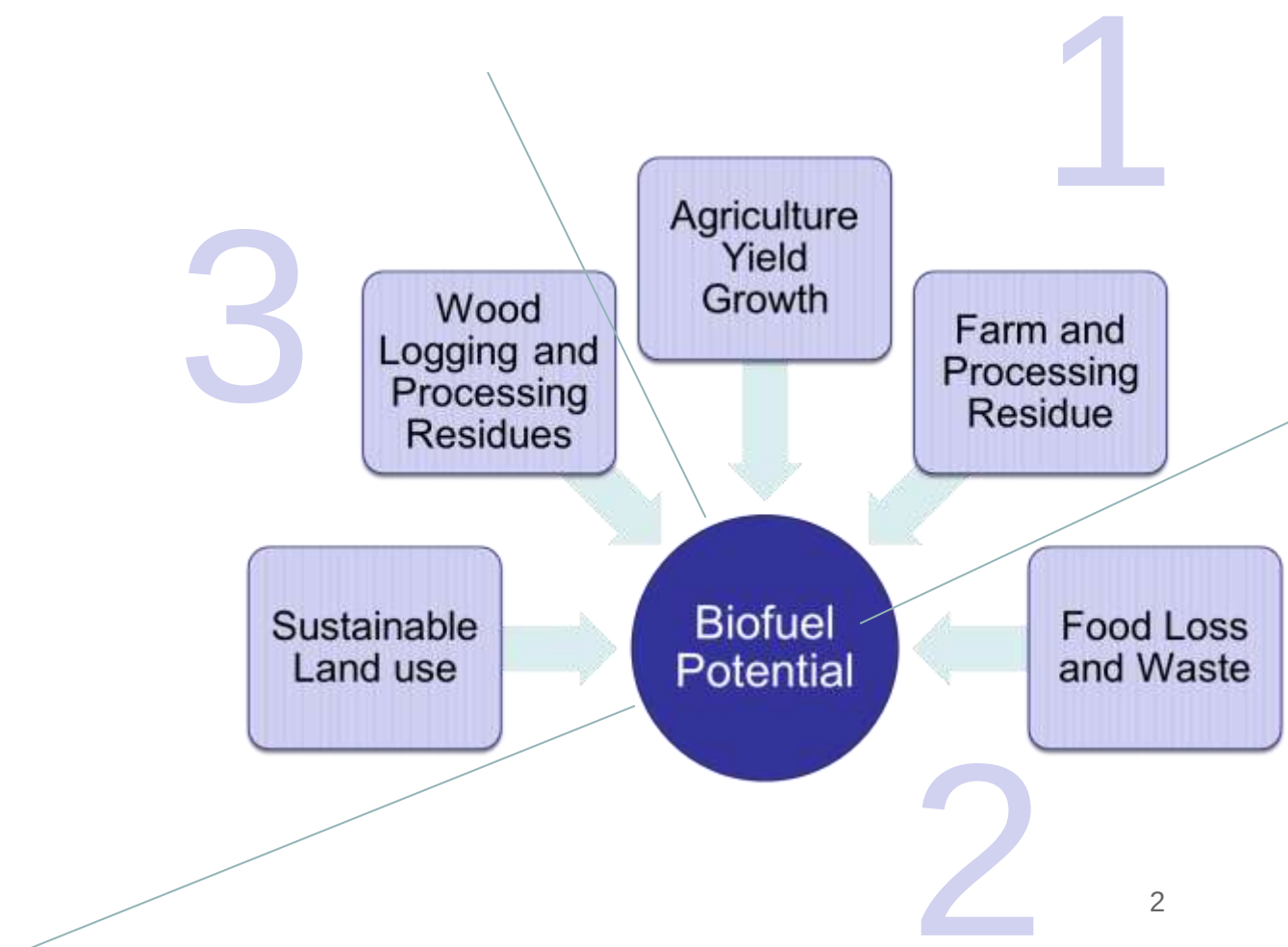
Session 3: Resources Assessment, Options and Strategies

ECOWAS-GBEP 5th Bioenergy Week * 23 June 2017 * Accra, Ghana

Yasuko Inoue
Bioenergy Analyst, IITC

IRENA under preparation:
"Biofuel Potential in Sub Sahara Africa – Raising Food Yield, Reducing Waste and Utilizing Residues"

Focusing on 5 countries:
- Ghana
- Mozambique
- Nigeria
- South Africa
- Uganda



Preliminary Analysis of sub-Sahara Africa Biomass Potentials

Country	Residues Potential with 50% Collection (PJ/year)	Potential from Closing Yield Gap (PJ/year)	Potential from Reduced Waste If Yield Gap Is Closed (PJ/year)	Total Primary Energy Potential (PJ/year)	Converted 40% to Advanced Biofuel (PJ/year)
Ghana	399	1,269	246	1,914	766
Mozambique	429	1,026	260	1,715	686
Nigeria	2,090	5,668	1,285	9,043	3,617
South Africa	424	701	636	1,761	704
Uganda	534	735	752	2,021	808
Total	**3,876**	**9,399**	**3,179**	**16,454**	**6,582**

…The analysis will be improved further.

Source:IRENA Analysis of FAO and Other Data

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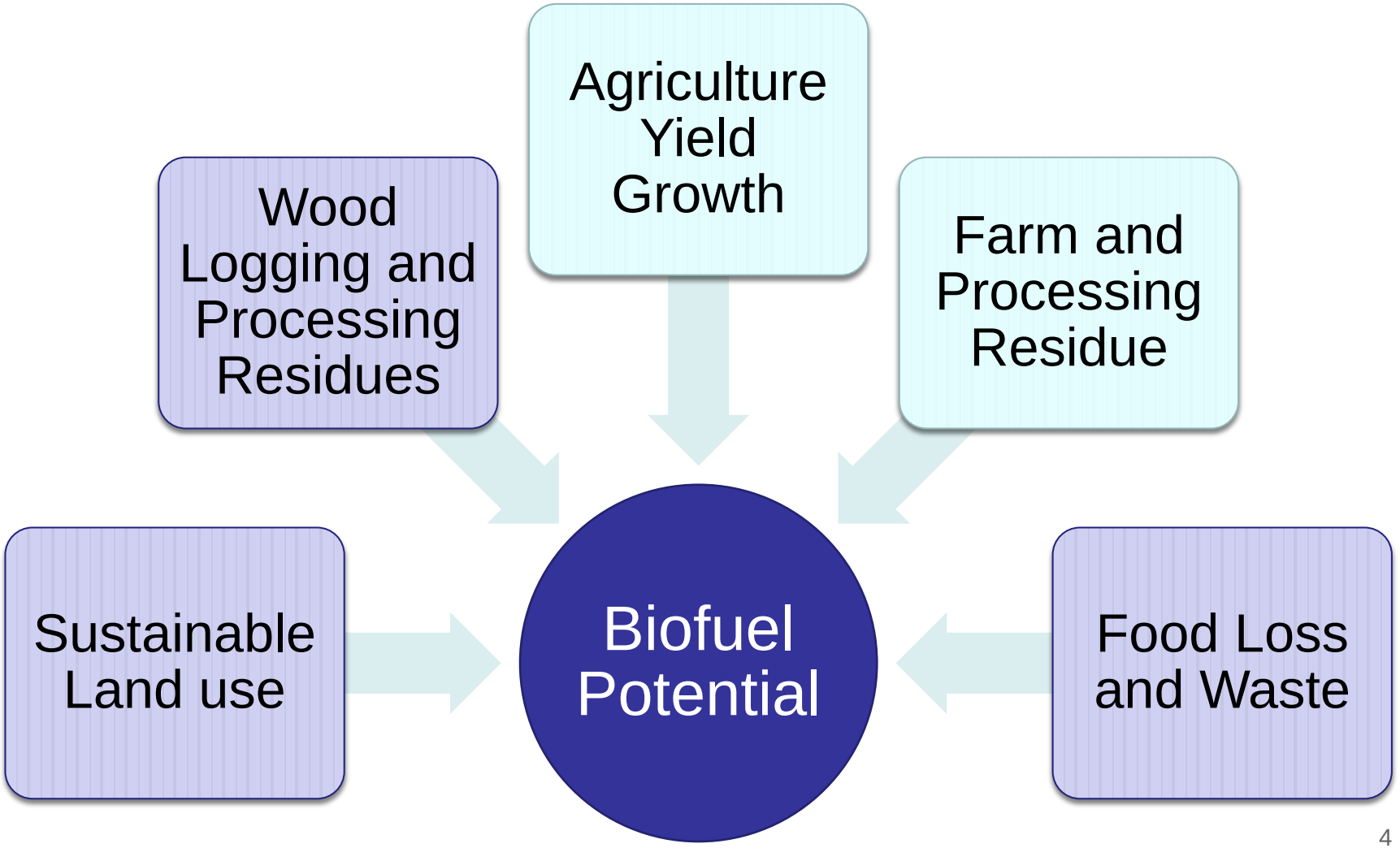

Agriculture Yield Growth
Wood Logging and Processing Residues
Farm and Processing Residue
Sustainable Land use
Biofuel Potential
Food Loss and Waste

Annual Crop Production Growth - FAO Projection

	1961-2007	1987-2007	1997-2007	2005/07-2030	2030-2050
World	2.2	2.3	2.3	1.3	0.7
Developing	3.0	3.1	3.0	1.4	0.8
- excl. China & India	2.8	2.8	3.2	1.7	1.0
Sub-Sahara Africa	**2.6**	**3.3**	**3.0**	**2.4 (43% increase)**	**1.9**
Latin America and the Caribbean	2.7	2.9	3.7	1.7	1.0
Near East and North Africa	2.9	2.5	2.4	1.4	0.9
South Asia	2.6	2.4	2.1	1.5	0.9
East Asia	3.4	3.6	3.2	1.1	0.3
Developed	0.8	0.4	0.5	0.8	0.3
44 countries over 2700kcl/person/day	2.6	2.9	2.1	1.1	0.4

Source: Alexandratos & Bruinsma (2012) Table 4.3

Climate Change, Natural Disasters, Water and Food Security and Competition over Good Land since yr. 2000

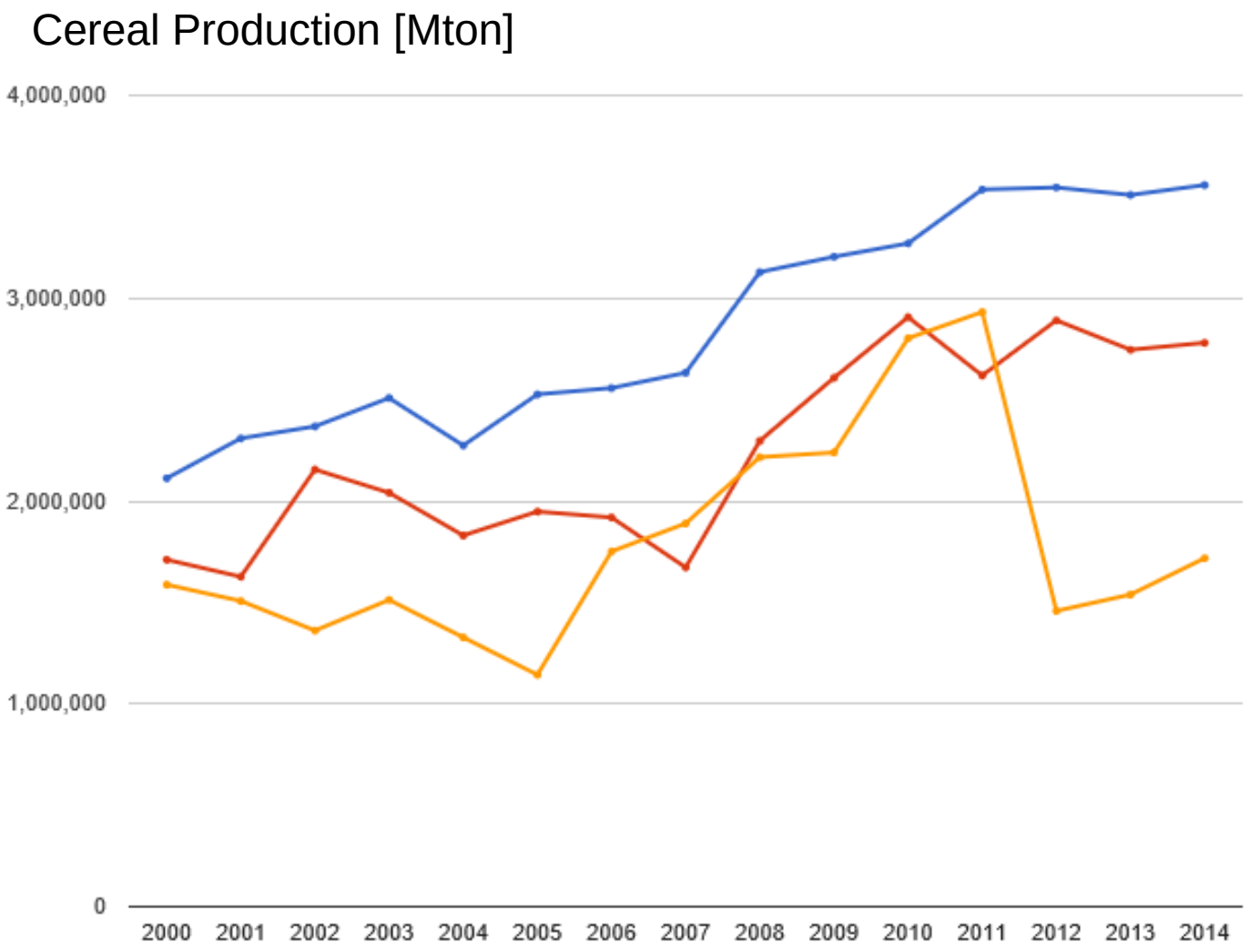
-Farmers know where is a good land and already occupied
-Population growth and climate change increase land resources demand

Dry up corn
Increasing unpredictability
November 2012

Photo: Flood in Limpopo
World Bank, Jan 2013

WFP Food Distribution at Camp
Photo: World Bank, Jan 2013

Ghana, Mozambique and Uganda Cereal Production Trend 2000-2014

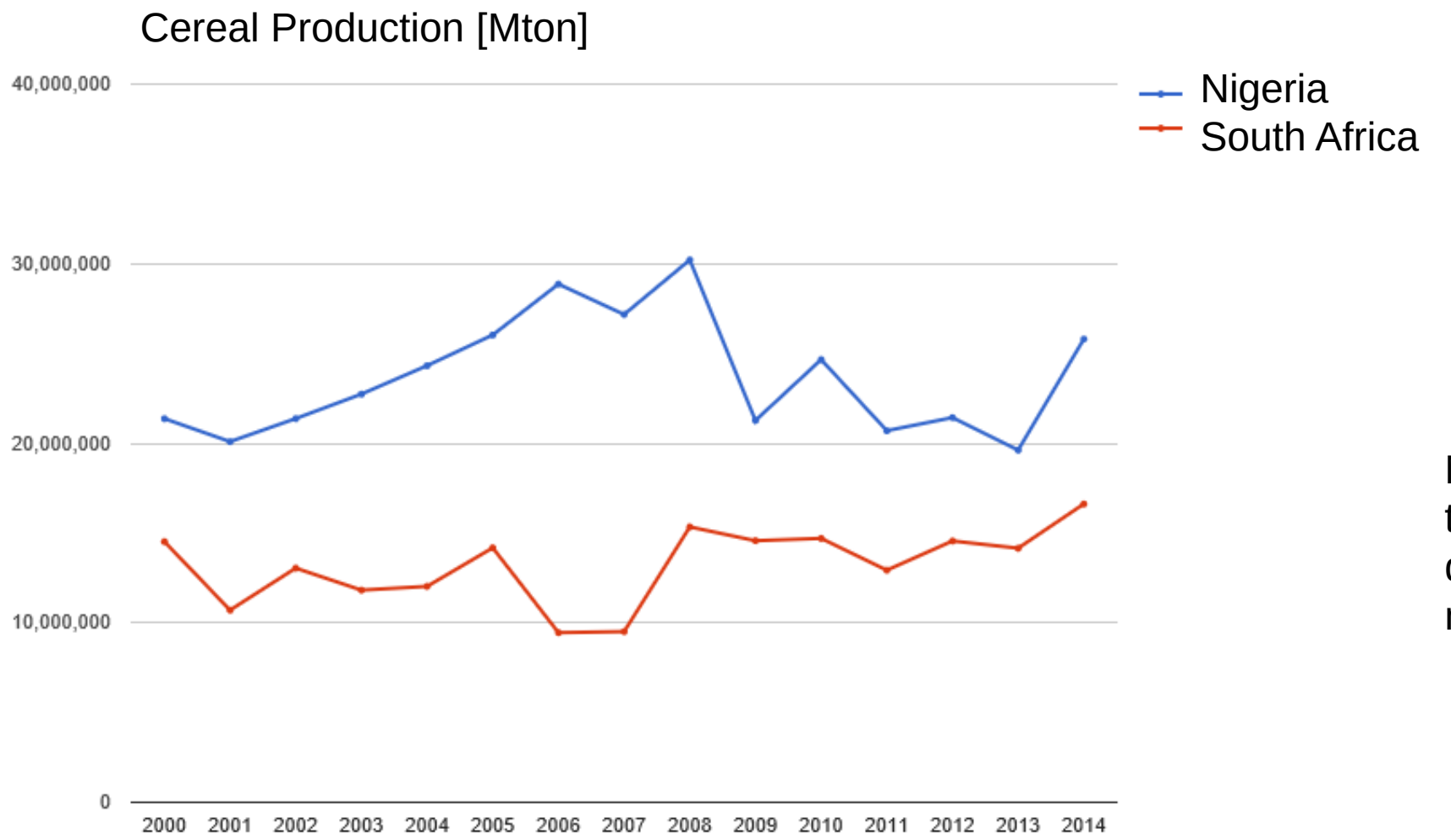


Fluctuation by frequent drought and flood

Uganda looks constant upwarding trend; but food insecurity at various part of the country (WFP)

FAOSTAT (accessed 2017)

Nigeria and South Africa Cereal Production Trend 1990-2014



Not always upward trend but certain degree of uncertainty must be considered

FAOSTAT (accessed 2017)

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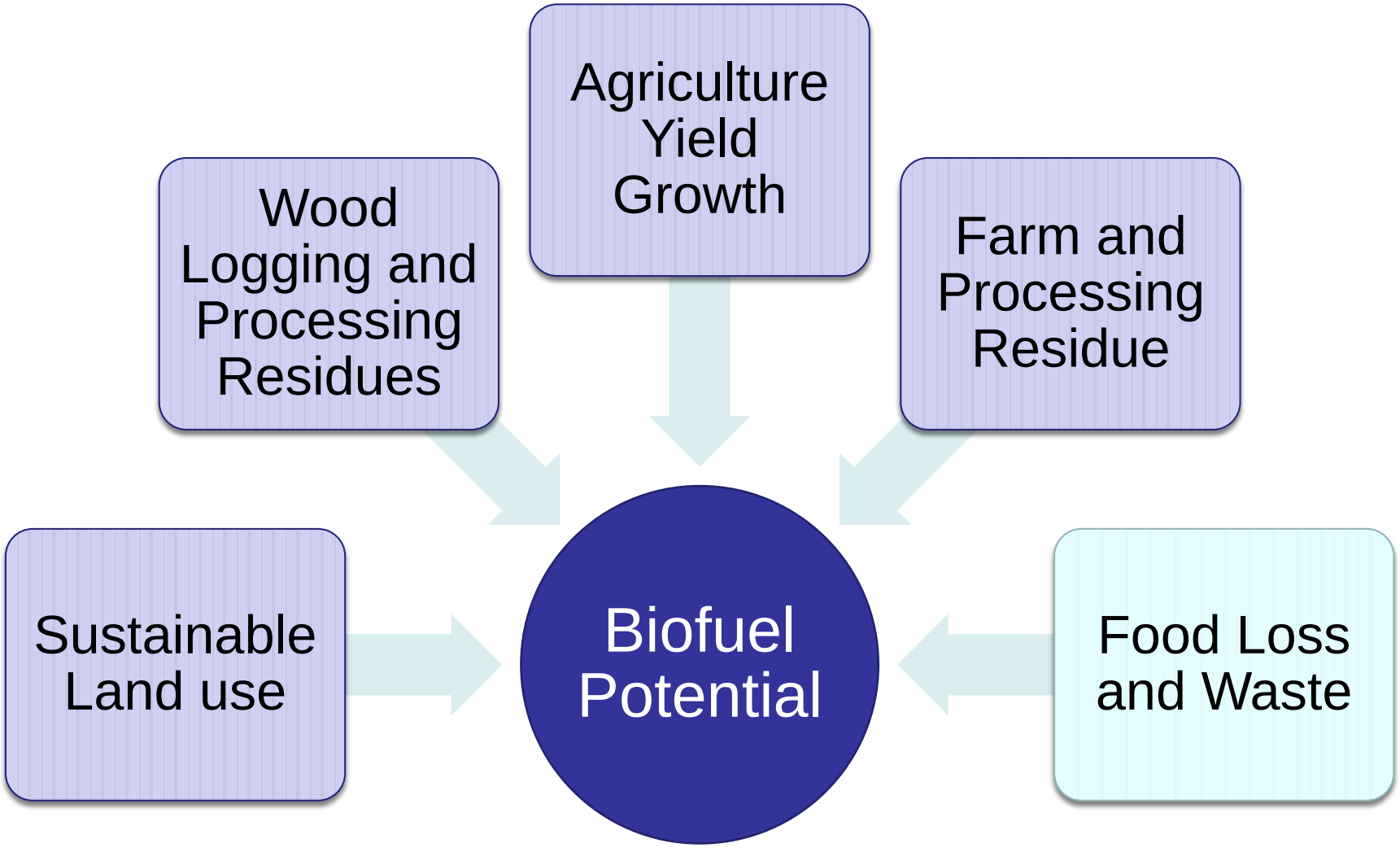
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Estimated Food Waste Percentage – Sub-Sahara Africa (A developed country region)

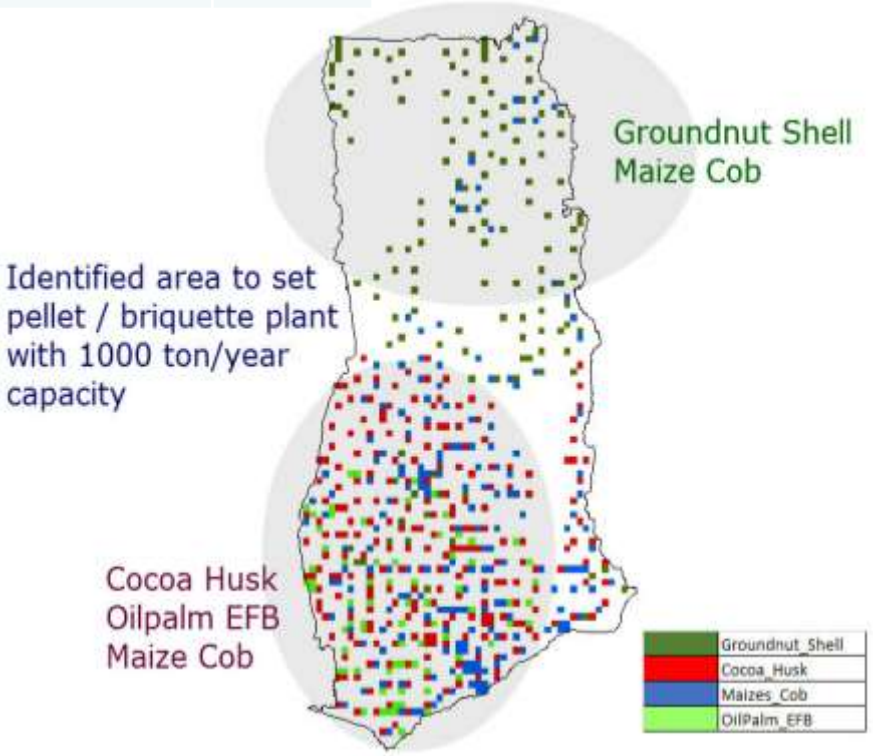
Source: FAO (2011) Annex 4

	Agricultural Production	Postharvest handling and storage	Processing and Packaging	Distribution	Consumption
Cereals	6% (2%)	8% (2%)	3.5% (0.5%,10%)	2% (2%)	1% (27%)
Roots and Tubers	14% (20%)	18% (10%)	15% (15%)	5% (7%)	2% (30%)
Oilseeds and pulses	12% (12%)	8% (0%)	8% (5%)	2% (1%)	1% (4%)
Fruits and Vegetables	10% (20%)	9% (4%)	25% (2%)	17% (12%)	5% (28%)
Meat	15% (3.5%)	0.7% (1%)	5% (5%)	7% (4%)	2% (11%)
Fish and seafood	5.7% (12%)	6% (0.5%)	9% (6%)	15% (9%)	2% (33%)
Milk	6% (3.5%)	11% (0.5%)	0.1% (1.2%)	10% (0.5%)	0.1% (15%)

Bioenergy plant location potential from supply data

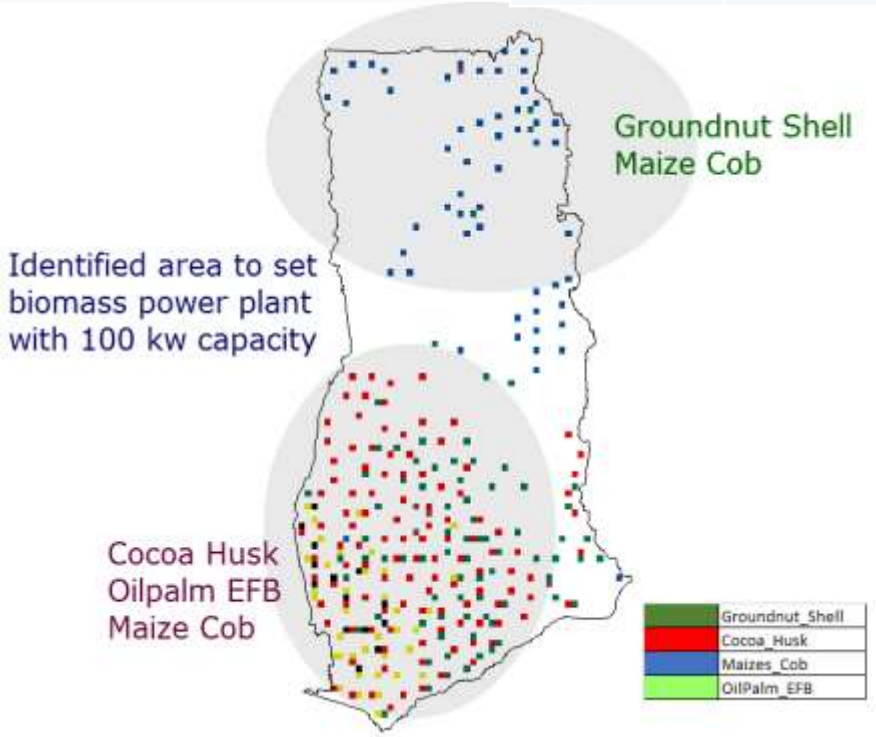
GIS based analysis（Ghana）
(a) 100kWh /yr - Small Scale Power Plant
(b) 2500 ton or 1000 ton Pellet factory
Collect biomass from 12 km radius

Commodity	No. plant
Cocoa husk	233
Oil palm EFB	123
Maize	298
Groundnut	148



Solid fuel

Commodity	No. plant
Cocoa husk	113
Oil palm EFB	60
Maize	132
Groundnut	70



Power generation

Food loss and waste – a solution tried in Zambia

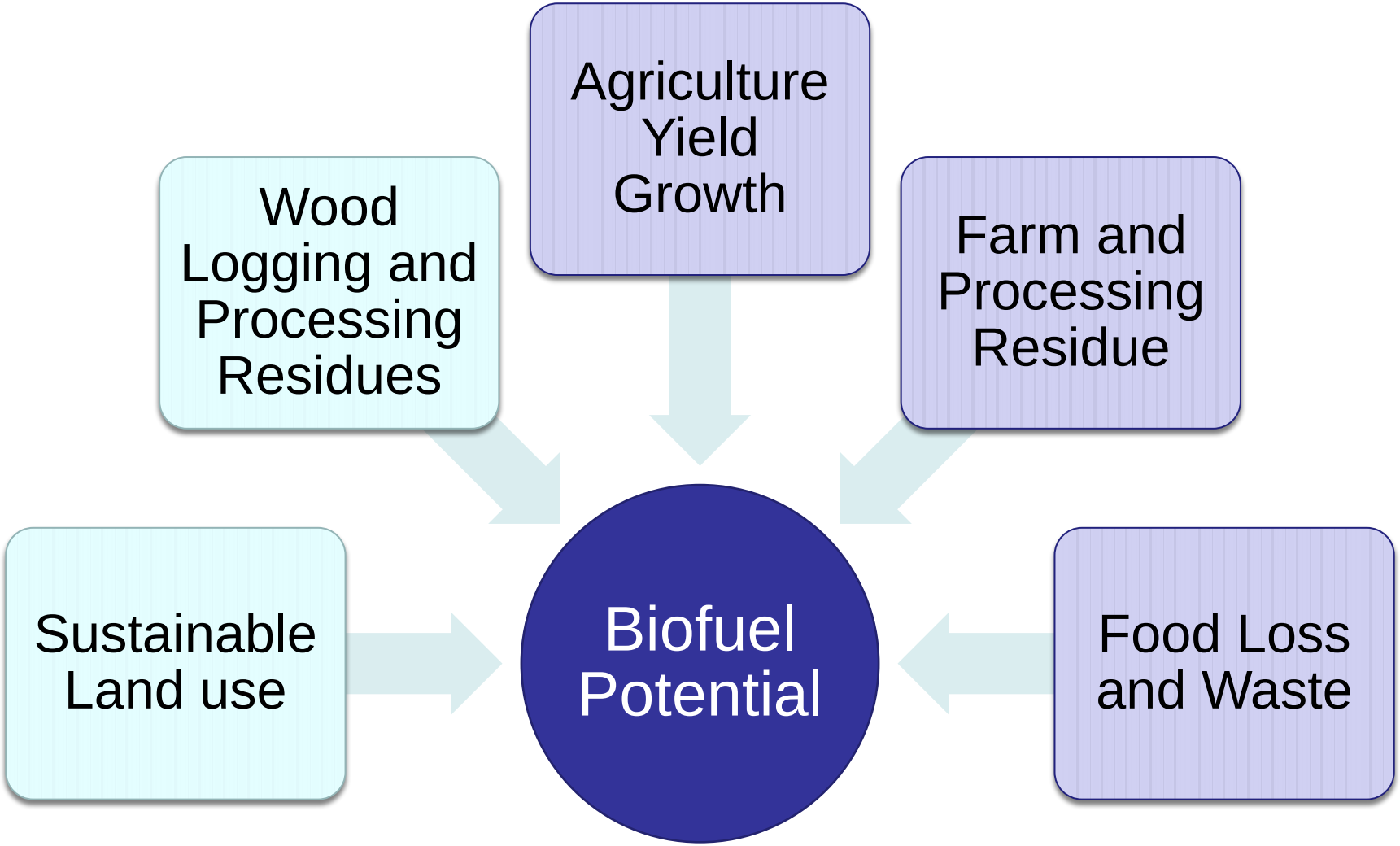
2017 - Virtual Farmers' Market: A digital solution connecting farmers to markets

- Enable farmers to search the most profitable market to sell their products
- Use mobile phone app
- Buyer pay the membership while farmers not
- Not only WFP, many African countries are making efforts

WFP United Nations World Food Programme

Huge investment is necessary to reduce the loss and waste

- vaccination for animals, road network, storage and delivery system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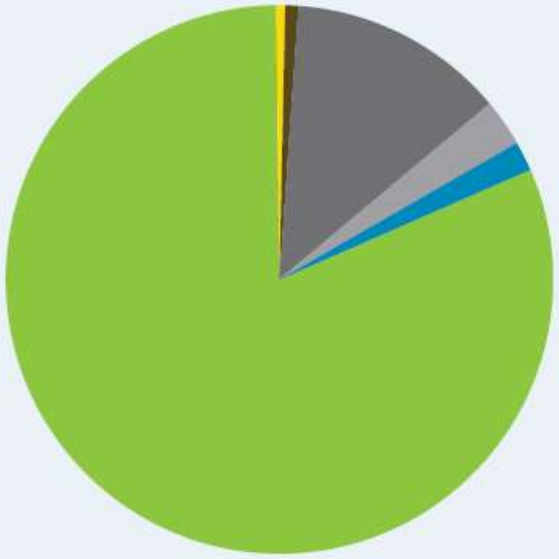
Share of Wood Energy in Sub-Sahara Africa (as of 2009)



C) SUB-SAHARAN AFRICA
(excl. SOUTH AFRICA)

Bioenergy	Shares
Solid biofuels	81.2%
Other renewables	0.3%
Coal and peat	1.0%
Oil	13%
Natural Gas	2.7%
Hydro	1.9%

IRENA (2014) based on IEA (2009)

80% of energy was soil biomass – fuel wood & charcoal in 2009

Forest degradation, respiratory disease, deforestation, time consuming labour

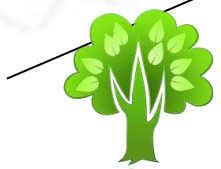
Many countries in Africa are seeking alternative solutions

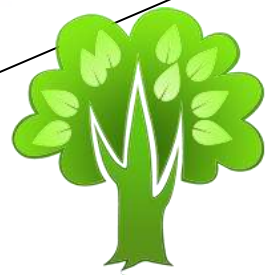
Apply 3 different rate types for 26 species available for wood energy (for Asia study)

P: Pulp (80% of harvested wood assumed use for pulp or paper; 20% available for energy use)
L + F: Lumber and Furniture/Other (60% used as timber or furniture, 40% energy)
A + F: Animal fodder and Furniture/Other (85% for non-energy uses, 15% for energy)

Example from Asia

Sustainable Wood Energy and Crop Lifecycle: Rubber case





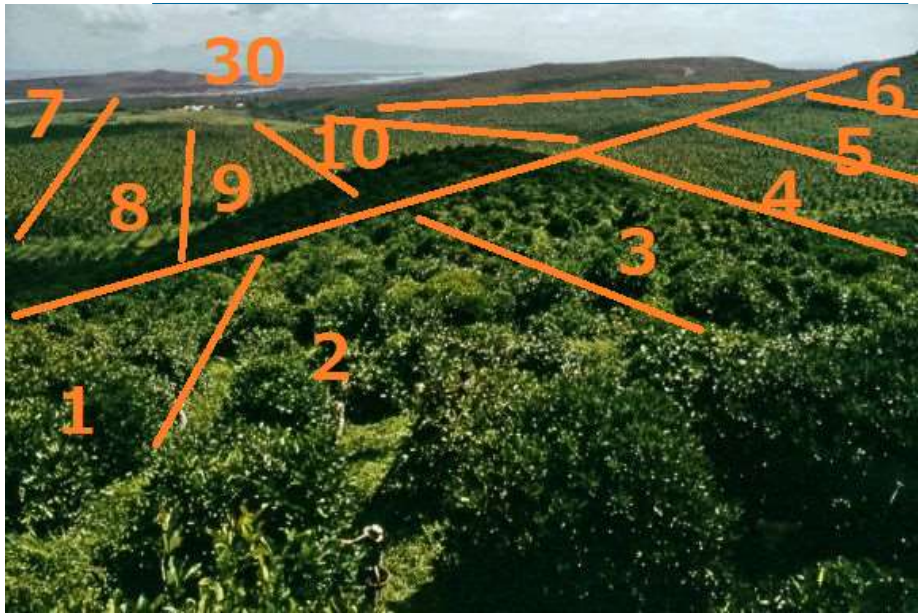
1st yr. 3rd Yr. 5th Yr. 10th Yr. 30th Yr.

Intensive care

Seeding Planting

Resin harvest period: 30 years =

30Year Rotation Cucle – Sus. Land Use



Ex-logging

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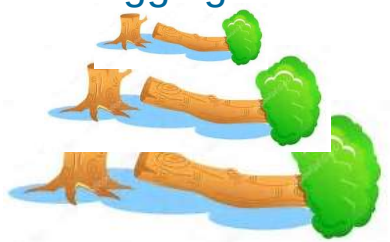
30 Yr. Cyclic Rotation

Logging



Cascade use is considered

Furniture production

Residues for Biofuel

IRENA (2017)

Conclusion: What is need to consider to improve biomass supply potential analysis?

- Climate change variabilities increase – take into account both challenge and opportunity
- Improvement of statistical information can increase better projection
- Bioenergy is not the only solution, combination with other renewable solution can increase resilience
- Please use IRENA tools
    - Bankable proposal
    - Potential simulation
    - Fund for Investment
    - Business matching

Sustainability is a key – Recent policy statement

January 2017

- IRENA-FAO- IEA

"Bioenergy for Sustainable Development"

http://www.irena.org/eventdocs/Bioenergy%20Side%20Event%20-%20Brief%20on%20BIOENERGY%20AND%20SUSTAINABLE%20DEVELOPMENT%2020170105.pdf

May 2017

- IRENA statement for UNFCCC

"Role of Renewable Energy for REDD+"

http://redd.unfccc.int/files/irena_statement_redd_volm4.pdf

United Nations Framework Convention on Climate Change

Call for Good Practice: International Workshop

Please share your good practices!

URL: http://www.irena.org/menu/index.aspx?mnu=cat&PriMenuID=30&CatID=142

A Workshop on
Sustainable Rural Biofuel Solution in Africa

[Call for Good Practice]
Please ***share your knowledge and good practices in Africa or applicable in Africa*** on;

- ***Agro-forestry*** and/or ***Agroecology*** good practice to increase bioenergy availability, improve nutrition and bring about healthy environment
- ***Innovative Biomass Residues to Energy Technology*** to boost energy access and efficiency.
- ***Practical Tools to Ensure Positive and Inclusive deployment*** of bioenergy in a wider range of society

- Selected good practices will be invited to present at the workshop and published in our Cookbook style guidebook.
  (Some funding availability)
- **Experiences from Asia, Latin America or other** region applicable to Africa are also welcome!

[A]
Agroforestry or Agroecology **practices which increase energy availability of communities while ensuring positive impacts on ecosystem, nutrition and calorie intake (examples: micro-catchment with fruit trees & animals etc)**

[C]
Tools for Enhanced Bioenergy Sustainability **to ensure positive and inclusive social, economic and environmental impacts in bioenergy development (example: GHG emission impact assessment tool etc)**

[B]
Bio to Energy Innovation **which enable effective use of 3Rs. (example: efficient bio-ethanol production technology from cassava starch; Biogas for chilling milk at rural market; fuel efficient cook stoves. etc)**

Abstract Submission: 31 August 2017
(200 word summary of [A], [B] or [C] above)
Full Paper Submission: 30 September 2017
(Template is on the 2nd Page)

Selected entries: will be invited to prepare a paper and present it at a workshop below. The summaries of the good practices will be included in our publication.

Workshop venue: tbc (in Africa, early 2018)

URL: www.irena.org

Submission/Inquiry to: Ms Yasuko Inoue,
IRENA Innovation Technology Centre
E-mail: Yinoue@Irena.org
Telephone: +49-228-3917-9094

IRENA
International Renewable Energy Agency

A Workshop on
Sustainable Rural Biofuel Solution in Africa
Call for Good Practice

Template for submission of your "Good Practice"

GENERAL INFORMATION	
Your Name	
Affiliation/Organization & Address	
Email	
Telephone	
Submission Date (DD/MM/YYYY)	
INFORMATION ABOUT YOUR GOOD PRACTICE	
Selected Category (please pick one of the three)	(1) Agroecology/agroforestry for Bioenergy (2) Bio to Energy Innovation (3) Tools for Enhanced Bioenergy Sustainability
Target Country and Region of the Good Practices	
Approx. 200 words summary of your Good Practices (with a few pictures)	
Potential of energy production volume by your Good Practice annually? (with estimation base)	
Applicable/Applied location or areas in Africa suitable/practiced for your Good Practice ? (with reasons)	
Enabling Factors or Conditions to Replicate Your Good Practice in Other Areas in Africa?	

Reference

- Alexandratos, N. and J. Bruinsma (2012), World agriculture towards 2030/2050: the 2012 revision, Food and Agricultural Organization, Rome
- FAO (n.d.) FAOSTAT
- Gustavsson, J. et al. (2011), Global food losses and food waste – Extent, causes and prevention, Food and Agricultural Organization, Rome
- IMF (n.d) Database
- IEA (2009) Energy Balance for Africa
- IRENA (2014) Biomass Potential in Africa
- IRENA (2017) Biofuel Potential in Southeast Asia: Raising food yields, reducing food waste and utilising residues
- Kosugi, A. et al. (2010), “Ethanol and lactic acid production using sap squeezed from old oil palm trunks felled for replanting,” Journal of Bioscience and Bioengineering, 110 (3), pp. 322–325.
- NBF (n.d.) Sustainable action with biomass energy (http://www.nbf-web.com/index.html)
- World Food Programme (2017) Virtual Farmers’ Market

Thank you

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www.irena.org

yinoue@irena.org