

Feed-In Tariff as a Tool for Motivating the Use of Renewable Energy



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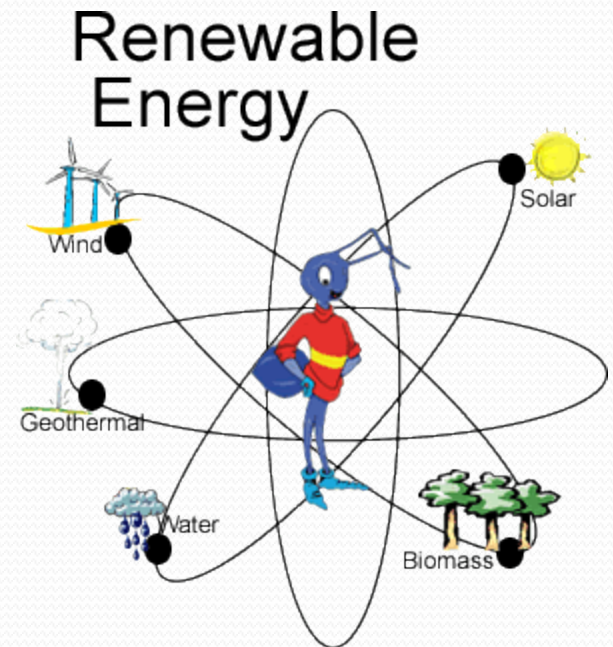


Scaling up the use of Renewable Energy in rural areas
in ESCWA Member Countries Workshop

1-2 February 2012, UN House, Beirut-Lebanon

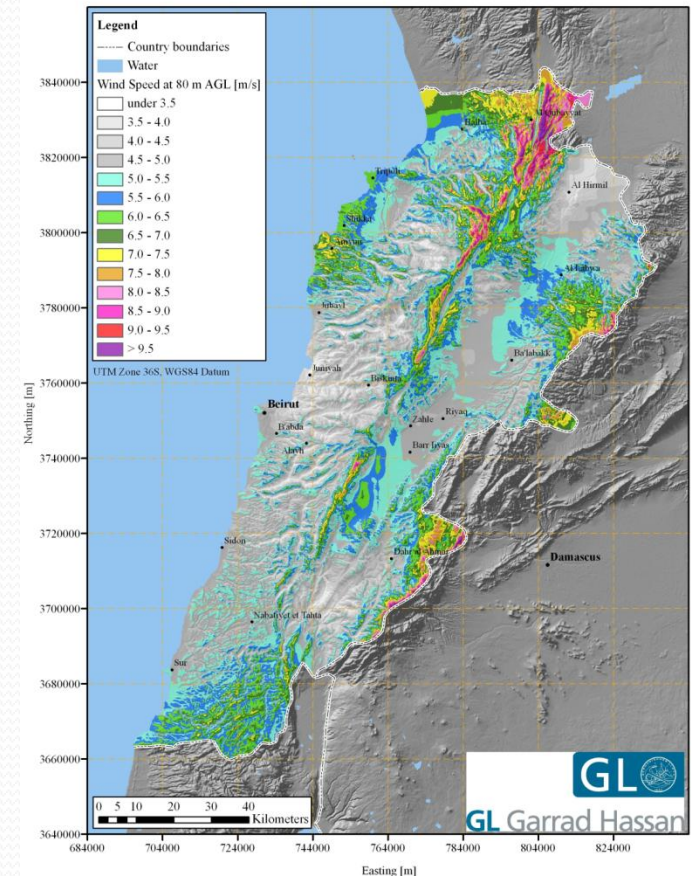
Basic Steps Towards Renewable Energy Implementation

- Identification of relevant electricity-generating technologies:
 - Concentrated Solar power (CSP)
 - Photovoltaic (PV)
 - Wind Energy
 - Hydropower
 - Tides and waves
 - Geothermal
 - Biomass



General Resource Assessment

- Solar irradiation map (for CSP and PV)
- Wind Atlas (for wind power)
- Long term data collection (For hydropower, tides and waves)
- Field studies and Surveys (for geothermal and Biomass)



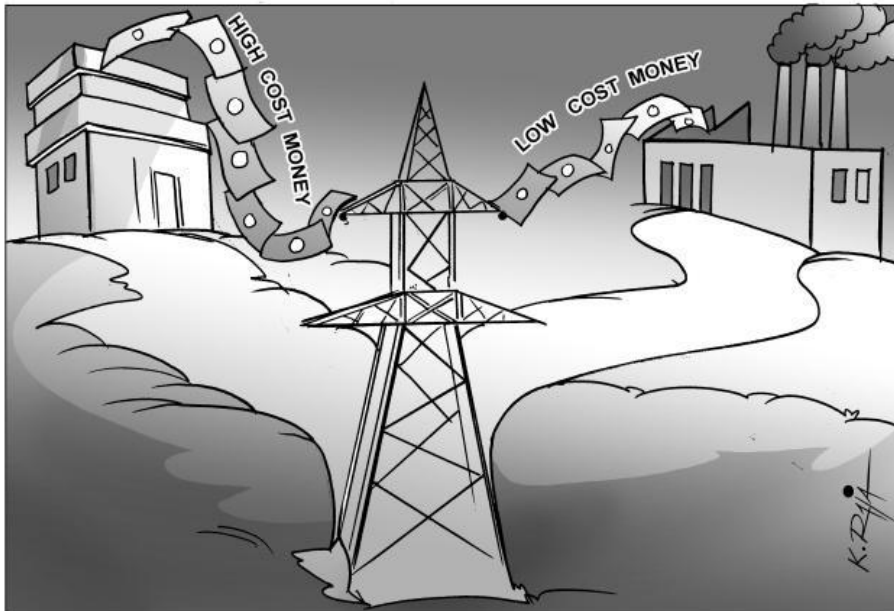
Identifying a site

- Micro-siting and site-specific analysis
- Environmental impact assessment
- Feasibility study
- Legislative framework



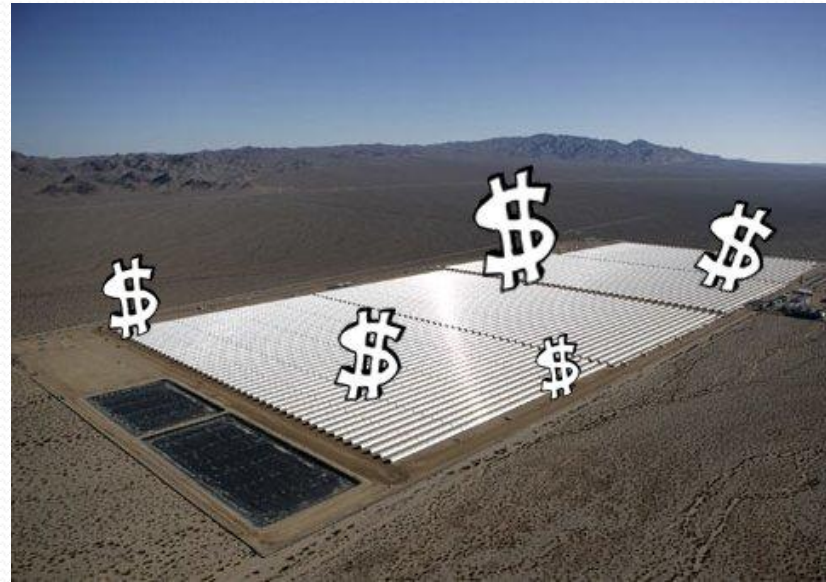
Starting a project

- What technology will be used?
- What business setup will we have?
- Who do we sell the electricity to?
- How do we sell the electricity?
- Are there any experiences to benefit from?



RE promotion formats

- Government taking the initiative
- Public Private Partnerships
- Renewable Energy Certificates
- Investment tax credits
- Production tax credits
- Renewables Portfolio Standards
- Net metering
- The most successful by far has been the Feed-In Tariff (FIT)
- Key legal legislation, including FIT, in Europe can be found in the following website: <http://www.res-legal.de/en/>



World Wind Energy Association Newsletter



- Has a specific section on FIT progress around the world in their Newsletter

Feed-in Tariffs and Community Power Around the World

[World: "Citizen Power" Conference to be held in Historic Chamber Where World's First Feed-in Law Was Enacted](#)

Germany, a country where 51% of the renewable energy generation is owned by its own citizens, will be hosting an international conference on community power 3-5 July, 2012 in Bonn, the former capital.

[Call for Papers: WWEC2012 "Community Power - Citizens' Power", Bonn, Germany, 3-5 July 2012](#)

WWEA and the German Wind Energy Association BWE are pleased to invite papers and presentations for the 11th World Wind Energy Conference and Exhibition "Community Power - Citizens' Power" taking place in Bonn, Germany, from 3-5 July 2012.

[World: US Climate Negotiator Calls for Feed-in Tariffs](#)

Todd Stern, the head of the climate change negotiating team for the US Government called for Feed-in Tariff policies

[Canada: Unlikely Coalition Joins Forces to Recommend Changes to Ontario's Feed-in Tariff Program](#)

Renewable energy advocates and a solar industry trade group filed a joint submission on December 14, 2011 as part of the province of Ontario's scheduled two-year review of its groundbreaking feed-in tariff (FIT) program.

[Canada: Smitherman plugs back in to green-energy debate](#)

There have been more than 2900 public submissions to the Ontario government's two-year review of its controversial green-energy strategy.

[UK: Co-operative renewable energy in the UK: a guide to this growing sector](#)

Co-operatively-owned energy generation is a vibrant and growing sector in the UK.

http://www.wwindea.org/home/index.php/&img=images/stories/index.php?option=com_performs&formid=1&Itemid=69

List of Countries With a Feed-In Law

Algeria	Finland	Latvia	Slovenia
Argentina	France	Lithuania	South Africa
Australia	Germany	Luembourg	South Korea
Austria	Greece	Macedonia	Spain
Bulgaria	Hungary	Malta	Sri Lanka
Canada	India	Mongolia	Switzerland
China	Indonesia	Morocco	Tanzania
Cyprus	Iran	Nicaragua	Thailand
Czech Republic	Ireland	Pakistan	Turkey
Denmark	Israel	Philippines	Uganda
Dominican Republic	Italy	Portugal	Ukraine
Ecuador	Japan	Serbia	United Kingdom
Estonia	Kenya	Slovakia	United States

What is the best application of FIT?

- The German Renewable Energy Act, EEG (Erneuerbare Energien Gesetz) or Act on Granting Priority to Renewable Energy Sources (revised 2009).
- Results? Renewables provide:
 - 17% of electricity
 - 8% of heat
 - 6% of fuel
 - Jobs for 350,000 people
- Germany today is the home of many RE companies



Pillars of the Feed-In Laws

- Grid Priority is given to RE generation facilities
- Price guarantees for every KWh generated, either fixed price or with a premium over market price.
- Long term guaranteed payments, up to 20 years
- Anyone can participate on almost any scale
- Remuneration rates reflect the costs of the RE technology or other country specific calculation
- Costs are paid by the consumers, electricity company or the government.
- Rates may undergo an annual or periodic degression (1% annually in Germany)
- The program may have a cap (annual or overall)

Samples of FIT Application – Bosnia

Simplest Formula

- 6.1 €/kWh for all RE application



Samples of FIT Application – Iran

Depending on time of day

All Renewables	€/kWh
Peak & Medium Load 20 hours	9.04
Low Load (4 hours)	6.26



Samples of FIT Application – China

Zone differentiation

Wind Onshore	€/kWh
Category 1 Energy Zone	5.92
Category 2 Energy Zone	6.26
Category 3 Energy Zone	6.73
Category 4 Energy Zone	7.08



Samples of FIT Application – Pakistan

Owner and time differentiation

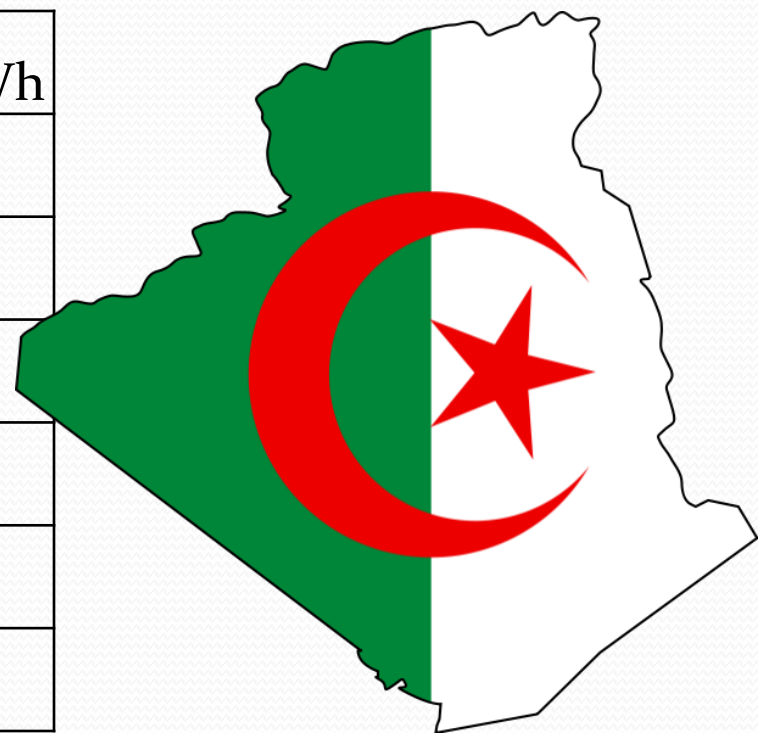
Wind	Years	€/kWh
Foreign owned		
	1-10	12.37
	11-20	5.76
Domestic owned		
	1-10	17.63
	11-20	6.14



Samples of FIT Application – Algeria

Depending on base rate and technology

	% of Base Rate	€/kWh
Base Rate		3.52
Wind Energy	300%	10.6
Solar Photovoltaics	300%	10.6
Concentrating Solar	200%	7.03
Hydro	100%	3.52
Waste	200%	7.03



Sample - Austria

Depends on technology, source and size



	Years	€/kWh
Wind Energy	13	9.7
Photovoltaics		
<5 kW	13	n/a
5-20 kW	13	38
>20 kW	13	33
Sewage Gas	13	6
Landfill Gas	13	5
Geothermal	13	7.5
Biogas		
<250 kW	15	18.5
250 kW-500 kW	15	16.5
>500 kW	15	13
CHP Bonus	15	2
Pipeline Bonus	15	2
Biomass		
<500 kW	15	14.98
500-1000 kW	15	13.54
1 MW-1.5 MW	15	13.1
1.5 MW-2 MW	15	12.97
2 MW-5 MW	15	12.26
5 MW-10 MW	15	12.06
>10 MW	15	10
		0
Biomass Waste	15	5
Biomass Co-firing	15	6.12
Liquid Biomass	15	5.8
CHP Bonus	15	2

Sample - Turkey

Special emphasis on “Locally Made”

Program Cap: 600 MW/yr



Technology	€/kWh
Wind	5.3
Hydro	5.3
Geothermal	7.63
Solar	9.66
Biomass & landfill gas	9.66
Bonus Payment for "Made in Turkey" Components	
Wind	
Blades	0.58
Generator & power electronics	0.73
Tower	0.44
All other mechanical components	0.94
Hydro	
Turbine	0.94
Generator & power electronics	0.73
Geothermal	
Steam or gas turbine	0.94
Generator & power electronics	5.09
Steam injector or gas compressor	5.09
Solar PV	
PV panel integration	0.58
Modules	0.94
Cells which constitute modules	2.54
Inverter	0.44
Tracking system	0.36
Concentrating Solar	
Heat tube	1.74
Mirrors	0.44
Tracking system	0.44
Mechanical components of heat storage	0.94
Mechanical components of heat collection	1.74
Stirling Engine	0.94
Panel integration and mechanical construction	4.36
Biomass & landfill gas	
Fluidized bed steam boiler	0.58
Liquid or gas fueled steam boiler	0.29
Gasification & gas cleaning components	0.44
Steam or gas turbine	1.45
ICE or Stirling engine	0.65
Generator & power electronics	0.36
Cogeneration	0.29

So which Feed-In application to apply?

- Country specific
- Basis of comparison: cost of electricity to consumer or to the government
- Objective: Saving money or the environment



Potential for ESCWA countries

Group 1: Countries that subsidize electricity

- Part 1: For countries with cash surplus
 - Tariffs should promote investment in RE and in generating local components, employment and experience.
 - They can afford to pay more than the current electricity generation cost to be more environmentally friendly
- Part 2: For countries with no cash surplus
 - Tariffs should simply be below current generation costs with a degression component to enhance speedy adoption.
 - This will leave some technologies out but will get the mature and efficient technologies first.
 - Will result in immediate cash savings

Potential for ESCWA countries

Group 2: Countries that do not subsidize electricity

- Tariffs should be lower than current generation costs
- Only home-made technologies can afford to be supported with higher prices
- A technology-based pricing should be adopted to have a balanced growth

A Case Study for Lebanon - Status

- Electricity generation cost of around 20 cents/KWh.
- Subsidized price to consumers of around 7 cents/KWh.
- Intermittent power supply.
- Monopoly of generation and distribution by EDL.
- Abundant documented wind, hydro and biomass resources available.
- Lack of RE technical practical expertise

A Case Study for Lebanon

Action Plan

- Change the law monopolizing electricity generation to allow independent producers
- Set an RE tariff of 15 cents/KWh for 2013 with a contract for 5 years to kick start investment
- Reduce RE tariff by 1 cent per year for new contracts while maintaining their contracts for 5 years
- After five years, the tariff will be reduced gradually
- Electricity must be supplied 24/7 in the areas where RE is to be implemented

Scenario Results

- According to the table below, Lebanon will be able to reduce its electricity generation cost to 7 cents/KWh by 2028 on all contracts.
- This scenario will rapidly start projects, will cost the government less and provide the country with more electricity

[illegible]

Scenario Results

- It is clear that this scenario will selectively favor wind energy and probably hydropower
- Expensive technologies will not play a role
- Electricity availability will increase in all territories
- Remote and rural areas will feel the benefits of RE as they will be getting electricity 24/7.
- More advanced studies will be needed to appropriately price other RE sources.
- This is only one potential scenario.

Conclusions

- Feed-In Tariff is an established and proven way to promote RE.
- Different scenarios apply for different countries.
- It enables the utilization of readily available international and local expertise immediately
- It will save money if appropriately priced.
- It will save the local and global environment and reduce stresses on natural resources

Thank You

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