Promoting Energy Innovation in Agriculture

The Case of Solar Powered Irrigation Systems

(GIZ / Hahn)

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Structure of Presentation

The Context: Promoting Productive Uses of Energy (PUE)

- Research: Gain insights on the relation between energy use and economic development
- Technical Assistance: Provide practical guidance on how to promote PUE
- Knowledge Management: Website, Webinars, Events

The Framework: Promoting Energy Innovation in Agriculture

- Background: Powering Agriculture Energy Grand Challenge
- Core Tool of PAEGC: The Global Innovation Call

The Case: Solar Powered Irrigation Systems (SPIS)

- Study: Conduct Research on solar powered irrigation systems
- Manual: Develop a Manual with Toolkit to assist market development

(GIZ / Hahn)

Context: PUE Research

Part 1

Key Objectives

- **Understand** the impact of electrification on economic development
- **Explore** opportunities of different energy technologies that are suitable for productive use (‚push') or energy needs along specific value chains (‚pull')

Key Outcome

- Evaluation Methodology: Tool for evaluating the impact of energy on firm performance
- Impact Study: Rigorous impact evaluation in three countries (Benin, Ghana, Uganda)
- Publications and Factsheets: Various value chains analysed, e.g.
  - Productive Use of **Thermal Energy**
- *Catalogue: Collect and present different applications for PUE*

(GIZ/Rammelt)

Context: PUE Technical Assistance

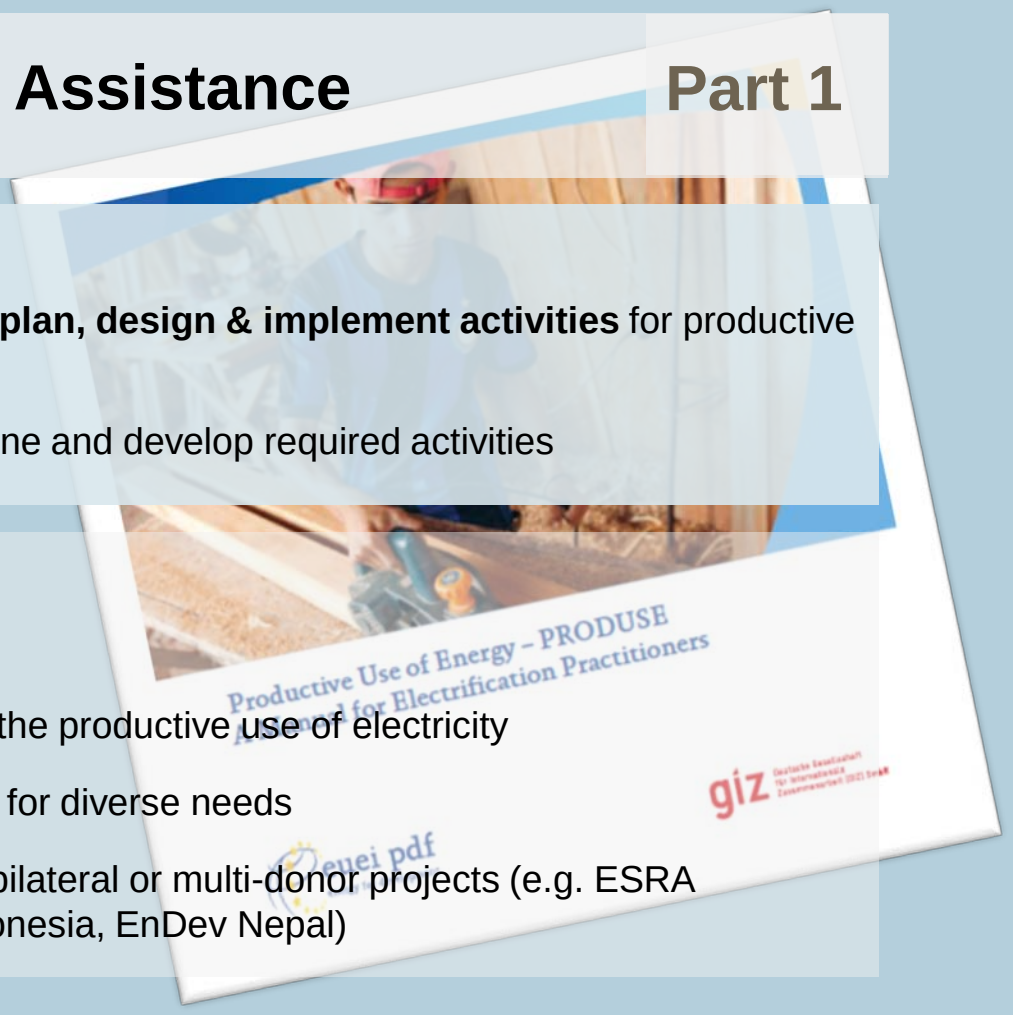
Part 1

Key Objectives

- Provide pragmatic guidelines on how to **plan, design & implement activities** for productive use promotion
- Offer a **structured approach** to determine and develop required activities

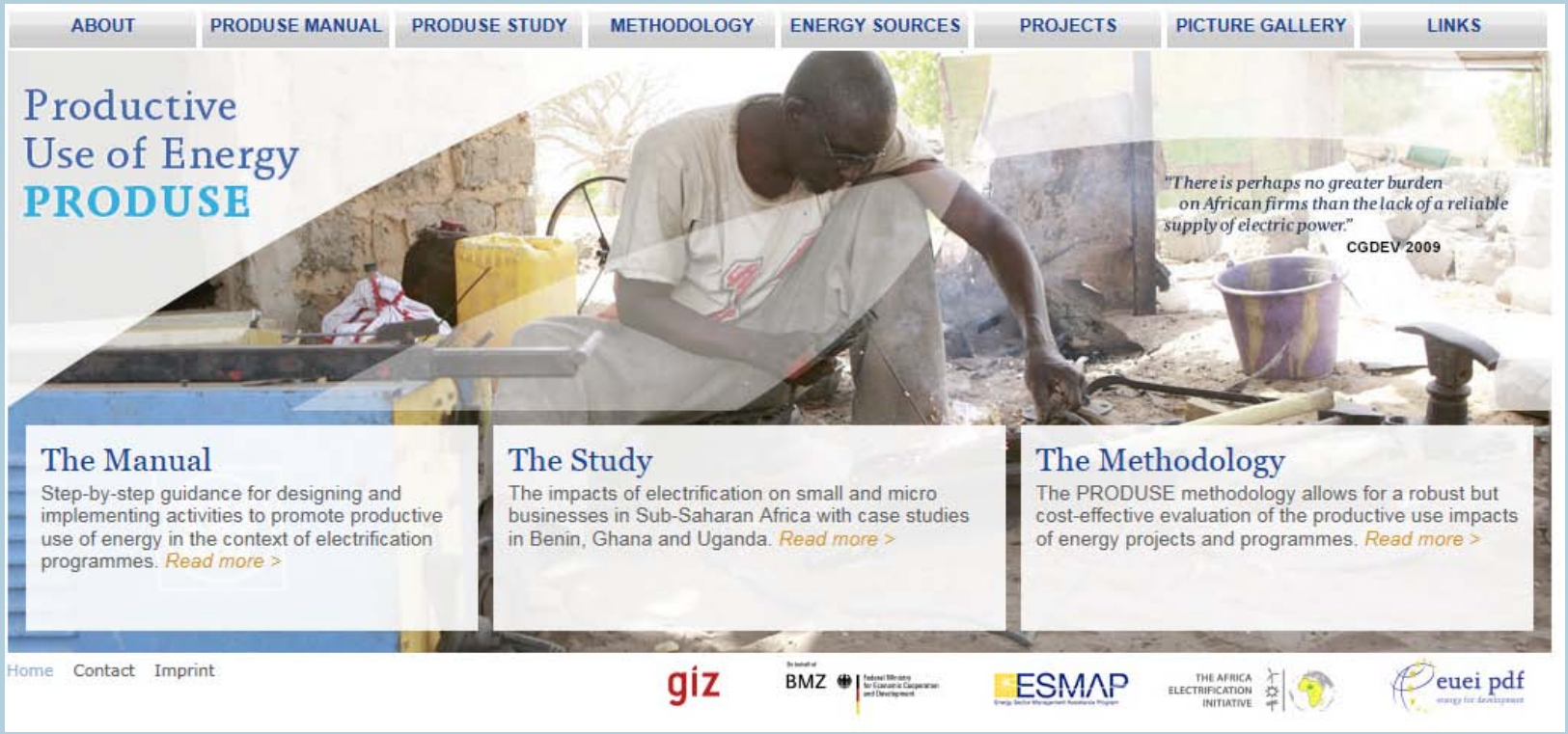
Key Outcome

- Manual: For Electrification Practitioners
  - **Step-by-step guide** to promoting the productive use of electricity
  - **Module-based approach** to cater for diverse needs
- In-country activities: Execution through bilateral or multi-donor projects (e.g. ESRA Afghanistan, EnDev Ghana, EnDev Indonesia, EnDev Nepal)



Context: PUE Knowledge Management

Part 1



- Information Dissemination: Websites (www.produse.org/, www.energypedia.info/), Webinars

Powering Agriculture

AN ENERGY GRAND CHALLENGE

POWERING AGRICULTURE:
AN ENERGY GRAND CHALLENGE FOR DEVELOPMENT

CHALLENGE

Millions of farmers and agribusinesses in developing countries lack access to the clean energy services necessary for increasing agricultural productivity and value.

Market Barriers

- Limited Demand
- Limited Access to Financing
- Inappropriate Technology Design & Cost
- Few Commercially Replicable Business Models

POWERING AGRICULTURE:
AN ENERGY GRAND CHALLENGE FOR DEVELOPMENT

INNOVATION DRIVES IMPACT

Part 2

Innovative & Appropriate Tech

Post-harvest Processing,

Decentralized Power,

Cold Storage,

Irrrigation

Impact

CO_2 mitigation,

Viable rural utilities,

Sustainable Economic Dvlp,

Increased Ag. Productivity & Value

New markets for renewable energy & efficient technology

Energy in the Agricultural Value Chain

Part 2

INPUTS
Seed
Water
Labor
Fodder
Fertilizer
Pesticide
Herbicide
Equipment

PRODUCTION
Growers or Cooperatives
Horticulture
Livestock
Aquaculture
Dairy/meat

LOCAL TRANSPORT/ COLLECTION
Truck
Bicycle
Train
Boat
Animal
On foot

STORAGE & HANDLING
Pre or post processing Storage
Silos
Cooling
Brokers & Traders

PROCESSING
Drying, grinding, milling, etc.
Food & feed ingredients

BEYOND POWERING AG

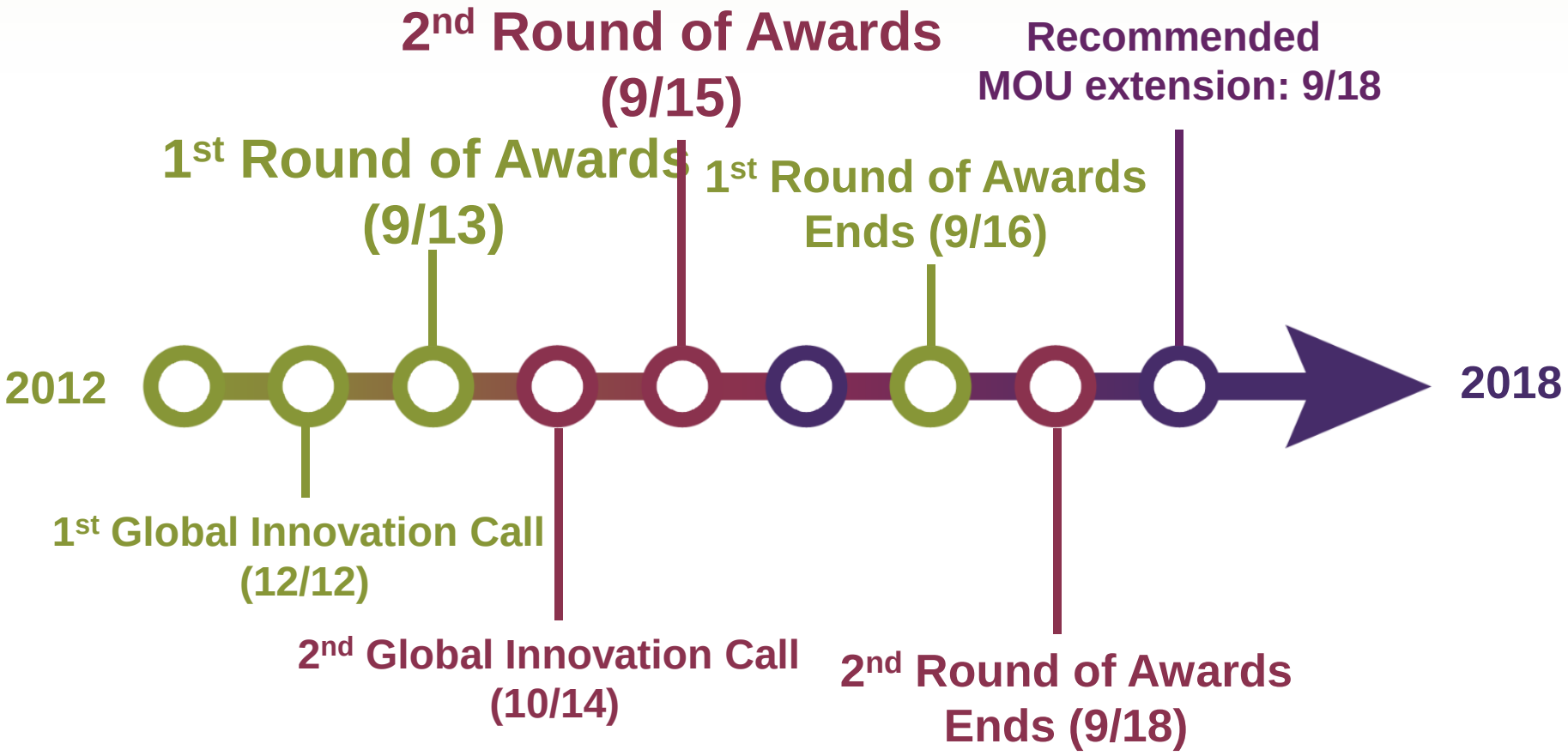
TRANSPORTATION & LOGISTICS

MARKETING & DISTRIBUTION

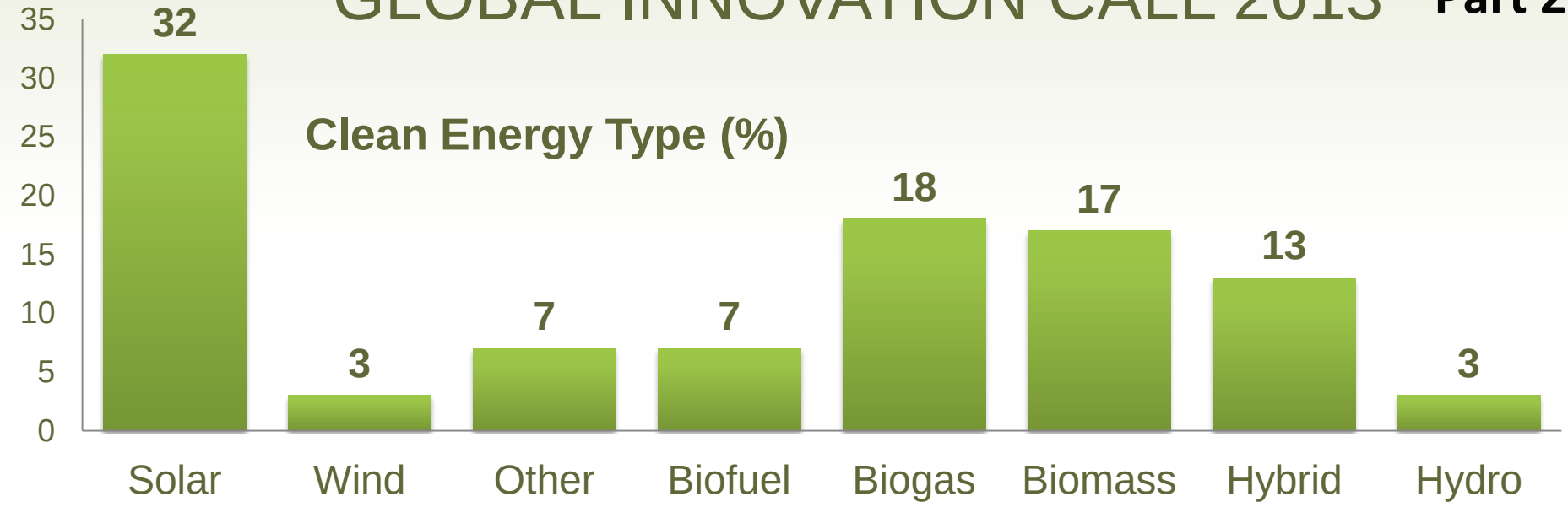
END USER

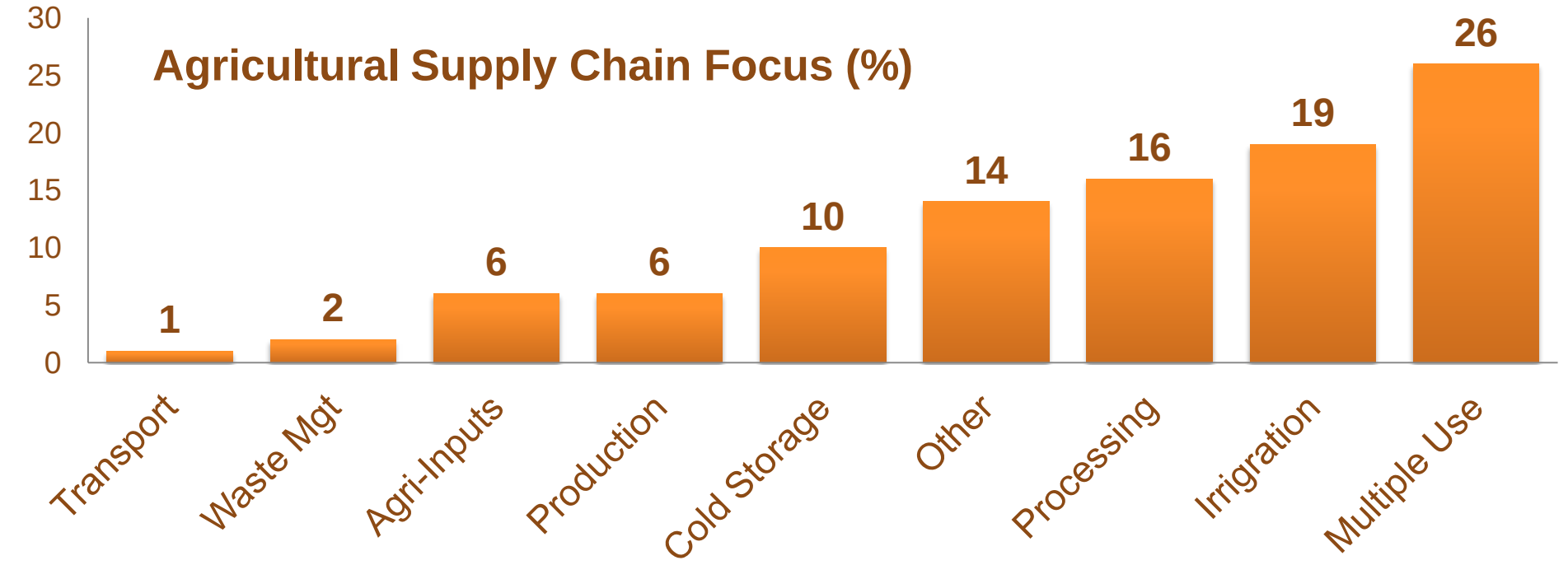
Part 2

Powering Ag Timeline



GLOBAL INNOVATION CALL 2013 Part 2

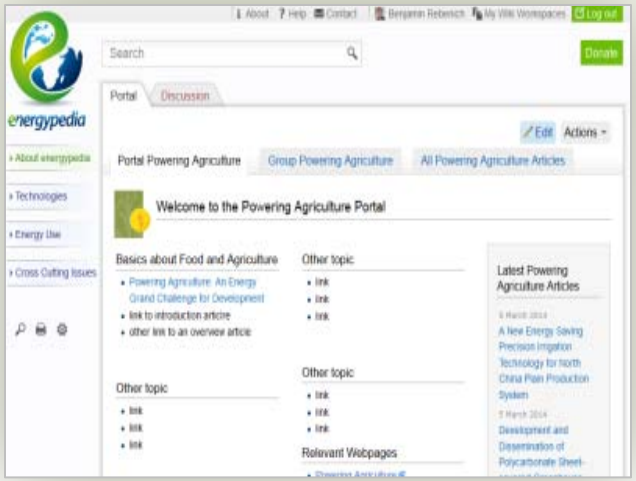




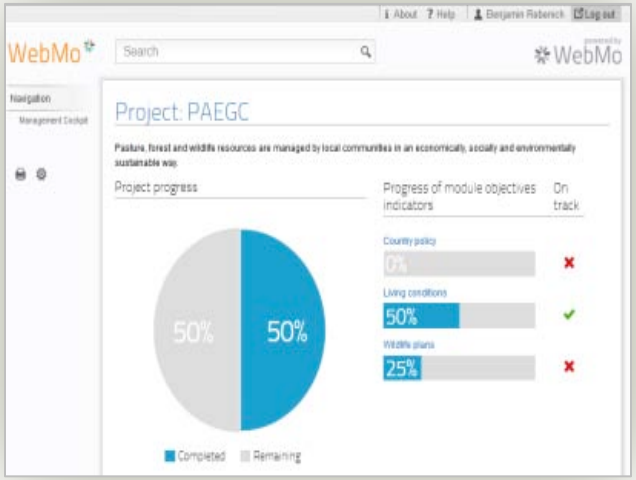
KNOWLEDGE MANAGEMENT

Part 2

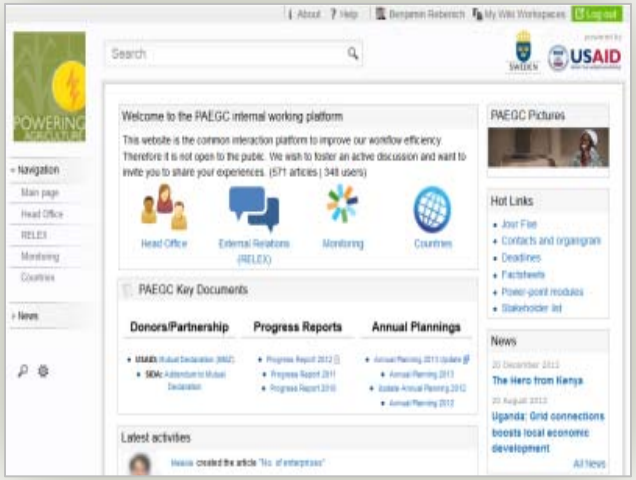
Communications



Knowledge Hub



Monitoring Platform



Project Management Platform

Case: SPIS Impact Project

Part 3

Background

- Trends such as favorable price development of PV modules and technology improvements have led to a (renewed) increased interest in **solar powered irrigation systems** (SPIS)
- SPIS rely on and affect different important resources ('**Water, Energy and Food Nexus**') with potential for synergies but also challenges for conflicting use

SPIS Impact Project

- In order to assess the economic and ecologic viability of SPIS on farms (2 – 15 ha), GIZ launched a **two-staged process** under the umbrella of **Powering Agriculture**
  - Stage One: In the first stage, a **stocktaking and analysis report** was compiled that assessed the status quo of irrigation on farms, technological options available for PV-powered irrigation, environmental impacts and economic viability
  - *Stage Two: In the second stage, a **manual with toolkit** is being developed to support the market development*

Case: SPIS Stocktaking and Analysis Report

Part 3

Key Findings

- Market Development: In recent years, several **thousands of PV water pumps** have been sold in 'developing' countries – manufacturers and suppliers continue to extend to new markets
- Market Drivers: The cost of irrigation water depends on the farm setting – if the system is **appropriately sized** and the **crops match the water conveyance** characteristics, SPIS are highly competitive compared to both diesel engine and grid-driven pumps
- Market Potential: More than **26 million diesel and electric pumps** run on Indian farms; in Morocco, IFC estimates a market potential valued at between **800 million and 1.3 billion USD by 2020** (IFC, 2014)

Country Cases

- **Government support programs** in place in Chile (up to 100%), Morocco and India (up to 70%)
- All results will be made available at: https://energypedia.info/wiki/Portal:Powering_Agriculture

Case: SPIS Manual and Toolkit

Part 3

Manual

- Limits in terms of a meaningful and feasible application of the PV technology result predominantly from the **agronomic and financial viability**
- To assess the suitability of SPIS on-farms and to facilitate access to finance, a manual is developed for building capacities in **agricultural extension offices** and **financial institutions**
- The manual will serve for a variety of needs, incl. **information** sourcing, **technology** choice, assessment of **financial viability** and **environmental impacts**, determination of O&M implications

Toolkit

- The toolkit will include a variety of tools including initial technological layout and economic assessment tools

(GIZ / Hahn)

Thank you for your attention

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