

Wood-Based Biomass Energy in Sub-Saharan Africa:

Issues & Approaches



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The Common Perception of Woodfuels

1. The use of wood energy is “traditional”
2. Wood energy is “dirty”
3. Wood energy is a major cause of deforestation & forest degradation
4. Wood energy is for the poor and does not meet “modern” energy requirements
5. Alternative sources of energy will replace wood energy (e.g. LPG or electrification)

Definition of “Traditional Fuel”:

Traditional biomass is defined by the International Energy Agency (IEA) as biomass consumption in the residential sector in developing countries and refers to the often unsustainable use of wood, charcoal, agricultural residues, and animal dung for cooking and heating. All other biomass use is defined as modern.



Structure of the Presentation

1. Wood Energy – The Global Perspective
2. Framing Facts – What drives the Use of and Demand for Wood Energy in Sub-Saharan Africa?
 - Jobs & livelihoods
 - Sustainability of feedstock production
3. Wood Energy and Sustainable Development in Sub-Saharan Africa
4. Policy Framework
5. Future outlook & considerations



Wood Energy: The Global Perspective

Wood Energy in Developed Economies

Many industrialized countries have already developed ambitious energy transition plans integrating wood energy:

- RWE: power plants in UK and Netherlands to substitute coal
- Berlin: LED Strategy includes switching from brown coal to biomass (wood)
- Denmark: 33% renewables (2030), fossil free (2050)
- USA: Use of wood energy for heating has grown by 30% between 2000 – 2010.
- Europe: Increasing household demand for wood for heating

Key Challenge:

➔ Demand is higher than supply!



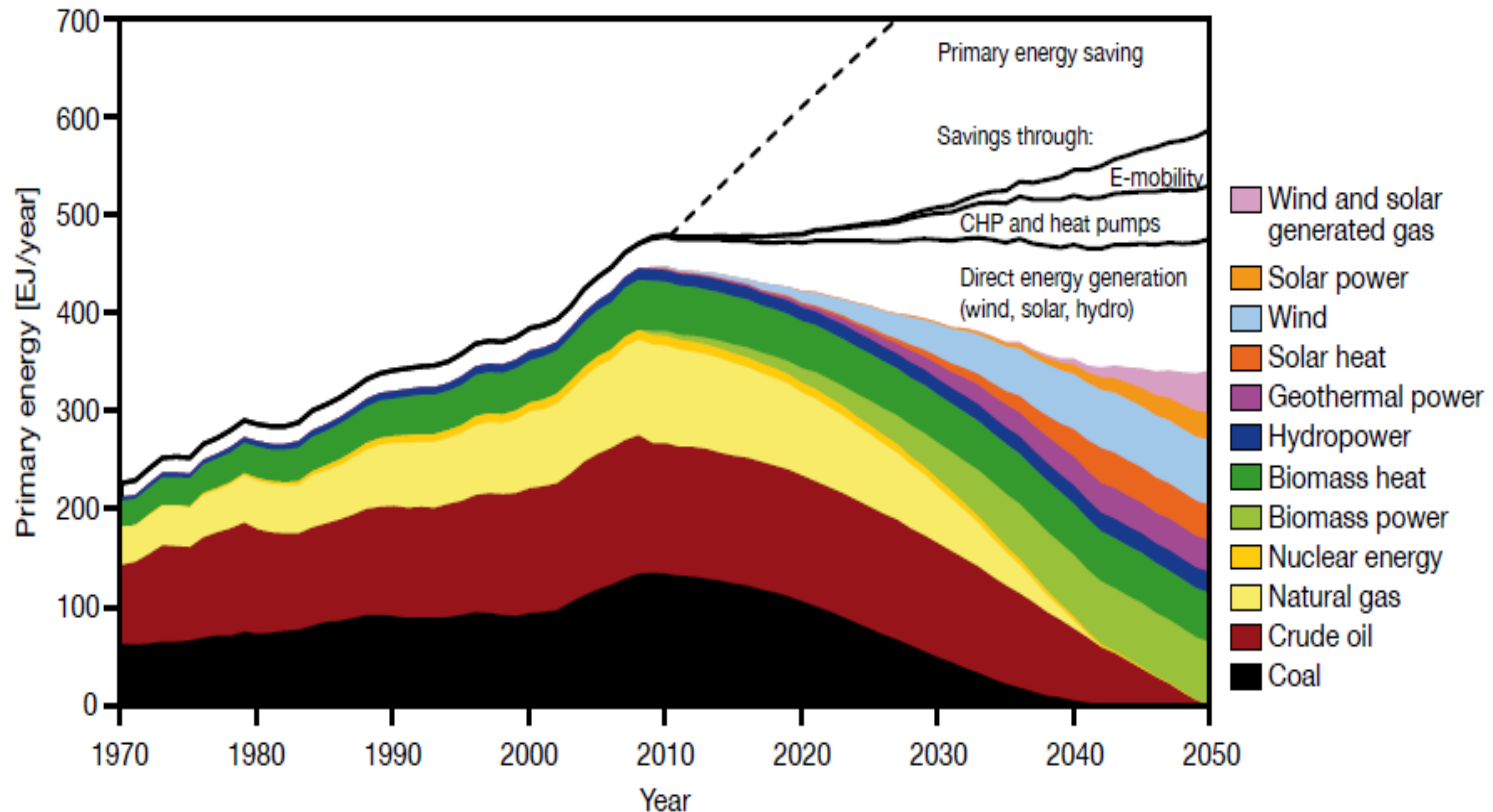
By 2020, estimate wood deficits for

Germany: 30-35 million cubic meter.

Europe: 400 million cubic meter.

Biomass Energy and Energy Transition

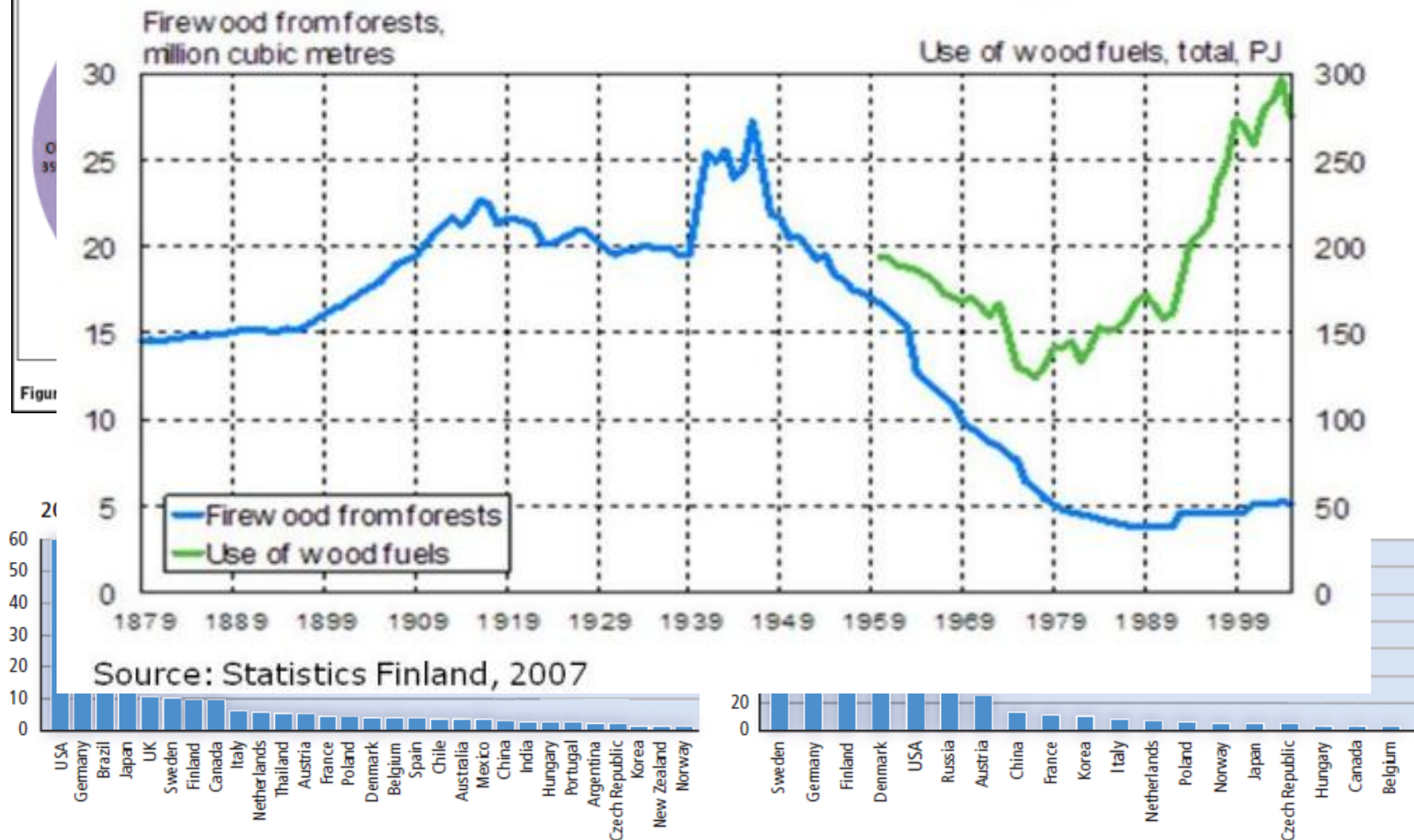
Vision for a Global Renewable Energy Supply by 2050



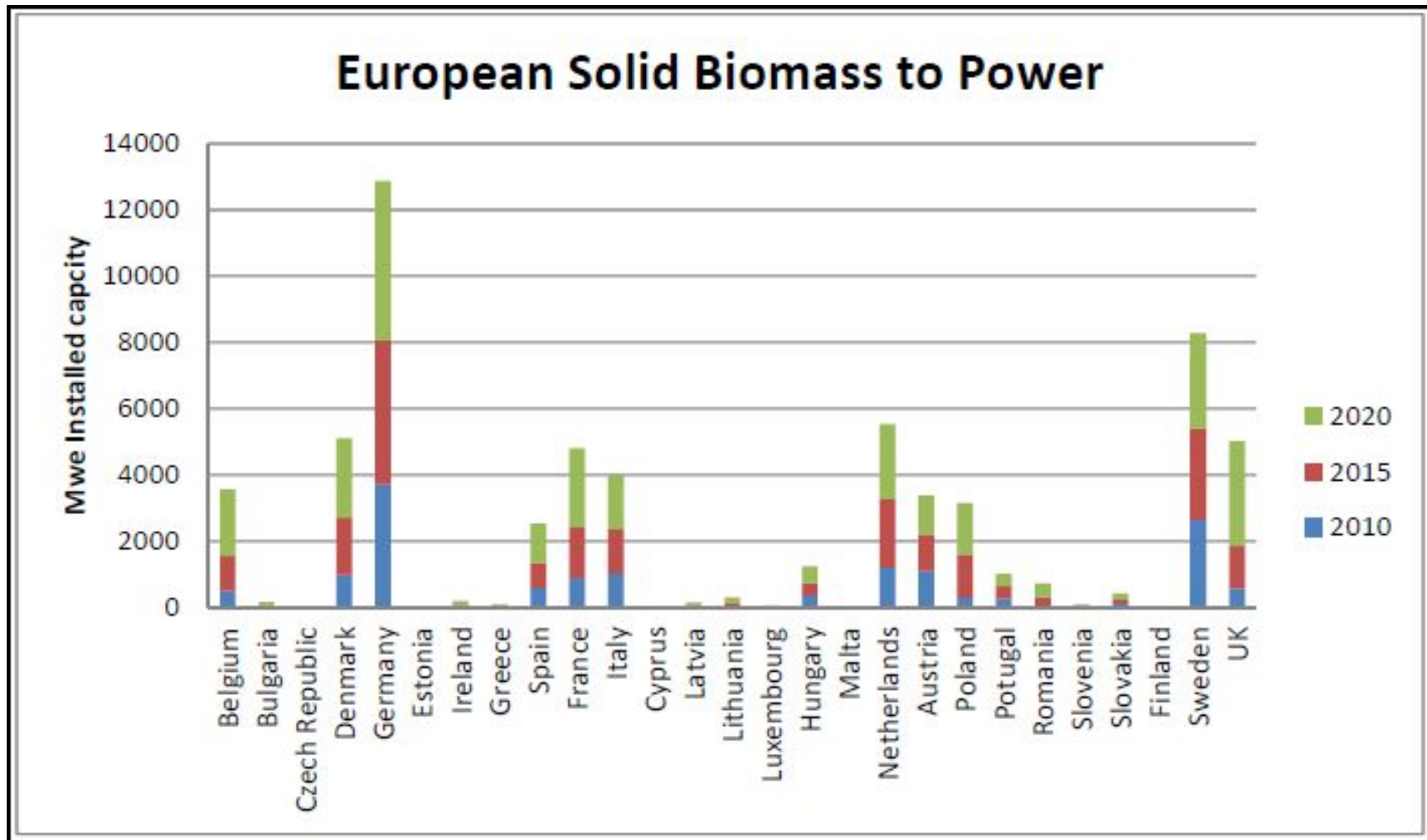
Source: German Advisory Council on Global Change (WBGU); Factsheet No. 02/2011

Wood Biomass Energy – Current Situation

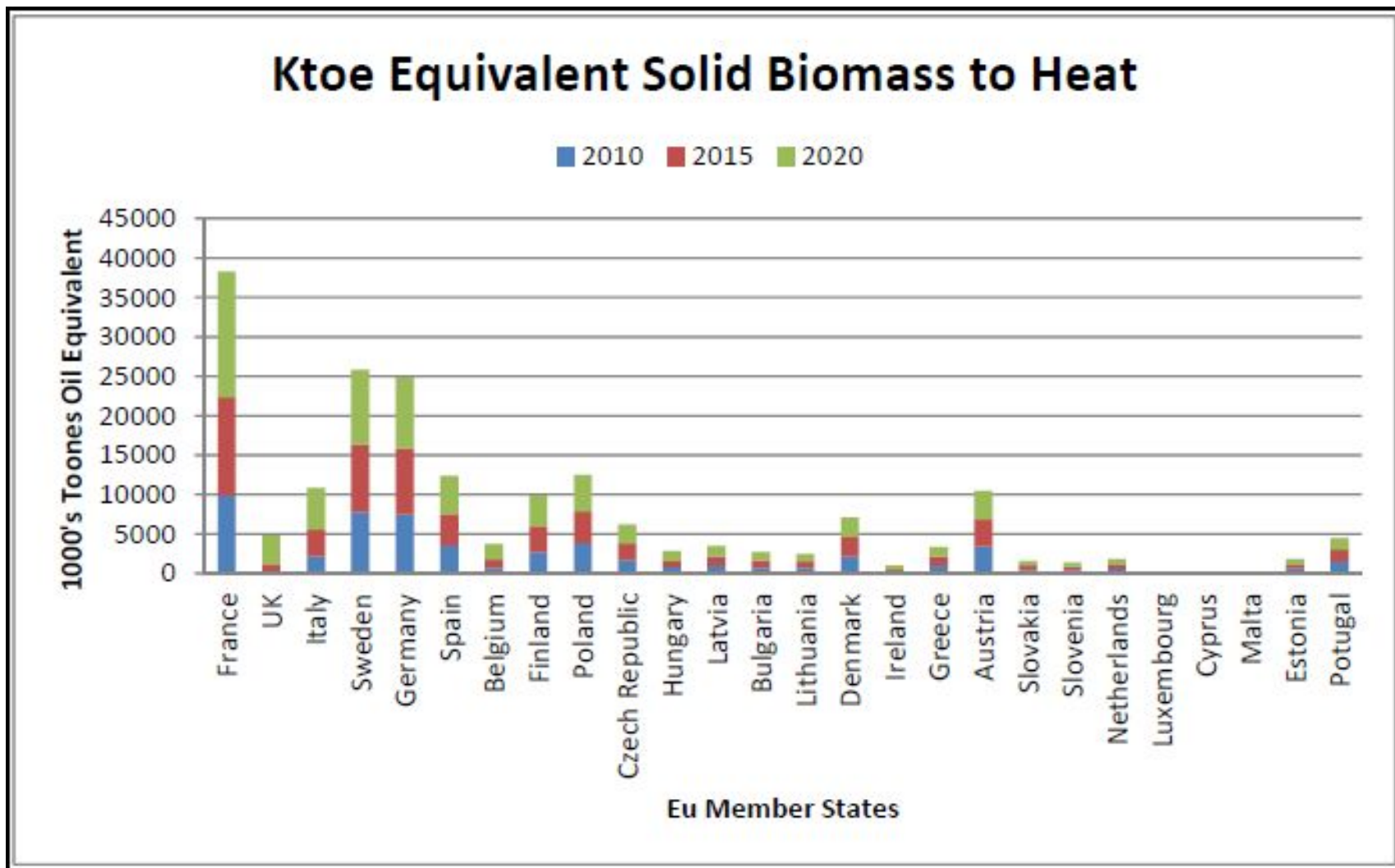
Use of firewood and other wood-based energy in Finland



Wood to Power Projections for the EU



Wood to Heat Projections for the EU



The increase in global woodfuel demand for power and heat is changing global wood markets:

- RWE (private utility):

Quantity: 0.75 million tons/a

Source: U.S. market (Georgia, USA)

- City of Berlin (Vattenfall utility):

Quantity: 1.3 million tons/a

Source: fast growing tree plantations within
300km; during transition also

Africa: 200.000 tons/a wood chips
(Liberia)

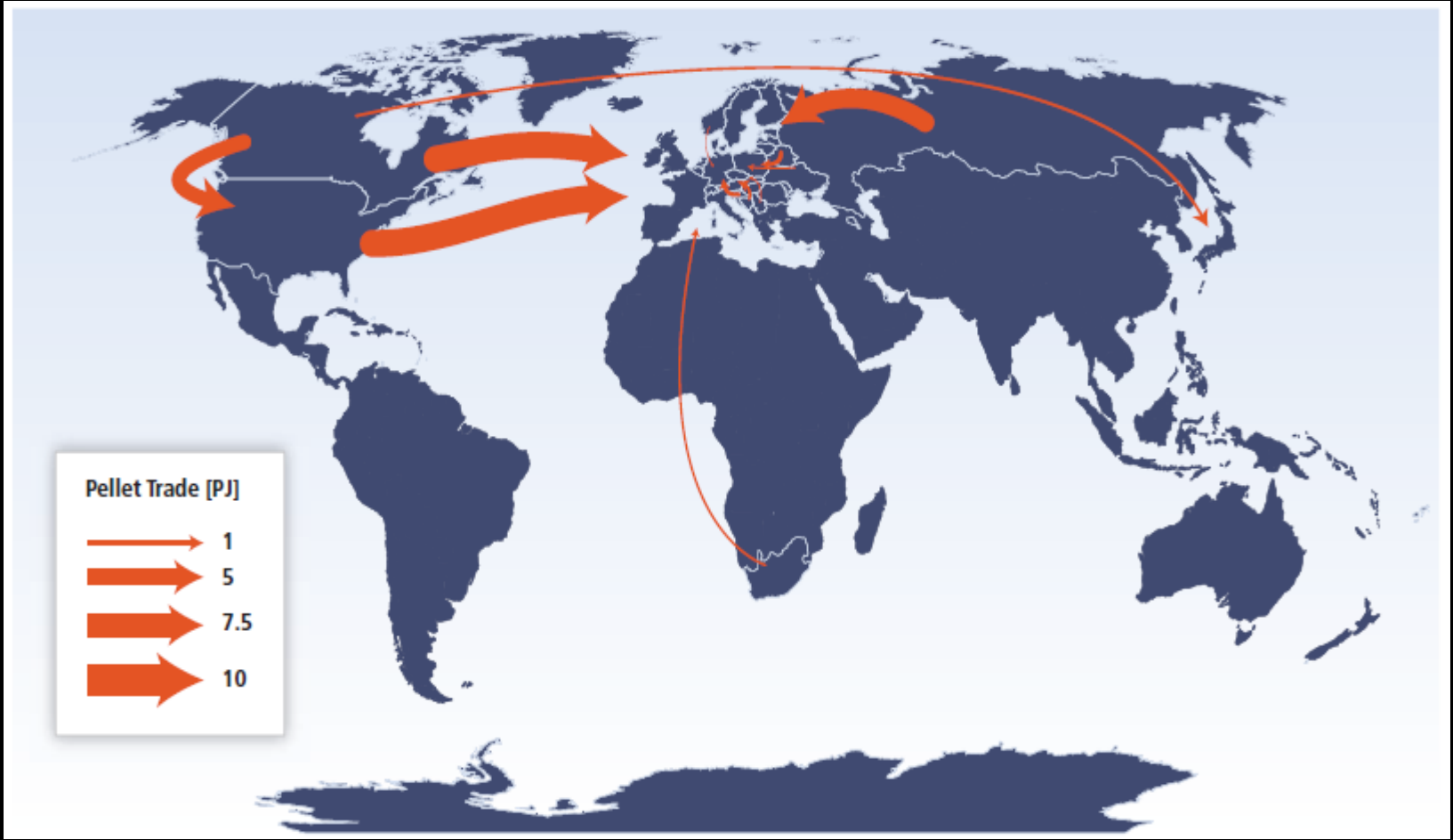
- Denmark:

Quantity: n/a

Source: long-term local sourcing through fast
growing plantations; doubling of
national forest cover (10% ⇔ 20%) over
next 80-100 years; during transition
also Africa: 100.000 tons/a wood chips
annually for 5 years (Ghana)



Global Woodfuel Markets



The Global Perspective – Key Messages

1. Wood energy has transitioned into a modern fuel applying modern technology
2. Wood energy is an integral part of countries' energy portfolio
3. Wood energy is part of countries' LED strategies
4. Wood energy markets are changing with an increase in trade in wood energy



What drives the Use of and Demand for Wood Energy in Sub-Saharan Africa?

Rapid urbanization is a global trend:

- Since 2008, 50% of the world's population lives in cities
- By 2050 → this number will increase to 5 billion

Lagos is growing at a rate of about 6% per year. Dar-es-Salaam at about 4.3% per year.

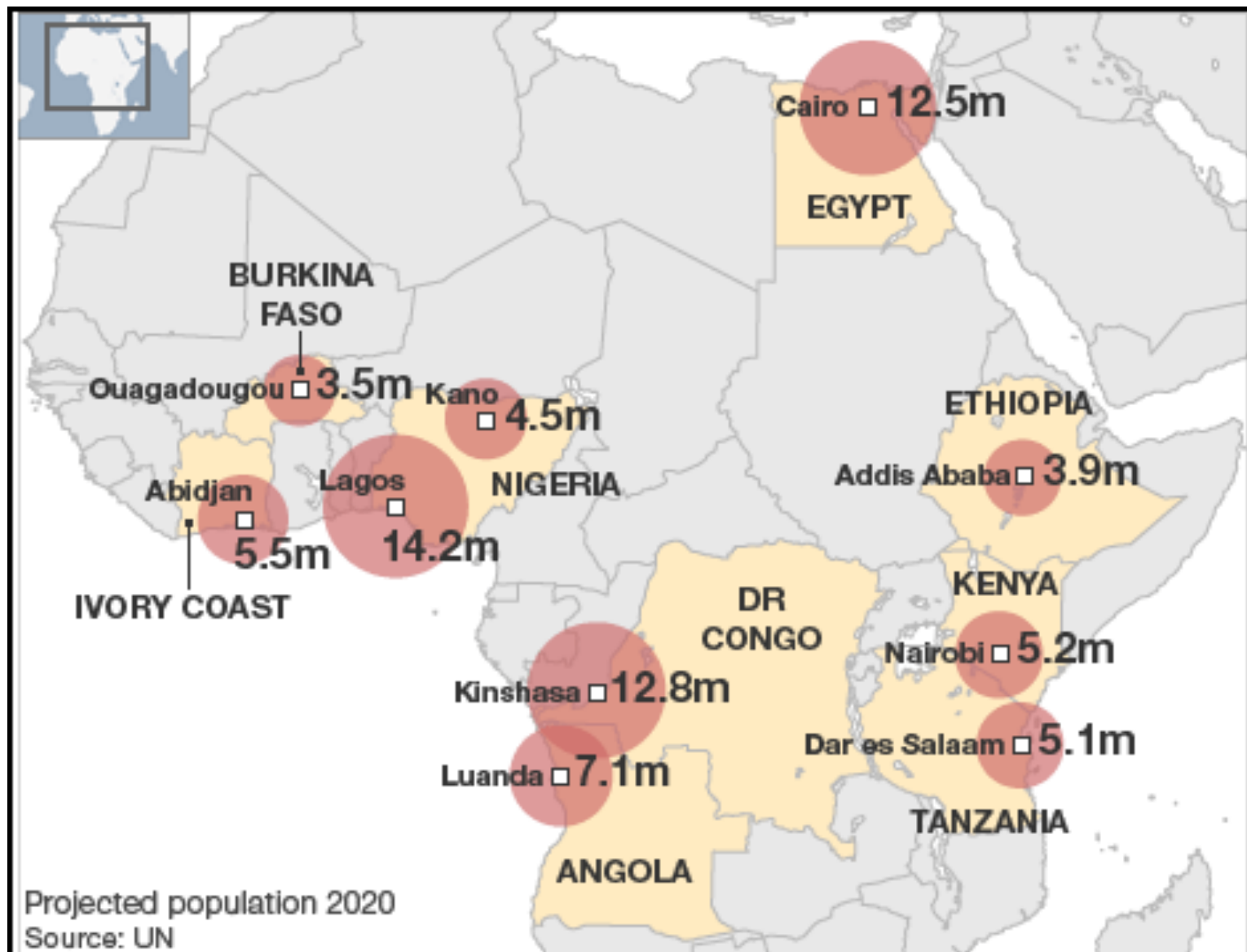
Urbanization in Africa is accelerating:

- Between 2000 – 2030 population in SSA is expected to double
- By 2030 50% of Africans will live in cities
- 52 cities with ≥ 1 million people (same as Europe and more than North America)
- Population growth & migration to cities
- Shift of fuels: fuelwood → charcoal

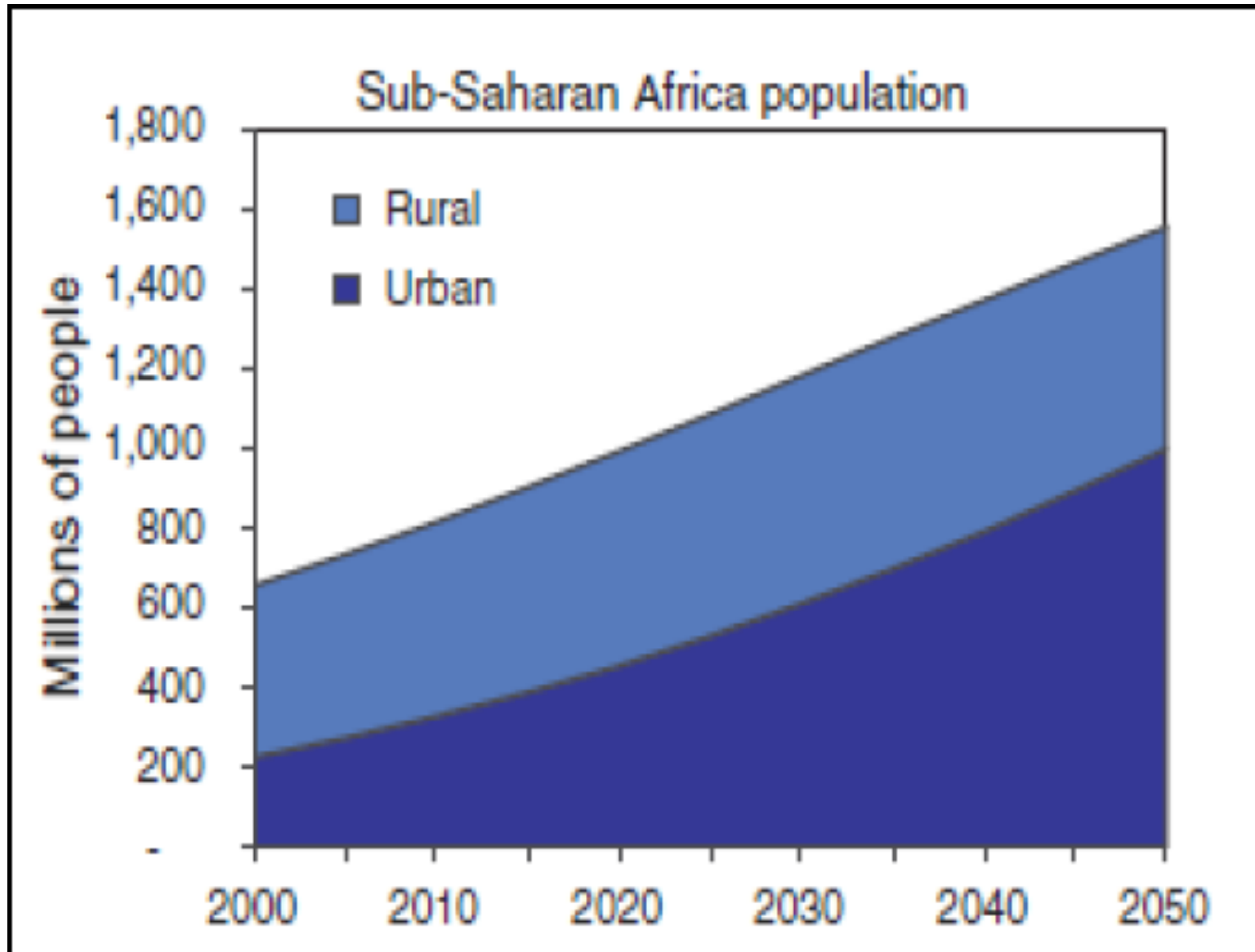
Shift from fuelwood to charcoal can reduce IAP by 90%

1% increase in urbanization → 14% increase in charcoal production.

Urbanization



Framing Facts – Urbanization



Framing Facts – Energy Use

Energy use in Africa is distinctively different than in other regions:

- Low access to electricity (about 29%)
- 51% of the urban population versus 8% in rural areas
- Access \neq Reliability
- Generation capacity in SSA is about one-tenth than in other low-income regions
- Large-scale elimination of energy subsidy programs (electricity, LPG, oil, etc.)
- Average African generates 13 times less GHG than counterpart in North America

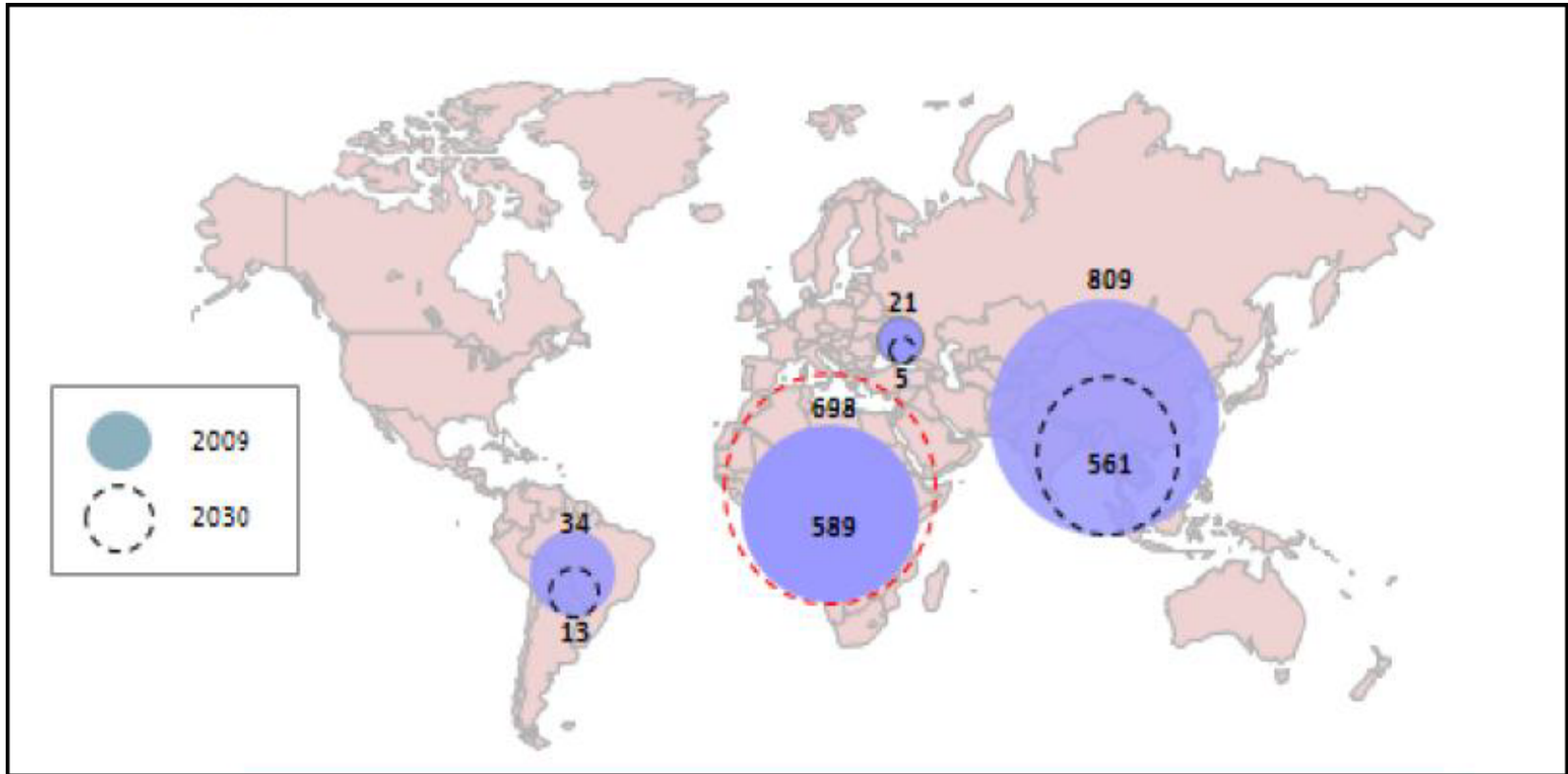
The number of people in Africa without access to electricity will increase by 18% by 2030.

Total installed generation capacity in SSA is 68GW. This is lower than Spain. 50% is South Africa.

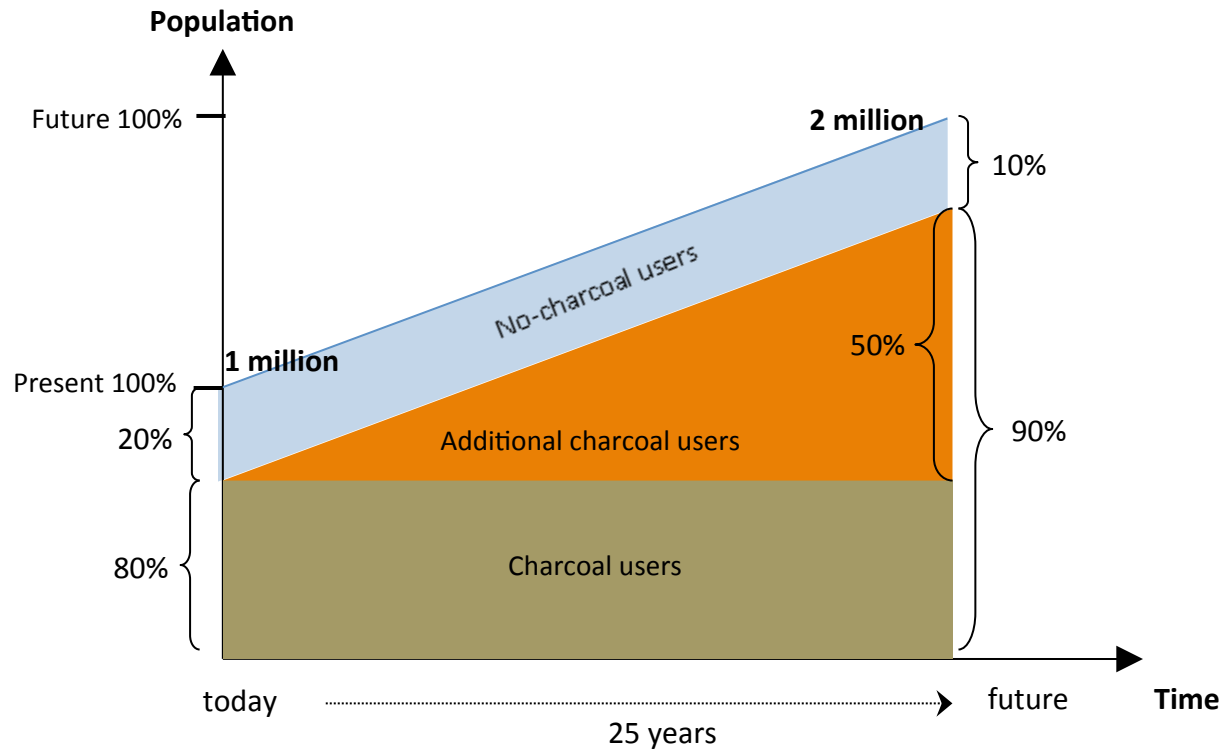
Africa is responsible for 4% of total global GHG emissions, mainly due to land-use changes.

Framing Facts – Energy Use

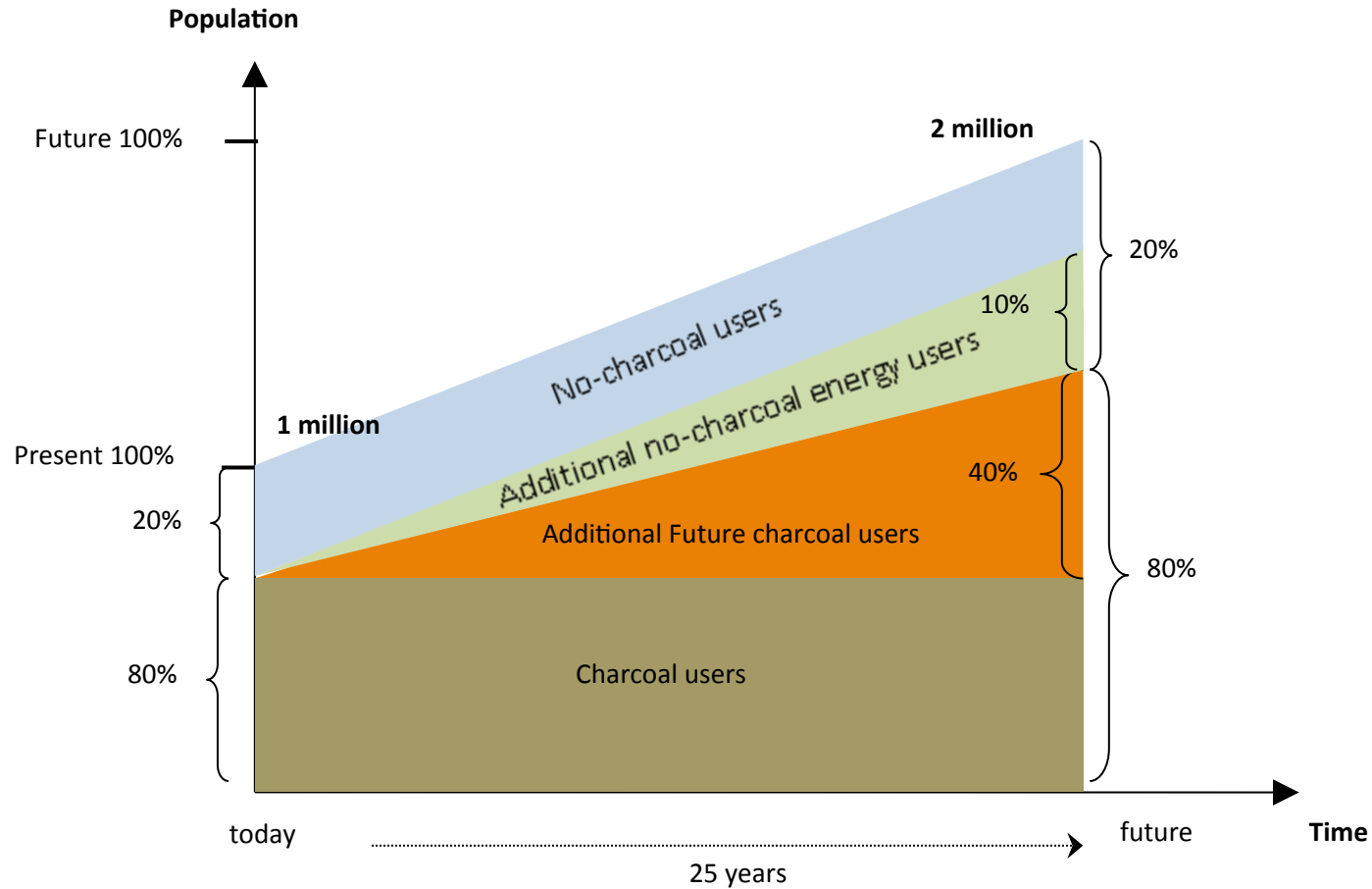
Population without access to electricity [in millions]



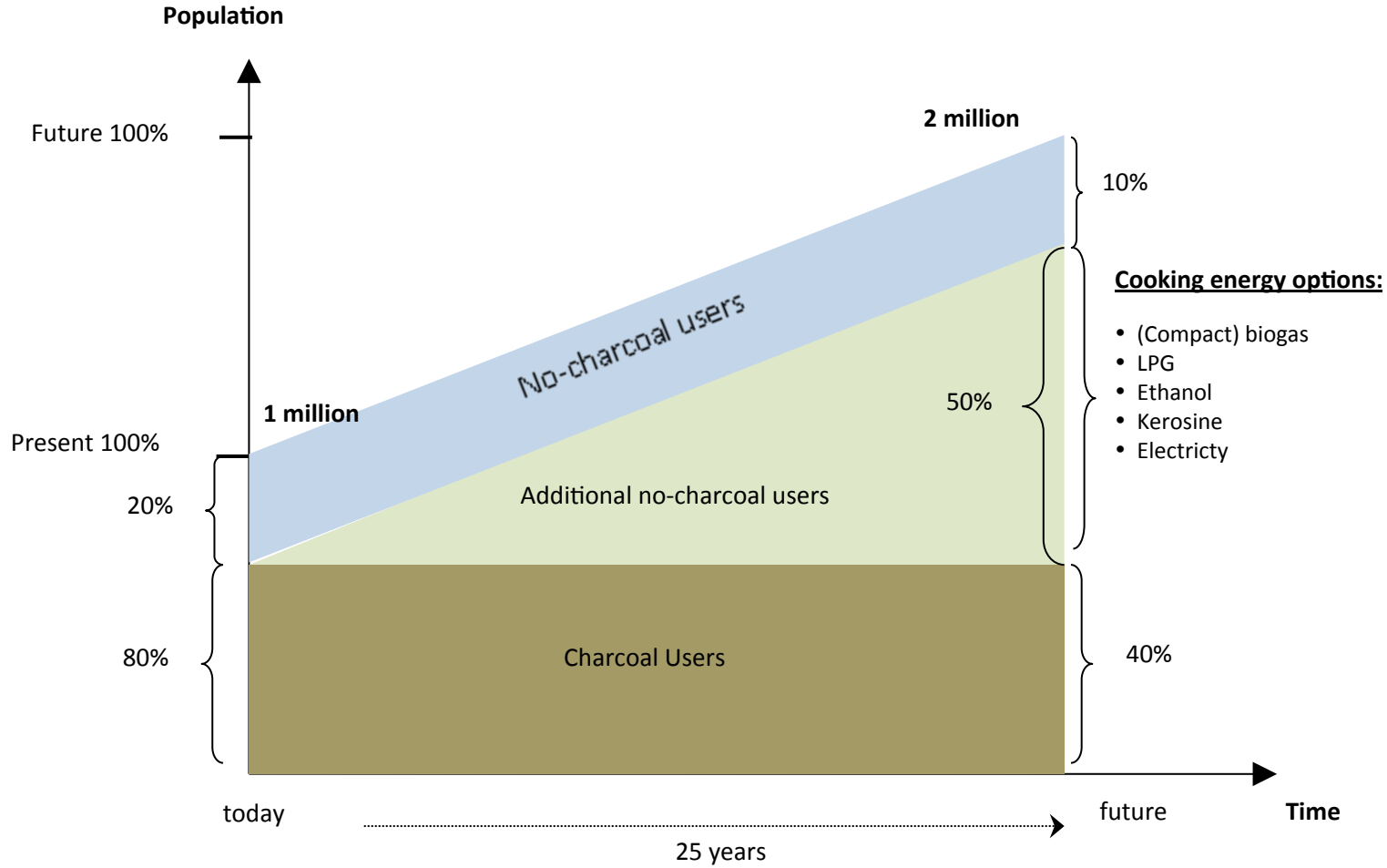
Framing Facts – Urbanization & Energy



Framing Facts – Urbanization & Energy



Framing Facts – Urbanization & Energy



Framing Facts – Key Messages

1. Urbanization is a driving factor in energy use in Africa → Focus on urban areas is important!
2. Woodfuels will continue to represent a principle source of energy – despite needed and ongoing investments in electrification and other energy options



Wood Energy and Sustainable Development in Sub-Saharan Africa

Africa's labor market characteristics:

Demographics: Rapidly growing labor force

Job growth: Lower than labor force growth

Formal sector: Lower than demand for jobs

Result: Most jobs are informal

- Rural areas → subsistence work
- Urban areas → wage labor
- Public jobs high share of formal employment
- Wage labor mostly men, even though women have increased
- Growth based on oil, gas, and mining creates few domestic jobs

In Kenya, wage salary employment increased by half a million from 1982 to 1996. At the same time, the labor force grew by the same amount every year.

By 2015, almost 50% of the African labor force will be found in urban areas.

Wood energy as principle energy source:

- ➔ Wood energy accounts for 70-90% of total energy use
- ➔ Rural (fuelwood) vs. urban (charcoal)
- ➔ Charcoal is a vibrant sector of the economy:
 - Annual value of USD 8 billion (2030: USD12 billion)
 - Employment & livelihoods: 7 million people (2030: 12 million)
 - 2030: one billion consumers
 - Annually several hundreds of millions of dollars in forgone revenue collection (Kenya: USD 65 million, Tanzania: USD 100 million)



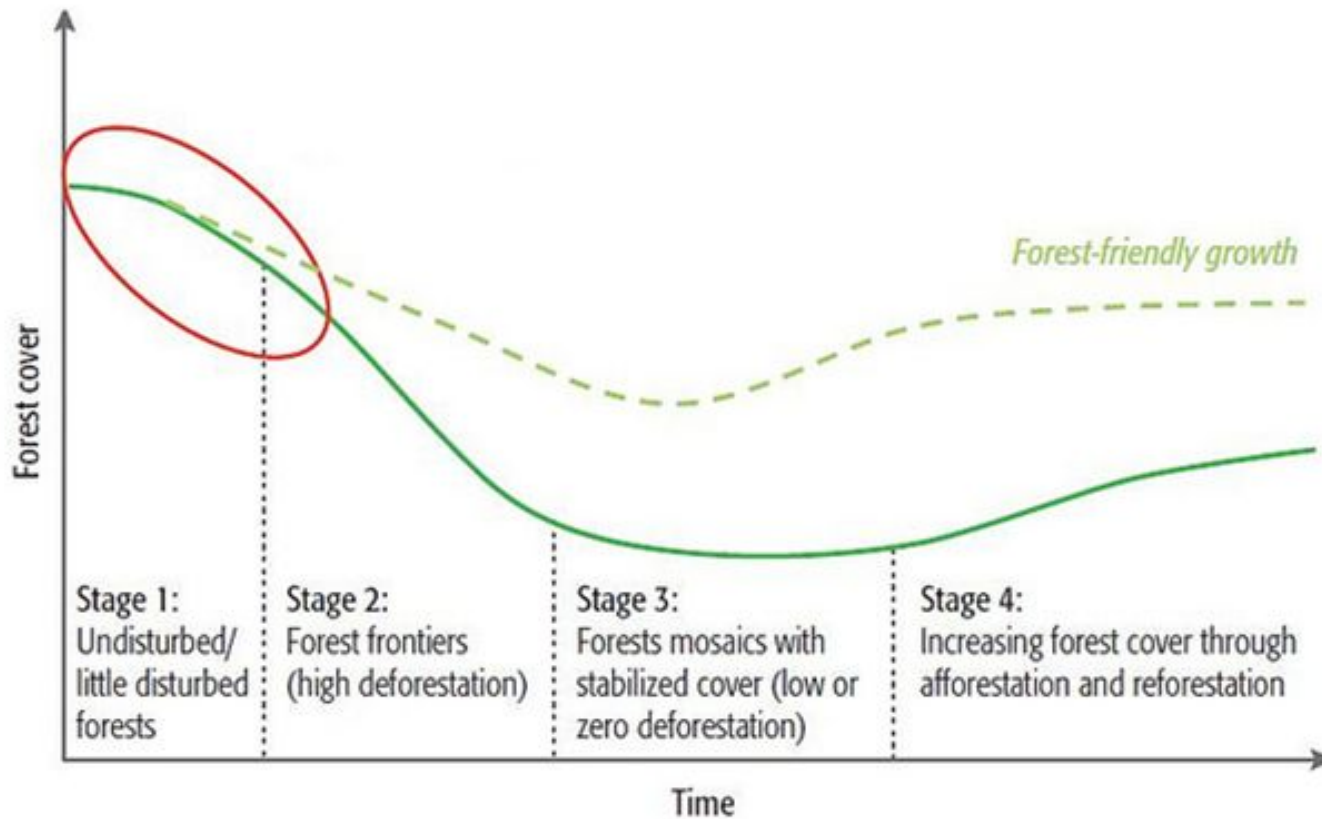
Wood energy use commonly associated with deforestation and forest degradation.

Challenges & considerations:

- Attributability (multiple drivers of deforestation and forest degradation)
- Deforestation => permanent land-use change
- Agriculture still most important driver; charcoal production as “side-effect”, but not as cause
- Fuelwood collection => no negative impact on forests
- Underestimation of available wood biomass in supply-demand modeling (TOF)
- Underestimation of forest growth & yield potential
- A never materializing “woodfuel crisis”
- Wood energy provides economic benefit => incentive to manage forests, not to cut down
- “Forest degradation” versus “forest management regimes” (short rotation coppice)

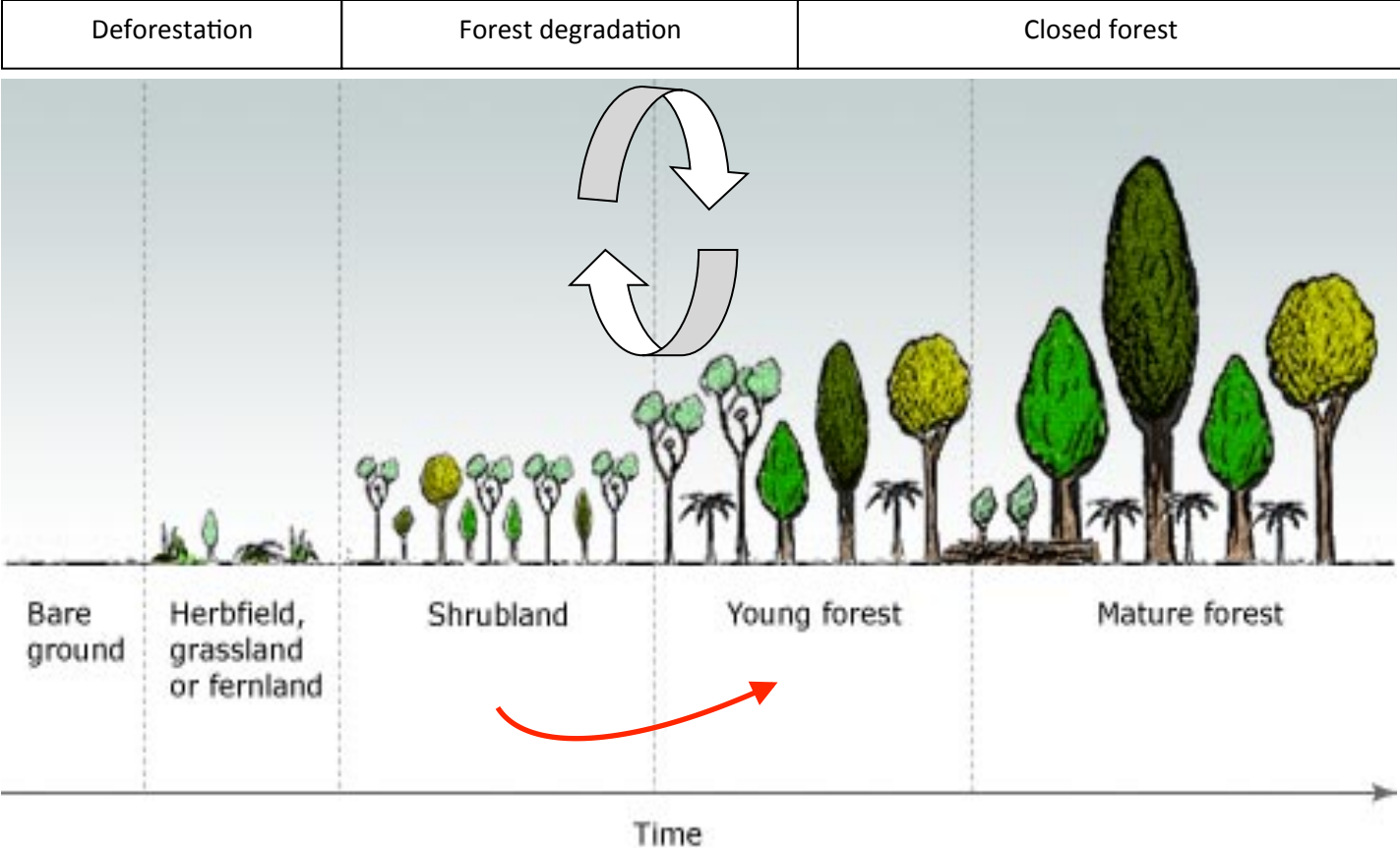


Sustainability of Wood Energy Use



Source: Adapted from Angelsen, 2008. The dotted line illustrates what "forest-friendly" growth could look like.

Sustainability of Wood Energy Use

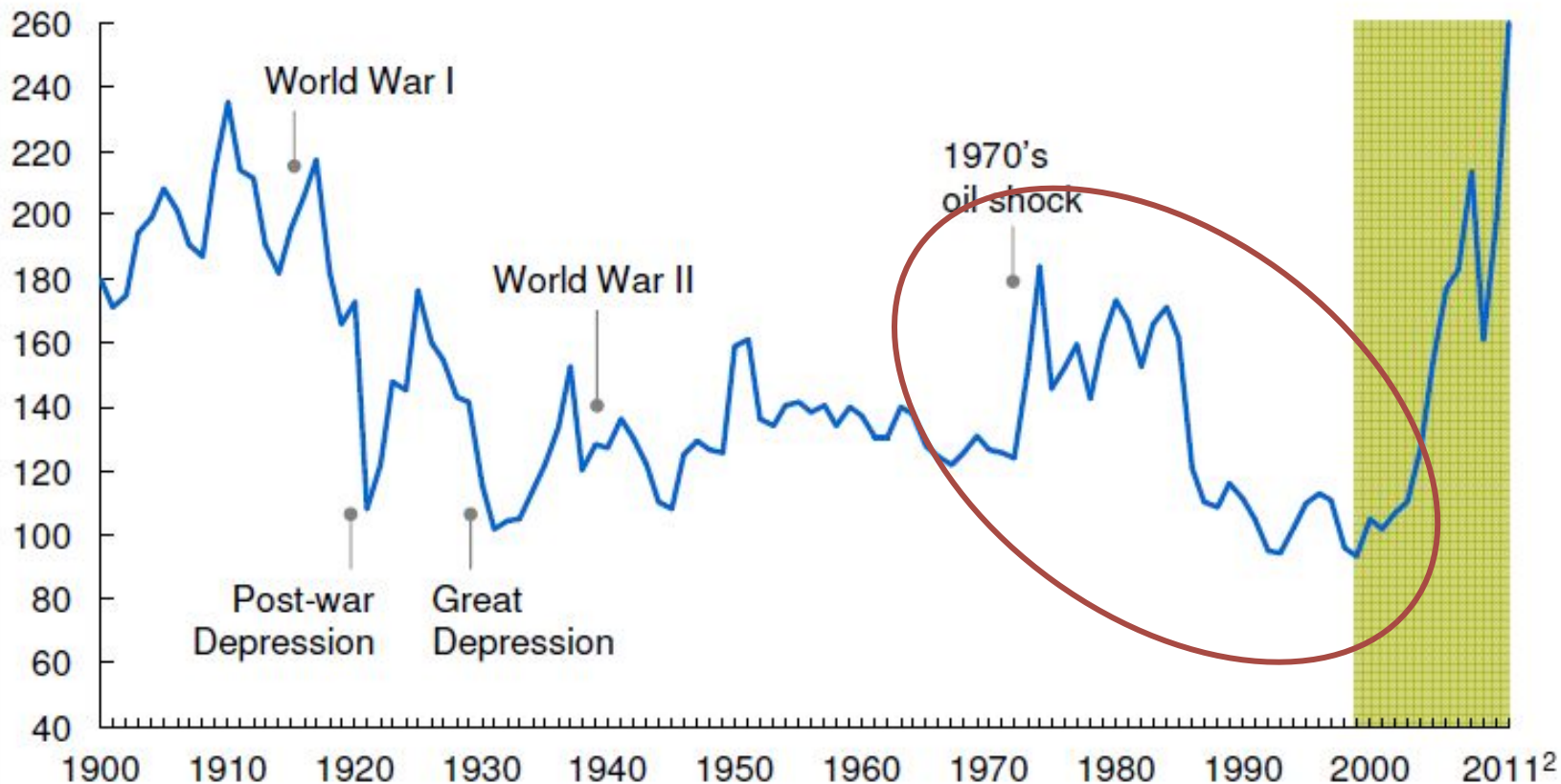


Policy for Sustainable Wood Energy in Sub-Saharan Africa

What is different than before?

Commodity prices have increased sharply since 2000, erasing all the declines of the 20th century

McKinsey Commodity Price Index (years 1999–2001 = 100)¹



1 Based on arithmetic average of 4 commodity sub-indices of food, non-food agricultural items, metals and energy.

2 2011 prices based on average of first eight months of 2011.

Change in the Use of Subsidies as Policy Tool

Energy subsidies are being eliminated:

- Reduce the wasteful use of energy
Incentivizing the efficient use of energy
- Reducing GHG emissions
- Incentivizing investments in alternative, renewable energy options
- Reduce fiscal burden on constraint government budgets

Analysis of DPO (FY08 – FY12):

- 74 with relevance for energy sector
- 46 were found to potentially trigger a shift towards "traditional" fuels
- For 44 DPOs a potential threat to sustainable forest management was indicated
- 20 of these DPO mentioned this threat explicitly in the environmental section



Several areas of policy intervention:

- Decriminalization of the actors and activities
- Formalization and Modernization of the sector
- Consideration of the entire value chain
- Integration of and consultations with affected stakeholders (bottom-up)
- Emphasize cross-sectoral linkages
- Integration in national strategies
- Innovative governance arrangements (e.g. taxation)



General Challenges to Sector Reforms

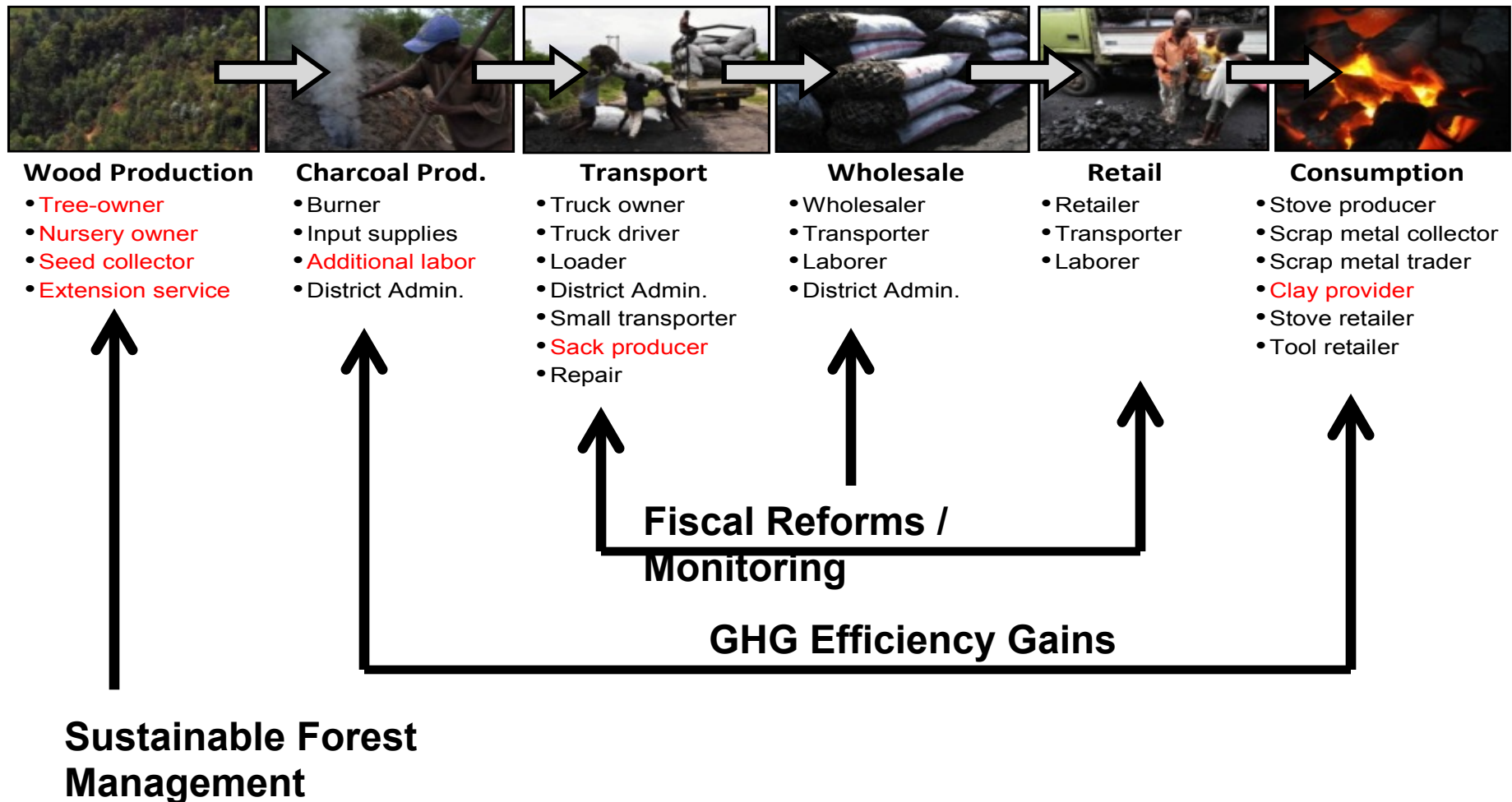
There are no real technical challenges... but:

- Confusion of leadership (e.g., which ministry should lead: Forest, Energy, Finance)
- Vested interests & political commitment
- Governance (current laws versus law enforcement)
- Forest rights & benefit sharing (communities versus government; central versus regional / local government)
- Forest service delivery vs. command & control



Changing the “Business as Usual”:

Significant potential for GHG emission reduction, jobs creation, revenue collection, and livelihood improvement (IAP)



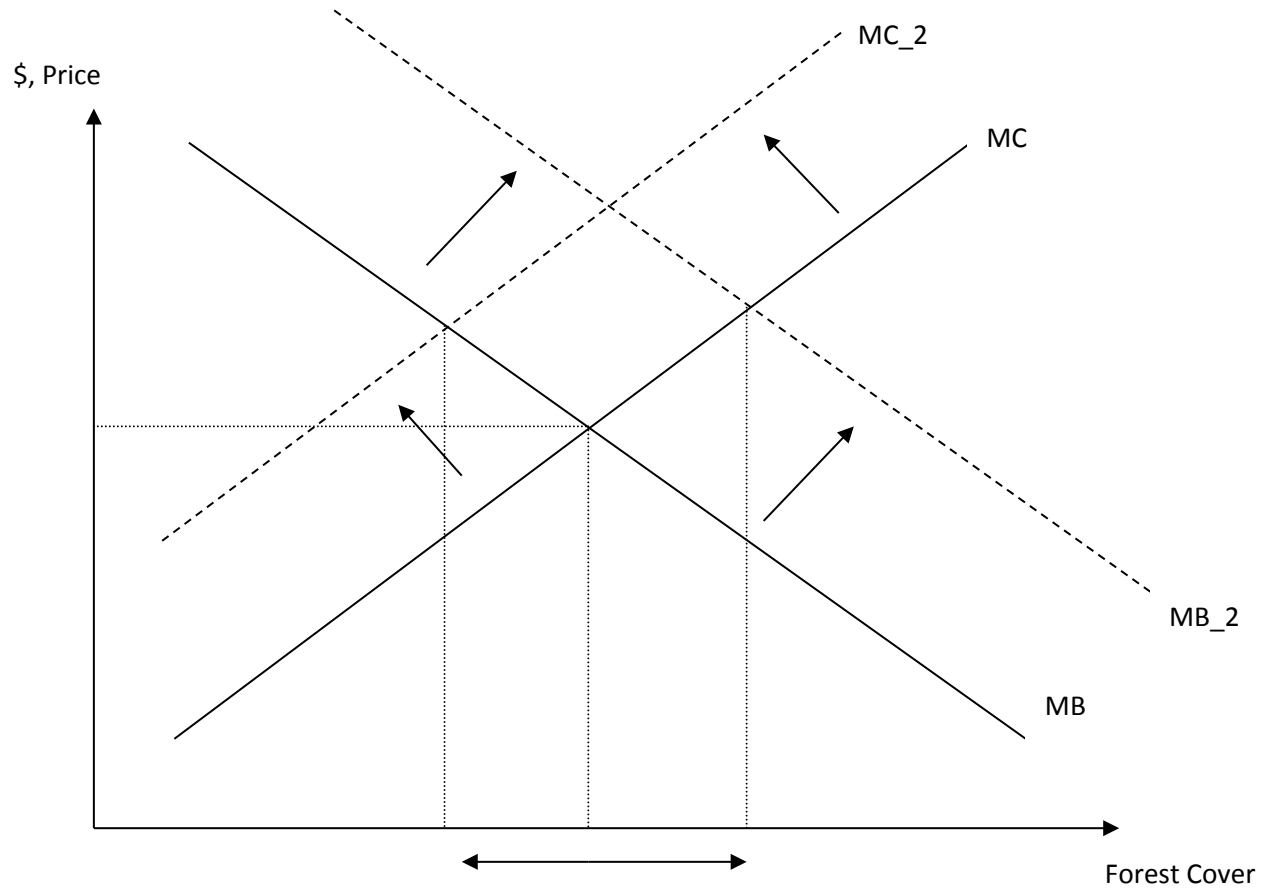
Additional Benefits - Highlights

Woodfuels carry additional potential, especially in the medium to long-term:

- Economic incentive for the restoration of degraded lands (Afforestation / reforestation)
- Local sourcing = local value-added
- Local sourcing = short transport distances
- Development into a vibrant private sector driven by local SME
- Further efficiency gains through technology development and transfer (South-South)
- Woodfuels for electricity generation (off-grid)
- Sustainable export of fuels (wood chips, pellets)



More forests – less forest?



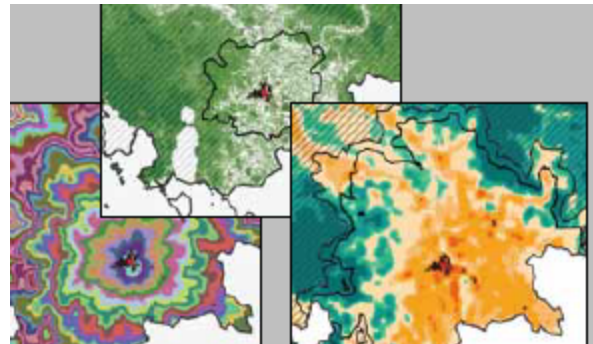
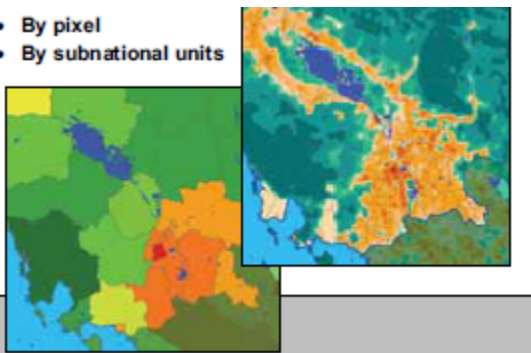
Improving the Sustainability of Feedstocks

There are a wide range of measures to enhance sustainability of wood energy production, e.g.:

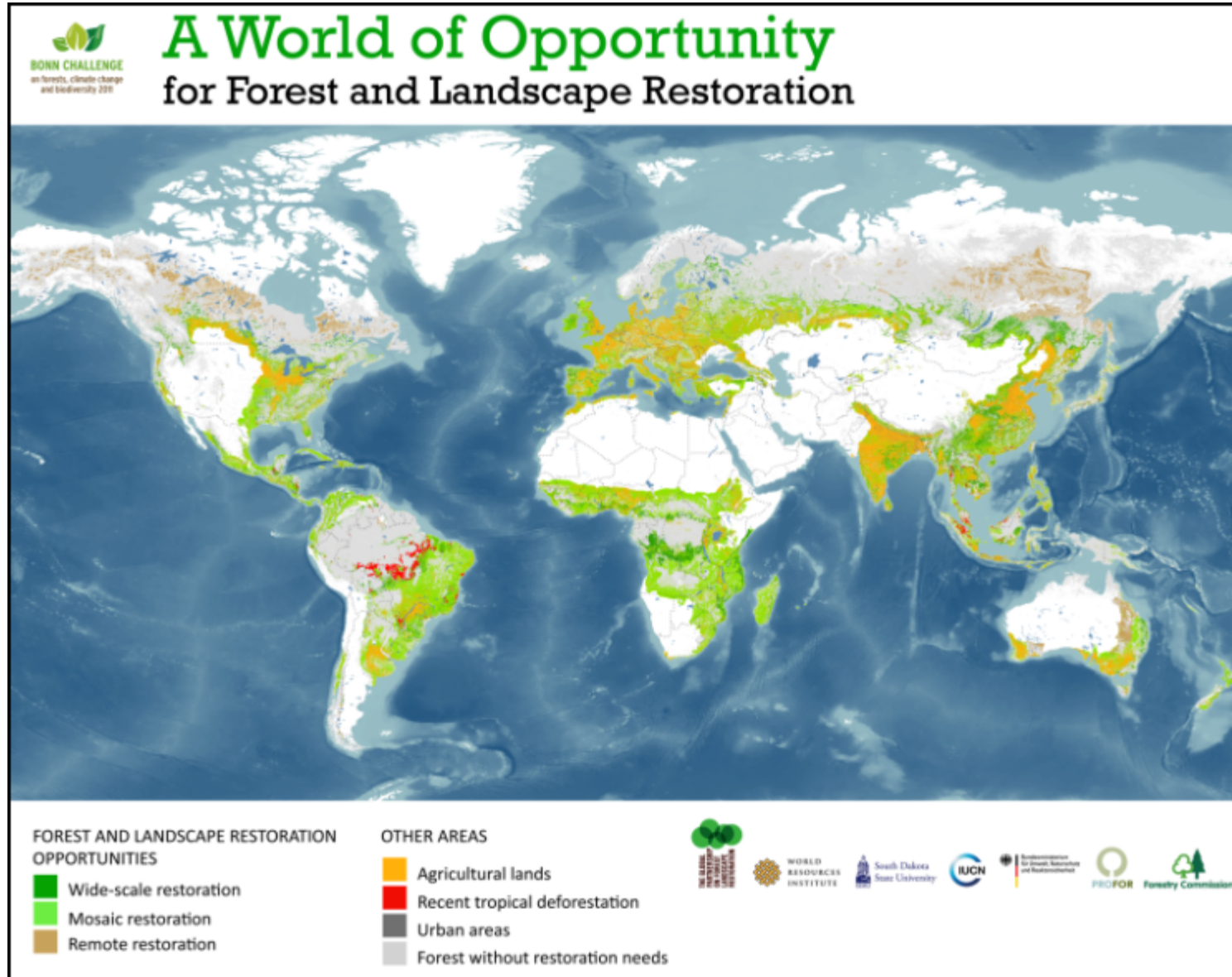
- Improving land and tree tenure regimes
- Spatio-temporal planning of wood-energy sourcing (deficit areas, HCVF identification, etc.)
- New approach to plantations (new species, improved management)
- Couple production benefits with other benefits (e.g. REDD)
- Contract plantation management (equivalent to contract farming); Outgrower schemes
- Enhancing CBFM / Participatory Forest Management



- By pixel
- By subnational units

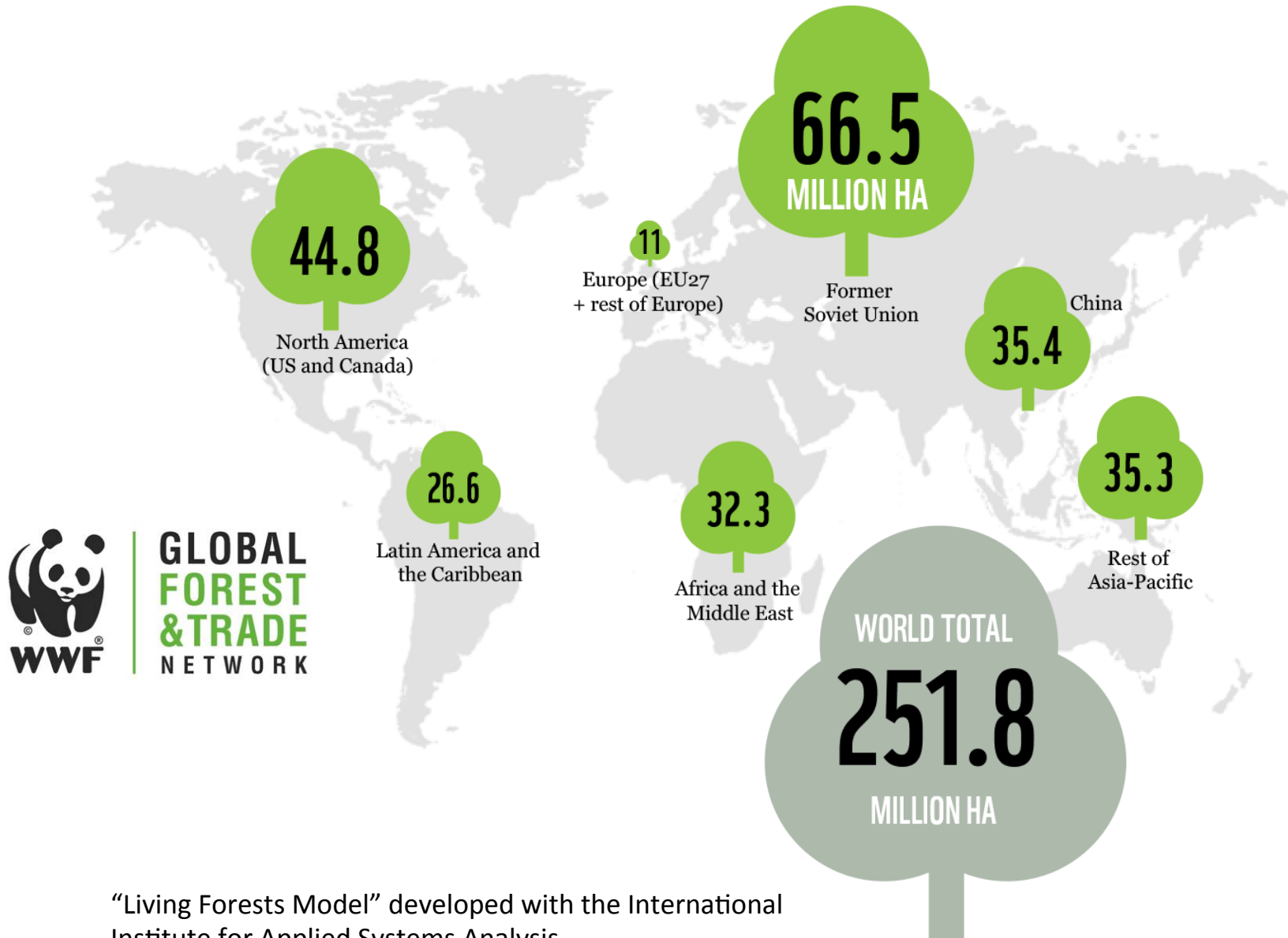


More forests – less forest?



Projected growth in plantations

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“Living Forests Model” developed with the International Institute for Applied Systems Analysis

New generation of plantations



What are new plantations:



maintain ecosystem integrity



are developed through effective stakeholder involvement processes



GLOBAL
FOREST
& TRADE
NETWORK

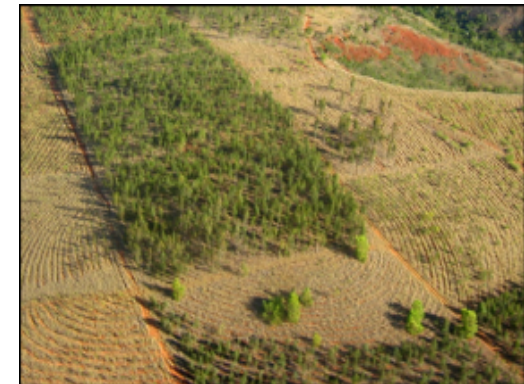


protect and enhance high conservation values



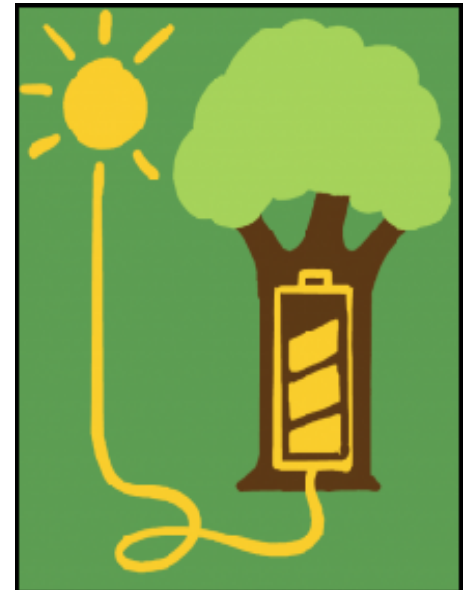
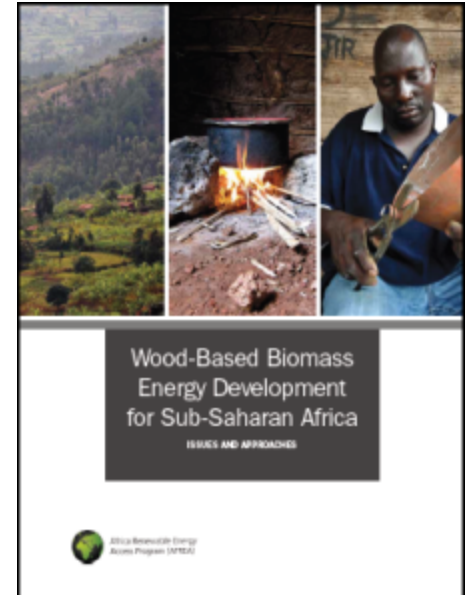
contribute to economic growth and employment

www.newgenerationplantations.com



Conclusions (some...)

- Wood energy is an important part of Africa's energy portfolio (energy access, energy security)
- Despite needed efforts to scale-up other energy sources, wood energy will continue to play an important role
- Transformation of wood energy from a "traditional" to a "modern" energy source is needed
- Cooking+ (decentralized biomass energy applications to meet energy demands)
- Huge potential for positive spillover effects (economic, social, and environmental)
- Policy efforts still very, very far away from what is needed
- Complementarities between local supply needs and internationally emerging trading potential
- Sustainability an issue, but less than commonly perceived
- Plantations / planted forests will play an important role for meeting future wood energy needs



Thank You !!!

