



**RAP**

Energy solutions  
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# ESCOs as a Delivery Mechanism for Grid Company DSM in China

## 中国电网企业开展电力需求侧工作中 节能服务公司的运作机制

State Grid DSM and ESCOs Development Workshop  
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# Agenda

## 议程

- What is an ESCO?
- ESCOs in China
- Lessons from international experience
- Role of grid company ESCOs in China
- 什么是节能服务公司？
- 中国的节能服务公司
- 国际经验总结
- 中国电网企业下属节能服务公司的角色定位

# What is an ESCO?

## 什么是节能服务公司？

# What Do ESCOs Do? (1)

## 节能服务公司做什么？（1）

- ESCOs develop, install, and arrange financing for projects that improve the energy efficiency of facilities
- ESCOs accept some degree of technical and financial risk
- ESCOs generally act as project developers and undertake a wide range of tasks
- 节能服务公司开发节能项目，安装节能设备，并安排项目资金。
- 节能服务公司承担一定程度的技术和财务风险。
- 节能服务公司通常作以项目开发商身份开展多种任务。

# What Do ESCOs Do? (2)

## 节能服务公司做什么？ (2)

- Develop, design, and arrange financing for energy efficiency projects
  - Install and maintain energy-efficient equipment
  - Measure, monitor, and verify the energy savings achieved through projects
  - Take on all or part of the risk that each project will achieve a specified level of energy savings
- 开发、设计能效项目，并为项目安排融资。
  - 安装和维护节能设备。
  - 测量、监测和验证实施节能项目而获得的节能量。
  - 承担部分或者全部项目获得特定节能量的风险。

# How Do ESCOs Operate?

## 节能服务公司如何运作？

- An ESCO's compensation is usually directly linked, under an Energy Performance Contract (EPC), to the amount of energy that is actually saved
- ESCOs typically carry out projects under one or more of three types of contracts
- 节能服务公司的补偿通常根据节能绩效合同（EPC），直接与实际取得的节能量挂钩。
- 节能服务公司一般按照三种合同类型中的一种或多种开展节能项目。

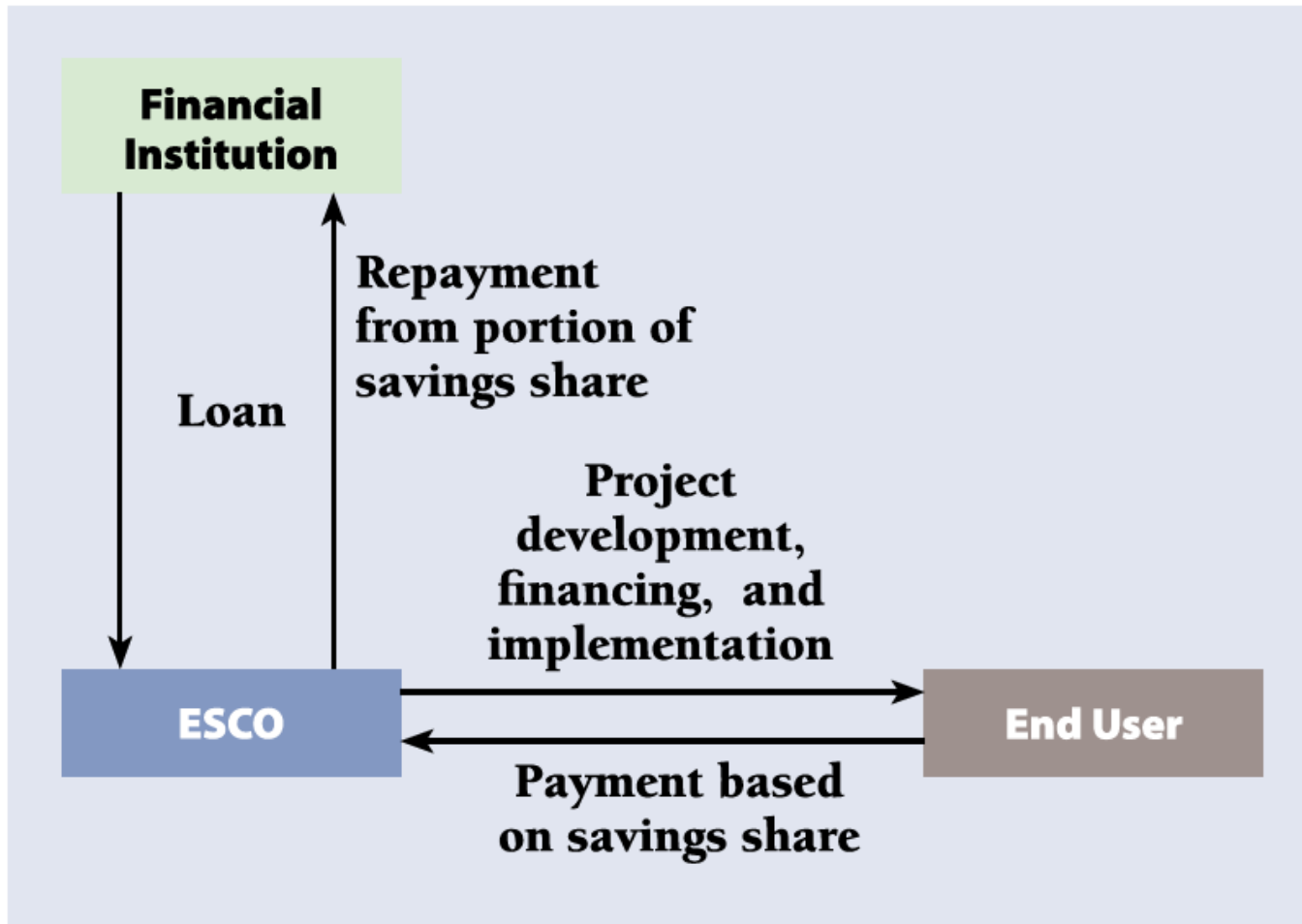
# Shared Savings Contracts (1)

## 分享节能效益合同模式 (1)

- In shared savings contracts, the **cost savings** from implementing energy efficiency measures are shared between the ESCO and the facility owner at agreed percentages for a fixed number of years
- 在分享节能效益合同模式中，实施节能措施所节约的成本，按照合同事先约定的百分比和年限，由节能服务公司和用户单位分享。

# Shared Savings Contracts (2)

## 分享节能效益合同模式 (2)





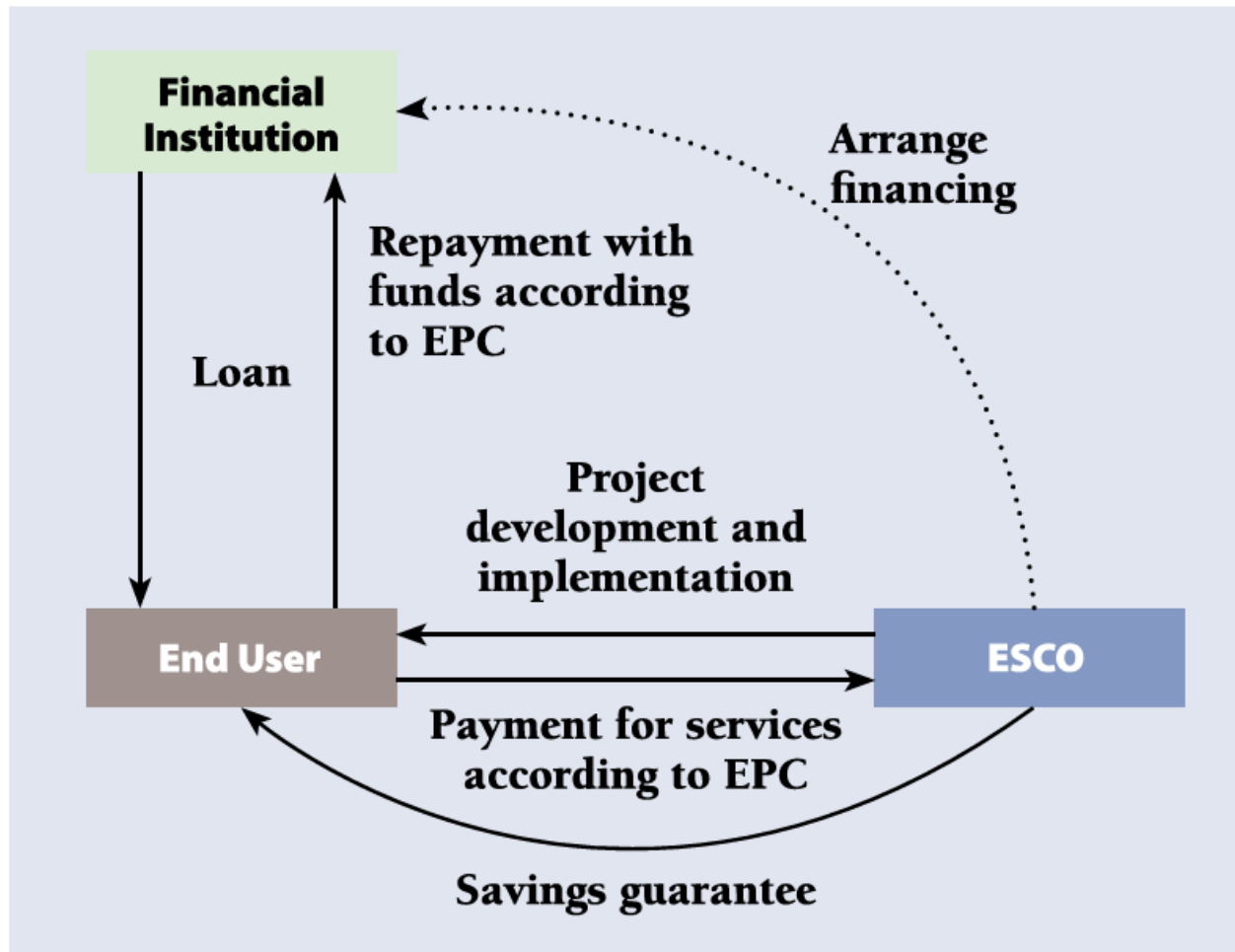
# Guaranteed Savings Contracts (1)

## 承诺节能效益合同模式 (1)

- In guaranteed savings contracts, the ESCO guarantees to the facility owner a specified level of **energy savings**
- Some or all of any **cost savings** resulting from energy savings in excess of the specified level are taken by the ESCO
- 在承诺节能效益合同模式中，节能服务公司向用户单位承诺达到一定的**节能量**。
- 超出该计划之外的**节约的成本**部分或全部归节能服务公司所有。

# Guaranteed Savings Contracts (2)

## 承诺节能效益合同模式 (2)



# Fee for Service Contracts

## 费用托管型服务合同模式

- In fee for service contracts, the ESCO provides specified energy efficiency services for an agreed fee
- The facility owner takes all the **cost savings** and there is no sharing of savings between the ESCO and the facility owner
- This type of contract is not performance-based
- 在费用托管型服务合同模式中，节能服务公司按照事先商定的收费标准提供指定的节能服务。
- 全部节约的成本归用户单位所有，用户单位和节能服务公司之间不存在节能效益分享。
- 这种合同不属于基于节能绩效的能源管理合同。

# ESCOs in China

## 中国的节能服务公司



# History of ESCOs in China

## 中国的节能服务产业简史

- The ESCO industry in China was launched in the mid-1990s as part of a deliberate plan by the Chinese central government, with support from the World Bank
- In 2011, there were about 3,900 ESCOs in China
- 中国节能服务产业起始于90年代中期中央政府精心策划的一项计划，并得到了世界银行的支持。
- 2011年，在中国有大约3900个节能服务公司。



# What Do ESCOs Do in China?

## 在中国节能服务公司做什么？

- ESCOs in China undertake detailed project design, manage most project implementation aspects, and guarantee energy savings performance
- Financing, contractual, and asset ownership arrangements vary
- In China, energy performance contracts are classified into three types
- 在中国，节能服务公司进行具体的项目设计、管理项目的实施细节，并承诺节能效果。
- 然而，在资金筹措、合同契约和设备所有权安排方面有所差异。
- 在中国，节能绩效合同分为三种类型。

# Shared Savings Contracts in China (1)

## 分享节能效益型合同在中国 (1)

- In the shared savings contract used in China, ESCOs provide the bulk of project financing
- This financing may be supported by a loan to the ESCO from a financial institution, a repayment guarantee from a guarantee company, or funding from the ESCO's own corporate shareholders
- 分享节能效益型合同在中国，节能服务公司提供项目所需的绝大部分资金。
- 融资渠道可以来自从金融机构申请的贷款由担保公司担保还款，或者由节能服务公司的股东提供资金。

# Shared Savings Contracts in China (2)

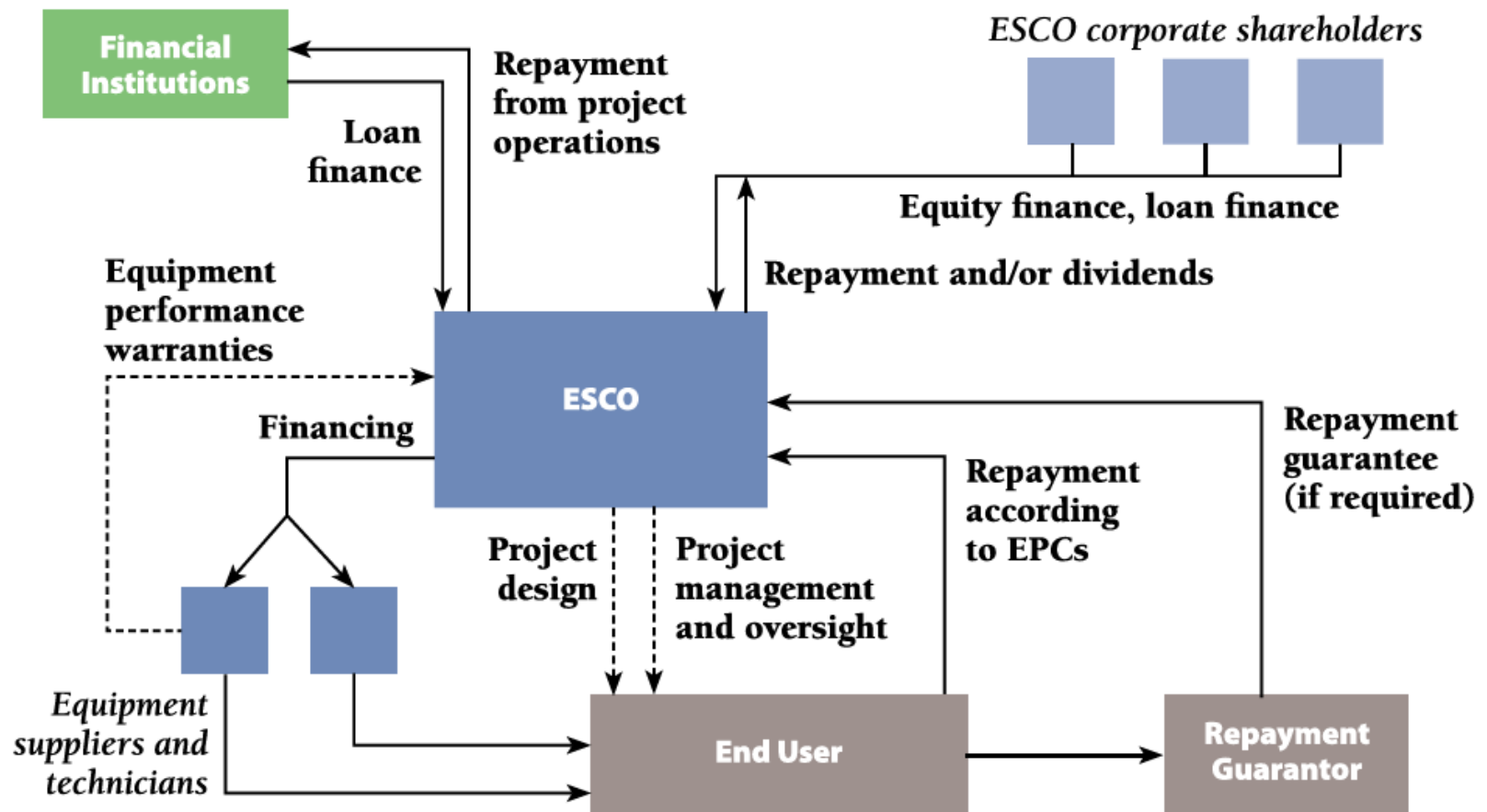
## 分享节能效益型合同在中国 (2)

- ESCOs are compensated by the facility owner from a portion of the cost savings resulting from the project
- The assets created by the project are owned by the ESCO until contract completion, when they are transferred to the facility owner, usually for no charge
- 用户单位拿出项目收益的一部分作为对节能服务公司的补偿。
- 项目产生的设备由节能服务公司所有，待合同完成后，产权通常免费地转交给用户单位。



# Shared Savings Contracts in China (3)

## 分享节能效益型合同在中国 (3)



# Guaranteed Savings Contracts in China

## 承诺节能效益型合同在中国

- Facility owners provide the bulk of project financing themselves
- Assets created by the project belong to the facility owner
- As well as providing design and implementation, ESCOs guarantee the energy savings from the project, and may receive a share of the cost savings
- 用户单位自己提供项目所需要的资金。
- 由项目产生的设备归用户单位所有。
- 节能服务公司设计并实施项目，同时承诺项目能够达到一定的节能量，ESCO可能获得一部分节能收益作为补偿。



# Outsourcing Contracts in China

## 外包合同在中国

- ESCOs finance and install energy saving assets within the owner's facility and operate the assets over an extended period for agreed compensation
- Compensation is linked to the energy savings achieved
- ESCOs own the assets, and transfer them to the client at the end of the contract, which may be 8 to 10 years
- 节能服务公司资助项目，为用户安装节能设备，并在一段时间内负责设备运行，按照合同约定收取补偿。
- 补偿的额度与获得的节能量挂钩。
- 节能服务公司拥有节能设备，合同结束通常8-10年后，产权转交给客户。

# ESCO Markets in China (1)

## 节能服务公司在中国的市场 (1)

- The two main markets for ESCOs in China are industry and commercial buildings
- Industrial projects are generally equipment-focused, including boilers, motor drive systems and cooling systems
- Commercial building projects focus primarily on HVAC systems
- 节能服务公司主要的两个市场是工业节能和商业建筑节能。
- 工业节能项目通常关注设备层面-包括锅炉、电机驱动系统和冷却系统的节能。
- 商业建筑节能项目主要关注采暖、通风与空调系统（暖通系统）的节能。

# ESCO Markets in China (2)

## 节能服务公司在中国的市场 (2)



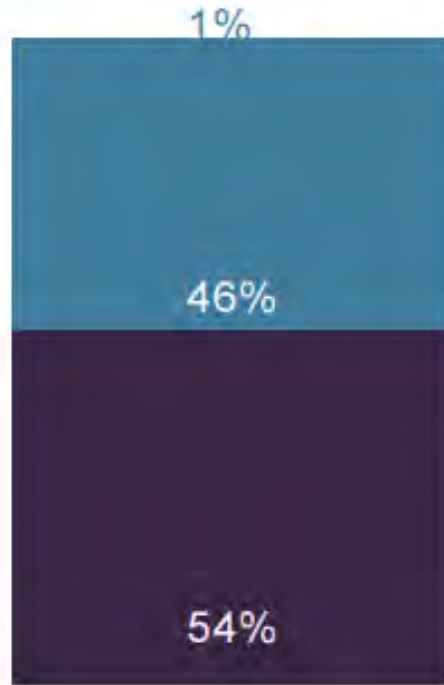
合同能源管理项目数



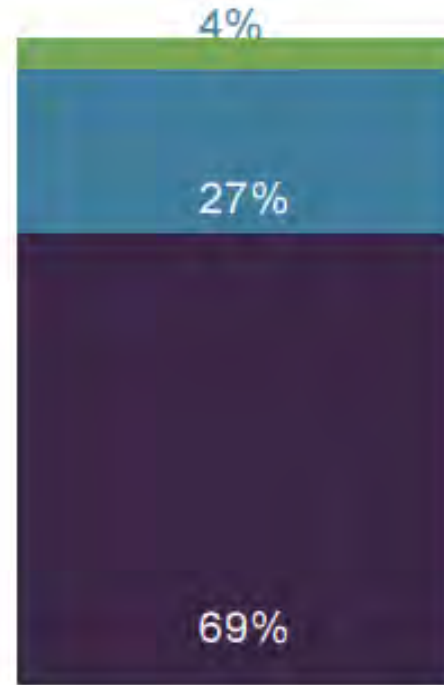
合同能源管理投资额

# ESCO Markets in China (3)

## 节能服务公司在中国的市场 (3)



Industry



Buildings



Shared Savings



Guaranteed Savings



Outsourcing

# ESCO Markets in China (4)

## 节能服务公司在中国的市场 (4)

- Facility owners in China prefer shared-savings contracts, if they can be provided at reasonable cost
- The ESCO provides the financing off the facility owner's balance sheet
- Facility owners need not provide most of the funds nor pay the ESCO if the energy savings are not achieved
- 在成本合理的前提下，中国的用户单位倾向采用分享节能效益型合同。
- 节能服务公司提供资金，不通过用户单位的财务报表。
- 用户单位不需要提供大量的资金，如果节能量未能达到也不必支付节能服务公司。

# Government Support for ESCOs in China (1)

## 中国政府对节能服务公司的支持 (1)

- In April 2010, State Council endorsed policy supporting development of ESCOs, including provisions for qualified EPC projects:
  - financial incentives;
  - various tax exemptions;
  - government entities to include EPC payments under energy costs;
  - local governments to support ESCO operation
- 2010年4月，国务院出台政策支持节能服务公司的发展，包括为符合条件的节能绩效合同项目提供：
  - 财政激励；
  - 各种税收减免；
  - 允许政府实体将节能绩效合同项目支出计入能源使用成本；
  - 鼓励地方政府支持节能服务公司。



# Government Support for ESCOs in China (2)

## 中国政府对节能服务公司的支持

- In June 2010, MOF and NDRC announced new financial incentives for projects under shared savings contracts
- Qualified EPC projects receive from the central government RMB 240 per tce energy saved plus at least RMB 60 per tce from provincial and municipal governments
- 2010年6月，财政部和发改委颁布了对节能效益分享型合同项目新的激励政策。
- 符合条件的节能绩效合同项目可以收到每节约1吨标煤240元的中央财政奖励以及至少60元省级和市级财政奖励。

# Lessons from International Experience

## 国际经验总结

# Advantages of the ESCO Business Model (1)

## 节能服务公司业务模式的优点 (1)

- ESCOs are attractive to facility owners:
  - carry out project design and management
  - take on some or all of the project technical risks
  - provide off-balance-sheet financing
  - seek payment only from the cash flow generated by energy savings
- 节能服务公司对用户单位有吸引力：
  - 开展项目设计和管理
  - 承担部分或全部项目技术风险
  - 提供外部融资
  - 仅需从节能量产生的现金流中提取支付服务公司的费用

# Advantages of the ESCO Business Model (2)

## 节能服务公司业务模式的优点 (2)

- ESCOs can assure both the facility owner and the financier that the cash flow from a project will happen
- ESCOs can aggregate projects, enabling financial institutions to provide financing for a package of projects
- Aggregation can also achieve economies of scale across similar projects
- 节能服务公司向用户单位和金融机构承诺项目会产生现金流。
- 节能服务公司可以组合项目，使得金融机构为一批节能项目提供贷款。
- 项目组合可以在相似的项目中间产生规模经济效应。



# Disadvantages of the ESCO Business Model (1)

## 节能服务公司业务模式的缺点 (1)

- Energy performance contracts require understanding and acceptance of the concept by the parties to the contracts
- Financial institutions are unwilling to provide funds for energy efficiency projects because they usually do not understand such projects
- 节能绩效合同要求各参与方对合同的概念有较好的理解和接受。
- 金融机构通常由于不理解此类项目而不愿意提供资金。



# Disadvantages of the ESCO Business Model (2)

## 节能服务公司业务模式的缺点 (2)

- Some large companies engage ESCOs only to identify energy efficiency opportunities and then proceed to finance and implement projects themselves
- Some industrial companies are reluctant to allow ESCOs to audit core industrial processes
- 一些大公司只让ESCO发现提高能效的机遇，然后自己融资并实施节能项目。
- 一些工业企业不愿意让ESCO来审计其核心生产工艺。

# Limited Scope of ESCO Operations (1)

## 节能服务公司运作的局限性 (1)

- Operating an ESCO is not simple
- To become a successful and profitable business, an ESCO requires:
  - staff with a complex mix of skills, and
  - a substantial level of equity capital
- 运作节能服务公司并非容易。
- 成为一个能成功盈利的企业，ESCO需要：
  - 具有一系列专业技能的员工，以及
  - 充足的资金

# Limited Scope of ESCO Operations (2)

## 节能服务公司运作的局限性 (2)

- ESCOs often manage risks by limiting the scope of their operations
- ESCOs usually undertake only relatively small projects and operate only in some parts of the market
- ESCOs often implement only simple and low cost energy efficiency measures, and ignore more complex measures at the same site
- ESCO通常通过缩小业务范围来降低风险。
- ESCO通常开展较小的项目，仅涉足一部分节能市场。
- ESCO通常只实施简单、低成本的能效措施，而忽略可以在同一地点开展的较复杂的节能措施。





# US Experience with Utility-Affiliated ESCOs (1)

## 美国关于电网公司所属ESCO的经验 (1)

- In the 1990s, utility-affiliated ESCOs increased from about 30 to about 300
- In the 2000s, many utilities closed or sold their ESCOs
- Unrealistic expectations about cost structure and growth potential of ESCOs
- Lack of experience in running an ESCO business
- Lack of infrastructure to deliver energy services
- 20世纪90年代，美国电网公司所属ESCO从30增加到300个。
- 21世纪初，许多电网公司关闭或出售了他们的节能服务公司。
- 对ESCO成本构成和增长潜力有不现实的期望
- 缺乏经营ESCO的经验
- 缺乏提供能源服务的基础设备



# US Experience with Utility-Affiliated ESCOs (2)

## 美国关于电网企业所属ESCO的经验(2)

- Many utilities in the United States now focus on implementing energy efficiency programs mandated by regulators
- Regulators have established mechanisms that allow utilities to make money from energy efficiency
- Such programs provide a more predictable financial return than ESCOs
- 美国许多电网公司都关注监管机构要求实施的能效项目。
- 监管机构建立了一些机制允许电网公司通过提高能效获得盈利。
- 这些项目与ESCO模式相比，更能保证可预期的经济回报。

# Role of Grid Company ESCOs in China

## 国家电网公司所属ESCO的角色定位

# Establishment of Grid Company ESCOs

## 电网公司下属ESCO的成立

- In China, government support for ESCOs and energy performance contracting have encouraged grid companies to establish ESCOs as their main mechanism for acquiring energy and demand savings to meet their energy and demand reduction targets
- 在中国，政府对ESCO的支持以及节能绩效合同鼓励了电网公司组建ESCO作为他们完成减少能耗和电力需求目标的主要机制。



# Problems with Grid Company ESCOs

## 电网公司下属ESCO的问题

- Experience during 2011 and 2012 has shown that the grid company ESCOs are not competitive and progress is slow:
  - insufficient capital
  - lack of projects
  - lengthy internal approval processes
  - lack of staff with the required skills
- 2011和2012年的经验显示电网公司ESCO并不太具有竞争力而且发生的过程缓慢：
  - 资金不充足
  - 缺乏项目
  - 内部审批程序漫长
  - 缺乏有所需技能的职员

# Recommended Grid Company Actions (1)

## 建议电网公司采取的行动 (1)

- Provide education and training to facility owners on the concept and operation of energy performance contracting
- Make sufficient funds available to grid company ESCOs to enable the ESCOs to provide off-balance sheet funding for energy efficiency projects at facility owners' sites
- 为用户单位在节能绩效合同的概念和运作方面提供培训。
- 保证电网公司下属 ESCO 拥有充足的资金，使其有能力为业主开展节能项目提供外部融资。

# Recommended Grid Company Actions (2)

## 建议电网公司采取的行动 (2)

- Provide detailed training for grid company ESCO staff in the full range of skills required, including technical, business and financial skills
- Establish partnering arrangements with technical experts who have specialized technical skills and expertise that existing grid company ESCO staff do not have
- 为电网公司下属ESCO提供包括技术、业务和财务方面的一系列技能的详细培训。
- 在电网公司所属ESCO技能欠缺的领域与具有相关专业背景的外部专家保持合作。

# Recommended Grid Company Actions (3)

## 建议电网公司采取的行动 (3)

- Engage third party ESCOs as contractors to collaborate with grid company ESCOs in carrying out energy efficiency projects in the particular market segments
- Market grid company ESCO services in areas of the market that match the technical capability and capacity of the ESCO and its partners
- 与第三方节能服务公司签订合同，联合电网公司下属ESCO一同在特定细分市场中开展节能项目。
- 根据电网公司下属ESCO和其合作方的技术能力和特点，做好市场营销工作。



# Recommended Grid Company Actions (4)

## 建议电网公司采取的行动 (4)

- Focus grid company ESCOs on funding and carrying out simpler energy efficiency projects
- Directly fund the costs of carrying out more complex and comprehensive energy efficiency projects
- 让电网公司下属ESCO集中精力投资和开展较为简单的节能项目。
- 电网公司直接投资支持实施更复杂和综合型的能效项目。



# Sources of Funding for Complex Projects

## 复杂节能项目的资金来源

- Financial incentives provided by governments for projects that deliver verified energy savings
- Cost savings that grid companies make from reducing energy use and energy demand
- The additional funding sources identified in the *DSM Implementation Measures* document
- 中央和地方政府为经验证获得了一定节能量的项目提供的财政资金。
- 电网公司由于降低了能耗和能源需求而节约的成本。
- 《电力需求侧管理实施办法》指导文件规定的其他资金来源。

# New Grid Company Business Model

## 电网企业新的业务模式

- Directly funding energy efficiency projects and engaging third party ESCOs would assist grid companies to change their business models
- Rather than only supplying electricity, grid companies would provide complete energy services to their customers, thereby reducing costs and increasing economic efficiency
- 电网公司直接投资能效项目，第三方节能服务公司可以辅助电网公司改变经营模式。
- 电网公司为用户提供完整的能源服务而不仅局限于供电，从而减少成本增加经济效益。

# Resources

## 参考资源

- This presentation is based on the following RAP Chinese publication: “ESCOs as a Delivery Mechanism for Grid Company DSM in China” available on the webpage: [www.raponline.org/china](http://www.raponline.org/china)
- Also see this webpage for other RAP Chinese publications
- 这个演讲根据睿博的中文报告：“中国电网企业开展电力需求侧工作中节能服务公司的运作机制”改编，可通过如下链接获取：[www.raponline.org/china](http://www.raponline.org/china)
- 这一网页也列出了RAP的其他中文发表文章。

## About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at [www.raonline.org](http://www.raonline.org)

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