DSM in Daily Practice

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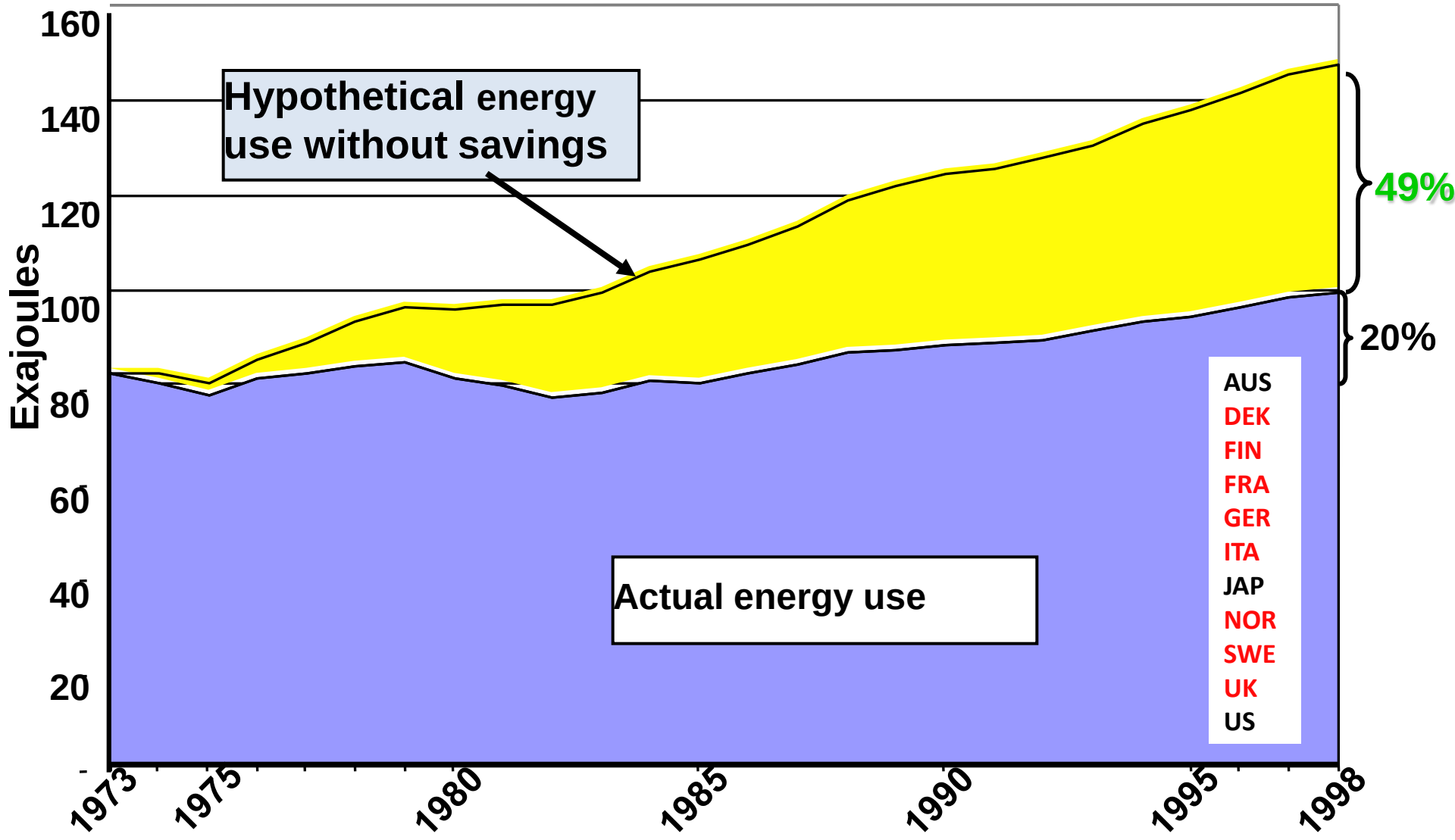
Chairman of the IEA DSM-Programme

A. Narratio (what does history tell us?)

Energy-use in the IEA-11

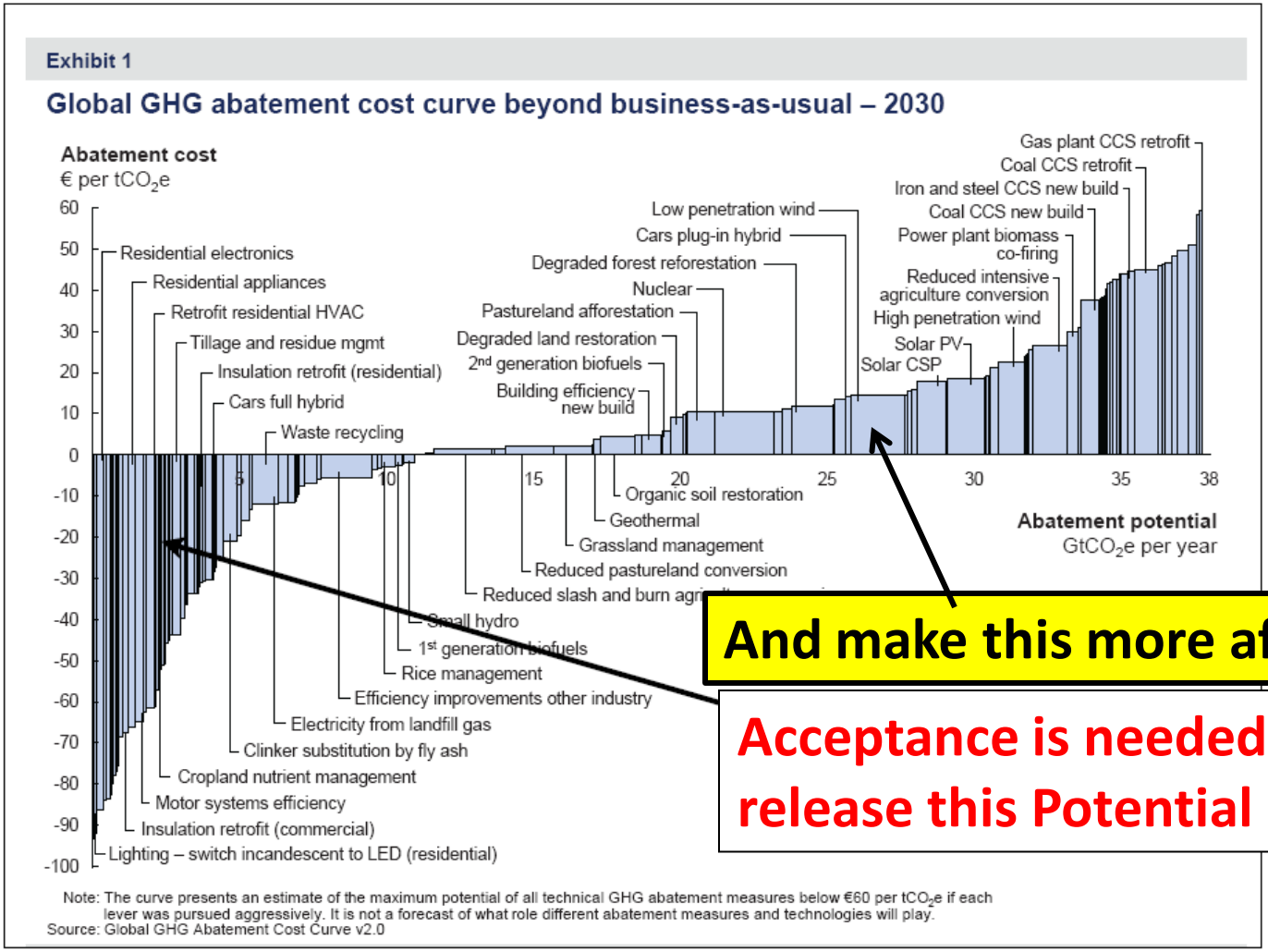


Source: 30 years of energy use in IEA countries

The rise in welfare depends more on energy efficiency improvements than on growth in energy use!

Efficiency is under-utilized, since...

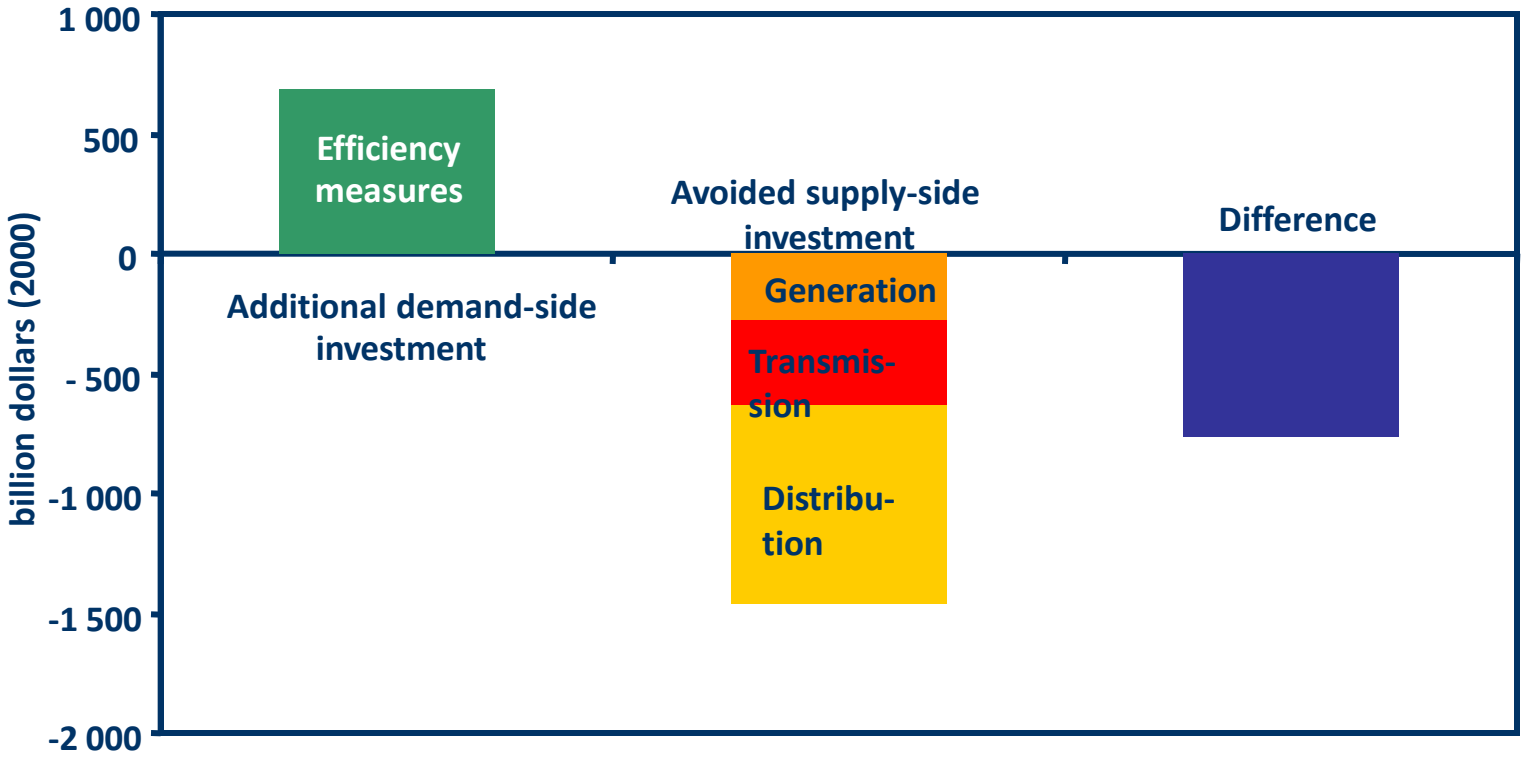
.... Result = Potential * Acceptance



And make this more affordable

Acceptance is needed to release this Potential

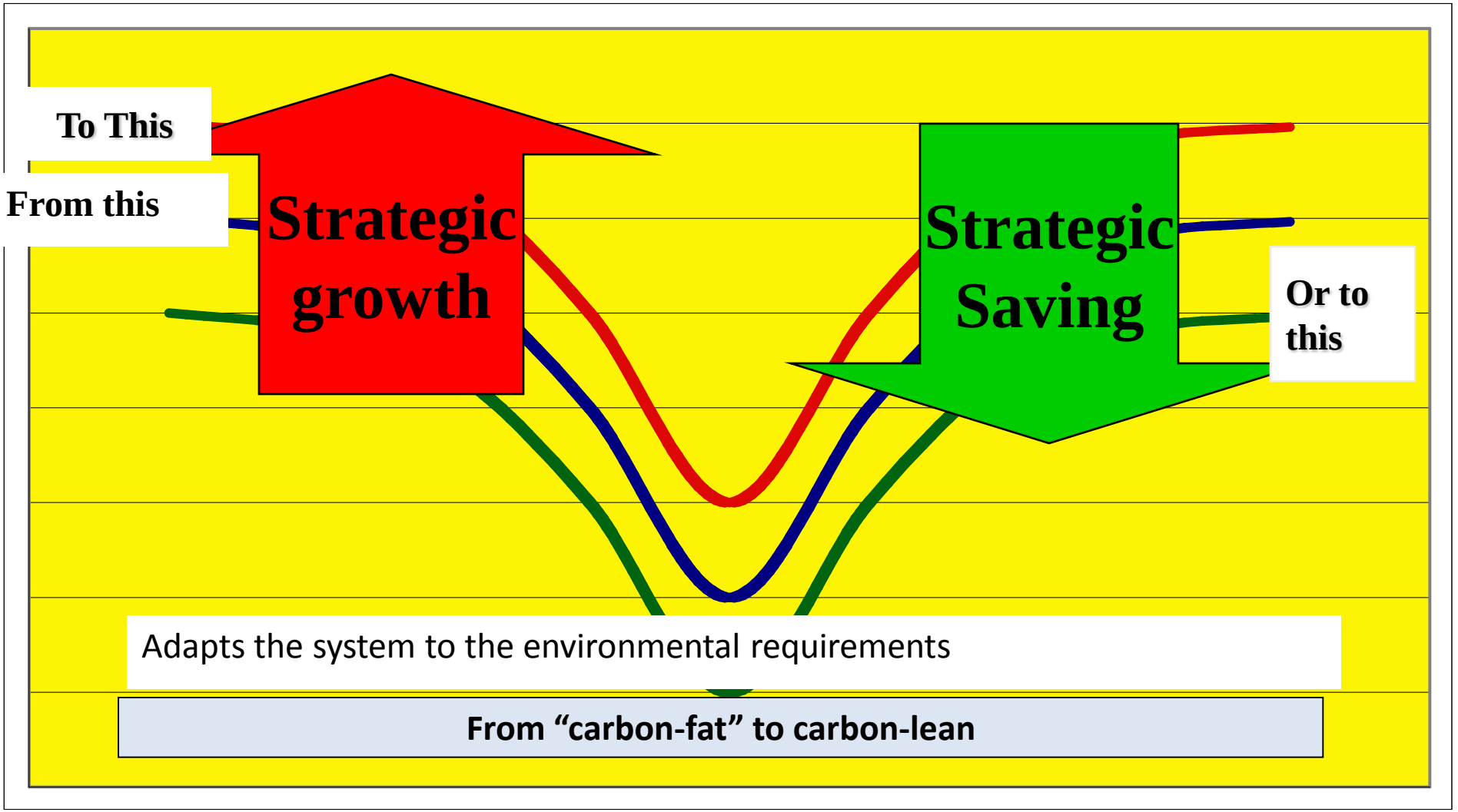
Difference in Electricity Investment in the Alternative vs. Reference Scenario 2003-2030



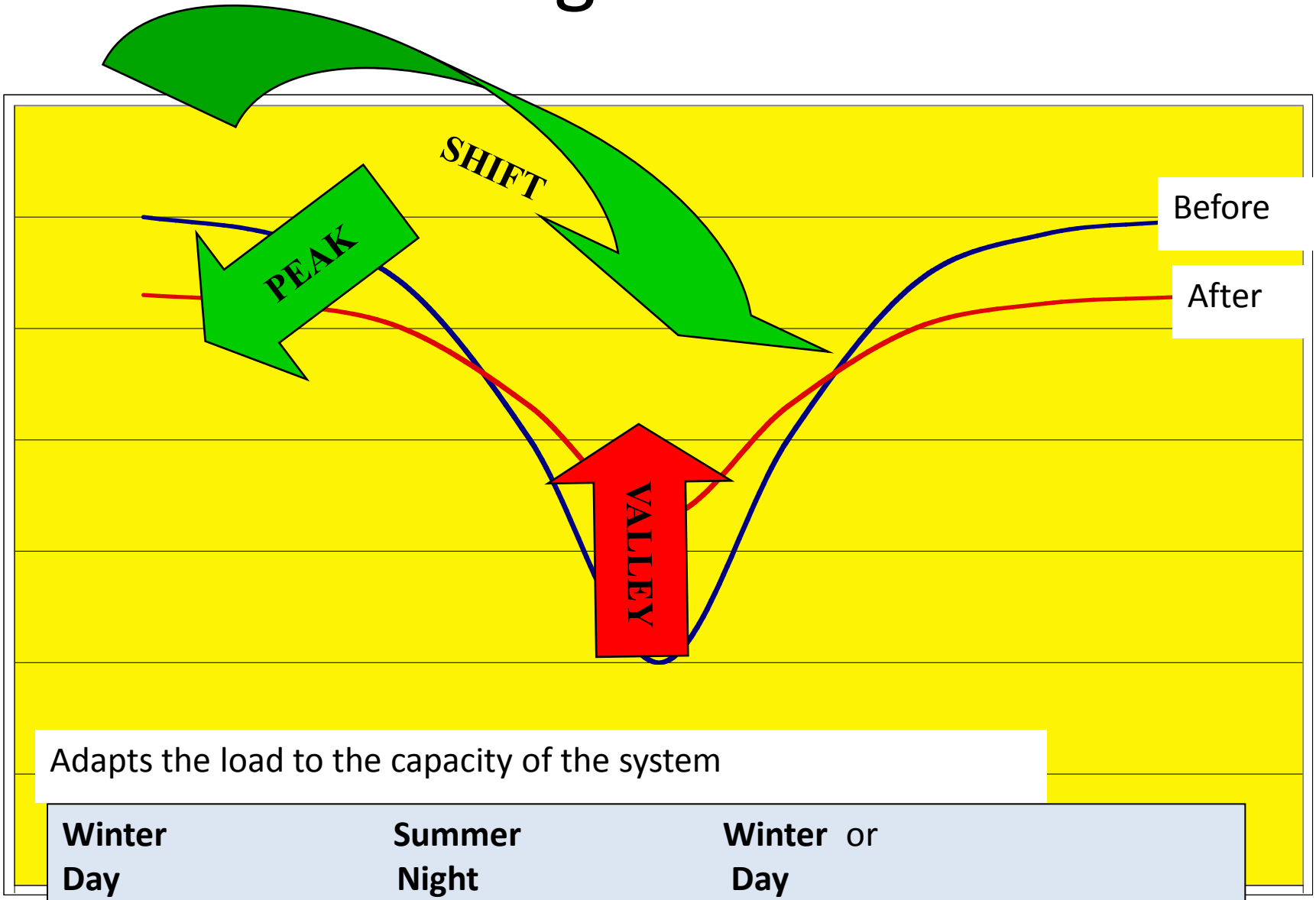
Additional investments on the demand side are more than offset by lower investment on the supply side

Source WEO 2004

DSM can change the LOAD LEVEL



DSM can Change the LOAD SHAPE



Adapts the load to the capacity of the system

Winter Day	**Summer Night**	**Winter** or **Day**

DSM Policy for load shape will deliver

- **Less Price Volatility** by improving short term price elasticity
- Improved **System Reliability** by reducing peaks and adding to safety margins
- Enhanced **System security** by reducing dependency on vulnerable supply resources
- Improved **Restoration capacity** by dispatching in/after emergency situations
- **Less costly network reinforcements** since energy efficiency measures will be active alternatives
- **Distributed generation** as alternative to transmission lines.
- Improved **operation and use of flowing renewable** sources
- **Elastic response** as complement to competition

IEA-DSM (a growing family)

Australia	Korea
Austria	Netherlands
Belgium	New Zealand
Canada	Norway
Finland	Spain
France	Sweden
Greece	Switzerland
India	United Kingdom
Italy	United States

Schneider Electric

The Regulatory Assistance Project

South Africa (ip)	China (obs)
Portugal (obs)	

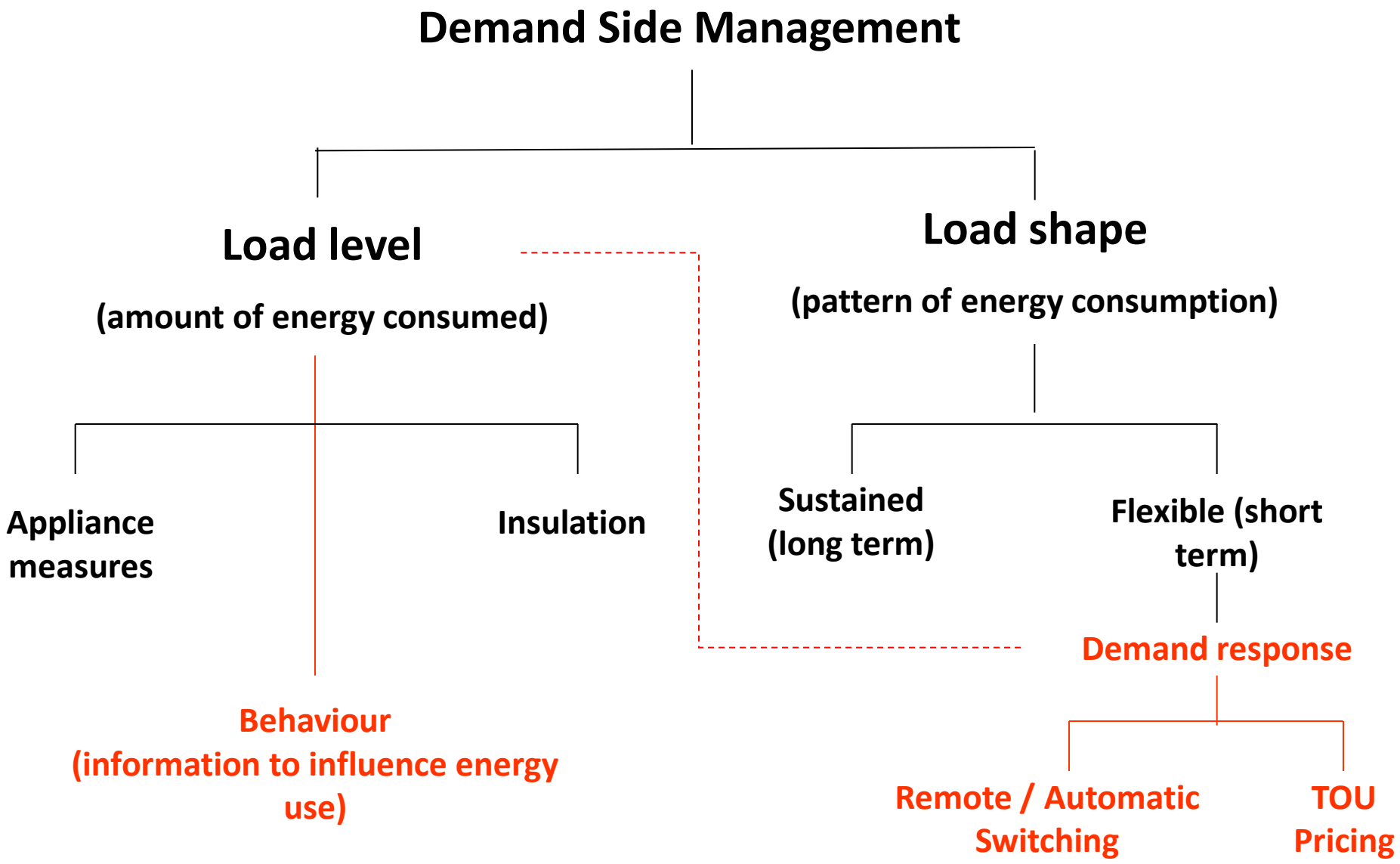
Eurelectric (obs)

Edison Electric Inst. (inv)

www.ieadsm.org

The issues!

- **Load level**
  - a wasteful demand requires too much supply for the specific needs (The customer do not need energy! He needs the service that energy, combined with an installation, provides)
- **Load shape**
  - high peaks,
  - little reserve capacity,
  - bottlenecks in transmission and distribution
- **Market responsibilities**
  - who is the owner of the problem?

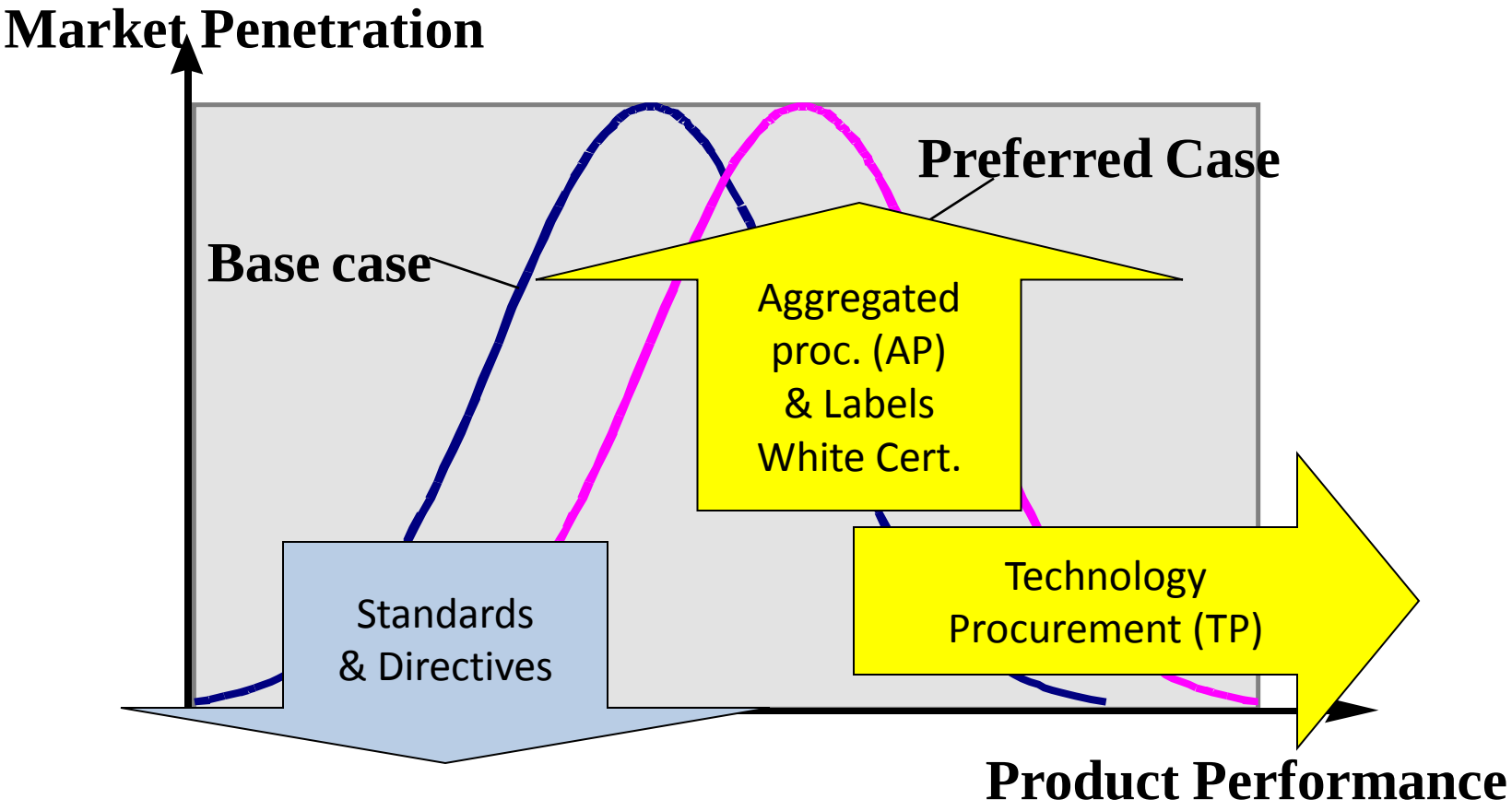

Demand Side Management
Load level
(amount of energy consumed)
Load shape
(pattern of energy consumption)
Appliance measures
Insulation
Behaviour
(information to influence energy use)
Sustained (long term)
Flexible (short term)
Demand response
Remote / Automatic Switching
TOU Pricing

		Business interest in DSM	
Status of Task		**Peak Load**	**Load Level**
Past, Present and Future IEA DSM-Programme tasks Further information on the activities can be found at www.ieadsm.org .	**Completed**	**Task II:** Communications Technologies for Demand-Side Management **Task VIII:** Demand-Side Bidding in a Competitive Electricity Market **Task XI:** Time of Use Pricing and Energy Use for Demand Management Delivery **Task XIII:** Demand Response Resources **Task XV:** Network-driven DSM	**Task I:** Subtask 9 – Evaluation Guidebook on the impact of DSM and Energy Efficiency Programmes **Task III:** Technology procurement **Task V:** Marketing of Energy Efficiency **Task VI:** Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses **Task VII:** Market Transformation **Task IX:** The Role of Municipalities in a Liberalised System **Task X:** Performance Contracting **Task XIV:** Market Mechanisms for White Certificates Trading **Task XVIII:** Demand Side Management and Climate Change
	Current	**Task XVII:** Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources **Task XIX:** Micro Demand Response and Energy Saving	**Task XVI:** Competitive Energy Services **Task XX:** Branding of Energy Efficiency **Task XXI:** Standardisation of Energy Efficiency Calculations **Task XXII:** Energy Efficiency Portfolio Standards
	Pro-posed	*** Delivering effective smart grids** *** DR for smart grids. Business cases and energy services**	*** DSM for TSOs**

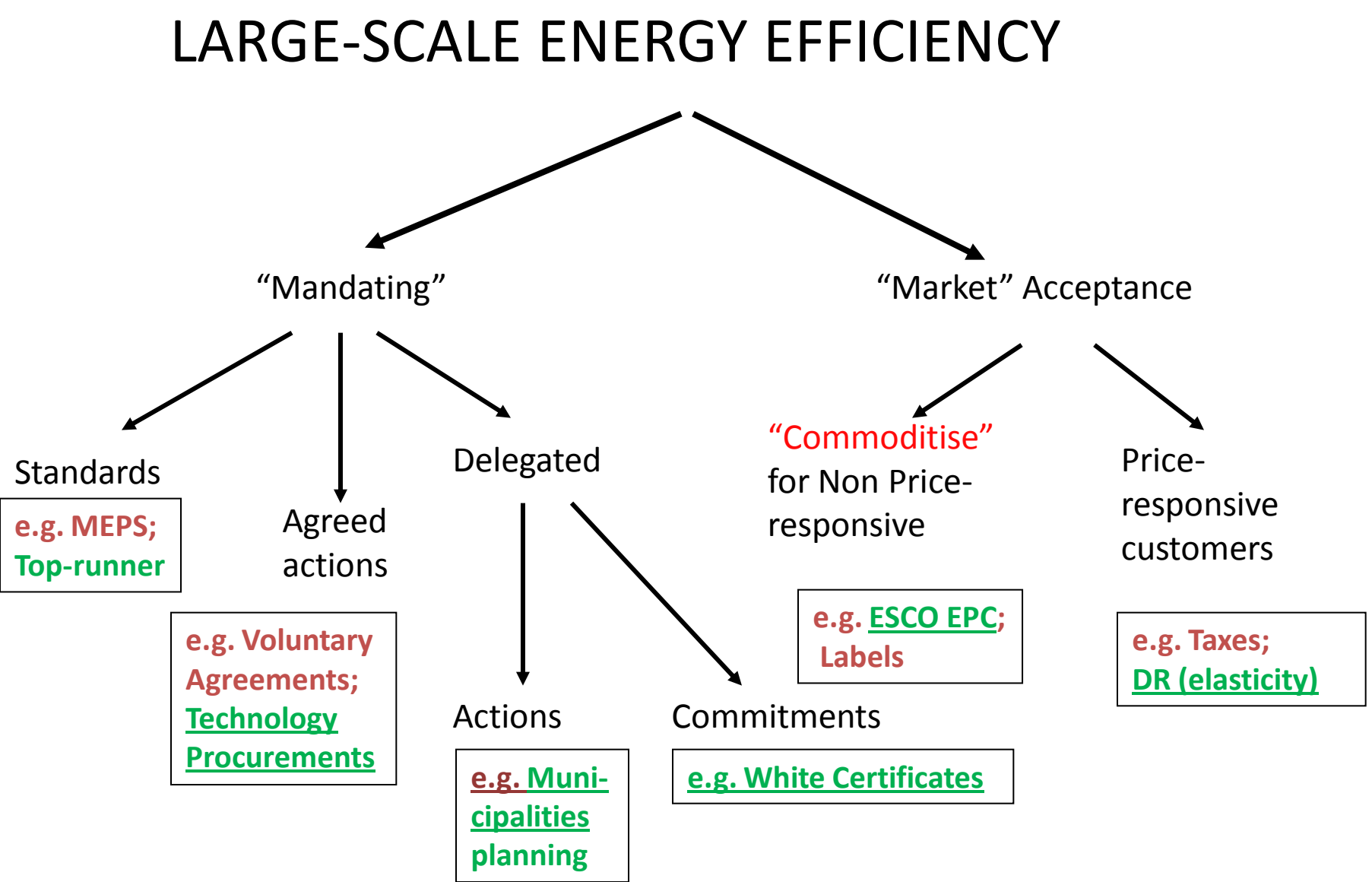
*** DSM-university**

B. Large-Scale Deployment

Market Transformation



Use all the tools



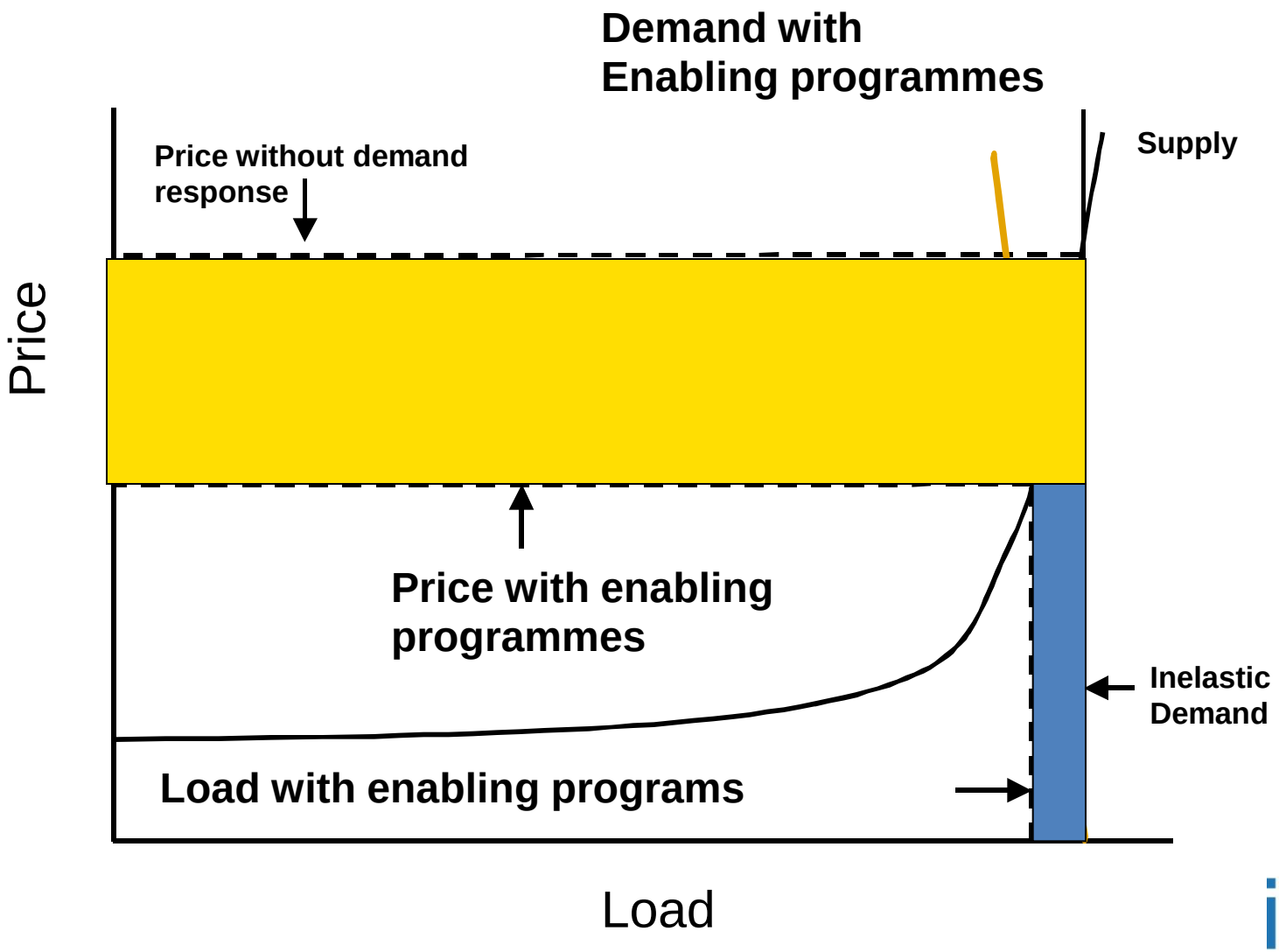
Horses for courses.

www.ieadsm.org

APPROACH	TYPE		EXAMPLE	
Mandated	Standards		• Minimum performance (MEPS) • Top-runner standard	
	"Agreed Actions"		• Voluntary Agreements • Technology Procurements (III)	
	Delegated Actions	By actor	• Regional bodies • Municipalities (IX)	
		By Means	• Commitments • Certificates (XIV) • Portfolios (XXII)	
Market Acceptance	Price-responsive customers		• Taxes; Tax reduction • Price elasticity (Demand Response) (II, VIII, XI, XIII, XIX)	• Branding (XX) • Market Transformation (V, VII)
	Non-price responsive customers	"Commoditising" energy efficiency	• Energy Services, ESCO (X, XVI) • Labels	

C. Demand Response in context

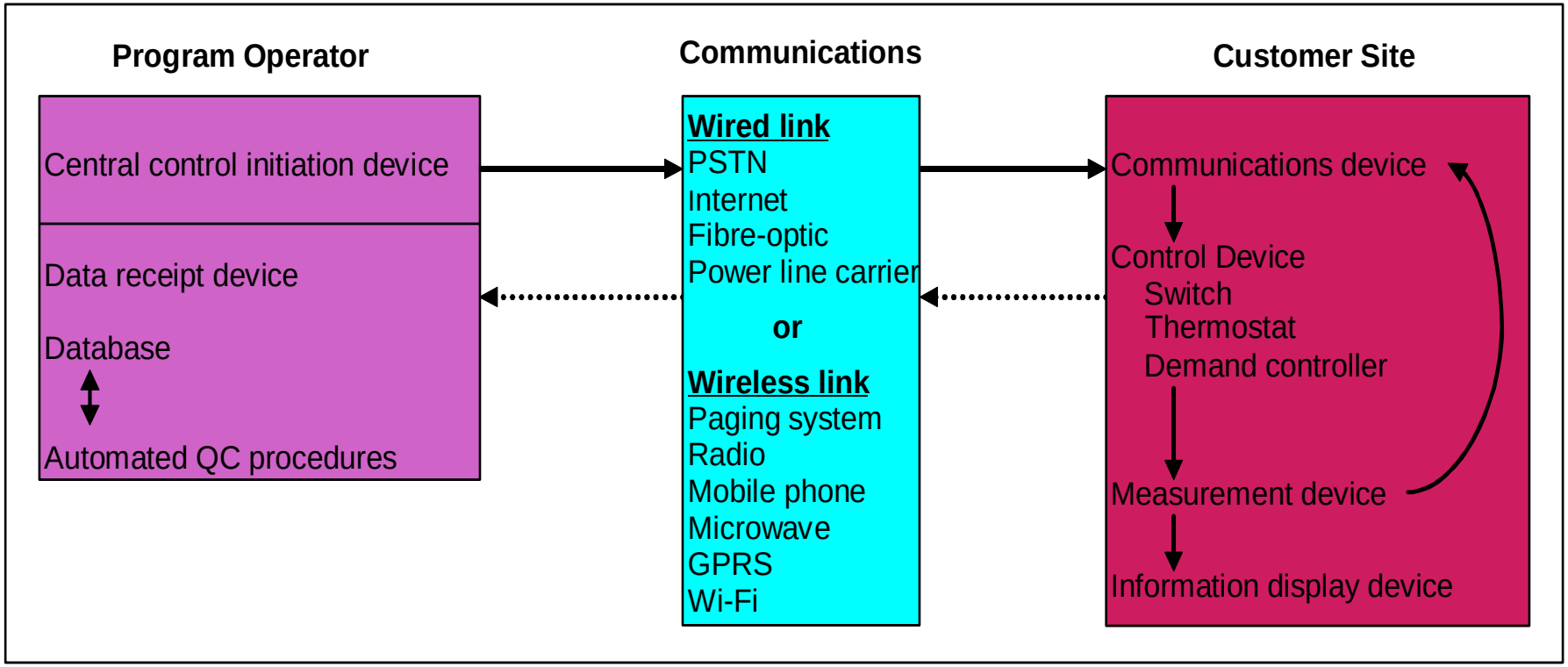
DR and price impact



Load Shape (DR) Technology requires the following to be considered

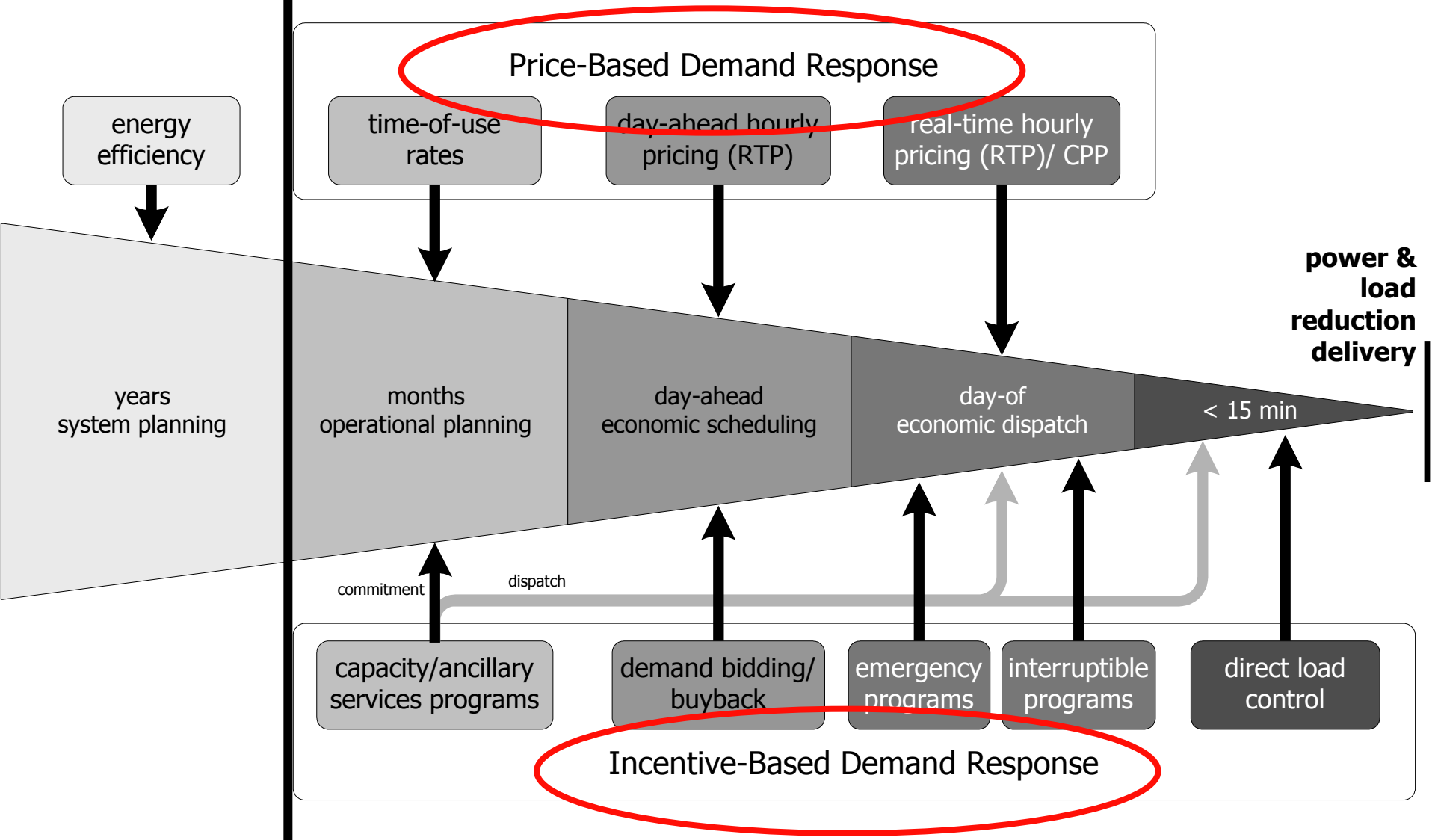
- Meters …….BUT ALSO…
- Communications ……..AND
- Software for calculation, billing, verification, settlement ……AND
- Pricing structure……AND
- Institutional models……..AND
- End use capacity to accommodate (e.g. Load patterns, Switching ability, Storage facilities and capacity, etc.).....AND
- Customer preferences

Load Control System



Components of a Load Control System

Load Shape involving the users



Source: Benefits of DR in Electricity Markets. US DOE 2006

Demand Response Resources – Task XIII

DRR material to be downloaded

- Workshops and Presentations
- Demand Response Resources - Guidebook |
- Communication Toolkit |
- DR Valuation Reports
- Market Potential Calculator Reports/Samples
- Marketplace Overviews
- Technology Case Studies
- Publications

http://www.ieadsm.org/ViewTask.aspx?ID=17&Task=13&Sort=1#ancPublications3

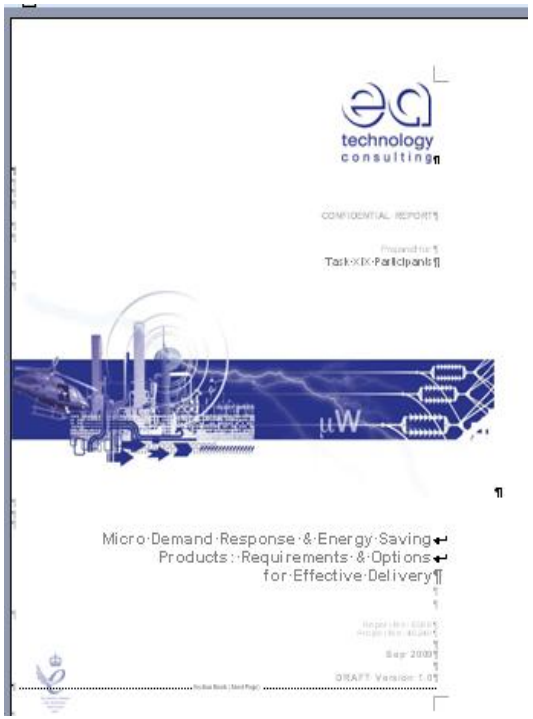
DRR Guidebook

- Section 1 - Background Information
- Section 2 - Getting Started
- Section 3 - DR Resource Base
- Section 4 - Market Potential
- Section 5 - DR Valuation
- Section 6 - Technologies
- Section 7 - Market Barriers and Solutions
- Section 8 - Drafting the Business Plan
- DRR Guidebook - Appendices

http://www.ieadsm.org/ViewTask.aspx?ID=17&Task=13&Sort=1#ancPublications3

Report 1: Requirements & Options for Effective Delivery (Available within a few months)

- **Overview of electricity system and trading arrangements**
- **Demand Response Requirements**
- **Review of Case Studies and Pilots**
- **End Use Demand Changes**
- **Delivery Mechanisms**
- **Technical Architecture Components**



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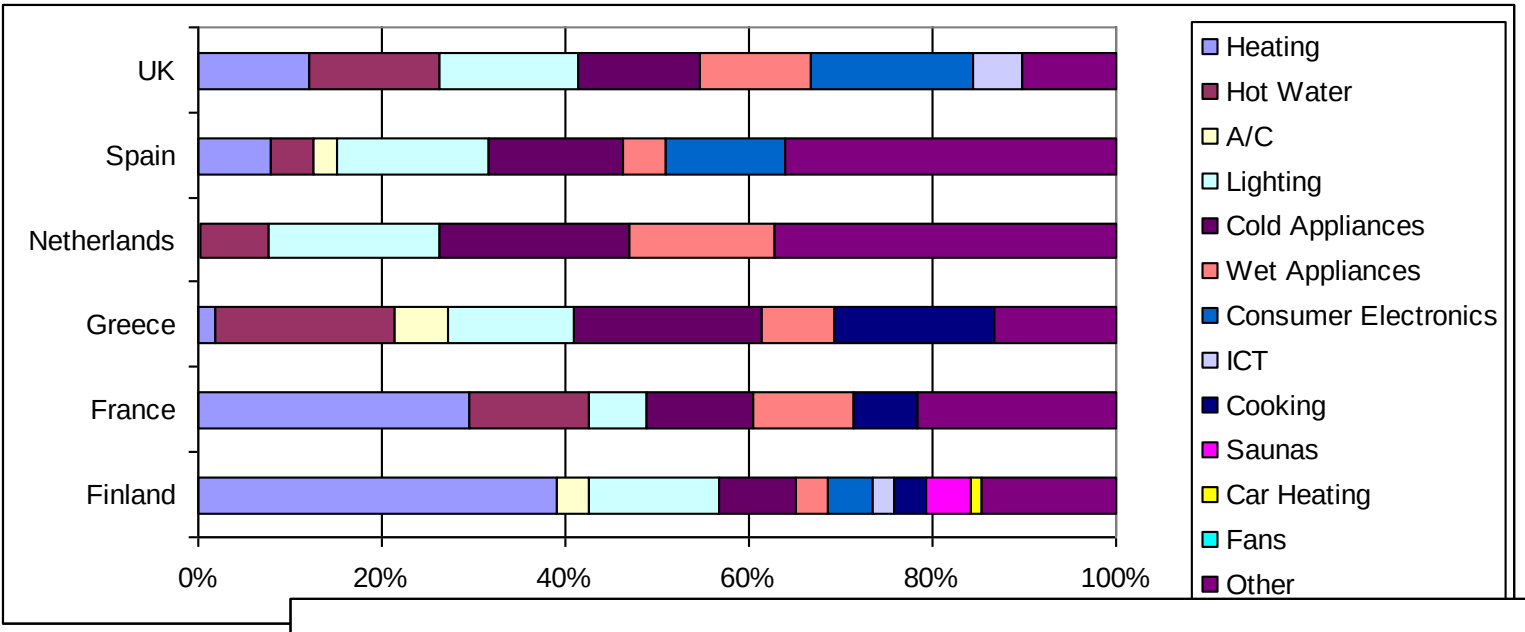
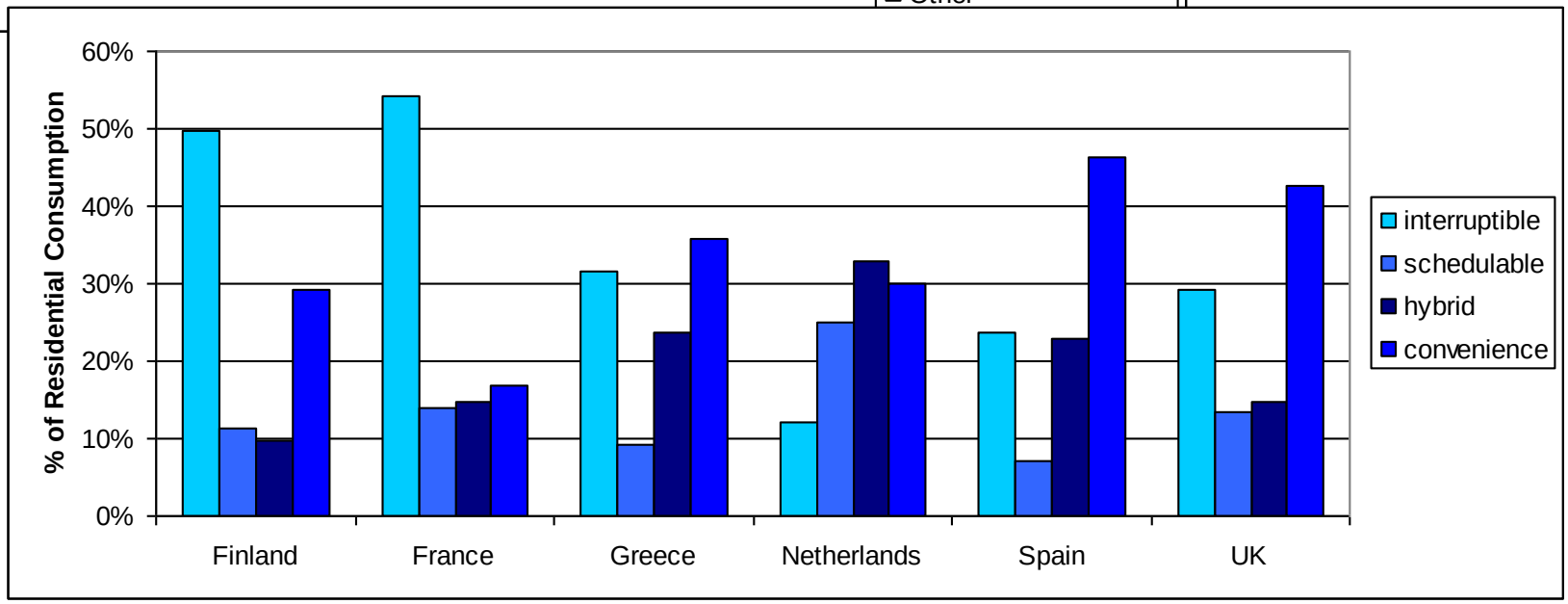
Residential Loads in Participating Countries





What have we learnt?

- Electricity markets are complex, with a diverse range of stakeholders that is likely to increase
- There are information gaps
  - Lack of information on the consumption habits of commercial, particularly SME, consumers
  - Lack of information on when different end uses occur, for both domestic and SME consumers
- Technologies are rapidly evolving in this area but few are mass market

What have we learnt? (2)

- Tariff-based interventions are likely to be the easiest to implement in current market arrangements, particularly for domestic consumers
- New and evolving loads, especially Air Conditioning, Electric Vehicles and Heat Pumps, present interesting opportunities for load shifting
- The degree to which consumers will be willing to engage with programmes is currently unknown

Customer Response to Time-Varying Prices

- Customers may change their behaviour for a period of time (months?) after time-varying prices are introduced
- However, this response usually decays over time as customers find that their financial savings are minimal and the effort required to respond to price changes is large

Metering and Load Control (1)

- **Interval metering** is necessary to implement time-varying pricing
- **Interval metering** is ***not*** necessary to carry out load control functions – available technology can remotely switch loads without requiring connection to a meter
- **One-way communication** (not necessarily through a meter) is essential to carry out remote switching of loads

Metering and Load Control (2)

- **Two-way communication** is not essential to carry out remote switching of loads but it can provide valuable information to the program operator about the results of the switching
- **Metering** in some form is required for settlement of the financial transactions associated with load control programs

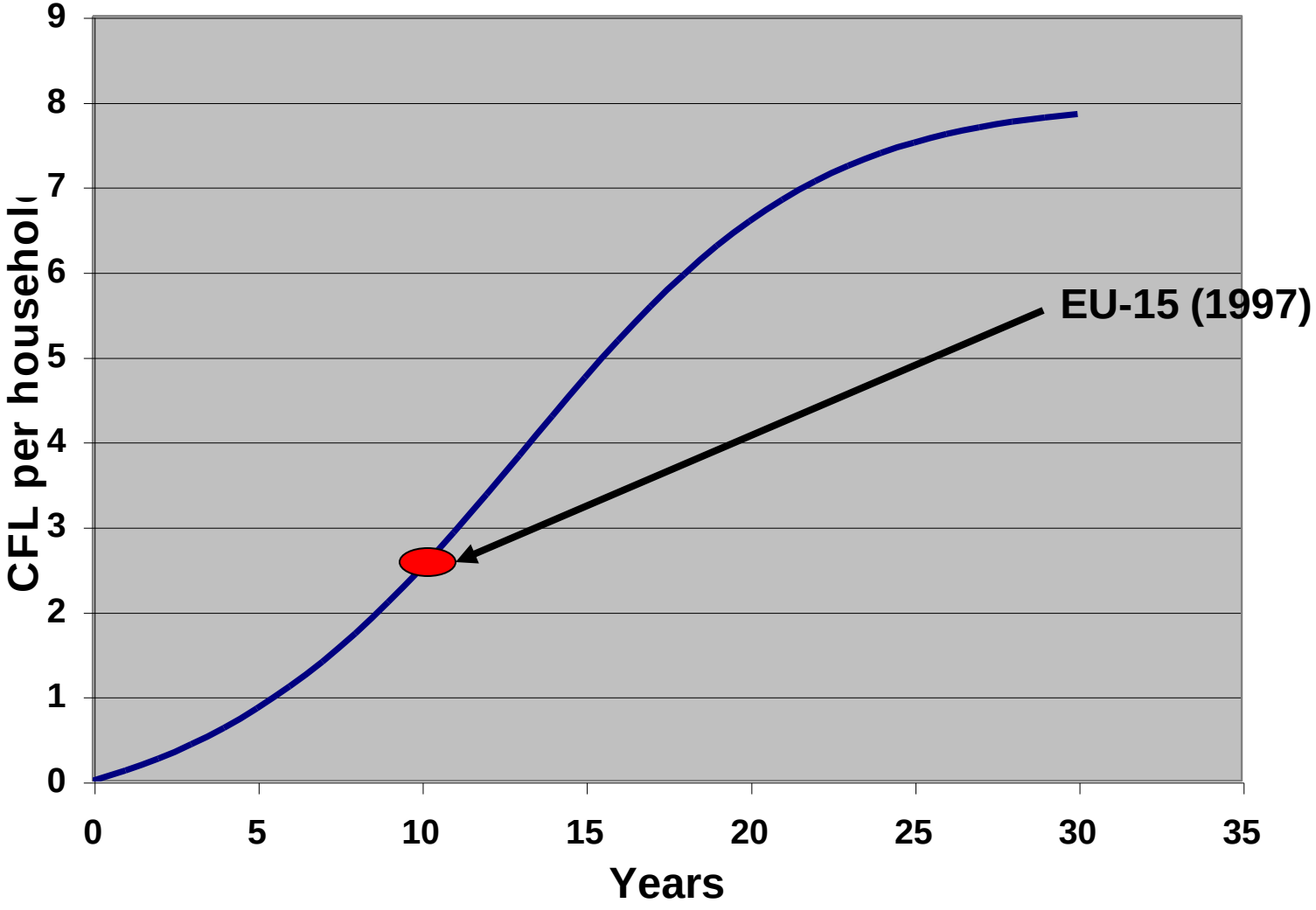
Smart Metering and Saving Energy

- Installing smart meters will, by itself, do nothing to save energy
- Energy savings will only be achieved if the metering results in changing people's behaviour so that they use less energy in total
- Some studies suggest that rolling out smart meters to all electricity consumers in a country may achieve savings of between 4% and 10% in total national electricity use
- However, energy savings can only be achieved if the installation of the meters is accompanied by supporting technology and programs, such as information displays, time-varying pricing, energy audits and particularly some form of load control

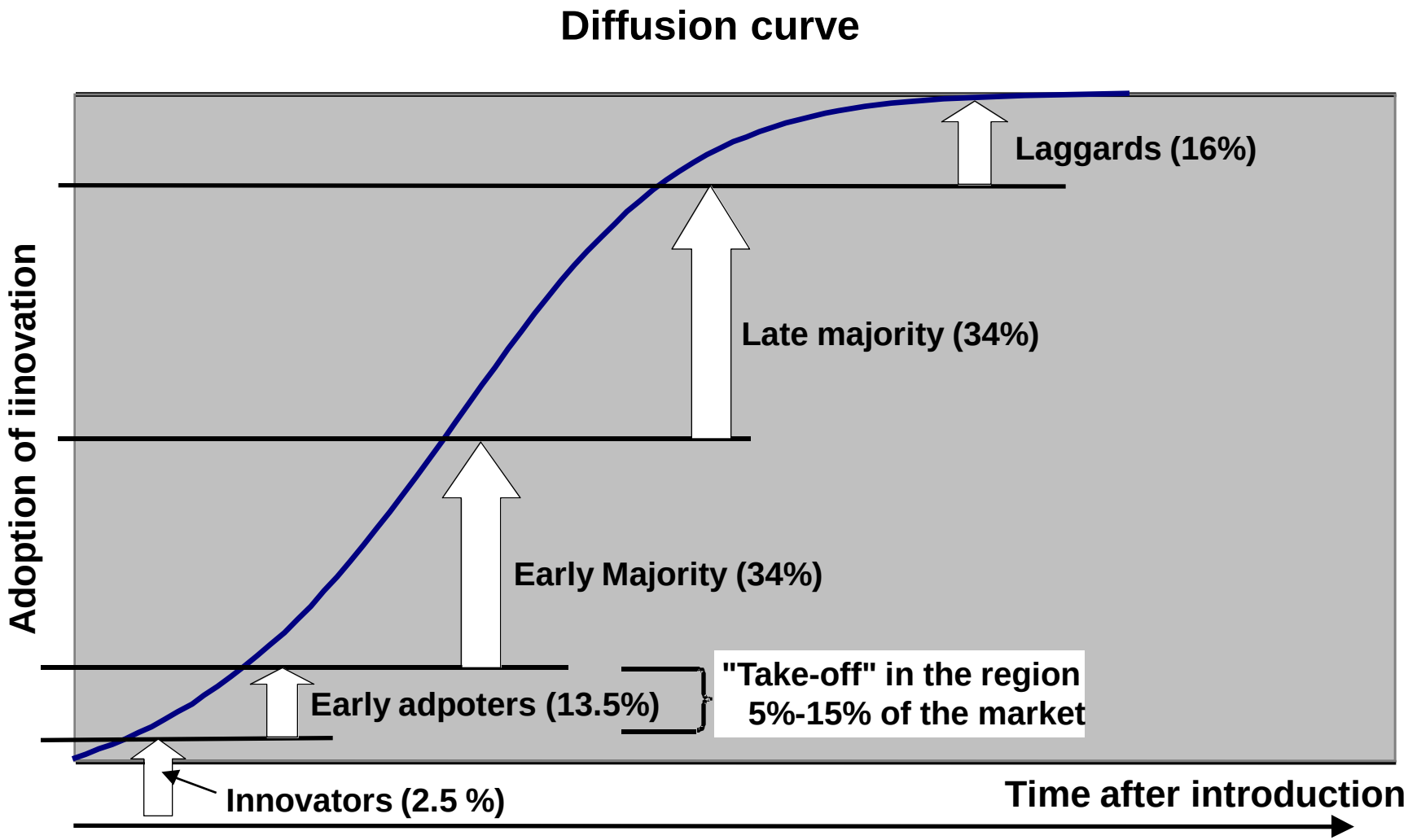
D. Creating success

http://www.iea.org/textbase/nppdf/free/2000/creating_markets2003.pdf

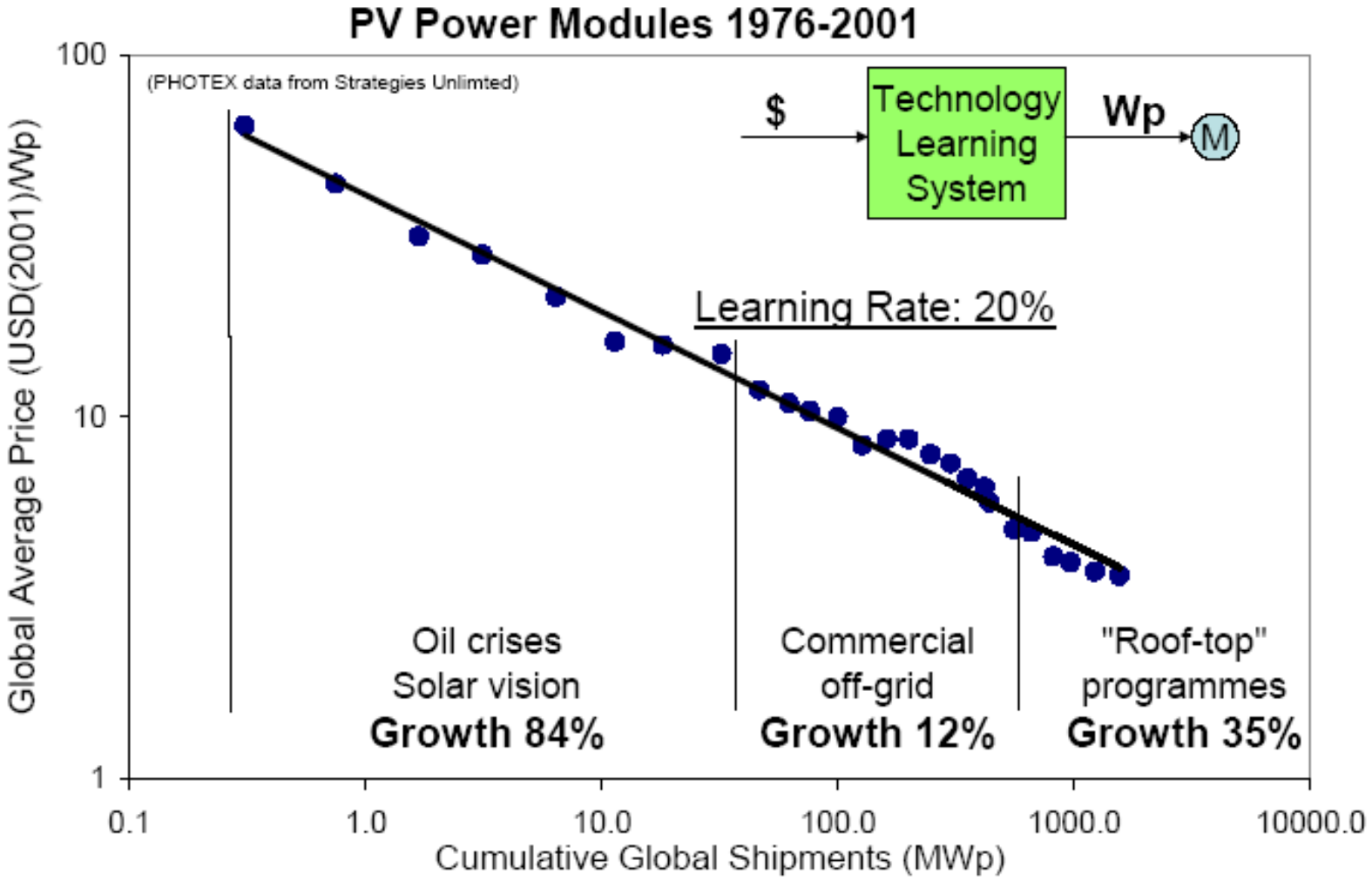
SUCCSS IS MARKET PENETRATION



General Market Segmentation

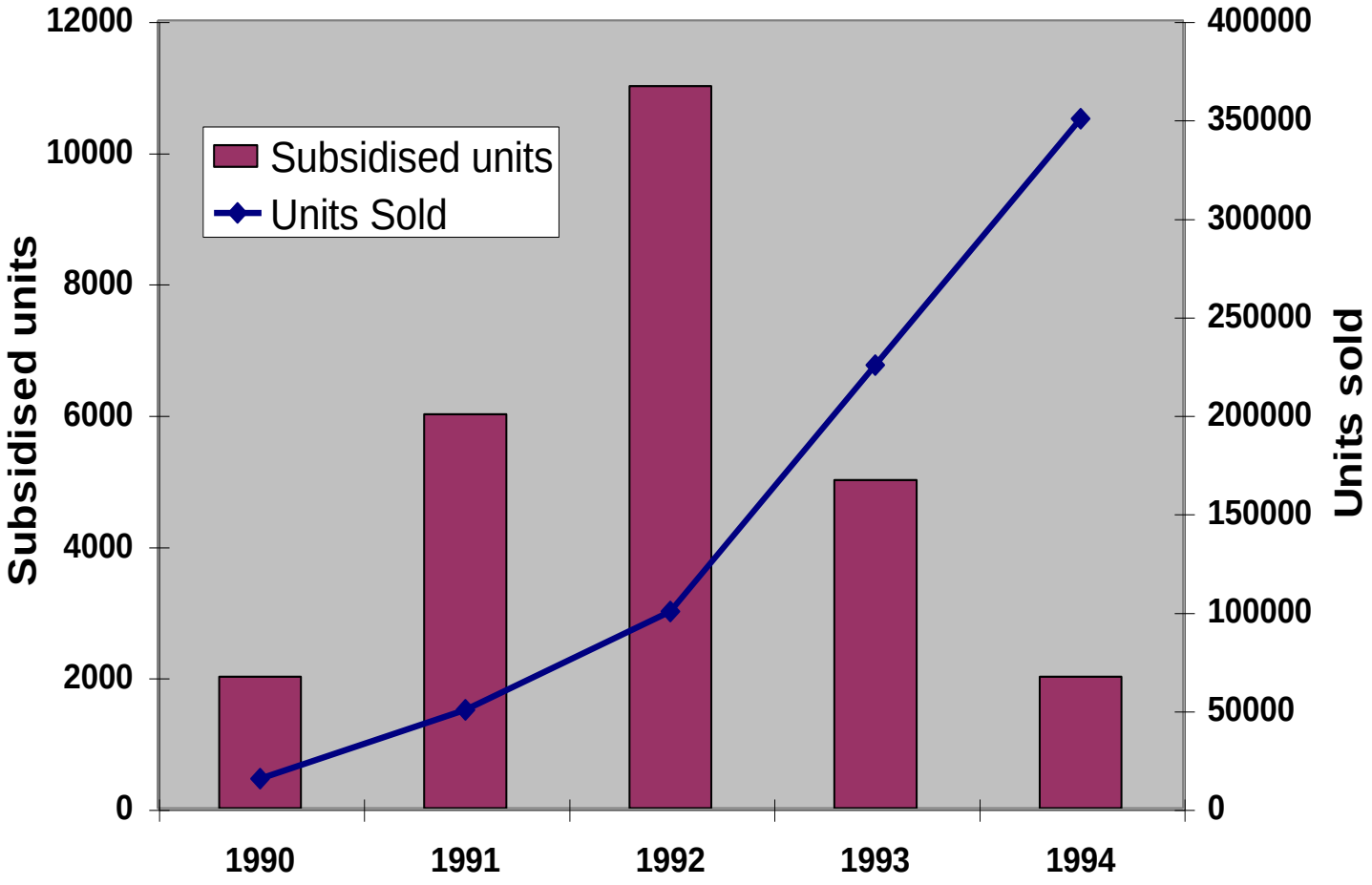


Success is performance and price



Source: Professor C-O Wene

SUCCESS IS ATTRIBUTION



Packages Delivery mechanisms
Customer Relations

Operational Objective	Characteristic Application and Examples of Measures
Serve the customer	The customer/user is assumed to need assistance in making better choices among available technologies. Some relevant measures: customer-oriented information and calculation tools; third-party financing, development of energy service companies (ESCOs), etc.
Incentives for the customer	Good technologies known to customers are not widely adopted because of market imperfections and externalities. Some relevant measures pricing, financing, fees rebates etc.
Educate and protect the customer	Inferior technologies are overly used because of inertia on the part of both suppliers and consumers, which weakens competition from new alternatives. Develop and provide tools purchasing rules such as least life cycle cost (LCC) and manuals

Source: Creating Markets for Energy Technologies, IEA/OECD

Packages Delivery mechanisms
Business Organisation

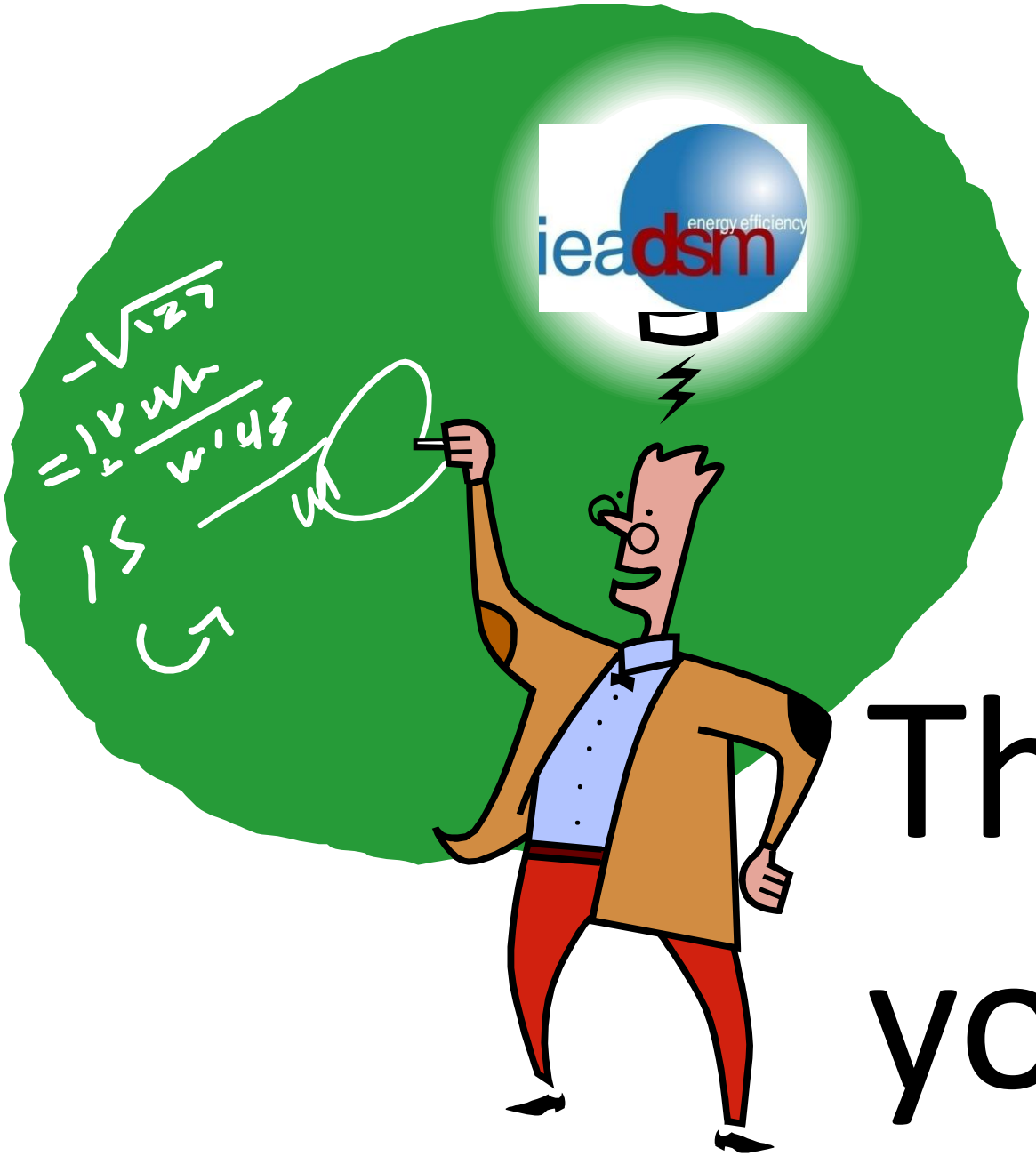
Manifest the demand for a change	Find niche and develop niche markets in which to launch and adapt technologies; Some relevant measures: work with stakeholders to aggregate product demand; help to finance learning investment.
Vitalise conservative business structure	The market has got stuck with traditional products delivered in forms that are not always favourable for customers and users. Activities to improve competition (e.g., deregulation) can vitalise market actors.

Source: Creating Markets for Energy Technologies, IEA/OECD

Packages Delivery mechanisms
Market Rules & Institutions

Reconsider existing regulations and rules	Wider application of good technologies can be hampered by legislation and regulations adapted to conventional technologies. E.g., liberalise regulations affecting electricity feeds from small scale combined production of heat and power (CHP) and independent power producers.
Enhance financial framework & conditions	Financial arrangements available to buyers may not be well adjusted to the needs of new energy technology markets and this may impede capital stock turnover and slow the adoption of new technologies. Enhancement of financial conditions may open new opportunities.
Recognise system aspects	A technological solution designed for a specific problem can affect the output of a larger system. Recognition of the totality of the system (energy, comfort, productivity, environment, etc.) is sometimes necessary to understand and handle the technology shift. A typical instrument is the ISO 9000 and 14000 standards.

Source: Creating Markets for Energy Technologies, IEA/OECD



Thank you !