Feed in Tariff: How to adapt it in a developing economy…

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Support Mechanisms for the Renewables

- income tax deductions,
- property tax exemptions,
- tax credits,
- loans or loan guaranties,
- investment credit subsidies
- depreciation allowances

&

- FITs.

… as the most effective and efficient mechanism.

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What is FIT?

A **feed-in tariff** (**FIT**) is a policy mechanism designed to encourage the adoption of renewable energy sources and to help accelerate the move toward grid parity.

Key provisions:

- guaranteed grid access,
- long-term contracts for the electricity produced
- purchase prices that are based on the cost of renewable energy generation and tend towards grid parity

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FIT: Advantages

Promote

- Renewable energy investments
- Alternative/new energy sources **(diversification)**
- Domestic low entensity energy sources
- Renewable energy technology development
- Qualified and low level labour employment
- Stability for suppliers
- Simplicity for utility managers
- Distributed/small scale energy generation

Reduce

- Carbon emissions and pollution
- Dependency on fossil fuels

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FIT: Characteristics

- Typical Time: 10-20 years
- Convergence to grid parity expected
- Cost shared by consumers/tax payers
- Standardization critical
- Control and inspection critical
- Local electric companies unwilling to increase number of auto-generators.
- Technical problems of renewable technologies (gird management, intermittent suppy etc.)

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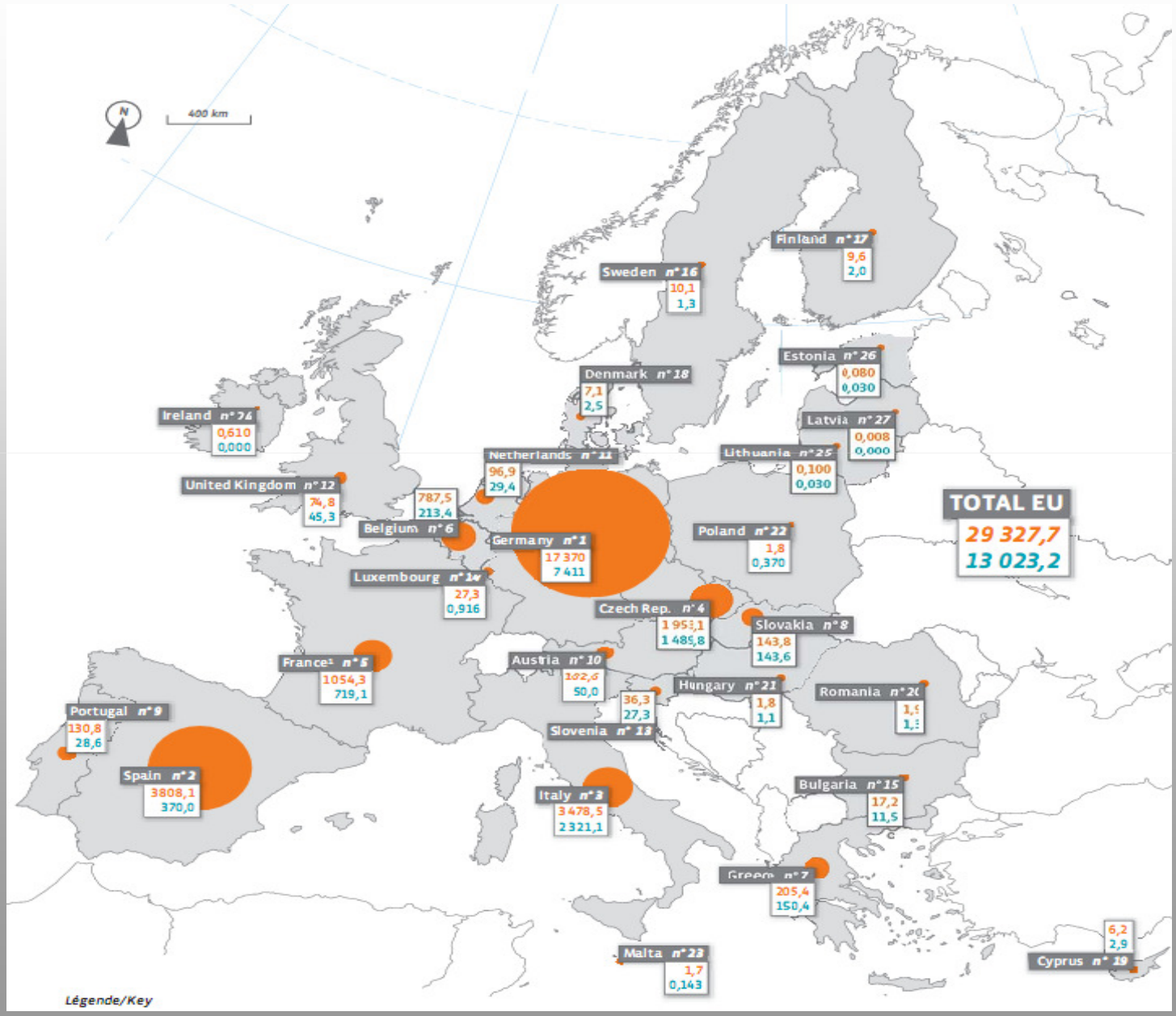
PV Map of EU (2010)



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PV Installations & FIT

	2009	2010
Germany	6 578,0	12 000,0
Spain	5 962,0	6302,0
Italy	677,0	1 600,0
Belgium	487,9	669,3
Czech Republic	88,8	615,6
France	215,0	600,0
Portugal	160,0	213,3
Greece	62,4	138,4
Slovakia	0,2	80,0
Netherlands	46,0	70,0
United Kingdom	26,5	41,8
Austria	21,0	26,0
Bulgaria	3,3	24,0
Luxembourg	20,3	21,0
Slovenia	4,2	15,0
Sweden	7,1	9,4
Finland	6,0	6,9
Denmark	3,7	5,7
Cyprus	2,9	5,6
Malta	1,1	2,6
Poland	1,2	1,8
Romania	0,8	1,7
Hungary	0,8	1,0
Ireland	0,4	0,4
Lithuania	0,0	0,1
Estonia	0,0	0,1
Latvia	0,0	0,0
Total EU 27	**14 376,6**	**22 451,6**

Estimation. Estimate. Les décimales sont séparées par une virgule. Decimals are written with a comma. Source : EurObserv'ER 2011.

Country	FIT started
Germany	1990/2000/ 2004
Spain	2004
Italy	2005/2007
Belgium	2004/2007
Chech Rep.	2000/2004

Revisions are made everywhere in 2011.

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Case: Evolution of Germany's FIT

- **Electricity Feed in Law (StrEG, 1990)**

  FIT: 65-90% of retail price, wind and small hydro
- **Energy Supply Industry Act (2000)**

  Deregulation and liberalization of the electricity market
- **Renewable energy sources act (EEG, 2000)**

  Fixed FITs based on type, size and site, fixed periods, to be adjusted biannually
- **EEG Amendment (2004)**

  Target commitments for 2010 (12.5%) and 2020 (20%), 20 year fixed period, annual reduction of 1-6.5%, "rationally" adjusted FITs

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Case: Germany

- Long period of evolution/fine tuning
- Penetration of renewables 11.8% by 2006
- Renewable targets were elevated
- Between 2000-2004 electric power from
  - wind and biomass doubled;
  - sun increased nine times
- 33 M tonnes of CO_2 prevented
- A strong renewable sector formed;
  - €21.6 Billion in 2006
  - 214,000 employees
- **Yet**, facing difficulties in global competition.

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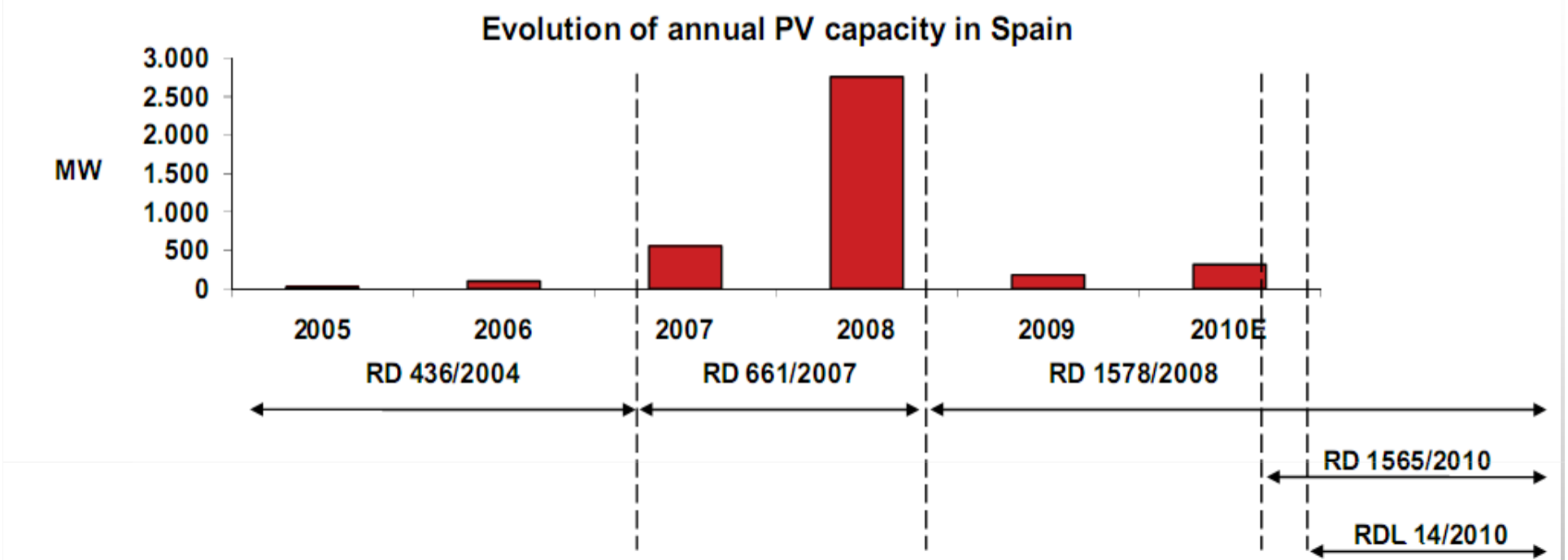
Case: Spain / Solar PV



Tariffs (Eu ct/kWh)

Ground	44*	44	32	14
Roof	44*	44	34	20-29

Caps (MW)

None	None	~500	~500

Note: * 575% of pool electricity price
Source: Eclareon research; Eclareon Analysis

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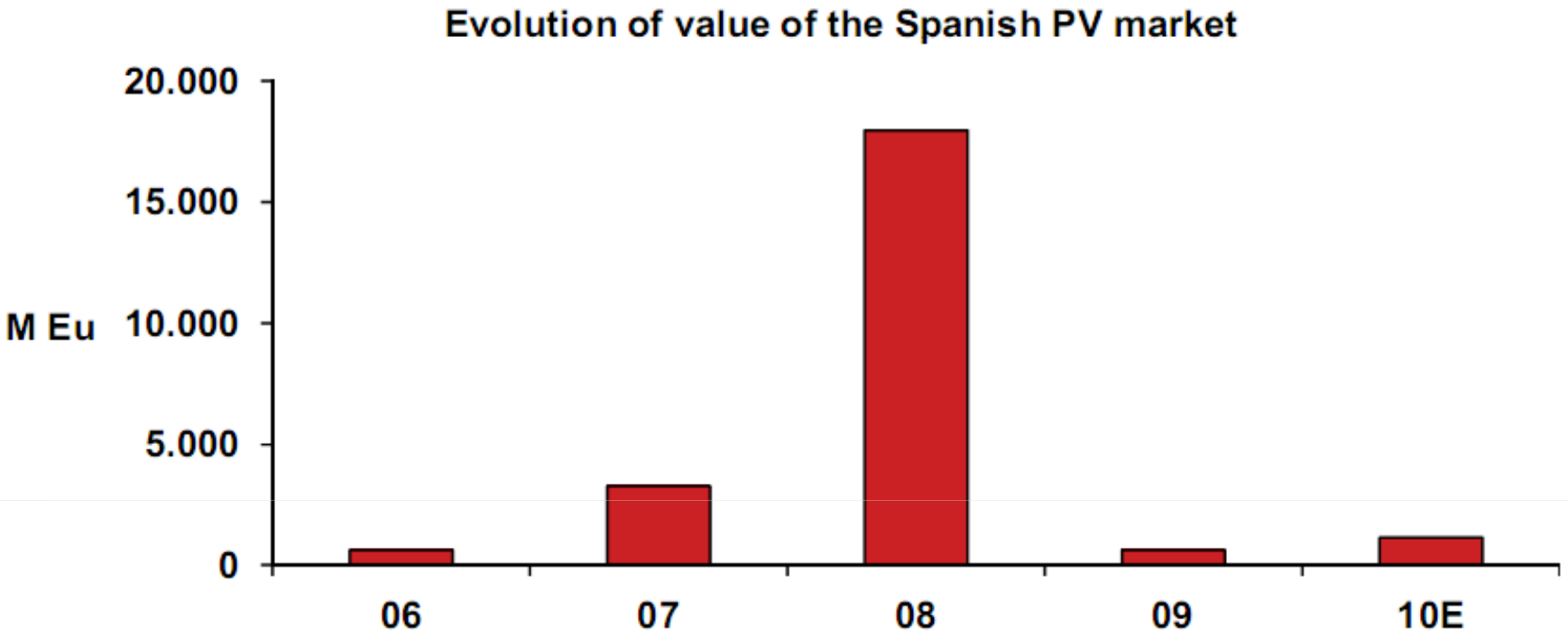
Evolution of a FIT program with large solar resource, weak PV system production…

Case: Spain



	06	07	08	09	10E
New installed annual (MW)	98	556	2.757	180	400
Average price* (€/Wp)	6,3	5,9	6,5	3,5	2,8

Note: *Turnkey price
Source: Eclareon research; Eclareon Analysis

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Generous FIT causes a rush of imported technology investment at high cost.

Solar PV production

Entreprises *Companies*	Pays *Country*	Technologie des cellules** *Cell technology***	*Production capacity*		*Production*	
			2010	2011	2009	2010
Suntech Power	China	Crystalline (mono, multi)/ Thin Film (a-Si, mc-Si)	1 800	2 400	704	1 572
JA Solar	China	Crystalline (multi)	1 800	3 000	509	1 460
First Solar	USA	Thin film modules (CdTe)	1 502	2 254	1 100	1 412
Trina Solar	China	Crystalline (mono)	1 200	1 900	399	1 064
Yingli Green Energy	China	Crystalline (multi)	980	1 700	525	1 062
Q-Cells	Germany	Crystalline (mono, multi)/Thin Film (CIGS, CdTe)	1 235	1 335	551	1 014
Motech Industries	Taiwan	Crystalline (mono, multi)	1 200	1 800	360	945
Sharp	Japan	Crystalline (mono, multi)/ Thin Film (a-Si, mc-Si)	1 000	1 400	595	910
Gintech	Taiwan	Crystalline (mono, multi)	930	1 500	368	827
Kyocera	Japan	Crystalline (mono, multi)	n.a	1 000	400	650

* *Estimation. Estimate. Les décimales sont séparées par une virgule. Decimals are written with a comma. ** CdTe : tellurure de cadmium (Cadmium teluride), a-Si : silicium amorphe (amorphous silicon), mc-SI : silicium microcristallin (microcrystalline silicon), CIGS : cuivre indium gallium sélénium (copper indium gallium diselenide), silicium monocristallin (monocrystalline silicon), silicium polycristallin (multicrystalline silicon). Source : EurObserv'ER 2011.*

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Case: Turkey

- More job
- Reasonable cost
- Support for industry to grow
- Increase export
- Less dependent on foreign technology/products.
- Less dependency on imported fuel
- Less environmental effects,…

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Case: Turkey

Renewable Energy Law in **2005**

- Covered wind energy (0.055 €/kWh).
- Licensing needed above 500 kW plant.
- Wind energy licenses did not require resource assessment. A huge flood of license applications
- Solar and biomass energy not covered.

Result:

- A slow wind energy penetration (upto 1,5 GW)
- Heavy investment on natural gas and coal powered plants continued.
- Unlicensed generation by-law issued end of Oct. 2010.

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Case: Turkey

Renewable En. Law Amendment in Jan. **2011**

- Solar PV (0.133+…=0.20 USD/kWh)
- Solar CSP (0.133 +…= 0.018 USD/kWh)
- Bio-gas/bio-mass (0.133 USD/kWh +…)
- Geothermal …
- Extras are given to domestic plant content
- By-laws (stardardization and metering) are being prepared.
- 600 MW license cap until the end of 2013.
- 10 yr fixed price guarantee.
- Tariffs may be revised in 2014.

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Problems and Upportunities

- Successful FIT programs (German and Danish) lead to strong a technological sector as well as market penetration.
- Weak FIT programs lead to unstable penetration and put unbearable load on consumers or are not effective at all.
- A “one size fits all” approach to FIT design does not work.
- Every country should consider strength of total economy (technology) as well as the energy resource.

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Lessons Learned: Key Elements

- Impose priority purchase obligation
- Determine the technologies and plants to be covered
- Determine a “good” tariff rate
- Determine a “good” guaranteed purchase period
- Determine an effective finance mechanism
- Reduce the tariff rate annually
- Do all in transparent manner to gain investor and consumer trust

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Solar FIT: Musts

- be simple for suppliers/investors to participate
- have widespread support from within the domestic energy industry
- adapt to the existing market structure rather than be counter-intuitive to it
- inspire technology providers to offer competitive products

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What is needed?

- Reasonably determined purchase price
- Provide necessary grid infrastructure
- Effective metering and control systems
- The option for generators to trade on a free market
- Power sales and renewable certificates remain accessible to suppliers
- Customers with microgeneration can switch suppliers
- Suppliers supporting many micro-generators do not suffer financially

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Summary

- FIT is a strong support mechanism for renewable energy in a liberated energy market.
- FITs must be designed as a controllable tool to promote renewable energy in financially sustainable conditions.
- Tariff pricing should be transparent as **cost + reasonable profit** to be attractive for investors
- License quotas are needed as a control tool.
- 20-30 year purchase guarantees are too long for a rapidly developing and cheapening technology.

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What can be done?

- The FIT programs of advanced European countries not suitable for developing economies of the South East Europe (Balkans) region.
- Balkan countries can use and export renewable energy products in the medium run
- Generous FITs only benefit low cost imports from big PV equipment manufacturers
- To eliminate risk of overloading the FIT subsidy, control mechanisms such as quotas and resource assessment requirements should be used by the administrative authority.

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THANK YOU

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