UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

UNCTAD

Promoting cotton BY-PRODUCTS in Eastern and Southern Africa

Project: 1617K - Funded by the United Nations Development Account - 2016-2019

"Biomass fuels as substitutes for wood and fossil fuels in Africa"

UNITED NATIONS
UNCTAD

WTO Cotton Days, Geneva, 7 June 2019

Kris Terauds - Commodities Branch

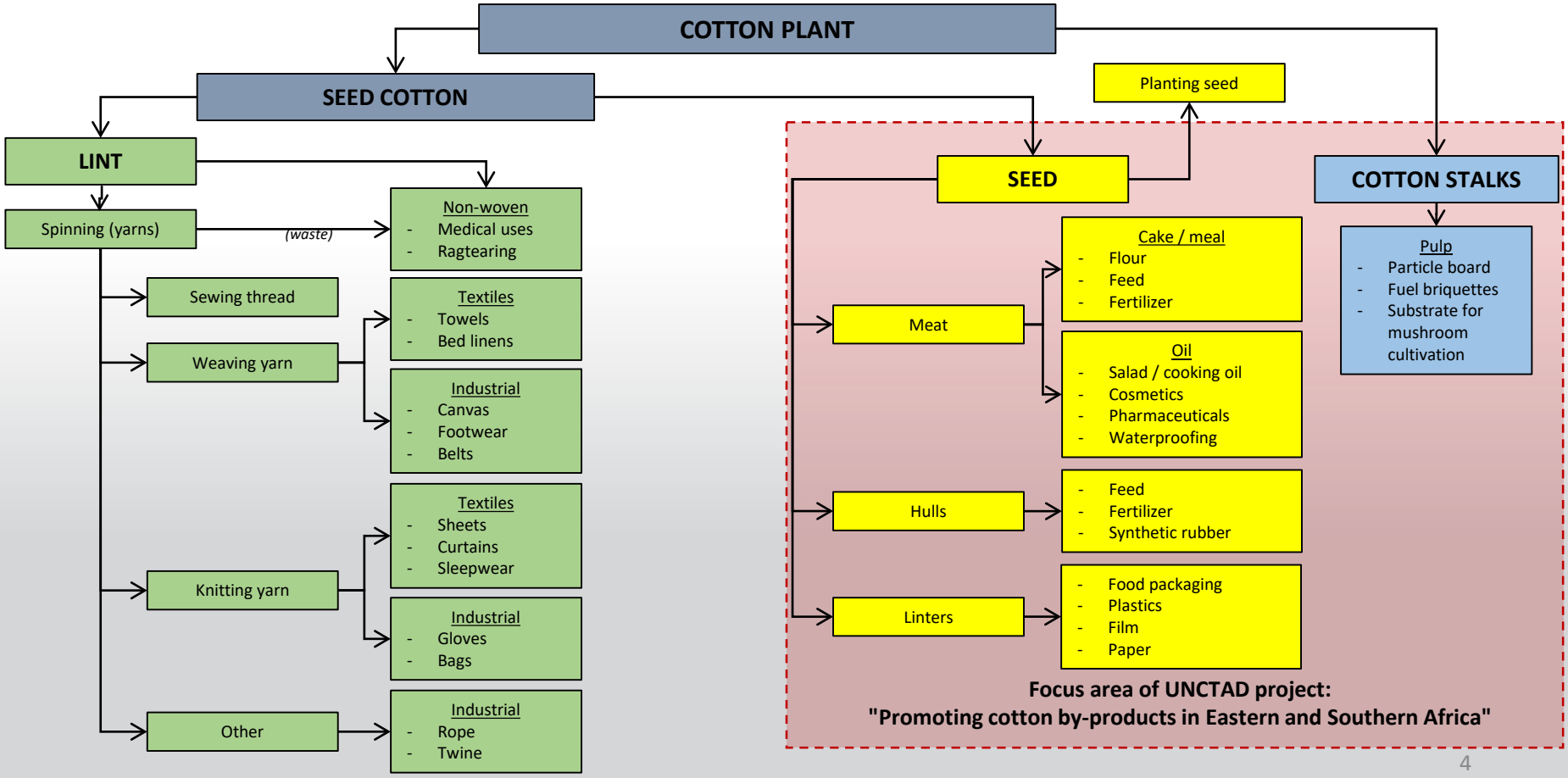
Outline of the presentation

- Overview of the project
- Cooperation with CIRCOT
- By-products selected for development
- Biomass fuels as substitutes for wood and fossil fuels
- Curbing deforestation
- Reducing fuel trade deficits
- Conclusions
- Project next steps

Overview of the project

Title	Promoting cotton by-products in Eastern and Southern Africa (ESA)
Funding source	United Nations Development Account (Project 1617K)
Countries	United Republic of Tanzania, Uganda, Zambia and Zimbabwe
Start date	March 2016
End date	December 2019
Total budget	US$ 591,000
Implementing agency	United Nations Conference on Trade and Development (UNCTAD)
Partners	United Nations Economic Commission for Africa (UNECA) Common Market for Eastern and Southern Africa (COMESA)

Our project assists countries in commercializing residues from the cotton value chain.



Source: Adapted from Cotton Development Organisation, Uganda

Project activities run from 2016 until the end of 2019.

Complete

- Surveys
- National capacity-building workshops (National Action Plan)
- Study visit to India
- Regional wrap-up workshop

Underway

- Investment profiles

Remaining

- Draft follow-on project proposals
- Evaluation

Cooperation with India's Central Institute for Research on Cotton Technology (CIRCOT)

- UNCTAD selected India as an example for project countries, due to:
  - Similarities between the production models and geographic densities;
  - India has revived its cotton sector by developing local value addition technologies and businesses, adapted to the rural context.
- CIRCOT researches, designs technologies and incubates businesses for post-harvest processing of cotton and its by-products.
- Close link with processors, machine fabricators and end users.

CIRCOT participation in project activities:

- At each national workshop, presented its work on cotton commercial applications for cotton by-products.
- Hosted a study visit for project participants in January 2019.

CIRCOT
ICAR - Central Institute for Research on Cotton Technology

All 4 project countries chose to develop biomass briquettes and pellets from cotton stalks.

Cotton by-products selected for National Action Plans

Raw material	End product	Tanzania	Uganda	Zambia	Zimbabwe
Stalks	Briquettes and pellets	👍	👍	👍	👍
Stalks / hulls	Mushrooms		👍		
Cottonseed cake	Gossypol-free cake	👍	👍		👍
Short staple cotton	Absorbent cotton wool	👍	👍	👍	

In project countries, biomass fuels respond well to policy priorities.

National policy priority	SDGs
Income opportunities for farmers	Primary – 8 Secondary – 1
Small-scale, rural business opportunities, including for women	Primary – 8 Secondary – 5
Energy security , reduction of fossil fuel trade deficits	Primary – 7
Forest conservation, reduce consumption of firewood and charcoal	Primary – 7 Secondary – 12
Reduction of greenhouse gas emissions and smoke-related health problems	Primary – 7

Briquettes are direct substitutes for industrial solid fuels, such as coal, firewood and charcoal.

Properties of selected solid fuels

Fuel	Density (g/cm^3)	Calorific value (kcal/kg)	Ash content (%)
Charcoal	2.1	7,000	5
Coal	1.3	3,800-5,300	20-40
Biomass briquettes, cotton stalks	2.3	4,400	3
Biomass briquettes, rice husk	1.3	3,700	18
Firewood	varies	3,900	1

Source: Singh, N.P., 1996. Agriwaste programme in India: an overview. Proceedings of the International Conference on Biomass Energy Systems, 26-27 February, New Delhi, India, pp. 65-72

Switching a boiler from liquid fuel to briquettes requires a conversion, or results in a reduced capacity.

Example: Pix Transmission, Nagpur, India

- Pix Transmission produces rubber belts for industrial machinery.
- For many years, Pix fueled its two 6 MT boilers with furnace oil.
- After the most recent oil price boom, Pix converted its boilers to biomass briquettes.
- The conversion resulted in a cheaper, environmentally-friendly operation.
- The company says it recovered its conversion investment in 4 years.
- Since the briquettes are organic, Pix can easily dispose of the residual ash.

PIX
Power Transmission Solutions
Driving growth!

Photo: UNCTAD

In Africa, briquettes can substitute for wood fuels, helping curb rampant illegal deforestation.

- Population growth and urbanization has contributed to rapid demand growth for affordable energy sources.
- Access to clean, modern energy remains low, so households turn to firewood and charcoal.
- E.g. In Zambia in 2015, 85% of rural households depended on firewood as their primary fuel and 59% of urban households depended on charcoal (Source: Central Statistics Office).
- Demand for wood-based fuels has outstripped the legal supply, leading to rampant illegal deforestation.
- In the border regions of Tanzania and Uganda, large camps of displaced persons have no other source of fuel, so they cut up to 20 MT of trees per person per year.

"Uganda's forest cover depleted to 8%, environment minister warns encroachers"
New Vision, 20 April 2018

"Zimbabwe's Famed Forests Could Soon Be Desert"
Inter Press Service, 6 Feb 2015

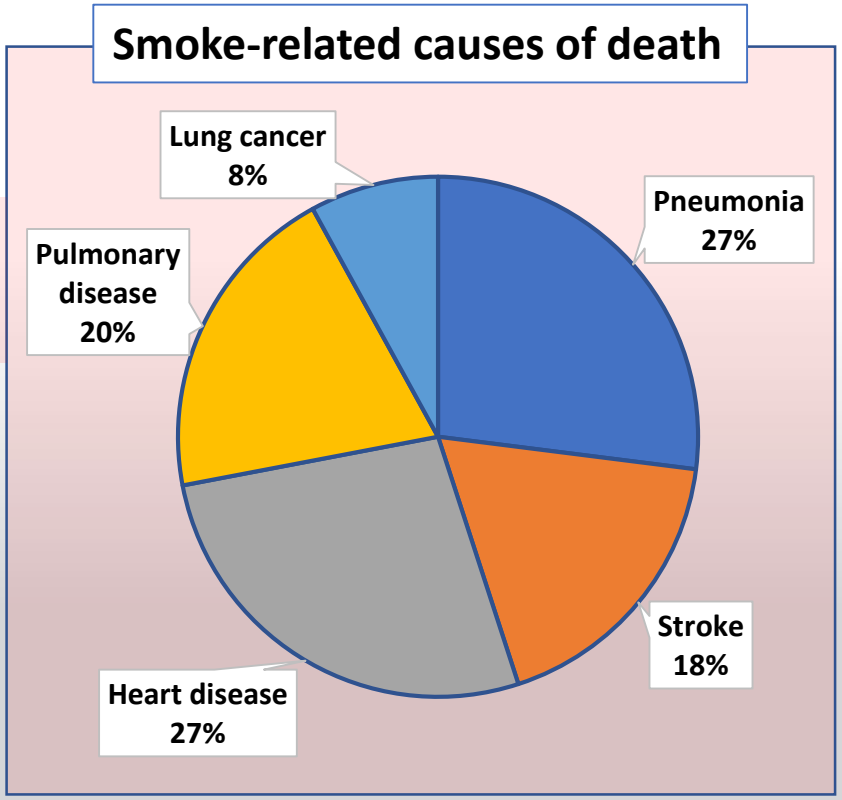
Replacing wood with smokeless biomass pellets in the home can help alleviate severe health risks.

3 billion worldwide cook using crude solid fuels in open fires or inefficient stoves

3.8 million people per year die from causes related to household air pollution

Women suffer disproportionately from lung cancer and pulmonary disease, as they cook more

Household air pollution is responsible for 45% of pneumonia deaths among children younger than 5



Source: WHO, 2018. Fact Sheet: Household air pollution and health

Substituting imported fossil fuels with biomass briquettes can ease heavy fuel trade deficits.

Average annual fossil fuel trade balance, 2014-17, USD millions

Country	Coal products (HS 2701)	Petroleum fuels (HS 2710)	Petroleum gas (HS 2711)	Total
Uganda	(3.1)	(824.1)	(10.9)	(838.2)
United Republic of Tanzania	(6.1)	(3,333)	(70.7)	(3,409.9)
Zambia	(2.7)	(950.1)	2.0	(950.8)
Zimbabwe	(1.4)	(1,393.4)	(19.3)	(1,414.0)

Source: United Nations Comtrade Database (https://comtrade.un.org/data)
Query terms: Partner – world, Trade flows – all, HS codes – 2701, 2710, 2711

Using cotton stalks for biomass briquettes and pellets can be a profitable, low-capital business.

Financial projections, small-scale briquette and pellet plants

Item	Briquetting plant	Pelleting plant
Capacity	20 MT/day	4 MT/day
Total capital investment (US$)	69,000	25,000
Total revenues / year (US$)	350,000	59,000
Net profits / year (US$)	35,000	8,000
Net profit margin	10%	14%
Return on investment, annual	53%	32%
Investment payback period (months)	23	38

Sources: UNCTAD and CIRCOT

A successful biomass fuel business depends on a cost-effective raw material supply chain.

Raw material and logistics

- Commercializing stalks would require modifying any pest management rules requiring their destruction
- Briquette and pellet plants require a supply chain organized around mobile chipping machines
- Briquette plants must source other biomass raw material outside the 3-4-month cotton season
- Briquetting plant of 4 MT/day requires approximately 1,000 MT/year of biomass, equivalent to 300-400 ha, on average, or a catchment radius of 25-30 km

Scale and scope

- Pelleting plant: multi-family cottage business
- Briquetting plant: commercial business with employees

Markets

- Pellets (fuel): households and restaurants
- Briquettes: industries and institutions with large boilers

Conclusions

- Accessible commercial technologies exist to establish a value chain for cotton stalks, based on small-scale, low-capital, rural businesses.
- Briquette and pellet plants can be profitable and scalable – from multi-family cottage activities, to SMEs.
- Cotton farmers can invest directly in these activities or earn additional income by selling chipped stalks to entrepreneurs.
- The main challenge is to establish a cost-effective supply chain for raw material, based on mobile chipping machines.
- Biomass fuels respond to policy priorities on forest conservation, emissions reduction and substitution of imported fossil fuels.

Project next steps

- Remaining project activities:
  - Project evaluation, by end 2019.
- Work with country focal points to draft selected initiatives into project plans and funding proposals for next phase of work.
- Implement joint WTO-UNCTAD-ITC initiative on cotton by-products.

For more information

- Project site, including all project documents:

  https://unctad.org/en/Pages/SUC/Commodities/SUC-Project-1617K.aspx

- Contact Kris Terauds:
  - kris.terauds@un.org
  - +41.22.917.5931

UNCTAD

PROSPERITY FOR ALL

www.unctad.org

UNITED NATIONS
UNCTAD