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Final Report Output 1

Assessment and Optimal Improvement of the Chaidamu Circular Economy Pilot Zone

Policy Advice on Promoting the Circular Economy in Qinghai Province

Project Management Office

February 2017

Abstract

On the basis of streamlining the development status of the Chaidamu Circular Economy Pilot Zone (hereafter referred to as CCEPZ) during the period of the 12th Five Year Plan, the research project team has summarized major practices in the construction of the CCEPZ in the following aspects such as scientific formulation of park development programs, implementation of priority heavy industry projects, execution of various legal codes and policies, making full use of key enterprise projects, and strengthening of the construction of both infrastructure and counterpart support system. In the meanwhile, the team has also made an analysis of resultant economical, ecological and social benefits. As a result, the research project team concludes that the construction of the CCEPZ fits with the current development status of Chaidamu, and it plays an important demonstration role in the development of local resources that enjoy comparative advantages. The achievements of above-mentioned results can be attributed to the four salient points the CCEPZ upholds, which include: 1) Clear thoughts, which is a prerequisite of speeding up the construction of circular economy in the CCEPZ; 2) Policy support, which is the key to accelerating the construction process; 3) S&T innovations, which served as a driving force; and 4) Business attractions, which served as an effective instrument.

However, when the CCEPZ reached a stage of full growth, affected by changes in micro, mezzo, and macro environments and many other factors, it has shown a downward development momentum in terms of speed and quality. The major issues cover five important aspects as the following: deviations in thinking and practice of circular economy development, low industrial efficiency, weak S&T innovation capacity, poor capacity of mitigating risks and inadequate development policies. In reflection of those issues, the research project team contends that it is important to carry out supply-side structural reforms and improving the quality and efficiency of supply system, and resolve issues like irrational industrial structure, excess capacity of traditional industries and small scale of emerging industries. In the long run, it is advisable to take the green low-carbon approach as a strategic direction, and develop a new industrial system characterized with green, low-carbon, innovation, and long-term competitiveness.

More specifically, the team propose the following major policy measures:

1. **Strengthening Supervision & Administration and Rectifying Deviations in Development Thinking and Practice.** Firstly, green performance shall be used to regulate behaviors of government bodies. It is important to develop a green performance mechanism dominated by circular economy, including evaluation system of green performance, supervision system and application of evaluation structure, in order to adequately strengthen circular economy behaviors of government officials. Secondly, environmental regulations should be used to regulate and control behaviors of corporate sectors. Market mechanism can be used to strengthen incentives and orientation, to change the outdated pollution management method of enterprises and greatly encourage enterprises to promote innovations in technology and management. Thirdly, Public participation should be encouraged. All levels of governments should actively give full play to the role of public participation, education and awareness-raising, creating a positive cultural environment for the circular economy of the CCEPZ.

2. **Promoting Industrial Transformation and Carrying Out Supply-Side Structural Reforms.** First, industrial transformation and upgrading should be promoted and the level of supply should be improved. It is essential to uphold “1 principle”, that is, rich natural

resource endowment of the Chaidamu Basin, to realize “2 driving forces” which include technological innovation and internet, and to take “3 paths”, including eliminating the excess capacity, developing the potential sectors, and upgrading the existing sectors. Second, there should be a strong emphasis of quality and optimization of supply structure. Specifically, it is wise to clarify the industrial development priorities of the CCEPZ and Xining industrial parks and realize the optimal integration of circular economy resources. According to their comparative advantages in resource and technology, both parties should identify industrial priorities in an effort to achieve differential developments and improve the optimal use of circular economy resources in the two regions, even in the whole province. In addition, it is reasonable to develop emerging industries, and efforts should be placed on the cultivation and development of such industries as distinctive plateau biology, new materials, new energy, salt lake chemical engineering and modern finance.

3. **Focusing on S&T and Innovation System.** Firstly, it is important to make up the shortage of skills and to enhance the quality of labor. There is a proposal to encourage people migration towards the East and fill the labor shortage, and meanwhile “the government + the enterprise” training be deployed to improve the quality of labors. Secondly, it is necessary to establish talents development platforms to attract talents from outside. There is a need to establish market-oriented talent recruiting mechanism and implement significant talents projects, widening channels of enticement and use of talents, and at the same time, improving the quality of existing talents. Thirdly, S&T inputs should be increased and S&T support should be intensified. Measures such as encouraging the participation of enterprises and the setup of special funds should be implemented to increase the S&T resources and stimulate R&D activities. Meanwhile, it’s important to strengthen the linkages between government research institutes and industries.

4. **Strengthening the Risk Management and Mitigation Capacity.** Firstly, it is essential to strengthen the efforts of raising the awareness of risks. This can be achieved by reinforcing risks awareness education, fully leveraging the role of think tanks and carrying out training workshops and study tours. Secondly, there is a need to establish mechanisms of risk management, such as risk identification, risk control and mitigation plans so as to improve the capacity of risk diagnosis and treatment in the industrial parks. Thirdly, it is also important to enhance the capacity of combating industrial risks. On one hand, brand building needs to be strengthened to increase the competitive edge of the park; on the other hand, industrial chains should be efficiently integrated to raise the clustering and agglomeration effect, thus increasing the core competitiveness of the park and enhance the capacity of resisting market cyclic risks.

In this study, the researchers strictly follow the ADB's technical and procedural requirements, mainly on the Qaidam circular economy pilot area of the development of industrial recycling economy in-depth study

Contents

Preface

Circular economy is defined as an economic development model based on resource recovery and circular reuse in accordance with the principles of reduction, reuse and recycling (3Rs). It is of great importance in resolving the conflict between economic development and resource environment, adjusting economic structure, innovating the development model and achieving sustainable development. As we are fully aware, the Chaidam (Qaidam) region is characterized with rich natural resources, important geographic position, vulnerable ecological system and sensitive natural environment. According to the characteristics of Chaidam, the Qinghai Provincial Party Commission and the Qinghai Provincial Government has made a strategic decision of development circular economy in the region. Since the Chaidamu Circular Economy Pilot zone (Hereafter referred to as "CCEPZ) was established, centering round the *General Plan of the CCEPZ*, it has yielded very fruitful results in terms of park development, industrial planning, project promotion, physical infrastructure building, technological innovation, business attraction, investment & financing, and park security. In this process, it has accumulated rich experiences in terms of exploring the circular economy development model in highland areas, and played an important role in advancing the socioeconomic development in Qinghai, and assisting the Tibet Autonomous Region and stabilizing the Xinjiang Uyghur Autonomous Region. In recent years, the CCEPZ has been recognized by relevant national ministries and commissions on different occasions as "Industrial Base with Distinctive Advantages in the National Initiative of Western Region Development", "Chaidamu National Demonstration Base of New-type Industrialization of Salt Lake Chemical Engineering and New Metal Materials" and National High-tech Industrial Base of Distinctive Materials of Salt Lakes", and also rated as a "Nationwide Advanced Unit of Circular Economy Work". In August, 2016, Chinese President Xi jinping emphasized while paying field visit to the CCEPZ Salt Lake Corporation Group: "Development of circular economy is a sure road to increase the efficiency of resource utilization. It is required that Qinghai Province firmly establish the concept of green development and actively promote innovations in relevant industrial technologies and production processes, and constantly making new achievements in the area of circular development.

There have been some issues that hinder the process of healthy and sustainable development of the CCEPZ while achieving enormous results. According to the field survey conducted by the research project, the major issues that CCEPZ currently faces include deviations in concept and practice of circular economy development, low industrial efficiency, and weak capacity of S&T innovations. The CCEPZ is a key strategic testing field for carrying out the national mandate of circular economy development pilot zones in Qinghai, therefore, to ensure the healthy and sustainable development of the CCEPZ is not only essential to the success of national circular economy development pilot zones, but also key to the success of the economic transformation andupgrading of Qinghai province. Confronted with such issues and difficulties, the CCEPZ needs to strengthen the supply-side structural reforms, improve the quality and efficiency of the supply chain system, upgrading industries with green and low carbon technologies, and constantly strengthen the comprehensive industrial competitiveness of the park. Meanwhile, it is also necessary to develop new industrial systems characterized with green and low-carbon production methods and innovative technologies to push forward the CCEPZ to the higher stage of development.

Chapter I Overview of the Chaidamu Circular Economy Pilot zone

I. Construction of the CCEPZ as a Sure Choice of Sustainable Development

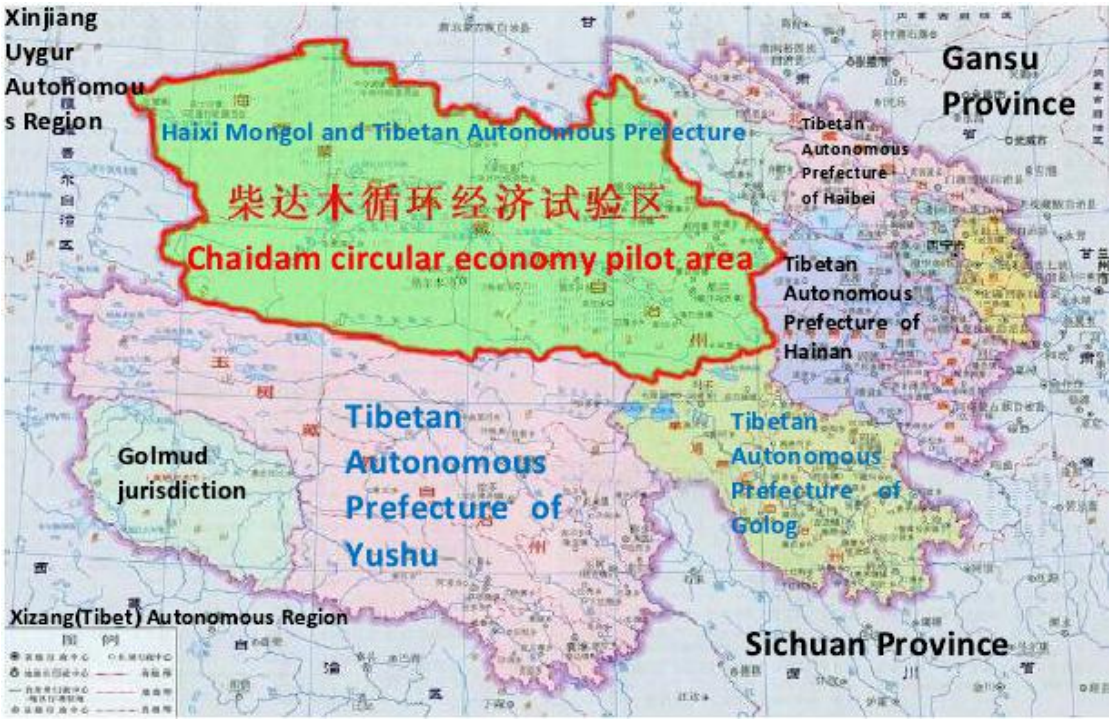
1. Great Importance of the Development of Circular Economy by the State

The Central Government and the State Council have attached great importance to the development of circular economy. In January 2003, the state issued and began implementing the "*Clean Production Promotion Law*". In July 2005, the State Council issued "*Opinions on Accelerating the Development of Circular Economy*". In January, 2009, the state began implementing the "*Circular Economy Promotion Law*". The *National 12th Five-Year Plan Outline* proposed the goal of accelerating the construction of a resource recycling system covering the whole society. The 18th Party Congress proposed a new requirement of achieving a fundamental change in national economy by promoting the mode of resource use of circular economy. In December 2012, the State Council passed the "*National 12th Five-Year Plan Circular Economy Development Plan*" at the executive symposium. In January 2013, the State Council issued the "*Circular Economy Development Strategy and Near-term Action Plan*". The issuance and implementation of a succession of national policy regulations has marked a new stage of the PRC's circular economy development, thus bringing good development opportunities for developing circular economy in the Chaidamu (Qaidam) region.

2. Unique Advantages of Developing Circular Economy in the Qaidam Region

1) Important Geographic Position

Situated in the northern Qinghai-Tibet Plateau, the Chaidamu Circular economy Pilot zone (hereafter referred to as "CCEPZ") is within the territory of the Qinghai Haixi Mongolian-Tibetan Autonomous Prefecture ("Haixi" for short), connecting with Gansu Province to the north and with Xinjiang to the west. To the south are Yushu and Golog Tibetan Autonomous Prefectures in Qinghai. To the east are Haibei and Hainan Tibetan Autonomous Prefectures in Qinghai. Qaidam is about 850 km east to west, and about 350 km north to south. The pilot zone is located in the core area of Qinghai, Tibet, Gansu, and Xinjiang, neighboring West Asia and South Asia. It is an important transport hub, and an open door in the northwest area of China. The southern route of the famous "Silk Road" passed through it and has been an important stop-over place in history. In the present, the "One Belt, One Road" [Chinese government transportation and investment strategy] goes through the pilot zone. It has an important role for stabilizing Tibetan and Uyghur areas.



2) Rich Natural Resources

The mineral resources in the CCEPZ have large reserves of associated high grade minerals, very diversified in kind, and concentrated in distribution. These characteristics support the overall development of a regional large-scale and multi-industry collective joint development, and are especially conducive to the building of a circular economy industrial system.

(1) Mineral Resources

A total of 86 kinds of minerals have been found in 1,050 different locations in the CCEPZ, accounting for 59% of the provincial total mineral resources. There are 57 kinds of proven mineral reserves, among which are 48 kinds listed in the "mineral reserves' table", accounting for 55% of the province's total, and 28% of the national total. The resources have a potential economic value of 16.27 trillion yuan, accounting for 95% of the province's mineral resources potential value, and accounting for 13% of the national potential value. In the salt lakes areas, 12 kinds of minerals are found, including sodium, magnesium, potassium, Glauber's salt, trona, gypsum, boron, lithium ore, and strontium ore. There are three kinds of energy minerals: oil, natural gas, and coal. There are 16 kinds of metal ores, including iron, chromium, copper, lead and zinc; 27 kinds of non-metallic minerals, including limestone, dolomite, pyrite, barite, serpentinite, and wollastonite (aedelforsite). Of these, seven kinds of mineral reserves rank first in the country: potassium, magnesium, lithium, strontium, Glauber's salt, asbestos, and limestone.

(2) Solar Energy Resources

The CCEPZ has a thin atmosphere, with high solar intensity and long hours of sunshine, combined with a dry climate with little rainfall. Cloud cover is low; the average annual sunshine time of 3,500 hours means a sunshine percentage of 80% or more. The

average annual solar radiation amount is 7000 MJ / m, the second highest value area for solar energy in the country. The theoretical solar power installed capacity is up to 28 million kilowatts; the theoretical generating capacity reaches 5.12 trillion kwh, amounting to more than 90% of the theoretical Qinghai solar installed capacity and power generation.

(3) Wind Energy Resources

The pilot zone is rich in wind resources, covering the majority of Qaidam area. The average wind power density is more than 50 to 100 watts / square meter; the annual wind energy available time is 3500 to 5000 hours, which works out to a frequency of 50 to 70%. The annual average wind speed is 3 m / sec or more; in the western and Tanggula Mountain areas it is more than 5 m / s. Overall there are more than 50 days in the basin with wind speed ≥17 m / s, but more than 100 days the western parts, and the Tanggula area has above 150 days of high winds. This is the highest in the nation with the same latitude. At three sites, the maximum wind speed exceeds 30 m / s site, with a maximum wind speed of 35 m / sec. However, due to the high altitude and low air density, the wind energy density is relatively small, with the maximum wind pressure of 0.48 kN / m; while at Cold Lake, Chaerhan, and Mangya, the overall average wind power density is 80 W / m or more.

(4) Distinctive Biological Resources

Haixi has a wide range of wildlife resources. There are 196 kinds of wild animals, and more than 400 species of wild plants, of which 62 rare wild animal species are classified as under national and provincial protection. There are unique pastoral resources: an abundance of spring wheat, high quality barley, canola, high quality beef and mutton and other agricultural and livestock products. Qaidam wolfberry red fruit, black fruit wolfberry, and cashmere are famous around the world. It is a vast natural grassland, with rich flora and fauna and a pollution-free environment: a good choice for the development of distinctive green bio-industry.

(5) Land Resources

Due to the fact that the pilot zone has large areas of saline soil, salt marshes, and gravel desert, the planned industrial development can take advantage of desert land and does not occupy arable land, farmland and pastures. Hence, there are good land resources for the development of CCEPZ. According to statistics, the pilot zone's usable land area is 491,970,000 mu, of which there are: 167,120,000 mu of agricultural land; construction land 1,207,400 mu; and unused land 301,140,000 mu.

(6) Water Resources

The CCEPZ has an independent inland water system with rich water resources. According to statistics, the Qaidam region has 79 small rivers, with 37 larger year-round rivers. There are eight rivers with more than 100 million cubic meters of annual runoff. There is presently a glacier area of 1,358.46 square kilometers, with water reserves of 113.5 billion cubic meters. The water resources total 4.339 billion cubic meters. According to the national and river basin water resources integrated planning, the annual available utilization is 1.874 billion cubic meters, of which 578 million cubic meters is being utilized.

(7) Tourism Resources

Qaidam has a beautiful and magnificent natural landscape, with colorful ethnic customs and unique religious practices. It is filled with natural charm and mystery, especially in the "mountains of the motherland," the Kunlun Mountains, which play an important role in Chinese culture. Along with the Kunlun Mountains are the Altun and Qilian mountains, and the Qaidam Basin is surrounded by the peculiar topography of the Tanggula Mountain plateaus. It is a magical land of great beauty. At the secluded roof of the world with landlocked geography, the Qaidam area possesses unique natural scenery. "Trip through the Qaidam" has been the one of the “Top 10 Tourism Destinations” in China. The Kunlun Mountains, Salt Lake and Yadan Geomorphology are rated among the top 100 sightseeing places in China.

II. Development Process of the CCEPZ

There are 2 key time periods in the CCEPZ development process.

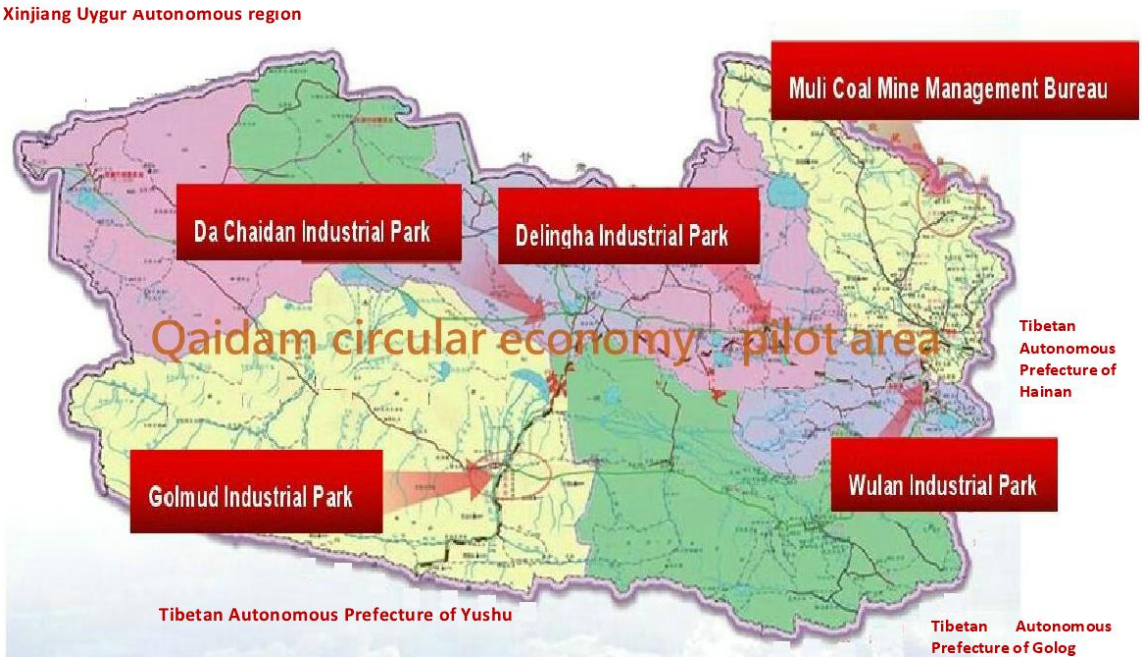
1. *In October 2005, the CCEPZ was Officially Established.*

In April 2005, the Qinghai Provincial Governor Song Xiuyan paid field visit to Haixi for investigation, proposing a development thought train for developing the resources of Qaidam, that is, “Comprehensive Development, Efficient Allocation, Recycling Use”. In May, China Premier Wen Jiabao inspected the Qinghai Salt Lake Industry Group, Golmud Refinery and other key enterprises, proposing to add "sustainable development” into what Qinghai governor Song Xiuyan proposed regarding Qaidam’s development. In August, the Qinghai Provincial Government organized a meeting for demonstration and argumentation, eventually having passed the "Implementation opinions of the CCEPZ". In September, the Qinghai Provincial Government submitted to the National Development and Reform Commission The “ Application Letter on Identifying the Qaidam Region as a National Circular economy Pilot Zone". In October, with the consent of the State Council, the National Development and Reform Commission, SEPA and four other ministries approved the Qinghai Qaidam [entire] region as one of the first of 13 national circular economy pilot industrial zones.

2. *In March, 2010, the General Plan of the CCEPZ was Laid Out.*

In March 2006, through the concerted efforts of all sides, the "Operational Plan of the CCEPZ in Qinghai" was prepared and submitted to the National Development and Reform Commission.

Chaidam (national) circular economy planning map



In June, the provincial government introduced the "Opinions on How to Implement the Development of Circular Economy in Qinghai Province". In November, in the "The Instructions from the State Council on Support for Economic and Social Development in Tibetan areas of Provinces like Qinghai", it explicitly proposed "to promote the circular economy pilot area, with emphasis on Golmud, Delingha, Ulan and Dachaidan demonstration park construction." In February 2009, the "General Plan of the CCEPZ" was completed and submitted to the National Development and Reform Commission (hereafter "NDRC"). In March, the NDRC agreed in principle with the "General Plan of the CCEPZ". In August of 2009, during his visit to Qinghai, Vice Premier Li Keqiang pointed out that the CCEPZ is forward-looking, thus having a long-term impact, and that the NDRC should set about making a plan to support it.

In March 2010, the "General Plan of the CCEPZ" was approved by the State Council. It has been a mark of upgrading the construction of the CCEPZ from a local development strategy to a national development strategy.

III. Major Contents of the General Plan of the CCEPZ

In March 2010, the State Council approved "the overall planning of Qinghai Qaidam CCEPZ". The document noted that as the "General plan" is implemented, it will be an opportunity to accelerate the transformation of economic development as well as of institutional and technological innovation. The principle of implementation includes: follow the "reduction, reuse, resource-based concept"; strengthen circular economy industrial park planning and construction; actively foster the industrial chain of circular economy and its leading enterprises; increase R&D and promotion efforts to support a recycling economy and technological development; and make efforts to build national circular economy demonstration zone area.

1. Guidelines and Fundamental Principles

The General Plan of the CCEPZ takes the concept of scientific Development as important guidelines. It will be operated under the "Circular Economy Promotion Law" and other relevant laws and regulations. In order to achieve the economic goal and protect the ecological environment, the “General plan” starts with the comprehensive utilization of specific resources with the support from scientific and technological innovation. The circular economy industrial park is used as the base. According to the circular economy “reduction, reuse, resource-based" concept, the General plan takes into account the pooling of resources and intensive use of the coordinated development of industry. The salt chemical industry is built as the leading industry in circular economic development. The new sustainable development pattern in the area of rich resources and ecological sensitivity will be continuously explored.

2. Development Objectives

The general plan should follow the concept of circular economy development with regional characteristics, and set up its goals to adhere to the conservation of resources, environmental protection, according to its requirements for "comprehensive development, effective distribution, recycling, and sustainable development". The General plan starts with comprehensive utilization of specific resources with the support from scientific and technological innovation. The circular economy industrial park is used as the base. The General plan takes into account the pooling of resources and intensive use of the coordinated development of industry. The salt chemical industry is built as the leading industry in circular economic development. The new sustainable development pattern in the area of rich in resources and ecological sensitivity will be continuously explored. The main goals are proposed in a two-stage approach: the initial stage starting in 2015 with the comprehensive development of salt lake resources as the core of the recycling industrial system, along with the basic development of the salt chemical industry, oil and gas and the potash chemical industry base. In 2020, the CCEPZ will be developed into a national distinctive circular economy demonstration zone, as the full realization of a well-off society.

3. Development Strategy of Major Industrial Sectors

The key General plan is to implement the construction of "One Zone with Four Parks" and build a "Six Important Industries" system. In the Qaidam ", "one zone" refers to the Qaidam CCEPZ that has features of low emissions and efficient use in resource development, recognized as a resource-based, regional industry circular economy demonstration zone. The "Four Parks" refer to circular economy industrial parks in Golmud, Delingha, Ulan, and Dachaidan. Of these, the Golmud circular economy industrial park focuses on salt chemical, oil and gas industry, and metallurgical industry. The Delingha circular economy industrial park focuses on saline chemicals, the silicon industry, and the development of new building materials industry. The Ulan industrial park focuses on coal full processing and utilization and developing salt lake resources. The Dachaidan circular economy industrial park focuses on energy, coal, nonferrous metallurgy comprehensive utilization, and the integrated development of the salt chemical industry. The six leading industries are as follows: (1) salt lake’s chemical recycling industry that focuses on potassium resources development; (2) metallurgical industry; (3) oil and gas chemical recycling industry; (4) coal chemical industry based on comprehensive utilization; (5) biological circular economy industry that focuses on plateau biological resources development; and (6) solar, wind and other

new and renewable energy industry.

4. Environmental Protection & Ecological Construction

The General plan proposes "to implement the strategy of sustainable development for the purpose of comprehensive utilization of resources, waste reduction, recycling and safe disposal of waste". These are the means to effectively transform the economic growth and industrial pollution prevention and control method, and commit to the most effective use of resources and protection of the environment based on circular economy. This should achieve the overall objective of sustainable development of the circular economy demonstration zone. It also clarifies the objectives of environmental protection in four aspects, which are: the protection of the atmosphere, surface water, soil, and ecologically sensitive areas. The specific control indicators are set up for the comprehensive recycling rate and disposal rate of industrial waste air, waste water, and industrial solid waste disposal. The measures of control in these three areas are meant to be implemented at the same time. The General plan has also made specific control indicators for industrial enterprises noise emission standards, and proposes specific implementation measures in the above areas.

5. Analyzing Resources Support Capacity and Developing Counterpart Systems & Safeguards

The General plan analyzes the supporting capacity in depth in the aspects of the minerals, energy, land, water, transportation and technical support in the pilot area. At the same time, it sets up plans for the construction of six systems, which include water-saving systems, infrastructure and supporting systems, hydraulic systems, energy engineering systems and technical support systems. It also proposes safeguard measures in six areas, which include laws and regulations, management, science and technology, organization, safety and disaster prevention, as well as public education. This assures a set of supporting systems for the pilot zone built so that the healthy and rapid development is guaranteed effectively.

Since the Twelfth Five Year Plan, the CCEPZ has speeded up its development according to the objectives and requirements set up by the General Plan of the CCEPZ. Among six categories with 21 indicators in the development of the CCEPZ, ten indicators were completed on time as it planned. 8 indicators were exceeded, accounting for 85.71% of all indicators; 3 indicators were close to staged targets, accounting for 14.29% of all indicators. Currently, taking the salt lake chemical engineering as the core, the CCEPZ has basically formed an industrial system of circular economy with integrated developments of multiple industries such as oil and gas chemical engineering, coal chemical engineering, metallurgy, new energy, new materials, and distinctive biology. The two industrial parks in Golmud and Delingha have already gained its considerable scale; the two industrial parks in Dachaidan, and Ulan have developed quickly, thus further enhancing industrial clustering effects and motivation effects of leading enterprises, obviously improving the capacity of innovation of key enterprises, and further promoting the work of energy conservation and emission reduction. In a sense, the CCEPZ has adjusted and developed its industrial structure towards the goal of improving quality and increasing efficiency, thus achieving its staged effects in terms of 3Rs, that is, Recycling, Reduction and Reuse. In February 2015A third-party interim assessment was conducted commissioned by the National Development and Reform Commission. In May 2015, the National Development and Reform Commission

confirmed that the pilot zone was inspected and accepted as the national circular economy pilot demonstration zones in the second round of inspections. It can be concluded that the CCEPZ has entered into a new stage of construction and development.

IV. Current Development Status of the CCEPZ

Since the implementation of the "12th Five-Year Plan, according to the General Plan of the CCEPZ, taking the salt lake chemical engineering as the core, the CCEPZ has basically formed an industrial system of circular economy with integrated developments of multiple industries such as oil and gas chemical engineering, coal chemical engineering, metallurgy, new energy, new materials, and distinctive biology. And it has basically developed a development situation of "One Zone with 4 Parks", namely, the CCEPZ with the 4 industrial parks in Golmud, Delingha, Dachaidan and Ulan. Of which, there are 2 hundred-billion-yuan industrial bases in Kunlun and Chaehan of Golmud as well as 4 fifty-billion-yuan industrial bases in Delingha, Dachaidan, Ulan and Dulan. They all have been taken off.

1. Golmud Industrial Park

This park is an experimental area for the construction and development of circular economy, and the main "battlefield" in order to accelerate the construction of the industrial bases in Kunlun and Chaerhan worth 100 billion Yuan respectively. The goal is a bigger and stronger salt chemical industry, oil and gas, chemical and black non-ferrous metallurgy smelting, and other new energy recycling leading industries. A modern logistics industry, with good registration and coordination services inside or outside of the pilot zone, has been set up. At the same time, the Park relies on the advantages of resources in the surrounding areas (Tibet and Xinjiang), to accelerate the construction of industrial parks in those areas.

After years of development, Golmud Industrial Park has nurtured many companies including: Qinghai Salt Lake Industry Co. Ltd., Golmud Zangge Potash Co. Ltd., Qinghai CITIC Guoan Technology Development Co. Ltd., Qinghai Lithium Industry Co. Ltd., and other salt chemical leading enterprises; Golmud refinery, Petro China Co., Ltd., Qinghai Zhonghao Gas Chemical Co. Ltd. Qinghai Kunlun Energy Co. Ltd. and other oil and gas chemical leading enterprises; Qinghai Qinghua Group Limited, Qinghai Xiyu Nonferrous Metals Co. Ltd., Yuyuan Golmud, Qinghai Huaxin Smelting Co. Ltd., and other metallurgical leading enterprises; Huaneng Golmud Photovoltaic Power Company Limited, Longyuan Golmud New Energy Development Co. Ltd., Three Gorges New Energy Golmud Power Generation Co. Ltd., Qinghai Photothermal Power Group Co. Ltd., and other new energy leading enterprises; the Kunlun Mountains Mineral Water, Kunlun Jade and other emerging industries. The main products in the CCEPZ are potassium, magnesium potassium sulfate fertilizer, agricultural potassium nitrate, ADC foaming agent, liquefied natural gas, methanol, sodium chlorate, potassium perchlorate, lithium carbonate, iron powder, crude lead, mineral water, and organic wolfberry.

Chaerhan major industrial base: located in Chaerhan Salt Lake (Golmud - Chaerhan Salt Lake) on both east and west sides of the Gecha highway, a total of 75 square kilometers. Its main industry includes large and medium-sized potassium chloride industry, salt lake chemical industry, metal magnesium and alloy industry as well as the non-standard

equipment manufacturing industry as supplemented industry. So far, a comprehensive utilization of resource-based industrial system has been established by using potassium as main resource with magnesium, sodium, lithium and boron. At present, there has been a number of leading enterprises such as the Salt Lake Co., Zangge Potash Co., Zhongxin Guoan Co. Now the capacity of production has reached 7.5 million tons of potassium chloride, 200,000 tons of potassium sulfate, 800,000 tons of potassium magnesium fertilizer, 300,000 tons of potassium nitrate, 120,000 tons of potash, 720,000 tons of potassium carbonate, 3.4 million tons of soda ash, 100,000 tons of high purity magnesium hydroxide. The on-going projects are building 400,000 tons of magnesium metal integration, 200,000 tons of potassium nitrate, 800,000 tons of magnesium-based new materials, new 1 million tons of potassium chloride.

Kunlun major industrial base: It is located in the southeast of Golmud city center and has the planning area of 45 square kilometers. Its main industries have oil refining, oil and gas chemical industry, black non-ferrous metal mining - smelting processing, Dongxi Taijinaier Salt Lake chemical comprehensive utilization of industry, supplemented by mineral water industry, Kunlun jade industry, chlorate chemical industry, building materials and chemical industry. At present, the base has reached the extraction capacity of 2.3 million tons of oil, 9 billion cubic meters of natural gas, and built gas transmission and oil pipelines of Seninglan, Sege, Sehua and Huage. The finished projects are to build 1.5 million tons refinery expansion, 300,000 tons of methanol project of Qinghai Oil Co., the 100 million tons of natural gas methanol project of Zhonghao Natural Gas and Chemical Co., Golmud 300,000 kilowatts of gas power plants.The on-going projects arethe resource development of nickel and cobalt ore, the integration of iron and steel, 6 million tons of iron ore mining, annual output of 20,000 tons of multi-metal smelting, 450,000 tons of iron ore mining, 500 million boxes of mineral water, natural gas and methanol upgrading, coal-fired power station, 1.2 million tons of multi-metal mining project.

2. Delingha Industrial Park

Around fifty billion Yuan has been invested to: build the industrial base, make efforts to promote the comprehensive salinization industry, green industry, new energy industry, alkali chemicals, new materials, and other leading industries. The Delingha Park actively supports the development of assorted equipment manufacturing, logistics, infrastructure, and systems for collaborating and connecting between industries in circular economy. Meanwhile, the Park has actively promoted the Zhengjiang industrial park construction with the support from Zhejiang Province as the counterpart. After years of development, the Park has nurtured many companies as follows: Zhongyan Qinghai Kunlun Alkali Industry Co. Ltd., Qinghai Fatou Alkali Industry Development Investment Co. Ltd., Qinghai Western Magnesium, Qinghai Jinfeng Industrial Co. Ltd. and other alkali chemical leading enterprises; Qinghai Zhonghang Silicon Materials Co. Ltd., Qinghai Qaidam Qingyuan Magnesium Technology Co. Ltd., and other new material leading enterprises; Haixi Huahui Chemical Engineering Machinery Co. Ltd., Qinghai Rijing Photoelectric Co. Ltd., and other equipment manufacturing enterprises; Qinghai Siruiyake Biological Engineering Co. Ltd., Delingha Biotechnology Co. Ltd., and other biotechnological leading enterprises; Qinghai Zhongkong Solar Ltd., Qinghai Hua Wei Optical Co. Ltd., Qinghai Eastern Hualu New Energy Investment Co. Ltd. and other new energy leading enterprises; Qinghai Haixi chemical & building materials Co., Ltd., Haixi Jinhai Building Materials Technology Co., Haixi Jianke Energy-Saving Building Materials Development Co. Ltd., and other building materials

enterprises. The main products are soda ash, calcium chloride, high purity magnesium, silicon metal, high strengthen and highly intensified magnesium alloy, steel mesh skeleton PE pipe, steel reinforced polyethylene corrugated pipe, polyethylene pipe, steel structures, pressure vessels, cement, Tibetan medicine, black wolfberry black juice, and organic wolfberry.

Salt chemical comprehensive industrial zone: The planned area is 52 square kilometers. The industrial functions are mainly built for the salt-alkali chemical industry, the new materials industry, building materials, equipment manufacturing industry. Nearly 12 square kilometers was finished. Its production capacity has reached 2.2 million tons of soda ash, 2 million tons of cement, 100,000 tons of calcium chloride, 300,000 meters of steel-framed PVC pipes, 100,000 tons of high purity magnesium hydroxide, 600,000 block of aerated blocks, 15,000 tons of silicon metal products. At present, the on-going projects are building 1,200 tons of high strength and toughness of magnesium alloy, 200,000 tons of new-type structural steel plate, 200,000 tons of magnesium-based fire retardants and composite materials, 10,000 tons of natural spherical graphite.

Green industrial zone: The planning area is 5 square kilometers, of which 0.28 square kilometers has been completed, mainly used for the development of wolfberry, yak, Qaidam Funiu, Tibetan antelope, Nitraria, sea buckthorn, fruit and vegetable products, to promote biological circular economy model by deep-processing these typical local products. At present, the on-going projects are building production capacity of deep-processing 2,000 tons of Tibetan medicine, 10,000 tons of wolfberry, and Qaidam Funiu, Nitraria.

3. Dachaidan Industrial Park

Around fifty billion Yuan was invested to build the industrial base, in Dameigou, Yuka, Mahai Lake, Big Salt Beach, Kunteyi, Xitieshan and other places rich in coal, salt, and non-ferrous metals. They are striving to have a bigger and stronger salt chemical industry, comprehensive utilization of nonferrous metallurgy, and other leading industries. New energy industries have been developed in Cold Lake, Mangai region. After years of development, the following companies have been nurtured: Qinghai Wucai Alkali Industry Co., Ltd., Qinghai Innovation Mining Development Co., Dachaidan Dahua Chemical Co. Ltd., Dachaidan Zhongtian Resources Development Co. Ltd., Qinghai Salt Lake Sanyuan Chemical Co. Qinghai Qaidam Boron Chemical industry Co. Ltd., Dachaidan Leqing Chemical Technology Co. Ltd., Dachaidan Geely Chemical Co. Ltd., and other Salt Lake chemical leading enterprises; Qinghai Yuca Coal Co., Ltd., Qinghai Kunyuan Mining Company Co. Ltd., Qinghai Yihai Energy Co., Ltd., and other coal leading enterprises; The Western Mining Corporation Xitiesan Branch, Dachaidan Mining Co. Ltd., and Qinghai Zhonglian Mining Development Co. Ltd., are the metallurgy leading enterprises; Zhongguanghe Solar (Dachaidan) Development Co. Ltd., Qinghai Dashadan Zhong Energy Saving Solar Power Generation Co. Ltd., Three Gorges New Energy Dachaidan Power Generation Co. Ltd., Dachaidan Yuntian Industrial Co. Ltd., Qinghai Bohua Lithium Industry Co. Ltd.,and other emerging industries and key enterprises. The main products are coal, soda ash, boric acid, electricity, sulfuric acid, potash, gold, lead, zinc, lithium chloride, calcium chloride, mono-ammonium phosphate, sodium sulfide, methyl-thio acetaldehyde oxime, magnesium sulfate, potassium magnesium, fertilizer, and organic wolfberry.

Xitieshan Industrial Zone: The planning area is 6.16 square kilometers. It is located in the Xitieshan Town of Dachaidan, northwest from Chaiqidan town about 70 kilometers, east of Qinghai-Tibet Railway's Xitie Shan Railway Station about 7 km, south to 215 State Road about 7 Km, is built as the fine chemical industrial zone for development of metallurgical and lead-zinc tailings and salt lake comprehensive utilization. It has settled in 4 enterprises.Its annual production output is 1.5 million tons of lead and zinc mining, 120,000 tons of sulfuric acid, 180,000 tons of synthetic ammonia, 75,000 tons of phosphoric acid, 100,000 tons of powdered ammonium phosphate, 1 million tons of compound fertilizer, 300,000 tons of joint base.

Yinma Gorge Industrial Zone: The planning area is 24.6 square kilometers. It is located in the North of Yinma Gorge Railway Station of Dachaidan Xingwei, the southwest of Hongtiegou in Quanji mountain, about 70 km to the northwest from Dachaidan Town, 3 kilometers to Yinma Gorge railway station at the intersection of the Qinghai-Tibet Railway and Guoge Railway. It is an industrial zone for energy and chemical industrial development, mainly based on the Salt Lake chemical industry and clean utilization of coal resources. It has settled in 8 enterprises. Its production output is 100,000 tons of alkali, 1.1 million tons of soda ash.The on-going projects are 100,000 tons of sodium sulfide, 1 million tons of new coal-based fuel treatment, 200,000 tons of coal ash, 3000 tons ofhexocyclium metilsulfate, and a 100 million plastic woven bag production line.

Dachaidan boron industrial zone: The planning area is 12 square kilometers. It is located in the southwest of Dachaidan town, adjacent to Dachaidan Lake.It is a chemical industrial zone for Salt Lake chemical and fine chemicals. 6 enterprises are now settled in. Its production output reached 300,000 tons of boron mining, 35,000 tons of boric acid, 100,000 tons of potassium chloride, 20,000 tons of magnesium sulfate. The on-going projects are the construction of 0.1 million tons of zinc borate, and 0.5 million tons of calcium borate and other projects.

4. Ulan Industrial Park

Around fifty billion Yuan have been invested to build the industrial base, to develop the coal resources in the Wuli coal mining area, and actively promote coal intensive processing and comprehensive utilization of industry, relying on rich limestone, salt lake resources. It will actively promote the salt chemical industry, develop new energy industries, and lead the [neighboring] Tianjun County industrial economic development. After years of development, it has nurtured the following companies: Qinghai Qinghua Coal Group Co. Ltd., Qinghai Ulan Coal Mining Group Chemical Co. and other coal chemical leading enterprises; Qinghai Salt Industry Co. Ltd., Qinghai Youming Salinization Co. Ltd., Qinghai Jing Ke Salinization Co. Ltd., Qinghai Haixi Mo River Tuochang Salt Factory, Qinghai Wujin Chemical Co. Ltd., Keke Salt Mining of Zhongyan Qinghai Kunlun Alkali Industry Co. Ltd. and other salt enterprises; Zhongguanghe Solar Limited Ulan Branch, Qinghai Yuhui New Energy Co. Ltd., Qinghai Jinfeng New Energy Photovoltaic Power Co. Ltd, Qinghai Yellow River Hydropower Development Co. Ltd., Ulan Solar Co. Ltd., Qinghai Qaidam Energy Investment Development Co. Ltd. and other new energy leading enterprises; Ulan Jiren Ecological Agriculture and Animal Husbandry Co., Haixi Sincere Agricultural Development Co., Ulan Sanjiang Wotu Ecological Agriculture Science and Technology Development Co. Ltd., Qinghai Tibetan Food Co. Ltd.. Qinghai Plateau Meat Co. Ltd., and other distinctive agricultural and livestock enterprises; Qinghai Hongsheng

Technology Development Co. Ltd., Haixi Yuanheng Investment Co. Ltd., Qinghai Kunlun Jade investment and Development Co., Wulan Huanyu New Building Materials Co. Ltd. and other emerging industries. Up to now, a total of 53 enterprises are in the park, of which 7 enterprises are large-scale. The main products include coke, coal, crude benzene, tar, ammonium sulphate, industrial salt, processed salt, potassium chloride, Chaka sheep, organic wolfberry, quinoa, organic fertilizer, Kunlun jade and soon.

Chahannuo coal coking industrial zone: The planning area is 10.5 square kilometers. It is located about 40 kilometers away from Ulan County. The State Road 315 and the Qinghai-Tibet Railway go through the north of the industrial zone from the east to the west. It is connecting to the National Highway 109 by the subline between Chahannuo and Chaka. It is mainly built for coal chemical industry by the utilization of rich coal coking resources from Muli coal mining. At present, the main enterprises in the industrial zone are Qinghai Qinghua Coal Chemical Company, with a capacity of 2 million tons of coke and supporting crude benzene, 3 million tons of coal separation, 150,000 tons of tar deep processing and 2x15megawattscombined heat and power generation. The on-going projects are 100,000 tons of coke-oven gasification LNG and 8 million tons' coal preparation plant.

Chapter II Major Practices and Benefits of the Chaidamu Circular Economy Pilot zone

I. Major Practices of the CCEPZ

Since 2006, in accordance with the "General Plan of the CCEPZ in Qinghai Qaidam" and the deployments and requirements of circular economy development by the Central Government, the Qinghai Provincial Government and the Haixi Prefecture Government, the pilot zone has made tremendous progress in the seven areas: planning, policy research, technological innovation, promotion, energy Saving, eco-environment building and infrastructure construction. The circular economy concept has been consistently applied to resource utilization, industrial development, industrial zones' construction and adjustment of industrial structure. The circular economy development pattern has been basically established.

1. Scientifically Preparing Park Development Plans

The CCEPZ has the aim of industrial restructuring, transformational upgrading, improvement of quality and efficiency, and promotion the development of key industries. The pilot zone has established and implemented a number of plans, such as: the "Pilot zone Special Advantage Circular Economy Industries Development Program"; "Pilot zone Water Resources Comprehensive Plan"; "Golmud Industrial Park Construction and Development Planning"; "Delingha Industrial Park Construction and Development Plan"; "Muli Coal Mine Coal Resources Comprehensive Utilization Plan"; "Qaidam Green Industrial Park Construction Plan;" "Kunlun Gold Industrial Park Plan"; "Magnesium Alloy New Materials Industry Plan"; and "Implementation Suggestions of Building a Circular Economy Leading Area in Pilot zone". There is a two hundred-billion industry base in Golmud, Kunlun, and Chaerhan, and four fifty-billon industrial base promotion plans in Delingha, Dachaidan, Ulan and Dulan. The "Pilot zone Master Plan Environmental Impact Assessment Report" passed the review by the Department of Environmental Protection. All of these have laid a good foundation to deepen and widen each industry, resource, and product developed at multiple levels.

In May 2015, the NDRC, Ministry of Environmental Protection, Ministry of Science and Technology, Ministry of Industry and Information Technology, Ministry of Finance, Ministry of Commerce, and National Bureau of Statistics jointly issued a "National Circular Economy Pilot Zone Unit Inspection and Evaluation and Acceptance Announcement". The CCEPZ passed the inspection and evaluation, so that the pilot zone can continue to enjoy preferential policies in investment, finance and other areas, and be considered under the same preferential conditions as the circular economy "Ten –Hundred- Thousand" national program.

2. Greatly Implementing Priority Industrial Projects

The CCEPZ has used the construction of circular economy projects as their means to build up the industrial system and promote industrial transformational upgrading. It has implemented a number of priority projects like Stages 1-2 of Integrated Use of Salt Lake Resources of the Salt Lake Company, Limited, Integration of Metal Magnesium, 1.2

million tons of sodium carbonate of the Qinghai Alkali Industry Development Investment Company, Limited, 0.6 million tons of methanol of the Zhonghao Company and 2 million tons of coke of the Qinghua Company, completing an investment of RMB 201.7 billion yuan. The CCEPZ has intensified efforts in business invitation and investment enticement by cumulatively signing 628 projects and implementing 248 projects, thus providing a powerful support for sustained investment growth.

1) Reforming and Upgrading Traditional Industries

Recycle-based industries in the CCEPZ have gained steady development, for example, salt lake chemical engineering that takes integrated use of salt lake resources as the core and uses development of potassium resource as a dragonhead. The Salt Lake Industrial Group has completed stages 1 and 2 projects of Comprehensive Use of Million-ton Potassium as scheduled. Furthermore, recycle-based industries relating to oil and gas chemical engineering dominated by the counterpart development of salt lake resources have also accelerated their development. For instance, the Golmud Oil Refinery has soundly completed the Project of Enhancing the Oil Finery Capacity of 1.5 million tons and Products Quality Improvement and Upgrading, and new breakthroughs have been made in terms of field survey and capacity development regarding oil and gas. In addition, there are metallurgy industries based on the integrated use of salt lake resources and coal integrated use industries using the counterpart development of salt lake resources as a prerequisite. They also have improved steadily, thus laying a good foundation for the future development of the CCEPZ.

2) Fostering and Developing Emerging Strategic Industries

In terms of new energy, the CCEPZ has made good use of the opportunity of national policies of greatly supporting new energy industry and taken advantage of rich resources of wind energy, solar energy as well as abundant land and electrical grid to vigorously develop such industries as photovoltaic power, photo-thermal power, wind power and lithium ion battery, thus constructing a well-round industrial chain of new energy. At present, the pilot zone has a completed PV installed capacity of 2933 MW and a wind power installed capacity of 317 MW. As of new materials, based on the existing industries and taking advantage of such metal elements as magnesium, nickel and cobalt, the CCEPZ has actively developed new type materials like magnesium alloy, nickel alloy and cobalt alloy. Moreover, based on lithium carbonate products, it has set about developing materials of lithium ion battery like lithium magnetite manganate, lithium cobalt oxide and lithium phosphate. At present, the CCEPZ has reached a production capacity of 40,000 tons of lithium carbonate, and the Qinghai Haimeite Magnesium Co. Ltd has a project with an annual output of 56,000 tons of magnesium alloy and special magnesium alloy which has turned out the first batch of products province-wide. Additionally, it has established a 1000 ton high-purity lithium chloride project and it is being on test run.

3) Boomingly Developing Distinctive Highland Biological Industries

The CCEPZ has vigorously developed the Qaidam wolfberry industry and the Qaidam cow milk industry, two distinctive agriculture planting and livestock raising industries worth RMB 10 billion Yuan, thus taking a big reap in promoting the extension of industrial chains of green agricultural and livestock products. Currently, the Qaidam wolfberry industry in the CCEPZ has an increasingly high proportion and an

increasingly great contribution rate in the primary industry, with an increasingly brilliant development prospect. By the end of 2015, the prefectural wolfberry industry had reached a total acreage of 314,500 mu, and has 58,000 mu of organic wolfberry. The annual harvest volume is 4350 tons, and the output value is 350 million Yuan. The CCEPZ has become the second largest wolfberry planting base only second to the Ningxia Hui Autonomous Region, with its organic wolfberries export volume ranking first nationwide. Currently, wolfberry production accounts for 43% of the value of Haixi agricultural output; wolfberry's net income per farmer is 2771 Yuan, accounting for 30.2% of the net income of farmers and herdsmen. More than 50,000 people are needed for wolfberry picking in the time of harvest. The current Haixi Qaidam wolfberry industry has become an important pillar in the agricultural industry, which has promoted agricultural industrial structure and efficiency, income for herdsmen.

3. Carefully Implementing Various National Regulations and Policies

To accelerate the development of the Pilot zone, the state has issued 10 policies with respect to the CCEPZ, which clearly guide related administration to support the pilot zone in project entry, industrial restructuring, infrastructure, science and technology support, human resources training, land-use planning and airports, railways, water conservancy, and power grid construction. The provincial government has introduced "the Qaidam Circular Economy Industry Orientation Guideline"; "Circular Economy Special Funds Management Regulation"; "Several Opinions of Qinghai Government on Accelerating the Qaidam Circular Economy Pilot Zone Development"; and "Qinghai Circular Economy Leading Area in Pilot zone Action Plan". And 20 policy measures have been unveiled. A special fund has been established with one billion yuan annually, for the development of circular economy. All these measures are to accelerate and promote the development of the pilot zone, and to guide the industrial parks' concentrated building infrastructure and industry agglomeration. In May 2014, at the Qaidam Circular Economy forum in Delingha, the Governor Hao Peng further clarified that the provincial government should support the construction and development of pilot zone in six areas, which are, to: streamline administration and delegate more power to lower-level governments; distribute productive forces, finance, taxation and elements of security, science and technology, human resources, and infrastructure; and, grant provincial project approval authority to the pilot zone. A series of policies is designed to stimulate the vitality of the pilot zone, and support the pilot zone in investment, project construction and enterprise development.

4. Giving Full Play to the Role of Projects of Key Enterprises

With the theme of "Extending the industrial chains, develop competitive industries, build the core business, foster industrial clusters, and construct major industrial bases", a number of key enterprises are to play the leading role: Qinghai Salt Lake Industry Group, CITIC Guoan, SUPCON, Qinghai Western Magnesium, Qinghai Kunlun Gold and Qinghai Red Magic. These firms are involved in these industries: metal magnesium integration, wolfberry extensive processing, thermal power generation, high purity magnesite, gold refining and other key projects. These companies are extending cluster development among the salt chemical industry, specialty biotechnology, new materials, new energy, metallurgy and other leading industries. They are further expanding the scale of industrial clusters, and further clarifying the industrial framework. They are bringing benefit to the emerging industry clusters, and the parks are healthy and orderly and showing good development momentum.

Enhancing the core competitiveness of industries is the fundamental goal of industrial transformation and upgrading, and upgrading the basic industries and cultivating new industries is the main direction to strengthen the real economy. These reforms will change the previous extensive fundamental economic growth model, which was factor investment and investment-driven, and promote resource development that extends to high-end, high-tech, and high-value. For example, this includes: focusing on the introduction of wolfberry enzymes, high purity lithium carbonate, high purity magnesia, magnesium alloy new materials, structural panels, solar thermal power generation, the third generation of high-performance HCPV, plateau wind power equipment manufacturing, light industry and agriculture and animal husbandry products processing, etc. These projects will promote industrial upgrading, while shifting the industrial economy in a low-carbon, green, circular direction, that promotes their products in a high value-added direction of expansion, and accelerates the pace of transformation across the industry. We can see the shift in the green industry development such as wolfberry, crossbred beef, through which we see the initial establishment of the "agricultural planting and livestock raising - processing - utilization" of the modern agricultural industrial system, changing the extensive agricultural production. We can see the shift in the magnesium alloy industry, through developing structural plate/panels, new materials and other high strength and high toughness magnesium alloy, to promote the integration of upgraded basic industries. We can also see the shift through the development of new energy industries, which effectively promote the development of iron and steel, logistics, construction and other industries, with new energy power plants that generate electricity and cut pollutant emissions. We also can see that core competitiveness has been effectively improved in the pilot zone through examples such as extending through the comprehensive development of magnesium resources, metallurgy and other basic industries, and technological innovation to expand the industrial chain, and the development of basic industries with renewed vigor in the pilot zone. In a sense, the core competitive capacity has been efficiently raised.

5. Vigorously Strengthening the Construction of Capital Projects

Currently, the CCEPZ has, by making good use of good opportunities of national and provincial increased efforts in the infrastructure construction, implemented a succession of significant capital projects with respect to water, electricity and roads, thus obviously improving the support conditions in the parks, remarkably their carrying capacity and service functions, and laying a solid foundation for industrial clustering and rapid development. Currently, the infrastructure for transportation, electricity, water, and communications in the pilot zone has been gradually improved. The three-dimensional transport network is based on road, rail, air, oil pipelines, and gas pipelines. The information network is based on Lanxila optical cables, Qingxin optical cables, and the mobile digital communications-based network. The power supply network is based on 750 kV, 330 kV, and 110 kV large power grids supplemented by small hydro, solar, wind and thermal power. The water supply network is based on regulating reservoirs and ancillary canals, water wells and water pipelines, reservoirs and water conservancy facilities. The pilot area basically has the infrastructure support to accelerate the development of recycling economy. This includes: transportation, energy, electricity, information and communication, water conservancy and other facilities. The various public services supporting the industrial park infrastructure construction have been fully developed according to the thought train of “overall plan, orderly progression, concerted efforts, important breakthroughs, reasonable orientation and multiple inputs”. As a result, the industrial park has improved its well-round foundation bearing capacity. Since 2010,

a total investment of 13.31 billion Yuan has been made, and 77 projects have been completed. Newly built and expanded roads in industrial parks total 574.6 kilometers, with 71.7 kilometers of industry-owned railway lines, 116.12 km of water supply networks, 73.2 km of drainage networks, 160 km of 330 kV power grid, 771 km of 110 kV power grid, and 35 km of 204 kV (and below) power grid. There is new water supply with an annual capacity of 18.25 million cubic meters. Sewage treatment capacity of 23.5 million cubic meters has been built. The industrial logistics parks are completed in Golmud, Delingha, and Dachaidan.

6. Strengthening the Construction of Counterpart Support Systems

The CCEPZ has formed a development situation characterized by different focuses, distinctive features, multiple inputs and mutual counterparts in the parks. It is achieved by furthering refining various counterpart functions of the parks, enhancing the capacity of S&T innovations, vigorously promoting the development of resources to develop and transform toward the advantaged industries, and greatly increasing the capacities of absorbing elements-resulted resources, industrial support and influencing surrounding areas.

1) Improving the Capacity of Securing Resources and Energies

The CCEPZ has prepared such documents like the *General Planning of Mineral Resources* and the *12th Five-Year Plan of Foundation Mapping,* further strengthened geological exploration work, increased input in geological exploration, and intensified efforts in the geological environment protection supervision and management of the mines.

According to statistics, the accumulated reserves of coal resources are 5.2 billion tons, with 408 million tons of petroleum geological reserves and 366.3 billion cubic meters of natural gas reserves. Such resources have further strengthened the capacity of mineral resources of supporting circular economy development. The CCEPZ has established a land reserve center, explored financing in form of loan and strengthened the management and control of land resources, thus constantly improving the capacity of securing land resources. Undoubtedly, the CCEPZ has also constantly reinforced the construction of support system of water resources by strictly implementing the use of water resources and rationally allocating water for socioeconomic development and ecological protection, thus securing the need of circular economy development.

2) Strengthening S&T Leading Role to Create New Advantages of Innovative Drives

To create innovative new advantages, the pilot zone focused on enhancing the core competitiveness of enterprises and the quality of development. The pilot zone continues to strengthen a scientific research platform, with the establishment of 6 national-level science and technology platforms include the national innovation-oriented salt lake industrial clusters pilot, the Salt Lake Comprehensive Utilization of Resources National Engineering Research Center, 7 provincial engineering technology research centers, 4 key laboratories, 2 business incubators and 3 agricultural and livestock research institutions. The pilot zone has also introduced international and national advanced technologies. A number of technical problems in production processes have been overcome, such as: wolfberry biochemical processing, high performance magnesium alloys. Scientific and technological innovation in industries of the pilot zone's industries

has been fully supporting capacity strengthening.

3) Implementing Recycle-based Reform toImprove the Construction Level of the CCEPZ

According to the spirit of the document of "*Opinions on Promoting the Recycle –based Reformation of Industrial Parks*" issued by the NDRC (National Development and Reform Commission) and the MOF (Ministry of Finance), the CCEPZ has organized and developed plans for circular economy transformation in three circular economy industrial parks of Golmud, Delingha, and Dachaidan. In January, 2012, the DRC and the MOF approved the implementation of "*Operational Program of Industrial Parks' Recycle-based Reformation, Demonstration and Pilot Trials in Golmud, Delingha, Dachaidan*". They issued 366 million yuan of circular transformation funds, thus effectively enhancing the industrial park's capacities of industrial carrying and sustainable development.

4) Carrying out Business Attractions Involving the Whole Industrial Chain to Invigorate the Development of the CCEPZ

In recent years, the pilot zone has closely followed the Master Plan requirements to extend the industrial chain, with precise planning in line with national industrial policies, products and good market prospects. There are 140 key investment projects to carry out the work of key investment for industrial development and the key missing links, of which 99 are being implemented so far, and 55 have been built, for a total of 37.948 billion yuan of funds invested in place (excluding photovoltaic power plants and some others). They have successfully introduced a batch of basic and milestone projects such as: Qinghai Huaniu (Ltd) wolfberry enzyme and calcium preparations and Linsheng Technology (Ltd) wolfberry extensive processing. The above projects has helped and will help to fill and enhance the industrial development chains, effectively promote the high value-added resources transformation and chain extending downward, thus improving the overall competitiveness level of the industrial parks.

5) Attaching Great Importance to Financial Services, Adding New Vigor to Corporate Development

In recent years, the pilot zone has continued to improve the financial services organization system and to build a "Park + +Enterprise +Bank" platform. Through joint guaranty loan/ group lending, syndicated loans, and other ways, it has increased the capacity of financing, thus effectively supporting enterprise development and project construction. State capital has played a leading role in financing many enterprises through holding staged stocks in order to entice social capital in the construction of projects with respect to wolfberry enzymes and structural panels. At the same time, to ease the problems of working capital loans for SMEs in the industrial parks, the Qaidam Financing Co. Ltd in the CCEPZ, together with other 13 commercial banks in Qinghai, have guaranteed and provided loans to the SMEs. This effectively supported the park infrastructure and industrial projects, with a cumulative 62 micro, small and medium micro enterprises for 150 loans, with guarantees amounted to 2.285 billion yuan. These loan guarantees have made a positive contribution to promote the industrial parks' construction and development.

6) Organically Connecting Upstream and Downstream Industries to Expand the Market Demand

Accordance with provincial and national requirements, the pilot zone has closely implemented the policy of making organic connections between upstream and downstream industries by highlighting priorities with respect to connections between wolfberry planting bases and wolfberry in-depth processing, between development of potassium nitrate and development of heat-storing melting salt. In so doing, the CCEPZ has greatly advanced a bridge of integrative connections among industries and between supply and demand, thus forming a new development of inter-enterprise collaborations, and building a solid foundation for a circular industrial system that is multi-industry, longitudinally extending, with horizontal integration.

II. Constructional Benefits of the CCEPZ

1. Economic Benefits

1) Significantly Increased Comprehensive Economic Strength

In 2013, the gross regional product of the pilot zone reached 60.97 billion yuan, representing an increase of 104.8% from 2008, an average annual increase of 15.4%. Industrial value added value was 42.67 billion yuan, an increase of 93.8% compared with 2008, for an average annual increase of 14.1%. For the three industry sectors [agriculture and animal husbandry, manufacturing, and services], the proportion was 3.6: 80.5: 15.9. The first and third industry sectors rose year by year; the industrial structure has been optimized, and the comprehensive economic strength of the region has been effectively improved. We can say that the implementation of the pilot zone Master Plan in these three years is the region's fastest growing period, with enhanced economic output and the largest ecological construction, contributing much to the provincial economy and making a significant impact.

2) Basically Developed Industrial Systems with Distinctive Advantages

In 2013, the gross regional product of the pilot zone reached 60.97 billion yuan, representing an increase of 104.8% from 2008, an average annual increase of 15.4%. Industrial value added value was 42.67 billion yuan, an increase of 93.8% compared with 2008, for an average annual increase of 14.1%. For the three industry sectors [agriculture and animal husbandry, manufacturing, and services], the proportion was 3.6: 80.5: 15.9. The first and third industry sectors rose year by year; the industrial structure has been optimized, and the comprehensive economic strength of the region has been effectively improved. It can be safely said that the implementation of the pilot zone Master Plan in these three years is the region's fastest growing period, with enhanced economic output and the largest ecological construction, contributing much to the provincial economy and making a significant impact.

The CCEPZ has increased project planning and investment efforts to attract a large number of investors interested in the pilot zone development, thus forming 6 industrial systems such as salt chemical, oil and gas, coal chemical, metallurgical and non-ferrous metals, specialty biotechnology, and new energy; a development situation with 1 circular economy pilot zone with 4 industrial parks in Golmud, Delingha, Dachaidan, and Ulan; and 10 primary product bases such as potash, salt, magnesium metal, oil and

gas, and wolfberry. A salt chemical industry is at the core, with a variety of mineral resources, and products, with comprehensive development of science and technology characterized by multi-industry cross-links, integration and development, and a reasonable structure. This highlights the advantages of intensive use, with a circular economy industrial chain framework, accelerating industrial restructuring and upgrading, and optimized industrial layout. At the same time, this has also led to circular agriculture, social services and construction of recycling systems; in short, a recycling-oriented society is bearing fruit.

3) Optimized Economic Structure

Through the development of a recycling economy, in the whole pilot zone in Haixi, the entire industrial structure has been greatly optimized. In the primary sector (agriculture and animal husbandry), specialized and advanced Green industry has been developed such as Chinese wolfberry, Funiu special beef brand, quinoa, wild donkey, and highland cold water aquaculture. Agricultural restructuring has been fostered, establishing a system of "agricultural planting, livestock raising - processing - utilization" system. It promotes a modern agricultural support system, and the mutual coordination of industrial development and farmers' incomes. This good situation is mutually reinforcing. In the secondary industry (resources and manufacturing), changes are underway from the past practice of relying solely on the extractive industries. Resource recycling is in full swing, the industrial chain continues to be extended, and downstream industries are being developed. The role of leading enterprises as the backbone of regional industrial linkages has been significantly enhanced, and industry cluster effects and industry aggregation are increasing. The tertiary industry (services) is developing rapidly: equipment manufacturing, installation and maintenance, logistics and other industries. A large-scale, modern logistics industrial park layout has been taking shape. Regional logistics nodes benefit Golmud and Delingha. Culture and tourism are booming, and charming Qaidam’s fame is growing. In recent years in the pilot zone, primary and tertiary industries have accounted for an increasing proportion of regional GDP year by year. The industrial chain extension of the secondary industry and processing industry has substantially increased as a proportion of the industrial structure. Development is being reoriented towards quality and efficiency.

2. Social Benefits

Circular economy development promotes local processing of resources to increase value, increase the total regional economy, and enhance scientific and technological strength, while effectively improving the logistics, energy flow, and flow of information. This drives the development of tertiary industry to achieve economic, social, and ecological harmonious development of the environment.

1) Synchronized Growth in Employment and Income of Urban Residents

Employment and income have simultaneously increased. About 42,000 direct jobs have been created in the new enterprises in the pilot zone, with management personnel, technicians, operators and other workers. The secondary industry has promoted about 21,000 jobs to be added in the tertiary industry, with logistics, repair, consulting, business, advertising, health and other ancillary services. The increase in employment has significantly promoted the growth of income of urban residents. The income has been increased to 23,399 yuan in 2013, with an increase of 73%, or an average annual

increase of 11.6%.

2) Collaborative Development of Social Initiatives

Through the implementation of the General Plan of the CCEPZ, the pilot zone is achieving its economic and environmental goals (win-win), but is also promoting the social initiatives of education, culture, health, science and technology, transportation, and municipal facilities. Together these bring prosperity and promote social harmony and stability, so that the people fully enjoy the fruits of development and opening up. The development of the circular economy pilot zone includes an aspect of urban-rural integration. For example, policies are being carried out to "build village enterprises", and for "military and political enterprises to build a model village together", to explore effective mechanisms for "city combined with rural, in order to promote agriculture". These are effective mechanisms, along with urban and rural integration demonstration zones, to provide good role models for improving people's livelihood, so that livelihood issues are in the forefront of the province. We vigorously develop vocational education, through contract training, special courses, etc., to attract a large number of local labor enrolling in these schools. This is not only to solve employment issues, but also to effectively increase the local employment ratio in the industrial park. It also means the income of urban and rural residents has been significantly improved, as well as the surplus rural labor, since they could sell or rent their land and pasture, and could move to the city and get employed. Thus the urbanization level has increased year by year.

3. Ecological Benefits

1) Obviously Improved Ecological Environment

Over years, the CCEPZ has long adhered to the following principles: Taking both economic and ecological benefits into account, and focusing on development & use as well as protection & management at the same time, effectively changing the economic growth and industrial pollution prevention and control mode, initially achieving coordinated development of a recycling economy with environmental protection and ecological construction. Until 2013, the ecological forestry construction was completed in the pilot zone with a total investment of 1.37 billion Yuan. These funds were used to: complete the treatment of desertification land area of 352.62 hectares; establish four provincial-level nature reserves: Golmud diversiform-leaved poplar Forest, Qaidam Sacsaoul Forest, Keluke Lake - Tuosu lake, Nuomuhong reserve and Ulan County HaliHa National Forest, Golmud Kunlun Mountain National Geological Park, with a total area of 5529 square kilometers protected area, accounting for 2.13% of the Qaidam Basin. The forest coverage rate has reached 3.2%. The natural wetland protection rate is 17.8%. A range of key national public forest area has been included in the central finance forest ecological benefit compensation fund totaling 142.53 millon mu. This amounts to 34.8% of Qinghai Province’s Key Public Forest compensation area. The ecological environment quality of Golmud City, Delingha, Dulan County and Ulan County have improved from "poor" to “normal” environmental quality. Cold Lake and Dachaidan have improved from "poor" to “poor +". The whole ecological environment of Qaidam has gradually improved and continued to accelerate in the right direction.

2) Improved Environment of the Muli Mining Zone

The Muli mining authority, together with the provincial counties' joint steering group promoted the implementation of the "comprehensive improvement of the Muli coalfield program implementation" according to instructions from the CPC Central Committee, the State Council and the provincial government. They urged the Muli mining enterprises to make the following improvements: total renovation of the slag mountain (13,707,600 square meters); re-green the slag mountain (11.44 million square meters); organize relevant enterprises to narrow down the roads and plant vegetation in the recovery area along the roads; exceed the government-established 50% of the slag mountain re-green task; demolish illegal mine buildings (54,000 square meters); and cleaning up and collecting various types of garbage (more than 5200 tons). Three companies – Yihai, Qinghua, and Xing Qing -- carried out mining pit slope treatment, and have completed 8,890,000 cubic meters of pit slope treatment; carried out Juhugeng's and Jiangcang's mining pit backfill pilot, and have completed work on 1227 cubic meters. All the work finished above created the conditions for the latter to carry out vegetation recovery and underground construction. The Muli Coal Mining Administration Bureau has been set up on the site and modernized its management. The Mine comprehensive law enforcement unit was founded to enforce the laws. The Muli Coal Mining administration legal framework has been improved and standardized. In this regard, General Secretary Xi Jinping commented: "Qinghai is really moving realistically; the Muli mine ecological environment has improved and achieved initial results."

3) Further Promoted Energy Conservation & Emission Reduction

The pilot zone has promoted rapid growth of the industrial economies of scale, but also enhanced mineral resources comprehensive utilization, using less raw materials, with lower energy and water consumption, reduced tailings, reduced waste gas, waste water and other waste generation and emissions. This has resulted in good ecological benefits, a win-win of economic and environmental goals. In 2013, the energy consumption per 10,000 Yuan of GDP in the CCEPZ was 1.3027 tons of standard coal. The large-scale industrial added value of energy consumption was 1.1672 tons of standard coal. Total dust emissions of Sulfur dioxide, COD, Ammonia and Nitrogen were controlled as follows: 39,950 tons of SO2, 25,280 tons of COD, 3402 tons of Ammonia and Nitrogen, and less than 22,190 tons of dust, respectively. The cycle of development, energy conservation, environmental protection and ecological construction work rose to a new level.

4) Extended Space of Energy Conservation & Emission by New Energy Development

The comprehensive advantages of the Qaidam Basin-- favorable geographic conditions, abundant solar energy resources, and a favorable electricity price policy-- has attracted major power generation groups to participate in the construction of photovoltaic power plants, creating a few world records of the largest solar photovoltaic power plant installed and inter-connected in a short time in the same region. Projects to stimulate investment, accelerate the iron and steel, logistics, construction and other industries have achieved remarkable results, and net production will run over 30 billion kWh of clean energy. By reducing the need for thermal power generation, more than 1.5 million tons of standard coal are avoided annually, reducing soot emissions by 22,000 tons, sulfur dioxide by 18,000 tons, and carbon dioxide by 4 million tons. All these achievements give more space for the next step in the development of the pilot zone.

III. Constructional Experiences and Overall Evaluation of the CCEPZ

Since the startup of the CCEPZ construction, the development of circular economy in the pilot zone has made great progress. In a real sense, the development of resources has shifted from singular development to integrated development; development bodies (players) have moved from state-owned ones to multilateral ones; development means have transferred from output of raw materials to sophisticated or deep processing of materials; park development has improved from resource superiority to economic and competitive advantages. Therefore, the CCEPZ has worked out a practical way of scientific development and gained some valuable experiences in terms of integrated development and recycling use of resources. The experiences can be summarized as follows:

1. Clear thinking is a prerequisite of speeding up the construction of circular economy in the CCEPZ

In the ecologically vulnerable area of the Qinghai-Tibet Plateau, it is a new and pioneering job to establish pilot and demonstration parks of recycle-based reformation by circular economy. The CCEPZ has insisted on clearing thought trains of development by making a careful study of thought trains of constructing the CCEPZ. Actually, the Qinghai Provincial Part Commission and the Qinghai Provincial Government have proposed the overall requirements of "Strengthening Top Design, Refining General Plan, Achieving Rational Layout and Promoting Rapid Development"; and the Haixi Prefecture Party Commission and the Haixi Prefecture Government have developed the overall objectives (2365 objectives) on the construction of the CCEPZ. On such basis, in light of sizing up the general economic situation and prefecture local realities, the CCEPZ has decided to create a locally distinctive featured system of salt lake chemical engineering, oil and gas chemical engineering, nonferrous metal, coal chemical engineering, distinctive biology and emerging industries, proposing the orientations of industrial extension and key support projects. After identifying the fundamental thought train, the CCEPZ has attempted to run the thought line through the aspects of preparing various plans, drawing up resolutions and developing feasibility studies for expert argumentation. Clear thought trains, accurate positioning and definite development direction have enabled the CCEPZ to be on the track of orderly, healthy and rapid development, thus providing a reliable assurance for the sound and rapid development of circular economy in the zone.

2. Policy support is the key to accelerating the construction of circular economy in the CCEPZ

Undoubtedly, the state has issued 10 policies regarding the acceleration of circular economy development in pilot zones; then the Qinghai Provincial Party Commission and the Qinghai Provincial Government have laid out 20 policy measures and issued two documents like "*Opinions on the Implementation of Developing Circular Economy in Qinghai Province*" and "*Temporary Methods for Identifying and Administrating Circular Economy Projects of Pilot zones*". Moreover, relevant departments like the Provincial Development and Reform Commission, the Provincial Economic Trade Commission and the Provincial Finance Bureau have jointly formulated 7 counterpart measures like "*Guideline of Orienting Circular economy Industries in the Qaidam Region*" and "*Administrative Methods for Special Funds regarding Circular economy*",

identifying that since 2010, Qinghai province will set up an annual special fund of RMB 1 billion yuan for developing circular economy. The special fund will take the forms of loan discount, financial awards for allowance and investment subsidy to support the construction of demonstrative and guiding projects with respect to integrated use of resources, conservation of water and energy, pollution prevention and control, circular economy technological development and counterpart infrastructure. The issuance of those policies and measures has highly motivated the higher performance of departments and enterprises, ensuring the orderly progression of project construction.

3. S&T innovation is a driving force to quicken the construction of circular economy in the CCEPZ

The CCEPZ has mineral resources of mostly paragenic ore and associated ore, in which 3 wastes also consist of many elements arrayed. It has very complicated technology and production process in terms of separation, extraction and integrated use, without ripe practices to be borrowed. It is essential to strengthen the research on key technology, node technology and control technology, breaking the bottlenecks in technology and production process. For this reason, the parks have oriented and support the enterprises to increase research input, to insist on the combination of introduction, digestion and absorption, and to set out organizing and implementing key S&T projects. Also the enterprises are made to spare no efforts to carry out R&D and technological breakthroughs in common techniques and critical techniques involving in-depth and sophisticated processing of resources, cascade use of energy, integrated development and connection and comprehensive development of wastes, thus enabling the enterprises to be a player of technological innovation and results application. The CCEPZ has also supported the enterprises to develop projects regarding energy conservation and emission reduction and reuse of wastes by providing multilateral supports for their projects of reuse of rejected materials and tail ores. There is no denying that it is important to further deepen S&T collaborations between universities and academic research institutions, thus building up platforms of S&T innovations and technological breakthroughs on which the enterprises can be a main player while industries, universities and research institutes can be integrated, and realizing the organic combination of technological breakthroughs and results transformation. The CCEPZ have tries to put this into practice. There has been mutual use of raw materials, products and wastes among industrial systems, basically forming a situation where recycling use of resources, circular production within the enterprises, recycle among industries are combined. It is important to note that integrated development of resources has extended to an in-depth level, and the circular economy industrial chains have taken shape, as evidenced by the two representative projects like the integrated use of potassium fertilizers and the integration of iron and steel.

4. Business attraction is an effective instrument of speeding up the construction of circular economy in the CCEPZ

Business Invitations can serve as an important instrument of extending industrial chains, increasing industrial scope, raising industrial levels and expanding industrial scales. In recent years, the CCEPZ has taken various forms to strengthen publicity and introduction by visiting provinces, regions and municipalities nationwide for a succession of road show business invitations, and actively attending such exhibitions as the Qinghai Business Exhibition, the Xiamen Investment Exhibition, the Xian Business Exhibition, the Tianjin Business Exhibition, and the Lanzhou Business Exhibition. It has

also held exhibitions and conferences like the Projects Orientation Exhibitions of the CCEPZ and the Forum of Magnesium Industrial Development for many years, thus further enhancing the popularity and influence of the CCEPZ. The pilot zone has innovated in approaches of business invitations for investment, taking the forms of customized business invitation, business invitation after another by recommendation, and business invitation at exhibitions. In so doing, the CCEPZ has fully extended channels and approaches of business invitation for investment and enhanced their quality and level, making new breakthroughs in contractual projects, contractual amounts and "landing" funds. Effective business invitations have become an important support for the rapid development of local economy and society in the Qaidam Region, an important platform of clustering industries and an important carrier of developing open economy, thus forming considerable scale benefits and clustering effects and playing an important role in speeding up the promotion of the new industrialization process and the complete development of "Xiaokang" (well-off) society of the Haixi Prefecture.

It has been proved that the construction of the CCEPZ is consistent with the development status of the pilot zone, thus playing an important promotional role in the development of resources with distinctive advantages in the region. The General plan's guiding ideology, development objectives and key industries and development orientations are scientific and reasonable, having effectively guided the pilot zone's construction and the development of circular economy. The General plan puts forward the main tasks and priorities in line with the development pattern of the pilot zone, and it can be achieved through hard work. Located in the less developed western region, the CCEPZ is an ethnic minority area with rich natural endowments, thus being identified as a priority zone for development of circular economy in Qinghai. Through the construction of the CCEPZ, the concepts of integrated resource development and circular economy development have been greatly strengthened between products, with the ideas of great recycle and great development among industries, among products and among between regions initially being set up. The General Plan implementation in the Qaidam Region has proved that the development in the Qaidam circular economy is a pilot agglomeration of capital, technology, human resources, brands and other development factors. It has upgraded the industry level, adjusted the economic structure, changed methods of development, achieved regional distinctiveness in development, and increased the competitive advantage. It is a strategic choice for Qaidam region to use its natural advantages for development and to narrow the gap with developed regions in China. The pilot zone has moved from basic development of resources with simple processing of primary products, to gradually move to: a comprehensive development of the resources, with intensive use, extensive product processing, extensive development, industrial chain network integration, and changed direction of cluster development. With the salt chemical industry as a base, an integrated multi-industry development has basically taken shape along with the gas industry, coal chemical, metallurgical and other industrial systems. The economic structure has been optimized, multi -industries have formed a joint and common prosperity, and jointly brought integrated development, economic and social prosperity. In May 2015, the CCEPZ passed a second round of acceptance among the national circular economy pilot demonstration units.

Chapter III Problem Diagnosis of the Chaidamu Circular Economy Pilot Zone

After five years of development, the Chaidamu Circular Economy Pilot Zone (CCEPZ) has grown from a prototype development to a large-scale, beneficial and competitive group of industrial parks. In this process, the CCEPZ is facing not only a variety of pressures and difficulties but alos opportunities and challenges, as it moves forward in continuous exploration and innovation. Initial construction in the CCEPZ was dependent on natural resources as the main development pattern, thus having played a role of "pusher" or "accelerator". However, entering the growth stage of the CCEPZ, and facing the impact of changes in the macro, meso and micro environments, the CCEPZ has been subject to multiple constraints in terms of speed and quality, showing a downward trend. At the micro level, there are breakthroughs needed in renewing the concept, optimizing institutional mechanisms, technical transformation and innovation, strengthening personnel training and other aspects. At the meso level, the salt chemical industry, metallurgy and coal chemical industry, and the photovoltaic industry in the CCEPZ has faced disadvantages because of a serious surplus of these products in China) Therefore, the CCEPZ has to upgrade the quality and efficiency of these industries by extending the industrial value chains, enhancing the quality of circular economy, and fostering new economic forms. At the macro level, the PRC has promoted the economic transformational upgrading by "new normal" economy, reinforced ecological restrictions by construction of ecological civilization continue and put forward higher development goals by "5 development concepts". Removing development barriers and nourishing development advantages is an important task for the CCEPZ to accomplish.

I. Deviations in Concept and Practice of Circular Economy Development

In order to achieve the healthy and sustainable development of circular economy, the CCEPZ not only needs to follow the laws of economic development and ecology, but also need to be given solid safeguards of social systems in terms of policies, regulations and mechanisms. However, whether supply elements play a positive and active role in promoting circular economy depends on all players' accurate understanding about the concept of circular economy. At present, in the construction process of the CCEPZ, there have been still various deviations of ideology and practice of circular economy between different players. They are mainly reflected in the following aspects:

1. Deviations in Concept & Practice of Circular Economy Development at Government Level

1) The Clash between Circular Economy Development Concept and Traditional Economy Development Inertia

Based on its advantages in nature resources, Qinghai province has developed hydropower, salt lake, oil and gas, and non-ferrous metals industries to support its rapid economy development over 30 years and laid a solid industrial base. While expanding in scale, these heavy industries have caused the deterioration of ecological environment in the province. As an industrial heartland in Qinghai, Qaidam has played a pivotal role in the development of provincial economy. However, with the progression of national ecological civilization construction and the constant intensification of rare natural resources in the PRC, the CCEPZ ha showed a slow growth rate and a downward trend

of total volume in its traditional industries which rely on natural resources. At the same time, due to lack of technology, capital, personnel support as production elements, Qinghai cannot get rid of its dependence on the heavy industry in the foreseeable future and the inertia of traditional economic development will last for a long time in the province. In the face of economic downturn and small benefits, all levels of government in Qinghai are under enormous economic and social pressures. The result is a conflict and inconsistency in economic ideology and concept as to whether traditional economic development or circular economy development will have priority.

The research project team gave 70 questionnaires to the leaders at different levels of departments of the Qinghai Provincial Government, the Haixi Prefecture Government, Delingha Municipality Government and the CCEPZ Government, among whom 10 provincial directors-general, 30 divisional directors, and 30 section chiefs were surveyed. The results indicate that 46 leaders hold that priority should be given to traditional economic development, accounting for 65.7% of the total. This data reflects that under downward pressure from short-term economic development, the leaders in Qinghai Province have advocated traditional industrial economic development, which has become and will be a mainstream ideology in a short time. Against the background, there have been deviations from the CCEPZ building requirements of circular economy development in Qinghai Province in terms of policy supply, institutional security, and system innovation. Thus, at present, there has been an intense friction between circular economy and traditional economic development. From the long-term perspective, with the implementation of the national ecological civilization construction, the new normal economic development, and the "five development concepts", it is anticipated that the friction in concept between circular economy development and traditional industrial development will show the change trend from the heavy level to the light level and to the complete integration level, eventually until it is completely eliminated.

2) The Conflict between Circular Economy Development Concept and Concept of Using Circular Economy as a "brand"

At present, leaders at all levels of the Qinghai government have different views and understandings about whether the CCEPZ should actually develop circular economy or should use "circular economy" as a "brand" to attract investments. Results of questionnaires show that 39 out of 70 people believe the current functions of CCEPZ should be used mainly to get project contracts and funding and supporting policies from national and provincial governments, representing 55.7% of the total respondents. This idea led to a number of short-sighted development behaviors, such as emphasizing regional short-term economic development and ignoring the requirements of circular economy. With this approach in mind, the CCEPZ has become a carrier and instrument to attain various types of elements, thus promoting the development of circular economy to become a concept of exploiting circular economy. Therefore, inconsistent behaviors with the development of circular economy in Qinghai are found in the allocation of resources, industrial planning and policy development in the construction of the CCEPZ, so that the extension of industrial chain, the development of scalable benefits and the effect of policy spillover in the CCEPZ cannot achieve "Pareto optimality".

3) The Contradiction between Circular Economy Development and Governmental Performance Evaluation System

The governmental performance evaluation system in China is an important measure to

guide leaders at all levels of governments in action and decision-making. Qinghai Province is one of the earlier provinces which have established the annual governmental achievement-oriented evaluation system to guide leaders in all administration positions. However, this evaluation indicators system for various types of governmental performance has an inadequate number of evaluation indicators of circular economy performance, without clear orientation. This is manifested in two aspects as follows:

Firstly, an indicators system that reflects local circular economy quality isn't set up clearly. The current evaluation system for leaders doesn't include the indicators system of circular economy quality and has very few indicators set up to reflect the achievement in "ecological protection". There are only indicators of energy consumption per GDP, carbon dioxide emissions, and total amount of pollutant emissions. These are listed in the evaluation system in relation to circular economy in resource consumption intensity, the intensity of waste emission, waste recycling rate and disposal of pollutants. Also there are no indicators about the comprehensive utilization rate of industrial solid waste, industrial water recycling rate, urban sewage recycling rate, the industrial added value of energy consumption per unit of GDP, water consumption per unit of GDP, water consumption per unit of product from major industries, sulfur dioxide emissions, or COD emissions.

Secondly, indicators of circular economy on industrial park development are lacking. In 2015, the assessment done by the performance evaluation office of the Qinghai Provincial Party Commission was mainly focusing on economic growth indicators such as GDP, industrial added value and meeting investment requirements, but lacking in such indicators as output rates of major mineral resources, energy, water and land. Based on the analysis of the quantity and structure of annual performance assessment of prefectures, municipalities as well as the CCEPZ, Qinghai Province has focused more on quantitative economic growth than on circular economy's requirements. Therefore, under this evaluation system for their governmental performance, the leaders at all levels of Qinghai government inevitably pursue behaviors which deviate from the concept of circular economy.

2. Deviations in Concept & Practice of Circular Economy Development at the Enterprise Level

The ecological environment is suffering while human civilization has transformed from a primitive age to the agricultural age to the industrial revolution, because ecological damage to the environment caused by human activity and productivity grows faster than eco-protection. Although materials accumulated have been continuously enriched, the ecological environment is deteriorating. Therefore, to change the means of production is an important instrument to promote circular economy development. However, in relation to this, Qinghai enterprises still have a long way to go in terms of circular economy.

1) Corporate Misconducts of Playing in a "Gray Zone" with the Government for Profit Maximization

The Haixi Qaidam region is rich in mineral resources in Qinghai province and attracts resource-based enterprises. To maximize their economic profits, enterprises seek to play in a "gray zone" with governments and the general public when they need to choose between ecological interests and economic interests, and between long-term economic benefits and sustainable development. Enterprises seek to invest as little as possible in

technology, energy-saving and low emissions to maximize their profit. Therefore, lack of investment in technology, low efficiency in the resource utilization and low output of pollution treatment has hindered ecological productivity development. At the same time, natural resources enterprises, aiming to avoid all aspects of regulation, energy conservation, pollution control, etc), demonstrate a degree of rent-seeking behavior, resulting in ecological management and enforcement organs subject to greater external interference in the enforcement process. The government authorities cannot even enforce the laws, which severely affects economic development and ecological management activities. These have become important factors hindering the development of the circular economy pilot area)

2) Inconsistent Behaviors with Circular Economy Based on Increased Costs

The CCEPZ growth in the early stages had a less developed industrial chain and a smaller scale. Enterprise features such as the clustering effect were not obvious. It is difficult for companies to reduce costs. At the same time, an ecological civilization to explore and implement a natural resource assets property rights system, with compensation for the use of natural resources, and an ecological compensation system, brings a corresponding increase in the cost of natural resources exploitation. With the progression of construction, the enterprises in the CCEPZ involved in the three areas (of resources exploitation, deep processing and industrial chains extension) face higher environmental compliance demands from the park. Companies engaged in circular economy need to continue to increase technological and managerial innovations in the process of production and operation. The above factors significantly increase production and operational costs for enterprises set up in the CCEPZ. So, some companies working in the CCEPZ bring a certain degree of conflict with circular economy and attempt to avoid the higher cost of operation, resulting in some cases in various corporate misconducts.

In the Chaidamu Circular economy Pilot zone, the research project team surveyed 40 companies including the Golmud Zangge Potash Corp. Limited, the Qinghai Assembly Chemical Technology Co., Ltd., and the Qinghai CITIC Guoan Technology Development Co., Ltd. Of the 40 companies in the survey, 24 companies recognized the concept of circular economy which has yet to be established, but were more concerned about their corporate immediate economic interests; these 24 firms have not yet implemented technological innovation or environmental protection systems or guidelines with respect to circular economy; 15 companies admit to reduced environmental costs through improper conducts of “rental-seeking”; 9 enterprises have strengthened the training on the concept of circular economy, constantly strengthening the position and role of the business in other sectors of the industry chains; 7 companies pay more attention to circular economy based on its long-term economic and social benefits, thus strengthening the enterprise circular economy development and making efforts to achieve an economic, social and ecological harmony.

3. Deviations in Concept & Practice of Circular Economy Development at the Public Level

The general public is both the most important social force to promote the development of circular economy and a direct stakeholder and participant in the local circular economy and related local ecological interests. Public awareness and awakening is not only to promote the healthy and sustainable development of circular economy, but the

general public can also play a supervisory role over behaviors conducted by the government and enterprises. Promoting circular economy requires the joint efforts and broad participation of the general public. China's "Circular Economy Promotion Law" stipulates the rights of citizens to participate in the development of circular economy, including the right to sue, the right to information and the right to make recommendations. That citizens have the right to report misconducts like a waste of resources, destruction of the environment, and the right to know what information the government uses to develop circular economy, and they have the right to put forward opinions and suggestions.

From a realistic point of view, in the circular economy pilot areas in Haixi and Xining, the general public concept of circular economy is still very weak. A random group of 500 people in the two regions were given a questionnaire: 84% of people think circular economy is for government and business to do, and the general public has nothing to do with it; 79% of people think the general public has no direct or indirect channel or responsibility to oversee circular economy practice in the pilot area; 95% of people consider themselves environmentally conscious, but 90% of people agree that their behaviors have damaged the environment. The above data clearly illustrate that Qinghai has a certain public awareness of environmental protection, but a serious lack of awareness of circular economy concept. In the case of public participation in circular economy, there is a big gap between people’s behaviors and governmental requirements. This gap is reflected in such aspects as low participation in circular economy construction of the CCEPZ, weak supervision and inadequate intellectual contribution.

II. Low Efficiency of Industry of the CCEPZ

Circular economy CCEPZ s depend on sharing resources to overcome the negative external obstacles, and promote the development of related industries, in order to effectively promote the formation of industrial clusters. However, the industrial planning, industrial layout, and industrial chain extension of the CCEPZ still have some deficiencies, so that the industrial effects of the CCEPZ in terms of radiating, driving, leading and demonstrating are weakened.

1. Unreasonable Industrial Planning and Unpromising Markets

The CCEPZ mainly depends on resources with light metals such as potassium, sodium, magnesium, lithium, and calcium from the Qaidam Salt Lake, and heavy metals such as lead, zinc, iron as well as coal and other natural resources. The industrial layout and structure based on the salt chemical industry, metallurgy, oil and gas industry, and coal chemical are built up. However, the industrial planning and resource-based developing areas in the CCEPZ overlap with one another, which weakens their effectiveness.

1) "Dilemma" of Enterprises with Serious Losses due to National-wide Industry Overcapacity

At present-- whether it is high energy consuming electrolytic aluminum or iron and steel industries, or new industries like photovoltaic solar and wind power generation industries, or shipbuilding and silicon steel industry to make high-end products—each of these industries are widely recognized as having "overcapacity". According to Goldman Sachs estimates, based on the cash cost, about 50% of China's aluminum production capacity is produced at a loss, equivalent to about 25% of the total global supply.

Unirule Institute of Economics estimated that, in addition to traditional industry, some new industries also have overcapacity, such as solar battery production capacity which has s 95% surplus. The vice deputy secretary Sun Weishan from the China Petroleum and Chemical Industry Association said that presently the utilization rate of China's oil refining, urea, phosphate, chloride, soda ash, and calcium carbide industries' production capacity will decline further, so the problem of overcapacity will get worse. The utilization of PTA, methanol, and caustic soda production capacity is increased, but overcapacity is still very serious[1]. By 2015, the photovoltaic industry in the CCEPZ had a total installed capacity of 2933 MW, 9.2% of the total PV installed capacity in China, accounting for 61.3% of the total installed capacity in Qinghai Province, ranked as the number one prefecture in the whole country for installed capacity[2].

Meanwhile, the CCEPZ has a production capacity of 7.5 million tons of potassium chloride, 4.4 million tons of soda ash, 10 million tons of thermal coal[3], etc) These industries (whether traditional or new industries) in the CCEPZ have overcapacity problems. In the case of overcapacity, the related industries are subject to greater impact in production and sales. At the same time, with the impact of the economic downturn in domestic markets and abroad, there are 46% of the enterprises in the CCEPZ that are in deficit. The resource-based products such as oil, soda ash, thermal coal, chlorinated potassium, etc, have had a 68% dramatic drop in price: the price of crude oil has dropped by 68%; the price of soda ash dropped by 58%; the price of thermal coal dropped by 74%; the price of chlorinated potassium dropped by 68%. As prices of the main products in the CCEPZ have dropped below the cost line, the enterprises in the CCEPZ appear to have an increase in production but not in profit, which has weakened the regional influence of these industries.

2) Overlapped Industrial layouts and Affected Resource Allocation

The CCEPZ and the Xining Economic Technological Development Zone (XETDZ) are two engines for Qinghai's economy. From the perspective of geo-spatial and functional advantages, Qinghai province has different designs for development planning and positioning for both zones. However, there are still overlaps in some of industrial layouts that lead to competition for resources and inefficiency of resource allocation. The CCEPZ takes salt lakes, non-ferrous metals and other natural resources as production materials to build up four industrial parks and each has a clear functional position and focus. XETDZ has four parks that are also distinctive, interactive and complementary[4]. The two zones both havean overlap in industrial layouts and industrial chains (both upstream and downstream), from the perspective of the healthy and sustainable development of circular economy for the whole province. For example, Gan River Industrial Park (near Xining) focuses on the development of non-ferrous metal production and processing, and the chemical industries, which include fertilizer, PVC, methanol, boric acid and other chemicals. Golmud and Dachaidan parks are very similar to Gan River in terms of process or product characteristics, resulting in a competition between the industries in the same region. Here is another example: The Nanchuan Industrial Park (PIK) focuses on building a deep processing base for lithium resources, which is similar to the lithium-based new materials industry in the Golmud Park. The

[1]"The overcapacity of 9 industries in China are shocking". http://www.topnews9.com/article_20140728_39211.html
[2]Qaidam "Borrow solar and use wind",Qaidam Daily, May 31st of 2016.
[3]"The introduction of Chaidamu Circular economy Pilot zone and its prominent industries",Renmin Website, http://qh.people.com.cn/n/2015/0604/c182769-25120925.html
[4]Xining Economic and Technological Development Zone includes DIP, Ganhe industrial park, Biological technology park and Nanchuan industrial park.

overlaps in the industrial layout of both the CCEPZ and XETDZ have a direct result that the industrial layout is scattered, therefore, the cost of trading is higher and the industrial scale effect is weakened. At the same time, the parks compete with each other. Since the industrial parks compete against each other in attracting investment, building up industrial chains, and promoting competitive power, this causes inefficiency of resource allocation and fostering of industries. Therefore, it has a serious impact in Qinghai Province's circular economy.

2. Unreasonable Structure and Unbalanced Proportion of Industries

1) Too high Proportion of Secondary Industry in 3 Industrial Categories, with Too Big Energy Consumption

The ratio [of primary, secondary and tertiary industry] in the CCEPZ went from 2.8：79.1：18.1 at the end of "the Eleventh Five Year Plan to 6.1：67.5：26.4 at the end of "the Twelfth Five Year Plan". The secondary industry in proportion to the other industries is declining and the third [tertiary] industry is increasing in the CCEPZ, which is in line with the national and Qinghai vision for industrialization and industrial structure development. However, at present there are two big gaps in the industrial structure in the CCEPZ. First, in comparison to the national and Qinghai provincial industrial structure, the secondary industry is proportionately high. In 2015, the ratio of the three industries in China is 9.0：40.5：50.5. In the same year, the ratio of the three industries in Qinghai is 8.6：50.3：41.1. The CCEPZ relies relatively much more on heavy industry. Because of a lack of technological innovation and funding, its economic development heavily depends on resources development, which will inevitably lead to high energy consumption, heavy pollution and other issues. The industrial structure in the CCEPZ has an irrationally high proportion of heavy industry. The salt chemical industry, oil and gas chemical and metallurgical industries, and coal chemical industry, are all considered as traditional heavy industry with high energy consumption. By 2015, industry in the CCEPZ accounted for 67.5% of the economy, of which light industry accounted for only 14.5%, and heavy industry accounted for 85.5%. A higher proportion of heavy industry caused two issues: First, it is more difficult to attract investments because heavy industry is typically capital-intensive. Secondly, the ecological environment pressure is increasing. Over the past five years, large industries in the CCEPZ have an average annual growth in industrial added value of over 10%. This growth is mainly due to the development and utilization of mineral resources which caused serious damage to the environment. The CCEPZ obtained rapid economic growth at the expense of ecological resources and the environment. Therefore, the transformation of the economic structure and fostering of new leading industry is imperative.

2) Initial Development Stage of Emerging Industries and Lack of Economic Scale

To change industrial structure from too high proportion of secondary industry and too low proportion of service industry, the CCEPZ has to increase not only the transformation and upgrading of traditional industries but also the cultivation and development of emerging industries. At present, the CCEPZ has made their priority to develop new energy, new materials, and biological industries to optimize the industrial structure. But there are two problems. First, due to limitations of industrial technology innovation and technical personnel, the new energy and new materials industries can't

yet play an important role in developing the industrial chain, upgrading industrial scale and making the value-added products. Secondly, competition in the plateau-featured farming industry has risen. Currently, the CCEPZ has made good progress in developing modern agriculture and animal husbandry industry that integrate “Agricultural Planting and Livestock Raising”, and “Processing” with “Comprehensive Utilization” to use well the biological resources in the plateau. It has obtained some benefits, but with small scale and arduous tasks.

3. Weakened Competitive Advantages and Slow Development of Industries

1) Constantly Rising Costs of Enterprises, Resulting in Non-economic Circular Economy

On the one hand, enterprises that rely on natural resource are more and more restrained by reinforced environmental laws. China has issued and improved the policies on natural resource property rights, utilization of natural resources with compensation and eco-compensation, and reinforced collecting fees for exploitation, taxes on mining resources, and compensation or guaranteed deposits on the restoration of the environment or dealing with emissions. On the other hand, the national and regional governments continue to increase management efforts on industrial emission and energy-saving. At present, China has built an environmental protection evaluation system to monitor pollutant indicators such as carbon dioxide emissions per unit of GDP, energy consumption per unit of GDP, non-fossil fuels proportion to the primary energy consumption, total amount of emissions of major pollutants, and chemical oxygen demand, sulfur dioxide, ammonia and nitrogen oxide and other pollutants. Qinghai’s "Thirteenth Five-Year Plan" made it clear that the Qinghai government will fully implement "The action plan for Qinghai province building a national-level circular economy CCEPZ", to accelerate the construction of a mature industrial system with the circular economy concept, extend the industrial chain, promote circular transformation, and improve industrial solid wastes utilization rate up to 60%. To achieve these goals, the enterprises in the CCEPZ will need to increase their investment in technology innovation and management, which will directly or indirectly increase the cost of production. Therefore, the cost of production is increasing, and even offsets advantages of natural resources in the Qaidam region, which makes circular economy uneconomic)

2) Split Industrial Chain and Reduced Scale Effect

Based on the analysis of Qinghai provincial economy development, the industrial chain is split and broken which leads to weakening the scale effect and fails to reflect the value of the industry. For example, the CCEPZ has solar PV installed capacity accounting for 9.2% of the total installed capacity of China, creating a number of world records and China records on the largest solar photovoltaic power plant installed capacity in the short term in the same area, and the world's largest solar photovoltaic power plant and network systems engineering. However, this doesn’t match with the upstream enterprises of silicon materials, solar photovoltaic modules and solar glass that are based in XETDZ. The DIP has initially formed a silicon photovoltaic industrial chain including the polycrystalline silicon, monocrystalline silicon, solar cells, solar photovoltaic modules and solar glass industries. The distance between the photovoltaic power plant in the CCEPZ and the silicon photovoltaic industrial chain in XETDZ is 800 km, which means that the industrial chain is split and broken in geo-space and its clustering and scale effects are weakened. Therefore, with the decrease in the flow and transmission

efficiency with respect to fund flow, value flow and information flow, the industrial values of all resources and their added values cannot be fully realized and maximized.

III. Weak Capacity of Scientific and Technological Innovation of the CCEPZ

Scientific and technological innovation and application is the most important internal power for circular economy development. At present, there are major issues in the regards in the CCEPZ as follows:

1. Insufficient Human Resource with Poor Structure of Talents

1) Insufficient Human Resource

Since the CCEPZ is in an area with harsh living condition and modest economic and social development, it is difficult to attract well-trained workers and provide training. The development of the CCEPZ needs high-quality management personnel, professionals and especially well-trained technical staff, management staff and skillful workers. This project team conducted a survey of 40 enterprises, of which 34 enterprises have noted "recruitment difficulties", and 100% of enterprises have noted "recruitment for senior management personnel is difficult" and "recruitment for middle-senior management personnel is difficult"; 29 enterprises have noted "lack of skilled operatives, management and technical professionals". Enterprises not only don't have enough skilled workers, they also don't have enough qualified management and technical personnel. Under this shortage of intelligence, technology and knowledge, forming an internally driven force for the development of the CCEPZ is a limiting factor. This has limited their technological innovation and improvement and affected circular economy development.

2) Poor Structure of Talents

The CCEPZ has unbalanced human resource structure. It is reflected in two areas: 1) The scientific and technological resources in the Qaidam region are unevenly distributed. From the aspect of the industry distribution, more professionals work in education, culture, health, and social welfare than in manufacturing industries. From the aspect of the enterprise distribution, most of the medium-sized or large enterprises have well-educated human resources and scientific research institutions; 2) The personnel with comprehensive skills or professional knowledge is relatively short. They need a great number of skilled industrial workers since most of the industries in the CCEPZ rely on natural resources and are labor-intensive enterprises. In recent years, with new industries of developing new materials, new energy and biological characteristics resource around the extension of the traditional industrial chain, the demand for high-level professional and technical personnel is also growing. According to preliminary estimates, during the "Thirteenth Five-Year Plan" period, the demand of industrial enterprises for skilled workers, high-level professional and technical personnel is about 40,000-50,000 people[5]. Only relying on existing human resource recruitment and training methods can't meet the need, therefore, the CCEPZ needs to further innovate the introduction mechanism for the recruitment of well-educated and well-trained personnel and explore the incentive mechanisms of innovative talents to solve this problem in the industrial development of the CCEPZ.

[5]Chongming Mo, "The research report on the construction of the CCEPZ and circular economy development", 2016.2.

2. Vulnerable Science & Technology Capacity, Resulting in Insufficient Technological Support

1) Inadequate Input of S&T Innovation with Low Economy Growth Contribution

In 2015, the Haixi prefecture's input of S&T's research and development in GDP accounted for more than 1.5%, with S&T's contribution to economic growth making up 46.4%. Qinghai's investment in research and development of S&T was less than 0.6% of China's. The S&T contributing to economic growth was lower than China's 3.6%. The data above reflects two issues: 1) The investment in this region over technological innovation is not enough. This results in weak research infrastructure, and enterprises which have lower capability for technological innovation, and products which have low technical elements. 2) The motivation of transforming S&T into economic growth is not high. In the case of insufficient investment in S&T, the practicality and direction of the investment doesn't meet up what the market needs, so that the contribution rate of S&T investment to economic growth is not high. At present, the overall skill level of scientific and technological research teams in the CCEPZ is low. The research on resources comprehensive development is insufficient and doesn't yield many high-tech products, so the needs of circular economy development could not be supported and met.

2) Incomplete Research Institutions with Serious Phenomenon of "Empty Nestles"

At present, the Haixi prefecture used the CCEPZ to establish the China Academy of Qaidam Circular Economy by the joint efforts from Qinghai Salt Lake Institute and Chinese Academy of Science, and created 6 national-level S&T platforms such as The Salt Lake Innovative Technology Alliance, China Plateau Nonferrous Metal Development Alliance, etc); 7 Provincial Engineering Technology Research Centers; 4 key laboratories, 2 enterprise incubators and 3 agricultural research and technology development organizations, etc); in total there are 22 research institutions, accounting for only 15.3% of 144 institutions in Qinghai province. At the same time, the 6 national-level S&T platforms are mainly built around institutions for the comprehensive utilization of Salt Lake resources, Salt Lake engineering technology and salt chemical product testing, which can't meet the existing objective of "Building a lithium potassium magnesium Park" in terms of products technology research and key resource utilization, and makes it difficult to achieve the extension of the industrial chain and the deep processing of products. On the other hand, due to the harsh natural environment, it is hard to keep trained professionals motivated and convince them to stay, and many research institutions are soon deserted after setup. Various research institutions in the CCEPZ have this "empty nests" phenomenon.

3) Difficulty in Maintaining Business and Low Innovative Motivation for Enterprises

At present, more than half of enterprises in the CCEPZ face financial loss since the economic downturn at home and abroad. Most of them try to reduce operating costs, employee's insurance, welfare and other related expenses to survive and avoid being shut down. Therefore, companies will do everything possible to reduce any investment including in the area of scientific and technological innovation. On the other hand, since the enterprises reduced staff entitlements and benefits significantly under great pressure of business survival, a large proportion of technical and management personnel have left, thus further weakening innovative support from enterprises.

IV. Weak Capacity of Mitigating Risks of The CCEPZ

With the changes in the CCEPZ ’s construction in scale, industrial extension, technology innovation, environmental change and other factors, the enterprises in the CCEPZ are facing ecological, economic and environmental risks.

1. Noncircular economy with High Ecological Risks

Driven by the goal of profit maximization, enterprises based in the CCEPZ have attached importance to the attainment of economic interests, but ignored and even run counter to ecological protection. Before 2012, the national coal price continued to rise high. This attracted many companies to settle in the Muli Coal Mine because it is in a coal accumulation area) These company gained huge short-term economic benefits. Tianjun County (where Muli coal mine is) had regional GDP of 7.3 billion Yuan in 2012, that contributed 580 million Yuan to the local fiscal revenue. However, in 2014, the illegal coal mine run by Qinghai Qinghua Group in northwest China was exposed, because it endangered the fragile ecosystem in China's Qinghai-Tibet Plateau. Subsequently, Qinghai Provincial government has increased the effort to protect the Qilian Mountain Nature Reserve and put forward a series of regulations over Muli coal mine development. Since then, the regional economy had a "cliff-style" GDP decline in 2015, dropping to 795 million Yuan, while the local fiscal revenue dropped to 148 million Yuan[6]. At the same time, the management committee in the CCEPZ has established a Muli coal mine bureau to supervise and manage the regional coal industry and promote the healthy development of the industry. This case clearly shows if the government and enterprises put their short-term economic interests as a priority, ignoring the healthy development of the ecological environment, even running away from the concept of circular economy, then economy and ecology will both lose at the end.

2. Non-economic Circulation with Big Market Risks

R enewable energy in the CCEPZ has attracted enterprises with the circular economy concept and good support of S&T. Zhejiang Zhongkong Technology Co., Ltd has settled in the Delingha industrial park and invested 400 million in the construction of China's first large-scale solar thermal power generation with independent intellectual property rights, since Delingha has the advantage of solar renewable energy. From the production technology to environmental protection, solar thermal power generation has obvious advantages. China has given policy support to the solar thermal industry at the approvals stage and in power generation networking policy. However, Zhejiang Zhongkong Technology must prolong the return period for their 4 million investment and faces great financial pressure due to inefficiency in the government policy system. It causes other enterprise to withhold their willingness to experience circular economic development. Qinghai Salt Lake Potash Co., Ltd has invested 32.4 billion yuan to build a magnesium integrated industrial park to achieve the utilization and development of potassium chloride, brine waste, and waste salt. However, because the government at all levels failed to support with funds for the park’s infrastructure, road network, etc), Qinghai Salt Lake Potash Co., Ltd. had to build the park’s road, heating and water supply infrastructure with its own funds. They had already lost the best market opportunities, from the "profit model" into a "loss mode". Enterprises experience "circular economy is not economic ". The heavy financial burden has seriously affected the later development of enterprises. Several entrepreneurs told this project team: “Whoever is at the forefront

[6] “朔 fter Muli coal mine stopped production, how did a county famous for coal mining have to tighten their belts”, Xinhua Daily Telegraph, http://news.xinhuanet.com/mrdx/2016-01/13/c_135005169.htm

of circular economy, will be the first to sacrifice". If the interests of enterprises could not be protected, even to achieve a recycling loop between the industrial chain, enterprises and technology, the enterprises still can't avoid market risks and will eventually walk into a "death trap."

Because of the limitation of funds, technology, and personnel, at present, the CCEPZ has formed the industrial chain based on processing natural resources and the cost of resources determines industrial profits. It is difficult to obtain the core competitiveness of the market despite their investment in information, technology, brand, management and personnel. This project team gave a survey to 40 enterprises in the CCEPZ. The survey showed that 77.5% of the enterprises, namely 31 companies, noted that "Currently, their industry is at the low-level of the whole industry chain; 72.5% of the enterprises, namely 29 companies, think that what caused this situation is mainly due to "industrial competitive advantage in natural resource development"; 62.5% of enterprises, namely 25 enterprises, think "the companies in the CCEPZ don't care too much about brand building, but focusing on short-term economic interest". The analysis from this survey shows most of enterprises operate at low-level of the industrial chain, build their competitive advantage based on natural resources development, and focus on short-term financial gain. They are short of competitiveness in marketing, branding, and technology. When there is greater volatility in the market, most of these enterprises are unsustainable, and eventually have to withdraw from the market.

Optimizing the industrial chain not only includes the resource flow but also value flow and information flow. It is built on resource flow and focuses on the value flow and information flow within the industrial chain to create more functions and higher value for customers. At present, 4 industrial parks formed an industrial chain based on resources and its industrial advantages. They are promoting the recycling of various types of mineral products generated in the production process of solid waste as well as the industrial integration of the salt chemical industry, petroleum chemical industry, utilization of clean coal, non-ferrous metal and new energy. This industrial chain also includes the recycling of by-products from chlor-alkali chemical industry, smelting industry, by-products of non-ferrous metal smelting, and solid waste, which focuses on the relevance between resources. This is also called "resource flow" between industrial chains. When the correlation and integration of resource flows which link the industries is relatively low, and the industrial chain's relationships are unstable, this could cause external and internal risks in circular economy industries and a collapse of industrial chains.

3. Poor Implementation of New Concepts with High External Environmental Risks

The five development concepts initiated by the 5th Plenary Session of the 18th Central Committee (held by Oct 26-29th, 2015) are "Innovation", "Coordination", "Green", "Opening" and "Sharing"; these are having a revolutionary impact over China's development. There are five different areas that the CCEPZ needs to develop in relation to follow these five concepts: In the technological area: promoting technologies for pollution treatment, waste utilization and green production; In the area of utilization of resource: achieve high-efficient utilization of resources, and recycling of resources, and; In the area of markets: foster the technological market for environment protection and energy saving, waste recycling market and circular economy consulting service; In the area of industrial development: enterprises need to pay attention to green production and minimize pollution, promoting all levels of recycling material and energy between regions and enterprises; In the area of social life: establish a recycling society including a system of sorting out, recycling and reusing solid waste and other waste; In the area of

construction of the CCEPZ: use land intensively in the planning and construction, and establish a reasonable industrial structure; In the area of management: make clear to enterprises who want to settle in the CCEPZ about their investment's requirement, and monitor and manage the ecological environment of the CCEPZ. The five development concepts help upgrade the CCEPZ but also giving higher standard to build up the CCEPZ. The CCEPZ is stepping up to overcome the difficulty in order to get healthy prospects for sustainable development. Otherwise, the CCEPZ could be eliminated in the process of historical development.

China's economic development has come to "new normal", shifting gear from the previous high-speed to a medium-to-high speed growth, from the rapid extensive growth in scale to quality-oriented efficient intensive growth. The economic structure is shifting from increasing in quantity and incremental expansion to adjusting inventory and optimizing. The new driver for the economy is shifting from the traditional spin-offs to new ones. In the "13th Five-Year Plan" period, the feature of China's economic development is to enter the "new normal", grasp the "new normal", lead the "new normal" as the guideline through overall development process in order to take initiative to adapt to the new normal and lead to good results. Under the challenge of "New normal", the CCEPZ must take initiative to reform the method of development, upgrade the traditional industry into a new level, focus on fostering the development of new industries, strengthen the supply lateral structure reforms, thus improving the capacity of development. It is the time when risk and opportunity are both present. Since the traditional industries in the CCEPZ account for nearly 70% of the total industry, achieving the transformation of traditional industries is very difficult. If the CCEPZ still uses the GDP incremental growth as an important indicator, departing from the concept and requirements of the circular economy development, then there is no future for the CCEPZ. Thus, the "new normal" is to bring difficulties but also opportunities.

V. Nonsystematic Development Policies of the CCEPZ

The development of circular economy not only relies on the "invisible hand" to allocate market's resources, to balance between supply and demand, and to determine the scale and efficiency of circular economy development through value being reflected in price, but also on the "visible hand" to make policies and regulations in macro guidance in order to build up a systematic and comprehensive development system. Currently, the CCEPZ has problems in three areas in policy-making.

1. Lagging-behind Policy Effects

1) Time lags

Five years after Qaidam was chosen as a CCEPZ of the first group, in the year 2010, the Qinghai provincial government issued a "Qinghai Provincial government suggestions on accelerating the development of circular economy in the CCEPZ" (hereinafter referred to as "Suggestions"). In 5 years, many relevant policies were not issued in time so that lots of work was inefficient, and hindered the CCEPZ development. In May 2012, at the 12th Congress of Qinghai Province, the Qinghai provincial party committee put forward the development strategy of building a national circular economy CCEPZ. In December 2013, the Qinghai provincial government put forward the "Qinghai action plan of building the circular economy CCEPZ" in which detailed instruction about land supply, technological support and taxation policies were given. The Qinghai provincial government held the Qaidam circular economic work conference in May 2014 and clarified the policy support in six aspects: policy simplicity and decentralization,

distribution of productivity, taxation and financing, supporting mechanism, giving the CCEPZ approval authority of provincial investment projects, and applying simplified management processes to the CCEPZ. In February 2016, the Qinghai provincial government held the Haixi development and reformation Conference and put forward 40 policies to support and strengthen work in eight areas such as: building innovation capacity, promoting industrial upgrading and optimization structure, optimization of institutional mechanism environment, and improvement of infrastructure. However, these policies were not made for withstanding a deteriorating market when the CCEPZ is facing domestic economic challenge such as enterprises having great losses of profits, with resource-based product's prices declining. In the short-term, these policies have given great help to boost hope and growing power for the enterprises, but they are still lagging from the perspective of the top-down planning and scientific policy design, so that enterprises are slow to respond to market and environmental changes and slow to cultivate their competitiveness.

2) Content Lag

After the CCEPZ was approved, the Central Government and the Qinghai Provincial Government have issued 13 major policies in relation to planning, land, taxation, and infrastructure. However, these policies are broad principles made for the macro level, which would need to be adapted by all levels of functional departments to be more specific and more executable. Currently, the CCEPZ follows national non-customized policies in resource allocation, project approval, environmental assessment, land use, infrastructure, waste utilization, etc) Since the policies are not customized, it results in limitations on realizing the principle of "Act first and try first" which is stated in the "Master Plan of Chaidamu Circular economy Pilot zone". The industries with obvious regional characteristics are also restrained by macro guideline given by governments. This situation is reflected in many aspects of comprehensive utilization of resources, extending the industrial chain, etc) More executable policies are needed to overcome the current difficulties when there are more and more uncertain macroeconomic factors, the financial environment is tighter, enterprises are losing confidence in investment, it is getting more difficult to get investment, and the construction of projects are delayed. At the same time, because of a lag of resources allocation, the projects such as integration of iron and steel, olefins made of coal, chlor-alkali chemical industry, coal-fired power plants, and oil shale exploration and development, have become difficult to be implemented. These projects are important to support and link the industrial system. New energy, new materials, biotechnology and other emerging industries don't have large projects to boost them. The formation of new growth is slow. The follow-up support for the CCEPZ development isn't sufficient.

2. Incomplete Policy Systems

1) Missing Contents

At present, the shortage of policy content is mainly reflected in the area of: 1)The development of laws and regulations is lagged behind. China has 4 environmental laws, 8 resources laws, more than 20 resource management administrative laws, and more than 260 environmental standards. But laws and regulations of circular economy are not sufficient for the needs of development; in particular, due to the lack of relevant laws for law enforcement to maintain the healthy circular economic development in the process of enforcement actions. 2) The comprehensive evaluation indicators system has not been established. The current indicators system doesn't have indicators of material input (consumption), emissions (waste), utilization efficiency and recycling, to reflect social

activities, and to evaluate and monitor its development. 3) There is lack of policies regarding governmental finance and banking financing. The CCEPZ mainly depends on commercial banks financing and uses various special funds issued by the central and provincial government as a supplement. A mature financial system with a tax-sharing system has not yet been established. Therefore, the CCEPZ has very limited financial resources. The land reserve and construction of infrastructure are mostly dependent on bank loans. Most of the construction projects in the CCEPZ are public welfare facilities, so the risk of paying back loans is increasing. The inability to establish a system to finance repayment has also influenced the sustainable development of the CCEPZ. 4) The development of green industry doesn't have an incentive system and supporting policies in the areas of land, natural resources, taxation, finance, research and others. Therefore, investors are not enthusiastic) To foster industries is slow because the structure of agriculture and animal husbandry still needs adjustment, and the Plateau specific special resources face various obstacles like reallocation, thus having slow development of industrial fostering.

2) Weak Operability

The policies developed for the CCEPZ are often not operable, especially with regard to the land needed for projects, which is a typical case. Although the CCEPZ is in a vast land, the state-owned and unused land that could be directly used for the CCEPZ development is not sufficient because there is a large amount of desert land that has been classified as grazing land, and forest land as agricultural and ecological protection land, by the Second National Land Status Survey. In addition, the current regional "Land Usage Planning" fails to meet the development needs of the CCEPZ, so a large percentage of new projects are facing the problem of "while developing, adjusting regulations and applying for needed land". The application for land approval and land auction take long time. It results in slow progress in getting projects started. In short, because of the reasons above, many circular economy key projects such as coal-to-olefins, coal-fired power plants and new energy projects experienced slow progress in their construction. The new energy equipment manufacturing and new materials industry don't have other relevant industries to support their development. It is difficult to form new growing industry and support the follow-up in the CCEPZ development.

3. Imbalanced Policy Implementation

1) Conflicts over Interdepartmental Policy Enforcement

The government departments refine and implement the policies of circular economy development within their authorities. They have different ways of thinking and behavior in their social management activities. The departments in charge of circular economy development use the "3R" principle to make policies that should be able to control and monitor the entire closed-loop and reversed economic manufacturing. The environmental protection department is extremely important for circular economy development as well as the executants of cleaner production policies. However, the environmental protection departments mainly monitor and manage at the end of the production process. They monitor environmental indicators to grasp the situation of environmental pollution and then take appropriate measures to control pollution. Therefore, the environmental protection department as the executants of "Cleaner production promotion law" mainly focuses on making enterprises install environment protection devices and facilities such as the sewage desulfurization, nitrogen, dust devices, in promoting the clean production process. They don't focus on promoting

cleaner production in enterprises. Obviously, this focus is not conducive to enterprises in promoting cleaner production. In 2011, the Qinghai provincial economic commission and the Qinghai provincial environmental protection office issued a list of enterprises for 2011 annual cleaner production inspection in "About issue on Qinghai 2011 annual cleaner production inspection plan" (Qingjingzi [2011] #84). By the end of inspection, among 39 enterprises of Qinghai in the list, less than 40% passed the cleaner production inspection, of which 9%were from Haixi prefecture (1 enterprise out of 11 passed). This is against a closed-loop production model of circular economy. For circular economy development, there is a “big cycle” at the social level, and a “medium cycle” at CCEPZ level, and a "small cycle" at the enterprise level. In these three levels, the “small cycle" at the enterprise level is the foundation. Because the core of the “small cycle" at the enterprise level is clean production, if there is no change in the way how the policy is implemented, it will take quite a while to implement circular economy policies.

2) Conflicts between Laws and Regional Policies

China has a unified state legal system that sets up frameworks for the local government in terms of making policies. The policy of circular economy development is no exception. To take the example of tax preferential policies in industrial development: the tax preferential policy is the important guiding policy, but national tax legal principle limits the power of the local government in determining the tax preferential policy. China has always given high-tech enterprises quite large tax incentives. In the survey among high-tech enterprises, respondents believe that for most enterprises, especially high-tech enterprises, due to the huge initial investment and the uncertainty of high-tech’s future, it is almost impossible to make profit in the first few years. The enterprise income tax is paid when there is income. Therefore, according to China tax laws and regulations, the majority of high-tech enterprises won’t be qualified to enjoy the corresponding preferential tax policies. In order to give tax incentives to the high-tech enterprises, the Qinghai provincial government issued a policy in the Qingzheng Ban [2013] No.27 and decided to make newly affirmed high-tech enterprises exempt from the enterprise income tax for two years from the date of earning profits. However, it is very difficult to implement this policy under the existing tax management system.

Chapter IV Optimal Improvement of the Chaidamu Circular Economy Pilot Zone

The Chaidamu Circular Economy Pilot zone (CCEPZ) is Qinghai's main front to build a national recycling economy development leading area) Therefore, its sustainable development determines the success of the national circular economy construction, but also the success of the economic transformation and upgrading of Qinghai Province. With the problems mentioned in Chapter Three, the pilot area should focus on supply structure reform, improve the quality and efficiency of the supply system, use green and low carbon as the main direction, solve the problems such as irrational industrial structure, conventional industries with inadequate efficiency, and new industries which are too small in scale; then, promote industry towards high-value added, form a green low-carbon cycle, innovation-driven, with a distinctive industrial system, continuously enhancing its competitiveness.

I. Strengthening Supervisory Management and Correcting Deviations in Concept and Practice

Among management activities, control plays the most important function, while correcting deviations is the core of the function of control. When government, enterprise and the general public develop circular economy, they should take different means including media to strengthen supervision and management, and correct the different concepts and behaviors.

1. "Green performance" Evaluation System for Government Agencies

Green evaluation system is the foundation to give objective assessment and encouragement to leaders, and is also a guideline for them to conduct their decision-making. To build a circular economy-led green performance assessment, will comprehensively strengthen the leading cadres of the concept of circular economy, and change the circular economy behavior.

1) Developing "Green Performance" Evaluation System

(1) Optimizing the "green performance" assessment indicators. First, bring the indicators which can measure the green circular economy degree and quality into the evaluation system, such as industrial wastewater discharge, industrial pollution control, clean energy utilization, environmental protection ratio, and comprehensive utilization rate of industrial waste. Second, add the indicators which measure ecological protection and reflect public requirements for a better environment into the evaluation system, such as soil and water loss rate, biodiversity index, wastewater discharge compliance rate, atmospheric environmental quality (grade 2) compliance rate, and grassland degradation rate.

(2) Completing the "green performance" evaluation content. First, in the current annual goal-oriented performance, add ecological performance assessment[7], to build a comprehensive "green performance" evaluation system. Second, adjust the current evaluation items and the added evaluation items. Which indicators are needed to

[7] Yang hao ran, "Qinghai Plateau Ecological Economy Sustainable Development Research", China Social Science Publishing House, 2013

maintain a reasonable growing ratio, should be based on different stages of development to determine different requirements. Third, establish multiple evaluation subjects. Set up three main evaluation subjects, the upper and lower organizations, the masses and third parties (stakeholders, professional individuals and institutions), to evaluate party and government leadership.

2) Developing "Green Performance" Supervision System

(1) Internal Supervision System. First, functional department supervision: a) Set up key supervisory points. According to the nature of relevant functional departments, choose the points which reflect the green development process and the quality as the key points, regularly and irregularly collect the data, have onsite inspection and hold meetings to collect circular economy development information of the CCEPZ. b) Level-to-level management. Set a three-level management with main impact, general impact and smaller impact. On this basis, adjust and correct deviations in a timely way. Second, ecological stakeholders' supervision: In the construction and development of circular economy CCEPZ, the local people made a great contribution. And they are concerned about the future economic or ecological interests of this project. They are the participants, witnesses and stakeholders in this process. Therefore, they have the right to supervise the government performance.

(2) External Supervision System. First, public supervision: a) Implement the "Government Information Disclosure Ordinance". Local governments should actively expand the circular economy information channels: establish information inquiry, and publish related information regularly, so that the general public can experience the status and trends of local circular economy in time. b) Expand public supervision carriers. Make full use of all kinds of media to build a public monitoring platform, and pass on the information of different stages of circular economy to the general public, such as decision-making and implementation. Then, listen to their feedback and suggestions. Second, media supervision: a) Strengthen the press legislation. Pass legislation to empower media with the rights to know, to interview, and to make comments on important matters, to ensure the freedom of the press and to enable journalists to better perform their supervisory duties according to the law. b) Improve the feedback and accountability of public supervision mechanism. If any issues are published by the media, the higher authorities should deal with it in a timely manner. Third, Professional individuals and institutional oversight. a) Ensure the independence of professional individuals and institutions. Support them both at the institutional and policy levels, to ensure the legitimacy, independence and objectivity of professional individuals and institutions. b) Take advantage of professional expertise; increasingly take "green performance" evaluation into consideration. Strengthen the use of professional and institutional assessment on the performance of the local government, give the right to the professionals and institutions, respect their opinion.

3) Focusing on a Results-driven "Green Performance" Evaluation System

(1) Establishing Green Accountability System. First, equal level (internal) accountability. a) Set the "green performance" accountability standard. The "green performance" accountability standard should build on the existing relevant administrative accountability system, and the annual assessment direct results should be the basis of setting goals for short-term and long-term performance, to build up the direct and indirect accountability basis and standard for "green performance". b)

Accountability inside the party. Strengthen the power of the party committee. Strengthen the party's power in decision-making, implementation and its results, fund use of ecological protection projects, project implementation effects, and other parts in the development of circular economy, with clear responsibilities and joint liability. c) Give full play to the key role of government accountability. Further establish and improve the internal accountability, highlight the construction and development requirements in the administrative responsibility system, public administration system, administrative performance system, administrative compensation system, government procurement system and other aspects of circular economy; provide clear government functions and the scope of accountability, to improve the government's accountability and credibility. Second, external accountability: a) Strengthen the accountability function of the National People's Congress (NPC) and the judiciary. Set up a special internal environmental accountability department in the NPC, and make the environmental accountability as daily work. If someone discovers any misconduct, the NPC should start questioning procedures immediately. b) Improve the existing accountability legal system: Any serious violation of the administrative action in the development of circular economy, shall start judicial accountability after its administrative accountability procedures. c) Give news media full play in the supervision and accountability. Guarantee its right, and protect its independence and freedom in this process. Government shall ensure that the news organizations' legitimate rights in interviewing, reporting, criticism and making comments, including the right to disclose negative events.

(2) Establishing Green Audit System. Green audit should be developed to audit and evaluate government officials in their tenure, for their performance in developing green circular economy. First, establish supervisory department's audit functions in "green performance". In the process of developing circular economy, the supervisory department should play a leading role and bear more responsibilities. a) the supervisory department should play the main role, organize and coordinate different departments to set up a green audit department. b) in the process of law enforcement, green performance and efficiency, strengthen the supervisory work comprehensively. Second, give full play to the government audit functions. Based in the supervision department, organize relevant departments such as auditing, land, forestry, agriculture, animal husbandry, economic and trade departments, to ensure the audit's scientific, comprehensive and objective nature. Third, improve the green audit content. Use cost audits to assess the development of circular economy. Set up circular economy project performance audit, based on project objectives, project organization, capital use and project benefits, and other aspects, to evaluate the performance. At the same time, set up a leadership green audit system, including the ongoing performance and results. Evaluations should follow officials whether in position as incumbents or having left their position; green audit should emphasize the entire life, to encourage the officials pursue sustainable development of a green circular economy.

2. Environmental Regulations to Regulate Corporate Sectors

According to environmental regulations, different business entities should have different pollutant discharge standards, which can be divided into command-based and incentive type[8]. Command-based environmental regulation is executed through the system of environmental performance, to control the enterprises' behavior such as sewage permits,

[8]Zhang Hong Feng et. al. "The internal principle and solution in win-win environmental and economic regulation", published in "Financial issues study", the third edition in 2008.

technical standards, and sewage standards. Market-based incentive regulation refers to the adoption of market mechanisms to encourage enterprises to actively adapt to environmental requirements such as pollution taxes, tradable permits and so on.

As mentioned earlier, environmental regulations play a different role under different conditions. The environmental regulation under dynamic conditions helps a healthy development of circular economy. But when the environmental regulations are under static conditions, it tends to conflict with circular economy development and causes "dilemma" situation in environmental protection and enterprise production, which will lead to governments and enterprises which aren't willing to cooperate with each other: governments want to use various regulations to limit the enterprises using large amounts of resources, but their efforts have made little difference. The enterprise will try to violate the environmental regulations and cause problems of pollution. In a short time, static and dynamic conditions come in turn. Therefore, it is necessary to design the environmental regulations more scientifically, and ensure that the environmental regulation plays a positive role in promoting enterprise transformation, enhancing their core competitiveness, and stimulates enterprises to take initiative to protect the environment, fulfill their social responsibilities, and build up a cooperative set of relationships with the government. This relationship will promote the innovation of enterprises, encourage consumers to consume greenly, improve the efficiency of social resource allocation, and lead to a "win-win" situation, which ultimately achieves ecological and economic balance and sustainable development. Environmental regulations in the CCEPZ can be carried out in the following aspects:

1) Using Market Mechanisms to Encourage and Guide Enterprises

At present, the developed countries have achieved good results in using market mechanisms to govern enterprises in environmental regulations. Through market mechanisms, the enterprises adapt environmental requirements with more initiative, and get more revenue from the market, which leads to win-win situations in environmental protection and economic growth. Therefore, the governments at all levels in Qinghai Province and Haixi Prefecture, should actively play their role in resource pricing, consumption guidance and brand support, closely integrate with related regulations and policies of environmental protection, use market mechanisms, as well as encourage, guide, and stimulate enterprises to innovate and follow the environmental regulations.

2) Build a Communication Platform between the Government and Enterprises

It is important to build a coordination mechanism between the government and enterprises, to improve the relevant communication system, and to build communication channels. Before releasing the environmental regulations and requirements, It is necessary to take initiative to seek advice, to adopt reasonable recommendations, and to constantly improve the various regulations, so that enterprises can adjust accordingly, to reduce or avoid conflict in the implementation of the regulations.

3) Changing the Pollution Control Mode

Give enterprises training in environmental protection, stimulate their sense of responsibility, encourage enterprises to adopt various technological changes and change from pollution control into cleaner production, so that enterprises will change from their traditional end-governance model to the source-governance model which means to

change regulations model of high pollutant discharge standards and traditional disposal of waste, and treat the sources from every phase between “input”, “production” and “outcome”. This will eventually resolve inefficient decision-making because of information asymmetry between different decision-makers, and reduce the cost when enterprises are not willing to cooperate with governments.

4) Introducing Informal Environmental Regulations Methods

Informal environmental regulations are an important complement to formal environmental regulations, which includes information disclosure, environmental management certification and audit, eco-labeling, environmental agreements and public opinion., which can promote public participation and supervision. These informal policies and requirements will encourage enterprises, and guide groups of interests to take initiative to participate in the introduction of the regulatory policies, to resolve the non-cooperative situation between government and enterprises, reduce the regulatory burden on government and enterprises, improve regulatory efficiency and achieve regulatory objectives.

5) Encouraging enterprises to promote technological and management innovation

Governments at all levels should reward enterprises for technological and managerial innovations, particularly in green innovative technologies, production technologies and management tools in environmental protection, ecological economy and circular economy. This should reduce the cost of corporate regulation, improve the production and management of enterprises in all aspects, encourage them to actively participate in environmental regulation, and create a competitive advantage.

3. Promoting Public Participation

1) Strengthening the Awareness of Public Participation

Public environmental awareness is an indicator of the regional and national civilization level, and is also the social foundation to form a regional circular economy. Governments at all levels should actively play a leading role in publicity, education and guidance, through the media and other carriers to educate the general public in circular economy and other aspects, form society-wide values, improve public acceptance of circular economy and create a humanistic environment for the development of circular economy.

2) Improving the Information Disclosure System

Information disclosure is a prerequisite for public participation. Provided it does not involve state secrets, the general public has the right to know relevant information. At the same time, authorities are obliged to provide information to the community and the general public) Information disclosure should mainly be carried out in the following aspects: a) To write good quality environmental reports, make sure relevant data is true and accurate. Regularly write environmental reports on major environmental issues. b) To report on major environmental events (pollution, natural disasters), the general public needs to be informed in a timely and accurate way, and be guided to have objective and rational judgments in environmental protection.

3) Strengthening Public Opinion Supervision

Public opinion is the effective means and important carrier, in government and enterprise environmental decision-making, by supervising law enforcement and other environmental management. To strengthen public opinion supervision, firstly, the media need to report about the policies of the environmental system, decision-making, and implementation issues to the general public and enterprises in a timely way. At the same time, the media should get feedback and suggestions on environmental issues, and be a bridge between the government, the general public, and enterprises. Secondly, the government releases the circular economy development information to a variety of media step by step, providing information for public participation. Thirdly, strengthen non-governmental organizations; strengthen the relationship between government and NGOs. The government shall relax restrictions on informal environmental protection organizations, support and encourage the development of non-governmental environmental organizations through a variety of policies, and have them play their role in circular economy development.

4) Actively promoting green consumption

Firstly, strengthen the awareness of green consumption, advocating the concept of green, environmentally friendly consumption; give full play to the role of various groups and social groups, and form a good sense of ecological protection. Secondly, cultivate consumers to choose to consume greenly, separate waste, encourage green, environmentally friendly, energy saving consuming patterns. At the same time, governments at all levels set an example to promote green consumption, with green procurement, green consumption, repeated use, recycling of office supplies, establishing a green demonstration for the whole society. Thirdly, develop incentive mechanisms to promote green consumption, through preferential loans, tax relief, financial subsidy and other means, to support green-product enterprises in their production, transportation and sales, and to encourage industries and enterprises of environmental protection, and to promote the whole society consuming “greenly”.

II. Focusing on Industrial Transformation and Promoting Supply-SideStructural Reforms

At present, to adapt to and lead the “new normal” economy, promoting supply-side reform has become a strong driving force to improve the quality and efficiency of the supply-system, to enhance sustainable growth. In order to develop healthily, the CCEPZ needs to adapt to the “new normal” economy, strengthen the structural reformation from the supply-side, and enhance industrial supply capacity. The CCEPZ needs to improve uncompetitive areas in the industry, cultivate advantages of development and industries,in close connection with the “Thirteenth Five Plan” by Qinghai Provincial and Haixi prefecture, especially under the "national circular economy development in Qinghai Province Action plan requirements”, to achieve coordinated and sustainable development, to enhance the circular economy industrial efficiency.

1. Enhancing Development Objectives and Clarifying Development Orientation

To enhance the industrial efficiency of the pilot area, it needs to optimize industrial planning, enhance development goals, make a clear direction by aiming high, lead the industrial transformation and upgrading by high standards, and lay a solid foundation for

the CCEPZ to foster new industries, and cultivate new impetus.

1) Development Objectives

The CCEPZ takes the “Thirteenth Five Year Plan” as it guiding ideology, leads the “new normal” by making structural reformation from the supply-side. It follows the development concept of “Innovation, Coordination, Green, Opening and Sharing”, in order to accelerate the transformation of economic development, and to cultivate the characteristics of the main industries as the core. The goal is to improve quality and efficiency and use the main enterprises and projects in the CCEPZ to promote the intensive use of resources, industry cluster development, regional linkage development, and build up the modern industrial system with innovative, circular economic and technological features. Its core is based on the salt lake chemical industry. The CCEPZ will be developed into a pioneering area for circular economy with distinctive features, structural optimization, advanced technology, and clean security.

2) Development Orientation

First, change to the pursuit of quality instead of the speed of development. The CCEPZ will continue to make structural adjustment, transformation and upgrading, optimize the structural layout, technical structure and industrial structure, promote the transformation of the development method, and achieve the goal of improving quality and efficiency. Second, change from the government-led to market-led, which means to allocate resources by market’s needs, promote the advantages of resources and industries, highlight enterprises as the dominating role and the government as guiding and regulating role in industrial development. Third, transform from the homogenization of competition to differentiated competition. It means to develop competitive industries, build the core business, cultivate industrial clusters, construct characteristics of circular economy industrial base, around the extension of the industrial chain. Fourth, change from a focus on tangible to intangible infrastructure. It means to promote institutional innovation, optimize the industrial layout, expand financing channels, improve the functions of CCEPZ, innovate in management systems, and maximize service effectiveness.

2. Promoting Industrial Transformation and Improving the Supply Level

The CCEPZ relies on the four traditional industries such as oil and gas, salt lake, coal and metal, so it results in a "cliff-type" decline when the market is not doing well. Therefore, the transformation and upgrading of traditional industries in the CCEPZ is a must. In this process, it should mainly use a "one principle, two drives, three paths" model of upgrading traditional industries.

1) "One principle", namely, Focusing on the Resources of the Qaidam Basin.

Based on the resource advantages of Qaidam Basin, the CCEPZ should take circular economy as the main direction of development. The planning system, industrial framework and industrial chain of circular economy have been done. The industry construction and development of circular economy are based on the ecological resources of the Qaidam Basin. The CCEPZ transformed the advantages of resources into economic advantages, gained outstanding financial benefits, and formed circular economy with the characteristics of Qinghai industrial clusters. The advantage of

Qaidam Basin is in resources, its potential and hope also rely on the resources, so this helps forming a characteristic of circular economy based on utilization of resources. Therefore, adherence to the "one principle", is the foundation of the CCEPZ development.

2) "Two drives", namely Pursuing Two Driving forces: Technological Innovation and "Internet +"

The supply-side of structural reformation in the CCEPZ depends on innovations, which means to build in more technological elements into circular economy industry, extend the industrial chain, build a strong brand, in order to achieve the supply-side of structural reformation, obtain new opportunities, new markets and new developments. "Internet +"is a driving force based on the internet platform, the use of information and communication technology and cross-industrial integration of various industries to promote industrial transformation and upgrading, and to continuously create new products, new business and new models, and build up a new economic ecology that connects all. "Two drives" has different focus and role in the industrial transformation and upgrading of the CCEPZ. They will optimize the market supply and expand market demand, and give new driven-power to the supply-side structural reforms.

(1) Technical innovation as a driving force. At present, the CCEPZ has passed the primary stage of resource development, so breakthroughs are needed to solve some key aspects of technological innovation bottlenecks, in order to achieve the intensive processing of salt lake resources, to produce high value-added products and diversified products. Ultimately, a sustainable and healthy development of the CCEPZ will be built. First, increase scientific and technological research. Promote the development of key technologies and technological projects, encourage enterprises and research institutes to develop new products, new technologies and new processes, and actively apply for the national high-tech industrialization special funding, accelerate the industrial research on new technologies of salt lake chemical industry, metal metallurgy, new energy, and new materials, in order to enhance the regional characteristics of the overall industrial technical level. Establish new industrial alliances initiated by the industrial leading enterprises and sharing technological innovation with others to jointly develop the key technology. Second, focus on promoting and importing technology. According to the needs of the CCEPZ development and market-oriented guidance, the CCEPZ accomplished industrial structure optimization, upgrading and opening up new space for industrial development through technological innovation. First, actively use advanced and mature technology, and focus on accelerating major infrastructure projects such as: the integration of salt lake magnesium (Phase II), Qinghua Iron and Steel, Kunlun Gold Smelting, the Yellow River Mining Summer Hamu Nickel Ore Mining and Smelting, sponge titanium and titanium alloy materials by Diyuan New Materials. In this way, the CCEPZ could use resources to the maximum but consume energy at minimum and has the smallest environmental impact, so it won't rely on resources too much and its growth won't fluctuate with the market change so much. Secondly, the introduction of cutting-edge technology- focusing on: promoting coal to olefins mining in Qinghai, Zhonghao joint transformation of million tons of coal to natural gas, high-performance magnesium alloy materials, graphene, stone paper and other projects. Through key technological breakthrough, it promotes the strategic upgrading of the overall industry.

(2) Internet +. Emphasizing the use of information platforms to develop tangible and intangible, online and offline combination of new business models for many enterprises

and consumers to provide them networked, intelligent, service-oriented services. This results in integration between the market system, management system, service system and participants, sharing and co-governance. It has formed the most powerful driving force of circular economy in the CCEPZ. First, establish a large data center for the CCEPZ . A cloud computing data center was built in Haixi prefecture through the use of cloud computing and cloud storage technology. The existing small data centers were integrated and improved. A provincial comprehensive cloud computing platform was encouraged to be built by telecom operators. And the CCEPZ actively promoted and introduced the data processing and disaster recovery center for large enterprises in communications, finance, and insurance. Second, promote a deep integration of information technology and industry. The CCEPZ accelerated to promote the integration of information technology and manufacturing industry, to develop the intelligent manufacturing as the main direction by the construction of an intelligent manufacturing network information platform, to promote the industrial Internet, cloud computing and large data) These were applied comprehensively for research and development in the whole process of enterprise design, manufacturing, management, and sales and service of integrated applications. The CCEPZ help enterprises build websites and e-commerce platforms to promote integration between Internet and industries. A large commodity trading center was built for trading potash, inorganic salts, soda ash, wolfberries and other. This results in achieving optimal allocation of resources and improving efficiency. Third, build a modern information industry. In accordance with the new energy industry development, climate conditions, geographical location and industrial advantages, the CCEPZ builds intelligent industrial parks, mainly in Golmud, Delingha industrial parks, which lead the neighbor areas to follow in their footsteps.

3) "Three Paths": Elimination, Retention, and Upgrade

(1) **Eliminate** the traditional small and medium enterprises with high energy consumption, which are over-capacity. For example, there are abundant iron resources in the CCEPZ. Since the “12th Five-Year Plan”, more than 40 iron mining enterprises came to set up. It results in not only becoming part of the national steel surplus, but also exploits iron inefficiently. Another example: the pilot area is rich in solar energy, so lots of photovoltaic enterprises came to settle in and eventually over-capacity became a serious problem. At same time the land, water and other resources are occupied and seriously wasted. To deal with this situation, some of enterprises need to be washed out through the "invisible hand"-competition in the market, and some will be out through the "visible hand" - guided restructuring and merging enterprises by the government, so that large-scale enterprises could be developed for efficiency of utilization of natural resources, and eventually the industrial competitive advantage is enhanced.

(2) **Retain** enterprises with a certain size and development potential. Four major industrial structures have been formed, namely, salt lake chemical industry, oil and gas chemical industry, comprehensive utilization of coal, and metal metallurgy. But these enterprises are still at the beginning of the industrial chain because they mainly depend on natural materials. Since the comprehensive development and utilization of resources is in the initial stage, the task of transformation and upgrading is difficult. At present, although these enterprises are still at the beginning of the chain, but in the circular economy industry, their production and sales have determined the quality and efficiency of the industrial chain. Therefore, this part of the enterprise should be retained, which should be improved through technological innovation, management innovation and

other means to enhance the skill level of enterprise in the extraction and capacity of resources and to lay a solid foundation for competitive, sustainable and healthy development of circular economy.
(3) Actively promote the transformation and **upgrading** of traditional industries. The CCEPZ should increase the technological innovation of traditional industries, develop deep processing of products, extend the industrial chain, improve the quality of product supply, promote the integration of upstream and downstream development of the industry, accomplish the change from resources into technological advantages in order to meet the market demand for high quality of products and services. For example, the brine from salt lake has associated resources, so it is important to constantly improve the technology of processing potassium, magnesium, sodium, lithium and boron, and strive to extend the industrial chain, making each of the resources fully developed and effectively used.

3. Emphasizing Quality and Optimizing the Supply Structure

1) Identifying Industrial Development Priorities in the CCEPZ and the XETDZ, Achieving Optimal Integration of Circular Economic Resources

There is a certain overlap between the Qaidam circular economy pilot area and XETDZ, resulting in inefficient allocation of resources. Therefore, the two zones, taking into account their respective resources, technology and other advantages, should clarify the focus of their industrial layout to achieve the development of differentiated circular economy and optimize the integration of resources.

(1) The XETDZ has focused on building industrial clusters, extending the industrial chain, technological transformation, and strengthening leading industries, cultivating new industries, upgrading traditional industries, eliminating out-of-date production capacity, and building the "7 +2 +1" industrial system. The "7 + 2 + 1" industrial system is formed specifically for the seven leading industries: silicon materials and photovoltaic manufacturing industry, nonferrous metal industry, new material industry, chemical industry, Tibetan carpet industry, plateau health industry, and high-end equipment manufacturing industry; Two new industries: Lithium and new energy automobile industry, photoelectric and information industry and one modern service industry. Among them, lithium and the new energy automotive industry have taken the opportunity that China supports the development of new energy vehicles and aimed at the goal of creating a lithium industry worth 100 billion yuan. They are focusing on the development of lithium materials, lithium batteries, new energy vehicles and related industries. The lithium industry will be developed to be the most important industry in Xining. The photoelectric and information industry will accelerate the development of sapphire crystals, silicon carbide and epitaxial products, optical fiber preform and fiber, LED and other products. The modern service industry is focusing on the needs of production and living including the development of modern logistics, financial services, R & D and design, business intermediary agents, headquarters' economy and other productive service. It also supports the development of consumer services such as trade, food and accommodation, leisure services; of public services such as education, health care, and community services, to improve integration.

(2) The Chaidamu Circular Economy Pilot Zone has focused on comprehensive development and utilization of salt lake resources, formed seven leading industrial chains and built the circular economy industrial system with a rational structure, great

advantages, intensive utilization, and the complete industrial chain. The CCEPZ has focused on the construction of two 100 billion yuan and four 50 billion yuan industrial bases, developed emerging industries such as biological products, new energy, new materials, information industries, continued to consolidate and optimize the salt lake chemical industry, oil and gas chemical industry, comprehensive utilization of coal industry, and metallurgy industry. It has also focused on cultivating financial services, services for production and logistics. The goal is to make the CCEPZ become the main engine of industrial economic development and social progress and the leading force for the whole Qinghai province to develop circular economy.

2) Fostering New Emerging Industries and Highlighting Industrial Characteristics

Based on the layout of resources and industrial development foundation, under the conditions of dealing well between development and protection, the CCEPZ followsthe principle of "promote work in all areas by drawing upon the experience gained on key points, link work at selected spots with that in entire areas, make the focal points stand out, promote overall". It focuses on building up four key circular economy industrial parks: Golmud, Delingha, DaChaidan, and Ulan, which lead comprehensive development of regional resources, and rapid economic and social development of Dulan, Tianjun, Leng lake, Mangya, etc)

(1) Plateau characteristics of the biological industry. Based on the industrial development condition of the whole prefecture, the focus and characteristics of plateau biological industry are highlighted. The CCEPZ has built a biological materials base, with integrated processing and production. Golmud, Delingha, Tianjun, Dulan, Ulan, and Dachaidan have adjusted their farming(cultivation) industrial structure. They have developed a biological materials base of organic wolfberry, Qaidam Funiu(beef brand), quinoa, barley, Chinese, Tibetan and Mongolian medicine, forage planting and organic fertilizer production. The goal is to make them large-scaled, standardized and industrialized. The comprehensive processing industry relies on Qaidam (Delingha) Green Industrial Park and Dulan Wolfberry Industrial Zone. They are the center of this industry, and from there, the bio-industrial chain is extended. They foster new brands, develop new markets, focus on the industries with advantages of resources and technology. The implementation of major projects and technological breakthroughs has led to industrial growth and the transfer of secondary industry to tertiary industry. A distinct competitive advantage has been created with Qinghai-Tibet Plateau biological resources, and an innovative industrial cluster of Tibetan medicine has been formed.

(2) New materials industry. Based on the distribution of resources and the foundation of industrial development, Golmud, Delingha, Dachaidan Industrial Parks focused on new multi-purpose chemical materials industries such as the salt chemical whisker materials, resin materials, polymer composite materials; and high-performance light metal and alloy materials industry such asmagnesium alloys, titanium alloys and others; and energy materials industry such as molten salt for storing heat, lithium series for energy storage, graphene, nickel-copper-manganese ternary materials, glass for photovoltaic power generation. They also focus on promoting new materials industries such as the extensive processing of salt lake magnesium resources, the construction of magnesium alloys, magnesium-based flame retardants, magnesia refractories and downstream products; development of PVC, propylene and other products around the oil and gas chemical industry and coal chemical industry; making high-performance modified plastics, composite materials and their products such as chlorinated PVC, polyphenylene

sulfide, high-performance polypropylene, carbon fiber, degradable plastics, glass fiber; and the development of high-performance special steel, based oniron and steel integration projects as well as iron ore resources, silicon, manganese, chromium, nickel, molybdenum; and developing new energy materials from the solar photovoltaic, solar thermal power generation and wind power industry, solar cells of third-generation high efficiency and their components, ion battery cathode materials, lithium cobalt oxide, lithium iron phosphate; promote new materials industry development and application on silicon resources, glass fiber, wind power equipment manufacturing, magnesium lithium and lithium aluminum products; focus on five materials: lithium battery materials, aluminum alloy materials, nickel and cobalt materials, olefin downstream of high-end chemical materials, magnesium-based alloys and magnesium refractories; focusing on planning industrial projects of light metal materials, inorganic chemical non-metal new materials, organic polymer materials, new battery materials; built the country's largest industrial base of magnesium and magnesium alloy, and of lithium carbonate.

(3) New energy industry. According to resources and internet conditions, the supporting equipment manufacturing industry for new energy industry is mainly located in Delingha industrial park. It is focusing on building efficient photovoltaic, photovoltaic power generation, plateau wind-power manufacturing, energy system integration, power plant integration, in order to form industrial clusters of new energy industrial incubation, transformation, and growth. The growth of new energy equipment manufacturing industry will rapidly follow. It includes solar power components, molten salt for storing heat, battery materials, glass fiber, wind power equipment manufacturing, and solar thermal power generation equipment. Delingha industrial park is aiming for the construction of an industrial chain of "equipment manufacturing - power generation - load consumption - export", focusing on planning of new energy power plants and supporting equipment manufacture, promoting photovoltaic, solar thermal, wind power, wind and solar power, up to a total installed capacity of 13GW. The goal is to build a national new-energy industrial demonstration base.

(4) The industries with characteristic advantages include salt lake chemical industry, oil and gas chemical industry, metal metallurgy, and comprehensive utilization of coal. For ecological protection, industries rely on the resources from the nearest location and making good use of resource extraction and producing good primary products; developing intensive processing and downstream industry in Golmud, Delingha, Dachaidan, Ulan and Dulan industrial parks. The centralized layout of each of these industries have formed a new pattern of industrial clusters in efficient configuration, with investment concentration, professional integration, reasonable structure, and resource intensive utilization.

(5) Productive services include modern financial services, logistics and warehouse services, technological research and development. Based on traffic conditions and industrial development condition, these services are mainly located in the Golmud and Delingha industrial park, where they will lead the development of productive services in other areas of the CCEPZ.

III. Focusing on S&T Inputs and Improving the System of Innovation

S&T innovation is the "accelerator" and "propeller" as well as the basic condition of circular economy development. The technological innovation system of the CCEPZ not only determines the industrial competitiveness, but also determines the industrial chain

extension and industrial integration. Therefore, it is an important means and carrier for sustainable development to improve the technological innovation system and build up a good innovative environment. According to the issues mentioned above, areas need to be improved as follows:

1. Addressing the Labor Shortage and Improving the Labor Quality

1) **Implementing the "Eastward Moving and Westward Expansion" Project, Thus Achieving the Mechanical Immigration of Population**

According to the study of "population carrying capacity of Xining, Haidong and Haixi"[9], the per capita ecological footprint of Haidong has exceeded the carrying capacity of local land resources in 2007, so the quality of ecological environment is declining and the population pressure is huge. In February 2013, the State Council approved Qinghai province establishing the prefecture-level city - Haidong City. Since then, Haidong has carried out a large-scale urbanization construction, so the population overload is more serious. However, Haixi prefecture still has the carrying capacity of the ecological environment and has a large space for development. The ecological footprint of Haixi is only 19.98% of the population of Xining, 27.10% of the Haidong area, but its land is 39.26 times bigger than Xining City, and 22.86 times bigger than Haidong City. Even after deducting 85% of Haixi area which is human inhabited area, it is still 5.89 times that of Xining City and 3.43 times of that of Haidong City. The available land per capita is 29.48 times of Xining City and 16.66 times of that of Haidong City. As a result, the per capita ecological footprint is much higher than that of Xining and Haidong. Based on the different ecological carrying capacity, the research team proposed to consider the implementation of the project of "moving people from the east and expanding cities in the west of China", which means to move a part of the population of Haidong city to Haixi's Golmud city and Delingha city. This will not only improve the population carrying capacity of Haidong City but also give Haixi population of different age and different education, and it will eventually solve the labor shortage problem in the CCEPZ.

2) **Build up the Training Mode of "Government + Enterprise", Improving the Overall Quality of Population**

(1) The government should focus on general public education: first, to build up an education system mixed with basic education, professional education, adult education and social education. According to the different types and nature of education, the knowledge and development concepts of circular economy should be taught so that the whole society would understand the circular economy and be willing to participate in circular economy education and training. Second, to use the media well. All-round promotion of the circular economy concept, measures and development path should be put out by use of the internet, television, newspapers, radio and other media, so that circular economy public opinion could be formed.

(2) Enterprises should focus on improving professional skill training to their employees: first, to build up training institutes, and make training routine. Enterprises should give staff professional training regularly or irregularly according to their development stage and the need to make employees grow with enterprises spontaneously. Second, to carry

[9]Population and development research institution of Nankai University Economics Institute, 2007

out training for key posts: for employees in the key technical departments and management departments, a set of operational and tailor-made training should be carried out in order to improve the overall quality of key staff's competence.

(3) "Government + Enterprise": the government should use social resources to carry out various education or training customized for different positions, different levels and different nature according to the needs of enterprises. The government should take into account the industrial characteristics of the CCEPZ, rely on vocational institutions like Qaidam Vocational and Technical College to make customized training and special courses. The educational system will be formed around the subjects of chemistry, metallurgy, electromechanics, and auto-repairing studies, accompanied with modern services， agriculture and animal husbandry. This will meet the basic needs of circular economy industrial development for human resources.

2. Strengthening Talents Recruitment & Establishing Talents Development Platforms

1) Expand Channels and Methods of Attracting and Using Human Resource

(1) To explore the establishment of market-oriented mechanism for talents introduction. Lots of well-trained workers and the professionals in eastern China are out of jobs because regional industrial restructuring is taking place. The CCEPZ should take this opportunity to attract them to come through the following means: Encourage the small and medium enterprises and incubation bases in the Haixi prefecture to work with other well-known head-hunting companies in China or outside of China to carry out the recruitment of well-trained personnel who would fit with the needed skills; use market-oriented operations and establish companies for head-hunting or a professional team for building up a database of professional human resources, according to the characteristics of the regional industrial structure; equip and train industrial workers and management personnel within enterprises in Haixi to help with the difficulty of worker shortage.

(2) To introduce high-level talents. The CCEPZ opens to the international and domestic human resources in order to enhance innovation ability. To make full use of the plan of "Qinghai introduction of a thousand high-end professionals", the CCEPZ shall introduce high-level professionals and innovation teams from China and abroad. The government will implement a more open policy on human resources and establish a system of allowance given to high-level professionals, strengthen the services in housing, medical care, social security and children's education so that there is a stable team of human resources serving the competitiveness of the CCEPZ and promoting the healthy development of circular economy.

(3) To implement great human resource projects. To attract intelligent personnel is one of the drives for innovation and an important starting point for the circular economy development. The CCEPZ needs to attract people in the areas of product innovation, technological upgrading, marketing and sales, to come and start their companies by implementing the model of "enterprise resources + industrial resource + human resources capital".

(4) To use platforms to attract talents. Build technological innovation platforms such as key laboratories and research centers to attract all kinds of professionals to carry out

technical research, experimental demonstration and other activities, break through the bottleneck of industrial development, develop a number of independent intellectual property rights and brands, and promote the coordinated development of human resources and industries.

2) Improve the Quality and Structure of Human Resources

(1) To establish flexible human resource mechanism. According to the actual situation in the CCEPZ, a flexible talent mechanism of "No move of citizenship, no transfer of work-relationship, two-way choice, freedom to come and leave" is established and perfected. The ways of introducing professionals include: contracting scientific and technological consultants, placing leaders on temporary posts, and hiring high-level personnel. Inviting bids for major scientific and technological projects is used to guide the talent coming to the key industries and those in need of technological support, to become leaders of technological innovation teams.

(2) To let research institutions play their important roles. The CCEPZ makes full use of numerous large and medium-sized enterprises which have considerable technology and equipment to build several open laboratories. They will meet the need for technological research work. The CCEPZ established post-doctoral research stations and various associations, and organizes experts and scholars to exchange knowledge. This has stimulated great interest among the technological personnel, especially high-tech talent, to start innovative businesses.

(3) To strengthen personnel training and employment. The CCEPZ has established an information database of human resources needed for key projects, engineering objects and technical transformations. At the same time, according to the features and needs of key enterprises, industries and industrial chains in the CCEPZ, five projects to foster talent are being implemented as follows: a) Selecting leaders in technological field; b) Training outstanding young professionals among the grassroots; c) Introducing and training professionals with academic qualifications; d) Increasing competitiveness of human resources; and e. Training highly-skilled personnel. This results in providing sufficient human resource needed for the development of circular economy, and leads to cultivating leaders in innovation and entrepreneurship, especially leaders who understand both technology and the market.

3. Increasing Investment in and Strengthening the Support of S&T

1) Increasing Multi-Channel Input and Stimulating S&T Motivation

(1) To carry out governmental orientation and corporate participation. The Government should strengthen the coordination with large enterprises such the Salt Lake Industrial Co. Ltd and Western Mining to encourage enterprises to increase their investment in S&T. At the same time, when the Qinghai provincial S&T department allocates special funds to support enterprises, they should give more support to small and medium-sized start-up businesses in Golmud, Delingha, and Dachaidan industrial parks, and to promote a number of low-cost, friendly and open incubators through the principle of "Everyone starts up businesses, everyone innovates". These incubators will become a "cradle" of S&T as well as entrepreneurs.

(2) To strive for the support of multiple funds. The government at all levels should

increase the financial support to the CCEPZ, design professional companies for the technology introduction as their main business. This is recommended to either let enterprises have sole proprietorship or let government funds and share-holding participate in forming these companies. The government could also encourage enterprises to accelerate scientific and technological breakthroughs and generalize the use of technological achievements. Thus the dominant position of enterprise in technological innovation is further strengthened and the development of enterprise in innovation and entrepreneurship is boosted.

(3) To establish special funds. To set up 1 billion Yuan special fund for scientific and technological innovation is the next step to support major industrial technological research and development, with key technological breakthroughs, and new high-tech project construction so that the CCEPZ could grow in technological innovation. The plan is to set up 10 million Yuan fund as an incentive/ reward for new energy, new materials, bio-industry, salt lake chemical industry, coal chemical industry, oil and gas, and equipment manufacturing technology to stimulate breakthroughs in key technology, and creativity in research work.

2) Setting up a Platform for Scientific Research and Integrating Technical Resources

(1) Empowering the Existing Platforms for S&T innovation

Focus on: building scientific research platforms for comprehensive utilization of salt lake technological innovation and the Qinghai-Tibet Plateau non-ferrous metal mining development and efficient utilization of industrial technological innovation, and actively promoting the Qinghai provincial major laboratories upgrade. Focus on the formation of strategic alliances in technological innovation of major industries. Promote major industrial alliances to become national-level technological industrial alliances with regional characteristics, in the following areas: magnesium alloy, third generation photovoltaic of high concentration of gallium arsenide, photovoltaic power generation and its equipment manufacturing, wolfberry and Funiu (beef) extensive processing. Guide and support enterprises to set up their technological centers, laboratories, and industrial testing basesas innovative platforms. Accelerate the construction of these centers: the plateau wind turbine R & D experimental center of Guangdong Mingyang Group, Qaidam Hongjing new materials research center of Guangzhou Huitiancheng Co., Ltd., Jieqing's structural plate products, Qingyuan Pan-Americanhigh-strength and high-toughness magnesium alloy, Huamei Wolfberry fermen products. Speed up the formation of new products with Qaidam characteristics in areas of magnesium alloy, wolfberry biochemical processing and new energy equipment manufacture. Promote platforms like the start-up base of small and medium enterprises in Golmud industrial park and new industrial incubator base in Delingha industrial park. Build up a number of low-cost, friendly and open technology incubators and improve the incubator industrial associations. Build a full incubation chain from the incubator to industrialization and a reliable platform to ensure the successful incubation of scientific and technological achievements, and to build and form an incubation model of "incubator + accelerator + industrial base".

(2) Give overall consideration of the financial resources for S&T. The financial resource is mainly given to build up: scientific research platforms for comprehensive utilization of salt lake technological innovation; the Qinghai-Tibet Plateau non-ferrous metal

mining development and efficient utilization of industrial technological innovation; development of a plateau low-speed wind turbine experimental center; the technology development and industrialization for solar thermal power generation; and support for self-built R&D platform for enterprises such as macromolecule new material research center. There is promotion of market-oriented application of technologies in the following areas: salt lake light-metal alloys, special macromolecule materials, low-cost and high-efficient photovoltaic power generation, nickel cobalt manganese ternary lithium anode materials, new energy equipment and its auxiliary materials manufacture, processing biological products and biochemical products with plateau special features, and recycling and comprehensive utilization of waste, all in order to improve the technological level and overall competitiveness of major industries.

(3) Let enterprises play a dominant role. An important means to encourage enterprises to increase their investment in research and development of technology is to implement preferential tax policies, to improve the communication with the tax department, and to execute the tax policies well to support enterprises' innovations. Support enterprises' R & D institutions to gather innovative resources and build talent workstations, and improve the service model of "special request + project + base", strengthen management system of enterprise R & D and standardization of intellectual property management, and strengthen the application and promotion of innovative methods, and promote the capability of enterprises in R &D upgrading. Guide, research and develop the capability of enterprise specialization and large-scale development, improve service capability of research and develop public technology, strengthen cross-banking cooperation and equity mergers, to create enterprise groups of complementary industrial technological research and development. Increase the equity incentive rewards, and let enterprises use their share options and stocks with restricted conditions to give incentive to technological personnel so that benefits of technological research and development of enterprises could be aligned with individual income.

IV. Strengthening Risks Management and Mitigation Capacity

Risks management in industrial parks is the decision-making process of the park to reduce the negative results of risk. The risks are identified through risk identification, risk estimation, risk assessment, selection and optimization. The risks are effectively controlled and properly managed. Therefore, take the least cost approach to achieve the greatest mitigation of risk.

1. Increasing the Risk Awareness

To operate industrial parks requires forward-looking risk awareness, to predict negative potential results and their impacts.

(1) To strengthen risk education. Different levels of officials should actively carry out different types of risk education. Qinghai Province, the provincial government and the functions of the relevant departments of the leading cadres, should focus on macro and mezzo-environmental risks arising from the analysis to achieve circular economy in the Qinghai Province pilot area in development direction, development policies, development methods and other controls and regulations. Haixi, Delingha and the pilot area management committee should focus on strengthening the layout of the industry, the pilot area planning and design and other aspects of potential risks.

(2) To play the role of think tank. In the process of construction and development of the park, the risks involved in different regions cannot be fully grasped and controlled by the government functional departments alone. Therefore, it is necessary to make use of professional think tanks within the CCEPZ to control the risks. Around the construction of the pilot area in its various stages of development and facing various problems, the Government can purchase services by way of a variety of think tanks to make the risk analysis, assessment, and teach other government leaders, to enhance the leading cadres risk awareness and monitoring and management capabilities.

(3) To carry out multi-form, multi-content training and learning: regular and irregular, case and case analysis, topics and special risk management training and learning, from theory to practice, local to comprehensive improvement of the leading cadres for the development of circular economy.

2. Establishing Risks Management Mechanism

According to the dynamic features of risk, there are three aspects in the construction of risk management mechanism in the CCEPZ: Risk identification, Risk control and Risk pre-arranged planning.

1) Enhancing Risk Identification Capacity

According to the sources, the CCEPZ has faced different forms of risks internally and externally; there are mainly policy risk, market risk and ecological risk.

(1) To prevent policy risk depends mainly on how well the management leaders of the pilot area understand the national macroeconomic policy and how well the investors judge the market trends. Since the 18th National Congress, China has made great changes in developing concepts, policy supply and goals in social governance, economic transformation, supply-side reformation and the construction of ecological civilization. The change is formed because China is in the new stage of development and the judgment of scientific characteristics, which not only requires the leaders of Qinghai government at all levels, leaders involved in development of circular economy but also the enterprises that invest in the CCEPZ , to understand comprehensively the new requirements, new goals and new tasks for developing circular economy and grasp developing trends nationally, locally and in the CCEPZ .In this way, risks could be avoided because of conflicts with the policy system. Therefore, government should focus on key problems of enterprises and industries of the CCEPZ in the industrial layout, capacity design, and extending the industrial chain that involved in healthy development in China and regionally.

(2) Market risk refers to the uncertainty of the future market prices (interest rates, exchange rates, stock prices and commodity prices) which have negative impact on the enterprise to achieve its established objectives. These market factors may have a direct impact on the enterprise, or may have indirect impact through its competitors, suppliers or consumers indirectly. The market risks of the CCEPZ mainly come from market price, market demand and market competition. Therefore, enterprises should pay attention to market prices, competitors and changes in demand and other factors in order to be able to implement tracking and management of market information, and constantly optimize the market counter-plan and improve market competitiveness.

(3) Ecological risk refers to the risk that the ecosystem and its components bear. The CCEPZ gathers large-scale salt lake chemical industry, coal chemical industry, metal metallurgy and other heavy industry enterprises, which could damage the ecological environment by the use of resources and waste emissions. The damage to the ecosystem will seriously undermine the principles, requirements and objectives of circular economy development. It will result in the failure of circular economy. Therefore, the CCEPZ primary focus has always been on prevention of ecological risk. To consider the specific situation of the CCEPZ, the focus of ecological risk is on air pollution, waste water pollution, solid waste pollution and hazardous waste treatment and so on.

2) Strengthening Risk Control

Risk control means that risk managers take various measures to eliminate or reduce the possibility of occurrence of risk, to control or reduce the loss in occurred risks.

(1) Set up key control points scientifically. The CCEPZ needs to set up risk control points according to the origin, features and trends of major risks when facing policy risks, market risks and ecological risks. Key control points need to be able to reflect and identify problems in a timely manner, to fully reflect and explain the level of performance. After the establishment of the key control points, the control standard should be set up according the types of different risks, such as the timetable, the standard of productivity and the quality. Thus the first layer of risk control system is ready.

(2) Data acquisition and analysis. After the key control points and control standards are established, the information acquisition, data process, analysis and conclusions on control points should be collected regularly and irregularly, to determine analysis results of risks in quantitative and qualitative terms. On this basis, the analysis and assessment of various types of risk based on their features, development stage, and negative impact will ensure risk management accurately grasps the development status of risks and have a solid foundation for scientific management.

(3) Prompt feedback and response. The data collection and analysis' conclusion of risks need to be provided to the government and enterprises in a timely way. According to the nature of risk, nature of information and other characteristics, feedback can be given to different levels of management of Qinghai Province, Haixi Prefecture and the CCEPZ, so that different leadership would develop appropriate measures of risk management including adjustments of policy and projects. At the same time, it is important to give the feedback to the enterprises so they could improve their efficiency and effectiveness of information collection and analysis in order to make a reasonable scientific response and improve the ability to manage risks.

3) Improve Risks Forecasting Mechanism

To establish various risks forecasting plans is the best strategy to deal with risks. The CCEPZ faces different types of risk. The maturity of a risk management pre-arranged plan determines the ability of the management team in the CCEPZ, whether the subject is the government or enterprise. Therefore, strengthening the design and improvement of the risk pre-arranged plan is an important part of risk management. The risk management pre-arranged plans can be divided into general pre-arranged plans, special pre-arranged plans and department pre-arranged plans according to the nature and

urgency of the risk.

(1) Make the general pre-arranged plan for risks management. The CCEPZ needs to issue regulatory documents on the risk pre-arranged plans, processing, assessments and feed backs to deal with the different risks that might impact sustainable development of the CCEPZ. The general pre-arranged plan of risk management is mainly made by Qinghai provincial government and Haixi autonomous prefecture, in which a four-level management mode is adopted - provincial, prefecture, city and the CCEPZ. The design and implementation of each specific risk pre-arranged plan is done by different management subjects in this four-level management model according to its nature and urgency. Since the general risk management pre-arranged plan involves the overall design of safe development of the pilot area, it is necessary to set up a record system for it. The subordinate management will submit the record of the risk management pre-arranged plan to the superior management after they design it, so that the coordination and the continuity of the management measures will be ensured.

(2) Make a special risk pre-arranged plan for risks management. The special risk management pre-arranged plans are mainly made to deal with a few types of risk events by the provincial and municipal and the CCEPZ. The risks are mainly related to risks of production safety, financial risks, and specific policy risks. The different levels of management face the specific risks involved in different scopes and different impacts. Therefore, although it is a special risk pre-arranged plan, it still applies for a four-level management which means different management levels have different responsibilities for the same risk or same type of risk, to keep the integrity and coordination of risk management, and ensure its efficiency and effectiveness.

(3) Develop department pre-arranged plans for risks management. The department pre-arranged plan is a plan prepared by the departments of the CCEPZ in accordance with the general plan, the special pre-arranged plan and departmental responsibilities in response to emergencies and risks including the risks of production safety, environmental pollution, natural disasters and other emergencies. The main risk management relies on the management committee of the CCEPZ and enterprises. At the same time, they report and submit records of risk plans to the higher authorities in a timely manner according to the nature and scope of the risk.

3. Enhancing the Industrial Capacity of Resisting Risks

1) Strengthening the Brand Cultivation

In the segmentation of the market by brand, 20% of famous brands occupy 80% of the market share, which shows that brand image has a strong appeal and influence. The pilot area should take the general development of brands as the leading factor to stimulate the creation of other brands in the CCEPZ. Each of the brands has direct or indirect connection with one another but maintain their relative independence. These brands should be treated differently and separately while brands are being established.

(1) Scientific planning and reasonable allocation. The features of brand building are scientific, prospective, strategic and sustainable. It has scientific planning, system integration, system management and rational allocation of resources, especially highlighting the strategic planning, developing pattern and main values on development of different brands. The CCEPZ should use brand building to lead its economic

restructuring and boost its economic growth so that the CCEPZ could become a local brand, a regional brand, a domestic brand and even an international brand.

(2) Deal with the relationship between a single brand and the general brand. The development of the general brand of the CCEPZ should be based on the development of individual brands. The method for developing brands is very different because the general brand, enterprise brand, industrial brand and product brand have their own requirements on brand name, logo, cultural connotation, value proposition and so on. Therefore, they need to be dealt with differently. Brand building should focus on brand positioning, brand image, brand marketing, brand communication, brand promotion, brand extension, brand protection and brand evaluation, and so on. The general brand of the CCEPZ should focus on the image of development of the general brand and individual brands in order to enhance the market position and competitiveness of the CCEPZ . In addition, to build a series of brands of the CCEPZ should not only take rational consideration but also gear toward breakthrough, so that the brands have great commercial values and cultural concepts that both highlight their characteristics and make interactions, mutual benefit and complementarities between brands.

(3) Highlight the characteristics and innovative ideas. To shape the brands, their unique features must be highlighted. No distinguishing features means no brand images. From the brand image point of view, the features of a brand could be reflected in the features of its business strategy, positioning, culture, technology and resource. From the industrial point of view, it could be reflected in the unique features of the salt lake chemical industry, fine chemical industry, biotechnological industry, and new energy material industry. From the product point of view, it can be reflected in the green, environmental protection, organic and other ecological brands. At the same time, whether to shape the brand image or to enhance the brand competitiveness, we must fully consider innovations of technology, product, mechanism and marketing. Technological innovation is the key element that includes brand innovation, quality innovation, service innovation, advertising innovation, public relations innovation, cultural orientation innovation, image innovation and many other aspects.

2) Efficiently Integrating Industrial Chains, Thus Enhancing the Clustering Effects

(1) Extend the traditional dominant industrial chain. We will focus on promoting the integration and development of the four resource-based industries: Salt lake chemical industry, oil and gas chemical industry, coal chemical industry and metal smelting, and promoting the transformation of existing industries and products into having high added-value and high-technological elements. To develop industries listed below, the circular economic industrial chain will be further extended, integrated and developed: Based on magnesium resource, develop an industrial base for high-end magnesium products such as high-strength high-toughness magnesium alloy, high-performance magnesium titanium alloy, magnesium-lithium alloy; Based on lithium carbonate resource, develop a lithium battery industrial base for electrolytes, new diaphragm composite materials and lithium battery positive and negative materials such as lithium cobalt oxide, lithium, lithium nickel phosphate, lithium iron phosphate, and six fluoride phosphates. Based on the resource of polyvinyl chloride, polypropylene, dimethyl carbonate, methanol, develop polyformaldehyde, ABS engineering plastics, PTFE, polycarbonate and other high-performance synthetic resin, plastic alloy, composite materials; Based on the resource of potassium carbonate, magnesium oxide, refined magnesium sulfate, and boric acid, develop magnesium oxide whisker, magnesium borate whisker, boron

aluminum magnesium whisker, magnesium sulfate whisker and other inorganic whisker materials, and thermoplastic resin composite materials; Based on magnesium hydroxide, develop flame retardant material and desulfurization material; Based on nickel, develop nickel-based heat-resistant, wear-resistant and corrosion-resistant alloy industry; Based on metal silicon and organic silicon, develop silicone rubber, silicone resin, silicone-modified polymer silicon series of materials industry; Based on fluorine chemical industry, use by-products of the salt lake- chlorine and silicon chemical products to develop poly fluoride, fluorine silicone resin industries.

(2) Build up the biological industry chain. Focus on building a green industrial park, and foster leading enterprises with extensive processing; Based on encouraging the establishment of the distinguished agricultural and livestock production, accelerate to build a Qaidam green industrial park. Actively promote upstream and downstream industries being extended; establish the complete industrial chain from raw material production to the end-consumption, and promote the effective connection between the various sectors to promote the "planting and breeding - processing - comprehensive utilization" as a development model of the integrated industrial and agricultural compound circular economy. Focus on the deep processing of agricultural and livestock products, vigorously foster organic food, bio-pharmaceutical industry, and specifically target on the development of high value-added products such as bone peptide, hemoglobin, wolfberry flavonoids, anthocyanins, betaine, wolfberry seed oil and soft capsule, and wolfberry-essence lozenge. Develop GAP cultivation of Chinese and Tibetan medicines such as Nitraria tangutorum Bobr, cynomorium, rhodiola rosea and form a large-scale raw material supply base; develop Chinese and Tibetan medicine slices, superfine powder, activity extraction of new drugs and special medicine products, and promote the development of biomedical industry to form unique plateau characteristics in the biological industry cluster.

(3) Improve the new material industry chain. To meet the needs of market demand of international and domestic new materials industrial development, the CCEPZ takes advantage of its distinguished industrial development, seizes the internal need of upgrading raw materials, accelerates the development of resources, and develops a number of fast-growing industrial groups. The specific framework is: based on magnesium, lithium, strontium and other special steel, focus on the development of magnesium alloy magnesium lithium alloy, mold steel, alloy steel and other products mainly used in aerospace, shipbuilding, vehicles, rail transportation, and construction. Based on new materials - crystalline silicon, thin-film flexible batteries, lithium battery cathode materials, electrolyte and diaphragm auxiliary materials, graphite and graphene, focus on the development of advanced battery materials, especially focus on thin-film flexible solar cells and high-power lithium-ion batteries, etc) so that the CCEPZ could lay a solid foundation to build national-level solar cells, lithium-ion battery industry base. Based on the upcoming industries of coal-to-olefins and new modified additives as the focus, develop new materials such as polyformaldehyde, chlorinated polyvinyl chloride, polyphenylene sulfide, modified plastics, glass fiber and so on. Based on natural stone, solar glass, heat insulation material and wollastonite comprehensive utilization, actively develop eco-friendly environmental protection materials such as solar glass, new wall materials and so on. The CCEPZ wants to build a new materials industry chain based on new products of salt lake chemicals, light metals and its alloy materials, modified plastics, high-performance fiber-based composite materials, special steel, new building energy-saving materials, environment-friendly materials and new energy materials. The CCEPZ will become an important new material industrial cluster

with distinguished Qaidam advantages.

(4) Build a new energy industry chain. The CCEPZ takes the opportunity to be able to fully integrate new energy industry development into the development of the Silk Road Economic Belt, focusing on large-scale development, construction of a supporting industrial base, efficient demonstration power stations, power plant operation management, and steadily expanding the construction scale of power station. Based on the industries of magnesium alloy, machinery, soda ash, glass, and plastic, the CCEPZ will develop the industries of supporting equipment manufacturing, investment and finance, research and development, operation and management, and focus on “R&D - equipment manufacturing - Power station construction - operation and maintenance - power transmission” in one integrated and large-scale industry chain as a whole collaborative development of industrial clusters; Strive to make new energy development into the Qinghai provincial key special development plan. Therefore, the CCEPZ will become the most influential international distinctive industrial base with integrated capacity of research and development, manufacturing, and construction. It will be an important strategic place for efficient and clean new energy development, to develop new energy industry integration, creating "one belt, one road".

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研究成果（一）

柴达木循环经济试验区建设评估与改进优化

《提升青海省循环经济政策建议》

项目办公室

2017 年 2 月

摘　要

课题在梳理柴达木循环经济试验区（以下简称试验区）“十二五”期间发展现状的基础上，课题组从科学编制园区发展规划、大力实施重点工业项目、认真执行各项法规政策、发挥骨干企业项目作用、着力加强基础设施建设、加强配套支撑体系建设等方面对试验区建设主要做法进行了总结，同时就产生的经济效益、社会效益、生态效益进行了分析。基于此，课题组认为试验区建设是符合柴达木发展现状的，对柴达木地区特色优势资源开发发挥了重要促进作用。以上成绩的取得正是试验区紧紧抓住了四个关键点，一是理清思路是加快试验区循环经济建设的前提，二是政策支撑是加快试验区循环经济建设的关键，三是科技创新是加快园区循环经济建设的动力，四是招商引资是加快试验区循环经济建设的手段。

但是，试验区进入成长阶段受到宏观、中观和微观环境的变化影响，无论发展速度还是质量均受到多方面制约而呈现下降态势。主要存在的问题是循环经济发展理念与实践存在偏差、循环经济试验区产业效能不高、循环经济试验区科技创新能力不足、循环经济试验区抵御风险能力不强、循环经济试验区发展政策不系统等五个方面。针对以上问题，课题组认为试验区要着力加强供给侧结构性改革，提高供给体系质量和效率，以绿色低碳为主攻方向，着力解决产业结构不合理、传统产业效益不高、新兴产业规模不大等问题，促进产业迈向中高端，基本形成绿色低碳循环、创新驱动、特色鲜明、效益显著的产业新体系，不断增强产业综合竞争力。主要措施有：

1.着力加强监督管理、纠正理念实践偏差。一是，以绿色政绩调控政府主体行为。构建以循环经济为主导的绿色政绩考核机制，包括构建绿色政绩考核体系、监督体系、考核结构运用等内容，以全面加强领导干部循环经济行为。二是，以环境规制调控企业主体行为。通过利用市场机制，加强激励与引导、改变企业污染治理模式、改变企业污染治理模式、大力鼓励企业推进技术和管理创新等方式。三是，推进公众参与。各级政府应积极发挥在宣传、教育和引导中的主导作用，加强舆论引导，形成全社会的价值观和行动方向，营造柴达木地区循环经济发展的人文环境。

2. 着力产业转型升级、推进供给侧改革。一是，推动转型升级，提高供给水平。坚持“一原则”，即坚持柴达木盆地“资源禀赋”原则；实现“两驱动”，即坚持技

术创新和互联网+驱动的发展模式；坚持“三路径”， 即坚持淘汰过剩、保留潜力、升级传统。二是，强化质量引领，优化供给结构。首先，明晰柴达木与西宁工业园区产业发展重点，实现循环经济资源优化整合。两者根据资源、技术等优势应明确产业布局重点，实现差异化发展，提升两地甚至全省循环经济资源优化整合。其次，培育新兴产业，突出产业特色。在处理好保护与开发的前提下，加大对高原特色生物、新材料、新能源、盐湖化工、现代金融等产业培育与发展力度。

3. 着力科技要素驱动，完善创新动力体系。一是，弥补劳动力短缺，提升人口素质。建议实施“东移西扩”项目，实现人口机械迁入，同时构建“政府+企业”培训模式，提升人口综合素质。二是，加强人才引进，构建培育平台。探索建立市场化人才引进机制、实施重大人才工程等措施，拓展吸引人才、使用人才渠道；提高人才素质，完善人才结构。建立柔性人才机制、发挥研究机构作用等方式，加强人才素质的提升。三是，加大科技投入，强化科技支撑。通过政府引导企业参与、设立专项基金等措施，加大多渠道投入，激发科研动力。同时，发挥政府引导、企业参与等作用，搭建科研平台，整合技术资源。

4. 着力加强风险管理，提高抵御风险能力。一是。加大风险意识培养。通过加强风险教育、发挥智库作用、开展培训与学习等方式加强风险意识培养。二是，建立风险管理机制。构建园区风险识别、风险控制、管理预案等风险管理机制，以提高风险预判、处理的能力。三是，提升产业抵御风险能力。通过加强品牌建设，提升竞争力；高效整合产业链，提升集聚倍增效应，以增加园区产业的核心竞争优势，增强抵御市场风险能力。

本课题在研究中，研究人员严格遵循亚行的技术和程序要求，主要就柴达木循环经济试验区工业循环经济的发展进行了深入研究。

目录

引　言

循环经济是按照资源减量化、再利用、资源化的原则，建立在资源回收和循环再利用基础上的经济发展模式，对解决经济发展与资源环境矛盾，调整经济结构、创新发展方式、实现可持续发展具有重要意义。柴达木地区资源富集、区位重要，生态系统脆弱、生态环境敏感并存的特点，青海省委、省政府审时度势，做出了发展循环经济的战略决策。柴达木循环经济试验区成立以来，紧紧围绕《柴达木循环经济试验区总体规划》，在园区发展、产业谋划、项目推进、基础建设、技术创新、招商引资、投资融资、要素保障等方面做了卓有成效的工作，在探索创建高原地区循环经济发展模式方面积累了丰富经验，为青海经济社会发展、支援西藏、稳定新疆发挥了重要作用。近年来，试验区相继被国家有关部委认定为“西部大开发特色优势产业基地”“柴达木盐湖化工及金属新材料国家新型工业化产业示范基地”“国家可持续发展试验区”“盐湖特色材料国家高新技术产业化基地”，被评为“全国循环经济工作先进单位”。 2016 年 8 月，习近平总书记在视察柴达木试验区盐湖集团时强调，发展循环经济是提高资源利用效率的必由之路，要求青海牢固树立绿色发展理念，积极推动相关产业流程、技术、工艺创新，在循环经济发展上不断取得新成就。

柴达木循环经济试验区在取得巨大成就的同时，也存在着一些问题阻碍着试验区健康可持续发展的进程。课题组调研发现，目前试验区发展过程中存着循环经济发展理念与实现存在偏差、试验区产业效能不高、科技创新能力不足以及抵御风险能力不强等主要问题。柴达木循环经济试验区是青海省打造国家循环经济发展先行区建设的主阵地，促进试验区健康可持续发展不仅决定着国家循环经济先行区建设的成败，也是青海省经济转型升级成功与否的关键所在。面对问题和困难，试验区要着力加强供给侧结构性改革，提高供给体系质量和效率，以绿色低碳为主攻方向，促进产业迈向中高端，不断增强产业综合竞争力，促进绿色低碳循环、创新驱动、特色鲜明、效益显著的产业新体系新发展，推动试验区迈向更高发展阶段。

第一章　柴达木循环经济试验区发展概况

一、建设柴达木循环经济试验区是可持续发展必然选择

（一）国家高度重视发展循环经济

党中央、国务院高度重视发展循环经济，2003 年 1 月《清洁生产促进法》颁布实施， 2005 年 7 月《关于加快发展循环经济的若干意见》顺利出台，2009 年 1 月《循环经济促进法》开始实施。国家“十二五”规划纲要提出了加快构建覆盖全社会的资源循环利用体系的目标，党的十八大提出了推动资源利用方式实现根本转变的新要求。2012 年 12 月，国务院常务会议专题研究通过《“十二五”循环经济发展规划》。2013 年 1 月，国务院印发《循环经济发展战略及近期行动计划》。一系列政策法规的相继出台实施，标志着我国循环经济发展进入新阶段，给柴达木地区发展循环经济带来了难得的发展机遇。

（二）柴达木地区发展循环经济的独特优势

1、区位重要

试验区地处青藏高原北部，位于青海省海西蒙古族藏族自治州境内，北邻甘肃，西接新疆，南与玉树、果洛藏族自治州相连，东与海北、海南藏族自治州毗邻，东西长约 850 公里，南北宽 350～450 公里，是青、藏、甘、新的核心区域。试验区西通西亚，南连南亚，北达北欧，是西北地区重要的交通枢纽、战略通道和开放门户，是“丝绸之路”南路的必经之地和重要驿站，是国家“一带一路”战略的重要节点之一，也是国家稳藏固疆的重要支撑点，战略地位十分重要。

2、资源富集

试验区矿产资源具有储量大、共伴生、品位高、类型全、组合好、分布集中等特点，有利于区域性大规模整体开发，多产业集群联动发展，特别适合构建循环经济产业体系。

（1）矿产资源。试验区累计发现各类矿产 86 种，产地 1050 处，占全省总数的 59%。探明储量的矿产 57 种，上储量表的矿产 48 种，占全省的 55%，占全国的 28%。资源潜在经济价值达 16.27 万亿元，占全省矿产资源潜在价值的 95%，占全国的 13%。

其中盐湖矿产 12 种，主要包括钠盐、镁盐、钾盐、芒硝、天然碱、石膏、硼矿、锂矿、锶矿等；能源矿产 3 种，即石油、天然气、煤；金属矿产 16 种，主要包括铁、铬、铜、铅、锌等；非金属矿产 27 种，主要包括石灰岩、白云岩、硫铁矿、重晶石、蛇纹岩、硅灰石等。其中钾、镁、锂、锶、芒硝、石棉、电石级石灰岩等 7 种矿产储量居全国首位。

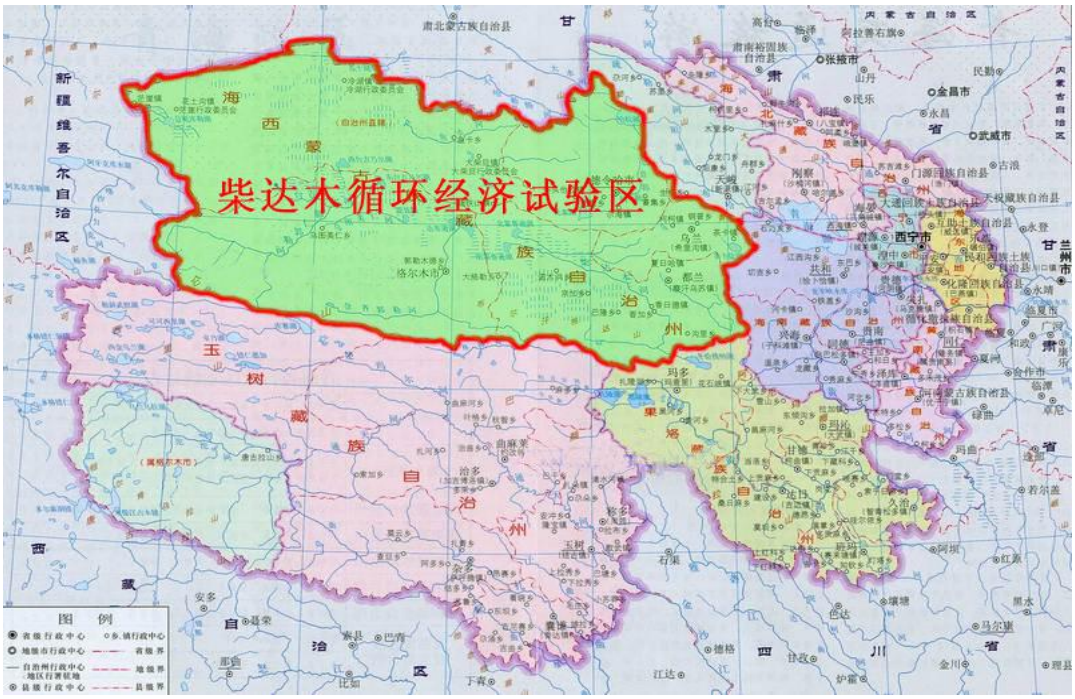

图 1.1 柴达木循环经济试验区地理区位

（2）太阳能资源。试验区大气稀薄，日光透过率高，日照时间长，加之气候干燥、降雨量小，云层遮蔽率低，年平均日照时数为 3500 小时以上，日照百分率为 80%以上，年平均太阳总辐射量为 7000 兆焦/平方米，理论发电量达到 51200 亿千瓦时，占青海省太阳能理论装机及发电量 90%以上。

（3）风能资源。试验区风能资源丰富，年平均风功率密度多在 50～100 瓦/平方米，全年风能可用时间 3500～5000 小时，出现频率 50～70%。年平均风速均在 3 米/秒以上，地区西部和唐古拉山区超过 5 米/秒，其中盆地内风速≥17 米/秒的大风日数均在 50 天以上，西部超过 100 天，唐古拉山区达 150 天以上，为全国同纬度之冠。由于海拔高，空气密度小，风能密度相对较小，风压最大为 0.48 千牛/平方米，冷湖、察尔汗、茫崖整体年平均风功率密度在 80 瓦/平方米以上。

（4）特色生物资源。试验区野生动植物资源种类繁多，有野生动物 196 种，野生植物 400 余种，其中被列为国家级和省级保护的珍稀野生动物有 62 种。农牧资源

独特，盛产春小麦、青稞、油菜和牛羊肉等农畜产品，柴达木红果枸杞、黑果枸杞、山羊绒等享誉海内外。辽阔的天然草场，丰富的动植物资源和无污染的生态环境，是发展特色绿色生物产业的首选之地。

（5）土地资源。试验区内广布大面积的盐土、盐沼、沙砾戈壁，产业发展可利用荒漠土地，不占耕地、基本农田和草场，为循环经济发展提供了良好的土地资源支撑。资料表明，试验区可利用土地面积 49197 万亩，其中：农用地 16712 万亩，建设用地 120.74 万亩，未利用地 30114 万亩。

（6）水资源。试验区水系相对独立，水力资源丰富。据统计，区内有大小河流 79 条，长年有水的较大河流有 37 条，年径流超过 1 亿立方米的河流有 8 条。拥有现代冰川面积 1358.46 平方公里，储量 1135 亿立方米。水资源总量为 43.39 亿立方米，按全国及流域水资源综合规划，年可利用量 18.74 亿立方米，现已开发利用 5.78 亿立方米。

（7）旅游资源。柴达木自然景观壮丽秀美，民族风情多姿多彩，宗教人文别具一格，充满着天然神韵和神秘色彩，特别是有“万山之祖”之称的昆仑山，在华夏文化中占有重要地位。由昆仑山、阿尔金山、祁连山环抱的柴达木盆地和唐古拉山北麓高原组成的奇特地形地貌，成就了雄浑神奇的大美之地。世界屋脊和深居内陆的地理环境，造就了独具特色的自然风光。“激情穿越柴达木”是中国十大完美旅游线路之一，昆仑山、察尔汗盐湖和雅丹地貌入围全国百强景区。

二、柴达木循环经济试验区发展轨迹

柴达木循环经济试验区（以下简称试验区）建设发展历程两个关键时间节点：一是 2005 年 10 月，试验区正式成立。2005 年 4 月，时任青海省省长宋秀岩在海西州考察调研时，提出了 “综合开发、有效配置、循环利用” 开发柴达木资源的发展思路。5 月，时任国务院总理温家宝考察青海盐湖工业集团、格尔木炼油厂等重点企业时，在又提出了“永续发展”的要求。8 月，省政府召开柴达木循环经济试验区实施意见论证研讨会，通过了《试验区实施意见》。9 月，省政府向国家发展改革委上报《关于申请将柴达木地区列为国家循环经济试点的函》。10 月，经国务院同意，国家发展改革委、原国家环保总局等六部委批准柴达木地区为全国首批 13 个循环经济试点产业园区之一。二是 2010 年 3 月，试验区总体规划出台。经过各方努力，2006 年 3 月《青海省柴达木循环经济试验区实施方案》编制完成并报国家发展改革委。

同年 5 月，省政府出台《青海省发展循环经济实施意见》。2008 年 11 月，《国务院关于支持青海等省藏区经济社会发展的若干意见》中明确提出：“推进循环经济试验区建设，重点抓好格尔木、德令哈、乌兰和大柴旦示范园区建设”。2009 年 2 月，《青海省柴达木循环经济试验区总体规划》编制完成报国家发展改革委。3 月，国家发展改革委原则通过《总体规划》。8 月，李克强副总理在青海考察期间指出，柴达木循环经济试验区这项工作立意高、影响长远，发展改革委要抓紧做出规划，予以支持。2010 年 3 月，《总体规划》正式获国务院批复，标志着试验区建设由地方战略上升为国家战略。

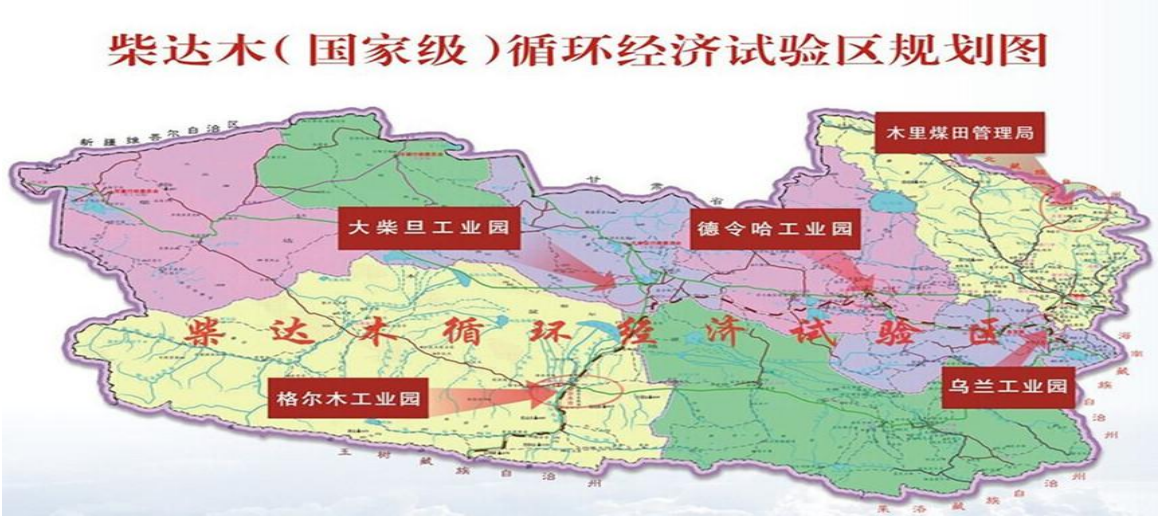

图 1.2 柴达木循环经济试验区规划

三、《总体规划》主要内容

（一）指导思想和基本原则

以科学发展观重要思想为指导，遵循《循环经济促进法》等相关法律法规，以经济建设为中心，保护生态为前提，科技创新为支撑，特色优势资源综合利用为切入点，循环经济工业园区建设为载体，按照循环经济“减量化、再利用、资源化”的理念，统筹资源集约利用与产业协调发展，构建以盐湖化工为核心的循环经济主导产业发展体系，探索资源型、生态脆弱型地区可持续发展新模式。

（二）发展目标

遵循循环经济发展理念，结合区域特点，按照“综合开发、有效配置、循环利

用、永续发展”的要求，坚持节约资源、保护环境、依靠科技、市场引导的方针，以特色优势资源综合利用为切入点，循环经济工业园区建设为载体，统筹资源集约利用与产业协调发展，构建以盐湖化工为核心的循环经济主导产业发展体系，探索资源型、生态脆弱型地区可持续发展新模式。提出两个阶段的主要奋斗目标，到2015年初步构建以盐湖资源综合开发为核心的循环型产业体系，基本建成盐湖化工、大型钾肥及石油天然气化工基地；到2020年，把试验区建设成为全国特色鲜明的循环经济示范区，全面实现小康社会目标。

1、主导产业体系发展战略

重点是建设“一区四园”和构建“六大产业”体系。“一区四园”是指：柴达木循环经济试验区和格尔木、德令哈、乌兰、大柴旦四个循环经济工业园。“四园“中，格尔木以盐湖化工、石油天然气化工、金属冶金产业融合发展为特色，德令哈以盐碱化工、硅产业、新型建材产业融合发展为特色，乌兰以煤炭综合利用及配套盐湖资源开发为主要特色，大柴旦以能源、煤炭、有色冶金综合利用，盐湖化工一体化发展为特色。“六大产业“体系是指：以盐湖资源综合利用为核心、以钾资源开发为龙头的盐湖化工循环型产业，以盐湖资源综合利用为基础的金属冶金产业，以配套盐湖资源开发为主导的油气化工循环型产业，以配套盐湖资源开发为前提的煤化工综合利用产业，以高原特色生物资源开发为核心的高原特色生物循环经济产业，以太阳能、风能等可再生能源开发为核心的新能源产业。

2、环境保护与生态建设

提出了“以实施可持续发展战略为宗旨，以资源综合利用、废弃物减量化、资源化和无害化为手段，切实转变工业经济增长和污染防治方式，坚持走以最有效利用资源和保护环境为基础的循环经济之路，实现循环经济示范区的可持续发展”的总体目标，明确了大气环境保护、地表水环境保护、土壤环境保护、生态敏感区保护四个方面的环境质量保护目标，确定了工业废气、工业废水、工业固废综合利用率和处置率、“三同时”执行、工业企业厂界噪声排放达标覆盖率等方面的具体控制指标，提出了具体的执行措施。

3、资源支撑能力分析、配套体系建设和保障措施

从矿产、能源、土地、水、交通以及技术等方面对试验区支撑发展的能力进行

了深入分析，同时，从节水体系建设、基础配套体系建设、水利工程体系建设、能源工程体系建设以及技术支撑体系建设等方面进行了规划，提出了法律法规、管理、科技、组织、安全防灾和宣传教育等六个方面的保障措施，为试验区的发展搭建起了一整套配套体系和支撑体系，有效保证了试验区健康快速发展。

“十二五”以来，试验区围绕《总体规划》的目标要求加快发展，6 大类 21 项指标中，有 10 项指标实现时间和指标同步阶段性完成，8 项指标超额完成，占全部指标的 85.71%；3 项指标趋向阶段性目标，占全部指标的 14.29%。目前，试验区已基本构建形成以盐湖化工为核心，融合油气化工、煤化工、金属冶金、新能源、新材料、特色生物等多产业发展的循环经济产业体系，格尔木、德令哈工业园形成规模，大柴旦、乌兰工业园加快发展，产业集聚效应和骨干企业带动效应进一步提升，重点企业创新能力明显提高，节能减排工作深入推进，产业结构正在向着提质增效的方向调整发展，试验区“资源化、减量化、再利用”方面取得阶段性成效。2015 年 2 月，《总体规划》通过国家发展改革委第三方中期评估，2015 年 5 月，试验区通过国家循环经济试点示范单位第二批验收，试验区建设和发展迈入了一个新阶段。

四、柴达木试验区发展现状

“十二五”以来，试验区围绕《总体规划》，构建了以盐湖化工为核心，融合油气化工、煤化工、金属冶金、新能源、新材料、特色生物等多产业发展的循环经济产业体系，基本形成格尔木、德令哈、乌兰、大柴旦工业园“一区四园”的发展格局，其中格尔木昆仑、察尔汗两个千亿元产业基地和德令哈、大柴旦、乌兰、都兰四个五百亿元产业基地开始起步。

（一）格尔木工业园

作为试验区循环经济建设发展的“主战场”，围绕加快推进昆仑和察尔汗两个千亿元产业基地建设，做大做强盐湖化工、油气化工和黑色有色金属冶炼、新能源等循环经济主导产业，大力发展现代物流业，依托西藏、新疆等周边地区的优势资源，加快建设藏青工业园、新青工业园。经过多年发展，现已培育青海盐湖工业股份有限公司、格尔木藏格钾肥有限公司、青海中信国安科技发展有限公司、青海锂业有限公司等盐湖化工骨干企业；格尔木炼油厂、中石油天然气开发公司、青海中浩天然气化工有限公司、昆仑能源青海有限公司等油气化工骨干企业；青海庆华集团有

限公司、青海西豫有色金属有限公司、格尔木豫源有限公司、青海华信冶炼有限公司等冶金产业骨干企业；华能格尔木光伏发电有限公司、龙源格尔木新能源开发有限公司、三峡新能源格尔木发电有限公司、青海光热电力集团有限公司等新能源骨干企业；昆仑山矿泉水、昆仑宝玉石等特色轻工知名企业。园区主要产品有钾肥、硫酸钾镁肥、农用硝酸钾、ADC 发泡剂、液化天然气、甲醇、氯酸钠、高氯酸钾、碳酸锂、铁精粉、粗铅、矿泉水、有机枸杞等。

察尔汗重大产业基地：位于察尔汗盐湖，占地 75 平方公里。主导产业是大中型氯化钾、盐湖化工、金属镁及合金产业，辅以非标设备制造等产业。目前已经形成了以钾（钾肥）为核心，镁、钠、锂、硼等其他盐湖资源协同开发的资源综合利用产业体系，有盐湖股份、藏格钾肥、中信国安等一批龙头企业；已形成 750 万吨氯化钾、20 万吨硫酸钾、80 万吨硫酸钾镁肥、30 万吨硝酸钾、12 万吨钾碱、7.2 万吨碳酸钾、340 万吨纯碱、10 万吨高纯氢氧化镁等产品产能，正在建设 40 万吨金属镁一体化、20 万吨硝酸钾、80 万吨镁基新材料、新增 100 万吨氯化钾等项目。

昆仑重大产业基地：位于格尔木市中心城区东南侧，规划面积 45 平方公里。主导产业是以炼油、油气化工、黑色有色金属采选-冶炼加工、东西台吉乃尔盐湖化工及综合利用产业，辅以矿泉水、昆仑玉、氯酸盐化工、建材化工等产业。目前已形成 230 万吨原油、90 亿立方米天然气开采能力，建成涩（北）（西）宁兰（州）、涩（北）格（尔木）、涩（北）花（土沟）、花（土沟）格（尔木）等输气、输油管线；建成 150 万吨炼油厂扩建升级改造、青海油田公司 30 万吨甲醇、中浩天然气化工公司 100 万吨天然气甲醇、格尔木 30 万千瓦燃气电站等项目，正在建设镍钴矿资源开发、钢铁一体化、600 万吨铁矿采选、年产 2 万吨多金属冶炼、45 万吨铁矿采选、年产 5 亿箱矿泉水、天然气甲醇升级改造、燃煤电站、120 万吨多金属采选等项目。

（二）德令哈工业园

围绕打造五百亿元产业基地，全力推进盐化综合产业、绿色产业、新能源产业建设，着力做大做强盐碱化工、新材料、新能源等主导产业，积极发展配套装备制造及物流业，努力建设基础设施比较完备、产业循环衔接和协作配套体系比较健全，产业辐射带动作用明显的工业园区；同时，利用浙江省对口支援建设的有利时机，积极推进浙江工业园建设。经过多年发展，已培育中盐青海昆仑碱业有限公司、青海发投碱业有限公司、青海西部镁业科技有限公司、青海金锋实业有限公司等盐碱

化工骨干企业；青海中航硅材料有限公司、青海柴达木青元泛镁科技有限公司等新材料骨干企业；海西华汇化工机械有限公司、青海日晶光电有限公司等装备制造骨干企业；青海斯瑞雅克生物工程有限公司、德令哈林生生物科技有限公司等特色生物骨干企业；青海中控太阳能发电有限公司、青海华炜光电有限公司、青海东方华路新能源投资有限公司等新能源骨干企业；青海海西化工建材股份有限公司、海西金海建材科技有限公司、海西建科节能建材开发有限公司等建材骨干企业。园区主要产品有纯碱、氯化钙、高纯氢氧化镁、金属硅、高强高韧镁合金、钢丝网骨架PE管、钢带增强聚乙烯波纹管、聚乙烯管、钢结构、压力容器、水泥、中藏药、黑枸杞露、有机枸杞等。

盐化工综合产业区：规划面积52平方公里，建成面积近12平方公里，主导产业是盐碱化工、新材料、建材、装备制造等。目前已形成220万吨纯碱、200万吨水泥、10万吨氯化钙、30万米钢骨架塑料复合管、10万吨高纯氢氧化镁、60万块加气块、1.5万吨金属硅等产品产能，正在建设1200吨高强高韧镁合金、20万吨新型结构板材、20万吨镁系阻燃剂及复合材料、1万吨天然球形石墨等项目。

绿色产业区：规划面积5平方公里，已建成面积0.28平方公里。主要以枸杞、牦牛、柴达木福牛、藏羊、白刺、沙棘、果蔬等资源开发为重点，推进特色生物资源向精深加工、精细化方向发展，形成典型的特色生物资源开发循环经济模式。目前正在建设2000吨中藏药、1万吨枸杞深加工、柴达木福牛精深加工、白刺果精深加工等项目。

（三）大柴旦工业园

围绕打造五百亿元产业基地，依托大煤沟、鱼卡、马海湖、大盐滩、昆特依、锡铁山等地丰富的煤炭、盐湖、有色金属资源，着力做大做强盐湖化工、有色冶金综合利用等主导产业，大力发展新能源产业，辐射带动冷湖、茫崖地区工业经济发展。经过多年发展，已培育青海五彩碱业有限公司、青海创新矿业开发有限公司、大柴旦大华化工有限公司、大柴旦中天资源开发有限公司、青海盐湖三元化工有限公司、青海柴达木硼业化工有限公司、大柴旦乐青化工科技有限公司、大柴旦吉利化工有限公司等盐湖化工骨干企业；青海煤业鱼卡有限公司、青海昆源矿业有限公司、青海义海能源有限责任公司等煤炭开发骨干企业；西部矿业公司锡铁山分公司、大柴旦矿业有限公司、青海中联矿业开发有限公司等金属冶金骨干企业；中广核太

阳能（大柴旦）开发有限公司、中节能青海大柴旦太阳能发电公司、三峡新能源大柴旦发电有限公司、大柴旦云天实业有限公司、青海博华锂业有限公司等新能源及新兴产业骨干企业。园区主要产品有煤炭、纯碱、硼酸、电力、硫酸、钾肥、黄金、铅、锌、氯化锂、氯化钙、磷酸一铵、硫化碱、甲硫基乙醛肟、硫酸镁、硫酸钾镁肥、有机枸杞等。

锡铁山产业区：位于大柴旦行委锡铁山镇，规划面积6.16平方公里，是以冶金和铅锌尾渣与盐湖资源综合利用融合发展为核心的精细化工产业区。已形成年产150万吨铅锌采选、12万吨硫酸、18万吨合成氨、7.5万吨磷酸、10万吨粉状磷铵生产能力，在建100万吨复合肥、30万吨联碱项目。

饮马峡产业区：位于大柴旦行委饮马峡，规划面积24.6平方公里，是以盐湖化工与煤炭资源清洁利用融合发展为核心的能源、化工产业区。已形成10万吨硫化碱、110万吨纯碱生产能力，正在建设10万吨硫化碱、100万吨新型煤基燃料处理、20万吨粉煤灰、0.3万吨甲硫基乙醛肟、1亿条塑料编织袋生产线等项目。

大柴旦硼化产业区：位于大柴旦镇西南，规划用地面积12平方公里，现已形成30万吨硼矿开采、3.5万吨硼酸、10万吨氯化钾、2万吨硫酸镁生产能力。正在建设0.1万吨硼酸锌、0.5万吨硼酸钙等项目。

（四）乌兰工业园

围绕打造五百亿元产业基地，利用木里煤田矿区丰富的焦煤资源，积极推进煤炭深加工和综合利用产业，依托丰富的石灰石、盐湖资源优势，积极推进盐化工产业，大力发展新能源产业，辐射带动天峻县工业经济发展。经过多年发展，已培育青海庆华集团煤化有限责任公司、青海省矿业集团乌兰煤化工有限公司等煤化工骨干企业；青海省盐业股份有限公司、青海友明盐化有限公司、青海京柯盐化有限公司、青海省海西州莫河驼场盐厂、青海乌金化工有限责任公司、中盐青海昆仑碱业有限公司柯柯盐矿等盐化骨干企业；中广核太阳能乌兰有限公司、青海昱辉新能源有限公司、青海金峰新能源光伏发电有限公司、青海黄河上游水电开发有限责任公司乌兰太阳能发电分公司、青海柴达木能源投资开发股份有限公司等新能源骨干企业；乌兰县吉仁生态农牧业有限公司、海西真诚农业开发有限公司、乌兰三江沃土生态农业科技开发有限公司、青海藏源食品有限公司、青海高原肉食品有限公司等特色农畜产品企业；青海虹昇科技开发有限公司、海西元亨投资有限公司、青海昆

仑翠投资开发有限公司、乌兰县环宇新型建筑材料有限责任公司等新兴产业骨干企业。园区主要产品有焦炭、精煤、粗苯、焦油、硫酸铵、工业盐、加工盐、氯化钾、茶卡羊、有机枸杞、藜麦、有机肥、昆仑翠美酒玉等。

察汉诺煤焦化产业区：规划面积10.5平方公里，距乌兰县城约40公里，主要利用木里煤矿丰富的焦煤资源，发展煤化工，提高产品附加值。目前产业区企业主体为青海庆华煤化公司，已形成200万吨焦炭及配套粗苯、300万吨选煤、15万吨焦油深加工、2×15兆瓦热电联产等产能。正在建设10万吨焦炉煤气制LNG，800万吨选煤厂等项目。

第二章 柴达木循环经济试验区主要做法及建设成效

一、试验区建设主要做法

试验区围绕《青海省柴达木循环经济试验区总体规划》，按照国家和省、州发展循环经济的部署和要求，依托自身优势，坚持用循环经济的理念统领资源开发和工业发展，深入推进资源综合利用、工业园区建设和产业结构调整，在规划体系建设、政策措施研究、科学技术攻关、招商引资、节能减排、生态环境建设、基础设施建设等方面取得积极进展。

（一）科学编制园区发展规划

围绕产业结构调整、转型升级、提质增效和推动重点产业发展，相继编制实施了《试验区循环经济特色优势产业体系发展规划》《试验区水资源综合规划》《格尔木工业园建设发展规划》《德令哈工业园建设发展规划》《木里煤田矿区煤炭资源综合利用规划》《柴达木绿色产业园建设规划》《昆仑黄金产业园规划》《镁合金新材料产业规划》《试验区建设循环经济发展先行区行动方案实施意见》以及格尔木昆仑、察尔汗两个千亿元产业基地和德令哈、大柴旦、乌兰、都兰四个五百亿元产业基地推进方案。《试验区总体规划环境影响评价报告书》顺利通过环境保护部审查，为加快构建各产业间纵向延伸、横向拓展和资源、产业和产品多层面联动发展的循环型产业格局奠定了基础。2015 年 5 月，国家发展改革委、环境保护部、科学技术部、工业和信息化部、财政部、商务部、国家统计局共同发布国家循环经济试点单位检查评估和验收公告，试验区顺利通过验收，可继续享受试点单位在投资、金融等方面的政策，并可在国家循环经济“十百千”示范行动中同等条件下优先被考虑。

（二）大力实施重点工业项目

试验区将循环经济项目建设作为构建优势产业体系、推动产业转型升级的重要抓手，相继实施了盐湖股份公司综合利用一二期、金属镁一体化、青海碱业 120 万吨纯碱、中浩 60 万吨甲醇、庆华 200 万吨焦炭等重点项目，完成投资 2017 亿元；加大招商引资力度，累计签约项目 628 个、落地项目 248 个，为投资持续增长提供了有力支撑。一是改造提升传统优势产业。以盐湖资源综合利用为核心、以钾资源

开发为龙头的盐湖化工等循环型产业稳步发展，盐湖集团百万吨钾肥综合利用一二期如期建成；以配套盐湖资源开发为主导的油气化工循环型产业加快发展，格尔木炼油厂150万吨炼油扩能及产品质量升级改造项目顺利竣工，石油天然气勘探及产能建设取得新突破；以盐湖资源综合利用为基础的金属冶金产业，以配套盐湖资源开发为前提的煤炭综合利用产业效益稳步提升，为试验区长远发展奠定了良好的基础。二是培育发展战略新兴产业。新能源方面，抓住国家大力支持新能源产业发展的政策机遇，依托丰富的风能、太阳能资源及土地、电网等优势，大力发展光伏、光热、风能发电和锂离子电池等产业，构建新能源全产业链。目前，试验区光伏、风力发电分别并网2933兆瓦和317兆瓦。新材料方面，以现有产业为基础，以金属镁、镍、钴产品为依托，积极发展镁基合金、镍、钴基合金等新型合金材料；以碳酸锂产品为基础，着重发展锰酸锂、钴酸锂、磷酸锂等锂离子电池材料。目前碳酸锂产能达到4万吨、海镁特公司5.6万吨镁合金项目生产出全省首批产品、1000高纯氯化锂项目建成试车。三是高原特色生物产业发展情况蓬勃兴起。大力发展柴达木枸杞和柴达木福牛两个“百亿元”特色种植养殖产业，推动特色绿色农畜产品产业链的延伸拓展迈出实质性步伐。当前，柴达木枸杞产业其在一产中的比重和贡献率越来越高,发展的前景越来越广阔。截止2015年底,全州枸杞种植面积累计达31.45万亩，有机枸杞种植面积5.8万亩，年采摘量4350吨，产值3.5亿元，成为仅次于宁夏的全国第二大枸杞种植基地，有机枸杞的出口量占据全国首位。目前，枸杞产值占农牧业总产值的43%，农牧民枸杞纯收入2771元，占农牧民纯收入的30.2%，枸杞采摘期年吸纳劳动力5万余人。枸杞产业已成为海西州调整农牧业产业结构、促进农牧业增效和农牧民增收的重要支柱产业。

（三）认真执行各项法规政策

为加快推进试验区建设，国家从项目准入、产业布局调整、基础设施建设、科技进步扶持、人力资源培训、土地规划利用及机场、铁路、水利、电网建设方面给予给予试验区10项政策措施。省委、省政府先后出台《柴达木循环经济产业导向指南》《循环经济发展专项资金管理办法》《青海省人民政府关于加快推进柴达木循环经济试验区发展的若干意见》《青海省建设国家循环经济发展先行区行动方案》和20条政策措施，设立了年均10亿元循环经济发展专项资金，为园区基础设施集中建设、产业聚集发展提供了发展动力。2014年5月，郝鹏省长在德令哈市组织召开柴达木

循环经济工作座谈会，进一步明确从简政放权、生产力布局、财税金融、要素保障、科技和人力资源、基础设施等方面支持试验区的建设发展，并授予试验区省级投资部门项目审批权限，对试验区实行计划单列管理。一系列扶持政策相继出台，试验区干事创业的活力动力不断增强，为试验区招商引资、项目建设和企业发展等提供了坚实的政策支撑。

（四）发挥骨干企业项目作用

按照“延伸产业链条、发展优势产业、打造核心企业、培育产业集群、建设重大产业基地”的思路，充分发挥盐湖集团、中信国安、青海中控、西部镁业、昆仑黄金、大漠红等骨干企业的示范引领作用，通过实施金属镁一体化、枸杞深加工、光热发电、高纯镁砂、黄金精炼等重点项目建设，延伸带动了盐湖化工、特色生物、新材料、新能源、金属冶金等主导产业集聚发展，产业集群规模进一步壮大，产业体系框架进一步明晰，产业集群效益日益显现，园区呈现出健康有序良好的发展态势。始终把提升产业核心竞争力作为产业转型升级的根本落脚点，把升级基础产业、培育新兴产业作为做强实体经济、创新发展的主攻方向，从根本上改变了以往注重要素投入和投资驱动的粗放型经济增长方式，促进了资源开发向高端化、高新化、高值化延伸，在推动产业升级的同时，实现了工业经济向低碳、绿色、循环方向转变，促进了企业产品向精细化、高附加值方向拓展，产业跨越转型步伐加快。特别是通过枸杞、福牛等绿色产业发展，初步建立了“种养植（殖）—加工—综合利用”的现代农牧业产业体系，改变了粗放的农牧业生产方式；通过结构性板材、高强高韧镁合金等新材料产业发展，推动了基础产业的融合升级；通过新能源产业的发展，有效拉动了钢铁、物流、建筑等行业发展，新能源电站发电所削减的污染物排放指标，为试验区下一步产业发展赢得了空间；通过镁资源综合开发、金属冶金等基础产业技术改造和产业链的延伸拓展，重新焕发了试验区基础产业发展活力，核心竞争力也得到了有效提升。

（五）着力加强基础设施建设

紧紧抓住国家和省上加大基础设施建设的有利时机，以改善发展环境为重点，实施了一批重大水、电、路等基础设施项目，园区支撑条件得到明显改善，承载能力和服务功能显著提升，为集聚产业、加快发展奠定了坚实基础。交通、电力、水利、通讯等基础设施条件逐步完善，初步形成了以公路、铁路、航空、输油管线、

输气管线为主的立体交通运输网络，以兰西拉光缆、青新光缆、移动数字通信为主的信息网络，以750千伏、330千伏、110千伏大电网供电为主、以小水电、光伏、风电和火电为辅的供电格局，以调蓄水库及配套渠系、机井取水及输水管道、蓄水池为主的水利设施体系。基本具备了支撑循环经济加快发展的交通运输、能源电力、信息通讯、水利设施等基础设施条件。按照“整体规划、有序推进，集中力量、重点突破，合理引导、多元投入”的思路，全力推动各工业园公共服务配套基础设施建设，园区基础承载能力全面提升。2010年以来，累计完成投资133.1亿元，相继建成77个项目。新建和改扩建园区主干道公路574.6公里、铁路专用线71.7公里、供水管网116.12公里、排水管网73.2公里、330千伏电网160公里、110千伏电网771公里、35千伏及以下电网204公里，新增年供水能力1825万立方米、污水处理能力2350万立方米，建成格尔木、德令哈、大柴旦物流园。

（六）加强配套支撑体系建设

进一步完善园区各项配套功能，提高科技创新能力，着力推进资源开发向优势产业开发转变，强化不同开发区产业特色功能，加快建设公共服务平台，大力提升试验区要素资源吸附能力、产业支撑能力和对周边辐射带动能力，形成了各工业园各有侧重、特色鲜明、多元并举、相互配套的发展格局。一是提升资源能源保障能力。编制矿产资源总体规划和“十二五”基础测绘规划，加强地勘工作力度，加大地质勘探投入，加大对矿山地质环境保护的监督管理力度，累计查明煤炭资源储量52亿吨，石油地质储量4.08亿吨，天然气地质储量3663亿立方米，矿产资源对循环经济发展的支撑能力进一步加强。建立土地储备中心，探索以贷款等方式进行融资，加强土地资源管控力度，土地保障能力不断提高。水资源支持体系建设不断强化，严格实施水资源利用底线，合理配置经济社会发展和生态保护用水，保障了循环经济发展需要。二是坚持科技引领打造创新驱动新优势。围绕提升企业核心竞争力和发展质量，试验区不断加强科研平台建设，建立了国家创新型盐湖产业集群试点、国家盐湖资源综合利用工程技术研究中心等6个国家级科技平台、7个省级工程技术研究中心、4个重点实验室、2个企业孵化器以及3个农牧业研究机构。相继引进国内外先进技术，先后攻克枸杞生化加工、高性能镁合金等关键节点技术难题，科技创新对产业发展的支撑作用日益凸显。三是实施循环化改造提升试验区建设水平。根据国家发改委、财政部《关于推进园区循环化改造的意见》精神，积极组织

格尔木、德令哈、大柴旦三个循环经济工业园开展循环化改造方案的编制工作，2012年1月国家发改委、财政部批准实施《青海省柴达木循环经济试验区格尔木、德令哈、大柴旦工业园循环化改造示范试点实施方案》，下达循环化改造资金3.66亿元，有效提升了工业园承载能力和可持续发展能力。四是开展全产业链招商引来试验区发展活水。围绕产业链延伸，精准谋划符合国家产业政策、产品市场前景好的重点招商项目140项，落实招商引资项目99个，目前已建成55项，累计完成到位资金379.48亿元（不含光伏电站等方面投资）。先后成功引进青海华牛生物枸杞酵素及钙制剂、林生科技枸杞深加工等一批基础性、节点性项目，产业发展缺失链条得以补齐、薄弱环节得以增强，有效推动了资源的高附加值转化和产业链向下延伸，园区产业的整体层次和竞争力跃上新水平。五是重视金融服务增添企业发展新动力。完善金融服务组织体系，搭建“园区+银行+企业”联动对接平台，通过联保、联贷等方式，加大融资力度，有效支撑了企业发展和项目建设。发挥国有资本引领作用，通过国有资金阶段性持股，以财政资金撬动社会资金投入枸杞酵素、结构性板材等项目建设，有效发挥了国有资金“四两拨千斤”的作用。开展担保业务，有效支持园区基础设施和产业项目建设，累计为62户中小微企业办理担保业务150笔，担保金额22.85亿元，贷款难、筹资贵等问题得到有效缓解。六是实施上下游产业对接拓展市场需求空间。贯彻落实上下游产业对接政策，注重突出对接重点，加强试验区内枸杞种植基地与枸杞深化加工，硝酸钾与储热熔盐开发等衔接，在各园区搭建产业链之间、供求之间相互融合的链接桥梁，形成了企业间协同发展的新局面，为构建多产业纵向延伸、横向融合的循环产业体系奠定了坚实基础。

二、柴达木试验区建设成效

（一）经济效益

1、**综合经济实力大幅增长**。2013年，试验区地区生产总值达到609.7亿元，较2008年增长104.8%，年均增长15.4%；规模以上工业增加值426.7亿元，较2008年增长93.8%，年均增长14.1%；地区三次产业比重为3.6:80.5:15.9，一、三产业比重逐年上升，产业结构趋于协调，地区综合经济实力得到有效提升。可以说，试验区建设以来，是柴达木地区有史以来经济发展最快，经济总量提升幅度最大、生态建设保护最为显著、对全省的贡献和对外影响力显著扩大的时期。

2、**特色优势产业体系基本构建**。不断加大项目谋划和招商引资力度，吸引大

批有志于在试验区扎根发展的投资者入驻园区，基本形成了以盐湖化工、油气化工、煤化工、冶金和有色金属、特色生物、新能源等为主导的六大产业体系和以格尔木、德令哈、大柴旦、乌兰工业园为重点的“一区四园”循环经济工业发展格局，谋划建设了钾肥、盐碱、金属镁、油气、枸杞等十大产品基地，构建了一个以盐湖化工产业为核心，以各种矿产资源、各种产品及各产业规模化、集约化、科技化综合开发为特点，多行业交叉、融合发展，结构合理、优势突出、集约利用、链条完整的循环经济产业框架体系，工业结构转型升级不断加快，产业布局得到优化。同时，还带动了循环型农业、服务业和循环型社会体系建设，循环型社会建设初见成效。

3、**经济结构得到优化。**三次产业结构得到大幅优化。第一产业立足枸杞、福牛、藜麦、野血驴、高原冷水养殖等特色优势绿色产业发展，因地制宜，推进农牧业结构调整，建立了“种植、养殖—加工—综合利用”现代农牧业支撑体系，形成产业发展与农牧增收相互协调、相互促进的良好局面。第二产业改变了以往单纯依靠采掘业支撑的工业经济的局面，资源循环利用全面展开，产业链条不断延伸、下游产业不断发展、副产物自我消纳能力不断提升的产业发展格局基本形成，以龙头企业为骨干、区域产业关联度显著增强、产业发展聚集度不断提高的产业集群效应全面显现。第三产业装备制造、安装维修、大型物流等行业发展迅速，现代物流园区布局已具雏形，格尔木、德令哈的区域性物流节点效益初步显现，文化、旅游蓬勃兴起，魅力柴达木声名鹊起。近年来，试验区一、三产业占区域GDP的比重逐年增加，二次产业中产业链延伸和深加工产业所占比重大幅提高，产业结构正在向着提质增效的方向调整发展。

（二）社会效益

循环经济发展在促进资源就地加工增值、增加区域经济总量、提升科技实力的同时，有效提高物流、能流、信息流的流通量，带动一、三产业发展，实现了经济与社会、生态环境的和谐发展。

1、**就业与居民收入同步增长。**二产新增企业管理人员、技术人员、操作工人等直接就业岗位约4.2万个；围绕二产发展，带动物流、修理、咨询、商务、广告、卫生等配套第三产业新增就业岗位约2.1万个。就业的增加推动了城镇居民收入的大幅增长， 2013年增长为23399元，增幅达到73%，年均增长11.6%。

2、**社会事业协同发展。**在实现经济、环境双赢目标的同时，推动了教育、文化、

卫生、科技、交通、市政设施等各项社会事业共同发展，促进了社会繁荣和谐稳定，使人民群众充分享受了开放发展的成果。以统筹城乡一体化建设为例，试验区在发展循环经济的同时，积极开展“企村共建”“党政军企共建示范村”等活动，探索“以城带乡、以工促农”的有效机制，在全省统筹城乡一体化示范区建设中起到了良好的示范作用，为改善民生、提高保障层次提供了坚实支撑，使民生建设走在了全省前列。试验区通过大力发展职业教育，通过订单式培养、特色专业课程等方式，吸引大量本地劳动力入学，不仅解决了园区企业用工问题，有效提升了园区企业本地用工比例，还使得城乡居民的收入得到了大幅提高，同时也使得因土地、草场流转而富余的农牧区劳动力进城发展，城镇化水平逐年提升。

（三）生态效益

1、**生态环境明显改善**。多年以来，试验区始终坚持经济效益和生态效益兼顾、开发利用和保护管理并重的原则，切实转变工业经济增长和污染防治方式，初步实现了循环经济与环境保护、生态建设的协同发展。截至2013年，试验区共完成林业重点生态建设总投资13.7亿元，完成沙化土地治理面积352.62万亩。建立格尔木胡杨林、柴达木梭梭林、可鲁克湖—托素湖、诺木洪4个省级自然保护区和乌兰县哈里哈图国家森林公园、格尔木昆仑山国家地质公园等，保护总面积达到5529 平方公里，占柴达木盆地的2.13%，区内森林覆盖率达到3.2%，自然湿地保护率达到17.8%，纳入中央财政森林生态效益补偿基金范围的国家重点公益林面积达到1425.3万亩，占青海省国家重点公益林补偿面积的34.8%。格尔木市、德令哈市、乌兰县和都兰县的生态环境质量均由“较差”提升至“一般”，冷湖与大柴旦的生态环境质量由“差”提升至“较差”，整个柴达木的生态环境逐步改善，并持续加快向好的方向发展。

2、**木里矿区环境整治**。按照党中央、国务院的要求和省委、省政府的部署，会同省州县联合督导组全力推进实施《木里煤田综合整治工作实施方案》。督促木里矿区各企业共整治渣山1370.76万平方米，复绿渣山1144万平方米，组织相关企业收窄矿区过宽道路，对收窄区域全部恢复了植被，超额完成了省政府确定的50%渣山复绿任务；拆除矿区违章建筑5.4万平方米，清理各类生产生活垃圾5200余吨；组织义海、庆华、兴青三家公司开展采坑边坡治理试点，完成工程量889万方；组织实施聚乎更和江仓矿区采坑回填试点，完成工程量1227万方，为后期开展植被恢复和井工建设创造了条件。木里煤田管理局进驻矿区一线办公，实现了现场管理常态化。

组建成立矿区综合执法大队，加强了矿区综合执法力量，矿区行政执法步入了法制化、规范化轨道。对此，习总书记作出批示：“青海省动真的抓实的，木里矿区生态环境整治取得了初步成效”。

3、**节能减排深入推进**。试验区在取得良好经济效益、促进工业经济规模快速壮大的同时，也提升了矿产资源综合回收利用率，降低了原材料、能源、水资源消耗，减少了尾矿、尾渣、废气、废水等废物的产生和排放，产生了良好的生态效益，实现了经济和环境的双赢目标。2013 年，试验区万元 GDP 能耗和规模以上工业增加值能耗分别为 1.3027 吨标准煤、1.1672 吨标煤，二氧化硫、COD、氨氮、粉尘排放总量分别控制在 39950 吨、25280 吨、3402 吨、22190 吨以内，循环发展、节能减排、环境保护和生态建设工作全面上升到了一个新的层面。

4、**新能源建设拓展节能减排空间**。柴达木盆地优越的区位条件、丰富的太阳能资源、发电上网电价政策等综合优势，先后吸引各大发电集团参与光伏电站建设，创造了同一地区短期内最大太阳能光伏电站安装量、并网等多个“世界之最”。项目建设对拉动投资，促进我省钢铁、物流、建筑等行业发展成效显著，并网运行后将生产超过 30 亿度以上清洁能源，对比火力发电，年节约标煤 150 余万吨，减少烟尘排放量 2.2 万吨、二氧化硫 1.8 万吨、二氧化碳 400 万吨，为试验区下一步产业发展赢得了发展空间。

三、柴达木循环经济试验区建设的经验和总体评价

试验区建设启动以来，循环经济发展取得了重大进展，资源开发从真正意义上实现了由单一开发向综合开发的转变，开发主体由国有向多元转变，开发方式由原料输出型向精深加工型转变，园区发展真正走向了由资源优势向经济优势、竞争优势的重大转变，在资源综合开发和循环利用方面探索出了一条切合实际的科学发展路子，也获得了一些有益的发展经验，主要有：一是理清思路是加快试验区循环经济建设的前提。在青藏高原生态脆弱地区发展循环经济、建设循环化改造示范试点园区是一项全新的、开拓性的工作。试验区坚持从理清发展思路入手，开展了试验区建设思路研究，按照省委、省政府“加强顶层设计，完善总体规划，实现合理布局，推进加快建设”的总体要求，准确把握宏观大势和州情实际，按照海西州委、州政府提出的“十二五”“2365”总体目标，确定了构建具有柴达木特色优势的盐湖化工、油气化工、有色金属、煤化工、特色生物和新兴产业体系，并提出了产业延

伸方向和重点支撑项目。基本思路确定后，试验区在各类规划编制、方案起草、可研论证等方面都予以遵循。由于思路清晰，定位准确，发展方向明确，使试验区发展步入了有序健康快速发展的轨道，为循环经济健康快速发展提供了可靠保证。二是政策支撑是加快试验区循环经济建设的关键。在国家对加快试验区发展的10项政策基础上，省委、省政府先后出台了20条政策措施以及《青海省发展循环经济实施意见》、《试验区循环经济项目认定管理暂行办法》，省发改委、省经委、省财政厅等相关部门研究制定了《柴达木循环经济产业导向指南》、《循环经济发展专项资金管理办法》等七项配套措施，并确定从2010年起，青海省建立每年10亿元的循环经济发展专项资金，以贴息贷款、以奖代补、投资补助等方式，支持具有示范性、导向性的资源综合利用、节水节能、污染防治、循环经济技术开发项目和配套基础设施建设。这些政策和措施的出台，调动了部门和企业的工作积极性，保障了项目建设有序推进。三是科技创新是加快园区循环经济建设的动力。柴达木地区矿产多为共生、伴生矿，包括“三废”也是多元素混合排放，在分离、提纯、综合利用方面的技术、工艺复杂，且没有成熟经验可借鉴。为加强重点技术、节点技术、控制性技术的研究，打通技术工艺“瓶颈”，园区引导、支持企业加大科研投入，坚持引进、消化、吸收并重，着力组织实施重大科技项目，集中力量对资源精深加工、能量梯级利用、一体化开发链接、废物综合利用等共性技术、关键技术进行研发和攻关，使企业成为技术创新和创新成果应用的主体。支持企业发展节能减排、废物利用等项目，对企业实施的废弃物和尾矿利用项目，给予多方面支持。进一步深化与高等院校和科研机构等的科技合作，搭建以企业为主体、产学研相结合的科技创新和攻关平台，实现技术攻关与成果转化的有机结合。各产业体系间原料、产品、废弃物相互利用，初步形成了资源循环利用、企业内循环生产、产业间循环组合的新局面，资源综合开发利用向纵深发展，其中以钾肥综合利用、钢铁一体项目为代表的循环经济产业链已见雏形。四是招商引资是加快试验区循环经济建设的手段。抓好招商引资是延伸产业链条、拓展产业范围、提升产业层次、壮大产业规模的重要手段。近年来，试验区采取多种形式加大宣传推介力度，先后赴全国各省、区、市路演招商，积极参加青洽会、厦投会、西博会、津洽会和兰洽会等节会，连续多年举办柴达木循环经济试验区项目推介会和镁产业发展论坛等大型节会活动，试验区的知名度和影响力进一步提升。创新招商引资方式，采取定向招商、以商招商、节会招商

等，全面拓宽招商引资渠道和途径，不断提升招商引资的质量和水平，实现了签约项目、签约金额和落地资金的新突破，成为了柴达木经济社会快速发展的重要支撑、集聚产业的重要平台、发展开放型经济的重要载体，形成了一定的规模效益和集聚效应，在加快推进海西州新型工业化进程、全面建成小康社会进程中发挥了重要作用。

实践证明，柴达木循环经济试验区建设是符合柴达木发展现状的，对柴达木地区特色优势资源开发发挥了重要促进作用。《柴达木循环经济试验区总体规划》的指导思想、发展目标、重点领域和发展方向是科学合理的，有效地指导了试验区建设和循环经济发展，《总体规划》提出的主要任务和重点工作，符合试验区的发展规律，经过努力是可以实现的。作为西部欠发达地区、民族地区、资源富集地区和青海发展的重点地区，柴达木通过循环经济试验区建设，资源综合开发、循环利用的观念得到极大改善，产品之间、产业之间、地区之间物质大循环、大发展的理念得到初步树立。在柴达木发展循环经济，是先行先试凝聚资本、技术、人才、品牌等发展要素的过程，是提升产业水平、调整经济结构、转变发展方式的过程，是实现特色发展、增大竞争优势的过程，更是柴达木地区发挥后发优势，实现跨越式发展，缩小与发达地区差距的重要战略选择。通过发展循环经济，试验区实现了由资源单一开发和简单初级产品加工，逐步向资源综合开发、集约利用，产品精深加工、深度开发，产业链网融合、集群发展方向的转变，以盐化工为核心，融合油气化工、煤化工、金属冶金等多产业一体化发展的产业体系基本形成，产业得到不断升级，结构得到大幅优化，一、二、三次产业形成了联动共荣、协同发展的良好局面，经济社会全面繁荣发展。

第三章　柴达木循环经济试验区问题诊断

试验区从雏形发展到具有一定规模、效益和竞争力的工业园区的过程中，既面临各种压力与困难，也存在诸多机遇与挑战，在不断探索与创新，聚力与发力中砥砺前行。建设初期，依赖自然资源为生产要素的发展模式起到了“助推器”和“加速器”作用。但是，进入成长阶段受到宏观、中观和微观环境的变化影响，试验区无论发展速度还是质量均受到多方面制约而呈现下降态势。微观方面，在更新理念思想、优化体制机制、变革创新技术、强化人才队伍培育等方面亟待有新突破；中观方面，盐化工、金属冶金、煤化工、光伏等优势产业已处于我国严重过剩局面，延伸产业价值链，提升循环经济质量，培育新经济形态已经成为试验区转型升级、提质增效必然选择；宏观方面，我国经济新常态力促经济转型升级，生态文明建设不断强化生态约束,“五大”理念提出更高发展目标。破除发展藩篱，厚植发展优势，是试验区实现健康可持续发展的重要任务。

一、循环经济发展理念与实践存在偏差

试验区实现循环经济健康可持续发展,不仅需要遵循经济和生态系统发展规律，还需要给予政策、制度和机制等社会系统的坚实保障。然而，供给要素是否起到良性、积极的促进作用，首要的是各行为主体的循环经济理念塑造是否正确。目前，试验区不同主体发展理念与实践方面还存在各种偏差。

（一）政府循环经济发展理念与实践的偏差

1、循环经济发展理念与传统经济发展惯性的摩擦

青海省在资源开发为主导战略思想下，以水电、盐湖、石油天然气和有色金属等优势资源为依托的重工业规模不断扩大，支撑了青海经济 30 余年的快速发展，打下了坚实的工业基础，也造成生态环境的恶化。柴达木地区作为青海省工业重地，在全省经济发展中起到了举足轻重的作用。然而，随着我国生态文明建设的推进，自然资源稀缺性不断加强，以自然资源为依赖的试验区传统重工业呈现出增速下滑、总量下降等现实局面。同时，由于生产要素如技术、资金、人才支撑不足，使得青海在未来一段时期无法摆脱对重工业的依赖，传统经济发展的惯性将持续较长时间。在经济下行、效益减小等现实面前，青海省各级政府面临着巨大的发展压力，在优

先发展传统经济还是循环经济，思想和理念出现了不统一、不一致的局面。课题组对青海省政府、海西州政府、德令哈市以及试验区等相关部门、不同级别领导干部70人进行了调查问卷，其中厅级干部10人，处级干部30人，科级干部30人，其中主张优先发展传统经济达到46人，占65.7%。此数据反映出，迫于经济发展的下行压力，短期内青海省领导干部主张以传统工业经济发展为主导的理念占据主流思想。在此情况下，青海省对于循环经济发展在政策供给、制度保障、体制创新等方面存在着与试验区建设要求的偏差。因此，当前循环经济发展与传统经济发展之间的摩擦较为剧烈。从长期分析，伴随着国家生态文明建设、经济新常态发展、“五大”发展理念等战略的实施，循环经济发展与传统经济发展两者理念的摩擦将会呈现从重到轻再到全面更迭的变化趋势，最终实现两者摩擦的消除。

2、循环经济发展理念与利用循环经济“招牌”理念的冲突

目前，青海省各级领导干部对试验区探索发展循环经济还是利用循环经济试验区“招牌”之间存在一定的冲突。课题组调查问卷的结果显示，70位调查对象中，39人认为目前试验区主要应承担起从国家、省市承揽项目、资金和政策的作用，甚至为了项目等资源的获得忽略项目是否满足、适合试验区产业发展规划，占调查对象总数的55.7%。这种理念导致若干短视行为的发生，即为地区短期经济发展动摇、放松遵循循环经济理念和发展要求。在此理念的影响下,试验区成为获得各类要素的载体和手段，促进循环经济发展成为利用循环经济概念。在以短期经济利益为主的理念导向下，青海省在试验区建设的资源配置、产业规划、政策构建等方面均出现了与循环经济发展相悖的现象，使得试验区产业链延伸、规模效益形成、政策外溢效应不能实现“帕累托最优”。

3、循环经济发展理念与政绩考核导向的矛盾

我国政绩考核是引导领导干部思想、行动的重要“指挥棒”。青海省是全国较早建立领导班子和领导干部年度目标考核制度的省份,但是各类政绩考核指标体系中，对循环经济政绩考核指标的数量不够，导向不明确。主要体现在，一是反应地方循环经济指标设置弱化。目前，考核指标体系中“经济发展”没有涉及反应循环经济质量的指标，而“生态保护”考核类别中反映循环经济的指标较少，在反应资源消耗强度、废物排放强度、废物回用率和污染物处置等循环经济指标设置仅有单位GDP能耗、二氧化碳排放强度、污染物排放总量等指标，缺少了工业固体废物综合利用

率、工业用水重复利用率、城市污水再生利用率、单位工业增加值能耗、二氧化硫排放量、COD 排放量等反映循环经济发展多项指标。二是反映工业园区循环经济发展指标欠缺。2015 年省委考核办对工业园区考核目标中，经济发展指标侧重经济数量如生产总值、工业增加值、完成投资和招商引资的增量要求，缺少了主要矿产资源产出率、能源产出率、土地产出率、水资源产出率等指标。从目前对州市和工业园区年度考核目标的数量和结构分析，青海省对于经济数量增量绩效要求仍然占据了主导地位。在此政绩考核体系下，青海各级政府和领导干部的行为必然与循环经济发展理念出现偏差。

（二）企业循环经济发展理念与实践的偏差

人类从原始文明、农耕文明到工业文明的演化中，生态环境不断受到损害，根本原因是人类的生活生产方式对生态环境破坏的速度远快于保护生态的速度，其结果是物质积累不断丰富，而生态环境却日益恶化。因此，推进循环经济发展重要手段是转变生产方式。但是，对照循环经济发展理念与要求，青海省驻地企业生产方式与循环经济发展还存在较大差距。

1、基于利润最大化与政府“博弈”的不当行为加剧

海西州柴达木地区是矿产资源的“聚宝盆”，吸引进驻试验区的规模企业多是以资源开发为主的资源型企业。企业为获得最大经济利益，在生态利益与经济利益、短期经济利益与可持续发展之间，与政府和公众进行着各种“博弈”。众多企业在科技创新、节能减排等方面均寻求最小成本投入，以获取最大经济利益，如此行为导致企业技术投入少，资源利用率较低，污染治理投入不足，企业生产无法实现生态化。同时，企业在资源获取、规避监管、节能减排、污染治理等各环节均存在着一定程度的寻租行为，致使生态管理单位在执法过程中受到较大的外部干扰，甚至无法执法，严重影响了经济发展与生态管理活动，成为阻碍试验区循环经济发展的重要影响因素。

2、基于增加成本与循环经济发展的抵触行为

目前，试验区产业链欠完善、规模效益较小、企业集群作用不明显，很难给进驻企业降低成本。同时，自然资源资产产权制度、自然资源有偿使用、生态补偿制度等生态文明制度探索和实施，进一步提高了自然资源开发利用成本。随着试验区

建设的推进，园区对企业在资源开采利用、精深加工、产业链延伸等方面提出了更高的要求，而实现这些目标的前提是企业需要不断加大对生产经营过程的技术与管理创新。在多方面作用下，短期内入驻企业的生产经营成本呈现较大幅度增加趋势，因此企业对于发展循环经济存在一定程度的抵触心态，致使企业在生产经营过程中出现各种不当行为，以减少发展循环经济带来的短期成本上升。

课题组对柴达木循环经济试验区格尔木藏格钾肥股份有限公司、青海联大化工科技有限公司、青海中信国安科技发展有限公司等 40 家企业进行了问卷调查，其中 24 家企业认同循环经济理念并未树立起来，更为关注企业眼前经济利益，在围绕发展循环经济的制度建设、技术创新、环境保护等方面存在着不到位、不执行等不当行为；15 家企业承认为降低环保成本而有过寻租行为；9 家企业已加强了循环经济理念的培训，不断强化企业在产业链等环节的定位与作用；7 家企业更加关注循环经济所带来的长期经济效益和社会效益，加强企业循环经济建设，努力实现经济、社会和生态和谐发展。

（三）公众循环经济理念与实践的偏差行为

公众是推进循环经济发展最重要的社会力量，也是地区循环经济和生态利益直接相关者和参与者。公众的意识和觉醒不仅是推进循环经济健康可持续发展的有生力量，同时他们还对政府和企业在此过程中的行为起到监督作用。推进循环经济发展，需要社会公众的共同努力和广泛参与。我国《循环经济促进法》规定，公民参与发展循环经济方面的权利包括控告权、知情权和建议权，即公民有权举报浪费资源、破坏环境的行为，有权了解政府发展循环经济的信息并提出意见和建议。从现实情况看，青海省两大循环经济试验区所在地海西州和西宁市的公众循环经济理念还非常薄弱。课题组随机对两地区 500 名民众进行了调查问卷，84%人认为循环经济是政府和企业的事情，与民众无关；79%人认为公众没有直接或间接通道或载体履行循环经济试验区建设的监督等职责；95%人认为自己有环保意识，但是其中 90%人认同自己有损害环境的行为。以上数据说明，青海省公众具有一定的环保意识，但是严重欠缺循环经济理念，公众行为与国家要求的方针存在较大差距。这种差距体现在对循环经济试验区建设参与度较低、监督薄弱、智力贡献不足等。

二、循环经济试验区产业效能不高

循环经济试验区通过共享资源、克服外部负效应，带动关联产业的发展，从而

有效地推动产业集群的形成。然而，目前试验区在产业规划、产业布局、产业链延伸等方面还存在着一定的不足，使得试验区产业辐射与带动、引领与示范等作用弱化。

（一）产业规划欠合理，市场受阻

试验区主要以柴达木盐湖钾、钠、镁、锂、钙等轻质金属和铅、锌、铁等重质金属以及煤炭等自然资源为生产要素，构建起盐湖化工、冶金、油气化工、煤化工等产业布局和产业结构。但是，试验区产业与全国其他资源型地区存在较大的同质性，大幅削减了产业效能。

1、深陷全国产能过剩“困境”，企业亏损严重

目前，我国无论是属于高耗能的电解铝、钢铁制造，还是新兴产业的光伏太阳能和风电，以及造船和钢铁业中高端产品的硅钢，均被业界公认为“产能过剩”。据高盛测算，以现金成本计算，中国约有50%的铝产能处在亏损状态，相当于全球总供应的25%左右。天则经济研究预计，除传统产业产能过剩外，一些新兴产业也出现产能过剩，如太阳能电池产能过剩达95%。中国石油和化学工业联合会副秘书长孙伟善称，目前我国炼油、尿素、磷肥、聚氯乙烯、纯碱、电石等行业产能利用率将进一步下降，产能过剩更加严重，PTA、甲醇、烧碱产能利用率也有所提高，但产能过剩仍十分严重[1]。2015年，试验区光伏产业累计实现装机容量2933兆瓦，占全国光伏总装机容量的9.2%，占青海省总装机容量的61.3%，位列全国州地市级装机规模第一[2]。同时，试验区已形成750万吨氯化钾、440万吨纯碱、1000万吨动力煤等生产能力[3]。由于我国产能过剩产业与试验区传统产业、新兴产业关联度较高，试验区相关产业在生产、销售等方面均受到较大冲击。同时，受到国内外经济下滑的冲击，试验区目前企业亏损面达到46%，其中资源型产品价格大幅下降，天然原油价格降幅68%，纯碱价格降幅58%，动力煤价格降幅74%，氯化钾价格降幅68%，主要产品价格已跌破成本线。在此情形下，试验区企业出现增产不增效的尴尬局面，其对于地区的带动和辐射作用不断弱化。

2、产业布局存在重叠，资源配置受影响

[1]中国9大产能过剩行业震惊世界，http://www.topnews9.com/article_20140728_39211.html
[2]柴达木“借光行风”，《柴达木日报》，2016年5月31日。
[3] 柴达木循环经济试验区及特色优势产业介绍，人民网，
http://qh.people.com.cn/n/2015/0604/c182769-25120925.html

柴达木循环经济试验区和西宁市经济技术开发区是青海省循环经济发展的“两驾马车”。从地理空间和功能优势角度，青海省对于两者发展规划、定位等设计均有不同。然而，从产业布局来看仍然存在着一定的重叠，这种重叠导致了对相关资源的争夺和资源配置效率不高的情况。试验区以盐湖、有色金属等自然资源为生产要素，构建起功能定位清晰、各有侧重不同的四个园区。西宁经济开发区四个园区也各具特色、关联互补4。但是，从全省循环经济健康可持续发展的视阈观察，两者无论在产业布局还是在产业链上下游延伸，均存在着一定的重叠。如，甘河工业园重点发展有色金属生产加工和化工产业，其中复合肥、PVC、甲醇、硼酸等化工产业与格尔木、大柴旦园区在工艺流程、产品特色方面均存在较强的同质性，造成了园区间产业资源的竞争，产业规模效益下降。再如，南川工业园区打造的锂资源精深加工基地，与格尔木园区培育锂系新材料产业也具有较强的雷同性，导致了相关企业分散，企业间交易等成本升高，无法形成企业的聚集与规模效益。同时，由于产业同质和雷同性，各园区在招商引资、产业链构建、产业竞争力打造等方面均存在着资源内耗的情况，导致资源配置不能高效利用，产业优势培育力量不集中，严重影响着青海省循环经济健康发展。

（二）产业结构欠合理，比例失衡

1、三次产业中工业占比过高，能源消耗大

试验区产业结构由“十一五”末的2.8： 79.1：18.1调整为“十二五”末的6.1：67.5：26.[4]。试验区二产下降、三产上升的变化趋势符合国家和青海省工业化进程，产业结构趋于合理化发展。但是，目前试验区在产业结构上还存在两方面差距，一方面，与国家和青海省产业结构相比二产占比过高。2015年我国三次产业比是9.0：40.5：50.5，同年青海省三次产业比是8.6：50.3：41.1。通过三次产业结构比较反映出，验区经济发展严重倚重工业发展。在技术创新和资金支持欠缺情况下，地区经济发展对于资源开发和利用的依赖程度依然很高，必将造成经济能耗高、污染重等问题。另一方面，试验区工业结构中重工业占比过高。目前，试验区无论是盐湖化工、油气化工，还是金属冶金产业、煤化工产业，仍然是以高耗能为主的传统重工产业，产业竞争力不强。2015年，试验区工业占比为67.5%。其中轻工业占比仅为14.5%,重工业占比达到85.5%。重工业占比较高又产生了两方面的问题，

[4]西宁经济技术开发区包括东川工业园区、甘河工业园区、生物技术园区和南川工业园区。

一是招商引资难度增加。重工业是属于典型的资本密集型行业，企业入驻需要较高的资本壁垒，这样势必给试验区招商引资带来较大难度。二是对生态环境造成较大压力。过去5年中，试验区规模以上工业增加值年均增长始终保持在10%以上。这个成绩的取得主要得益于对矿产资源的开发和利用，此举不仅消耗了大量的自然资源，也在很大程度对环境造成了破坏。转变经济结构，培育新型主导产业势在必行。

2、新兴产业处于起步阶段，规模效益尚未显现

试验区产业结构处于二产占比过高，三产过低的局面，除了加大传统工业转型升级，更为重要的是需要加大新兴产业的培育和发展。目前，试验区以新能源、新材料和特色生物等新兴产业作为主攻方向，以实现产业结构调整和优化。但就现实发展情况来看，主要还存在着两方面的问题。一是新能源、新材料发展受技术创新等要素制约。由于产业技术创新和技术人才等方面的限制，导致新能源和新材料产业规模化发展不够，在产品附加值提升、产业链延伸、规模效益等方面还不能起到支撑作用，甚至陷入的“进退两难”的境地。二是高原特色农牧产业竞争压力增大。目前，试验区围绕特色生物资源，大力发展高原特色农牧产业，打造“种植养殖—加工—综合利用”现代特色农牧产业链，并已经取得一定成效，但规模尚小，发展任重道远。

（三）产业竞争优势减弱，步履艰难

1、企业成本不断升高，循环经济不经济

一方面，以自然资源为生产要素的企业受到了保护生态环境约束不断强化。由于，国家在原有的政策基础上出台和完善自然资源资产产权制度、自然资源有偿使用制度、生态补偿制度等，并不断推进采矿权使用费、矿产资源税、矿产资源补偿费、矿山地质环境治理恢复保证金、排污费等费用改革力度。另一方面，国家和地方政府不断加大了对企业节能减排的管理力度。目前，我国已经构建了单位GDP二氧化碳排放、单位GDP能耗、非化石能源占一次能源消费比重、主要污染物排放总量以及化学需氧量、二氧化硫、氨氮和氮氧化物等污染物控制指标，作为监控地方生态环境保护成效的考核体系。青海省“十三五”规划中明确提出，深入实施《青海省建设国家循环经济发展先行区行动方案》，加快构建完整的循环型工业体系，延伸产业链条，推进循环化改造，工业固体废物综合利用率达到60%以上。实现这些目

标，需要企业不断加大技术创新、管理创新，这些举措又直接或间接地提高了企业经营成本。在上述两方面因素作用下，企业成本大幅增加，甚至抵消了柴达木地区富集的自然资源低成本优势，出现了循环经济不经济的情况。

2、产业链分割，规模效益减弱

从全省循环经济发展的视角看，目前试验区产业链还存在着被分割和断裂的情况，导致产业效应不能充分体现。如，试验区光伏装机容量占全国光伏总装机容量的9.2%，创造了同一地区短期内最大太阳能光伏电站安装量、全球最大太阳能光伏电站并网系统工程等多个世界和中国之最。但是，光伏产业的上游产业硅材料、太阳能光伏组件、太阳能玻璃等企业多数进驻西宁经济技术开发区东川工业园区。东川工业园区引进、落实了多晶硅、单晶硅、太阳能电池、太阳能光伏组件以及太阳能玻璃等行业，初步形成了围绕光伏行业的硅材料产业链条。然而，光伏电站在柴达木试验区，产业延伸的硅材料产品加工在西宁经济技术开发区，两者相距800公里，这样不仅造成了空间上的割裂，也造成了两个园区在相关产业链上的断裂，循环经济光伏产业的集聚效益、规模效益均不能得到充分发挥，光伏产业链的资金流、价值流、物质流和信息流的流动与传递效率下降，产业价值实现与增值不能达到最大化。

三、循环经济试验区科技创新能力不足

循环经济发展最为重要的内在动力是科技运用和科技创新。目前，试验区此方面还存在较多问题，主要体现在：

（一）人才总量少、结构欠合理

1.人才缺乏

由于试验区地理环境劣势和经济社会发展滞后等因素的影响，导致人才队伍建设步伐迟缓，人才引进和培养均存在较大的难度。试验区的人才数量明显不足，突出表现在从事应用开发的科技人才、管理人才、技工人才严重匮乏。项目组对试验区40家企业进行了问卷调查，34家企业选择了“招工难”，其中100%的企业选择了“高级人力资源即高级管理类的人才”和“中高级专业人才”招聘困难，29家企业选择了“能够供企业使用的熟练操作工、管理类和技术工种十分有限”。企业既缺乏高素质的技术工人，更缺少高层次的管理人才和工程技术人才，在智力、技术、知

识等欠缺的情况下，严重制约了试验区发展内驱动力的形成。这不仅影响企业技术创新能力，也严重影响了循环经济产业的发展。

2.人才结构不合理

试验区人才结构存在的缺陷主要体现两方面，一是柴达木地区的科技资源分布不均衡。从行业分布来看，教育、文化、卫生、社会公共福利事业等集中了较多的专业技术人员，而制造业等行业较少；从企业分布来看，大中型企业拥有较多的科技资源，拥有高层次人才和科研机构，而小微企业严重匮乏。二是试验区综合性人才、专业性人才比较稀缺。由于试验区内企业多为劳动密集型企业，对熟练产业工人、高技能人才和综合管理人才的需求量较大，而现实情况此类人才缺口较大。同时，近年来试验区围绕延伸传统优势产业链，大力发展新材料、新能源、特色生物等新产业，企业对高层次专业技术人才和高科技人才的需求也在不断增长。经初步估算，“十三五”期间试验区企业对熟练产业工人、高技能人才、高层次专业技术人才及高科技人才的需求在4—5万人左右[5]。如此庞大的人才需求量，仅靠现有的人才引进和培养方式无法满足，需进一步探索人才引进机制，创新人才引进激励机制，破解试验区在产业发展中遇到的人才引进难题。

（二）科技短板凸显，支持动力不足

1、科技创新投入不足，贡献率不高

2015年，试验区所处的青海省海西州全社会研究与开发投入占GDP1.5%以上，科技对经济增长的贡献率仅为46.4%。青海省海西州全社会研究与开发投入低于我国水平水平的0.6%，科技对经济的贡献率低于全国平均水平的3.6%。以上数据凸显了两方面的问题，一是地区对于科技创新投入不足，导致科研基础设施薄弱，企业科技创新能力低，产品竞争力不强。二是科技转化经济动力不高，科技投入的针对性和实践性与市场需求存一定的偏差，使得科技投入对经济贡献率不高。目前，试验区科研队伍整体水平较低，资源综合开发水平不高，高新技术产出率偏低，不能满足加快资源综合开发、有效配置和循环利用、构建科技创新体系的需要。

2、研究机构不全，“空巢”现象严重

目前，海西州围绕试验区发展依托青海盐湖研究所与中科院共同组建了中国柴

[5] 莫重明，园区建设和循环经济发展专题调研报告，2016.2.

达木循环经济研究院，引导创建了盐湖创新技术联盟，国家青藏高原有色金属矿产开发与高效利用产业技术创新战略联盟等6个国家级科技平台、7个省级工程技术研究中心、4个重点实验室、2个企业孵化器以及3个农牧业研究与技术开发机构等22个研发机构，但是总量仅占全省144个机构的15.3%，这与试验区定位和作用不相符合。同时，6个国家级科技平台主要是围绕盐湖资源综合利用、盐湖工程技术和盐化工产品检验等研究机构，这与试验区构建“镁锂钾园”在产业技术研发、重点资源利用等方面存在着结构上的欠缺，难以实现试验区产业链的延伸和产品的精深加工。另一方面，试验区建立的各类研究机构普遍存在着“空巢”现象。由于自然环境恶劣，激励政策不到位，导致聘请的省内外专家无法长期坚持在此地进行科学研究，研究机构设立不久便人去楼空。

3、企业维持艰难，创新动力不足

当前，在国内外经济下行的巨大压力下，试验区近一半企业亏损。在企业成本没有达到“关门点”前，众多企业面对亏损局面仍然勉强维持生产以减少亏损面的扩大。企业为减少经营成本，在保障基本工资外大幅减少了员工社保、福利等相关支出。在经济新常态下，企业为避免被市场淘汰，度过难关生存下去，将尽一切可能减少各种投资和支出，更难将资金再投入到科技创新等其他领域。企业创新投入少、创新能力不足，供给侧优化改革难以维系，产品质量和竞争力难以实现较大提升。另一方面，由于企业面临较大的生存压力，大幅减少了员工待遇和福利，导致大批技术、管理等人才的流失，进一步弱化了企业创新内驱动力人才的支撑。

四、循环经济试验区抵御风险能力不强

随着试验区建设规模扩大、产业延伸、技术变革和环境变化等因素的变化，试验区企业面临着生态风险、市场风险和外部环境风险。

（一）经济不循环，生态风险大

在利润最大化目标的驱使下，入驻企业更加注重经济利益的获得，而忽略甚至无视生态保护。2012年之前，全国煤炭价格持续高位运行，由于木里煤矿是主要煤炭资源聚集区而吸引了一批煤炭企业入驻，并取得了巨大的短期经济收益。木里煤矿所在的天峻县2012年地区生产总值超过73亿元，地方财政收入达5.8亿元。然而，2014年私营公司青海庆华集团违法开采严重危及青藏高原脆弱的生态系统事件

爆发后，青海省加大祁连山自然保护区的保护力度、全面整顿并规范木里煤田矿区开发秩序提出了系列举措。此后地区经济出现“断崖式”下滑，2015 年地区生产总值下降至 7.95 亿元，地方财政收入锐减至 1.48 亿元[6]。同时，试验区管委会专门成立了木里煤田管理局，以实现地区煤炭行业监督管理，以促进行业健康发展。此案例清晰地说明，无论是政府还是企业追求短期经济利益，无视生态环境健康发展，背离循环经济发展理念，在短期经济辉煌后极易陷入经济发展与生态保护两者“皆输”的风险困境。

（二）循环不经济，市场风险大

试验区再生能源也吸引了循环理念先进、科技技术支撑和遵循循环经济发展规律的企业。浙江中控技术股份有限公司瞄准德令哈工业园区太阳能可再生能源的优势，投资 4 个亿兴建的我国第一座拥有自主知识产权、规模化应用的太阳能光热发电示范电站。从生产技术到环境保护，光热具有明显的优势，虽然国家就光热产业发展在审批、并网等环节给予支持，但是由于政策体系的欠缺性和时滞性，导致浙江中控投资 4 个亿的回收周期不断延长，给企业发展造成了较大经济压力。该企业发展经历的示范效益使得更多愿意尝试循环经济发展的企业持观望态度。青海盐湖钾肥股份有限公司先后投入 324 亿元打造试验区金属镁一体化产业园区，以实现氯化钾、废液老卤、废盐深度开发和废弃物利用率。但是，由于政府对园区路网建设的资金不足，致使企业自筹资金进行基础设施建设，严重影响了企业资金生产经营的使用效率，丧失了最佳的市场机会，导致从“盈利模式”变成了“亏损模式”。企业的“循环不经济”，不仅让企业背上了沉重的经济负担，也严重影响企业后期发展。几位企业家对课题组不无感叹道：谁走在循环经济的前列，谁就最先牺牲。若企业经济利益不能得到应有保障，即使实现了产业链、企业和工艺之间循环的循环，也是无法抵御市场风险，最终陷入“死亡陷阱”。

由于受到资金、技术和人才等要素的限制，目前实验区形成了以原材料加工为主，以资源成本为利润的产业发展模式，其所投入的信息、技术、品牌、管理、人才等属知识密集要素还未形成核心竞争力。课题组对柴达木循环经济试验区 40 家企业调查的结果显示，77.5%的企业，即 31 家企业选择了“目前，试验区产业获得利

[6] 《停产后，一个煤炭大县如何过“紧日子”》，新华每日电讯，http://news.xinhuanet.com/mrdx/2016-01/13/c_135005169.htm

润是在整个产业链的低端”选项；72.5%的企业，即29家企业认为造成此情况的主要原因是“产业以自然资源为竞争优势”； 62.5%的企业，即25家企业认为“试验区和企业对于产品品牌建设重视程度不够，注重眼前利益”。从以上三类的选项可以分析出，试验区多数企业处于产业链的低端，以自然资源为竞争优势，关注眼前利益。由于缺乏营销、品牌、技术等核心竞争力，当市场出现较大波动时，这些企业多数难以为继，最终不得不退出市场。

产业链各链条间不仅有物质流，更重要的是价值流、信息流，它们是在物质流的基础上侧重产业链内在的价值和信息的流动，从而创造出强大的功能和更高的价值等，因此是一种更高级别的链接。目前，试验区四个工业园区均以各自资源及产业优势构建了产业链，除了推进各类无机盐产品生产工艺过程中产生的固体废物的循环利用外，盐湖化工、油气化工、煤炭清洁利用、有色金属、新能源等主导产业的融合，氯碱化工、冶炼等产业副产物的循环利用以及有色金属冶炼副产品和固体废物的循环利用等产业均注重的资源利用的关联性，即强调产业链间的物质流链接。物质流链接起的产业的相关度和融合度相对较低，产业链上下游关系不稳定，容易受到循环经济产业内外部各种风险影响而导致产业链断链等情况发生。

（三）新理念落实不到位，外部环境风险大

十八届五中全会提出了“创新、协调、绿色、开放、共享”的五大发展理念，这是关系我国发展全局的一场深刻变革，影响将十分深远。试验区实践“五大”发展理念需要加强五个方面的建设：从技术手段角度，全面推行污染治理技术、废物利用技术和清洁生产技术；从资源利用角度，实现资源的高效利用、相互利用和再造利用；从市场领域角度，要加强节能环保技术市场、社会废弃物静脉回收再造市场、循环经济咨询服务市场培育；从产业发展角度，企业层面注意清洁生产和污染排放最小化，区域层面企业间促进物质和能源的充分循环，社会层面要建立城市生活垃圾以及其他废旧物分类、回收、再造系统；从园区建设角度，要加强土地集约利用，构建合理产业结构，提高准入门槛。加强生态环境监控。“五大”发展理念为试验区产业转型升级，提质增效提供了机遇，同时也提高了建设更高要求和标准。只有克服困难，抓住机遇，将压力转化为动力，试验区才能获得健康可持续发展的前景。否则，试验区只能在新的历史发展进程中被淘汰。

我国经济发展进入新常态，正从高速增长转向中高速增长，经济发展方式正从

规模速度型粗放增长转向质量效率型集约增长，经济结构正从增量扩能为主转向调整存量、做优增量并存的深度调整，经济发展动力正从传统增长点转向新的增长点。“明者因时而变，知者随世而制。”“十三五”时期，要把适应新常态、把握新常态、引领新常态作为贯穿发展全局和全过程的大逻辑，才能做到适应更加主动，引领更加有为。试验区面对国家经济新常态的发展新规律，必须积极转变发展方式，加强传统产业的转型升级，注重新型产业培育发展，加强供给侧结构改革，提升发展能力。试验区传统产业占比接近70%，在经济新常态下实现对传统产业转型升级的任务相当艰巨，若还是以GDP增量和增速作为重要发展指标，背离循环经济发展理念、背离经济新常态的发展要求，试验区则必将走进“死胡同”。如此，经济新常态带来的就是危机和困难。

五、循环经济试验区发展政策不系统

循环经济发展不仅要依靠“无形的手”进行市场资源配置、供给与需求均衡、价值与价格体现来确定循环经济发展规模和效益，还需要“有形的手”在政策、制度等方面进行宏观引导和调控，才能构建起系统、全面的发展体系。目前，从促进试验区政策供给还存在些许以下三方面的问题亟待解决。

（一）政策效应的滞后性

1、时间滞后

试验区作为首批循环经济产业试点园区,经过5年后即2010年省政府才出台了《青海省人民政府关于加快推进柴达木循环经济试验区发展的若干意见》(以下简称《若干意见》)。5年间由于相关政策未能及时出台，使得试验区很多工作效率不高，推进缓慢，制约甚至阻碍了试验区建设。2012年5月，在青海省第十二次党代会上，青海省委提出了全力建设国家循环经济发展先行区的发展战略。2013年12月，青海省政府提出了《青海省建设国家循环经济发展先行区行动方案》，其中对于试验区发展土地保障、科技支撑、财政税收等扶持政策给予了说明。2014年5月，青海省政府召开了柴达木循环经济工作座谈会，从简政放权、生产力布局、财税金融、要素保障等六个方面进一步明确了支持政策，并授予了试验区省级投资部门项目审批权限，对试验区实行计划单列管理。2016年2月，青海省政府召开了海西发展改革工作会议，出台了加强创新能力建设、推动产业升级和结构调整、优化体制机制环境、

完善基础设施等八个方面40条支持政策。但是，这些政策的出台主要是抵御国内外经济持续下滑、企业大面积亏损、资源产品价格持续下降等市场恶化的困难，短期内为企业带来较大希望和较强动力，但是从设计科学性和前瞻性角度来分析，政策还是存在一定的时间滞后，导致企业应对市场环境变化能力不足，行业竞争力培育迟缓。

2、内容滞后

试验区批准后国家、省政府先后出台了13大项政策，涉及规划、土地、税收、基础设施等多方面的政策。但是，这些政策多数属于相对宏观指导层面的要求，要将这些转化为可以执行和落实的具体政策还需要各职能单位和部门针对性的分解和构建。目前，试验区在资源配置、项目审批、环境评价、土地利用、基础设施建设、废弃物利用等方面均执行国家“一刀切”政策，没有制定出更具针对性、前瞻性和可操作性的符合试验区的政策体系，导致了《青海省柴达木循环经济试验区总体规划》所确定的“先行先试”原则受到约束。面对当前宏观经济下滑，金融环境趋紧，企业投资信心不足，招商引资难度变大、项目建设滞缓等问题，更需要具有可执行的相关政策给予支持才能摆脱目前的困境。同时，目前受资源配置、产业等政策滞后因素影响，试验区规划实施的钢铁一体化、煤制烯烃、氯碱化工、燃煤电站、油母页岩勘探与开发等产业体系支撑配套的关键环节和节点项目落地困难。新能源、新材料、特色生物等新兴产业缺乏骨干大项目拉动，新的增长点形成缓慢，园区发展后续支撑不足。

（二）政策体系的欠缺性

1、内容缺失

当前，试验区在政策内容上的缺失主要体现在，一是法律法规建设滞后。我国已有4部环境法、8部资源法、20多项资源管理行政法、260多项环境标准。但循环经济法律法规较缺乏，不能满足发展的需要，特别是由于执法依据的缺失导致维护循环经济健康发展过程中的执法等行为的受阻。二是综合评价指标体系尚未建立。现行指标体系缺少反映经济社会活动中的物质投入(消耗)、排放(废弃)、利用效率和循环利用方面的指标，不利于评价和跟踪监测其发展情况。三是财政与金融政策缺失。试验区循环经济发展资金以各商业银行融资为主，以中央及省级下达的各类

专项资金为辅，尚未形成较为完善的分税制财税体系，财力十分有限，土地储备及园区基础设施建设大多依赖银行贷款解决，加之试验区建设项目大部分为公益性设施，偿债风险和压力不断增大，无法建立稳固的融资还贷机制，影响园区可持续发展。四是绿色产业支撑政策不足。绿色产业发展缺乏有效的投资激励机制和符合实际的土地、资源、税收、财政、金融、科研等配套政策，投资主体积极性不高，加之农牧业结构尚需调整、特色资源面临着再分配等因素影响，产业培育发展缓慢。

2、操作性不强

试验区发展政策构建过程中还存在着操作性不强的现实情况，尤其在项目建设用地方面的政策可操作性较弱，具有较强的代表性。试验区尽管地域广袤，但大量荒漠化土地均已在第二次全国土地现状调查库中被归类为牧草地、林地等农业、生态保护用地，可供直接开发利用的国有未利用地相对不足，加上现行的地方《土地利用规划》难以满足工业园集聚发展需要，大批新建项目用地都面临“边推进、边调规、边报批”的问题，土地预审手续繁琐，土地招拍挂耗时冗长，严重影响项目落地建设。受上述多方面因素影响，试验区规划实施的煤制烯烃、燃煤电站、新能源等一批循环经济产业体系建设的关键节点项目落地建设进度缓慢，下游新能源装备制造、新材料等产业缺乏基础项目和骨干项目拉动，新的增长点形成困难，园区发展后续支撑不足。

（三）政策体系的失衡性

1、部门政策执行的冲突

政府各职能部门在其职权范围内细化和执行循环经济发展政策，在社会管理活动中呈现出的思维方式与行为方式是各有不相同。循环经济发展主管部门制定政策时，以“3R”原则为依据，政策应当对于整个闭环组织和能够逆向生产的经济过程进行调控，而环保部门是极其重要的循环经济发展相关部门，也是清洁生产促进工作相关政策的执行者。但是，环保部门在环境保护工作是以末端治理为主要方式，通过对环境指标的检测，来掌握环境污染的情况进而采取相应措施治理污染。因此，环保部门作为《清洁生产促进法》的具体执法者，在推进企业清洁生产过程中，其政策执行重点在于排污的脱硫装置、除氮、除尘装置等环保设施建设上，并不在通过企业清洁生产推进。显然，这种工作侧重点不利于企业推进清洁生产。2011 年，

省经委、省环保厅《关于印发青海省2011年度清洁生产审核计划的通知》（青经资〔2011〕84号）下达了2011年度清洁生产审核名单。截至审核期限结束，全省列入名单中的39家企业通过清洁生产审核评估或验收的尚不足40%，其中海西州9%（列入名单的企业11家，通过1家）。这与循环经济闭环生产模式是冲突的政策执行方式。在循环经济发展的社会层面“大循环”、园区层面“中循环”和企业层面“小循环”三个环节中，企业层面“小循环”是基础，而企业层面“小循环”的核心是清洁生产。如果不改变政策执行的方式，循环经济政策落到实处可能还得假以时日。

2、地区政策与法律冲突

我国是法制统一的国家，国家层面的法律构成地方政府政策边界，循环经济发展的政策也不例外，尤其是在税收优惠政策上体现的更加突出。在产业发展中，税收优惠政策是重要导向性政策，但是税收法定原则限制了地方政府在确定税收优惠政策的权力空间。国家一直给予高新企业的较大的税收优惠政策。调研中针对高新技术发展，被调查者认为大多数企业，尤其是高新科技企业，由于初始投资巨大，又加上高新技术又具有的不确定性，经营之初的几年内盈利几乎是不可能的。企业所得税是企业盈利时有所得，才向国家承担的税负。因此，如果依照国家税收法律法规的规定，绝大多数高新企业是不可能享受相应税收优惠政策的。调研中税收工作人员谈到的税收优惠待遇，对于大多数企业而言是“镜中月、水中花”。青海省政府为了给予高新企业切实有效的税收优惠，在青政办[2013]27号文中确定被新认定为高新企业的，可以自盈利之日起两年免征企业所得税。但是，这样的规定，在现行税务管理体制下落实到位难度很大。

第四章　柴达木循环经济试验区改进优化

柴达木循环经济试验区是青海省打造国家循环经济发展先行区建设的主阵地，促进试验区健康可持续发展不仅决定着国家循环经济先行区建设的成败，也是青海省经济转型升级成功与否的关键所在。面对第三章陈述的各种问题，试验区要着力加强供给侧结构性改革，提高供给体系质量和效率，以绿色低碳为主攻方向，着力解决产业结构不合理、传统产业效益不高、新兴产业规模不大等问题，促进产业迈向中高端，基本形成绿色低碳循环、创新驱动、特色鲜明、效益显著的产业新体系，不断增强产业综合竞争力。

一、着力加强监督管理、纠正理念实践偏差

控制是管理活动中最为重要的职能，纠正偏差又是控制职能的核心。针对在推进循环经济发展过程中政府、企业和公众理念与实践的偏差，应采取不同手段、利用不同载体加强监督管理，以纠正不同主体循环经济理念和行为之间的偏差。

（一）绿色政绩调控政府主体

政绩考核是对领导干部表现的客观评价、激励的重要依据，是引导领导干部思想、行动的重要“指挥棒”。构建以循环经济为主导的绿色政绩考核机制，将全面加强领导干部的循环经济理念转变和循环经济行为。

1、构建绿色政绩考核体系

（1）优化绿色政绩考核指标。一是将工业废水排放量、工业污染治理投资、清洁能源使用率、环保投资比率、工业固体废物综合利用率等能够衡量循环经济绿色化程度，反应循环经济质量指标纳入考核指标体系。二是增加水土流失率、生物多样性指数、废水排放达标率、大气环境质量（2级）达标率、草地退化率等衡量生态保护以及反应民众对环境诉求的主观感受指标。

（2）完善绿色政绩考核方法和内容。一是在以年度目标考核为导向的显性绩效前提下，应加大隐性生态绩效考核[7]，构建起较为全面地绿色政绩考核指标体系。二是处理好考核内容存量与增量关系。哪些指标需要保持合理增长速度、哪些指标需要保持科学增长数量，应根据试验区不同阶段的主要任务、承担责任和发展基础的

[7] 杨皓然，《青海高原生态经济系统可持续发展研究》，中国社会科学出版社，2013年。

不同来确定增长规模和数量要求。三是设立多元考核主体。实行上下级组织、群众和第三方（利益相关者、专业性个人和机构）三种考核主体力量，对党政领导班子和干部的绿色政绩进行考核。

2、构建绿色政绩监督体系

（1）内部监督体系。一是职能部门监督。首先，设置监督的关键控制点。根据相关职能部门工作属性，选择能够反应海西州循环经济绿色发展过程、发展质量的关键点作为控制点，进行定期和不定期的数据采集、现场勘验和座谈等方式获得试验区循环经济发展质量的相关信息。其次，对各个控制点进行分级管理，形成影响程度（最）主要、一般和较小的三级管理方式。在此基础上对各级控制点进行偏差分析，实现对目标偏差及时纠正。二是生态利益相关者监督。试验区循环经济发展和建设过程中，地方民众是做出了巨大贡献的群体。他们也都关注着贡献可能换取未来的经济或者生态利益。他们是地方政府实现目标过程中的参与者、亲历者和利益相关者，因而对于政府绩效考核最有监督权和发言权。

（2）外部监督体系。一是公众监督。首先，切实贯彻落实《政府信息公开条例》。地方政府应积极拓展关于循环经济发展的信息公开渠道。设立专门的信息查询处，或定期出版专门的信息专刊，让公众及时、零距离体验到地方循环经济发展现状和趋势。其次，扩展公众监督载体。应充分利用平面媒体、电视媒体和网络媒体构建公众监督平台，将循环经济发展中各项决策、执行和效果等不同阶段对考核内容通过媒体及时反馈公众，并听取各方意见和建议。二是媒体监督。首先，加强新闻立法。以法律形式赋予新闻媒体以重大事情的知情权、采访权和评论权等，切实保障新闻自由，使新闻工作者能更好地依法履行监督职责。其次，完善舆论监督的信息反馈和责任追究机制。对新闻报道批评和揭露的问题和单位，上级主管部门要及时进行查处，并及时向有关新闻单位通报。三是专业性个人和机构监督。首先，注重顶层设计，确保专业性个人和机构的独立性。从制度和政策两个层面给予鼓励和支持，以确保专业性个人和机构的合法性，以确保其工作的独立性，结果的客观性。其次，发挥专业优势，增加考核权重。应当加强专业性个人和机构评估结果运用中的权重赋予，尊重他们的专业优势，为确保考核结果的科学性、合理性奠定基础。

3、注重绿色政绩考核结果运用

2、搭建政府与企业沟通平台与渠道

建立政府与企业之间的意见征询、协商和协调机制，完善相关的沟通制度，构建交流渠道。在各项环境规制制度和要求发布前，主动征求企业意见，采纳合理建议，不断完善各种规制，使企业能有具有充分的预期判断，以此减少或避免制度实施中的磨擦与冲突和在生产周期中调整生产可能导致的成本上升。

3、改变企业污染治理模式

加强对企业环境知识、责任意识的培训与培养，积极鼓励企业采取各项技术变革，由污染控制转变为清洁生产，以此转变企业对高污染物达标排放和废弃物传统处置的规制模式，形成从“输入”、“生产”和“输出”各环节源头治理，改变企业由传统的末端治理模式转变为源头治理模式，以最终解决不同主体之间信息不对称而导致的决策低效率问题，降低企业与政府不合作博弈的交易成本。

4、引进非正式的环境规制方法

非正式环境规制是对正式环境规制的重要补充，这其中包括信息公开、环境管理认证与审计、生态标识、环境协议和舆论导向等等内容，可以较好地促进公众参与和监督企业行为。这些非正式政策和要求将会激励被规制企业，并引导、鼓励利益集团主动参与各项规制政策的出台，以此来促进化解政府和企业的不合作博弈，减轻政府和企业的规制负担，提高规制效率，实现规制目标。

5、大力鼓励企业推进技术和管理创新

各级政府应通过政策、制度对企业进行技术和管理创新的奖励，尤其是企业在环保、生态经济、循环经济等方面的绿色生产技术、产品技术和管理手段等内容的创新活动应大力给予政策和物质奖励的倾斜，以减低企业规制成本，提高企业在所有生产和管理环节中主动参与环境规制，为企业创造出竞争优势。

（三）推进公众参与

1、提高公众参与意识

公众环境意识是一个地区和民族文明意识高低的标志，同时也是形成区域循环经济发展思想保障的社会基础。各级政府应积极发挥在宣传、教育和引导中的主导作用，通过媒体、活动等各种载体对公众进行循环经济等方面知识的引导，形成全社会的价值观和行动方向，以提高公众对循环经济的理解和接受程度，营造柴达木

地区循环经济发展的人文环境。

2、完善信息公开制度

信息公开是公众参与的前提，只要不涉及国家机密等信息，公众有获取相关信息权利。同时，管理机构也有义务向社会和公众提供相关信息。信息公开制度应主要从以下三方面开展，一是要做好环境质量报告，确保相关数据的真实性和准确性。要定期举行环境状况发布会以及做好重大环境问题的预警报告。二是对于重大环境事件（污染、自然灾害），要及时、准确向公众通报，满足公众的环境知情权需要，引导公众对环境保护客观、理性判断。

3、加强舆论监督与宣传

新闻舆论是公众参与政府和企业各种环境决策，监督政府执法等环境管理和企业生产环节中有效手段和重要载体。加强舆论监督和宣传，一是媒体需要及时向公众和企业及时传达各项环境制度、决策，以及执行情况。同时，如实、迅速反应各种对环境问题的意见和建议，在政府和公众、企业之间形成信息桥梁作用。二是政府各项促进循环经济发展等工作有步骤地向各种开放媒体，为公众参与提供信息条件。三是加强非政府组织培育与建设，加强政府与其联系与合作。政府要放宽有关环境保护等非正式组织和公民因环保结社的审批条件，多种政策支持和鼓励民间环保组织的发展，发挥他们在循环经济发展的宣传、教育、引导和监督等方面的积极作用。

4、积极倡导绿色消费

一是培育绿色消费理念，宣传崇尚绿色、环境友好的消费理念，充分发挥各类群团组织和社会团体作用引导形成良好的生态保护意识。二是培育消费者从自身做起，选择绿色消费、选择废弃物分类处理，培育绿色、环保、节能、理性的消费模式。同时，推动各级政府发挥绿色消费表率作用，通过绿色采购、绿色消费、多次重复使用、废弃办公用品回收等行为，为全社会树立绿色消费典型示范。三是制定促进绿色消费的激励机制，通过优惠贷款、税收减免、财政补贴等措施，加大对生产、运输和销售绿色产品企业的支持力度，鼓励环保企业和环保产业的发展，引导和促进全社会公众进行绿色消费。

二、着力产业转型升级、推进供给侧改革

当前，适应引领经济新常态，推进供给侧改革已成为我国提高供给体系质量和效率，增强经济持续增长的强大动力。试验区健康发展要积极适应经济新常态，加强供给侧结构改革，提升产业供给能力，紧密结合青海省、海西州“十三五”规划，特别是根据《青海省建设国家循环经济发展先行区行动方案》的要求，补齐产业短板，厚植发展优势，培育新型产业，实现园区之间、园区与地方之间的循环经济产业协调可持续发展，以全面提升循环经济产业效能。

（一）提升发展目标，明确发展方向

在新的历史起点，提升试验区产业效能首先要优化产业规划、提升发展目标，用高目标明确发展方向，用高标准引领产业转型升级，为试验区产业发展形成新主体、培育新动力和发展新产业奠定坚实基础。

1、发展目标

以全省“十三五”发展指导思想为指针，以供给侧结构性改革引领经济新常态，以创新、协调、绿色、开放、共享的发展理念为遵循，以改革创新为动力，以加快转变经济发展方式为主线，以培育特色优势主导产业为核心，以保增长促发展为前提，以提质增效为目标，以园区骨干企业和重大产业项目建设为抓手，促进资源集约利用、产业集群发展、区域联动开发，努力构建以盐湖化工为核心，科技引领明显、创新驱动突出、循环特征显著的现代产业体系，把试验区建设成为特色鲜明、结构优化、技术先进、清洁安全、内生动力较强的循环经济发展先行区。

2、发展方向

一是由追求速度向追求质量转变。深入推进经济结构调整和转型升级，着力优化布局结构、技术结构和行业结构，推动发展方式的转变提升，实现提质增效。二是由政府主导向市场主导转变。突出市场在资源配置中的决定性作用，推动优势资源向优势产业集聚，形成叠加效应，突出企业主体地位，加强政府在产业发展中的引导和调控作用。三是由同质化竞争向差异化竞争转变。围绕延伸产业链条、发展优势产业、打造核心企业、培育产业集群、建设特色循环产业基地。四是由硬环境见长向软环境致胜转变。推进机制体制创新，着力优化产业布局，拓展融资渠道，完善园区功能配置，创新园区管理体制，最大限度释放服务效力。

（二）推动转型升级，提高供给水平

试验区油气、盐湖、煤炭、金属等四大传统基础产业结构偏重便粗，抵御市场风险能力较弱，出现了“断崖式”下滑。因此，试验区传统产业转型升级势在必行。在传统基础产业转型升级过程中重点应采用“一原则、两驱动、三路径”模式对传统基础产业进行转型升级。

1、“一原则”，即坚持柴达木盆地“资源禀赋”原则

立足柴达木盆地特色资源优势，坚持把发展循环经济作为转变发展方式的主攻方向，先后完成试验区的循环经济的规划体系、产业框架和产业链条。循环经济产业的建设和发展均是以柴达木盆地具有的生态资源为基础，实现了将资源优势转化为经济优势，并取得了较为突出的效益，形成了具有青海特色的循环经济产业集群。柴达木盆地的优势在资源，潜力在资源，希望在资源，优势资源形成了优势产业、优势产业提升了资源利用率，形成了特色循环经济。因此，坚持“资源禀赋”原则，就是坚持试验区的特色和发展基础。

2、“两驱动”，即坚持技术创新和互联网+

创新驱动强调试验区产业和产品供给侧结构改革，以技术为手段提升循环经济产业科技含量、延伸产业链条、打造强势品牌，实现循环经济供给侧优化改革，从而获得新机遇、新市场和新发展。互联网+驱动是以互联网平台为基础，利用信息通信技术与各行业的跨界融合，推动产业转型升级，并不断创造出新产品、新业务与新模式，构建连接一切的新生态。“两驱动”在推进试验区产业转型升级中的侧重点和作用各有不同，形成的合力将优化市场供给与拓展市场需求，从而产业转型升级注入新的活力，更为供给侧结构改革注入强大动力。

（1）技术创新驱动。目前，试验区正在迈过资源初级开发的发展阶段，破解困难需要突破一些关键环节的技术创新瓶颈问题，实现盐湖等资源的精深加工，生产出高附加值的产品，促进资源产品多样化，以实现试验区可持续健康发展。一是加大科技攻关。推进关键技术、共性技术项目攻关，鼓励企业和科研机构踊跃开展新产品、新技术和新工艺开发，积极申报国家高技术产业化专项，加快组织实施盐湖化工、金属冶金、新能源、新材料等产业关键技术的研发与攻关，提升区域特色产业的整体技术水平。建立行业龙头企业或骨干企业牵头，技术创新战略联盟等新型产业组织承担，创新成果共享的技术攻关模式，合力推动关键技术和共性技术的突破。二是重点应用推广与引进吸收技术。结合试验区产业发展需求，以市场为导向，

通过科技创新、推广应用，实现产业结构优化升级，开拓产业发展的新空间。首先，积极采用先进技术和成熟工艺，重点加快推动盐湖镁业金属镁一体化（二期）、庆华钢铁、昆仑黄金冶炼、黄河矿业夏日哈木镍钴矿采选及冶炼、地源新材料海绵钛及钛合金材料等重大基础产业项目落地建设，做到资源利用率最大、能耗最低、环境影响最小，彻底摆脱目前过度依赖资源开发、增长随市场大幅度剧烈波动的困局。其次，引进和吸收前沿技术，重点加快青海矿业煤制烯烃、中浩百万吨煤-天然气联合转化、高性能镁基合金材料、石墨烯、石头纸等项目落地建设，通过关键性和节点性技术瓶颈的突破，推动整体产业的战略性升级，以科技创新的跨越式发展，全面推动循环经济主导产业真正实现转型。

（2）互联网+驱动。强调运用信息化平台发展有形与无形、线上与线下相结合的新型商业模式，为众多企业和消费者提供网络化、智能化、服务化大平台服务，促进市场体系、治理体系、服务体系和参与体系互通、共享与共治，形成试验区循环经济最强大的驱动力量。一是建立柴达木循环经济试验区大数据中心。运用云计算、云存储等技术，在海西建设大中型云计算数据中心，改造整合现有小型数据中心，引进省外龙头企业、支持省内基础电信运营企业建设全省综合性云计算公共平台。积极推动和引进通信业、金融业、保险业等大型企业数据处理与灾备中心落户海西州。二是推进信息化与工业深度融合。加快推动新一代信息技术与制造业融合发展，建立“两化”融合贯标体系，把智能制造作为主攻方向，建设智能制造网络信息平台，促进工业互联网、云计算、大数据在企业研发设计、生产制造、经营管理、销售服务等全流程和全产业链的综合集成应用。引导重点企业基于工业云平台构建信息门户网站和电子商务平台，促进互联网与产业发展深度结合，建设钾肥、无机盐、纯碱、枸杞等大宗商品交易中心，壮大电商经济规模，加快物联网推广应用，实现资源优化配置和高效利用。三是构建现代信息产业。按照新能源产业发展、气候条件、地理区位以及产业基础优势，建设智慧工业园。重点布局在格尔木、德令哈工业园，并以此为核心，辐射带动试验区其它区域智慧化、信息化发展。

3、“三路径”， 即坚持淘汰、保留、升级

（1）淘汰以能源消耗为主、产能过剩的传统中小型企业。如，试验区铁矿资源丰富，“十二五”以来入驻 40 多家铁矿开采企业，不仅与全国钢铁过剩产业严重重叠，还导致了试验区铁矿资源的碎片化低效率的开采。再如，试验区太阳能资源丰

富，光伏企业扎推入驻试验区导致不仅深陷全国产能过剩“陷阱”，而且占用土地、水资源等情况严重。面对如此局面，试验区应通过“无形的手”淘汰部分企业，通过“有形的手”引导企业重组与兼并，从而实现企业规模化发展，提升企业自然资源高效率利用率，增强行业竞争优势。

（2）保留具有一定规模和发展潜力、空间的企业。试验区盐湖化工、油气化工、煤炭综合利用和金属冶金四大基础优势产业架构基本形成，但是企业生产还处于以基础原材料为主导的产业链前端，资源综合开发利用处于起步阶段，转型升级任务艰巨。目前，这些企业虽然还处于产业链前段，但是在对于循环经济产业而言，它们的生产、销售都决定了产业链的质量和效益。因此，对于这部分企业应给予保留。这种保留不是简单的存在，是需要通过技术革新、管理创新等手段提升企业资源开采水平和能力，形成循环经济具有竞争力第一链条，为试验区循环经济健康可持续发展奠定坚实基础。

（3）积极推进优势传统产业转型升级。加大传统产业技术革新，发展产品精深加工，延伸产业链条，提高产品供给质量，促进产业间上下游的融合发展，实现从资源要素优势转化为技术竞争优势，为满足市场各类需求提供高质量的产业与服务。如，针对盐湖卤水多资源半生的实际，不断提升盐湖提钾、提镁、提钠、提锂、提硼工艺，努力延伸产业链条，使得盐湖卤水所富含的每一种资源都得到充分的开发和有效的利用。

（三）强化质量引领，优化供给结构

1、明晰柴达木与西宁工业园区产业发展重点，实现循环经济资源优化整合

由于柴达木循环经济试验区与西宁经济技术开发区在产业规划、布局等方面存在一定的重叠，导致资源配置效率不高。因此，两者根据资源、技术等优势应明确产业布局重点，实现差异化发展，提升两地甚至全省循环经济资源优化整合。

（1）西宁经济技术开发区聚焦产业集群打造、产业链条延伸、企业技术改造，做强主导产业，培育新兴产业，升级传统产业，退出落后产能，构建“7+2+1”产业体系。“7+2+1”产业体系具体为 7 个主导产业：硅材料及光伏制造产业、有色(黑色)金属产业、新材料产业、特色化工产业、藏毯绒纺产业、高原生物健康产业、高端装备制造产业，2 个新兴产业：锂电与新能源汽车产业、光电与新兴信息产业和 1 个现代服务业。其中，锂电与新能源汽车产业紧紧抓住国家大力支持新能源汽车发展

机遇，围绕打造千亿元锂产业的目标，重点发展锂电材料、锂电池、新能源汽车和相关产业链，将锂电产业打造成为开发区最重要的产业增长极；光电与新兴信息产业则加快发展蓝宝石晶体、碳化硅及外延产品、光纤预制棒及光纤、LED 应用产品等产品。现代服务业围绕园区生产生活需要，重点发展现代物流、金融服务、研发设计、商务中介、总部经济等生产性服务业，配套发展商贸流通、餐饮住宿、休闲度假等消费性服务业，融合发展文化教育、医疗卫生、社区服务等公共性服务业，提升园区产城融合发展水平。

（2）柴达木循环经济试验区重点围绕盐湖资源综合开发利用，形成七大主导产业链，形成结构合理、优势突出、集约利用、链条完整的循环经济产业体系。试验区应着力打造 2 个千亿元和 4 个五百亿元产业基地，重点发展特色生物、新能源、新材料、信息化等新兴产业，继续巩固优化盐湖化工、油气化工、煤炭综合利用、金属冶金等特色优势产业，着力培育金融服务业、生产性服务业和仓储物流业等现代服务业，推动试验区循环经济实现转型跨越发展，以实现循环经济成为工业经济发展和社会进步的主要引擎，成为全省建设循环经济发展先行区的龙头。

2、培育新兴产业，突出产业特色

依据试验区资源区域分布和产业发展基础，在处理好保护和开发的前提下，按照“以点带面、点面结合、分步实施、重点突破、全面推进”的原则，重点打造格尔木、德令哈、大柴旦、乌兰四个重点循环经济工业园，辐射带动都兰、天峻、冷湖、茫崖等区域资源的综合开发和经济社会的快速发展。

（1）高原特色生物产业。在全州范围内依托产业发展条件进行布局，突出高原生物产业发展的重点和特色，加快推进特色生物原料基地和综合加工生产建设，格尔木、德令哈、天峻、都兰、乌兰、大柴旦等地积极调整种养植（殖）业结构，形成有机枸杞、柴达木福牛、藜麦、青稞、中藏蒙药材、饲草种植和有机肥生产等特色生物原料基地，促进规模化、标准化、产业化发展；综合加工产业依托柴达木（德令哈）绿色产业园、都兰枸杞产业区进行集中布局，不断延伸生物产业链，培育新品牌、开拓新市场，着力发展具有相对资源、技术优势的产业。通过重大项目的实施带动技术突破和产业壮大，加快推进二产向三产转移，形成具有明显竞争优势的青藏高原特色生物资源与中藏药创新性产业集群。

（2）新材料产业。依托资源分布状况和特色优势产业的发展基础，在格尔木、

德令哈、大柴旦工业园重点集中布局盐化工晶须材料、树脂材料、高分子合成材料等多类型、多用途化工新材料产业，镁合金、钛合金等高性能轻金属及其合金材料产业，储热熔盐、锂系列储能、石墨烯、镍铜锰三元材料、光伏光热发电专用玻璃等能源材料产业。重点推进盐湖镁资源深度开发，建设镁系合金、镁系阻燃剂、镁质耐火材料及其下游产品等新材料产业；围绕油气化工、煤化工产业发展中聚氯乙烯、丙烯等产品，建设氯化聚氯乙烯、聚苯硫醚、高性能聚丙烯、碳纤维、降解塑料、玻璃纤维等高性能改性塑料、复合材料及其制品产业；以钢铁一体化项目为基础，依托铁矿资源、硅、锰、铬、镍、钼等资源，重点发展高性能特种钢材等新材料；围绕太阳能光伏、光热发电和风电产业，发展第三代高效太阳能电池及其组件、储热熔盐、锂离子电池正极材料、钴酸锂、磷酸铁锂等新能源材料，推进硅资源、玻纤、风电装备制造、镁锂及锂铝等新材料产业开发应用；重点围绕锂系电池材料、铝基合金材料、镍钴材料、烯烃下游高端化工材料、镁基合金材料及镁系耐火材料五个板块，重点规划合金及轻金属新材料、无机盐化工非金属新材料、有机高分子新材料、新型电池材料等产业项目，建成国家最大金属镁及其合金材料产业基地、碳酸锂及其材料产业基地。

（3）新能源产业。依资源和上网条件而建，配套装备制造产业重点依托德令哈工业园集中布局。重点规划建设太阳能高效光伏、光热发电、高原风电制造及能源系统集成、电站一体化建设项目，形成新能源产业孵化、转化、成长、壮大的块状产业集群，带动高效太阳能发电组件、储热熔盐、储能电池材料、玻纤、风电装备制造、太阳能热发电装备制造等新能源装备制造相关产业快速发展。加快构建“装备制造—发电—负荷消纳—向外输出”产业链，重点规划新能源电站及配套装备制造项目，推动光伏、光热、风电、风光互补装机总规模达到13GW，打造国家级新能源产业示范基地和电力输出基地。

（4）盐湖化工、油气化工、金属冶金、煤炭综合利用等特色优势产业。在生态保护第一的原则下，依托资源就近开发，做好资源开采和初级产品生产；精深加工及下游产业发展依托格尔木、德令哈、大柴旦、乌兰和都兰等工业园和地区进行集中布局，形成配置高效、投资集中、专业集成、结构合理、资源集约、产业集聚发展的新格局。

（5）现代金融服务、物流仓储、科技研发等生产性服务业。依托交通区位条件

和产业发展基础，重点布局在格尔木工业园和德令哈工业园，辐射带动试验区其他地区生产性服务业发展。

三、着力科技要素驱动，完善创新动力体系

（一）弥补劳动力短缺，提升人口素质

1、实施“东移西扩”项目，实现人口机械迁入

根据《青海省西宁市、海东地区和海西州人口承载能力研究》[8]研究成果显示，2007 年海东地区的人均生态足迹已经超出了当地的土地资源承载能力，生态环境质量下降，人口压力巨大。2013 年 2 月，国务院批复同意青海省设立地级海东市。海东市又进行了较大规模的城镇化建设，城市人口激增导致海东市人均生态足迹的增加，较大幅度削弱现有生产性土地的人口承载能力，人口超载更为严重。然而，试验区所在的海西州，从总体而言还处于生态环境的承载能力之内还有较大的发展空间。生态足迹供给来看是海西州人口较少只有西宁市的 19.98% ，海东地区的 27.10% ，但土地面积却是西宁市的 39.26 倍，海东市的 22.86 倍，即便是扣除 85% 的不宜人类居住地区的面积，仍然为西宁市的 5.89 倍，海东市的 3.43 倍，人均可利用土地分别为西宁市的 29.48 倍，海东市的 16.66 倍。因而，人均生态足迹供给远高于西宁市和海东市。基于地区间生态承载能力的不同，课题组建议考虑实施“东移西扩”项目，将海东市部分人口迁入海西州格尔木市和德令哈市，不仅实现了提高海东市人口承载能力，更为海西州输入不同年龄结构、不同学历结构的人口，从而解决试验区发展循环经济劳动短缺的情况。

2、构建“政府+企业”培训模式，提升人口综合素质

（1）政府应注重对地区公众的普遍素质教育。一是构建以基础教育、专业教育、成人教育和社会教育为主的教育体系。根据不同教育类别和性质，开展针对性较强的循环经济基本常识、发展理念等方面知识的教育活动，达到全社会了解循环经济、参与循环经济的教育培训目标。二是发挥媒体作用。广泛利用网络、电视、报纸、广播等媒介，全方位宣传循环经济理念、措施和发展道路，促进形成地区循环经济社会舆论格局。

（2）企业培训应注重对企业员工专业技能水平的提升。一是建立培训机制，将

[8] 南开大学经济学院人口与发展研究所，2007 年。

员工培训常态化。企业应根据发展阶段、行业特点等因素，定期不定期进行员工专业技术培训，实现员工知识与企业成长同步。二是开展重点岗位展开定点培训。针对技术关键部门、重要管理部门等员工进行针对性、操作性强的定岗、定编培训，以实现企业骨干员工能力和水平全面素质的提高。

（3）“政府+企业”培训则应注重政府根据企业发展需求，利用社会各种教育资源开展针对性较强的不同岗位、不同层级、不同性质的员工培训。政府应紧密结合试验区产业特色，依托柴达木职业技术学院等职业院校等教育单位，通过订单式培养、特色专业课程等方式，形成以化工类、冶金类专业为主体，以机电、汽修等工科类专业为主干，以现代服务和农牧专业为补充的教育网格，逐步形成产业并举、相辅相成的专业集群，以基本满足循环经济产业发展用工需求。

（二）加强人才引进，构建培育平台

1、拓展吸引人才、使用人才渠道与方式

（1）探索建立市场化人才引进机制。抓住内地发达地区深入推进产业结构调整、大量产业工人乃至高端人才闲置的有利时机，鼓励州内中小企业服务中心、创新孵化基地等与国内外知名人才服务机构开展合作，结合地区产业结构特征，采用市场化运作的方式，以内地人才存量为依托，探索设立劳动力资本运营公司，组成人才引进专业团队，有针对性地开展人才库建设，对州内企业开展产业工人乃至管理人才的整装配置和管理运行，缓解产业项目人才缺乏的困难。

（2）大力引进高层次人才。拓展国际人才视野，开放式集聚国内外创新力量，增强创新能力。要充分利用青海省“高端创新人才千人计划”，努力引进一批海内外高层次人才和创新团队。实施更加开放的人才政策，建立高层次人才政府津贴制度，在住房、医疗服务、社会保障、子女教育等方面，加大对各行业各领域优秀人才干事创业的服务保障力度，不断优化试验区人才发展环境，实现稳定人才，凝聚人才的发展目标。通过各项政策和制度的完善，促进各类人才贡献智慧力量，转化成产业核心竞争力，以促进试验区循环经济健康发展。

（3）实施重大人才工程。把招商引智作为创新驱动、循环发展的重要抓手，采取“企业资源+产业资本+人力资本”的模式，聚一批涉及产品研发创新、技术改造升级、市场营销拓展等全产业链人才，来试验区创新创业。

（4）用平台吸引人才。围绕优势特色产业建设重点实验室、研究中心等科技创

新平台，吸引各类人才开展技术攻关、实验示范等活动，着力突破产业发展的技术瓶颈，加快形成一批具有自主知识产权和自主品牌的目标产品，促进人才与产业协同发展。

2、提高人才素质，完善人才结构

（1）建立柔性人才机制。立足试验区实情，建立和完善“户口不迁、关系不转、双向选择、自由流动”的柔性人才机制。通过聘请科技顾问、干部挂职、聘任高层次人才、实行重大科技攻关项目面向国内外公开招标等多种方式，引导人才向关键产业和科技紧缺行业集聚，培育科技创新团队带头人。

（2）发挥研究机构扩散作用。充分利用试验区一大批大中型企业的技术设备优势，建成一批开放型实验室，为试验区特色优势产业的关键技术攻坚克难提供保障。通过建立博士后科研工作站和各种学会、协会的形式，组织专家、学者进行交流，激发广大科技人员特别是高科技人才的创新和创业潜能，为试验区特色产业发展提供强有力的人才支撑。

（3）强化人才培育和使用。设立试验区重点项目、重点工程和重点技改所需的人才需求信息库建设，并实施态管理，确保紧缺人才引进与使用。同时，根据试验区企骨干企业、重点产业和产业链延伸等特点和需要，实施学科带头人培养选拔、基层优秀青年专业技术人才培养、高学历科技人才引进培养、人才竞争力提升、高技能人才培养等五大人才工程，以支撑试验区循环经济发展科学的人才需要。大力培养造就创新创业领军人才，特别注重培养既懂科技又懂市场的科技企业家。

（三）加大科技投入，强化科技支撑

1、加大多渠道投入，激发科研动力

（1）政府引导企业参与。政府要加强与盐湖工业股份、西部矿业等省属大型骨干企业协调，引导企业加大科技投入。同时，省州科技部门在安排省级科技专项资金时，向试验区重点倾斜，支持格尔木、德令哈、大柴旦工业园中小企业创业基地、科技创新产业孵化基地等创新创业服务载体建设和运行，推动“大众创业、万众创新”，帮助建成一批低成本、全要素、便利化、开放式的孵化器，成为催生科技型企业和培育科技型企业家的“摇篮”。

（2）争取多种资金支持。省州市加大在资金方面支持试验区先行先试力度，设

立以技术引进为主营业务的专业公司，采取企业独资或政府资金参与、持股等形式，引导形成市场化载体，开展好技术引进推广应用。通过一次性资助、贷款贴息、国有资本参股等方式，鼓励支持企业加快推进科技攻关和成果转化，进一步强化企业技术创新主体地位，助推企业创新创业发展。

（3）设立专项基金。谋划设立10亿元科技创新专项基金，支持重大产业科技研发、关键性技术攻关、高新技术项目建设，为试压区科技创新提供强劲动力。设立1000万元创新奖励资金，对新能源、新材料、生物产业、盐湖化工、煤化工、石油天然气、装备制造等技术领域取得突破的核心技术给予重奖，激发科研工作的积极性和创造性。

2.搭建科研平台，整合技术资源

（1）做强现有科技创新的基础平台。重点建设盐湖资源综合利用技术创新、青藏高原有色金属矿产开发与高效利用产业技术创新等科研平台，并积极推动省部共建国家重点实验室培育基地升级。同时，抓紧组建重点产业技术创新战略联盟，立足企业力量，加强协调沟通，推动镁合金、高倍聚光砷化镓第三代光伏、光热发电及装备制造、枸杞和福牛深加工重点产业联盟成为国家级区域特色科技产业联盟。引导和支持企业设立企业技术中心、重点实验室、产业中试基地等创新平台建设。加快推进广东明阳集团高原型风力发电机研发实验中心、广州汇天成有限公司柴达木泓景新材料研究中心、杰青结构型板材、青元泛镁高强高韧镁合金、华牛枸杞酵素等项目建设，加快形成镁合金、枸杞生化加工、新能源装备制造等一批具有柴达木特色的核心拳头产品。推动格尔木工业园中小企业创业基地、德令哈工业园科技创新型产业孵化基地等创新创业平台建设，建成一批低成本、全要素、便利化、开放式的孵化器，同时完善孵化器行业协会组织，构建从孵化器到产业化基地的完整孵化链条，为科技成果成功孵化搭建可靠平台，努力构建“孵化器+加速器+产业化基地”的孵化模式。

（2）统筹科技类财政资金。重点支持试验区盐湖资源综合利用技术创新、有色金属矿产开发与高效利用产业技术创新等科研平台建设。支持推动高原型低风速风力发电机研发实验中心、太阳能热发电技术开发及产业化验证平台建设，扶持推动高分子新材料研究中心等企业自建研发平台。重点对盐湖轻金属合金、特种高分子材料、低成本高效率光伏发电、镍钴锰三元锂电正极材料、新能源装备及辅材制造、

特色生物生化加工、废弃物综合回收利用等领域的新技术、工程化技术进行市场化引进和应用，带动主导产业科技水平和核心竞争力的整体提升。

（3）发挥企业主体作用。把落实科技税收优惠政策作为激励企业增加研发投入的重要手段，健全与税务部门的工作会商机制，加大企业创新政策落实力度。支持企业研发机构集聚创新资源，建设人才工作站，完善“专求+项目+基地”的服务模式，强化企业研发管理体系和知识产权管理标准化，加强创新方法推广应用等，提升企业研发机构支撑企业转型升级的能力。引导研发类企业专业化、规模化发展，提高公共技术研发服务能力，加强跨行业合作和股权兼并，打造优势互补的产业技术研发集团。加大股权激励力度，鼓励企业以股票期权、限制性股票等方式对科技人员给予股权激励，使企业科技收益与研发人员个人收益有机结合。

四、着力加强风险管理，提高抵御风险能力

工业园区风险管理是园区用以降低风险的消极结果的决策过程,通过风险识别、风险估测、风险评价，选择与优化组合各种风险管理技术，对风险实施有效控制和妥善处理风险所致损失的后果，从而以最小的成本收获最大的安全保障。

（一）加大风险意识培养

风险意识就是对工业园区生产经营风险的前瞻性认识。它是基于对园区发展过程的规律性判断，对于未然过程、结果及其负面影响的预测。

1、加强风险教育。围绕试验区建设与发展，应积极开展不同层次、不同主体的风险教育。青海省政府及省直职能相关部门的领导干部，应侧重对于宏观和中观环境所产生的风险进行分析与研判，以实现对青海省循环经济试验区发展方向、发展政策、发展方式等内容的驾驭与调控。海西州、德令哈市和试验区管委会应侧重加强在产业布局、招商引资等涉及试验区规划与设计等方面可能产生的各种潜在风险展开专题学习。两个层面、两个主体对于试验区风险管理所承担的角色与责任不同，针对性开展试验区建设与发展的风险学习与分析，将重点加强对试验区建设前控，确保科学规避宏观和中观层面风险。

2、发挥智库作用。试验区建设是没有成功经验可以效仿与借鉴，因此在园区建设与发展过程中涉及不同区域、不同环节的风险，政府职能部门并不能全面、详实掌握、控制风险的产生与威胁，此时就需要借助专业智库作用。围绕试验区建设的不同发展阶段所面临的各种问题，政府可以通过政府购买服务方式聘请各种智库对

存在风险进行分析、评估，并通过教学和培训等方式与政府领导干部进行交流，以实现对提升领导干部对风险的认识和监测管理的能力。

3、开展多形式、多内容的培训与学习。围绕试验区循环经济建设与发展存在的风险与危机，开展定期与不定期、案例与实例剖析、专题与专项的风险管理培训与学习，从理论到实践、局部到全面提高领导干部对于循环经济发展中存在风险的知识结构和认识水平。

（二）建立风险管理机制

根据风险具有动态变化特性，构建试验区风险管理机制需注重三个环节，即风险识别、风险控制和风险预案。

1、加强风险识别

根据风险发生源，试验区面临着来自内外部不同风险，主要有政策风险、市场风险和生态风险等。

（1）政策风险防范主要取决于试验区管理者、参与者对国家宏观政策的理解和把握，取决于投资者对市场趋势的正确判断。十八大以来，我国在社会治理、经济转型、供给侧改革和生态文明建设等方面发展思路、政策供给和目标任务均发生了较大的变化。这种变化是基于我国在新的发展阶段和特征科学研判所形成的，这不仅需要青海省涉及循环经济发展的各级政府领导干部而且需要投资柴达木循环经济试验区的企业，准确把握国家、青海省和试验区发展趋势，全面理解对于循环经济发展的新要求、新目标和新任务。如此，才能够实现按照国家、地方新政策框架下的发展要求，从而避免与政策体系冲突而产生的风险。因此，政府应关注试验区重点企业、行业在全国和地区产业布局、产能设计、产业链延伸等涉及产业健康发展的核心问题。

（2）市场风险是指未来市场价格(利率、汇率、股票价格和商品价格)的不确定性对企业实现其既定目标的不利影响。这些市场因素可能直接对企业产生影响，也可能是通过对其竞争者、供应商或者消费者间接对企业产生影响。试验区市场风险主要来源于市场价格、市场需求、市场竞争。因此，企业应侧重关注市场价格、竞争对手措施和需求变化等因素，从而实现对市场信息跟踪管理，不断优化市场对策，提高市场竞争能力。

（3）生态风险是指生态系统及其组分所承受的风险。试验区集聚较大规模的盐

湖化工、煤化工、金属冶金等重工企业，在资源利用和废气废水排放等方面容易造成对生态环境的损害。生态系统的损害将严重破坏循环经济发展的原则、要求和目标，导致试验区循环经济失败。因此，生态风险始终都是试验区政府和企业重点防范的内容。针对试验区具体区情，生态风险重点需要关注大气污染、废水污染、固体废弃物污染和危险废物处理等方面。

2、加强风险控制

风险控制是指风险管理者采取各种措施和方法，消灭或减少风险事件发生的各种可能性，或风险控制者减少风险事件发生时造成的损失。

（1）科学设置关键控制点。试验区需要根据面临的政策风险、市场风险和生态风险等主要风险的发生源、特点和变化趋势等方面设置风险关键控制点。关键控制点需要能及时反映并发现问题、能全面反映并说明绩效水平、应考虑经济使用、应注意平衡。在关键控制点确立后，根据试验区不同风险类别设置控制标准，如时间表准、产生力标准、质量标准等，从而构建的第一层风险控制防御体系。

（2）数据采集与分析。在确立关键控制点和控制标准后，应在风险控制点上进行定期和不定期的信息采集、数据处理、结论分析和归纳总结，形成风险的定量和定性分析结果。在此基础上，对各类风险进行特征、发展阶段、负面影响等方面的梳理和评估，以确保准确掌握风险潜伏和发展状态，为风险管理提供基本数据资料，奠定科学管理的坚实基础。

（3）及时反馈与处理。在风险数据采集和分析后结论要及时反馈到政府和企业这两个管理主体。根据风险性质、信息性质等特征，可将相关信息反馈至青海省、海西州、试验区等不同层面的管理者，以便不同层级的管理制定出台相应的风险管理措施，包括政策调整、项目调整等内容。同时，可将相关信息及时反馈至企业，提升企业获取信息、分析信息的效率和效果，以便做出合理科学的市场反应，实现提高企业抵御风险的能力管理目标。

3、完善风险管理预案

建立好各种风险处理预案，居安而思危、未雨而绸缪是对付“风险” 的最佳管理策略。试验区面临不同风险，无论风险管理主体是政府还是企业，对于风险管理预案的完善情况决定着试验区管理能力大小、水平的高地。因此，加强风险预案的设计和完善是风险管理重要内容。根据风险性质影响大小和紧急程度，可将风险管

理预案分为总体预案、专项预案和部门预案。

（1）制定风险管理总体预案。根据试验区面临的不同风险，出台影响试验区可持续发展的重大风险预警、处理、评估和反馈等规范性文件。风险管理总体预案主要由青海省、海西州政府做出，实行省、州、市和试验区四级管理模式，对于不同性质、不同程度的风险由四级管理不同主体进行具体方案的设计和实施。由于，风险管理总体预案涉及试验区整体安全发展的设计，因此还需实行预案备案制，即下级管理主体将风险管理预案设计后备案至上级管理主体，以确保管理措施的协同性和连续性。

（2）制定风险管理专项风险预案。专项风险管理预案主要是省州市和试验区所属各职能部门为应对某一类型或某几种类型的风险事件而制定的应急预案。此类风险主要涉及如生产安全风险、金融风险、具体政策风险等。不同管理层次面临的专项风险涉及影响范围、作用大小等有所不同，因此虽然是风险专项应急预案但同样实行四级管理，针对同一种或一类风险的不同层级管理执行不同层级管理职能，但是管理体系、具体措施整体性和联动性的，以确保专项风险管理的效率和效果。

（3）试验区管理部门风险预案。部门应急预案是试验区所属各职能部门和直属单位根据总体预案、专项应急预案和部门职责为应对突发、紧急风险事件而制定的预案。这种预案侧重针对试验区突发、意外和紧急事件的处理。此类风险主要涉及生产安全、环境污染、自然灾害等紧急情况，管理主体主要是试验区管委会和企业共同制定风险管理预案，同时要根据风险影响力的大小和范围，及时向上级管理部门汇报与备案。

（三）提升产业抵御风险能力

1、加强品牌建设

在品牌对市场的分割中，20% 的强势品牌占有 80% 的市场份额，这足以说明品牌形象具有极强的号召力及影响力。试验区应以园区整体品牌建设为主导，带动园区内部其他品牌的创建，各品牌之间具有直接或间接的联系，并各自保持相对的独立性，在品牌塑造时应区别对待、分别进行。

（1）科学规划、合理配置。试验区园区品牌打造还应突出科学性、前瞻性、战略性和可持续性的特点，科学的规划、系统的整合、制度的管理和资源的合理配置，特别是凸显不同品牌的战略规划、发展规律及其核心价值的体现。试验区要以品牌

的打造引领园区经济转型，助推园区经济飞跃，逐步将园区打造成为当地品牌、地区品牌、国内品牌乃至国际品牌园区。

（2）处理好单个品牌与整体品牌的关系。试验区的整体品牌的打造应以单个品牌的塑造为基础。试验区整体品牌与园区企业品牌、产业品牌、产品品牌等，在品牌名称、标志物、文化内涵、价值主张等方面各有要求、各有侧重，因而品牌塑造的规律与方法也相差悬殊，应区别对待、逐一进行。个体品牌塑造应注重品牌定位、品牌形象、品牌营销、品牌传播、品牌推广、品牌延伸、品牌保护及品牌评估等内容。试验区整体品牌塑造应注重品牌系整体形象与个体品牌形象的塑造，以便增强园区整体品牌实力，提高园区市场地位和竞争能力。此外，园区品牌系的建设既要理性从事、有所突破，又要饱含商业价值和文化理念，既能彰显各品牌的个性特征，又能使各品牌之间互动、互利、互补。

（3）突出特色和创新理念。塑造试验区品牌必须走特色化道路，突出品牌特色。没有特色，就无法创名牌。从形象角度分析，试验区的品牌特色可以包含经营策略特色、定位特色、文化特色、技术特色、资源特色等特色形象；从产业角度分析，可体现盐湖化工、精细化工、生物技术、新能源材料等特色行业；从产品角度分析，可体现在绿色、环保、有机等生态品牌。同时，无论是塑造试验区品牌形象还是增强品牌实力，都要充分考虑技术创新、产品创新、机制创新和营销创新等因素，其中技术创新是核心要素，包括品牌创新、质量创新、服务创新、广告创新、公关创新、文化定位创新、形象创新等多方面的内容。

2、高效整合产业链，提升集聚倍增效应

（1）延伸传统优势产业链。着力推进盐湖化工、油气化工、煤化工、金属冶炼四大基础原材料产业的融合发展，推动现有产业、产品项目向高附加值、高科技含量方向转变。以金属镁等为基础，通过发展高强高韧镁合金、高性能镁钛合金、镁锂合金等材料，打造镁系轻质金属高端产品基地；以碳酸锂为基础，发展钴酸锂、锰酸锂、镍酸锂、磷酸铁锂、六氟磷锂等锂电池正负极材料、电解液、新型隔膜复合材料，构建锂电池产业基地；以聚氯乙烯、聚丙烯、碳酸二甲酯、甲醇等为基础，发展聚甲醛、ABS 工程塑料、聚四氟乙烯、聚碳酸酯等高性能合成树脂、塑料合金、复合材料；以现有碳酸钾、氧化镁、精制硫酸镁、硼酸为基础，发展氧化镁晶须、硼酸铝晶须、硼铝镁晶须、硫酸镁晶须等无机晶须材料、热塑树脂复合材料；以氢

氧化镁为基础，发展阻燃、脱硫材料；以镍为基础，发展镍基耐热、耐磨、耐蚀合金产业；以金属硅、有机硅等为基础，发展硅橡胶、硅树脂、有机硅改性等高分子硅系列材料产业；以氟化工为基础，利用盐湖副产氯气和硅化工产品，发展聚氟化物、氟硅树脂等产业，为循环经济产业体系的再延伸、再融合、再发展开辟新空间。

（2）建设特色生物产业链。以绿色产业园建设为重点，大力培育深加工龙头企业，带动合作组织针对原料基地产业化经营，在鼓励建立特色农畜产品生产基地的基础上，加快建设柴达木绿色产业园。积极推动上下游产业延伸，建立从原料生产到终端消费的全产业链，促进各环节有效衔接，推广以“种养植（殖）—加工—综合利用”为特征的一体化工农业复合型循环经济发展模式。重点围绕农畜产品精深加工，大力培育有机食品、生物制药等产业，有针对性地开发骨肽、血红蛋白、枸杞黄酮、花青素、甜菜碱、枸杞籽油、枸杞软胶囊、枸杞精华含片等高附加值产品。发展白刺、锁阳、红景天等中藏药药材 GAP 种植，形成规模化的原料供应基地，开发中藏药饮片、超微粉、有效活性提取及新药、特效药产品，带动生物医药产业发展，形成独具高原特色的生物产业集群。

（3）完善新材料产业链。顺应国际、国内新材料产业发展趋势和市场需求，立足试验区特色优势产业发展，抓住基础原材料转型提升的内在要求，加速推进资源深度开发，发展若干具有快速成长性的产业群。具体构架为：以镁、锂、锶等金属以及特种钢材为基础，重点发展主要用于航空航天、船舶、车辆、轨道交通、建筑等领域的镁合金、镁锂合金、模具钢、合金结构钢等产品。以晶体硅、薄膜柔性电池、锂电池正极材料、电解液及隔膜辅助材料、石墨及石墨烯新材料等为重点，发展先进电池材料，重点发展先进薄膜柔性太阳能电池、大功率动力锂离子电池等产品，为全省打造国家级太阳能电池、锂离子电池产业基地奠定坚实基础。以即将形成的煤制烯烃、新型改性添加剂等产业为重点，大力发展聚甲醛、氯化聚氯乙烯、聚苯硫醚、改性塑料、玻璃纤维等新材料产品。以天然石材、太阳能玻璃、隔热材料、硅灰石综合利用等为重点，积极发展太阳能热利用镜板玻璃、新型墙体材料等生态环保材料产品，构建形成以盐湖化工新材料、轻质金属及其合金材料、改性塑料、高性能纤维基复合材料、特种钢材、新型建筑节能材料、环境友好材料和新能源材料等互为支撑、竞相发展的新材料产业链条，将试验区打造成为全国重要的具有柴达木特色、影响力突出、优势明显的新材料产业集聚区。

（4）构建新能源产业链。试验区新能源产业发展以全面融入丝绸之路经济带建设为契机，以规模化发展、产业配套基地建设、高效示范电站建设、电站运营管理等方面为重点，在稳步扩大电站建设规模的基础上，依托镁合金、机械、纯碱、玻璃、塑料等现有或发展中的产业，大力发展配套装备制造产业，适度发展相关投融资、研发设计、运营及管理等产业，着力构建技术研发—装备制造—电站建设—运营维护—电能输送于一体的大规模、全产业链整体协同发展产业集群，努力将试验区新能源发展纳入全省重点专项发展规划，积极争取进入国家新能源建设产业基地名录，把试验区打造成为我国特色鲜明，集研发、制造、建设、运营于一体的新能源协同开发重要战略支点和最具国际影响力的规模化、高效化、清洁化新能源产业及输出基地，以新能源产业一体化发展，打造“一带一路”新兴产业发展“共同体”。

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