

# **The Multiple Benefits of Energy Efficiency Policies**

**The 15th Annual Conference of the European Environment and Sustainable Development Advisory Councils/EEAC:**

**“Energy Efficiency - Key Pillar for a Competitive, Secure and Sustainable Europe”**

**Thomas B. Johansson**

International Institute for Industrial Environmental Economics,  
Lund University, Sweden

12 October 2007; Evora, Portugal

# Sustainable Development Challenges:

- Social, incl. poverty
- Security, and peace
- Economic
- Environment,
  - Urban and Rural
  - Regional
  - Global
- Major changes needed, incl. in energy systems
- **Context -- a changing world!**

# Challenges requiring actions on Energy - I

- a. The challenge of achieving equity in energy services for the two billion, or so people, who currently don't have access to affordable and clean modern forms of energy;
- b. The need to sustain affordable energy services as a precursor to sustainable economic growth, particularly difficult for oil-importing developing countries with high oil prices;
- c. The requirement for continued, secure supplies of energy; aggravated by the approach of stagnating conventional oil production.

# Challenges requiring actions on Energy -- II

- d. To adequately resolve the numerous **local and regional environmental challenges** posed by energy production, transport, processing and use, including indoor and urban air pollution, the atmospheric brown cloud phenomenon, and regional acidification;
- e. The need to address **climate change mitigation** in a timely and effective fashion,
- f. The need to **contain ancillary risks** posed by operating energy systems, such as ensuring security and peace through addressing nuclear weapons proliferation, nuclear waste security, and reducing the potential for acts of terrorism.

this translates into a need for a major  
energy system transformation

Main elements:

- Energy end-use efficiency
- Renewable energies
- Carbon Capture and Storage

# Key is:

- The overall energy systems challenge is to evolve the present portfolio of energy forms through establishing enabling conditions to support sustainable development locally and globally

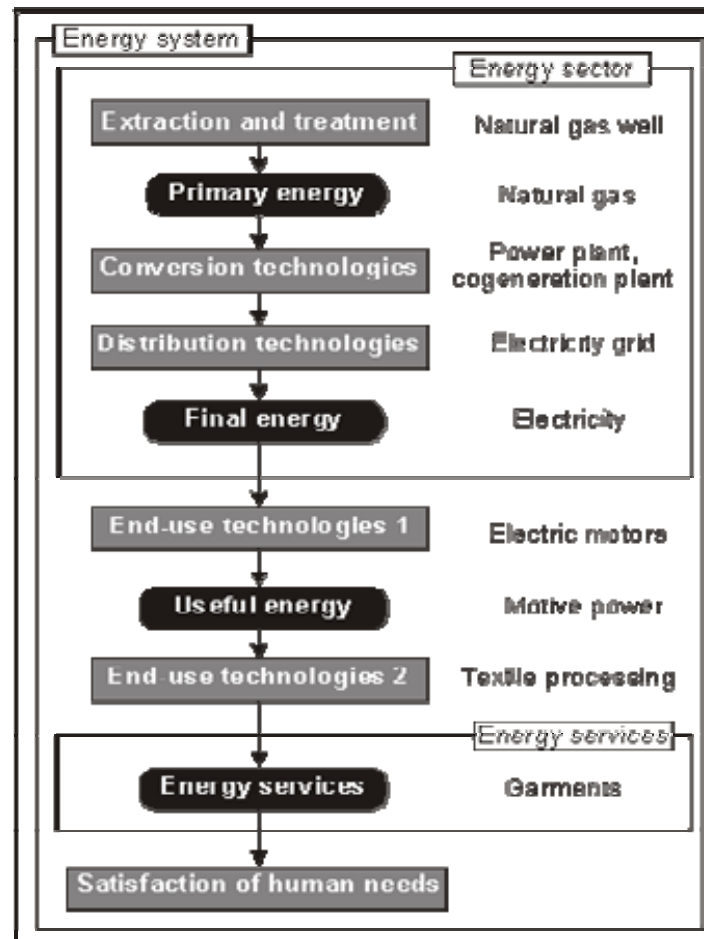
The challenges must be addressed

**simultaneously**

**adequately**

**timely**

# An Example of the Energy Chain from Extraction to Satisfaction of Needs

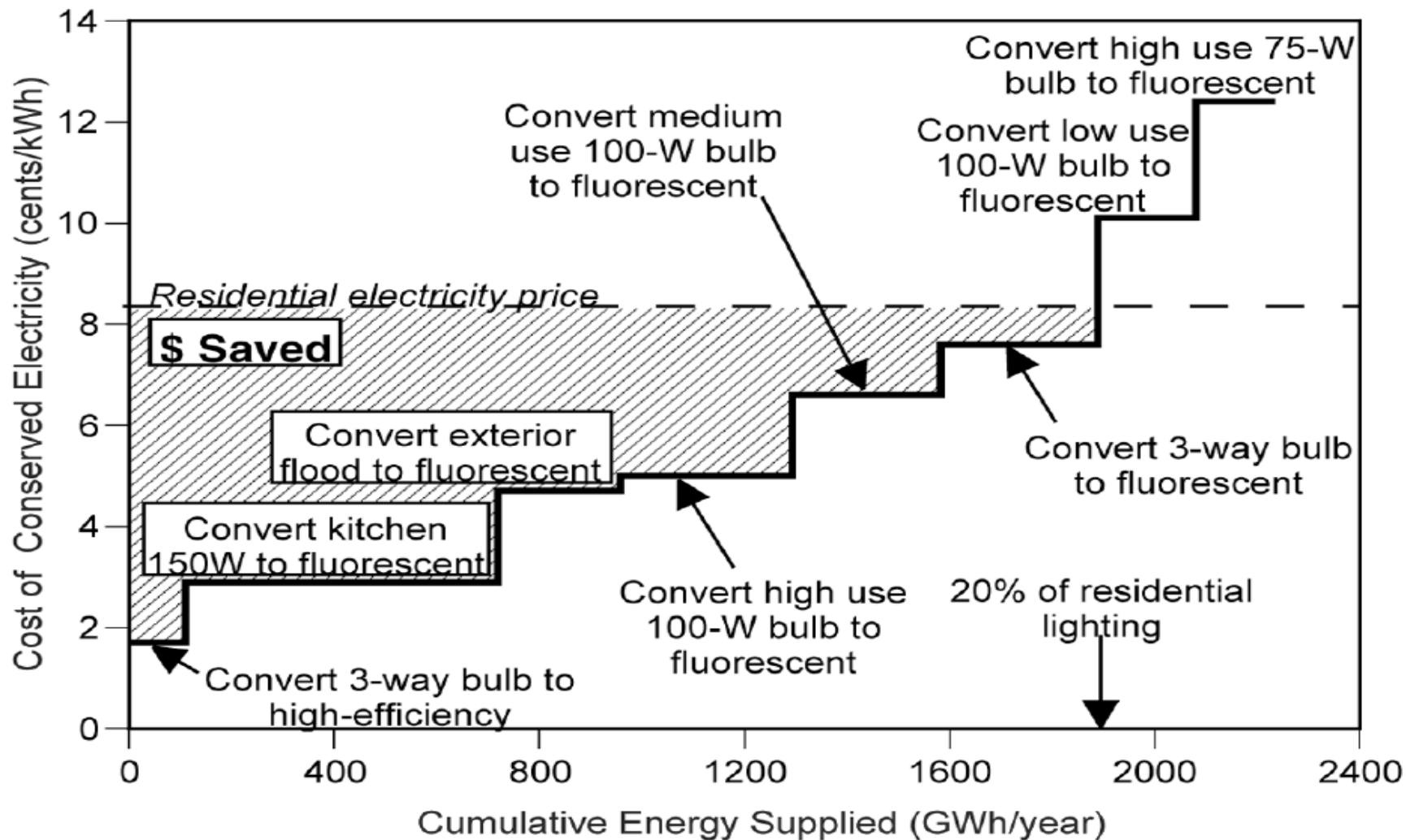


# benefits of EE

- Lower cost of energy services
- Reduced emissions: improving environment and mitigating climate change
- Improved security of energy supply
- Facilitates high % RE contributions
- Enhanced competitiveness through lowering cost, and developing more competitive products

# How to calculate costs and benefits of EE measures?

- System boundary?
- Which costs and benefits?
- Can all costs and benefits be converted into monetary value? If not, how to proceed?
- Discounting, how?
- Who benefits? Investor, owner, user, local or global society?



**Figure 4** Macro supply curve of conserved residential lighting in California. Although the last cost-effective step costs 7.6 cents/kWh, the average CCE is only 4.8 c/kWh. This is adapted from Figures 3–12 of Meier et al (20).

Source: Rosenfeld, Ann. Rev. of Energy Environment, vol. 24, 1999

# Multiple Benefits Evaluation

- How to assign costs and benefits?
- Traditional ex.: Combined Heat and Power (CHP)
- Energy efficiency measures provide benefits
  - Economic growth
  - Poverty alleviation, jobs creation
  - Urban and indoor air pollution, acidification
  - Security of energy supply, enhancing peace
  - Climate change
- Can all the costs for such a measure be assigned to one of the benefits, often climate change mitigation?

- Some EE benefits accrue to the investor
- Many do not!
- How then to reflect societal benefits in the market conditions? (for security, resource efficiency, environmental protection, climate change mitigation!)

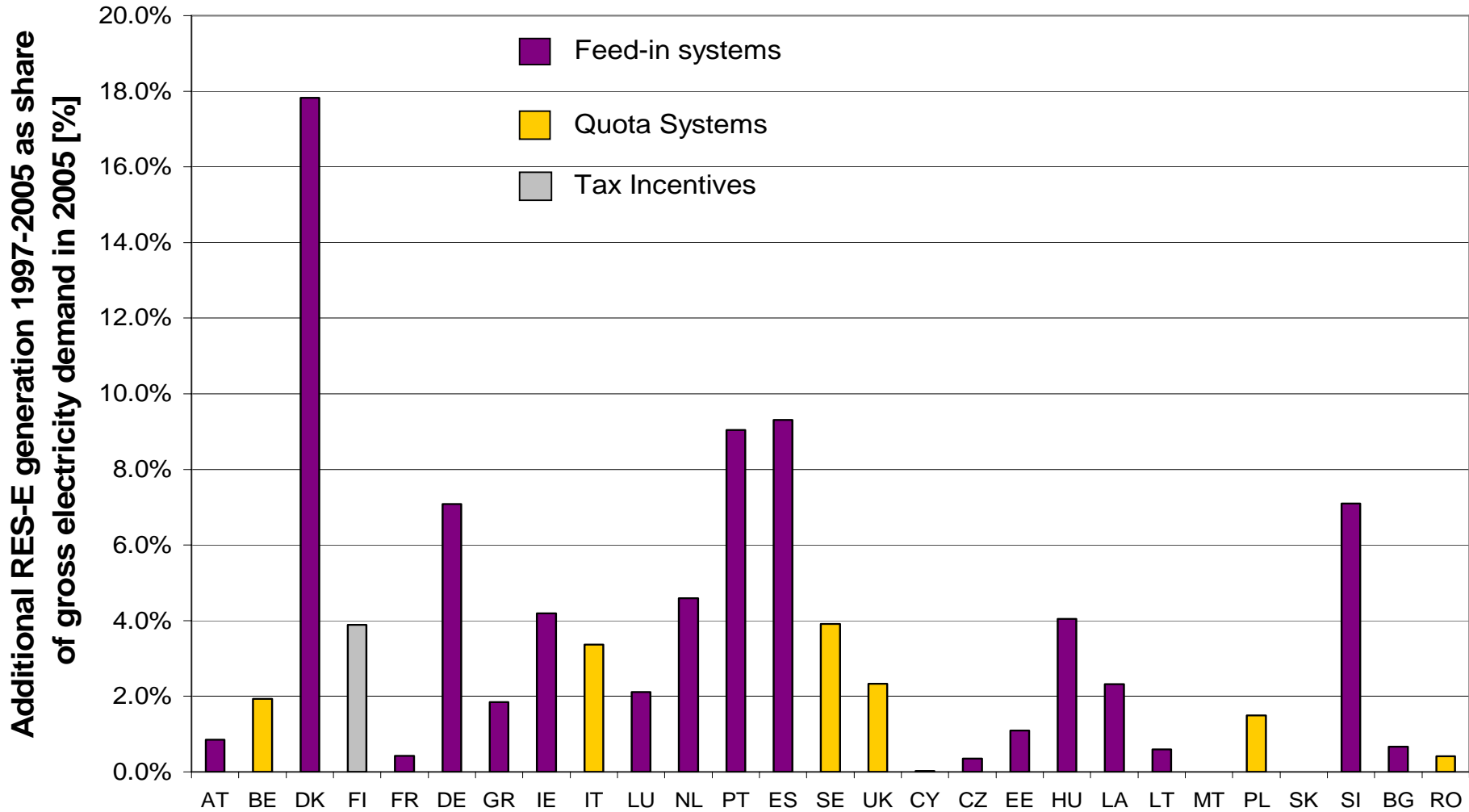
# an approach to EE ambitions?

- The sustainability challenges are very large, and urgent
- Energy efficiency is an effective and efficient measure to address SD challenges
- Benefits often not easy to monetarise
- Set ambitious targets, related to SD issues
- Use multiple instruments, adjusted to sector conditions and circumstances
- Avoid simple economic criteria

# EU Renewable Energy Policy

- EU target set: 20% by 2020, to be allocated by country
- This is but a step -- much more will be needed!
- Support scheme required to reflect external costs and benefits, and initially to start buying down the present cost of RETs
- Intense debate on support mechanisms: feed-in-tariffs vs. certificate markets; trade in certificates? harmonisation?
- Criteria for selection: (1) effective, (2) efficient

# Additional RES-E penetration 1997 - 2005



# Global Energy Assessment

## Towards a more Sustainable Future

- The *magnitude* of the change required is *huge*
- The challenge is to find a way forward that addresses all the issues *simultaneously*
- A paradigm shift is needed: energy end-use efficiency, new renewables, advanced nuclear and carbon capture and storage.

# Need for a new Energy Assessment

- The world is at a critical juncture for energy policy
  - ◆ New challenges have emerged, while old challenges remain
- Previous studies do not identify the strategies and solutions for addressing **comprehensively** today's major energy challenges in an **integrated** way



# Concepts and approach

- GEA structure is organized around **knowledge clusters** comprising **knowledge modules**
- Structure is being determined through an ongoing consultative process
  - Outline presented here is evolving
- Knowledge clusters and modules will be tightly integrated
  - sequential numbering of the modules in this presentation **does not** imply a sequential or linear approach within the GEA



# GEA Knowledge Clusters

- **Cluster I: Major Global Issues and Energy**
  - assessment of the **Challenges**
- **Cluster II: Energy Resources and Technological Options**
  - assessment of the **Components** available to build future energy systems
- **Cluster III: Possible Sustainable Futures**
  - assessment of how to combine the Components to create **Systems** that address the Challenges
- **Cluster IV: Policies Advancing Energy for Sustainable Development**
  - assessment of the **Policies** needed to address the Challenges and realize the Systems



## Next steps – Support

- Austria
- Brazil
- Sweden
- UNDP
- UNEP
- UNIDO
- World Bank
- WEC
- IEA
- UN Foundation
- Petrobras
- IIASA
- ...



*energy* and the challenge of sustainability