



RENEWABLE ENERGY IN THE SOUTH AFRICAN GREEN ECONOMY – HOW WILL OUR GRANDCHILDREN JUDGE US?

Some thoughts to stimulate discussion:

*"Ministers and Government Representatives from 154 countries gathered in Bonn, Germany, June 1-4, 2004, for the International Conference for Renewable Energies, **acknowledge that renewable energies combined with enhanced energy efficiency, can significantly contribute to sustainable development [...] creating new economic opportunities, and enhancing energy security through cooperation and collaboration.**"*

*"The **creation of decent work** will be at the centre of our economic policies and will influence our investment attraction and job creation initiatives. In line with our undertakings, we have to forge ahead to promote a more inclusive economy." President Zuma, 2009*

Where are we starting from?

Despite an economic growth rate of about 4% between 1994 and 2008, South Africa remains one of the most inequitable countries in the world. About 40% of national income goes to richest 10% households. In the first quarter of 2010, 40% of youth between 16 and 30 were unemployed¹. According to the New Growth Path (NGP), 16% of adults over 30 were unemployed although others suggest it is much higher.

About half of employed people earn less than R2500 a month, one third earn under R1000 a month. About one in 5 employed African women is a domestic worker.

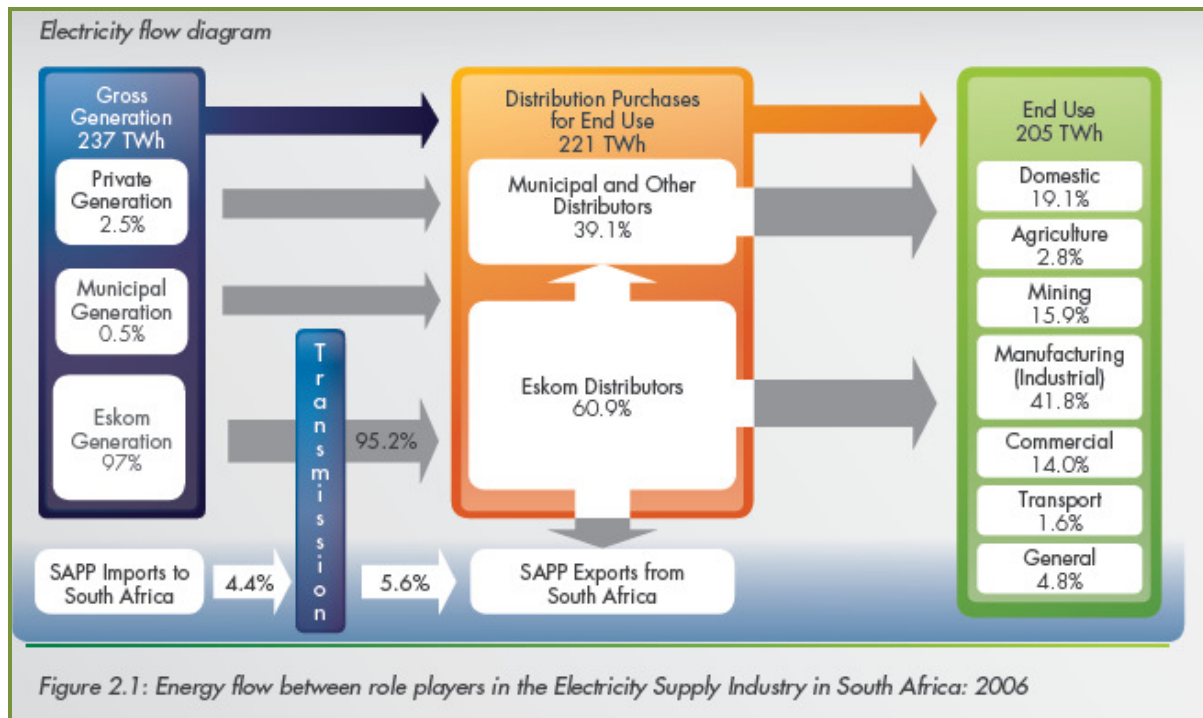
In South Africa, an upper income household consumes an average of 1000 kWh per month (Zipplies & du Plooy 2008), while a poor household may be dependent on the allocation of 50 kWh of free basic electricity (FBE) if they have access to electricity at all (Anneke 2009). If we examine the energy use for the rural poor it would equate to a household with a total income of R20 000 spending R4 000 on electricity each month (CURES energy poverty report (Sugrue 2009)).

The government national electrification programme raised the electrification rate to 80% by 2007. This still leaves about 2,5 million (mainly poor rural) households, without access to electricity. However, access to electricity does not equate to use of electricity as electricity usage is dependent on disposable income. With high unemployment, the electrification figures have to be seen in the context of the 2 million disconnections that have taken place due to an inability to pay (Sugrue 2009)².

The following diagram gives an idea of where electricity is used in South Africa.

¹Dube, O. Hausmann, R., Rodrik, R 2007 "Identifying the Binding Constraint on Shared Growth" - If discouraged workers are included, unemployment is at 40%

²Input into World Bank Energy Strategy Consultative process – 2010 (Green Connection/Bank Information Centre)



Source: NERSA 2006 Electricity supply statistics pg 34.

(Note: General refers to economic activities such as Construction, Electricity, Gas, Water Supply (own use) Financial Intermediation, Insurance, Real Estate, Business Services, Community, Social & Personal Services)

Where are we headed – the Green Economy?

Industrial Policy Action Plan³ identifies the Green Economy as a ‘major new thrust for the South African economy which presents multiple opportunities to create jobs and value-adding industries’ (DTI, 2011: 17). Progress highlights in the Green Industries sector identified since the launch of IPAP2 include progress in the revision of building standards, the finalisation of SABS enabling standards for solar water heaters, wind turbines, energy efficient lighting, appliances and products, electric batteries and alternative fuel vehicles, cogeneration of electricity and biofuels, progress in the REFIT rules and the development of the South African Renewables Initiative (SARI).⁴

Elsewhere in the IPAP, the following industries are also highlighted:

IPAP2 includes biofuels, buses and electric vehicles (Automotives sector) and nuclear energy (Advanced manufacturing).⁵

The new Growth Path, focused on creating decent work, reducing inequality and defeating poverty identifies the green economy as one of the key drivers of employment.

Why renewable energy as a green growth sector?

Renewable energy is on a growth trajectory that cannot be held back or stifled by pollution taxes, will not be held to ransom by declining and ever more costly fossil fuels, but will use the best available technology internationally, producing clean electricity forever.

³IPAP2 2011/12 - 2013/14

⁴Trollip and Tyler, 2011 page 11

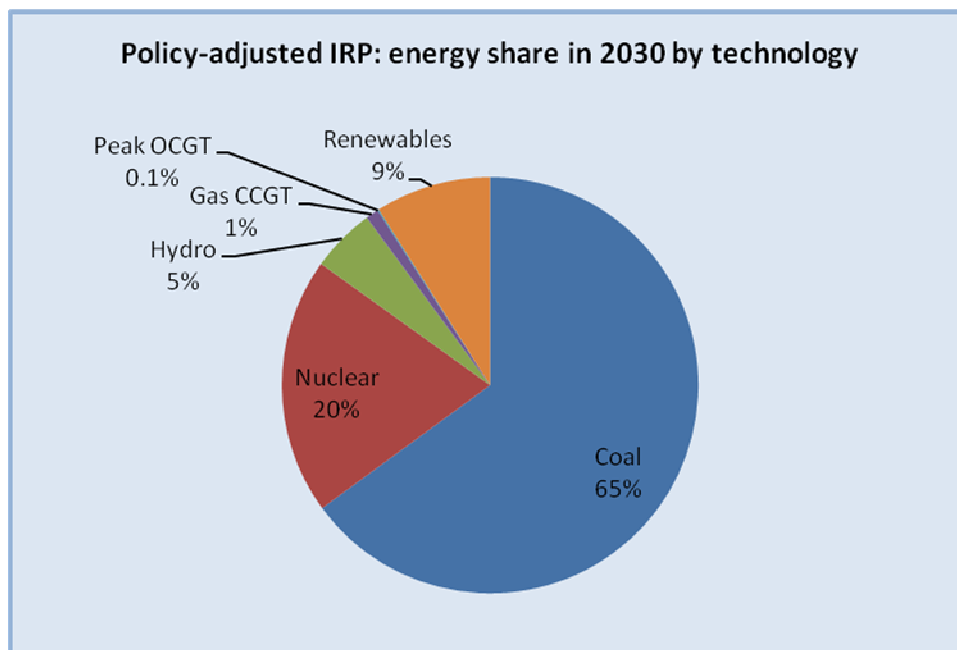
⁵Trollip and Tyler, 2011 page 11

Does our electricity plan for the next 20 years reflect renewable energy as a growth sector?

The IRP2010 is the electricity plan for the country, as gazetted on 6th May 2011, and proposes a significant infrastructure investment plan of estimated R867bn to meet South Africa's electricity needs until 2030, although much of the infrastructure would have a lifespan beyond 2030. The IRP2010 electricity demand forecast does not reference the IPAP or the NGP, and is calculated from confidential information within Eskom. The IRP proposes significant electricity demand for industrial growth (particularly for smelters) but this industrial growth appears not to be aligned with IPAP and in effect results in industrial policy being made by the IRP⁶.

Good practice planning should prioritise demand side investments to avoid additional supply investments, and to mitigate emissions and deliver other benefits (Tellus Institute, 1999). However, there is no reference to the National Energy Efficiency Strategy in the IRP 2010 and energy efficiency appears to be viewed *as a short-term measure for addressing supply shortages*.⁷ There appears, therefore, to be a mismatch between the IRP2010 and best practice.

By 2030, the IRP2010 proposes that the renewable portion of our energy mix would only be 9%. Is this sufficient to drive renewable energy as a key part of the green Economy?



Source: IRP Final report

Can renewable energy contribute to responding to climate change?

According to the cabinet approved White Paper on Climate Change⁸, *Policy decisions on new infrastructure investments must consider climate change impacts to avoid the lock-in of emissions-intensive technologies into the future. However, in the short-term, due to the stock and stage in the economic lifecycle of existing infrastructure and plant, the most promising mitigation options are primarily energy efficiency and demand side management, coupled with increasing investment in a renewable energy programme in the electricity sector. In addition, in the short term, the emergence of bio-fuels and a suite of non-energy mitigation options, such as afforestation, are also important.* (Page 26)

⁶ Trollip and Tyler, 2011 page 18

⁷ Trollip and Tyler, 2011 page 21

⁸ CC White Paper, gazetted October 2011

What role could renewable energy play in the green economy?

What is happening internationally?

2009 – “the renewable energy and energy efficiency agenda is deeply rooted in the World Bank Group’s operations across the globe, for the first time exceeding 40 percent of the total energy lending commitment.” A number of development banks have increased development assistance flows. Such flows jumped to over **\$5 billion in 2009**, compared with some **\$2 billion in 2008**.

In Spain, the sector directly employed 20 781 people (in 2007), of which component manufacturers account for 32%, specialized services 32%, turbine manufacturers 16%, and operating and development 21%. Including indirect employment, there are 37 730 workers in the industry (EWEA 2009). Overall in the EU, there are 154 000 jobs in the wind sector (including offshore), of which 108 600 are direct” (Burton, 2011 draft report)⁹.

In China the wind sector grew very fast – from less than **1GW** in 2005 to about **44GW** in 2010. The government set a goal of 70-80% local manufacture and a minimum of 40% was required for participation in programmes with state-support (SAWEC page 19). India is fifth worldwide in total existing wind power capacity.

*Renewables delivered 18% of global electricity supply in 2009, with **Grid-connected solar PV** growing by an average of **60 percent every year for the past decade**, increasing 100-fold since 2000. During those five years, **wind** power capacity grew an average of **27 percent annually**, and **solar hot water** by **19 percent annually** (page 9 of ren21).*

And Locally:

SWH manufacturer, Matla Solar Energy, is a black owned company in the Eastern Cape, owned by Zwelakhe Sisulu and has Korean partners (who provide finance and management skills) and the Eastern Cape Development Corporation (who provided initial R20 million financing).¹⁰

The west coast project in St Helena Bay, involves 205 families who own 800ha in the form of the Seeland Development Trust. According to the website, “*The trust will benefit from a substantial equity share in the business as well as a regular lease payment – allowing it to invest in other business opportunities on the land, create more jobs and pay members a regular dividend to boost standards of living.*”¹¹

Beka Lighting is a success story of how renewable energy and energy efficiency can lead to South Africa gaining a competitive advantage. Beka Lighting started in Namibia and has investment from a Belgium company, Schröder Group GIE, which provided intellectual property. Beka Lighting provides energy efficient lighting, has designed new lamps and manufactures in South Africa. Government-led energy efficiency lighting programmes have stimulated demand. Beka lighting is now exporting to Kiev and to China. According to Beka, conventional lighting technology is outdated, new energy efficient lighting is a business opportunity, and the higher electricity prices in South Africa increase the business growth further.

Beka Lighting has an empowerment partner, Indonsi Investments (Pty) Ltd who is a shareholder and a member of the Board. *Indonsi Investments is owned by South Africa's well-known lighting personality Enock Zikalala, a Past President of the Illumination Engineering Society of South Africa.*¹²

Beka has a learnership programme that draws in students at technikons to do 6 months training. Such a process allows Beka to assess the students and is a good route to obtaining a job in the company.

⁹ Jesse Burton: Technical Energy Report for 1 million jobs campaign – 2011

¹⁰ http://www.ecdc.co.za/news_article/1414/EL_solar_energy_plant_for_East_London_IDZ/05_February_2009,

<http://www.matla-innovation.com/index.html>

¹¹ <http://just-energy.org/just-enterprises>

¹² <http://www.beka.co.za/node/17>

How could renewable energy and energy efficiency contribute to poverty alleviation?

Access to lighting enables home study in the evenings. In Bangladesh, a study reported that 90% of recently electrified households showed improvement in children's education¹³. Such benefits contribute to addressing poverty but the benefit may only be realised in the future. Renewable energy technologies are often easier and cheaper to implement in rural and remote areas where national grid-tied electrification projects are slow to arrive.

More immediate benefits can also be realised through increases in commercial activity enabled by electrification. Other benefits include access to personal media and communication technologies, and increased personal safety and security. In crime-ridden areas especially, being able to run lights at night can greatly increase safety, comfort and security (Anneke 2009), especially for women.

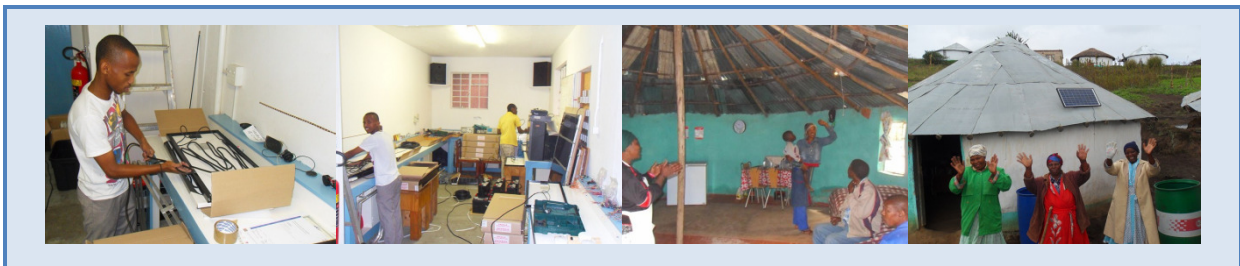
Ensuring that all houses have ceilings can also have significant energy efficiency and health benefits. In the Kuyasa Project, for example, houses were fitted with ceilings and 100 litre evacuated tube solar water heaters. Prior to the installation of ceilings, **79% of households experienced illnesses twice or more a year**. Afterwards, this dropped to **26%** (Walsh et al, 2011). This would have an impact on health services in reducing the amount of medication needed for respiratory diseases¹⁴, and thus also improve people's ability to work. Installing ceilings also helped to reduce people's use of paraffin and other expensive and unhealthy fuels, by keeping houses warmer.

The Kuyasa project was able to demonstrate that people's well-being improved through the project's contribution to energy security. Prior to the installation of the solar water heaters, 92% of households used electric kettles to boil water. The project aimed to therefore demonstrate the carbon savings that would occur if coal generated electricity was replaced with solar energy.¹⁵

How could renewable energy contribute to job creation?

According to U.S. Government statistics, the "price" of job creation is \$145,000 per job for coal projects, over \$193,000 per job in the oil and gas industry, \$238,000 per job created from nuclear energy, or **more than twice the cost per job when compared to energy efficiency**¹⁶ (13 full time equivalent jobs per \$1m dollars spent in the US).

Energy efficiency estimates for job creation in South Africa could reach 27 000 by 2030, while estimates of RE jobs indicate that an increased RE scenario with localised manufacturing could create 28% more jobs than an emissions-intensive business as usual scenario.¹⁷ For Example, in the NMBM solar water heaters programme, a roll-out of 4000 systems per month provides 300 installation jobs.



Project 90 by 2030 Renewable Energy Solar Lighting Demonstration Site in Marianhill, KwaZulu-Natal

¹³ Commission on Climate Change and Development 2009

¹⁴ Sustainable Energy Africa (McDaid, 2011) Developmental impacts of Cape Town's Energy and Climate Action Plan

¹⁵ Sustainable Energy Africa (McDaid, 2011) Developmental impacts of Cape Town's Energy and Climate Action Plan

¹⁶ Reference - <http://www.nationofchange.org/green-jobs-reality-check-clean-energy-still-means-more-and-better-jobs-american-workers-1314715402>

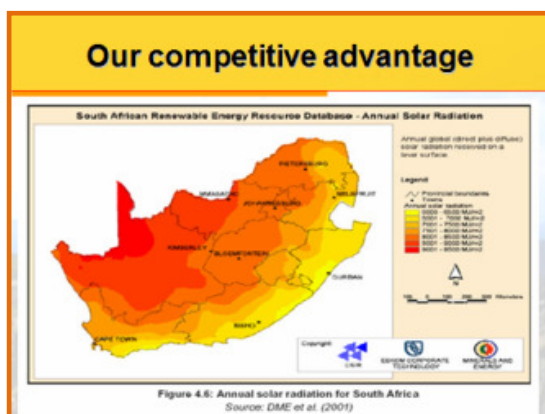
¹⁷ Rutovitz, J. 2010. South African energy sector jobs to 2030. Institute for Sustainable Futures, University of Technology, Sydney, Australia

How can renewable energy contribute to energy security?

There is a strong argument to be made for diversifying South Africa's energy system away from its current over-reliance on coal and other fossil fuels. Security of energy supply is a major challenge facing both developed and developing economies because disruption causes major economic upheaval. Security risks include the incapacity of an electricity infrastructure system to meet growing load demand; the threat of an attack on centralised power production structures, transmission and distribution grids or gas pipelines; etc. Including a diverse mix of renewable energy (hydro, geothermal, bioenergy, solar and wind) *generating plants into the system, and establishing a decentralised power generation system can provide more security, especially where many small to medium generating plants can be located close to the load.*¹⁸ *RET installations have the advantage of being flexible with regard to the scale of plant size and to the possibility of integrating them either into the transmission or the distribution systems. These characteristics yield positive effects for physical aspects of energy security.*¹⁹

Rapid response is possible if we choose technologies with a short lead time, with some degree of certainty of costs, and with maximum potential for job creation. This will enable South Africa to respond to a varying demand, and meet the priority needs of energy security, affordable electricity and appropriate job creation.

How much renewable energy potential do we have?



As part of any country's commitment to addressing and responding to climate change, as well as a commitment to sustainable development, there is a need to direct a transition away from finite sources of energy such as coal or nuclear, and towards the increasing use of renewable energy. "Although coal is by far our largest non-renewable energy resource with an impressive energy reserve of 1,298,000 PJ²⁰, it is far less significant in comparison to our largest renewable energy resource, namely solar, with an energy reserve of 8,500,000 PJ/year.

***The total coal reserve is 1,298,000 PJ, the annual solar reserve is 8,500,000 PJ. Thus, our total coal reserve is only equal to around 15% of the solar reserve that is available to us every year"* (Lukey, 2008).²¹**

According to the IRP, technologies with short lead times are solar, wind, and biomass, those with highest potential for job creation include biomass and solar (for example, SWHs) and those technologies with the most certainty in terms of long term levelised costs would be those with very low operational costs. Renewable technologies that have zero fuel costs would score well here.

In debates and discussions regarding renewable energy, civil society organisations and Members of Parliament have raised a number of issues. Some of these are captured in the following table:

¹⁸ Contribution of renewables to energy security (IEA information paper) Olz, Samantha, Sims, Ralph, Kierchner Nicolai, International energy Agency, April 2007 (page 11-13)

¹⁹ Contribution of renewables to energy security (IEA information paper) Olz, Samantha, Sims, Ralph, Kierchner Nicolai, International energy Agency, April 2007 (page 11-13)

²⁰ Our Uranium reserve is far less than our coal reserve at 157,853 PJ, i.e. it is only 12% of our coal reserves (Lukey 2008)

²¹ Peter Lukey, 2008. Department of Environment Affairs, Presentation at WWF Renewable Energy conference, 7 November 2008 in Sandton.

Some key issues raised by Members of Parliament and Civil Society Organisations:

Members of Parliament	Civil Society organisations
Policy coherence with IPAP and NGP. Alignment between Millennium Development Goals and departmental goals	GDP is a poor index of human development as it hides inequalities. Need to consider the Human Development Index (HDI), the GINI coefficient or the achievement of Millennium Development Goals.
How to Create 5 million jobs	Decent jobs and a just transition to a low carbon, renewable energy economy
Job creation through the energy sector	Sufficient allocation of renewables to stimulate a localised manufacturing industry and create employment
The urgent requirement for change in economic thinking throughout government. Public capital investment required now to bring about this change and ensure future labour intensity.	Change in economic structuring required, diversifying the economy and addressing the imbalance of power - skewed towards energy intensive minerals-energy complex
Lack of emphasis on women's empowerment	Women's involvement in the energy sector, as well as consideration of Gender issues when planning for energy in SA
High level of youth unemployment	Concern for what we leave behind for future generations (taxation without representation)
Possibilities for SA to be the green industrial technology expert to region	Localised manufacturing of RE
Water and environmental sustainability	Impacts on South Africa as a water scarce country. Impact on power generation
Slow Progress in solar water heater roll-out and narrow focus on only SWH for energy efficiency initiatives	Too little priority to energy efficiency – want to see more focus on energy efficiency initiatives
Inclusion and promotion of training and skills for green economy	Emphasis on a just transition to a green economy
Climate change awareness in rural areas	Access to affordable electricity by the poor and vulnerable
Disconnect between different levels of government	Programmes to enable / encourage residents, communities, municipalities and industries to own generation?
The role of NEDLAC	Need inclusive decision-making - Failure to consider civil society in energy related decisions – IRP 61% of comments were ignored ²²
Ensuring sufficient energy provision for the economic development of SA	Overestimating overall electricity demand – danger of very expensive over capacity. Concern over expanding electricity capacity to cater for energy-intensive industries. And these effectively being subsidised by the public who in turn are not receiving economic, social or environmental benefits from such industries.
Nuclear Energy - disaster preparedness; sufficient funding for regulatory bodies and emergency response	High Risk of nuclear energy - Nuclear energy should be excluded from climate change response. Increased renewables to increase energy security
Cost effective electricity plan	Externalities must be included in costing of energy - acid mine drainage, other health, social and environmental impacts
Consideration of rural versus urban development needs and prioritisation.	Energy equality for all and more support for distributed models of supply
Concern that Carbon Tax will further increase electricity costs and marginalise the poor	Carbon Tax will not necessarily mitigate climate change or ensure energy equality

²² Report analysing civil society inputs to IRP process by 28 civil society organisations – 2010

Challenges to growing the Green Economy:

Skills:

South Africa has a shortage of engineers. According to an article in engineering news, Brazil has one engineer per 277 people; in India the ratio is 1:157, while in South Africa, we have one engineer for 3166 people.²³

The job creation model proposed under the South African Wind Energy Association, SAWEA, aims to draw on engineering students at tertiary level and to offer them bursaries to undergo specialist wind farm training.

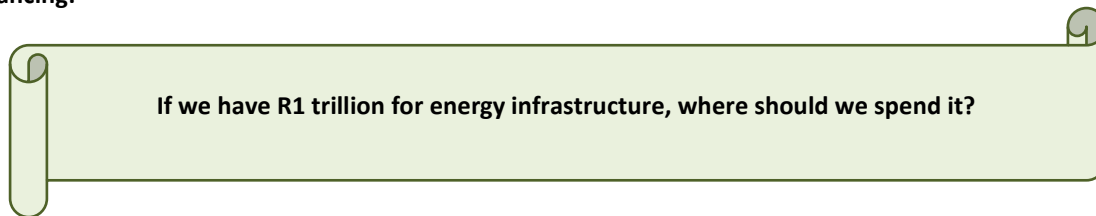
Gender:

The engineering council of South Africa has about 35 000 members of which less than 3000 are women.²⁴

Localisation:

Manufacturing is where the most jobs are created (e.g. 75% in the case of wind and SWH). Local authorities need to use procurement and financial incentives to promote localisation of content.

Financing:



In 2010 – 30 countries had nuclear power for electricity – one less than 2009. **World nuclear production fell for the third year in a row, generating 103 TWh (nearly 4 percent) less power than in 2006.**

Investment costs. ...The size and complexities of nuclear reactors make both their cost per megawatt and the upfront investment requirements **far higher** than for conventional and renewable alternatives.The economics of nuclear power are such that **government subsidies are almost always** required to support private sector construction of nuclear plants. Yet in many countries that wish to develop nuclear energy, **limited government resources compete with pressing needs from health, education, and poverty reduction programs.**²⁵

Cooperation: Governments promoting renewable energy

The International Renewable Energy Agency (IRENA) was founded in 2009 to promote international uptake and sustainable use of renewable energies. By mid-2010, more than 140 countries had signed up, including 48 African countries. IRENA's founding reflects a growing consensus of governments around the world on the need to actively support the expansion of renewable energy.²⁶

A full list of References is available on request.

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²³Becoming engeniuss, Eleanor Seggie, pg 16 engineering news vol 31 no 18, may13-19 2011

²⁴Becoming engeniuss, Eleanor Seggie, pg 16 engineering news vol 31 no 18, may13-19 2011

²⁵World Nuclear Industry Status Report 2010-2011.

²⁶REN21 global Status report - Sept 2010