

Prospect of APEC Energy Goals for Energy Intensity and Renewable Energy

by

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Abstract

The Asia Pacific Economic Cooperation (APEC) have made two major goals in relation to energy. APEC Leaders agreed to achieve a 45% reduction in APEC-wide energy intensity by 2035 from 2005 levels in 2011. In 2014, APEC Ministers formally adopted the goal of doubling the share of renewables in the APEC energy mix, including power generation by 2030 relative to 2010 levels. The APEC 8th Energy Demand and Supply Outlook, carried out by APERC, is likely to see APEC achieve both goals ahead of their schedules, highlighting the strength and robustness of existing policies and measures adopted by APEC economies. Looking particularly at renewables doubling goal, APEC economies' enhanced ambitions in accelerating renewables deployment, particularly solar photovoltaic, wind, and hydro will help APEC achieve its renewables doubling goal in REF, in contrast to the previous APEC Outlook editions.

1. Overview

The Asia Pacific Economic Cooperation (APEC) forum comprises 21 member economies that are home to almost three billion people. Since its establishment in 1989, APEC has developed to become one of the most important regional forums in the Asia Pacific. APEC-wide economy grew impressively from USD 19.0 trillion to USD 46.9 trillion (in real GDP) between 1989 to 2010, while per capita GDP expanded 74%. As a result, APEC represents approximately 60% of the world's GDP. The significant economic growth has resulted in substantial growth in APEC-wide energy supply and demand, which accounts for approximately 60% of the world's energy supply and demand. Over half of the total APEC-wide energy demand comprises petroleum products in 2018, and it is poised to remain dominant in the next few years as APEC economies continue to prosper.

APEC-wide energy self-sufficiency stood at 98.6% in 2018, with energy imports important for meeting APEC economies' energy needs. Being a net-energy importer is associated with elevated risks of security of energy supply arising from geopolitical issues. The APEC forum considers energy as an important issue for cooperation, especially in transitioning towards a low-carbon society that will enhance APEC's energy security, in addition to economic growth.

In 2007 during the Sydney APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development, APEC Leaders reached consensus to achieve at least 25% reduction in APEC's energy intensity by 2030, relative to 2005 levels. Subsequently in 2011, during the Honolulu Declaration, Leaders agreed to enhance this ambition to 45% by 2035, using the same baseline year. It is important to note that the energy intensity reduction target is not set at the economy level. In the field of renewables, the doubling goal of renewables was proposed by the United States during the 47th APEC Energy Working Group (EWG) meeting. Thereafter, during the 11th APEC Energy Ministerial Meeting in Beijing, China, APEC formally adopted the goal of doubling the share of renewables in the APEC energy mix, including in power generation by 2030, from 2010 levels.

2. Methodology

The Asia Pacific Energy Research Centre (APEREC) has been tracking both the energy intensity and renewable energy share of APEC economies. The upcoming 8th APEC Energy Demand and Supply Outlook would see both energy intensity and the renewable energy forecasted through to 2050 under a Reference (REF) and a Carbon Neutrality (CN) scenario using 2018 figures as the baseline. The REF scenario entails APEC economies' current energy policies and measures which, to a certain extent, have been updated to reflect recent carbon neutrality/net-zero commitments made by some of these economies. The CN scenario is a hypothetical scenario that explores possible pathways towards achieving carbon neutrality, through additional and enhanced measures. The energy intensity and share of renewable energy trends in both scenarios are thus compared against the APEC-wide aspirational targets.

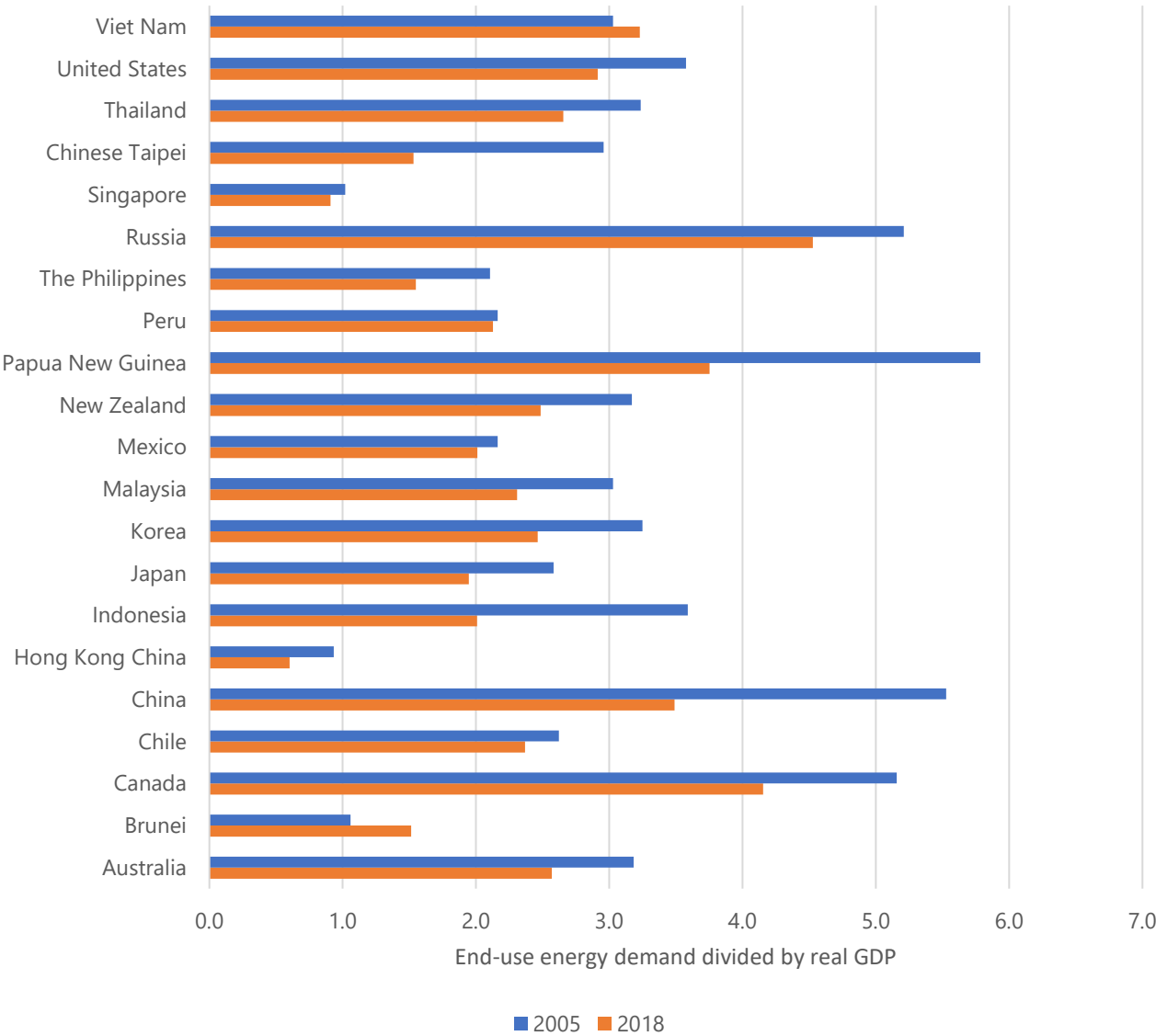
Energy intensity is a proxy measure of the level of efficiency of an economy's energy use. Mathematically, it is the ratio of the economy's overall end-use energy demand in Petajoules (PJ) and its GDP at Purchasing Power Parity (PPP) at constant 2018 prices (billion USD). Sectoral energy consumption in industry, transport, buildings, and agriculture sectors are included, with non-energy consumption excluded. Renewable energy share, on the other hand, does not consider the use of traditional biomass for cooking, heating, and drying in end-use sectors. Only modern renewables are considered such as solar, hydro, and geothermal. Biomass used by industry is considered a modern renewable.

3. APEC Energy Intensity

3.1. Current Trend

The energy intensity in APEC has been showing a decreasing trend historically. Between 2005 and 2018, a decline of 22%, corresponding to 1.9% per annum was observed, owing to a substantial increase in APEC’s GDP of 64% compared to just a 28% increase in the final energy demand for the same period. Energy intensities vary widely between APEC economies as shown in Figure 1 below, owing to different economic and energy efficiency structures. Nine economies have recorded reductions greater than APEC’s average reduction. Chinese Taipei and Indonesia have recorded a more than 40% reduction in their energy intensity, followed by China; Hong Kong, China; and Papua New Guinea at between 30% and 40%

Figure 1: APEC Economies' Final Energy Intensities: End-use energy demand (PJ) divided by real GDP (2018 PPP), 2005 and 2018

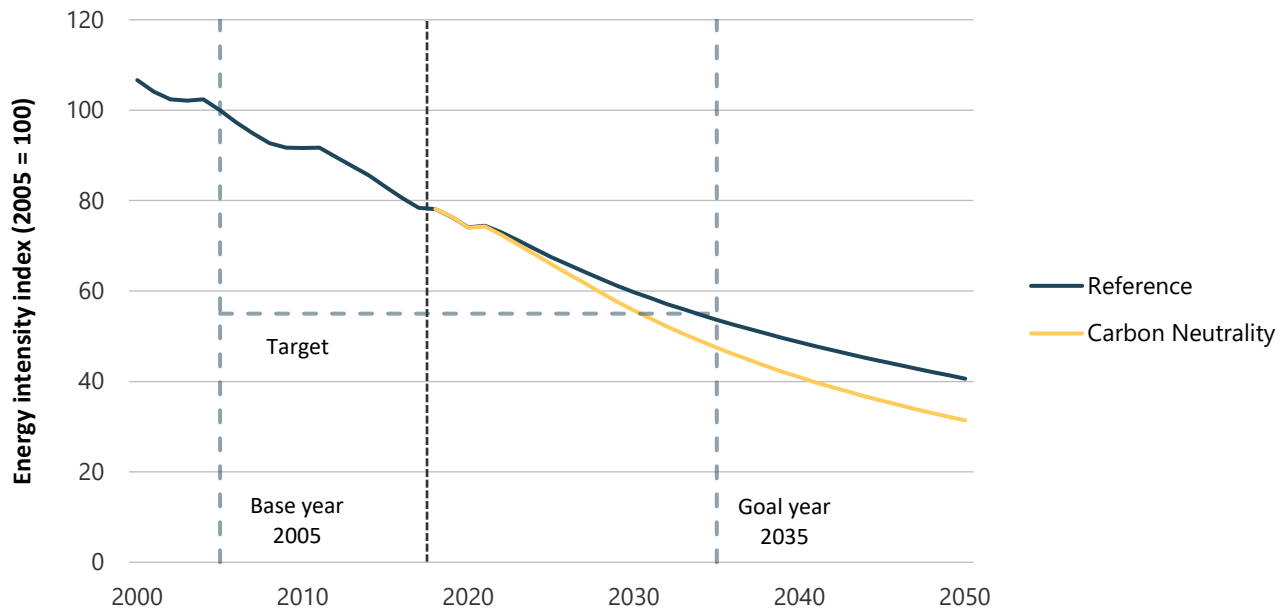


Source: EGEDA (2021), World Bank (2021).

3.2. Reaching APEC Energy Intensity Reduction Goal

The 8th APEC Energy Demand and Supply Outlook results show that APEC is expected to achieve the intensity reduction goal in 2034, one year ahead of schedule in REF, as shown in Figure 2. This suggests that the current policies, measures, and trends are sufficient for the goal to be achieved. Beyond 2035, APEC will continue to reduce its energy intensity, projecting to reach 60% below 2005 levels in 2050 in REF. In CN, APEC reaches the goal four years earlier (2031), as economies move towards more stringent and robust policy interventions that positively impact energy efficiency across end-use sectors. By 2050, a 70% reduction is expected relative to 2005 levels in CN.

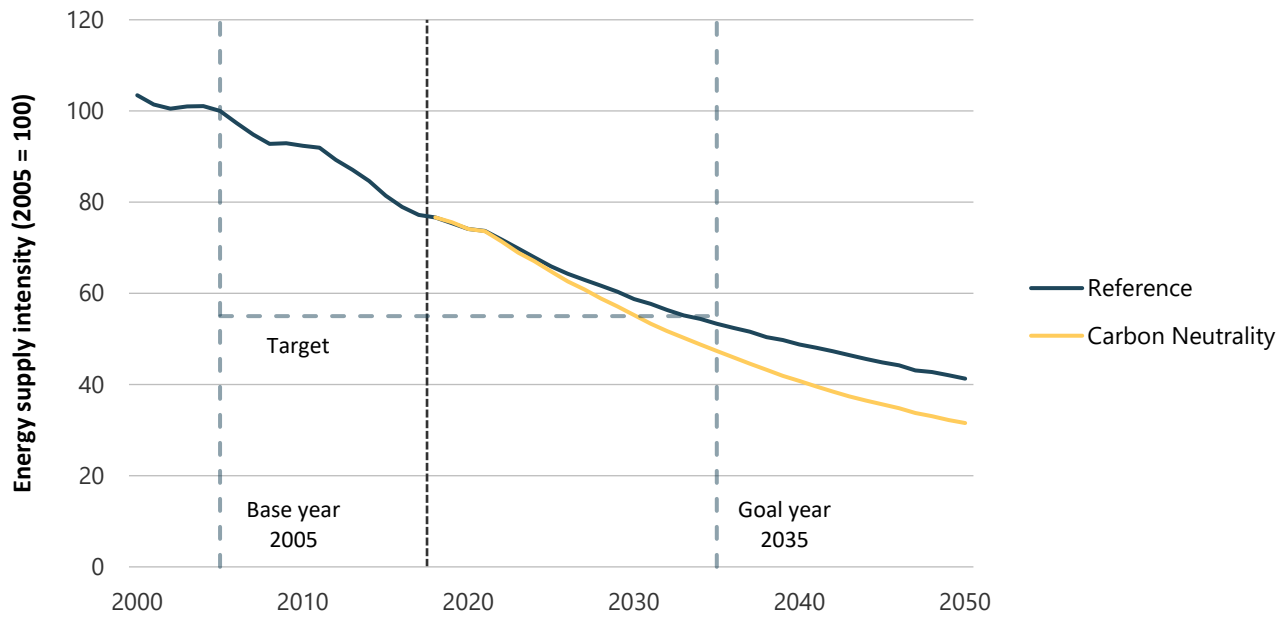
Figure 2: Final Energy Intensity in REF and CN, 2000 - 2050



Source: APERC (2022).

APEC's energy supply intensity (relative to GDP PPP) is also forecast in tandem with final (demand) energy intensity in the 8th edition, as illustrated in figure 3. Over long periods of time, both energy supply and demand trends mirror each other. Improvements in energy supply and demand intensities are very close to each other for the REF and CN.

Figure 3: Energy Supply Intensity in REF and CN, 2000 - 2050



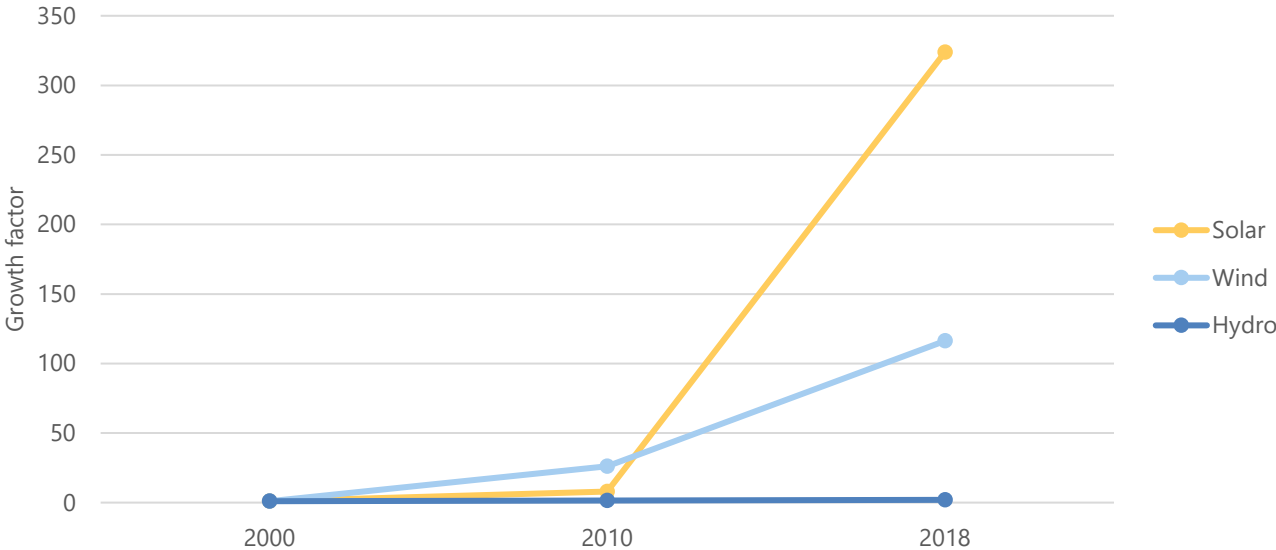
Source: APERC (2022).

4. APEC Renewable Energy

4.1. Current Renewable Energy Development in the APEC Region

Renewable energy development in APEC has been evolving rapidly for the past two decades, given that its share with respect to APEC-wide electricity generation grew from 13% in 2000 to 21% in 2018, corresponding to significant additional installed capacity of over 825 GW, from 612 GW in 2010 to 1438 GW in 2018. Solar and wind are the two most prominent sources of renewables electricity growth, increasing over 300 times and 110 times, respectively, for the period, as illustrated in Figure 4.

Figure 4: Growth of Renewables Electricity in APEC since 2000.

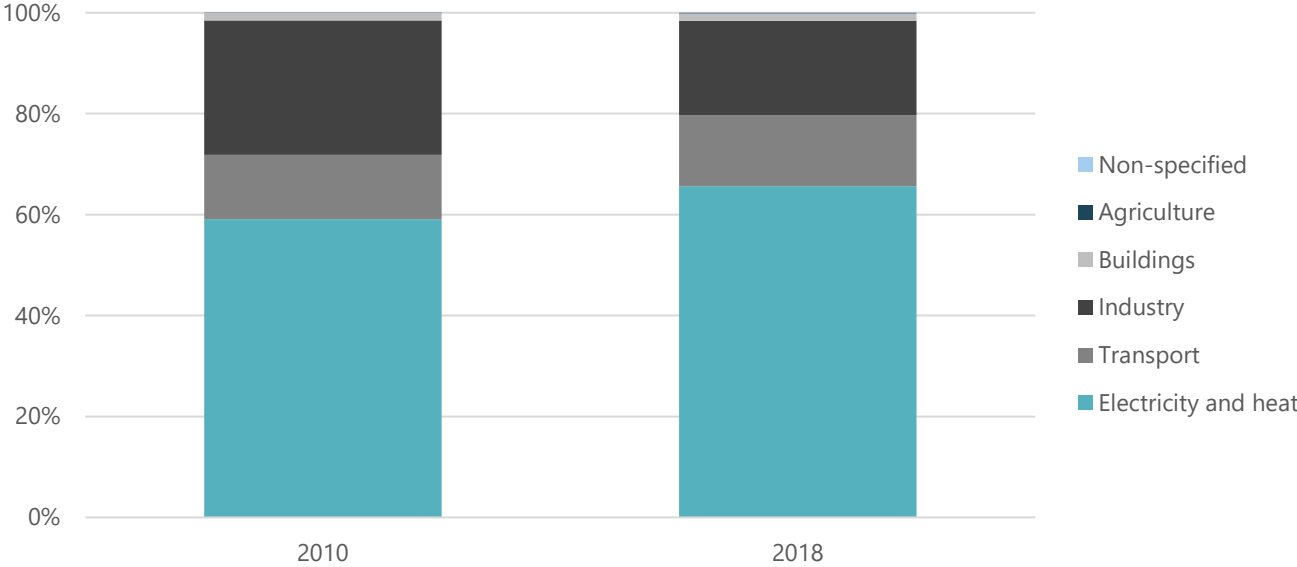


Source: APERC (2022).

Although hydroelectricity showed little growth, hydro remains the dominant renewable source, albeit seeing its share with respect to total renewables electricity decreasing considerably from 91.7% in 2000 to 65.3% in 2018. In contrast, the collective share of solar and wind increased significantly from 0.56% in 2000 to 29.3% in 2018, reflecting greater deployment of solar energy and wind power within APEC.

Direct consumption of modern renewables in end-use sectors also increases throughout the historical period. Biomass (modern) utilisation in the industry sector registered a 21% increase, while biofuels consumption in the transport sector grew over 13 times.

Figure 5: Modern Renewable Energy Share in End-use Sectors, 2010 and 2018



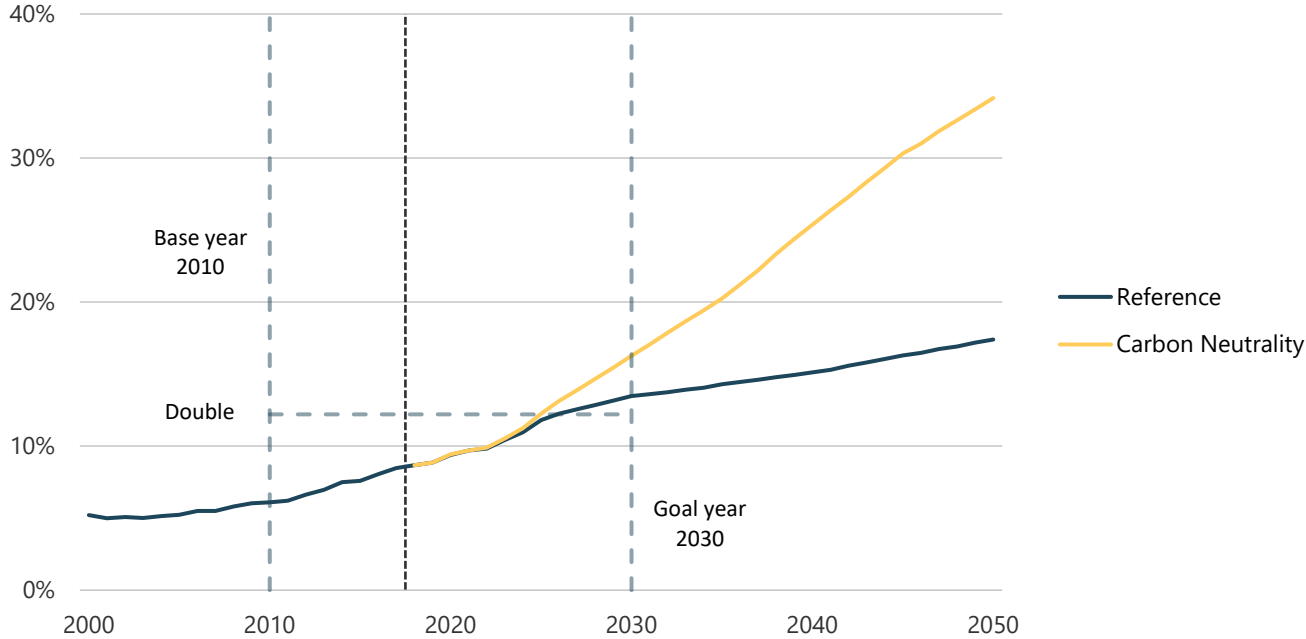
Source: APERC (2022)

APERC concurrently tracks the share of modern renewables in APEC, in line with APEC-wide renewables doubling goal relative to 2010 levels. Significant uptake of renewables in end-use sectors has seen the aggregated share of modern renewables increased from 6.1% in 2010 to 8.7% in 2018, representing an increase of 42%. As illustrated in Figure 5, renewable electricity and heat consumption accounted for the largest share of modern renewables in 2010 and 2018, followed by direct modern renewables consumption in the industry and transport sectors.

4.2. Towards Renewables Doubling Goal

APEC is expected to meet the aspirational doubling of renewables goal by 2026 in REF, four years ahead of schedule, implying that APEC economies have enhanced their policies and measures in accelerating deployment of renewables. In CN, the goal is achieved five years earlier (2025), as can be seen in Figure 6.

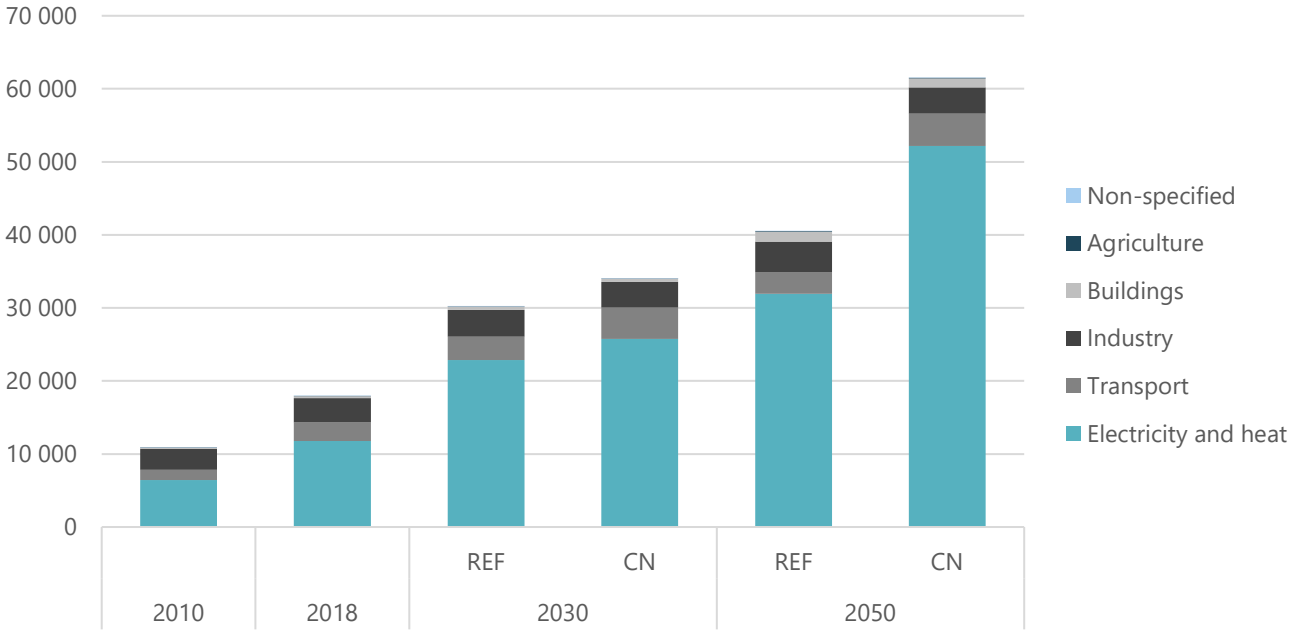
Figure 6: Aggregated Modern Renewable Energy Share in REF and CN, 2000 - 2050



Source: APERC (2022).

Renewable electricity and heat are expected to continue to account for the largest proportion of renewables, increasing to account for an even greater share of modern renewables that is currently the case. Figure 7 below shows that three-quarters of modern renewables consumption is expected to come from renewable electricity and heat in 2030, and by 2050, this will account for 79% and 85% of modern renewable consumption, in REF and CN, respectively.

Figure 7: Modern Renewable Energy Consumption in End-use Sectors, 2010 - 2050



Source: APERC (2022).

5. Conclusion

Achieving APEC-wide aspirational goals are vital for APEC to pursue a sustainable development pathway, especially in a low-carbon energy transition. The 8th APEC Energy Demand and Supply Outlook results highlight that the existing policies and measures adopted by APEC economies are likely to be effective in achieving the energy intensity reduction goal ahead of schedule in REF. Likewise, in contrast to the previous Outlook versions, APEC economies’ enhanced ambitions in accelerating renewables deployment, particularly solar photovoltaic, wind and hydro will help APEC achieve its renewables doubling goal in 2030 in REF.

6. References

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