

The Brazilian Energy Initiative

Revised text after Johannesburg WSSD

José Goldemberg¹
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Development – understood as access to food, health, sanitation, education and employment – is the aspiration of a large fraction of the world’s population living in the poorer countries in the Southern hemisphere which have not reached yet the level of affluence of countries in the Northern hemisphere. This requires a variety of ingredients such as natural resources, minerals, agriculture, industry and all the aggregated technologies.

Concerns over the exhaustion of natural resources have been raised over the time but have proven to be either exaggerated or baseless. What has not been proved baseless is that mankind with 6 billion people is moving around all kinds of materials at the average level of 8 tons per capita per year, i.e., “circa” 50 billion tons per year. This is approximately the amount of materials that natural forces such as wind, rain, volcanic eruptions, earthquakes, etc move around every year. In other words man has become a “geological force”. The environmental problems we are creating are the most immediate reason to be concerned with the use of natural resources.

A good part of the materials used by men is made up of fossil fuels (coal, oil and gas) which are used as sources of energy as heat or motive power, basic for our civilization. Energy is not only one of the ingredients of our system but a fundamental one; without it there is no access to water, agriculture is impossible and so is the access the other resources responsible for development.

The use of energy around the world is very uneven: while an average citizen in the United States consumes per year 35 times more electricity and 17 times more overall

¹ Secretary of State for the Environment, São Paulo, Brazil.

total energy than a citizen in India. In the aggregate, average “per capita” consumption in the OECD countries is almost five times higher than in the rest of the world².

One naive solution to this problem is to propose the increase in energy consumption in the developing countries. This can be done to some extent but is not viable in the long term. If all the population of the world were to reach the level of consumption of OECD countries, global consumption would increase threefold.

The consequence of that is that fossil fuel reserves, that are limited, would be consumed very rapidly. In addition to that, pollution at the local, regional and global level would increase rapidly and jeopardize the conditions of the environment we live in.

Renewable energy is thus a basic ingredient for sustainable development. Such sources can supply the energy we need for indefinite periods of time polluting far less overall than fossil or nuclear fuels. According to Figure 1, renewable energy³ (including renewables and waste, geothermal, solar etc and hydro) represented, in 1998, 13.33% of total world consumption.

**World shares
of total primary energy supply 2000
414.6 EJ
(source: IEA Energy Balances)**

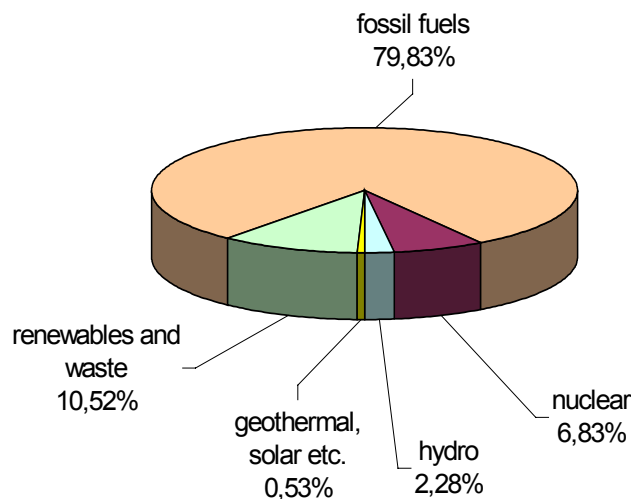


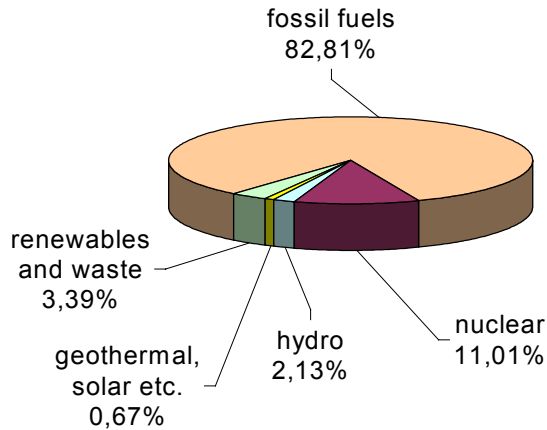
Figure 1. World shares of TPES - total primary energy supply (IEA, 2000).

These shares, though, are quite different for developed and developing countries, as shown in Figures 2 and 3:

² 1998 data from the IEA (2000)

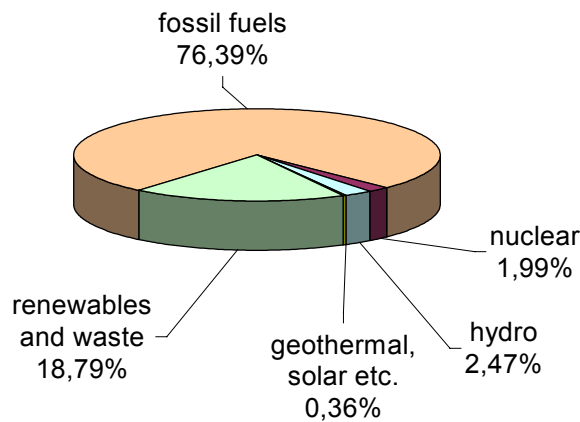
³ *Renewable energy according to IEA includes: hydropower, biomass, wind, solar (thermal, photovoltaics), geothermal and marine energy (wave and tidal).

OECD countries (222.6 EJ)



Figures 2. Shares of TPES in developed countries as of 1998. (source: IEA, 2000).

Non-OECD countries (192.0 EJ)



Figures 3. Shares of TPES in developing countries 1998. (source: IEA, 2000).

At the Johannesburg World Summit on Sustainable Development (WSSD), the European Union presented a proposal to increase the share of renewables which reads as:

“Diversify energy supply by developing cleaner, more efficient and innovative fossil fuel technologies, and by increasing the global share of renewable energy sources to at least 15% of global total primary energy supply by 2010. To achieve this all countries should adopt and implement ambitious national goals for renewable energy. For industrialized countries, these goals should aim at an increase of the share of renewable energy sources in the total primary energy supply by at least 2 percentage points by 2010 relative to 2000”.

There are three problems with this proposal when applied to developing countries

1. it includes hydro (small and large hydro) with no restrictions, although some large hydro are subjected to heavy criticism since they can lead to social (relocation of populations) and environmental (loss of biodiversity) reasons, as well as potential damages to archaeological sites.
2. “renewable” includes biomass used either in a sustainable or unsustainable way; it is well known that in many countries the widespread use of trees as fuelwood is not sustainable.
3. it is a very modest proposal: a “2% points increase by 2010” implies a growth rate of only approximately 40 % in 10 years, which is less than 4% per year, practically a *business-as-usual* approach. Several renewables (PV, wind) are growing much faster than that. According to the WEA (2000), wind and solar photovoltaics (PV) grows at an yearly rate of 30%. Other sources are: biomass heat, ethanol and electricity (3%/yr), low temperature solar heat (8%/yr), geothermal electricity and heat (4%/yr and 6%/yr respectively), small and large hydro (3%/yr and 2%/yr). Fossil fuels consumption grows at 2%/yr.

Another approach is to distinguish from the start between “traditional biomass” used as a non-commercial source – usually with very low efficiencies for cooking in many countries – and “modern biomass” which is sustainable and used as commercial energy for the production of heat and electricity mainly in industrialized countries. Figure 4 shows the world consumption of primary energy using the above characterization.

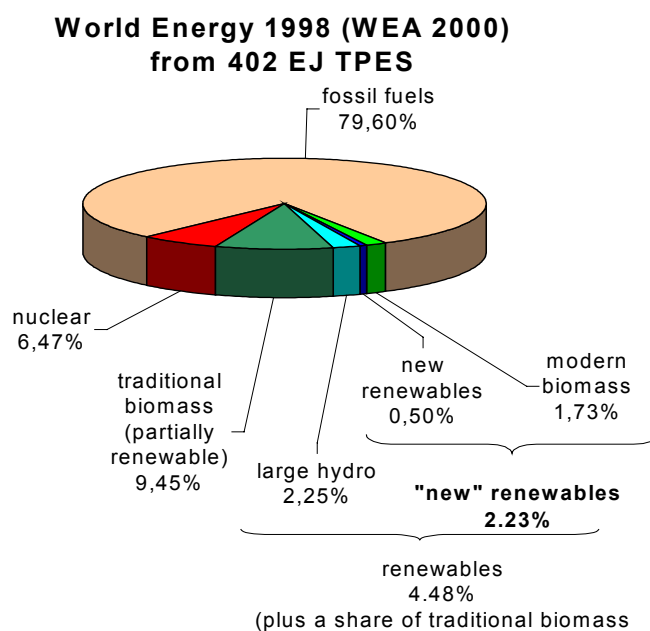


Figure 4. World energy consumption in 1998 (TPES). (source: WEA, 2000).

Biomass, the most important energy source in several developing countries, is only sustainable under certain conditions. It is only “renewable” if realistically replaced. Much biomass use in developing countries is leading to deforestation both for either domestic small scale or large scale for industrial purposes. Moreover, biomass use for cooking and heating in developing countries is a major cause of serious indoor pollution, particularly to women, small children and the elderly.

Figure 5 shows growth rates for the different types of renewable energy and an extrapolation to 2003 and 2008 assuming these growth rates will be the same as they were in the period 1993-1998.

This Figure is the basis for the Brazilian Energy Initiative which proposes an increase of “the use of new renewable sources to 10% as a share of world energy matrix by 2010”. “New renewable sources” include modern biomass, small hydropower, geothermal energy, wind energy, solar energy (including photovoltaics) and marine energy. “Modern biomass” excludes traditional uses of biomass as fuelwood and includes electricity generation and heat production from agricultural and forest residues and solid waste. With such caveats “new renewable energy sources” could be labeled as “sustainable renewable energy sources”. Large hydro were not included originally in the proposal but were included later provided they are “socially and environmentally acceptable”.

This proposal was submitted to the Ministers of the Environment of the Latin American and the Caribbean region this year, approved with the inclusion of all hydropower sources (see Annex I).

With this compromise it is seen that a 10% share of renewables by 2010 is within reach requiring a small additional effort on top of the increase that is taking place today in the world (3.73%/year).

The Brazilian Energy Initiative, differently from the Kyoto Protocol, requires that all countries should reach by year 2010 a fraction of renewables in their energy mix, not only Annex I countries. Such goals are to be achieved “individually or jointly”, which opens the way for flexibility mechanisms and trading of renewable energy certificates. In principle this should remove one of the main objections of the United States to agreements of this type.

World Renewables - TPES and shares

source: WEA 2000. Projections upon yearly rate of increase by source (2.89% for renewables and 3.73% for new renewables)

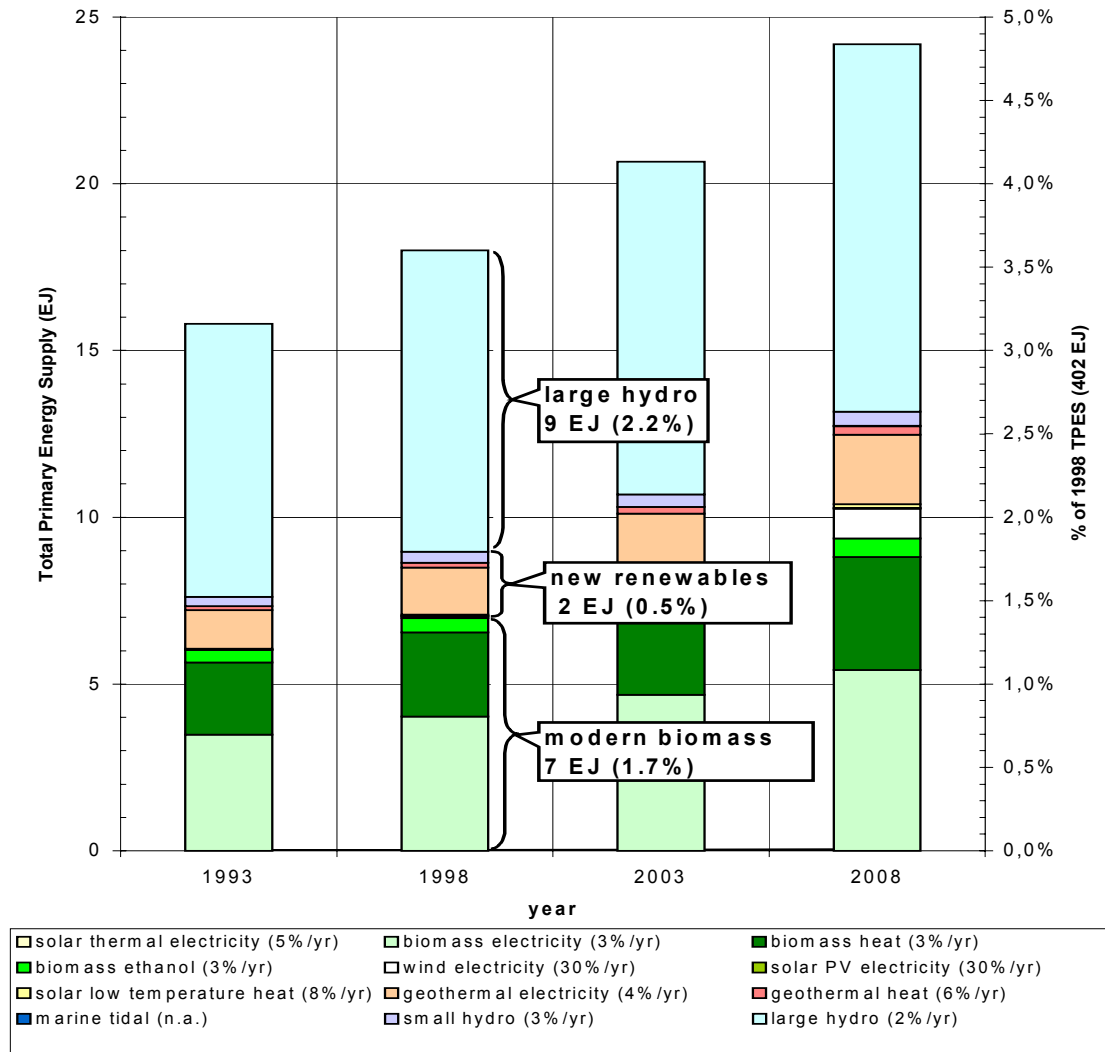


Figure 5. World renewables - TPES and shares (adapted from WEA, 2000).

Clearly the OECD countries would not have many problems in attaining, by year 2010, 10% of sustainable renewable energy in their systems. As seen in Figure 2, such energies represent already 6.19%.

For developing countries the situation may be more complex. As seen in Figure 3 they use a lot of “renewable and waste” energy (18.79%), a good part of which is not strictly sustainable.

Economic development will at first encourage them to reduce their use of biomass either through efficiency improvements and fuel switch which may reduce deforestation but will not lead necessarily to sustainability. Economic development will

also inevitably lead to some increase in the use of fossil fuels. In many of them, however, “modern or sustainable biomass” is already significant and could be easily increased. Examples are Brazil (20.4%) and India (4.7%) among others.

Renewable energy, just like any infant technology, needs support until having conditions to compete with conventional fossil fuel sources. Subsidies for environmentally sound energy options are harmful only if they persist in the long term without the so-called "sunset clauses". To push forward renewables it is necessary to have on its favour stronger market forces, not only alternative experiments. Figure 6 shows the effect of higher production volumes in decreasing the costs of renewable energy sources: the learning curves of wind energy, solar photovoltaics and ethanol in Brazil.

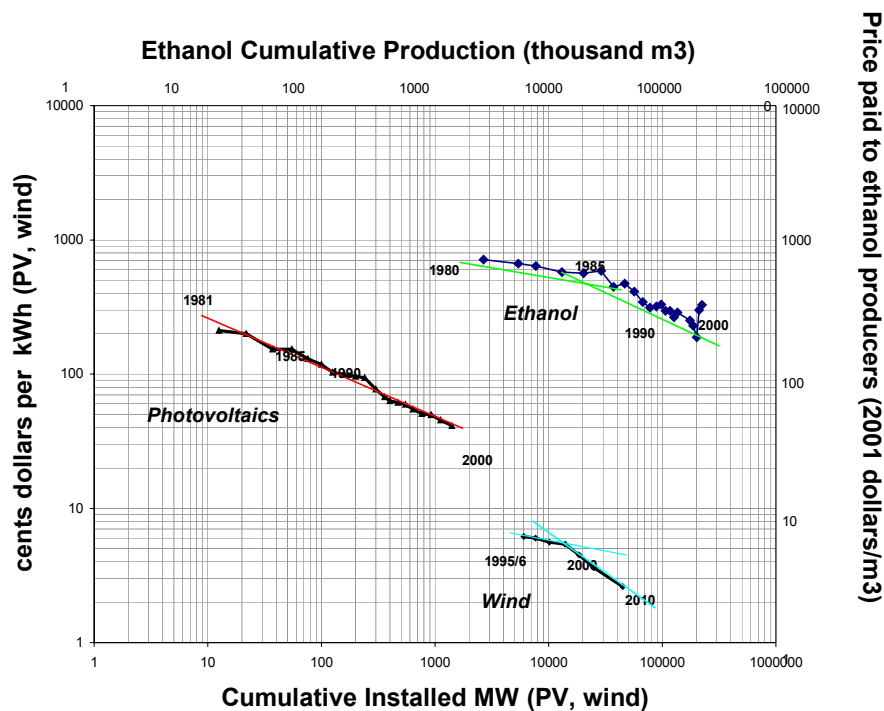


Figure 8. Wind, solar PV energy and ethanol learning curves (source: CENBIO, 2000).

Brazil, a country with a large experience in the development of renewable energy, has proven this paradigm: today, dedicated sugarcane alcohol fuelled cars are on the streets without subsidies⁴. Urban air pollution has dropped considerably due to this measure and carbon dioxide is recaptured by photosynthesis.

The WSSD Plan and both the Brazilian and the European proposals recognize clearly the advantages of renewables as far as they enhance diversity in energy supply markets; secure long-term sustainable energy supplies; reduce local and global atmospheric emissions; create new employment opportunities offering possibilities for local manufacturing and enhance security of supply since they do not require imports that characterize the supply of fossil fuels. Table I compares the number of jobs (in person-years) generated by the production of energy of different types.

⁴ ethanol is also added to all gasoline at 25% as a lead-free carburant, much less polluting than MTBE

Table I
Direct jobs in energy production

Sector	Jobs (person-years) Terawatt-hour
Petroleum	260
Offshore oil	265
Natural gas	250
Coal	370
Nuclear	75
Wood energy	1000
Hydro	250
Minihydro	120
Wind	918
Photovoltaics	76,000
Ethanol (from sugarcane)	4,000

References:

1. CENBIO - The Brazilian National Reference Center on Biomass. **Personal communication, 2000, 2001**
2. IEA **Energy Balances of non-OECD Countries 2001**. International Energy Agency, 2002
3. IEA **Energy Balances of OECD Countries 2001**. International Energy Agency, 2002
4. UNDP **World Energy Assessment 2000**. United Nations Development Programme, Washington, 2000
5. **WSSD Plan of Implementation, advanced unedited text**. World Summit on Sustainable Development, Johannesburg, 5 September 2002

Collaborators:

Suani T. Coelho, Oswaldo Lucon and João Wagner Alves

ANNEX I

The Latin American and Caribbean region has agreed in May 2002 on the following proposal for targets and timeframes on renewables, stated as:

“Increase in the region the use of renewable energy to 10% as a share of total by 2010” (Draft of the Final Report of the 7th Meeting of the Intersessional Committee of the Forum of Ministers of Environment of Latin America and the Caribbean, São Paulo, May 2002)

Paragraph 19 of the World Summit on Sustainable Development (WSSD) Plan of implementation adopted in Johannesburg reads as:

19. *Call upon Governments, as well as relevant regional and international organizations and other relevant stakeholders, to implement, taking into account national and regional specificities and circumstances, the recommendations and conclusions of the Commission on Sustainable Development concerning energy for sustainable development adopted at its ninth session, including the issues and options set out below, bearing in mind that in view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. This would include actions at all levels to:*

(...)

*(c) Develop and disseminate alternative energy technologies with the aim of **giving a greater share of the energy mix to renewable energies**, improving energy efficiency and greater reliance on advanced energy technologies, including cleaner fossil fuel technologies;*

*(d) Combine, as appropriate, **the increased use of renewable energy resources**, more efficient use of energy, greater reliance on advanced energy technologies, including advanced and cleaner fossil fuel technologies, **and the sustainable use of traditional energy resources**, which could meet the growing need for energy services in the longer term to achieve sustainable development;*

*(e) Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. **With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end;***