KTH VETENSKAP OCH KONST

ROYAL INSTITUTE OF TECHNOLOGY

Perspectives on

Sustainable Energy

Mark Howells (KTH) and Alex Roehrl (UNDESA)

Mark Howells. Prof and Division Director: Energy Systems Analysis
Mark.howells@energy.kth.se www.desa.kth.se

Division of Energy Systems Analysis: Overview

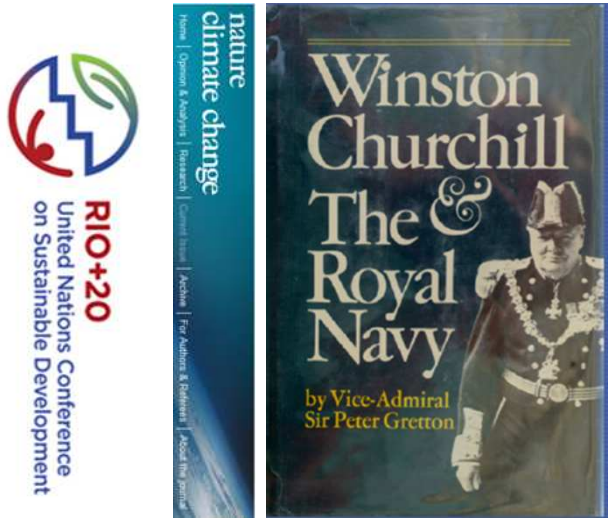
ROYAL INSTITUTE OF TECHNOLOGY

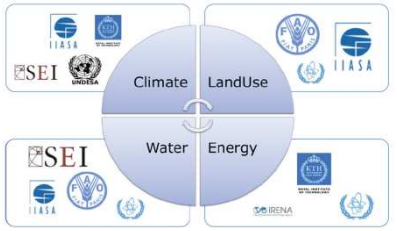
Research areas:
1.Sustainable Energy Development
2.Accelerated Access in Africa
3.Multi-resource modeling
4.Smart Energy Modelling
5.Energy Security

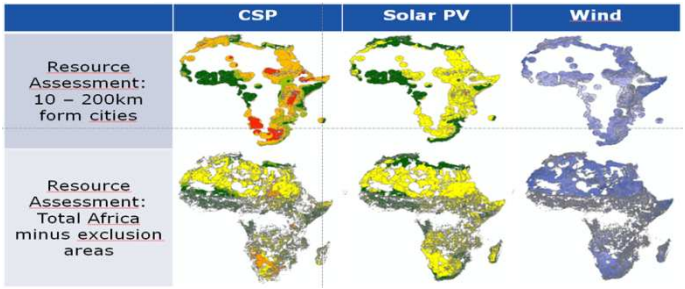
Open model databases:
•World – under development
•Africa
•Sweden, Isreal, Cyprus, NZ etc.

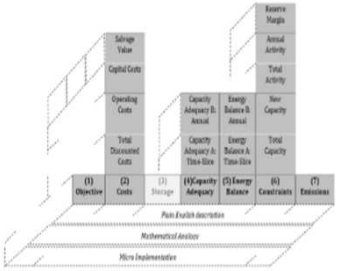
Toolkits
•OSeMOSYS
•CLEW

External relationships:
•IRENA
•IAEA
•UNDESA
•Others





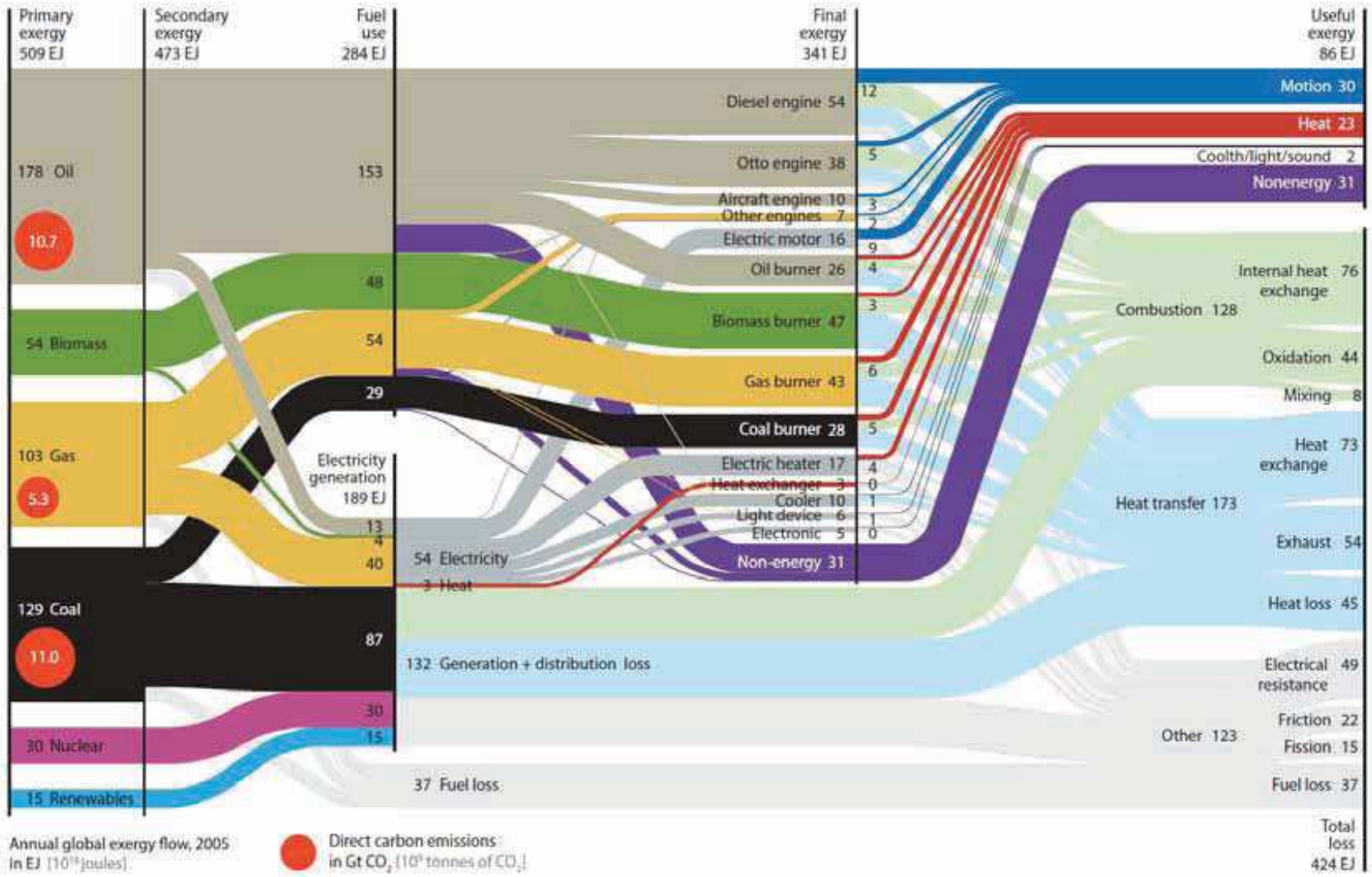




OSeMOSYS the Open Source Energy Modelling System

ROYAL INSTITUTE OF TECHNOLOGY

The energy system and policy



ROYAL INSTITUTE OF TECHNOLOGY

The energy system and policy

Some energy system characteristics

- Energy is big business
- There are strong geopolitical considerations
- Its impact on the environment has been significant
- Its effect on people's lives are immense
- Without it there can be no development. Let alone sustainable development

The energy decision maker

- Yet the policy maker must make sense of these views, in the context of the energy system to:

  i. Enable adequate affordable access to services

  ii. Ensure the 'energy system' can do so in a sustainable manner (i.e. it is dynamic enough)

  iii. Such that the broader interactions (social, economic and environmental) do not compromise the planets future development

ROYAL INSTITUTE OF TECHNOLOGY

A rhetorical landscape – 20 views

- **Empower the poor:** Lack of access to electricity, safe heating, and cooking causes over a million of deaths a year, yet this has received little attention compared to GHG emissions mitigation.
- **Security first:** Is there enough energy available when needed at the right price to ensure development? It is the priority and right of every national government to secure its energy supplies.
- **Oh behave:** Behavior needs to change, since so-called 'planetary boundaries' will be exceeded, if current growth patterns continue. It may even be necessary for the 'de-growth' of rich nations, for equitable access to services.
- **Development first:** Lower income countries should be encouraged to undertake sustainable development actions that are compliant with their drive to develop: nationally appropriate mitigation measures are needed.

ROYAL INSTITUTE OF TECHNOLOGY

A rhetorical landscape – 20 views

- **Biofuel is bad:** Using crops for large-scale biofuel production will lead to higher food prices for the poor, and our vulnerability to the climate.
- **Energy technology revolution:** In order to meet global GHG emissions targets, the burning of fossil fuels with no capture and storage must be limited. Urgently, a rapid change is needed in energy system investments, including, inter alia, large-scale investments in renewable energy, energy efficiency, nuclear power, and carbon capture and storage.
- **Sustainable energy technologies:** Investments should be made only in energy efficiency and renewables, since only renewable 'fuel sources' can ultimately be sustained.
- **Nuclear renaissance:** Nuclear energy should be the preferred option, as it is not intermittent and it is clean. Plants require little land, but produce much power as well as material used for medical, security and other uses.

ROYAL INSTITUTE OF TECHNOLOGY

A rhetorical landscape – 20 views

- **Anti-Nuke:** Nuclear energy should be phased out, due to unacceptable risks at power plants, dangerous waste that remains radio-active for a very long time and might enable weapons production.
- **Free the market:** Markets provide the best mechanism to determine what investment and R&D needs to take place in the energy system, therefore subsidies must be removed. Further, by getting everyone to play by transparent rules access to resources can be secured, as long as the price is right.
- **Leverage learning:** As markets are entrenched, subsidies need to be provided, especially for renewable energy to help them compete with conventional fuels and secure necessary R&D.
- **The polluter pays:** There should be a clear (exonerative or punitive) penalty charged for external costs incurred by damaging the ecosystem and society.

ROYAL INSTITUTE OF TECHNOLOGY

A rhetorical landscape – 20 views

- **The prime movers pay:** As damage to the ecosystem (including GHG emissions) were made by (now) rich countries, they should pay to fix the problem.
- **Basket case:** Put in place standards, feed-in tariffs, measurement and verification, mandatory audits, carbon caps and trade etc. No single policy is sufficient.
- **Energy efficiency:** Is the single largest, most economic, environmentally friendly energy source yet to be comprehensively harnessed – and should be done so using a suite of measures.
- **Economic and financing limits:** Measures need to be put in place to improve access to capital for energy infrastructure.

ROYAL INSTITUTE OF TECHNOLOGY

A rhetorical landscape – 20 views

- **Peak oil:** The age of fossil fuel is coming to a rapid end. Depletion rates for oil (and other) fossil fuel have peaked or are about to peak. This leaves a gap to be filled as demand continues to grow.
- **No limits:** There are essentially limitless reserves of fossil fuels and their level of availability is dependent on prices. As prices increase more unconventional reserves will be discovered and exploited. Some postulate that gas is not a fossil fuel, but renewably produced.
- **Destroying the global commons:** The ecosystem provides a limited amount of service. We damage these services by polluting too much or using too much. However, as many do not pay for this damage, they are free to continue.
- **Planetary boundaries:** The limits to the use of these ecosystem services needs to be determined and boundaries established. Once we overstep them disaster will ensue.

ROYAL INSTITUTE OF TECHNOLOGY

Building a powerful consensus – 6 steps

- **Scenarios and indicators**: Promote tracking the diagnosis, progress and scenarios of national, regional and global energy systems with a common set of 'strategic' SD (Sustainable Development) indicators.
- **Energy assessments:** Promote platforms for transparent national and international energy assessments (tracking economic development, fuel flows, physical resource use and environmental impacts in a quantitative manner).
- **Economic efficiency:** Assess opportunities to increase the economic efficiency of the energy system - especially (but not limited to) where these promote end-use energy efficiency improvements.

ROYAL INSTITUTE OF TECHNOLOGY

Building a powerful consensus – 6 steps

- **Strategies for modern energy access:** Develop strategies and a supporting framework to help the poorest countries gain adequate, affordable access to modern energy services (at least to meet the MDGs) and prevent the 2 million (or so) deaths a year attributed to burning solid fuels in poorly ventilated housing.
- **Evaluation of ecosystem services:** Undertake transparent evaluations of ecosystem services and their limits, to support discussions on their usage.
- **Develop methodologies** for the integrated analysis of the systemic implications of meeting simultaneously global food, water and energy needs - given that each is essential and each may compete for common ecosystem (and other) services and affect each other.

ROYAL INSTITUTE OF TECHNOLOGY

What do the experts say ?

- **Scores of thought leaders were contacted**
- **Each with divergent views:**
  - Technology optimists to proponents of degrowth
  - Pro nuclear and fossil, to anti nuclear and pro renewable
  - Nobel prize winners to folk working in slums
- Each concensus building action had over a **90% approval rate**
- The sample was small, but the se were **proponents of drastically differing 'views'**
- Apprently divergency there is **much more common ground** and room for substantive steps than we would think
- This implies that the only **obstical is really political will**

ROYAL INSTITUTE OF TECHNOLOGY

Thank you !

- Contributing experts, from Kates to Shelling…, UNDESA, David le Blanc of (United Nations DESA); independent consultant Lucille Langlois; as well as Oliver Broad, Yu Sheng Lan, Dayo Adegbaiye, Usman Hassan Syed, Rochelle Morrison, Ahmad Zulifqar and Rebecka Sergerström of KTH.

- Feedback: Your feedback is most welcome. mark.howells@energy.kth.se or roehrl@un.org.