Rapid Planning Case City Kigali

Rapid Planning Stakeholder Conference
9 November 2016

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The United Nations Human Settlements Programme – UN HABITAT

UN HABITAT FOR A BETTER URBAN FUTURE

Bernd Franke, IFEU Heidelberg, Germany

ifeu INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH HEIDELBERG

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RAPID PLANNING TEAM

AT-Verband, Verband zur Förderung angepasster, sozial- & umweltverträglicher Technologien e.V.

AT-Association, association for the promotion of socially & environmentally appropriate technologies e.V.

Brandenburgische Technische Universität (BTU) Cottbus

Brandenburg University of Technology Cottbus

Fachhochschule Frankfurt am Main – University of Applied Sciences

FFin / Frankfurt Research Institute for Architecture · Civil Engineering · Geomatics

Institut für Automation und Kommunikation e. V. (ifak), Magdeburg

ifeu – Institut für Energie- und Umweltforschung Heidelberg GmbH

Institute for Energy and Environmental Research (IFEU)

IUWA e.V.

IZES gGmbH – Institut für ZukunftsEnergieSysteme

Institute for Future Energy Systems

Ostfalia University of Applied Sciences, Campus Suderburg

Technische Universität Berlin (TU Berlin)
School VI. Planning Building Environment
Dept. of Landscape Architecture and Environmental Planning
Chair of Landscape Architecture. Open Space Planning
Part of Innovation Center - Habitat Design

University of Stuttgart
Institute of Energy Economics and the Rational Use of Energy (IER)

Eberhard Karls Universität Tübingen
Faculty of Science,
Department of Geosciences
Chair of Geoinformatics

The United Nations Human Settlements Programme – UN HABITAT

UN HABITAT FOR A BETTER URBAN FUTURE

1. THE CITY OF KIGALI AND ITS INFRASTRUCTURE CHALLENGES

KIGALI TODAY: POPULATION 1.1 MILLION

THE VISION: KIGALI CONCEPTUAL MASTER PLAN (KCMP)

1. The City of Kigali and its infrastructure challenges

CITY OF KIGALI: CHALLENGES

Population growth:
Expected to reach about 2 million by 2025.

Housing demand:
30,000 new dwelling units per year until 2025; 80% for incomes of 450 USD per month or less.

Informal/unplanned housing:
78% of the city's population, many on steep slopes and/or in need of major upgrading.

Energy demand:
Biomass (firewood, charcoal) is still the main source for cooking; electricity demand growing fast.

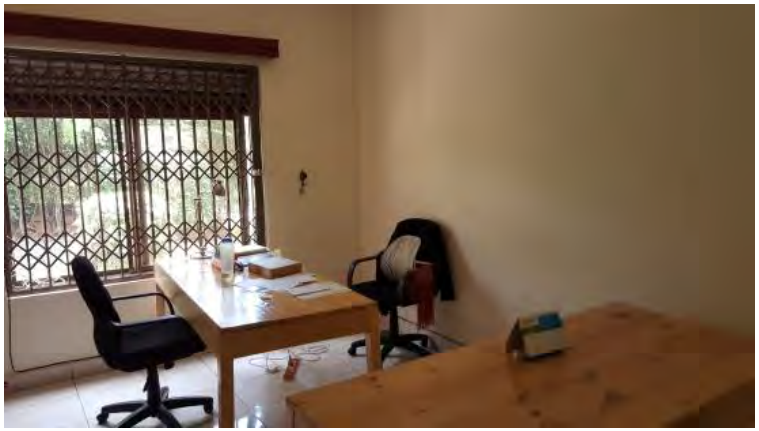
Solid Waste:
About 2,000 tonnes per day are mostly landfilled; waste utilisation needs to be improved.

Water:
Access to supply for 92% of residents; supply currently not meeting demand; network leakage of 40%.

Waste water:
No centralised sewage treatment plant. Most domestic sanitation systems are pit latrines causing groundwater pollution problems.

Urban agriculture:
Employment for 5% of the city's working population. Agriculture in the wetlands is threatened by flood waters and by water pollution due to lack of adequate waste water treatment.

2. RAPID PLANNING KIGALI: OFFICE



3. MAIN RP PARTNERS IN KIGALI

City of Kigali (CoK), One-Stop Center (City Planning Office)

- City Planning and Construction Permitting
- Responsible for Kigali City Master Plan

Nyarugenge District

- Upgradung of Unplanned Areas around Agatare Cell

Ministry of Infrastructure (Mininfra) & Rwanda Housing Authority

- WASAC, REG, RURA
- Setting national policies
- Infrastructure services for local development

University of Rwanda

- College of Science and Technology, School of Architecture

4. INFRASTRUCTURE ANALYSIS

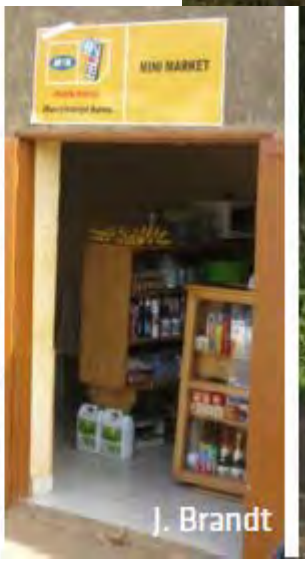
ENERGY (IER)

HH-ELECTRICITY

Technology	Example Image	Investment Costs	Operating Costs	Power Output	Comment	Pro	Con
PV		2,5 USD/Wp	0 USD	from W to kW	For comparison: <1€/Wp in Germany	No fuel costs, no dependence of grid, possibility of energy storage by battery for night	High investment costs, depends on weather
Solar Kit (PV + Battery + LED tube lamp)		with 15 W Solar Panel: 115.000 RWF (165 USD)	0 USD	10 W - 200 W		No fuel costs, no dependence of grid, easy to use, no mounting necessary, portable	High investment costs, limited power output
Grid		0 USD	0,22 USD/kWh	any		No investment costs	expensive, unreliable
Diesel Generator		Rough estimation: 5000 USD for 5 kW	1,19 USD/l (≈0,35 USD/kWh)	kW		Independence from grid and sun, high power output possible	High investment and opearting costs, costs for maintenance, noisy

WATER & WASTE WATER (OSTFALIA)

FOOD (TU BERLIN)



WASTE (AT-VERBAND)

URBAN STRUCTURE ANALYSIS (BTU)

No.	Income Group	Housing Typology	Formal/Legal Status	(Current/Proposed) Locations	Infrastructure Services	Density and additional information
2	Q1-Q4	Unplanned low rise residential in urban areas 	Unplanned: Some of these areas with local character may be retained as conserved neighborhoods with improved urban services.	• city center • most predominant typology of houses located in Biryogo, Nyamirambo, Kimisagara and Gatsata neighborhoods.	• These houses are with 1 or 2 pit latrine with electricity and piped water supply.	• These houses sit on 200-250 sqm plot sizes and are largely wood and mud finished with 2-3 bedrooms. • These sites are densely populated and pose a higher potential for compact development.
3	Q1	**CASE EXAMPLE**: In-City Courtyard 	Informal 	• Typically found in the center city • Case Location: Urwibutso, Kacyiru, Gasabo	• Sanitation and Water: 5 Pit Latrines (No Provision For Septic Tank); Piped Water	• Size: 3 Bedrooms With Living Room And Dining Area • Plot Size: 150 Square Meters • Residents: Mother and 7 Children, 2 Workers, 8 Renters (In 4 Households)
4	Q1	**CASE EXAMPLE**: In City Courtyard, Mixed Use (Restaurant & Shops at wide, unpaved street) 	Informal 	• Typically found in the center city • Case Location: Biryogo, Nyamirambo, Nyarugenge •	• Sanitation and Water: 2 Pit Latrines, Bath; Piped Water	• Size: 3 Bedrooms, Living Area, Outdoor Kitchen, 3 Rental Units, 3 Rental Shops (200 Square Meters) • Plot Size: 225 Square Meters • Residents: 7 (Husband, Wife, 4 Children, Sister-In-Law); 10 Renters (In Three Households) • Household Income: Rf150,000 Per Month

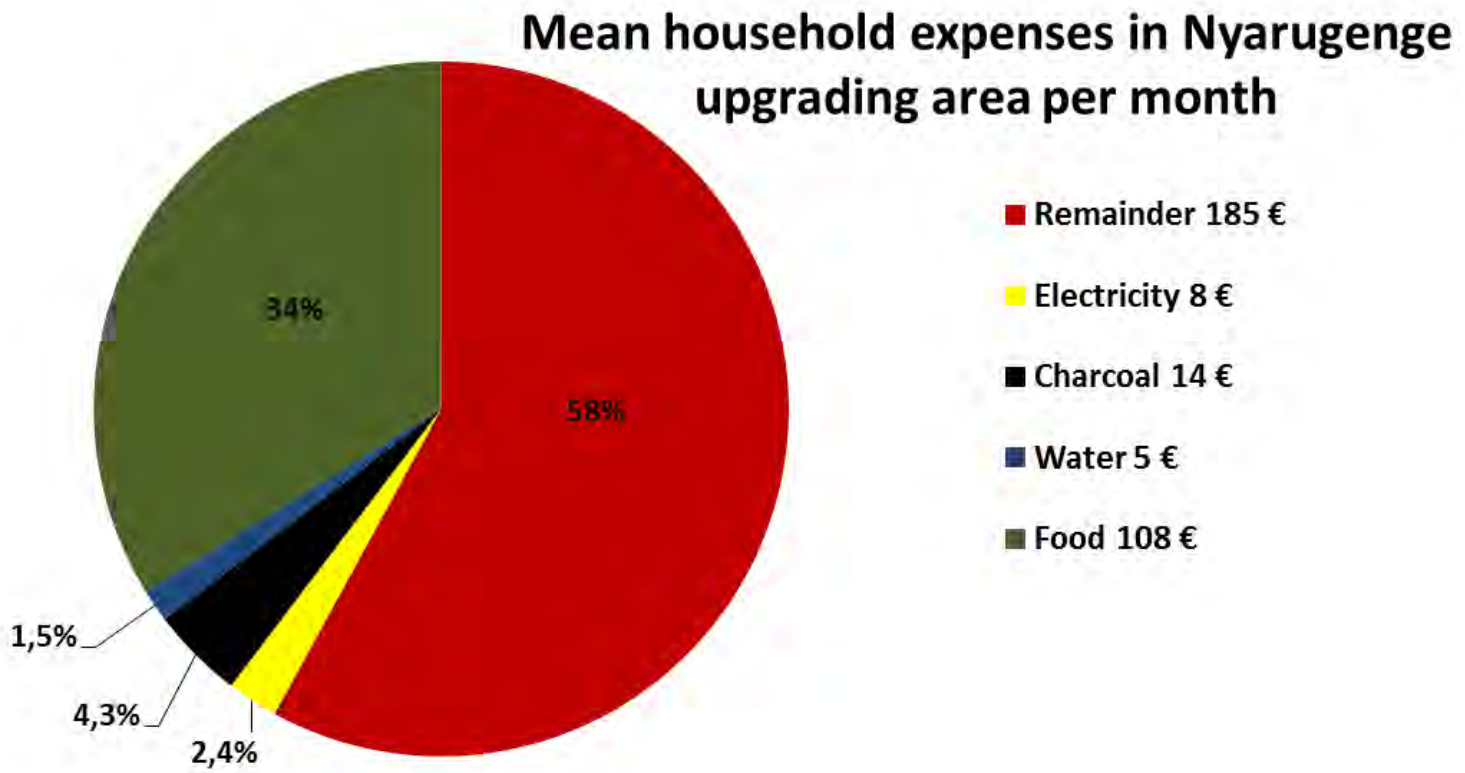
CONSTRUCTION MATERIALS (IFEU)






5. SPECIFIC DATA COLLECTION

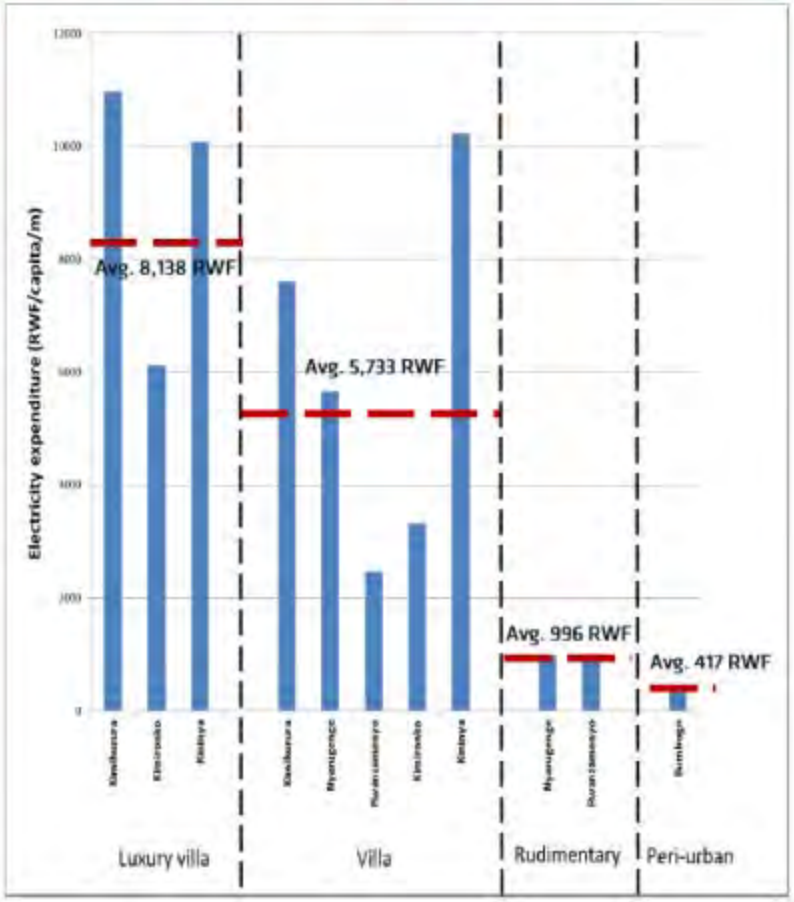
SOCIO-ECONOMIC ANALYSIS



Source: IUWA

SECTOR-SPECIFIC DATA

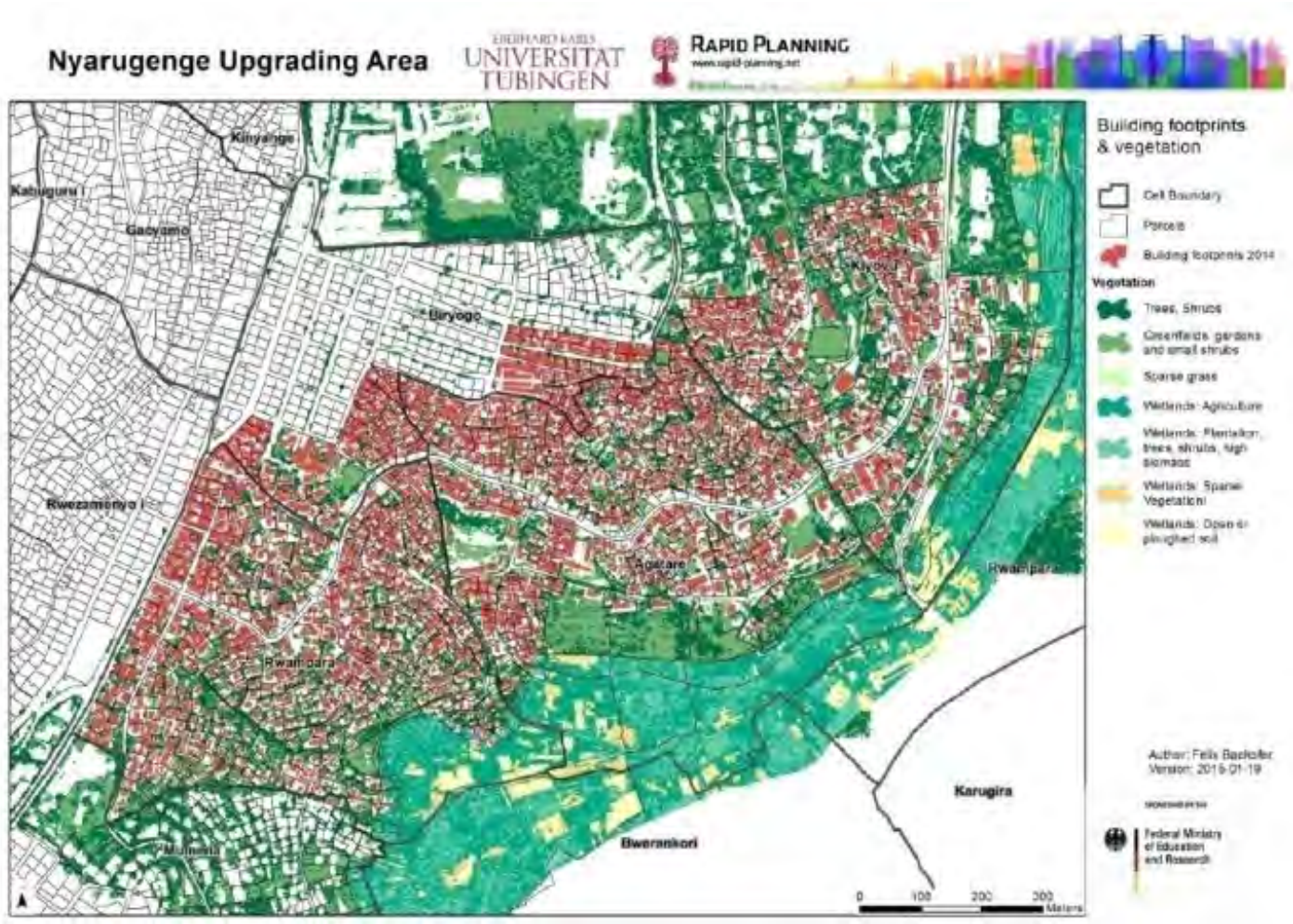
HOW MUCH DO YOU PAY FOR ELECTRICITY? _____ RWF/MONTH



- Highest expenditure/capita/m = 200,000 RWF
- Lowest expenditure/capita/m =100 RWF
- Highest average expenditure is seen in luxury villas (8,138 RWF/capita/m)
- Lowest average expenditure is seen in the peri-urban area (417 RWF/capita/m)
- Current electricity price = 158 RWF/kWh (incl. VAT)
- Average monthly expenditure lies at 4,938 RWF per capita
- According to EICV3, average monthly expenditure in Rwanda per capita is 989 RWF (EICV 3, 2011)
- In Agatare, average monthly expenditure is 1,278 RWF per capita (GISTech Report, 2015)

Source: IER

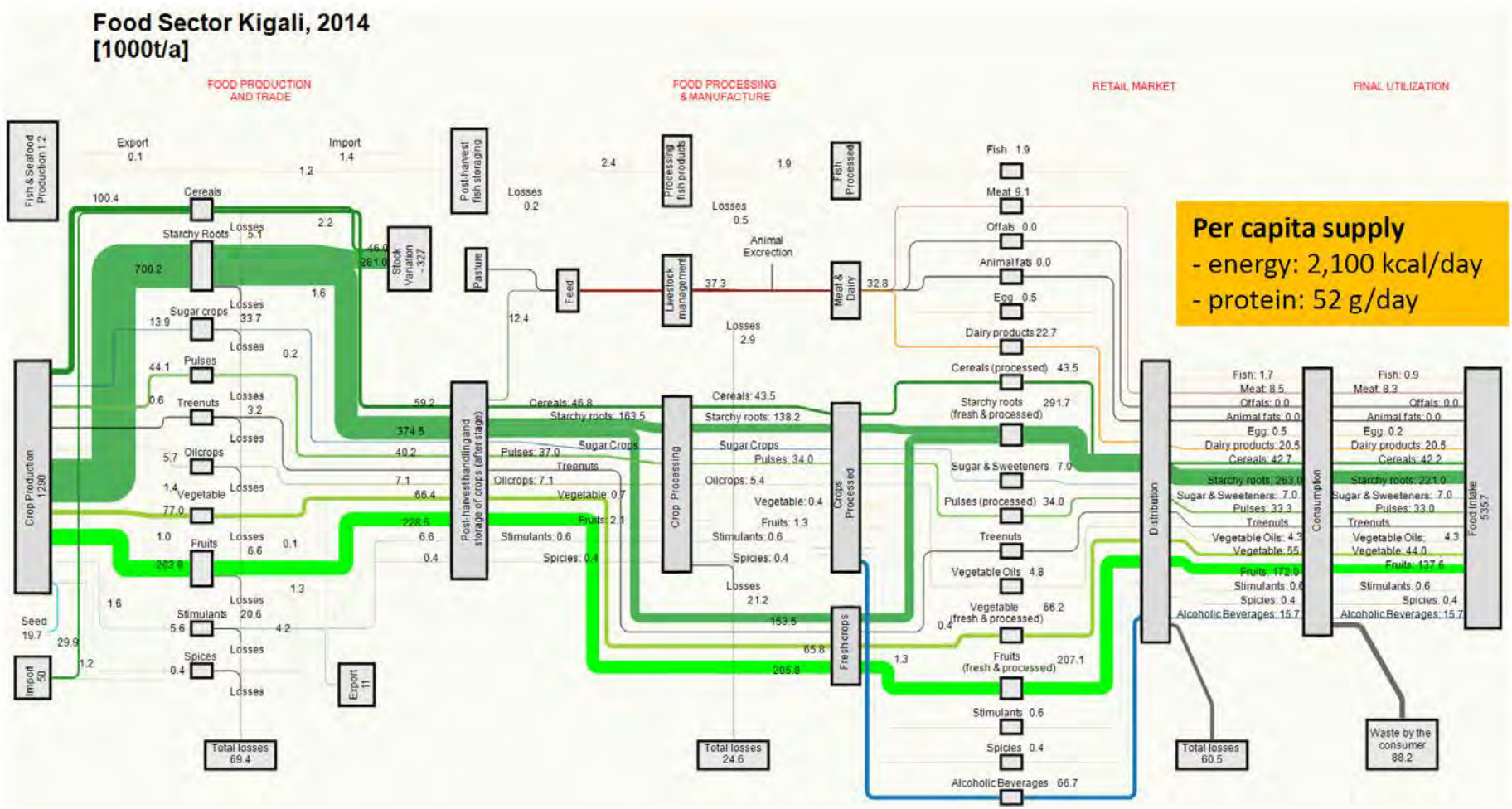
GIS MAPPING



5. Specific data collection

Source: Universität Tübingen

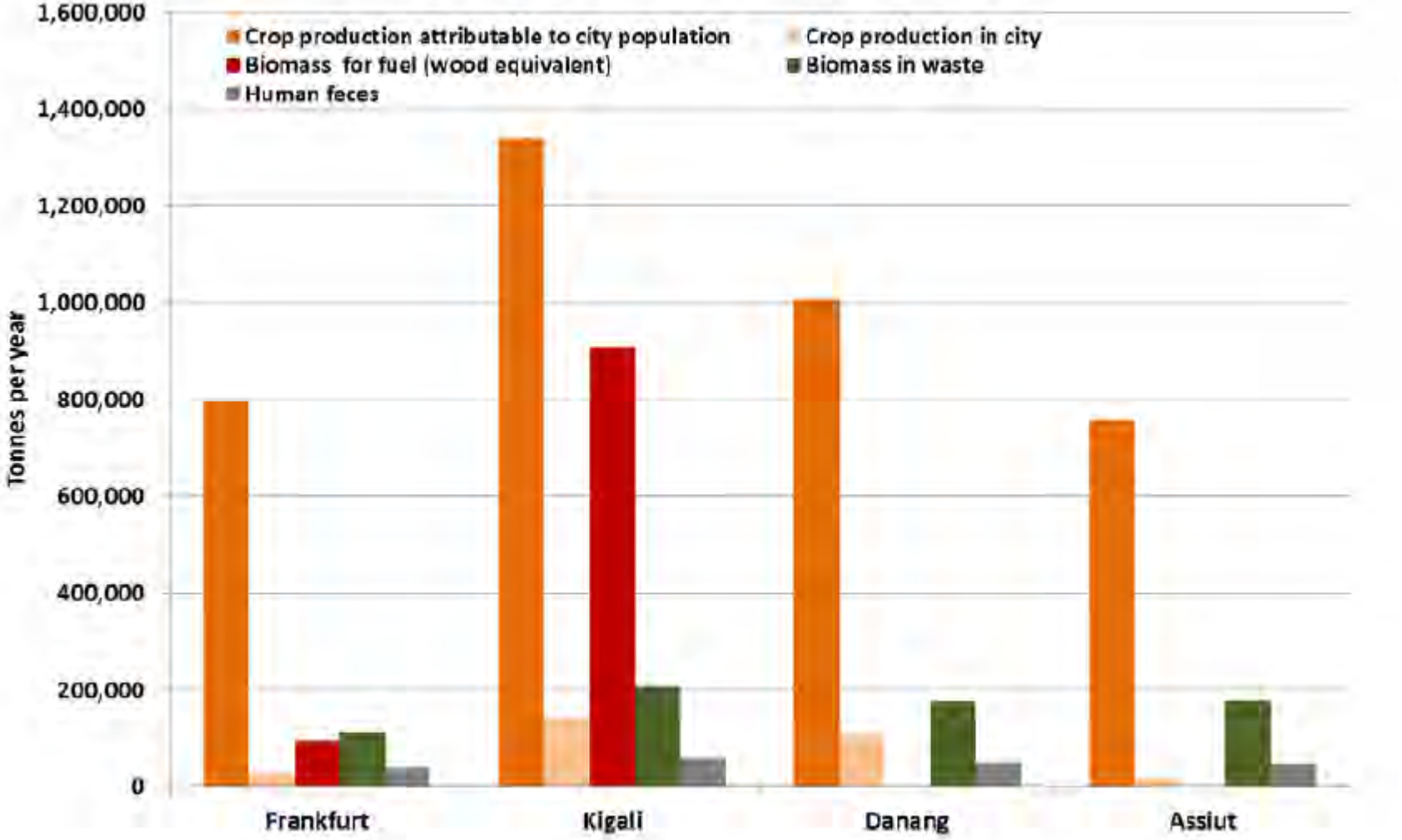
KIGALI MASS AND ENERGY FLOW ANALYSIS



5. Specific data collection

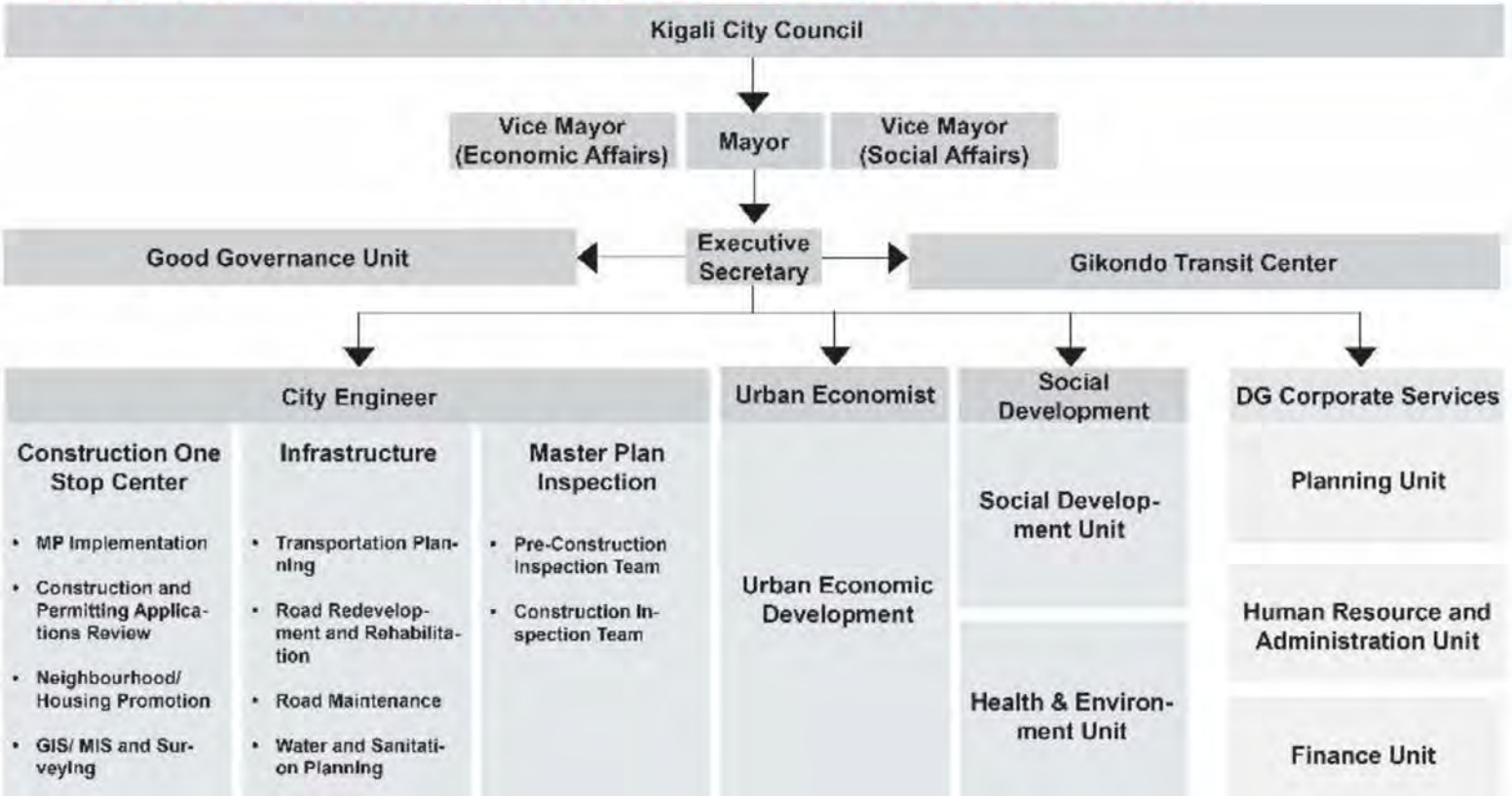
Source: IFEU

BIOMASS FLOWS FOR CASE CITIES



STAKEHOLDER MAPPING

TASK 9.1: SYSTEM AND ACTOR ANALYSIS

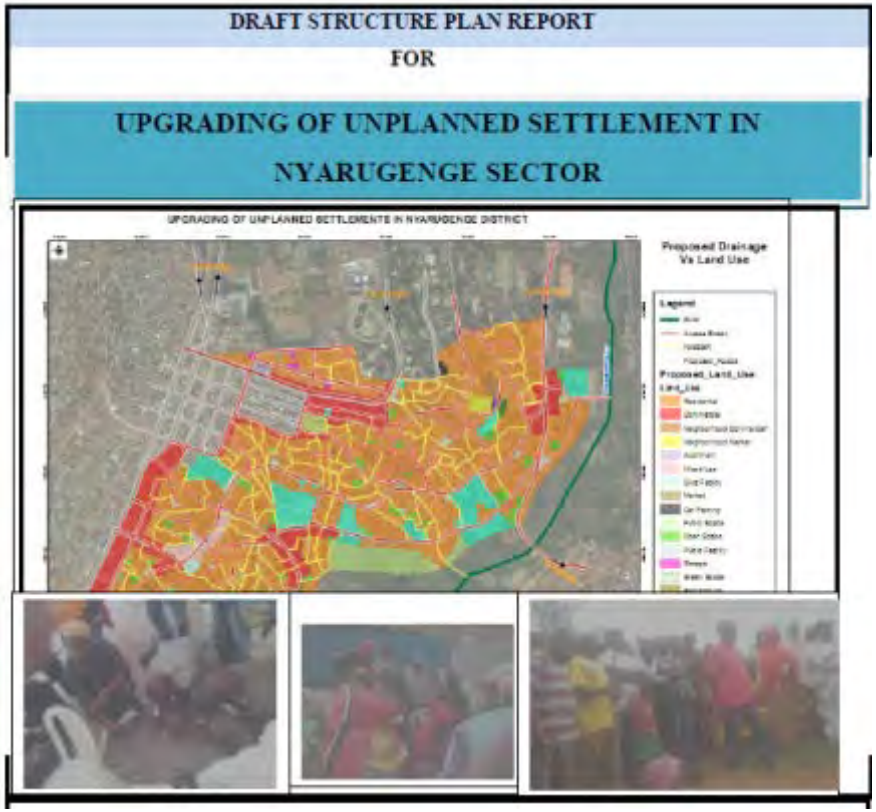


5. Specific data collection

Source: IZES

6. ACTIVITIES WITH STAKEHOLDERS

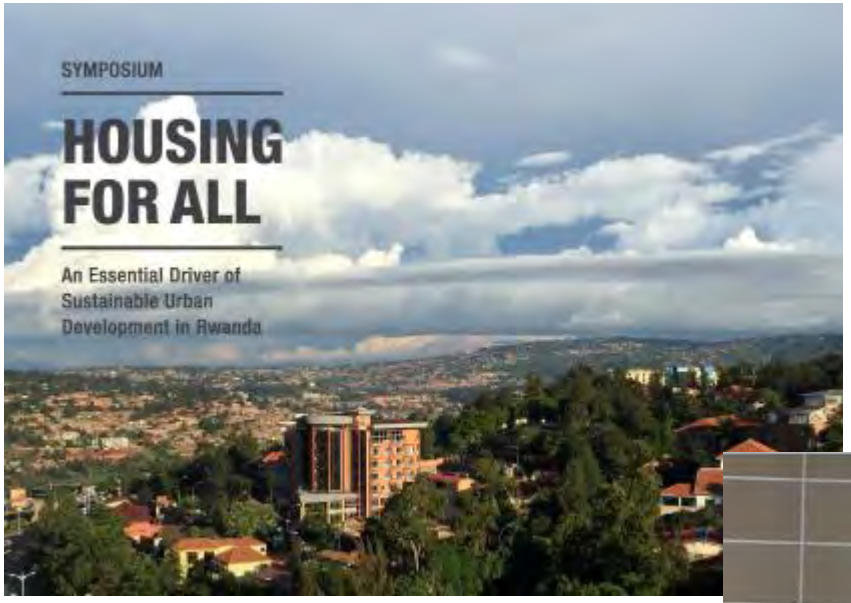
CITY OF KIGALI (JAN-APR 2015):
SUPPORT FOR NYARUGENGE UPGRADING STUDY

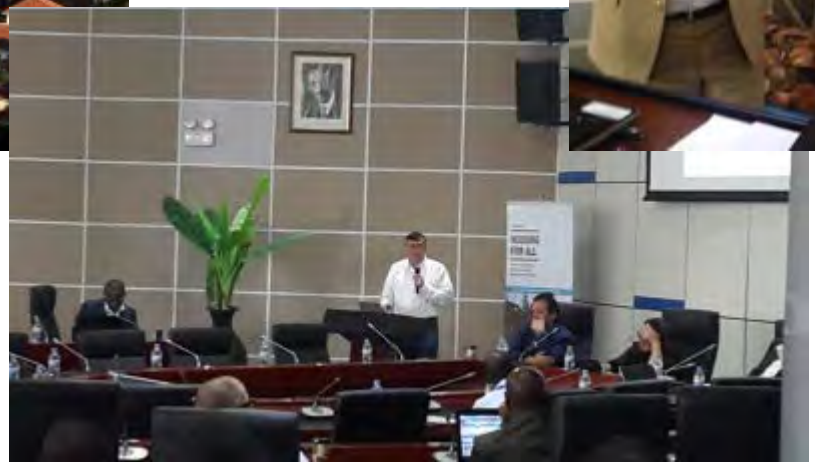


6. Activities with stakeholders

RWANDA ASSOCIATION OF MANUFACTURERS (AUG 2015) WORKSHOP AND AUDITS: RESOURCE EFFIENCY IN INDUSTRY

CITY OF KIGALI (JUNE 2015)
HOUSING FOR ALL, INTERNATIONAL CONFERENCE



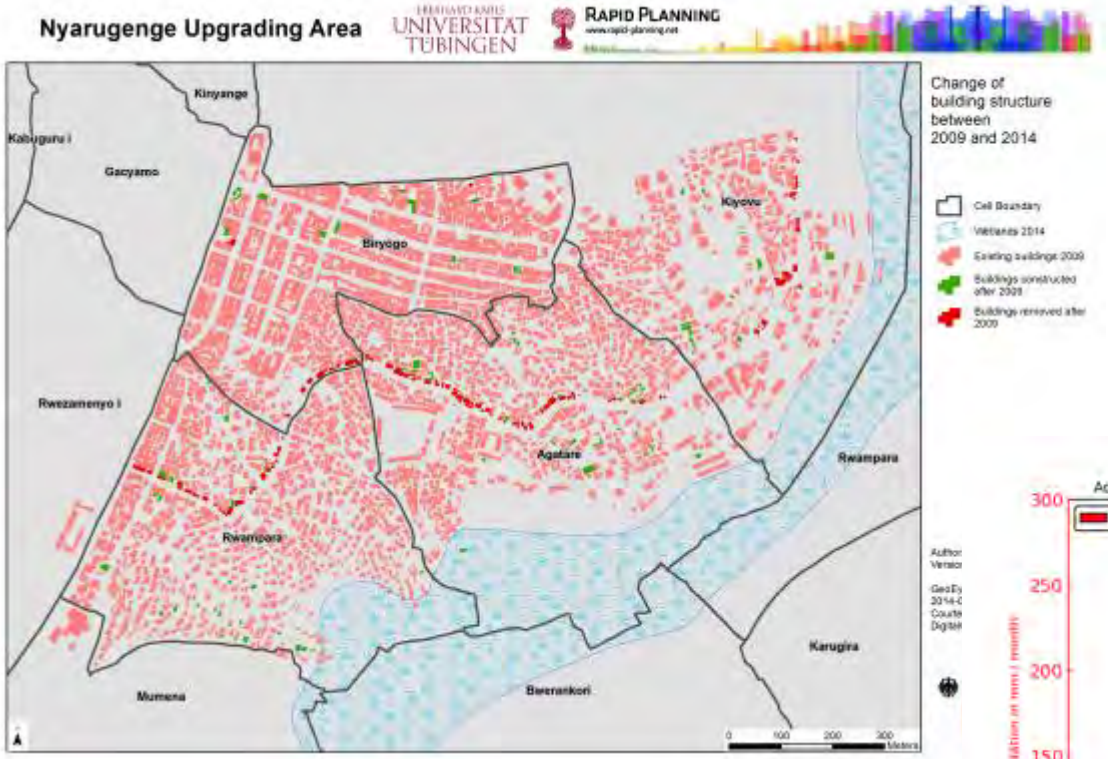


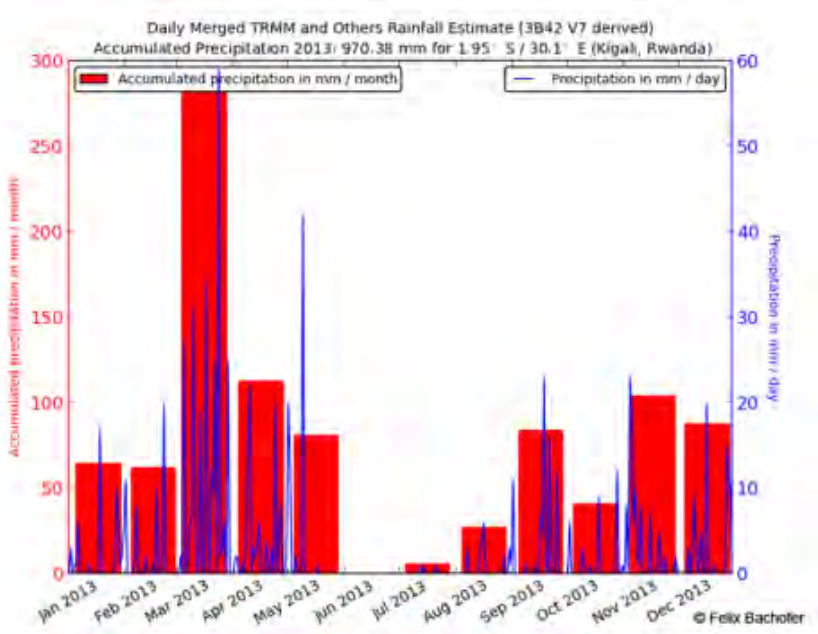
6. Activities with stakeholders

UNIVERSITY OF RWANDA (AUGUST 2015)
RAPID PLANNING SUMMER SCHOOL

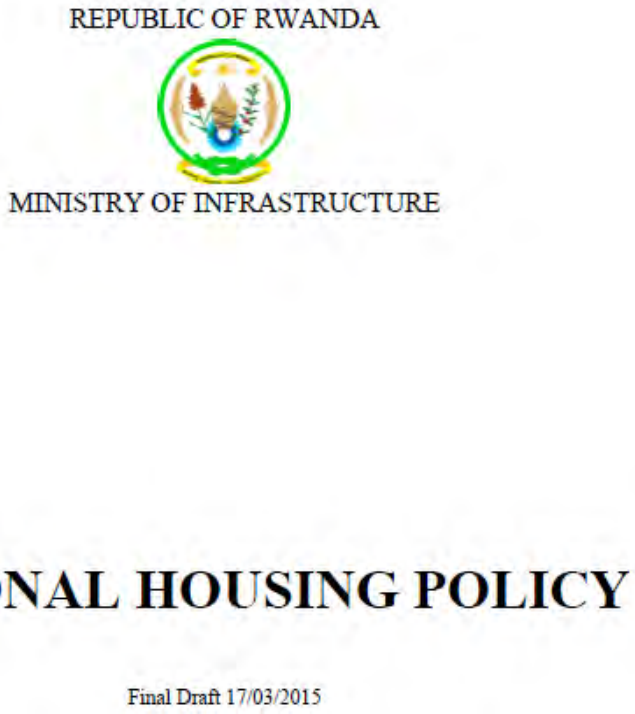
7. INTERIM PRODUCTS

IMPROVED GIS INFORMATION (UNIVERSITY OF TÜBINGEN)





RWANDA HOUSING POLICY, 17 MARCH 2015


REPUBLIC OF RWANDA

MINISTRY OF INFRASTRUCTURE

NATIONAL HOUSING POLICY

Final Draft 17/03/2015

The challenge

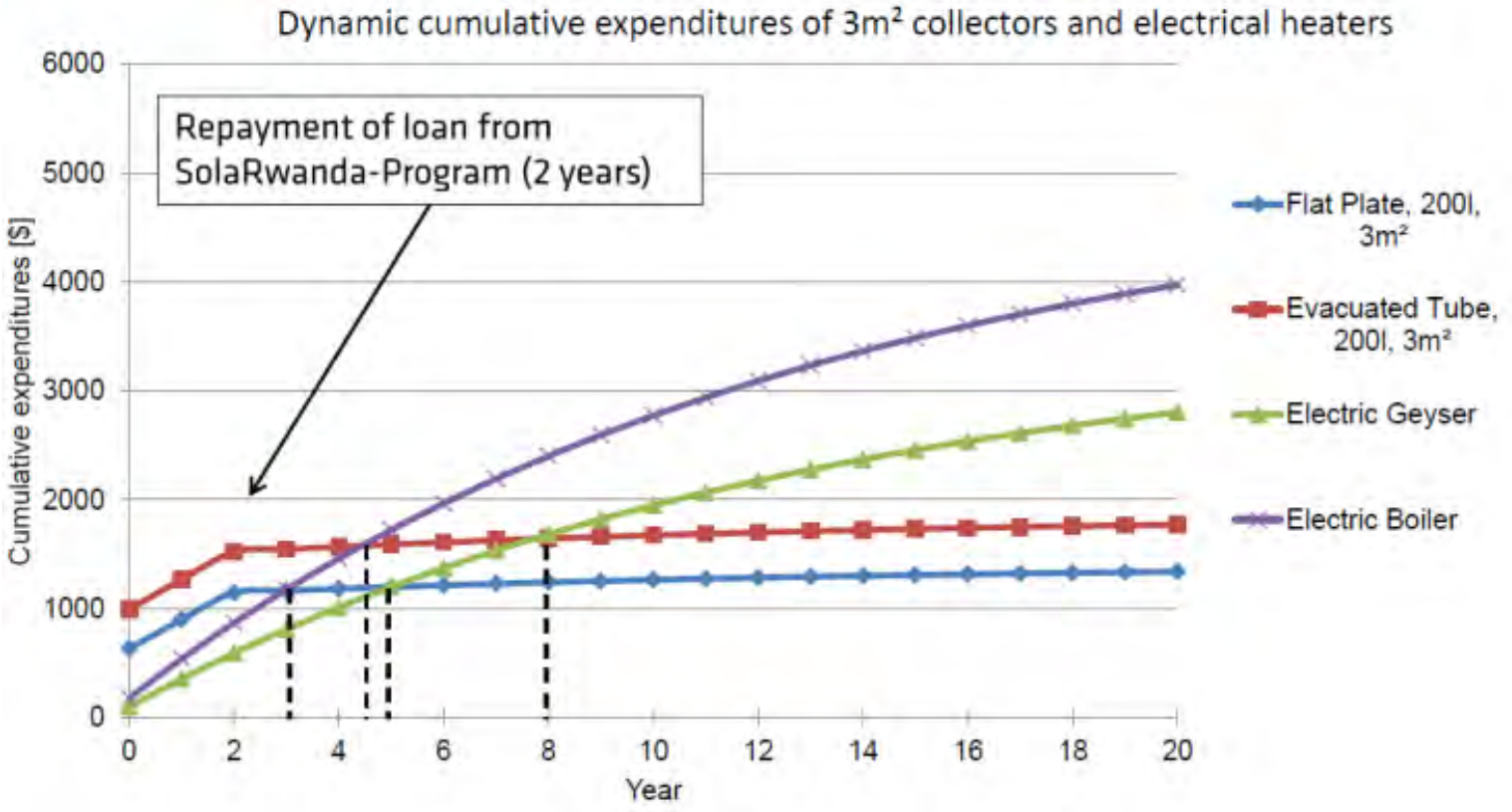
…..The production of construction materials shall be “green”, considering any energy input required, carbon dioxide output reduction, labor creation, and ensuring no cause of reduction in food production.

Rapid Planning contribution

- Share research on material flows
- Support Rwanda Green Building Council
- Building Material Calculator
- Green Building Rating System

CALCULATION TOOL ON SOLAR RESOURCE USE (IER)

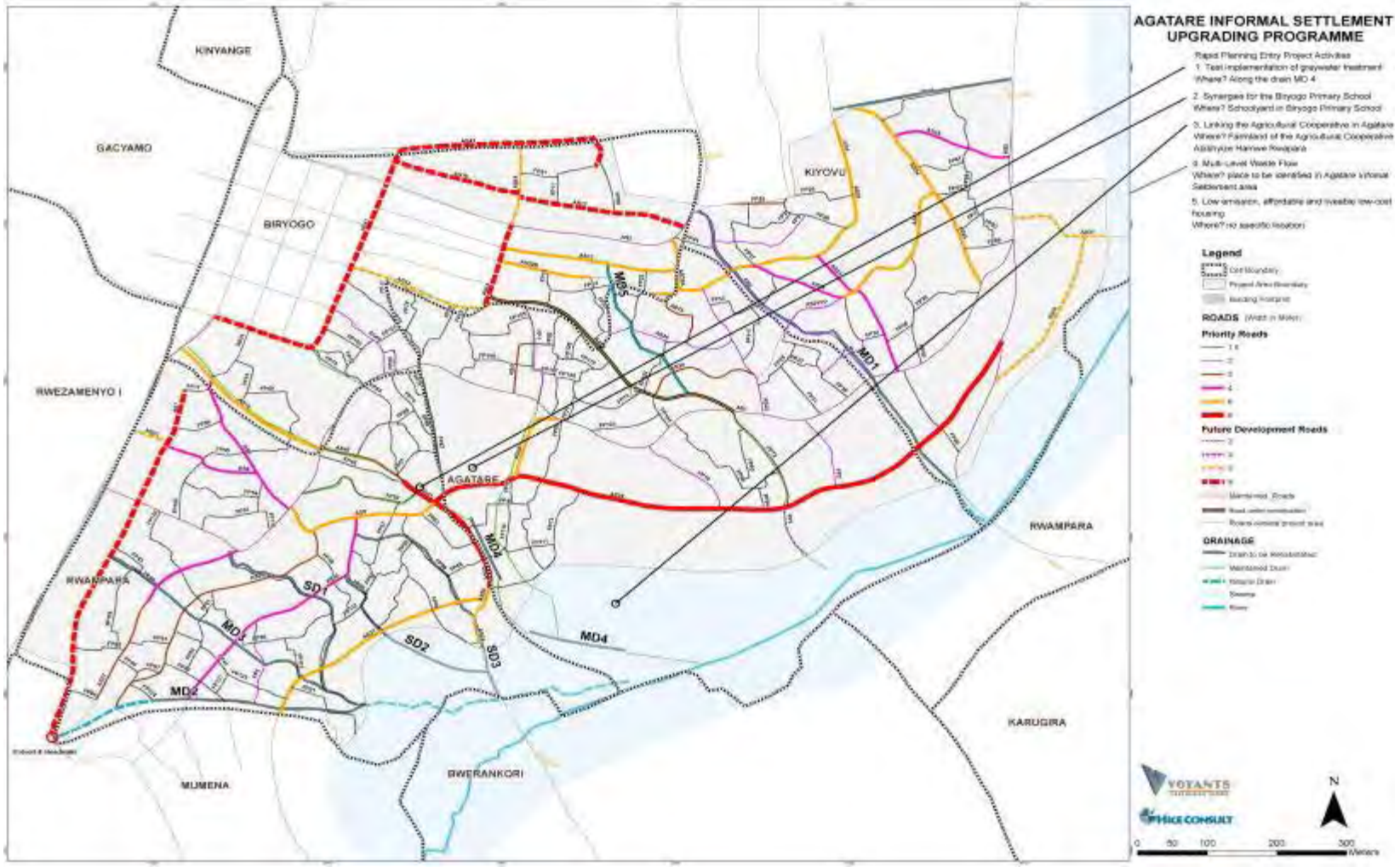
DYNAMIC CUMULATIVE EXPENDITURES- 3M² ABSORBER AREA



8. ENTRY PROJECT IN AGATARE

RP ENTRY PROJECT IN AGATARE

"Integrating the trans-sectoral approach for the critical lifelines …"



RP ENTRY PROJECT IN AGATARE

I. BIRYOGO PRIMARY SCHOOL

SPONGE SCHOOL CONCEPT

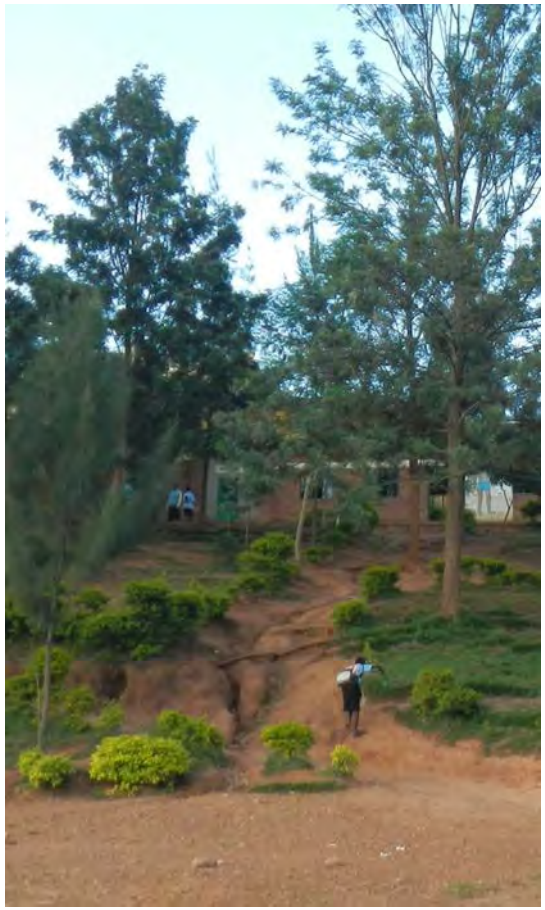
- GREY WATER TREATMENT SYSTEM (GWTS)
- IMPROVE AND ENLARGE RAIN WATER HARVESTING (RWH)
- EROSION CONTROL WITH VETIVER GRASS AND OTHER PLANTS
- HAND-WASH STATIONS CONNECTED TO RWH AND GWTS




RP ENTRY PROJECT IN AGATARE

II. HOUSEHOLDS AND SCHOOL IN AGATARE

EROSION CONTROL GREYWATER TREATMENT SYSTEM



RP ENTRY PROJECT IN AGATARE

III. AGRICULTURAL COOPERATIVE *ABISHYIZE HAMWE RWAMPARA*

IMPROVE AGRICULTURAL PRODUCTION AND SALE

Water + Waste water Energy Solid waste Food/Urban agri

RP ENTRY PROJECT IN AGATARE

IV. WATER KIOSK & COPED

WASTE COLLECTION AT WATER KIOSK

9. CAPACITY DEVELOPMENT

RP CAPACITY BUILDING EXCHANGE ACTIVITIES

First International RP Capacity Development Workshop in Frankfurt, 22 to 29th May, 2016

German Rapid Planning team members and guests from Kigali, Da Nang & Assiut

Thank You!
[English]

Cảm On!
[Vietnamese]

Danke!
[German]

Murakoze!
[Kinyarwanda]

Shukran!
[Arabic]

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