

私人轿车与中国

*Personal
Cars
and
China*

CHINESE ACADEMY OF ENGINEERING
NATIONAL ACADEMY OF ENGINEERING
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中国工程院
美国国家工程院
美国国家研究理事会

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汽车工业对社会的影响与任何其他工业对社会的影响不同。汽车不仅仅是一种技术和交通方式，它还是整个经济的一个基本的决定因素，它还在改变着整个国家经济以及就业结构。中国是世界上汽车增长速度最快的国家之一。

1999 年，中国工程院和美国工程院成立了一个专家委员会，委员会中一半人选是由中国工程院提名，一半人选是由美国国家学会提名，该委员会的两主席之一是中国工程院院士郭孔辉，另一人是美国国家工程院的 Dale Comptom。该委员会分别在中国的北京、上海、长春和美国的华盛顿特区、加利福尼亚的戴维斯举行了五次会议。

这项研究的目的是：

- 了解在中国发展私人用车的好处和代价。
- 为解决城市拥挤、污染、能源消耗增加和城市结构变化问题提供建议。
- 在充分考虑社会发展、现有技术、国际合作、政府与企业合作、汽车在国内交通运输中的作用及汽车对可持续发展的影响等诸多因素的前提下，为中国民族汽车工业的可持续发展提供建议和咨询。

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THE CHINESE ACADEMY OF ENGINEERING

The Chinese Academy of Engineering (CAE) is China's foremost academic and advisory institution in engineering and technological sciences. It was founded in June 1994 and now has 611 members. As a national institution, CAE has the following missions: to promote the progress of engineering and technological sciences, foster the growth of outstanding talents in close collaboration with the engineering and technological community, and enhance international cooperation in order to facilitate sustainable economic and social development in China. Prof. Xu Kuangdi is president of the Chinese Academy of Engineering. Dr. Song Jian is the former president (June 1998–June 2002).

THE NATIONAL ACADEMIES

The National Academy of Sciences is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Bruce M. Alberts is president of the National Academy of Sciences.

The National Academy of Engineering was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Wm. A. Wulf is president of the National Academy of Engineering.

The Institute of Medicine was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Feinberg is president of the Institute of Medicine.

The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. Wm. A. Wulf are chairman and vice chairman, respectively, of the National Research Council.

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中国工程院

中国工程院 (CAE) 是中国工程技术科学界的最高学术性、咨询性机构, 成立于 1994 年 6 月, 现由 611 名院士组成。作为国家机构, 中国工程院的任务是促进全国工程科学技术界的团结与合作, 推动中国工程科学技术水平的不断提高, 加强工程科学技术队伍建设和优秀人才的培养, 为国民经济的持续发展服务。徐匡迪教授是中国工程院现任院长; 宋健博士是前任院长 (1998 年 6 月~2002 年 6 月)

美国国家研究院

美国国家科学院 (NAS) 是一个非政府、非盈利性的独立组织, 由从事科学和工程研究的著名学者组成, 致力于促进科学技术的发展, 并应用于公众福利事业。1863 年国会通过的宪章规定, 国家科学院要为联邦政府提供科学技术方面的咨询。布鲁斯 M.艾伯茨为美国国家科学院现任院长。

美国国家工程院 (NAE) 是按照美国国家科学院的宪章于 1964 年创建的, 由著名的工程师们组成, 与美国国家科学院属同类组织。在管理和选举院士方面具有自主权。在为联邦政府提供咨询服务方面, 与美国国家科学院共同分担责任。美国国家工程院还支持国家需求的工程项目, 鼓励教育与研究, 认可工程师所取得的卓越成就。现任院长为威廉 A·沃尔夫博士。

美国医学科学院 (IOM) 由美国国家科学院于 1970 年创建, 是为了保证有名望的成员能在适合的专业领域为公众健康问题的政策研究提供服务。该机构依据国会宪章所赋予国家科学院的责任开展活动, 为政府提供咨询服务, 并在医疗保健、研究和教育方面提出自己的倡议。哈维 V.范伯格为医学科学院院长。

美国国家研究理事会 (NRC) 是由美国国家科学院于 1916 年设立的, 目的是使国家科学院和广大的科技界联合, 达到促进知识进步、为联邦政府提供咨询的目标。理事会按照国家科学院制定的常规的政策行使职责, 在为政府、公众及工程科学界提供服务方面, 理事会已成为国家科学院和国家工程院的主要工作机构。理事会由国家科学院、国家工程院和国家医学科学院共同管理。布鲁斯 M.艾伯茨博士和威廉 A·沃尔夫博士分别为国家研究理事会的主席和副主席。

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Preface

In mid-1999 representatives of the Chinese Academy of Engineering (CAE) visited the U.S. National Research Council (NRC) to explore the prospects for collaboration between the two institutions on a study of the future of the personal car in China. This is the second instance of formal collaboration between the CAE and the NRC. The outcome of the first was a study entitled *Cooperation in the Energy Futures of China and the United States*, published in 2001, in which the Chinese Academy of Sciences also participated.

The National Research Council, the operating arm of the three National Academies—the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine—has been producing independent advisory reports at the request of the U.S. government and other government and donor organizations since 1916 (the parent organization, the National Academy of Sciences, received its congressional charter in 1863). The Chinese Academy of Engineering has been in existence since 1994, and is developing a role as adviser to its government that parallels that of the NRC.

Although the nominal topic of this report—the Chinese automotive industry and the future of personal cars in China—is specific to China, many of the issues examined also are relevant to the United States and other countries. For example, the higher polluting emissions that will accompany the proliferation of cars in China are predicted to have global implications for climate change. Moreover, an expanding Chinese automotive fleet will increase the world demand for petroleum, and raises the

前 言

1999 年年中，中国工程院（CAE）的代表访问了美国国家研究理事会（NRC），探讨了两个机构在中国私人轿车未来的课题上进行合作研究的前景。这是中国工程院与美国国家研究理事会的第二次正式合作。第一次合作研究的报告是《中美在能源未来的合作》，出版于 2001 年，中国科学院也曾参与其中。

美国国家研究理事会是美国国家科学院、国家工程院和医学科学院三个“国家研究院”的执行机构，自 1916 年以来，已经应美国政府和其他国家政府及一些捐赠组织的要求完成了很多独立的咨询报告（其前身机构国家科学院于 1863 年获得国会宪章认可）。中国工程院成立于 1994 年，在对政府的咨询作用方面与美国国家研究理事会作用相同。

虽然在名义上该课题是专门针对中国的，也就是中国汽车工业及中国私人轿车的未来，但所研究的很多问题与美国和其他国家是有关系的。例如，随着中国轿车数量的增长，尾气排放污染将会加剧，这将关系到全球气候的变化。此外，中国日益增加的汽车将使世界石油需求增加，而且当中国成为主要的石油进口国时，世界石

possibility of higher international prices as China becomes a major petroleum importer. Those and the other problems that will confront China as it continues to develop its transportation system—such as congestion, more accidents, undesirable changes in land use, and urban decentralization—must be addressed by any nation that expects to see its motor vehicle population grow significantly.

This study could not examine the extent of global problems that may ensue from a large increase in motorization worldwide, but the committee felt very strongly that the impacts, both positive and negative, of any such increase should be thoroughly explored. Essentially all of the issues identified in this report as being critical to China will arise on a global scale and will be that much more difficult to manage. We urge that such a study be undertaken at the earliest possible moment.

Some important issues identified that are specific to China could not be explored in detail within the present study. These include the impact of motorization on inequity among various segments of the population and the cost and financing of the new infrastructure that will accompany increased motorization in China. An in-depth study of these issues, however, would require an examination of regional and national economic and social development, and the committee was not prepared to examine the many ramifications of this subject.

Similarly, the report devotes less space to social change and changes in urban form than to automotive and fuel-related technologies. Although the report does observe that increases in motorization will lead to decentralization of both jobs and residences in Chinese cities, with some illustrative calculations for Shanghai, answering important questions about the economic impacts and how the transportation infrastructure is to be financed involves issues of public revenues and expenditures that were well beyond the charge to the committee. Nevertheless, these issues are of immense importance to China and deserve further study.

As the goals and priorities of the Chinese automotive industry and the Chinese government evolve, it is clear that the many ways to achieve them will come to light, but none certain of success and all with palpable risks. Naturally, these conflicts were reflected in differences of opinion among members of the committee; however, the line of advocacy on each side of these issues rarely coincided with the nationalities of the committee members. It was a committee of individual experts who, taken together, represented all points of view. Each side learned from the other, and the collaboration has strengthened both of the collaborating institutions. We hope that this report will be viewed as a useful contribution to policy making by the automotive industries and governments of all countries and will serve as an important addition to the literature of science and technology policy. We were honored to serve as cochairmen of this

油的价格将会提高。随着交通运输系统的不断发展，中国还会遇到其他一些问题，如：交通拥塞，交通事故增多，土地利用不合理，城市分散化，这些问题必须要引起所有即将大幅度增加机动车数量的国家的高度重视。

本研究报告没有阐述世界机动化程度的提高可能带来的所有全球问题，不过委员会强烈感到，对此种提高所带来的各种影响，无论是正面的还是负面的，都应该进行深入探讨。从根本上来说，本报告中提到的所有对中国至关重要的问题都将在全球范围内出现，而且会更加难以应对。因此我们强烈呼吁尽早开展此项研究。

在目前这份报告中无法对中国特有的一些重要问题进行详细的论述。这些问题包括：机动化对各类人群之间的不平等性有何影响；伴随着中国不断发展的机动化，如何筹集资金来建立新的基础设施，其费用是多少？要对这些问题进行深入研究，必须对地区及全国的经济和社会发展进行调查，但委员会不准备对涉及本课题的大量分歧问题进行分析。

同样，本研究报告对社会变化以及城市形式的改变的论述要少于对汽车及燃油相关的技术问题论述。虽然本报告提到了机动化的发展会导致中国城市工作区和居住区的分散化，并对上海进行了案例分析，但回答有关经济影响的重大问题以及如何为建立交通基础设施筹措资金的问题将涉及到公共税收与支出，这不是委员会的研究范围。不过，这些问题对中国来说是至关重要的，值得对其做进一步的研究。

随着中国政府和中国汽车工业的目标和优先权的进展，显然有很多途径可以为之实现，但不能保证都能成功，所有途径都伴有可知的风险。这些意见很自然地反映在委员会成员的不同见解上；每一方的支持者都极少与委员会成员的国籍保持一致。委员会由很多独立的专家组成，包含了不同意见的代表。双方互相学习，增进了双方机构的合作。我们希望本报告将被各国汽车工业界和政府视为有助于制定政策的文献，同时也是对科技政策方面著作的重要补充。我们很荣幸成为这个委员会的联合主席，也非常感谢委员会成员们在整个研究过程中的勤奋工作，是他们的努力确保了此项研究

distinguished committee. And we compliment the members of the committee for their diligence and efforts throughout this study to ensure that it properly reflected the challenges and opportunities of this period of dynamic change for the Chinese automotive industry and the people and government of China.

W. Dale Compton
U.S. National Research Council

Guo Konghui
Chinese Academy of Engineering

能够恰当地反映出这个变幻莫测的时期赋予中国汽车工业、中国人民以及中国政府的挑战和机遇。

郭孔辉

中国工程院

W.戴尔·康普顿

美国国家研究理事会

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This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee and the CAE's Committee for Consultative Projects. The purpose of these independent reviews is to provide candid and critical comments that will assist the institutions in making their published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review

致 谢

专家委员会感谢上海汽车工业集团公司、中国第一汽车工业集团公司、东风汽车工业公司及中国工程院，福特汽车公司、戴姆勒克莱斯勒汽车公司、美国能源部、美国国家研究理事会（NRC）及美国国家工程院对该研究报告所给予的财力和其他方面的支持。美国国家研究理事会交通研究委员会及能源与环境系统委员会的委员，特别是史蒂芬·戈德温和詹姆斯·祖凯托协助开展了此次研究，而且国家工程院的莱斯特·赫尔和哈罗德·福森还专程到上海去帮助制订理解备忘录。中国工程院朱高峰院士在报告审议过程中起了重要作用。委员会办公室主任迈克尔·格林、郑晓光和李仁涵为报告的撰写和评议过程中提供了基本的后勤保障，作出了有益的贡献。计划顾问萨卜拉·比塞特·莱登特细致地编写了该报告。

按照美国国家研究理事会报告评审委员会和中国工程院咨询工作委员会所规定的程序，我们挑选出各个专业技术领域的专家对报告的初稿进行了评审。独立评审的目的是对报告做出公正、严谨的评价，帮助两机构出版内容尽量详实的报告，并且确保该报告在客观性、证据的详实程度及对学术研究的作用和价值方面，符合制度化标准。为了保证审议过程的完整性，评审意见和初稿仍是保密的。