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Bioenergy transition in rural China

Results from Re-Impact in Yunnan province

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CMES, a joint research centre between the World Agroforestry Centre (ICRAF) and the Chinese Academy of Sciences hosted by Kunming Institute of Botany

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In cooperation with:

CERES | Center for energy, resources and economic sustainability
University of california, berkeley

The three big questions

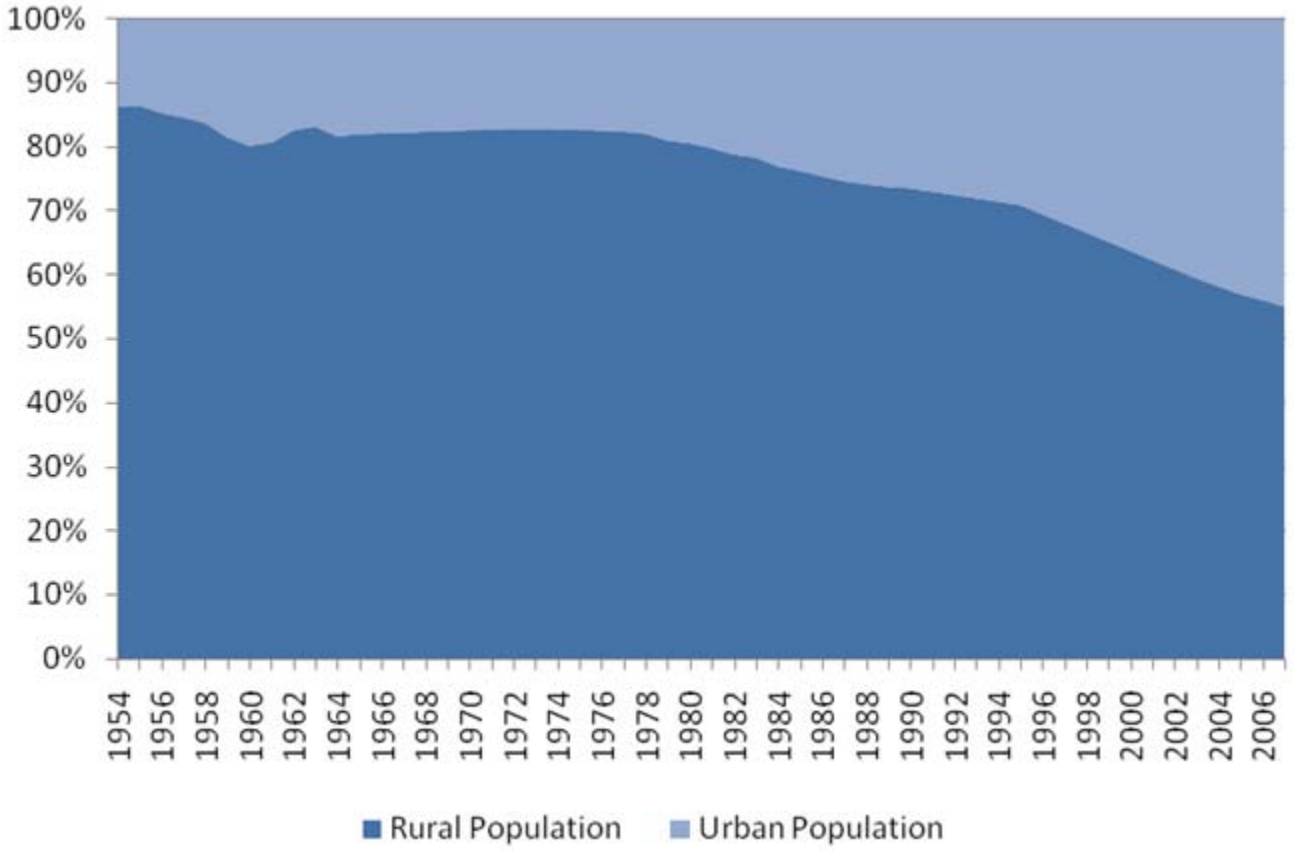
How to integrate agriculture-livestock-forestry into rural energy & climate policy?

What role can and should rural land and energy use in developing countries play in GHG mitigation?

What role can and should GHG mitigation play in rural development?

China is still a predominantly rural country

China's Urban and Rural Population, 1954-2006



Source: China Data Online

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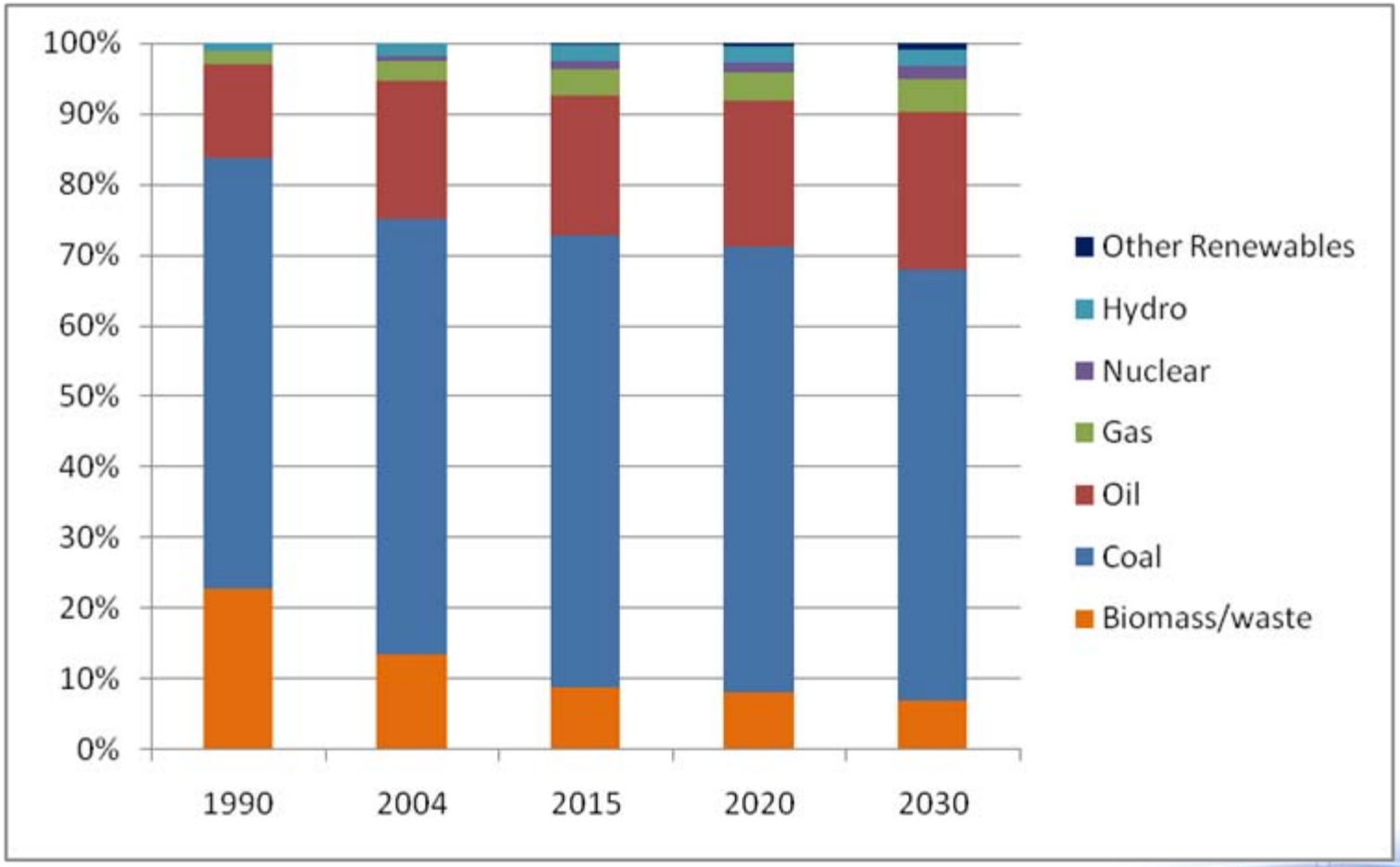
China's Primary Energy Supply: Low Carbon Options



Source: International Energy Agency, World Energy Outlook 2006

China Urban

China Rural

Rural China in Transition

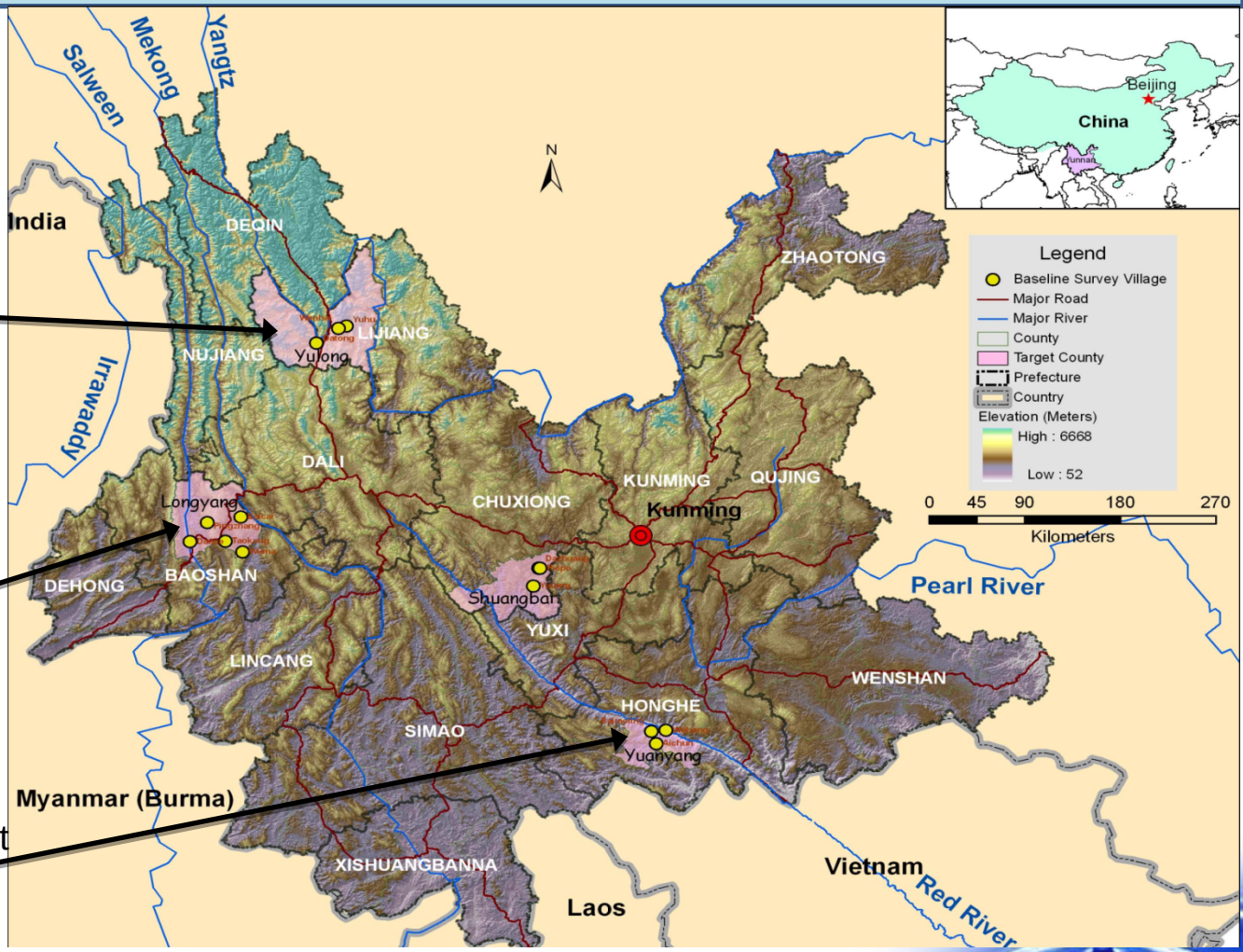
Study sites and survey design within Yunnan

Survey (structured interviews) : 783 households in 3 districts, 11 village committees, 33 natural village

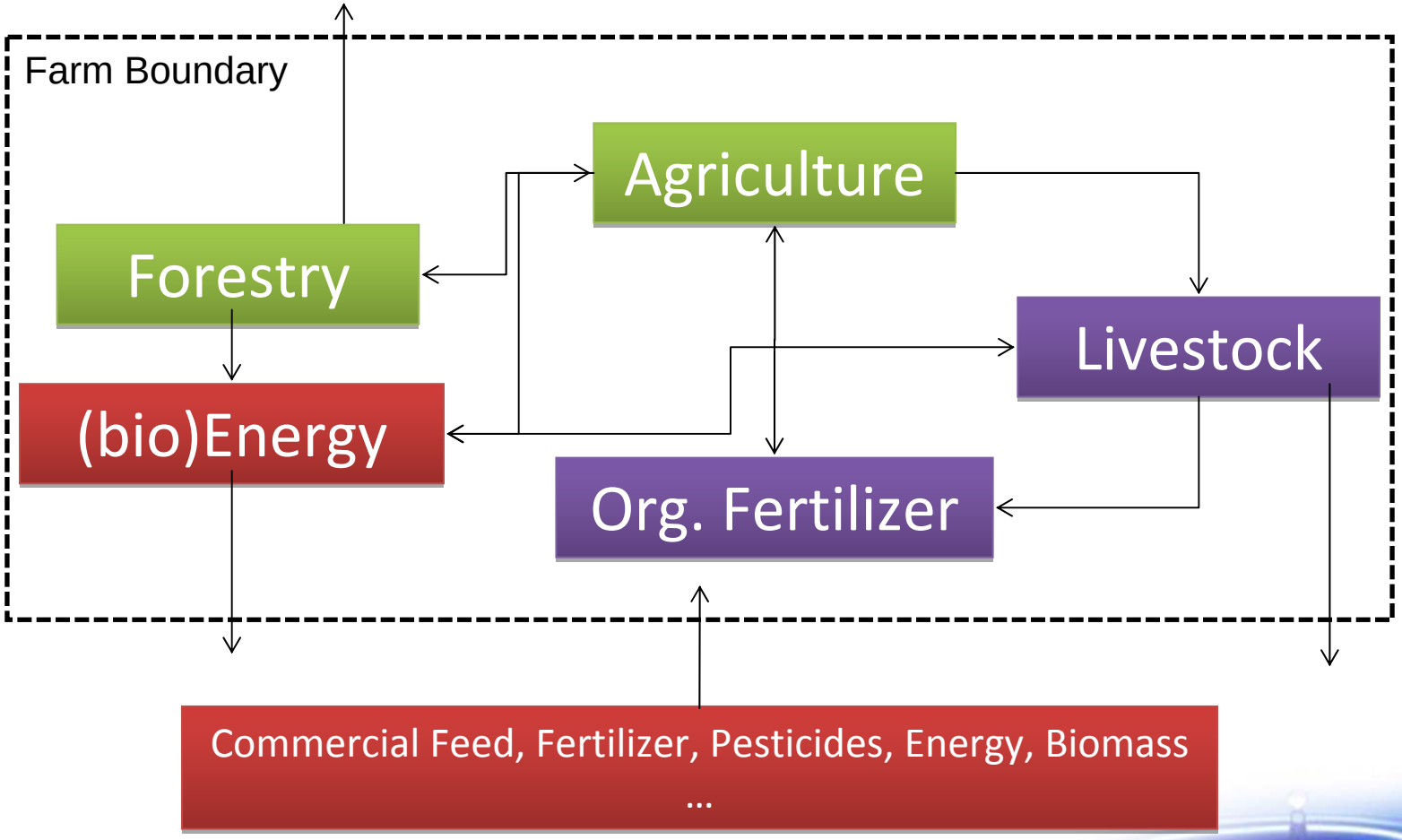
Yulong County (Sub-alpine)

Longyang District (Temperate)

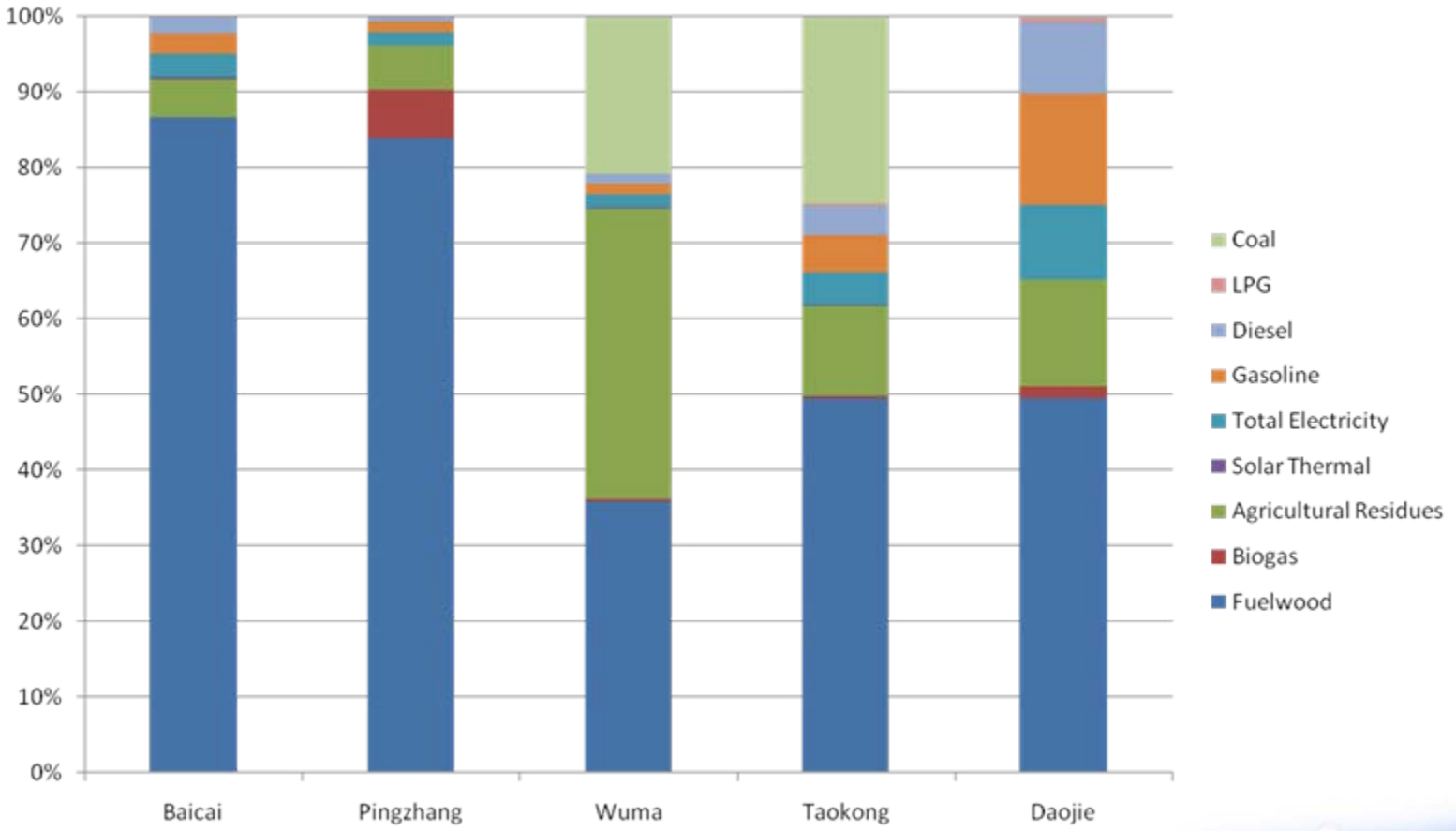
Yuanyang District (Sub-tropical)



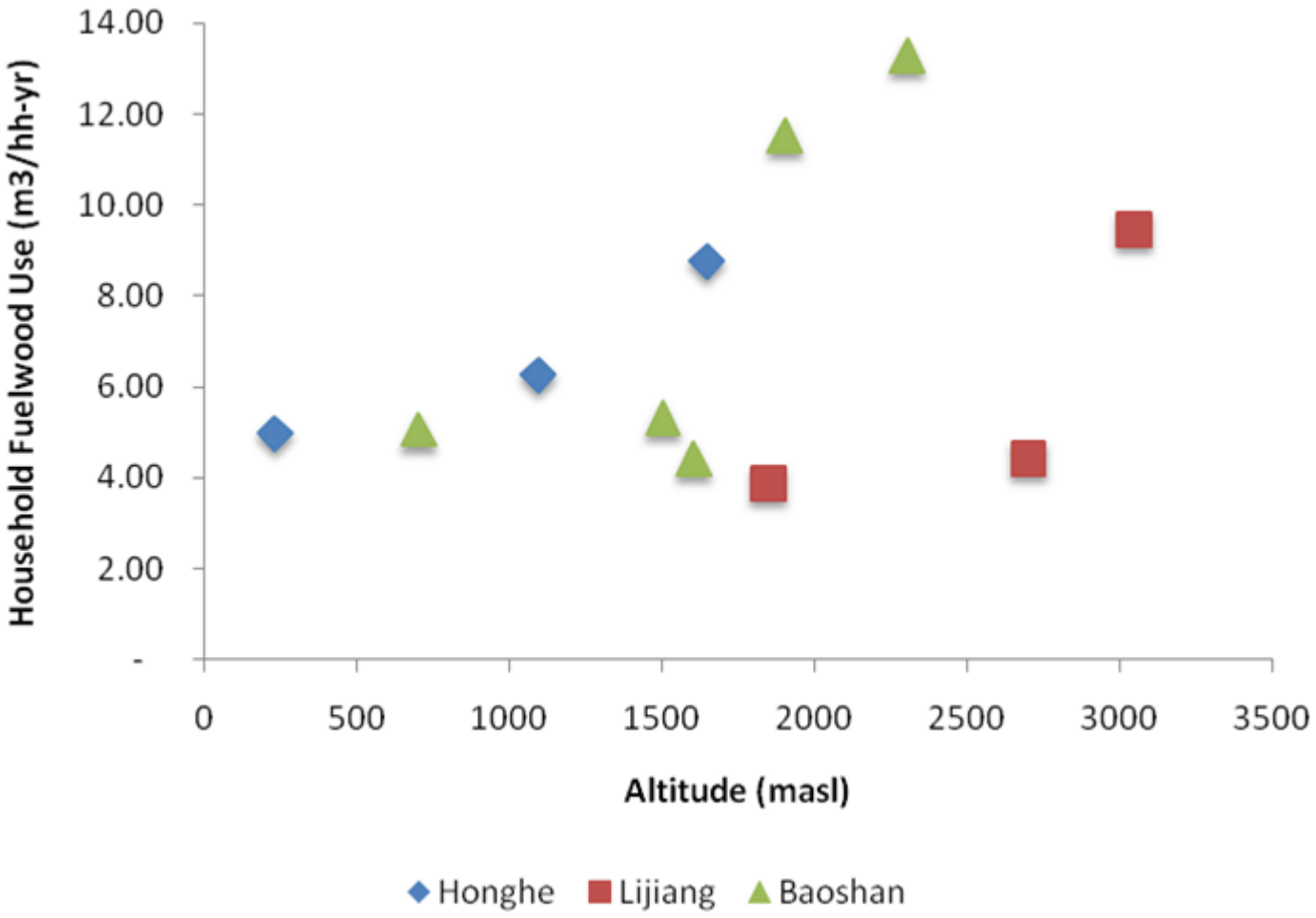
Energy and carbon flows between land-use systems and households



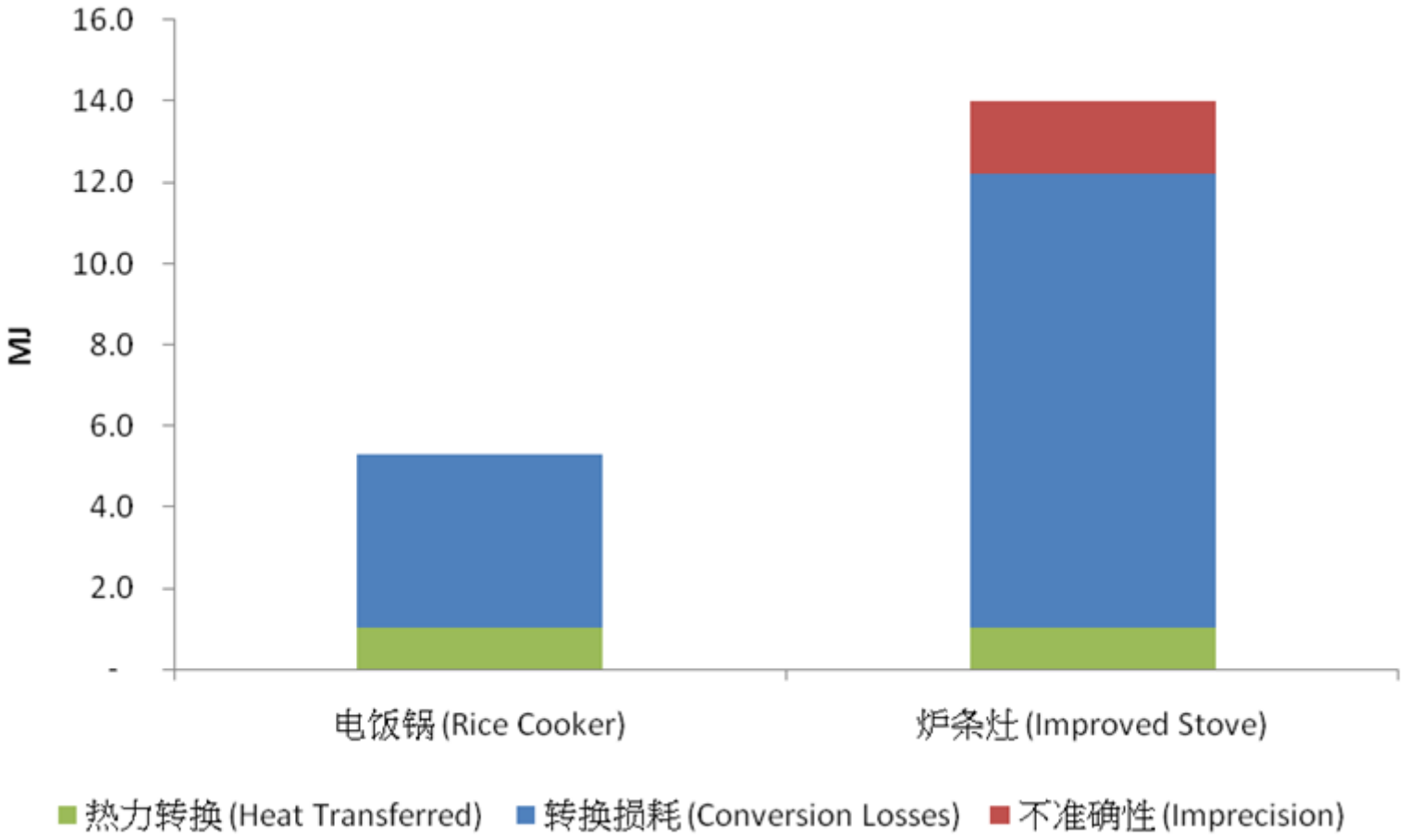
Energy use in 5 villages in Baoshan Municipality (prefectural level) along an altitudinal gradient



Fuelwood use in relation to altitude: No simple relationships



The dishwasher effect



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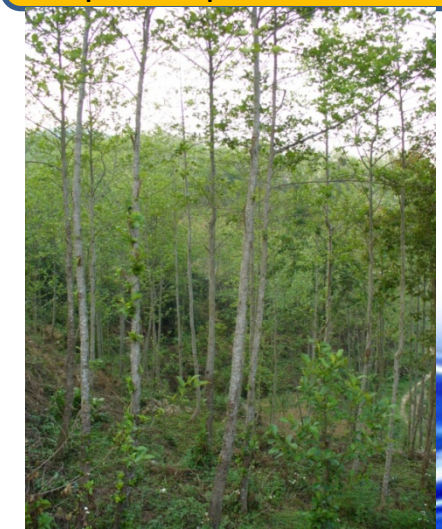
Forest transition producing wood products or biopower?

Typical young pine plantation in Yunnan, time to start managing it?

Business as usual….

Close-to-nature forest Germany

Alder Energy forest for biopower production



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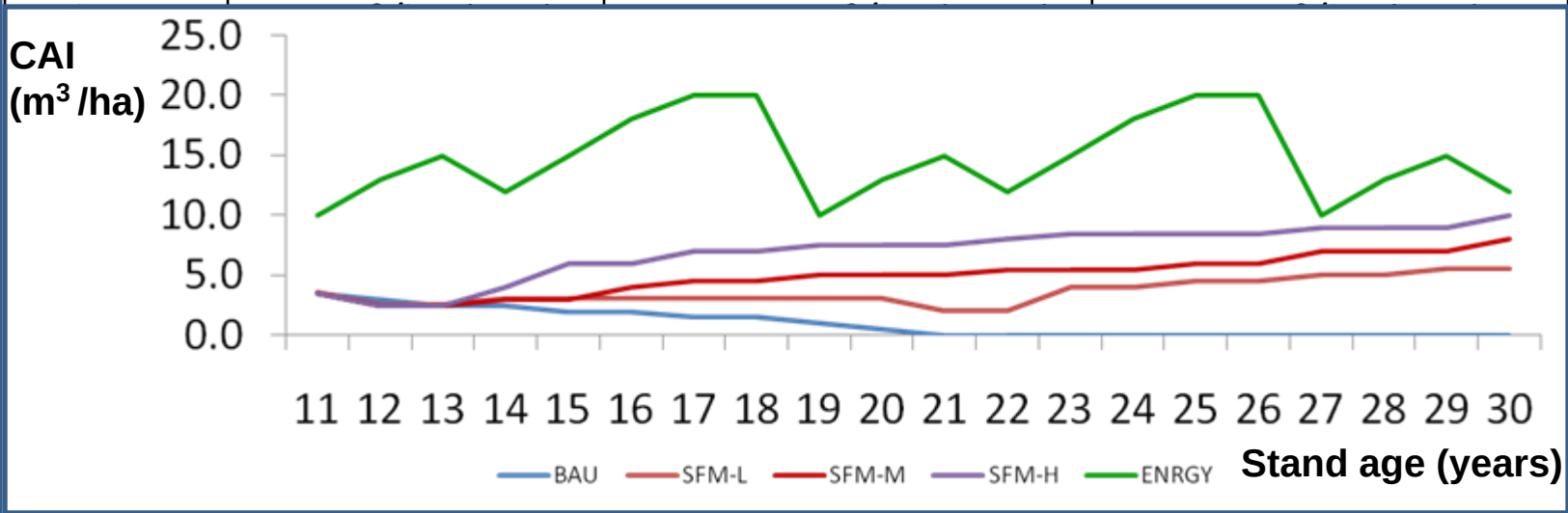
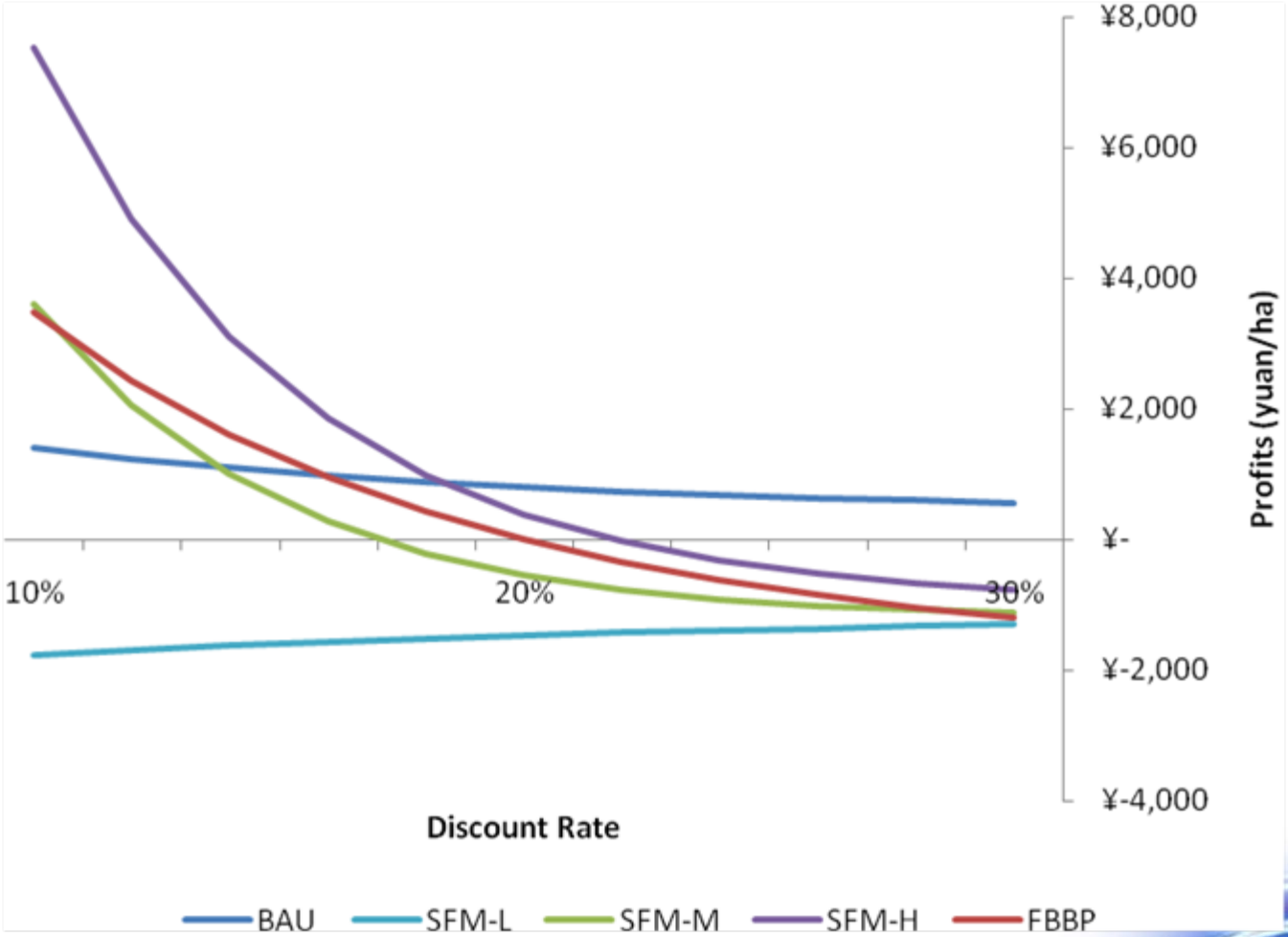
Forest transition scenarios

Scenarios	Business as usual (BAU)	Sustainable forest management (L,M,H)	Forest based biopower production
Mgmt activities	No, selectively extracting biggest trees without quota, poor trees remain	Selective harvesting of mature trees, mgmt of natural regeneration or group planting of native broad leaved trees	Clear cut every 8 y.
Y10 vol.	40 m^3/ha	40 m^3/ha	40 m^3/ha



Economics of different forest transition scenarios



Conclusions

- Modern forest based bioenergy is financially not competitive in China with bio-based material use. Mechanized energy forests in the lowlands are facing competition with food security.
- Sustainable forest management and replacing traditional fuel-wood use can be only jointly adopted, potential drivers are health issues, prospects of increasing wood production and associated emission reductions/removals.
- Small-scale off-grid modern bioenergy is currently not cost competitive in China, mainly because 98 % of all households are linked to the power grid.
- Rural energy and climate change policy are expected to be a strong drivers of a forest and energy transition in rural China within the next 10 years.

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