

International Energy Agency

IEA Electricity Security Action Plan

RD&D activities, gaps and opportunities: IEA Perspective

International Energy Agency

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IEA Committee on Energy Research and Technology Experts' group on R&D priority setting and evaluation – 14 November 2013



1. Introduction to IEA and IEA's work on electricity

2. Natural disaster frequency and impact history

3. Resilience dimension in ESAP

Introduction to the IEA



Formed in the wake of the 1973 oil embargo with a mission to promote member country energy security

Oil: The good old tradition of a geopolitical risk



Why Electricity at IEA? OECD is significantly electrifying since the 70's





US GDP and power demand growth





It catches up much more rapidly in emerging markets



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So its recent growth is just a taste of things to

Incremental global power generation till 2035, twh





Context: Drivers for electricity supply



THE FASTEST GROWING ENERGY SOURCE CONSUMED



Natural factors

FLOODING RISKS







AIR TEMPERATURE WATER AVAILABILITY WIND INTENSITY/ STORMS

Number of Climate-related Disasters Around the World (1980-2011)



"A disaster is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources."

Terminology, UNISDR



Natural Catastrophes 2011



Source: 2012 "Munich Re – NatCat service

- O Natural Catastrophes
- OSelection of significant loss events
- Geophysical events (earthquakes, tsunami, volcanic,..)
- Meterological events (storm)
- Hydrological events (flood, mass movement)
- Climatological events (extreme temperature, drought, wildfire)



The Economic and Human Impact of Disasters* in the last 12 years





Temperatures changes scenarios



Global warming predictions based on different emission scenarios - IPCC

System Security: Index SAIDI *average outage duration for each customer served*



<u>Source</u>: Approaches to setting electric distribution reliability standards and outcomes – The Brattle Group January.2012

<u>Source</u>: 5th CEER Benchmarking Report on the Quality of Electricity Supply - 2011

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Resilience dimension in all pillars of electricity systems security

POWER SECURITY CHALLENGES

Low carbon





1. FUEL SECURITY: RENEWABLES INTEGRATION – No longer a niche player



2. INTERCONNECTIONS: As generation capacity?



Source: EWI Cologne, Optimal transmission grid scenario

Can transmission be regarded as a non-scarce resource?

3. MARKET DESIGN

Existing and planned capacity mechanisms in Europe



Balancing the dimensions - Electricity Security Action Plan (ESAP)

<u>ESAP</u>





Natural disasters and electricity networks

Prevent/anticipate vs. Recovery

LT actions (adaptation) vs. Immediate action (emergency plan)

Prevent





- Power network vulnerability
- How adaptation to CC is affecting generation adequacy?
- Predictability scenarios

"It is virtually impossible to protect the system from a storm like Sandy," said Clark Gellings, a fellow at the industry's <u>Electric Power Research Institute</u>, "Can we do a better job at putting it all back together?"



Restore

Resist

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Thank you for your attention For more information: http://www.iea.org/topics/electricity/