

# Clean Energy & Transportation In China

## Introduction

China has urbanized and industrialized rapidly in the last fifty years and as a result has had a significant increase in greenhouse gas emission (GHG) Currently China is the largest producer of coal in the world.<sup>1</sup> Population growth poses unique challenges to China's growth in transportation and clean energy. Below we will discuss China's response to these challenges.

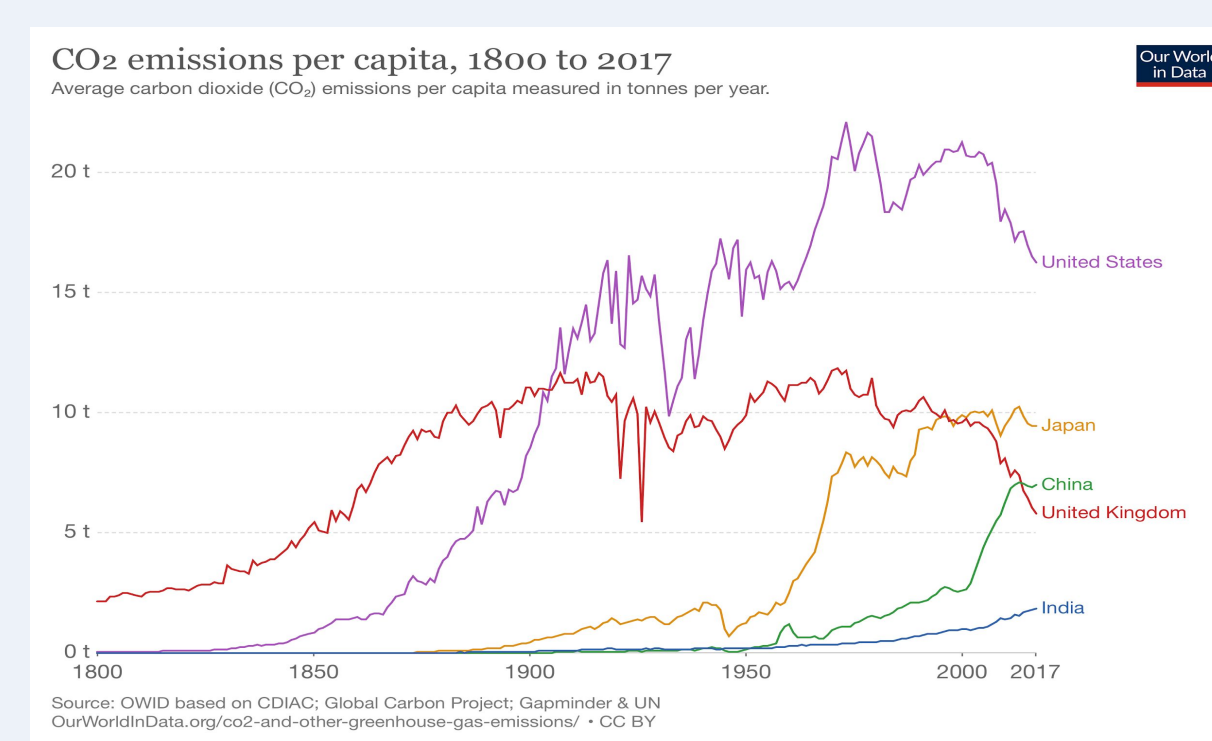


Figure 1: CO<sub>2</sub> emissions per capita, 1800 to 2017

## Population Growth

There are a multitude of factors that lead to population growth in cities. The combination of China's improvements in innovation, productivity, employment, and economic growth lead to larger urbanization of cities.<sup>2</sup> As a result China has witnessed the biggest urban transformation ever: between 1980 and 2010, the urban population in China rose by 480 million.<sup>3</sup> With urbanization continuing to increase, naturally transportation will be a necessity. However, clean energy will be essential to keep the countries pollution rates to a minimum.

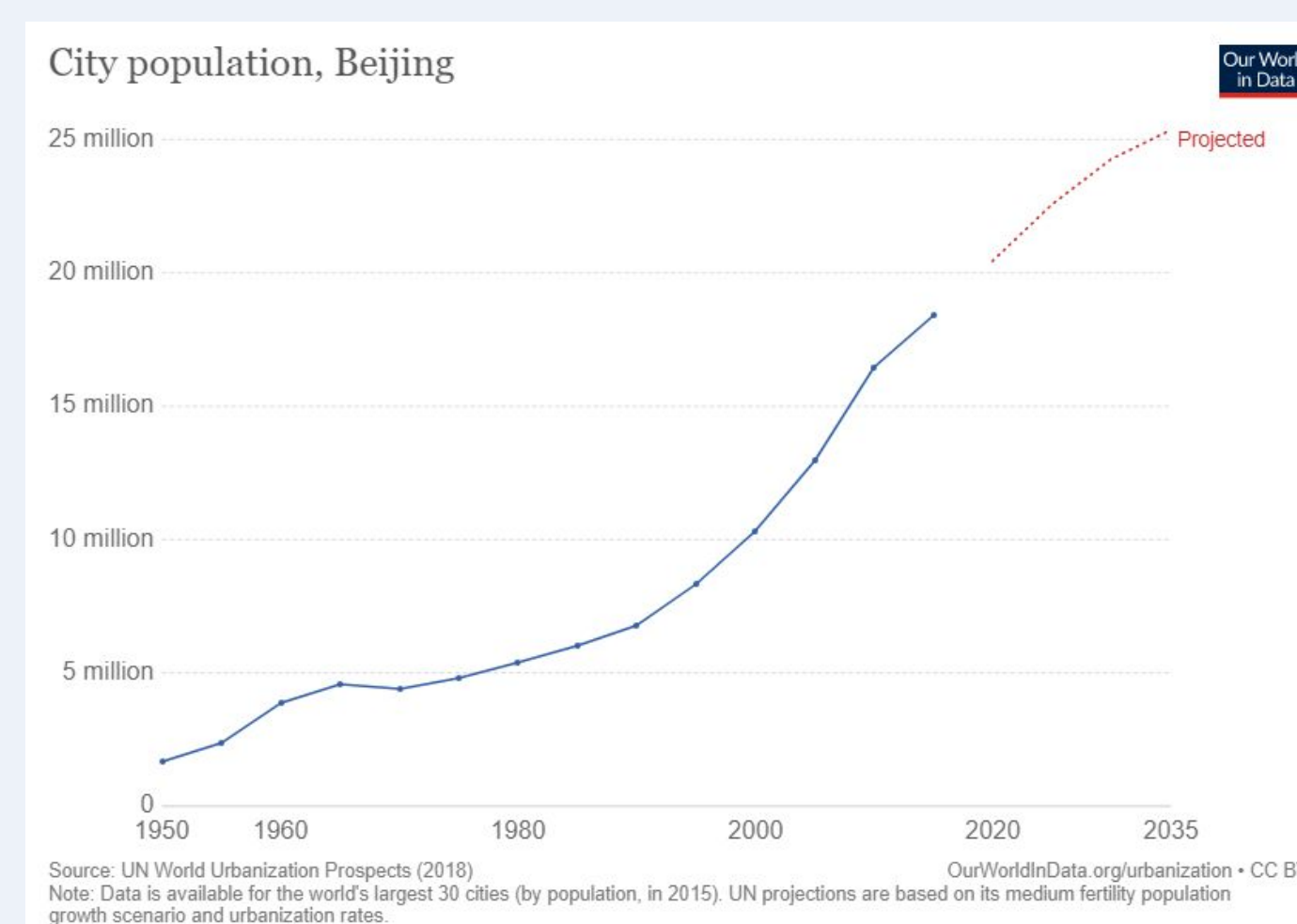


Figure 2: This graph shows the population growth trend line of Beijing over the last 70 years.

## Clean Energy

In 2016 China released their 13th Fifth Year Plan (FYP) which detailed their plans to expand their renewable energy, increase energy efficiency and introduce a green bond market. Their latest FYP included an increase in wind capacity, solar capacity and electric vehicles. China has now invested four times as much per capita GDP than their European counterparts. This marks a profound transition toward a low carbon economy. The main objectives of the FYP was to lift people out of poverty to double growth and to increase the urbanization rate to 60%.<sup>4</sup>

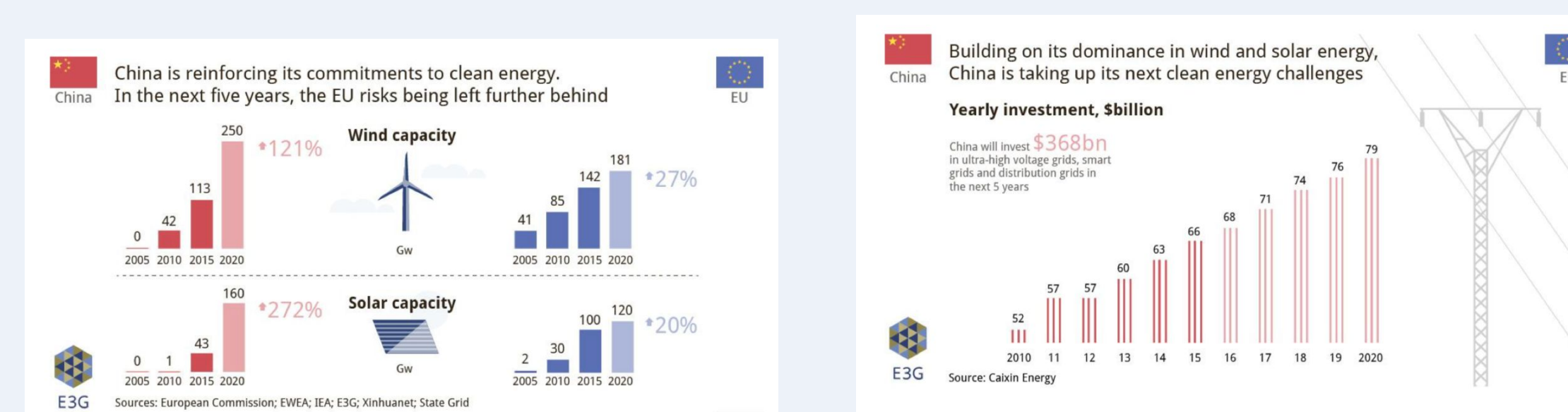


Figure 3: China's wind and solar

Figure 4: yearly investment

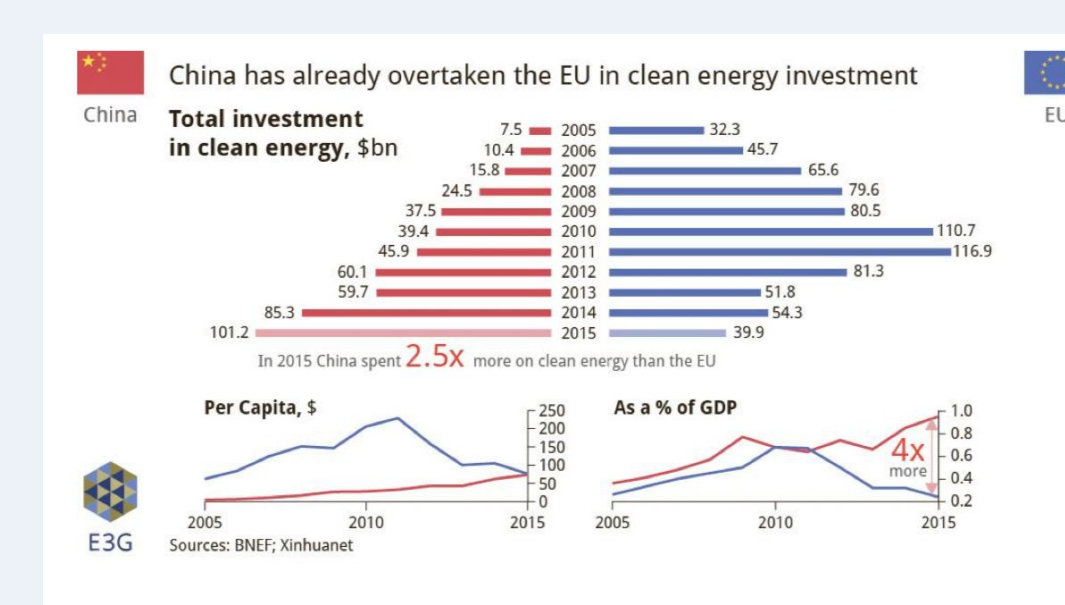


Figure 5: China vs. EU clean energy investment

China has invested four times as much per unit of GDP as the EU. They have established themselves in the wind turbine industry as well as the solar panel industry. In the most recent FYP they have committed themselves to lowering carbon intensity and committed to meeting 20% of their energy need with wind, solar, hydropower and nuclear. They have also pledged to reduce their coal production by 20%.<sup>5</sup> This plan outline their ambitious goals for the future, hopefully we can see these goals translating into real world application.

## Implications

Although China has made significant investments in wind, solar and hydropower there are drawbacks to the rapid pace of investment. There has been a disconnect between over capacity and incentive. As a result many wind turbines have remained idle and disconnected from the grid.<sup>6</sup> China has also faced problems in regards to their hydropower dams, which they are low carbon energy sources they have endangered wildlife and have displaced thousands of people.<sup>7</sup>

## Transportation Policy

The increase of urbanization, motorization, and economic growth in China over the span of thirty years have resulted in severe traffic congestion, air pollution and urbanization. Public transportation is one of the key ways for China to have a more sustainable environment as China's population increases everyday and the number of vehicle are rising daily. As urbanization increases and the number of cars increases, this has led to an increase of traffic congestion, traffic deaths and injuries, air pollution, noise, and energy consumption, along with urban sprawl in many areas.<sup>8</sup>

There are many ways of public transportation for people in China these days. Some of them include the high-speed railway, urban metro rail system, and bus rapid transit and bus investment. By 2011, China's high-speed railway system had become larger than the rest of the world's high-speed rail combined.<sup>9</sup> In 2010, China operated 8,538 km of high-speed and inter-city rail and another 5,000km will be constructed by the end of 2011. By the end of 2015, rail lines in China will reach 120,000km with more than 16,000 km of high-speed rail. For the urban metro rail system, there are six cities that already have it including: Beijing, Shanghai, Tianjin, Guangzhou, Shenzhen, and Nanjing, all together having 48 lines and having a total length of 1,395 km.<sup>10</sup>

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