



# 德国节能政策研究

## Research on German Energy Efficiency Policy

**2018年12月10日**

**December 10<sup>th</sup> 2018**



# 内容提要 / Content



- 德国节能法律体系和节能政策体系
- German legislative and policy system for energy efficiency
- 德国重点节能激励政策及其启示
- German key promotional programmes and experience
- 德国节能政策对中国的借鉴意义
- Energy efficient policy in Germany as potential blueprint for China



## ■ 欧盟节能低碳法律

- “20-20-20” 目标
- 《欧盟能源效率指令》
  - 《国家能效行动计划》
  - 能耗目标、措施、预期效果

## ■ 德国节能法律体系

- 《能源服务法》
- 《热电联产法》
- 《电力税法》
- 《能源税法》
- 《能源行业法》
- 《节能法》

## ■ EU energy efficiency and low carbon laws

- 20-20-20 targets
- Energy Efficiency Directive
  - National Action Plan on Energy Efficiency
  - Energy consumption goals, measures and expected results

## ■ German legislative system for energy efficiency

- Energy Services Law
- Combined Heat and Power Generation Law
- Electricity Tax Law
- Energy Tax Law
- Energy Industry Law
- Energy Saving Law

# 德国节能法律体系 Legislative System for Energy Efficiency



气候保护和能源指令及目标一揽子计划 (20-20-20 目标)

2030 气候和能源政策框架

能效指令

建筑指令



Package of directives and targets for climate protection & energy (20-20-20 targets)

Policy framework for climate and energy 2030

Energy Efficiency Directive

Buildings Directive



能源服务法 (EDL-G)

设立“能源和气候基金”法 (EKFG)

热电联产法 (KWKG)

电力税法 (StromStG)

能源税法 (EnergieStG)

能源行业发法 (EnKG)

节能法 (EnEG)



各种条例

节能条例 (EnEV)

供热成本条例 (HeizkostenV)

Energy Services Law (EDL-G)

Law on establishing an  
“Energy and Climate Fund” (EKFG)

Combined Heat and Power Generation Law  
(KWKG)

Electricity Tax Law (StromStG)

Energy Tax Law (EnergieStG)

Energy Industry Law (EnWG)

Energy Saving Law (EnEG)



Various Ordinances

Energy Saving Ordinance  
(EnEV)

Heating Costs Ordinance  
(HeizkostenV)

欧盟政策

欧盟指令

德国联邦法律

德国联邦条例

EU Policies

EU Directives

German Federal Laws

German Federal  
Ordinances



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



## ■ 德国能源转型战略

- 2011年议会决定
- 2020年一次能源消费比2008年减少**20%**
- 2050年一次能源消费比2008年减少**50%**
- 世界上**第一个国家级能源消费总量下降目标**，雄心勃勃的“能源消费总量控制目标”

## ■ Energiewende

- 2011: passed by federal parliament
- 2020: primary energy consumption reduced by **20%** compared to 2008
- 2050: primary energy consumption reduced by **50%** compared to 2008
- The **first national total energy consumption reduction goal** in the world, with ambitious “targets control of total energy consumption”



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



年份	温室气体减排(%)	可再生能源占比(%)		能源效率目标(%)			
		最终能源消费	发电量	一次能源消费	供热	交通终端能耗	用电量
2020	-40	18	35	-20	-20	-10	-10
2030	-55	30	50				
2040	-70	45	65				
2050	-80~-95	60	80	-50	-80	-40	-25
基准年	1990			2008	2008	2005	2008

	2020	2030	2040	2050
<b>Greenhouse gas emissions</b>				
Greenhouse gas emissions (compared with 1990)	at least -40 %	at least -55 %	at least -70 %	at least -80 bis -95 %
<b>Renewable energy</b>				
Share of gross final energy consumption	18 %	30 %	45 %	60 %
Share of gross electricity consumption	at least 35 %	at least 50 %	at least 65 %	at least 80 %
		Renewable Energy Sources Act 2025: 40-45 %	Renewable Energy Sources Act 2025: 55-60 %	
<b>Efficiency and consumption</b>				
Primary energy consumption (compared with 2008)	-20 %			-50 %
Gross electricity consumption (compared with 2008)	-10 %			-25 %
Heat consumption in buildings (compared with 2008)	-20 %			
Final energy consumption: transport (compared with 2005)	-10 %			-40 %



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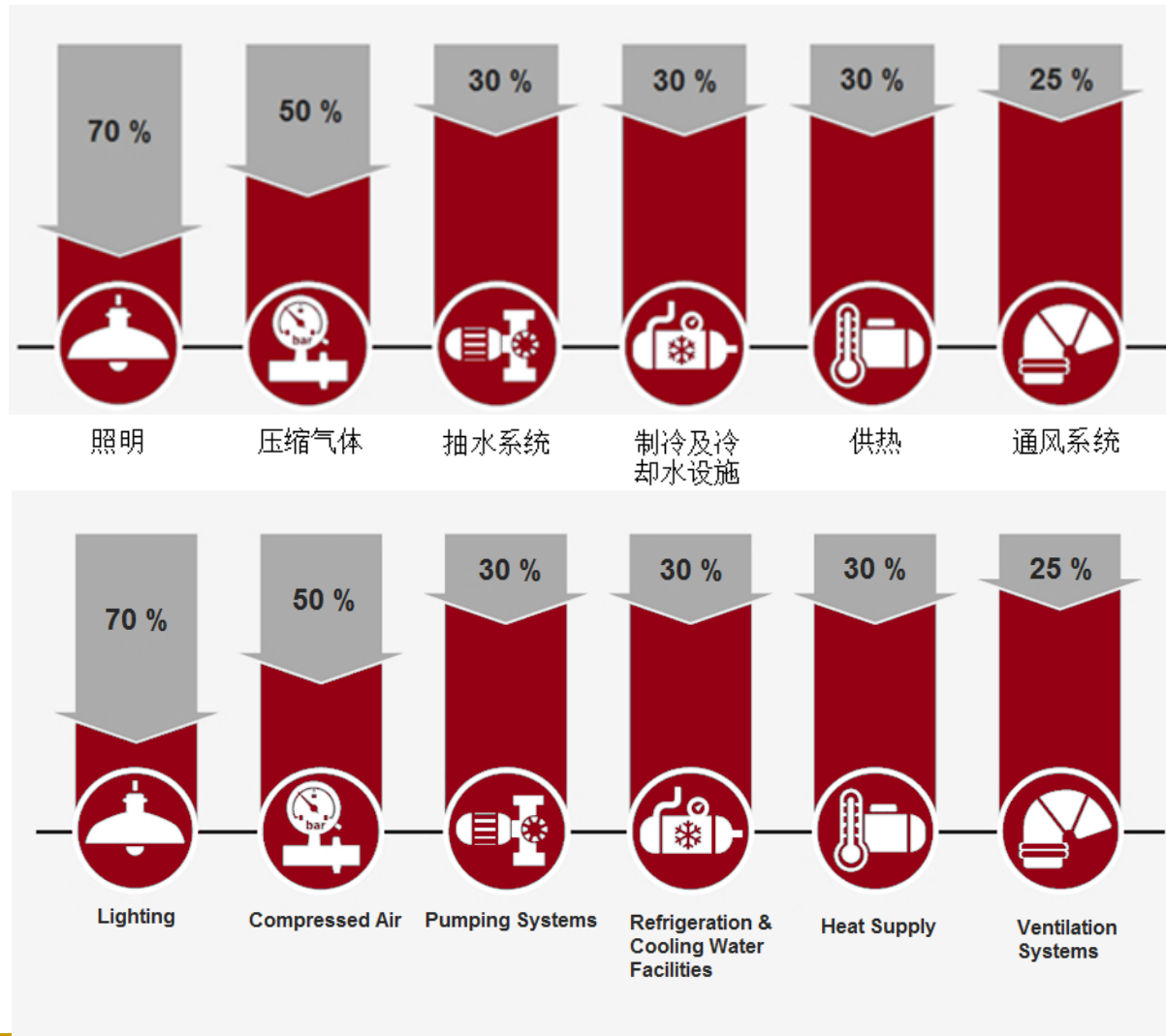


- 德国节能在能源转型战略中的地位
  - 德国能源转型的第二大支柱
    - 可再生能源是第一大支柱，但成本越来越高
    - 能源进口费用高达3560亿欧元，能源成本压力大
    - 德国节能仍有较大潜力，节能是中小企业投资回报高的好项目，回报率20%-25%
- The status of energy conservation in “Energiewende” strategy
  - The second pillar of Energiewende in Germany
    - Renewable energy is the first pillar, but the costs are rising
    - Energy import costs 356 billion Euros, which is a great pressure
    - German still has great energy-saving potential, since the ROI of energy-saving projects for SMEs can reach 20%-25%





# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany





# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



- 德国节能在能源转型战略中的地位
  - 节能对德国经济社会发展的重要意义
    - 落实《欧盟能效指令》的要求
    - 实现《巴黎协定》确定的自主承诺目标
    - 对居民和企业能够带来经济效益
    - 为德国增加商业机会和科技创新增长点
- **The status of energy conservation in Energiewende**
  - Great significance to economic and social development
    - Implement the EU Energy Efficiency Directive
    - Fulfill the Intended Nationally Determined Contributions
    - Bring economic benefits to residents and enterprises
    - Create business opportunities and growth points for technological innovation



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



- 德国能源消费的基本情况
- Energy consumption in Germany
  - 商贸服务+居民生活: 40.6%
  - 工业: 29.0%
  
  - Business service & daily life of residents: 40.6%
  - Industry: 29.0%



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany

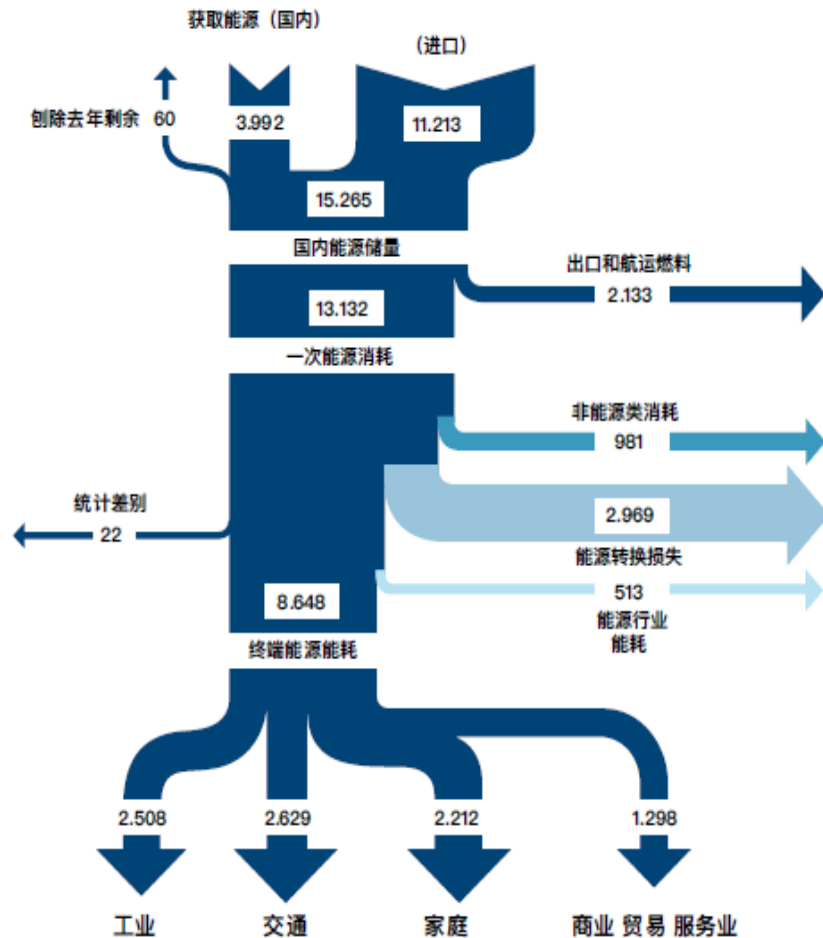
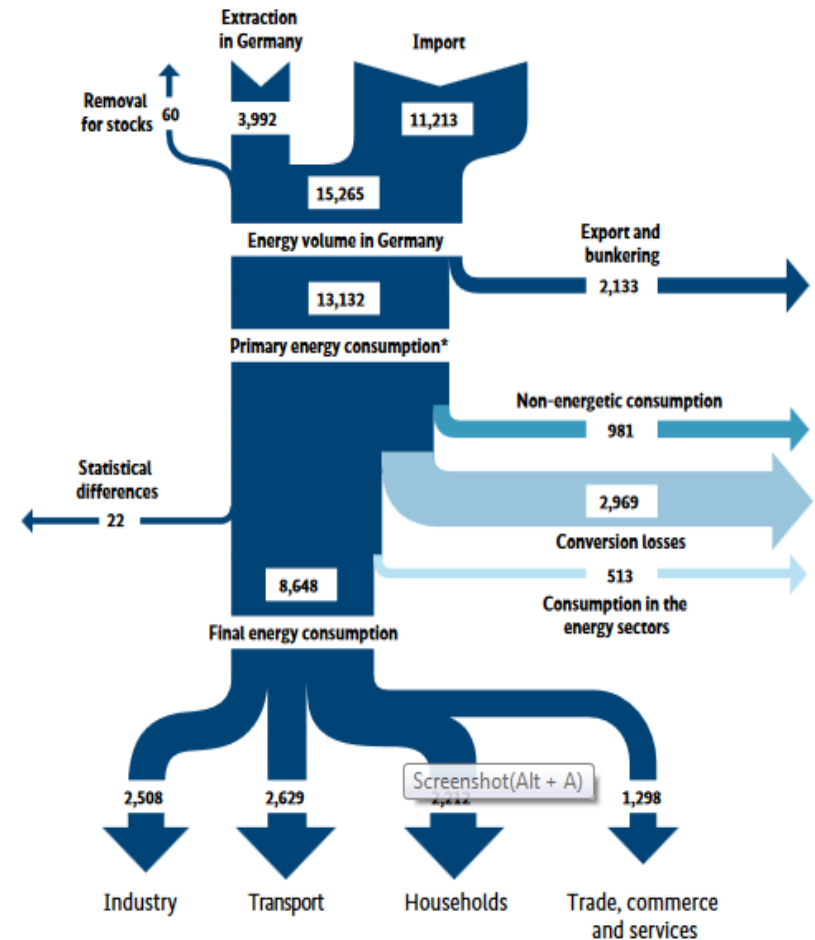


Figure 1: Energy flow chart 2014 in petajoules (PJ)



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



- 德国节能的总目标和分行业目标
- Total goals and goals for different industries
  - 德国分部门能效目标/ Goals for different industries

指标	2020年目标	2050年目标	2014年现状
一次能源消费 (与2008年相比)	-20 %	-50 %	-8.3 %
电力(毛)消费 (与2008年相比)	-10 %	-25 %	-4.2 %
终端能源生产率	每年2.1% (2008-2050)		每年1.6% (2008-2014均值)
建筑领域一次能源需求 (与2008年相比)	-	规模为-80 %	-14.8 %
建筑领域采暖需求 (与2008年相比)	-20 %	-	-12.4 %
交通领域终端能源消耗 (与2005年相比)	-10 %	-40 %	+1.1 %



# 德国节能的目标/German Energy-saving Goals



措施	到 2020 年预计的节能量	
	一次能耗 (单位: PJ)	温室气体减排量 (百万吨二氧化碳当量)
<b>《国家能源效率行动计划》所包括的节能措施:</b>		
能源咨询的质量保障和优化	4.0	0.2
通过减免税收政策促进节能改造	40.0	2.1
继续开发研究二氧化碳减排的建筑节能改造项目	12.5	0.7
对能效措施采用竞争性招标模式	26-51.5	1.5-3.1
合同能源管理的促进措施 (包括亏损担保和合同能源管理)	5.5-10	0.3-0.5
进一步发展德国复兴信贷银行的能效项目	29.5	2.0
能效网络倡议活动	74.5	5.0
领跑者战略——国家和欧盟层面	85.0	5.1
非中小企业的能源审计义务	50.5	3.4
采暖设备的国家能效标识	10.0	0.7
《国家能源效率行动计划》所包括的其他即时措施:	约为 10	约为 0.5
<b>节能措施总计</b>	<b>350-380</b>	<b>21.5-23.3</b>
<b>其他措施</b>		
从 2012 年 10 月开始实行的措施	43.0	2.5
后续工作步骤成果的暂时估值	小于等于 40	小于等于 4
<b>总计</b>	<b>390-460</b>	<b>约 25-30</b>
交通领域的措施 (参见《2020 年气候保护行动项目》)	110-162	7-10

Measure	Forecast savings by 2020	
	PEC in PJ	Greenhouse gases in million tonnes of CO <sub>2</sub> -equivalent
<b>Short-term NAPE measures</b>		
Quality assurance and optimising existing energy consulting	4.0	0.2
Granting tax incentives for energy efficiency renovations	40.0	2.1
Upgrading the CO <sub>2</sub> Building Renovation Programme	12.5	0.7
Introduction of a competitive tendering scheme	26-51.5	1.5-3.1
Funding for energy performance contracting (including default guarantees)	5.5-10	0.3-0.5
Upgrading KfW energy efficiency programmes	29.5	2.0
Energy Efficiency Networks Initiative	74.5	5.0
Top Runner Strategy – at national and EU level	85.0	5.1
Energy audit obligation for non-SMEs	50.5	3.4
National energy efficiency label for old heating installations	10.0	0.7
Additional short-term measures in NAPE	about 10	about 0.5
<b>Total for short-term measures</b>	<b>350-380</b>	<b>21.5-23.3</b>
<b>Other measures</b>		
Measures as of October 2012	43.0	2.5
Provisional estimate of effects of long-term work processes	up to 40	up to 4
<b>Total</b>	<b>390-460</b>	<b>approx. 25-30</b>
Transport measures (see Climate Action Programme 2020)	110-162	7-10



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



## ■ 德国制定节能的思路 / Ideas for German energy-saving policy

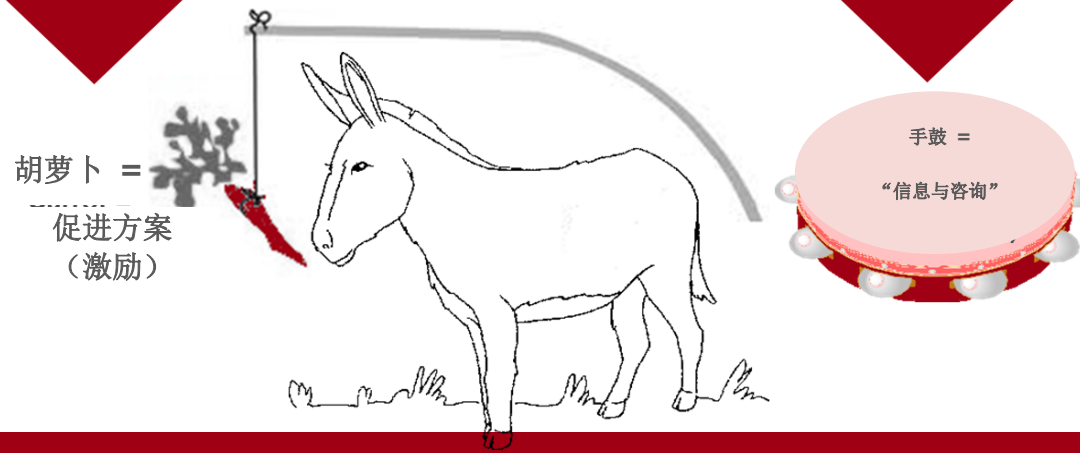
法律要求 (如规定、规范)	促进方案 (如经济激励)	积极推动 (如信息宣传、认识提升等)
<ul style="list-style-type: none"><li>▪ 本研究未予考虑。</li><li>▪ 不形成激励。</li></ul>	<ul style="list-style-type: none"><li>▪ 本研究主要关注点。</li><li>▪ 长期市场转型的主要手段。</li></ul>	<ul style="list-style-type: none"><li>▪ 本研究包含关键信息手段。</li></ul>
<b>Legal requirements (e.g., regulations, codes)</b>	<b>Promotional programmes (e.g., financial incentives)</b>	<b>Motivation (e.g., information campaigns, awareness raising)</b>
<ul style="list-style-type: none"><li>• Not considered for this study.</li><li>• Do not pose an incentive.</li></ul>	<ul style="list-style-type: none"><li>• <b>Main focus of this study.</b></li><li>• Main instrument for long-term market transformation.</li></ul>	<ul style="list-style-type: none"><li>• Not considered for this study.</li><li>• Do not pose a financial incentive.</li></ul>

# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



## 德国制定节能的思路 / Ideas for German energy-saving policy

大棒=立法、规章制度、技术标准  
→能效要求 →针对生产、服务、新建筑和现有显著



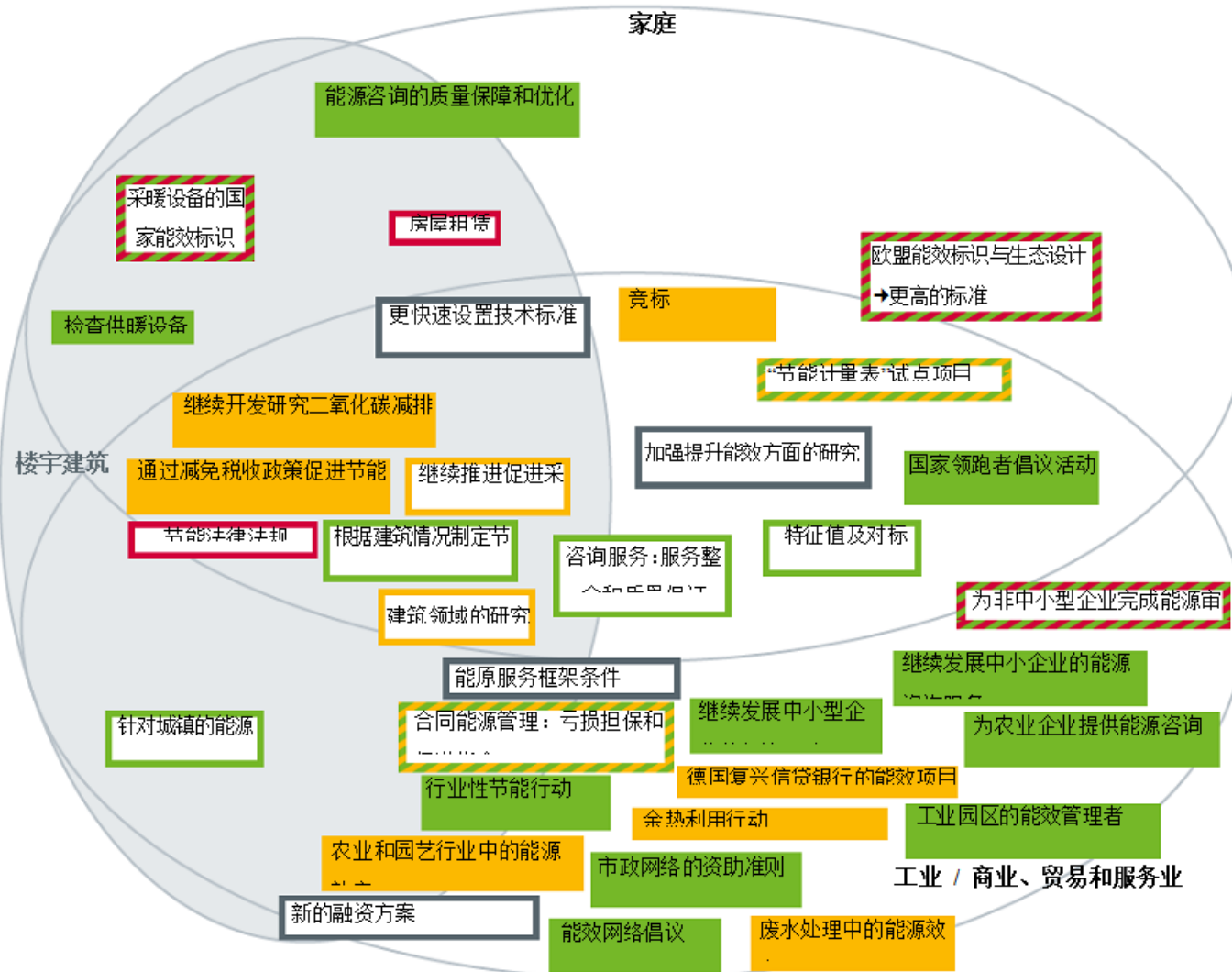
Stick = Legislation, Rules & Regulations, Technical Standards  
→ EE requirements → for production, services, new & existing buildings





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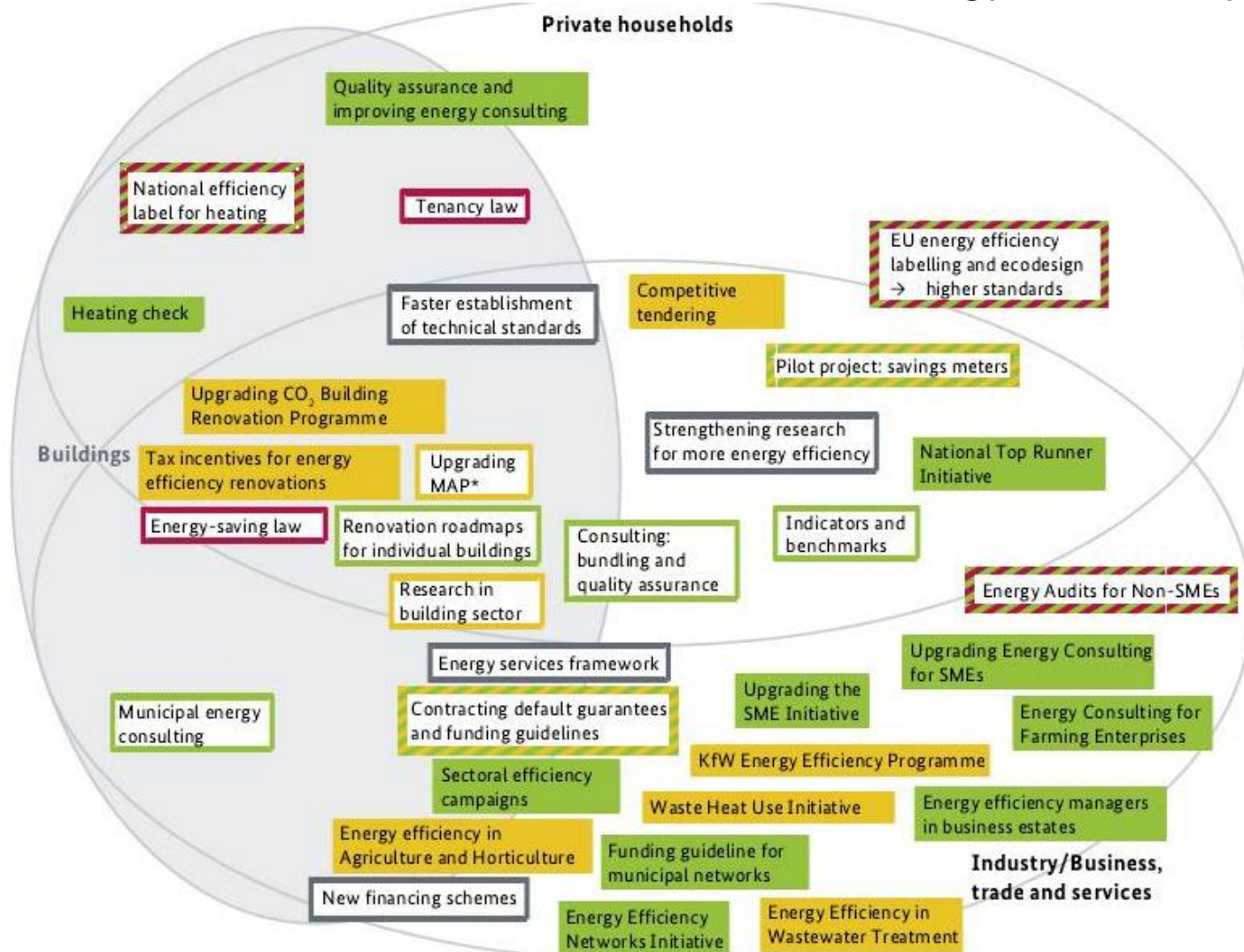
## 《国家能源效率行动计划》的总体结构



# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



## ■ General structure of National Action Plan on Energy Efficiency

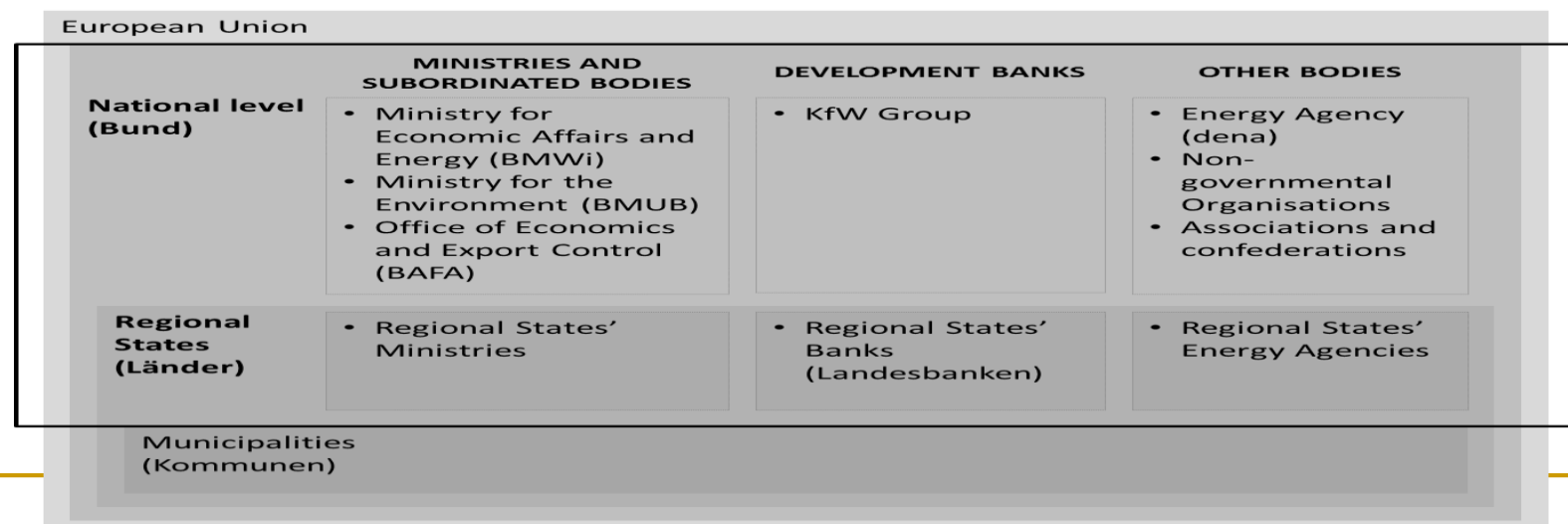


# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



## ■ 德国实施节能管理的机构 / Promotional system

欧盟			
	部委和下属机构	发展银行	其他机构
国家层面 (Bund)	<ul style="list-style-type: none"><li>▪ 经济与能源部 (BMWi)</li><li>▪ 环境部 (BMUB)</li><li>▪ 经济和出口控制办公室 (BAFA)</li></ul>	<ul style="list-style-type: none"><li>▪ KfW 集团</li></ul>	<ul style="list-style-type: none"><li>▪ 能源署 (dena)</li><li>▪ 非政府组织</li><li>▪ 协会和联合会</li></ul>
联邦州 ("Länder")	<ul style="list-style-type: none"><li>▪ 联邦州各部</li></ul>	<ul style="list-style-type: none"><li>▪ 联邦州银行 (Landesbanken)</li></ul>	<ul style="list-style-type: none"><li>▪ 联邦州能源机构</li></ul>
城市 (Kommunen)			

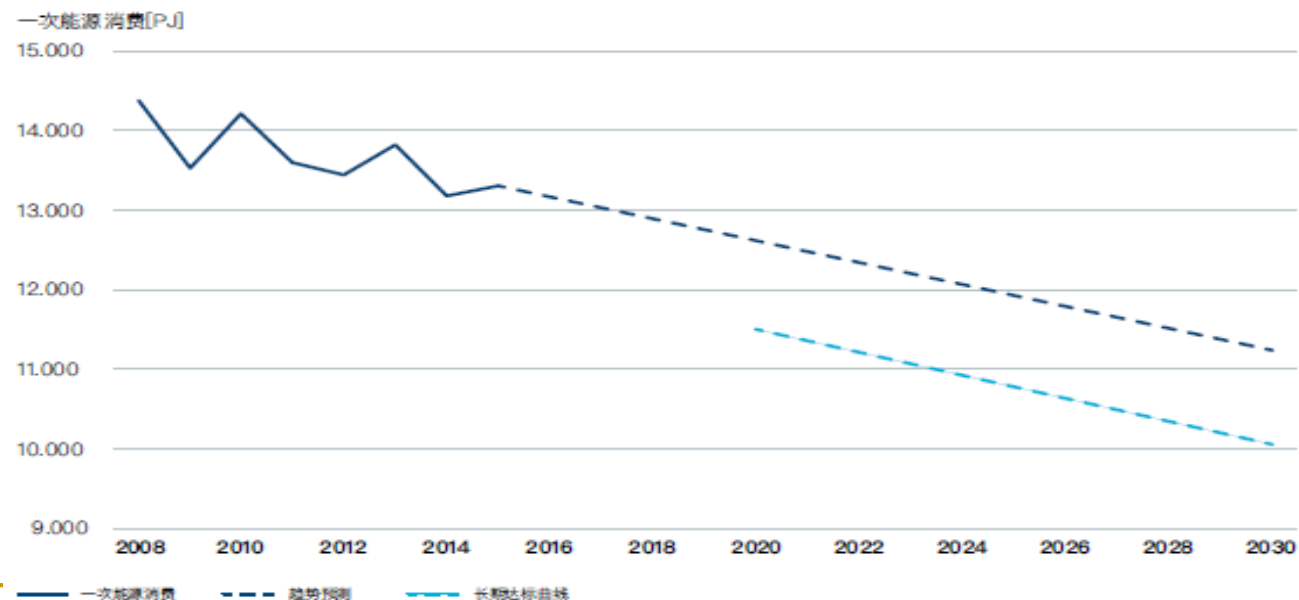


# 德国节能的地位、目标和管理方式/Status, Targets and Management of Energy Conservation in Germany



- 德国节能政策对目标的贡献
- Contribution of German energy efficiency policy to the goals
  - 德国能效目标：下降20%，预计只能下降10%左右
  - German energy efficiency goal: 20% reduction, just 10% is expected to be realized

图4：一次能源消费的发展，2008 — 2030年



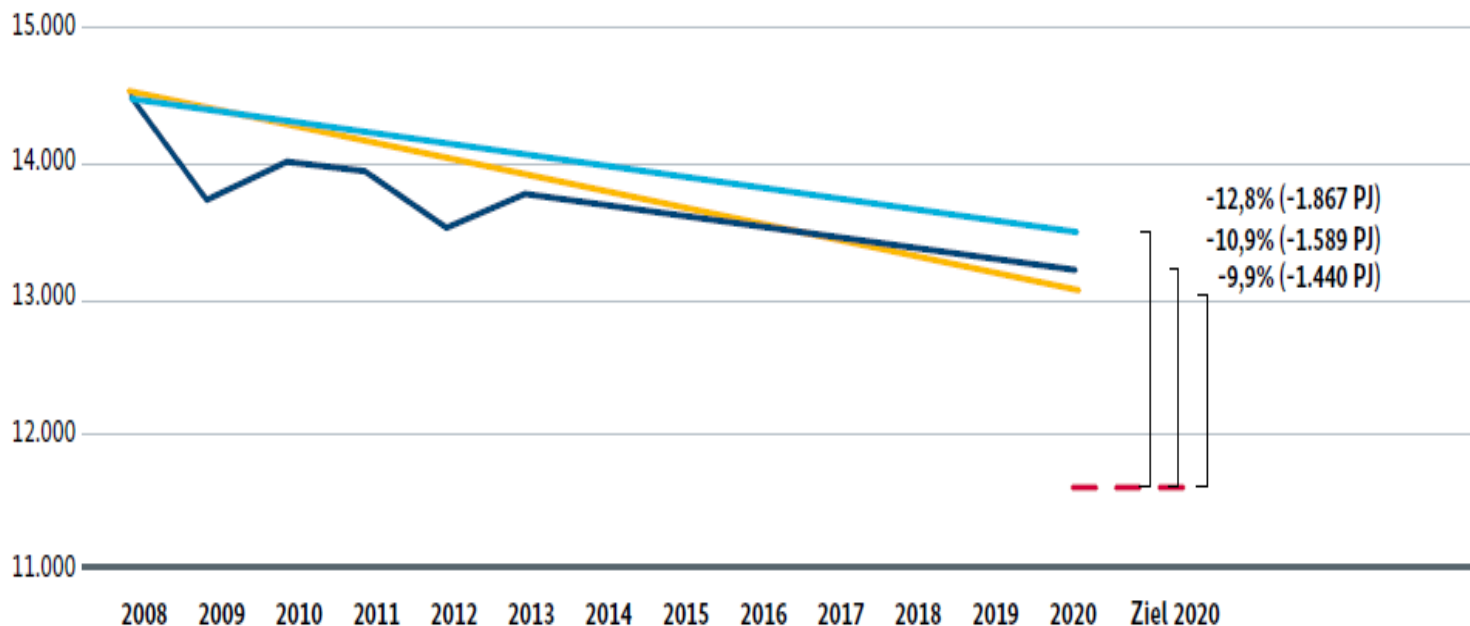
来源：德国联邦经济和能源部能源平衡工作组；趋势预测基于2008 — 2015年数据



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# 德国重点节能激励政策及其启示 / Programme & Experience

## ■ 22个案例 / 22 Cases

	政策名称	组内方案数量	属性
1	修建节能建筑物	13	
2	建筑节能改造	44	
3	节能改造项目的监督管理	6	
4	实施节能技术改造	30	
5	建立能源消费监测系统	5	
6	开展建筑物能源审计	10	
7	开展能源审计	2	
8	开展节能咨询	1	
9	开展节能培训和能力建设	4	
10	建立能效网络小组	4	
11	推广能源管理体系或能源管理制度	7	
12	实施城市气候和能源项目	1	
13	开发城市级应对气候变化和能源措施	8	
14	公共机构雇佣专业能源管理人员	3	
15	成立区域性能源机构	2	
16	为学校提供节能经济激励	1	
17	安装电力负荷管理系统	1	
18	签署电力可中断负荷协议	1	
19	安装电力储存系统	6	
20	安装热电联产系统	16	
21	余能回收用于供热或制冷	7	
22	提供合同能源管理咨询	1	

Cluster name	No. of schemes in cluster
1. Construction of energy efficient buildings	13
2. Energy efficient refurbishment of buildings	44
3. Planning /supervision of energy efficient refurbishment	6
4. Implementation of energy efficient technologies / measures	33
5. Establishment of monitoring / measurement systems	5
6. Conduction of energy audits in buildings	10
7. Conduction of energy audits in industries	2
8. (Long-term) energy coaching / consulting	1
9. Conduction of EE training	4
10. Networking platforms for companies exchanging ideas on energy efficiency	4
11. Implementation of energy management systems in industries	7
12. Implementation of management systems for achieving and evaluating climate and energy targets for municipalities	1
13. Development of climate / energy concepts in municipalities	8
14. Employment of an energy manager in public entities	3
15. Foundation of regional energy agencies	2
16. Financial incentives for schools to save energy	1
17. Installation of load management systems	1
18. Companies shutting down heavy loads in peak load times	1
19. Installation of energy storage systems	6
20. Installation of cogeneration of heat and power	16
21. Implementation of heating / cooling network solutions	7
22. Consulting for energy performance contracting	1





- （一）节能技术改造支持政策 / Programmes for implementation of energy efficient technologies
- （二）建筑节能政策 / Programmes for energy-efficient construction
- （三）能源管理体系 / Energy management systems
- （四）能效网络小组 / Energy Efficiency Networks (EEN)
- （五）能源消费监测系统 / Energy consumption monitoring systems
- （六）节能咨询服务和节能信息服务 / Energy-saving consulting and information services
- （七）能源审计 / Energy audits
- （八）能效竞标 / Competitive tendering scheme for energy efficiency



## （一）节能技术改造支持政策 / Programmes for implementation of energy efficient technologies

- 2017年时，德国共有33个针对不同领域、不同技术的节能技术改造支持政策
- 多数对象是中小企业，有的对象是某个地区（如州、市），有的对象是某个领域（如采暖）的通用性节能技术
- 政府财政提供资金支持，2013年的1150万欧元提高到2016年的1.8亿欧元
- By 2017 there was 33 programmes for the implementation of EE technologies.
- Most programmes are directed at SMEs. The programmes also finance cross-cutting EE measures in a specific region (e.g. state-level, municipality), or for a certain energy usage purpose (e.g. heating).
- The fund from BMWi has been increased from 11.5 million Euro in 2013 to 180 million Euro in 2016.





## (一) 节能技术改造支持政策 / Programmes for implementation of energy efficient technologies

欧盟对中小企业的定义：

公司类别	雇员	并且	营业额	或	资产负债表总额
中型	<250		≤ 5000万欧元		≤ 4300万欧元
小型	<50		≤ 1000万欧元		≤ 1000万欧元
微型	<10		≤ 200万欧元		≤ 200万欧元

欧洲所有企业中90%为中小企业

SME definition by the European Union:

Company category	Employees	and	Turnover	or	Balance sheet total
Medium-sized	< 250		≤ EUR 50 million		≤ EUR 43 million
Small	< 50		≤ EUR 10 million		≤ EUR 10 million
Micro	< 10		≤ EUR 2 million		≤ EUR 2 million

90% of all businesses in the EU are SMEs

联邦经济与能源部提供的能效资金

由德国联邦政府设立，为特殊资产“能源和气候基金”的一部分，设立目的是支持合理使用能源，提高整体能效。

支持的节能技术措施包括：

- 通用节能技术
- 能源管理体系
- 生产工艺能效
- 节能咨询
- 中小企业节能咨询

资金资助额度：

- 2013: 1150 万 欧元
- 2014: 2860 万欧元
- 2015: 1.401 亿欧元
- 2016: 1.803 亿欧元

Energy efficiency fund by the BMWi:

Set up by the German Federal Government as part of the Special Assets “Energy and Climate Fund”. Created to support the rational use of energy and to increase energy efficiency in general.

Measures promoted:

- Cross-cutting technologies
- Energy Management Systems
- Energy efficient production
- Energy-saving coaching
- SME energy saving coaching

Financial means of fund:

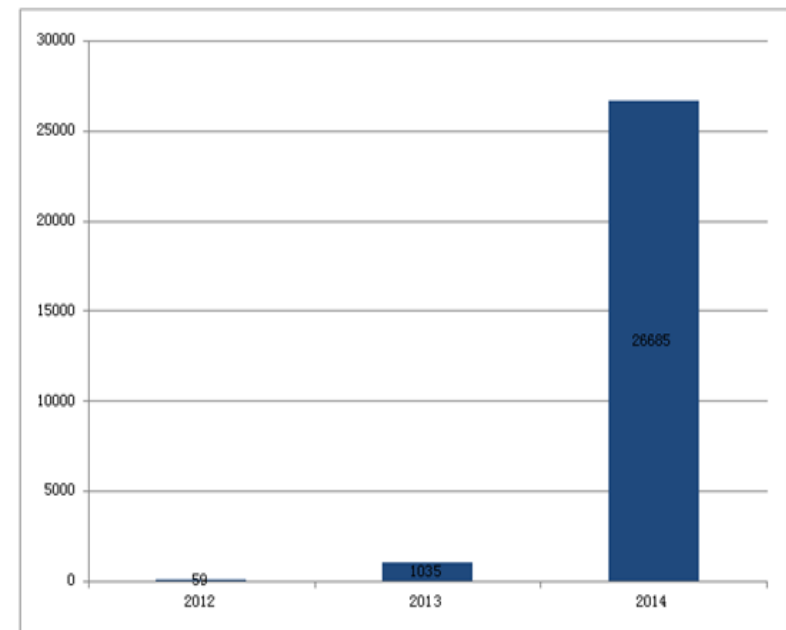
2013: 11.5 million EUR  
2014: 28.6 million EUR  
2015: 140.1 million EUR  
2016: 180.3 million EUR





## (一) 节能技术改造支持政策 / Programmes for implementation of energy efficient technologies

- 政策和实施效果
  - 实施流程
  - 获得企业广泛欢迎
- Programmes and implementation
  - Implementation process
  - Widely welcomed by enterprises



中小企业通用节能技术的项目申请数量2012-2014年  
Number of applications for the programme “Investment grants for highly efficient cross-cutting technologies in SMEs”, 2012-2014



## 取得效果的原因

- 立足于德国实际国情
  - 大企业少
  - 中小企业数量多、潜力大
- 设立多样化的技术支持政策
  - 多种技术可选择
  - 不同技术有不同的节能激励政策可供选择
- 针对中小企业和大型企业设立不同的资金解决方案
  - 大企业：信贷
  - 中小企业：补贴，但通过银行实施
- 依托商业机构的网络体系为政府提供支持
  - 联邦信贷银行

## Success Faktoren

- Based on Germany's actual situation
  - Few large-scale enterprises
  - Lots of SMEs with great potentials
- Diversified programmes
  - Various technologies available
  - Different programmes for different technologies
- Targeted funding solutions
  - Large-scale enterprises: credits
  - SMEs: subsidies, but by banks
- Government relying on the network system of commercial organization
  - KFW



## 对中国的借鉴意义

- 提高对中小企业节能的重视程度
- 支持中小企业节能以补贴为主、大企业以信贷为主
- 与金融机构深度合作设立节能项目服务一揽子方案
- 培育更多高素质的能源审计人员

## What we can learn

- Pay more attention to the energy efficiency in SMEs
- Support SMEs mainly with subsidies, large-scale enterprises mainly with credits
- Provide a package of services for energy efficiency projects under intensive cooperation with financial organizations
- Cultivate more qualified energy auditors





## （二）建筑节能政策 / Programmes for energy-efficient construction

### □ 政策和实施效果

- 德国联邦政府为建筑领域制定的节能目标——到**2050年全部建筑实现近零排放**
- 四类政策：
  - 提供信息和咨询
  - 给予资金支持
  - 提出法律法规要求
  - 强化科技研发

### □ Programmes & implementation

- Energy efficiency goals for building sector: **all buildings** shall be **carbon neutral** by **2050**
- Four kinds of programmes
  - Information and consultation
  - Financial support
  - Legal requirements
  - Technology research and development





## （二）建筑节能政策 / Programmes for energy-efficient construction

### □ 政策和实施效果

#### ■ 德国《国家能效行动计划》

- 开展建筑能效咨询
- 对节能改造和可再生能源采暖提供激励政策
- 检查供暖设备
- 加大建筑节能改造力度

#### ■ 效果

- 2008年-2012年，住宅建筑能耗减少15%，商业和服务业建筑能耗下降11%，工业建筑能耗下降6%

### □ Programmes & implementation

#### ■ Germany National Action Plan on Energy Efficiency

- Energy consulting for buildings
- MAP
- Heating check
- Increase of the building renovation programme

#### ■ Energy consumption reduction from 2008 to 2012:

- Residential buildings: 15%
- Commercial and service buildings: 11%
- Industrial buildings: 6%.





## 取得效果的原因 Success factors

- 具备较为完善的法律体系
  - 注重建筑能效咨询工作
  - 多样化的经济激励政策
  - 关注技术方案的经济性
- 
- Complete legal system
  - Emphasis on energy consulting for buildings
  - Diversified economic incentives
  - Focus on the economy of technological solutions

## 对中国的借鉴意义 What we can learn

- 完善建筑节能相关立法
  - 强化建筑节能咨询工作
  - 优化经济激励政策
  - 强化技术和措施的经济性评估
- 
- Improve the legislation system on energy-efficient construction
  - Provide more energy consulting
  - Optimize economic incentives
  - Strengthen economic evaluation of technologies and measures



## （三）推广能源管理体系 / Promotion of energy management systems

- 政策和实施效果
  - 明确法律要求
  - 激励政策
    - 能源税减免
    - 7个行业性支持政策
  - 约束政策
    - 大企业的法律要求
- Programmes and implementation
  - Legal requirements
  - Incentives
    - Energy tax reliefs
    - 7 industrial promotional programmes
  - Restraint policy
    - Legal requirements of large companies



## （三）推广能源管理体系 / Promotion of energy management systems

### □ 政策和实施效果 / Programmes and implementation

	ISO 50001	DIN EN 16247-1	替代制度
内容	<ul style="list-style-type: none"> <li>● 流程导向法，明确内部政策，设置目标</li> <li>● 持续系统优化</li> <li>● 顶层管理参与</li> <li>● 文件记录要求</li> <li>● 能源审计</li> </ul>	<ul style="list-style-type: none"> <li>● 能源使用情况分析</li> <li>● 确定和评估节能潜力</li> </ul>	<ul style="list-style-type: none"> <li>● 明确管理层义务</li> <li>● 明确公司节能负责人</li> <li>● 能源使用情况分析</li> <li>● 确定和评估节能潜力</li> </ul>
工作	<ul style="list-style-type: none"> <li>● 管理层必须积极参与</li> <li>● 较努力地记录文件</li> <li>● 可采用外部咨询</li> </ul>	<ul style="list-style-type: none"> <li>● 主要由能源审计师负责</li> <li>● 由内部或外部审计员，实施年度能源审计</li> </ul>	<ul style="list-style-type: none"> <li>● 公司管理层积极参与</li> <li>● 至少要分析年能源消费情况</li> </ul>
质量	明确指南，保留解释空间，实现持续的系统优化	由具备资质的能源审计员负责，并符合流程需求	根据参与者能力和动机确定（无法定义务）
节能	关注能效和常规监控，并持续改进	借助外部力量推动能源利用系统优化	由公司自行确定
成本	认证成本	审计成本	证明成本
目标群体	中小企业/大公司	中小企业/大公司	中小企业

## (三) 推广能源管理体系 / Promotion of energy management systems

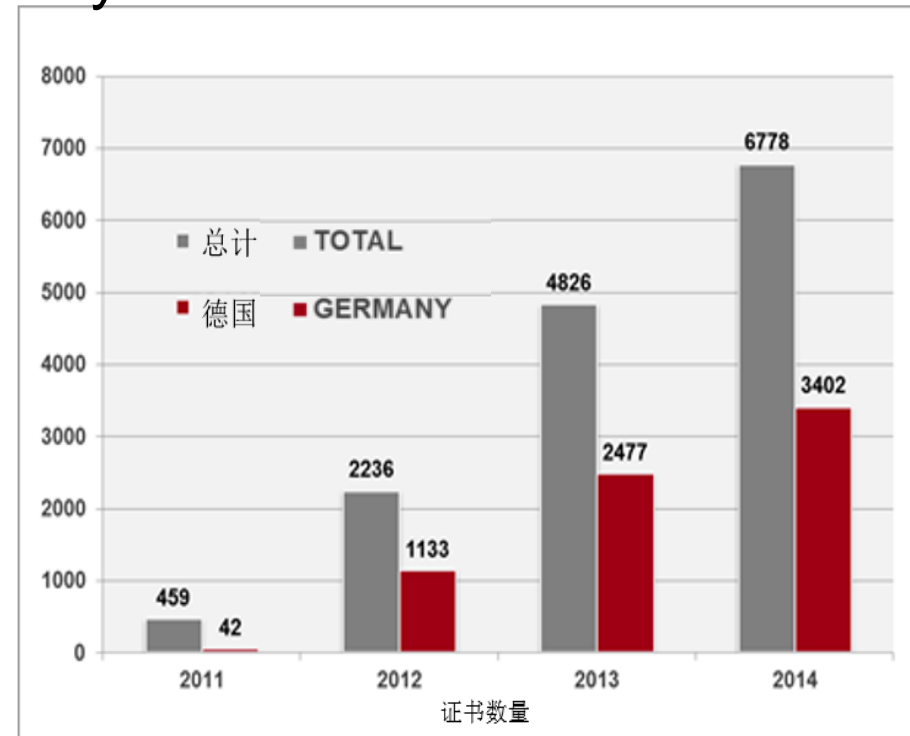
### □ 政策和实施效果 / Programmes and implementation

	Alternative System	DIN EN 16247-1	ISO 50001
<b>Content</b>	<ul style="list-style-type: none"> <li>• Obligation by management</li> <li>• Responsible person in company</li> <li>• Capture and analyse energy usage</li> <li>• Identification and evaluation of potential improvements</li> </ul>	<ul style="list-style-type: none"> <li>• Capture and analyse energy usage</li> <li>• Identification and evaluation of potential improvements</li> </ul>	<ul style="list-style-type: none"> <li>• Process oriented approach, with clear internal policy and goal setting</li> <li>• Continuous system optimization</li> <li>• Involvement of top management</li> <li>• Documentation requirements</li> <li>• Energy audits</li> </ul>
<b>Effort</b>	<ul style="list-style-type: none"> <li>• Active participation of management</li> <li>• Minimum annual capture and analysis of energy usage</li> </ul>	<ul style="list-style-type: none"> <li>• No active participation of company required</li> <li>• Annual energy audits by internal or external auditors</li> </ul>	<ul style="list-style-type: none"> <li>• Active participation of management</li> <li>• Relative high effort for documentation</li> <li>• Possibly external consulting</li> </ul>
<b>Quality</b>	Depending on competence and motivation of participants (no legal obligations)	Minimum requirement ensured by demands in process and qualification of energy auditor in norm	Clear guidelines with room for interpretation to achieve continuous system optimization
<b>Savings</b>	Depending on company internal ambition and qualifications	External competences can create impulses for process optimization	Focus on energy efficiency and regular monitoring und continuous improvement
<b>Costs</b>	<ul style="list-style-type: none"> <li>• Costs for attestation</li> </ul>	Costs for audit	Costs for certification
<b>Target group</b>	<ul style="list-style-type: none"> <li>• SME</li> </ul>	SME/Large Company	SME/Large Company



## （三）推广能源管理体系 / Promotion of energy management systems

- 政策和实施效果
  - 实施效果显著：德国占当年全球新增认证企业的一半左右
- Programmes and implementation
  - Remarkable effects: German companies account for about **half** of the newly added certificated companies in the world.



No. of Certificates



## 取得效果的原因

### Success factors

- 为大企业和中小企业制定不同的能源管理体系标准
- 将能源管理体系与税收减免挂钩
- 对能源管理体系给予资金支持
- Different energy management system standards for large-scale enterprises and SMEs
- Connecting energy management system with tax breaks
- Financial support

## 对中国的借鉴意义

### What we can learn

- 对不同规模的企业能源管理提出不同的要求
- 政府为企业提高能源管理水平提供优惠
- Set up different energy management system standards for enterprises of different sizes
- Provide financial incentives for enterprises to improve energy management level





## （四）建立能效网络小组 / Energy Efficiency Networks (EEN)

- 德国能效网络于2015年启动
- 目标：2020年建立500个左右的网络小组
- 统一的最低要求
  - 规定每家参与网络小组的企业都要开展能源审计
  - 建立企业节能目标
  - 每个网络小组配备一名资深能源咨询师做技术支持
  - 每年编写监控报告
- Started in 2015
- Goal: 500 EENs by 2020
- Minimum requirements:
  - Every member in the EEN must conduct energy audits
  - Set up energy-saving goals for enterprises
  - Every EEN shall have a senior energy consultant as technical support
  - Annual monitoring report





## 取得效果的原因 Success factors

- 满足企业的节能能力建设需求
- 分布式的培训+个性化的服务
- 调动节能专业人士的积极性
- Satisfying the capacity building needs of enterprise energy efficiency
- Distributed training & personalized service
- Mobilizing the enthusiasm of energy efficiency professionals

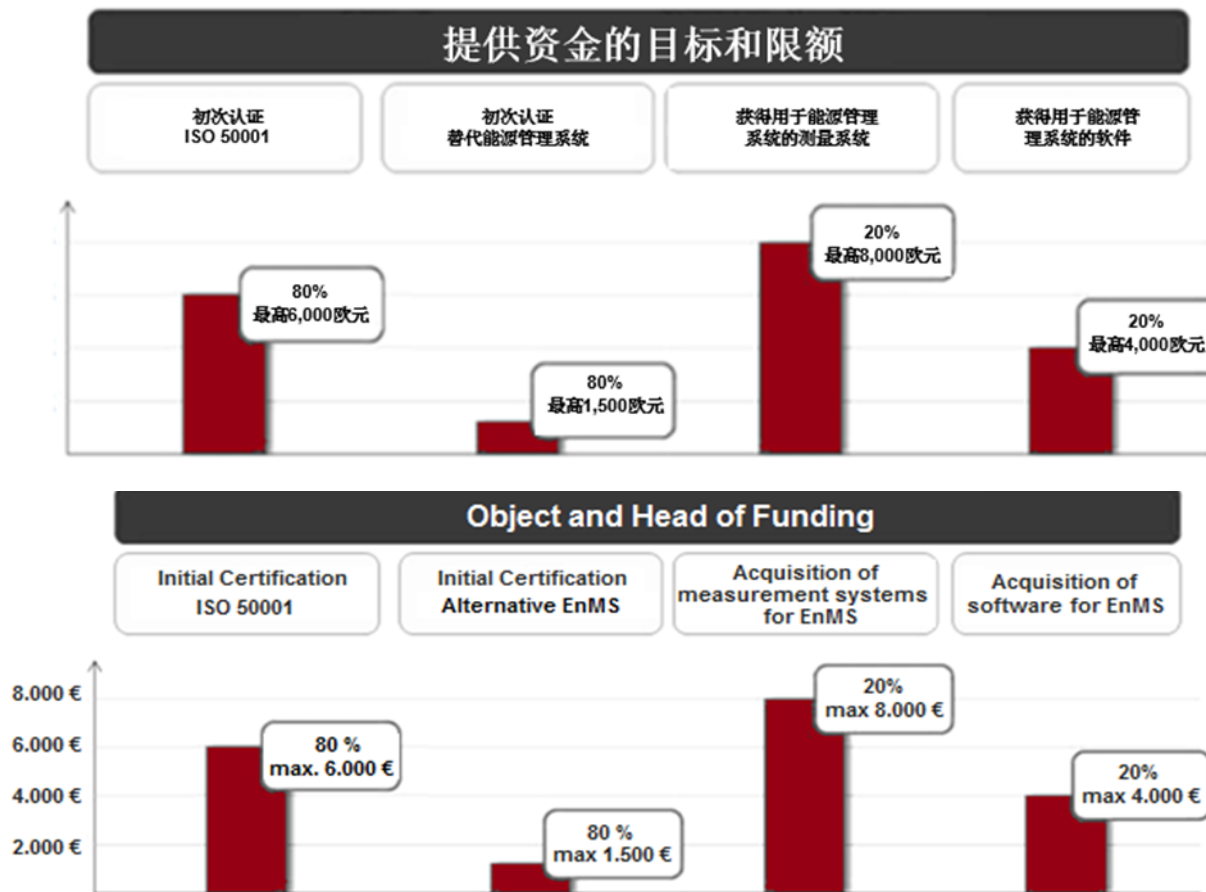
## 对中国的借鉴意义 What we can learn

- 为企业节能能力建设提供了新思路
  - 能源管理专业人士发挥作用搭建平台
  - 为企业能源管理师增加节能显示度打通“上升通道”
- 建立能源咨询师制度
- 提供额度不高但很必要的资金支持
- New ideas for the capacity building of enterprise energy efficiency
  - Energy management professionals contribute in building a platform
  - Increase the energy-saving display for enterprise energy managers to open up the “upward channel”
- Establish an energy consultant system
- Provide limited but necessary financial support

## (五) 建立能源消费监测系统 / Energy consumption monitoring systems

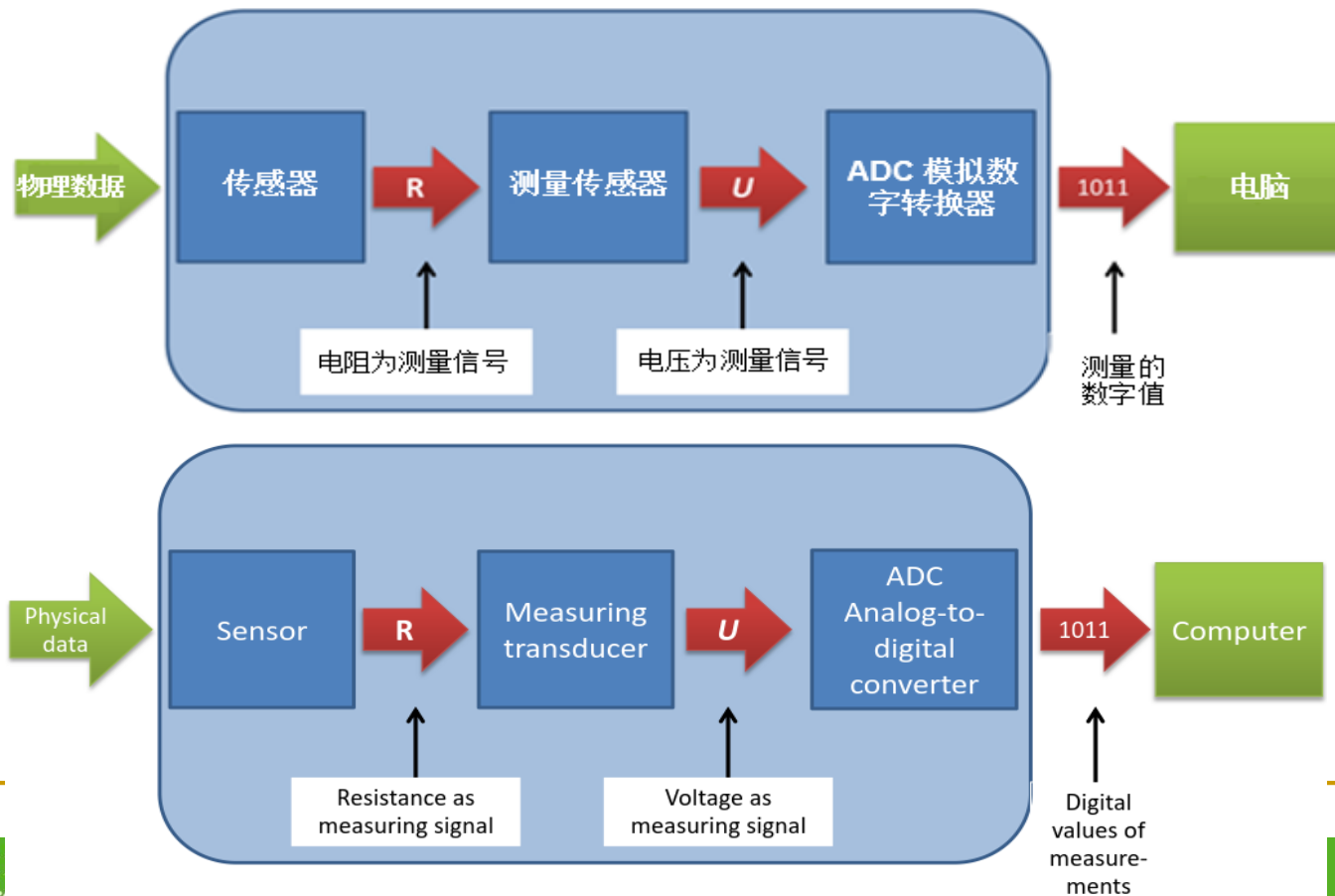
- 智能计量表监控能耗
- 有5个政策可以支持建立能源消费检测系统
- 都不是独立的项目，而是包含在综合节能改造项目之中。
- 政府提供资金支持
- 目标以中小企业为主
- Smart meters used to monitor the energy consumption
- 5 programmes to establish monitoring systems
- A component of a wider programme instead of promoting the system establishment exclusively
- Funded by government
- Directed at SMEs

## (五) 建立能源消费监测系统 / Energy consumption monitoring systems



## (五) 建立能源消费监测系统 / Energy consumption monitoring systems

- 不支持服务器、计算机和电缆等的购买
- Servers, PCs and other cabling are excluded.





## 取得效果的原因 Success factors

- 直接针对能源消费管理粗放的问题
- 将节能监测系统单独列项给予支持，但与节能改造项目整合在一起
- Specific to the problem of extensive energy consumption management
- Integrated into a wider reconstruction project, but with extra support for the monitoring system

## 对中国的借鉴意义 What we can learn

- 在节能改造项目中明确对建立能源消费监测系统的支持
- 要配套开展设备操作培训
- Emphasize the specific support for energy consumption monitoring systems within an energy conservation project
- Organize related equipment operation trainings



## （六）节能咨询服务和节能信息服务 / Energy-saving consulting and information services

- 德国联邦政府高度重视
- 分为四类：信息服务、咨询服务、能源管理服务、合同能源管理服务
- 对象分为两类：房屋业主、中小企业



- Highly regarded by the government
- Four main services: Information, consulting, energy management and energy performance contracting
- Two main clients: homeowners and SMEs





## (六) 节能咨询服务和节能信息服务 / Energy-saving consulting and information services

- 能效咨询服务：19%的房屋业主、23%的中小企业都委托能源咨询师提供高质量的能效咨询
- 能源管理服务：12%的中小企业已经获得了经过认证的能源管理体系
- 合同能源管理：1.6%的中小企业采用了节能量分享型合同能源管理
- Consulting: 19% of homeowners and 23% of SMEs have asked for high quality consulting.
- Energy management: 12% of SMEs operate a certificated energy management system.
- Energy performance contracting: 1.6% of SMEs have adopted energy performance contracting (model: shared savings).



## 取得效果的原因

### Success factors

- 把帮扶弱势群体节能放在政治和经济工作的重要议事日程
- 直接针对德国房屋业主和中小企业节能信息匮乏的问题
- 具备专业的能源咨询师队伍提供技术支持
- Energy conservation services for disadvantage groups
- Specific to the lack of energy-saving information for German homeowners and SMEs
- Technical support from energy professionals

## 对中国的借鉴意义

### What we can learn

- 通过提供节能咨询服务更好地满足人民日益增长的美好生活需要
- 建立节能咨询服务和节能信息服务项目
- 建立专业化的能源咨询师队伍
- Providing energy consulting services to meet people's growing needs of a better life
- Carry out energy efficiency consulting and information projects
- Establish a professional team of energy consultants



## （七）能源审计 / Energy audits

- 大型企业
  - 强制性，每四年再开展一次
  - 通过能源管理体系（DIN EN ISO 50001标准）认证或者通过EMAS环境管理体系认证，可免除
  - 政府不提供补贴
  - 如果到期不完成，面临最高5万欧元罚金的处罚
- Large-scale enterprises
  - Obligated to carry out energy audits every four years
  - Exempted when certificated to DIN EN ISO 50001 or an EMAS environmental management system
  - No subsidies from the government
  - Enterprises that fail to finish energy audits in time will face a penalty up to 50,000 Euro

## （七）能源审计 / Energy audits

- 中小企业
  - 给予资金支持，每24个月（2年）支持一次
  - 最高支持8000欧元（5.6万元人民币）
  
- SMEs
  - Financial means every 24 months (every two years)
  - Maximal 8,000 Euro (56,000 RMB)



## (七) 能源审计 / Energy audits

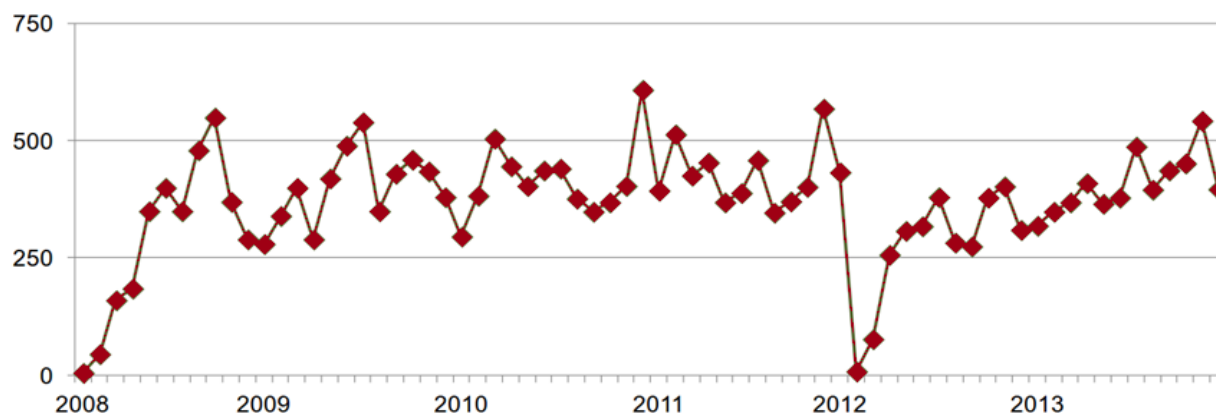
### □ 申请流程 / Application procedure





## (七) 能源审计 / Energy audits

### □ 实施效果 / Effects



## 取得效果的原因 Success factors

- 对能源审计提出明确的法律要求
- 对大型企业能源审计建立倒逼机制
- 对中小企业能源审计给予支持
- Clear legal requirements for energy audits
- Reversal mechanism for energy audits of large-scale enterprises
- Support for SMEs' energy audits

## 对中国的借鉴意义 What we can learn

- 把能源审计的具体要求写入《节约能源法》
- 为中小企业开展能源审计提供政策支持
- 借助专业人员队伍的力量为中小企业能源审计提供支持
- Write the specific requirements of energy audits into the "Energy Conservation Law"
- Provide preferential policy to SMEs for energy audits
- Support the SMEs with the help of professionals





## (八) 能效竞标政策 / Competitive tendering scheme for energy efficiency

- 竞争性招标，是指通过对节能项目进行公开招标，寻找能以最低成本完成节能项目目标的方法
- 主要针对具有巨大节能潜力和存在较大阻碍的特定领域，如综合节电，热力系统优化等。
- 招标过程：以最低的成本效益比（即节约1度电花费的欧元）实现既定节能目标的方案，才能中标
- The open tendering aims at finding the way to conduct energy efficiency projects at the lowest cost.
- It is mainly targeted at specific areas with great energy-saving potential, but also obstacles, such as integrated power saving and thermal system optimization.
- The contract will be awarded to bids for measures with the most economic cost-benefit ratio (euro per saved kWh).





## 取得效果的原因 Success factors

## 对中国的借鉴意义 What we can learn

- It remains to be seen.

- 结果导向的投标新思路值得借鉴
- 优先在技术解决方法较多的领域尝试能效竞标政策
- The idea of a result-oriented tender scheme is worth learning.
- Priority shall be given to the areas with more technical solutions

# 内容提要 / Content



- 德国节能法律体系和节能政策体系
- German legislative and policy system for energy efficiency
- 德国重点节能激励政策及其启示
- German key promotional programmes and experience
- 德国节能政策对中国的借鉴意义
- Energy efficient policy in Germany as potential blueprint for China



# 德国节能政策对中国的借鉴意义 / Energy efficient policy in Germany as potential blueprint for China



## ■ （一）德国节能政策体系设计思路的启示 / Design of German legislative system for energy efficiency

### □ 共同点

- 在**国家战略**层面高度重视节能和提高能效
- 把“**依法治国**”和“**依法行政**”放在突出地位
- 注重采用“**大棒+胡萝卜**”的政策设计思路
- 注重抓住**节能重点领域**采取节能行动
- 积极运用**经济手段**推动进工作

### □ Common points between China and Germany

- Emphasis on energy conservation and efficiency improvement **at the national strategic level**
- “**Rule by law**” and “**administration according to law**”
- Policy design guided by the idea of “**big stick + carrot**”
- Focus on **energy conservation key areas**
- Financial means



# 德国节能政策对中国的借鉴意义 / Energy efficient policy in Germany as potential blueprint for China



## 德国 / Germany

- 更注重设计**市场机制**、借助**市场力量**
- 更强调支持**中小企业和居民**节能
- 更注重节能与**可再生能源**的**融合**
- 更强调发挥**信息服务和咨询**的作用
- More on **market mechanisms design** and **market forces**
- More on supporting **SMEs and residents** to save energy
- More on the **integration** of energy saving and **renewable energy**
- More on the role of **information services and consultation**

## 中国 / China

- 更强调发挥**政府的责任和作用**
- 更强调**大企业**节能
- 更强调节能与**能源消费清洁化**相结合
- 简政放权后如何开展，**尚待摸索**
- More on **the role and responsibility of government**
- More on energy saving **in large-scale enterprises**
- More on the combination of energy saving and **clean energy consumption**
- The influence of streamline administration and institute decentralization **is still to be seen**



# 德国节能政策对中国的借鉴意义 / Energy efficient policy in Germany as potential blueprint for China



## （二）对中国政府完善节能政策的建议 / Suggestions on improving the energy efficient policy in China

- ❑ 加强对中小企业节能的支持力度
- ❑ 建立高素质的节能专业队伍
- ❑ 借助银行服务网络开展节能业务
- ❑ 推动节能与可再生能源、智慧能源融合发展
- ❑ Provide more support for energy efficiency of SMEs
- ❑ Establish a high-quality energy-saving professional team
- ❑ Carry out activities with the help of bank service network
- ❑ Promote the integrated development of energy efficiency, renewable energy and smart energy





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谢谢！  
Thank you for your  
attention!

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