



Introduction to Germany's energy efficiency strategy 德国能效战略介绍

Sino-German Energy Efficiency Expert Roundtable

中德能效专家圆桌论坛

Morning Session 上午场

Expert Roundtable on "Energy Efficiency Strategy and Supporting Policies – Experiences from the EU and Germany"

“提升建筑能效战略和工具”专家圆桌论坛

Beijing, 5 December 2017 2017年12月5日, 北京

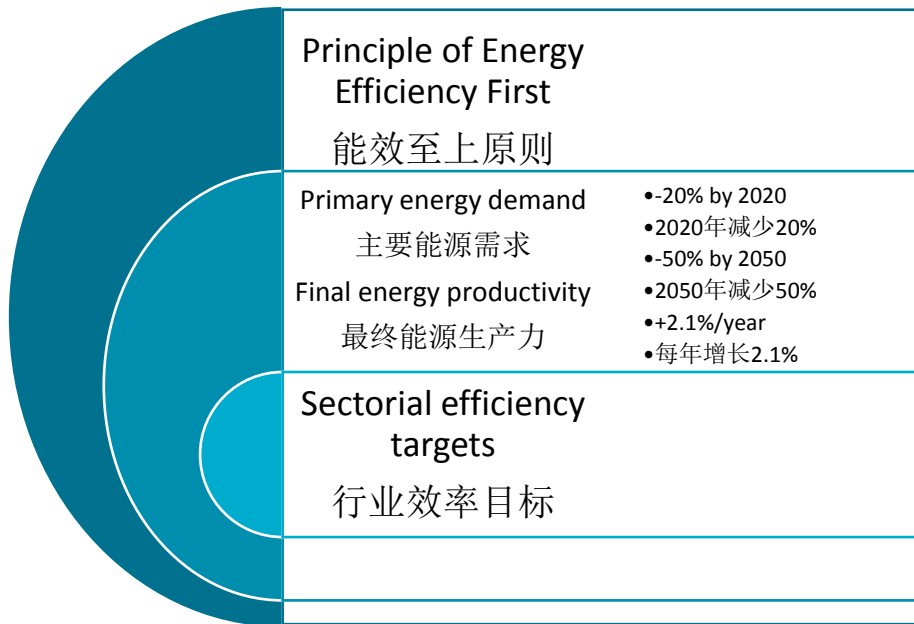
Outline 纲要



- 🏠 Germany' s energy efficiency policy
- 🏠 德国的能效政策
 - 🏠 Targets 目标
 - 🏠 Strategies 战略
 - 🏠 Policies and Measures 政策和措施
- 🏠 Lessons Learned
- 🏠 经验教训
 - 🏠 Policy Flagships 政策核心
 - 🏠 Impact 影响
 - 🏠 New promising measures 有前景的创新措施
- 🏠 A new initiative: Green Paper Energy Efficiency
- 🏠 新倡议：《能效绿皮书》
- 🏠 Outlook
- 🏠 展望

Germany's energy efficiency targets

德国的能效目标



Sectorial targets 行业目标	2020年	2050年
Gross power consumption 总能源消耗	-10%	-25%
Final energy demand for heat 最终热能需求	-20%	
Primary energy demand of buildings 建筑主要能源需求		-80%
Final energy consumption of transport* 运输的最终能源消耗*	-10%	-40%

*All targets have 2008 as reference year. However, for transport the base year is 2005

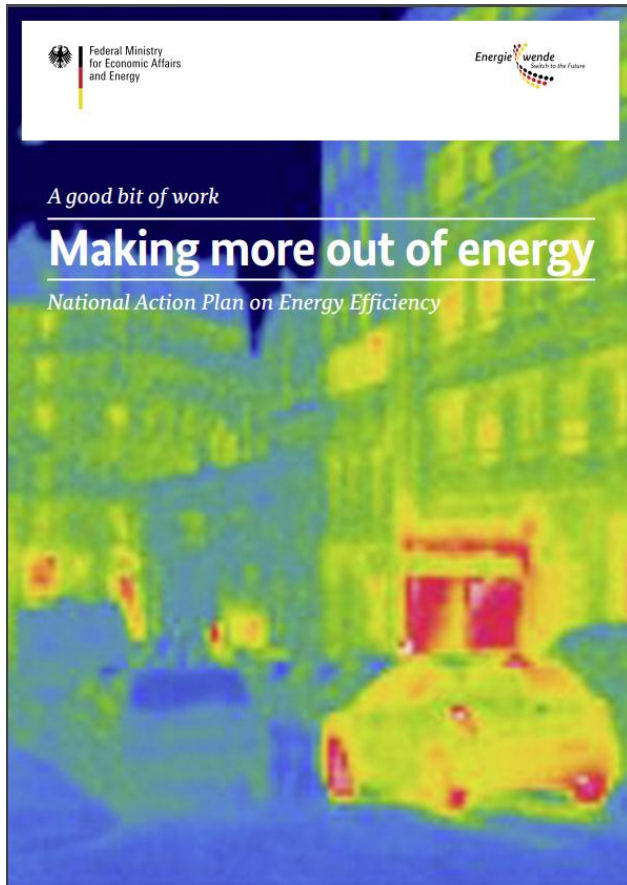
*所有目标的基准年均均为2008年。但运输业的基准年是2005年

Strategies

National Action Plan for Energy Efficiency: NAPE

战略

国家能源效率行动计划：NAPE

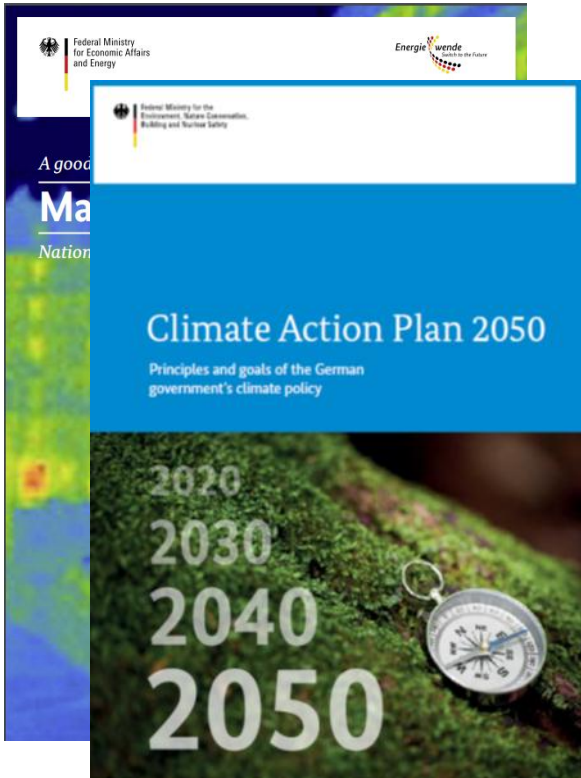


3 strategic targets:

三大战略目标：

- 🏠 Stepping up energy efficiency in the building sector
- 🏠 提高建筑业的能效
- 🏠 Establishing energy efficiency as an investment and business model
- 🏠 建立能效投资和商业模式
- 🏠 Increasing individual responsibility for energy efficiency
- 🏠 增加个人对能效的责任
- 🏠 Comprehensive action package: Short-term and long-term instruments for energy efficiency across sectors
- 🏠 综合行动方案：跨行业能效的短期和长期工具

Strategies Climate Action Plan 2050 战略 《2050年气候行动计划》



In light of the Paris Agreement:

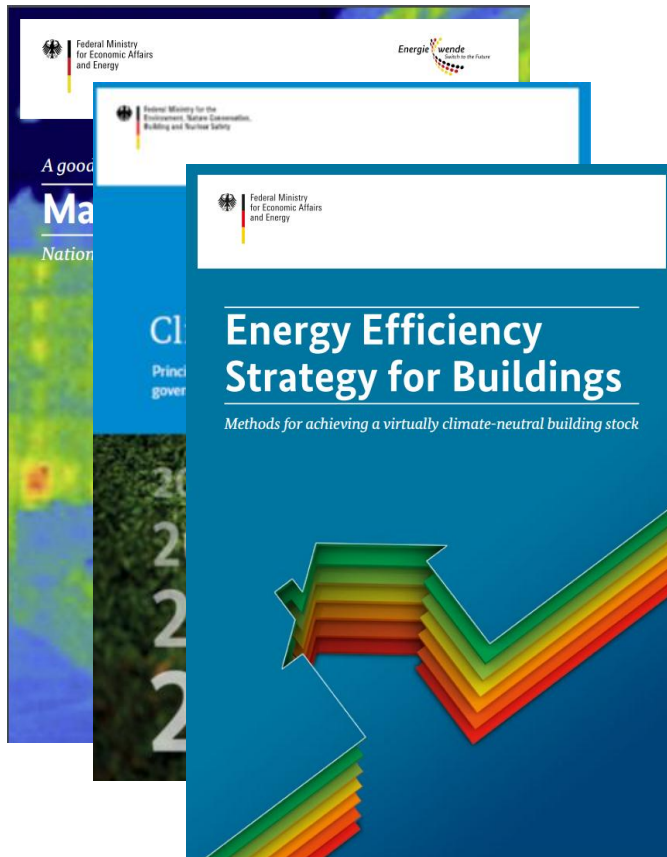
根据《巴黎协定》：

- 📍 Definition of a roadmap to achieve long-term targets
- 📍 定义实现长期目标的路线图
- 📍 Guidance to all areas of action
- 📍 对各领域行动的指导
- 📍 Ongoing process with stakeholder consultation
- 📍 不断和利益相关方进行磋商
- 📍 Sectoral targets & strategic measures
- 📍 行业目标和战略措施
- 📍 Programmes and measures to be defined in 2018
- 📍 计划和措施将在2018年确定

Strategies

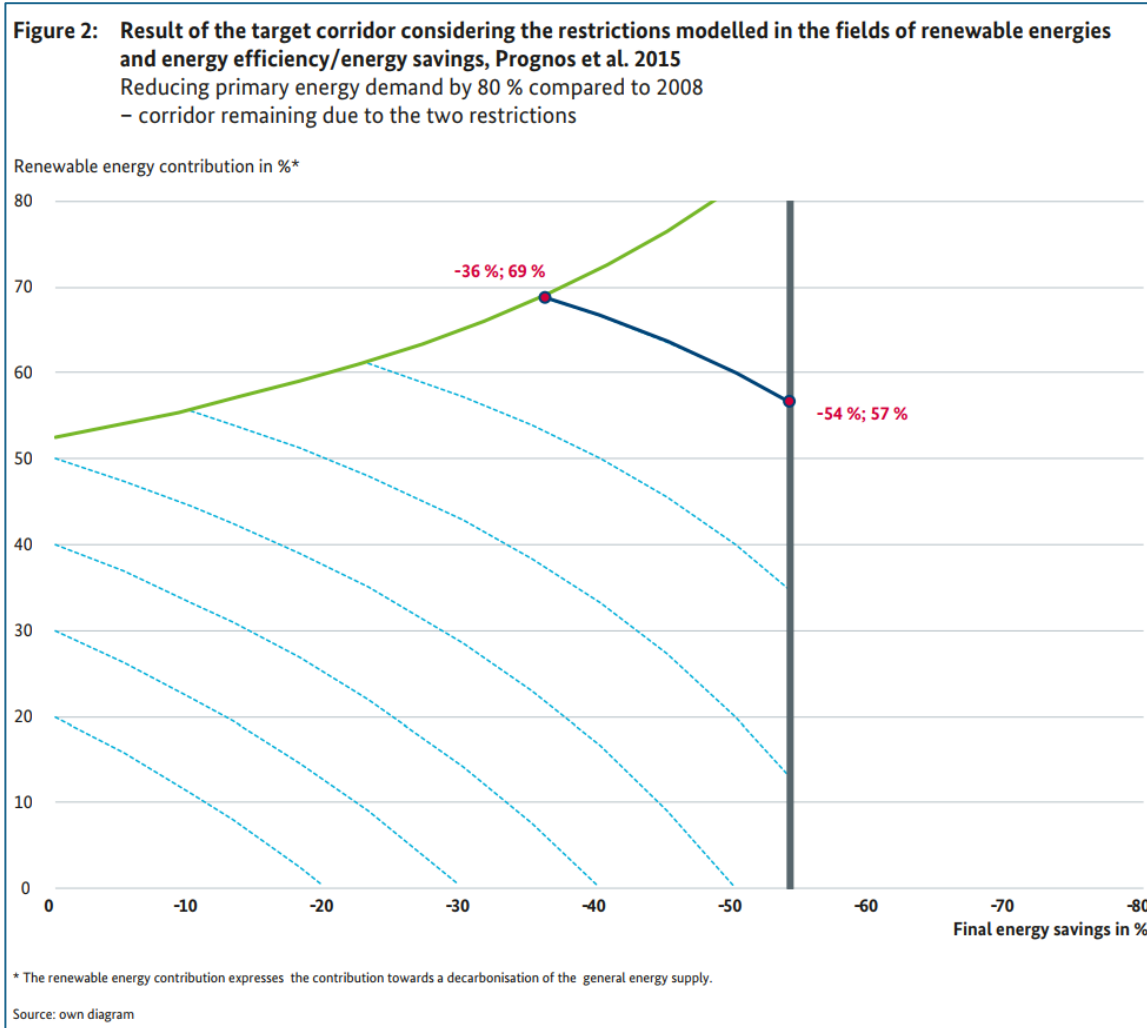
Energy Efficiency Strategy for Buildings

战略 建筑能效战略



- 🏠 Confirmation of target: achieving a virtually climate-neutral building stock by 2050
- 🏠 目标确认：在2050年之前实现几乎不对气候产生影响的建筑存量
- 🏠 Development of target corridor
- 🏠 制定目标走廊

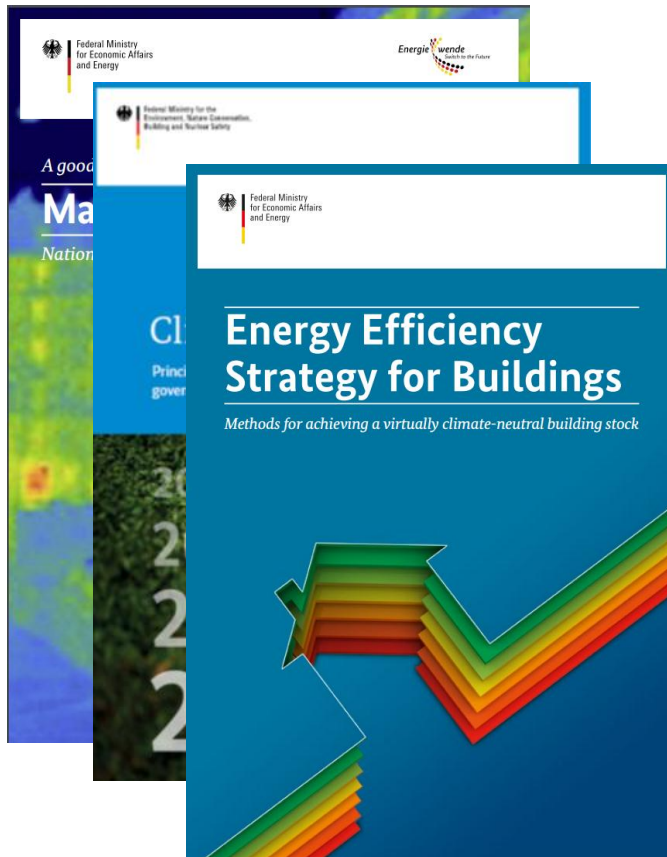
Target Corridor for Energy Efficiency and Renewables 能效和可再生能源目标走廊



Strategies

Energy Efficiency Strategy for Buildings

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- 🏠 制定目标走廊
- 🏠 Interaction between electricity and heat
- 🏠 电热之间的相互作用
- 🏠 Technological opportunities and policy measures
- 🏠 技术机会和政策措施

Existing Policy Instruments and Programmes

现有政策工具和计划

REGULATORY LAW

- Energy Saving Law
- Tenancy Law
- Energy Audits for Non-SMEs
 - Ecodesign Standards
 - 监管法
 - 节能法
 - 租赁法
- 非中小企业能源审计
- 生态设计标准

AWARENESS RAISING

- Awareness raising campaign: "Germany makes it efficient"
- Sector efficiency campaigns
- National Top Runner Initiative
- ...
- 提高认识
- 提高认识运动: "德国使其高效"
- 行业效率运动
- 全国领跑者倡议
- ...

FINANCIAL INCENTIVES

- CO2 Building Renovation Programme
- Market Incentive Programme for Renewables
- KfW Energy Efficiency Programme (companies)
- Contracting default guaranties and funding guidelines
- 财政激励
- 二氧化碳建筑改造计划
- 可再生能源市场激励计划
- KfW能源效率计划(企业)
- 违约担保和拨款指引

QUALITY INSURANCE

- Consulting: Bundling and quality insurance
- BAFA-On-Site-Consultation
- 质量保险
- 咨询: 捆绑和质量保险
- BAFA-现场咨询

ADVICE

- Consulting Programmes for a range of actors and sectors such as SME Initiative
- Energy Consulting for Farming Enterprises
- Energy Efficiency Managers in Business Estates
- Energy Efficiency Network Initiative
- 建议
- 为各类行动者和行业(如中小企业倡议)提供咨询方案
- 养殖企业能源咨询
- 商业地产能效管理人员
- 能效网络倡议

Lessons Learned

经验教训

Policy Instruments and Programmes

Flagships

政策工具和计划核心



- ☐ CO2 building renovation programme/ KfW-Efficiency Programmes
- ☐ 二氧化碳建筑改造计划/ KfW-节能计划
- ☐ Ecological Tax Reform
- ☐ 生态税改革
- ☐ Heat Cost Ordinance
- ☐ 《热费条例》
- ☐ Energy Efficiency Networks in Industry
- ☐ 工业能效网络
- ☐ Energy Consulting for SMEs
- ☐ 中小企业能源咨询



big savings from efficiency law (often EU origin), especially energy saving law, audit obligation, top runner strategy

能效法律（通常起源于欧盟）实现了显著节能效果，特别是节能法、审计义务、领跑者战略

CO₂-building renovation programme/Energy Efficient Refurbishment – key figures 2005-2015

二氧化碳建筑改造计划/节能翻新 - 关键数字2005-2015



Promotional cases from	Dwellings considered	Planned Investment* [Mio. €]	CO _{2e} -reduction [tonnes per year]	Final energy savings** [GWh per year]	Effects on employment [person-years]
2005	70,000	1,500	340,000	670	27,000
2006	155,000	3,500	700,000	1,520	65,000
2007	89,000	2,100	330,000	940	35,000
2008	134,000	3,200	546,000	1,530	51,000
2009	363,000	7,000	955,000	2,680	111,000
2010	343,000	6,900	847,000	2,450	93,000
2011	180,000	3,900	457,000	1,250	52,000
2012	242,000	5,400	576,000	1,720	69,000
2013	276,000	6,500	650,000	1,740	79,000
2014	230,000	5,900	514,000	1,370	72,000
2015	237,000	6,400	523,000	1,390	75,000
Accumulated 2005 - 2015	2,320,000	52,200	6,438,000	17,260	728,000

* investments in energy saving refurbishment measures

** district heating, electricity, fossil fuels, biomass

KfW: Energy-efficient Refurbishment

KfW: 节能翻新



- 🏠 Promotion of refurbishment if the house exceeds a specific energy requirement for a comparable new house
- 🏠 如果房屋的具体能耗需求超过一个可比新房，提倡对其进行翻新
- 🏠 Six levels of support for a "KfW Efficiency House"
- 🏠 对“KfW高能效住宅”的资助分六个等级
- 🏠 Loans or grants available, for e.g.:
- 🏠 贷款或补助，例如：
- 🏠 Thermal insulation of walls, roof and floor space; renewal of windows and exterior doors; installation of a ventilation system; renewal of the heating system; optimisation of heat distribution
- 🏠 墙壁、屋顶和地面的隔热；窗户和外门翻新；安装通风系统；供热系统改造；热量分配优化
- 🏠 Grants: max. 5,000 – 30,000 €
- 🏠 补助：最高5000-30000欧元
- 🏠 Loan: up to 100,000 € per housing unit for energy-efficient refurbishment **plus** a repayment bonus up to 27,500 € calculated on the loan amount
- 🏠 贷款：为每套住房单元提供高达10万欧元的节能翻新贷款，并且根据贷款金额最多减少27500欧元的偿还金额

KfW-Efficiency Programme for companies

KfW-企业节能计划



- 🏠 KfW Energy Efficiency Programme – Production Facilities and Processes
- 🏠 KfW节能计划 – 生产设施和工艺
- 🏠 KfW Energy Efficiency Programme – Waste Heat
- 🏠 KfW节能计划 – 废热
- 🏠 KfW Energy Efficiency Programme – Energy-Efficient Construction and Refurbishment
- 🏠 KfW节能计划 – 节能建筑和翻新

KfW-Efficiency Programme for companies:

impact as of 2012

KfW-企业节能计划
截至2012年的影响



- 3,800 million € investments
- 38亿欧元投资
- 2,117 projects
- 2117个项目
- Annual end-energy savings: 900 GWh
- 每年终端能源节省量：900千兆瓦时
- Annual GHG-emission reductions: 545,000 CO₂e
- 每年温室气体减排量：54.5万二氧化碳当量
- 51,000 jobs
- 提供51000个工作岗位

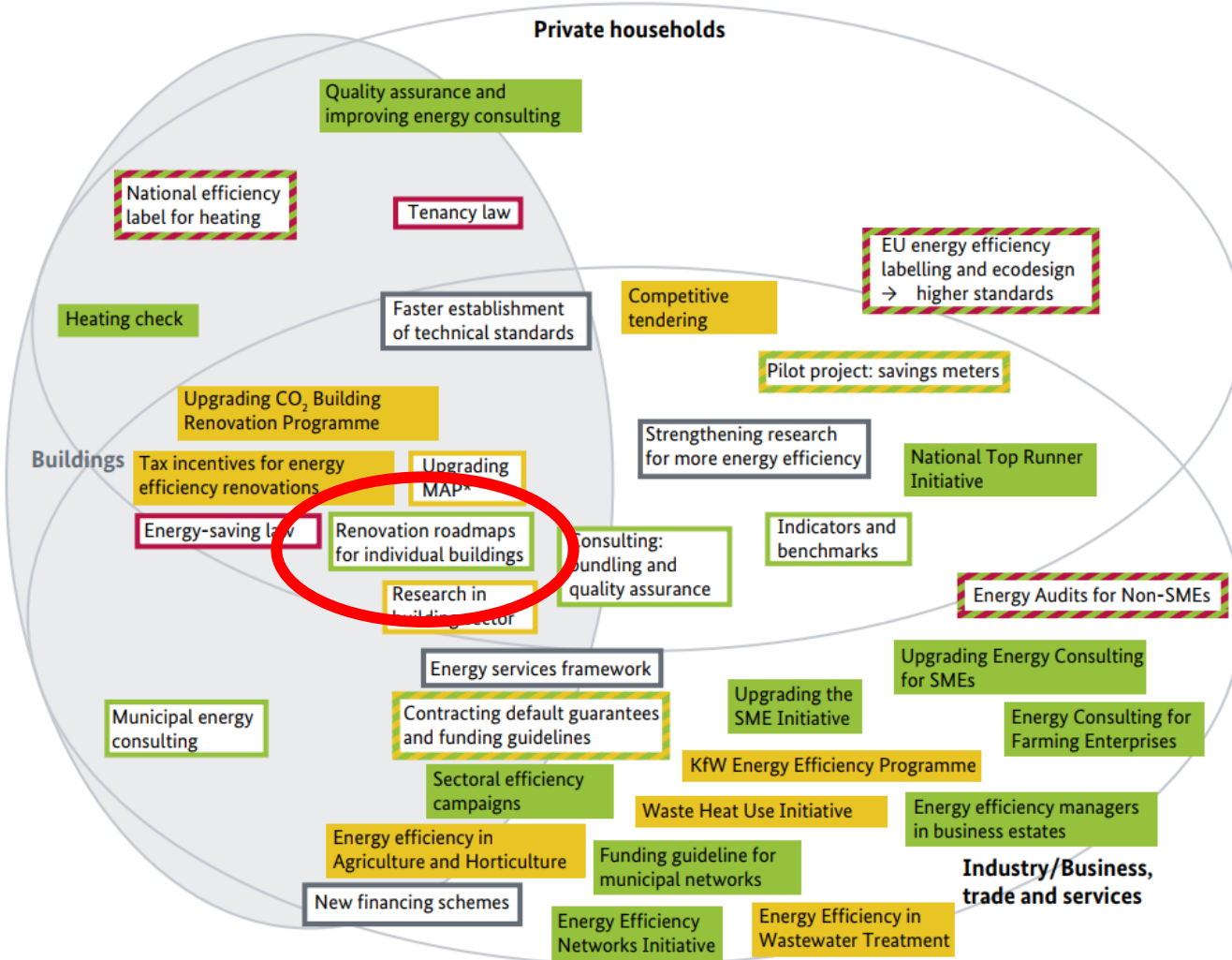
Example of new promising measures:



**the individual building renovation
passport –
a user-focused policy instrument**

**有前景的创新措施示例：
单个建筑改造路线图——以用户为
中心的政策工具**

Targeted initiatives for energy efficiency 有针对性的能效倡议



■ Information ■ Financial incentives ■ Regulatory law

* "Marktanreizprogramm" – Market Incentive Programme for Renewable Energies

Stimulating renovation: a focus on the occupant 鼓励改造：以用户为中心

Seeking for dialogue: developing a vision

Don't give up on holidays!



... with the individual Building Renovation

Passport

...凭借单个建筑改造路线图



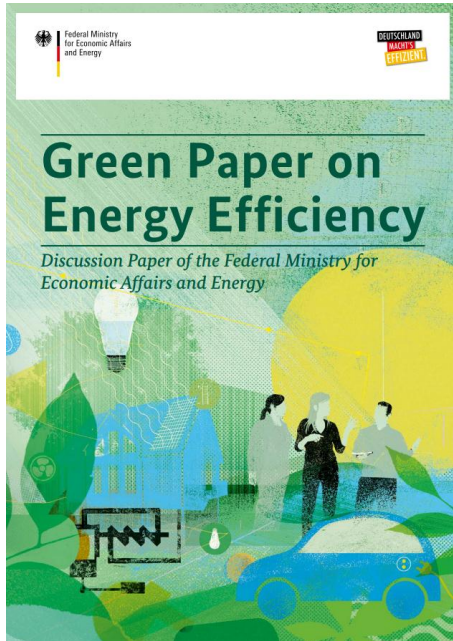
Result: building-specific renovation roadmap



Green Paper on Energy Efficiency

《能效绿皮书》

Green Paper on Energy Efficiency 《能效绿皮书》



Consultation on

磋商内容如下：

Energy Efficiency First

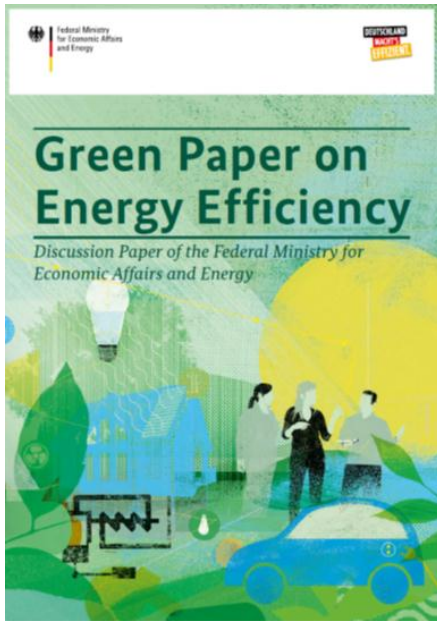
- 🔸 能效至上
- 🔸 Sector Coupling
- 🔸 行业耦合
- 🔸 Digitalisation
- 🔸 数字化
- 🔸 Further development of instruments on energy efficiency
- 🔸 进一步开发能效工具

145 written comments from almost 200 stakeholder
(associations, companies, private persons, research & think
tanks, public authorities)

近200个利益相关方（协会、企业、私人、研究和智库、公共机构）
提供了145份书面意见

Green Paper: Energy Efficiency First

《绿皮书》：能效至上



Guidelines for the efficient use of energy:

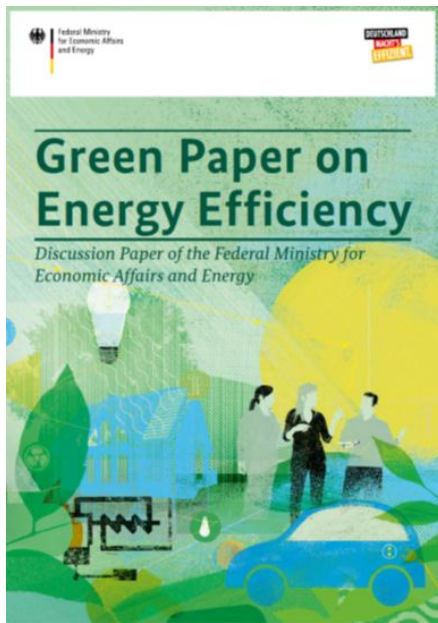
能源高效利用指南：

1. The demand for energy must be distinctly and sustainably reduced in all sectors (“Efficiency First”)
必须显著并持续降低所有行业的能源需求（“能效至上”）
2. Direct use of renewable energies
直接使用可再生能源
3. Renewable power is used efficiently for heat, transport and industry (sector coupling)
可再生能源有效地用于供热、运输和工业（行业耦合）

- 
- 🏠 Macro- and micro-economic cost considerations
 - 🏠 宏观和微观经济成本考量
 - 🏠 Energy Efficiency First as planning principle
 - 🏠 能效至上作为规划原则

Green Paper: New Instruments

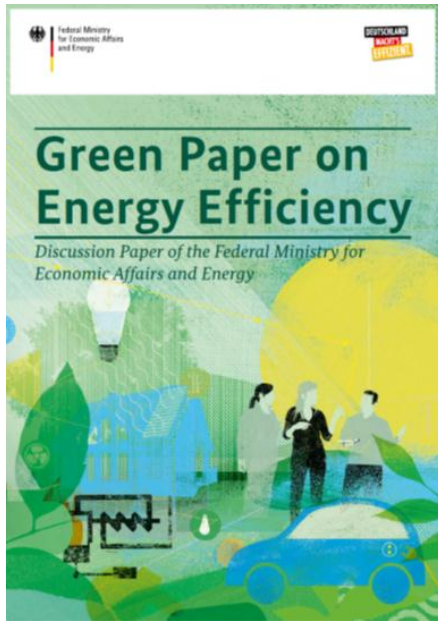
《绿皮书》：新工具



- 🏠 Which instruments are suitable by preference to increase energy efficiency in a low energy price environment?
- 🏠 在低能源价格环境下，哪些工具适用于提高能效？
- 🏠 Which instruments are particularly suited to providing an incentive for energy services to increase energy efficiency?
- 🏠 哪些工具特别适合提供能源服务激励来提高能源效率？
- 🏠 In which areas is standardisation advantageous or necessary to develop the market for energy efficiency services?
- 🏠 为发展能效服务市场，在哪些领域实行标准化会更有利或者有必要在哪些领域实行标准化？

Green Paper: Sector Coupling

《绿皮书》行业耦合



Integration of energy sectors to:
能源行业一体化能够:

- ☐ Meet demand
- ☐ 满足需求
- ☐ Use renewables efficiently and
- ☐ 有效使用可再生能源以及
- ☐ Provide flexibility on demand side
- ☐ 在需求方面更加灵活



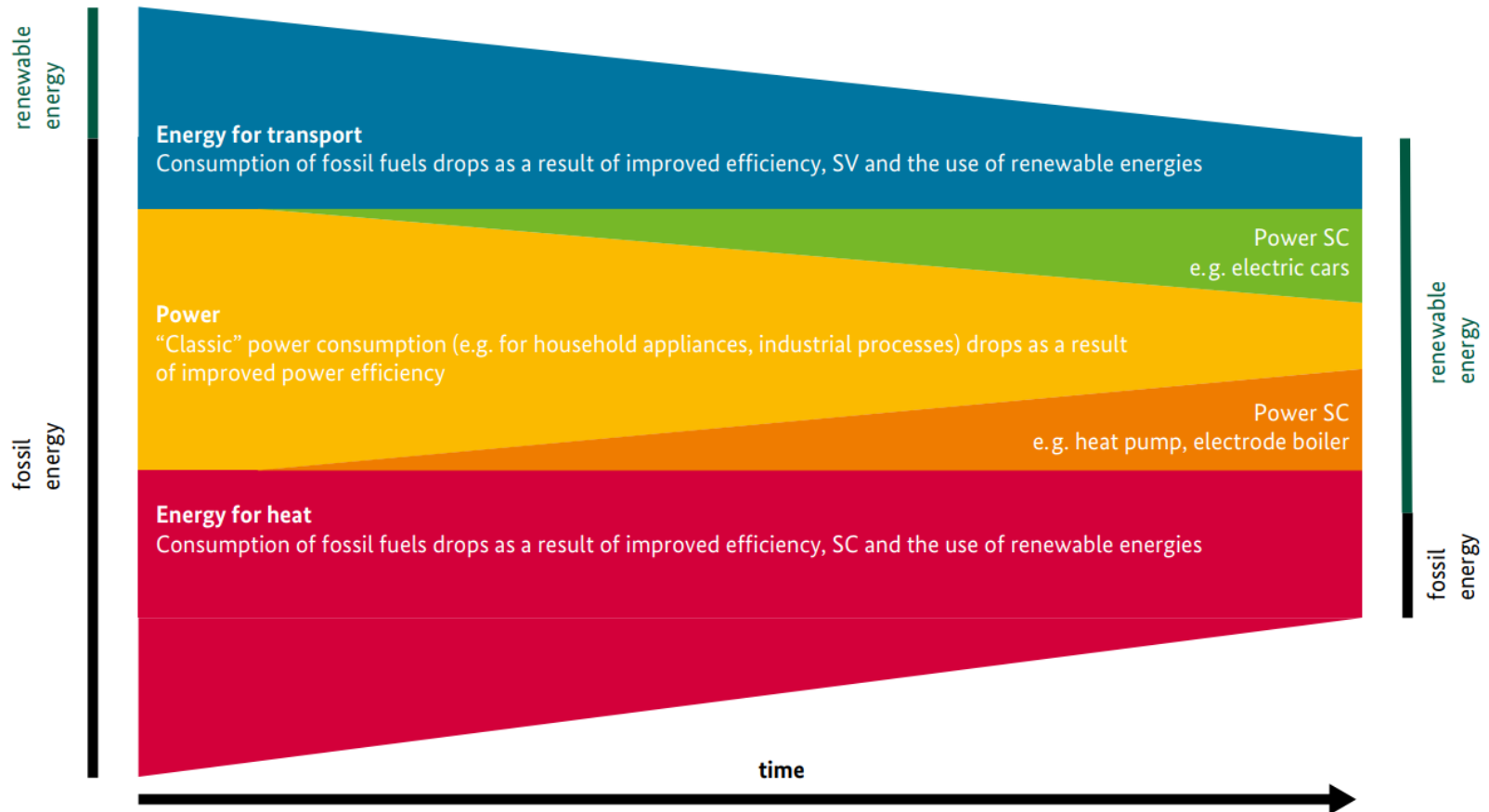
Not to be misunderstood as instrument to take up surplus electricity

不要将其误解为是解决富余供电的工具

Green Paper: Sector Coupling

《绿皮书》：行业耦合

Figure 7: Illustration of sector coupling (SC) and energy consumption



Source: Own diagram building on IWES et al. (2015). Classic efficiency measures (e.g. building renovation or the use of more efficient equipment) and sector coupling reduce the final energy consumption overall; the direct use of renewable energies (e.g. solarthermal energy) and sector coupling increases the share of renewable energies in final energy consumption as a whole.

Green Paper: Sector Coupling Technologies

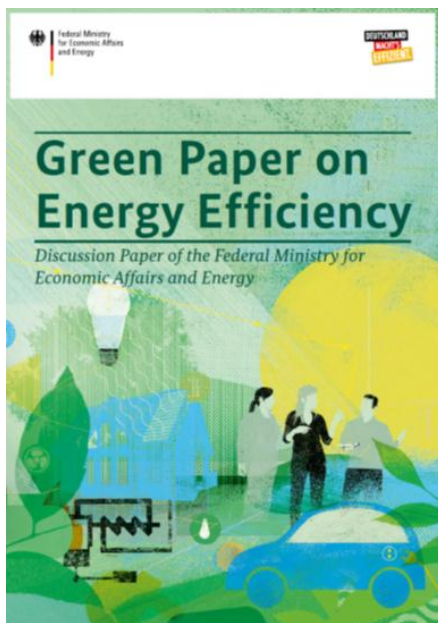
《绿皮书》：行业耦合技术

	Households / TCS	Heat networks	Transport	Industry	
Power-to-Heat	Heat pump Direct electric heating	Large-scale heat pumps Electrode boilers		Process heat generation in electrode boiler, heating panel, light arch etc.	← Sector-coupling technologies
	Heating boiler (natural gas and heating oil)	Heating boiler (natural gas and heating oil)		Direct combustion Natural gas	← Substituted technologies or fuel sources
Power-to-Gas	Combustion in heating boilers and CHP plants Natural gas	Combustion in heating boilers and CHP plants Natural gas	Fuel cell Combustion engine Gas turbine	Process heat generation Use as a material	
			Combustion engine (petrol, diesel)	Natural gas and coal	
Power-to-Liquid	Possibly combustion in heating boilers		Combustion engine, turbine	Use as a material	
	Heating oil		Combustion engine (petrol, diesel) Turbine with kerosene	Crude oil derivatives	
Direct electric propulsion in transport			Electric car Rail transport Trolleytruck Combustion engine (petrol, diesel)		
New electricity-based methods				New method (plasma etc.)	
				Conventional methods (various)	

Source: ifeu, Fraunhofer ISI

Green Paper: Digitalisation

《绿皮书》：数字化



New possibilities for added value services and efficiency services:

增值服务和高效服务新的可能性:

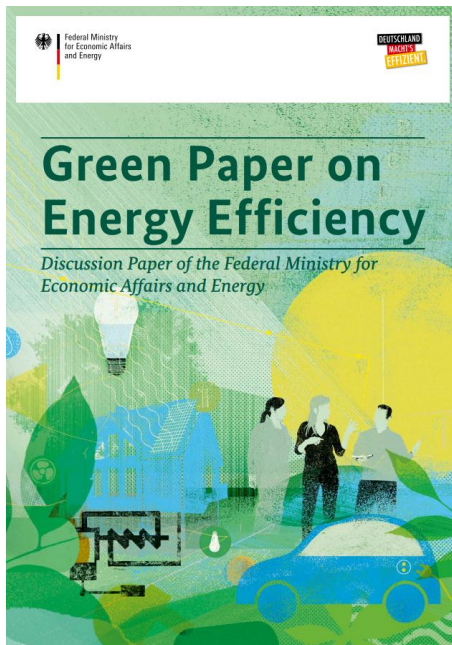
- 🏠 Continuous consumption metering & user feedback: new possibilities of analysis and user information
- 🏠 持续消耗计量和用户反馈：分析和用户信息新的可能性
- 🏠 New forms of organisation & control of industrial production processes facilitated
- 🏠 促进工业生产工艺组织和控制的新形式
- 🏠 Pre-condition for untapping demand response potential
- 🏠 发掘需求响应潜力的先决条件
- 🏠 New performance-dependent funding measures
- 🏠 根据绩效的创新资助措施

Green Paper on Energy Efficiency

《能效绿皮书》

Outcome of consultation

磋商成果



- 🏠 Sector coupling: effective and cost-efficient energy transition; infrastructure needed
- 🏠 行业耦合：高效率低成本的能源转型；所需基础设施
- 🏠 Implementation of „Energy Efficiency First“: Energy Efficiency Law
- 🏠 “能效至上”的实施：能效法
- 🏠 Price- and quantity-based instruments favoured
- 🏠 基于价格和数量的工具受到青睐
- 🏠 Advanced energy efficiency at the European level
- 🏠 欧洲层面的先进能源效率
- 🏠 Digitalisation to exactly identify energy consumption - advanced instruments
- 🏠 数字化准确识别能耗 - 先进仪器

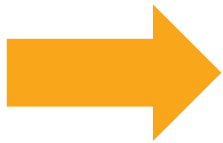
Outlook

展望

New Government in 2018

2018年新政府展望

- 🏠 White Paper on Energy Efficiency?
- 🏠 能效白皮书?
- 🏠 New law on energy in buildings defining nearly zero energy buildings
- 🏠 对近零能耗建筑进行定义的新建筑能源法规
- 🏠 Climate Action Plan 2050 - new measures in pipeline
- 🏠 《2050年气候行动计划》-- 新措施正在制定
- 🏠 Currently discussed measures:
- 🏠 目前讨论的措施:
 - CO₂-tax 二氧化碳税
 - Tax incentives for energy efficiency renovation 节能改造的税收优惠



Sector coupling and the role of energy efficiency for the energy transition will stay high on the agenda; measures are expected to be developed accordingly.

行业耦合和能效在能源转化中的作用依然是政府工作的重点；预计将相应制定措施。



Thank you!
谢谢!

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