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The 18th IPHS Conference

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Daqing Oil Cluster: From petroleum hub to sustainable future

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Since the mid-20th century, the Chinese government in collaboration with various governmental petroleum authorities, first with the Ministry of Petroleum and later with state-owned companies, has transformed the built environment on multiple levels, creating interrelated infrastructures and production sites, installing refineries and petrochemical industries, constructing dedicated oil ports, building workers' housing and educational, health or leisure facilities, effectively creating a palimpsestic petroleumscape.[1] The development of Daqing oil field can be the best representor showing the how the Chinese government shaped the built environment and people's lifestyle. Urban form in Daqing has changed extensively after the Chinese Economic Reform in early-1980s when the national policy shifted to complete and optimize the infrastructure and civic facilities. The recent national policies of the *OBOR Initiative*, which aims at balancing the economic sustainability and environmental preservation and *Revitalizing the Old Industrial Bases* in China have helped develop Daqing at the regional scale, Moreover, these national plans aim at balancing two potentially conflicting objectives: economic development and ecological sustainability. This paper explores in which manner the national policies and local spatial plans of Daqing have transform Daqing from the old oil mining district to the domestic oil hub, then to a sustainable oil cluster.

Keywords: oil, regional planning, urban planning, ecological and economic sustainable,

Introduction

Daqing, the most influential Chinese oil city, is an intriguing case to study in which manner the particular Chinese top-down planning system has influenced the urban transformation of the Chinese oil-based cities. As a city built for the national demands for oil, the built environment and lifestyle in Daqing was intertwined closely with the consecutive political shifts. In early-1960s, the central government highly praised the industrial rural form and low-cost living shelters of Daqing, promoting them as the domestic models for the other cities to learn. Specifically, the Architecture Society of China even organized a national conference to learn the experience of the urban form and architecture of Daqing and promote to the national wide.[2] However, the national planning patterns of 'working first, living second' and 'building extremely low-cost' housing were widely criticised by the national leader in 1980s when the Chinese Economic Reform started. The political propaganda of 'building a beautiful Daqing' is thus a by-product of the politic shift which can be seen as the guideline for the Daqing Municipality and local design bureau to complete the civic infrastructure and facilities. Between 1980-2000, Daqing was slowly transforming from the old oil mining districts to a domestic oil hub. The current OBOR Initiative, which aims to balance two opposing terms of economic development and environmental preservation, is influencing the current policies and plans for Daqing. It has conceived the future development of Daqing into the regional scale, bringing more economic and technological resources to archive the two terms. The national government have issued several economic plans to coordinate the local development such as the *Thirteenth-Five Year Plan for Revitalizing the Old Industrial Bases in Northeast China.*[3] Can the Chinese government meaningfully balance the opposing terms of economic and ecologic sustainability in the oil mining cities?

The paper intends to enrich the current research field of the urban history of Daqing. Hou Li, a prominent Chinese urban historian, has studied the lifestyle and the built environment between 1960s to early 1980s,[4] however, she has not explored the urban changes since 1990s, specifically, after 2004 when the central government issued the national policy of 'scientific development'. It was a national policy for the sustainable development. Moreover, scholars as He Li, a Chinese human geographer, has studied the current urban problems in the post reforming period, however, has not studied the relationship between diverse oil installations.[5]

The paper examines in which degree the national policies and local spatial plans have transformed Daqing Oil Cluster from the old oil mining districts to the domestic oil hub, moreover, in which manner the national policies

and plans have imagined Daqing from the domestic oil hub to the sustainable oil cluster. First, the paper explores how the national spatial strategies shaped the Daqing from the mining districts into a domestic oil hub of multiple oil industries and technology innovations. Second, it examines whether and how the national strategies and local spatial plans have formed a concept of the oil cluster, which brings regional oil infrastructure and various oil-related installations into one agglomerative spatial entity. The last, it investigates how the national and local plans have addressed the notion of ecological sustainability.

Planning processes in the Daqing Oil Hub: Urban centralization and industrial transformation

The national policies, strategies and economic plans, such as *Building a beautiful Daqing* and *Precaution for the industrial transformation*, were national intervene to transform Daqing from the oil mining district to the domestic oil hub after the Chinese Economic Reform. The *Building a beautiful Daqing*,[6] announced by the former Chinese leader Xiaoping Deng in 1978, aimed to complete infrastructure construction, build more civic facilities including cinema, museum, shopping centre etc. to optimize the people everyday life experience. The *Precaution for the industrial transformation,*[7] conceived by the former Chinese President Zemin Jiang in 1990, aimed to establish new industries in Daqing for the coming production decline of the oil industry. Therefore, the urban plans in 1990s were made generally for two consecutive purposes, better living environment and industrial transformation. Together with the local planning bureau and planning bureau of the Heilongjiang Province, Daqing municipality issued 3 comprehensive urban plans of Daqing to transform Daqing from the oil mining districts to a domestic oil hub.

Urban centralization was the main planning principle after early 1980s, which was made by the local design bureau to reflect the national strategy shifts of *Building a beautiful Daqing.* Since 1960, the infrastructure and facilities of Daqing were planned on the principle of 'Working first, Living Second'. The form of the oil industrial facilities, living settlements decentralized in the vast oil field. For instance, the residences were constructed in compact areas alongside the roads to the oil extraction sites. According to the yearbook of the Daqing Planning Bureau, the living condition and decentralized urban and rural form were barriers to attract and host the human resources. Therefore, the second comprehensive urban plan proposed to centralize the compositions and infrastructure in the oil field and highlighted the idea of 'core city'. Specifically, Ranghulu District was planned as the cultural, economic, and administrative centre for the oil field. The idea of 'core city' was a start point of the transitions, and it was updated to a new concept of the 'main district' in the Third Comprehensive Urban Planning in 1996 (Figure 1). The Third Comprehensive Urban Plan conceived the tri-town structure to accelerate the urban centralization for the first time. The tri-town refers to three districts West City District, East City District, and Sartu District respectively.

Figure 1The Third Comprehensive Urban Planning of Daqing (1998-2010), Resource, Daqing Library

The Daqing Oil Field and city started the industrial transformation since early 1990s when the central government issued the developing strategy of Daqing to multiple oil industries and innovative technology industry in mid-1990s. The central government proclaimed the local municipality of Daqing to 'take precautions' of the probable

oil decline, though Daqing still produced a large amount of oil in 1990s. The idea of reforming the local industries soon reflected in the comprehensive urban planning of Daqing. The tri-town system, which has been the major spatial structure to date, has defined the main function of each districts. Among the three districts, East District has been conceived to host the technology innovation zone, while West City District has been planned as the site to facilitate multiple oil industries, Sartu District was the cultural, administrative, and commercial centre. Daqing City started construction of Daqing Hi-Tech Industrial Development Zone on April 10, 1992 which was approved as a National Hi-tech Industrial Development Zone on November 9th the same year. The overall planning area of the development area is 30.65 square kilometres, which consists of the main area and three chemical parks of Hongwei, Xinghua and Linyuan. After several years of development and construction, the development zone has now developed an area of 6.8 square kilometres, a total construction area of 1.68 million square meters, a total of 450 units.

However, the transformation from the oil mining districts to the domestic oil hubs was a slow progress to the particular local planning system that both the municipality and state-owned oil companies were both institutions for the urban development. Before the Chinese Economic Reform, the Ministry of the Petroleum Industry was in charge of the planning processes between early-1960 to later 1970s. Though there was not a comprehensive urban planning in this period, the construction plans were easy to make and build due to the national strategy of 'industry first, living second', which refers to a decentralized semi-urban semi-rural form. The Daqing Municipality, established in 1980 in light of the Chinese Economic Reform, thus far, has been the local institution to make urban plans. However, the municipality can only plan for the infrastructures and facilities outside the oil fields while the Petroleum Administrative Bureau of Daqing was responsible for the planning in the oil fields. They were individual institutions which affiliated to different higher administrators. The Daqing municipality was under the supervision of the Heilongjiang Provincial government and the Petroleum Administrative Bureau was under the supervision of the state-owned PetroChina Company. According to the locals, there has been a gap between these two in the planning processes. For instance, the local municipality and local design bureau conceive the infrastructure and facilities in the comprehensive plans of Daqing, however, the petroleum administrative bureau can postpone or modify the plan when they implement the projects in the area under their control, as an example the West City District.

The local municipality and local urban planning bureau, thus far, have put lots of efforts to coordinate the urban development in the west city district (administrated by the petroleum office). First, the local municipality and local planning bureau tried to highlight their institutional legacy in the planning processes. In 1996, the local municipality organized numerous propaganda which highlighted the importance of the municipality in order to coordinate the construction in the whole city. According to the 1996 yearbook of Daqing, such action was relatively successful. Second, together with the petroleum administration bureau, the Daqing municipality revised the Master Plan of the West City District in 2005. Specifically, it proposed the road adjustment planning, private science and technological centre, and transformation control planning of the West Passenger Station.

Daqing has been urging to balance the economic and ecological development since early-2000. As a double-edged industry, the oil industry is one hand sustaining the domestic economic growth, at the other, it is one of the major pollutions to the environment. The traditional oil field and the city have been facing the problem of environmental degradation for decades since early 2000s. After 50 years intensive oil extraction, the environment problem is severe. Both the national strategies and local spatial ignored the importance of the ecological sustainability until early 2000. The first, second, and third comprehensive urban plans of Daqing did not address the environmental issue as planning priority. The plans focused more on the economic development and industry reforming.

Daqing Oil Cluster: Economic sustainability and environmental preservation

The current national policies, strategies, and plans considers the future development of Daqing into the regional scale, such as the *Plan for Revitalizing the Old Industrial Bases in Northeast China* issued by the National Development and Reforming Commission in 2014,[8] which aims to reactive the industries in the northeast China, and the *One Belt One Road (OBOR) Initiative*[9] proclaimed by the national government since 2013, which aims to invest some of 1 trillion dollars to build a new Silk Road of trade routines,[10] specifically, the construction of railways, pipelines, oil storages, and massive infrastructure, moreover a joint cooperation of the green technology development. As one node industrial city involved in these national strategies, the future development of Daqing has been tightening with the national developing strategies of regional scale. Together with the national development and Reform Commission and Ministry of Housing and Urban-Rural Development, provincial governments of Jilin and Heilongjiang issued the Plan of Ha Chang City Group Development in 2015 (Figure 2).[11] It aims to archive the infrastructure interconnection, industrial coordinated development, co-construction of the

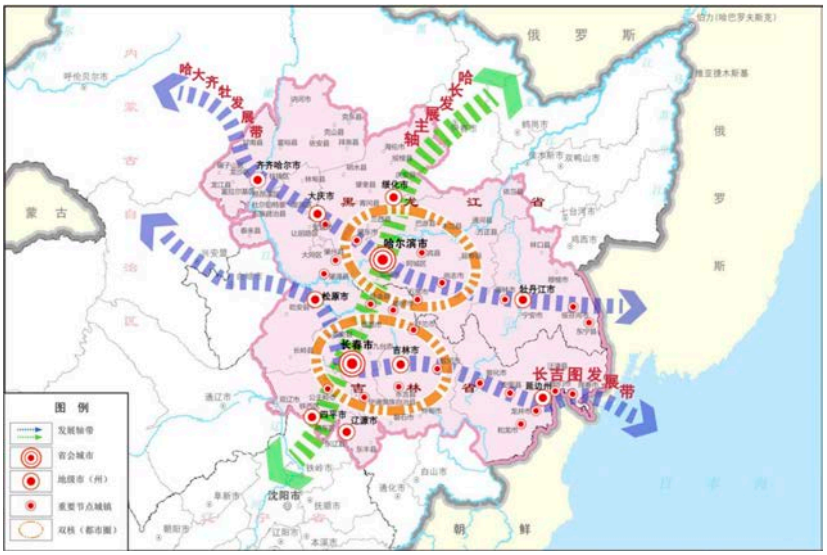

Figure 2 HaChang City Group Pattern, Resource, Plan of Ha Chang City Group Development

environment, and explore new urban forms for the main grain-producing areas. Daqing has been conceived as the core city in the plan which facilitates three industrial bases, petroleum/petrochemical industrial bases, equipment manufactory base, and the new material industrial base. The regional scale goes beyond the traditional provincial and local administrative divisions, can help us to understand the circulations of the oil flow have redrawn the urban form, architectural composition, and landscape. It is the appropriate scale for the research of oil industry development since the infrastructure of the Chinese oil hub has been planned and implemented to serve a region. Meanwhile, it is a potential tool to look at the manner which the national government has tried efforts to balance the two opposing terms of economic sustainability and environmental preservation, studying in which manner and to what extend the national government, local municipality, and local planning bureau have addressed the notions of economic and ecological sustainability, though the national policies and strategies have not spelled out the specific concept of the oil cluster.

Figure 3 Planning of China-Europe Railway Route, Resource, The Plan for China-Europe Railway Express

The paper conceives the regional spatial concept of the Daqing Oil Cluster, which includes the Daqing Oil field and the Daqing city, the oil-related infrastructure and facilities in the Northeast China, as the spatial reality carrying the national terms of balancing the economic sustainability and environmental persevation. The concept of the Daqing Oil Cluster is based on Carola Hein's concept of *palimpsestic Petroleumscape*,[12] which brings not only the built environment and architecture, but the representations and social meanings to the research of the oil as well. Therefore, the oil cluster brings all the oil-related installations into one specific spatial concept which includes the oil exploiting and extracting installations, the national strategic oil storages and the oil dedicated port as well. In the northeast China, the port of Dalian can be seen as a remote, but important part of the Daqing oil cluster. The port Dalian has long been the portal to the hinterlands in the northeast China. It is seen as the key shipping and commercial centre in northeast China in the OBOR Initiative. The infrastructure constructions carried by the OBOR Initiative are mutual advantages for both Daqing and Dalian. In the OBOR Initiative, Dalian port is

the start point of the China-Mongolia-Russia-EU Economic Corridor while Daqing is one of the industrial nodes alongside the plan for China-Europe Railway Express, issued by the national development and reform commission and China Railway Corporation in 2016 (Figure 3).[13] And the oil products and Volvo cars produced in Daqing have already entered the market through the railway.[14] Meanwhile, as one of the largest oil importing port in the world, the importing oil from Dalian port can also connect to the refining factory in Daqing. Second, Dalian is a potential example to share the experience of reforming in economy and industrial for Daqing. As a national strategical port city, Dalian has been in the frontline of reforming and urban planning to facilitate the foreign investors. However, Daqing is relative conservative comparing to Dalian, as a traditional oil strategic city with high political concern. It has been facing the threaten of oil decline and environmental pollution for decade, moreover, is at the point of balancing the objectives of economy and environment.

The construction of the oil industry is still one of the major goals of industries constructions in the Daqing Oil Cluster. *The Plan of Ha Long City Group Development* has proposed to build an important national reserve base for oil, natural gas, and coal. It aims to enhance the operation management and dispatch adjustment of oil and gas, moreover, improve the cross-regional energy security mechanism. Specifically, it has proposed numerous pipeline constructions including the Daqing-Jinxi crude oil pipeline (Daqing-Tieling section), Sino-Russian crude oil pipeline second-line project and the Sino-Russian-East natural gas pipeline, and the Dalian LNG and Shaan-Jing-Shen-Chang pipeline connection project.[15] Moreover, it proposes to accelerate the construction of Daqing's 10-million-ton oil refining and million-ton ethylene projects, develop ethylene and downstream products in depth, focus on the development of synthetic resins, synthetic rubber, synthetic fibbers, and organic chemical materials. Though the oil industrial still acts as the leading industry, the *Plan of Ha Long City Group Development* has proposed various programs of industrial reforming, highlighting the importance of the economic sustainability. First, it proposes to build cooperation of equipment manufacturing in five cities, Harbin, Daqing, Qiqihar, Changchun, and Siping respectively. The manufacturing including CNC machine tools, agricultural machinery equipment, petrochemical equipment, photovoltaic and new energy equipment. Second, it has conceived Daqing as production centre of the spare parts of vehicle, moreover, a new developing centre of new energy vehicles and plug-in hybrid vehicles.

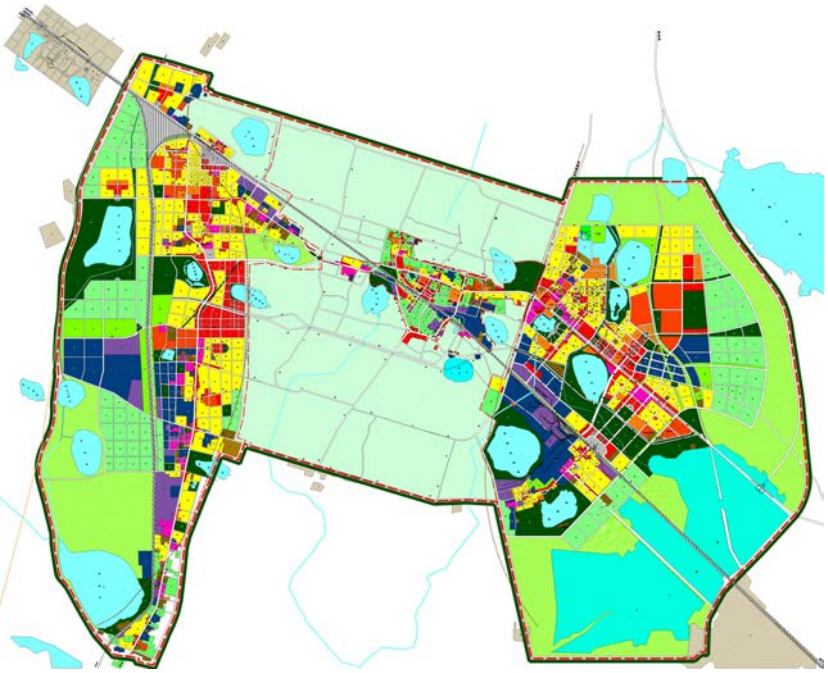

Figure 4 The Forth Comprehensive Urban Planning of Daqing (2002-2020), Resource, Daqing Construction Bureau

To balance the economic development, the fourth and fifth comprehensive urban plans in Daqing has set priorities for environmental sustainability. The national economic plan of *the eleventh five-year plan (2006-2010)*, which highlighted the sustainable development in various aspects including economy and ecology, was the first time addressing the importance of the environment sustainability. The local spatial plans soon reflected to the national strategies that the Forth Comprehensive Urban Planning of Daqing (2002-2020) highlighted the environmental preservation as one of the planning principles in for the first time (Figure 4). Comparing to the third plan, the forth

plan was as a distinct step forward of trying efforts to archive ecological sustainability. By the end of 2004, 20 ecological parks and1400 hectares of urban green land were implemented in the oil field. Moreover, the sewage treatment program in numerous lakes were completed which solved the traditional problems of ponding. The environmental protection and ecological sustainability became the major social concern in the *Twelfth Five-Year Plan for urban and Rural construction of Daqing (2011-2015)*.[16] It conceived more detailed plans for each district in Daqing, comparing to the eleventh five-year plan. *The Twelfth Five-Year Plan for the Construction of Ecological Civilization in Daqing* proposed three aspects, identifying the ecological zone, developing the ecological industry, developing low-carbon industries and clean energy production base. Specifically, identifying the ecological zone refers to protecting wetland, nature reserves, and forest parks, building agricultural and animal husbandry production and green food base. Developing the ecological industry refers to developing ecological industry and green petroleum and petrochemical base. The last, developing low-carbon industries and clean energy production base refers to develop industries of the wind energy, geothermal energy, and biomass energy. According to the local condition, these three energies resources are substantial in Daqing.

Conclusion

Examining the spatial impacts of the national strategies, the paper first examines the planning ideas of the domestic oil hub between 1980s-2000 in which to assess the implementation of the urban plans in Daqing. It argues that the transformation from the oil mining district was slow due to the two institutions in the planning processes. Moreover, the plans between 1980s-2000 only focused on economic development ignoring the importance of the environmental preservation in the plans. Second, the paper posits the concept of the regional oil cluster as a space in which to assess the implementation of the ongoing OBOR Initiative. It argues that the Daqing Oil Cluster is the appropriate planning scale for the national policies and strategies to archive the economic and environmental sustainability. At last, the environment issue will be the major concern of the future planning. Though the local municipalities and planning bureau have tried efforts to improve the ecology system in consecutive plans, the ecological sustainability is still one of the crucial problem in Daqing due to the oil industry. Lots of human resources and financial support are necessary parts to implement the plans. Thus, whether and to what extend the local municipality have implemented these plans will be an intriguing question for the further research.

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Figure 1. Daqing Library

Figure 2. National Development and Reform Commission

Figure 3. National Development and Reform Commission

Figure 3. Daqing Planning Bureau

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