Environmental Systems Co., Ltd.	301018. SZ	Indoor environ ment regulati on	Private Placeme nt	Preplan of board of Directors	The full implementation of the "Channel computing resources from the east to the west" project brings a broad market demand for special air conditioners for data services. The fund is used for 1. Intelligent manufacturing project of intelligent temperature control equipment in new infrastructure field; 2. Professional special environmental System R&D and Manufacturing Base Project (Phase II).	0.80	ChiNext Market
9	AMSKY Technology Co., Ltd.	300521. SZ	Industri al printing (Shell Compan y) Data center	Back- door Listing	Approved by the general meeting of shareholders	Help IDC industry leader Jinyun technology to achieve asset securitization and financing	1.00	ChiNext Market

			(backdo or side)					
--	--	--	---------------------	--	--	--	--	--

Source: Data from IBSG

Companies react actively to the theme, but there's a question about this trip to the west. Are they using the theme as an excuse to raise capital, or it is really a good deal for not only the government?

To answer this question, we can start with an official document, the Implementation Plan for Innovative computer power Hub and The National Integrated Big Data Center, released in May 2021. The document clearly pointed out two imbalances in China's route to digitization and the significance of intensification.

a. Two imbalances

1) Immense demand in the east

In Beijing-Tianjin-Hebei region, Yangtze River Delta, Guangdong-Hong Kong-Macao Greater Bay Area, Sichuan-Chongqing, there is a large demand for computing power due to their large scale of users and intensive enterprises. However, with the development of the east, land, energy and other resources are increasingly scarce, making it difficult to build or develop data centers.

2) The demand for edge computing in the inner edge of urban area is enormous

Due to geographical restrictions, end-to-end data centers of those services with higher requirements for delay, like high-frequency trading, virtual reality/augmented reality (VR/AR), high-definition video, car networking, networking drones, smart factory, intelligent security, need to be constructed within the city, but at present the usages of data centers in urban area are still disorganized. Some data center service providers with low requirements for delay still occupy core urban resources. The situation is in urgent need of policy planning guidance.

b. The significance of intensive development

1) Convenience for regulation

Through intensive development, requirements for new data centers, such as construction scale, energy saving level, and construction rate, can be regulated to avoid pell-mell investment

that may lead to the market disruption. To avoid the construction of some data centers that do not meet the requirements, *Several Opinions of The National Development and Reform Commission and other departments on Promoting Energy Conservation and Carbon Reduction in Key Areas under Strict Energy Efficiency Constraints* clearly pointed out that local governments shall not grant preferential policies in land, finance and taxation for areas outside the core computer power hubs.

2) Convenience for green development

After the intensification of data centers, renewable energy power stations can be equipped for data center clusters to enlarge the market trading scope of renewable energy. Besides, under this condition data centers can use method like direct supply of large-scale user, dedicated lines and the construction of distributed photovoltaic to increase the consumption of renewable energy.

3) Convenience for lower Delay and cost

Building high-speed data transmission networks between data center clusters and between clusters and major cities can optimize communication network structure, expand network communication bandwidth, and reduce data rotation delay. Moreover, establishing reasonable network settlement mechanism in national computer power hubs can significantly reduce long-distance transmission costs.

Because there is imbalance between supply and demand in the east, and the west has huge development potential, the government want to construct The National Hubs of Integrated Computer Power Network in Beijing-Tianjin-Hebei region, Yangtze River Delta, Guangdong-Hong Kong-Macao Greater Bay Area, Sichuan-Chongqing, and Guizhou, Inner Mongolia, Gansu, Ningxia province in order to develop data center, promote cross-regional computer power dispatching level and move the demand for non-real-time computing power, such as background processing, off-line analysis and storage backup to the west, namely the " Channel computing resources from the east to the west ".

Next, we will analyze the advantages and disadvantages of developing data centers in the west to understand the significance and necessity of the project.

2. What are the advantages of the west?

a. Design at the national level

Economically, Channel computing resources from the east to the west is a national-level design thinking to optimize the allocation of resources. Because the east gathers most of China's advanced industries and population, the west has a surplus of land, labor and energy resources. Suppose the resource advantages of the west are fully expanded to form a natural grand cycle, linking all the population, regions, and production factors. In that case, both the west and east part can exploit the full competitive advantages.

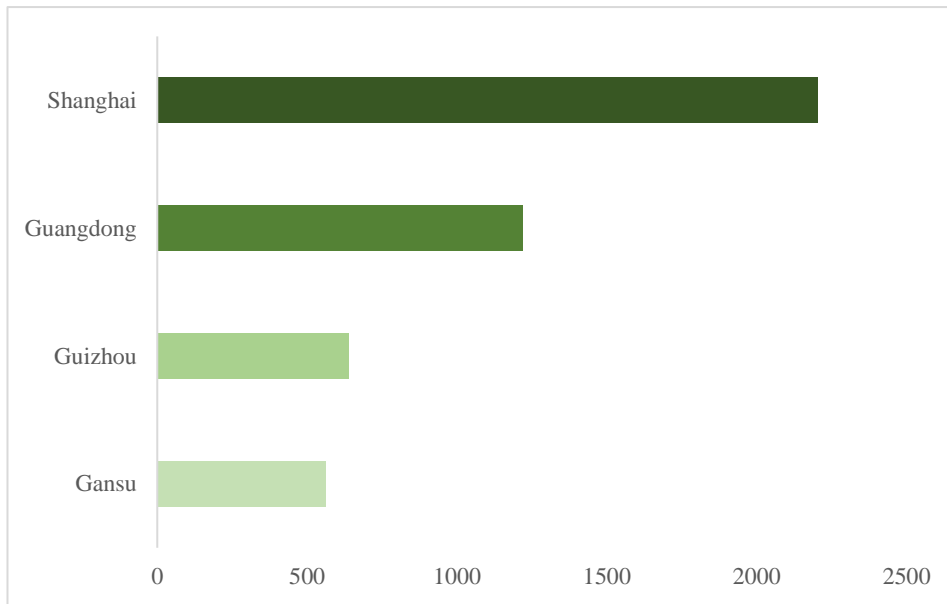
Second, from human destiny community, China needs to achieve a carbon peak and be carbon neutral. A large part of the energy in the east is supplied from the west. The cost of electricity accounts for 50% to 70% of the overall expenditure, the energy loss in the middle is tremendous.

b. Cost

1) Land cost

If you want to build a data center, you must be concerned about land resource scarcity, and this is significantly different from place to place. Currently, land resources in the eastern region are minimal, so the cost is extremely high. In the eastern region, especially the coastal region, it is more commercialized and economically developed, so the ratio of land commercialization is higher, which means less industrial land and higher average land cost. According to the data from Tuli, a website that collects statistics on land rent prices, the average land price in the first quarter of 2022 in Gansu was 562.7 yuan/acre/year, an increase of 0.29% year-on-year. The average land price in Shanghai in the first quarter of 2022 was 2205.6 yuan/mu/year, a rise of 1.28% compared with the previous quarter.

Graph: Average Agriculture Land Price in 2022 Q1 (Yuan/acre/Year)



Source: Tuli Website

2) Energy Cost

As China is now in a semi-market stage of electricity prices, consumers can either buy power directly from power producers or entrust The State Grid Corporation to buy power on their behalf. Since the standard of agent purchase price will be published every month, the price is more stable and easier to collect, so the agent purchase price is used here to represent regional electricity price.

West	Electricity Price (Yuan/KWh)	East	Electricity Price (Yuan/KWh)
Guizhou	0.3753	Beijing-Tianjin-Hebei region	0.4409
Inner Mongolia	0.3145	Yangtze River Delta	0.4802
Gansu	0.3715	Guangdong-Hong Kong-Macao Greater Bay Area	0.5695
Ningxia	0.2986	Sichuan-Chongqing	0.4234
Average Price	0.3400	Average Price	0.4785

The electricity price in eastern China is 0.1385 yuan per KWH higher than that in western China, accounting for 28.95% of the electricity price in eastern China. Given that electricity

costs account for 56.7 percent of data center operating costs, moving data centers from east to west can reduce operating costs by 16.41 percent on an electricity price basis alone.

The operating cost of data center

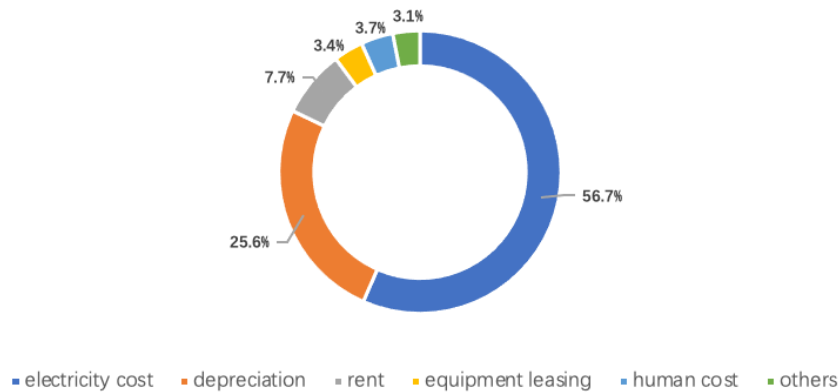


Figure: The Energy structure at the location of the eight hubs

West	Electric Energy Production (TWH)	Nuclear Power Generation (TWH)	Hydraulic Power Generation (TWH)	Wind Power Generation (TWH)	Solar Energy Generation (TWH)	Thermal Power Generation (TWH)	Clear Energy Ratio
Guizhou	180.5	0.0	68.0	8.1	7.2	97.2	46.15%
Inner Mongolia	511.8	0.0	2.7	88.1	16.4	404.6	20.94%
Gansu	145.5	0.0	29.7	30.9	13.2	71.7	50.73%
Ningxia	182.4	0.0	1.9	20.3	18.1	142.1	22.10%
East	Electric Energy Production (TWH)	Nuclear Power Generation (TWH)	Hydraulic Power Generation (TWH)	Wind Power Generation (TWH)	Solar Energy Generation (TWH)	Thermal Power Generation (TWH)	Clear Energy Ratio

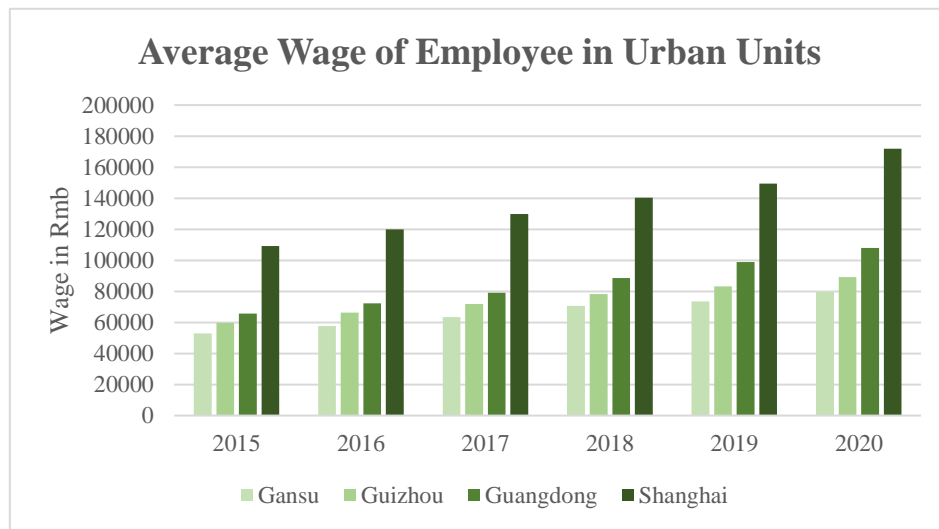
Beijing- Tianjin- Hebei region	118.4	0.0	0.4	18.5	5.9	93.6	20.89%
Yangtze River Delta	321.8	33.6	7.4	15.5	7.9	257.5	9.56%
Guangdong -Hong Kong- Macao Greater Bay Area	441.4	98.3	17.8	18.1	4.2	303.0	9.08%
Sichuan- Chongqing	203.0	0.0	158.6	4.8	1.4	38.3	81.13%

Source: Power generation by province in May 2022 Source: National Bureau of Statistics

As can be seen from the chart, the four hubs in the west and the four hubs in the east do not show the extreme situation that the proportion of clean energy in the west is all high and that in the east is all low. Although the policy mentioned that the western region is rich in renewable resources, the current energy structure of Inner Mongolia and Ningxia is still dominated by thermal power generation, while the energy structure of Sichuan-Chongqing region has great advantages, with the proportion of renewable energy reaching an astonishing value of 81.13%. Under this condition, we can conclude that the energy structure is not a major consideration in this policy, but an icing on the cake.

3) Labor Cost

Graph: Average Wage of Employee in Urban Units



Source: Ceidata

According to the data from Ceidata, the average labor cost in Shanghai is almost twice as much as in Gansu, or even higher. The average wage of an employee in Shanghai in 2020 is 171,884, year-on-year growth of 15.06%, and in Gansu is 79,730, year-on-year growth of 8.32%. Labor costs in the east are more expensive and growing faster, and there is no need to spend too much on the day-to-day maintenance and construction of data centers.

c. PUE and Cooling System

Compared with the eastern climate, the climate in western China can make the $PUE \leq 1.30/1.25$ more easily. By improving the overhead rate, the data center arrangement can be horizontally integrated, and the unified management can achieve better results.

Dive into the cooling system, the most practical and cost-effective temperature control system in the west is mainly divided into indirect evaporative cooling and liquid cooling system. The cooling system architecture of these two technologies is simple. The technical solution with the best cooling effect among many data center cooling technologies.

● Advantages of liquid cooling systems:

High efficiency: Liquid conducts heat 25 times better than air, resulting in faster and better temperature transfer, enabling efficient cooling of IT equipment.

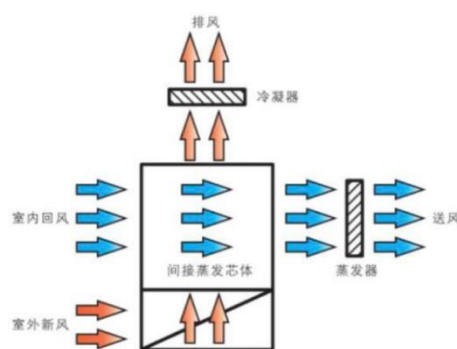
Energy-saving: Lower energy consumption because no air conditioning system is required at the same heat dissipation level

Stability: Data centers are primarily built-in high-altitude areas, and the lower the atmospheric pressure or air density, the lower the cooling effect of the air medium.

The lower the cooling effect of the air medium, the lower the air-cooling capacity. The liquid cooling system does not have this concern.

Economic effect: The heat collected by the liquid cooling system can be used twice.

Graph: Theory of two Cooling Systems



Baidu Baike

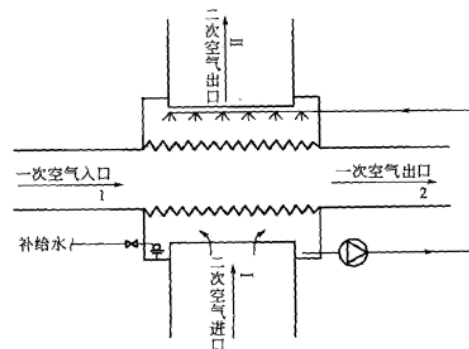


图1 间接蒸发冷却示意图

Source: Baidu Baike

- Advantages of Indirect evaporative cooling system:

An indirect evaporative cooling system refers to using the cold quantity of the wet air (secondary air) obtained by direct evaporative cooling is transferred to the air to be treated (primary air). Indirect evaporative cooling technology can acquire the cooling capacity from the natural environment. Compared with general conventional mechanical refrigeration, it can save 80% ~ 90% energy in hot and dry areas, 20% ~ 25% in hot and humid regions, and 40% in medium humidity areas, thus significantly reducing the energy consumption of air-conditioning refrigeration. The indirect evaporation system comprises a spray device, heat exchanger core, indoor fan, outdoor fan, mechanical refrigeration supplement device, control system, and so on.

3. Conclusion

Channel computing resources from the east to the west is considered a natural choice for the market. On an economic level, it is a top-level design at the national level to optimize the

allocation of resources, while all kinds of capital have led the trend. Secondly, from the perspective of carbon peaking and carbon neutral, channel computing resources from the east to the west significantly reduces energy loss and finds a balance between efficiency and loss. To sum up, the west is the most suitable for data center development with abundant energy, suitable climate and high security. Capital operations often go first to find the optimal allocation