

DSM in the 21st century

-

Large scale deployment of energy efficiency for sustainable energy systems.

Hans Nilsson

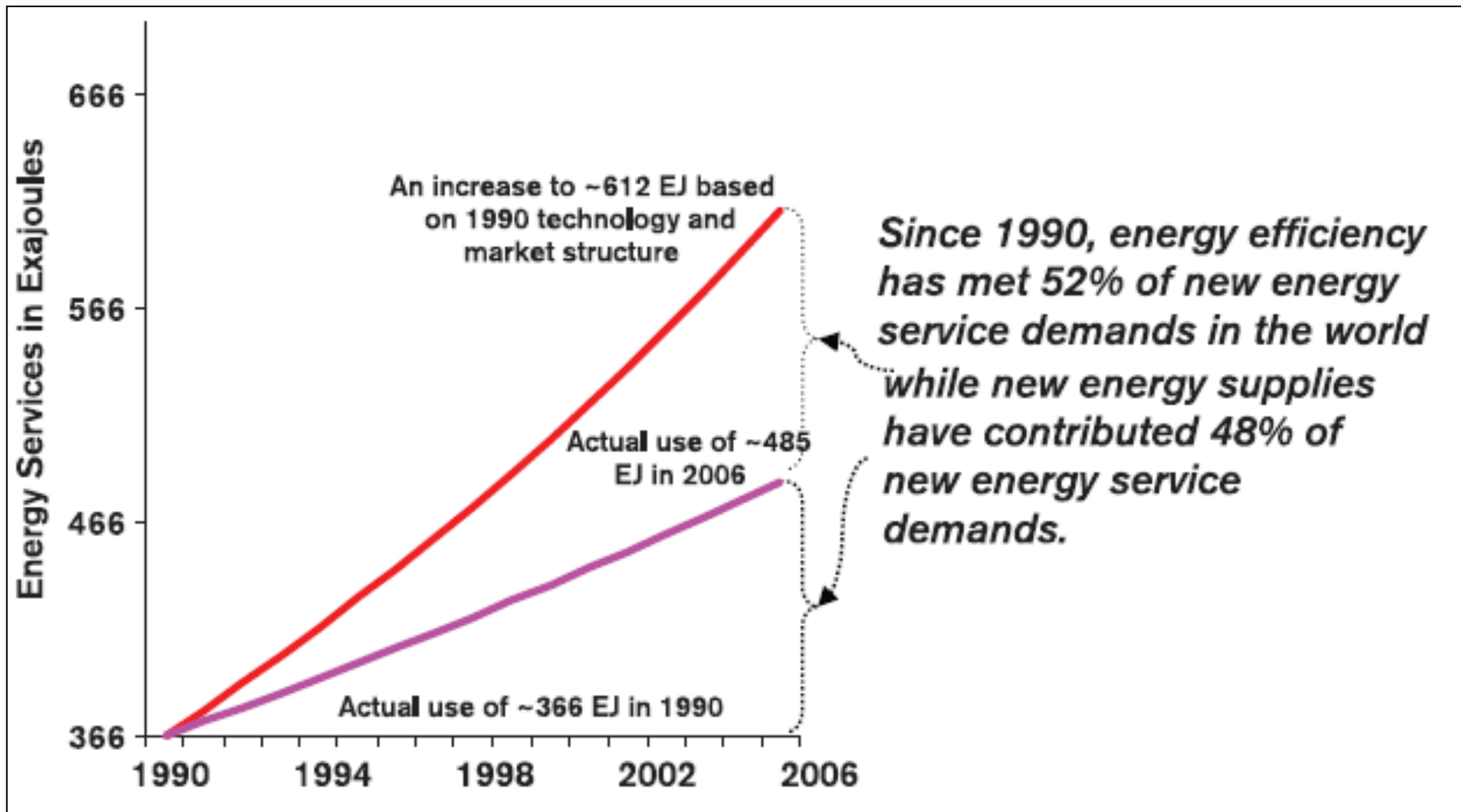
”Chairman Emeritus” of the
IEA DSM-Programme



What does history tell us?

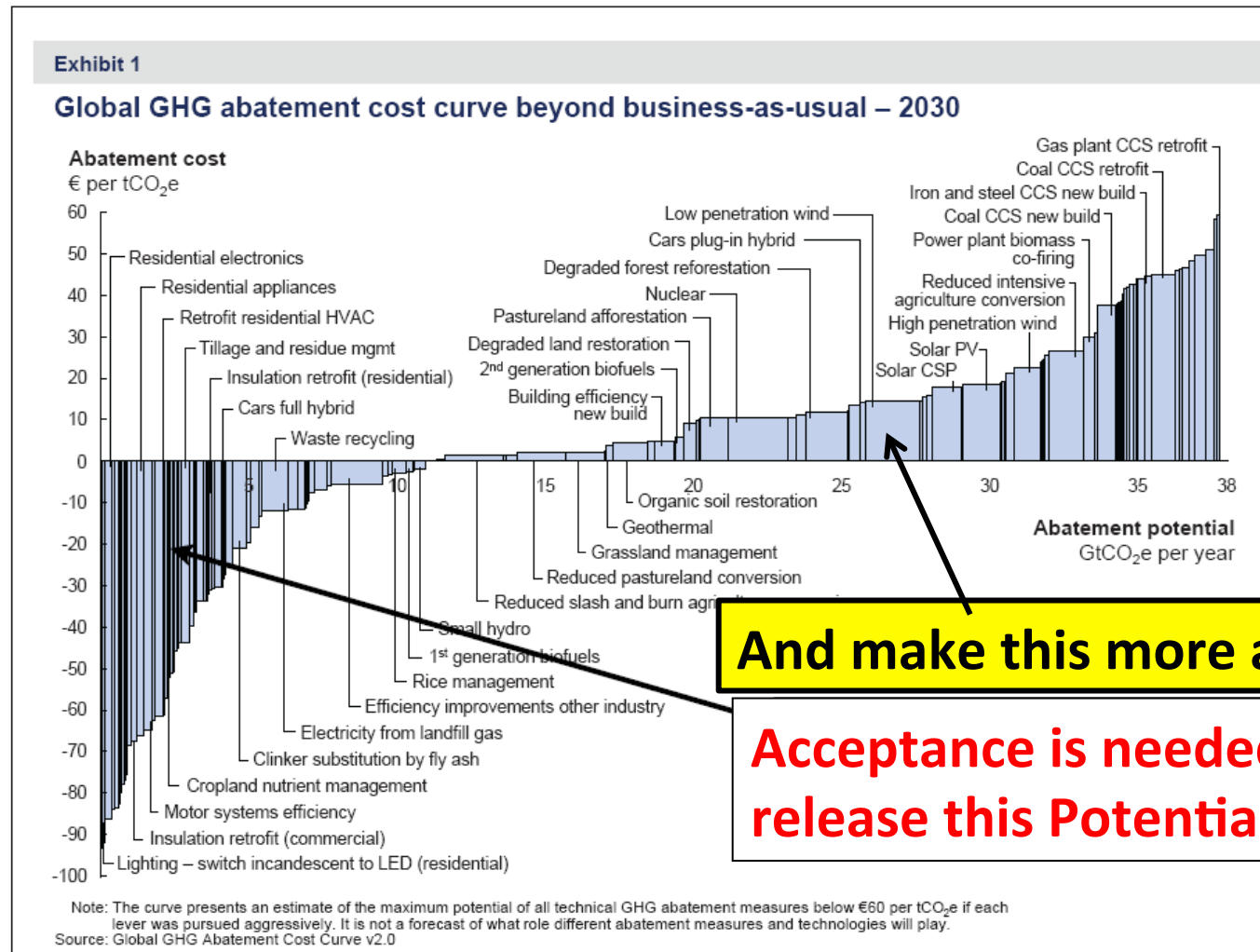


Our rise in welfare depends more on energy efficiency improvements than increased supply!



Efficiency is under-utilized, since...

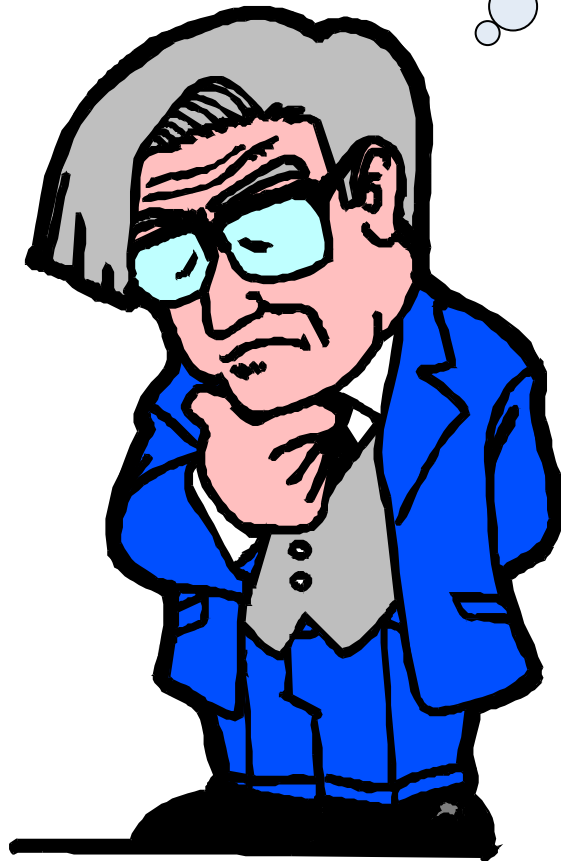
.... Result = Potential * Acceptance



And make this more affordable

Acceptance is needed to release this Potential

What is holding us back?

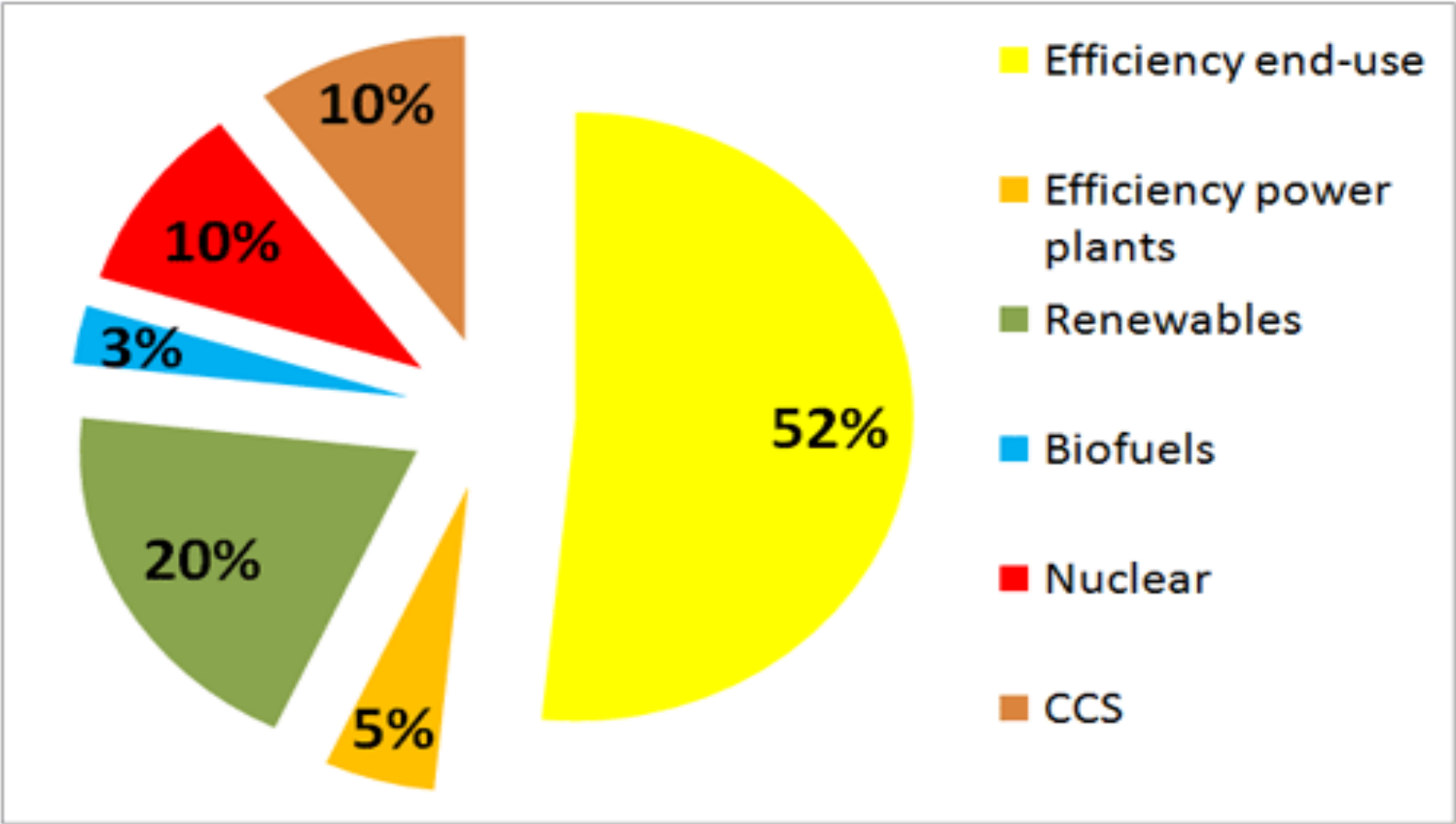


Energy Efficiency is not a Product, but a characteristic with a product.

A changing framework



Source for GHG reductions till 2030

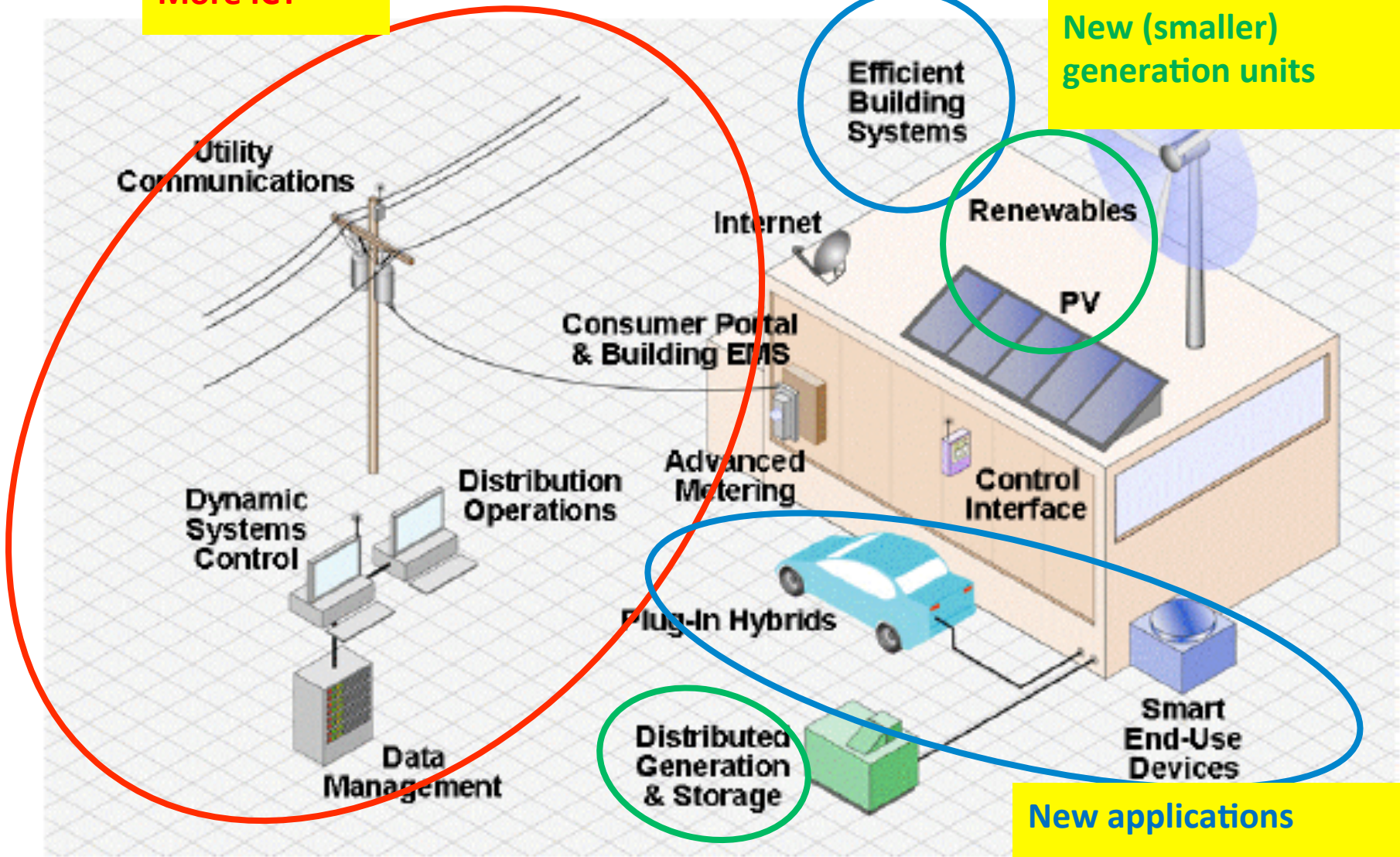


Source: IEA WEO 2009

New Technologies

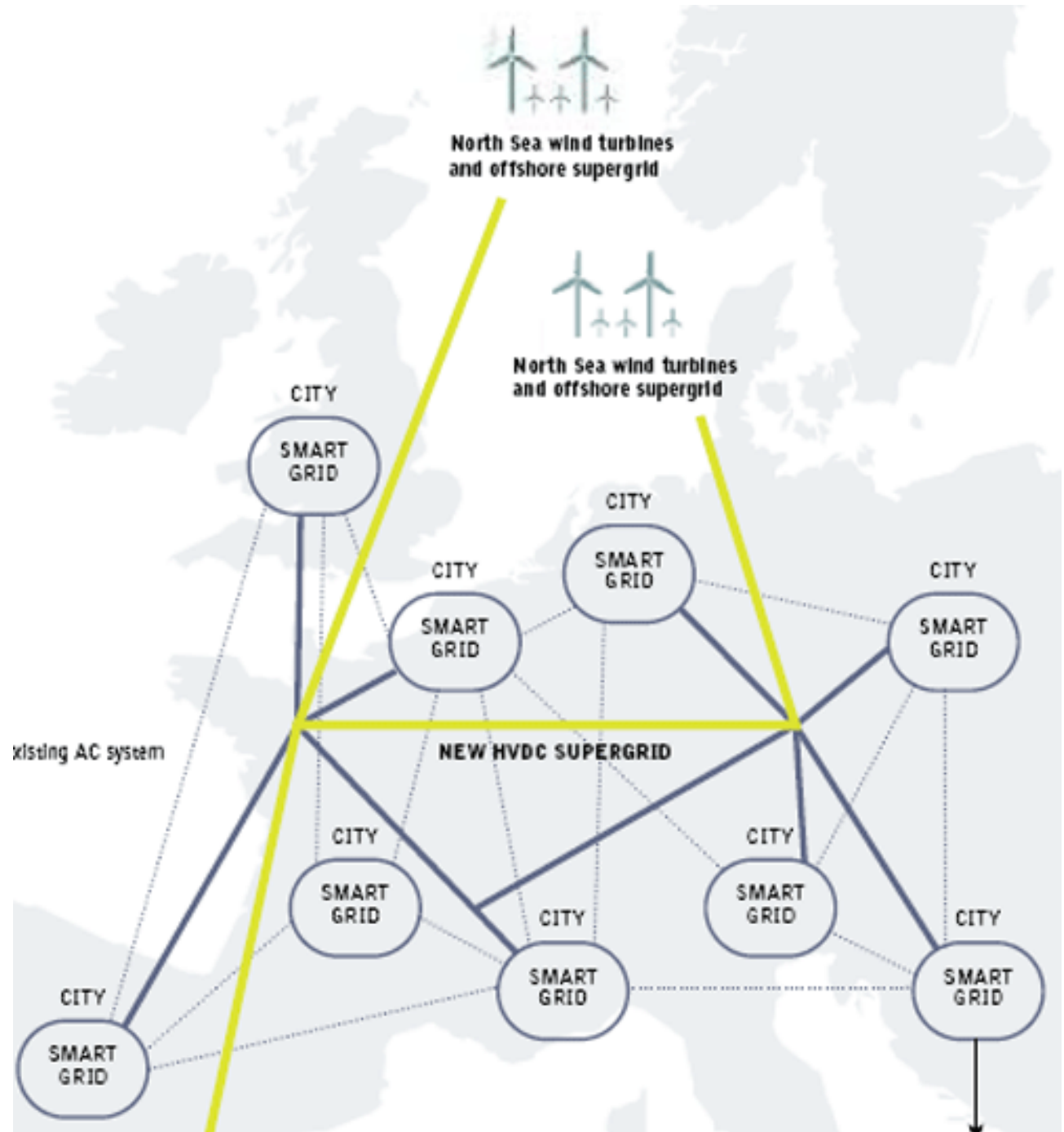
More ICT

New (smaller) generation units

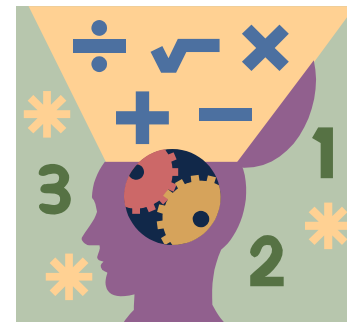


New applications

The supersmart grid in Europe!



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

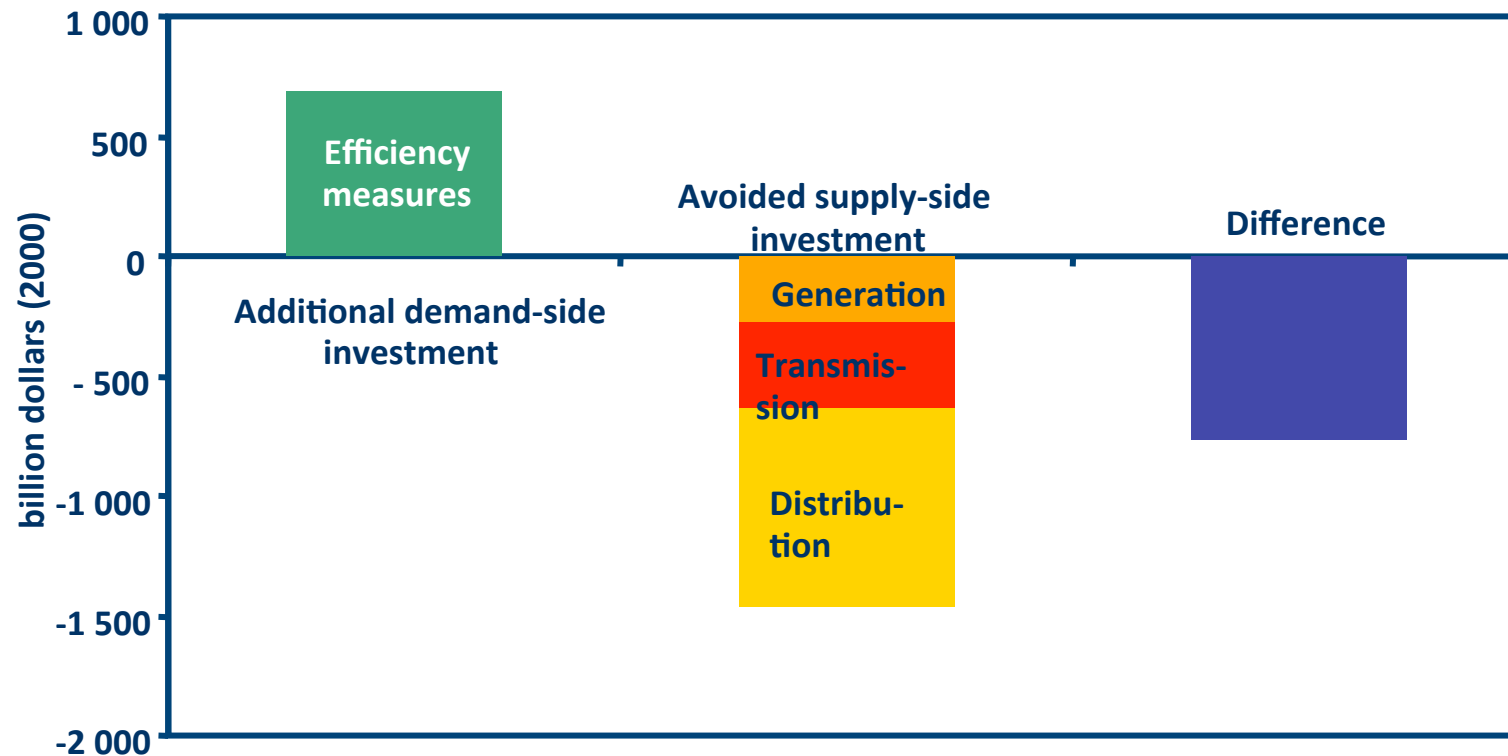
Good model to estimate the potential

Behavioural economics model HUMANS

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

Necessary to decide on policies for implementation

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

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?

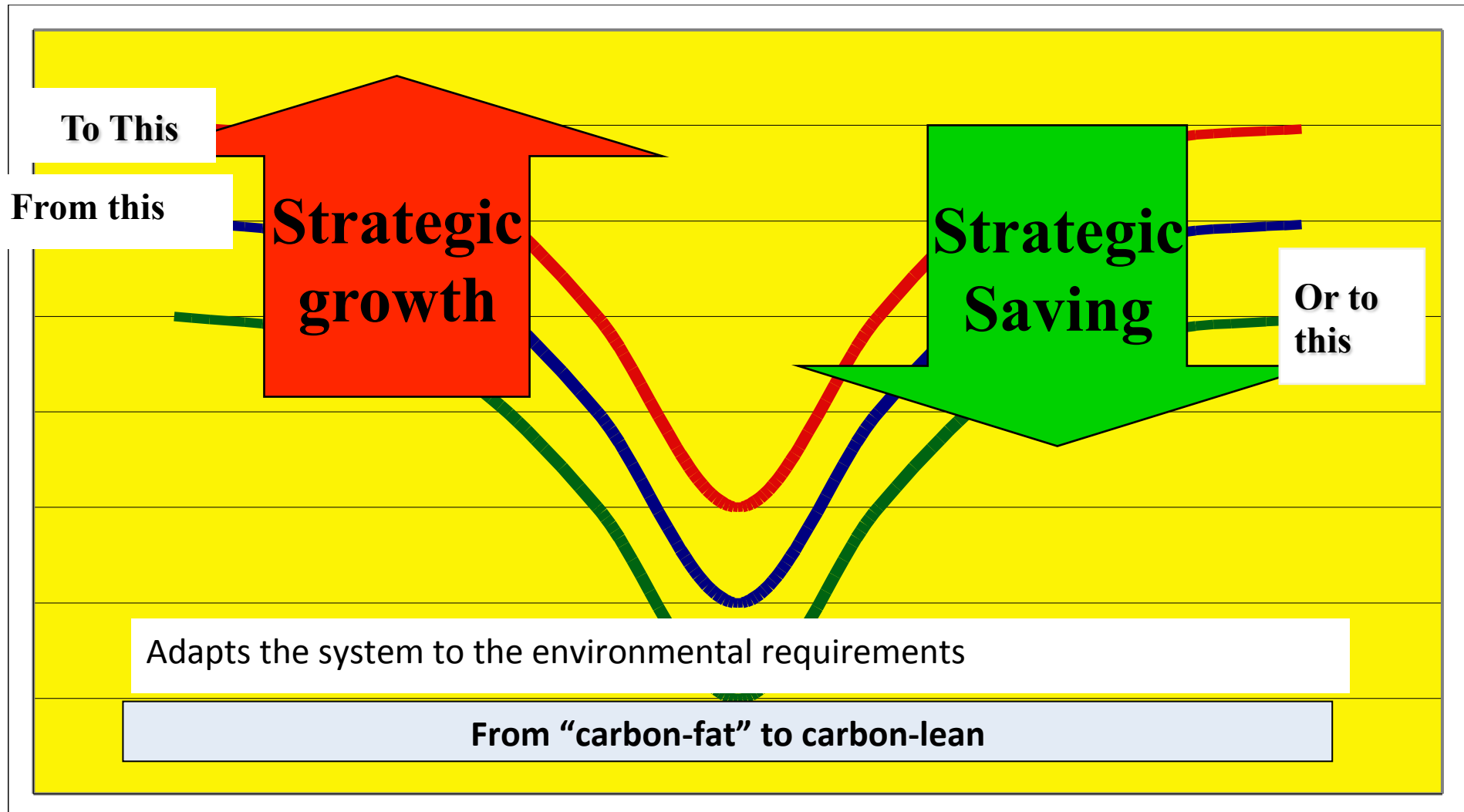
The imperative logic of Demand Side Management

- 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

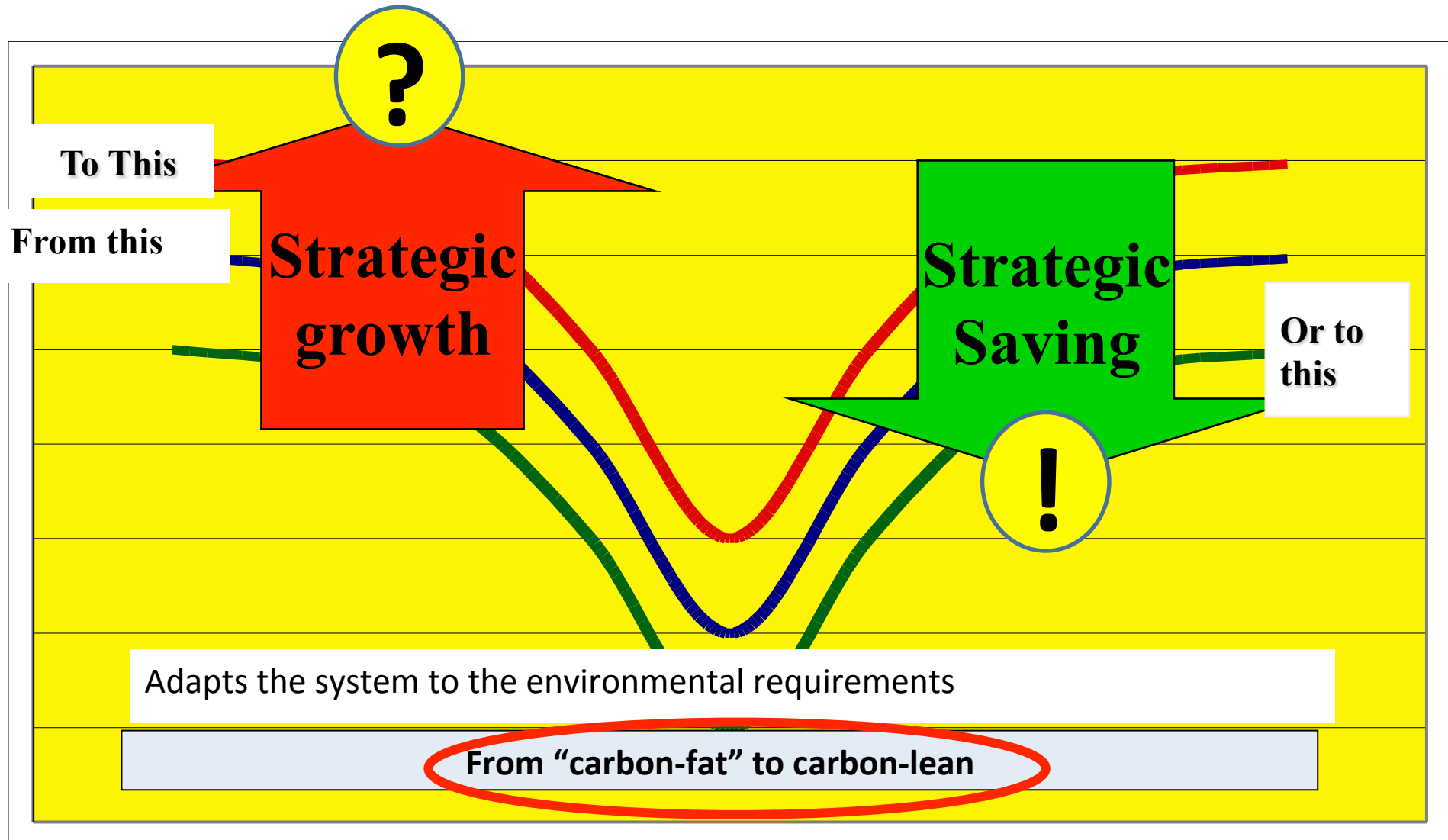
The Mechanics of DSM



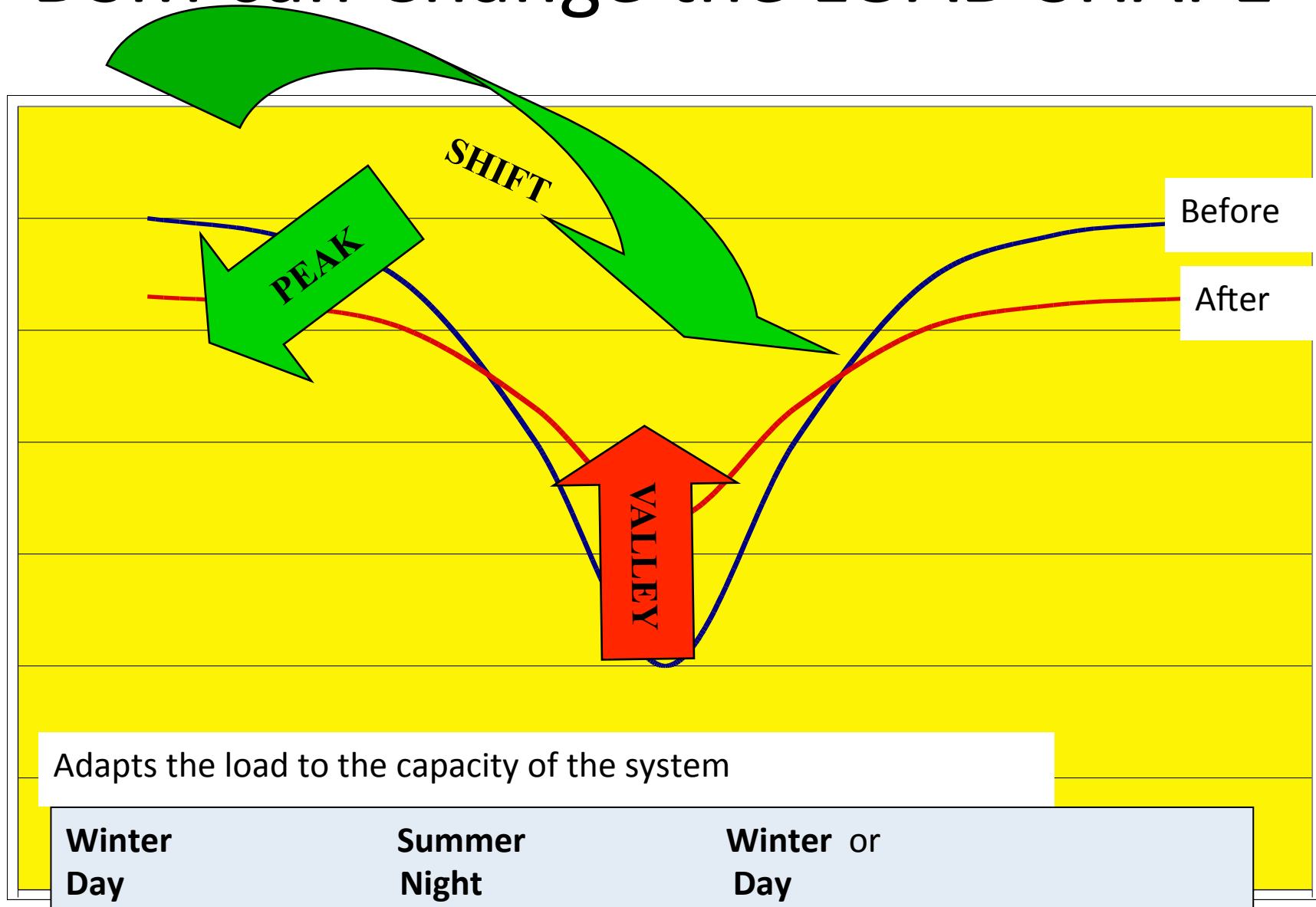
DSM can change the LOAD LEVEL



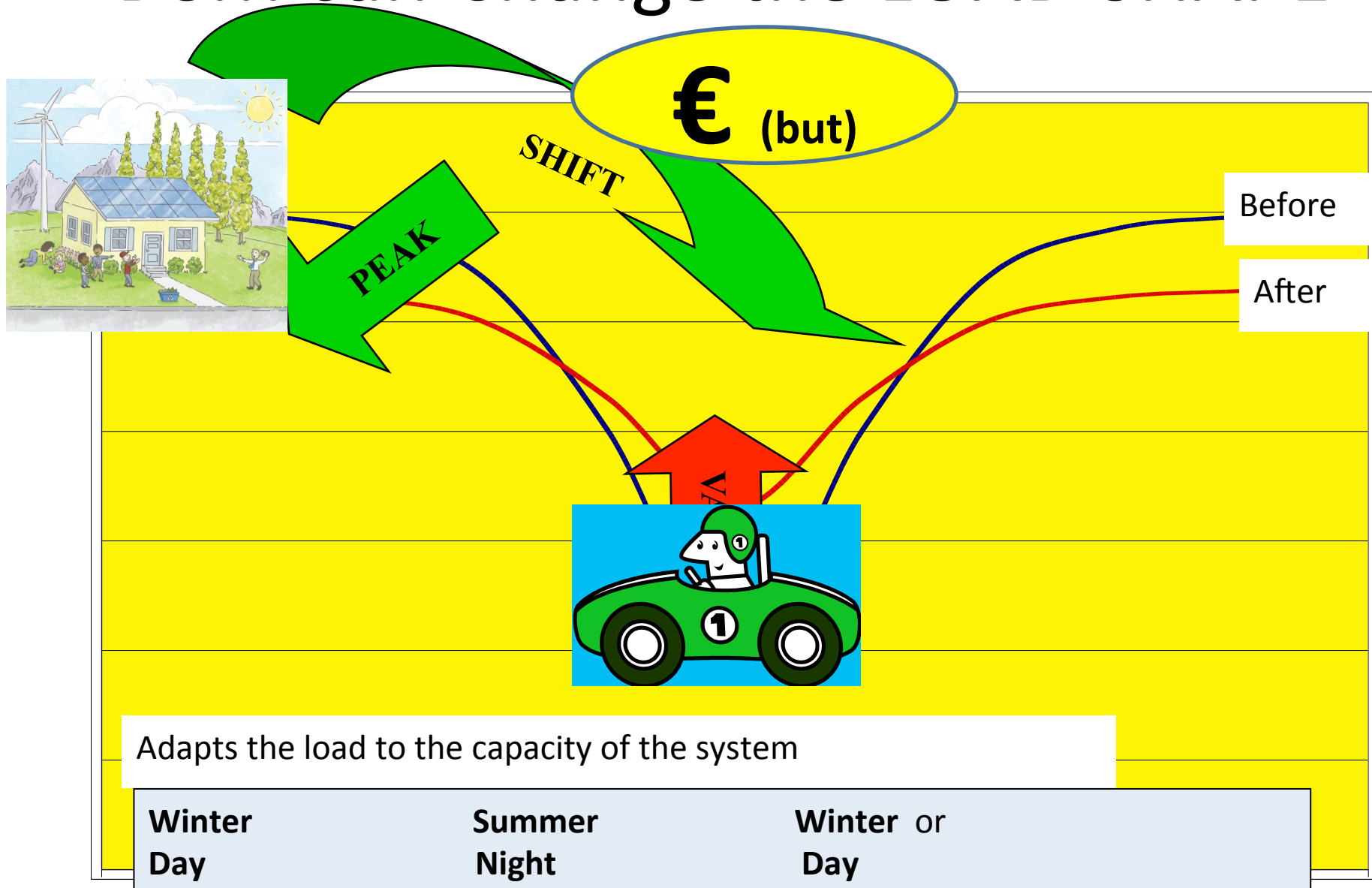
DSM can change the LOAD LEVEL



DSM can Change the LOAD SHAPE



DSM can Change the LOAD SHAPE



The IEA DSM-Programme		
Status of Task	Peak Load	Load Level
<p>Past, Present and Future IEA DSM-Programme tasks</p> <p>Further information on the activities can be found at www.ieadsm.org.</p>	Completed	<p>Task II: Communications Technologies for Demand-Side Management</p> <p>Task VIII: Demand-Side Bidding in a Competitive Electricity Market</p> <p>Task XI: Time of Use Pricing and Energy Use for Demand Management Delivery</p> <p>Task XIII: Demand Response Resources</p> <p>Task XV: Network-driven DSM</p> <p>Task XIX: Micro Demand Response and Energy Saving</p>
	Current	<p>Task XVII: Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources</p> <p>Task XXIII: <i>The Role of Customers in Delivering Effective Smart Grids</i></p>
	<p>Task XXIV: <i>Closing the loop - Behaviour change in DSM, from theory to policies and practice</i></p>	

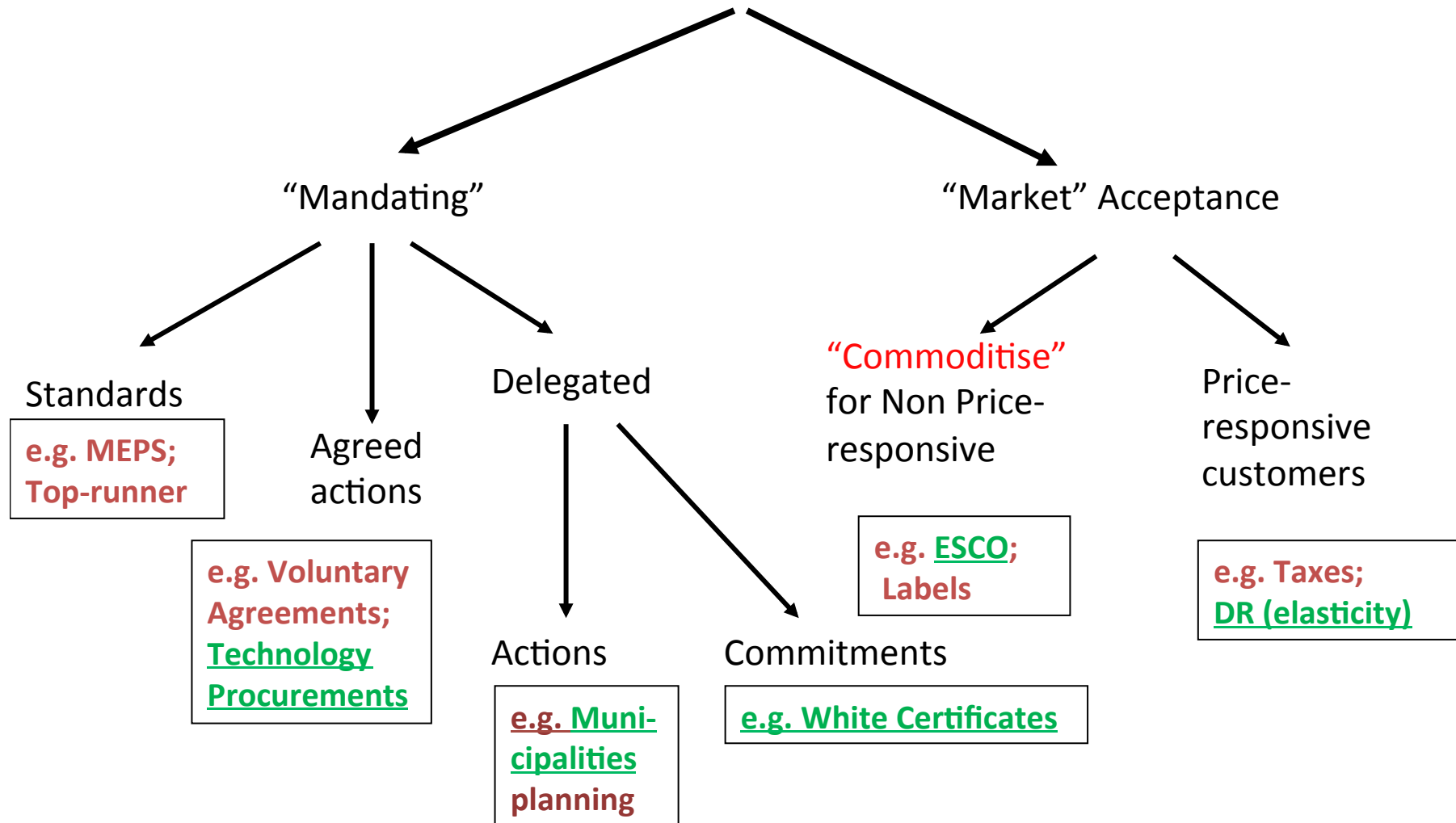
*** DSM-university**

Large-Scale Deployment



Use all the tools

LARGE-SCALE ENERGY EFFICIENCY

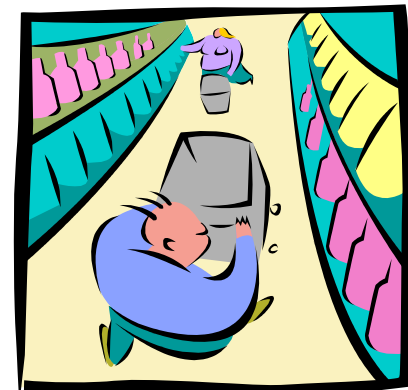
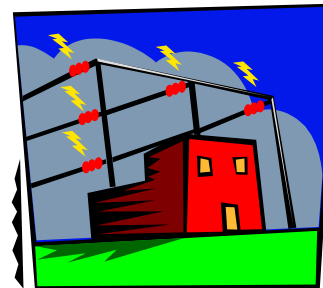


Change Agents (companies, intermediaries, catalysts)

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)

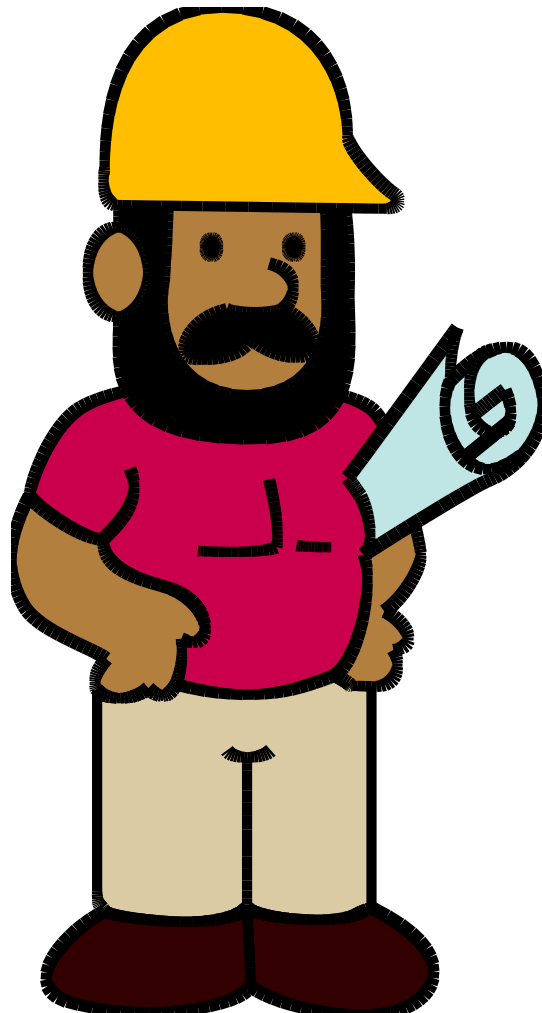


And in the future...?

- 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

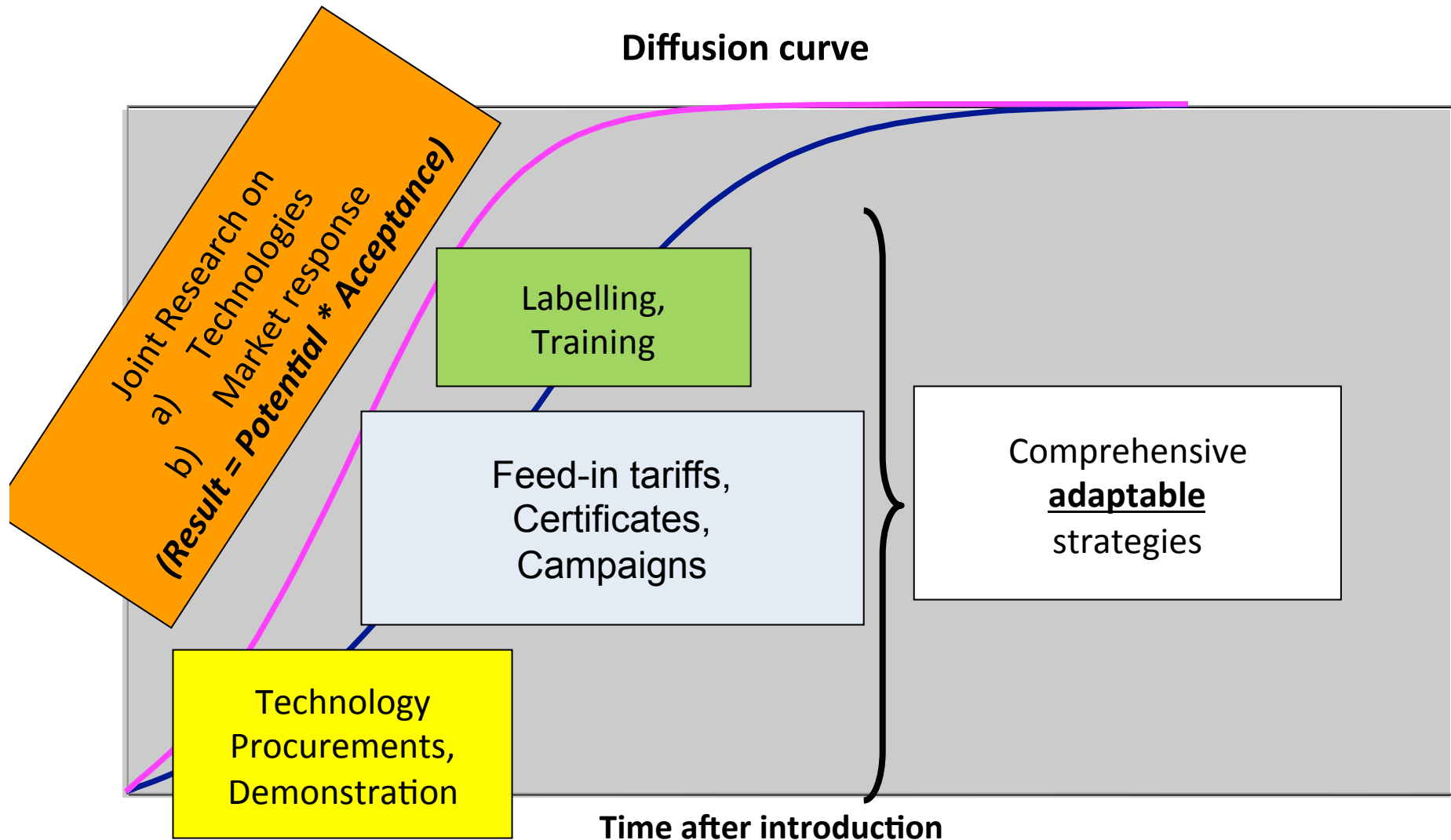
The strategy of the IEA DSM Programme

- 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.

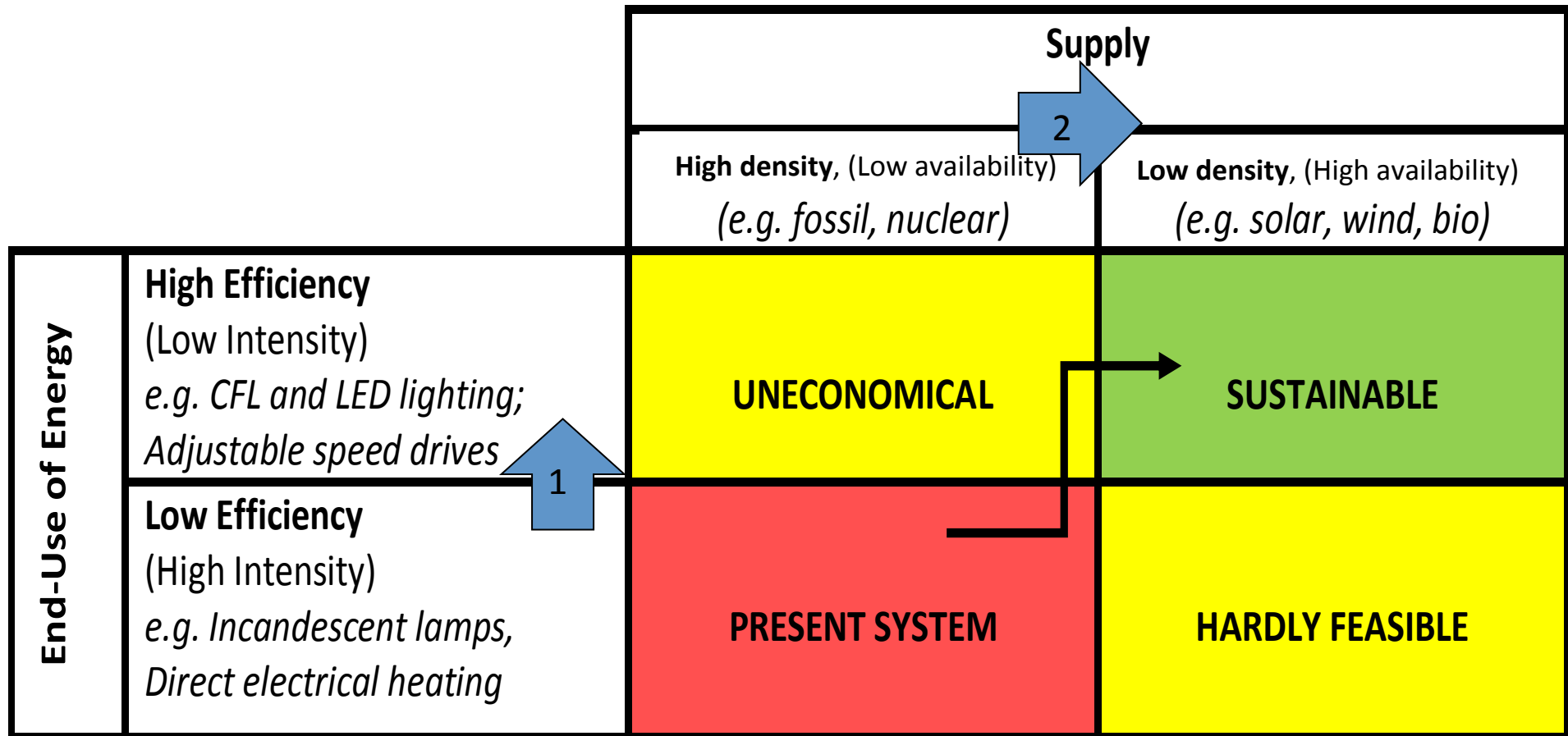
Horses for courses.

APPROACH	TYPE		EXAMPLE	
Mandated	Standards		<ul style="list-style-type: none"> • Minimum performance (MEPS) • Top-runner standard 	
	“Agreed Actions”		<ul style="list-style-type: none"> • Voluntary Agreements • Technology Procurements (III) 	
	Delegated Actions	By actor	<ul style="list-style-type: none"> • Regional bodies • Municipalities (IX) 	
		By Means	<ul style="list-style-type: none"> • Commitments • Certificates (XIV) • Portfolios (XXII) 	
Market Acceptance	Price-responsive customers		<ul style="list-style-type: none"> • Taxes; Tax reduction • Price elasticity (Demand Response) (II, VIII, XI, XIII, XIX) 	<ul style="list-style-type: none"> • Branding (XX) • Market transformation (V, VII)
	Non-price responsive customers	“Commoditising” energy efficiency	<ul style="list-style-type: none"> • Energy Services, ESCO (X, XVI) • Labels 	

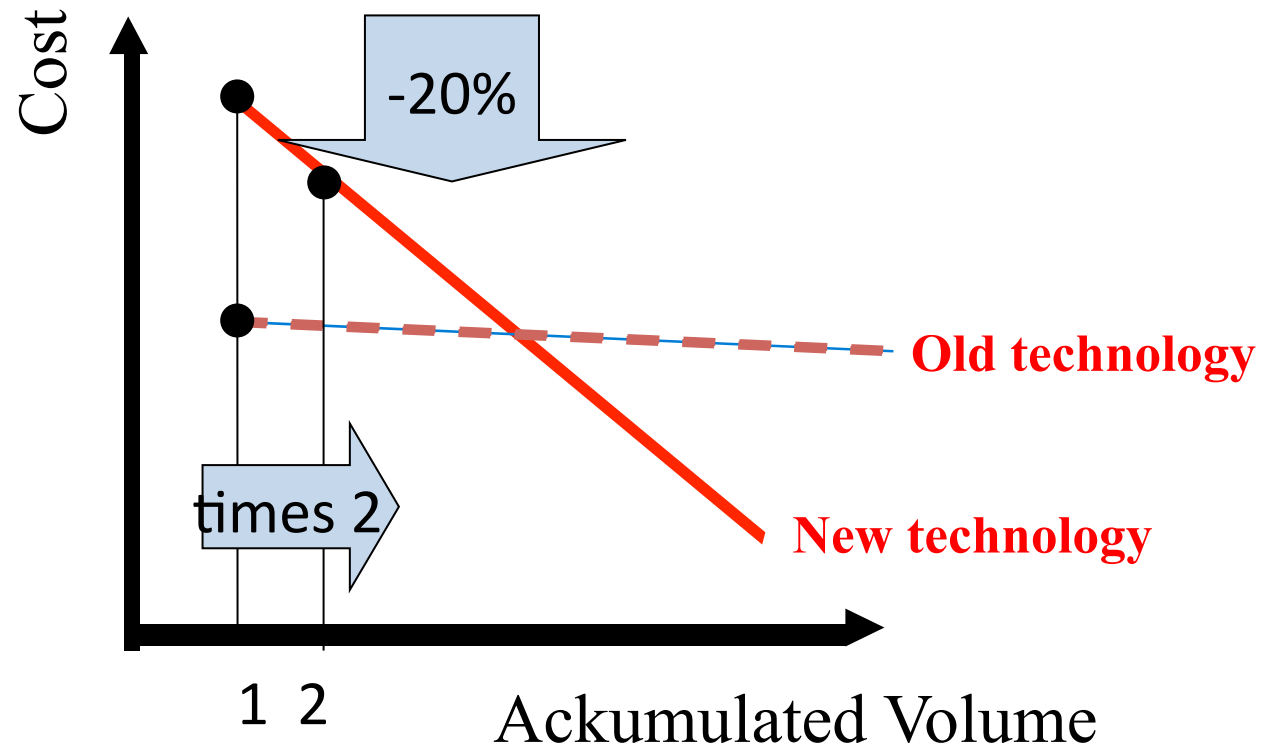
Means for accelerated diffusion



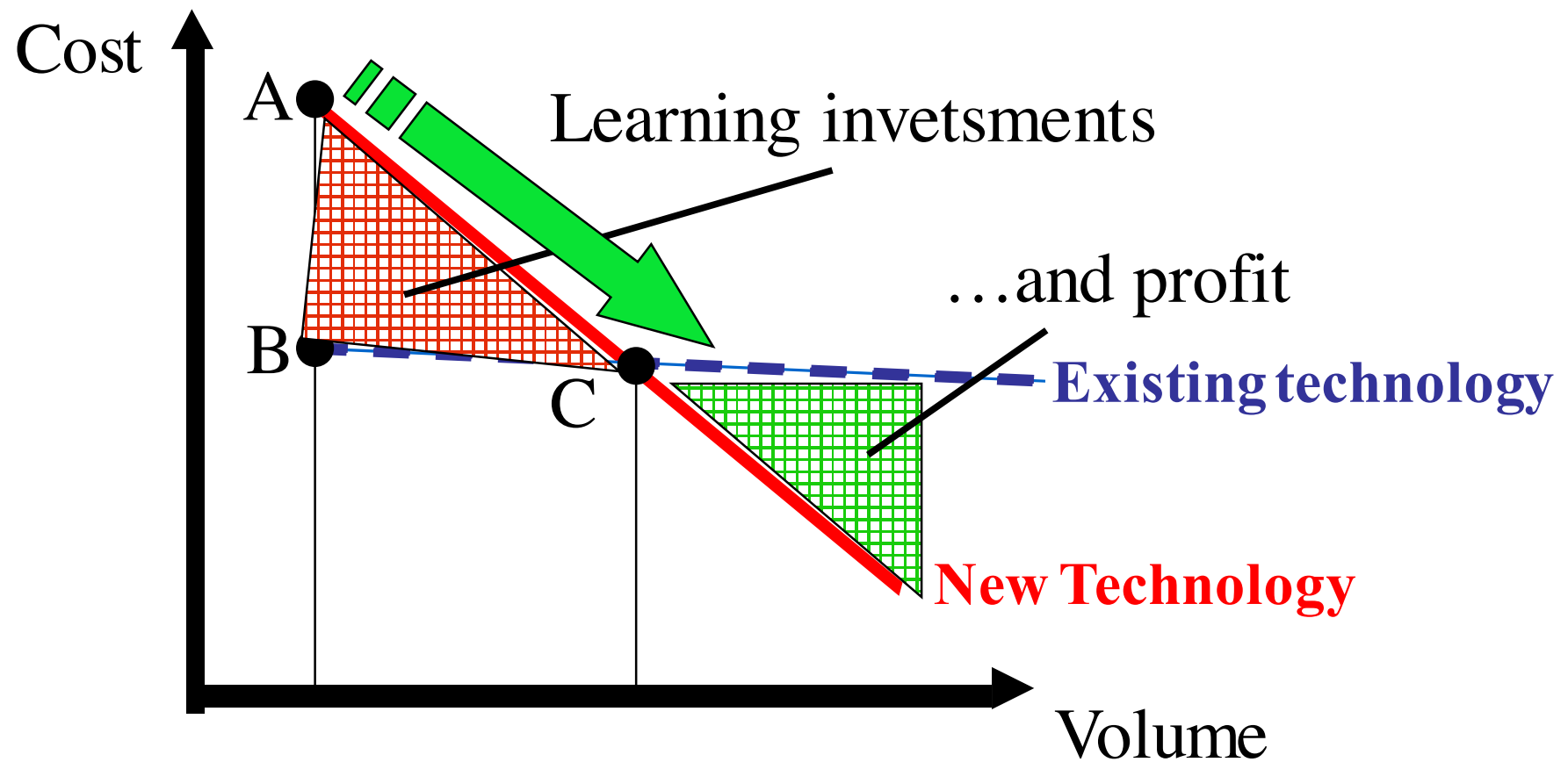
Towards a robust Sustainability



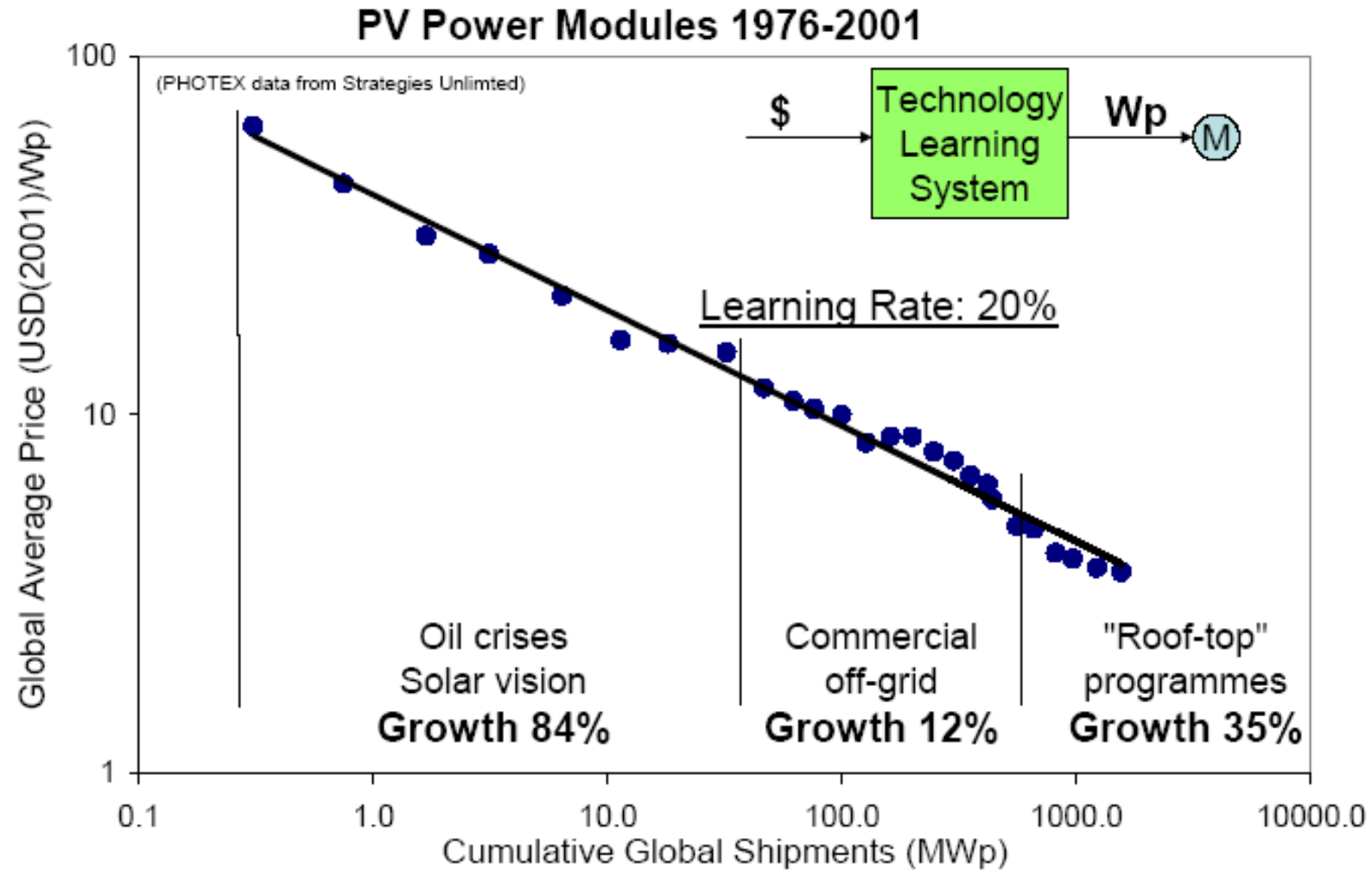
The Learning Curve



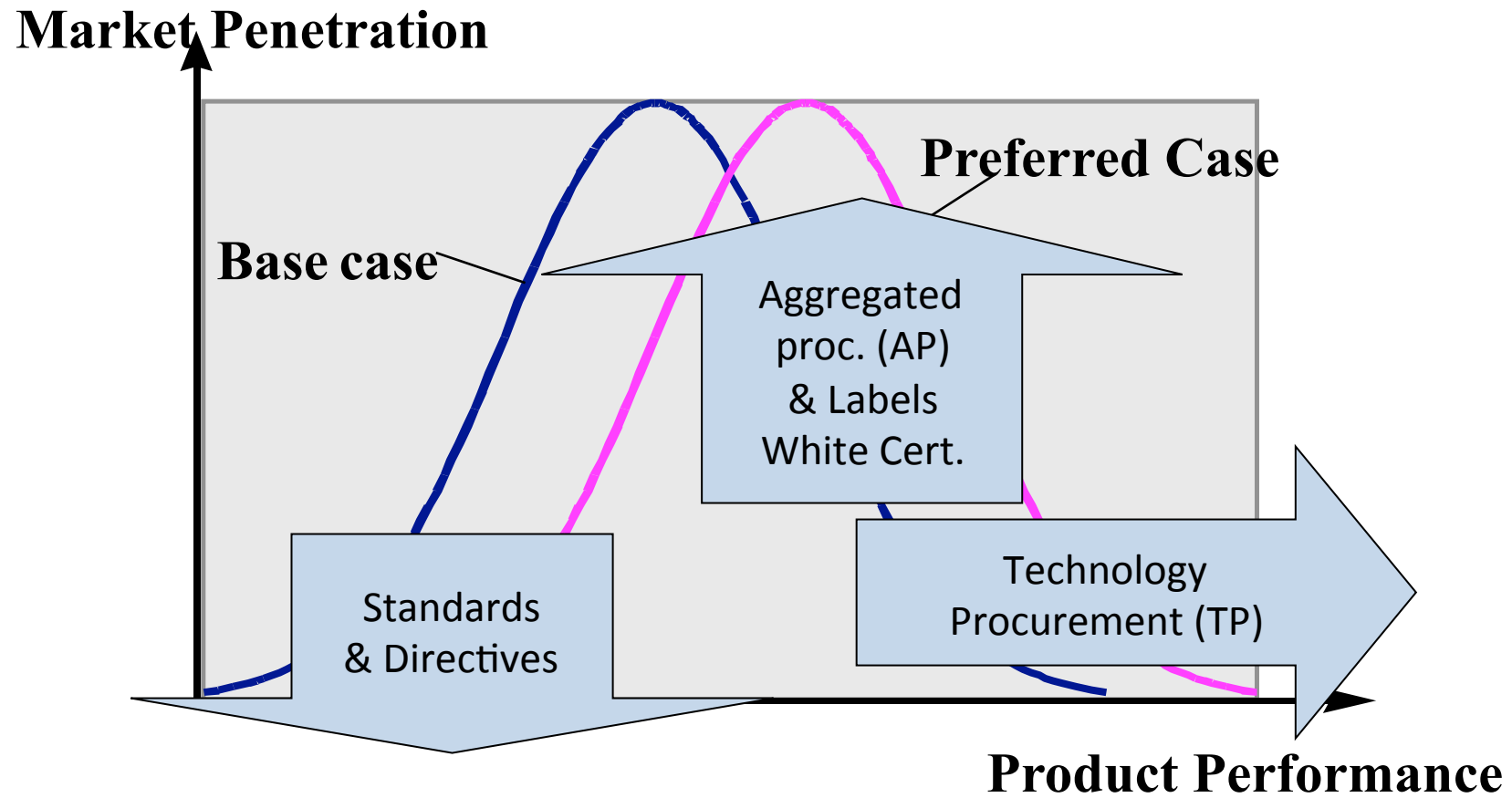
And the learning investments



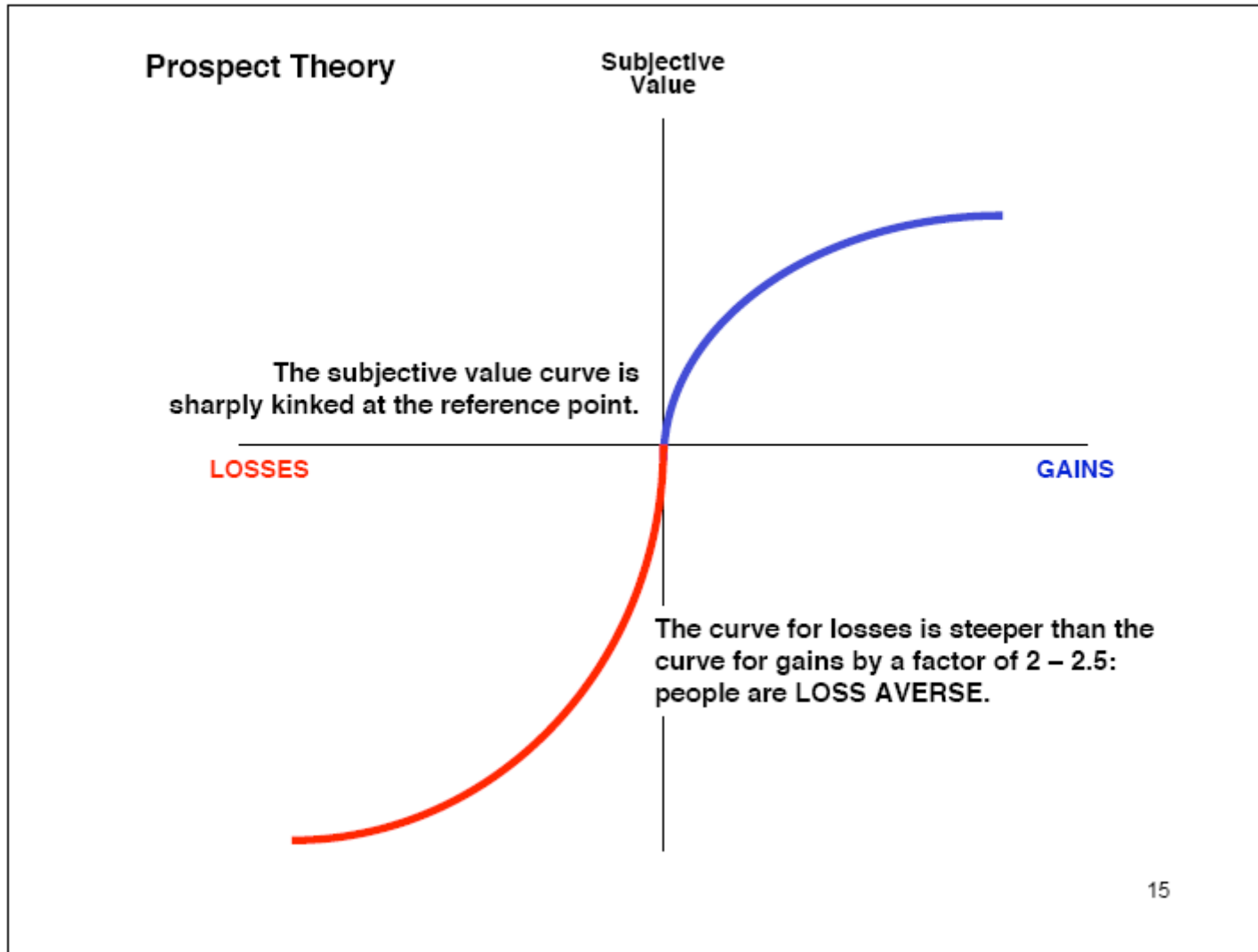
Tracked learning for PV



Market Transformation



Winning < Loosing.



Choice architecture

- **iNcentives** (who pays/chooses-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