ECOWAS-GFSE-GEF-UNIDO
High Level Energy Forum
Towards Sustainable Energy For All in West Africa
“Paving the Way through Renewable Energy and Energy Efficiency”

GEA Findings Related to SE4ALL

by

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Challenges requiring actions on Energy

a. **Energy services** for growing populations, 7 to 9 billion by 2050; and economies, 2%/a per capita
b. **Universal access** to modern forms of energy (the ~3 billion w/o access)
c. **affordable** energy services (@$100/bbl??)
d. **secure** supplies, from households to nations; “peak oil”
e. **health and environment** challenges (WHO guidelines ++)
f. **planetary boundaries, incl. climate change mitigation** (<+2 deg above pre.ind.)
g. **Peace**
h. **ancillary risks** (large accidents, nuclear weapons proliferation, food prices, ...)

=> Major Energy System and Policy Changes Needed!

These **challenges** must be addressed

adequately

timely

simultaneously

Global Energy Assessment

Towards a Sustainable Future

- Initiated to explore the role of energy and energy options addressing local, regional, and global sustainability,
- The work involved >300 Authors from five continents,
- Peer-review by >200 Anonymous Reviewers coordinated by Review Editors,
- Final report (Cambridge University Press), 1800 pages, just published (September 2012)
- GEA Council overall responsibility, Executive Committee led the analytical work, IIASA was the host institution

The challenges translate into a need for a major energy systems transformation

Main elements:

- **Universal access to modern forms of energy**
- **Energy end-use efficiency**
- **Renewable energies**
- Carbon Capture and Storage (for CC only)

Many People Without Access to Modern Energy

People with no Electricity

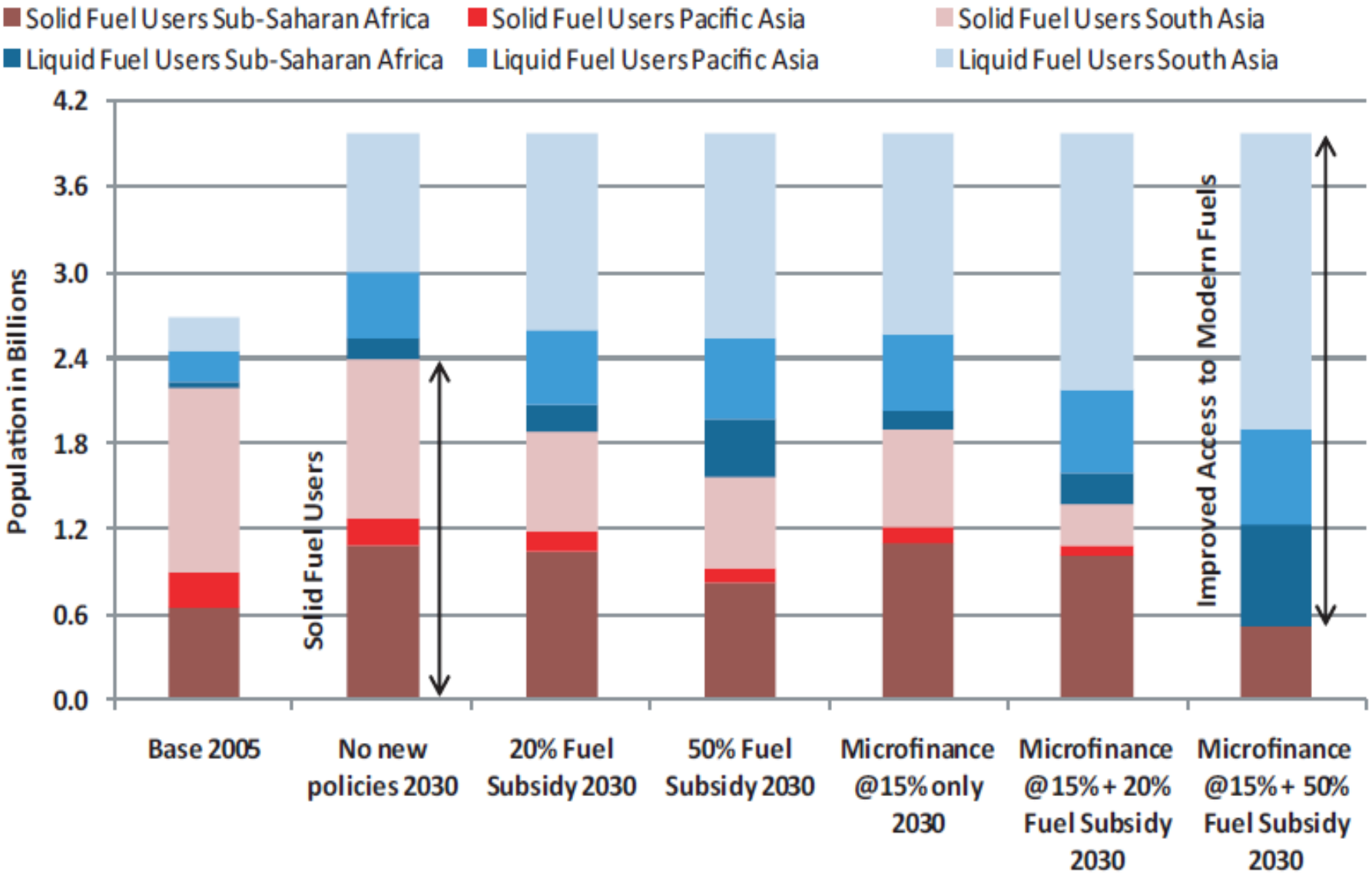
Region	Rural (million)	Urban (million)
Sub-Saharan Africa	465	120
China	8	–
India	381	23
Other developing countries in Asia	328	59
Latin America	27	4
Total	**1209**	**206**

People relying on Traditional Biomass

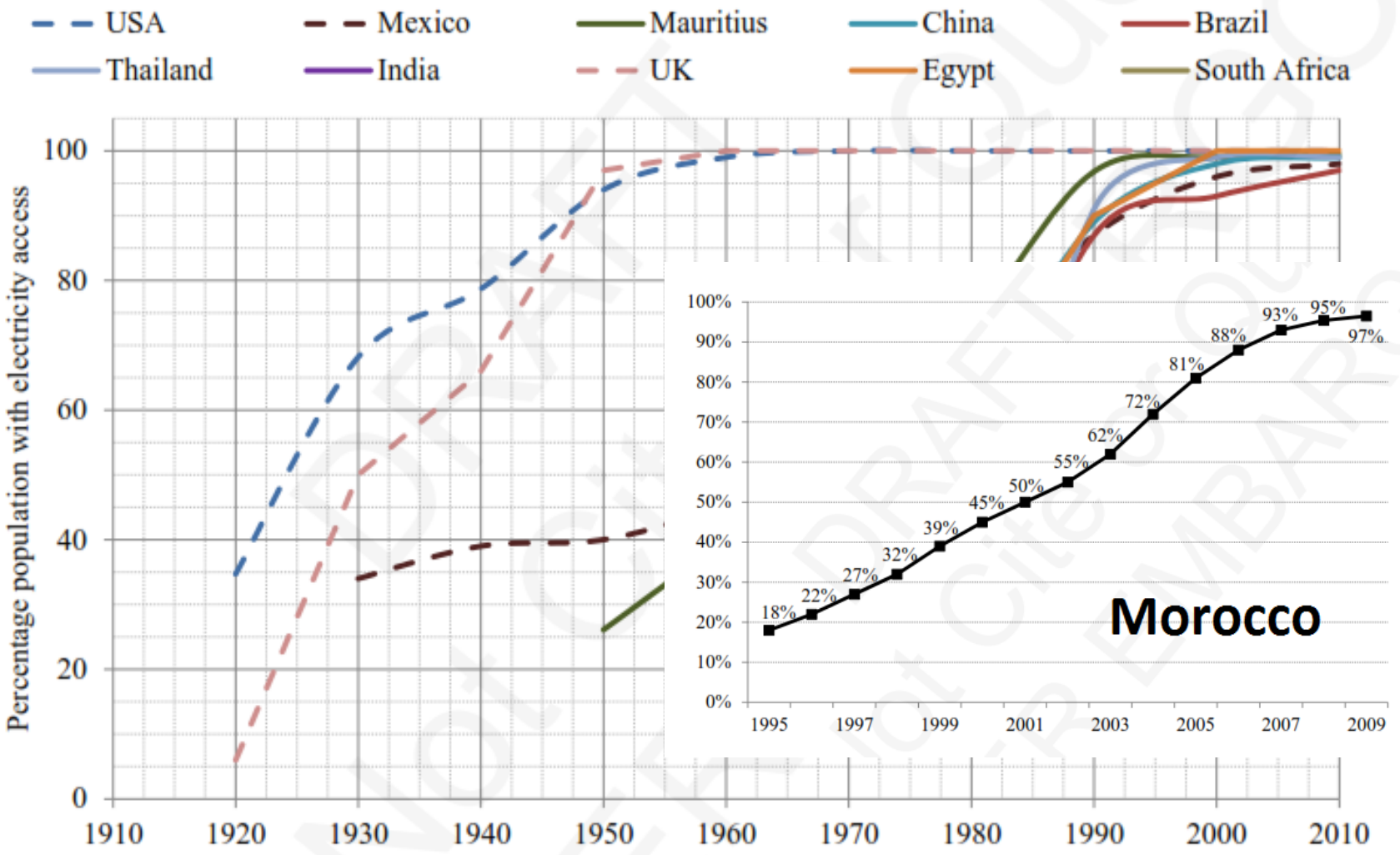
Subregion	Total number of people relying on traditional biomass (million)			Population relying on biomass as share of subregion's population (%)
	Rural	Urban	Total	
Africa	481	176	657	67
Sub-Saharan Africa	477	176	653	80
Developing Asia	1694	243	1 937	55
China	377	47	423	32
India	765	90	855	75
Other Asia	553	106	659	63
Latin America	60	24	85	18
Developing countries*	**2235**	**444**	**2679**	**54**

Source: Karekezi et al., 'Energy Access for Development', GEA, 2012, p. 151-190.

Access as an example of policy integration: Combining policies delivers maximum benefit



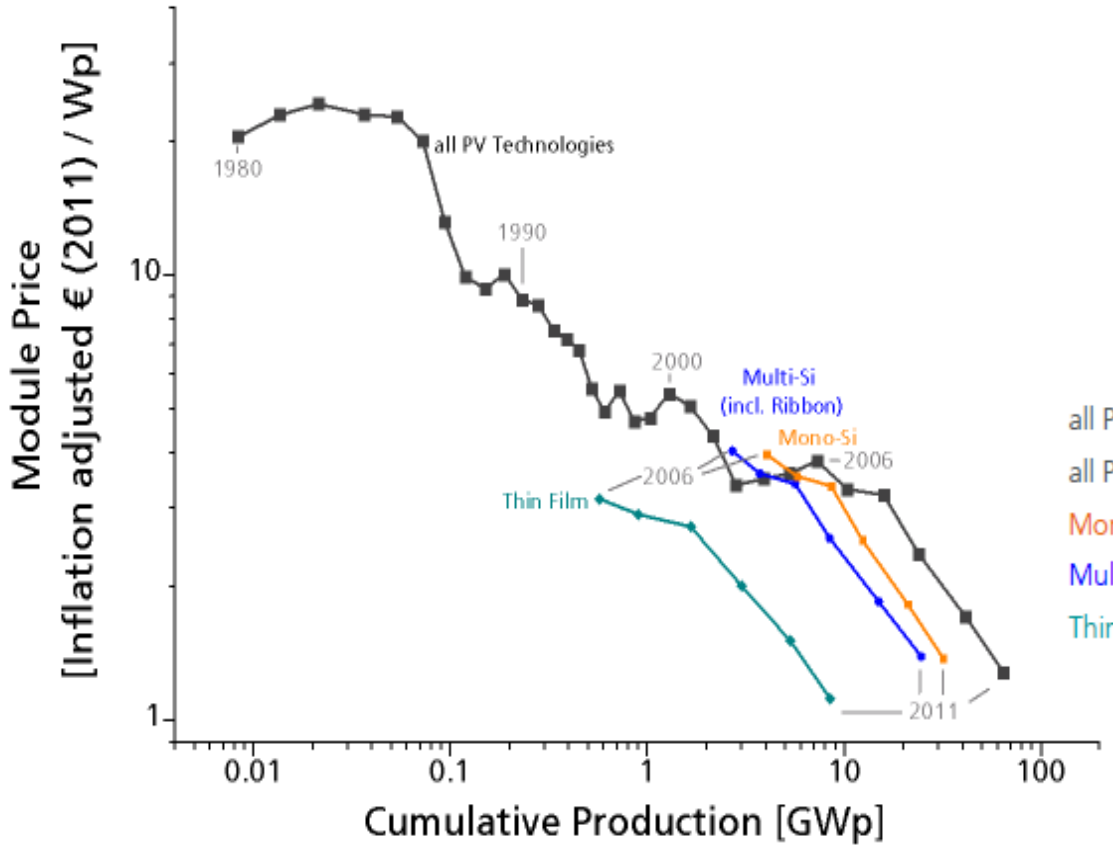
Many Countries have succeeded with Electrification



Source: Pachauri et al., 'Energy Access for Development', GEA, 2012, p. 1401-1458.

Price Learning Curve by Technology

Cumulative Production up to 2011



- All PV Technologies
- Mono-Si 24.5 GWp
- Multi-Si 31.6 GWp (incl. Ribbon-Si)
- Thin Film 8.5 GWp

all PV Technol. (1980-2011) **LR 19.52**

all PV Technol. (2006-2011) **LR 26.93**

Mono (2006-2011) **LR 26.61**

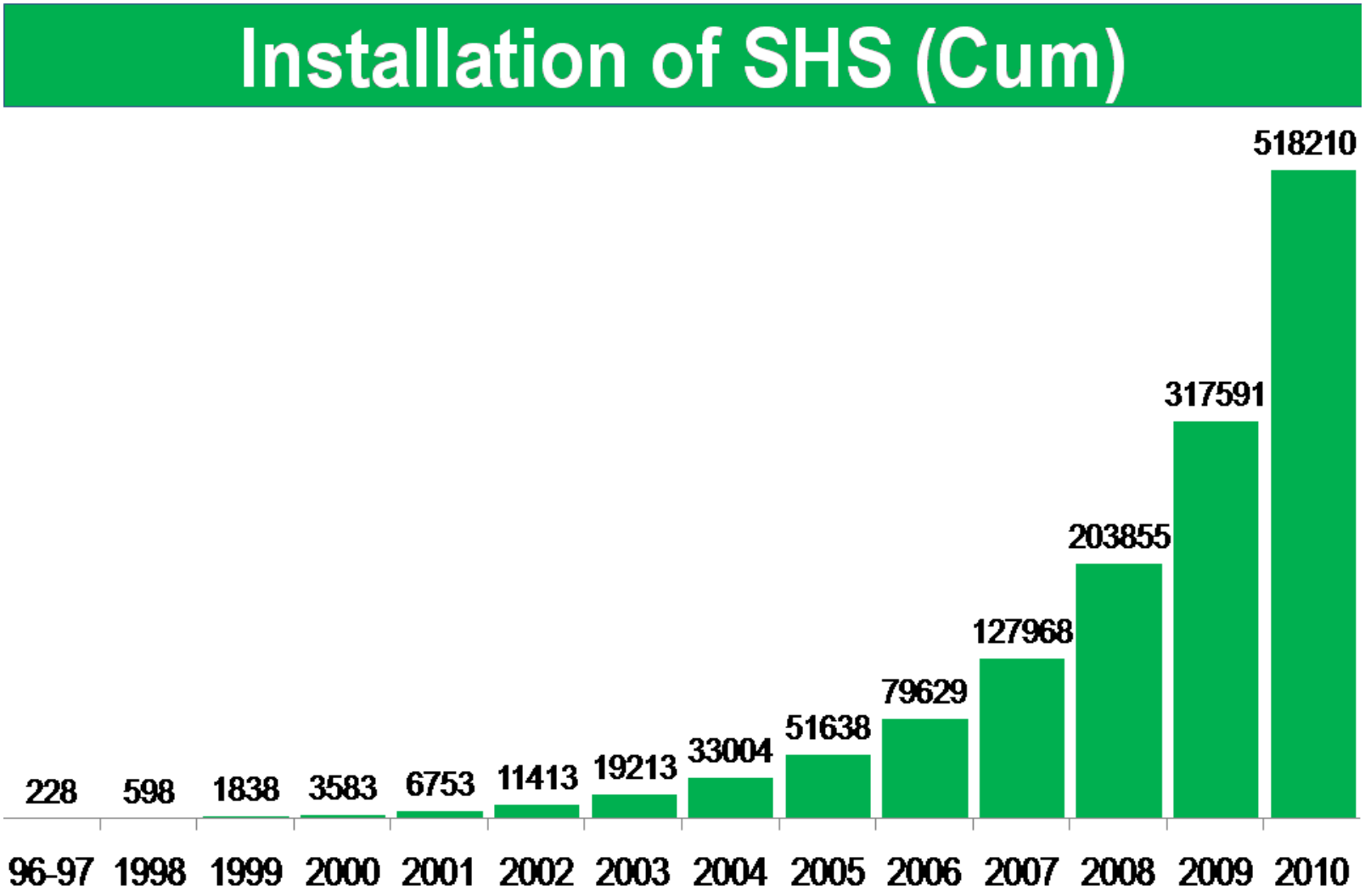
Multi (2006-2011) **LR 27.35**

Thin Film (2006-2011) **LR 20.51**

Data: Navigant Consulting; EUPD module price (since 2006) Graph: PSE AG 2012

Fraunhofer

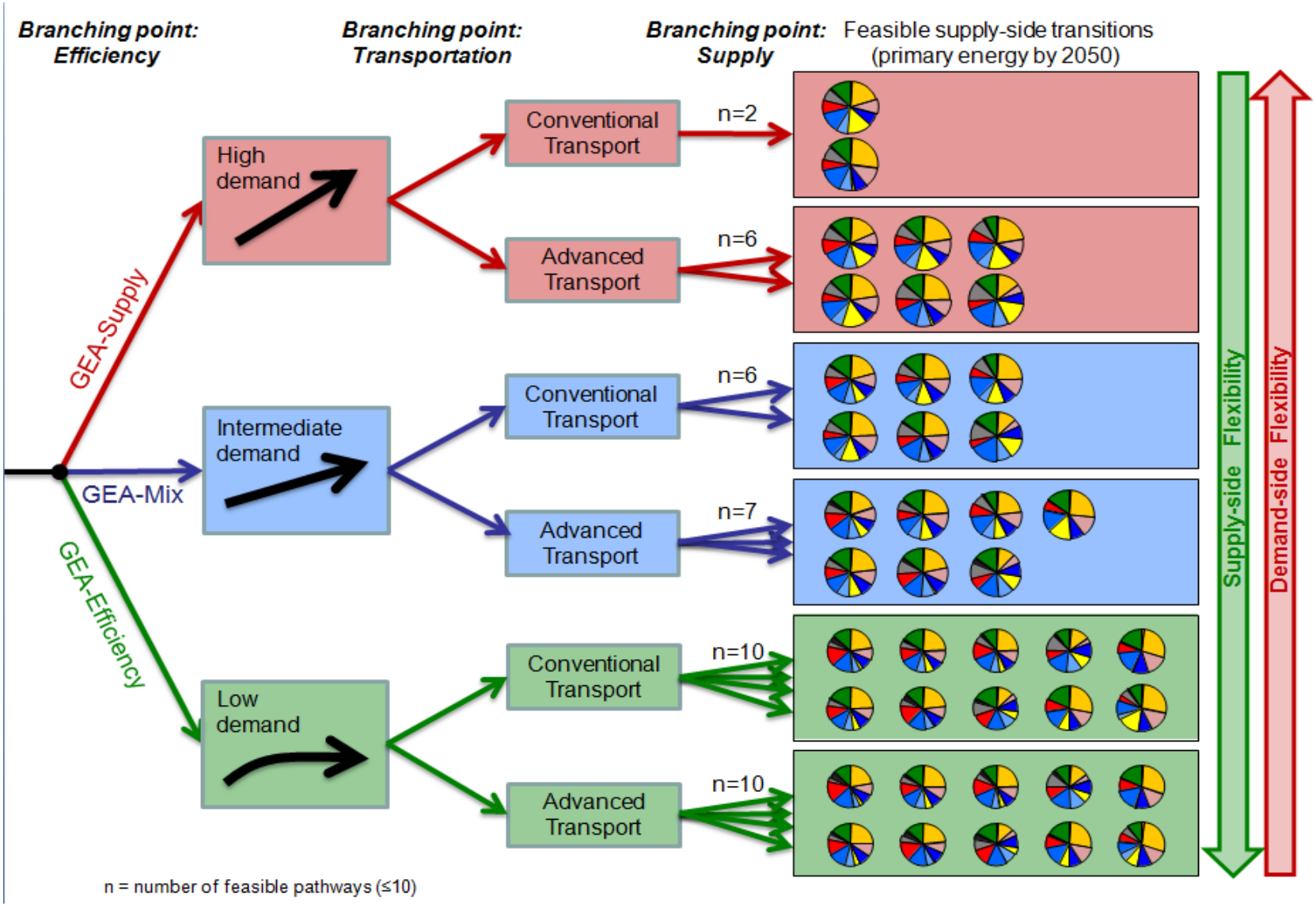
Bangladesh


Installation of SHS (Cum)
228
598
1838
3583
6753
11413
19213
33004
51638
79629
127968
203855
317591
518210
96-97
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

Objectives and goals for the GEA energy back-casting scenario for 2050

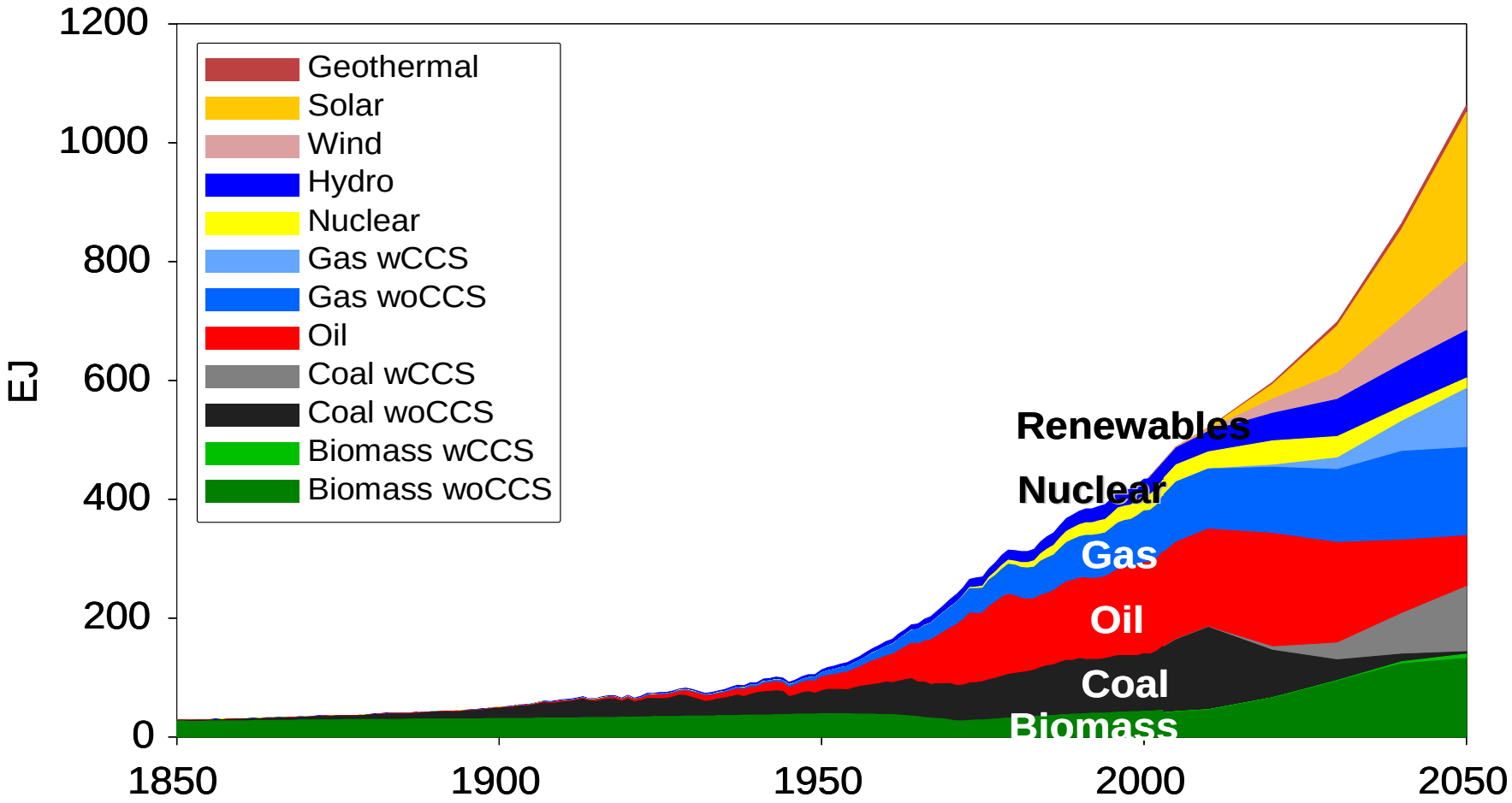
- **Support economic growth at recent historic rates**
- **Almost universal access to electricity and cleaner cooking, by 2030**
- **Reduce air pollution impacts on health, adhering to WHO guidelines**
- **Avoid dangerous climate change, stay below + 2 ^{o}C above pre-industrial global mean temperature**
- **Improve energy security through enhanced diversity and resilience of energy supply**
- **And in the process, address peak oil and nuclear weapons proliferation challenges**

Branching points in GEA backcasting analysis



Source: GEA Chapter 17

GEA-Supply Pathway



Source: GEA Chapter 17

not just energy technology

- Urban planning
- Transportation systems
- Material use
- Land use
- Consumption patterns
- …..

Actions to overcome key barriers will be required

- **Global community must take action** with specific and far-reaching measures (e.g. SE4All)
- **Quantity and quality of statistical information** must be improved considerably
- **More dedicated and broad-based efforts** will be needed, especially with cooking and heating services, and mechanical power in rural and remote areas
- **Targets** will be needed to provide a framework for tracking progress and accountability
- **Massive efforts** will be required to expand range, quality and quantity of energy services for the poor

Source: Bouille et al., 'Policies for Energy Access', GEA, 2012, p. 1603-1664.

Capacity, Management and Institutional Gap need to be addressed with specific measures

- **Ability to collect and manage data** to establish baselines and monitor ongoing performance
- **Analytical ability** to create district-level rural energy policies and plans
- **Ability to manage financial resources** transparently and accountably
- **Technical capability** to guide, regulate and train non-state implementing actors (including NGOs)

Source: Bouille et al., 'Policies for Energy Access', GEA, 2012, p. 1603-1664.

A few Conclusions:

- Many combinations of resources and technologies can address the challenges simultaneously.
- these combinations create multiple benefits not reflected in the conditions of market actors.
- access to modern energy a pre-requisite to poverty alleviation and economic grotwh
- more efficient energy use offers the largest flexibility on the supply side; renewables to increase significantly
- Nuclar energy is not a ”must”; CCS most likely is
- strong incentives och capacity development are needed and can only be provided by the public sector

Thank you!