Global (International) Energy Policy and Biomass

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California Biomass Collaboration – First Annual Forum
January 8th, 2004
Sacramento, CA.
Understanding Policy

- Policies are applied against uncertain futures!
- Can be
  - EXPLICIT as in having an “Energy Policy”
- OR
  - IMPLICIT derived from the sum total of previous actions
- Biomass Specific Policy
  - At the Intersection of several policies and jurisdictions
    - Energy
    - Environment
    - Land Use
      - Agriculture
      - Forestry
      - Rural Development
    - Urban
- ZEN Rules
  - not having an Explicit policy can still be an Energy Policy!
  - However well meaning a policy – there is a law of unintended consequences
World TPES 2000
(Total Primary Energy Supply = 448 EJ)

- Food TPES
  - 2700 Cal/person/day
  - Popn. 6.1 Billion
- Source for Food TPES
  - FAO.org
- Nuclear conversion
  - kWh = 10.8 MJ
- Hydro conversion
  - kWh = 3.6 MJ
- source for fuel TPES (9700 Mtoe)
  - Iea.org
Business as Usual - World Energy according to IEA WEO2002

- 2030 time horizon
- TPES grows at 1.7%/a from 9179 – 15267 Mtoe
  - No shortage of traditional fossil fuel resources (see next slide)
  - Requires considerable investment > 17 T$ (2002)
    - About 1% of global GDP
    - 50% goes for infrastructure replacement
    - Electricity system needs about 10 T$ (50% in T&D)
    - Oil and Gas each about 3 T$
    - Coal < 400 G$
    - RES < 500 G$
    - OECD/Developing World about 50:50 in investments
- What if it is not BAU?
  - Energy growth constrained environmentally
    - Global climate change
      - Increased investments for less TPES
        » Investments in sequestration
        » Increased renewables investment
    - Policies that follow the Precautionary Principle?
- Kyoto is dead? Watch out for Contraction and Convergence!

World - conventional oil

Mid-point year: 2005
Ultimate 2050: 1800 Gb
To-date 1999: 822 Gb

Discoveries, Gb/a
Production, Gb/a

Peak Discovery  1965  Peak Production  2005  Time-lag: 40 years
Basic Policy Instruments

- Research and Development
- Demonstration and Deployment
- Dissemination and Policy Promotion
- Government Purchase
- Feed In Laws
- Portfolio Standards (RPS)
- Net Metering
- Revenue generation through fossil fuel taxes
- Grants
  - Consumers
  - Business
  - Renewable energy industry
- Loans
  - Corporate
  - Guarantees
- Tax Incentives
  - Sales tax remission
  - Holidays
  - Personal/Corporate Income
IEA Country Biomass Policy Portfolios

- **European Union**
  - Directive on the Promotion of Electricity produced from RE sources – *Portfolio Standard*
  - Intelligent Energy Europe (EIE, 2003 – 2006), successor to *ALTENER* (RE for electricity and heat), – *Demonstration and Dissemination and Policy Promotion*, also *STEER* (transport) and *SAVE* (EE), *COOPENER* (International development of RE)
  - 6th Framework RTD (Research, Technology and Demonstration) + Regional Funds - *Research and Development, Demonstration and Deployment*
EU Policy Linkages

RUE - Rational Use of Energy (EE)  RES - Renewable Energy Services

Sustainable Development
Overall target RUE/RES

MARKET PLACE
Technologies and Services RUE/RES

Legislative Measures
Local/Regional/National Level
Regulations and Laws
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European level
Regulations - Directives

Market Instruments
Local/Regional/National Level
Dissemination - Policy Promotion
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European level
EIE Program

Technology Based Initiatives
Local/Regional/National Level
Taxes and Subsidies
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European level
RTD Programs and Regional Funds
IEA Country Biomass Policy Portfolios

• United States
  – RE (renewable energy) Production Credit (REPC) Corporate Tax Incentive
  – Renewable Production Tax Credit (PTC) Feed-In & Tax Incentive
  – Ethanol – Partial exemption from Excise Tax Tax Incentive
  – Farm Bill – Title IX. – Grants to Business Users
  – Historic
    • PURPA Feed-In Law
    • Section 29 Credit Tax Incentive

• Canada
  – RE Deployment Initiative (REDI) – Grants to Business Users

• Sweden
  – Energy Taxation on Fossil Fuels for Consumers Revenue Generation
  – Feed-In Tariff for Biomass
  – R&D
  – RE Investment support program – Grants to Business Users

• Finland
  – Wood Energy Technology Program – Demonstration Projects
  – VAT (value added tax) reduction – Sales Tax Remission
IEA Country Biomass Policy Portfolios

- **United Kingdom**
  - Pioneer in Liberalization (aka deregulation)
  - NFFO (Non-Fossil Fuel Obligation)
    - Fossil fuel levy to generate income
    - Portfolio standard implicit
    - Feed in-law designed for price convergence
    - Effective for biomass – see next slide
    - Reviewed and replaced in 2002
  - New and Renewable Energy Program
    - R&D + Demonstration and Dissemination
  - Renewables Obligation (UK Utilities Act 2000)
    - Administered by Ofgem (Independent regulator)
    - Portfolio standard started in 2002
      - Compliance through Renewable Obligation Certs
      - Payments from the Climate Change Levy
  - **ENERGY WHITE PAPER**: Our energy future creating a low carbon economy
    - 60% CO2 reduction by about 2050, with real progress by 2020;
Policy in Action

RE Penetration due to NFFO

Year

Primary Energy Use

RE Source
- Solar H
- Wind
- Hydro
- LFC
- Sewage Sludge
- Wood
- Straw
- MSW
- Other Biofuels
A vision of the Biomass Future
The Framework Convention…

*stabilization of greenhouse gas concentrations in the atmosphere*

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**Global Annual CO2 Emissions**

**Concentrations**

JJ Dooley, Staff Scientist
Joint Global Change Research Institute at the Pacific Northwest National Laboratory
There are Two Critical Innovation Gaps that must be bridged.

- **Emissions with Frozen 1990 Technology**
  - **Upper Gap = 1300 Gigatons**
  - **Lower Gap = 480 Gigatons**

1300 Gigatons of carbon are simply assumed away before we ever introduce any explicit climate policy.
Emissions Reductions “Frozen Tech” to IS92a
Once Again No Climate Constraint, Just Assumed to Happen

CO₂ emissions reductions by technology.

CO₂ concentrations 682 ppmv and rising rapidly by 2100

Upper Gap 1300 Gigatons

Nuclear, Solar & Hydro
Biomass
Transportation Energy Intensity
Industrial Energy Intensity
Residential-Commercial Energy Intensity
Fossil Power Efficiency
Synfuels Production
Reference Case


TgC/year

- 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000
If we lived in a CBF 550 world, where would the emissions reductions come from?

Global CBF550 Stabilization “Gap Chart”

- Soil carbon sequestration
- Sequestration from fossil power generation
- Sequestration from synfuels production
- Sequestration from H2 production
- Other: nuclear, solar, biomass

CO₂ emissions reductions by technology.

Lower Gap: 480 Gigatons
Composition of Global CO2 Emissions Reductions in 2050 for a CBF 550 World

Deployment Beyond Innovation as Usual

- Biomass: 13%
- Nuclear: 4%
- Solar: 5%
- Central Power Plant Sequestration: 6%
- Sequestration from Synfuels Production: 23%
- Soil Carbon Sequestration: 37%
- Sequestration from H2 Production: 12%

13% of emissions reductions from biomass?
37% of emissions reductions from soil carbon sequestration?
Are we willing to bet the global economy on these agricultural/energy technologies and the cooperation of farmers everywhere?

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