

# EC Task Force for Smart Grids: Assessment framework



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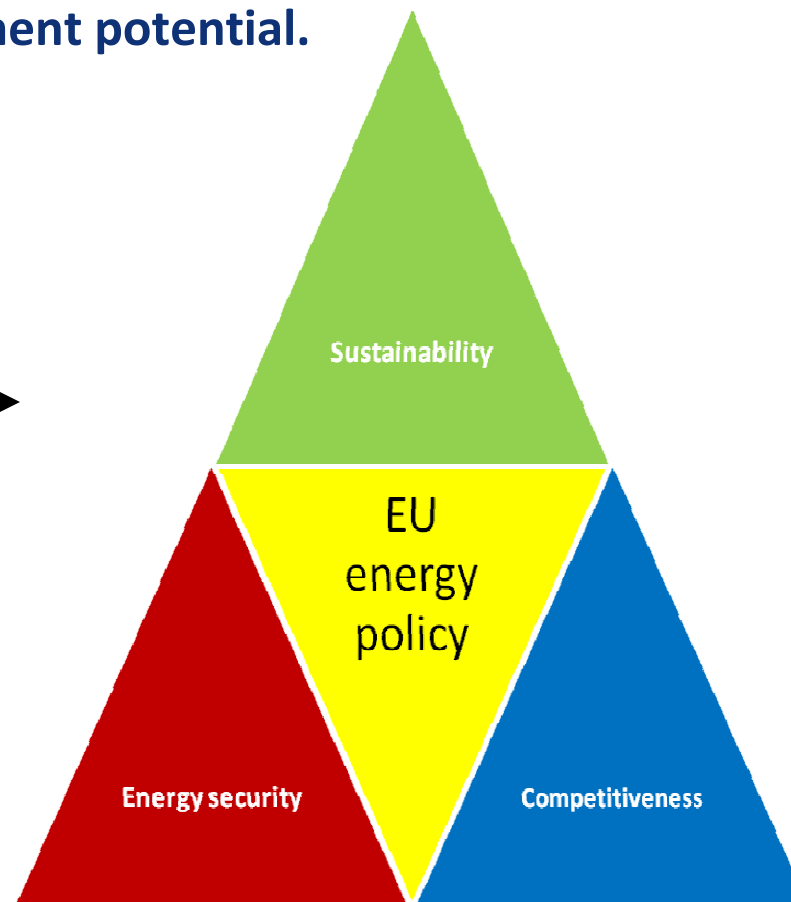
*Petten - The Netherlands*

**In a major infrastructural shift,  
technologies do not replace technologies,  
rather systems replace systems**

**Rising political attention on Smart Grids as a means to achieve EU energy policy objectives. Need to unlock market investment potential.**

Storage Prosumers  
Renewables EV  
Aggregators Distributed Generation  
Demand Response Smart Meters

**Market**



- How much are we progressing toward a Smart Grid? What are the outcomes?

= **Performance assessment**

- Which smart grid solutions are economically viable?  
For whom?

= **Cost benefit analysis**

- What makes an electricity grid smart?
- How to measure the level of smartness?
- How to measure the outcomes of smartness?

## European Union

Ideal Smart Grids defined in terms of Smart Grid **Services**

Definition of the outcome of the ideal Smart Grid in terms of **Benefits**

Metrics to measure progresses and outcomes: **56 Key Performance Indicators** (EC Task Force)

## USA

Ideal Smart Grids defined in terms of Smart Grid **Characteristics**

Metrics to measure progresses and outcomes: **20 Build/Value metrics** (DoE Smart Grid System Report)

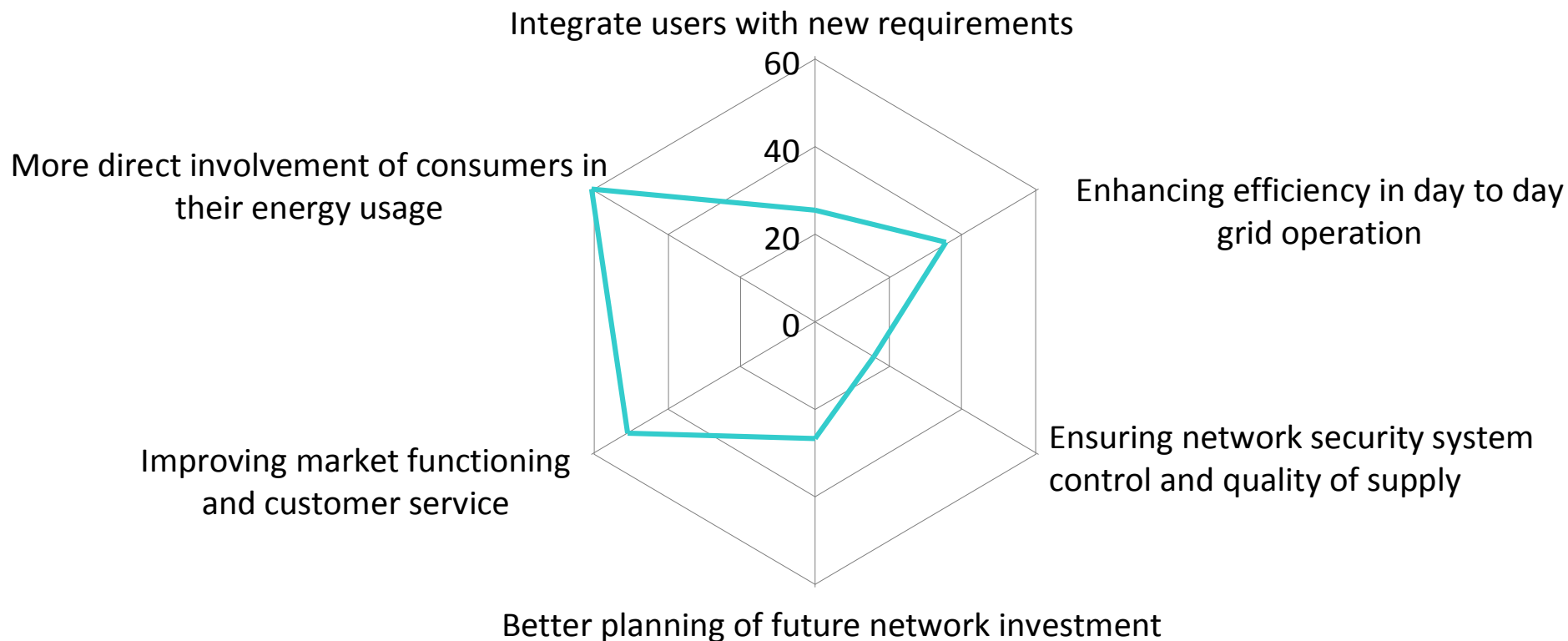
	European Union (Services)	USA (Characteristics)
<b>Smart Grid services/ characteristics</b>	Enabling the network to integrate users with new requirements	Accommodate all generation and storage options
	Enabling and encouraging stronger and more direct involvement of consumers in their energy usage and management	Enable active participation by customers
	Improving market functioning and customer service	Enable new products, services, and markets
	Enhancing efficiency in day-to-day grid operation	Optimize asset utilization and operate efficiently
	Enabling better planning of future network investment	
	Ensuring network security, system control and quality of supply	
Provide the power quality for the range of needs		

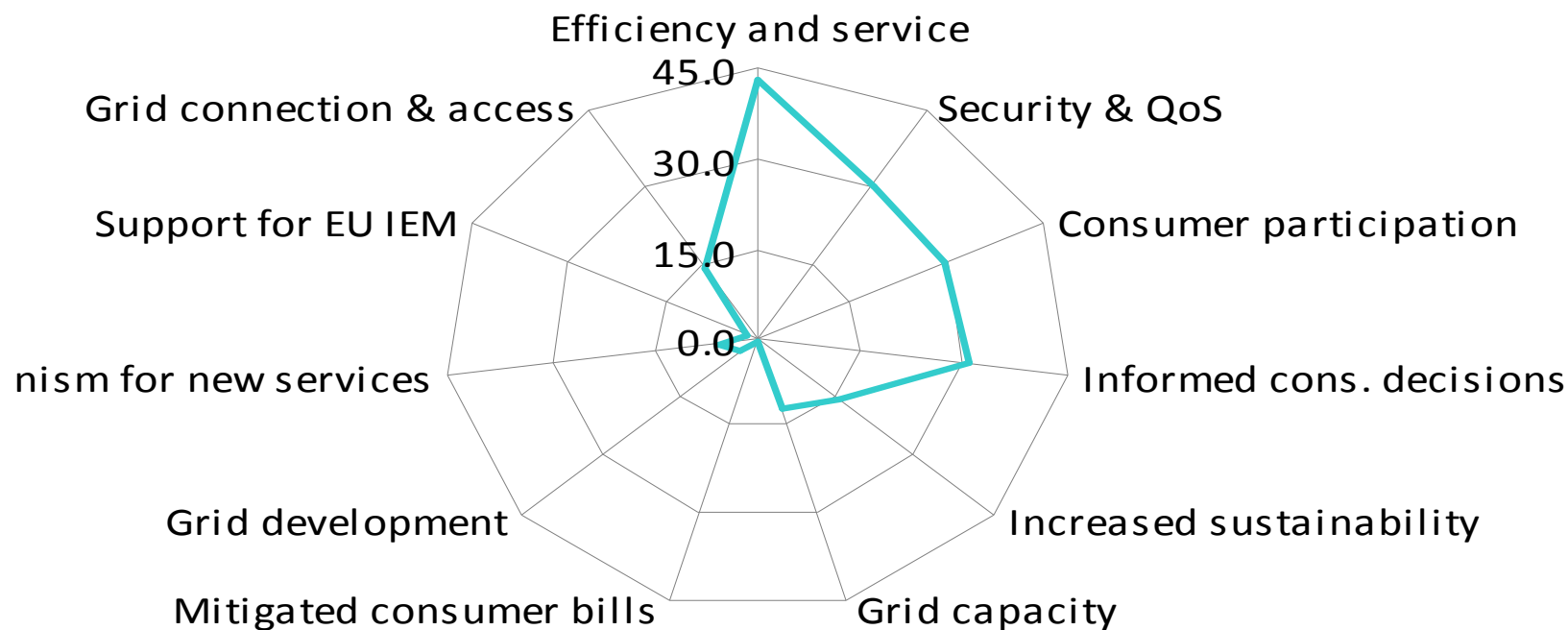
In discussing the list of benefits arising from the implementation of a Smart Grid, the EC Task Force has proposed a comprehensive set of benefits and indicators, which in many instances cannot be easily monetized, but that nevertheless provide a useful qualitative indication of the impact of Smart Grids.



	<b>European Union (Benefit/Key Performance indicator)</b>	<b>USA (Build and Value metrics)</b>
<b>Some Metrics to measure progress toward the ideal Smart Grids and the corresponding outcomes</b>	<b>Enhanced Consumer awareness and participation in the market by new players/</b> Demand side participation in electricity markets and in energy efficiency measures	<b>Dynamic Pricing</b> -Fraction of customers and total load served by real-time pricing and Time of Use tariffs
	<b>Adequate capacity of transmission and distribution grids for collecting and bringing electricity to consumers /</b> Hosting capacity for distributed energy resources in distribution grids	<b>Load Participation Based on Grid Conditions</b> -Fraction of load served by interruptible tariffs, direct load control, and consumer load control with incentives
	<b>Satisfactory levels of security and quality of supply/</b> Share of electrical energy produced by renewable sources	<b>Grid-Connected Distributed Generation (renewable and non-renewable) and Storage</b> - Percentage of distributed generation and storage
	<b>Enhanced efficiency and better service in electricity supply and grid operation/</b> Level of losses in transmission and in distribution networks (absolute or percentage) <sup>[1]</sup> . Storage induces losses too, but also active flow control increases losses.	<b>Generation and T&amp;D Efficiencies</b> - Percentage of energy consumed to generate electricity that is not lost
	<b>Satisfactory levels of security and quality of supply</b> Voltage quality performance of electricity grids (e.g. voltage dips, voltage and frequency deviations)	<b>T&amp;D System Reliability</b> - SAIDI, SAIFI, MAIFI
	<b>Create a market mechanism for new energy services such as energy efficiency or energy consulting for customers/</b> Effective consumer complaint handling and redress. This includes clear lines of responsibility should things go wrong	<b>Power Quality</b> - Percentage of Customers complaints related to power quality issues, excluding outages

<b>Services</b>	Integrate users with new requirements	Improving market functioning and customer service	More direct involvement of consumers in their energy usage	Total
	Facilitate the use of the grid for the users at all voltages/locations	Open platform (grid infrastructure) for EV recharge purposes	Consumption/injection data and price signals by different means	
<b>Functionalities</b>				
<b>Benefits</b>				
<b>Increased sustainability</b>				
<i>Quantified reduction of carbon emissions</i>	1	0,5	1	4
<i>Environmental impacts of grid infrastructure</i>	KPI		1	
<i>Quantified reduction of accidents and risks</i>		0,5		
<b>Adequate grid connection and access</b>				
<i>Grid tariffs</i>			1	2
<i>Faster innovation against clear standards</i>		1		
<b>Total</b>	1	2	3	





- ✓ Provides a picture of the level of smartness in different areas of the Smart Grids and of the resulting outcome
- ✓ Allows comparison of outcomes across different projects and areas

- High degree of interpretation and subjectivity in filling in the matrix
- Comparing different projects and scaling-up results still an open issue
- However, it is a structured approach to capture the outcomes of a project and the progresses toward the “ideal Smart Grid”
- It can capture benefits and impacts which are difficult to monetize and include in a cost-benefit analysis (e.g. Ability of consumers to participate in relevant energy market to purchase and/or sell electricity; Data ownership is clearly defined to allow for service providers to be active with customer consent)

**Thank you for  
your attention**

**Institute for Energy and  
Transport**  
<http://iet.jrc.ec.europa.eu/>

**Smart Electricity Systems**  
<http://ses.jrc.ec.europa.eu/>

