

ON DEVELOPING ENVIRONMENT AND RESOURCE DEVELOPMENT OF PANZHIHUA

Huang Jing(黄静)

Regional Economic Institute, People's University of China, Beijing 100872, PRC

(Manuscript was received in December 1995)

ABSTRACT: Panzhihua is a resource treasure basin and natural green house of China. The demands of international market and domestically economic constructions are the important prerequisites of developing Panzhihua's resources. Through more than 20 years construction, the city has laid a sound bases for resource utilization. In order to enlarge the functions of Panzhihua's resources in national economy and to promote the Changjiang (Yangtze) River Industry Zone construction, China will develop Panzhihua resources actively and effectively. Through analysis, key related projects of resource development and required facilities of improving the environment of investing and specialist nursing are listed in this paper.

KEY WORDS: Panzhihua, resources development, developing environment

Panzhihua, whose former name was Dukao City, is located in southwest corner of Sichuan Province, surrounded by the jointed zone of Sichuan, Yunnan and Guizhou provinces. It is an important base of resource development of China at the crossing of Chengdu—Kunming railway and the Changjiang River. Once the city was a thorough-fare of "Southern Silk Road" from being started developing vanadium (V) titanium (Ti) magnetite in 1965, Panzhihua has formed a certain dimension of city and accumulated a large capacity of resource development.

The resources in Panzhihua possess 3 protruding characteristics; the first is that minerals are quite abundant and they have a good combination in space; the second is that hydropower is highly concentrated in some sections of rivers with favorable developing conditions; the third is that it is rich and various in agricultural resources and there are good prospects of agricultural development in 3-dimension. Panzhihua once played an important role in resource development history of China. Along with the modal change of China's national econo-

my and the construction focus shifting from east section to middle and west sections gradually, Panzhihua will possess a brilliant opportunity in resource development again.

I. RESOURCES IN PANZHIHUA

Because of its special geographic location, Panzhihua experienced many times of large-scale geologic motion and has complicate geologic structures. There are all kinds of strata there. Lithological characters vary widely. The whirl geologic structure line controls the mountains trend, leading rivers run down sharply. Compound insular climate is based on subtropical zone; all the year round has four season climates. All these above have made Panzhihua an exceptional resource treasure basin and natural green house of China.

1. Minerals

1.1 *Iron ore*

Iron mine in Panzhihua is one of three biggest intergrowth mines in China. It is concentrated within a small area, and its development conditions are favorable and economic effect are very wide. Among the resources, V-Ti magnetite is the most important. By the end of 1988, the accumulatively prospected reserve of iron ore in form was 4.76 billion tons, iron out form was 3.23 billion tons. It is enough for an iron and steel factory with a annual production capacity of 10 million tons to exploit for 70—100 years. Moreover its prospective reserves are about more than 20 billion tons, the reserved potential is very great. In addition, the main intergrowth components, as strategic materials, in the magnetite are V, Ti, Co, Ni, Sc, Ga, as well as available elements of Cu, Mn, S, Se, Te, Pt family. In the total mineral resources there are 702 million tons of TiO_2 , 16.5 million tons of V_2O_5 , 7.05 million tons of Cr_2O_5 . The three extraordinary mines of Hongge, Baima and Panzhihua, by the way of Chengdu—Kunming railway and the Changjiang (Yangtze) River, embrace 99.2% of V-Ti magnetite resources in only 47 km². The three mines are large in thickness, most of ore areas outcropped and mining conditions are very simple in hydro-geology and technology. Due to similar property with iron family, V and Ti can be retrieved in dressing, smelting processes through strategic reducing reaction in rotary furnace.

1.2 *Nonferrous metals*

Panzhihua has more than 9 kinds of nonferrous metals, such as Cu, Pb, Zn, Al, Ni, Co, Sn, Au and Pt family. Respectively, prospected reserve of

Cu is 1.13 million tons, Pb 0.97 million tons, Ni 1.81 million tons, Co 0.83 million tons. Assumed that each of Fe, V, Ti, Sc and Cr can reach the industrial index of development, Ga, Co, Ni, and Cu can be concentrated to the demand of industrial development through dressing and smelting processes.

1.3 Scandium

Panzhuhua is extremely rich in scandium (Sc), only to say metal volume associated with formed ores, Panzhuhua has 128 thousand tons, equaling to ten thousand large Sc mines of the world. Its value may be more than 54.5 percent of total resource values.

1.4 Metallurgical auxiliary resources

Panzhuhua has many kinds of metallurgical auxiliary resources. They are mainly limestone ore, with reserves of 435 million tons, distributed along New Village (Xin Zhuang)—Big Well (Dashuijing) and Baguan River—Dragon Hole (Longdong); first class dolomite ore, 76 millions tons, distributed around Tortoise Well (Wuguijing) and Avalokitesvara Temple (Guanyin, Miyi County); hard refractory clay, 20 million tons. All these resources are near to smelting base, a large part of them can be gotten from stripping.

1.5 Coal

Coal resources, presently the main power source, are 620 million tons. Among them, anthracite is 120 million tons, bituminize 500 million tons. All the coals are mainly buried in Baoding and Hongni mines with characteristics of low sulphur, low ash content and easy mining. If not transfer coal from Lupanshui, the coal can just be used for 40 years at current exploitation rate.

2. Hydropower

Three big rivers, Jinsha River, Yalong River and Anning River, running across the administrative region, have large and steady runoff, and their tributaries cover all over the area. Hydropower of theoretical reserves is 4,929 MW, available power is 4,306 MW. The hydropower density is 41 times of the world's average. Within the territory there are 4 large-scale hydropower stations for the nation to build, total installed capacity will be 6,900 MW including region-outed head of water, guarantee out-put power will be 3,040 MW, yearly electric-energy production will reach 381.8 TWh. They are Ertan Hydropower Station on the Yalong River (installed capacity 3,300 MW, guarantee out-put power 1,000 MW, yearly electric-energy production 170 TWh, the same unit and meaning below), Tongzhilin Station on the Yalong River (400, 230, 25.5, to be built), Guangyinyan Station on the Jinsha River (2800, 1560, 160.3) and Half Street Station on the Jinsha River (400, 250,

26. 0). Not only is the hydropower in Panzhihua concentrated, but its dynamic indexes of the stations are favorable, such as fewer emigration, less submerged loss, less investment and short constructive period. The total emigration is just 43,000, only 1/27 of Three Gorges Station, submerged arable is 3.39 kha, which is next to nothing compared with Three Gorges Station. For instance, Ertan Station will just swallow 165 ha arable, emigration is 21,900. Compared with being built and built stations, it is the best one in developing conditions with vantage benefits of economy, society and ecology.

3. Agricultural Resources

Under the co-function of latitude zone, relief, topography and atmospheric circulation, compound insular climate gave Panzhihua much advantage to carry out agricultural production. Different mountains or different latitudes have different climates around the year. Complex vertical spectra, varied micro-climates, good soils and diversiform vegetation can be used to produce nearly all kinds of agricultural products. Season-advanced gourds and vegetables can be put into market about 1—2 months ahead, far reaching northeast China, north China and northwest China. Panzhihua has been an important gourd and vegetable source of big and middle cities of Sichuan and part of big cities of northern China in winter and early spring. If irrigation conditions were improved greatly, we could have expected Panzhihua to become an important national base of gourd, fruit and vegetable.

II. SOCIO-ECONOMIC ENVIRONMENT OF RESOURCE DEVELOPMENT

1. Interior Conditions^①

From 1965, Panzhihua has achieved rapid and steady development. By the end of 1992, total population was 926,300, non-agricultural population 466,900, accumulatively fixed asset 11 billion yuan (RMB), total social production 8 billion yuan, Gross National Product 3.11 billion yuan, total industrial and agricultural production 5.2 billion yuan. Through 30-year construction, Panzhihua has formed a raw material and energy base taking metallurgical industry as its main body, and characterized agro-commodity bases based on planting. In industrial structure, metallurgical industry was 64.4%, energy resources 16.9%, the rest 18.7% including light industry, building mate-

^① Part of data came from "National Economic and Social Statistics of Panzhihua, 1992". Part of data were transferred from the Statistics.

rial, engineering and chemical industry. In 1992 Panzhihua produced steel 2.4 million tons, pig iron 2.85 million tons, steel products 1.33 million tons, raw vanadium (converted volume) 65,000 tons, iron ore 11.38 million tons, coke 2.22 million tons, raw coal 5.76 million tons, generated electricity 25.54 TWh. The industrial group, including metallurgical, coal, electric, building material, log processing, engineering, food, beverage, chemical, medicine, hide processing, paper making and textile trades, could produce more than 1000 specifications of products, especially its main products, iron and steel and raw vanadium, have occupied an important position in domestic market, part of them are sold to more than 10 countries of Asia and Europe. V, Ti and Sc in world market have monopoly in some degree. Agriculture has been transferred from just providing Panzhihua with grain and vegetables to out-regional providing. So far Panzhihua has established good-quality, high-productivity and stable-production bases of vegetable, cane, fruit, live pig and fishery. Especially the season-advanced gourds and vegetables have good prospects.

Panzhihua has a relative advanced communication system within a total area of 7,434 km², 2,500 km of highway, 180 km of railway and 38.4 specified railway. These lines put steel plant, mines, cement plant and urban area together, and turned the iron and steel production base into a famous "Fine Carved" one in the world.

Panzhihua, so far, has 20 specified scientific research institutes, 51,800 professional personnel covering many kinds of specification scopes. These institutes and personnel formed Panzhihua scientific research system and achievement spreading system. More than 6,000 fruits achieved laid a new concrete technique base for ordinary blast furnace to smelt V-Ti magnetite, to extract V by atomizing method, to separate Ti from tailings, to make high concentration raw Ti, Ti-tetrachord, titanium dioxide and sponge Ti. These achievements above have made iron and steel industries of China stand at international advanced level in developing V, Ti and intergrowth non-ferrous metals.

About facilities, the second phase project of Panzhihua Iron and Steel Plant was started in 1986, the fourth furnace has been set up. To match this project, Panzhihua is extending Baoding and Taihe iron mines. Ertan Station was opened ground in 1987, having dammed the Yalongjiang River on the 1st December of 1993, the first generator group will start operation in 1997. A conveyance system, the feedbacking station Tongzhilin, has been listed in the near agenda. By the time, the two stations will cut down about 11.25 million tons raw coal consumption in national economic construction in a year.

In addition, the inalienable is "Panzhihua Spirit" having formed in

Panzhuhua's construction process of the whole economy. We can assert it is the model of entirety and cooperation in similar relationship between Panzhuhua City and Panzhuhua Iron and Steel Plant. It is just the relationship for Panzhuhua to have overcome many difficulties and tided over many hard periods. That is why Panzhuhua can construct such a modern resource developing city in just more than 20 years. This spirit will continue active functions in economic development and resource utilization in the future.

2. External Environment

To Panzhuhua, the whole economic environment of China and Sichuan Province and outside markets strongly demanding Panzhuhua's resources are its external environment. Looking into about future 20 years, the following three respects will be convenient and favorable to develop Panzhuhua's resources.

2.1 National economic environment

From the reform and open policies being carried out, China has made a great progress in economy, the development rate has shaken the world, and China has become the heat point in attention and foreign trade.

In the 1980s, China focused economic construction on east section, developed 5 special economic zones and 14 opened cities with high investment and high developmental intensity. During these years, China introduced much advanced technology, equipment and management experience, that pushed the whole east section onto a new stage in economy. On the one hand the reform and opening irritated great economic development, on the other hand enlarged the gap of east and middle-west sections. Furthermore this development irritated unbalance of national economic patterns and setups of production location and raw material place. In the 1990s, China has been trying to reentry signatory to General Agreement of Tariffs and Trade, trying to widen international resource market and product market, trying to share more comparative benefits in foreign trade. Meanwhile China has prepared to confront the shock of products from advanced countries challenging Chinese "infant industries", so China moved onto import substituting way. China now is actively developing hi-technology as well as energies and raw materials to ensure material balance demanded by high development speed of domestic industrial system. One of the overall strategies is to treat Pudong development of Shanghai as bellwether and Three Gorges construction as a developing opportunity, and to extend the hinterlands of coastal area to middle and west sections by the "Golden Changjiang River". China is driving to establish the biggest industry belt of China, Changjiang River Industry Belt, running through east, middle and

west sections in the early 21st century. With the belt being built, Panzhihua will be the First City along the Changjiang River actually.

2.2 Position in Sichuan Province

Panzhihua has an important position in Sichuan Province, not only in V, Ti, iron ore, coal, flux limestone, flux dolomite, hydropower and agriculture, but in Gross Domestic Product (GDP) and national income per capita. Moreover Panzhihua has been far ahead of any city or prefecture in above aspects from 1988.

GDP of Panzhihua per capita in 1991 was 943 yuan higher than that of Chengdu City whose GDP per capita was the second in Sichuan Province, the difference equaled to GDP per capita of Guangyuan City or Liangshan Prefecture. By the way, national income per capita in Panzhihua was 687 yuan higher than that of Chengdu, the difference equaled to that of Daxian Prefecture. Panzhihua is not only remainder after self-sufficiency in finance, but is one of the regions with the most finances handed into the province. To develop economy rapidly, Sichuan must rely on support of Panzhihua in raw materials and energies as well as in finance, meanwhile Sichuan shall support Panzhihua more in economic construction and resource development.

2.3 Resource demand trend

1) Iron and steel. China produced 46.66 million tons of steel in 1985, while consumption was 70.00 million tons actually. In 1994 China produced steel 88.00 million tons of steel and consumed 92.35 million tons. It was forecasted that China will demand more than 100 million tons of steel in the year 2000 (southwest China will demand 10 million tons), 40 million tons will be imported to full the balance gap in domestic market. As embracing V and Ti, Panzhihua's steel has the characteristics of high strength, wear-resisting, and acid-resisting as well as alkali-resisting, 1 ton Panzhihua's steel is equivalent to 1.2—1.4 tons ordinary steel. So it is possible and essential to develop Panzhihua's iron resources.

2) Vanadium. A report^① showed that Panzhihua's V shared 23.8 % of the world's and 52.2 % of China's. The small area took an important position in world's V resource. It is estimated that increasing rate of V_2O_5 consumption in the world is 4.5 %, by the year 2000 the volume will be 116.7 kt. By Chinese Development Planning of Steel, Low Alloy Steel and V-Ti Steel, China will consume 12.5 kt in 2000. Presently there are 7 plants can produce V_2O_5 , total productivity is 14,000 t/a. Rapidly demanding volume of domestic and international markets has laid great demand on Panzhihua's V production. By

① Panzhihua Territory Bureau. Construction Planning of V and Ti Industry Bases. 1993.

the planning, Panzhihua will produce 7.3 kt in the end of the 20th century.

3) Titanium. Ti is mainly used for titanium white pigment, sponge Ti, welding rod material and Tied-iron. Economic Institute of Germany forecasted that titanium white demanded by the whole world would increase in 4.2 % per year. By demanding trend, Chinese consumption increasing rate is 10% yearly. As to metal Ti, the world calls for it at 3.4 % increasing rate per year. Main consumers are advanced countries, Chinese consumption will reach 14 kt in 2000 at 20 % increasing rate. In 2000 China will demand welding rod materials 70 kt, Tied-iron 17 kt^①. Panzhihua's Ti resource shared 73.4 % of the world's and 75.0 % of China's, it is at advantage position in Ti supply. To satisfy the inner and outer markets, development of Panzhihua's Ti holds the balance.

4) Scandium. So far available Sc of the world in industrial utilization is mainly extracted from by-products of V-Th mine, W-Sn mine, Ta-Nb mine, rare earth mine, Ti-Fe mine, bauxite and muscovite, just only Japan, America, Former Soviet Union, France, Australia and China can produce Sc products. China extracts Sc-oxide from Ti-Fe mine and black concentrated wolfram mine and has become a big supply country. Advanced nations are main Sc consumers. In 1978 total consumption volume in the world was 100 kg, it is estimated that the consumption volume in 2000 will reach 38,010 kg by increasing rate 31 percent^②. One day Panzhihua will be a monopoly producer.

5) Agricultural products. Exceptional geo-environment bestowed Panzhihua the conditions to produce a large of season-advanced gourds and vegetables, which have many advantages of early market, diverse kinds, good quality and relative low price. Panzhihua is naturally the important source of gourds and vegetables in winter and early spring of partly big and middle cities in Sichuan and northern China. If there were no carrying capacity limitations on the lines of Chengdu — Kunming and Baoji — Chengdu, Panzhihua would have provided season-advanced gourds and vegetables about times.

III. STRATEGIC MEASURES TO DEVELOP PANZHIHUA'S RESOURCES

Because of important position of Panzhihua's resources in the whole China as well as in the world, it is essential to develop Panzhihua's resources to support southwest development, to serve hi-tech products development and key project construction of China as well as to satisfy world markets.

^① Panzhihua Territory Bureau. Integrated Utilization Planning of V, Ti and Other Intergrowed Resources. 1993.

^② Panzhihua Territory Bureau. The Research and Production Situation of V, Ti and Other Bioresource Integrated Utilization. 1993.

1. External Supports Shall Be Given to Panzhihua Strongly

Panzhihua is not only one of the ten biggest iron and steel enterprises of China, but also the base of strategic materials and combat readiness materials of China, it will give China great support in economic construction in a relative long period. China shall perfect its industrial production system and agricultural production system by creating favorable conditions in finance, project and management right, so as to establish a strongly integrated resource development complex. Meanwhile Sichuan shall give Panzhihua much concert support, especially in local communication, urban construction, telecommunication, living service facility and matched facility of large-scale project. We are full sure that the integration of strongly external support and Panzhihua Spirit can make a new Panzhihua.

2. To Construct Panzhihua as an Open-Development Zone of Special Resource

In the 1960s Panzhihua was the first “Special Economic Zone” of China, it played an important role in Chinese iron and steel production. So far there are special economic zones, open cities and areas, development regions and tax exempted districts in the coast section, while there is no one open-development area of integrated city-resource-society-economy in hinterland. The implication to establish such an open area is not second to found Shenzhen Special Economic Zone in that year. So the paper suggests that China shapes Panzhihua a Special Resource Open-Development Area by carrying out limited special zone system, international practice, foreign capital introduction, advanced technologic adoption, its advanced technologic popularization, and China promote Panzhihua to consolidate multiple resource integrated development as to form its series products of special resource.

Ertan Hydropower Station was the first key project for China to bid by international practice, it can provide reference for Panzhihua to setup Special Resource Open-Development Area.

3. To Build a Strong Resource Development Complex

Having rich minerals, enormous hydropower and good agricultural sustaining conditions, Panzhihua has a consolidatory industrial base, and is being improved location situation through Chengdu—Kunming railway electrified remodeling and communication improving, furthermore Panzhihua has wide con-

sumption market of the middle and lower reaches of the Changjiang River and many kinds of strategic resources having easy entrance to international market. To make use of these advantages, China shall establish the powerful resource development complex in the oncoming ten years by high investment and high intensity to help Panzhihua to develop its resources comprehensively, effectively and rapidly.

4. To Improve Panzhihua's Connection with Outside Regions

The main limitations of Panzhihua's connection with outside regions are traffic and communication. Chengdu—Kunming railway has been saturated in a bottleneck section, coal coming from Liupanshui must go around about several hundreds of kilometers to Panzhihua, sail channel of the Jinshajiang River is broken off by dangerous shoals, setuping of 20,000 program controlling communication lines are still in hinder of demand, so that it is difficult for Panzhihua's resource products to go out as well as coal of Liupanshui and foreign advanced technology, technique and management experiences come in. All these above in some degree obstruct Panzhihua to develop its resources. For those reasons, China shall put more power on improving traffic and communications with Chengdu, Liupanshui, middle and lower reaches of the Changjiang River, Nanning—Kunming railway and south Asia, to hasten construction of the Special Resource Open-Development Area, and to help Panzhihua to turn its resource advantages into economic capacity so as to greatly support the nation's economic construction and to promote establishment of the Changjiang River Industry Zone. Then the most direct is to help Panzhihua to gear up development of southwest China and to lay a good base for China to occupy more resource and product markets in south Asia.

5. To Improve Interior Environment for Nursing and Introducing Specialists

From the reform and opening, coast areas and metropolises have been attracting many intellects for having relative superiority. For that reasons, Panzhihua suffered a severe braindrain, taking away the firewood from under caldron about Panzhihua's development. To turn the continuing situation back, the paper suggests that China and Sichuan improve Panzhihua's production and living conditions and construction more facilities for the city people having made great contribution to Chinese economic development. One of the construction aims is to introduce professional persons, to foster them and to root them, especially for domestic and overseas persons needed to develop re-

sources further.

IV. FOCUSES OF PANZHIHUA'S RESOURCE DEVELOPMENT^①

Panzhuhua's construction is one part of southwest China's economic take-off development. Its importance is laid on that it can provide southwest China powerful materials and energy/hydropower, and also economic leading and radiating function. So Panzhuhua's construction shall be included in the macro-development strategy of southwest China and the long-term economic development strategy of China. According to the situations analyzed above, Panzhuhua shall start the following middle-and large-scale developing projects in suitable time.

1. V—Ti Industry

To extend Panzhuhua's Ti Dressing Plant, enhancing the capacity of concentrated Ti mine from 100 kt to 300 kt by the end of 2000 and 800 kt by the year 2020. To build Panzhuhua Concentrated Metal Ti Plant, 50 kt capacity by 2000, 350—500 kt by 2020. To build Panzhuhua Ti White Plant, sulfated Ti white capacity 10 kt by 2000, tentatively Chlorinating Ti White 10 kt. To build Panzhuhua Sponge Ti Plant, 10 kt capacity by 2020. To build V-ed Iron Plant of Panzhuhua Iron and Steel Factory by 2000, 1.5 kt high V-ed Fe capacity. To build Panzhuhua Scandium Plant, 300 kg ScO capacity by 2000. To build Panzhuhua Gallium Plant, 75 kt metal Ga capacity by 2000.

2. Metallurgical Industry

To open Baima Iron Mine about the year 2000 and to make it reach the capacity of yearly 18 million tons of iron ore, 6 million tons of concentrated iron ore and 0.2 million tons of concentrated Ti mine. To extend the second phase period project of Panzhuhua Steel Plant and Baima Steel and Iron plant, to add the following capacities: 2.7 million tons of pig iron, 1.5 million tons of steel, 2.3 million tons of steel materials and 1.0 million tons of shapes steel. To set-up the second base of Panzhuhua Steel Plant as soon as possible in order to increase Panzhuhua's iron and steel production capacity more quickly and more effectively.

^① Economic Planning Committee of Panzhuhua. Near Term Schemes to Be Executed to Accelerate Panzhuhua's Resource Development, 1992.

3. Agricultural and Irrigation Works

Agriculture shall be focused on extensive construction, mainly on grain base, vegetable base, cane base, fruit base, silk cocoon base and so on, to emphasize agricultural production on these bases and to carry out intensification management. Irrigation works shall be focused on new construction; to build Factory Reservoir and Huangqiao Reservoir before the year 2000, and to achieve effective irrigation area 1,467 ha. To build Vanguard Reservoir, Guanwu Reservoir, Shabatian Reservoir and Shaba Reservoir, to irrigate 2,527 ha effectively.

4. Energy Industries

To tap Panzhihua's energy can assure and promote the development of high energy consumed metallurgical and V, Ti industries. The first Panzhihua shall keep Ertan Station construction smoothly, then try to build Guanyinyan Hydropower Station, Banbianjie Hydropower Station and Tongzhilin Hydropower Station before 2000, and complete improvement of No. 502 Thermal Power Station, build No. 504 Thermal Power Station as well as extend construction of Hongni Coal Mine and deeper part wall of Baoding Coal Mine.

5. Traffic and Communication

About these, China and Sichuan shall complete electrified improvement of Chengdu—Kunming railway, better Dukou—Huaping (Yunnan) highway and Dukou—Qiaojia (Yunnan) highway. If capital is enough, China and Sichuan shall build Panzhihua Airport and dredge Jinshajiang River channel, and construct the second phase 18,000 line program controlling project in the city and optical cable project of Chengdu—Panzhihua—Kunming.

REFERENCES

- [1] Panzhihua Territory Bureau. Panzhihua Territory Planning. Chengdu: Science and Technology Press of Sichuan, 1993. (in Chinese)
- [2] Gao Qunde et al. Regional Industry Structure of China. Beijing: Chinese Planning Press, 1991. (in Chinese)
- [3] Zhou Suolian et al. Research on Chinese Industry Policies. Beijing: Economy and Management Press, 1990. (in Chinese)
- [4] Cheng Hong. Natural Resources Handbook of China. Beijing: Science Press, 1990. (in Chinese)