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**1. Introduction** One of the key factors to the development of a certain country is a sustainable and sufficient energy. As Rwanda continued its journey to the development and wellbeing of its population, to overcome all challenges found in its energy sector is needed. In this paper the current situation and challenges faced in Rwanda energy sector and were discussed.

**2. Methodology** To understand better overview present energy situation in Rwanda, we collected different reports made about Rwanda energy such as government reports, World Bank reports, and etc. In addition, we collected different data from different data bases, such as: (1) UNSD (United Nations Statistic Division), (2) FAO (Food and Agriculture Organization), (3) IRENA (International Renewable Energy Agency), and (4) World Bank and then we analyzed them.

### 3. Result and consideration

**3.1 Socio-economy** Rwanda population is currently at 12.3million and the population is higher in urban areas or trading centers, where social infrastructures exist. Population is growing by 2.4% annually and will reach to 23million in 2050 under medium growth scenario. Rwanda economic sector is growing astronomically. The GDP per person is currently at 825\$ and the export value index has grown hundred times in just 20 years (shown in Fig.1). As the Economy continue to grow, the energy sector capacity also continue to grow. However, challenges are inevitable.

**3.2 Energy situation** Fig.2 shows the energy consumption change and the sources. Energy consumption is steadily increasing since 2005. And it is understood that wood fuel is the most dominant and the most important energy source. Oil products is on the second place, and hydro is the third. Fig.3 shows that electricity production, its sources, consumption, and per capita consumption. Both electricity production and consumption are sharply increasing. Electricity consumption is currently at 49.7kwh per person and mainly based on combustible fuel, hydro and solar energy. Since biomass is a dominant source of energy, the situation of forest is a very important factor to energy supply in Rwanda. 19% of Rwanda's land is occupied by forest in which 87.1% are planted forest. However, forest land per person is still small (0.039ha/person) relative

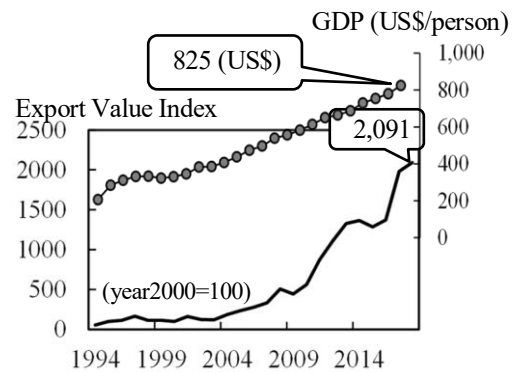


Fig.1 GDP and Export in Rwanda

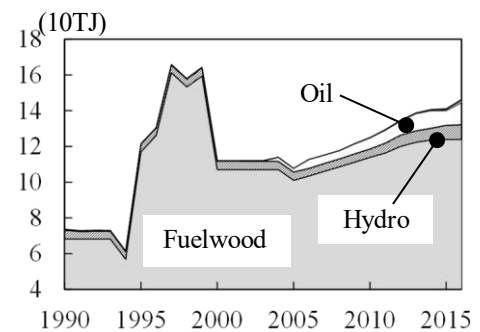
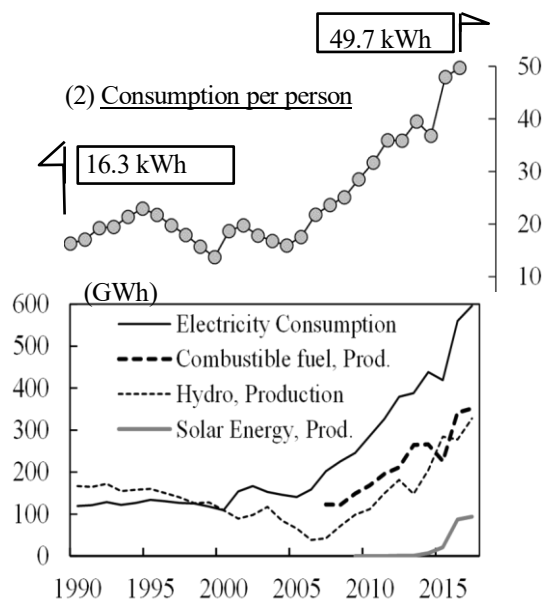


Fig. 2 Energy Consumption in Rwanda



(1) Electricity Production and Consumption

Fig. 3 Electricity in Rwanda

Data Source: (1) UNSD. (2) IRENA

to most African countries.

### 3.3 Electricity future scenario

Rwandan Government intends to deliver electricity to all the sectors. It seems huge challenge. This is described in Fig.4. Electricity demand per capita has increased by 7.9% so far. The BAU scenario is an estimation based on a same trend continuing in the future. ESSP scenario is based on 10.0% increasing rate, which ESSP (Energy Sector Strategic Plan) envisages. Rwandan Government declares that Rwanda will become a member of high income countries by 2050 in the report of “Vision 2050”. In this report, the target of GDP in 2035 and in 2050 are put on 4,035 and 12,476(US\$ per capita) respectively. Vision 2050 scenario is based on that

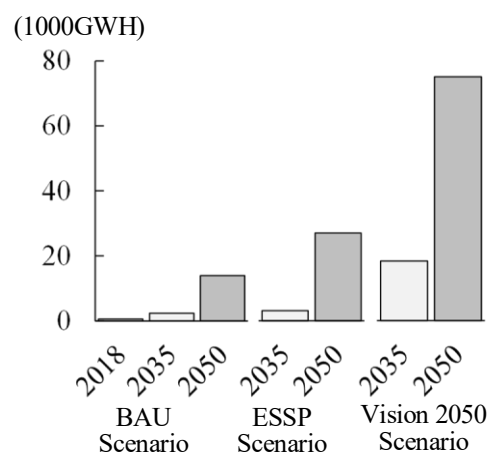


Fig. 4 Electricity Demand Scenario

Rwandan people will demand similar quantity of electricity to people in high income countries. For example, according to Vision 2050 scenario, national electricity demand in 2050 will become 124 times more than today.

### 3.4 Energy policy and subject

Fig.5 shows energy scheme and goal in Rwanda. Energy Sector Strategic Plan is an on-going national energy plan in Rwanda. This plan is underpinned by Rwanda’s national development plan and forest sector plan and aims to achieve some targets, such as 1) delivering electricity to 100% households and industry, 2) reducing power interruptions, 3) decreasing electricity losses in the grid, 4) halving the number of households using traditional cooking technologies, and so on. In order to reach to these goals Rwandan Government suggests the fade away of woody biomass, increasing the capacity of fossil fuel(Natural gas, Peat, oil), hydropower, solar, wind, and geothermal energy. However, to achieve the goals in the energy plan, we suggest another ideas, namely Janus-faced Approach shown in Fig.6.

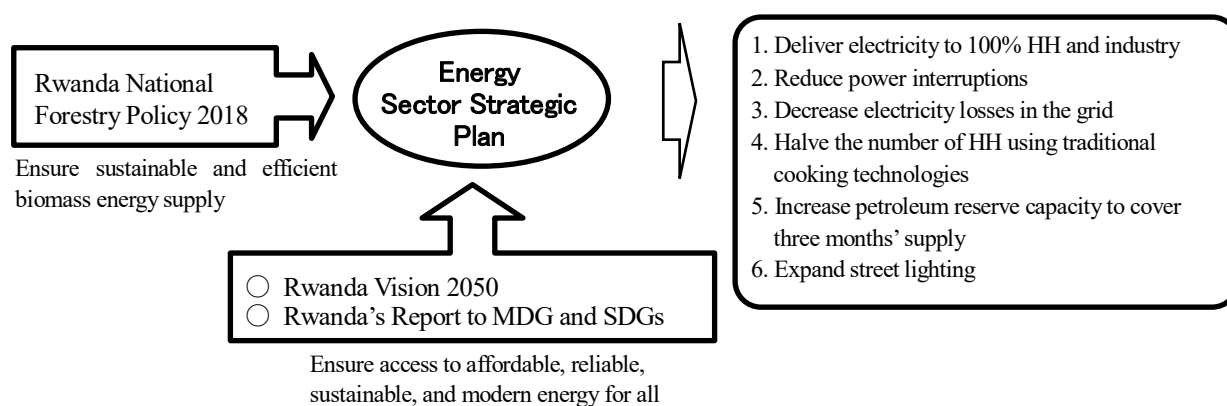


Fig. 5 Energy Scheme and Goal in Rwanda

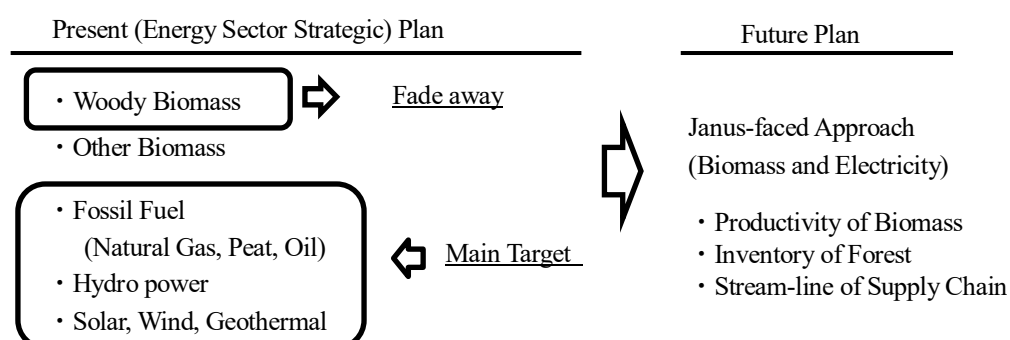


Fig. 6 Present and Future Plan