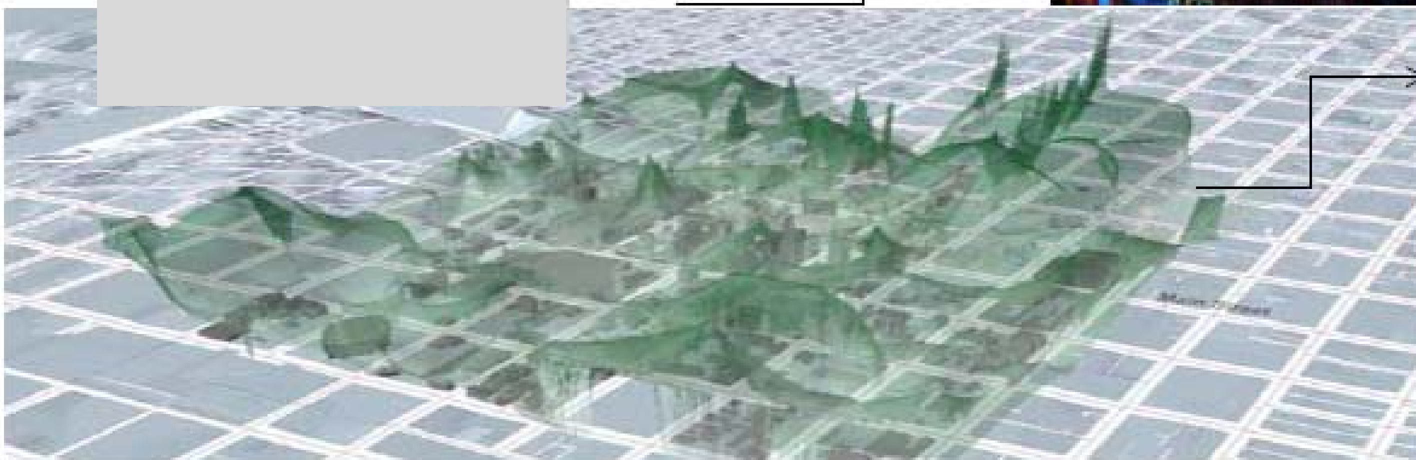
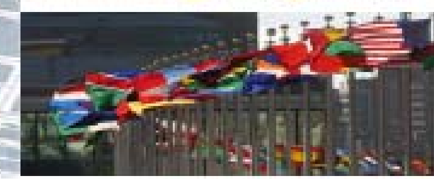
The Role of science and scenario modeling in setting SDG priorities

Why scenarios ?

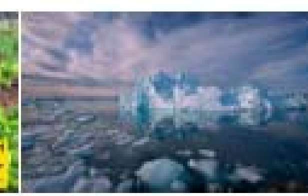
Investors and infrastructure



Policy makers & bodies



Big-ticket issues

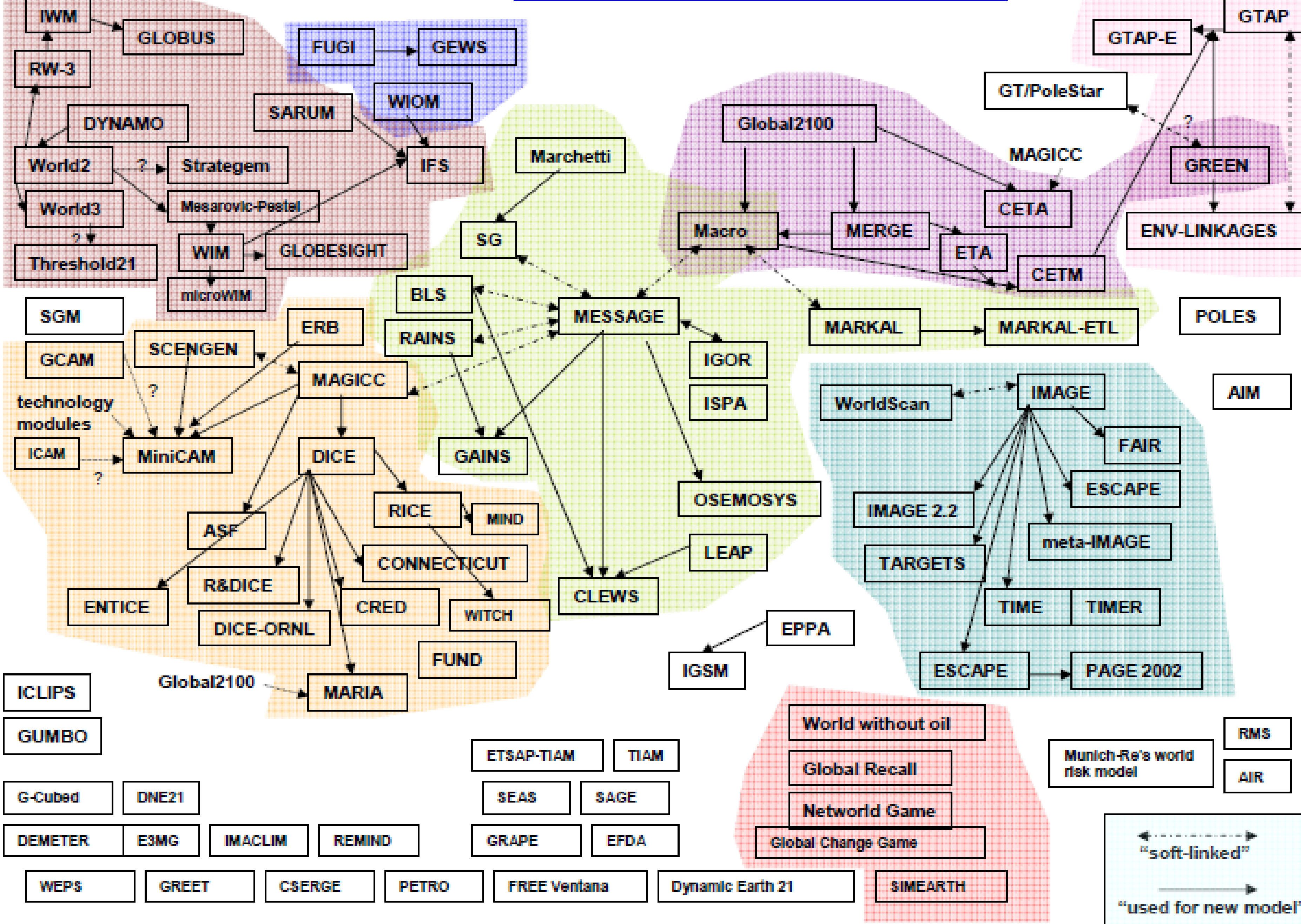


Consistent pictures of:

- Earth system, social, economic dynamics
- Governance and resource allocation
- Building concensus
-Different futures from predictive to backcasting
-An art – not a science.
-However we need to take calculated risks …

Division of dESA Energy Systems Analysis

"Family Tree" of Global Scenario Models



http://sustainabledevelopment.un.org/content/documents/SD21-scenarios_Alex_Roehrl.pdf

Contents

Selected key issues

- Transparency and trust
- Communicating a consistent message
  - Our GHG schizophrenia
  - Clear mapping
- Mapping with policy levers
- Global trends, but national decisions
  - Translating to national needs
  - National sensitivities
- The sum of the parts …
  - A move to integration
  - A complex system
- Challenges
  - Develop an inclusive process

Transparency

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Brussels

Last updated: November 6, 2011 7:44 pm

Credibility of EU energy review questioned

By Pilita Clark

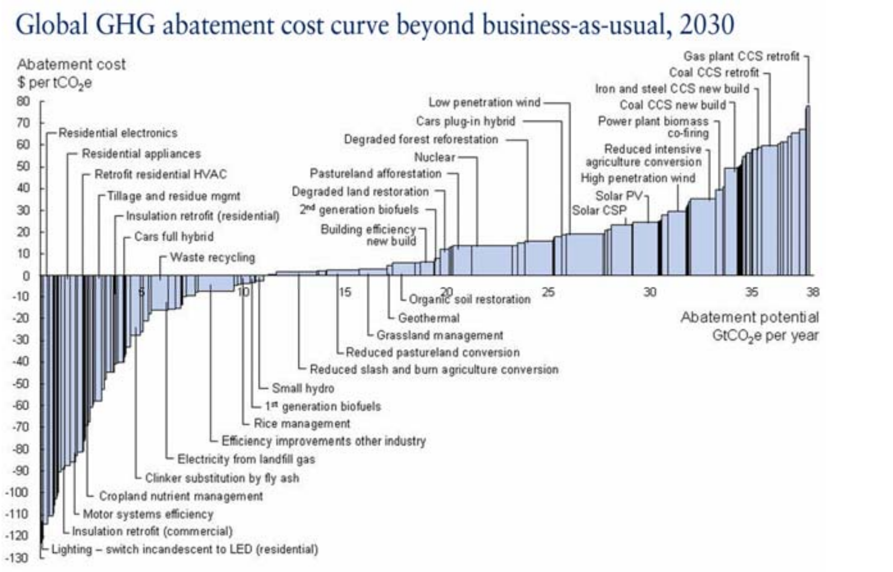
The credibility of a European energy review has been cast into doubt by experts who point out that long-term plans to cut carbon emissions are based on an economic model owned by a single Greek university that cannot be independently scrutinised.

Experts have "raised a host of questions" about how the European Commission's use of a non-transparent model could affect the energy review, according to a leaked report by energy specialists chosen by Brussels to advise on the forthcoming "Energy Roadmap to 2050".

The economic model, known as "Primes", is owned by the National Technical University of Athens and is designed to show how using different mixes of energy

Communicating a consistent message

Our GHG schizophrenia



- The idea that 'society will pay more for energy for a better environment in the future' is a deficient characterization. We compare costs with some ethereal state. We should compare costs with costs, and be explicit about our uncertainty.

- *Two common mistakes:*
  - *There is the assumption that the future will look like the past.*
  - *The only cost often mentioned in many such studies is the cost of mitigation. Not the benefit of having to pay a lower cost than having to adapt to a dangerous future. To stylize, these tend to be kept in compartmentalized silos.*

- *Business as usual is probably not business as usual. A continuation of current trends builds debt that – according to our current understanding - humanity will pay. Our investments in the future need to be seen as investments with dividends quantified in the same terms. There is uncertainty around those dividends.*

Energy-relation	Probable Impact	Ref	Energy-relation	Probable Impact	Ref
Climate Change					
Greenhouse gas emissions from burning carbon-based fuels	Strong	A	Lowering emissions in the energy sector (including carbon capture)	Strong	B
Deforestation (and natural habitat loss) due to wood used for heating and cooking	Local	C	Forestry management, alternative fuels (e.g. LPG) and banning charcoal	Local	C
More biofuels production causing deforestation	Strong local	E	Bio-fuel production regulation including so called 'sustainability criteria'	Strong regional	F
Ocean Acidification					
Increased atmospheric CO2 concentrations	Strong	A, C, E	Decreased atmospheric CO2 concentrations	Strong / local	B,D,F
			Extraction of carbon from seawater (counter-acting acidification) for synthetic fuel production	Limited	G
Stratospheric Ozone Depletion					
Increased biofuel production increasing fertilizer us				cal	J
Production, mainly from fossil fuels 'fixes' large qua the fertilizer.					
Nitrogen is taken from the air when fuel is burned t nitrogen-oxides				cal/regional	T
Increased biofuel production increasing fertilizer us					
Water use in energy production				rong	M
Water use in biofuel production					
Extensive polution and ecosystem loss				cal/regional	T
Land use change for large-area energy production					
Effects of hydropower dams on ecosystems and hydrology	Local	Q			
Heavy pollution from fossil fuel extraction	Local/regional	R	Pollution standards abatement technology	Local/regional	T
Deforestation (and natural habitat loss) due to wood used for heating and cooking	Local	C	Sustainable energy for all	Local/regional	U
Rate of Biodiversity Loss					
Deforestation (and natural habitat loss) due to wood used for heating and cooking	Local	C	Foresty management, alternative fuels and banning charcoal	Local	D
Biodiversity loss due to biofuels production	Local	P	Bio-fuel production regulation including so called 'sustainability criteria'	Strong regional	F
Heavy pollution from fossil fuel extraction	Local	Q			
Heavy pollution from fossil fuel extraction	Local/regional	R	Pollution standards abatement technology	Local/regional	T
Atmospheric Aerosol Loading					
Fine dust and smoke pollution from fuel burning and processing	Local/regional	S	Pollution standards abatement technology	Local/regional	T
			Sustainable energy for all	Local/regional	U
Chemical Pollution					
Extensive polution and ecosystem loss	Local/regional	R	Pollution standards abatement technology	Local/regional	T

Clear mapping:

- does not exist
- gaps between scenario apporaches
- limited sets of goals represented
- limited sets of systems represented
- not all goals are equal
- boundaries versus softer targets

Mapping with policy levers

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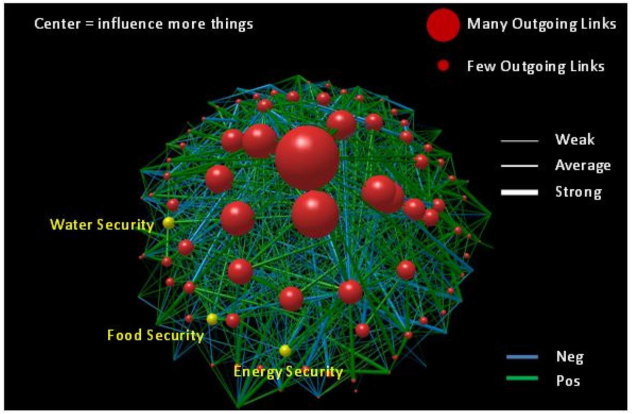

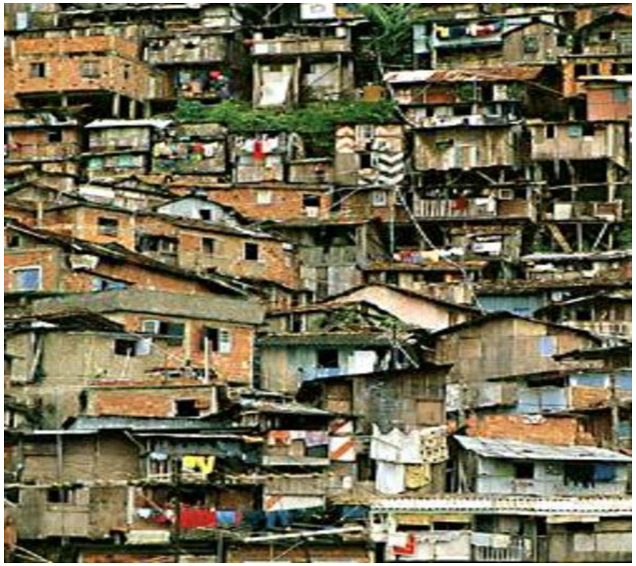

- According to recent scenario work urban planning can have of the highest impacts on sustainable development
  - Cities are the largest users of energy
  - The hubs of economic activities
- Unit costs for cleaner service supply are much lower in well designed cities than elsewhere
  - Larger 'bang for development buck' compared
  - To rural development strategies
- The trend of urbanization provides a strong opportunity to act now
  - Most of the world lives in cities and growing
- However poor / no planning can result in long lived infrastructure:
  - Locking people into unsustainable poor:
    - Energy use (and other resource, such as water) use
  - With a slow turn over rate
    - Social (slums)
    - Political (renewal policies)
    - and Physical (appliances, buildings and transport)
- Good planning can strongly reduce:
  - Costs, ecological footprint

http://www-static.shell.com/static/aboutshell/downloads/our_strategy/shell_global_scenarios/speech_jeremy_bentham_world_water_water_24082011.pdf

Mapping with policy levers

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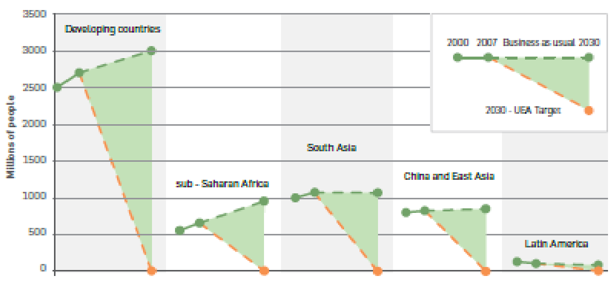

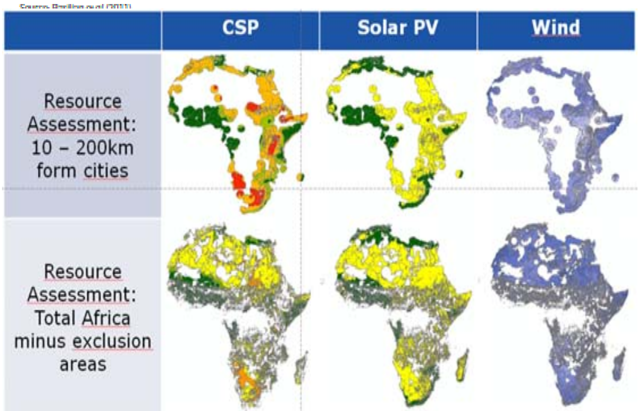

- Large opportunity, example: Africa:
  - Africa has a higher GDP & energy investment growth rate than any other continent
  - Some of the highest levels of renewable and other energy resource
  - Analysis shows large (profitable) investment opportunities
- But, Africa has: the lowest level of electrification and high levels of import based generation, why:
  - Low capital cost = dirty energy sources
  - Limited access to expensive energy-services and ecosystem damage
- Weak institutions and poor planning
  - Basic information and local capacity to synthesize this often lacking
  - Ability to rationalize these into implementable policy is weak
  - Understanding of government levers matching opportunities is limited
  - Little domestic related ‘higher education’ / research support
- With strong institutions
  - Clean(er) capital intensive options with lower investment risk
  - Lower cost (energy) services with rational mobilization
  - Equitable engagement with investors
  - Leverage GDP growth and investment at little marginal cost
- Strong resource interactions
  - Supply of food, energy and water are strongly interrelated
  - Systems are vulnerable to climate change
  - Threat: divergent development/Opportunity: efficient policy

Global to national

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- Decision makers have constituencies and urgent decisions to make
- The sum of local decisions develop the global picture
- Yet:
  - It is difficult for the national decision makers to incorperate global concerns
  - There is often no value associated with the ’global commons’

<table>
<tr><th></th><th>Subnational</th><th>National</th><th>Regional and global</th></tr>
<tr><td>Project</td><td colspan="2">EIA, ESIA, almost universal and mandatory</td><td>Ad hoc IA of cross-border projects</td></tr>
<tr><td>Programme</td><td rowspan="2">Isolated examples</td><td rowspan="2">SEA mandatory in Europe and selected other countries; CADO in selected developing countries</td><td>EIA and PIA by UN, development banks, and global funds</td></tr>
<tr><td>Policy</td><td>IA by OECD, UNEP, G20</td></tr>
<tr><td>Sector</td><td>Conventional sectoral planning</td><td>Conventional energy and infrastructure planning</td><td>Many energy, land-use, and water models.</td></tr>
<tr><td>Multi-sector</td><td>Significant number of academic applications</td><td>Few examples. CLEWS</td><td>Moderate number of IAs</td></tr>
</table>

The sum of the parts

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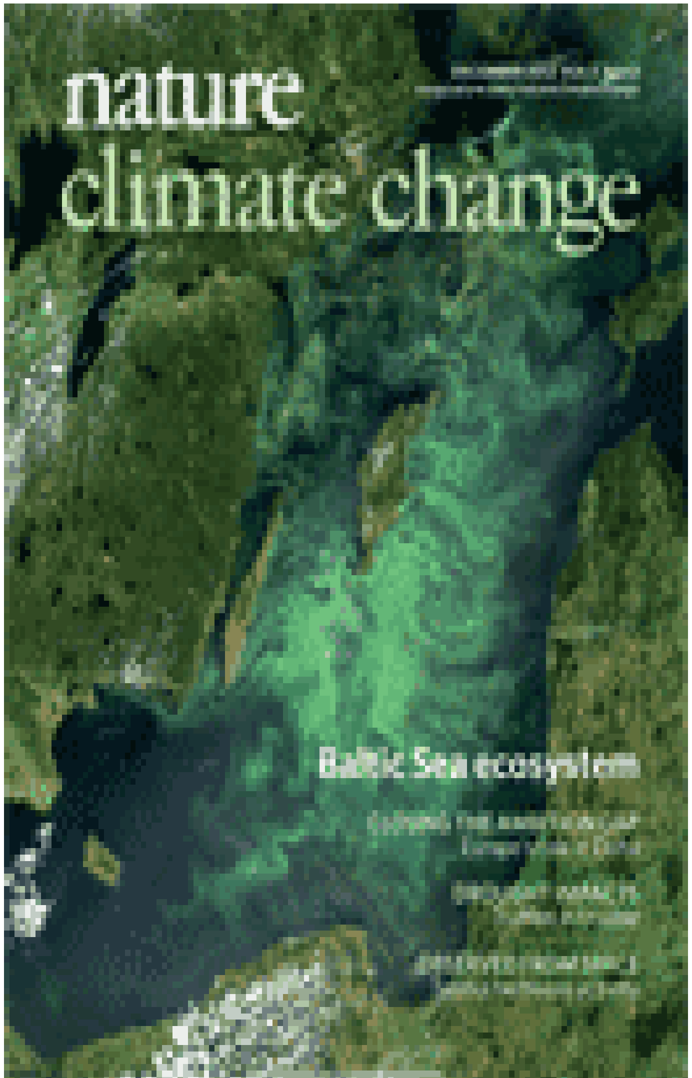
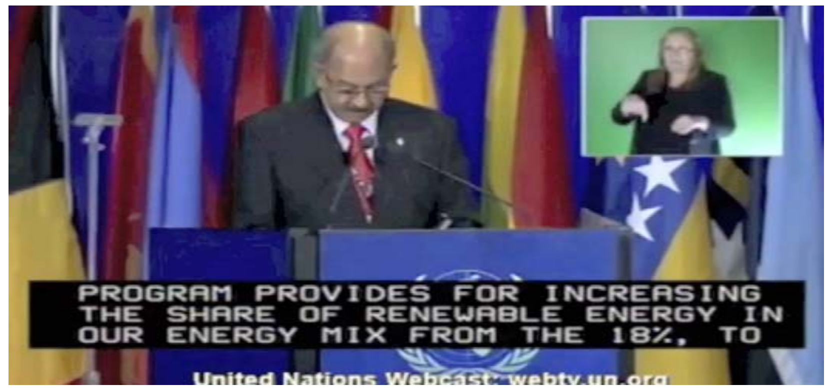
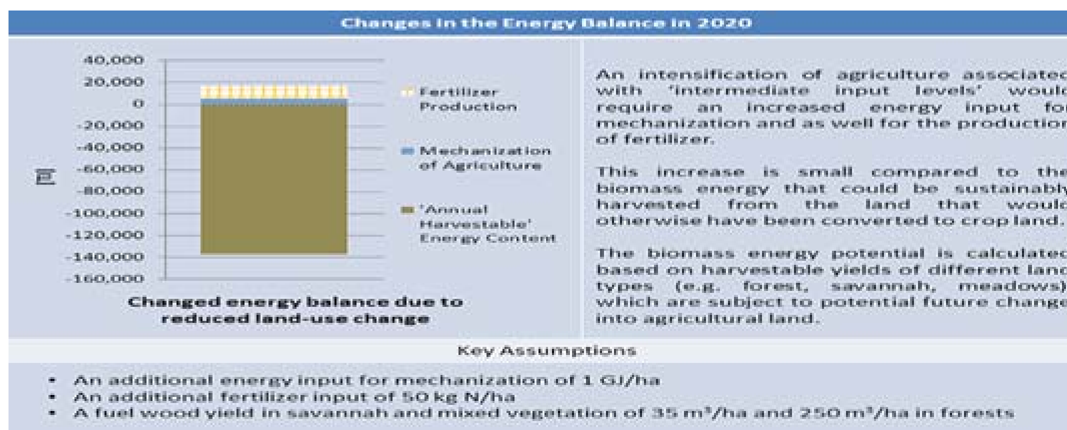
Navigating the nexus with sustainable development CLEWs: climate, land-use, energy and water strategies…



The danger of secoral goals … efficient integration



[http://webtv.un.org/search/mauritius-general-debate-3rd-plenary-meeting-rio20/1700992573001?term=Rio%2020 /](http://webtv.un.org/search/mauritius-general-debate-3rd-plenary-meeting-rio20/1700992573001?term=Rio%2020)



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An inclusive process

#	Group	Perspective	Consensus building actions – Actions: A. SD Energy-related indicators	B. Energy assessments	C. Promoting economic efficiency	D. Access assessments and support	E. Ecosystem assessments	F. Food water and energy nexus	Policy maker concern: I. Access to adequate services	II. Energy system dynamics	III. Interactions with other systems
1	Goals and strategy	Empower the poor	●	●	●	●			●		
2	Goals and strategy	Security first	●	●					●		
3	Goals and strategy	Oh behave	●	●		●	●		●		●
4	Goals and strategy	Development first	●	●	●	●			●	●	●
5	Means and broad policy	Biofuel is bad	●	●			●	●			●
6	Means and broad policy	Energy revolution	●	●						●	
7	Means and broad policy	Sustainable energy technologies	●	●						●	
8	Means and broad policy	Nuclear renaissance	●	●						●	
9	Means and broad policy	Anti-Nuke	●	●						●	
10	Means and broad policy	Free the market	●	●	●				●	●	●
11	Means and broad policy	Leverage learning	●	●						●	
12	Means and broad policy	The polluter pays	●	●			●				●
13	Means and broad policy	The prime movers pay	●	●	●		●				●
14	Means and broad policy	Basket case	●	●	●		●	●	●	●	●
15	Means and broad policy	Energy efficiency	●	●	●				●	●	
16	Means and broad policy	Economic and financing limits	●	●	●				●	●	●
17	Context and limits	Peak oil	●	●						●	
18	Context and limits	No limits	●	●				●		●	●
19	Context and limits	Destroying the global commons	●	●			●	●			●
20	Context and limits	Planetary boundaries	●	●			●	●			

A clear convening agenda is needed

- **Standardized data, indicators and scenarios**
  - Benchmarking
  - Rationalizating effort
- **Accessible open toolkits and analysis**
  - Review and revision
  - Adoption and Adaption
  - Mapping
- **Transparent assessments to improve:**
  - Integrated development with clear 'goals'
  - Economic efficiency
  - Affordable access to services
- **Multi-service delivery methodologies**
  - Consistent: lower cost
  - Isolated: counter productive
- **Policy relevant evaluation of ecosystem services**
  - To negotiate common resource management
  - Support short term decision with long term consequence

Metics: what to measure, what are goals, in a complex system

http://sustainabledevelopment.un.org/content/documents/1131Energy_SD21.pdf