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中国可持续能源项目

第十三次高级政策顾问委员会会议

会 议 日 程

9:30 am **欢迎致辞**
柯尔布恩 S. 威尔伯，高级政策顾问委员会主席，大卫与露茜尔•派克德基金会董事会董事

介绍高级政策顾问委员会新成员：

9:40 am **主旨发言：**陈至立，第十一届全国人大常委会副委员长

9:55 am **中国中长期能源战略的思考**
徐匡迪，原全国政协副主席，原中国工程院院长

10:10 am **新能源示范城市实践与思考**
汪光焘，全国人大环境和资源保护委员会主任委员

10:25 am **中国新型能源产业规划情况介绍**
吴吟，国家能源局副局长

10:40 am **中国交通系统中长期节能目标研究及对策**
傅志寰，中国节能协会理事长，原全国人大财政经济委员会主任委员

10:55 am **茶歇**

11:10 am **支持中国的低碳发展及 2010 年中国可持续能源项目工作进展报告**
林江，能源基金会高级副主席，中国可持续能源项目主任

11:25 am **讨论：中国可持续能源项目 2011 年工作重点**

12:15 pm **会议总结**
陈清泰，原国务院发展研究中心副主任
柯尔布恩 S. 威尔伯，高级政策顾问委员会主席，大卫与露茜尔•派克德基金会董事会董事

12:30 pm **休会及午餐**

CHINA SUSTAINABLE ENERGY PROGRAM
13TH SENIOR POLICY ADVISORY COUNCIL (PAC) MEETING

November 19, 2010
China World Summit Wing
Beijing, P. R. China

AGENDA

9:30 am **OPENING REMARKS**
Colburn S. WILBUR, Chair, Senior Policy Advisory Council; Trustee, The David and Lucile Packard Foundation

Introduction of new PAC members

9:40 am **KEYNOTE SPEECH:**
CHEN Zhili, Vice Chair, Standing Committee of the 11th National People's Congress

9:55 am **CHINA'S MEDIUM AND LONG TERM ENERGY STRATEGY**
XU Kuangdi, Former Vice Chairman of the CPPCC National Committee, Former President of Chinese Academy Engineering

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10:10 am **NEW ENERGY PILOT CITIES: THOUGHTS ON PRACTICES**
WANG Guangtao, Chairman, Environmental Protection and Resources Conservation Committee

10:25 am **INTRODUCTION TO CHINA'S NEW ENERGY INDUSTRY DEVELOPMENT PLAN**
WU Yin, Deputy Administrator, National Energy Administration

10:40 am **MEDIUM AND LONG TERM TRANSPORTATION SYSTEM ENERGY SAVING TARGETS: RESEARCH AND POLICIES**
FU Zhihuan, Chairman of the Board of Directors, China Energy Conservation Association; Former Chairman, Finance and Economics Committee, NPC

10:55 am **TEA BREAK**

11:10 am **SUPPORTING CHINA'S LOW-CARBON DEVELOPMENT AND THE CHINA SUSTAINABLE ENERGY PROGRAM'S (CSEP) 2010 PROGRESS REPORT**
LIN Jiang, Senior Vice President, Energy Foundation; Director, China Sustainable Energy Program

11:25 am **DISCUSSION: CSEP'S FOCUS IN 2011**

12:15 pm **CLOSING REMARKS**

CHEN Qingtai, Former Vice President, Development Research Center of the State Council

Colburn S. WILBUR, Chair, Senior Policy Advisory Council; Trustee, The David and Lucile Packard Foundation

12:30 pm **ADJOURN & LUNCH**

发言人简介

陈至立　十一届全国人大常委会副委员长，全国妇联主席。2003 年至 2008 年期间任国务委员、国务院党组成员，北京奥运会组委会第一副主席。陈至立女士毕业于复旦大学物理系固体物理专业，是中国科学院上海硅酸盐研究所电介质物理专业研究生。她曾任教育部部长、国家教委党组书记、上海市委副书记。 中共第十三届、十四届中央候补委员，十五届、十六届、十七届中央委员。

徐匡迪　原全国政协副主席，原中国工程院院长。1995 年至 2001 年期间任上海市市长。徐匡迪先生 1959 年毕业于北京钢铁工程学院。他曾任上海工学院副主任，上海市高教局局长，上海市计划委员会主任，上海市委副书记。中共第十四届中央候补委员，第十五届、第十六届中央委员。

汪光焘　全国人大环境与资源保护委员会主任委员，全国人大常委。汪光焘先生毕业于上海同济大学。曾任中华人民共和国建设部部长、党组书记，北京市副市长，哈尔滨市市长及徐州市副市长。是欧亚科学院院士，香港中文大学荣誉教授，是清华大学、同济大学和北京工业大学教授、博士生导师。是中共第十六届中央委员。

吴　吟　国家能源局副局长（副部级）。中国矿业大学管理科学与工程专业博士研究生。历任国家能源局总工程师,国家发展改革委能源局副局长,国家经贸委行业规划司副司长,国家煤炭工业局行业管理司副司长。

傅志寰　中国工程院院士。曾担任第十届全国人大财经委主任委员。现任中国节能协会理事长。目前他致力于发挥中介组织作用，从政策、技术、市场等多个角度促进节能减排。他在交通节能、低碳经济、新能源技术发展及应对气候变化等领域从事研究。傅志寰于 1998 年至 2003 年 3 月担任铁道部部长。对于铁路建设、运营，做出贡献，主持了中国铁路提速和青藏铁路建设以及高速铁路建设的前期工作。

林　江　现为能源基金会高级副主席和中国可持续能源项目主任。林江博士深厚的技术知识以及多年来研究中国能源政策的经验对中国可持续能源项目助益匪浅。在 2007 年加入能源基金会之前的 13 年，林江博士长期担任美国加利福

尼亚州劳伦斯-伯克利国家实验室中国能源项目组的高级科学家，作为首席研究员研究中国的能源效率和可再生能源政策。他同时担任许多中国政府机构/世界银行和联合国开发署的顾问。林江博士长期以来参与中国可持续能源项目的研究工作，帮助推动中国家用电器能效标准和低碳发展前景。他是中美关系国家委员会以及国际政策太平洋委员会的成员。林江博士于 1992 年在加利福尼亚大学伯克利分校取得人口统计学博士学位，1984 年在西安交通大学取得电子工程学士学位。

Presenters' Biography

CHEN Zhili

Madame Chen Zhili is a senior leader of the People's Republic of China (PRC). She is Vice Chairman of the Standing Committee of the 11th National People's Congress and President of the All-China Women's Federation. From 2003 to 2008, she served as State Councilor, member of Leading Party Group of the State Council, and Vice Chairman of the organizing committee of the 29th Olympic Games.

Prior to her current position, Madame Chen was the Minister of Education of the PRC, First Secretary of the National Leading Group of State Education Commission, and Deputy Secretary of Shanghai Municipal Government. Madam Chen was an alternate member of the 13th and 14th CPC Central Committee and member of both the 15th and 16th CPC Central Committees. She is currently a member of the 17th CPC Central Committee. Madam Chen graduated from Fudan University, and earned her MA from the Chinese Academy of Sciences' Shanghai Institute of Ceramics.

XU Kuangdi

Xu Kuangdi is Former Vice Chairman of 10th National Committee of the China People's Political Consultative Congress (CPPCC) and Former President of the Chinese Academy of Engineering. From 1995 to 2001, he served as the Mayor of Shanghai, and he has also served as Executive Vice President of Shanghai Polytechnic University, Director of the Shanghai Municipal Higher Education Bureau, Director of the Shanghai Municipal Planning Committee, and Deputy Secretary of the Communist Party of China's (CPC) Shanghai Municipal Committee. Dr. Xu was an alternate member of the 14th CPC Central Committee and a member of both the 15th and 16th CPC Central Committees. He graduated from the Beijing Institute of Iron and Steel Engineering in 1959.

WANG Guangtao

Wang Guangtao is the Chairman of the Environmental and Resources Protection Committee of the National People's Congress. He has served as Vice Mayor of Xuzhou City, Mayor of Harbin City, Vice Mayor of Beijing, and Minister and Secretary of the Party Leadership Group of the Ministry of Construction. Mr. Wang is now an academician of the International Eurasian Academy of Science, Honorary

Professor of the Chinese University of Hong Kong, and Professor and Doctoral Supervisor at Tsinghua University, Tongji University and Beijing University of Technology. He is also a member of the Sixteenth Central Committee of the Communist Party of China. Mr.Wang graduated from Tongji University in Shanghai.

FU Zhihuan

Fu Zhihuan is an academician at the Chinese Academy of Engineering and former Chairman of the Finance and Economics Committee of the 10th National People's Congress. He currently serves as Chairman of the Board of Directors of the China Energy Conservation Association (CECA), an organization committed to promoting energy conservation and emissions reduction via policy, technology, and market development. Mr. Fu is an expert on energy conservation in the transportation sector, low-carbon economy development and technology, and new energy and climate change issues. Mr. Fu served as Minister of Railways from 1998 to 2003 March. He directed the preparatory work in China’s railway acceleration and the Qinghai-Tibet Railway, thus greatly contributing to the construction and operation of the national railway system.

WU Yin

WU Yin is the Deputy Administrator of National Energy Administration. Previous Post: General Engineer of National Energy Administration, Deputy Director General of Energy Bureau of National Development and Reform Commission, Deputy Director General of Department of Sectoral Planning of State Economic and Trade Commission, Deputy Director General of Department of Sectoral Administration of State Bureau of Coal Industry.

LIN Jiang

Dr. Jiang Lin joined the Energy Foundation as Senior Vice President and Director of the China Sustainable Energy Program in 2007, bringing years of technical expertise to the program, as well as years of experience with Chinese energy policy. Before joining the Energy Foundation, Dr. Lin spent 13 years as a Senior Scientist with the China Energy Group at Lawrence Berkeley National Laboratory in Berkeley, California. He has served as an advisor to government agencies in China as well as to multilateral institutions such as the World Bank and the United Nations. Dr. Lin was also a long-time CSEP grantee, helping to develop several of China’s appliance efficiency standards and low-carbon development scenarios. Since 1997, he has

provided extensive support to China's appliances efficiency standards and labeling program, which has grown to be one of the most comprehensive in the world. From 2001 to 2005, Dr. Lin championed LBNL's collaboration with Shanghai in promoting the energy services industry and the implementation of building codes. Dr. Lin received his PhD from the University of California, Berkeley in 1992. From 1993-94 he was a post-doctoral fellow at the University of Pennsylvania. Mr. Lin received his BA in 1984, and undertook post-graduate studies at Xi'an Jiaotong University.

中国中长期能源战略的思考

本演讲回顾中国建国以来，特别是改革开放30年能源生产和消费的发展情况，以及中国新的发展阶段中，能源发展所遇到的挑战和障碍。演讲还将根据一些最新的中、长期能源战略研究成果勾画未来中国走低碳发展之路的能源情景。

新中国成立60年来一次能源生产总量增长了100多倍，改革开放以来人均消费增长4倍多。由于产业结构和居民用能的增加，一次能源结构也发生了很大变化，对煤炭的依存从建国初的90%下降到改革初期的75，到2008年进一步下降到68%与此同时，石油对外依存度持续上升，已经超过50%.

中国的非化石能源在政策扶持和节能减排的约束下发展迅猛。中国09年的风电新增装机已经超过美国，成为世界第一位。中国还是全球最大的太阳能电池生产国,其中很大部分满足了国内需求,光伏发电装机与09年一年就翻了一番。另外，中国的太阳能热利用规模也是世界第一，使用量和产量均占世界总量一半以上，总产值仅580亿元。

中国在提高能源效率方面也做出了前所未有的努力，采取了很多严格先进的政策、技术和标准，但还存在由于整体能源系统整合不足导致的新建建筑实际运行能耗高于既有建筑的情况。更大的挑战来自于城镇化带来的居住面积的大量增加，中国预计未来25年的新建建筑量将翻一番。

为了满足发展带来的能源需求，并保障能源安全、气候安全、环境安全，中国必须大大降低能源消耗总量增长的速度，也就是能源强度的大大降低。为此，核电将是发展重点。中国未来的核电装机预计在2030年达到10%。随着天然气的探明可采储量大幅增加，天然气将在能源清洁化利用中具有更大贡献，到2030年一次能源供应比重达到15%左右。

中国还将大力发展其他非化石能源，有可能在2050年，可再生能源占一次能源约三分之一的比例。中国正处于工业化及城市化快速发展期，以煤为主的能源结构使中国CO2排放处于世界前列；但人均排放仍大大低于发达国家，因此中国应承担共同但有区别的减排责任；大力节能减排，降低单位GDP能耗；调整能源结构，发展核能与可再生能源是建设低碳社会的基础；倡导低碳节能的生活方式，是建设低碳社会的根本保证。

China’s Medium and Long-term Energy Strategy

This speech reviews the development of energy production and consumption since the establishment of the People’s Republic of China, especially in the last 30 years of opening-up and reform, and analyzes the challenges and obstacles that energy development has encountered in the new phase of development. In addition, this speech will sketch out an energy scenario of China’s future low-carbon development path based on some of the latest medium-term and long-term energy strategy research results.

In the 60 years since the founding of new China, the national primary energy output has grown more than a hundredfold. Since the opening-up and reform policy, per capita energy consumption has grown more than fourfold. Due to the growth of industrial and residential energy use, the primary energy structure has undergone a large change. China’s dependency on coal fell from 90 percent in the early years of the People’s Republic to 75 percent in the early opening-up and reform period, and further dropped to 68 percent in 2008. At the same time, China’s dependency on oil imports has continuously risen, already exceeding 50 percent.

China’s non-fossil energy industry has developed rapidly due to policy support for energy-saving and emission reduction. In 2009, China’s new growth of installed wind power capacity surpassed that of the USA, ranking No. 1 in the world. China is the largest solar battery producer in the world, a considerable amount of which has satisfied domestic demand, and the installed capacity of photovoltaic power doubled in 2009. In addition, China has topped the rest of the world in the utilization of solar thermal energy. Though the total output value of solar thermal energy is only 58 billion yuan, its utilization and output both account for more than 50 percent of the world total.

In addition, China has made unprecedented efforts to increase energy efficiency, adopting many strict and advanced policies, technologies, and standards. However, there remains the situation that the real operational energy consumption of newly constructed buildings is higher than that of existing buildings, attributable to the insufficient integration of the total energy system. An even bigger challenge comes from the substantial increase in living floor area attributable to the urbanization process. It is estimated that in the next 25 years the amount of newly constructed buildings will double.

In order to meet the energy demands brought by development, safeguard energy security, and protect the climate and environment, China must significantly reduce the rate of growth of its national energy consumption, or in other words greatly decrease its energy intensity. In order to achieve this goal, nuclear power will be the top priority in the development agenda. It is

estimated that in 2030, China's installed capacity of nuclear power will amount to 10 percent. With the dramatic increase of proved exploitable natural gas reserves, natural gas will also contribute more to the clean utilization of energy, accounting for about 15 percent of the supply of primary energy by 2030.

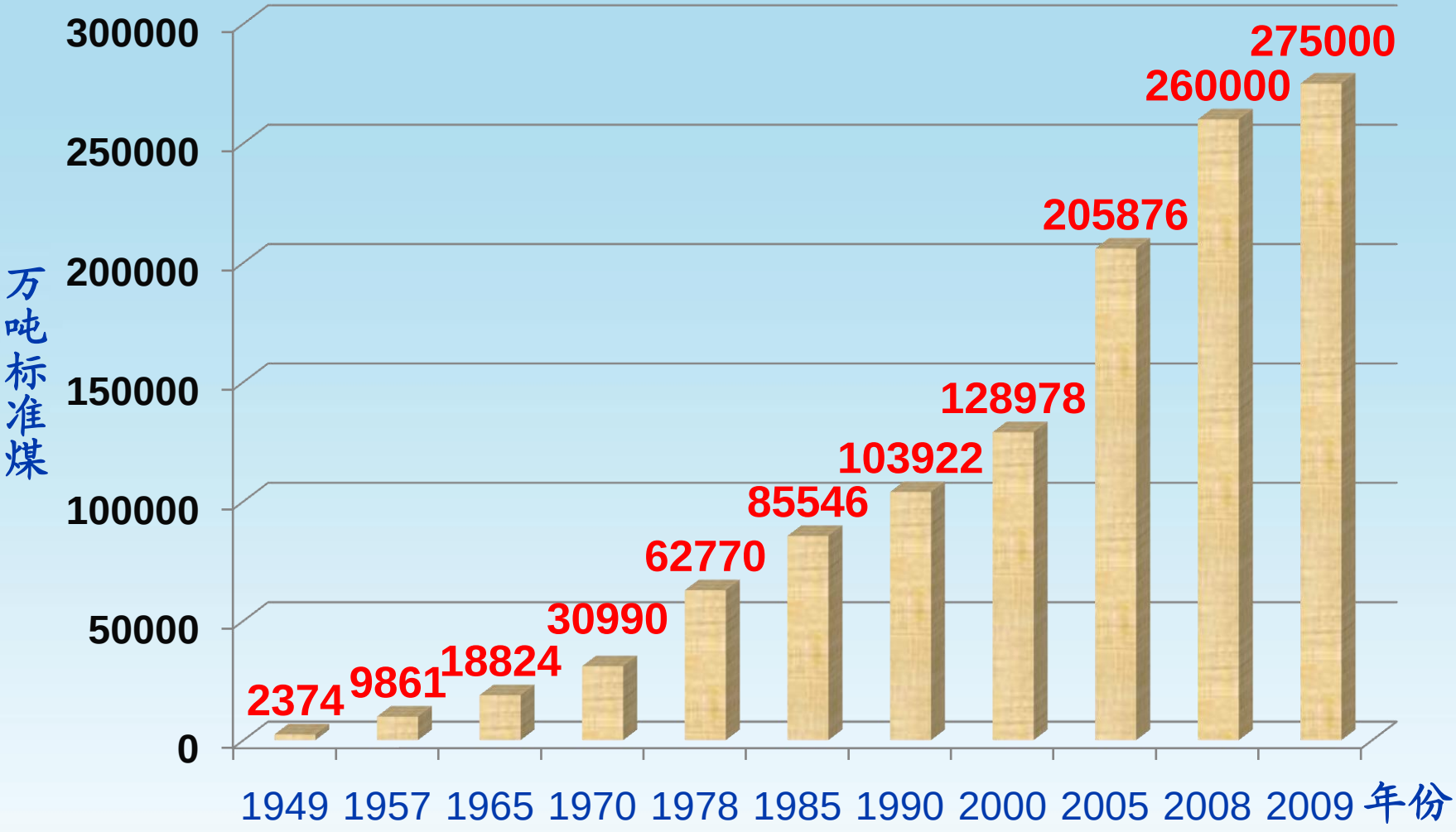
In addition, China will make great efforts to develop other non-fossil energy. It is possible that by 2050, renewable energy will account for one third of primary energy. Since China is in a fast development phase of industrialization and urbanization, it has a coal-centered energy structure that ranks it first in the world in CO_2 emission. However, its level of per capita emission is fairly lower than that of developed countries and therefore it should shoulder common but differentiated emission reduction responsibilities. China will launch a big drive to promote energy conservation and emission reduction and lower energy consumption per unit GDP; it will set the adjustment of its energy structure and development of nuclear and renewable energy as the foundation in the construction of a low-carbon society; and it will advocate an energy-efficient and low-carbon lifestyle to ensure the building of this low-carbon society.

中国能源的现状与发展

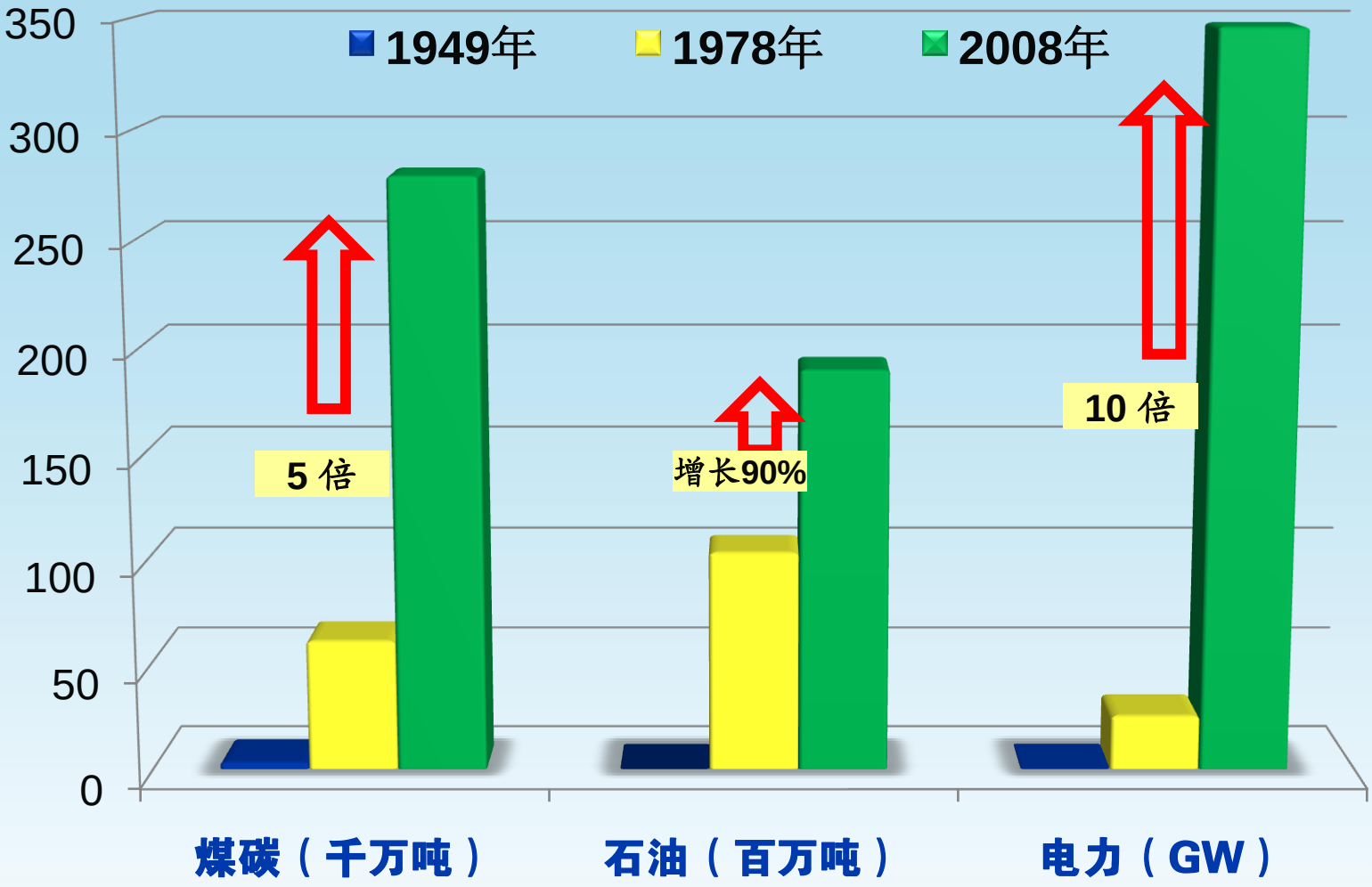
徐 匡 迪

2010年11月，北京

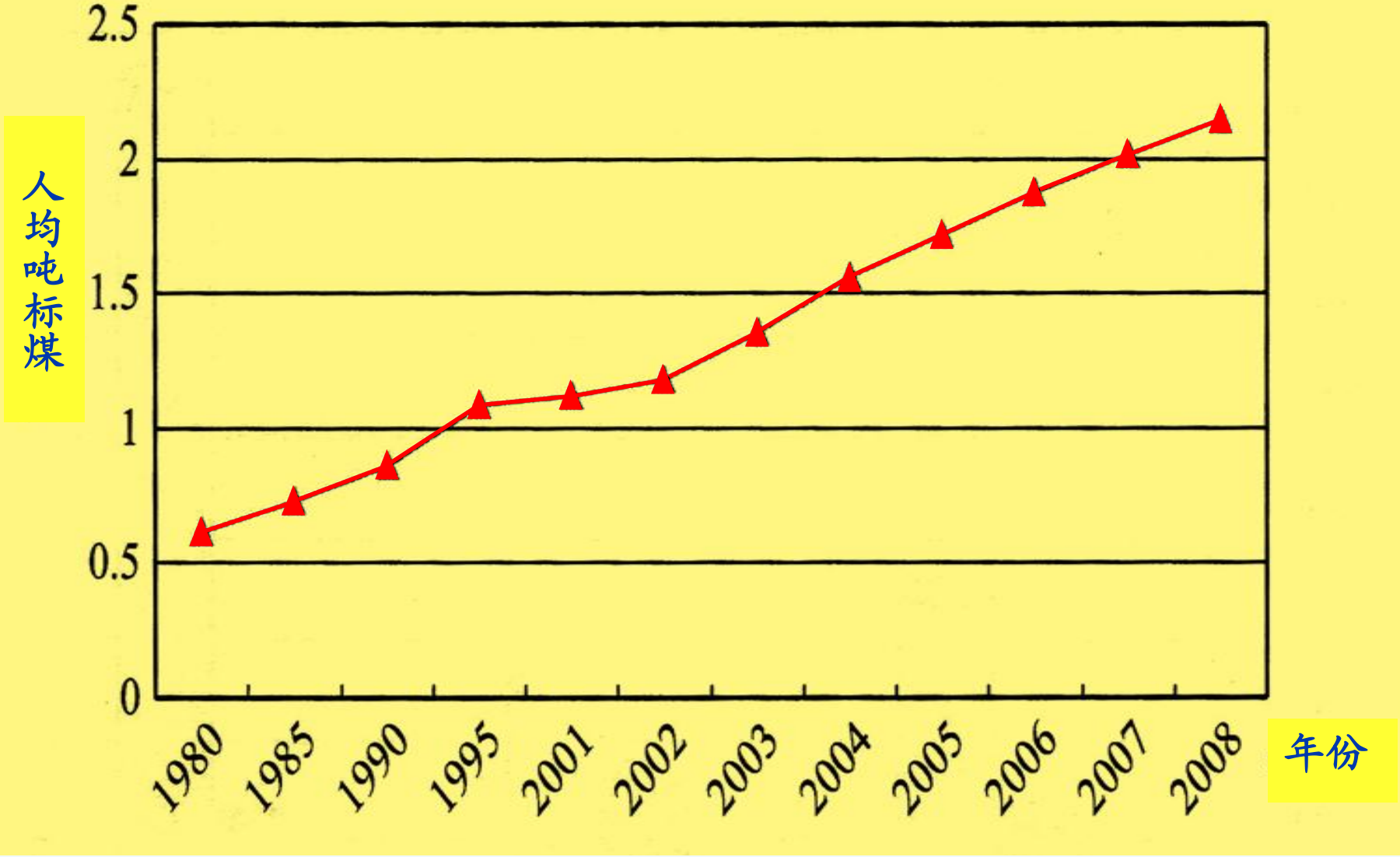
新中国成立60年来
一次能源生产总量增长100多倍



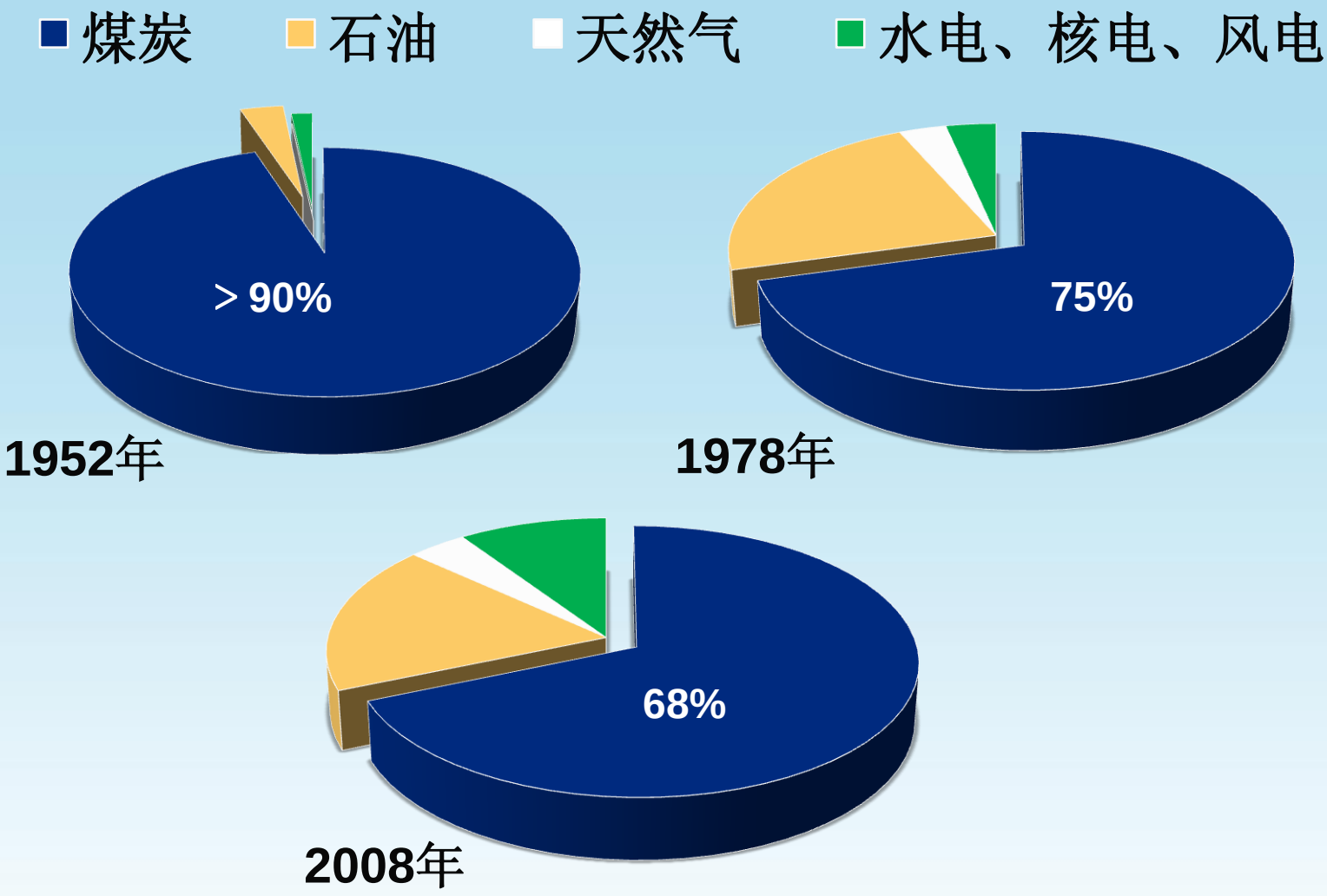
新中国成立60年来
一次能源产量增长迅猛



人均一次能源消费水平变化



能源消费结构对比



The output and consumption volume of the three main fossil energy in China in 2004 – 2008

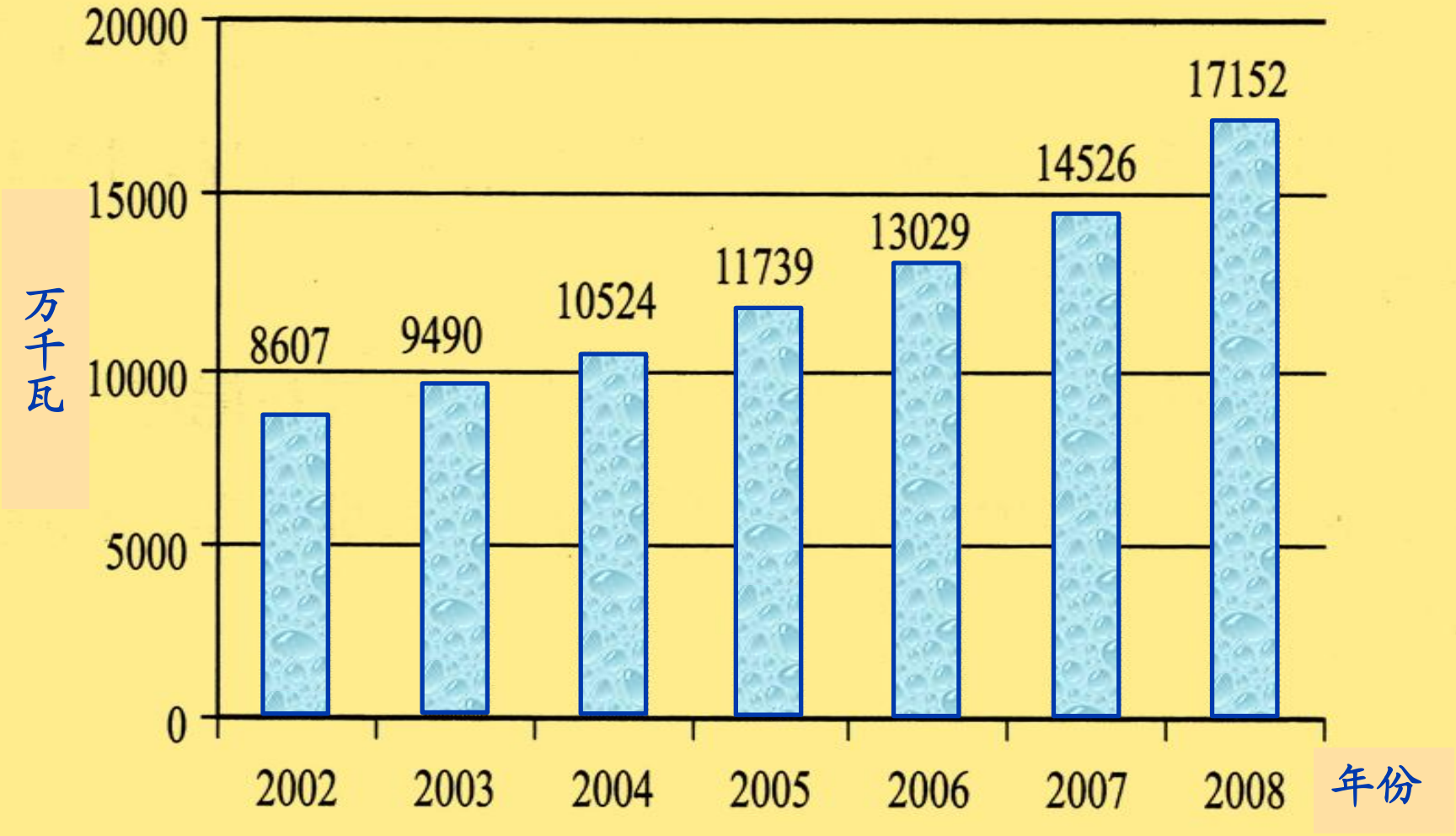
年份	产量			消费量		
	石油	天然气	煤炭	石油	天然气	煤炭
2004	174.1	41.5	1 012.1	318.9	39.7	983.0
2005	180.8	49.3	120.0	327.8	46.8	1 100.5
2006	183.7	58.6	1 205.1	346.1	56.1	1 215.0
2007	186.7	69.2	1 282.4	362.8	69.5	1 313.6
2008	189.7	76.1	1 414.5	375.7	80.7	1 406.3

注：石油的单位为百万吨，天然气的单位为10亿M^3，煤碳的单位为百万吨油数量

The net import volume of crude oil and refined oil products and import dependency in 2004 – 2008

年份	2004	2005	2006	2007	2008
净进口量(原油 + 成品油)/ $\times 10^4$ t	15 038	14 361	16 935	18 348	20 053
进口依存度/%	46.7	44.4	48.1	49.5	52.8

2002-2008年水电装机容量



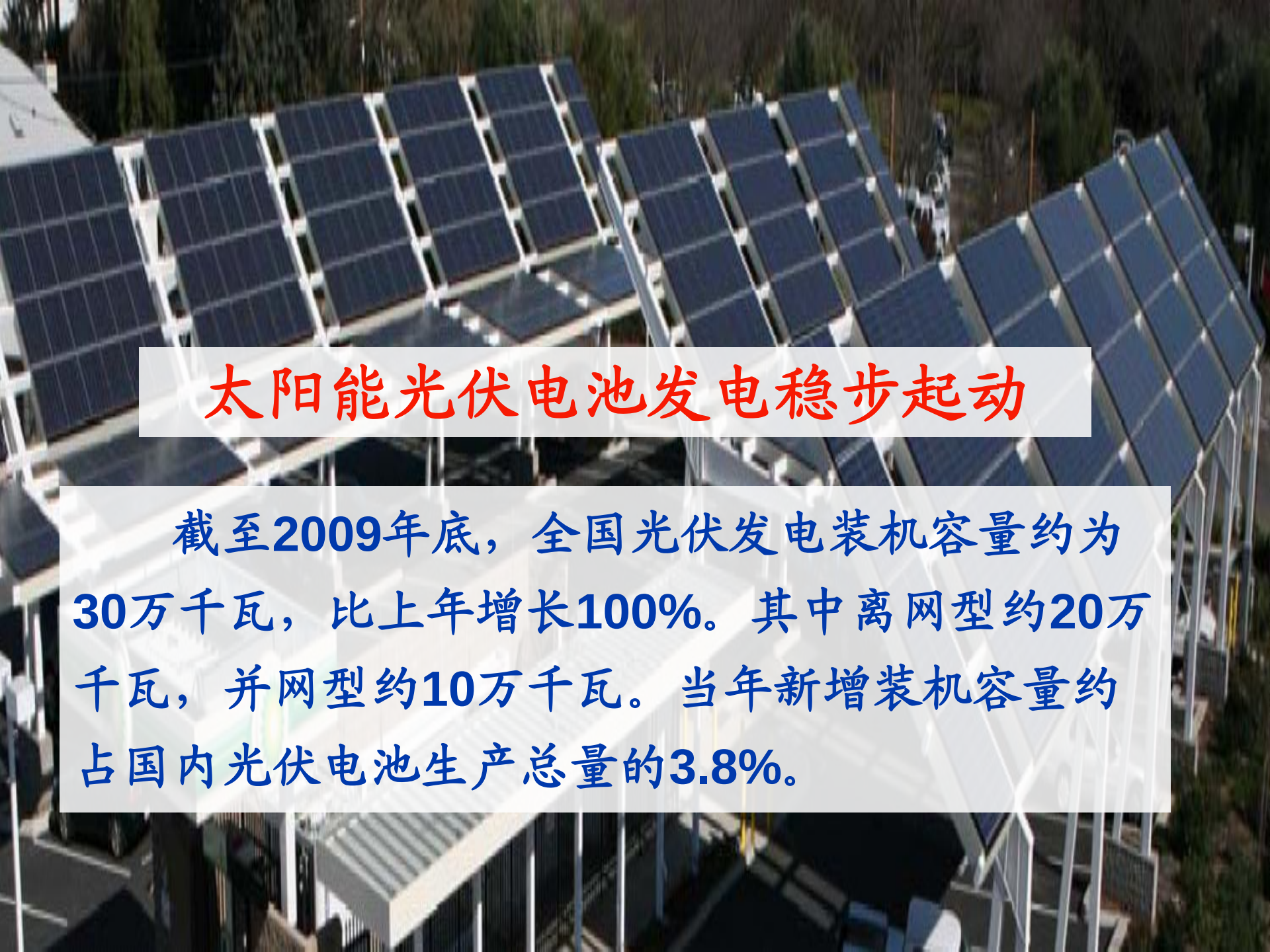
风电历年新增及累计装机容量

注：此容量为吊装容量

2002～2009年世界太阳电池产量

（单位：兆瓦）

年份 / 国家或地区	2002	2003	2004	2005	2006	2007	2008	2009
中国	10	10	50	200	400	1088	2600	4000.0
欧洲	135	193	314	470	657	1063	2000	2800.0
日本	251	364	602	833	928	920	1300	1800.0
中国台湾						450	900	1000.0
美国	120	103	140	154	202	266	432	600.0
其他	45	74	89	102	314	663	668	500.0
合计	561	744	1195	1759	2500	4000	7900	10700



太阳能光伏电池发电稳步起动

截至2009年底，全国光伏发电装机容量约为30万千瓦，比上年增长100%。其中离网型约20万千瓦，并网型约10万千瓦。当年新增装机容量约占国内光伏电池生产总量的3.8%。

太阳能热利用规模世界第一

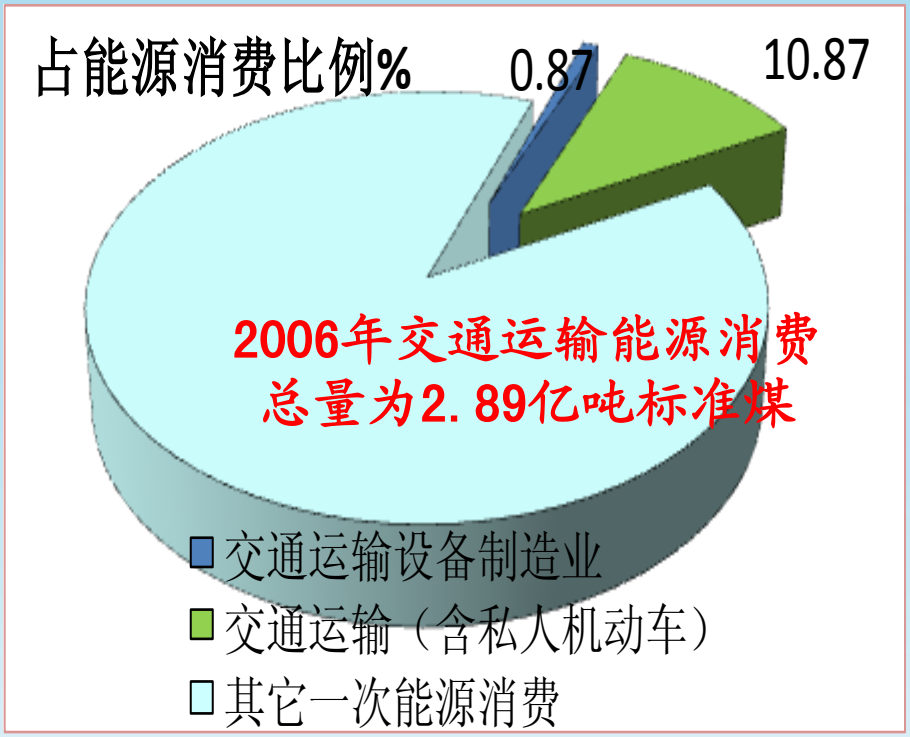
到2009年底，太阳能热水器总集热面积达到14500万平方米，年生产能力达到4200万平方米，使用量和年产量均占世界总量的一半以上。全国太阳能热水器产业年总产值近580亿元。

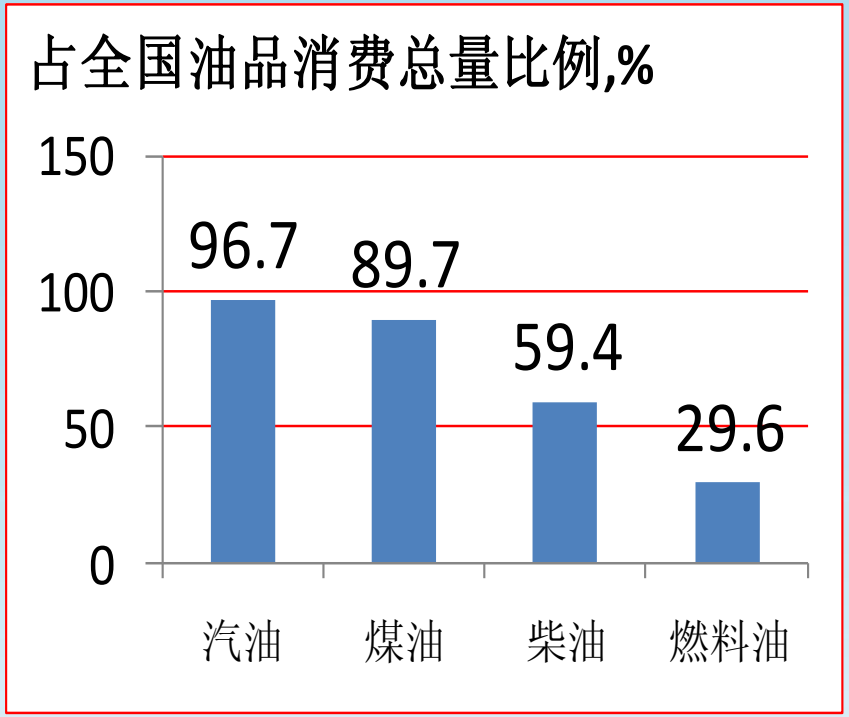
Primary energy demand forecast

(单位：百万吨标准煤，低碳情景)

年份	煤	石油	天然气	水电	核电	风电	太阳能发电	生物质能源	合计
2010	2173.1	528.2	108.7	206.5	45.6	12.1	0.1	12.4	3086.7
2020	2194.8	842.8	349.1	374.7	136.2	51.1	0.7	46.5	3995.8
2030	2091.5	963.7	529.2	400.7	300.6	92.2	4	92	4473.9
2050	1984.4	1025	745.5	422	759.5	168.8	19.7	125	5250

交通运输能源消费现状



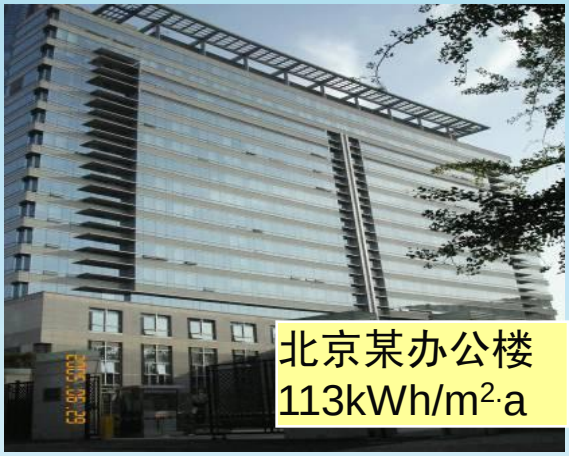


2006年道路交通(包括私人机动车和公路运输)石油消费量1.15亿吨，占交通运输业石油消费量约74%；其中私人机动车消耗汽、柴油量0.52亿吨，约占全部道路交通汽、柴油消耗量的约45%。

建筑节能迫在眉睫

整体能源系统存在着很多不合理的现象，很多能源和技术被用在了不合适的地方。


清华学堂
34kWh/m^2·a


北京某办公楼
113kWh/m^2·a


上海某大厦
215kWh/m^2·a


美国UPENN办公楼
356kWh/m^2·a

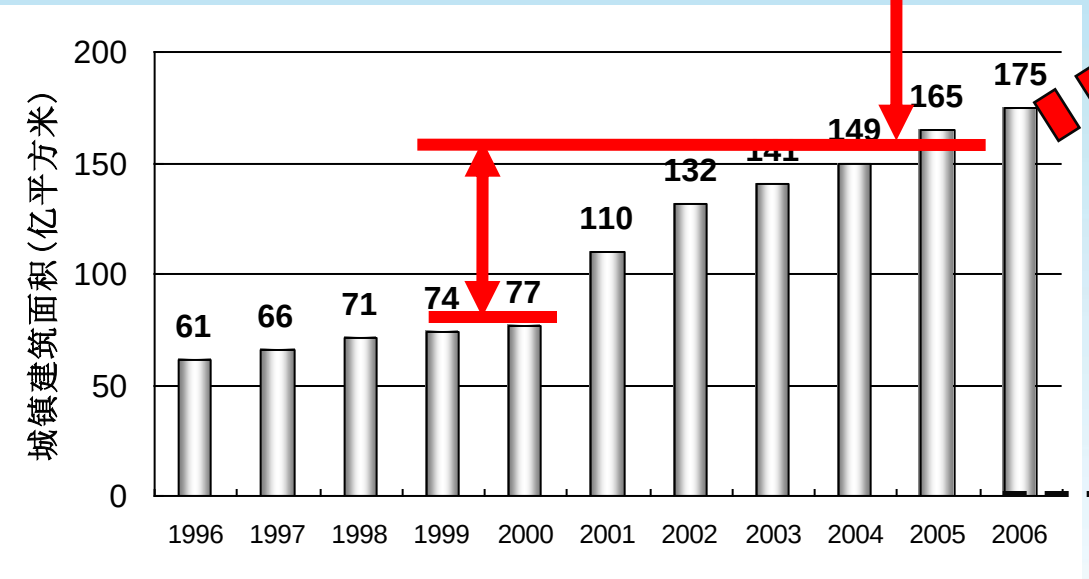
技术先进的新办公建筑单位面积能耗比老建筑高10倍！

引自江亿院士报告

2030年我国城镇化引起的建筑面积增加

25年间再造一个中国！

300亿平方米



平均增加10亿平方米/年
2030年可达400亿平方米

我国城镇建筑面积　　《中国统计年鉴》

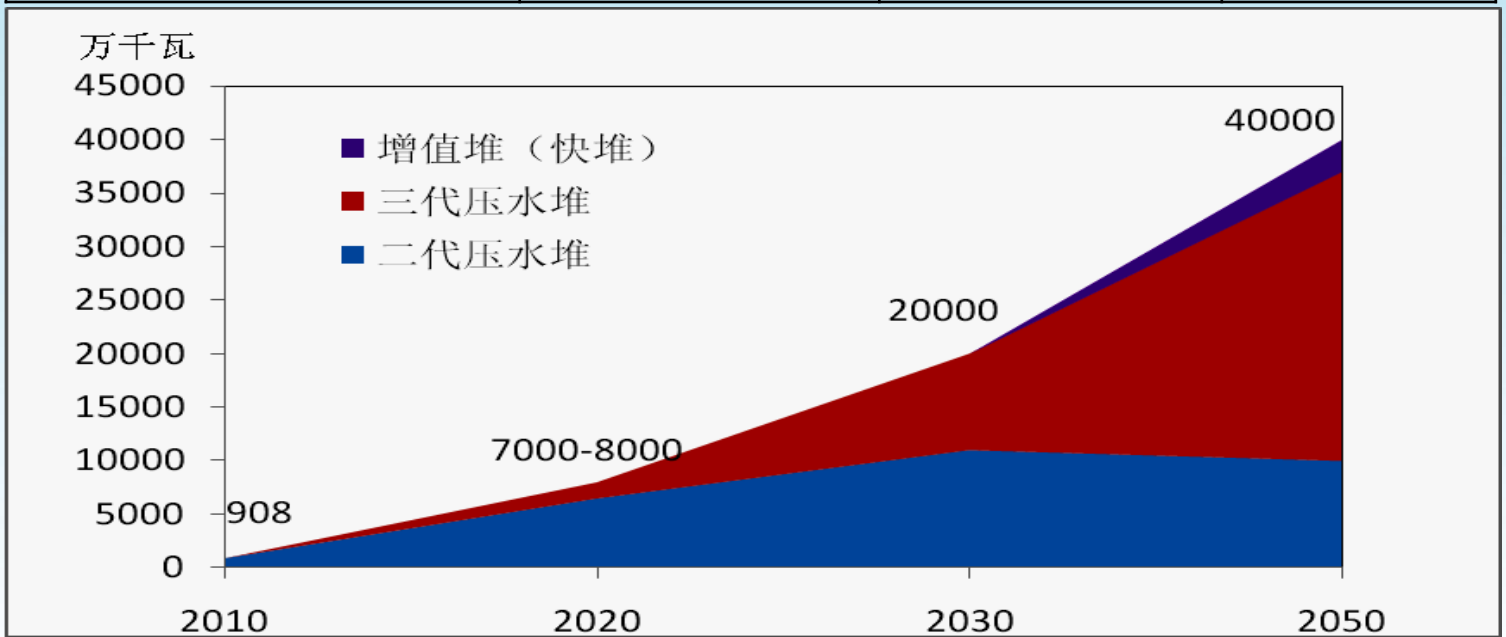
优先发展核电使之成为一次能源的支柱之一

不同能源发电温室气体排放系数（等效碳 g/k·wh）

90年代技术			新技术
	最大	最小	
褐煤	336	261	228(2005~2020)
煤	357	264	206(2005~2020)
石油	246	219	149(2005~2020)
太阳能	76.4	27.3	8.2(2010~2020)
水力	64.4	1.1	
生物质	16.6	8.4	
风	13.1	2.5	
核	5.7	2.5	

我国未来核电发展路线图

单位：万千瓦	2020	2030	2050
总装机容量	7000-8000	20000	40000
其中：二代压水堆	6110-6490	9000-12000	10000
三代压水堆	890-1510	8000-11000	27000
增值堆（快堆）			3000



核电应在较短时间内发展成为我国能源的重要组成成分之一

2007	9.1GW	1.2%
2020	70GW	5%
2030	200GW	10%

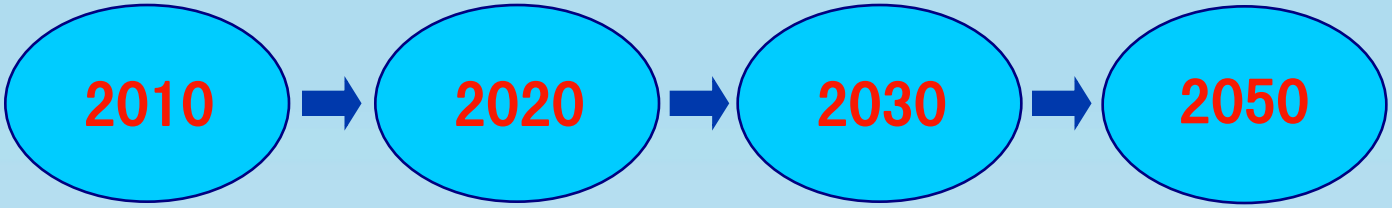
大力发展天然气，成为重要清洁能源支柱

2030年国内天然气产量争取达到3000亿立方米以上，并稳产至2050年。天然气进口规模达到1500亿立方米左右。使2030年天然气在一次能源供应量中比重达到15%左右。

使水电成为绿色能源支柱之一

到2020年，全国水电装机容量达到3.4亿kW，其中小水电装机容量将达到7500万kW。到2030年，水电资源开发基本完毕，水电装机约4亿kW(含小水电)。平均年可利用时间达到4000小时以上。

我国发展低碳经济、绿色能源路线图



战略地位	补充能源➡替代能源➡主流能源➡主导能源			
非水再生能源	2%	5-10%	9-19%	17-34%
含水再生能源	10%	16-23%	20-31%	27-45%
相当于化石能源(亿TCE)	3.0	5.6-8.1	8.6-13.1	13.6-22.8

结束语

1、中国正处于工业化及城市化快速发展期，以煤为主的能源结构使中国CO_2排放处于世界前列；但人均排放仍大大低于发达国家，因此中国应承担共同但有区别的减排责任；

2、大力节能减排，降低单位GDP能耗；调整能源结构，发展核能与可再生能源是建设低碳社会的基础；

3、倡导低碳节能的生活方式，是建设低碳社会的根本保证。


谢谢！

中国交通系统中长期节能目标研究及对策

一、 研究背景和研究范围

改革开放以来，我国交通运输业取得了巨大的成就，有力地支撑了国民经济持续、稳定的发展，同时也消费了大量的能源。我国交通运输业能源消费年均增长率为7.66%，为全社会能源消费年均增长率的1.32倍，其中石油消费年均增长率为10.12%，为全社会石油消费年均增长率的1.86倍。因此，交通运输行业是节能的重要领域。与历来有关研究工作不同，课题组从源头上进行研究，以运输量、运输结构和运输能耗强度三因素为突破点分析交通运输节能问题，提出节能的相关政策建议。

本研究以城际交通为研究重点，包括铁路、公路（营运和城际非营运客运）、水路（不包括远洋）、航空、管道运输；为了使研究工作具有完整性，在城际交通研究的基础上，还兼顾了城市交通，将城际交通运输系统和城市交通运输系统加以整合，统称为交通运输大系统，并对其能源消耗加以分析研究。

二、研究的主要内容和结论

1 现状分析及发展预测

（1） 运输量预测

结合我国社会经济的发展实际，将国民经济活动划分为137个产业部门、3种投入要素（劳动力、资本、土地）和6个经济主体（生产、投资、家庭、政府、国外、库存）。同时考虑了水路、航空、铁路、公路、管道运输、保险、贸易（批发和零售）、仓库贮存8类流通投入。以我国2002年投入产出表和2002~2008年相关经济数据为基础，应用SICGE模型，对我国客、货运输需求量进行了预测。并设定了未来我国经济发展三种情景和相应运输需求量的三种情景，即基准情景、低增长情景和高增长情景。

（2） 运输结构情景设计

在对发达国家运输结构演变规律进行分析基础上，结合我国客货运输结构演变的实际，建立了我国交通运输结构模型和分析方法。在承认实际合理性、发展延续性、经济有利性、协调发展等原则的前提下，参照国外各国运输结构的变化趋势，以我国历年运输结构变化历程及相关影响因素的实际数据为依据，得出我国交通运输发展基本情景方案；在基本方案的基础上，以总成本（内部成本、外部成本、时间成本）为约束条件，对我国未来的运输结构进行优化，得出优化方案；以运输能源消耗强度为约束条件，调整五种运输方式的发展速度及比重，得

出节能方案。

（3） 运输能源消耗强度预测

应用中国能源环境综合政策评价模型（IPAC 模型）预测不同运输方式的能源消费量及其能源消耗强度，并设定了基准和节能两种情景。

2 节能潜力分析

交通运输能源消费是运输量、运输结构和能源消耗强度三因素共同作用的结果，而运输量又分为货物运输和旅客运输，因此进行情景分析时，货物和旅客运输均应按照上述三个主要因素设计的不同情景方案进行组合，货物运输和旅客运输分别形成18个情景组合方案。将运输量为基准方案、运输结构为基本方案、运输能耗强度为基准方案组合而成的一组方案，称为基准方案，即表示在现有经济增长模式下，运输量、运输结构和运输能耗强度按其自然趋势继续发展的情景；其他方案表示运输量、运输结构和运输能耗强度不同情景组合而成的方案。运输量为低方案、运输结构为节能方案、运输能耗强度为节能方案组合而成的一组方案，称为最节能方案，其运输量、运输结构和运输能耗强度均朝着尽可能节能的方向发展。

本研究定义的“节能潜力”是指任一情景组合方案的能源消费量与基准方案能源消费量相比减少能耗的可能性,即能源消费量之差；最大节能潜力，是指最节能方案能源消费量与基准方案能源消费量之差。

3 研究主要结论

（1） 交通运输能源消费比重呈上升趋势

交通运输大系统能耗比重研究表明，基准方案（F_{111}）2030年交通运输能源消费量为11.2亿吨标煤，为2008年的2.8倍，占全社会能源消费量的20.0%。最节能方案（F_{232}）2030年交通运输能源消费量为7.9亿吨标煤，为2008年的2倍，占全社会能源消费量的17.7%。

（2） 单位GDP交通运输能源消费量变化呈下降趋势

我国单位GDP交通运输能源消费量将大幅度下降，实现最节能方案，2020年、2030年单位GDP交通运输能源消费量有望较2008年分别下降30.7%和56.0%。2030年，将单位GDP交通运输能源消费量下降50%作为奋斗目标是有可能达到的。

（3） 客运能耗比重越来越大

交通运输能耗分为货运能耗和客运能耗，计算结果表明，客运能耗比重越来越大，2020、2030年，最节能方案客运能耗量分别占交通能耗总量的35.9%和41.5%。

（4） 积极转变发展方式、调整产业结构、压缩国民经济运输强度是交通运输节能的关键

粗放型经济增长方式，是造成货运量快速增长和能源消费量居高不下的主要原因。一般来说，粗放型经济单位GDP货运量较高，集约型经济单位GDP货运量较低。由于二者的差异所导致的粗放型经济比集约型经济多出的运量，可以看作为“过度运输”。我国存在“过度运输”问题。

因此，转变经济发展方式、调整产业结构是运输节能的关键。通过产业结构的调整可以大大压缩过度运输，使国民经济货物运输强度从2008年的8.71吨/万元降低到2030年的2.56吨/万元，降低了71%，使能源消费量大幅度降低。

（5） 运输结构的调整应给予高度重视

各种运输方式的能源消费强度不同，铁路和水路能耗强度较低，而公路、航空的能源消耗强度较高，因此不同运输结构必然产生能源消费量的不同。2020、2030年运输结构调整节约的能源分别占总节能潜力35.0%、27.3%。进一步研究表明，在货物运输结构中，铁路每提高1%，相应地公路降低1%，可减少能源消费量1.2%；水路每提高1%，相应地公路降低1%，可节能能源消费量1.3%。在旅客运输结构中，铁路每提高1%，相应地公路降低1%，可降低能源消费1.9%；铁路每提高1%，相应地航空降低1%，可减少能源消费1.6%。

（6） 降低能源消耗强度是交通运输节能的重要手段

交通运输能耗强度是交通运输节能的重要影响因素，其对交通节能的影响也最为直观，节能效果也较显著。研究表明，2020、2030年能耗强度降低导致的节能在节能潜力中分别占23.4%和23.1%。可见，能耗强度在交通运输节能中的重要作用。

（7）交通运输存在着巨大的节能潜力。

实现最节能方案， 2020、2030年的节能潜力分别为1.4亿和3.2亿吨标煤。

三、 政策建议

1 高度重视交通运输节能，明确中长期交通运输节能目标

在制定交通行业“十二五”发展规划时，除提出各种交通运输方式的建设目标、发展目标外，建议由交通运输管理部门牵头，会同有关部门和行业协会，提出交通运输各行业的具体节能目标、行动方案。

2 把调整优化产业结构作为推进交通运输节能的关键

1）逐步降低第二产业比重，提高第三产业比重，减少“过度运输”量

2）优化产业的区域布局，降低货物运输量

3 优化运输结构，构建节能型综合交通运输体系

1）改革现行管理体制，建立综合运输管理机构

2）调整运输投资结构

3）投资主体多元化

通过上述措施，统一规划建设节能型综合交通运输体系，支持铁路、水运、管道的建设，推动交通运输结构的调整，实现节能。

4 推进技术进步，减少汽车和船舶的单耗，降低能源消耗强度

5 制定相应财政税收和价格政策，推动交通运输节能

1）加大财政支持力度

2）完善促进交通运输节能的税收政策

3）推进资源要素价格改革

4）采取综合措施，降低小汽车出行率

6 完善法律法规，保障交通运输节约能源措施的有效实施

1）修订《中华人民共和国节约能源法》

2）制定《机动车节能管理条例》

3）制定行业规章，完善节能标准

Medium and Long-term Transportation System Energy Savings Targets: Research and Policies

1. Background and Scope

Since the beginning of China's economic reform, the transportation industry has made great achievements. It has strongly supported the continuous and stable development of the national economy. But at the same time, it has consumed a growing amount of energy. China's average annual growth rate of energy consumption in transportation is 7.66%，which is 1.32 times higher than in other industries. The average annual growth rate of the consumption of oil alone is 10.12%, which is 1.86 times higher than the consumption of oil in other industries. Therefore, transportation is certainly a key industry for saving energy. Differing from previous studies, this study reviewed the historical development of China's transportation and economy, as well as that of developed counties. Specifically, this study analyzed the characteristics of three critical factors: transportation volume, transportation structure, and transportation energy intensity, which were then used in developing scenarios of transportation energy consumption reduction. Policy recommendations on transportation energy saving were developed based on analysis of these three factors and related scenarios.

The study emphasized inter-city transportation systems that include railway, highway waterway, aviation, and pipeline. To make the study comprehensive, this study also took urban transportation systems into account by combining inter-city and urban systems, jointly referring to them as the comprehensive transportation system. The energy consumption in this comprehensive system was also analyzed in this study.

2. Research tasks and conclusions

2.1 Analysis of existing conditions and forecasts

2.1.1 Prediction of transportation volume

Considering actual social and economic development conditions in China, the national economic activity was categorized into 137 industrial divisions, three input elements (labor, capital, land), and six economic subjects (production, investment, family, government, foreign, and inventory). In addition, eight circulation inputs were taken into account: waterway, airway, railways, highway, pipeline transportation, insurance, trade (wholesale and retail), and warehouse storage. Forecasts of freight and passenger transport volumes were made by applying the SICGE, using the 2002 input-output table and relevant economy data from 2002 to 2008. Three scenarios of

future economic development in China were developed: baseline, low growth rate, and high growth rate. These economic conditions were used to forecast transportation volumes.

2.1.2 Design of transportation structure scenarios

A transportation structure model and analysis methods were developed taking into account changes in transportation structure in developed countries and China. Three scenarios were proposed: baseline, optimal, and energy-saving. The baseline scenario was based on the principles that the scenarios should be practically reasonable; continuous economic development; positive economic development; and coordination of all systems internally and externally. Transportation structure historical trends from both developed countries and China were used as references. Related factor data affecting the change of the transportation structure also supported this scenario. The optimal scenario was derived based on the baseline scenario. Transportation structure was optimized subject to the constraint of the total cost, including internal cost, external cost, and time cost. The energy-saving scenario adjusted the proportions of the five transportation modes and their development paces, with transportation energy intensity as a constraint.

2.1.3 Transportation energy intensity forecasts

Energy consumption and energy intensity were forecast for different transportation modes by using the China's energy and environment comprehensive policy evaluation model (i.e., IPAC model). Two scenarios were designed: a baseline and energy-saving scenario.

2.2 Analysis of energy-saving potential

Energy saving potential was analyzed based on 18 combinations of scenarios that were developed for transportation volume, transportation structure, and energy intensity, since energy consumption in transportation is the result of these three interacting elements. Transportation volume was further divided into freight and passenger. Among these 18 combinations of scenarios, the baseline scenario was formed based on the baseline scenarios of the three factors, representing a situation where transportation volume, transportation structure, and energy intensity all developed in accordance with current economic growth trends. The maximum energy saving scenario is defined as the one where transportation volume is low, and transportation structure and energy intensity are energy-saving. Under this scenario, transportation volume, transportation structure, and energy intensity all develop towards the best possible energy-saving situation.

In this study, energy-saving potential refers to the difference in energy consumptions between any combination of scenarios and the baseline scenario. The maximum energy saving potential is defined as the difference between the energy

consumption of maximum energy-saving scenario and that of the baseline scenario.

2.3 Conclusions

2.3.1 The proportion of transportation energy consumption in all industries will increase

An analysis of the proportion of transportation energy consumption versus the whole society indicates that energy consumption under the baseline scenario (F_{111}) in 2030 is 1.12 billion tce, which is 2.8 times higher than that in 2008 and accounts for 20.0% of the total energy consumption of the whole society. The energy consumption under the maximum energy saving scenario (F_{232}) in 2030 is 0.79 billion tce, which is two times higher than that in 2008 and accounts for 17.7% of the total energy consumption of the whole society.

2.3.2 The energy consumption in transportation per unit of GDP will decrease.

The energy consumption in transportation per unit of GDP will drop dramatically. Compared to 2008, the energy consumption in transportation per unit of GDP under the maximum energy-saving scenario in 2020 and 2030 is expected to decrease by 30.7% and 56.0%, respectively. A drop down to 50% in 2030 as a goal is likely to be achieved.

2.3.3 The proportion of passenger transportation energy consumption becomes bigger in future.

Transportation energy can be divided into that used for freight and passengers, respectively. The results from transportation energy show that the proportion of passenger transportation energy consumption will become bigger in future. In the maximum energy-saving scenario, passenger transportation energy consumption in 2020 and 2030 will account for 35.9% and 41.5% of the total transportation energy, respectively.

2.3.4 Transforming economic development mode, adjusting industrial structure, and reducing transportation intensity are the keys for energy saving in transportation

Extensive economic growth is the main cause of the rapid growth of freight transportation volume and high energy consumption. Generally speaking, freight transportation volume per unit of GDP under extensive economic growth is higher than under intensive economic growth. The difference in transportation volume under these two types of growth can be seen as excessive transportation, which is the case in today's China.

The transformation of the economic development mode and the adjustment of the industrial structure are key for energy saving. Through the adjustment of the industrial structure, excessive transportation can be greatly reduced. In one scenario study, freight transportation intensity could be reduced from 8.71 ton per ten thousand RMB in 2008 to 2.56 ton per ten thousand RMB in 2030, a 71% reduction. Energy

consumption would be reduced in correspondence with the change of industrial structure.

2.3.5 Adequate attention should be paid to the adjustment of transportation structure

The energy intensities of different transportation modes are different. In general, the energy intensities of railway and waterway are lower than those of highway and aviation. Thus, different transportation modes are accompanied by different levels of energy consumption. Energy consumption in freight transportation could be reduced by 1.2% if the proportion of railway volume increases by 1% and that of highway volume decreases by 1%. Energy consumption could be reduced by 1.3% when the proportion of waterway increases by 1% and that of highway decreases by 1%. For passenger transportation, energy consumption could be reduced by 1.9% when the proportion of railway volume increases by 1% and that of highway volume decreases by 1%. Energy consumption could be reduced by 1.6% when the proportion of railway volume increases by 1% and that of aviation decreases by 1%.

2.3.6 Decreasing energy intensity is an important means of energy saving in transportation

The influence of energy intensity on energy saving in transportation is very direct, causing a prominent energy-saving effect. This study shows that the amount of energy saving caused by the decrease of energy intensity accounts for 23.4% and 23.1% of the total energy saving potential in 2020 and 2030, respectively. This result underscores the importance of energy intensity for energy saving in transportation.

2.3.7 Transportation has a huge energy saving potential

Under the maximum energy saving scenario, the potential of energy saving in 2020 and 2030 are 140 and 320 million tce, respectively.

3. Policy Suggestions

3.1 More attention should be paid to energy saving in transportation and a long-term objective of energy saving should be stated clearly

When formulating the 12th Five Year Development Plan for the transportation sector, transportation management agencies should take the lead in coordinating relevant agencies and industry associations to propose detailed targets and implementation schemes for energy saving in all transportation sector entities.

3.2 Optimizing industrial structure should be viewed as the key to promoting energy saving in transportation

1) Gradually reduce the proportion of secondary industry and increase that of tertiary industry, with the objective of reducing excessive transportation.

2) Optimize industrial spatial distribution to reduce freight transportation volume.

3.3 Optimizing transportation structure and building an integrated energy-saving transportation system should be advocated.

1) Reform the current management system by establishing an integrated transportation administration system.

2) Adjust the transportation investment structure.

3) Diversify investment entities.

Through the implementation of these measures, the planning and construction for energy saving can be streamlined in an integrated transportation system. It is encouraged that support be given to the construction of railway, waterways, and pipelines, to move forward the adjustment of the transportation structure, and thus to realize energy saving.

3.4 Technical progress should be promoted for reducing the unit consumption of vehicles and then lowering energy intensity.

3.5 Necessary fiscal and financial policies should be formulated to promote energy saving in transportation

1） Increase governmental fiscal support

2） Perfect taxation policies for promoting energy saving in transportation

3） Promote price reform for resource elements

4） Take comprehensive measures to reduce travel by automobiles

3.6 Laws and regulations relevant to energy saving in transportation should be developed to enforce the effective implementation of proposed measures

1） Revise the People's Republic of China’s Energy Conservation Law

2） Formulate energy saving management regulations for motor vehicles.

3） Formulate industry regulations and perfect energy saving standards.

中国交通系统中长期节能目标研究及对策

Study on Transportation Medium- & Long-Term Energy Saving Goals & Policies

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2010-11-19

研究内容 Research contents

1. 交通运输节能问题研究的必要性 — The necessity for the research on energy saving in transportation
2. 影响交通运输能耗的因素分析 — Analysis on factors influencing energy consumption in transportation
3. 我国未来交通运输能源消费的预测 — Prediction of China's energy consumption in transportation
4. 交通运输节能潜力分析 — Analysis of the energy saving potentials in transportation
5. 交通运输节能的政策建议 — Policy recommendations on energy saving in transportation

第一部分

交通运输节能问题研究的必要性

Part One

The necessity for the research on energy saving in transportation

1.交通运输能源消费量持续上升

The energy consumption in transportation increases continuously

- 2008年交通能耗是1980年的7.9倍。
- 1980-2008年交通能源消费量，年均增速为 7.66%,而1995-2008年为11.06%。

- The transportation energy consumption in 2030 is 7.9 times higher than that in 2008.
- From 1980 to 2008, China increased the gross energy consumption in transportation by 7.66% annually, while the increase reached to 11.06% from 1995 to 2008.

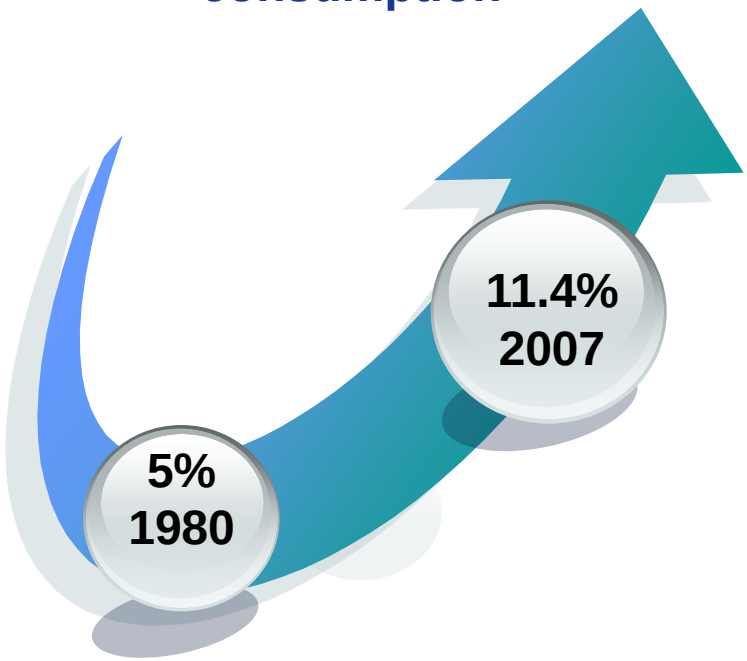
1.交通运输节能问题研究的必要性

The necessity for the research on energy saving in transportation

- 交通能源消费量，占全社会能源消费比重也越来越大。
- **The ratio of transportation energy consumption over the national total consumption increased annually.**

交通能耗占总能耗比重变化图

The percentages of China's transportation energy consumption



1.交通运输节能问题研究的必要性
The necessity for the research on energy saving in transportation

无论从能源消耗总量还是增速看，交通运输行业是我国节能的关键领域。

Transportation is the key area for energy saving in China, no matter in terms of total energy consumption or growth speed.

本课题着重研究影响我国交通运输行业能源消费的主要因素、节能潜力和途径。

This study focused on energy saving influencing factors, the potentials, and policy recommendations on strategies and goals for China's transportation.

第二部分

交通运输能耗影响的因素分析

Part Two

Analysis on factors influencing energy consumption in transportation

影响交通运输能耗的三个因素
Three key factors influencing transportation energy consumption

运输量

已有关于运输量的研究，与运输能耗涉及不多。

Transportation volume

Previous researches on transportation volume were seldom related to transportation energy consumption.

运输结构

已有关于运输结构的研究，从能耗方面的研究还较少。

Transportation structure

Previous researches on transportation structure also seldom addressed transportation energy consumption.

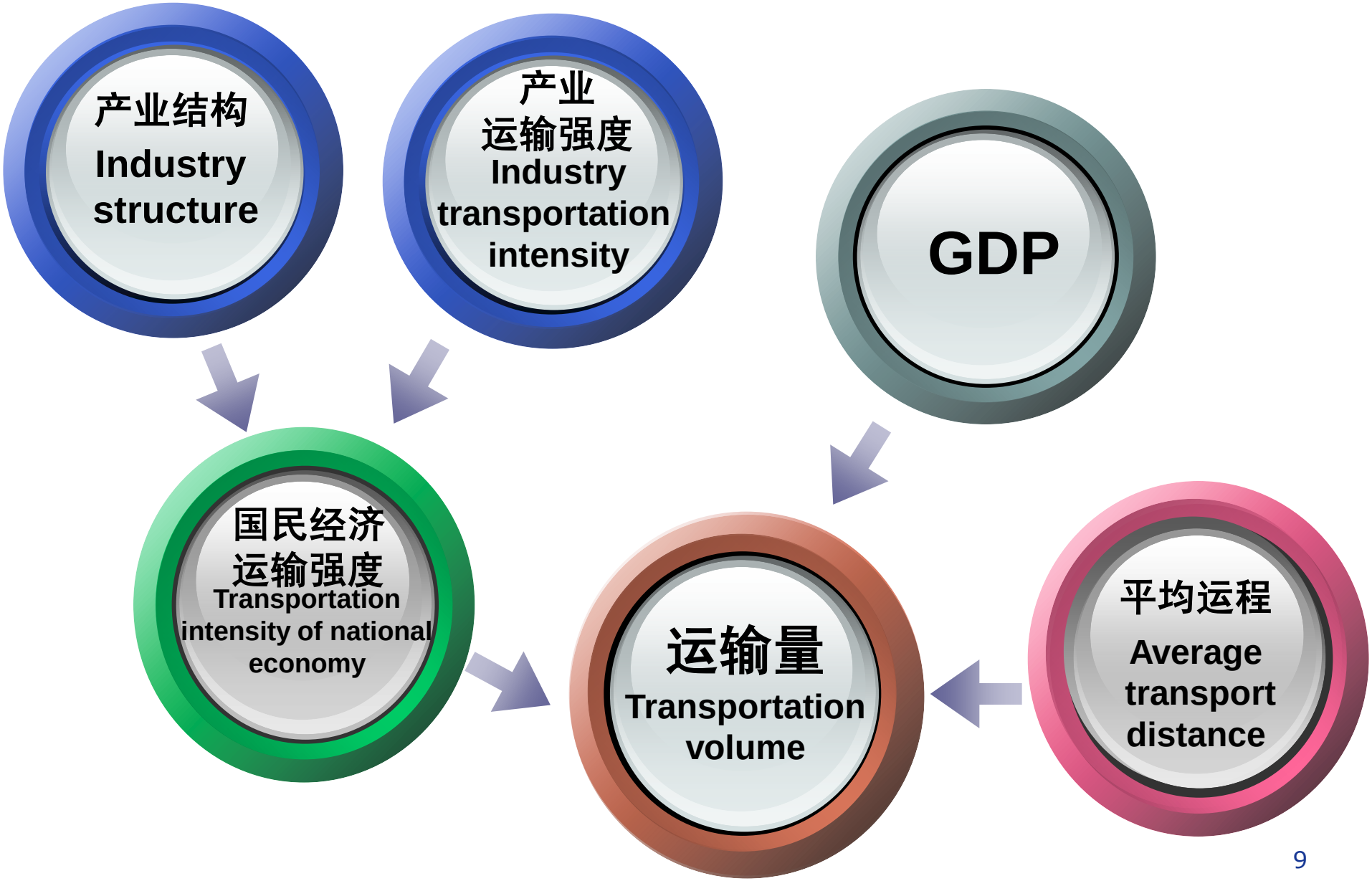
运输能耗强度

目前这方面的研究很多，尤其是公路方面。

Transportation energy intensity

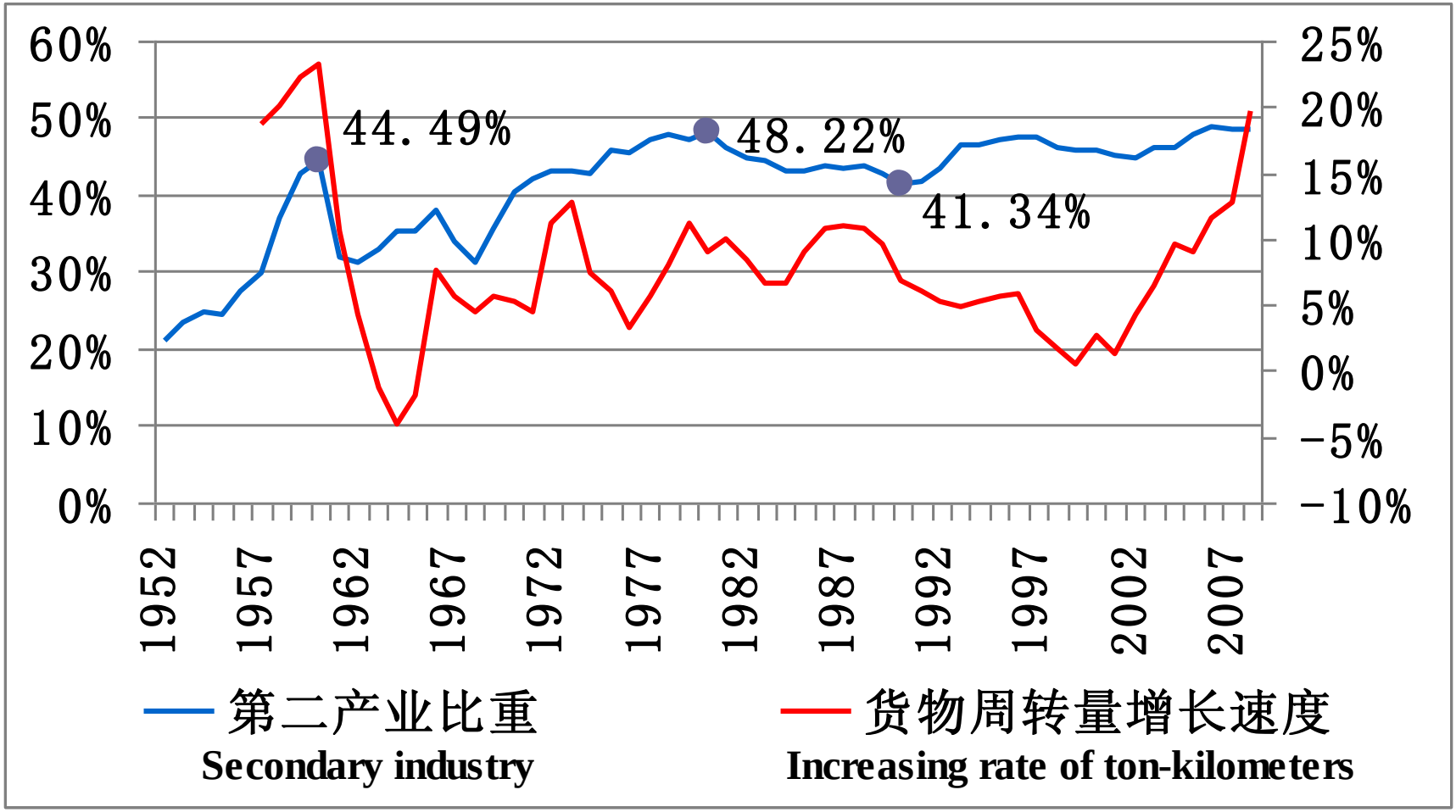
Many researches on this subject have been conducted, primarily on highway.

2.1 运输量Transportation volume



2.1.1 货物周转量与经济结构的关系
Connection between freight circulation volume & economy structure

- 货物周转量的增速与第二产业比重的关系密切。
- **The growth speed of freight circulation volume is closely correlated to the proportion of Secondary Industry.**



2.1.2 与国外比较
Comparison with developed countries

- 2008年我国货物周转量已与美国相当，但是我国的GDP还不到美国的三分之一，即我国单位GDP的货物周转量是美国的3倍多。与其它发达国家相比，结果也大同小异。与国外比较我国运输量过高，是经济粗放发展导致的后果。
- 同一时期，我国单位GDP的货物周转量远高于美国，既使进行两个国家同一经济发展阶段的比较，也就是对我国2005年与美国1960年进行比较，我国单位GDP的货物运输量也是偏大的。我国2005年的数值几乎是美国1960年的2倍。

- In 2008, freight ton-kilometers in China is almost equal to that in the U.S., but China's GDP is less than one third of that in the U.S.; that is, freight ton-kilometers per China's GDP is three times more than that of U.S. This result is roughly the same as those from comparing China with other developed countries. Based on data analysis, the China's exorbitant freight transport volume is caused by extensive economic growth.
- Even in the same stage of economic development, such as 2005 in China and 1960 in the U.S., China's freight transport volume was still bigger than the U.S. China's volume in 2005 was almost twice that of U.S. in 1960.

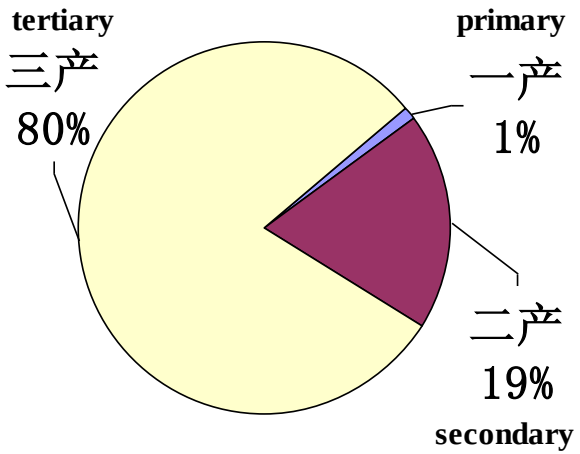
2.1.2 与国外比较
Comparison with developed countries

- 一般来说，粗放型经济单位GDP货运量较高，集约型经济单位GDP货运量较低。由于二者的差异所导致的粗放型经济比集约型经济多出的运量，我们可以看作为“过度运输”量。

- **In general, freight transport volume per GDP under extensive economy growth is higher than that under intensive economy growth. The difference of these two freight transport volumes is called “excessive transport volume”.**

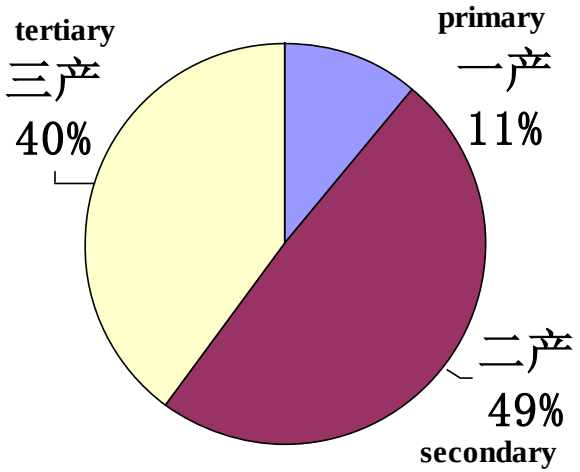
2.1.2 与国外比较
Comparison with developed countries

- 与“过度运输”相伴的产业结构过重，是我国运量居高不下的重要因素。
- 与美国相比，我国第三产业比重较低，第二产业比重过大，产生的运量很大，因此运输强度远远高于美国等发达国家。
- **The exorbitant proportion of secondary industry, which causes the excessive transport volume, is the important factor for high transport volume in China.**
- **Compared with U.S., China's Tertiary Industry proportion is lower, while that of Secondary industry is higher, which produce huge transport volume. This difference in industrial structure explains why China's transport intensity is far higher than the developed countries such as U.S.**



美国产业结构比重

Proportion of industries in U.S.



我国产业结构比重

Proportion of industries in China

2.1.2 与国外比较
Comparison with developed countries

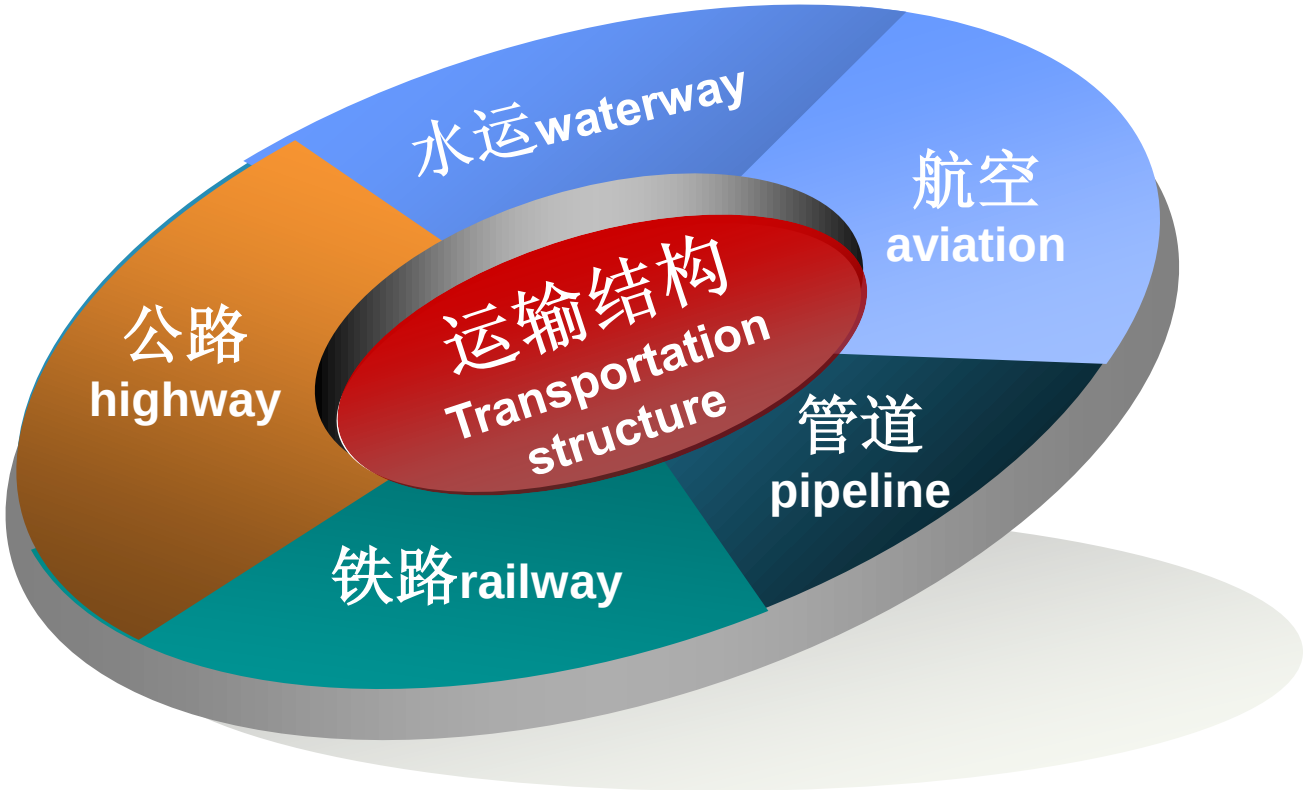
- 从上述分析中，我们可以大致看到，压缩“过度运输量”是减少运输量的关键，也是挖掘交通运输节能潜力的重要方面。
- 虽然，我国目前处于工业化中期，而美国处于后工业化时代，要求我国单位GDP的运量达到它们的水平是不合理的，但是要看到我国在运输量方面减少的潜力。而我们的研究，就是要分析和挖掘这种潜力。

- **The analysis above indicates that reducing excessive transport volume is the key to decreasing transport demand. It becomes important to tap on the potentials of transportation energy saving.**
- **China at present time is in the middle stage of industrialization, while countries like the U.S. is in the post-industrial stage. It is not reasonable to expect current China to achieve the same level of transport volume per GDP as theirs. However, China has potential to decrease transport volume, which is the goal of this study.**

2.2 运输结构 Transportation Structure

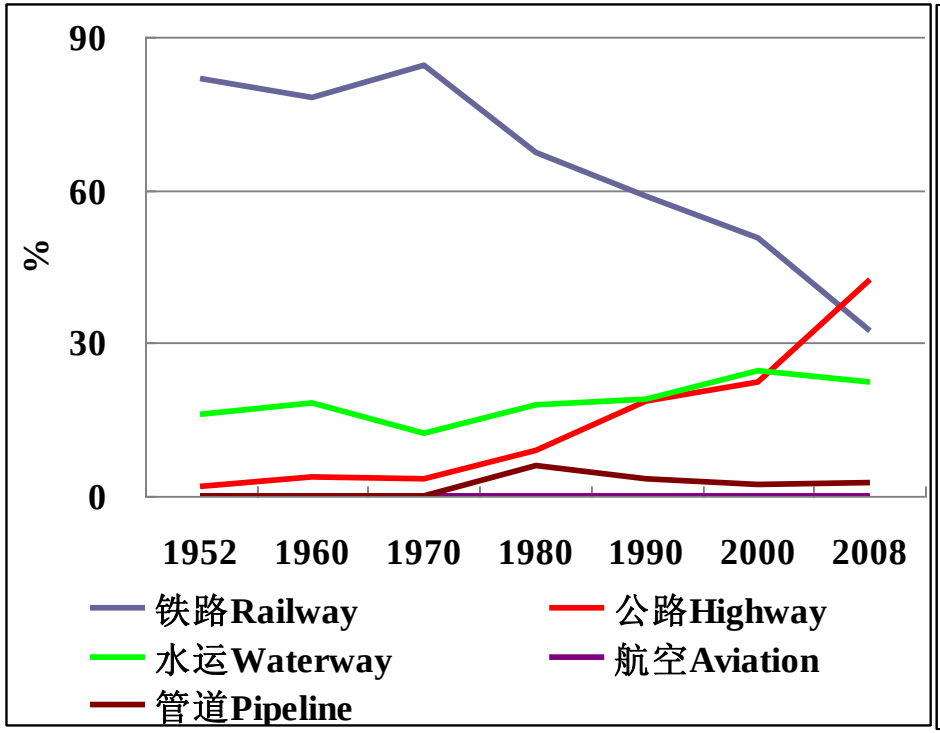
- 交通运输共有五种运输方式：铁路、公路、水运、航空、管道。
- 各种运输方式的能耗强度不同。

- Transportation includes five modes：railway, highway, waterway, aviation, and pipeline.
- Their energy consumption intensities are different.

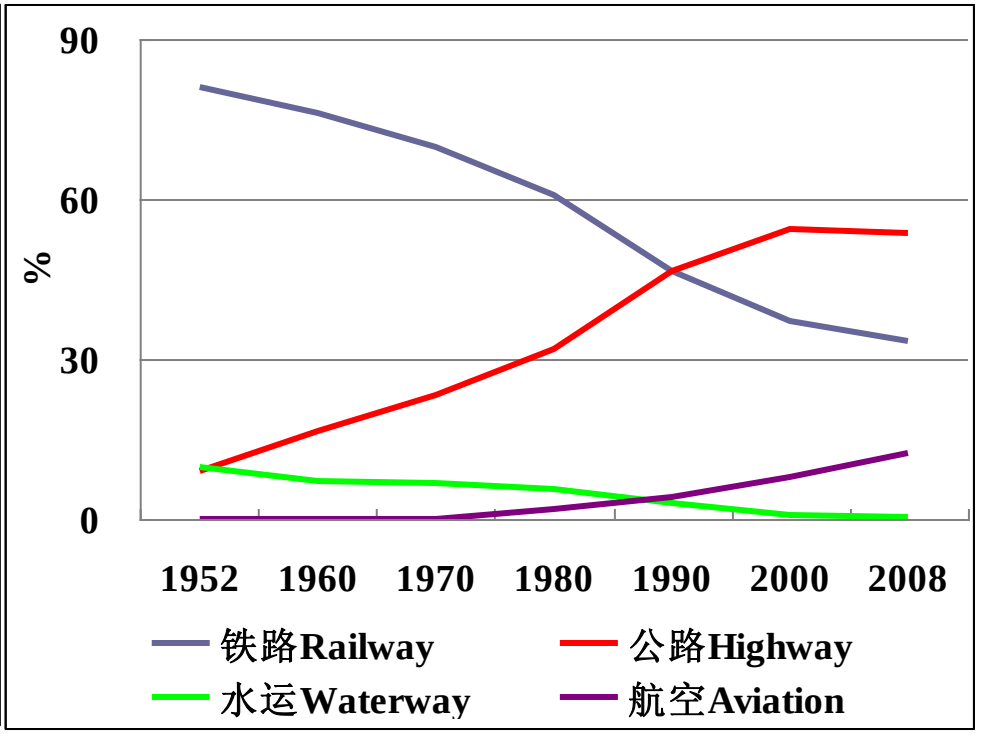


2.2 运输结构 Transportation structure

货运结构
Freight transportation structure



客运结构
Passenger transportation structure



- 公路和民航的比重上升，铁路的比重下降。
- **The proportions of highway and aviation transportation have been growing rapidly, while that of railway transportation has been falling.**

2.2 运输结构 Transportation Structure

- 从发展趋势看，由于公路和航空的快速发展，运输结构有可能“恶化”；
- 要采取措施防止迅速“恶化”。

- **Since highway and air are developing quickly, transportation structure may out of balance.**
- **It’s necessary to take actions to prevent being out of control rapidly.**

2.3 运输能耗强度 Transportation energy intensity

- 我国货运能耗强度较美国和日本高10-20%，节能潜力较大。
- 未来人们对运输服务质量提高的需求会导致能耗强度变大，而技术进步会使能耗强度变小，将产生某种抵消的效果。

- **China's energy intensity of freight transportation is 10 – 20% higher than that of the U.S or Japan, which implies big energy-saving potential.**
- **In future, China's energy intensity of passenger transportation would be increased due to possible improvement on service quality. However, technological advancement would make it lower. As such, the possible increase and decrease in the energy intensity may be evened out.**

第三部分

我国未来交通运输能源消费的预测

Part Three

Prediction of China's transportation energy consumption

3.1 运输量 Transportation Volume

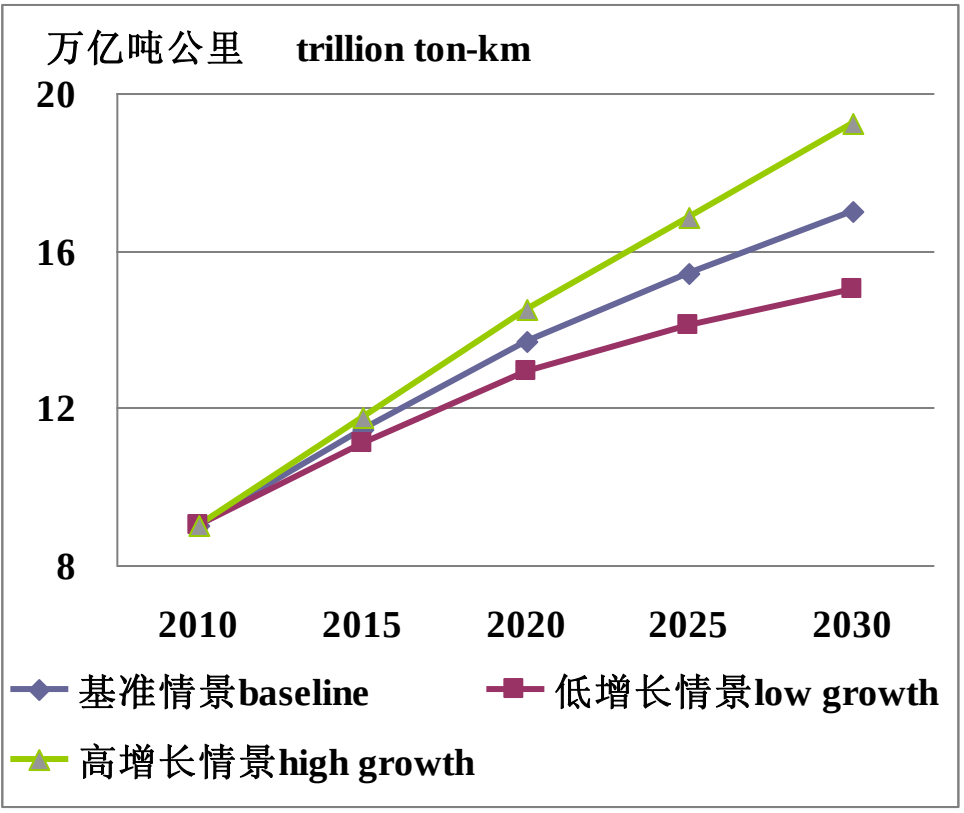
- 以我国经济数据为基础，应用SICGE模型，对我国客、货运输量进行了预测。设定了三种情景，即基准情景、低增长情景和高增长情景。

- **This study forecast passenger and freight in China using SICGE model, based on input-output table in 2002 and relevant economy data from 2002 to 2008. Three scenarios were considered: baseline condition, low and high growth rates.**

3.1 运输量 Transportation Volume

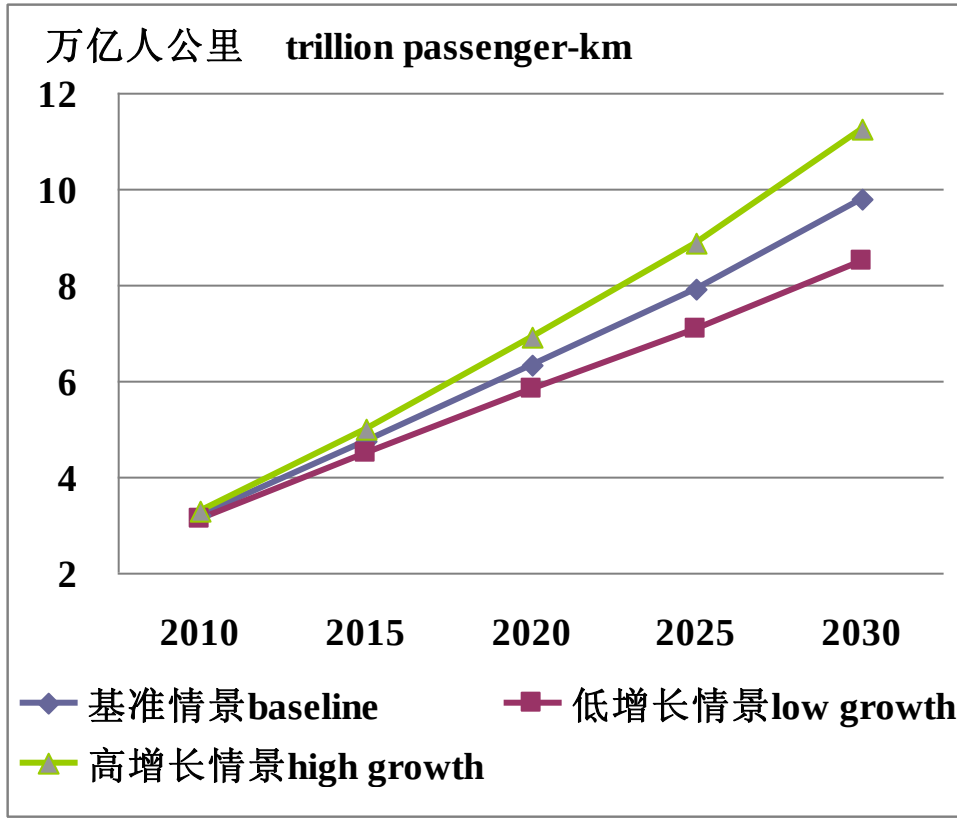
货物周转量预测图

Forecast of freight ton-kilometers



客运周转量预测图

Forecast of passenger-kilometers



3.2 情景组合方案 Combined Scenarios

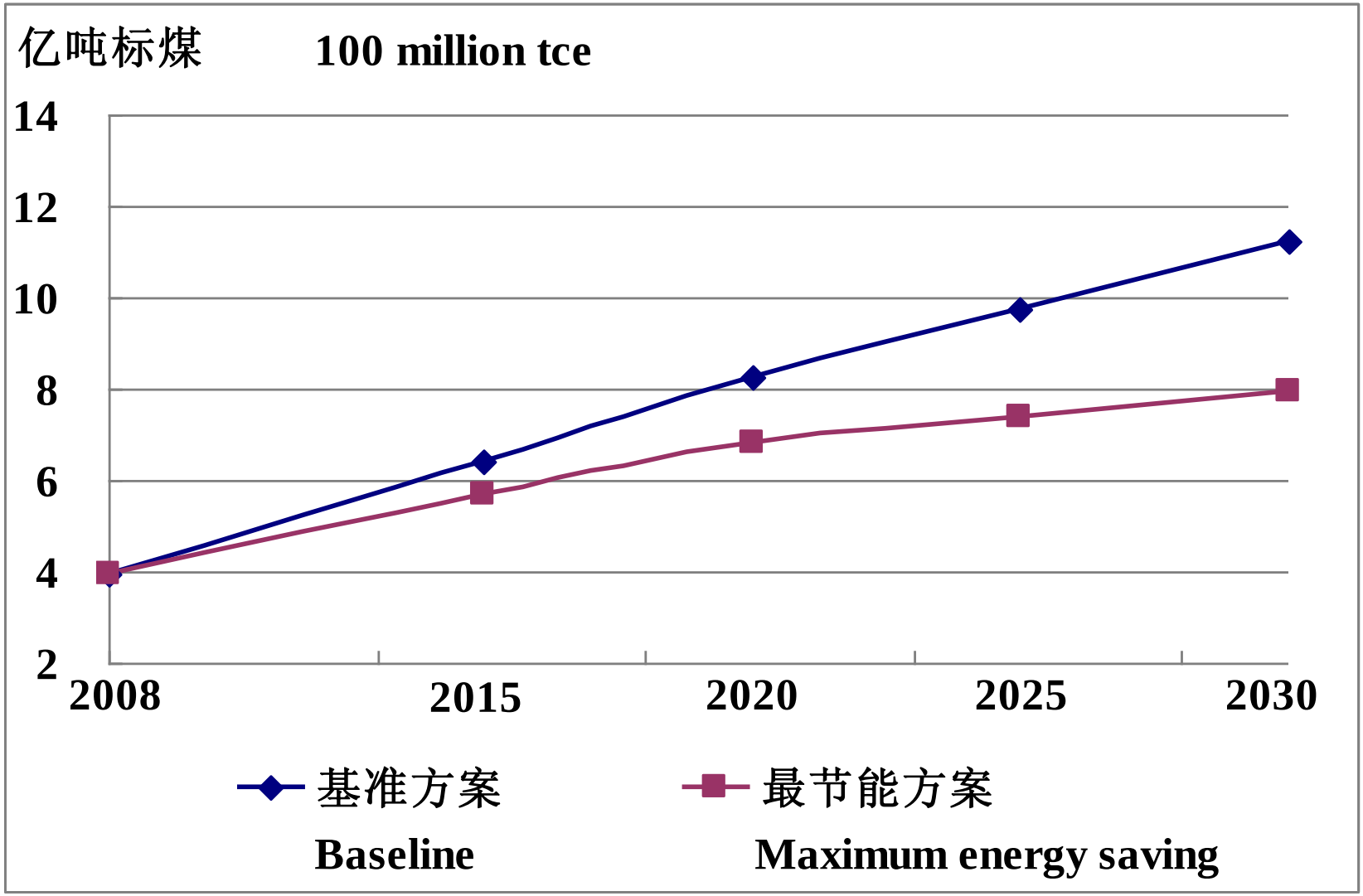
- 将运输量、运输结构、能耗强度的不同方案的进行组合，形成18个方案。
- 基准方案: 运输量、运输结构和运输能耗强度按其自然趋势进行发展的方案。
- 最节能方案: 运输量、运输结构和运输能耗强度均朝着最节能的方向发展的方案。

- **Developed 18 scenarios with different trends for three factors: transportation volume, structure and energy intensity.**
- **Baseline scenario: the baseline scenario for all three factors.**
- **Maximum energy saving scenario: the scenario with energy saving trends of all three factors.**

3.3 能源消费量 Energy consumption

典型方案能源消费量示意图

Energy consumption of typical scenarios



第四部分

交通运输节能潜力分析

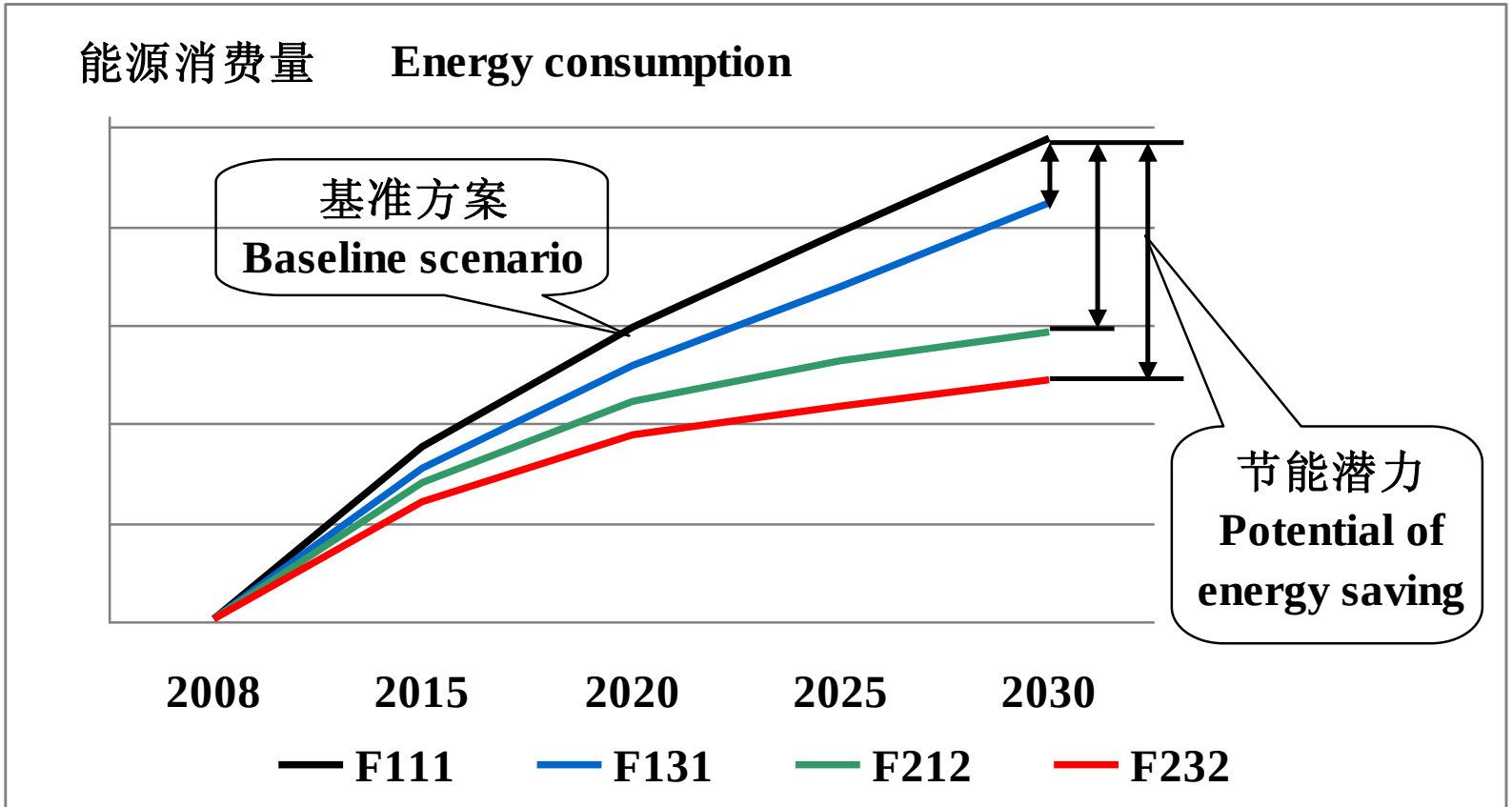
Part Four

Analysis of the potentials on energy saving in transportation

4.1交通运输节能潜力界定
Definition of potential of energy saving in transportation

- 交通运输节能潜力界定为：任一情景组合方案的能源消费量与基准方案能源消费量相比，减少能耗的可能性。

- **Potential of energy saving in transportation -- difference between energy consumptions of any scenarios and that of baseline scenario.**

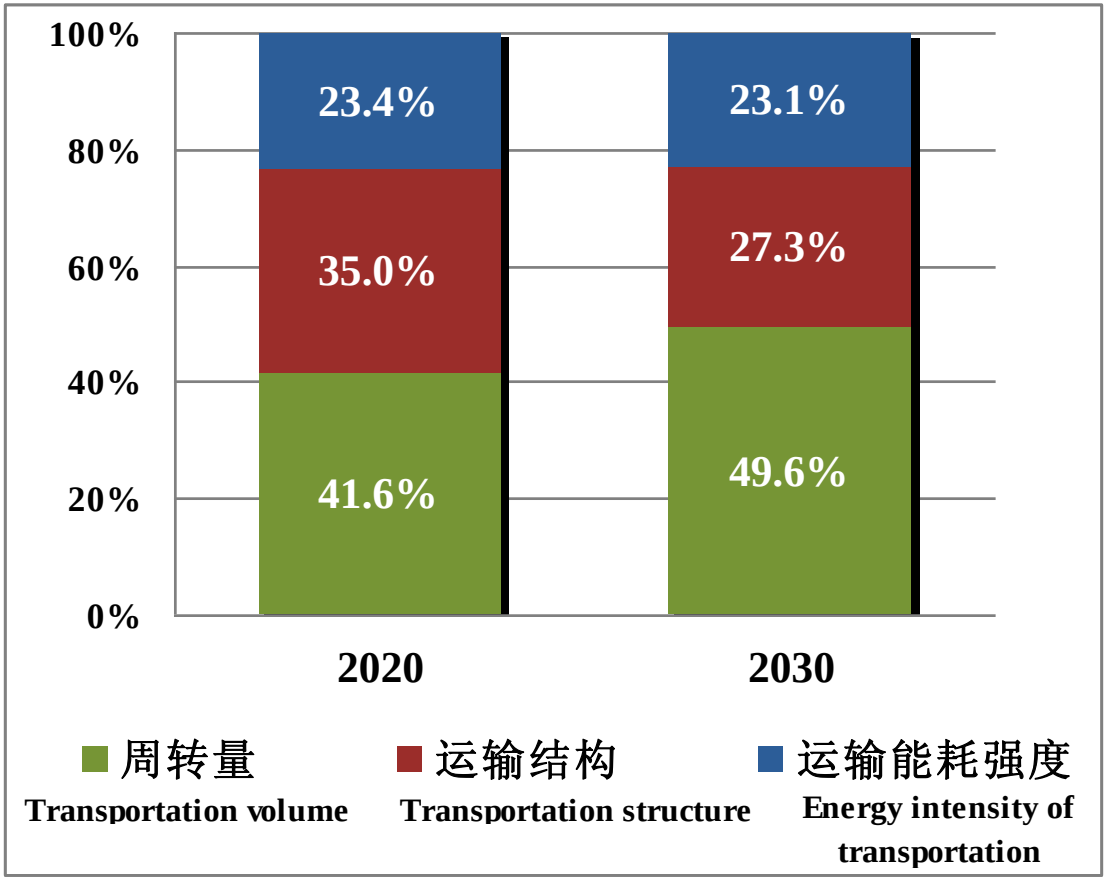


4.2货物运输节能潜力分析
Analysis on potential of energy saving in freight

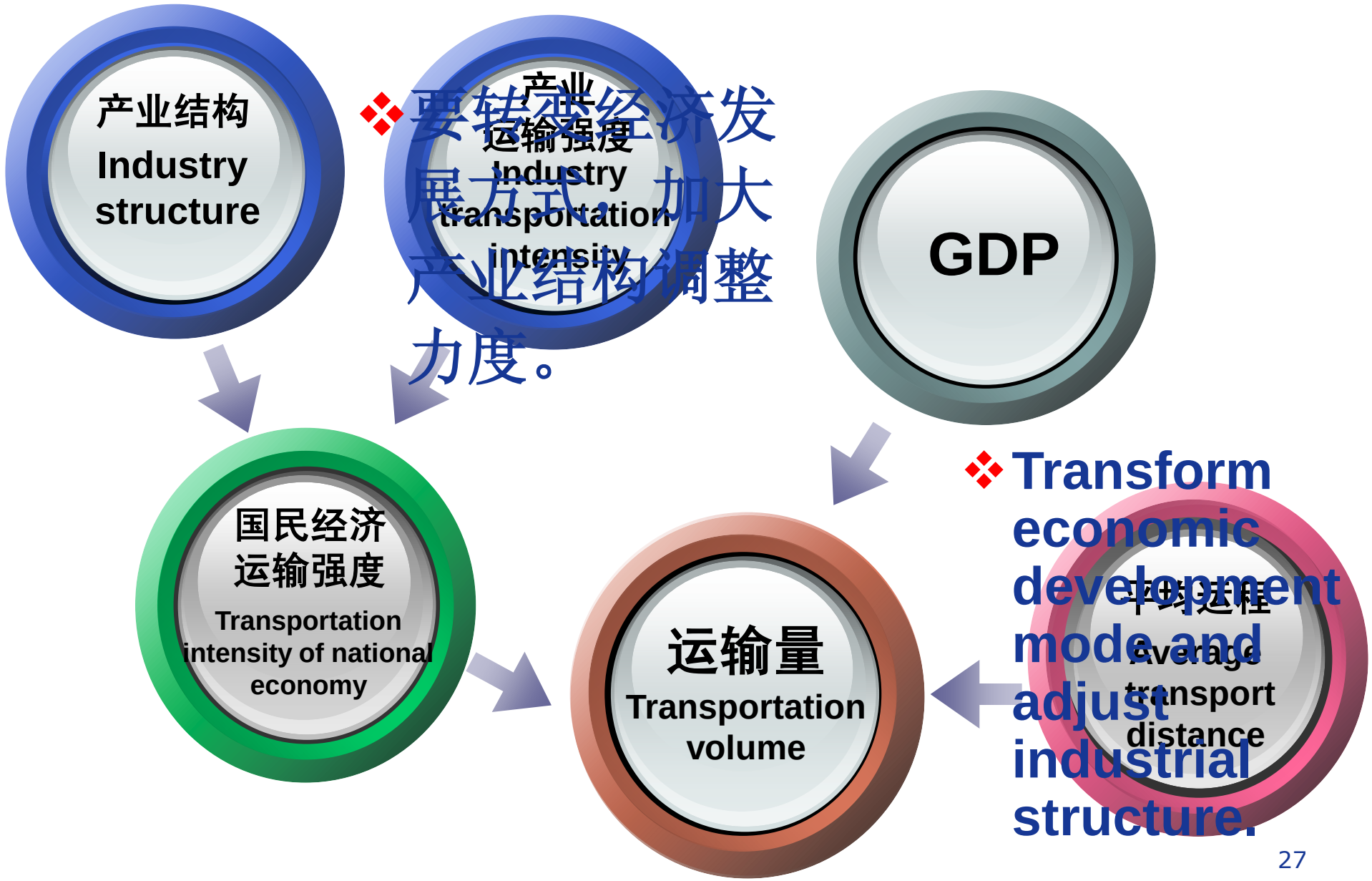
- 运输量的影响最大，其次是运输结构，能耗强度的作用也很重要。
- **Among the three factors, transportation volume has the biggest influence, the next is transportation structure, and the least is energy intensity.**

最大节能潜力中三因素节能贡献率图

Proportions of three factors in the Maximum Energy Saving scenario



影响运量的因素



❖要转变经济发展方式，加大产业结构调整力度。

❖Transform economic development mode and adjust industrial structure.

4.3旅客运输节能潜力
Analysis on potential of energy saving in passenger

- 通过增加铁路运输比重，减少公路运输比重，降低能源消费强度等措施，也可以挖掘出很大的旅客运输节能潜力。

- **With guiding more people to travel using railway instead of highway and low-power vehicles instead of high-power ones , the management institutions can do very well in the potential of energy saving in passenger.**

4.4分析研究结论 Conclusions

1.交通运输能耗占全国能耗比重逐年增加。

若不采取有力措施，任其发展的话，交通运输能耗比重将由2007年的11.4%增加到2030年的20.0%。

1.The proportion of transportation energy consumption among the total energy consumption in China will increase.

If developing without restriction, the proportion of transportation energy consumption in China will increase from 11.4% in 2007 to 20.0% in 2030.

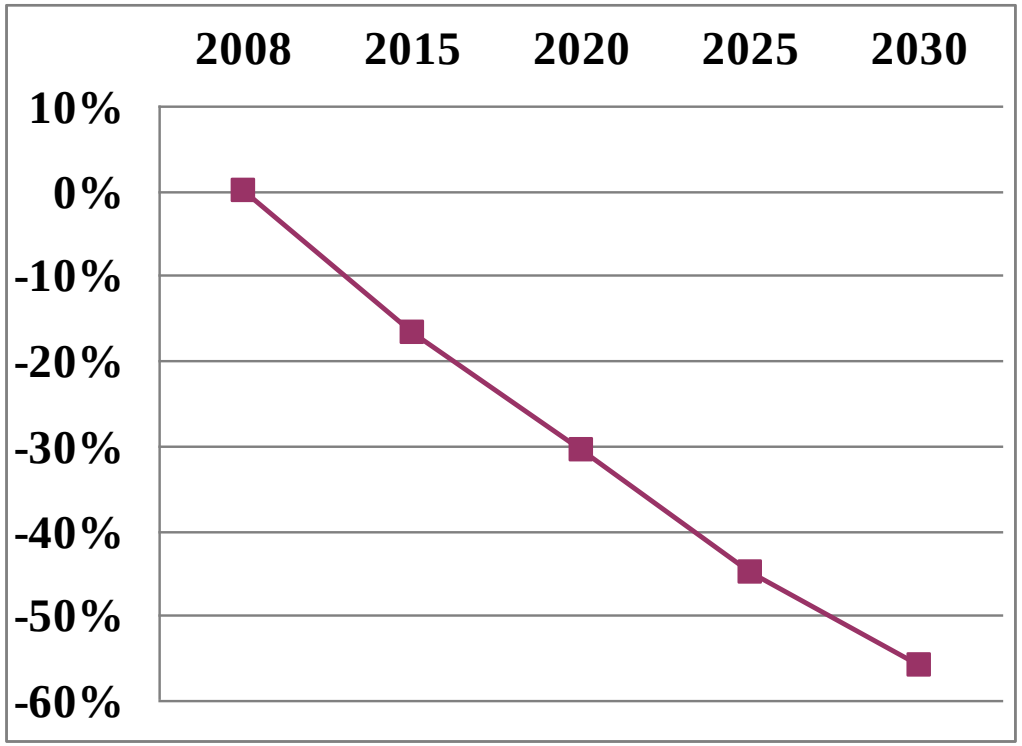
4.4分析研究结论 Conclusions

2.单位GDP交通运输能耗有望大幅降低。实现最节能方案，2030年单位GDP交通运输能耗较2008下降56%。

2.The energy consumption in transportation per GDP would drop dramatically. Compared to 2008, the energy consumptions in transportation per GDP under the maximum energy saving scenario in 2030 is expected to decrease by 56%.

单位GDP交通运输能耗较2008下降幅度示图

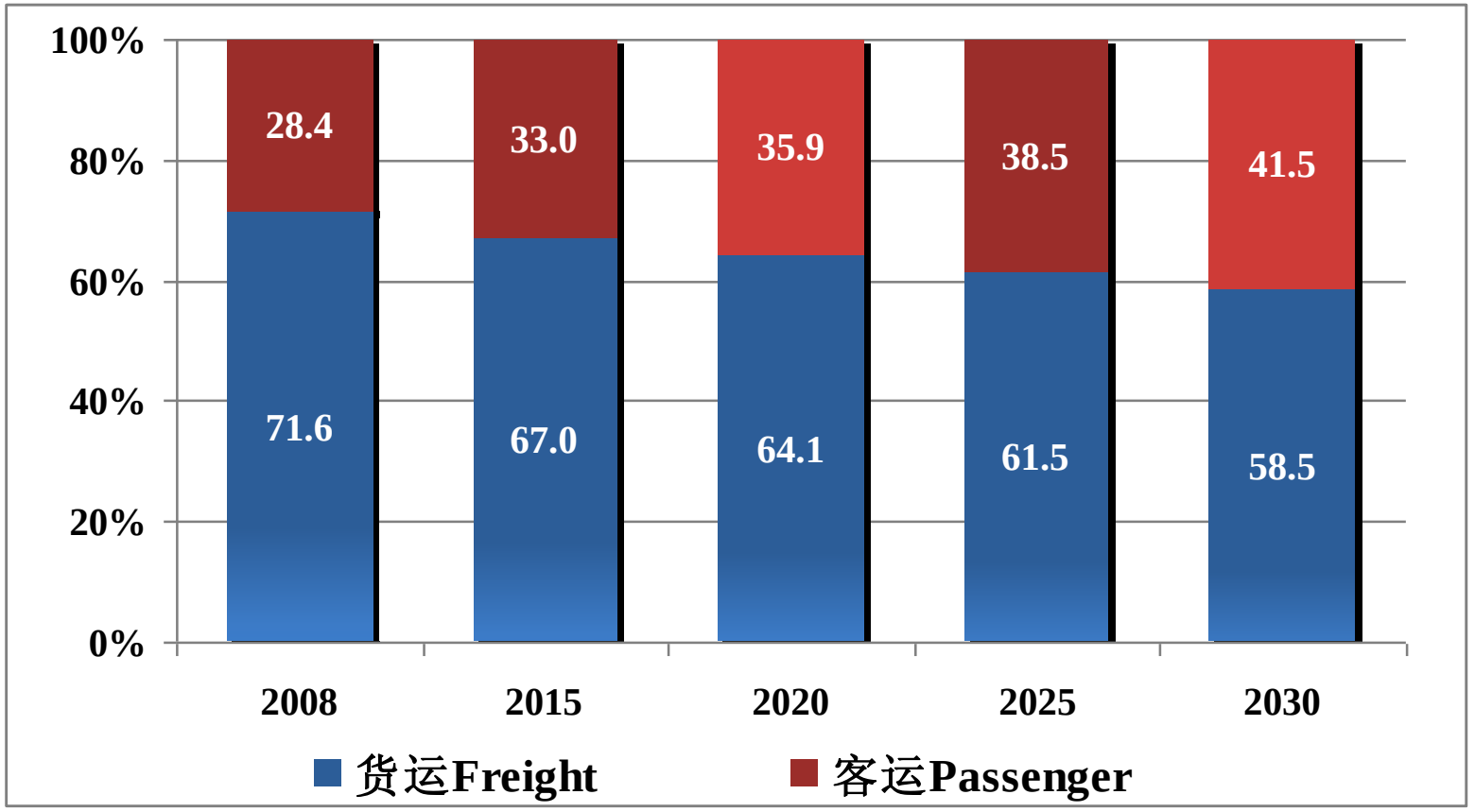
Energy consumption in transportation per GDP in the future years compared with that in 2008



4.4分析研究结论 Conclusions

3. 客运能耗比重越来越大。

The proportion of passenger transportation energy consumption becomes bigger in future.



客货运能耗比重对比图

Comparison between the proportion of passenger transportation energy consumption and that of freight

4.4分析研究结论 Conclusions

4.调整产业结构、压缩过度运输是节能的关键。

第二产业每降低1%，相应地第三产业每增加1%，可以使能源消费量降低2%。

4. The key to energy saving is to adjust industrial structure and reduce excessive transport.

If the proportion of the secondary industry decreases by 1 %, along with that of tertiary industry increases by 1 %, energy consumption can decrease by 2%.

4.4分析研究结论 Conclusions

5. 运输结构的调整应给予高度重视。

- 在货物运输中，铁路每提高1%，相应地公路降低1%，可减少能源消费量1. 2%；水路每提高1%，相应地公路降低1%，可节能能源消费量1. 3%。
- 在旅客运输中，铁路每提高1%，相应地公路降低1%，可降低能源消费1. 9%；铁路每提高1%，相应地航空降低1%，可减少能源消费1. 6%。

5. **More attention should be given to the adjustment of transportation structure.**

- **If the proportion of railway freight increases by 1%, along with that of highway decreases by 1%, energy consumption can decrease by 1.2%. If the proportion of waterway increases by 1% and that of highway decreases by 1%, energy consumption can decrease by 1.3%.**
- **If the proportion of railway passenger increases by 1% and that of highway decreases by 1%, energy consumption can decrease by 1.9%. If the proportion of railway passenger increases by 1 % and that of air decreases by 1%, energy consumption can decrease by 1.6%.**

4.4分析研究结论 Conclusions

6.降低交通运输能耗强度是重要的节能潜力。

2020、2030年货运能耗强度降低对节能的贡献率分别为23.4%和23.1%。

6. Decreasing energy intensity implies important potential for energy saving in transportation.

In 2020 and 2030, the energy saved due to freight energy intensity take 23.4% and 23.1% of the total potential of energy saving, respectively.

4.4分析研究结论 Conclusions

7.交通运输存在着巨大的节能潜力。

实现最节能方案，2020、2030年的节能潜力分别为1.4亿和3.2亿吨标煤。2030年交通运输能耗占全国能耗比重由20.0%降至17.7%。

7.Transportation has a huge energy saving potential.

Under the maximum energy saving scenario, the potential of energy saving in 2020 and 2030 are 140 and 320 million tce, respectively. In 2030, the proportion of transportation energy consumption will decrease to 17.7% from 20.0%.

4.4分析研究结论 Conclusions

经过各种方案的比较分析，考虑实现的可能性，提出节能目标是：2030年单位GDP交通运输能源消费量较2008年下降50%。

By analyzing and comparing of various scenarios, considering the possibility of achieving, transportation energy saving goal is proposed as follow: Compared to 2008, the transportation energy consumption per GDP in 2030 decreases by 50%.

第五部分

交通运输节能政策的建议

Part Five

Policy recommendations on energy saving in transportation

我国交通运输节能存在的主要问题：

- 对交通运输节能问题重视不够；
- 未把改变经济发展方式、优化产业结构作为交通运输节能作为的关键因素；
- 现行交通运输管理体制，缺乏综合协调，各种交通运输方式各自规划、各自建设，不利于构建节能型综合交通运输体系；
- 现行税制无法起到引导节能的作用。

Main problems in China's transportation energy saving:

- Not enough attention paid to transportation energy saving.
- Economy development pattern transform and industrial structure optimization are not considered as key solutions for transportation energy saving .
- Lack of coordination in current transportation management system. Planning and construction of different transportation modes are not consistent.
- Current tax system cannot promote energy saving.

5.1 高度重视交通运输节能，明确节能目标

Highlight the importance of transportation energy saving & adopt clear targets

- 交通行业“十二五”发展规划，应当明确提出交通运输各行业的节能目标和统计、监测、考核办法。

- **The 12th Five-year Plan should clearly specify the energy saving goals, performance measures, supervision and evaluation methods for all transportation modes.**

5.2 把优化产业结构作为推进交通运输节能的关键

Recognizing that the optimization of industrial structure is the key for improving transportation energy saving

- ❖ 加快转变经济发展方式，大力调整和优化产业结构。
- ➢ 遏制重化工业盲目增长的趋势，发展高新技术产业和服务业，降低第二产业比重，提高第三产业比重,减少过度运输。
- ❖ 优化产业的区域布局，降低货物运输量
- ➢ 鼓励坑口电厂和煤化工基地的建设，提高煤炭就地转化率。进一步抓好临海大型钢铁、石化基地的建设。

- ❖ **Accelerate the transformation of economy development pattern; adjust and optimize industry structure**
- ➢ **Control the growth of heavy and chemical industry; enhance high-tech and service industries; reduce the share of secondary industry; increase the share of tertiary industry; reduce excessive transportation.**
- ❖ **Optimize spatial distribution of industry and reduce the volume of freight transportation**
- ➢ **Encourage the construction of pithead power plants and coal chemical industry bases; increase coal conversion rate in situ. Continue to choose seaside region for constructing large-scale steel and petrochemical bases.**

5.3 优化运输结构，构建节能型综合交通运输体系

Optimize transportation structure & build energy efficient transportation system

- 调整投资结构，加强节能型运输方式建设
  - 调整交通运输的投资结构，向运能大、能耗和污染小的铁路、水运和管道等运输方式倾斜。
- **Adjust investment to strengthen the construction of energy-efficient transportation modes**
  - **Railway, waterway and pipeline need to be prioritized because of their high energy efficiency, low pollution, and good capacity,.**

5.3 优化运输结构，构建节能型综合交通运输体系

Optimize transportation structure & build energy efficient transportation system

- 改革现行管理体制，建立统一的综合运输管理机构
  - 将铁路、公路、民航、水路、管道五类运输方式由一个政府部门统一规划和管理。建立统一的综合运输管理机构。推动建设节能型的交通运输体系。

- **Reform current management system and establish an integrated transportation management agency.**
  - **Establish one ministry to integrate the planning and management of the five transportation modes: railway, highway, air, waterway, and pipeline.**

5.4进一步降低能源消费强度

Continue to reduce energy intensity

- 加大各种运输方式的技术节能力度
  - 选用新型机车车辆、汽车、船舶、飞机，淘汰高耗能的老型号交通工具；
  - 推进技术进步，降低既有交通工具能耗。
  - 加快建立包括所有主要车型的机动车燃油经济性标准体系。

- **Enhance technical energy saving in all transportation modes**
  - **Accelerate the penetration of new trains, vehicles, boats, and airplanes and the retirement of old models.**
  - **Promote technical innovation to reduce energy consumption.**
  - **Accelerate the establishment of a motor vehicle fuel economy standard system include all the main vehicles.**

5.5 制定财税和价格政策，促进交通运输节能

Adopt fiscal policies to promote transportation energy saving

- 加大财政支持力度
  - 加大对交通节能的投入。
  - 中央财政和地方预算应安排交通节能专项资金，对一些重要的交通节能项目，采取财政直接投资的方式予以支持。
  - 对于使用新能源汽车的用户，采取现金补贴、和低息贷款等激励政策。

- **Increase fiscal support**
  - **Increase the investment on transportation energy saving.**
  - **The central and local governments should establish special funding for providing direct support to some important transportation energy-saving projects.**
  - **Adopt incentive policies to encourage using new-energy vehicles, e.g., providing cash subsidy and low interest loan.**

5.5 制定财税和价格政策，促进交通运输节能

Adopt fiscal policies to promote transportation energy saving

- 完善促进交通运输节能的税收政策
  - 提高燃油税税率，推进机动车节能。
  - 完善机动车能源效率标识制度，引导购买低排量、节能汽车。
  - 汽车消费税、购置税和车船税等应当与其燃油经济性挂钩。
  - 对新能源汽车研发和生产，给予增值税、所得税减免等。

- **Improve tax policies for the promotion of energy saving in transportation**
  - **Increase fuel tax for promoting energy saving of motor vehicles**
  - **perfect motor vehicle energy efficiency labeling system, and encourage purchasing low emissions and energy saving vehicles**
  - **Link vehicle fuel economic efficiency to their sale and usage taxes**
  - **Provide preferential tax such as value-added tax and income tax relief for research and development and production of new-energy motor vehicles.**

5.5 制定财税和价格政策，促进交通运输节能

Adopt fiscal policies to promote transportation energy saving

- 推进资源要素价格改革
  - 理顺资源产品的价格，建立能够反映资源稀缺程度、环境损害成本的资源产品价格形成机制。
  - 大幅度提高资源税水平，遏制盲目发展重化工业的倾向，推进产业结构升级。

- **Advocate price reform for products with resource elements**
  - **Reform resources pricing mechanism to reflect the scarcity degree and environmental cost.**
  - **Increase energy resources tax significantly; suppress blind development of heavy chemical industry, and promote update of industrial structure.**

5.5 制定财税和价格政策，促进交通运输节能

Adopt fiscal policies to promote transportation energy saving

- 采取综合措施，降低小汽车出行率
  - 要加大公共交通建设力度，为居民出行提供方便快捷的公交出行方式。
  - 依靠经济手段，鼓励居民出行使用公共交通。提高市区停车收费标准，实施有偿停车等政策，提高汽车使用成本。

- **Take comprehensive measures to reduce car travels**
  - **Improve public transportation to provide fast and convenient service.**
  - **Use market oriented measures to encourage the use of public transportation: increase downtown parking fees; implement paid parking; increase automobile usage costs.**

5.6 完善法律法规，保障交通运输节能措施的有效实施

Improve regulation system & ensure effective enforcement of energy-saving measures in transportation.

❖ 修订《中华人民共和国节约能源法》

➢《节约能源法》关于运输节能的规定不明确、不完整，操作性较差。

➢修订《节约能源法》，加强、细化交通运输行业的内容。

◆明确节能主管、监督部门职责；

◆加大对运输企业节能监管；

◆完善燃油消耗限值标准为核心的市场准入门槛，强化对违法行为的处罚。

❖ **Amend Energy Conservation Law**

➢**No clear requirements on transportation energy savings, incomplete, and not easy to implement.**

➢**Should strengthen and improve the contents on transportation energy saving.**

◆**Specify the responsibilities of management and supervision agencies for transportation energy saving.**

◆**Enhance energy conservation supervision on transportation enterprises.**

◆**Improve market entrance requirements based on fuel consumption limit standard; strengthen the punishment on illegal behaviors.**

谢谢！

Thanks!

新能源示范城市的实践与思考

-吐鲁番市新区可持续发展城市项目

为促进新能源的利用，有效应对全球气候变化，探索西部荒漠化地区城市发展道路。2008 年的金秋时节，在新疆自治区和地区各级领导的支持下，由国际欧亚科学院院士（现任秘书长）、中国科学中心主席团常务副主席、城市科学部主任汪光焘教授主持，由国际欧亚科学院中国科学中心、北京市建筑设计研究院、广州市城市规划勘测设计研究院、中国电子工程设计院、中国气象局风能太阳能资源评估中心等单位组成的“可持续城市发展研究中心”团队逐步开始了新区的研究、规划和设计工作。

在这两年的时间里，以起步区一期 1.43 平方公里的居住建设用地作为试点，针对当地气候文化特征、充分利用当地太阳能等可再生能源的优势，研究太阳能光电、光热等可再生能源技术在城市建筑群中的综合应用，探索一种充分利用可再生能源的低能耗、低排放的新型城市可持续发展模式。

本着“以开发低碳能源为保证，以清洁生产为关键，以循环经济为有效方法，以合理布局为主要内容，最终以可持续城市发展为根本方向”的理念，以研究为基础、和实践充分结合，在内容和工作方法上进行了全面的创新。新区起步区一期总建筑面积为 75.4 万平方米，光伏板装机容量可达到 13.4 兆瓦，光伏年发电量可达到 1580.8 万千瓦时，约可达到该区住宅用电量的 1.3 倍，可以实现在太阳能产电、产热满足住户使用需求的基础上，太阳能光伏发电富余电量还可满足区内绿色公交用电的要求。

本项目经过参与各方的努力，已被列为“自治区和谐生态城区和城乡一体化建设示范区”，得到了国家能源局“支持新疆吐鲁番市新区创建国家新能源示范城市”的批复。

本项目是环境友好、造福百姓的，它充分利用太阳能资源，让老百姓得到实惠。 包括：

1. 社区利用太阳能资源产生的电能尽大程度的社区内部使用；
2. 社区住宅优惠用电；
3. 住宅使用的余电用于社区绿色交通。

本项目是在中国可复制性:

1. 气候条件： 吐鲁番地区太阳能资源总量属于“很丰富带”，中国有一半以上的国土面积与其相当或在其之上。

2. 经济条件：吐鲁番地区在中国属于欠发达地区。

3. 城市模式：吐鲁番市是典型的中国中小城市。

吐鲁番市新区建成后将成为全疆乃至西北干旱、半干旱地区新能源综合利用及城乡一体化的示范区，它对中国西部地区特别是干旱炎热地区，因地制宜地建设适居城市将具有积极的指导意义和示范作用。

New Energy Pilot Cities: Thoughts on Practices

Sustainable Urban Development Project in New District of Turpan City

To accelerate the use of new energy, respond to global climate change, and explore the development of the western desert area of China, in the golden autumn of 2008 a team from the Sustainable Urban Development and Research Center directed by Professor Wang Guang Tao[1] and supported by the Xinjiang government leadership of all levels began the research, plan, and design of the Turpan City New District. The team has member from several scientific research institutes, such as China Science Center of the International Academy for Europe and Asia, Beijing Institute of Architectural Design & Research, Guangzhou Urban Planning and Design Survey Research Institute, China Electronics Engineering Design Institute, as well as the Wind and Solar Energy Resource Assessment Center of China Meteorological Bureau.

Over the course of the last two years, the first-stage 1.43 square km. residential construction area has been developed as a pilot project. In accordance with the local climate and cultural features, we have made best use of the renewable solar energy, researched the comprehensive application of renewable energy (such as solar photovoltaic and thermal energy) to apply them to the urban building complex, and explored a new urban development pattern that can fully put low power consumption and emission to use.

In accordance with the slogan "To guarantee a development of low-carbon energy as target, clean production as key guideline, cycling economy as an efficient approach, reasonable redistribution as the main point, and sustainable urban development as the direction," we have created a new approach to realizing these ideas and carried out work that integrates research and practice. The building area of the first-stage project of the New District is 754 thousand square meters; the installed capacity of photovoltaic panels is 13.4 megawatt; and the annual photovoltaic power output is 15.808 million kilowatt-hours, almost 1.3 times the residential electricity of the area. Solar energy can not only generate heat and electricity to meet users' demand, but the remaining solar photovoltaic power can be used for green transport in the New District.

With the efforts of all participants, this project has been named "The Harmonious and Ecological City and Urban-Rural Integration Construction Demonstration Area in

[1] Academician of International Academy for Europe and Asia, the presidium routine Vice President of China Science Center and the Director of City Science

the Autonomous Region," and has also received official approval by National Energy Administration.

This environment-friendly project that makes the best use of solar energy and benefits the people includes:

1. Electricity from solar energy can be used within the community to the maximum extent.
2. Residents in the community can enjoy the benefits of this electricity.
3. Residual electricity can be used for green transport within the community

The reproducibility of this project in China includes:

1. Climate conditions: The gross solar energy in Turpan area can be classified as a "rich zone of energy resource," over half of China's land area is equal or above this level.
2. Economic conditions: The Turpan area is in an underdeveloped region of China
3. Urban size: Turpan is a typical middle-sized city.

After the completion of the New District, it will be a demonstration of the comprehensive use of new energy and urban-rural integration not only for Xinjiang, but also for the whole arid and semi-arid western region. The success of the New District will become a guide and example, and provide experience for the building of livable cities in accordance with local conditions.

新能源示范城市的实践与思考

New Energy Pilot Cities: Thoughts on Practices

–吐鲁番市新区可持续发展城市项目

-Turpan New District Sustainable Development City Project

2010.11

目标：促进新能源的利用，有效应对全球气候变化，探索西部荒漠化地区城市发展道路。

Goals: To accelerate the utilization of new energy; address global climate change; explore urban development in China's western desert region.

国家能源局文件

国能新能〔2010〕107号

国家能源局关于新疆吐鲁番市新区创建国家新能源示范城市的复函

新疆自治区人民政府：

报来《关于申报新疆吐鲁番市新区为国家新能源示范城市的函》（新政函〔2010〕22号）收悉，现函复如下：

一、为促进新能源技术应用，扩大新能源利用规模，有效应对全球气候变化，发挥吐鲁番地区光热资源优势，探索西部荒漠化地区城市发展道路，我们支持新疆吐鲁番市新区创建国家新能源示范城市。

二、建设国家新能源示范城市的总体要求是，充分利用当地太阳能资源，创新城市能源建设和管理理念，探索各类新能源技术在建筑节能、市政供电和公共交通中的应用，显著提高新能源在城市用能中的比重，不断增强吐鲁番市新区可持续发展能力。

三、新能源示范城市建设要因地制宜、统筹规划，深入分析当地气象条件和资源状况，在吐鲁番市新区规划建设中，充分利用太阳能光伏、光热和地源热泵等技术，实现新能源利用与城市建设的和谐发展。

四、高度重视新能源示范城市的运行管理，加强现代网络技术在城市能源管理中的应用，以智能电网建设为基础，建立新能源发电并网系统运行及管理制度，形成有利于发挥新能源技术优势、适合系统运行的管理体系。

请按照上述要求，认真做好新能源示范城市建设的相关工作，不断完善方案，并将有关情况报告我局。我局将根据相关政策要求，对符合条件的太阳能、风能和地热能等综合利用工程予以支持，对相关财政支持政策和配套电网建设予以协调。

特此函复。

二〇一〇年七月六日

主题词：新能源　示范城市　新疆　函

抄送：国家发展改革委、财政部、住房和城乡建设部，国家电网公司、中国节能投资集团公司

项目概述：

启动时间：2008年 10月

研究团队：汪光焘主任为首席科学家的“可持续城市发展研究中心”

研究对象： 吐鲁番市新区

支持机构： 美国能源基金会

Project Summary

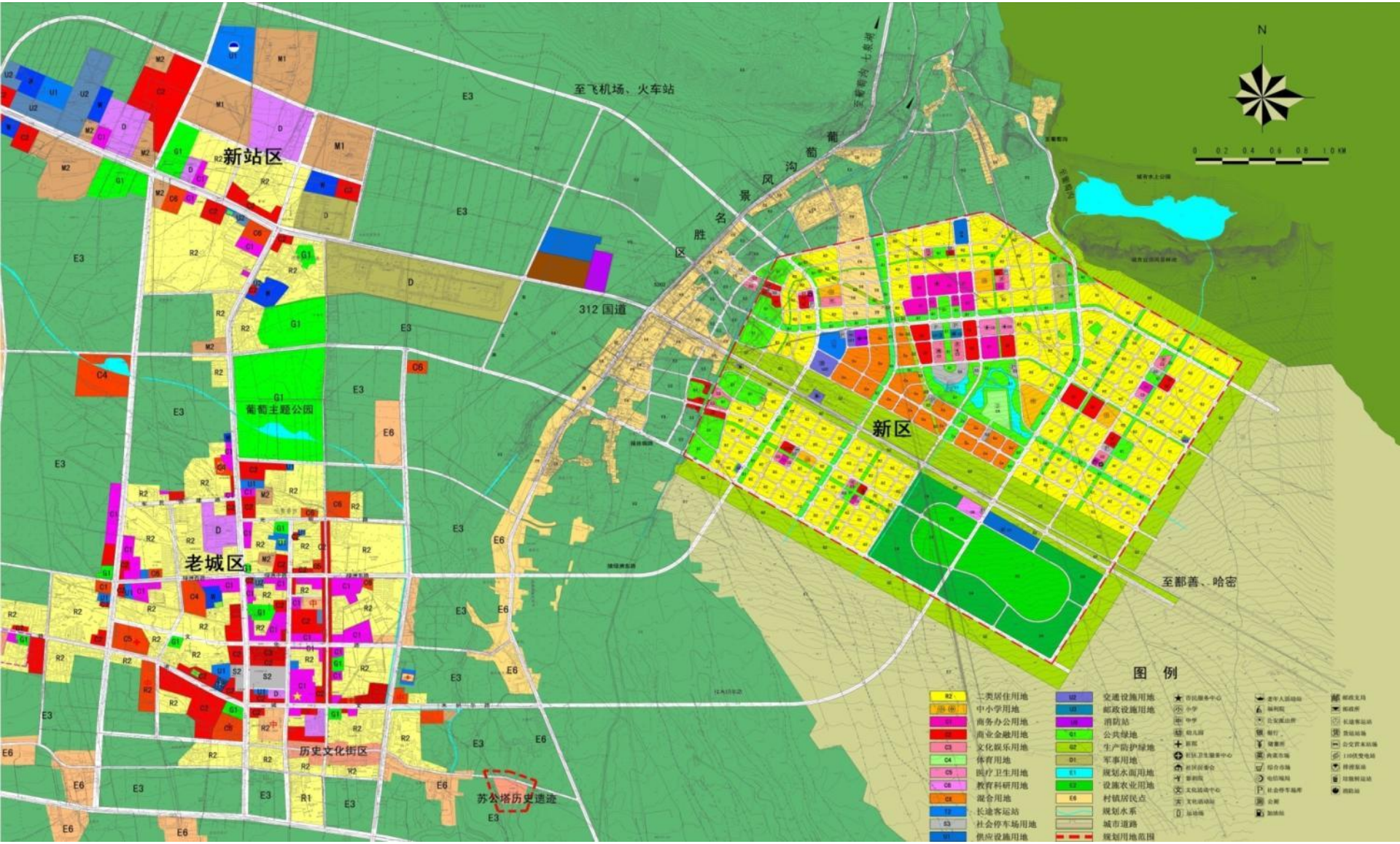
Start Date： October 2008

Research Team： Research Center for Sustainable Urban Development

Chief Scientist: Wang Guangtao

Object of Study: Turpan City’s New District

Supporting Sponsor: The Energy Foundation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历史文化街区
苏公塔历史遗迹
至飞机场、火车站
312 国道
至鄯善、哈密
葡萄沟风景名胜区
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工作回顾

- **2008年10月至2009年01月**

完成概念规划和四个专题研究，包括：

《新区产业发展研究》

《新区绿色交通系统发展研究》

《基于生态的城市空间发展策略研究》

《地域性生态建筑研究》

于2009年1月7日，通过专家评审。

Work Update

- **From October 2008 to January 2009**

Completed concept planning and four monographic studies, including:

- *A Study on New District Industry Development*

- *A Study on New District Green Transport System Development*

- *Development Strategy Study based on Ecological Urban Space*

- *A Study on Regional Ecological Construction*

Passed an evaluation by experts on January 7, 2009

- 2009年01月至2009年05月

2009年3月14日，完成总体规划通过专家组评审。

2009年3月20日自治区人民政府将吐鲁番市新区列为“自治区和谐生态城区和城乡一体化示范区”。

2009年7月31日自治区人民政府批准《吐鲁番市新区总体规划》。

- **From January 2009 to May 2009**

Completed the general plan for Turpan City New District, and passed an evaluation by an expert panel on March 14, 2009.

On March 20, 2009 the government of autonomous region listed Turpan City New District as an “Autonomous Region Harmonious Ecological City and Urban/Rural Integration Demonstration Area”

July 31, 2009 the government of the autonomous region approved Turpan City New District General Plan

•2009年06月-2010年4月

《建筑和太阳能的一体化研究及示范区设计》

《基于光伏发电的微电网系统研究》

《基于太阳能综合运用的绿色交通研究》

《主要指标、经济及碳排放的初步估算气象研究》等研究

2010年4月获得“国家能源局关于新疆吐鲁番市新区创建国家新能源示范城市的复函”。

•2010年05月-至今，示范项目实施阶段。

•From June 2009 to April 2010

-- Study on Construction and Solar Energy Integration and Demonstration Area Design

-- Study on Microgrid Systems based on Photovoltaic Power Generation

-- Study on Green Transport based on Integrated Use of Solar Energy

-- Meteorological Research on Preliminary Estimate of Key Indicators, Economy, and Carbon Emissions

-- Other research studies

In April 2010 received *Reply from National Energy Administration on Xinjiang Turpan City New District to Create Environmental Energy Sources Demonstration City*

• From May 2010 to present - Implementation Phase of Demonstration Project

国家能源局文件

国能新能〔2010〕107号

国家能源局关于新疆吐鲁番市新区创建国家新能源示范城市的复函

新疆维吾尔自治区人民政府：

你区《关于申报新疆吐鲁番市新区为国家新能源示范城市的请示》（新政函〔2010〕22号）收悉。现函复如下：

一、为促进新能源技术应用，扩大新能源利用规模，有效应对全球气候变化，发挥吐鲁番地区太阳能资源优势，探索西部地区新能源城市发展道路，我们支持新疆吐鲁番市新区创建国家新能源示范城市。

二、建设国家新能源示范城市要因地制宜，充分利用当地太阳能资源，创新城市规划建设和管理理念，探索太阳能等新能源技术在建筑节能、市政设施和公共交通中的应用，提高新能源在城市供能中的比重，不断增强吐鲁番新区可持续发展能力。

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三、要在新能源示范城市建设中因地制宜，统筹规划，充分分析当地气象条件和资源状况，结合吐鲁番市新区规划建设要求，充分利用太阳能光伏、光热和地源热泵等技术，实现新能源利用与城市建设的和谐发展。

四、要高度重视新能源示范城市的运行管理，加强现代网络技术在城市能源管理中的应用，以智能电网建设为基础，建立新能源发电运行及管理制度，形成有利于新能源技术进步、适合新城市的能源管理体系。

请你区按上述要求，认真做好新能源示范城市建设的组织工作，[illegible]

特此函复。

[illegible]日

主题词：新能源　示范城市　新疆　函

抄送：国家发展改革委，财政部，住房城乡建设部，国家电网公司，[illegible]

2

研究介绍：

目标：建设充分利用太阳能资源的可持续新区。

重点：技术整合、建筑一体化、智能电网气候监控等难点领域的突破。

思路原则：采用光热与光电相结合的原则；

太阳能光热产热实行满足用户自身需求的原则，不进行统一管理；

太阳能光电产电将进行统一管理，实行用户计量、回归使用原则。

Study Introduction:

Purpose: To construct a district that fully utilizes solar energy resources

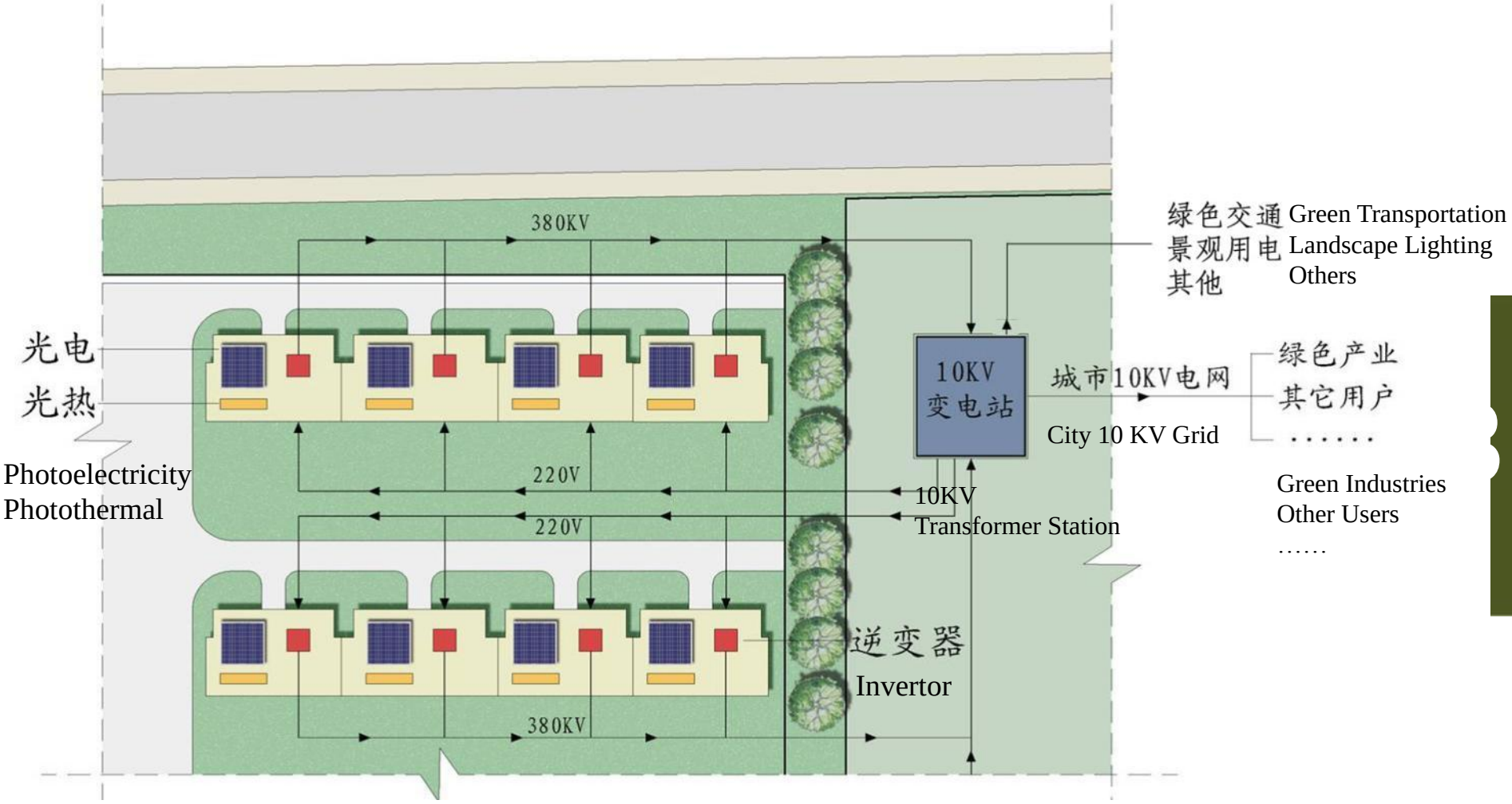
Main Points: Technological integration, building integration, intelligent climate monitoring network, and breakthroughs in other difficult areas

Principles：

Integrate application of solar heating and solar PV technologies;

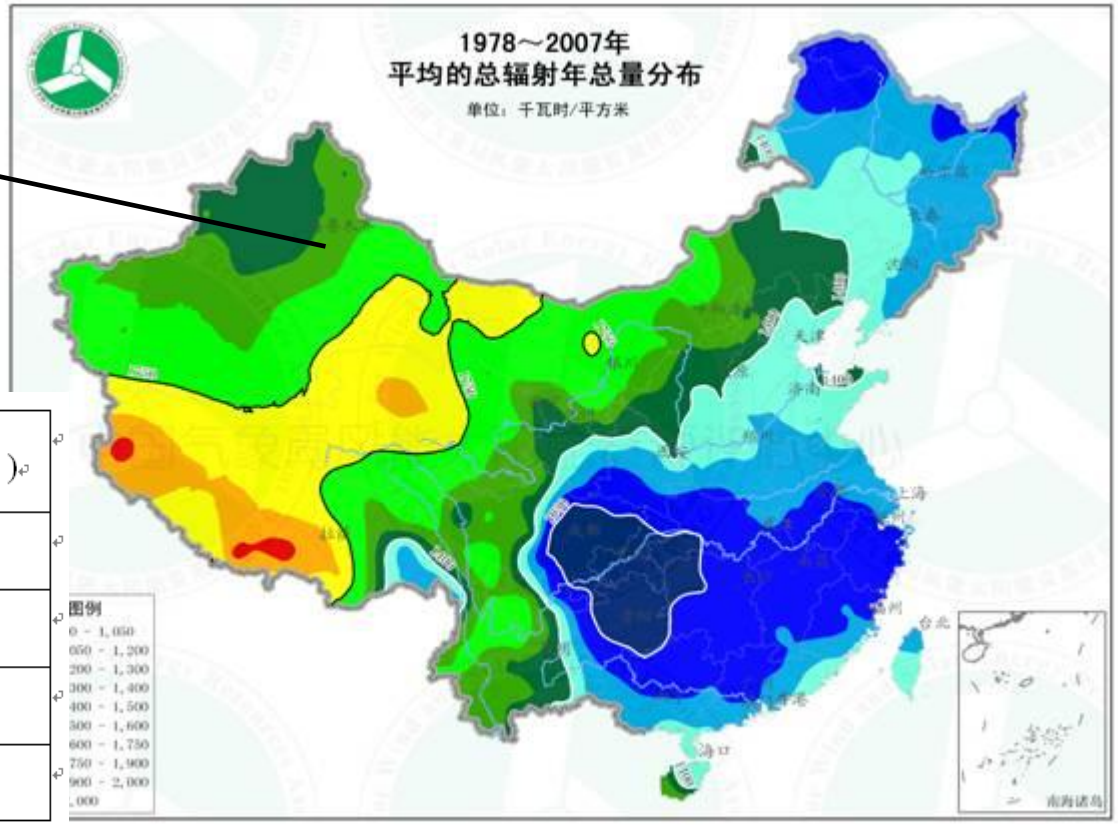
Solar heating: generation according to residents' needs, no unified management is needed

Solar PV: apply unified management of PV power systems; adopt net metering and maximize use of PV power.


380KV
光电
光热
Photoelectricity
Photothermal
220V
220V
380KV
10KV
变电站
10KV
Transformer Station
逆变器
Invertor
绿色交通 Green Transportation
景观用电 Landscape Lighting
其他 Others
城市10KV电网
City 10 KV Grid
绿色产业
其它用户
.....
Green Industries
Other Users
.....

气候条件：吐鲁番地区太阳能资源总量属于“很丰富带”，中国有一半以上的国土面积与其相当或在其之上。

≈1500kWh/m^2



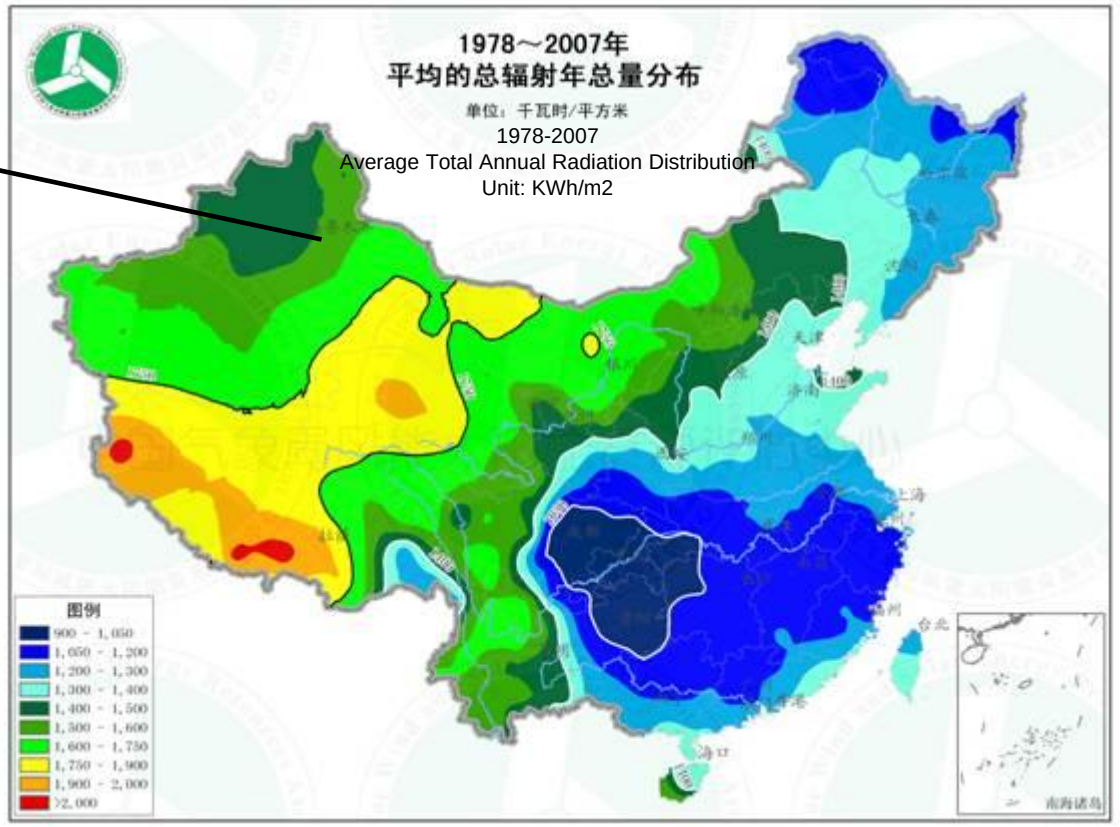
名　称	年辐射总量指标（kWh·m^{-2}）
最丰富带	≥1750
很丰富带	1400～1750
较丰富带	1050～1400
一 般 带	<1050

欧洲部分城市的太阳能资源（kWh/m^2）

城市（国家）	赫尔辛基（芬兰）	汉堡（德国）	斯德哥尔摩（瑞典）	伦敦（英国）	维也纳（奥地利）	巴黎（法国）
总辐射年总量	917	952	987	1010	1080	1115

Climatic Condition： Total solar energy resource in Turpan District is recognized as "Abundant Region." Over one half of China's land area has equivalent or greater annual radiation.

≈1500kWh/m^2



Region	Total Annual Radiation Indicator (KWh m-2)
Most Abundant	≥ 1750
Abundant	1400 - 1750
Less Abundant	1050 - 1400
General	< 1050

Solar Resources of Some European Cities (KWh/m2)

City (Nation)	Helsinki (Finland)	Hamburg (German)	Stockholm (Sweden)	London (United Kingdom)	Vienna (Austria)	Paris (France)
Total Annual Radiation	**917**	**952**	**987**	**1010**	**1080**	**1115**

研究及设计构架 Research and Designed Structure

太阳能资源分析
Solar Energy Resource Analysis

建筑＝发电站
Building＝Power Station

资源充足
Sufficient Resource

建筑与发电一体
充分利用太阳能和地域建筑的有机结合
Integration of building and power generation
Make full use of dynamic integration of solar energy with regional buildings

管理
•基于光伏发电的微电网系统方案与运行模式
•数字管理与信息共享平台

Management
•Microgrid plan and run mode based on photovoltaic power generation
•Platform of digital management and information sharing

使用
•基于太阳能综合利用的绿色交通发展
•与旧城供电互动

Usage
•Green transport development based on integrated use of solar energy
•Interactive with old city power supply

实践
•起步区一期修建性详细规范
•示范区建筑设计

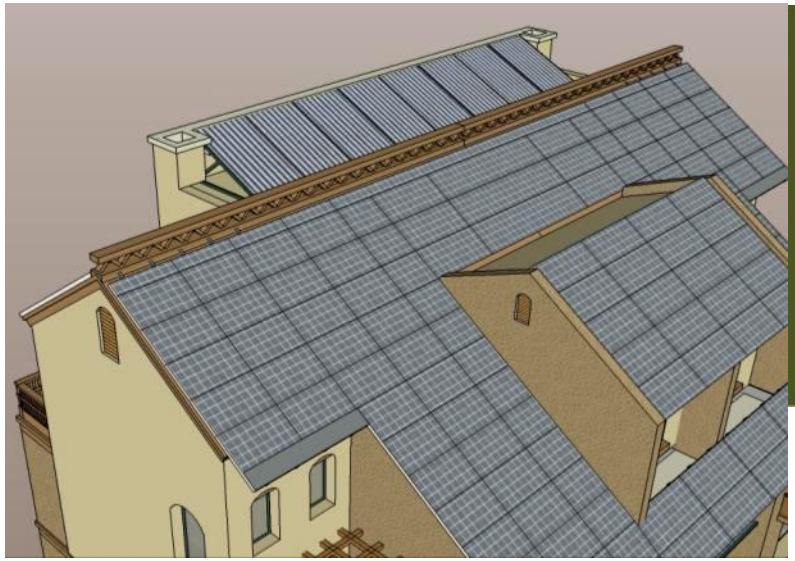
Practice
•Detailed construction specifications for the first stage
•Building design in the demonstration area

技术整合：

将气候、规划、建筑、微电网管理、数字管理等各专业高度整合，共同完成可持续的目标。

难点和创新点：

•气候变化的影响的评估、预警和监测；
•太阳能技术和建筑的有机结合；
•微电网的智能化管理。



Technological Integration：

Use integration of climate, plans, architecture, microgrid management, digital management, and other fields to jointly complete sustainability goals

Difficult Points and Innovation Points：

•Evaluation, early-warning, and supervision of the effects of climatic change
•Integration of solar energy technology and buildings
•Intelligent management of microgrid

示范区

一期示范区约1.5平方公里；
总建筑面积：753972 ㎡；
住宅建筑面积：686375 ㎡ ；
示范区内有8个以变电站、公交站、公交车充电为核心建设的社区中心。
光伏板装机容量：13.4兆瓦。
约为住宅用电量的1.3倍。
预计年产生减排量按电量边际计算：16197 tCO_2。

4

Demonstration Area

- First period demonstration district approximately 1.5 square km
- Total building area: 753972 ㎡
- Floor space of residential buildings：686375 ㎡
- Community center will be constructed with the cores of converting station, transit station, and transit charging. There will be 8 community centers in the district.
- Installed capacity of photovoltaic panels: 13.4MW, about 1.3 times of household power consumption.
- Annual estimated emissions reduction calculated by operation margin: 16197 tCO_2.

实施情况

Implementation Status

项目已于2010年5月正式开工
Project launches May 2010

2010年8月建成气候监测站
Climate monitoring station completed August 2010

正在实施区域：

约51万平方米住宅

Constructing Area:

~ 510,000 ㎡ residence housing

项目意义

环境友好、造福百姓：

充分利用太阳能资源，让老百姓得到实惠。

1. 社区利用太阳能资源产生的电能尽大程度的社区内部使用
2. 社区住宅优惠用电
3. 住宅使用的余电用于社区绿色交通

Significance of the Project

"Environment-friendly, beneficial to common people"

Make full use of solar energy resources, allow common people to benefit

1.The community will use solar energy to the largest degree possible
2. Preferential electricity for community residents
3.Residual electricity for green transport

示范作用：

把吐鲁番市新区作为全疆乃至西北干旱、半干旱地区新能源综合利用及城乡一体化重点项目示范区来建设。

可复制性：

1. 气候条件： 吐鲁番地区太阳能资源总量属于“很丰富带”，中国有一半以上的国土面积与其相当或在其之上。

2. 经济条件：吐鲁番地区在中国属于欠发达地区。

3. 城市模式：吐鲁番市是典型的中国中小城市。

Demonstration Effect:

Turpan City New District becomes a main demonstration area of new energy resources and urban/rural integration in Xinjiang and north-west arid and semi-arid zones

Reproducibility:

1. Climatic Conditions: Turpan District belongs to “Abundant Region” in terms of solar resources; over one half of land area in China receives equivalent or greater solar radiation

2. Economic Conditions: Turpan District is a less-developed area in China

3. City Type: Turpan City is a typical small-medium city in China

谢谢！
THANK YOU!

支持中国的低碳发展
—中国可持续能源项目2010进展报告

Supporting China's Low-Carbon Development: CSEP 2010 Progress Report

林江
能源基金会高级副主席，中国可持续能源项目主任

Lin Jiang
Senior Vice President, The Energy Foundation
Director, The China Sustainable Energy Program

低碳发展规划
Low-Carbon Growth Plan

主要政策

- 可再生能源激励政策
- 工业节能政策
- 需求侧管理办法
- 家电和建筑节能标准
- 车辆燃油经济性标准
- 低碳城市规划
- 碳总量与交易，价格，税收

Key policies

- Renewable incentives
- Industrial EE Program
- Demand-side Management Rules
- Building Codes and Appliance Standards
- Fuel Economy Standards
- Low-Carbon Cities
- Cap &Trade, Price, and Tax Policies

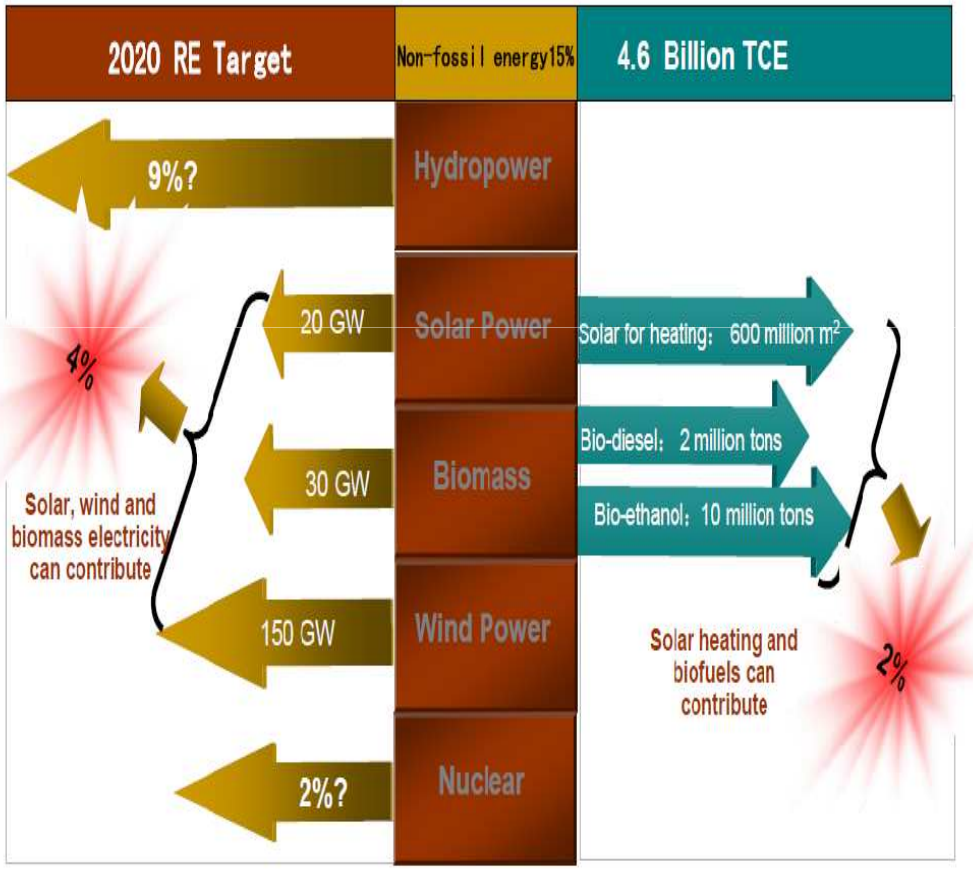
2020年15%非化石能源发展目标
15% Non-Fossil Fuel Target by 2020

2010年项目进展：

- *完成可再生能源配额方案建议稿*
- *完成2030年中国风电发展展望并对解决大规模风电并网提出政策建议*
- *完成生物质能产业发展路线图*
- *启动光伏发电政策和示范项目实施效果评估*

Program Progress in 2010:

- *Completed RE quota system design*
- *Completed China 2030 Wind Power Outlook and proposed policy measures for resolving grid integration issues*
- *Completed biomass industry development roadmap*
- *Started evaluation of the implementation effects of solar PV policies and demonstration programs*



资料来源：能源所可再生能源发展中心
Source: Center for Renewable Energy Development, ERI

工业节能
Industrial Energy Efficiency

2010年主要工作:

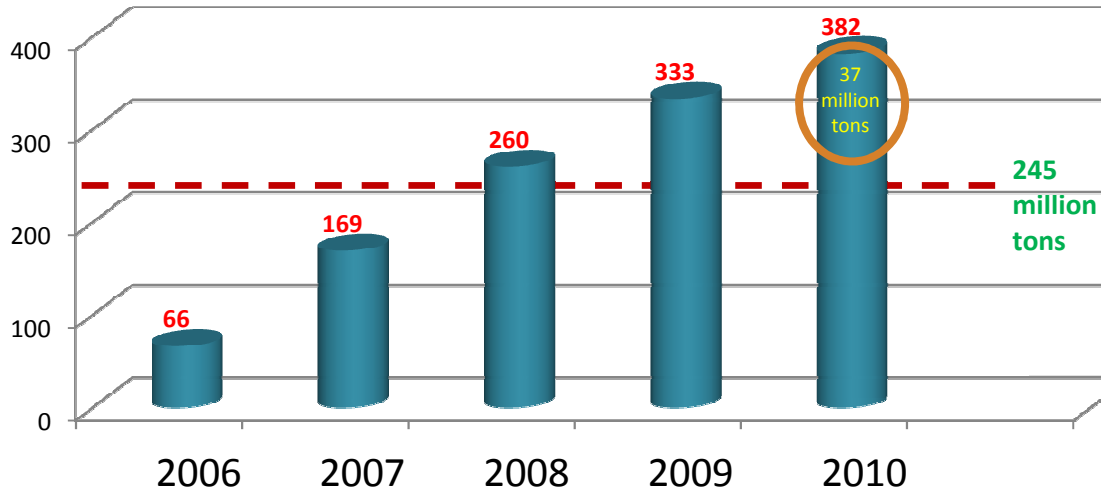
- *支持中央和地方开展“十二五”工业节能规划研究;*
- *支持高耗能产品单位能耗限额标准及中国电机挑战计划的实施;*
- *倡建和支持中国工业节能减排大学联盟。*

2010 Achievements:

- *Supported the development of the 12th Five-Year Plan (FYP) on industrial energy efficiency at both the central and local level*
- *Supported implementation of 22 National Standards of Maximum Allowable Energy Use of Industrial Products and the China Motor Challenge Program*
- *Initiated and supported the University Alliance for Industrial Energy Efficiency (UAIEE)*

“千家企业”项目每年减少的CO2 排放（百万吨）

Top 1000 Enterprises Energy Efficiency Program CO2 reductions



电力项目政策进展与地方试点

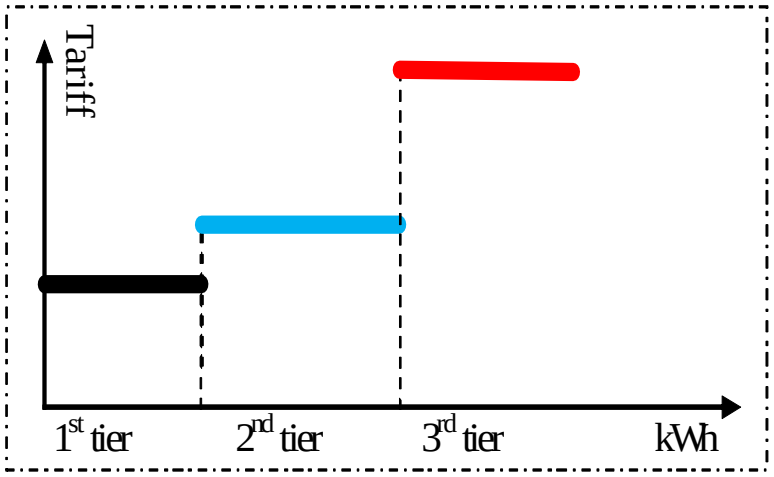
Electric Utilities Program National Policy Wins & EPP Pilots

需求侧管理办法

- *电网公司EE义务*
- *节电量不低于上年销售量的0.3%*
- *合理DSM 投入纳入成本*
- *六个能效电厂试点年节电70亿度*

居民阶梯电价

- 分为三档随用电量增加而增加



National Demand-side Management Rule

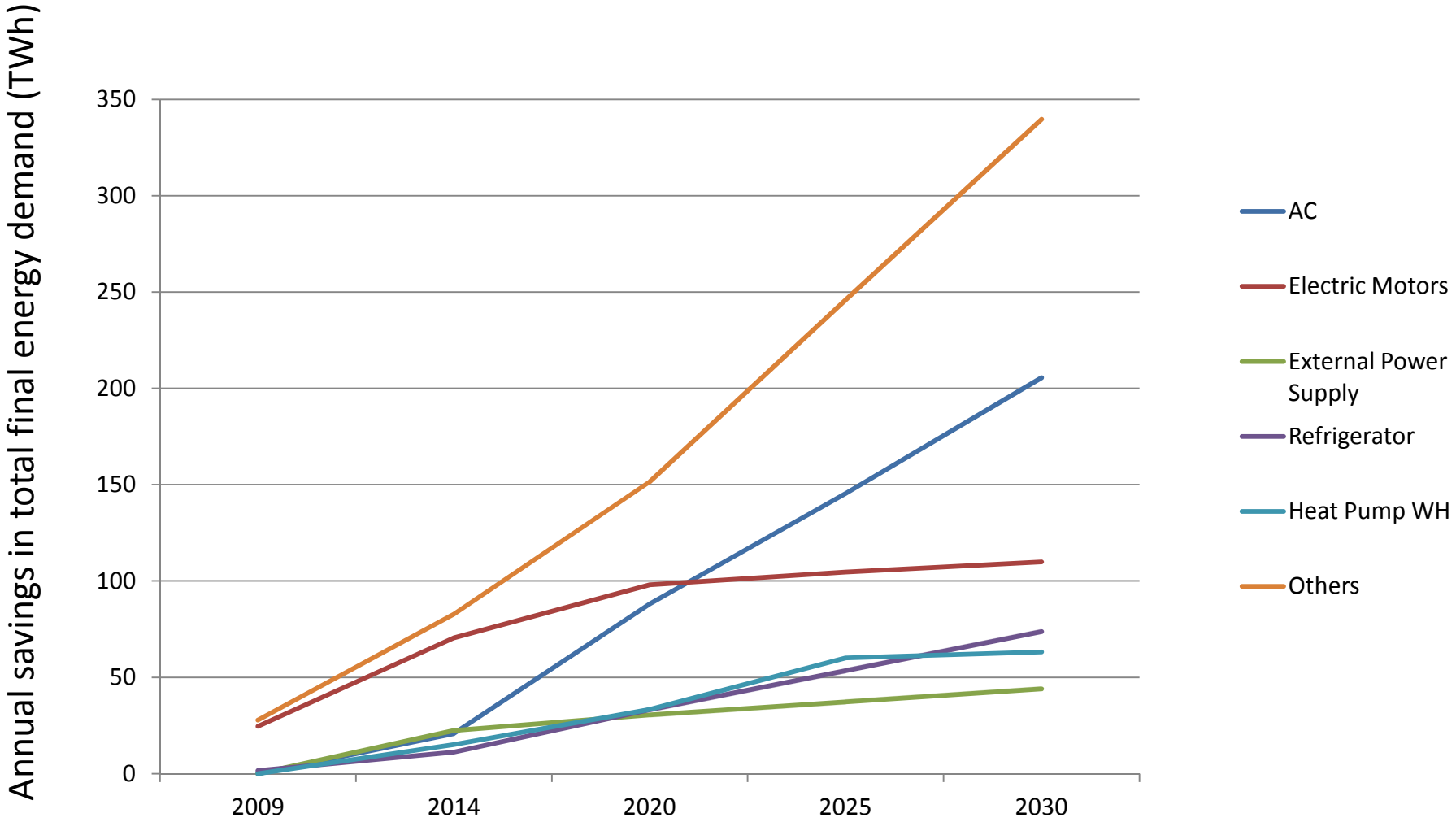
- *Grid EE obligation*
- *Target: no less than 0.3% of sales*
- *DSM cost socialized*
- *6 EPP pilots save 7 billion kWh/yr*

Inclined Block Tariff

- *Three tiers, higher as usage increases*

家电能效—节电量

Energy Efficient Appliances – Electricity Savings



Frozen minus continued improvement scenario

建筑：65% 新标准与绿色建筑
Buildings: 65% Building Codes & Green Buildings

65%新建筑节能标准于今年八月实施

- *CSEP支持了新标准模拟计算方法的研究*
- *支持国家建筑能效标识制度的建立及实施*
- *继续支持四个省级试点（河北省，山西省,山东省和江苏省）及北京，天津和西安落65%新建筑节能标准的实施*

支持了国家绿色建筑设计标准编制研究

- *选择海南做全面推广绿色建筑的试点省*
- *支持绿色大学运行评估体系并在2000所大学推广*
- *支持同济大学帮助财政部和住建部研究低碳住区发展的激励政策*

65% New Building Standards Adopted

- *Supported modeling research on the new standards*
- *Supported national building labeling program*
- *Continue support for pilot implementation of the 65% new building standards*

Supported National Green Building Design Standard

- *Selected Hainan as a pilot province to scale up GB*
- *Supported the "Green Campus Program" and implemented at 2,000 universities across China.*
- *Supported Tongji University in helping MOF and MOHURD research policy incentives for low carbon neighborhoods*



交通节能与尾气排放控制

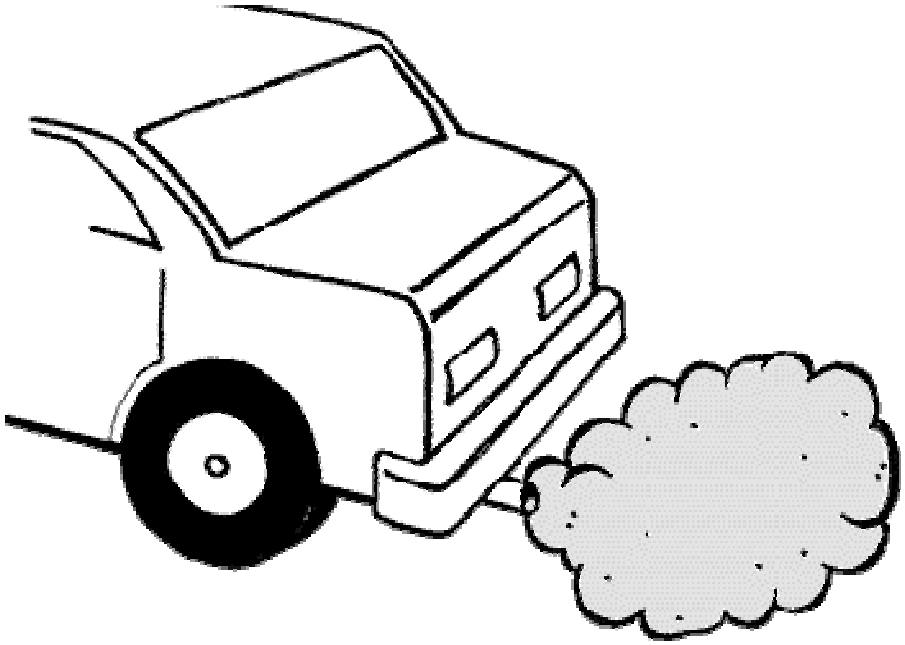
Transportation Energy Savings & Tailpipe Emissions Control

2010年项目进展：

- *重型车油耗测试方法标准进入批准程序*
- *乘用车第三阶段油耗标准提前产生节能效果：1.6L以下乘用车达到第三阶段油耗标准获得财政补贴*
- *区域机动车污染控制在珠三角获得突破：自2010年9月1日起九个城市全部提前实施轻型车国四排放标准及配套油品*
- *环保部建立了机动车污染控制年度报告机制*

Program Progress in 2010:

- *Fuel consumption test method standard for heavy-duty vehicle is in process of approval*
- *Passenger vehicle Phase III fuel economy standard produces energy saving impacts: models smaller than 1.6 liters and meeting Phase III receive subsidies*
- *Regional vehicle emissions control makes breakthrough: all nine cities in the PRD enforced Euro IV emissions and fuel quality for LDV from Sep. 1st, 2010*
- *MEP released its first-ever annual report on vehicle emissions control*



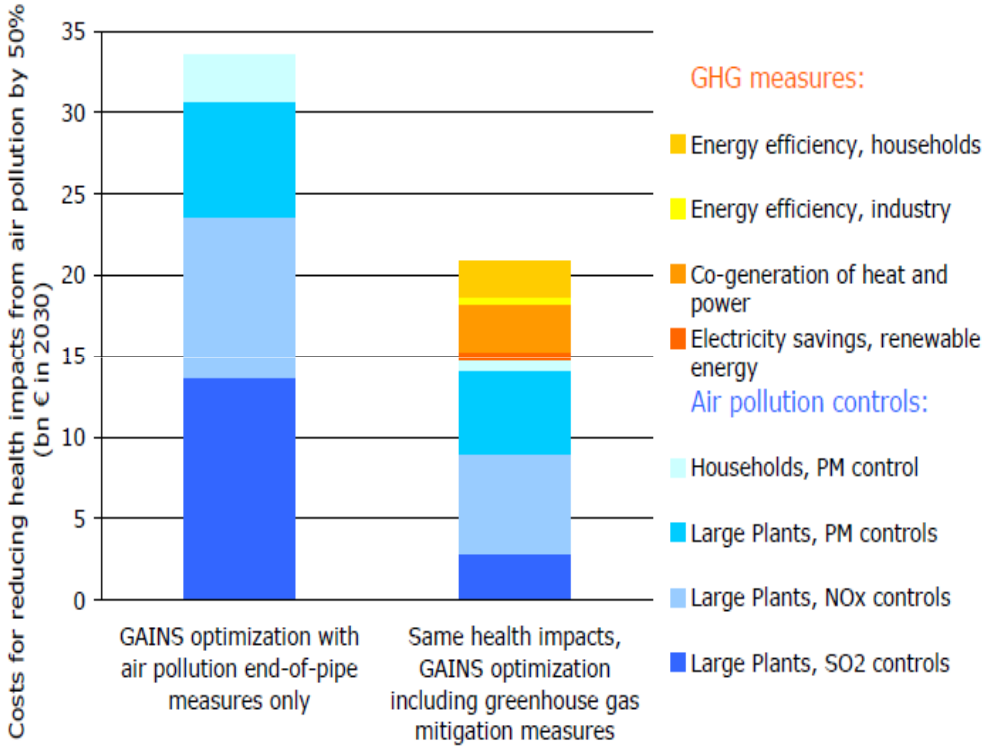
空气污染与温室气体协同减排策略，到2030年能节约一半成本
Co-control of Air Pollution and GHGs could save 50% by 2030

2010年项目进展：

- *支持研究“十二五”空气污染与温室气体协同减排*
- *考察美国《清洁空气法》，支持《大气污染防治法》修订*
- *为国务院《关于推进空气污染联防联控工作改善区域空气质量指导意见》的出台和实施提供研究支持*
- *开展气候友好型清洁空气试点：上海世博会、重庆、济南等*

Program Progress in 2010:

- *Supported research on co-control of air pollutants and GHGs during 12th Five-Year Plan (FYP)*
- *Supported study tour on U.S. Clean Air Act*
- *Supported the issuance and implementation of Regional Air Quality Monitoring (RAQM) guidance*
- *Developed climate-friendly clean air pilots in Shanghai, Chongqing, Jinan.*



资料来源：IIASA，发改委能源所，清华大学
Source: IIASA, ERI, Tsinghua University

低碳发展
Low Carbon Development

国家发改委提出：

- *五省八市开展低碳试点工作*
- *低碳经济合作项目：*
  - ✓ 项目与2010年2月启动，协助气候司支持五个地区编制低碳发展工作方案，支持其他试点的综合能力建设

2010年工作重点：

- *低碳试点：*
  - ✓ 山东省低碳经济战略前期研究
  - ✓ 低碳发展行动方案方法建议
- *碳税、碳交易和节能量交易研究*
- *支持低碳绿色增长、十二五能源和碳强度指标设定和分解的方法学研究*
- *能源和温室气体排放的统计能力和标准化体系建设的有关研究*

First batch of Low-carbon pilots:

- *8 Cities and 5 Provinces nominated by NDRC*
- *Low Carbon Economy Joint Program:*
  - ✓ **Launched in Feb. 2010**
  - ✓ **Supporting 5 regions to develop low-carbon action plans**
  - ✓ **Continue to support capacity building in other pilots**

2010 Highlights：

- *Low Carbon Pilots*
  - ✓ **Shandong LCD Strategy Study**
  - ✓ **A proposed guideline to develop LCGP**
- *Studies on Carbon tax, Carbon Trading*
- *Supported China Green Growth Study and other research on methodologies on energy and climate target setting and allocation for 12th Five-Year Plan (FYP)*
- *Supported efforts to improve energy and GHG statistics and monitoring capacity, as well as standardization system development*

城市项目
Sustainable Cities Program

国家层面主要进展

- *协助住房与城乡建设部开展步行与自行车示范项目*
  - ✓ 一省六市启动示范段建设及规划指南和激励政策的制定工作
  - ✓ 根据地方经验制定国家慢性体系规划设计指南和相关政策
- *支持交通部起草国家十二五公共交通发展规划初稿*
  - ✓ 设定公交分担率目标
  - ✓ 设定快速公交（BRT）建设目标
  - ✓ 建立公共交通政策法规体系和激励政策
- *支持住房与城乡建设部起草生态城市规划导则*

National Level Progress

- *Supported MOHURD to conduct Non-Motorized Mode (NMM) demonstration project*
  - ✓ **One province and six cities to build demonstrate sites, developing NMM planning guideline and incentive policies**
  - ✓ **Experience to be summarized as national guidelines and policies**
- *Supported MOT in drafting Public Transit 12th Five-Year Plan*
  - ✓ **Target for mode share of public transit**
  - ✓ **Target for BRT development**
  - ✓ **Establishing of public transit development regulatory system and incentives policies**
- *Supported MOHURD to develop planning guideline for eco-cities*




从现代主义到新城市主义 –
昆明呈贡新城的可持续发展实践
From Modernism to New Urbanism
A practice in Kunming Chenggong New Town

能源基金会的13个资助伙伴
13 Energy Foundation Partners

The ClimateWorks Foundation

The Grousbeck Family Foundation

The William and Flora Hewlett Foundation

The Kresge Foundation

The McKnight Foundation

The George and Cynthia Mitchell Foundation

The David and Lucile Packard Foundation

The Pisces Foundation

The Sea Change Foundation

The Schmidt Family Foundation

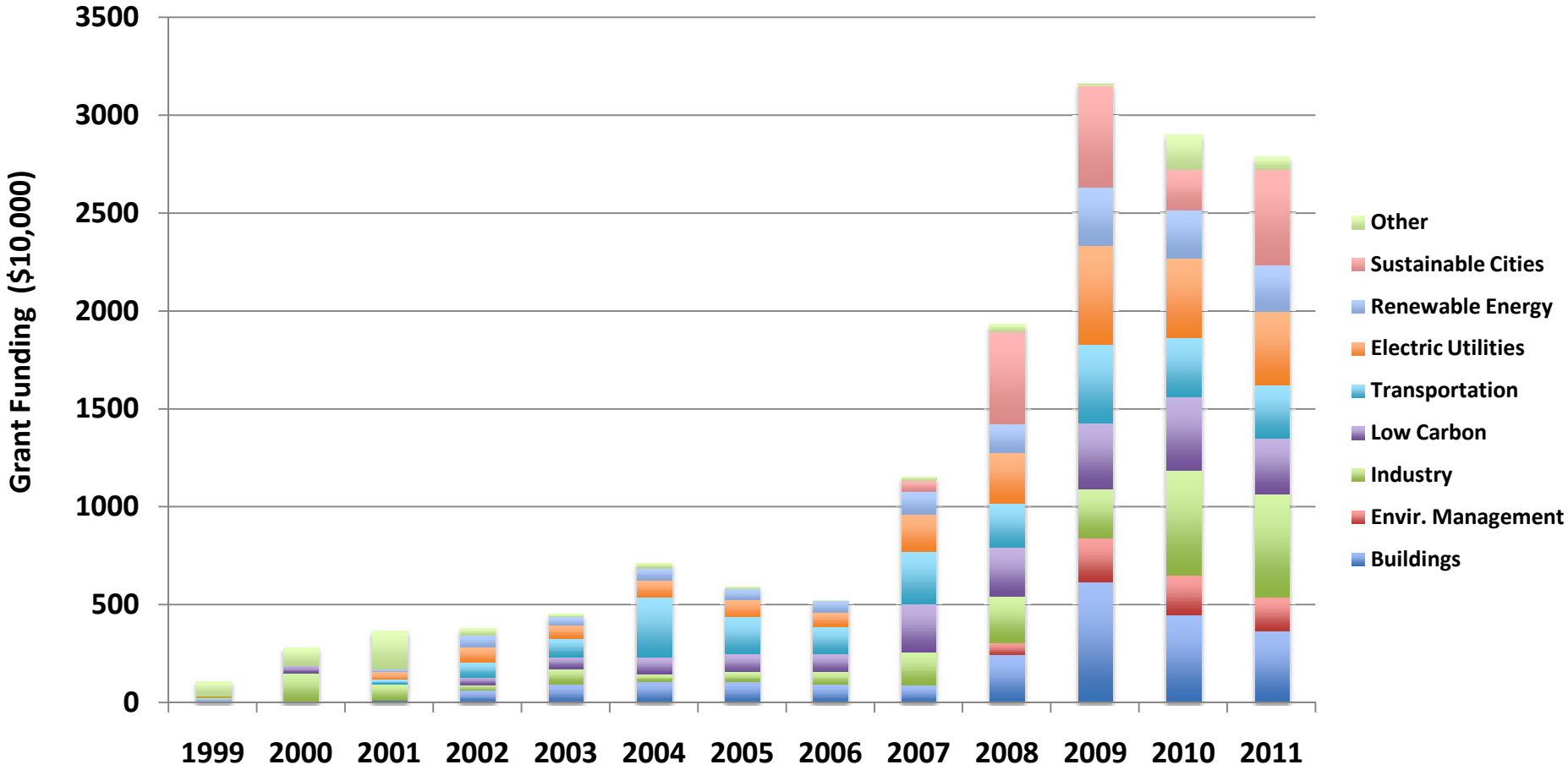
The TomKat Trust

The TOSA Foundation

Claire Perry

中国可持续能源项目分部门资助情况，1999-2011

CSEP Funding by Sector, 1999-2011



Note: 2010 and 2011 are based on budget. 2011 is an estimate.

迈克尔·沃什获“友谊奖”

Highest Honor - Friendship Award to Michael Walsh

谢谢！

Thank you!