The Scope of Production and Usage of Biofuels in Nepal

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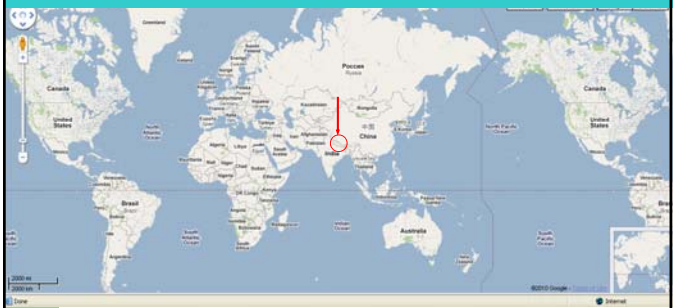
Presentation Outline

- Nepal, country background
- Energy consumption scenario
- Fuel cost for Nepal
- Land use pattern in Nepal
- Biofuel programs in Nepal
- Present situation of biofuel development
- Potential plants for biofuels in Nepal
- Jatropha oil is superior
- Why Nepal has potential
- Opportunities , Challenges, Difficulties to be addressed
- Possible growing area and productivity scenario
- Possible implementation modality
- Recommendations
- Relevant photographs

Nepal in World Map



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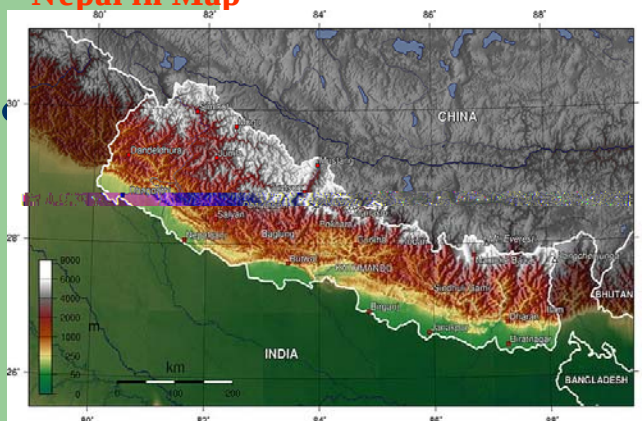
Nepal in Map



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- Area 147181 Sq. km.(93rd)

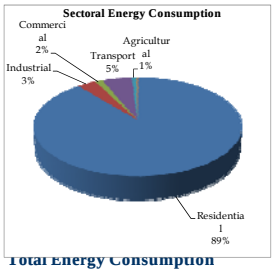
Slide 4

N2 Nepal
NTA, 7/4/2010

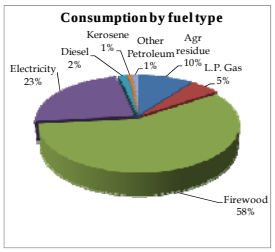
Background

- **Country profile:**
  - Located in South Asia
  - 0.03% of the total land area of the World and 0.3% of the total land area of Asia
  - Landscape: diverse topography, geography and physiography (Approx. Width- 200 km from South to North, and Length-800 km from East to West, Altitude varies from 60 m to 8848 m from MSL)
  - Landlocked country (India in south, east & west and China in north)
  - Population: About 27 million
  - Economy: Single digit growth rate (developing nation)
  - Transportation: Limited air transport, road services increasing
  - Huge potential of natural resources with various climatic conditions
  - Mainly based on Agriculture
  - Facing energy crisis (both electricity and imported petroleum products)

Energy Consumption Scenario



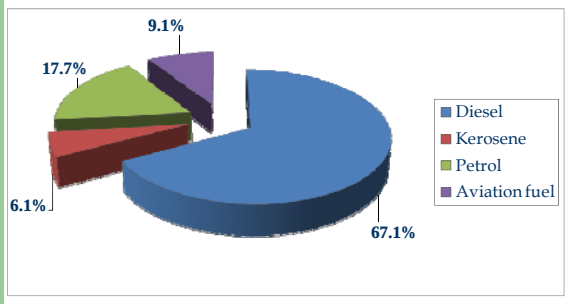
Total Energy Consumption



Industrial Energy Consumption

Source: Energy Sector Synopsis Report, 2010

Consumption Share of Petroleum Products



Import of Major Petroleum Products (in KL)

SN	Fiscal Year	MS (Petrol)	HSD (Diesel)	SKO (Kerosene)	ATF (Aviation Turbine Fuel)
1	2009/2010	163,000	600,000	53,000	83,000
2	2010/2011	188,000	653,000	43,000	100,000

Fuel Cost for Nepal

- Imbalance between demand and supply of imported petroleum products
- Annual cash payment from the country: equivalent to US$ 900 million for petroleum products (Indian Oil Corporation)
- Nepal Oil Corporation (NOC), authorized government entity to import petroleum is in monthly loss of US$ 19.5 million
- Price of oil is in increasing trend

Land Use Pattern in Nepal

Particulars	Million hectares
Cultivated land Areas (Edible crops)	3.091
Possible additional arable land (Non-cultivated land)	1.03
Arable Land Areas (Subtotal)	4.121
Forest land Areas	5.828
Pastureland Areas	1.766
Wetland	0.383
Others	2.62
Total land area	14.718

*Data source: Agriculture Information and communication Centre, 2012

Biofuel Cultivation in Nepal

Jatropha plantation in various parts of Nepal

- Approximate Area : 12,000 ha
- Those areas are previously uncultivated land
- Promotion for Commercial cultivation : not started yet
- No irrigation facility in cultivated area

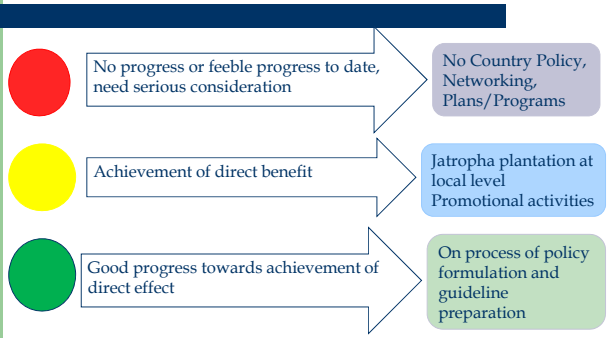
Objectives of Renewable Energy Policy/biofuel program

- To reduce dependency on traditional energy and conserve environment by increasing access to clean and cost effective energy in the country.
- To increase employment and productivity through the development of renewable energy resources.
- To increase the living standards of rural population by integrating renewable energy with social and economic activities.

Involved Institutions in Renewable Energy

- Alternative Energy Promotion Center (AEPC)
- Winrock International Nepal
- Research Center for Applied Science and Technology (RECAST)
- Private Companies
- Development partners
- Local government bodies like District Development Committies, Village DevelopmentCommitties

Present situation of biofuel development



Potential Non edible plants for biofuels production in Nepal

S.N.	Local Name	Scientific Name	Type	Remarks
1	Sajiban	Jatropha cercus	Non edible	
2	Adir	Riccinus comunis	Non edible	
3	Sal	Shorea robusta	Non edible	
4	Chiuri	Bassia butyracea	Non edible	
5	Simal	Bombax ceiba	Non edible	
6	Khurpani	Prunus armenica	Non edible	
7	Simal	Bombax ceiba	Non edible	
8	Bakaino	Melia azedarach	Non edible	
9	Nim	Azadirachta indica	Non edible	
10	Dhaturo	Cannabis sativa	Non edible	

Jatropha oil is superior

- Short gestation period
- Non-edible (no food scarcity and conflict in developing countries for food crops instead of their energy issues)
- Easy handling
- High oil content
- Superior quality of biodiesel

Nepal has Potential for Biofuel (Jatropha) Production

- Climate: Tropical and Sub-tropical
- Rainfall: 1500mm -2500mm
- Elevation of land: 60m – 4000 m (Terai & hills)
- Farming system and available labor
- Technical manpower
- Market
- Resources

Opportunities in Nepal

- Gradual reduction in use of imported petroleum
- Create local employment
- Promote economic growth
- Use land wisely.
- Environmental protection
- Big industries
- Progressive use & diversification

Challenges for Nepal

- Lack of biodiesel policies
- Lack of awareness
- Lack of land use policies for plantation of Jatropha
- Availability of hybreed Jatropha varieties
- Lack of research and study
- Reluctance of investors

Difficulties for the promotion of Biofuels in Nepal

Difficulty	Reasons
Institutional	Limited Institutional capacity (R&D) for demonstration & implementation
Market	Lack of marketing systems, limited access to market infrastructures and services
Awareness Information	Lack of awareness and access to information on biofuels, Lack of knowledge
Financial	Inadequate financing arrangements for production, processing and marketing of biodiesel
Economic	Imbalances in prices
Technical	Lack of access to processing technology .
Capacity	Lack of skilled human resources and training facilities
Social	No grass root participation at the local level
Environment	No proper valuation of environmental benefits
Policy	Lack of proper co-ordination between public and market regulatory mechanism

Possible Growing Areas

- Cultivable wastelands.
- Rain fed lands (low rainfall zone)
- Hedge plantation
- Road sides
- Below High Voltage Transmission Line
- Community forest
- River sides
- Reclaimed areas by river training works.
- Erosion prone watershed areas
- Sloppy/hilly areas (unsuitable for cereal and vegetable crops)
- Intercropping with agriculture and forest crops

Productivity Scenario of Jatropha Seeds in Nepal

Years	Rain fed condition (Kg/ha/yr)	Irrigated Condition (Kg/ha/yr)
1	-	250
2	250	1000
3	1000	2500
4	2000	5000
5	3000	8000
6	4000	12000

Source: Prof. Dr. Rhiddibir Singh, 2011 (Research for Jatropha production)

Implementation Modality

Technology

Financial Support/Incentives

Few Photographs during field visits

Examples of deforested areas in Nepal

Why Biodiesel?

Jatropha Seeds in Field

Chumlingtar

Germplasm Garden in Chumlingtar, Chitwan District of Nepal

Transesterification Process