

# Measures identified in technology action plans to enhance national capacity

## The case of Solar PV in Africa

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## Outline of Presentation

- The TNA project approach
- Market mapping and NIS
- Measures proposed in technology action plans
- Interest in local assembly of PV panels
- Concluding remarks
- Reflections on using the NIS approach in a developing country context



# Technology Needs Assessment Project (TNA)

## Objective

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

## Funding

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

More info about the project at [www.tech-action.org](http://www.tech-action.org)

## Approach

Country driven process,

- Multi-stakeholder committees
- local consultants, stakeholder involvement

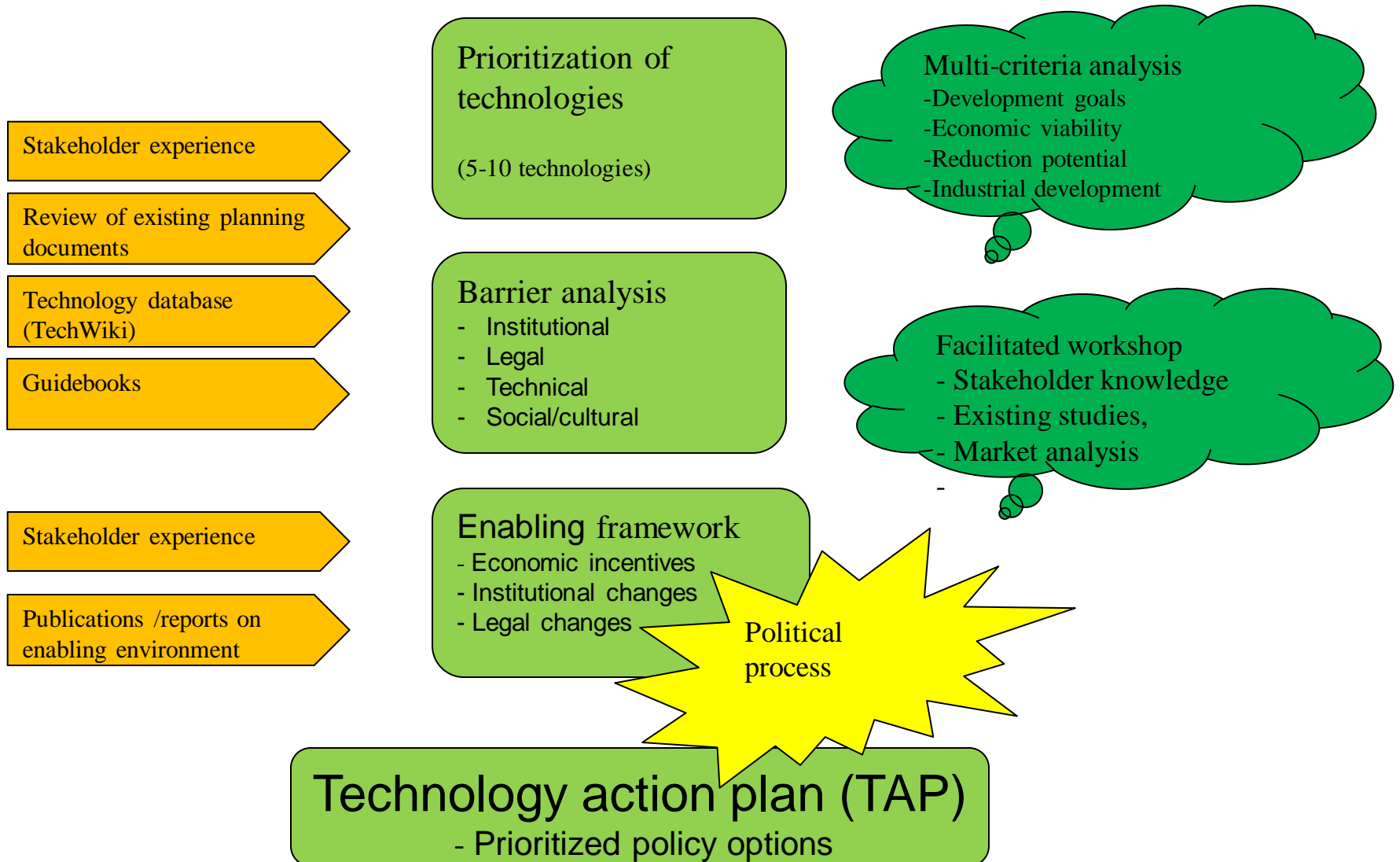
Executed by UNEP in cooperation with UDP, and 4 regional knowledge centres

- Methodology development,
- Capacity building,
- Project administration

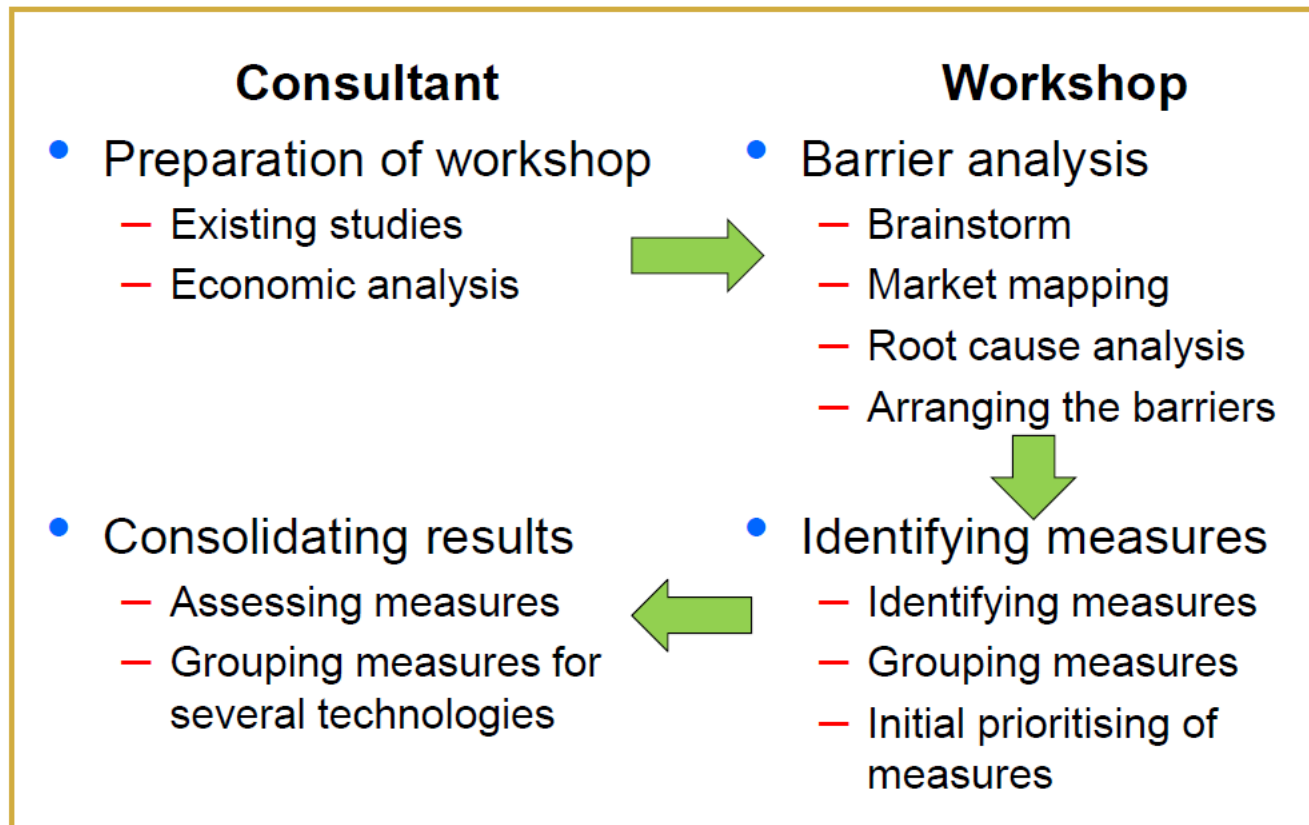
## Project implementation

- 2010-13, 36 countries
- 2014-17, 22 countries





## The process of capturing local knowledge and facilitating networking



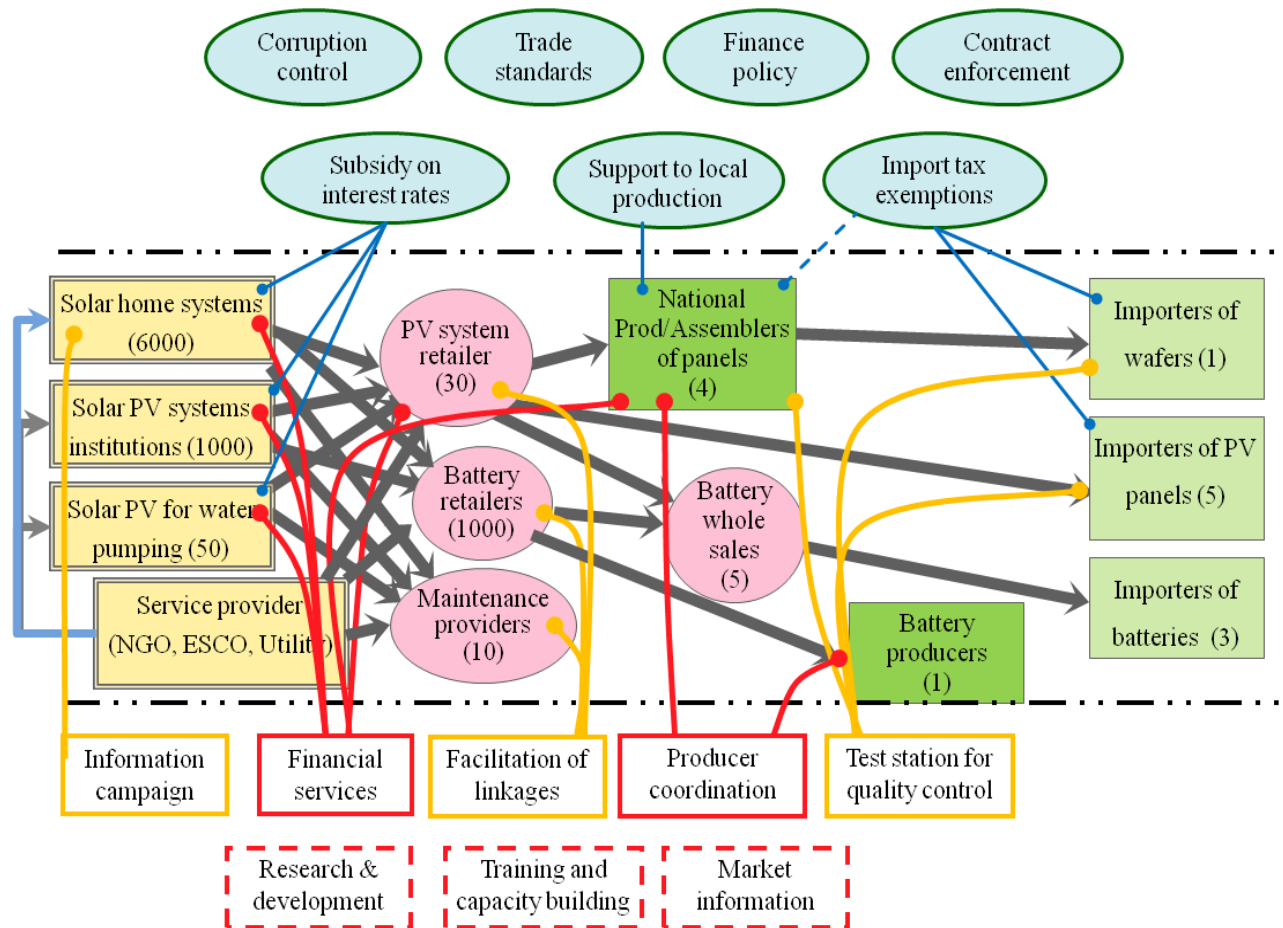
# Market mapping and Innovation Systems

Market maps were used to:

- encourage representatives from national government agencies to shift focus from projects to markets.
- understand the importance of analysing and strengthening
  - the whole value chain from the consumers and upwards the value chain
  - the linkages between actors in the value chain
  - the institutional setting (rules, norms and values)
  - the necessary supporting and service companies

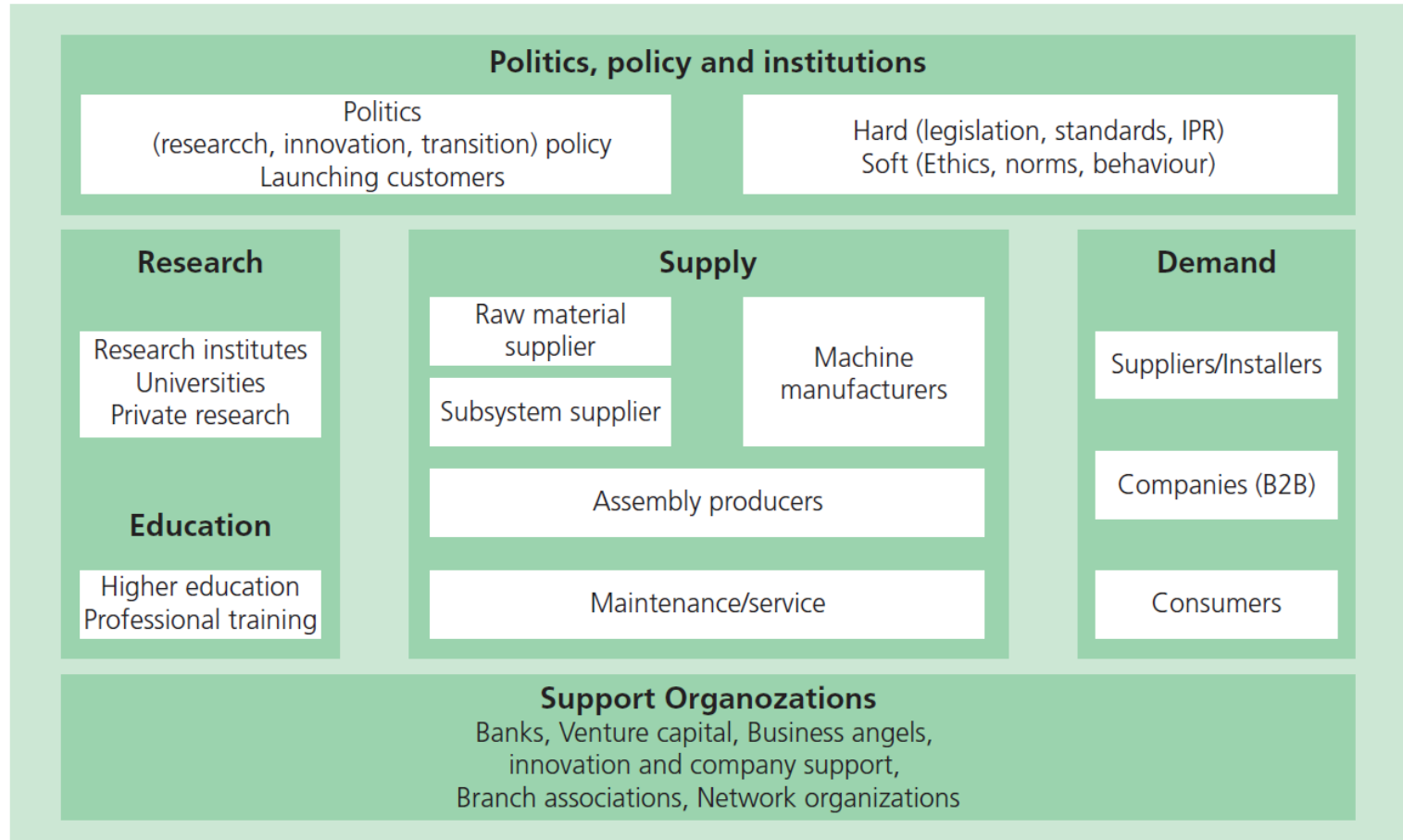
The market map includes the major analytical elements from National Innovation System (NIS) approach or Technical Innovation System approach (TIS)

# Market mapping of solar PV





# Technological Innovation Systems (Structural analysis)



Source: Hekkert, M.P., Negro, S.O., Heimeriks, G., Harmsen, R., 2011. Technological Innovation System Analysis - A manual for analysts. Faculty of Geosciences Utrecht University

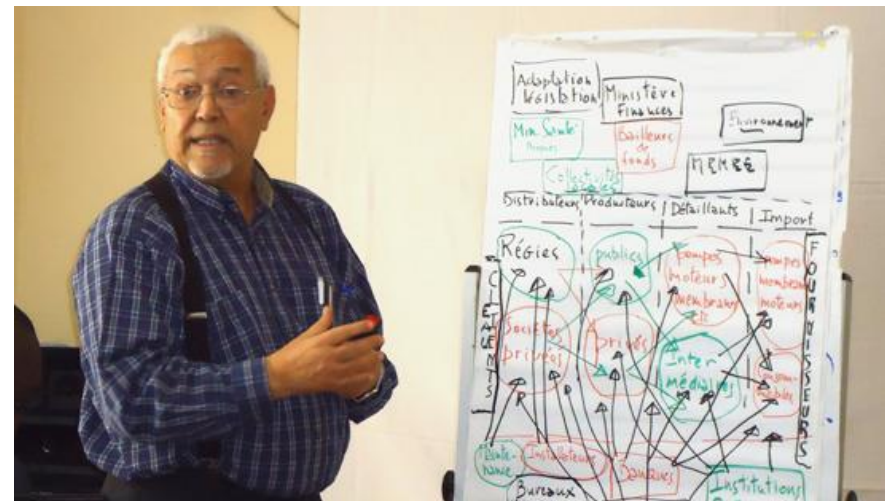
# Experience with market mapping

## Focus on short term options among stakeholders

- Rapid diffusion of technologies rather than long term industrial development

## Market mapping

- Directed analytical focus on market development and NIS
- Was important as a measure to discuss enabling environments
- Was difficult to understand, because the model is condensed
- Had a tendency to be rather complicated
- Became a symbolic artefact, rather than an analytical tool
- Was contradictory to the approach of capturing actors knowledge to what is needed for immediate action



# Measures to enhance national capacity

## The case of PV in Africa

### Which measures

#### Foreign Direct Investment

- knowledge transfer through subsidiaries of multi-national companies

#### Global Value Chains

- Downwards knowledge transfer through global value chains with the objective of upgrading

#### University networks and cooperation

#### Donor supported capacity building

- support to universities, government agencies, NGOs

#### Donor supported institutions

- Innovation centres,
- Incubators

### Which capacity

#### Company level

- technological, organisational, managerial

#### Strategic planning level

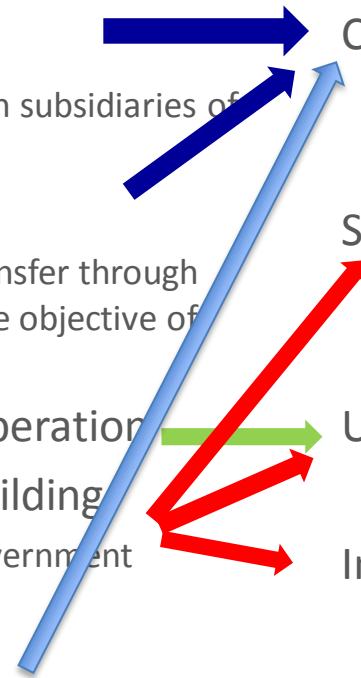
- regulation, incentive structures, market development

#### University level

- research, development

#### Institutional level

- Combination of all actors capacity to interact and innovate



# Measures for transfer and diffusion of PV

Kenya, Rwanda, Cote d'Ivoire, Mali, Senegal, Morocco

## 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
- Creation of networks

## Large scale

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

## Mini-grids

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

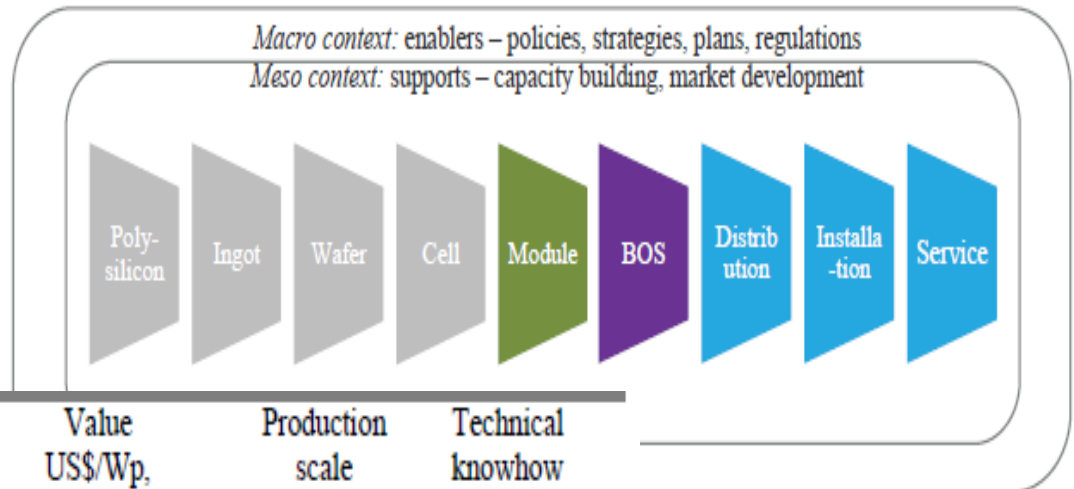
## Solar Home Systems

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

# The importance of capturing a higher share of the value added

## Diffuse measures:

- Setting up a unit of production
- Training of SMEs
- Development of Public Private Partnerships



	CAPEX M\$/MW	Jobs/MW	Value US\$/Wp,	Production scale	Technical knowhow
Silicon	0.8-1.5		0.30-0.50		
Ingot, Wafer	0.7-1.0	3-4	0.10-0.30		
Cell	0.4-0.8		0.25-0.80		
Module	0.1-0.5	2-4	0.35-0.70		
Balance of System		1/50SHS	1.60-3.60		
Distribution, Installation, Service		1,000/MW			

# Measures for enhancing national capacity in the PV sector

Kenya, Rwanda, Cote d'Ivoire, Mali, Senegal, Morocco

- Enhancement of R&D activities (all)
- Awareness campaign for politicians, stakeholders, consumers (Kenya, Senegal)
- Training of
  - technical personnel (Kenya, Senegal)
  - bank personnel (Cote d'Ivoire, Mali)
  - local communities in including PV in plans (Cote d'Ivoire, Mali)
  - Training of high school students (Cote d'Ivoire)
- Partnership with international research institutions on development of concentrating solar PV (Morocco)

# Concluding remarks

- The TNA project is based on an idea of capturing local expert knowledge through stakeholder engagement and feeding it into action plans
- Value chain inspired market mapping was used as an analytical tool. It created focus on market diffusion and NSI, it focussed on enabling frameworks, but was seen by some as too complicated for the purpose
- While research would point towards highest impact on knowledge transfer through private sector engagement, donor funded capacity building measures were most common, as TNA is perceived as a donor financing vehicle
- In the PV sector, there was big interest for capturing a higher share of value added in the value chain, but proposed measures in this regard were vague, probably due to limited understanding of how 'donor support' could facilitate upgrading in the PV value chain.
- The TNA's main focus has been on incentives for market creation and diffusion of technologies, while strengthening of long-term national capacity and national systems of innovation has had less attention?

# Reflections on using national systems of innovation approaches in a developing country context

- Is there a link between the national innovation system for SHS (gradually built up over the last 20 years) and innovation system for today's large scale grid-connected power plants ? (Hansen, Nygaard & Pedersen, under review)
- Why are national linkages between companies in a developing country context not observed to the extent as in developed countries ? - and are national linkages as important for national innovation as claimed in innovation system literature. (Hansen & Nygaard, 2014)
- How does it influence innovation and investment that policy measures are supported and financed by donor interventions ? (Hansen & Nygaard, 2013)
- A new research agenda on national innovation systems needs to be able to capture the effects of transnational linkages in terms of donor interventions, company to company cooperation and Global Value Chain (GVC)



## Thanks for your attention

### Further reading:

- Boldt, J., Nygaard, I., Hansen, U. E., & Trærup, S. (2012). Overcoming barriers to the transfer and diffusion of climate technologies (pp. 1–113). Roskilde, Denmark: UNEP Risoe Centre, DTU.
- Hansen, U. E., & Nygaard, I. (2014). Sustainable energy transitions in emerging economies: The formation of a palm oil biomass waste-to-energy niche in Malaysia 1990–2011. *Energy Policy*, 66, 666–676.
- Hansen, U. E., & Nygaard, I. (2013). Transnational linkages and sustainable transitions in emerging countries: Exploring the role of donor interventions in niche development. *Environmental Innovation and Societal Transitions*, 8, 1–19.
- Hansen, U. E., & Ockwell, D. (2014). Learning and technological capability building in emerging economies: The case of the biomass power equipment industry in Malaysia. *Technovation*, 34(10), 617–630.
- Hansen, U. E., Nygaard, I., & Pedersen, M. B. (2015). Analysing the ongoing solar energy transition in Africa through the multilevel perspective on niche development. *Energy for Sustainable Development*, Under review.
- Nygaard, I., Hansen, U. E., & Pedersen, M. B. (2015). Measures for diffusion of solar PV in selected African countries. *Journal of Cleaner Production*, under review.