

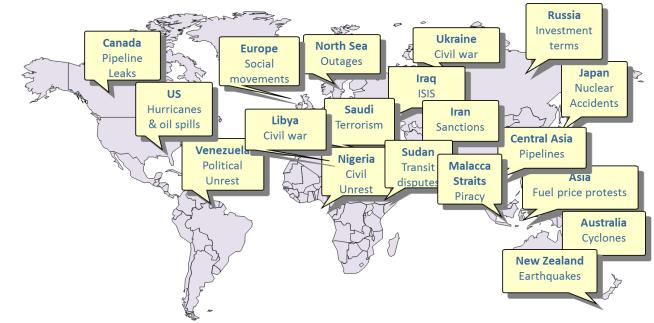
# **Energy sector resilience**

#### **Emergency response measures**

www.iea.org

### Energy security as urgent as ever

- Countries must prepare for all forms of risk
  - 3 IEA collective actions with 1 in response to weather-related (hurricanes Katrina & Rita in 2005)



### **Energy security relies on markets**

- Market balances supply & demand smoothly
- Sufficient interconnections
- Diversity of supply (countries & fuels)
- Robust infrastructure for seasonal fluctuations (ports, pipelines, storage)
- Appropriate government regulations (e.g. public service obligations)



### What can we do to increase resilience?

- Flexible & efficient policies
- Communication, information
- Dialogue with partners
- Emergency Response Reviews
  - Regular reviews of member & partner country emergency preparedness policies / procedures
- Exercises

#### Robust data

## **Real-life experience is priceless!**

- Gulf of Mexico, two similar sets of events:
  - 2005 Hurricanes Katrina & Rita
  - 2008 Hurricanes Gustav & Ike
- Similar effect, different market conditions
  - IEA Collective Action in 2005, no action in 2008
- Significant difference to consider:
  - Better preparation based on experience -> faster expected recovery



## **Brief overview of IEA emergency policy**

#### • Key tools for oil security:

- Increase supply: oil stocks (90 days)
- Decrease demand: demand restraint / management measures
  - Short-term can lead to long-term behavioral changes & fuel efficiencies (car-pooling, smart truck logistics etc.)

#### Gas and electricity security

- Different IEA remit (identify / share best practice)
- Monitoring, policy recommendations



## **Tools for resilience under development**

- Geospatial energy infrastructure disruption analysis
  - Scrape weather/earthquake data
  - Combine with energy data
  - Perform spatial queries
- Real-time alerts



### **Example of spatial analysis**

AFFECTED GAS PRODUCTION AFFECTED GAS PRODUCTION COUNTRY ASSET (KBDOE) China Vacheng 1.9 China Ledong 14.2 Malampay Philippines a-Camago 78.6 	TE	Star Pro	С <sup>у</sup>		1.					_
COUNTRY ASSET (KBDOE) China Vacheng 1.9 China Ledong 14.2 Malampay Philippines a-Camago 78.6  AFFECTED OIL PRODUCTION Country ASSET CRUDE (KB/D) CONDENSATE (KBD) NGL (KBD) China Weizhou 2.5 0 0 China Ledong 0 1.2 0 Malampaya- Philippines Camago 0 7.0 0	when						AFFECTED GAS PRODUCTION			
Countrey       AFFECTED OIL PRODUCTION         China       Vacheng         Countrey       ASSET         CRUDE (KB/D)       CONDENSATE (KBD)         NGL (KBD)         China       Ledong         Vacheng       1.9         China       Ledong         Vacheng       1.9         China       Crube (KB/D)         Vacheng       1.9         China       Ledong         Nalampaya-         Philippines       Camago         Malampaya-         Nalampaya-         Nalampay-         Nalampay-         Nalampay-         Nalampay-         Nalampay-         Nalampay-         Nalampay-         Nalampay-         Nalampay-	5	21	E.		A				CRUDE	
China       Ledong       14.2         Malampay       Philippines       a-Camago       78.6                COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)       NGL (KBD)         China       Ledong       0       1.2       0         China       Ledong       0       1.2       0         Philippines       Camago       7.0       0       0	Lee		5 mm	Jan Same			COUNTRY	ASSET	(KBDOE)	
Malampay         Philippines       a-Camago       78.6  COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)         China       Weizhou       2.5       0       0         China       Ledong       0       1.2       0         Malampaya-       0       7.0       0          Philippines       Camago       0       7.0       0	- Allow	e de	man 2	de à	4		China	Yacheng	1.9	
COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)       NGL (KBD)         China       Ledong       0       1.2       0         Malampaya-       0       7.0       0       0         Philippines       Camago       78.6		2	54 2		24		China	Ledong	14.2	
COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)       NGL (KBD)         China       Weizhou       2.5       0       0         China       Ledong       0       1.2       0         Malampaya-       0       7.0       0       0		) . 5			13			Malampay		
AFFECTED OIL PRODUCTION         COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)       NGL (KBD)         China       Weizhou       2.5       0       0         China       Ledong       0       1.2       0         Malampaya- Philippines       0       7.0       0		(dece -	13 . 5		86		Philippines	a-Camago	78.6	
AFFECTED OIL PRODUCTION         COUNTRY       ASSET       CRUDE (KB/D)       CONDENSATE (KBD)       NGL (KBD)         China       Weizhou       2.5       0       0         China       Ledong       0       1.2       0         Malampaya- Philippines       0       7.0       0		A	D: mas		Contract of					
COUNTRYASSETCRUDE (KB/D)CONDENSATE (KBD)NGL (KBD)ChinaWeizhou2.500ChinaLedong01.20Malampaya- Philippines07.00		1. ··	112							
COUNTRYASSETCRUDE (KB/D)CONDENSATE (KBD)NGL (KBD)ChinaWeizhou2.500ChinaLedong01.20Malampaya- Philippines07.00		5	14 - E	nie	. Contrat					
ChinaWeizhou2.500ChinaLedong01.20Malampaya- Camago07.00		AFFECTED OIL PRODUCTION								
China       Ledong       0       1.2       0         Malampaya- Philippines       Malampaya- Camago       0       7.0       0	COUNTRY	ASSET	CRUDE (KB/D)	CONDENSATE (KBD)	NGL (KBD)		4			
Philippines Camago 0 7.0 0	China	Weizhou	2.5	0	0		3.2			
Philippines Camago 0 7.0 0	China	Ledong	0	1.2	0	and S		- Tr	P. 041.	*
ist any hois	Philippines		0	7.0	0		A		Society .	
						· · · 1	a	1 yr	the's	1
© OECD/IEA 2015	•••								1 22	

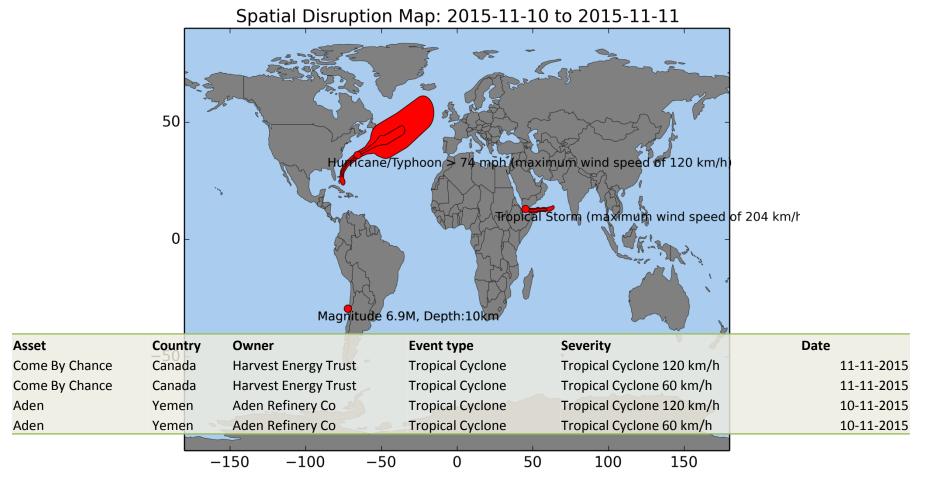


### **Example of spatial analysis**

		PLANT	MW	FUEL	СІТҮ	COUNTRY		
Legend		QINZHOU	1260	Coal	Qinzhou City	CHINA		
J	And the second sec	YANTAN	1210	Hydro	Dahu Yao Autonomous County	CHINA		
• BFG	~ ·····	SANTA RITA BATANGAS	1000	Gas	Santa Rita	PHILIPPINES		
COAL	The areas	HUANENG HAIKOU	1061	Coal	Chengmai County - Haikou City	CHINA		
• CWM	mar 2	FANGCHENGGANG	1200	Coal	Qisha County - Fangchenggang City	CHINA		
GAS			1200	cour	disha county Pangenenggang erry	CHINA		
<ul> <li>LNG</li> </ul>	K mind	10 1000			1			
<ul> <li>OIL</li> </ul>	OIL							
UR	I mars	- Rife						
WAT	24 6.4							
<ul> <li>WSTH</li> </ul>								
		Mars . !						
	had in the	s i o b						
			. 2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
	of the man	5 F	000	-6	P. '04			
	· · · · · · · · · · · · · · · · · · ·							
	d ~ Zom							
		TROOM - TROOM	° ¥		Long of La			



### **Example of a recent alert**





Energy Agency Secure Sustainable Together

### Way forward

Red alert for Tro	pical Cyclone HAIY	AN-13 2013-06-11					
Category 5 (catastrophic damage	Infrastructure at risk*						
Maximum sustained winds: 315 k	Units	Severe	Moderate	Low	Total		
GDACS weblink for further inform	Oil production	kbd (2014 production)	18	36	-	55	
	China		2	36	-	38	
	Philippines		17	0	-	17	
	Vietnam		-	0	-	0	
	Refining	kbd (ACD capacity)	40	643	-	683	
	China		40	360	-	400	
	Philippines			153	-	153	
	Vietnam			130	-	130	
	Crude oil export ports	kbd (2014 exports)	11	5	-	16	
	China		-	3	-	3	
	Philippines		11	1	-	12	
	Vietnam		-	2	-	2	
	Crude oil import ports	kbd (2014 imports)	-	550	-	550	
man the second second	China		-	398	-	398	
	Philippines		-	82	-	82	
	Z Vietnam		-	71	-	71	
	Gas production	bcmy (2014 production)	5	2	-	7	
in the second se	🖌 China		3	2	-	6	
	Philippines		1	-	-	1	
	Liquifaction plant	bcmy (2014 exports)	-	-	-	-	
	Regasification plant	bcmy (capacity)	-	-	-	-	



## Conclusions

- Energy security as urgent as ever
- Threats to energy security from many sources
- Efficient, transparent markets crucial for flexibility
- Government policies must complement efficient markets
- IEA helping members & partners to be ready



### **2014** publication

#### ENERGY SUPPLY **SECURITY**

nergy Agenc

Emergency Response of IEA Countries 2014



Available for download at: <u>http://www.iea.org/topics/energysecurity/</u>

600 pages describing the emergency response policies for oil and gas of IEA and key partner countries.

Pdf files for whole publication and individual chapters.