**Development of the pathways to achieve SE4ALL 2030 objectives**

The objectives of the United Nations Sustainable Energy for All Initiative (SE4ALL) are to achieve, by 2030: 1) universal access to modern energy services; 2) a doubling of the global rate of improvement in energy efficiency (in terms of the rate of energy intensity reduction); and 3) a doubling of the share of renewable energy in the global energy mix (in terms of renewable energy share in the global energy mix). The study explores the techno-economical pathways of sectoral and regional developments to 2030, taking into account realization of potential for energy efficiency improvement and renewable energy deployment.

Beyond the reference scenario (which includes no additional policy measures or technology development beyond the current status quo assumptions), we create three alternative scenarios. The first alternative scenario focuses on meeting the SE4ALL 2030 energy efficiency target through a combination of more ambitious technological improvements and policy incentives within end use energy consumption in the buildings, industry and transportation sectors. To create this scenario, we simulate substantial improvements in conventional technologies’ efficiencies, phasing out of energy intensive technologies at an accelerated pace (replaced with more advanced counterparts), and the emergence /proliferation of innovative new technologies not yet widely available in the market.

The second alternative scenario focuses on achieving the SE4ALL 2030 renewable energy targets. This scenario sets both global and region-specific targets to closely follow those outlined by International Renewable Energy Agency Global Renewable Roadmap (IRENA REMap2030).

The third alternative scenario combines the first two.

The alternative scenarios also incorporate the effect of various barriers to energy efficiency development, to simulate various known social, political, and economic effects in that curtail adoption of new technologies. This allows for a more effectual representation of meeting the SE4ALL targets.

The TIMES Integrated Assessment Model (TIAM) is employed to analyze the various scenarios. From here, we develop technology and policy pathways for different regions for meeting the SE4ALL energy efficiency and renewable energy goals. The pathways are evaluated in terms of cost effectiveness and by assessing the degree to which modern technology is dispersed across the various regional technology profiles (the first objective of SE4ALL). The optimal pathways are converted into policy recommendations and cost estimates for best achieving the SE4ALL objectives.