

公共经济与公共政策

齐鲁文库

国家软科学项目“公众节约能源行为及
政策引导研究”研究成果

郭 琪 著

公众

节能行为的经济分析 及政策引导研究

The Economic Analysis and Policy Study
of the Public's Energy Conservation Behavior



经济科学出版社
Economic Science Press

公共经济与公共政策 齐鲁文库

国家软科学项目“公众节约能源行为及
政策引导研究”研究成果

郭 琪 著

公众 节能行为的经济分析 及政策引导研究

The Economic Analysis and Policy Study
of the Public's Energy Conservation Behavior



经济科学出版社
Economic Science Press

责任编辑：吕 萍 于海汛

责任校对：杨 海

版式设计：代小卫

技术编辑：邱 天

图书在版编目 (CIP) 数据

公众节能行为的经济分析及政策引导研究/郭琪著. —北京:
经济科学出版社, 2008. 6

(公共经济与公共政策齐鲁文库)

ISBN 978 - 7 - 5058 - 7247 - 9

I. 公… II. 郭… III. ①节能 - 经济分析 - 中国②节能 -
政策 - 研究 - 中国 IV. F426. 2

中国版本图书馆 CIP 数据核字 (2008) 第 078459 号

公众节能行为的经济分析及政策引导研究

郭 琪 著

经济科学出版社出版、发行 新华书店经销

社址：北京市海淀区阜成路甲 28 号 邮编：100036

总编室电话：88191217 发行部电话：88191540

网址：www. esp. com. cn

电子邮件：esp@ esp. com. cn

北京天宇星印刷厂印刷

永胜装订厂装订

787 × 1092 16 开 16 印张 220000 字

2008 年 6 月第 1 版 2008 年 6 月第 1 次印刷

ISBN 978 - 7 - 5058 - 7247 - 9/F · 6498 定价：25. 00 元

(图书出现印装问题，本社负责调换)

(版权所有 翻印必究)

公共经济与公共政策齐鲁文库

编 委 会

顾 问：何盛明 安体富 高培勇

主 任：樊丽明

副主任：刘尚希 李齐云

委 员：（以姓氏笔画为序）

白景明 李士雪 李铁岗 李 文 孟庆跃

赵梦涵 高鉴国 曹现强 楚成亚

总 序

2007年金秋时节，经山东省委宣传部、山东省哲学社会科学研究规划领导小组批准，山东省公共经济与公共政策研究基地正式成立。该基地挂靠山东大学，依托山东大学多学科、综合性的研究优势，设立公共经济与政策、公共管理与公民自治、社会福利政策、公共卫生政策、生态环境政策、公共政策效应计量等六个研究中心。研究基地主要承担三项职能：第一，开展学术研究与咨询，针对学科前沿和重大理论与实践问题，组织高水平科研项目，产出创新性成果；第二，搭建交流平台，组织学术交流；第三，培养和造就高素质的学术带头人和中青年学术骨干，培养博士、硕士等高级专门人才，壮大社会科学研究队伍。

我们确立的基地建设目标是，通过5~8年的努力，力争把公共经济与公共政策研究基地建设成为省内首位、国内有重要地位、国际有一定影响的重点研究和咨询基地，活跃开放的学术交流基地，高水平的公共经济与政策高层次人才培养基地。为了实现上述目标，我们将主要采取如下建设措施：第一，凝练方向，培养和形成研究优势与特色；第二，整合力量，组织承接国家和地方重大研究项目；第三，潜心研究，形成《中国公共经济与公共政策研究报告》；第四，

扶持新人，遴选出版“公共经济与公共政策齐鲁文库”；第五，营造氛围，办好双周公共经济与公共政策讨论班。

研究基地成立以来，紧密结合我国经济发展和社会进步的实际，以科学发展观为指导，我们凝聚一支结构合理、素质良好、勤奋敬业的研究队伍，在公共经济与公共政策的几个关键领域开展了比较深入系统的研究，迄今已初见成效，形成了系列研究报告和专著。经基地学术委员会委员投票表决、认真甄选，现已确定《新农村建设中的公共品供需均衡研究》入选《中国公共经济与公共政策研究报告》，《城乡基础教育均等化供给研究》、《公众节能行为的经济分析及政策引导研究》、《我国农村公共品的供给效率研究——基于制度比较和行为分析的视角》、《公共品供给中的政府经济行为分析——一个理论分析框架及在中国的应用》等四本专著入选“公共经济与公共政策齐鲁文库”第一批专著。

仰赖经济科学出版社和中国财政经济出版社的鼎力支持，承蒙经济科学出版社吕萍副总编和中国财政经济出版社赖伟文副总编、赵力女士的精心谋划，《中国公共经济与公共政策研究报告》（第一辑）和“公共经济与公共政策齐鲁文库”第一批专著即将面世。在此，衷心感谢他们的真诚关心和辛勤劳动！

期待读者们的积极回应和热心指教。

樊丽明

2008 年立夏于山东大学

摘要

节能是可持续消费的具体体现，是应对能源短缺、解决环境问题的一种合理有效的能源消费行为。世界能源委员会 20 世纪 70 年代提出“节能是指采取技术上可行、经济上合理以及环境和社会可接受的一切措施，来更有效地利用能源资源”，由此可见，节能是要充分发挥在自然规律所决定的限度内能源利用的潜力，包括利用效率和利用质量。就此，本书所研究的公众节能行为是指与能源消费有直接或间接关系的个人、群体或组织，通过改变与能源相关的行为习惯或改进行为技术从而降低单位产值能耗（即提高能效）实现节能的行为，以及通过使用优质清洁能源（即提高能质）实现节能的行为。

世界节能先行国家的节能规划大体经历了四个阶段，由最初的减少绝对能源使用量（energy saving），到保持能源消费总量基本不增长的情况下发展经济（energy conservation），再到注重能源效率（energy efficiency），直到近期由于能源消费引发了严重的环境问题，进入有助于环保的倡导使用清洁能源（climate change）阶段。在整个推行节能的过程中，能源战略已逐渐从传统的增加供给转向需求管理。要进行能源需求管理，关键是深入理解并掌握能源消费主体的需求行为，并把握其规律性。本书从理论创新的角度，对公众能源消费选择行为进行了系统、详尽的研究，分析了解释变量、偏好（效用）、选择行为三者之间的转换机制，即公众对选择对象的偏好是如何形成的，形成的偏好又是如何决定一定的选择行为，

这有助于更好地分析、预测公众的能源消费选择行为，为政府制定政策引导能源需求管理提供指导和依据。此外，在行为研究的基础上，透析我国政府节能引导政策的现状和效应，同时借鉴节能先行国家政府引导政策的基本经验，设计、构建促进我国公众节能行为的政府引导政策框架，从而促使政府倡导的节能理念转化为微观主体的自觉行动，在全社会蔚然形成崇尚节能、科学用能的文明行为规范。

—

作为现实中的“理性经济人”，利益驱动是影响公众行为的主要原则，他会根据自身利益去平衡，从而决定节能行为的采取与否。但从社会整体利益出发，当代人的能源消费不可避免地存在对后代人利益的损害，因此为减小人类整体福利损失，当代人必须对后代人进行代际补偿，换言之，理想中的公众应是兼顾自身利益与代际利益的“理性生态经济人”。为实现行为人角色的转变，本书运用微观经济学和现代行为理论对微观主体的节能行为进行分析，并引入行为特征向量深入剖析公众自身因素、行为工具因素以及政府引导政策因素在公众节能行为产生—实施—持续过程中的地位及作用途径。

1. 公众自身因素通过作用于先倾要素（predisposing factor）从而预先形成或改变行为主体对能源消费方式、数量、频度等的偏好，它为行为产生提供动机，主要与文化教育、人口素质等有关。这些因素综合作用就形成了对行为的特定态度，不同属性的行为主体面临同样的选择肢，其选择结果可能大不相同。

2. 行为工具因素通过作用于先倾要素和强化要素（reinforcing factor）来影响行为的发生与继续。节能措施的实施范围、方式、节能量等会使行为主体对节能行为实施的效果、成本、便捷程度等的认知与态度迥异，从而影响能源消费者节能行为选择的偏好与动机以及节能措施的接受或采用程度，进而决定公众的节能努力和效果。笔者在 2006 年 5 月对山东省济南市居民进行了实地调研，并

运用联合分析的计量方法进行了数据处理,结果显示:居民在进行节能活动时,首要考虑的是节能措施的效果,其次是节能成本和项目,而对节能实现途径不太关注;居民更偏好效果明显、成本低的节能措施;倾向于简单、初级的行为节能方式,即通过改变用能习惯实现节能,而在技术节能方式中,更倾向于通过购买能效用具而非改造原来用具实现节能。

3. 由于“市场失灵”、“代际不公平”以及“信息不对称”的存在,政府引导政策因素贯穿行为形成、实施与继续的全过程,通过对先倾、促成(enabling factor)和强化要素发生作用,既影响行为主体的偏好与动机,又影响行为的实施基础,还通过强化或淡化行为主体对行为结果的反应决定行为的继续与否。

此外,按照政策科学的分类,政府引导政策可以分为三类:法律政策、经济政策以及信息交流政策(或曰说教政策),其中法律政策可以通过强制力来构建整个公众群体的期望行为模型,并巩固预期的政策效果;信息交流政策主要通过改变行为主体的观念和价值取向,使之树立起符合可持续发展的节能意识,从而改变生产、生活中的能源消费行为方式;经济政策的核心作用是贯彻物质利益原则,通过各种具体的经济措施不断调整各行为主体的经济利益关系,限制负外部性行为,奖励正外部性活动,把行为主体的局部利益、短期利益同全社会的共同利益、长期利益有机结合起来,赋予行为主体自主寻找最低成本、实现最高效能源消费行为的同时,使得行为者最终做出的决策和选择的行为方式服务于可持续发展的需要。

促进节能的经济政策主要分为两类:一是直接调整微观主体行为的宏观政策,如财税政策、金融政策等。其作用机制在于对先倾要素和促成要素产生影响:(1)先倾要素:通过政策差别可以向能源消费者明示政府的政策导向,进而改变行为主体的态度和意识,形成符合政策导向的行为动机;(2)促成要素:通过政策正向和反向作用增加或降低行为成本来促使公众选择政府引导的行为模式,但是直接经济政策能够有效发挥作用的前提是能源富有价格弹性。二是间接政策,它不直接作用于微观主体,而是通过改变微观主体

的外界环境促使行为改变,如产业政策等。

按照三因素对节能行为的作用机制和影响程度,将其纳入两阶段能源需求函数,从而构建出公众能源消费函数 $w_i = \alpha_i \bar{P}_i + \varepsilon_i (F_c + F_b + F_p) \left[\lambda + \gamma \ln \left(\frac{P_c}{P_n} \right) + \beta \ln \left(\frac{Y}{P} \right) \right]$ 。公众自身因素 (F_c) 与行为工具因素 (F_b) 会通过影响行为主体的偏好来决定能源消费的无差异曲线,而政府引导政策因素 (F_p) 则会通过改变节能与不节能行为的相对价格或行为主体的经济能力约束旋转或平移预算线,从而引导最优向节能行为转移。

二

在对公众节能行为的特征、影响因素及因素的作用机理进行了系统的理论研究之后,本书转入实证篇。书中选取了代表三种不同能源情势和消费模式的国家和地区——欧盟、日本和美国,从而对节能先行国家的引导政策进行回顾与评价。首先,通过对三个国家和地区的法律、经济和信息政策的总结,可以看出这些国家或地区的节能政策实现了区别于结构变化的实质性能耗降低,获得了显著的能源效应、经济效应和环境效应。政策的成功主要源于以下方面的基础:(1) 正确处理和协调各利益主体在节能中的地位和职能;(2) 建立系统完善的能源管理体制和能源管理模式;(3) 注重各种节能政策的连贯性和互动性;(4) 政策设计的原则是基于性能(或目标),而非单纯的成本;(5) 注重非政府组织在节能中的作用;(6) 保持政策的动态性。其次,同样是节能先行国家,内部节能效果也差异很大,这一方面与两国节能政策的执行方式和力度有关,但国家的自然资源禀赋、文化地理环境、产业结构等也是重要的影响因素。

中国自 20 世纪 80 年代提出节能,经过二十多年的实践,在能源消费的总量水平、能源强度、能源消费结构等方面有了显著的改善,而且节能政策带来的能源强度降低和以煤为主的能源结构优化取得了明显的环境效应,中国已实现了向非能源依赖型国家的转

变,节能政策的推行不会给经济增长带来负效应。按照对1980~2005年的相关数据进行的计量分析结果,可以看出中国的节能政策虽不如有些专家和学者描述的那么有效,但还是值得肯定的,且有待进一步改善和强化:法律政策作用效果微弱;信息宣传和教育示范政策具有一定的政策效应,但距离期望效果差距还很大;经济政策中产业结构调整 and 能源价格政策对节能目标的实现影响较大,而补贴政策由于普及率低、力度小,存在较大的局限性,甚至会对节能产生负效应。另外,对于目前在节能领域取得的成就,计量分析也表明了产业结构调整是贯彻始终发挥作用的最有效政策。

根据前述研究结论,在分析当前中国节能现实背景的基础上,本书设计与构建了促进公众节能行为的引导政策体系。新时期的节能政策应从“需求”与“供给”两方面入手,具体设想如下:建立“政监分离”的独立节能监管机构,从而有一个独立于其他部门并且强有力的机构来确保将节能提高到与生产同等重要的地位上来;健全和完善节能法律体系,尤其是完善相应的配套法规 and 实施细则,形成集基本法、专项法和执行法为一体的制度保障体系;强化与推广节能宣传体系,通过设立节能咨询点和网站、制作和发布节能案例、开展形式多样的节能项目,提高公众参与能力,并且大力发挥国内国际节能中介组织的作用,实现节能领域的合作共赢;构建有效多样的节能经济政策体系,包括建立基于综合、差别和中性三原则的激励与约束兼容的能源税收体系;完善基于性能的动态补贴政策;拓展政府政策性金融机构与私人渠道的融资政策;创建基于期权定价的绿色配额初级和二级交易市场;强化政府采购执行、监管的高度集中化和信息化;实施体现能源比价关系的超额累进定价机制;执行带有严格约束指标和市场准入标准的产业结构政策等。

关键词 公众节能 行为动机 政策引导 能源消费

ABSTRACT

Energy conservation is the concrete embodiment of sustainable consumption, and it is a kind of effective energy consuming behavior which can resolve the environment problems and energy shortage. World Energy Council has raised the concept of energy conservation and indicated that it means improving energy efficiency and quality. In this book, the public's energy conservation behavior refers to the acts of lowering the energy consumption per unit GDP (i. e. to improve energy efficiency) and using clean energy (i. e. to improve energy quality). And the actors are individuals, groups or organizations, which are directly or indirectly related to energy consuming, by ways of changing habits and technology related to energy.

Throughout the process of implementing energy conservation, energy strategy has gradually shifted from the traditional supply increase to demand management. The key of energy-demanding management is to find out the law of consumption behavior. This book will give a detailed and systematic study on energy consumption behavior by way of analyzing and explaining the transformation among factors, preference and choice. That is how the preference of certain objects is formed, than how will the preference decide some certain choices. It is better for our forecasting the energy consumption choice and providing directions and basis for government's energy-demanding management. In addition, we will

analysis the current situation and effect of energy-saving policies in China and draw experiences of policy carried out by the pioneering countries. As the result, we will construct the practical policy system in China.

I

As a “rational economic man” in ordinary life, interest is the main principle that affects public’s behavior. However, considering from the whole welfare of society, the contemporary existence of the energy consumption will inevitably harm the interests of future generations. Therefore, in order to induce the loss of the welfare of humanity as a whole, the contemporary generation should conduct some compensation on behalf of future generations. In another word, publics should be “ecological rational economic man” who will keep balance between their own interests and the interests of future generations. In order to realize the role switching of perpetrators, here we will use the behavior theory and microeconomics to analyze the energy-saving behavior of individuals. And this book will still give a deep analyze on the status and function of public’s own character, act measure’s character and policy incentives in the course of “come into being-implement-continuing” by drawing eigenvectors.

1. The public’s own character will perform or change the individual’s preference by its influence on predisposing factor and it relates closely to social development, the quality of population and education etc.

2. Act measure’s character will go on affecting the producing and continuing of actions by influencing predisposing factor and reinforcing factor. The implementation scope, ways of a certain kind of energy-saving measure will give individuals different cognitive and attitude about the effect, cost and convenience of energy-saving measures. Thus, the fact will influence consumers’ preferences motivation and decide public’s energy-saving efforts and results. We has done a field survey on the resi-

dences of Jinan, Shandong Province in May 2006, and the result shows that: people who apply energy-saving measures will firstly consider the effect of the measures, then cost and energy-saving items come out, people pay less attention on the realizing path; Ways with obvious effects and low cost will win people's preference; Most of them prefer simple and initial energy-saving methods which means to realize energy-saving by changing people's habits; In the path of technical energy-saving, people tend to purchase devices of energy-saving but not reform their initial appliance.

3. Policy incentives will perform or change the individual's behavior choice by its influence on predisposing factor, enabling factor and reinforcing factor. According to the classification of science policy, policy can be divided into three categories: law policy, economic policy and information policy. Law policy can build a model out of public's anticipation by the way of mandatory; Information policy can change actor's concept and values, and help them foster an awareness of sustainable development of energy, thereby change the production and consumption behavior; The core role of economic policy is to readjust the economic interests of the various actors according to the principle of material interests. There are two categories of major economic policies: one is the macroeconomic policy which will adjust the behavior directly, such as fiscal policy, monetary policy etc. It works by its influence on promoting factor and predisposing factor: (1) predisposing factor: to express the government's policy orientation according to policy differences, then try to change actor's attitude and concept with the aim of forming policy-oriented motives; (2) promoting factor: to increase or decrease behavior cost according to the adjusting of policies then encourage the public choose the behavior pattern led by government. The direct economic policy works effectively on condition that the energy price is full of price-elasticity. The second is the indirect economic policy which works by chan-

ging the main microcosmic environment then cause the change of behaviors, like industry policy etc.

According to the degree of their impacts and functions on energy-saving behavior, three kinds of factors can be involved into the following energy demanding function with two phases: $w_i = \alpha_i \bar{P}_i + \varepsilon_i (F_c + F_b + F_p) \left[\lambda + \gamma \ln \left(\frac{P_e}{P_n} \right) + \beta \ln \left(\frac{Y}{P} \right) \right]$, and the symbol F_c refers to public's own character, F_b means act measure's character while F_p refers to policy incentives. F_c and F_b will decide energy consumption's indifference curve according to their impacts on actors' preferences; while F_p can either change the relative prices of energy-saving and non-energy-saving or those actors' financial capability, then turn or translate budget line.

II

After a systematic normative study on the characteristics of public's energy-saving behaviors, factors and these factors' function mechanism, the book will switch to demonstrational research. At the meanwhile of reviewing and evaluating energy-saving policies of pioneer countries, the book has chosen three types of energy consumption models which come from different countries and districts—EU, Japan and America. According to a comparison on law, economy and information policies of the three different countries and districts, we can find the fact that all the energy-saving policies have fulfilled a substantive reduce of energy consumption. These policies and measures have achieved remarkable energy efficiency, economic and environmental effects. The following items are the basis on which these policies can be successful: 1) to correctly handle and coordinate all the main interests' status and function in energy-saving; 2) to establish a complete energy management system and model; 3) focus on the coherence and inter-activeness of all kinds of energy-saving policies; 4) the principles for policy designing is its effect

(or aim), but not simply cost; 5) to focus on the role of non-government organizations in saving energy; 6) to maintain the policy dynamic. In addition, because of the difference of policy power and manner, natural resource reservation, environment and geography, industry structure etc, the pioneer countries and directors show different energy-saving effects.

Chinese government has prompted the idea of energy-saving since 1980's. After more than 20 years practice, it has achieved a lot in the total energy consumption, energy intensity, the structure of energy consumption etc. The correct energy-saving policy has not only brought us a lower level of energy intensity, but also the obvious environmental effects, which means China has already realized the switch to non-energy-dependent countries and energy-saving policy won't lead to negative growth of economy. According to the analyzing result on related data from 1980 - 2005, we can come to such a conclusion that although China's energy-saving policies were not so effective as some experts and scholars had described, it was still worthy of recognition, and those policies need our further improve and complete; the law policies are still week; information and education can produce some certain policy effects, but it still far below our anticipation; the adjustment of industrial structure and energy pricing policies in our economic policies can influence our energy-saving target, and at the same time because of the low penetration the subsidies is limited, sometimes it even leads to a negative effect. In addition, as for the achievement we have fulfilled in energy field, the quantitative analysis shows that the adjustment of industrial structure is the most effective and lasting policy.

According to the foregoing findings, based on analyzing China's current energy-saving background, the book will design and build a directing policy system which will prompt public's energy-saving behavior. The energy-saving policies of new era should start with "demand"

and “supply”, and the concrete assume goes like the following: to build separate energy-saving supervising system featured in “politic apart from supervise”, that will ensure the existence of an isolated and strong department which will upgrade energy-saving’s importance to the position of production; to complete and perfect the law system, especially to improve the matching rules and regulations to form a secure system with basic law, special laws and enforcement law united in it; to strengthen and promote the publicity of energy-saving system, setting up energy-saving advisory point and website, producing and publicizing energy-saving cases while issuing all kinds of energy-saving items to enhance the public participation capability; to give a full play of domestic and international energy intermediary organizations, realizing the win-win cooperation in the field of energy-saving; to build effective and various energy-saving economy policy systems, including (i) energy tax system based on three principles of comprehensive, neutral and differences; (ii) dynamic subsidies policy based on performances; (iii) financing policy of expanding government’s policy-oriented financial institutions and private channel; (iv) constructing primary and secondary trading market of green quota based on option pricing; (v) strengthen the high centralization and informatization of the performance and supervision of government purchasing; (vi) Excess progressive pricing system which can embody the demand relationship between kinds of energy; (vii) industrial policy with market access standards etc.

Key Words: *Public Energy Conservation Behavior Motivation*
Policy Incentive Energy Consumption