



Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

ELECTRIC POWER GENERATION EXTERNALITIES

The Regional Conference on : "Renewable Energy and Sustainable
Development in Rural Areas of the ESCWA Region"

Rabat, Morocco, November 26 – 28, 2013

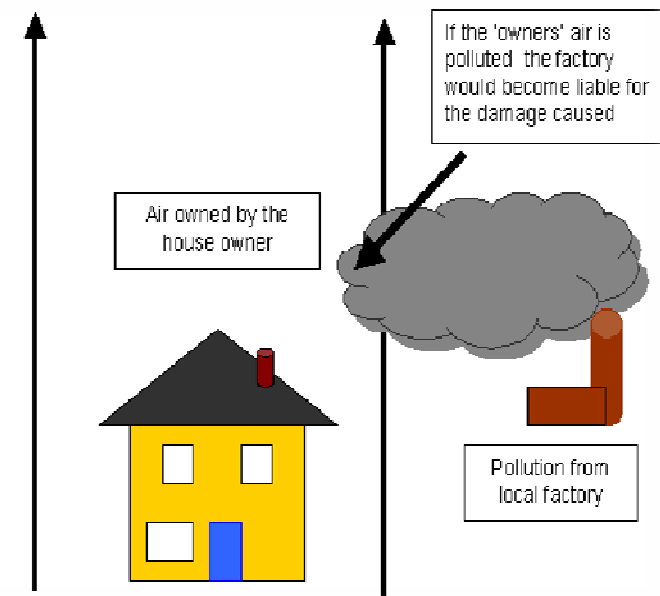
Rana El-Guindy



What do we mean by externalities ?

- Externalities definition

Externalities are generally un-priced costs, usually of side-effects of production processes, which impose costs on third parties through their impacts on climate, human health, crops, structures and biodiversity ” ASTE (2009)





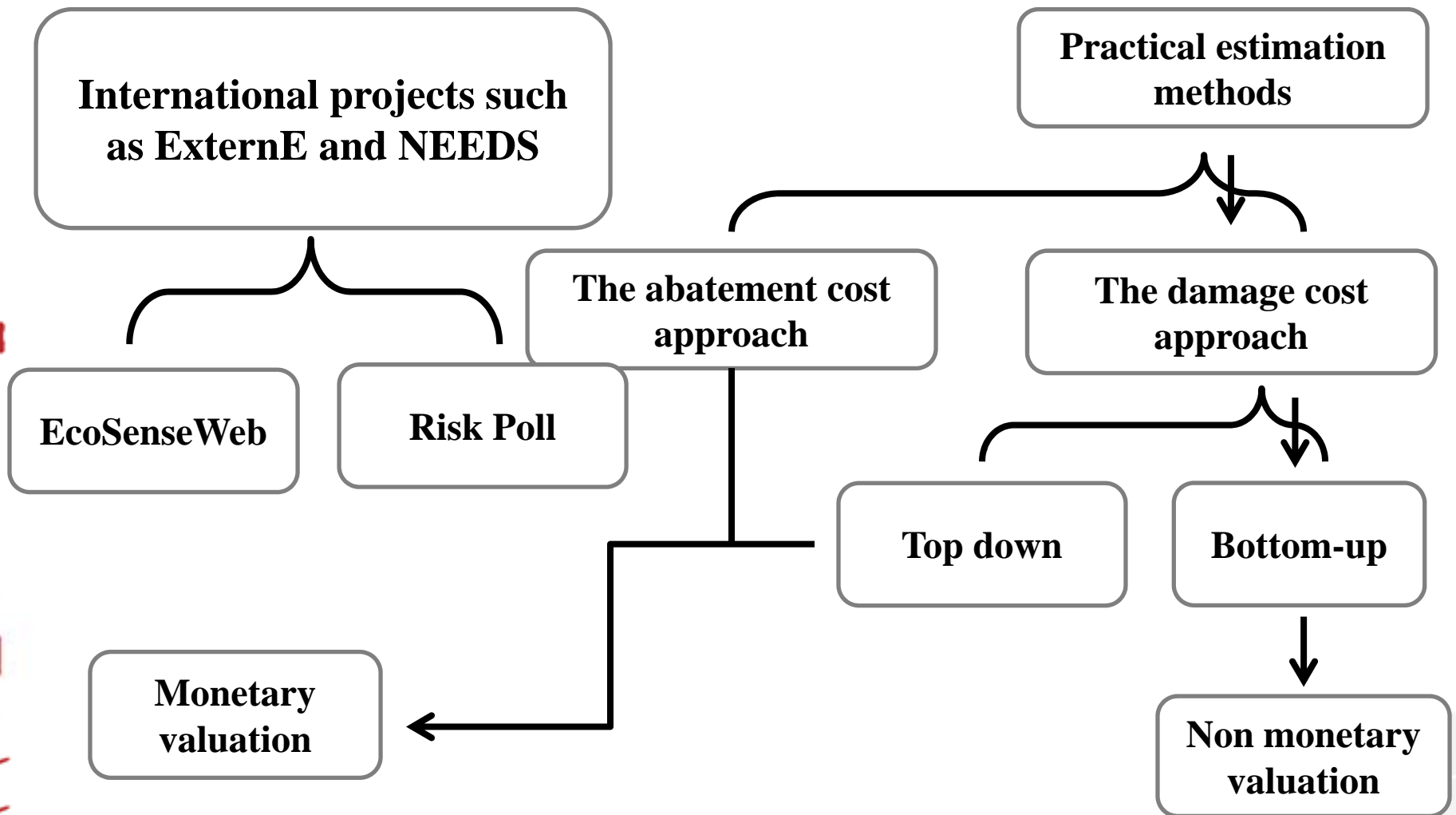
Different impacts to assess

GHG emissions impact on:

- Climate change
- Health impacts
- Building materials
- Agriculture crops

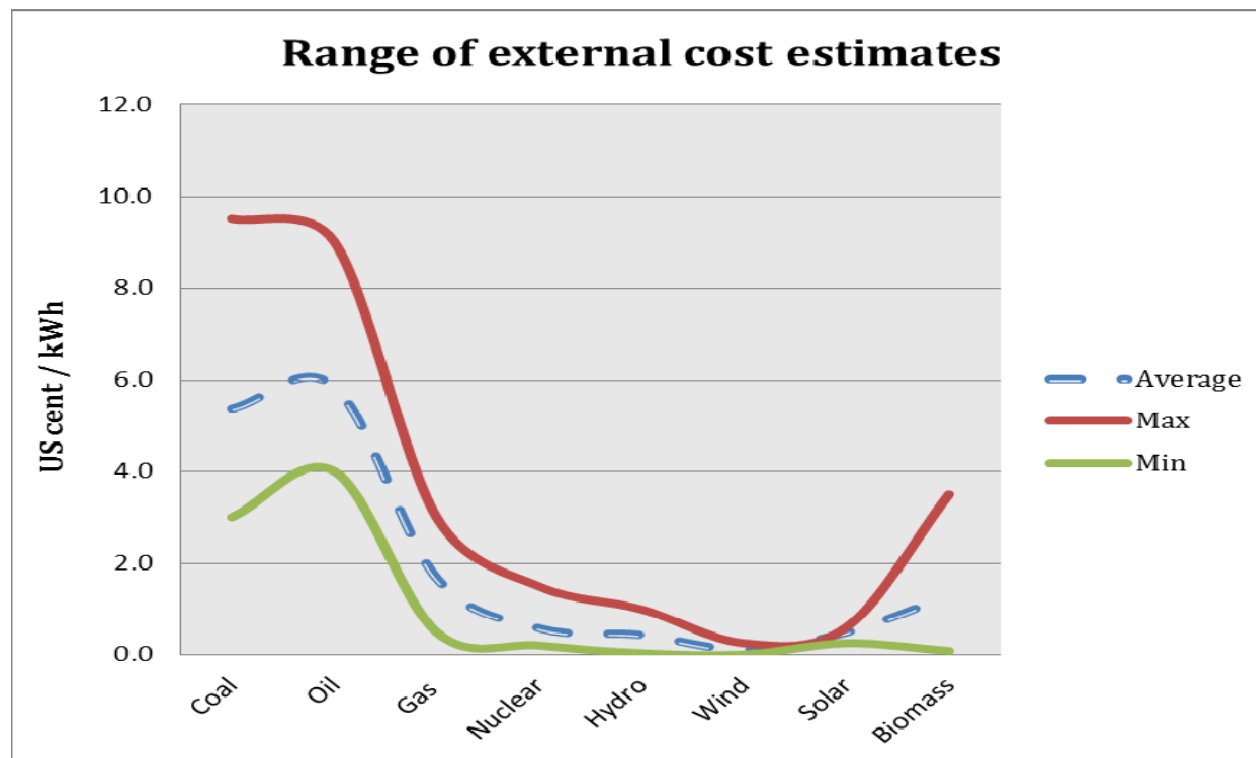


How to estimate externalities



Average externalities estimates

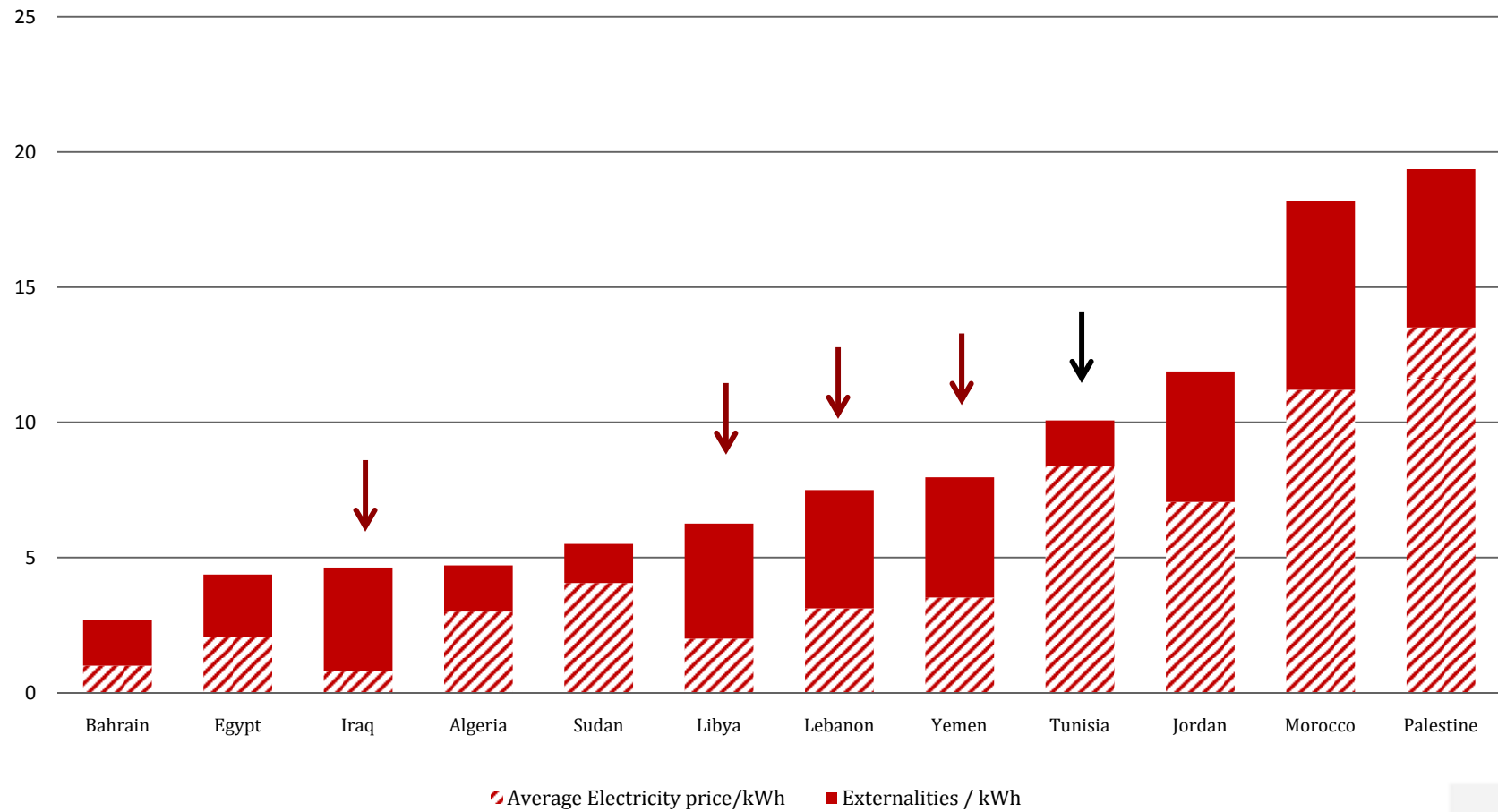
US cent / kWh	Coal	Oil	Gas	Nuclear	Hydro	Wind	Solar	Biomass
Average	6.1	5.9	1.7	0.6	0.4	0.1	0.5	1.3
Max	9.5	9	3	1.5	1	0.25	0.6	3.5
Min	4	4	0.49	0.2	0.03	0.001	0.25	0.08



Total externalities for RCREEE Member States in 2011 (US million \$)

Country	Externalities (US million \$)
<div> <p>Generated energy</p> <p>61% 32% 7%</p> <p>Coal Oil Gas Hydro Wind solar</p> </div>	<div> <p>Externalities</p> <p>64% 35%</p> <p>Coal & Peat Oil Gas Hydro Wind solar</p> </div>
Palestine	27
Libya	1300
Syria	1472
Iraq	2063
Egypt	3366
Total	12315

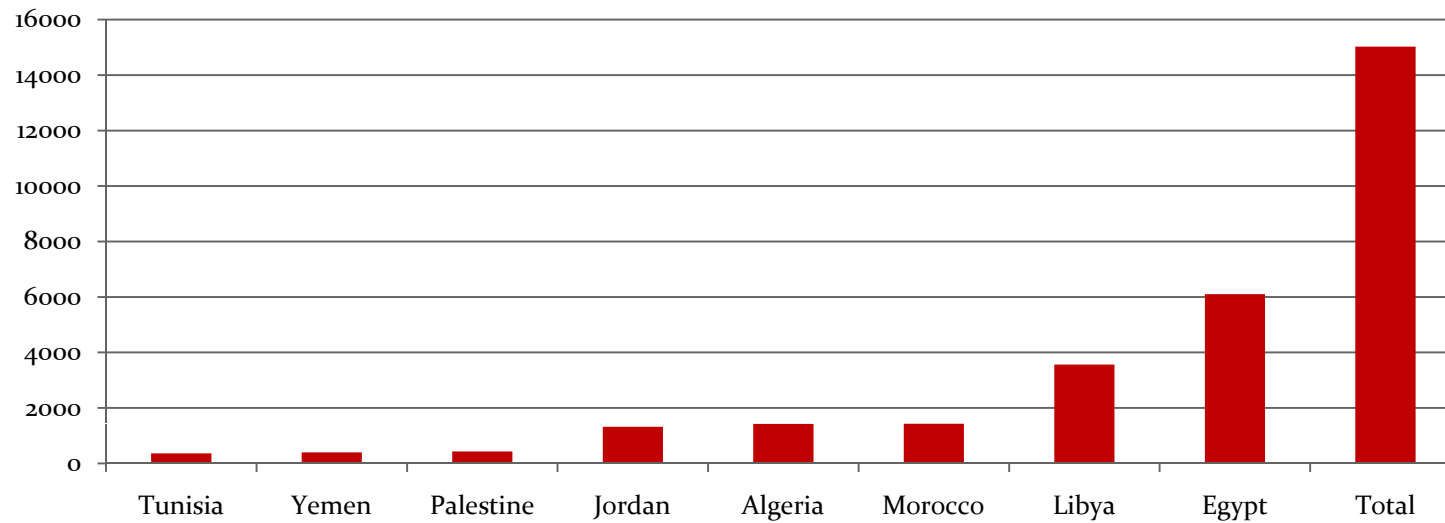
Real price of Electricity





Externalities 2020 (Announced renewable energy targets)

Country	Total
Tunisia	362
Yemen	396
Palestine	431
Jordan	1322
Algeria	1422
Morocco	1428
Libya	3564
Egypt	6101
Total	15026




Savings by 2020

	Externalities (US cent per kWh)		Savings in term of externalities	% of externalities savings/kWh	Million dollar	2020
Country	2011	2020	US cent / kWh	Savings/2011	Total savings	Renewable energy target
Egypt	2.3	2.0	0.2	10.6%	723	20.0%
Jordan	4.7	4.3	0.4	9.2%	134	10.0%
Morocco	4.2	2.9	1.3	31.5%	658	42.0%
Palestine	5.9	5.3	0.6	9.5%	45	10.0%
Algeria	1.7	1.5	0.2	10.8%	172	15.0%
Libya	4.3	4.0	0.3	6.5%	247	7.0%
Tunisia	1.7	1.4	0.2	13.8%	58	18.0%
Yemen	4.4	3.8	0.6	14.6%	68	15.0%



CONCLUSION

- Electricity generation externalities estimates currently represents 12 billion \$ in the region, where the highest amounts are observed in Egypt and the lowest in Palestine.
 - Oil externalities represents 64% from the total externalities, while it only represents 32% from the current mix, which represents the importance of switching towards RE
 - In some countries, externalities/kWh are higher than the average electricity prices which leads to higher real prices which can reach the triple sometimes.
 - Increasing Renewable Energy targets is definitely helping countries to increase their savings per kWh, which may reach 2 billion dollars for the whole region in 2020.
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THANK YOU

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