



**Policy Instruments for Chinese Sustainable Future:
Environmental Policy Integration and
Strategic Environmental Assessment
for the Energy and Transport Sectors**

An Action under the
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Energy Plan of Xichang City
An Outline of Strategic Environmental
Assessment

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Project outline

Policy Instruments for Chinese Sustainable Future focuses on the integration of the environment into transport and energy planning in China, both at the policy level and in terms of concrete measures for the two administrative levels of provinces and municipalities. The implementation of this project will help to build transportation and energy-use systems that are environmentally sound and capable of achieving sustainable development in China. As part of the Asia Pro Eco II Programme the project contributes to the programme's main themes for China: energy savings, improved air quality and reduced emissions of GHGs.

At the heart of this project are two closely related mechanisms that are central to the EU efforts to promote sustainability: Environmental Policy Integration (EPI) and Strategic Environmental Assessment (SEA).

The action targets the inadequate reflection on environmental policy objectives and the weakness of the environment as a cross-sectoral priority and the need for information and knowledge of technical/practical solutions that can lead to immediate improvements in the development of sectoral plans. The 30 months Action consists of four work packages and multiple activities.

For further information please look at:

http://www.epi-in-china.com/project_information/summary.html

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1 General Principles

Purpose and Function of the Outline

(1) Make a preliminary investigation on the status-quo of natural environment and social environment as well as planning situation of local area.

(2) Based on the investigation above, make a preliminary analysis of the planning characteristics and environmental status-quo so as to identify the objectives and other related assessment indicator system, and specify the contents, methods, key points and schedule of environmental assessment which will be the basis for conducting environmental assessment.

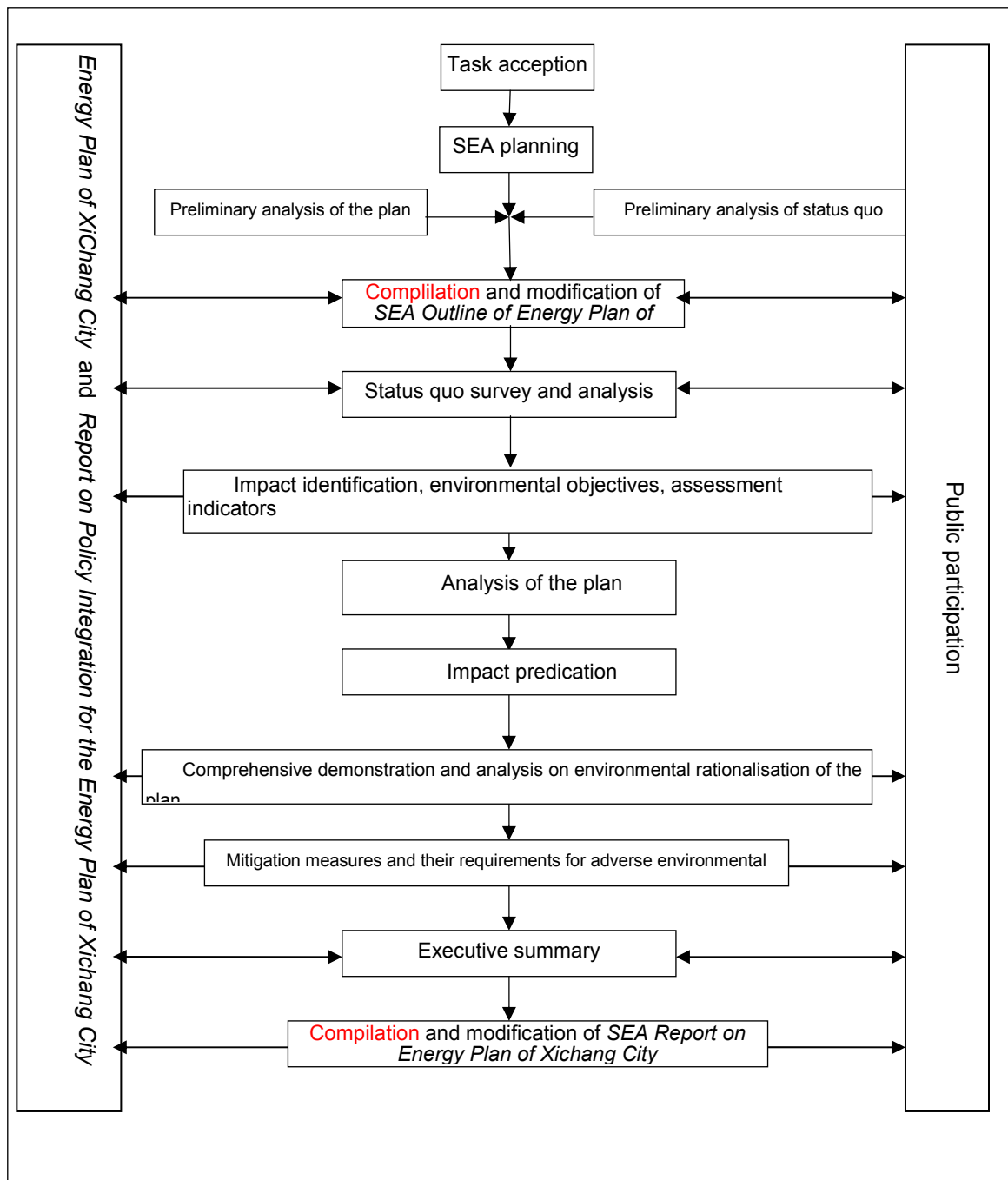
1.2 Outline *Compilation* and Its Institutional Division

Table 1-1 Institutional Division for Complying the SEA Outline of Energy Plan of Xichang City

No	Theme	Actor	Person in charge	Position/ Title	Department / organization
1	General principles				
2	Introduction to the Energy Plan				
3	Windows of opportunity of the Energy Plan				
4	Actors for the Energy Plan and SEA				
5	Environmental baseline information				
6	Environmental and sustainability issues				
7	Environmental and sustainability objectives and targets				
8	Scope of the SEA				

1.3 SEA Process

Below framework of the SEA process is drafted according to the requirement of *Technical Guidance on Planning Environmental Impact Assessment (tentative)*.



Flow Chart of SEA Process for the Energy Plan of Xichang City

2 *Brief Introduction to The Energy Plan

2.1 List of Relevant Policies, Procedures, Strategies and Initiatives That Are Directly or Indirectly Relevant to The Proposed Plan

See link with Questionnaire – section 3A

Source (e.g. Author/ Department)	Date	Level I, N, P, M*	Title
The State Development and	2004	N	<i>The Medium and Long-term Special Energy-saving Planning</i>

Reform Commission			
The State Development and Reform Commission	2007	N	<i>The 11th Five-Year Plan for Energy Development</i>
State Environmental Protection Administration (SEPA)	2006	N	<i>The 11th Five-Year Plan for National Eco-protection</i>
Xiachang Construction Bureau	2003	M	<i>Master Plan of Xichang City</i>
State Council	2003	N	<i>Decision on Strengthening Energy-saving Work by State Council</i>
SEPA	2007	N	<i>Suggestion on Further Strengthening Eco-protection Work</i>
SEPA	2003	N	<i>Suggestions on Strengthening Rural Eco-environmental Protection Work</i>
People's Government of Liangshan Prefecture	2006	M	<i>The 11th Five-year Plan of the National Economy and Social Development in Liangshan Yi Autonomous Prefecture</i>
People's Government of Liangshan Prefecture	2006	M	<i>The Outline for 11th Five-year Economic and Social Development Plan of Xichang City</i>

*= Governance level of each source:

- I – International
- N – National
- P – Provincial
- M – Municipal, local

2.2 List of Relevant Legislation That Is Directly or Indirectly Relevant to The Proposed Plan

See link with Questionnaire – section 3A

Source (e.g. Author/ Department)	Date	Level I, N, P, M*	Title
Standing Committee of	1998	N	<i>Energy Conservation</i>

NPC			<i>Law of PRC</i>
Standing Committee of NPC	2002	N	<i>Cleaner Production Promotion Law of PRC</i>
People's Government of Sichuan Province	2006	P	<i>Decision on Accelerating Rural Biogas Development</i>
Standing Committee of NPC	2006	M	<i>Renewable Energy Law of PRC</i>
Standing Committee of NPC	1989	M	<i>Environmental Protection Law of PRC</i>
Standing Committee of NPC	1996	M	<i>Electricity Law of PRC</i>
Ministry of Agriculture	2003	M	<i>Management Measures for Rural Biogas Construction Bonds Project (Tentative)</i>

*= Governance level of each source:

I – International

N – National

P – Provincial

M – Municipal, local

2.3 Key Findings from Institutional and Policy Context Analysis

This table will effectively summarise the range of issues and / or objectives that are of relevance to the proposed energy plan.

See link with Questionnaire – section 3A

Theme*	Description

* = Organise the key findings from the analysis of relevant plans and legislation according to the main themes of the proposed energy plan for Xichang, for e.g.:

- Energy sources
- Energy demand reduction
- Energy saving
- Air quality improvement
- Overall government priorities and principles for environmental protection and sustainability (e.g. from the 11th Five-year Plan)
- Minorities' use of energy
- Etc.

2.4 Objectives of The Proposed Plan

Describe the proposed plan objectives and relate these to the findings abovementioned before expressing them in a table format.

See link with Questionnaire-section 3A

List of Objectives of The Proposed Plan

Theme*	Description	Detail of sources of such objective/target (eg. expert opinion, policy, law etc.)
Energy saving	Energy-saving buildings, municipal energy saving	<i>Energy-saving Design Standard for Public Buildings, Suggestions on Strengthening Urban Lighting Management to Promote the Work of</i>

		<i>Power Conservation, etc.</i>
Improve energy efficiency	Advocate cleaner production; Improve technologies.	<i>Cleaner Production Promotion Law of PRC</i>
Enhance the use of renewable energy	Enhance the use of solar energy and biomass energy	<i>Renewable Energy Law of PRC, Decision on Accelerating Rural Biogas Development, CFFNo.7(2006) issued by Sichuan Government; Practical Technical Specification on Civil Solar Water Heating System, etc.</i>
Strengthen eco-protection	Strengthen the protection of rural environment and atmospheric environment	<i>The 11th Five-year Plan for National Eco-protection, Suggestions on Strengthening Rural Environmental Protection, HFNo.77(2007) issued by SEPA, Suggestions on Further Strengthening Eco-protection Work, HFNo.37(2007) issued by SEPA, Suggestions on Strengthening Rural eco-environmental Protection Work, etc.</i>
Enhance the water resource exploration	Enhance the exploration of hydro-power source	<i>Electricity Law of PRC</i>

Table 1 : Supply Side

Primary energy	Production	Import(+)/Export(-)	Available
Coal			
Oil			
Gas			
Wood, Biomass			
Hydro power	/	/	The total quantity of water resource of the city is 5.401×10^9 m ³ /a
Solar energy	/	/	5.71×10^5 J/cm ²

For instance, supply side figures should distinguish between the various technologies within each source, while demand side figures should distinguish between the various end use technologies within each end use sector, etc.

Table 2 Demand Side (tce)

Final energy demand		Residential		Industry	Transport	Services (urban only)
		Urban	Rural			
Thermal	Coal	7996 ton	30 300 ton	67 000 ton	/	1008 ton
	Wood, biomass	/	96 600ton	/	/	/
	Oil	2839 ton	/	2097 ton	561 ton	9.74 ton
	Gas	/	/	/	/	/
	Solar	11 000 ton	2181 ton	/	/	/
	Biogas	/	9838 ton	/	/	/
	Coke	/	/	635 000 ton	/	/
Electricity	Coal	/	/	/	/	/
	Oil	/	/	/	/	/
	Gas	/	/	/	/	/
	Hydro	29 200 ton	20 000 ton	348 000 ton	/	N/A
	Solar	/	/	/	/	/

Economic Elements of Xichang city

Major Element (max 10)	Energy Trend (in quantity or quality)	Major suggestions to the energy department of Xichang city
GDP increase	Energy consumption increase	
GDP increase per capita	Energy consumption increase	
Percentage change for 3 major industries		
Industrial investment increase	Energy consumption increase	
The increase of added value of full aperture industry	Energy consumption increase	
The total retail sales of consumer goods increased	Energy consumption increase	
Total investments increase in social assets	Energy consumption increase	
Farmer income increase	Energy consumption increase	

Social Elements of Xichang City

Major social element (max 10)	Trend (in quantity or quality)	Brief review on its effect to the energy department in the future
Population increase	Energy consumption increase	??
Urbanization and enlargement of city proper	Energy consumption increase	??
Living standard improving both in urban and rural areas	Energy consumption increase	??

4 Actors in Planning and SEA

4.1 * Actors of Energy Plan *Compilation*

4.2 * Actors of SEA *Compilation*

Table 4-1 Actors and Reseponsibility for SEA of Energy Plan of Xichang City

Theme	Actor	Person in charge	Position/title	Department
1 General Principles				
2 Profile and Analysis of the Proposed Plan				
3 Environmental Setting				
4 Environmental Impact Prediction Assessment				
5 Environmental Feasible Schemes and Mitigation Measures				
6 Monitoring and Follow-up Assessment plan				
7 Environment investment budget				
8 Public Participation				
9 Difficulties and Uncertainties				
10 Executive Summary				

4.3 Public Participation

4.3.1 Participants

In accordance with the principle of universality and pertinency, this plan is targeted at the extensive public. The major participants are those whose interests will probably affected, as well as environment protection professionals, officers of local government, and people concerned to the energy plan.

Local government and its related departments are acting as the key point.

4.3.2 Methodology

- (1) Hold discussion meetings on the outline and draft report of SEA to seek views from all sides.
- (2) Hold consultation meetings to seek for suggestions or advices from relevant experts.
- (3) Publish notices and feedback pages on the internet.

4.3.3 Actions to The Findings

- (1) According to public discussion and expert advice or recommendation, make a detailed assessment to the public and expert's key concerns.
- (2) Consult with relevant experts in terms of rationalized proposals from the public, and try best to adopt those proposals or suggestions in consider of prioritization of economy and technology,.
- (3) Make best efforts in communicating the oppositions from public by analysis and feedback. Figure out the reasons and reasonability for those oppositions, and take measures to tackle problems or mitigate adverse impacts.

4.3.4 * Contact

Table 4-2 Public Participation Contact List for SEA of Energy Plan of Xichang City

Phase	Pulic participation approach	Contact		
		Name	Telephone	Email
Outline	Public notice on the internet			
	Discussion meetings			
	Consultation meetings			
Report	Discussion meeting on the draft report			
	Publish the draft report on the internet			
	Consultation meeting on the report			

5 Environmental Baseline Information

5.1 *Environmental Setting*

5.1.1 Natural Environment

5.1.1.1 Geographical location

Xichang city is located in the southwest of Sichuan province, in the middle of Liangshan Yi Autonomous Prefecture and the central section of Anning river valley as well. It is at the eastern longitude between 101°46' to 102°25', and the northern latitude from 27°32' to 28°10'. The city has an area of 2655 km², 70 km from north to south and 63 km from west to east.

5.1.1.2 Topography and landform

Xichang city is located in the Xichang Basin, being on the coast of Qionghai Lake and the bank of An'ning River. Topographically, the ground of the city is slopes down from north to south, most part of it are plateau and mid-mountains. In the area, the altitude difference of ridge to valley are high, most part of the area are at the elevation above 1500 m. It varies from the lowest 1160 m (at Tungzilin, Qiaodi township in Yalong River deep valley) to the highest 4359 m in Luoji Mountain. Plateau makes up 80% of the total terrain, and other 20% are plains of rift trough or basins among mountains, which form the landform of "eighty percent of mountains and twenty percent of fields, and in the fields, "eighty percent of land and twenty percent of waters".

5.1.1.3 Geological environment

Nearly all the urban area is covered by loose layer of the quaternary period, while some hills are covered by the bedrock of the quaternary period. These stratum can be classified into alluvial layer, diluvial layer, residual layer, as well as diluvial layer of drift bed, and diluvial alluvial layer, and so on.

Diluvial layer is distributed around Qionghai Lake, which consists of gravel, sand, light mild clay, and mild clay. The residual layer is of physical weathering residues, distributing in some low mountains or hills around the city.

The component of stratum and the geological structure of Xichang city are very complicated. Now there are three ruptures, that is, Anning river rupture (a north – south orientation with an inclination of 60 to 80 degree), Zemuhe rupture (inclination 60 to 75 degree), and Xichang rupture (a west-east orientation). The basic earthquake intensity is 9.

5.1.1.4 Meteorology

Xichang city is in the subtropics and half arid monsoon climatic region. Therefore, it is warm in winter and cool in summer. The temperature during the year is slightly different, however, the difference in temperature between the day and night are larger, with distinctive difference of dry season and damp season. Also, the climate there is complex and diversified, verticle mountain climate is obvious.

Although the rainfall of Xichang city is abundant with 1013 mm per year averagely, and the annual evaporation is 1961.8 mm. The rainfall distribution is extremely uneven by seasons. In summer and autumn (the rainy seasons from May to October), it accounts for 93% of the totally rainfall, whiloe the dry seasons (from November to April) only makes up about 7%. The prevailing wind direction is from south or north.

5.1.1.5 Hydrology

All the rivers in Xichang belong to Jinsha River system. Anning River and the boundary river, Yalong River are the two main rivers. Both of them are south-north trend. The streams in both banks distribute asymmetrically like feathers. There is a downfaulted lake, Qionghai Lake in the southeast of the city. The groundwater in the valley of An'ning River and around the lake basin is adequate.

(2) Surface water

Anning River is the first-order tributary of Yalong River or the second-order tributary of Jinsha River. It flows through the area with a total length of 83 km. The river basin area is 11150 km² with an average annual runoff amount of 23 billion m³, of which Xichang city takes up 35.6 billion m³. There are 36 tributaries alongside the banks, 20 of them are on the east bank of the river, and another 16 are on the west. Six of them, each has a catchmnet area of over 100 km², they are Guanba River, Donghe River, Xihe River, Reshuiher River, Xixi River and Tuolang River.

Yalong River is the biggest river along the west Xichang, which comes from Mianning County in the north, then flows through valleys of Maoniu Mountain and Mopan Mountain, and finnaly to the boundary of Dechang County. It transits approximately 90 km in the city, and it belongs to deep cutting river section. Along the slopes of Maoniu Mountain and Mopan Mountain, 170 creeks become 15 streams, among which Daqiao River and Xialiu River have a catchmnet area over 100 km². The total catchmnet area in the city is 802.9km², and the annual total precipitation is 0.9 billion m³ with a rainfall of 1121 mm and a runoff amount of 0.521 m³.

Qionghai Lake is 5km southeast from the urban area of Xichang. It's a semi-closed plateau freshwater lake, and it has an area of 31 km² (25 km² in dry season). The average depth of the water is 14 m and the water storage is 0.32 billion m³. The main source of the water is from the streams around the lake, such as Ezhang River and Guanba River, with a catchment area of more than 302 km² and an annual runoff amount of 0.12 billion m³. Qionghai is drained into Anning River by Haihe River.

(2) Groundwater

In the urban area of Xichang, the groundwater is mainly fissure water of bedrock in both sides of the valley and the mountains around the basin, and it is also phreatic water and confined pore water from the alluvial fan deposit.

5.1.1.6 Soils

Because of obvious vertical difference of biological climate in the mountainous area of Xichang, the soil distributes in belt-shape regularly according to the change of elevation. Meanwhile, since the soil rock is complicated, the distribution of soil is restricted by the geological structure. The soil is vertically different on Maoniu Mountain, Mopan Mountain and Luoji Mountain in succession from the top to foot: mountain red soil, mountain brown-yellow soil, brown soil and sub-alpine meadow soil.

5.1.1.7 Soil erosion

Xichang lies in southwest of Sichuan Province, upper and middle reaches of the Changjiang River. As located in mountainous area, the proportion of farmland is large on the slopes of high gradient as well as the long-term excessive cultivation and deforestation, making ecological functions of forest-grass reduced and serious soil erosion occurred. Soil erosion area of the city is 1109.57 km², 41.79% of the total area.

5.1.1.8 Plants

The flora of Xichang city is in the pan-plants district, it is also a flora of Asia in China and Himalayas Mountain, being the most abundant alpine plateau subtropical flora. The division of vegetation in the area belongs to seasonal subtropical evergreen broad-leaved forest of wide valley of Xichang's transverse mountain, sub-area of China's Himalaya Mountain. Most of them belong to Yunan pine **state of the vegetation province** in the wide cutting valley of upper and mid reaches of Anning River, while Luoji Mountain area belongs to cold alpine spruce forest **state**.

Vegetation types: sub-tropical mountain evergreen coniferous forest; sub-tropical evergreen coniferous forest; sub-tropical mountain evergreen broad-leaved forest; sub-tropical alpine and sub-alpine bush forest; rare sub-tropical bush and grassland; mountain meadow.

Wild cash plants, totally 2000 species, 532 generas, 233 families, distribute in the forest of which more than 30 species are rare flora under the first-class national protection, such as Panzhihua cycads, and the Xikang magnolia flowers.

5.1.1.9 Animals

Large number of deforestation caused the destruction of the ecological balance, thus wildlife species and the number have been reduced, much fewer than before.

(1) High mountains and mountain animals: In the high mountain area, animals are mainly bears, musk deer, deer, antelope, blue sheep, monkeys, brown eared

pheasants, red ventral horn chickens. Mountain animals are eagles, harriers, magpies, crows, snakes and all kinds of insects.

(2) Rare wild animals: Animals under the second-class national protection are little pandas, red ventral horn chickens, and brown eared pheasants, and the third-class national protection animals are blood chickens, pangolins and red ventral chickens.

5.1.2 Existing Social Environment

Xichang City is the capital or resident of Liangshan Yi Autonomous Prefecture and municipal government, It is the political, economic and cultural center, and one of the important intersections of Sichuan and Yunnan provinces for material collection and distribution. Xichang is a provincial historical and cultural city where the world famous Xichang space launching site located.

5.1.2.1 *Population, ethnic groups and administrative regionalization

In 2005, the territorial range of authority in Xichang City include 37 town (township), 6 urban communities, 227 villages, 1749 groups of villagers. In the city proper, 6 communities, and 13 residents' committees. The total population reached 584,300 by the end of 2005.

5.1.2.2 Education

An educational system of nine-year compulsory education in Xichang City has been formed, including kindergarten, primary school, junior high school, high school, vocational high school, adult education, staff education as the mainstay of better teaching system.

5.1.2.3 Transportation

Transport facilities in Xichang City have been greatly improved in recent years, but still relatively weak, and the lag in traffic environment to a certain extent, constraining the development of economy, especially the tourism, trade and tertiary industry.

5.1.2.4 Tourism

Xichang is very active in the creation of the excellent tourism city, number of tourists and tourism revenues have increased substantially by creating "sunshine" tourism. It received 1.33 million domestic tourists in 2005, and the total tourism revenue came out 820 million yuan.

5.1.3 Resources

5.1.3.1 Soil resource

Because of locating in mountainous area, land resources in Xichang is relatively scarce, especially farmland resources. The city's existing area of cultivated land is 373 600 mu or some 24900 ha (1 ha = 15 mu), and with a high proportion of sloping cultivated land. Due to the long-term and excessive cultivation and deforestation, the land resources was destroyed, the reserve resources became scarcer.

5.1.3.2 Water resource

For many yaers, Xichang City has an average water resource is 1.42 billion m³, of which 1.32 billion m³ of surface runoff and 100 million m³ of groundwater. Besides 4.08 billion m³ of average water transit through the city. The total annual quantity of water resource of the city is 5.401 billion m³ (including water entering the area, but excluding transiting water of Yalong River). Totally, 2.854 billion m³ of precipitation or rainfall, 1.321 billion m³ of runoff, and 1 billion m³ of groundwater. The precipitation concentrates through June to September, accounting for 90% of annual precipitation, while it takes up only 10% from October to next May, so seasonal water is in shortage.

5.1.3.3 Agriculture resource

Anning river valley is an open plain and it is the second largest plain after the Chengdu Plain in Sichuan that was the famous "South Sichuan granary." Owing to good solar thermal conditions and biological resources to the development of agriculture combined with "excellent, unique, rare, early" advantages, Xichang has become an ideal district of developing high-efficiency agriculture and bio-technology products.

5.1.3.4 Tourism resources

(1) Natural scenery resource

Because of the unique natural and climatic conditions, various landscape has been created here: pine trees and cypress trees in Lu Shan, strong wind in Anning valley, the boundless expanse of the Qionghai Lake and the bright moon night. Pine, wind, water and the moon all vividly reflect the features of the natural landscape of Xichang.

(2) Humanistic and cultural resources

Xichang is one of the ancient cities with a history of 2100 plus years. It was approved as a provincial historical and cultural city by Sichuan people's provincial government in 1992.

Besides, Xichang is a multi-ethnic region where the Han, Yi, Hui, Tibetan and other ethnic groups live in.

(3) Exploitation of tourism resources

Xichang's beautiful natural scenery and the ancient mystery of humanistic and cultural landscapes attract foreign tourists both from home and abroad. The diverse types of tourism resources make it one of the eight Scenic Areas in Sichuan, and it has been listed into the national top 10 tourist routes, and very broad prospects for development.

5.1.3.5 Mineral resources

Xichang locates in Panxi rift zone of mineralization, a variety of mineral resources widely distributes there. Ferrous metals, nonferrous metals, non-metallic minerals and rare metals are disposed in the city area.

More than 10 kinds of mineral resources: vanadium titan-magnetite, copper, lead, tantalum, niobium, nickel, cobalt, gold, etc.

Non-mineral resources: marble, granite, solvent limestone, muscovite, asbestos, lignite, anthracite, dolomite, clay, etc.

5.2 * Performance of Baseline Data

Table 5-1 Performance of Baseline Data

Theme	Assessment indicator	Basic value of indicator		
Resource utilization	Water consumption per unit GDP(t/10 000 yuan)	Xichang statistical bureau		
	Recycling efficiency of industrial water (%)	Xichang statistical bureau		
	Changes of land utilization	Xichang statistical bureau		
	Forest area and coverage (%)	Forest coverage increased from 28.4% in 2000 to 33.4% in 2005		
Social economy	Growth rate of infrastructure facilities and related industry (%)	The proportion of three industries was adjusted from 21:32:47(2000) to 17:40:43(2005). economic structure was optimized.		
	Increase rate of GDP(%), per capita GDP (¥/capita)and increase rate(%)	During the 10th Five-year plan period, the GDP of the city grew at 12.7%, about 8.59 billion yuan, and 13 292 yuan /capita in 2005.		
Ecological environment	Soil erosion area (km ²), proportion (%) and erosion modulus (t/a)	The total eroded area of the city is 1109.57 km ² , makes up 41.79% of the whole area		
	Intensity of acid rain(pH), frequency (%), area(km ²)	Not in the 2 "control regions"		
	Changes in biodiversity	Vegetation in Xichang is abundant, main trees: 185 species, 139 generas, 62 families.		
	Nature reserves and their area (km ²)	Year 2005		
		Area of nature reserves (km ²)	210.14	
		Among	Area of scenic spots (km ²)	144.64
			Area of forest park (km ²)	65.5
Total land area in Xichang (km ²)		2654.89		
Coverage of nature reserves (%)	7.9			
Atmospheric environment	Annual emission (t/a) and average concentration (mg/m ³) of main pollutants (PM ₁₀ , SO ₂ , NO ₂ , etc.)	Actual emission in 2005(10 ⁴ t)		
		Soot and smoke	0.3416	
		SO ₂	1.448	
		Dust	0.3504	
		COD	0.7048	
		Industrial wastes	0.01	
		average air quality in 2005: SO ₂ :0.039mg/m ³ , CO ₂ :0.017mg/m ³ , PM ₁₀ :0.108mg/m ³		
	Annual emission of greenhouse gases(CO ₂ ,CH ₄ , etc.) (t/a)	Xichang environment protection bureau		
The proportion of the area	Xichang environment protection			

	where air quality is over the standard to the total area (%), the proportion of population in the over-standard area to the total population (%).	bureau
Water environment	Average concentration of main pollutants (COD _{Mn} , ammonia nitrogen)(mg/m ³)	Xichang environment protection bureau
	Water consumption for ecological environment (m ³ /s)	10% of average flow rate of many years

- Note:
- Good performance (green)
 - Reasonable performance, need more progress (yellow)
 - Poor performance- Prioritize to take measures(red)
 - Uncertain or unclassifiable (grey)

6 Environmental and Sustainability Issues

6.1 * Issues Originated from Baseline Data and Related Organizations

Table 6-1 Major Environmental Issues in Xichang City

Theme	Issue	Baseline data	Possible causes
Natural environment	Earthquake	Xichangs statistical bureau	Regional geological structure is complicated, with strong new tectonic movement, and frequent seismic activity in Xichang city with a radius of 300 km around the region, several of the deep fault zones which can be divided into several blocks.
	Soil erosion	Xichang statistical bureau	1.Objective reasons: 2. Human reasons:
	Storm and flood	Xichang statistical bureau	(1)Hydro-meteorological factors; (2)Special terrain conditions; (3) Low design standard of hydrological projects in Xichang.
	Water pollution	Xichang environment protection bureau	1.Objective reasons: 2. Human reasons:
	Air pollution	Xichang environment protection bureau	1.Objective reasons: 2. Human reasons:
Social environment	Weak economic foundation, lack of pillar industries	Xichang statistical bureau	(1) Inrational industrial structure; (2)Mono-production structure; (3)No intensive management of agriculture or no large-scaled economy.
	Transportation needs further improvement	Xichang statistical bureau	Located in southwest China inland, complex terrain conditions, traffic inconvenience; The economic is underdeveloped, the government's self-financial resources is limited.

6.2 Issues Originated from Relevant Policies and Planning

Table 6-2 Environmental and Sustainability Issues from Relevant Policies and Planning

Potential environmental and sustainable development issues	Relevant policies and plans
Energy efficiency	<i>Cleaner Production Promotion Law of PRC; Civil Building Energy Conservation Ordinance (draft); Suggestions on strengthening urban Lighting management to promote the work of power conservation</i>
Energy structure	<i>Renewable energy law of PRC; 11th five -year plan of energy development,; Decision on accelerating rural biogas development, CFFNo.7(2006)((issued by Sichuan government); Planning of oil, coal, electricity, industry and transport sectors</i>
Resource utilization	<i>Xichang City mineral resources use planning; Master plan of Xichang City Land Use; Xichang City water use planning; Master plan of Xichang City Soil and Water Conservation Master Plan; Master plan of Xichang City Tourism,etc.</i>
Social economy	<i>The 11th Five-year Plan of national economy and social development in Liangshan Yi Autonomous Prefecture,The outline for 11th Five-year economic and social development plan of XiChang City,Xi'chang city Master Plan of Xichang City, etc.</i>
Ecological environment	<i>National Ecological protection "11th Five-Year Plan"; Master Plan of Xichang City,; Ecological construction plan of Xichang City; Xichang City Environmental Protection of Xichang City; Plans of oil, coal, electricity, industry and transport sectors, etc.</i>
Atmospheric environment	<i>Master Plan of Xichang City; Mneral resources use plan of Xichang City; Plans of oil,, coal, electricity, industry and transport sectors, etc</i>
Water environment	<i>Master Plan of Xichang City; Mneral resources use plan of Xichang City, plans of oil, coal, electricity, industry and transport sectors, etc</i>

7 Environmental and Sustainability Objectives and Targets

7.1 *List of SEA Objectives and Related Indicators

Table 7-1 List of SEA Objectives and Related Indicators for Energy Plan of Xichang City

Theme	Environmental objectives	Assessment indicators
Energy efficiency	Encourage consumers meet their needs with less energy inputs	Average energy efficiency (%)
		Energy consumption per unit GDP (tce) (t/10 000yuan)
Energy structure	Implementation of clean energy alternatives, enhance the use of renewable resources, reduce the use of non-renewable resources	Proportion of hydropower in the terminal energy consumption (%)
		Natural gas, petroleum and other clean energy accounted for a proportion of total energy consumption (%)
		Various renewable energy accounted for a proportion of total energy consumption (%)
		Fossil energy resources of tenure (10 000 hm ²)
		Fossil energy consumption (10,000 t) and efficiency(%)
		Non-renewable energy alternative energy use ratio (%)
Resource utilization	Rational use of natural resources, reduce the consumption of non-renewable resources.	Water consumption per unit GDP (t/10 000 yuan)
		Recycling efficiency of industrial water (%)
		Changes of land use structure
		Area of forest (km ²) and coverage (%)
Social economy	Promote the development of social economy and the improvement of people's life	Growth rate of infrastructure and related industries(%)
		Growth rate of GDP(%),GDP per capita (yuan /person)and growth rate(%)
Ecological environment	Conserve biodiversity and control negative effects in	Area of soil erosion (km ²),proportion(%)and erosion modulus (t/a)
		Acid rain intensity (pH),frequency (%) ,area (km ²)

	biologically sensitive areas	Changes in biodiversity
		Biologically sensitive area (km ²) and proportion (%)
		Natural reserves and protected area (km ²)
Atmospheric environment	Control air pollutants and the emission of greenhouse gasses	Annual emission of air pollutant (PM ₁₀ , SO ₂ , NO ₂ , etc.) (t/a) and average concentration (mg/m ³)
		Annual emission of greenhouse gasses (CO ₂ , CH ₄ , etc.) (t/a)
		The proportion of the area where air quality is over the standard to the total area (%) and the proportion of population in the area to the total area (%)
Water environment	Meet the requirement of water function	Main pollutant (COD _{Mn} , ammonia nitrogen, average concentration (mg/m ³)
		Eco-environment water consumption (m ³ /s)

7.2 Criteria for Assessing SEA Indicators

Table 7-2 Statistic List of Criteria for Assessing SEA Objectives of Energy Plan, Xichang City

Theme	Assessment indicator	Criteria for assessing objectives
Energy efficiency	Average energy efficiency (%)	Does the efficiency reach the province's average level
	Energy consumption per unit GDP (tce) (t/10 000yuan)	
Energy structure	Proportion of hydropower in the terminal energy consumption (%)	Does it reach the province's average level
	Natural gas, petroleum and other clean energy accounted for a proportion of total energy consumption (%)	
	Various renewable energy accounted for a proportion of total energy consumption (%)	
	Fossil energy resources of tenure (10,000 hm ²)	
	Fossil energy consumption (10,000 t) and efficiency (%)	
	Non-renewable energy alternative energy use ratio (%)	
Resource utilization	Water consumption per unit GDP (t/10 000 yuan)	Does it reach the province's average level
	Recycling efficiency of industrial water (%)	Does it reach the province's average

		level
	Changes of land use structure	Does it meet the Xichang city's land use regulatory requirements
	Area of forest (km ²) and coverage (%)	Does it increase the area of forests
Social economy	Growth rate of infrastructure and related industries (%)	Does it benefit the growth of related industries
	Growth rate of GDP (%), GDP per capita (yuan/person) and growth rate (%)	Does it good for the development of social economy
Ecological environment	Area of soil erosion (km ²), proportion (%) and erosion modulus (t/a)	Does it mitigate soil erosion
	Acid rain intensity (pH), frequency (%), area (km ²)	Does it improve the current state of acid rain
	Changes in biodiversity	Does it good for protecting and improving biodiversity
	Ecologically sensitive area occupied (km ²) and proportion (%)	Does it change the structure and function of ecologically sensitive area
	Natural reserves and protected area (km ²)	Does it reduce the area of protected region
Atmospheric environment	Annual emission of main pollutant (PM ₁₀ , SO ₂ , NO ₂ , etc.) (t/a) and average concentration (mg/m ³)	Does it meet the national quality standards
	Annual emission of greenhouse gasses (CO ₂ , CH ₄ , etc.) (t/a)	Does it meet the national quality standards
	The proportion of the area where air quality is over the standard to the total area (%) and the proportion of population in the area to the total area (%)	Does it reach the province's average level
Water environment	Main pollutant (COD _{Mn} , ammonia nitrogen, average consistency (mg/m ³))	Does it meet the national quality standards
	Eco-environment water consumption (m ³ /s)	Does it meet the relevant provisions

7.3 Compatibility Analysis for Plan Objectives and SEA Objectives

Table 7-3 List of Compatibility Analysis for the Plan Objectives and the SEA Objectives of Energy Plan, XichangCity

Project		Plan objectives					Preliminary conclusions
		Energy saving	Improve the energy efficiency	Enhanced use of renewable energy	Enhanced ecological protection	Strengthen the development of water resources exploration	
Environmental objectives		Energy -saving buildings, municipal energy-saving	Promote cleaner production; Improve production process.	Enhance the use of solar energy and biomass energy	Enhance the protection for rural and atmospheric environment	Enhance the exploration of water and power	
Energy efficiency	Promote consumers to meet their needs with less input energy to	√	√				Significant environmental benefits
Energy structure	Realize clean energy alternatives, strengthen the use of renewable energy, reduce non-renewable energy use		√	√	√	√	Significant environmental benefits
Resource utilization	Rational use of natural resources to reduce the consumption of non-renewable resources		√	√	√	√	Significant environmental benefits
Social economy	Pomote socio-economic development and improved living standards		√	√	√	√	Significant environmental benefits

Ecological environment	Protection of ecosystems and biodiversity, the control the negative impact to the ecological sensitive areas	√		√	√	x	With negative impact to the river ecological system, while with positive environmental benefits in other aspects
Atmospheric environment	Control air pollutants and greenhouse gas emissions related to energy consumption	√	√	√	√	√	Significant environmental benefits
Water environment	Meet the functional requirements of the waters		√	√			Significant environmental benefits

8 Scope of SEA

8.1 *Purpose and Significance of SEA*

(1)Based on the survey of natural and social environment, as well as analysis to the existing energy use situation in Xichang city, make an overall, micro forecast assessment to the impact of energy plan as to the whole Xichang city, to judge its environmental feasibility.

(2)In a harmonious and sustainable perspective, fully consider the possible environmental issues and constraints in the early stage of energy plan, choice and optimized the proposals to minimize the negative environmental impact in the implementation process.

(3)Based on conclusion of environmental assessment, make necessary comprehensive environmental-friendly measures and designs to next steps, provide guidance and outlined concern about construction and assessment, coordinate the relationship among energy exploration, economic growth, social development and environmental protection.

8.2 *Principles of SEA*

- (1) Scientific, objective and justicial principle
- (2) Early involvement principle
- (3) Aggregative and overall principle
- (4) Public participation principle
- (5) Consistency principle
- (6) Guidance principle

8.3 *Major Contents of SEA*

1 General Principles

- 1.1 Origins of the Task
- 1.2 Scope of the Assessment
- 1.3 Proposed Year for Assessment
- 1.4 Environmental Impact Identification
- 1.5 Environment Protection Objectives and Targets
- 1.6 Assessment Indicator System
- 1.7 Assessment Methodology
- 1.8 Assessment Procedures

2. Profile and Analysis of the Proposed Plan

- 2.1 Necessity of the Proposed Plan
- 2.2 Objectives of the Proposed Plan
- 2.3 Task of the Proposed Plan
- 2.4 Principles for the Proposed Plan
- 2.5 Brief Introduction to the Proposed Plan
- 2.6 Analysis of the Proposed Plan

3 Environmental Setting

- 3.1 Environmental Setting
- 3.2 Environmental Quality Status Quo and Changing Trends
- 3.3 Environmental Constraint Factor Analysis

4 Environmental Impact Prediction Assessment

- 4.1 Atmospheric Environmental Impact Prediction
- 4.2 Surface Water Environmental Impact Prediction
- 4.3 Ecological Environmental Impact Prediction
- 4.4 Social Environmental Impact Prediction
- 4.5 Comprehensive Assessment to the Proposed Plan

5 Environmental Feasible Schemes and Mitigation Measures

6 Monitoring and Follow-up Assessment Plan

7 Environmental Investment Budget

8 Public Participation

9 Difficulties and Uncertainties

10 Executive Summary

8.4 Main Methods of SEA

Table 8-1 List of SEA Methods for Energy Plan of Xichang City

Theme	Assessment indicator	Main assessment methods
Energy efficiency	Average energy efficiency(%)	Statistical analysis,contrast method
	Eergy consumption per unit GDP (tce) (t/10 000yuan)	
Energy structure	Proportion of hydropower in the terminal energy consumption (%)	Statistical analysis,contrast method
	Natural gas, petroleum and other clean energy accounted for a proportion of total energy consumption (%)	
	Various renewable energy	

	accounted for a proportion of total energy consumption (%)	
	Fossil energy resources of tenure (10 000 hm ²)	
	Fossil energy consumption (10 000 t) and efficiency (%)	
	Non-renewable energy alternative energy use ratio (%)	
Resource utilization	Water consumption per unit GDP (t/10 000 yuan)	Statistical analysis, contrast method
	Recycling efficiency of industrial water (%)	
	Changes of land use structure Area of forest (km ²) and coverage (%)	Statistical analysis, overlapping/overlays, contrast method
Social economy	Growth rate of infrastructure and related industries (%)	Statistical analysis, analogism
	Growth rate of GDP (%) ,GDP per capita (yuan /person)and growth rate (%)	Statistical analysis, contrast method
Ecological environment	Area of soil erosion (km ²) ,proportion (%) and erosion modulus (t/a)	Statistical analysis, overlapping/overlays, contrast method
	Acid rain intensity (pH) ,frequency (%) ,area (km ²)	Statistical analysis, contrast method
	Changes in biodiversity	Ecological Mechanism Analysis, analogism, ad hoc method/professional judgment
	Biologically sensitive area occupied (km ²) and proportion (%)	Location analysis, overlapping/overlays, statistical analysis, functional division evaluation
	Natural reserves and protected area (km ²)	Statistical analysis, contrast method
Atmospheric environment	Annual emission of main air pollutants (PM ₁₀ , SO ₂ , NO ₂ etc.) (t/a) and average concentration (mg/m ³)	Standard index, contrast method
	Annual emission of greenhouse gasses (CO ₂ , CH ₄ , etc.) (t/a)	Standard index, contrast method
	The proportion of the area where air quality is over the standard to the total area (%) and the proportion of population in the area to the total area (%)	Statistical analysis, contrast method

Water environment	Main pollutant (COD _{Mn} , ammonia nitrogen, average consistency (mg/m ³))	Standard index, contrast method
	Eco-environment water consumption (m ³ /s)	Analogism, contrast method

8.5 Outline Consultation

Sichuan Environmental Engineering Evaluation Centre (SEEEC) will be responsible for the internet publicity, feedback collection, as well as meetings regarding *SEA Outline for Energy Plan of Xichang City*. While Xichang Environmental Protection Bureau will be responsible for organizing discussion meetings on the *Outline* and for collecting suggestions.

Table 8-2 SEA Outline Consultation and Timeline

Dates	Consultation approach	Lead organisation	Participants
	Outline published on internet	SEEEC	All the public concerned about the environment issues
	Outline Discussion meetings	Xichang Environmental Protection Bureau	Representatives from related Department of Xichang city and Liangshan Prefecture
	Outline consultation meetings	SEEEC	Related experts

According to advises and suggestions got from each steps, make corresponding adjustments to *The SEA Outline for The Energy Plan of Xichang City*, and then confirmed by related administrative departments.