

Methane to Markets Workshop

Investment in the Effective Utilization of Agriculture Wastes

30 October -1 November 2007

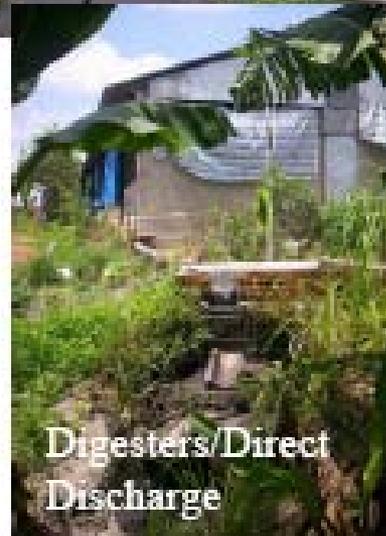
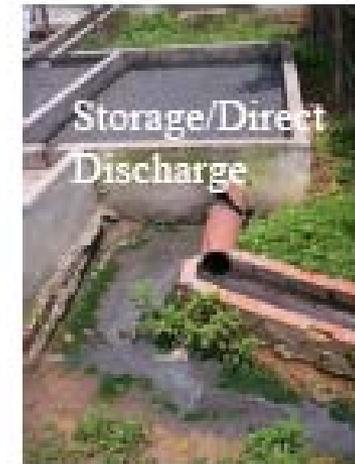
**Qingfeng Zhang, EAAE
October 30, 2007
Asian Development Bank**

Environmental Implications from Agriculture Wastes

- **Direct combustion of agriculture residues**
 - Air pollution
 - Human health risk
 - Erosion
 - Deforestation
 - Biodiversity reduction
- **Direct Discharge of Animal Wastes from household breeding & livestock farming**
 - Massive Non-point Source Pollutants Discharge (COD, TN and TP)
 - Damage to watersheds

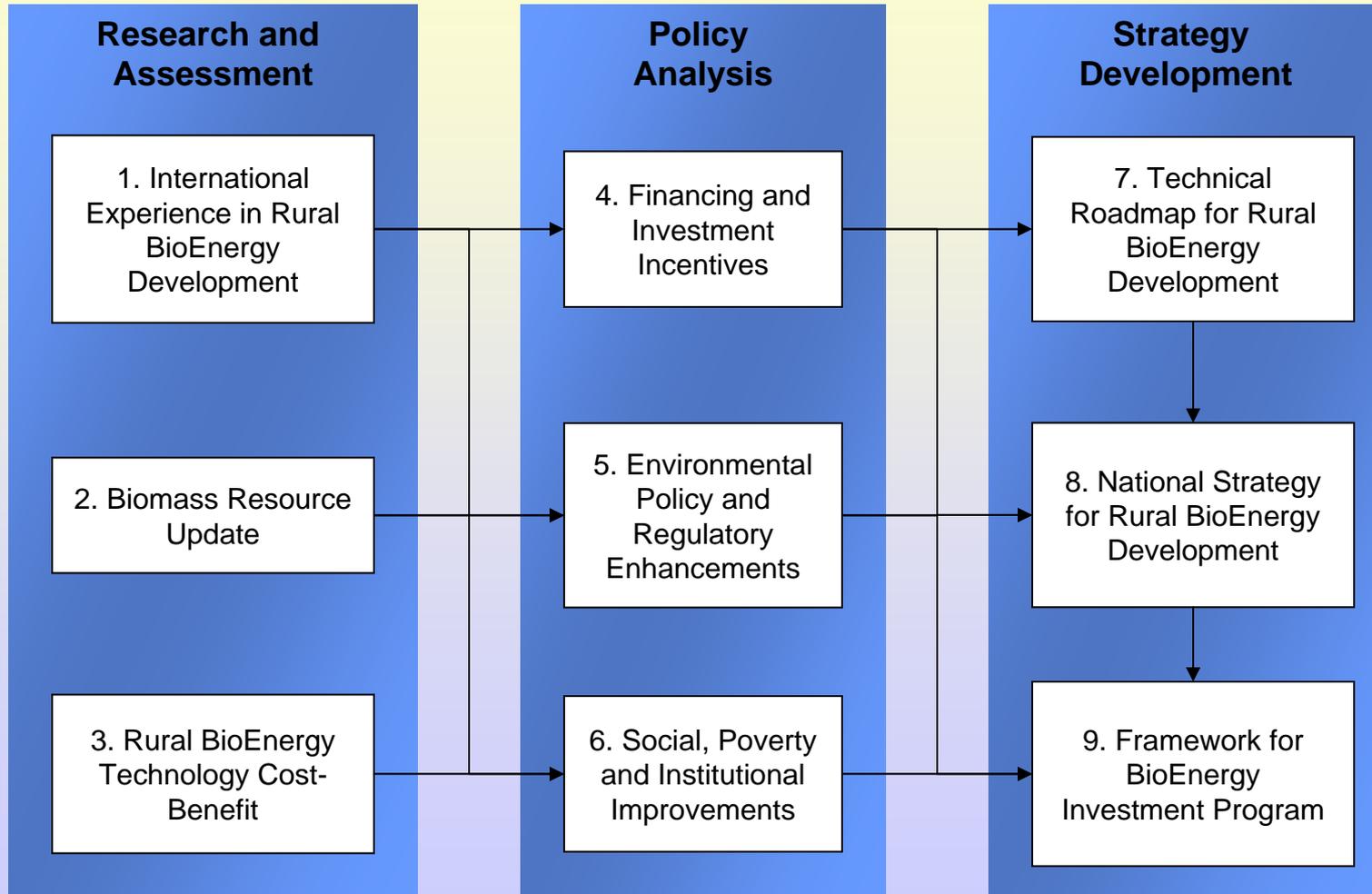
Direct Discharge of Animal Wastes

ENERGY AND POLLUTION PREVENTION



- 1) Land application of nutrients limited to solids fraction only
- 2) Have discharge standards
- 3) Pollution load is catastrophic

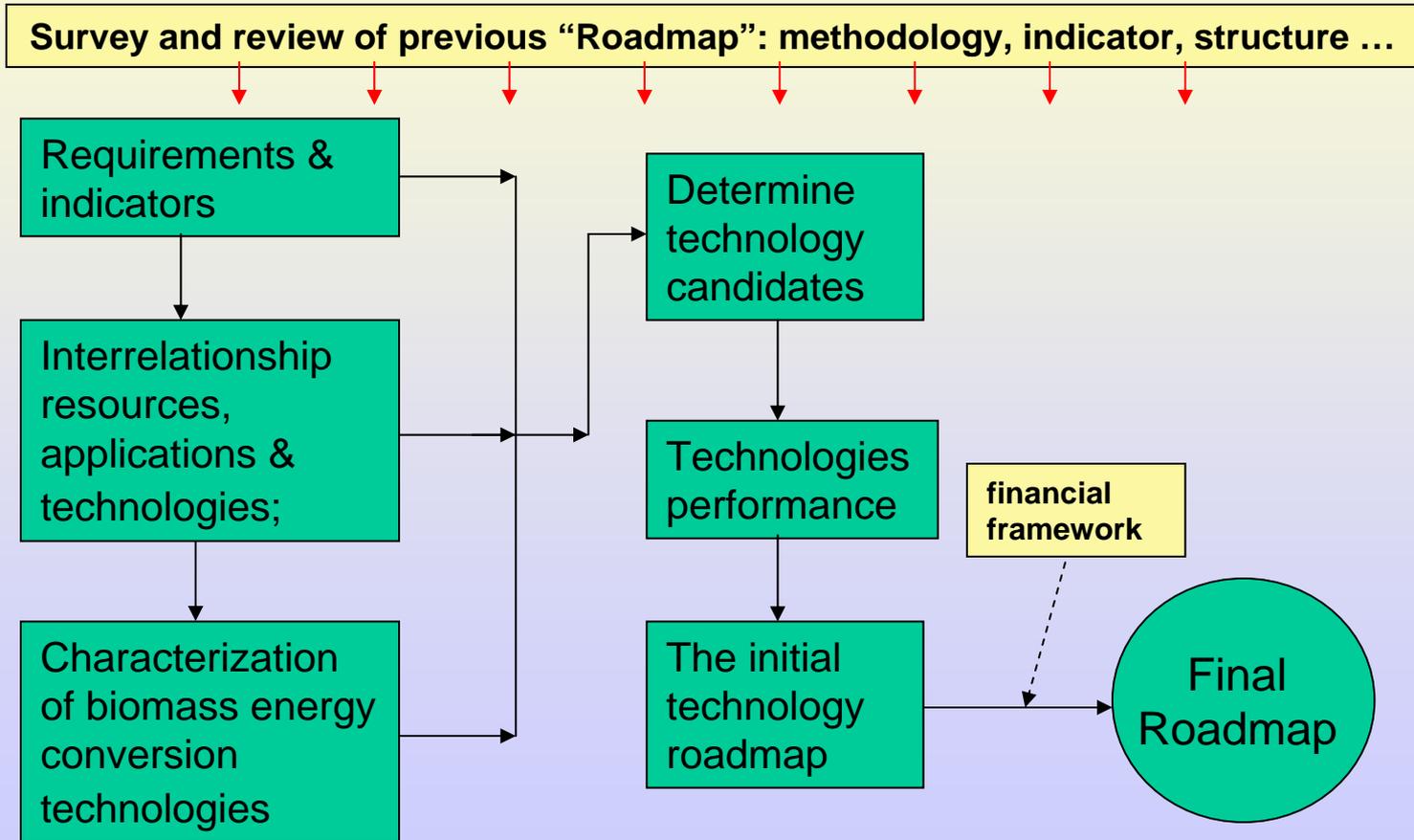
Framework for Waste-Energy Investment



Waste-Energy Options

Application Resource	Processing	Cooking	Space heating and hot water	Electricity Generation	Transportation fuel
Crop straw residues <ul style="list-style-type: none"> • corn stalk • rice straw • wheat straw • cotton stalk • bean stalk • bagasse 	Collection Pelletization Distribution	Stoves and Heaters		Co-firing with coal	NA
	Combustion	NA	Cogeneration and district heating	Grid power and co-generation	NA
	Gasification	Stoves and Heaters		GT-CC	FT-liquids and DME
Animal manure	Various digester types	Pipe network and stoves / heaters		Industrial power Grid power	NA
Agro-processing wastewater	Various digester types	Pipe network and stoves / heaters		Industrial power Grid power	NA
Energy Crops <ul style="list-style-type: none"> • Rapeseed • Waste oils • others 	Trans-esterification	Stoves?	NA	NA	Diesel substitute
<ul style="list-style-type: none"> • Corn • Sugarcane • others 	Ethanol production techs	NA	NA	NA	E85 and other blends

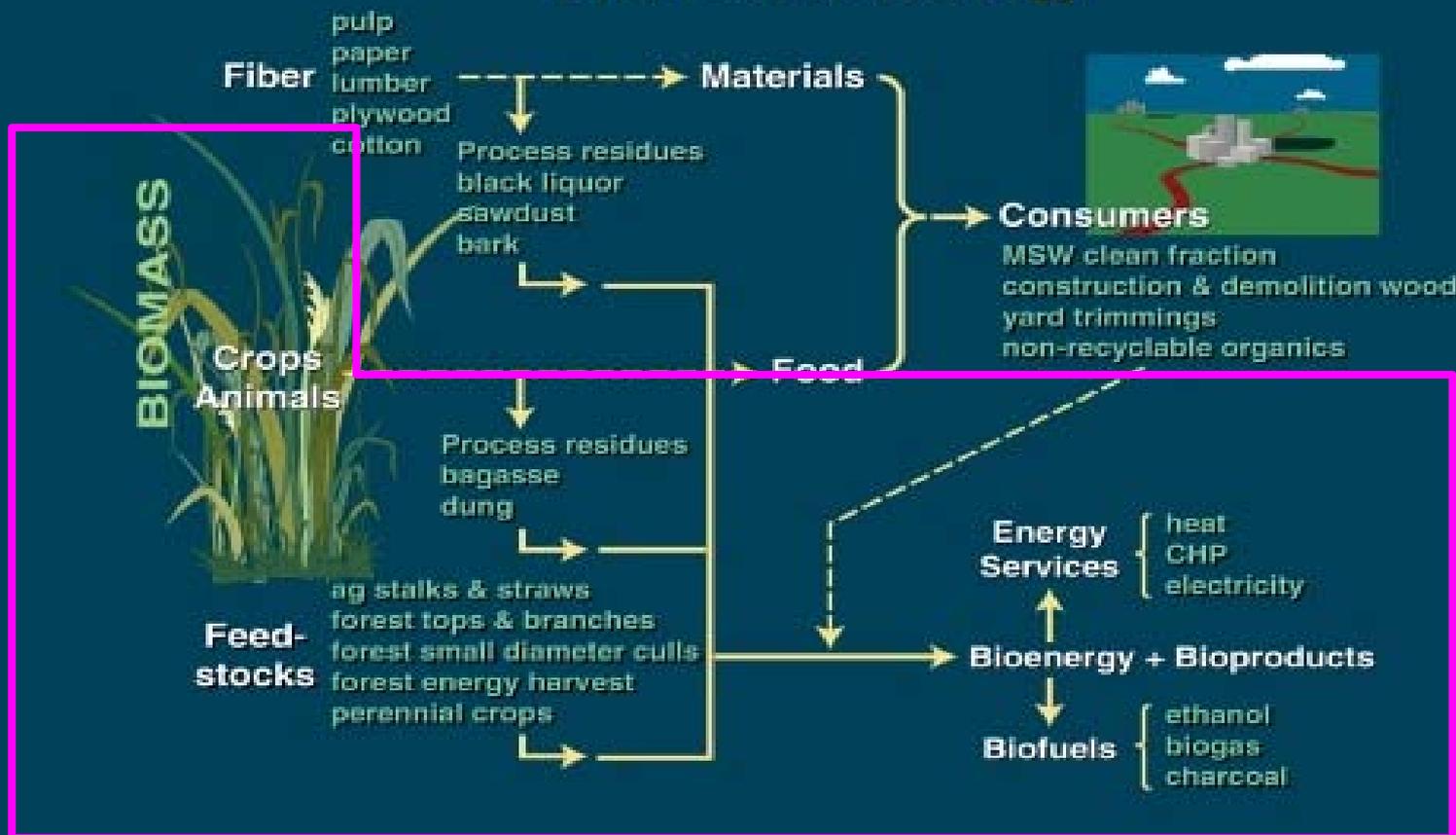
Steps to Develop the Wastes-Energy Roadmap



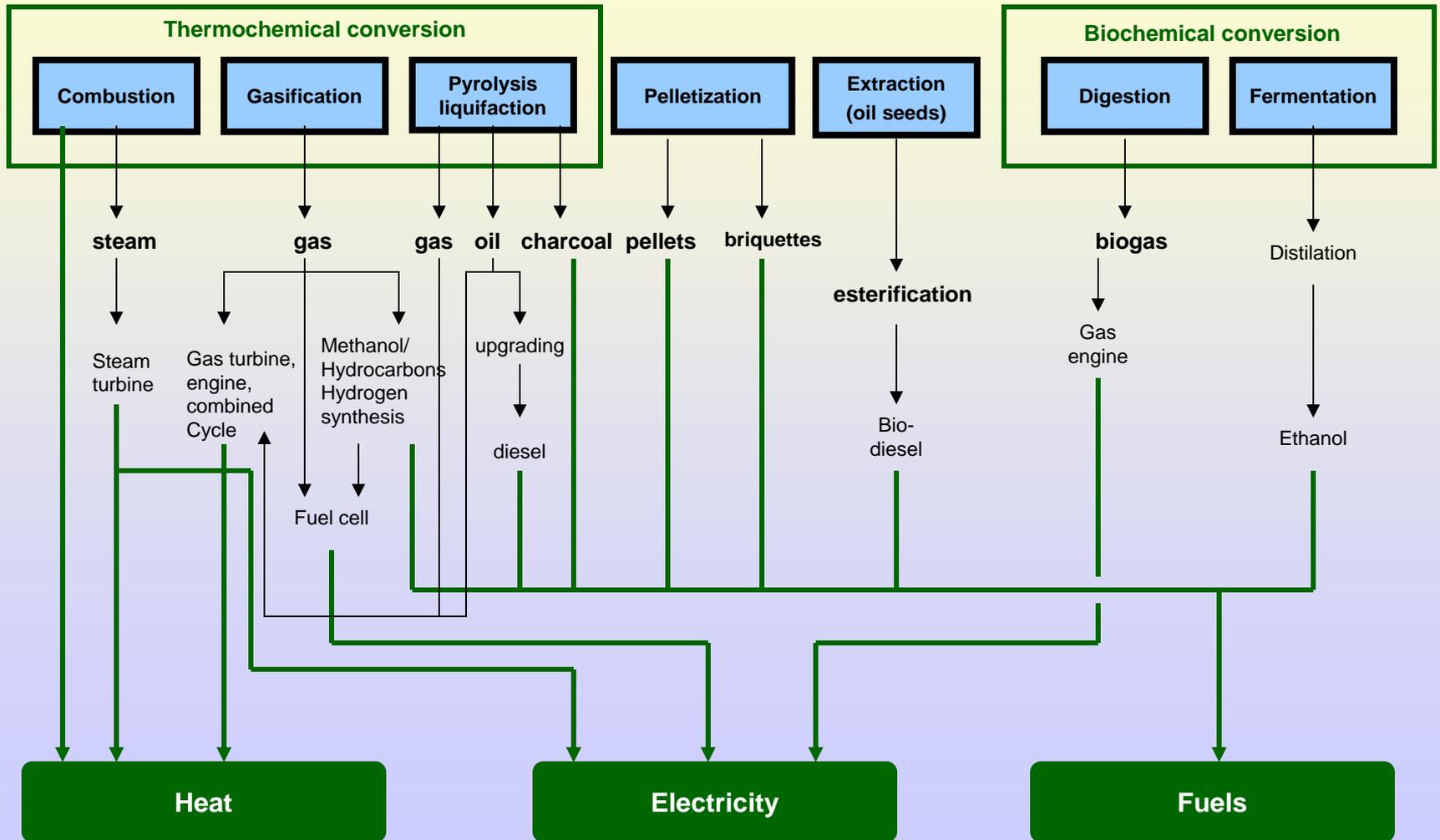
Biomass Resources/Agriculture Wastes for Energy Conversion

CCPL 98-025ms

Biomass to Bioenergy



Bioenergy conversion technologies paths

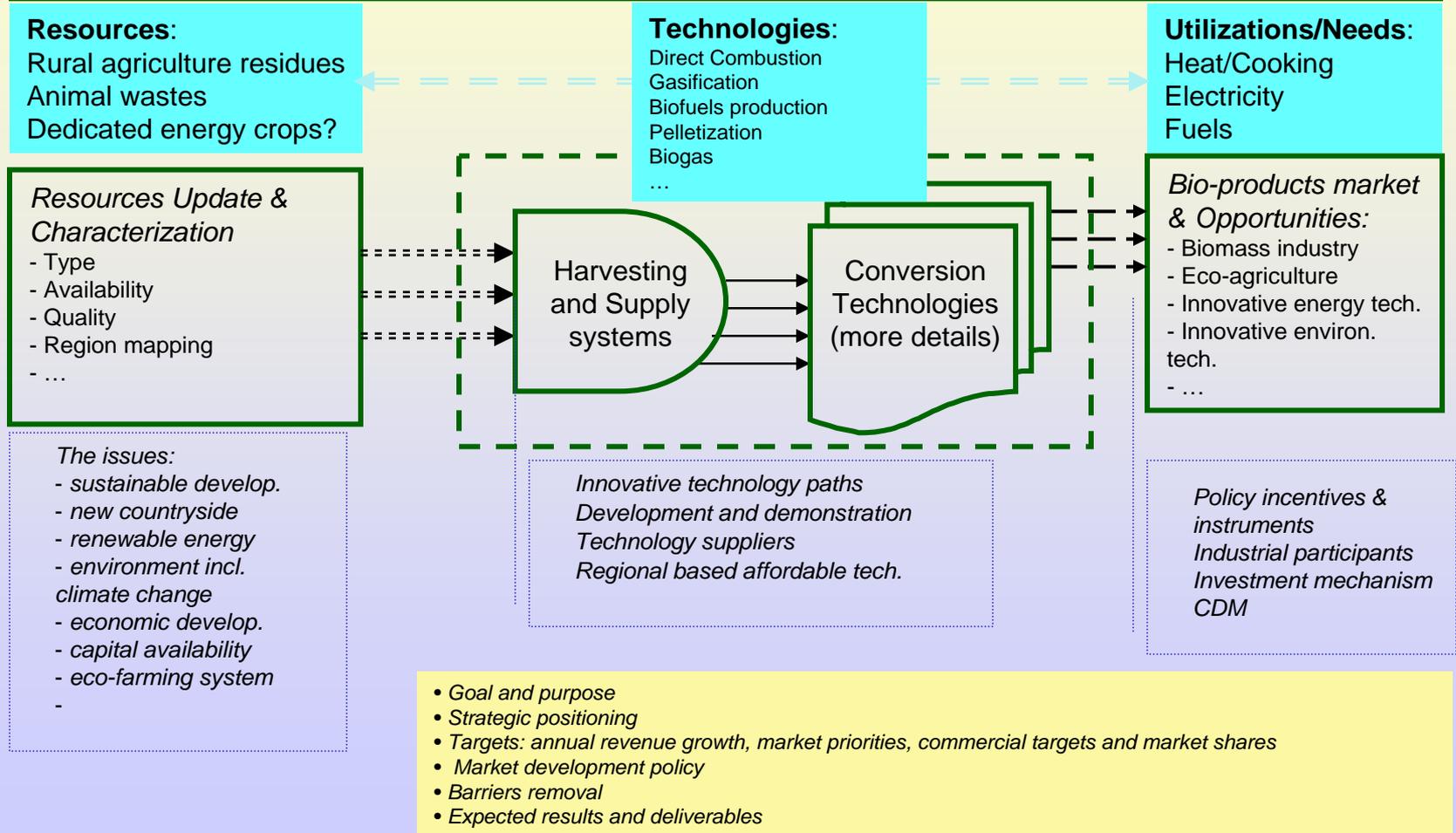


Important issues

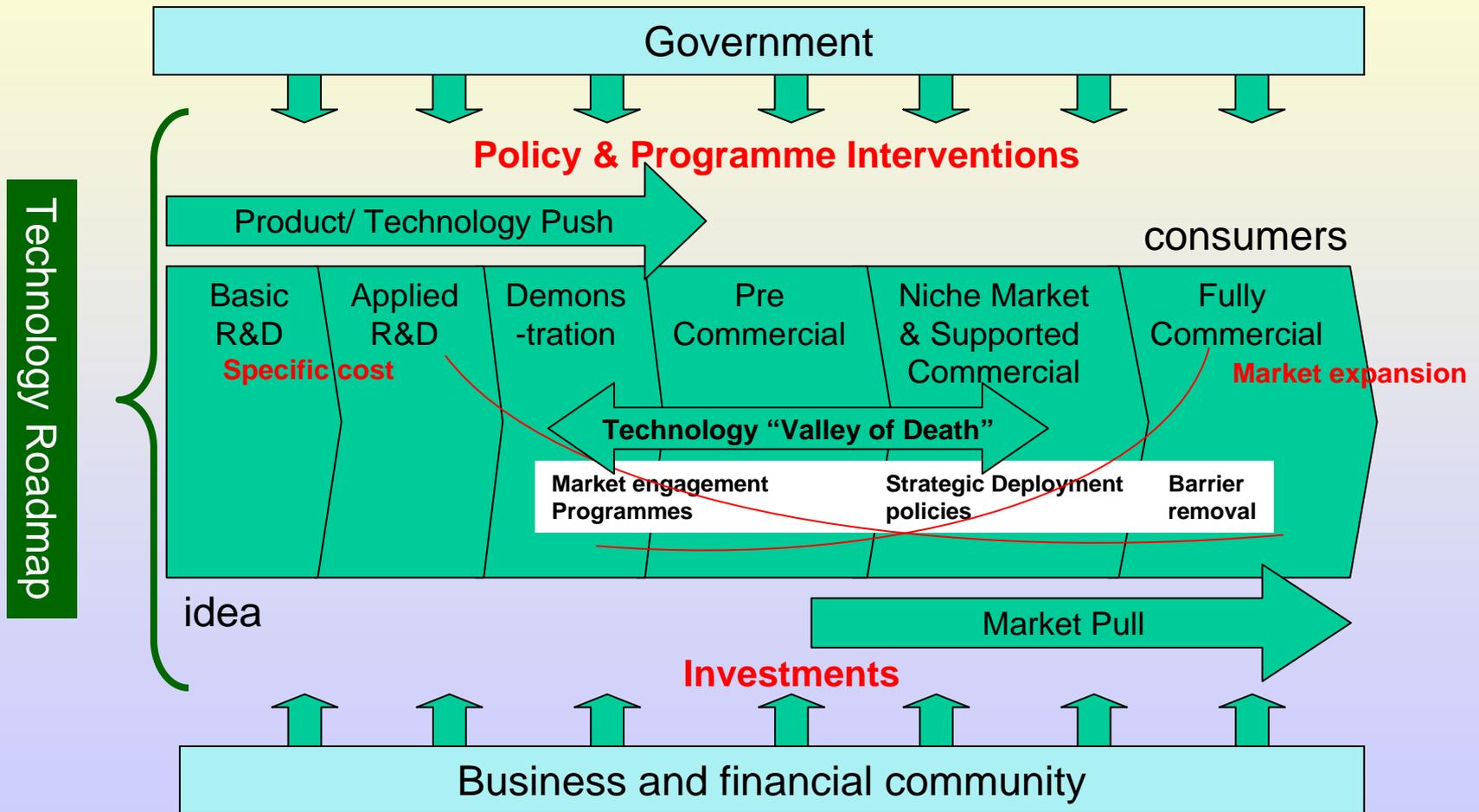
- **Accurate resources and utilization information**
- **Careful considerations of competition use of biomass resources**
- **Relevant indicators definitions including technological, economic, environmental and institutional factors in both quantity and quality criteria**
- **Linkage between the resources, technologies and demands by technologies pathways with considerations of development trends**

Link of Biomass Resource and Utilization/Needs by Bioenergy Technologies in Rural Bioenergy Roadmap

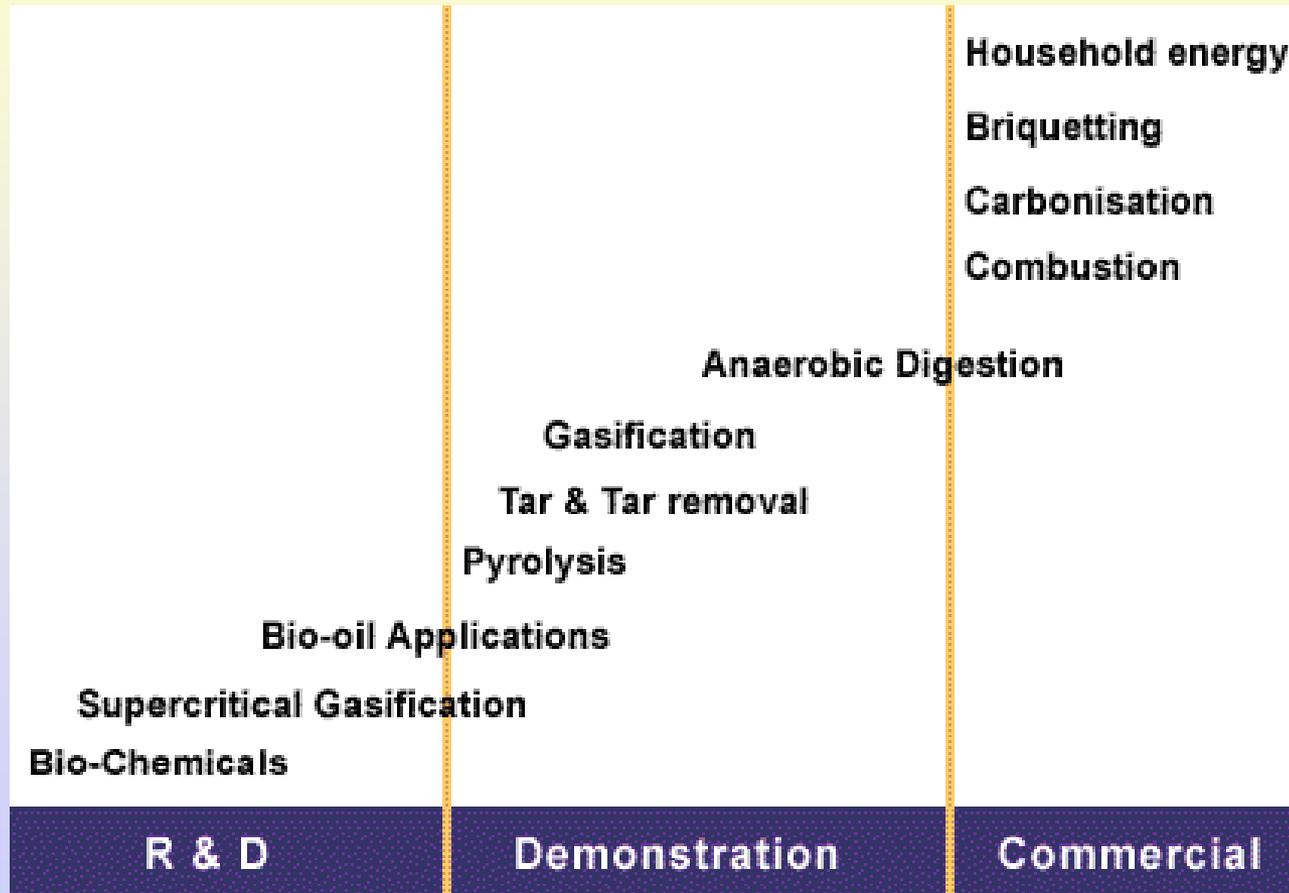
National Strategy for Biomass-Based Rural Renewable Energy Development - Rural biomass energy strategic partnership

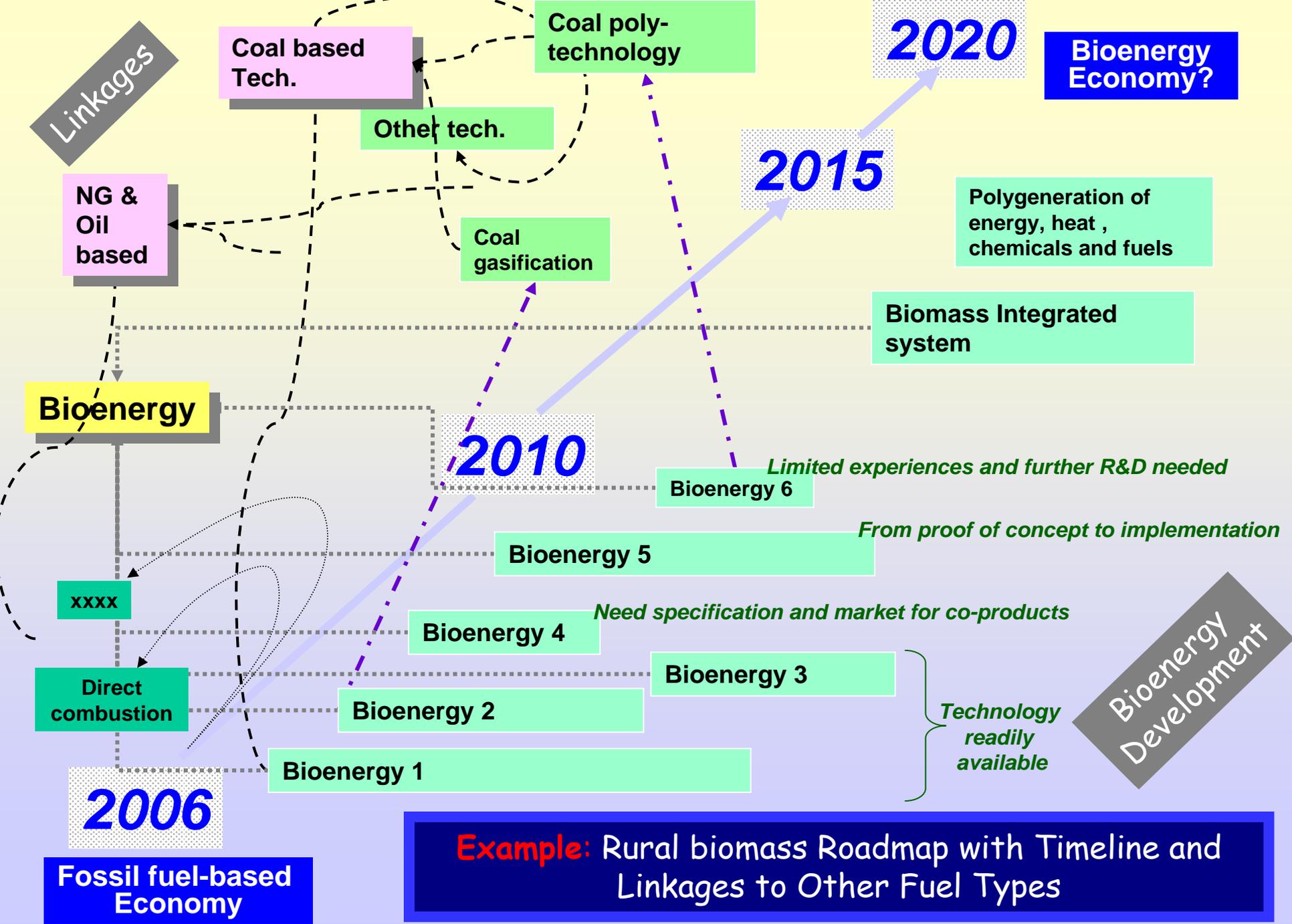


Technology Innovation Chain vs. Technology Roadmap



Potential Technologies Candidates and Different Stages of Development

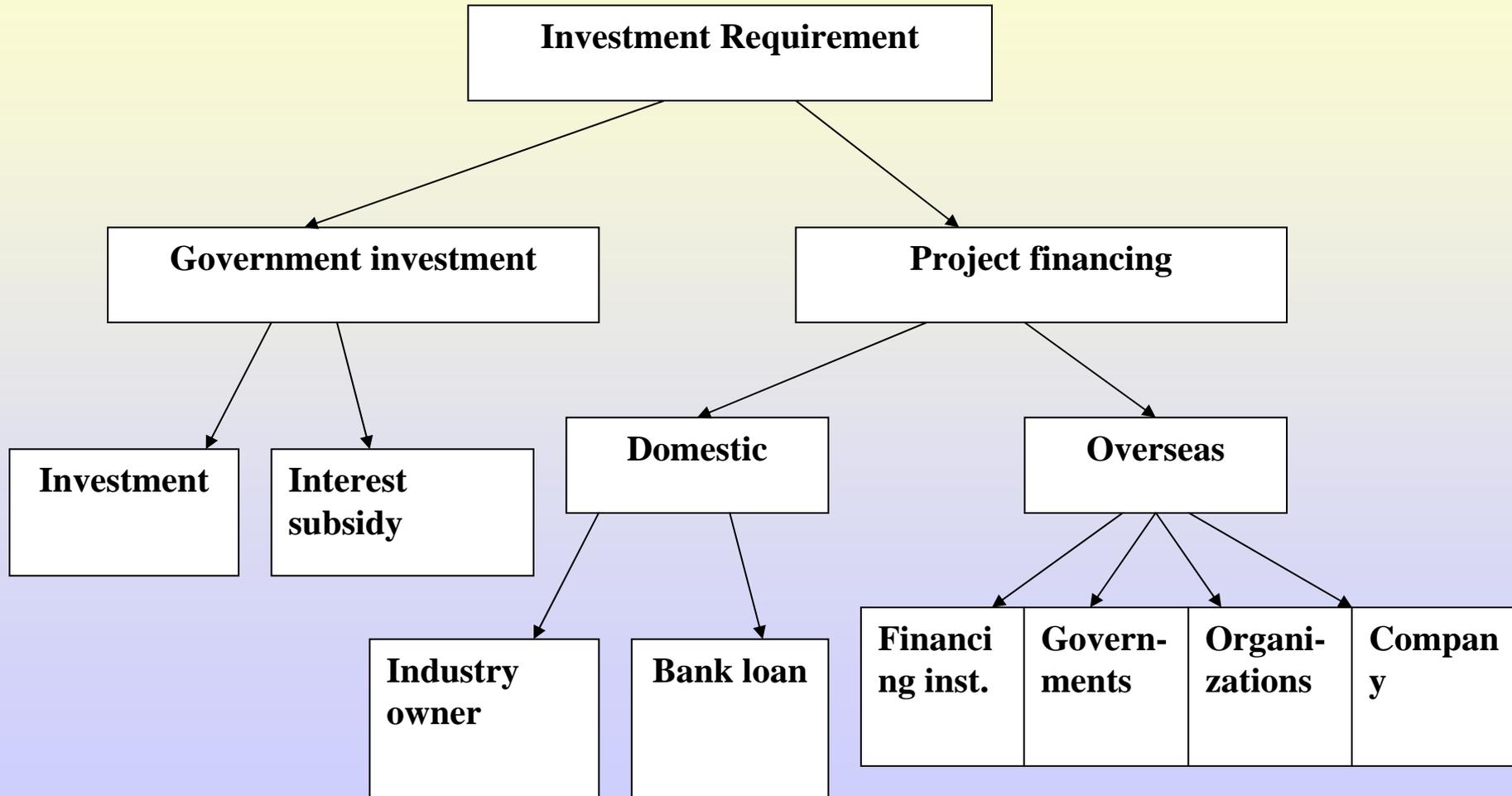




Prerequisites for an Effective Investment Program

- **Implementation of Effective Policies and Incentives**
 - **Environmental Policy and Regulatory Enforcement**
 - **Financing and Investment Incentives**
- **Consistency with Priorities and Programs of Financial Partners**
- **Realistic National Targets for Waste/Biomass-Energy Investment**
- **Commitment to Sustainable Institutional Structures**

Financing Mechanism



Elements of an Integrated Investment Strategy

- **National Targets for Local and Global Environmental Benefits**
- **National Targets for Rural Economic and Social Development**
- **Strategic Plan Integrating Domestic and External Sources**
- **Agreements to Formalize Commitment to the External Investment**

Investment Coordination Mechanisms

- **Steering Committee**
 - Ministerial Level
 - National and International representatives
- **Annual Coordination Workshops**
 - Review Projects
 - Assess Progress
 - Adjust Financing Plan
- **Measures of Investment Effectiveness**
 - Investment targets
 - Environmental benefits
 - Social and economic improvement

Monitoring and Evaluation Plan

- **Measuring National Targets and Environmental Goals**
 - Monitoring incorporated into each project
 - National monitoring group
 - International expert support as needed
- **Capacity Building to Improve Investment Effectiveness**
 - Strengthen national, provincial and local institutions and personnel
 - Near-term implementation requirements as well as long-term sustainability

Loan 1924-PRC:Efficient Utilisation of Agricultural Wastes

- **Strong Ownership:** reflects national priorities and farmers' needs
- **Clear Structure:** clear institutional arrangements from top levels of government to the field
- **Enhancing Capacity:** continuous capacity building (GEF)
- **Strategic focus:** policy dialogue
- **Implementation :** flexibility and adaptive management

Preparation for Eco-agriculture Development thru Integrated Livestock Biogas System

- **National Priority: Rural Circular Economy**
 - **livestock operation—biogas digester—eco-farming**
- **Strategic Plan Integrating Domestic and ADB Financing**
- **Potential Implementation of Effective Policies and Incentive thru GEF co-financing**
- **Application of Carbon Financing for Replication**