DSM in the 21st century

-

Large scale deployment of smart applications

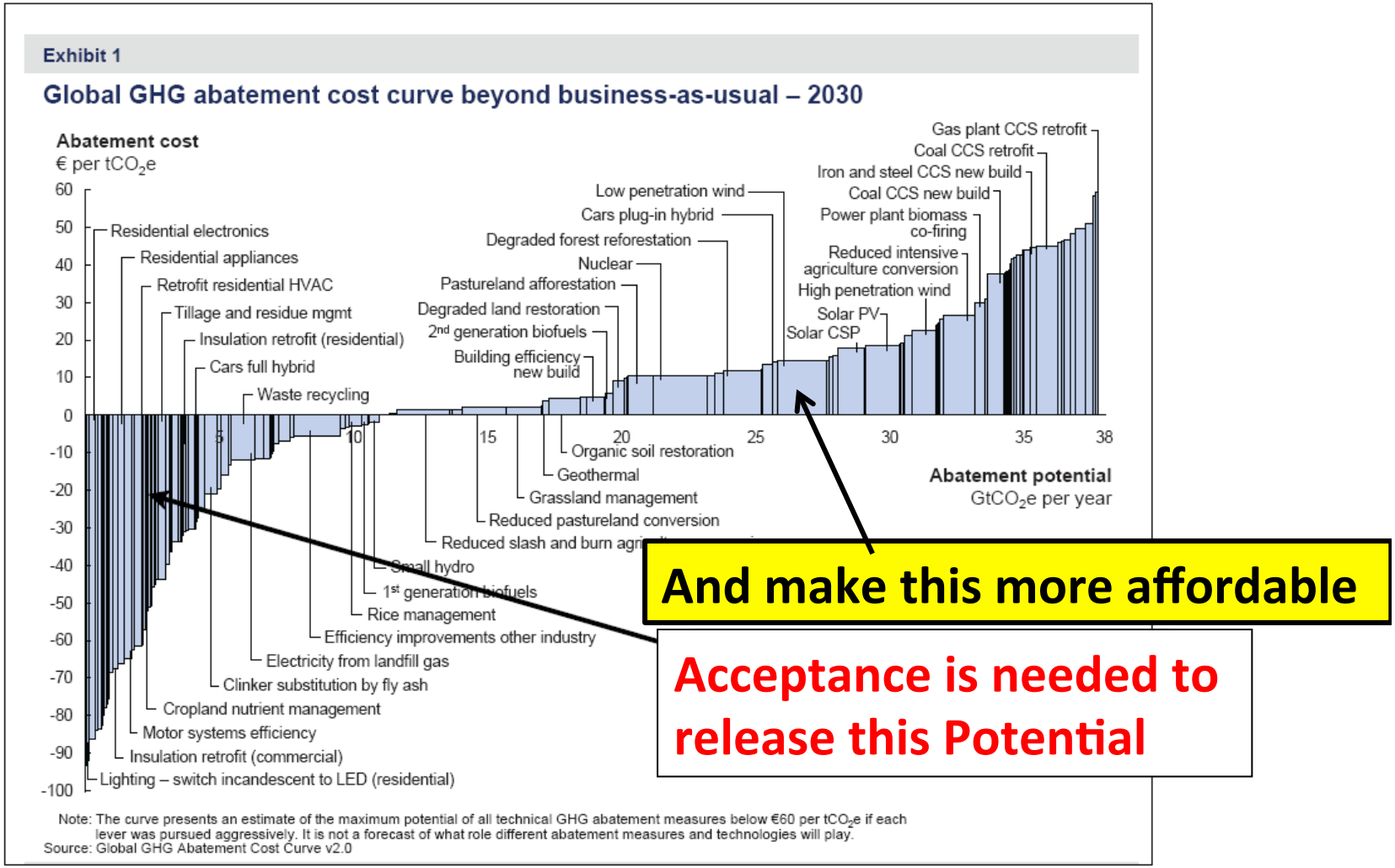
Hans Nilsson

”Chairman Emeritus” of the

IEA DSM-Programme

Efficiency is under-utilized, since…

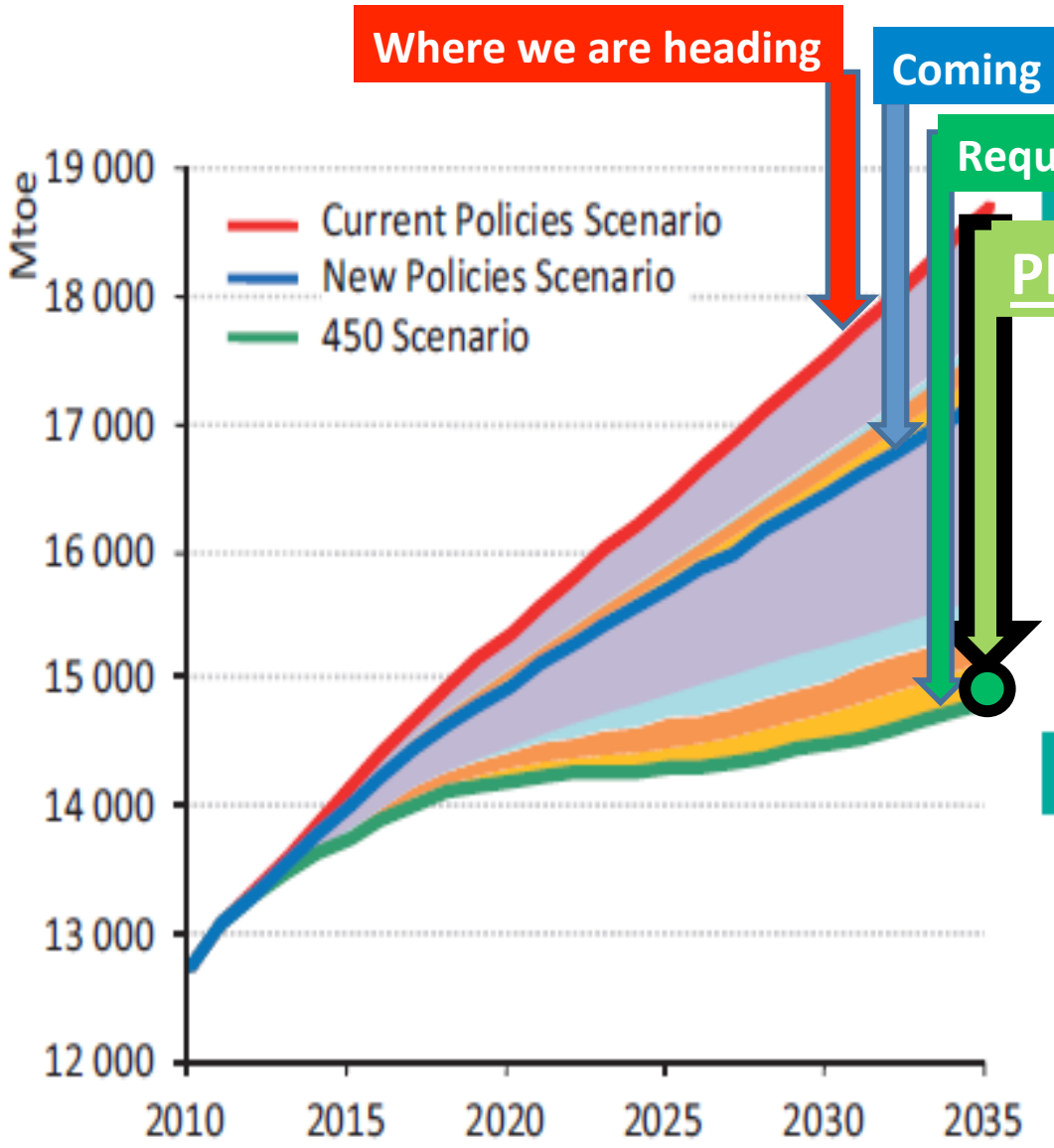
…. Result = Potential * Acceptance



And make this more affordable

Acceptance is needed to release this Potential

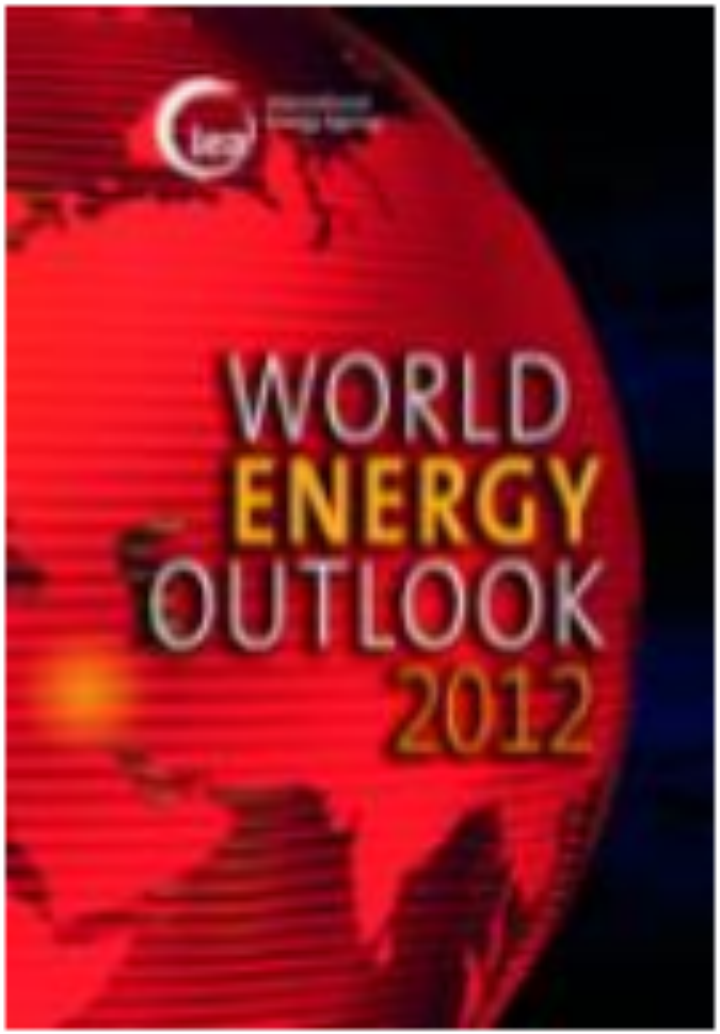
WEO 2012



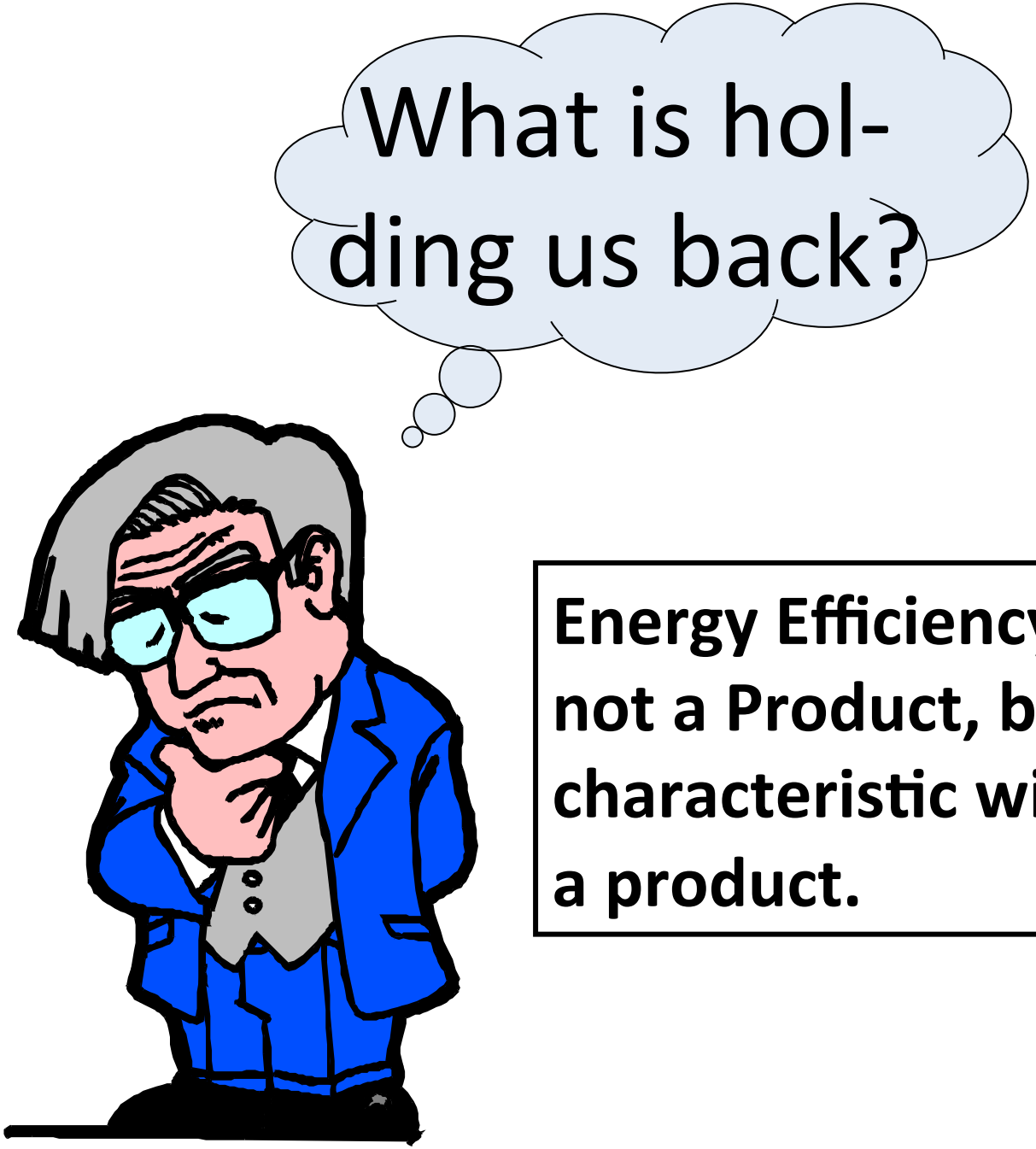
Energy savings in 2035	CPS to NPS	NPS to 450
Efficiency in end-uses	67%	66%
Efficiency in energy supply	5%	8%
Fuel and technology switching	12%	12%
Activity	16%	14%
Total (Mtoe)	**1 479**	**2 404**

Note: CPS = Current Policies Scenario;
NPS = New Policies Scenario;
450 = 450 Scenario.

WEO 2012
(six steps to energy efficiency)



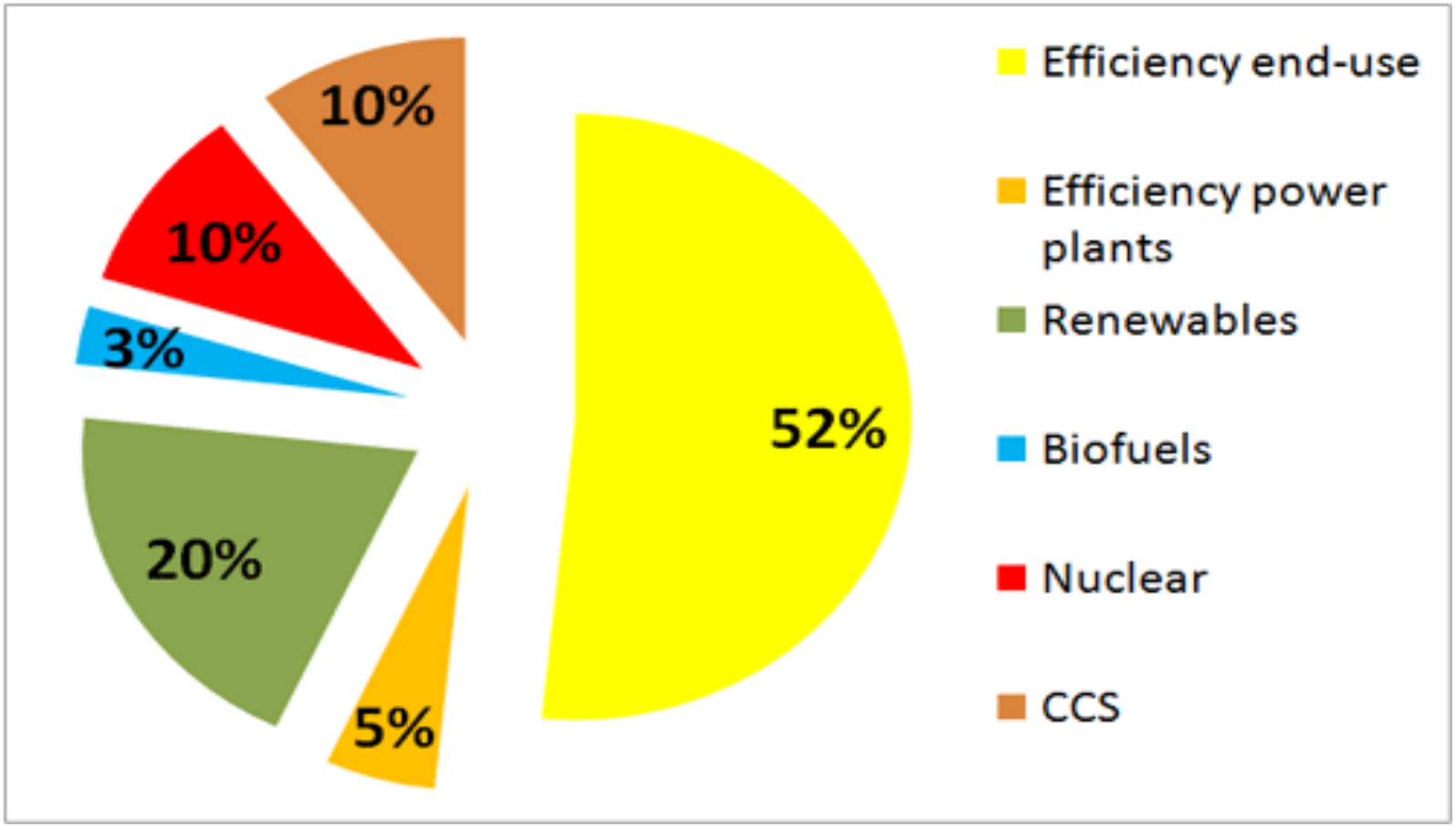
- Visible
- Priority
- Affordability
- Normal
- Real
- Realisable



Energy Efficiency is not a Product, but a characteristic with a product.

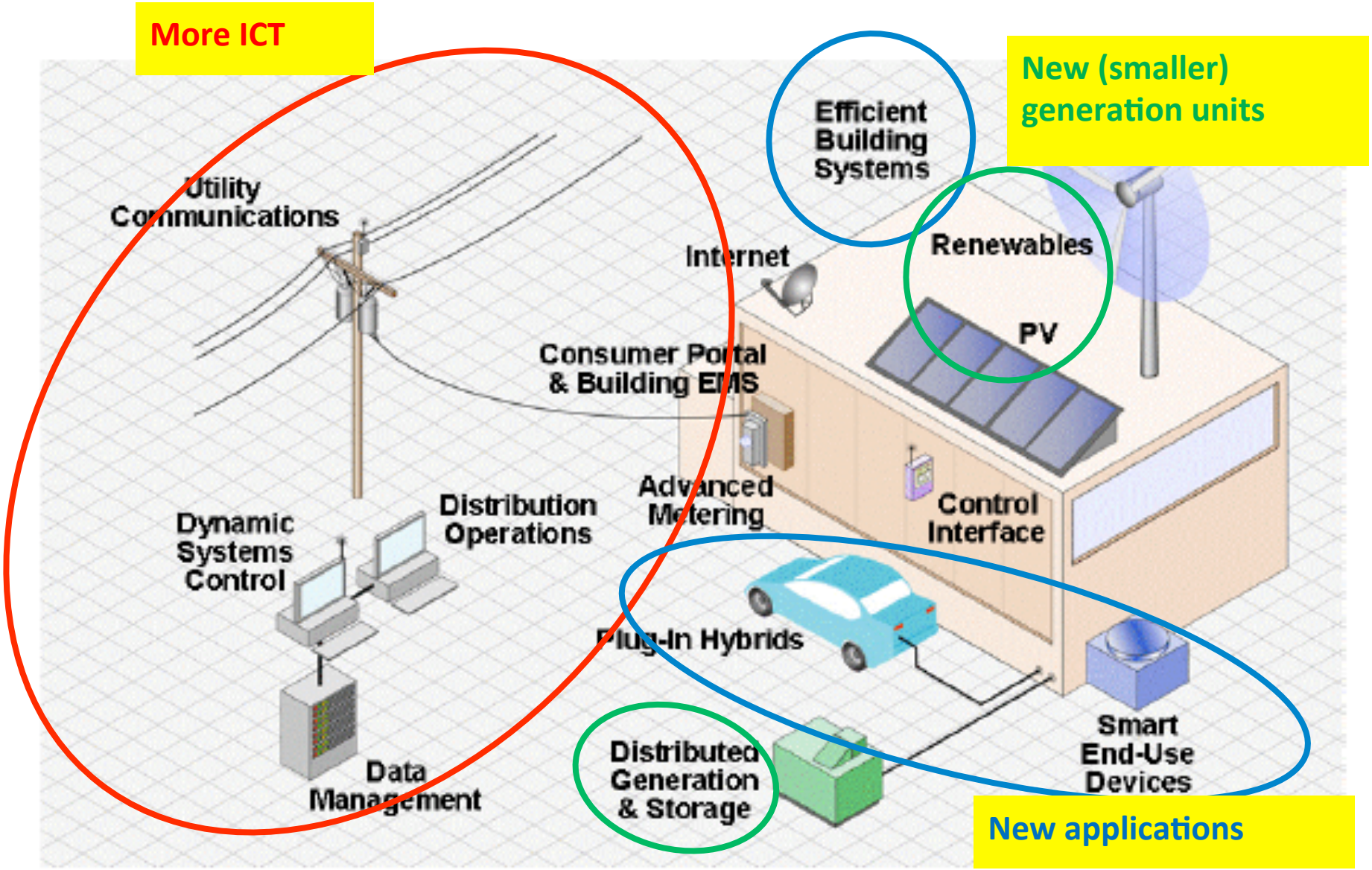
A changing framework

Source for GHG reductions till 2030



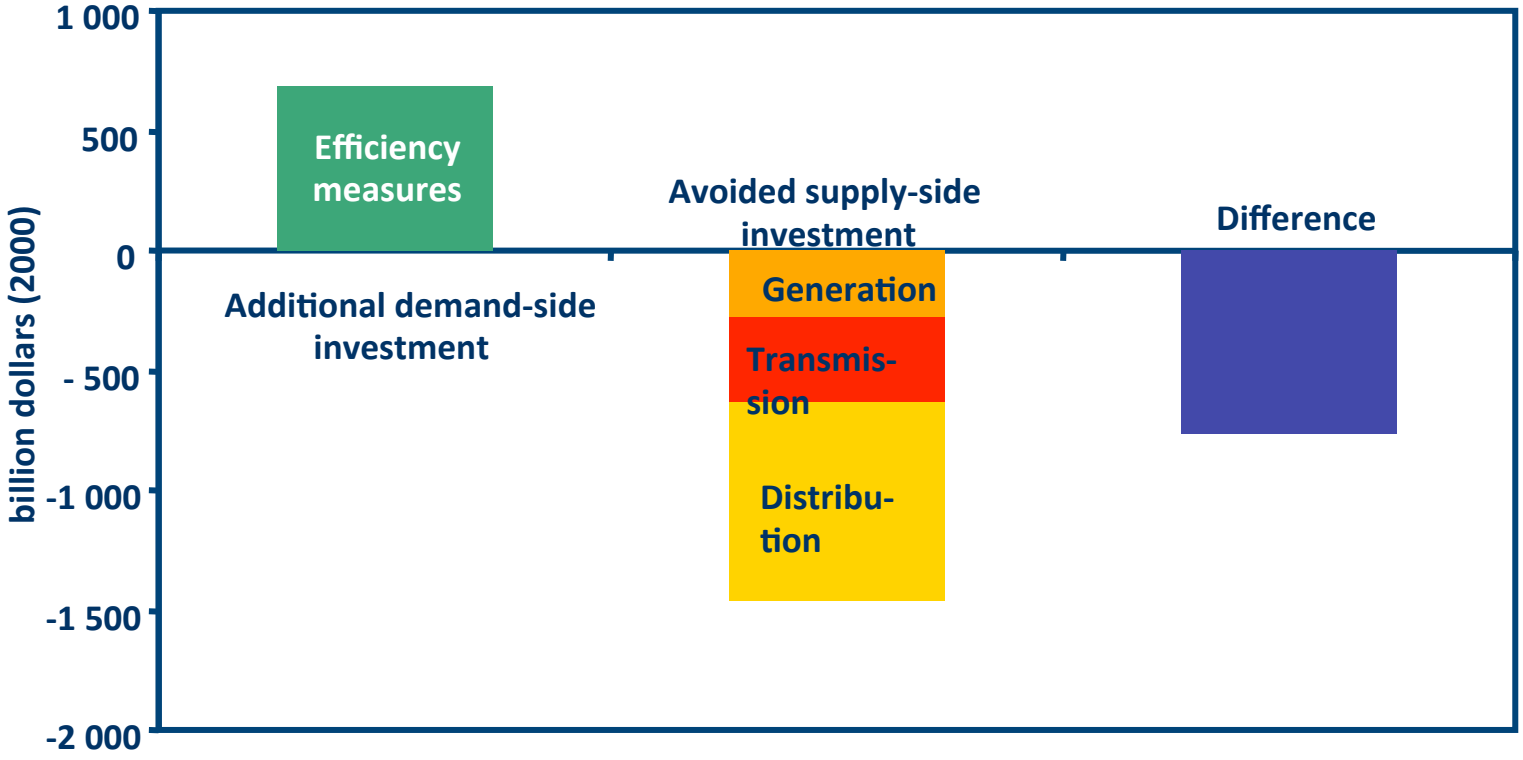
Source: IEA WEO 2009

New Technologies



Source: An EPRI Initiative to Advance the Efficient and Effective Use of Energy

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



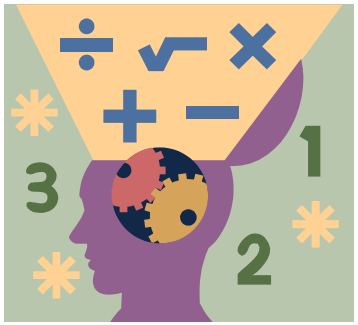
Additional investments on the demand side are more than offset by lower investment on the supply side

Source WEO 2004

WEO 2012

Figure 10.10 ▷ Change in investment across the electricity value chain in the Efficient World Scenario, compared with the New Policies Scenario, 2012-2035

Perspectives on the market



Standard (Neo)-classical model
ECONS

- Preferences are constant
- The prices contains the necessary information
- Customers have access to all necessary information on performance and prices

Behavioural economics model
HUMANS

- Preferences are changing
- Decisons are biased by the way we are treating information
- Offers need to be designed (choice architecture)

Good model to estimate the potential

Necessary to decide on policies for implementation

What is this thing they call DSM?

DSM is more than meets the eye

- DSM is universal and does not only apply to utilities, electricity or monopolies
- DSM encompasses the entire range of management functions (**planning, evaluation, implementation and monitoring**)
- DSM = Large-Scale Deployment of Energy Efficient Equipment by use of specially designed Programmes

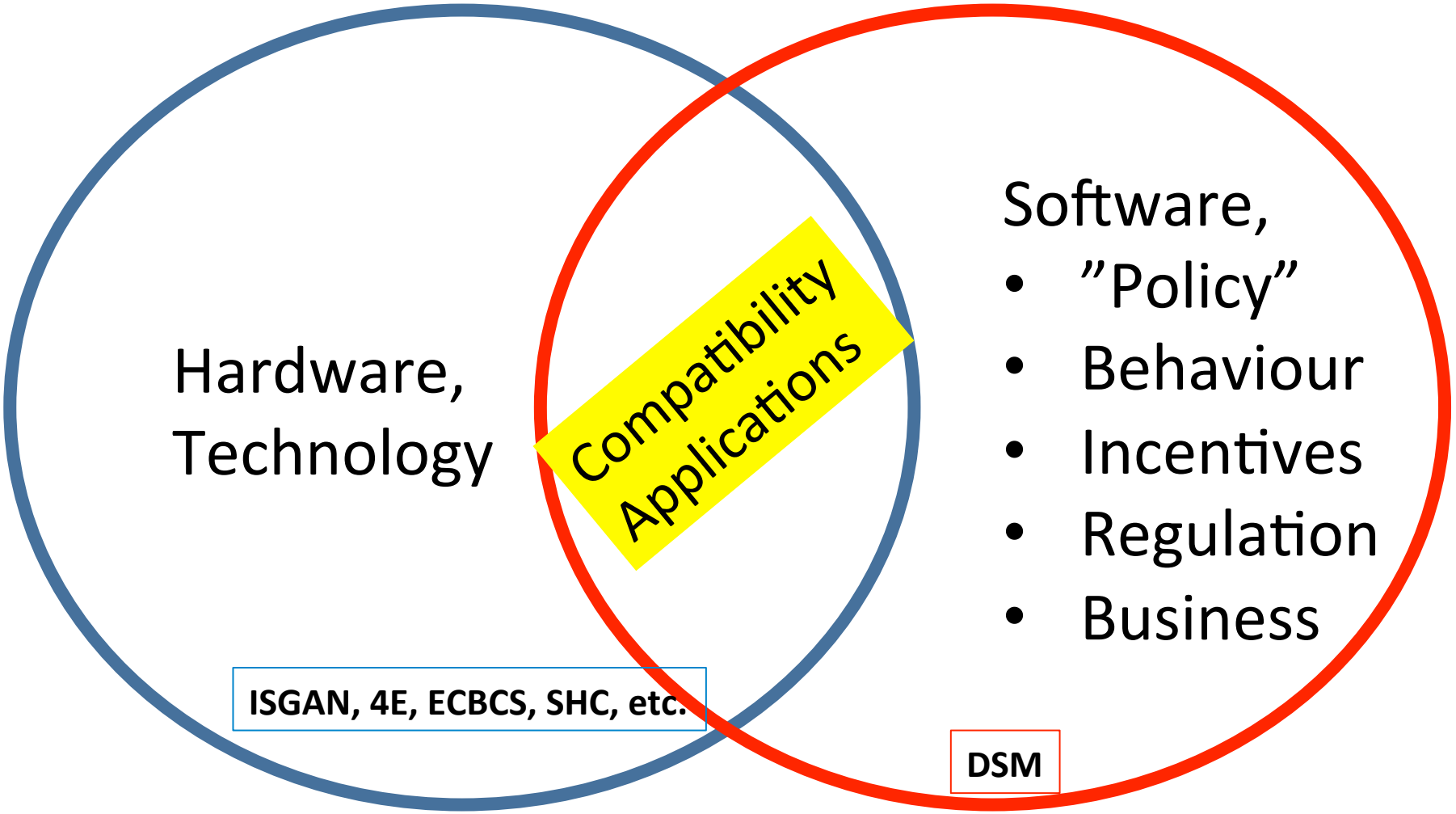
The issues!

- **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?

The imperative logic of Demand Side Management

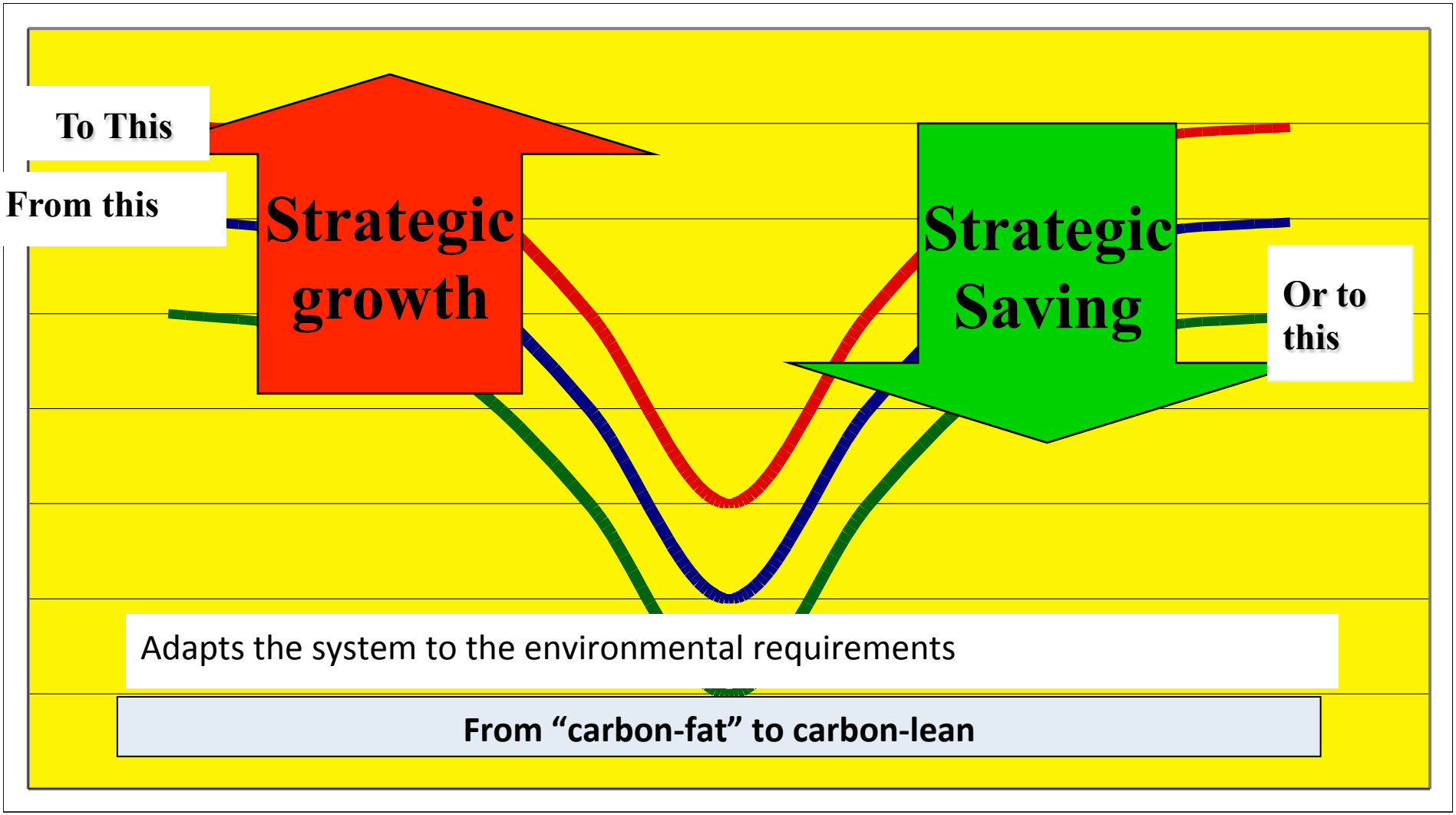
- A better use of resources equals **lower cost** for service
- A balanced use of resources means more **secure and reliable** energy supply
- An expansion for products/services using less energy is an injection for **future business**
- A step change in improved energy efficiency is the only way to achieve wide-spread **welfare** without resources depletion

IEA Implementing Agreements

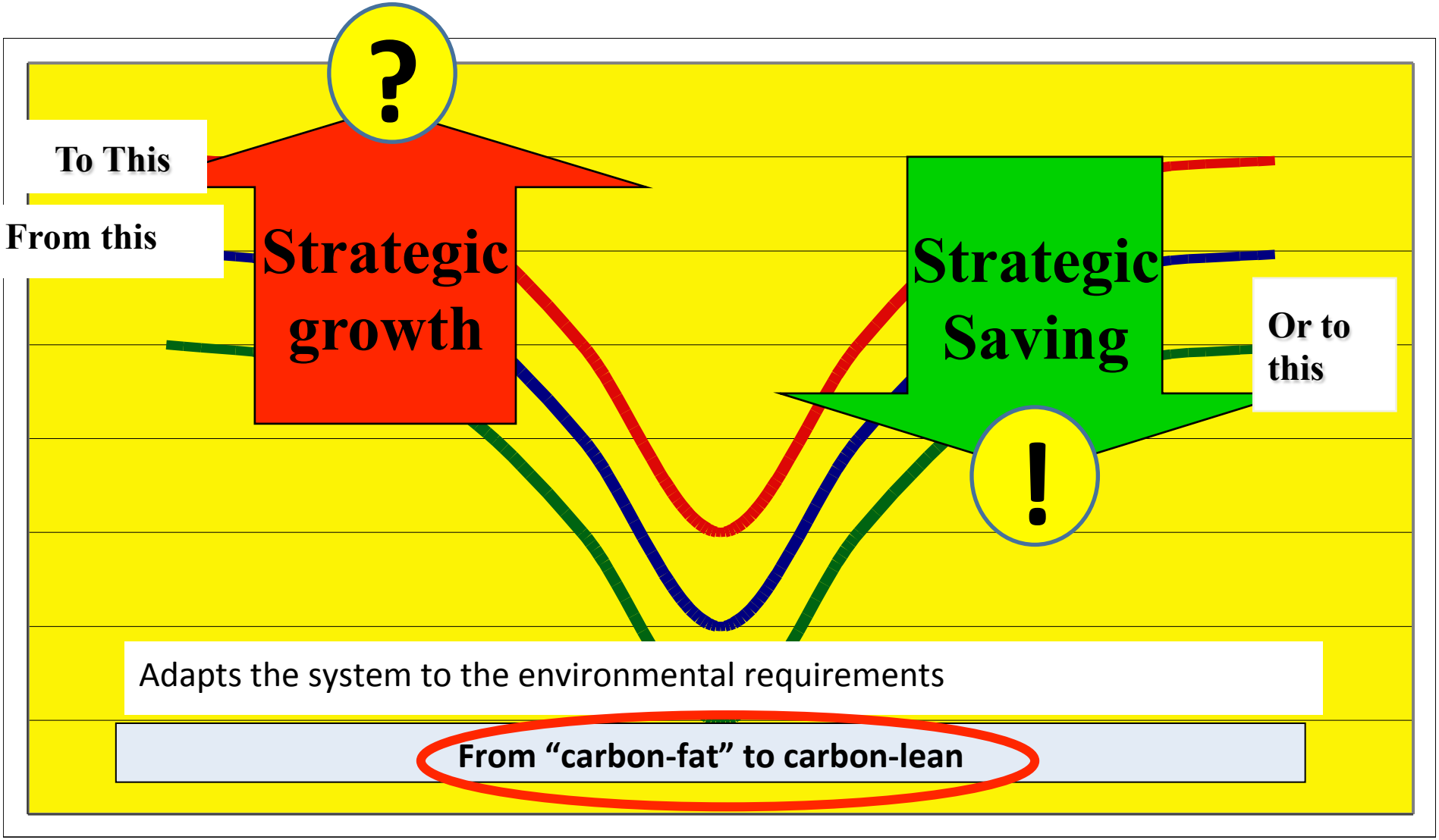


The Mechanics of DSM

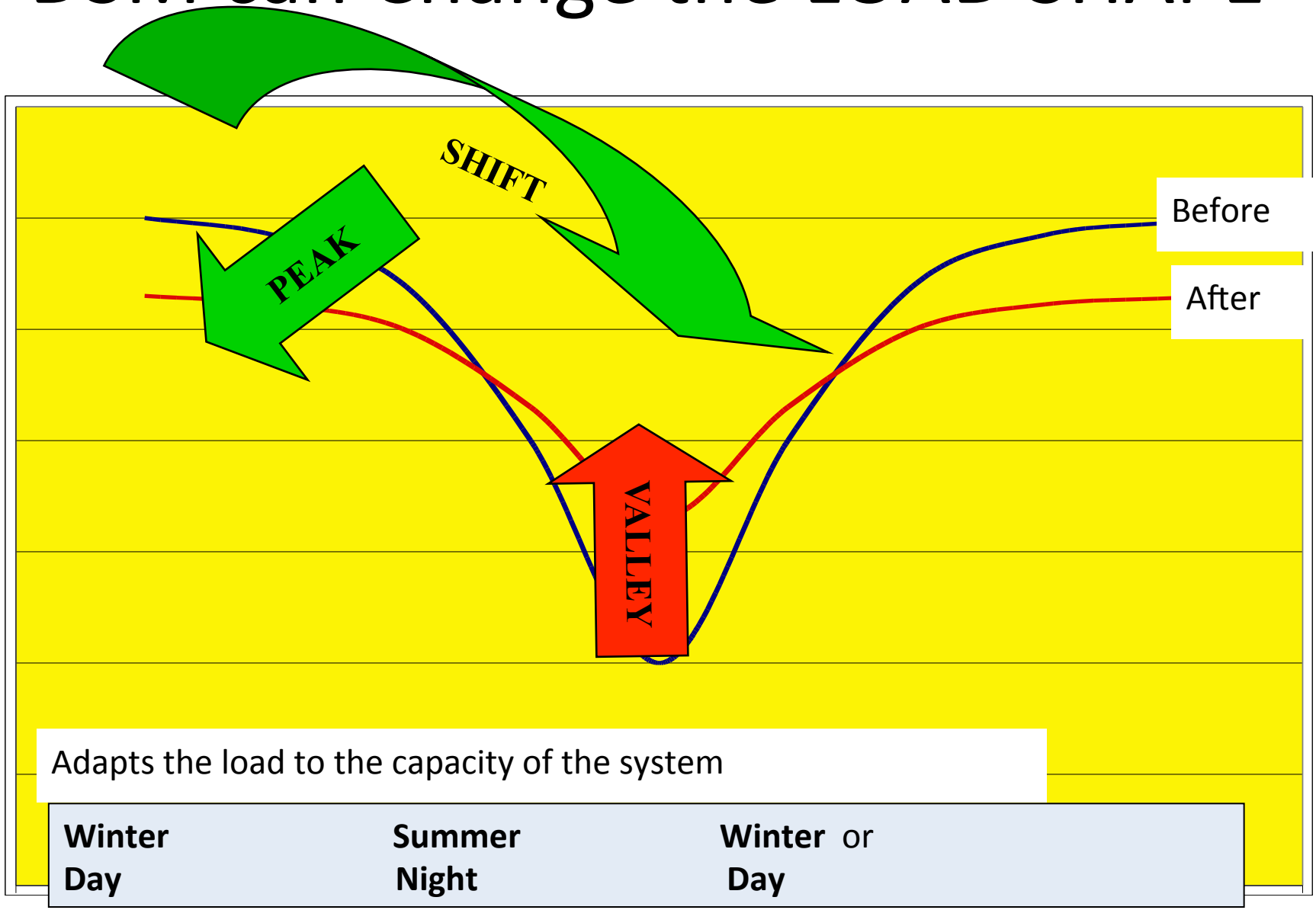
DSM can change the LOAD LEVEL



DSM can change the LOAD LEVEL



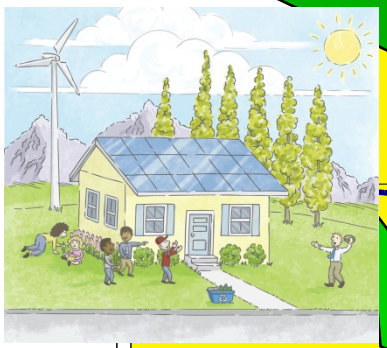
DSM can Change the LOAD SHAPE



Adapts the load to the capacity of the system

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

DSM can Change the LOAD SHAPE



€ (but)

SHIFT

PEAK

Before

After

Adapts the load to the capacity of the system

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

Past, Present and Future Tasks

		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:** EvaluationGuidebook 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 in Changing Electricity Businesses **Task VII:** Market Transformation **Task IX:** Municipalities in a Liberalised System **Task X:** Performance Contracting **Task XIV:** Market Mechanisms for White Certificates Trading
	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 XXIII:** Role of the Demand Side in delivering effective smart grids	**Task XVI:** Competitive Energy Services **Task XVIII:** Demand Side Management and Climate Change **Task XX:** Branding of Energy Efficiency **Task XXI:** Standardisation of Energy Efficiency Calculations **Task XXII:** Energy Efficiency Portfolio Standards **Task XXIV:** Behaviour change in DSM, from theory to policies and practice
	Proposed		- **DSM University** - **DSM importance for TSOs**

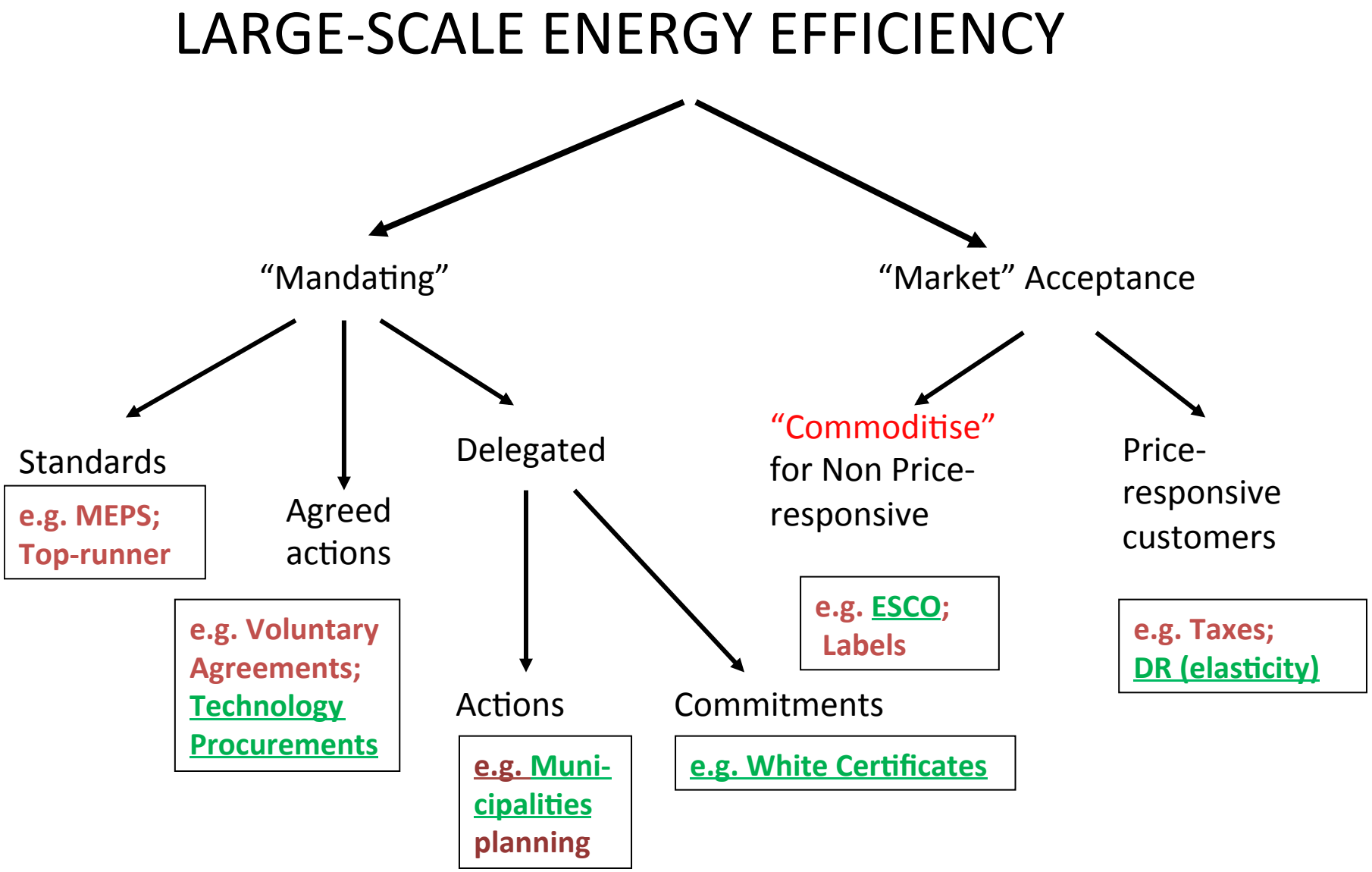
The strategy of the IEA DSM Programme

- Vision: *Demand side activities should be **the first choice** in all energy policy decisions designed to create more reliable and more sustainable energy systems.*

- Mission: *To deliver to our stakeholders useful information and effective guidance for crafting and implementing **DSM policies and measures**, along with the necessary technologies and applications, which together can transform markets and facilitate energy system operations.*

Large-Scale Deployment

Use all the tools

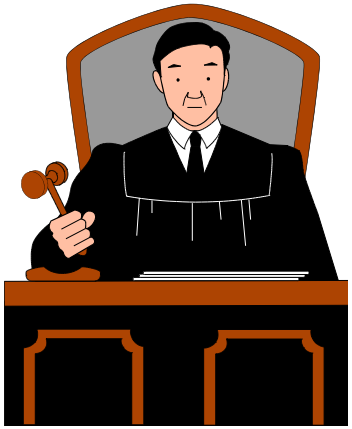


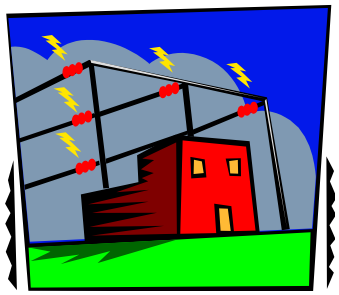
Change Agents (companies, intermediaries, catalysts)

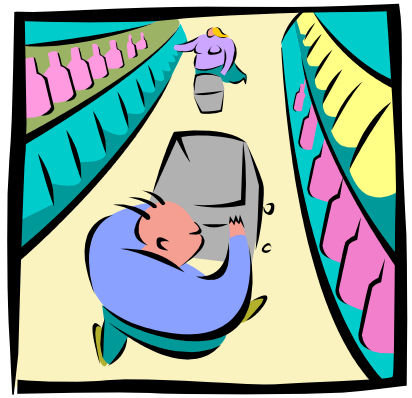
DSM-concept		Change agent role	Example
Classic (addressing utilities as they are)	Monopolised markets	Deliver products and services	Paradip Port (India)
	Customer aggregation	Fundraising	Public Benefit Charges (USA)
	Liberalised markets	Mandate utilities to achieve a set level of energy efficiency	White Certificates (Italy and some Australian states) and EE Commitment (UK)
Incentivising utilities to deliver energy efficiency		Decouple profit from sales volume	California Investor-owned Utilities
Energy Efficiency Power Station		Aggregate energy efficiency projects to the scale of a virtual power plant	Jiangsu, Shanghai and Guangdong (China) Efficiency Vermont
Government Deployment schemes		Aggregation of purchasing power	FEMP (USA), Technology procurement (Sweden)

New concerns on the agenda

- **Environment and Climate** (codified in the Kyoto-Agreement)
- **Governance** (who has the responsibility?)
- Can we **make business** out of these concerns? (ESCOs, emissions trading)
- **Systems reliability** (e.g. black outs)
- **Customer market role** (price taker or player)



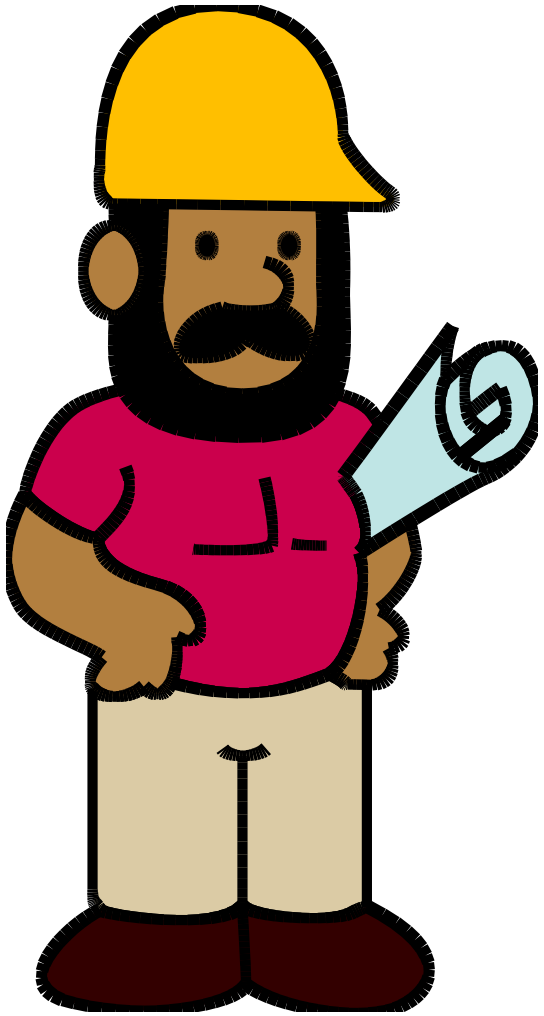




And in the future...?

- DSM is changing and may take into account supply (distributed generation)
- DSM has an impact on security of supply, diversification and systems reliability that has to be quantified and recognised
- DSM might be more business oriented with new actors
- The IEA DSM-Programme will be “the best show in town” for those who want to stay in the forefront.

But someone has to organise the DSM!



And then use the market to have energy efficiency delivered…

http://ieadsm.org

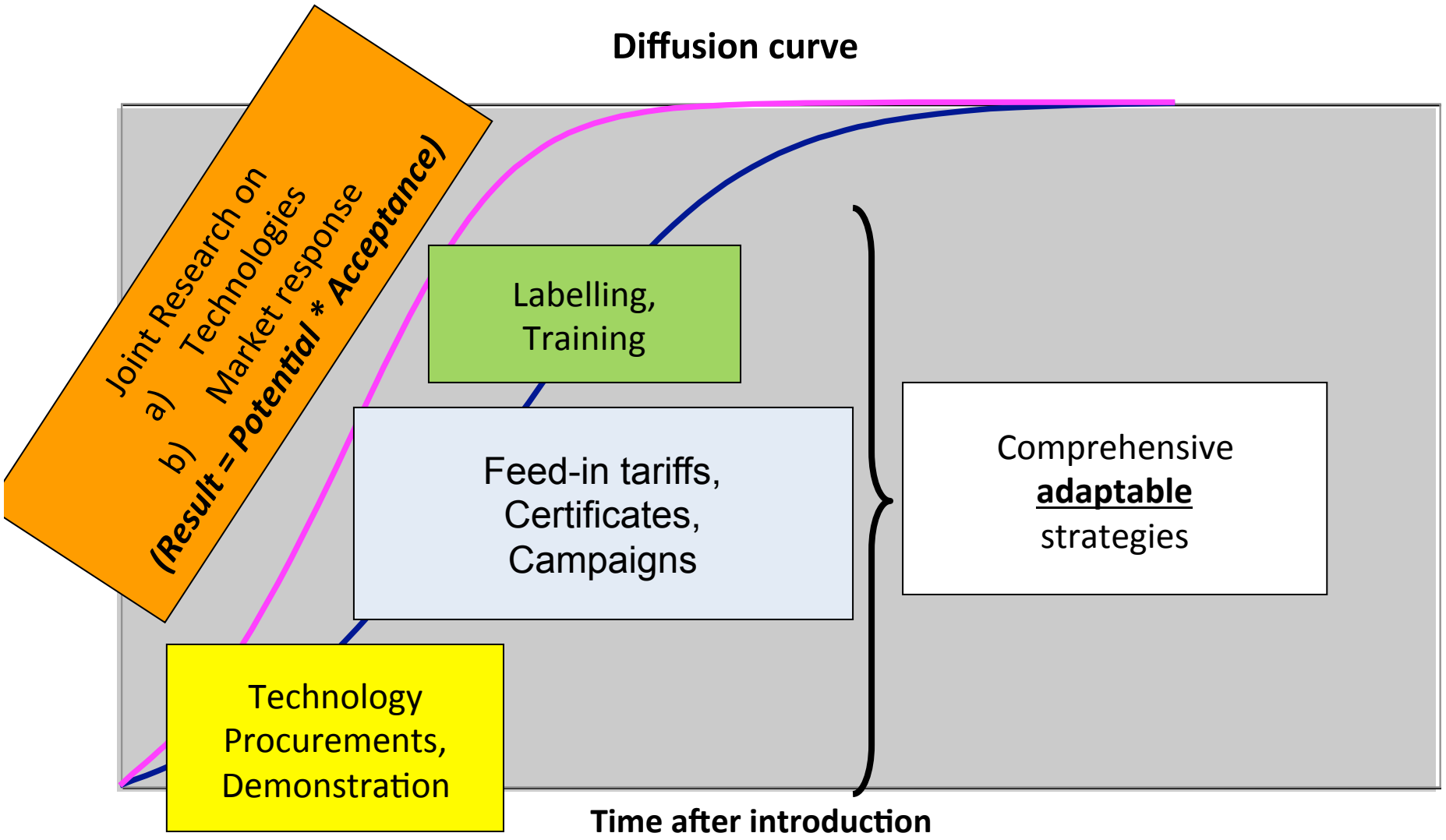
The centre of DSM excellence

Extra material

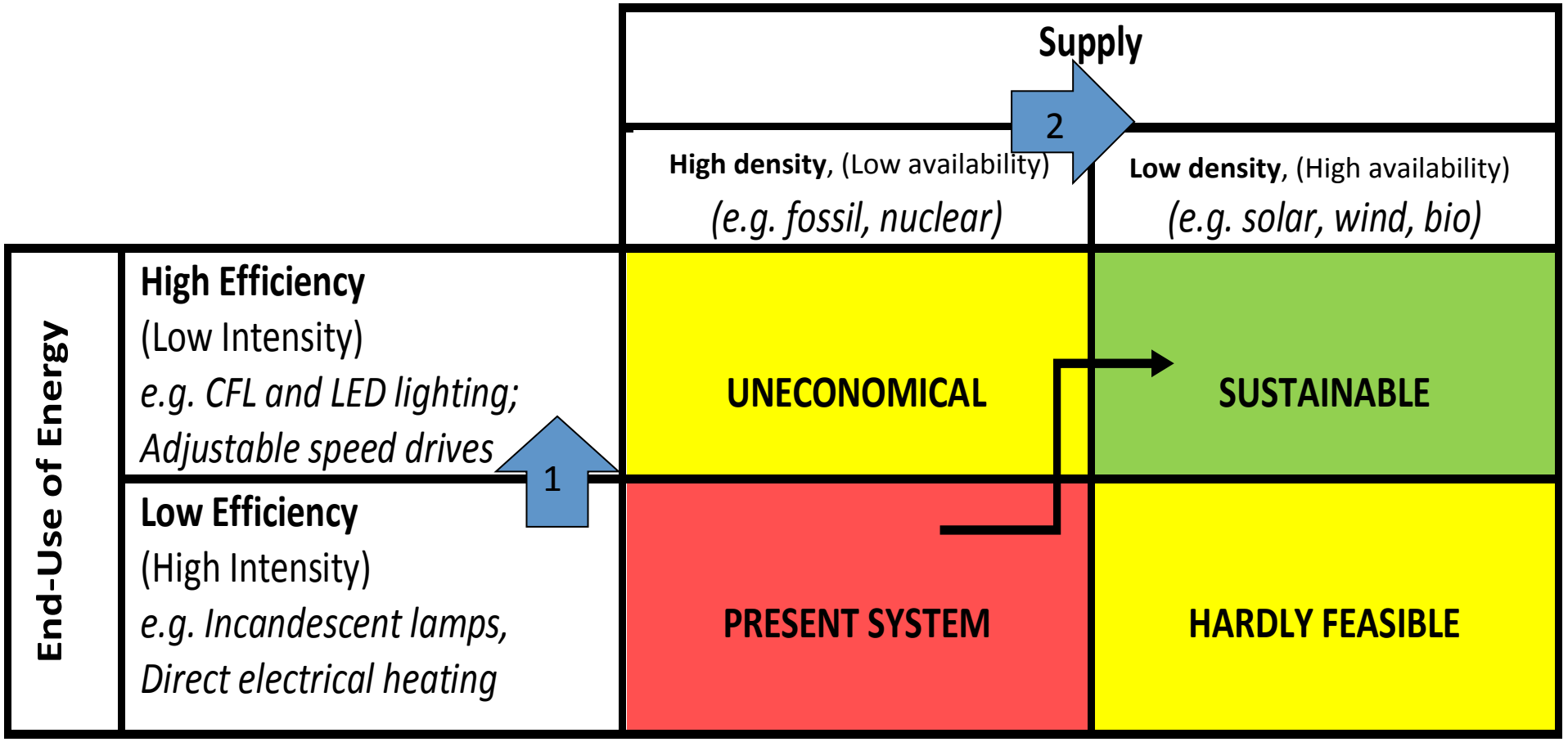
Horses for courses.

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 trasnfor-mation (V, VII)
	Non-price responsive customers	"Commoditising" energy efficiency	Energy Services, ESCO (X, XVI) Labels	

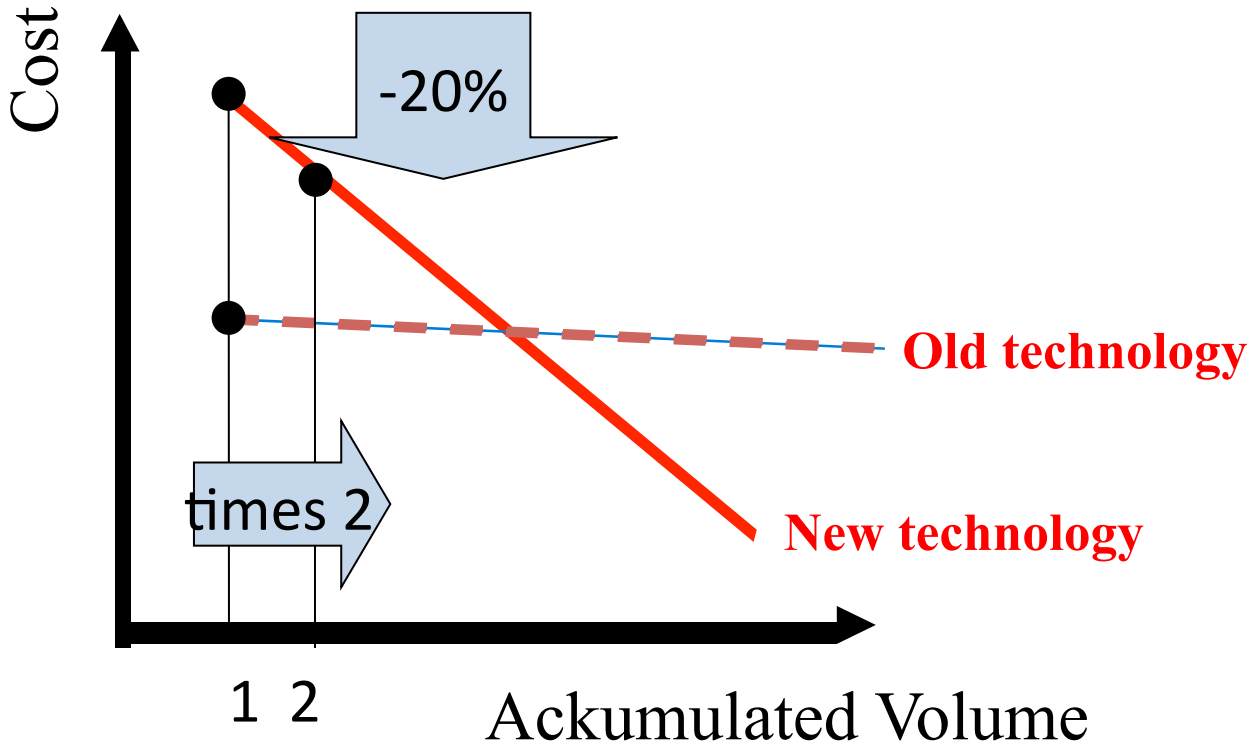
Means for accelerated diffusion



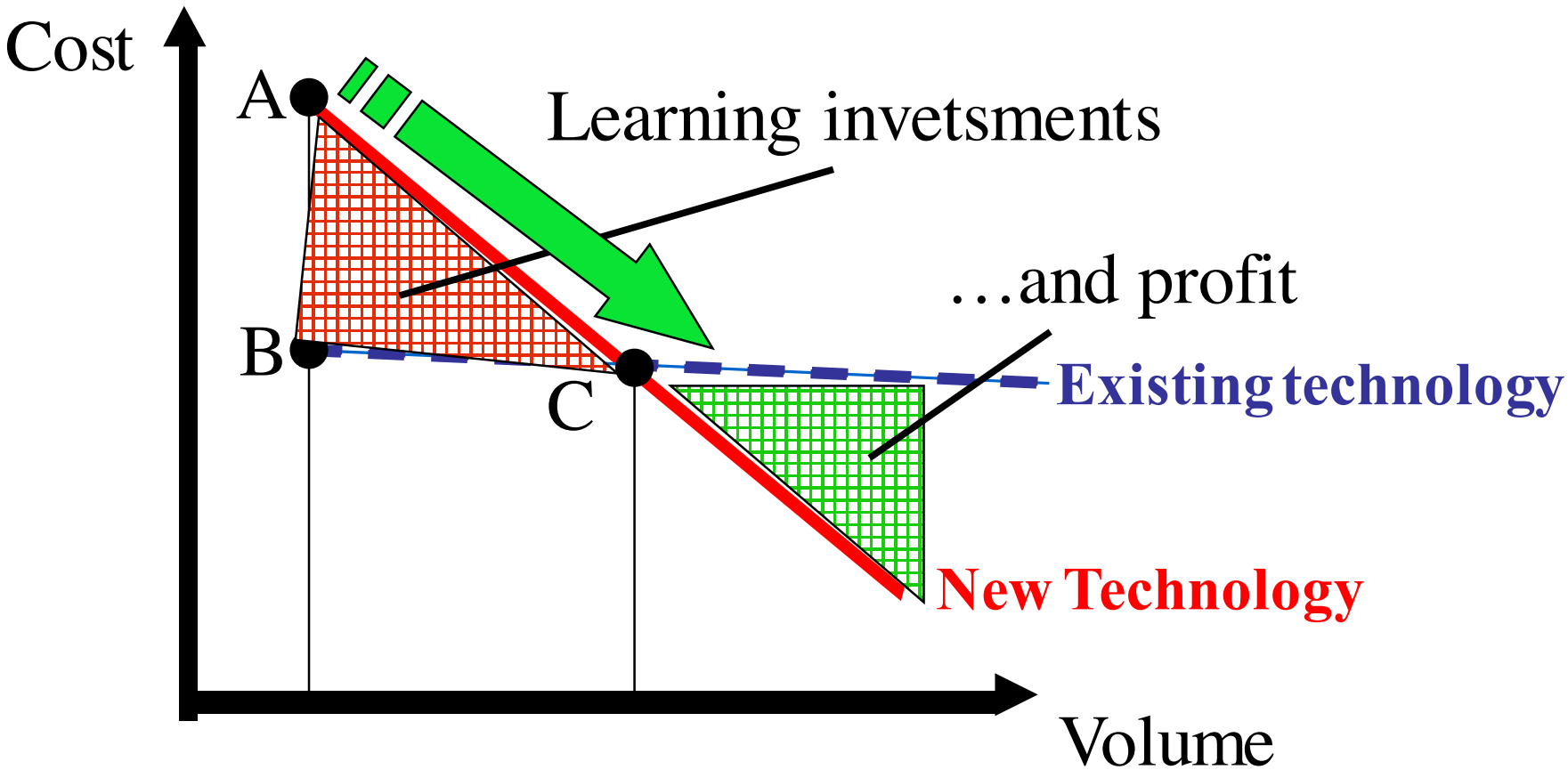
Towards a robust Sustainability



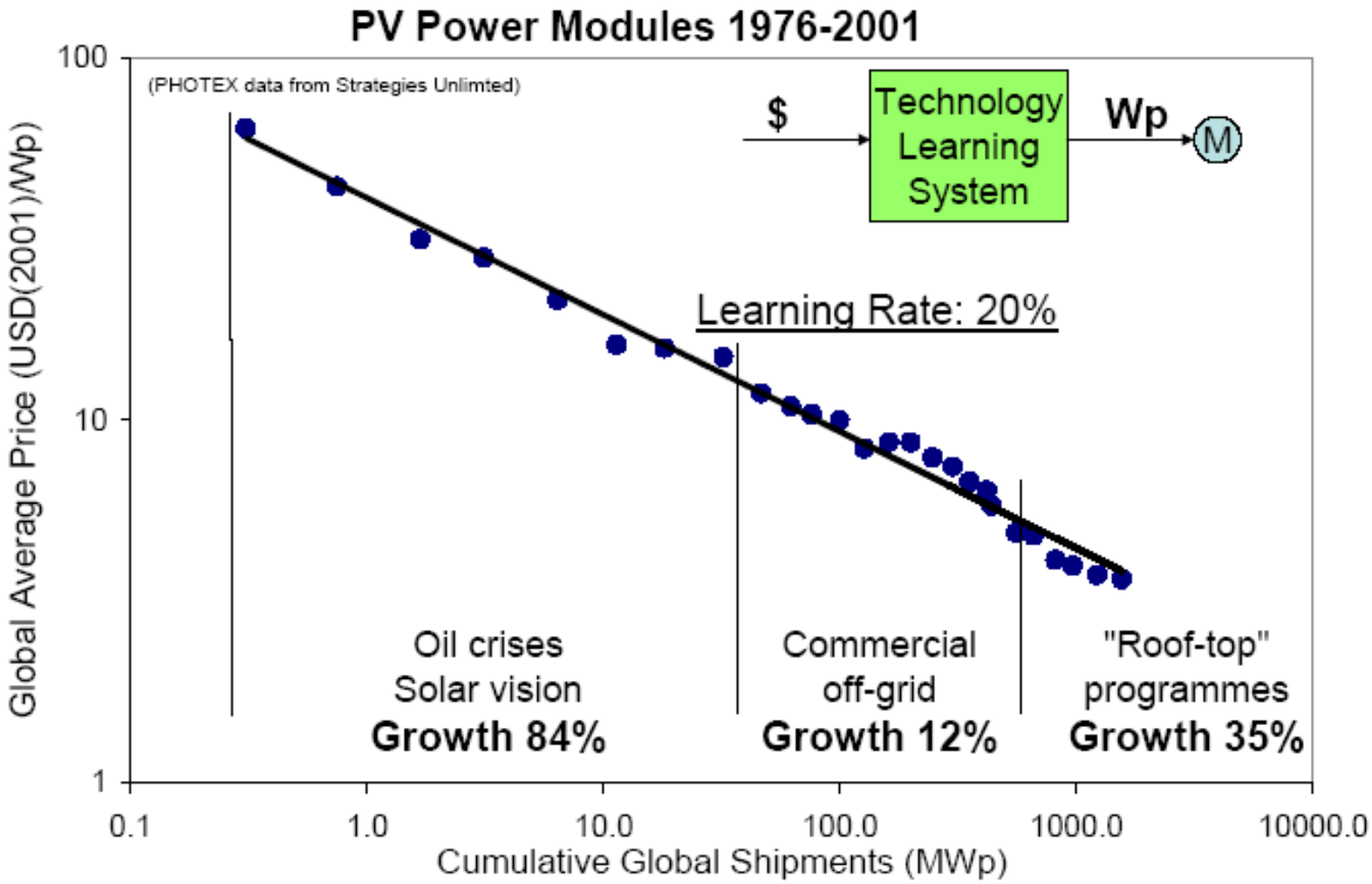
The Learning Curve



And the learning investments

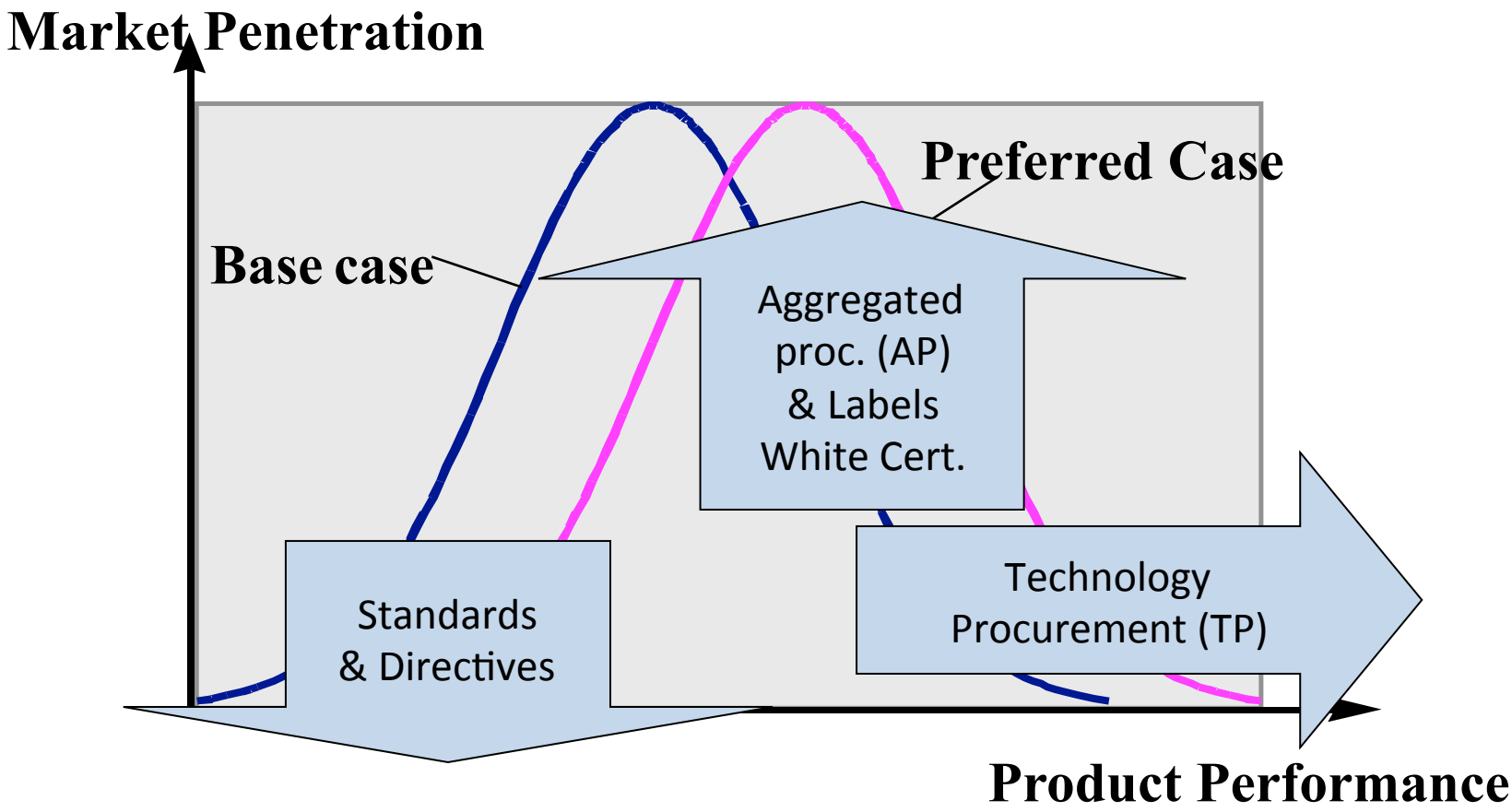


Tracked learning for PV

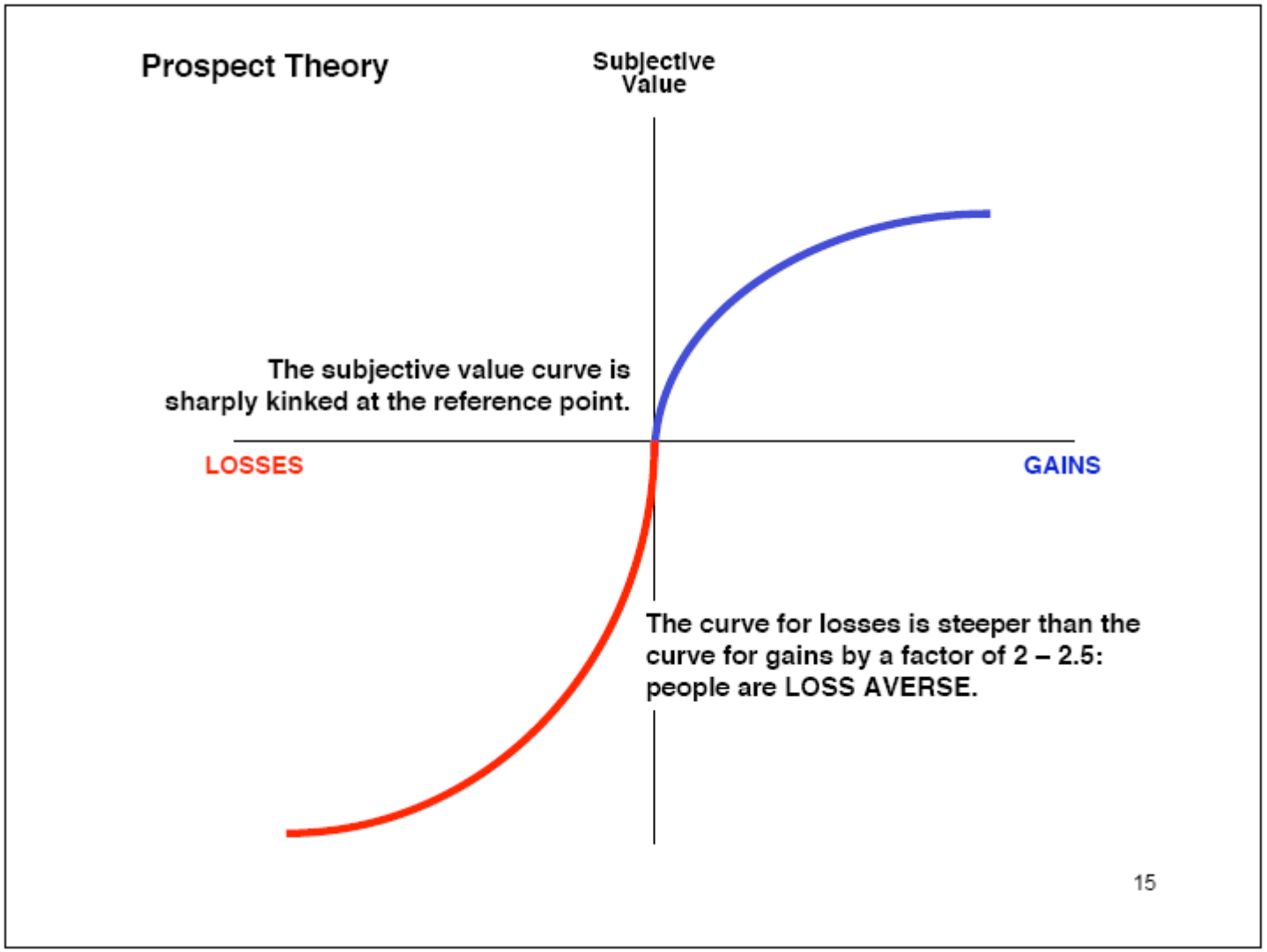


Source: Professor C-O Wene

Market Transformation



Winning < Loosing.



Choice architecture

- iNcentives (who pays/choses-pays/profits); what does changing of the thermostat yield?
- Understand mapping (Choices related to welfare); Illustrate consequences or “try free for X months”
- Default (Opt-in or opt-out); computer screen-saver
- Give feedback (Understand function); Plug-out sign or warning lamps
- Expect errors (Foolproof?); example insert a card 4-ways
- Structure complex choices (Filtering); Models and features

Framing of the offers

Source: Nudges by Thaler and Sunstein