Productive Uses of Energy

Experiences, publications, guidance and tools

Monika Rammelt & Caspar Priesemann
Energy Advisors, GIZ GmbH
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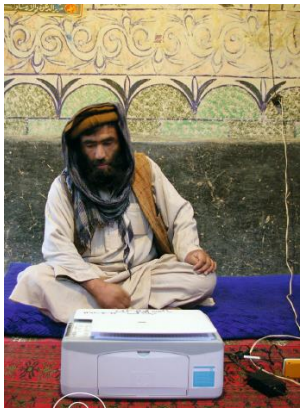


What are Productive Uses of Energy (PUE)?

PUE are defined as agricultural, commercial and industrial activities involving energy services as a direct input to the production of goods or provision of services. PUE…

- …includes home businesses, non-monetary income
- …excludes social infrastructure etc.
- …cuts across different sectors, energy sources, types of enterprises

Why are PUE important?

Productive use of energy can be a significant driver of economic growth and social progress in developing countries. PUE can…

- …underpin the creation and upgrading of value chains
- …facilitate diversification of economic structures and livelihoods
- …reduce vulnerability to multiple stresses and external shocks
- …enhance the commercial viability and financial sustainability of infrastructure investments

What does this mean in practice?

Productive Uses of Energy can…

- …convert into additional sources of income for end-users
- …increase their ability to pay bills and recoup investment in grid connection/standalone systems as well as end-use equipment
- …increase economic viability of mini-grids through higher load factors (particularly during daytime) and hence offer a baseload and higher revenues for operators
- …increase the technical durability of energy infrastructure through an improved operator ability to cover O&M costs
- …enhance impact of (rural) electrification

What does GIZ offer in the PUE sector?

- **Advisory services and knowledge management**
- **Networking and international lobbying**
- **Tools and guidelines on…**
  - …promoting PUE in energy access interventions
  - …monitoring PUE impacts
  - …specific technologies (e.g. DC Appliances, Solar Powered Irrigation Systems, Cooling)
  - …and specific energy sources (Solar PV, Thermal Energy)

Publications and tools

Part I: PUE promotion and business trainings

PRODUSE Manual

A structured approach towards PUE promotion

http://produse.org/index.php?lang=eng&page=4

Objectives

- Pragmatic guidelines on how to plan, design & implement programmes for productive use promotion
- Structured approach applicable to a wide range of settings

Assumed scenario

- To supplement ongoing (grid) electrification programme
- Headed by energy sector experts
- Target population is “electricity-illiterate”

Photovoltaics for Productive Use Applications

A Catalogue of DC Appliances

https://energypedia.info/images/9/98/GIZ_(2016)_Catalogue_PV_Appliances_for_Micro_Enterprises.pdf

- Catalogue with factsheets for DC appliances clustered according to the following categories:
  - Cold chain
  - Pumping
  - Milling, grinding, hulling, oil presses
  - Lighting and charging
  - Kitchen devices, hand tools for cottage and service industry, media & entertainment devices,
- Each factsheet includes technical specifications of the appliances and the required PV system and – if available – information on prices and costing
- Brief discussion on exemplary business cases and business planning.

Mini Business Plan Calculator

https://energypedia.info/wiki/File:PUE_Mini_Business_Plan_Calculator.xlsx

Review Sheet

This Review Sheet gives you an overview of the general technical and financial aspects of your future business. The results in this review can be chang

Name of business:		0
Type of main products:		0
Type of main services:		0

	Technical and Financial Aspects		Value	Unit	
B	**Your business income**				
	Scenario: Strong		0	$/month	If your market is strong, your produc
	Scenario: Stable		0	$/month	If your market is stable and your pro
	Scenario: Weak		0	$/month	If your market is weak and there is l
C	**Your business expenditure**				
	Total start-up expenses (excluding equipment)		-	$	
	Total monthly material and consumables expenses:		-	$/month	
	Total recurring monthly regular expenses:		-	$/month	
	Annual price increases:		0%	%/annum	The higher → the faster your expens
D	**Your electric equipment**				
	Total number of electric appliances:		0	qty	The higher → the larger the investm
	Total cost for electrical appliances:		-	$	The higher → the larger the investm
	Total cost for solar PV System:		-	$	The higher → the larger the investm
	Monthly savings for appliance maintenance and repairs:		-	$/month	The higher → the more funds saved
	Monthly savings for solar PV System maintenance and repairs:		-	$/month	The higher → the more funds saved
	Total power that all your appliances need is:		-	Watts	Maximum power, if all appliances a

Publications and tools

Part II: Agricultural Applications

Solar Powered Irrigation Systems (SPIS): Study & Manual

http://produse.org/index.php?lang=eng&page=9 (Forthcoming)

SPIS Study

- Technology: The market can provide a suitable solution for almost any requirement or condition but a range of site-specific information is needed
- Economy: Cost-efficient and viable operation can be achieved but higher upfront investment costs pose a barrier
- Impacts: CO2 emissions and groundwater contamination can be reduced but risks (particularly groundwater depletion) need to be mitigated

SPIS Manual

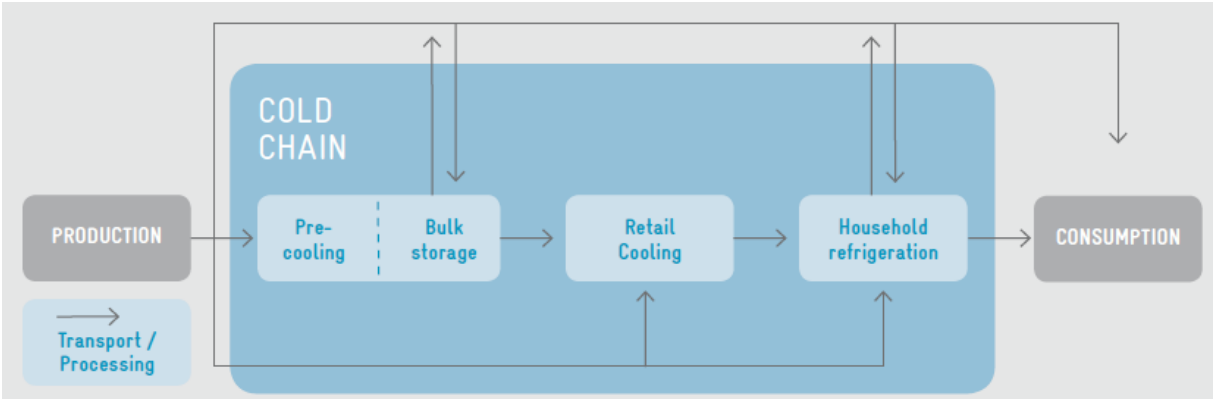
- Particularly SPIS involving drip irrigation pose a high challenge to farmers (due to dual innovation) and financial service providers – a capacity development manual is hence under development to assist in developing the skills to operate & finance SPIS

Cold Chains for Perishable Food Products

http://produse.org/index.php?lang=eng&page=9 (Forthcoming)

Structure and Content

- **Contrast and compare cold chains** (set-up, organisation, actors for perishable food products in low- and high-income countries
- Identify cooling needs along **three product categories** (fruits & vegetables, dairy, fish & meat)
- Summarise **technological options** for cooling and identify options for (renewable) **energy supply**
- **GIZ project examples**



Publications and tools

Part III: Productive Use of Thermal Energy

Productive Use of Thermal Energy

Overview of Technology Options and Approaches for Practitioners

http://produse.org/index.php?lang=eng&page=15&gallery=34

Overview study on…

- …existing technologies and conventional production processes in the agricultural, industrial and commercial sectors

Technology examples for…

- …cooking, baking, drying, smoking, cooling or heating

Publications and tools

Part IV: Monitoring and evaluation

PRODUSE Methodology

http://produse.org/index.php?lang=eng&page=6

- Businesses that get electrified can per se be different to those that do not get electrified, simple comparison of these two groups can lead to invalid findings

→ *Proper usage of statistical techniques necessary and sufficient size of sample*

- Methodological rigour is possible with small budget
- Development of a robust and sound evaluation method for energy interventions with a focus impacts on SMEs; incl. three modules
  - Short SME survey (Module a)
  - Extended and profound SME survey (Module b)
  - Anecdotal case studies (Module c)

PRODUSE I (2013): Benin, Ghana, Uganda

http://produse.org/index.php?lang=eng&page=5

Findings

- Businesses in service sector tend to get connected to the grid, take-up rates in manufacturing sector of rural areas were low
- Usage of electrical appliances low, electricity mostly used for lighting (exception study in Ghana)
- Electrification hardly translated into higher profits, instead could even reduce profitability (Benin)
- Electrification can lead to creation of businesses, which generate additional income, and attraction of larger enterprises to the area of electrification

Publications and tools

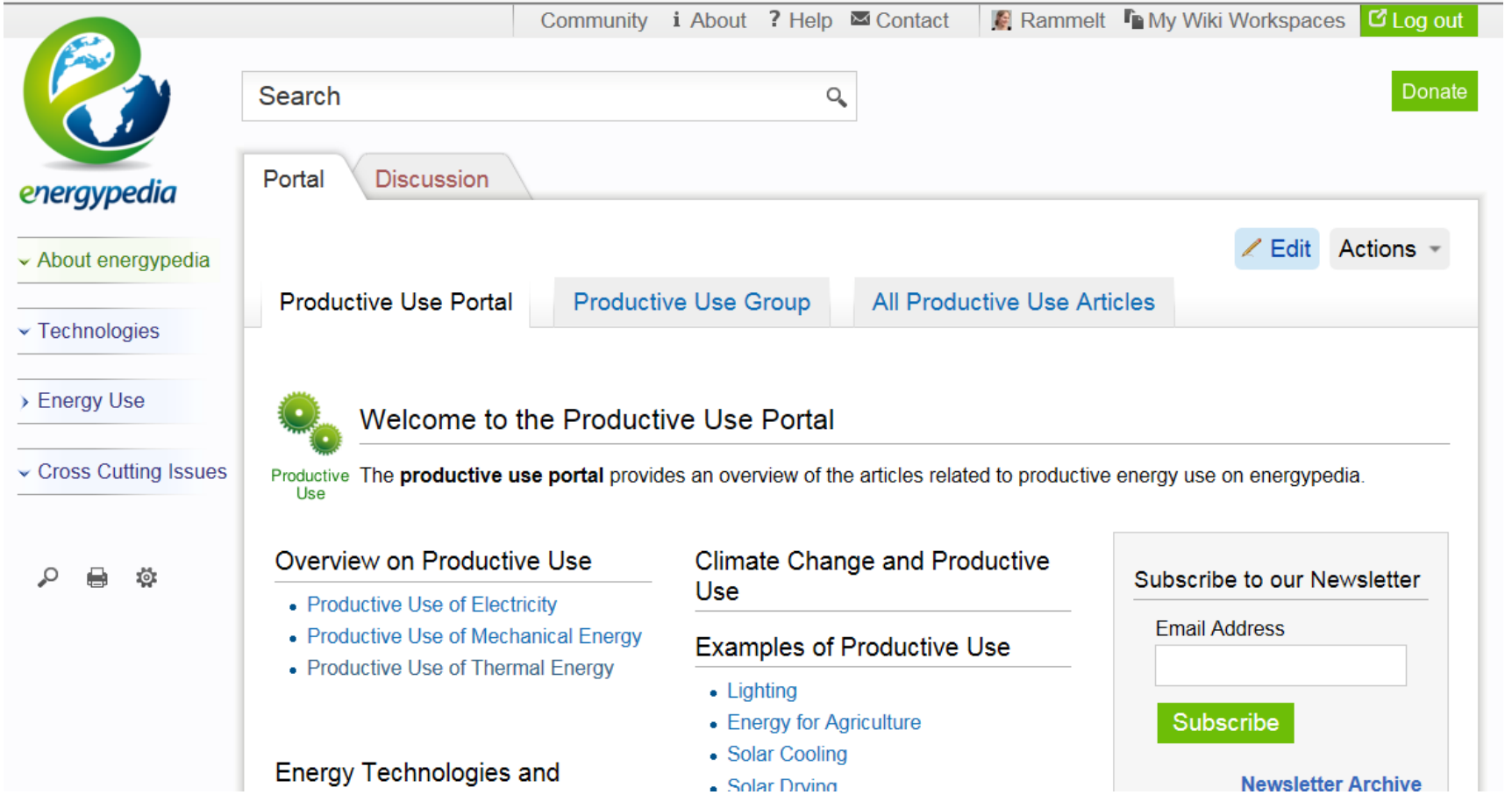
Part V: Website and WIKI-based information platform

PRODUSE Website

http://produse.org

Energypedia Portal on Productive Use

https://energypedia.info/wiki/Portal:Productive_Use



Publications and tools

Tools for PUE promotion and business trainings

- Productive use manual
- Catalogue of DC Driven Appliances for Productive Use
- PUE Mini Business Plan Calculator

Agricultural Applications

- Solar-Powered Irrigation Systems Study (forthcoming)
- Solar-Powered Irrigation Systems Manual & Tools (forthcoming)
- Cold Chains (forthcoming)

Other energy sources

- Productive Use of Thermal Energy Guide

Monitoring and Evaluation

- PRODUSE I Impact Study (Benin, Uganda, Ghana)
- PRODUSE Impact Methodology

Website and WIKI-based information platform

- PRODUSE website
- Energypedia Portal for Productive Use of Energy

Project examples

- Productive Use in Indonesia Study and Youtube

Thank you.

Monika Rammelt& Caspar Priesemann
Poverty-oriented basic energy services
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
monika.rammelt@giz.de & caspar.priesemann@giz.de