Measures for diffusion of solar PV are aligned in technology action plans for 6 countries in the African region

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Measures for diffusion of solar PV are aligned in technology action plans for 6 countries in the African region

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Outline of Presentation

- The TNA project approach
- Markets for PV
- Three examples of PV diffusion
- Commonly identified barriers
- Proposed measures
- Concluding remarks

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Technology needs assessment Project (TNA)

Funded by the GEF, and executed as part of the Strategic program for technology transfer agreed upon at COP14 in Poznan

Objective:

To identify and facilitate transfer and diffusion of technologies for climate change mitigation and adaptation though development of technology actions plans in non - annex 1 countries

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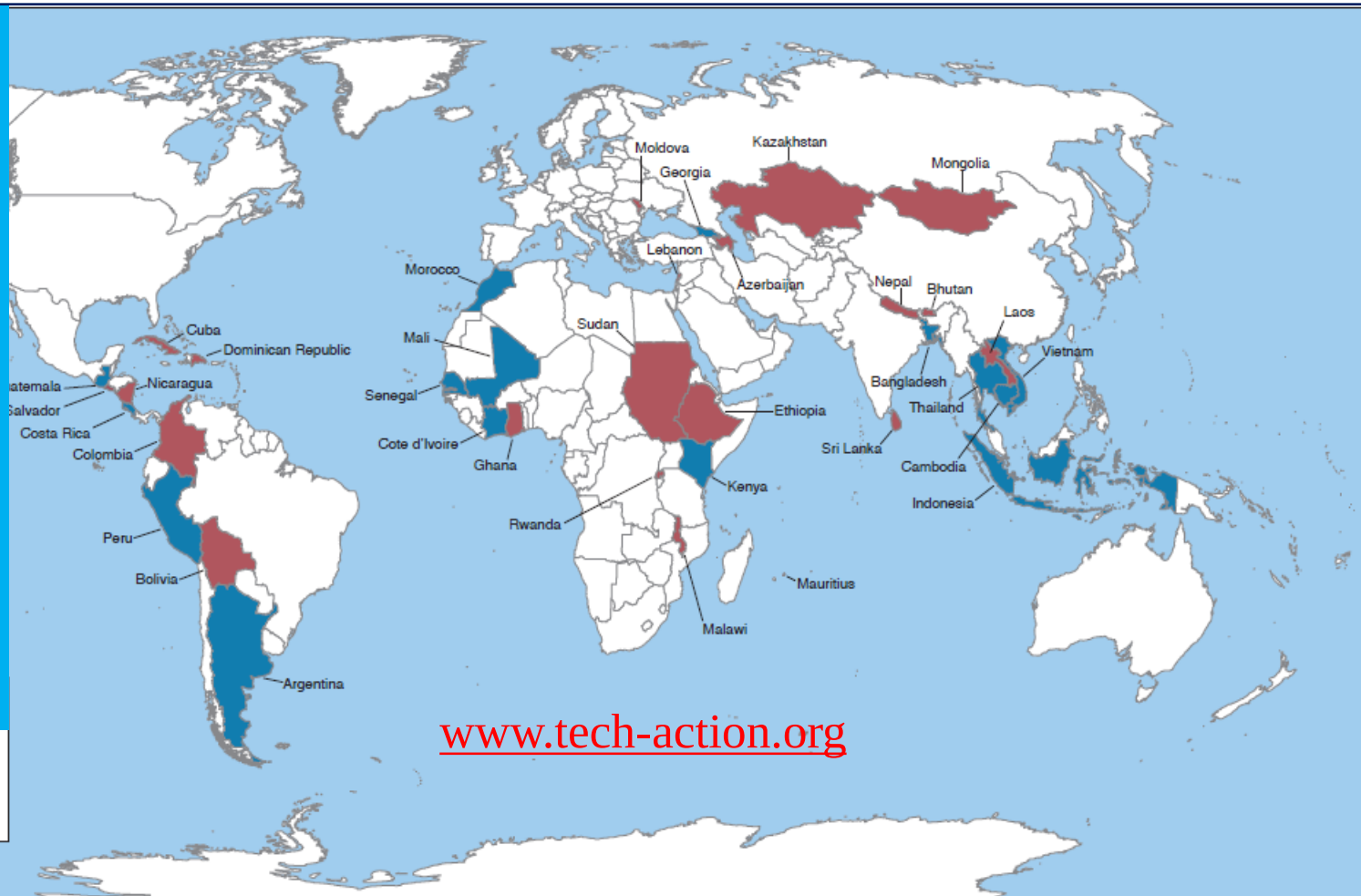
Geographical scope of the TNA project 36 countries (2010-2013)

AFRICA: Morocco, Senegal, Mali, Cote D'Ivoire, (Ghana), Sudan, (Ethiopia), Kenya, Rwanda, Zambia, Mauritius

2014-2017:

Burkina Faso
Burundi
Egypt
Gambia
Madagascar
Mauritania
Mozambique
Seychelles
Swaziland
Tanzania
Togo
Tunisia



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Technology Action Plans (TAP)

Step 1

- **Prioritizing technologies**
  - Multi criteria analysis, development priorities, marginal abatement costs, local employment, etc

Step 2

- **Barrier analysis for market penetration**
  - Economic, Legal, institutional, social, knowledge

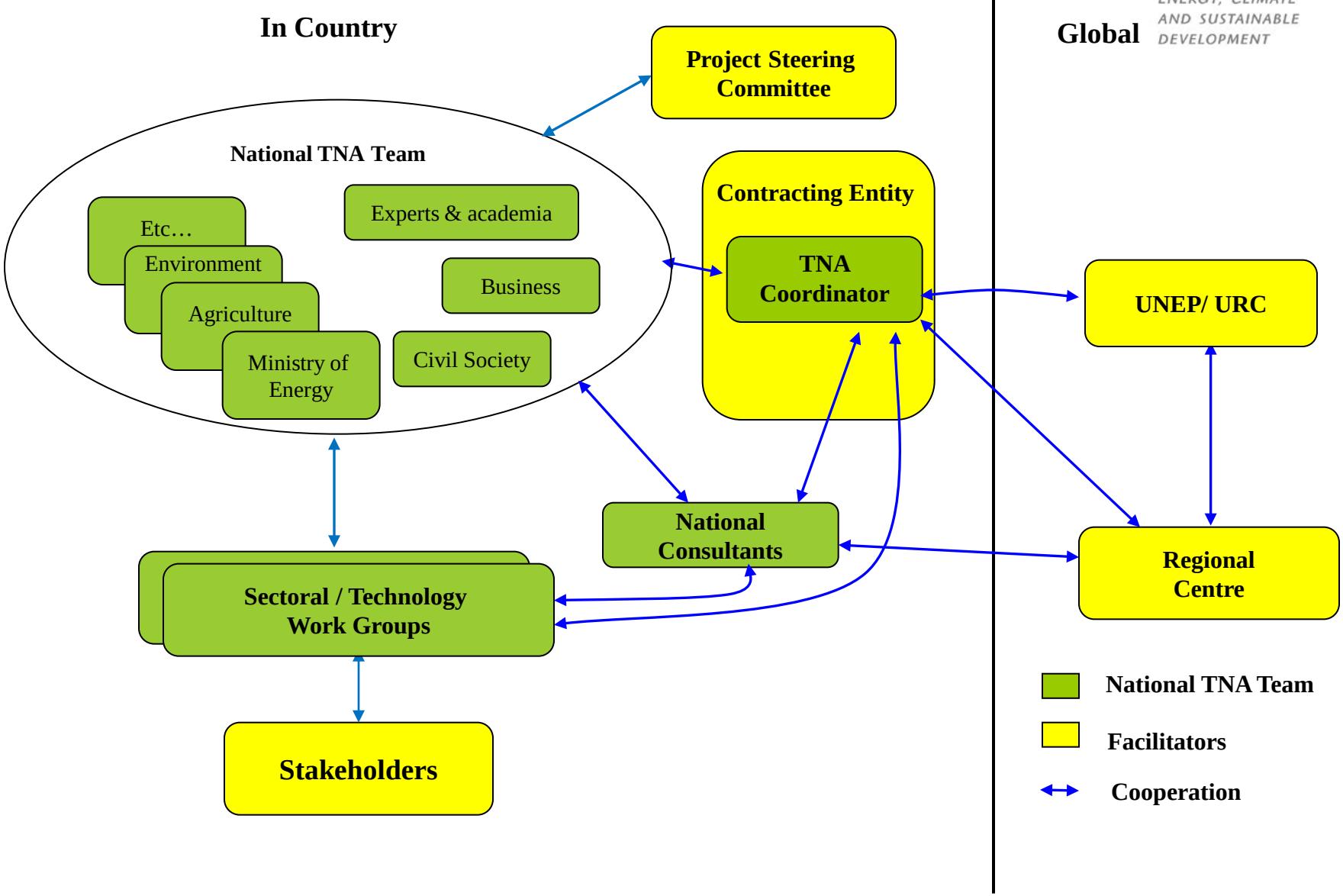
Step 3

- **Policy options – enabling framework**
  - Legal, institutional, Finance

Step 4

- **Technology action plan**
  - Prioritized policy options

Organisational Structure



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Markets, products and owners of PV

Market segment	Product and size	Owners
Grid connected	Large scale 1-50 MWp	IPPs, Utilities
	Roof top 1-10 KWp	Firms, private household
Mini-grids	Hybrid 5 kW-1 MWp	Utilities, Coops, ESCO
Institutions	Large SHS 50-500 Wp	Governm/ municip/ESCO
Waterpumping	PV pumps 50-500 Wp	Municip/CBOs/ESCO
Individual houses	SHS 10-100 Wp	Private, ESCOs
Lighting and charging mobiles	Lanterns 1-10 Wp	Private

Alternatives, competition and measures to diffuse PV on all markets are different

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Prioritized mitigation technologies

Technology group	Cote d'Ivoire	Kenya	Mali	Mauritius	Morocco	Rwanda	Senegal	Sudan	Zambia	Grand Total
Grand Total	**6**	**4**	**7**	**2**	**4**	**5**	**9**	**5**	**10**	**52**
Forest and agriculture			**3**						**3**	**6**
Transport						**1**		**1**		**2**
Waste	**2**	**1**								**3**
Energy	**4**	**3**	**4**	**2**	**4**	**4**	**9**	**4**	**7**	**41**

Specific technologies	Cote d'Ivoire	Kenya	Mali	Morocco	Rwanda	Senegal	Grand Total
Photovoltaic solar energy			1			1	2
Large Grid Connected PV			*		1	*	1
Solar Home Systems (SHS)	1	1	*			*	2
PV driven water pumping	1						1
PV lanterns						1	1
Concentrated PV for power plants				1			1
Molten salt for thermal solar plants				1			1
Solar Power	2	1	1	2	1	2	9

Technology group	Cote d'Ivoire	Kenya	Mali	Mauritius	Morocco	Rwanda	Senegal	Sudan	Zambia	Grand Total
Energy	**4**	**3**	**4**	**2**	**4**	**4**	**9**	**4**	**7**	**41**
2nd Gen Biofuels			1							1
Advanced Coal Technology								1		1
Biodiesel									3	3
Biogas								1		1
Biomass gasification									1	1
Biomass power							1			1
CFL's								1		1
Combined cycle power plant										
Combined heat and power						1	1			2
Efficient Lighting Systems							1			1
Efficient stoves			1					1	2	4
Geothermal Power						1			1	2
Hydro power	1		1			1				3
Less energy intensive products							2			2
Methane gas utilisation		1								1
Residential energy efficiency					1					1
Solar Heating/drying		1					1			2
Solar power	2	1	1		2	1	2			9
Tidal power					1					1
Waste Heat Recovery				1						1
Wind power				1			1			2
Briquetting	1									1

(*) means that it is included in the general PV category in first line

PV market development in Kenya

Solar PV Technology	Estimated installed capacity	Estimated capacity installed/year (2008)	Estimated financial volume[2] (€/Year/2008)	Degree of competition
Off-grid HH Electrification and Small Scale Commercial	> 6-8 MWp	> 700 kW	> 5 million Euros	Extremely competitive – many players
Off-Grid Community Systems (including institutional and pumping systems)	> 1.5 MWp	> 250 kW	> 2.5 million Euros	Dominated by wholesaler/agent partnerships
Telecom	> 100 kWp	100 kWp	N/A	Emergent – few players
Tourism	> 50 kWp	N/A	N/A	Emergent

Source: Hankins et al. (2009) Kenya's Solar Energy market, GTZ

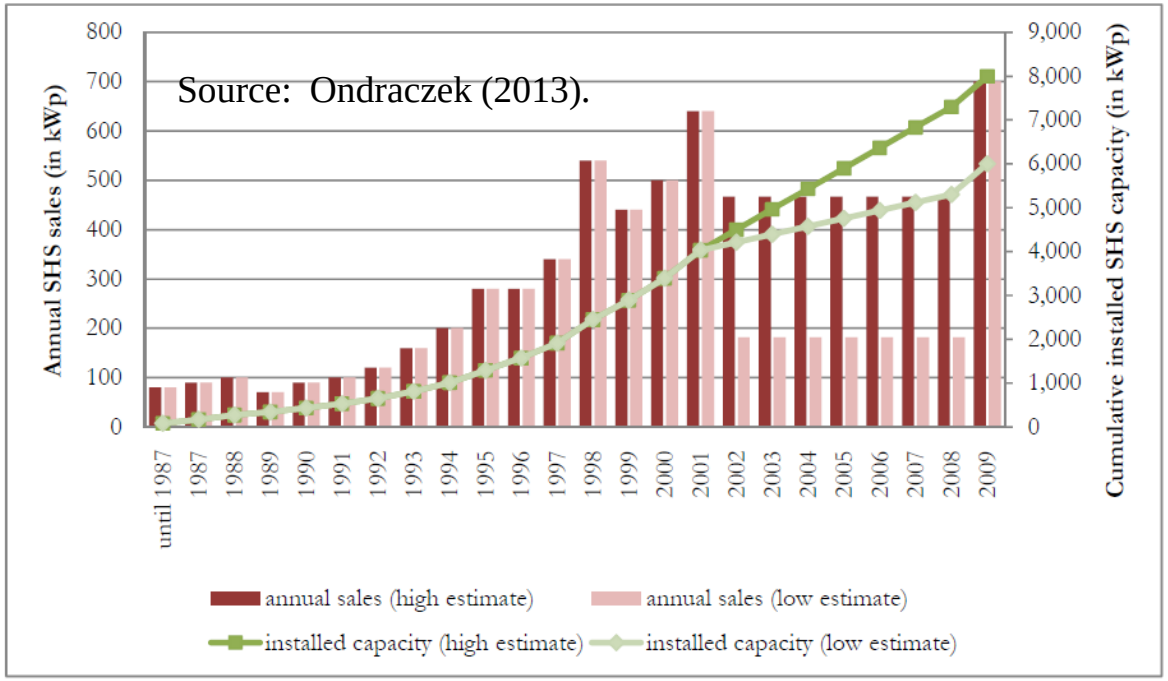
Ubbink (a Dutch subsidiary of the German group Centrotec) set up the first solar module manufacturing company in East Africa, located in Naivasha, Kenya.

(Tobias Gossen, GIZ, PV magazine 2013)

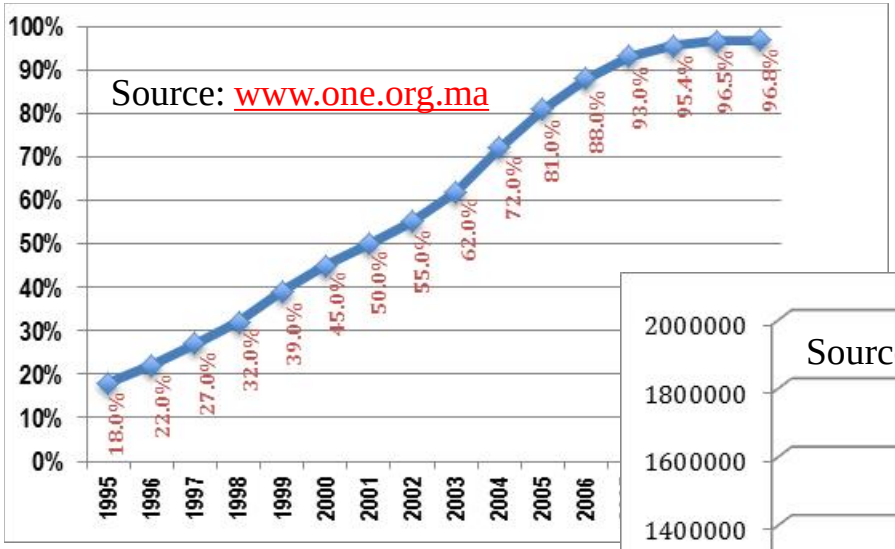
Grid connected systems (2013) (60 kW, 515 kW and 72 kW)

Total installed capacity in 2013: 20 MWp
Government vision in 2030: 300 MWp

(Tobias Gossen, GIZ, PV magazine 2013)



Rural electrification in Morocco



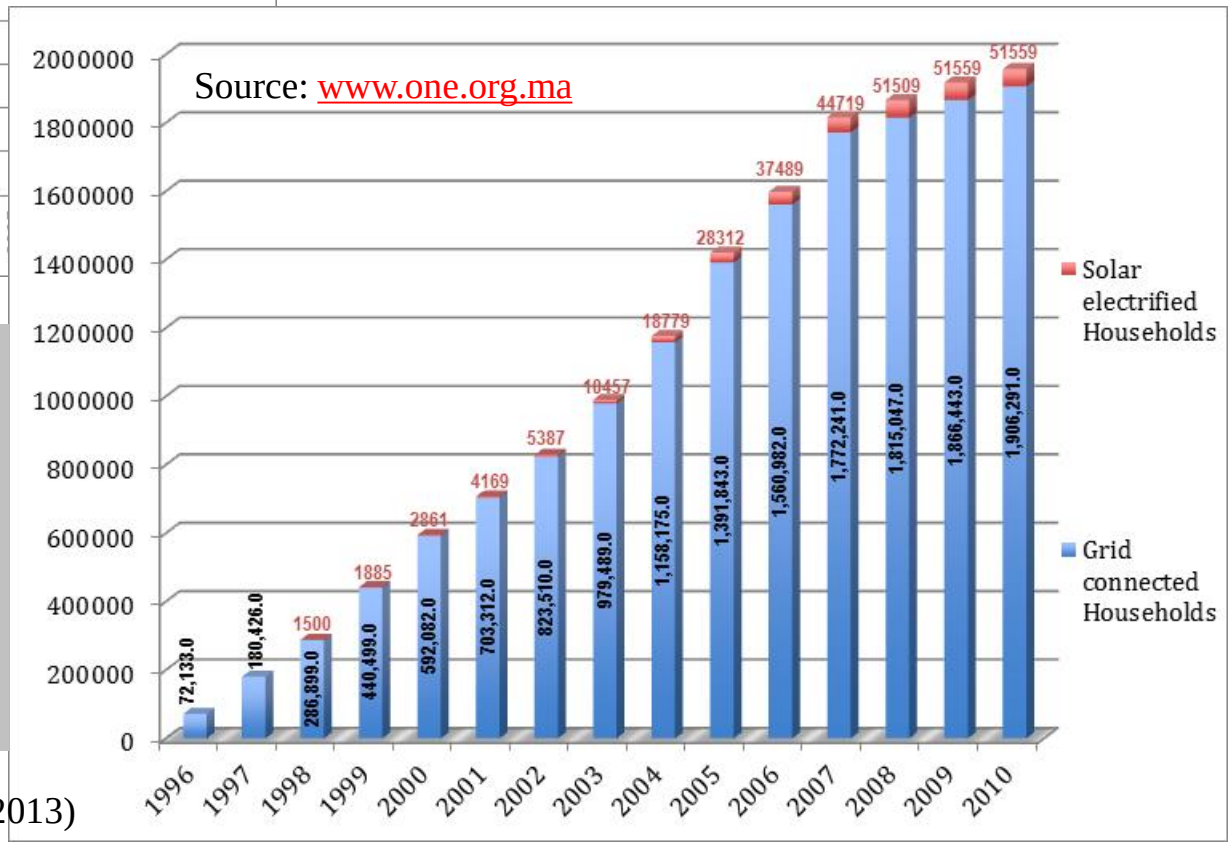
Small scale Grid connected PV (2008)
Promasol: 2* 200 kWp.

Source: EU parliament Library briefing (2013)

Large scale grid connected projects are mainly CSP projects
2010:
Mathar thermo-solar CC: 472/20 MW

Moroccan Integrated Solar Project:
Aim: 2000 MWp by 2019 on five sites:
2015: Quarzazate 1 SCP: 160 MW
201?: Quarzazate 2 SCP: 300 MW

Source: EU parliament Library briefing (2013)



Slow development and paradigm shift in Rwanda

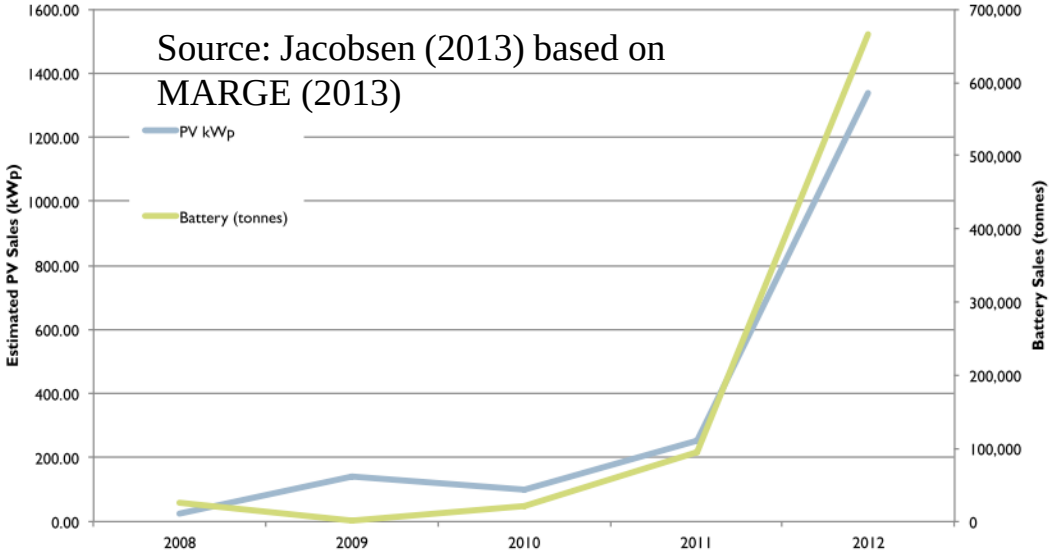
Solar PV technology	Size of opportunity	Estimated kWp installed/year (2008)	Notes
Government administrative centres	>0.4 MWp	±15 kW	Good government contacts required
Government clinics and schools	>1 MWp	±40 kW	World Bank, EU, Belgium
NGO & NGO health sector	>0.3 MWp	<±5 kWp	PEPFAR
Solar Home System	>4 MWp	N/A	Low rural spending power
TOTAL	**>6 MWp**	**>50kWp**	

Mainly donor driven market, limited spillover from neighboring Kenya

Source: Hankins et al. (2009). Rwanda's Solar Energy Market, GTZ.

Type of solar home systems	Size of system (Wp)	Estimated % of households buying	Total number	Size of market (kWp)
No System	0	55.0%	944,690	-
Micro Systems	2	35.0%	601,166	1,202
One Light & Radio	10	7.3%	124,527	1,245
Two light and radio system	20	2.0%	34,352	687
Four light system or higher	50	0.5%	8,588	429
Larger systems (inverter or hybrid)	150	0.3%	4,294	644
TOTAL		**100.0%**	**1,717,618**	**4,208 kWp**

Paradigm shift in 2012-13



Grid connected plants

250 kWp pilot plant in 2008
8.5 MWp plant in 2013 (contract signed)

International financing: Scatec, development banks

Source: PV-Magazin, 2013

Barriers for diffusion of PV

General barriers

- High upfront costs
  - Low volume, few suppliers, low competition
  - Imported equipment
  - VAT, import duties
- Low quality products and no or poorly enforced standards
- Low technical training level
- Low level of R&D

Large scale

- High production cost compared to alternatives
- Difficult access to soft loans, and venture capital
- No fixed selling prices (FIT)
- Few potential investors

Solar Home Systems

- Low purchasing power
- Difficult access to capital
- Poor delivery and service network in rural areas

Mini-grids

- Relatively few experiences with hybrid systems
- Rural electrification behind schedule
- Organisational and funding issues

Measures for diffusion of PV

General measures

- Support to local production
- Roadmap for incentives
  - Investment subsidies
  - Exemption from VAT, import duties
- Establishment and reinforcement of standards
- Support to technical training
- Support to R&D

Solar Home Systems

- Subsidies
- Soft loans, guaranties
- Increase security against theft

Large scale

- Feasibility study for large projects
- Standard PPAs
- Feed in Tariffs (FIT)

Mini-grids

- Support to up scaling of hybrid-systems (SREP)

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Concluding remarks

- From donors to markets
  - From being a niche for donor supported equipment PV is currently a viable or 'almost' viable alternative for consumers and private investors in all markets
- From projects to enabling frameworks
  - This means that donors and government officials need to move from 'project holders' to enabling framework specialists
  - The TNA project is strongly supporting this trajectory by its focus on enabling frameworks and analysis of markets and market actors.
- From import to local production
  - Upgrading in the global value chain in terms of local assembly of panels and local production of other system elements is an opportunity acknowledged by the TNA project participants.
  - The adequate and efficient support to this upgrading is a challenge, which are not only solved by the energy sector, but which needs expertise on learning in firms, technological innovation systems and niche development and involves a multi sectoral approach

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Thanks for your attention !