

**INSC WORKSHOP ON NUCLEAR CONTRIBUTION TO ACHIEVING NET-ZERO
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**Implementing the Energy Transition in Latin
America under the Sustainability Goals
Framework**

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BASIC ELEMENTS FOR THE ENERGY TRANSITION

- **Coping with greenhouse gases concentration increase in the atmosphere;**
- **Drastically reducing fossil fuels combustion as the most utilized process to generate energy;**
- **Replacing combustion processes by electrical power;**
- **Following up the UN sustainable development goals;**
- **Assuring the existence of firm baseload energy;**
- **Considering additional losses of efficiency and transmission.**

RENEWABLES AND SUSTAINABILITY

- **Solar photovoltaic and wind energy require a large number of units per installed kW, leading to an early depletion of minerals like copper, lithium, nickel, cobalt and rare-earth elements, nickel and zirconium and platinum-group metals;**
- **Off-shore wind energy plants use ~15,500 kg/MW, on-shore plants ~10,000, solar energy ~7,000, nuclear ~5,000;**
- **UN sustainable development goals require among others the protection of biodiversity and the preservation of indigenous populations' dwelling places;**
- **Hydroelectric dams with reservoirs may be incompatible with these goals, requiring "run-of-river" type solutions subject to climatic intermittence.**

BASE LOAD

- **Assure the stability of the transmission lines by keeping the electric frequency constant;**
- **The existence of firm baseload energy guarantees a constant electrical frequency;**
- **Fossil fuel thermal plants, hydropower plants with important reservoirs and nuclear plants are used to generate baseload energy;**
- **The future trend will lead to the use of hydropower with reservoirs, biofuels and nuclear energy and to the increase of interconnection of electrical transmission systems across countries' borders.**

SYSTEMS EFFICIENCY AND TRANSMISSION LOSSES

- **Maximum electricity usage will diminish the efficiency of thermal energy consumption (home heating, cooking processes, electric cars usage);**
- **Entropy will be higher in future human-life systems;**
- **Efficiency of steam powered systems will also decrease due to higher condensing temperatures as a result of climate change phenomena;**
- **Power transmission from distant sites of solar and wind power sources will also generate important efficiency losses;**
- **The amount of power to be supplied will be much higher.**

NUCLEAR AS ONE OF THE CLEAN ENERGIES

- **The drastic reduction of carbon emissions will lead to the use of technologies that limit the combustion of fossil fuels;**
- **A more pronounced use of so-called clean energies (renewables, run-of-river hydro, biofuels and nuclear);**
- **Baseload will be supplied by hydropower plants with reservoirs and by nuclear power plants;**
- **The nuclear industry is the only one that contains, processes and controls its solid, liquid and gaseous wastes;**
- **Built near consumption centers, without long transmission lines, nuclear units require little space for installation.**

REGIONAL NUCLEAR COMMERCIAL ADVANTAGES

- **The Treaty of Tlatelolco established a Nuclear Weapons Free-Zone in the 33 countries of Latin America and the Caribbean;**
- **Two countries of the region agreed to mutually control their nuclear activities making regular safeguarding inspections on each other;**
- **Brazil has been internationally recognized as an exporter of enriched uranium for nuclear power plants based on its process of centrifuge enrichment;**
- **The region has large amounts of natural uranium mineral resources and the expertise of fuel element manufacture, as well as the knowhow for LWR and HWR nuclear power engineering;**
- **Latin America is one of the few regions in the world to be able to provide enriched fuel elements under regional and international safeguards treaties for the peaceful use of nuclear energy.**

CONCLUSIONS

- **Due to global warming electrical energy will be used more intensively, replacing fossil fuels with sources that do not emit greenhouse gases;**
- **Electric power will be used in large scale;**
- **Pursuant to policies based on the UNSDGs the installation of fossil fueled plants, as well as of hydropower plants with large reservoirs, will be largely reduced;**
- **Combustion of fossil fuels will be replaced by clean energy sources, like renewables and nuclear;**
- **It will be necessary to ensure a generation of baseload power that accompanies generation by intermittent energy sources;**
- **Latin America is one of the few regions in the world able to manufacture and furnish enriched fuel elements under regional and international safeguards treaties;**
- **To provide clean baseload power in sufficient scale, near the consumption centers, the proven and available technology that exists is nuclear power.**