Ladies and gentlemen, good afternoon.

It is an honour to be here in Chengdu with you today, speaking alongside such distinguished guests. I am equally pleased to be speaking on such a compelling topic, namely: when it comes to the transportation sector, how can we manage significant energy demand while reducing emissions?

In fact the answer has already been summed up by the headline above the forward to this Green Paper, where it says: “Be daring! Be innovative!” This is exactly what is necessary.

For global energy demand, not only in transportation but indeed across all sectors, is an issue of significant concern for both China and the rest of world. According to the IEA’s World Energy Outlook 2014, China is the world’s top energy user. It is the world’s largest consumer of coal and the second-largest consumer of oil. Expanding car ownership and use underlie a continued rise in China’s oil demand – from 10 million barrels per day in 2012, to more than 15 million in 2040. Local air pollution has become, and will remain, one of the most pressing public health challenges facing Chinese policy makers for the foreseeable future.

According to a report issued by the Ministry of Environmental Protection, only three out of 74 Chinese major cities were able to meet national air quality standards in 2013, and 11 of China’s most polluted cities were among the 13 cities in the Beijing-Tianjin-Hebei area accounted for.

However, China is also one of the world’s top generators of electricity from hydropower, wind and solar PV. This raises the possibility of the electrification of the transport network, powered by clean, renewable energy. Not so many years ago, this may have seemed like science fiction, but globally the number of plug-in electric vehicles on the road has increased by at least a factor of four in just the last three years. A clean, bright future is possible.

However this is not something that will happen easily, and we are not on the right track.

In fact, the IEA’s business-as-usual scenario sees global transport sector energy use and emissions nearly doubling over 2010 levels by 2050, putting us on a dangerous course toward an average global temperature rise of 6 degrees Celsius.

Energy use in transport has increased by 28% since 2000, at a rate of 2% per year. And oil products represent more than 90% of final energy consumption in the transport sector.
With this in mind, in order to reach targets of an average temperature rise of 2 degrees Celsius by 2050, the world will need to take drastic actions. It will mean not only cutting transport emissions by nearly 30% by 2050, but also stabilising transport energy consumption.

A major part of those reductions will come from increasing adoption of efficient vehicles – including hybrid, plug-in hybrid and electric vehicles. Low-carbon fuels, such as second-generation biofuels, will also play a key role in moving transport away from conventional oil products. Better planned communities will enable investments for shifts to more efficient modes such as bus and rail, helping to meet emission targets while also building a more sustainable and cost-effective transport sector.

However, what we need for sustainable change is to go beyond these individual actions, to a broader systems approach. We must be wary of quick fixes, and this is something I will return to shortly. Of course it helps to start with a framework that I’m sure many of you are familiar with – avoid, shift, improve.

- **Avoid** refers to measures that slow individual travel growth. This can be accomplished through city planning and demand management. It will mean reducing the average distance between the origin and the destination of trips and optimising the usage of vehicles and infrastructure.
- **Shift** enables people to travel on more efficient modes, such as public transport, walking and cycling, and prompts businesses to shift transport of goods from trucks to rail. It refers to measures that enable us to take advantage of better efficiency exhibited by collective passenger transport modes, in addition to rail.
- **Improve** encourages the adoption of new technologies and fuels. This means reducing the specific energy consumption and emissions of each mode with technologies that allow for efficiency improvements, diversification of energy sources, and access to low-carbon energy carriers.

The good news is that most of these technologies are already commercially available.

There are a number of promising technologies, and for cars, a 50% reduction in specific energy consumption by 2030 is viable and cost-effective. Electrification is of course the first consideration. It is highly efficient, enables access to low-carbon electricity, and can be used immediately in road and rail transport.

Biofuels are also an option, and are especially important where electrification is not well suited, such as heavy-duty road vehicles, shipping and aviation.

Finally, hydrogen remains part of the discussion, but its potential is – at least for now – limited by the high costs of hydrogen distribution infrastructure and the need for significant cost reductions for fuel-cell technologies.

**However, despite the promise of such technologies, there is no magic solution to decreasing emissions while managing demand for transport.**

Rather than focusing on specific technologies, what is needed is a systemic approach, where the transit system works in tandem with the energy system. Where regulations reinforce and complement the
trajectory of industry. Where innovative policies and technologies are an integral, fundamental part of the system.

Game changers are important, there is no question. Like we said, Be daring! Be innovative! But game changers need support. Let’s be honest, it is relatively easy, for example, to implement a car-sharing scheme. This has been done in major cities throughout the world. However, how much use is this car sharing scheme if it’s based on inefficient vehicles and congested roads, is priced out of the reach of low-income families, or discourages investment in the public transportation system?

What’s needed instead is an integrated and intelligent transportation and energy system.

This is a system that features distributed power generation, both fossil-based and renewable, increased consumer engagement and demand side management, utility-scale storage technologies, and centralized power and heat generation.

It’s a system where you can plug in your electric car in the evening, and while charging, help to balance the grid.

It’s a system where information technology and big data mean the optimisation of planning and deployment. Transit supply can be more accurately matched with demand, and energy and resources can be routed to where they are most needed.

It’s a system where prices are set to optimise investment and operation. This means pricing mechanisms that encourage transit demand and reduce congestion, fiscal incentives for transport infrastructure deployment, and putting a cost on emissions.

It’s a system that optimizes the use of resources, and gets people and goods to where they need to be as quickly and efficiently as possible.

With a systems approach, the benefits reach far beyond emission reductions. It can mean improved energy security, health benefits, increased economic competitiveness and, of course, a positive environmental impact.

So while we shouldn’t stop building for the sky, we must be sure we’re building on a solid foundation.

There are three fundamental steps that can be taken to ensure that innovations have an opportunity to make a difference.

- **First**, the removal of fuel subsidies will allow price signals to be passed on to consumers. This can help to manage demand, and make energy-efficient technologies cost-effective. For biofuels, we need legislative frameworks that regulate the conversion of land, paying attention to deforestation, with an aim to linking the benefits of biofuels to actual benefits in terms of emission reductions.
- **Second**, pricing mechanisms can manage demand growth. These include fuel taxes, road charges, congestion and parking fees, and access restrictions. If implemented in tandem with policies that reduce travel distances, these pricing mechanisms can be cost-neutral for consumers. These will also
become necessary to maintain government revenues, as fossil fuel use declines in favour of alternatives.

- **Third**, market incentives for energy efficiency – including fuel economy standards, labeling and information campaigns – can encourage consumers to make good choices. Combined with electrification, and a push for low-carbon technologies in power generation, this can have a significant effect in decreasing the emissions of the transport system.

Ladies and gentlemen: **It is true that we must be daring, and we must be innovative.**

The status quo in the transport sector, and indeed in the energy sector, is unsustainable in the context of emissions reductions and pollution control. Electrifying transport while continuing to burn coal is not the answer. Investing in public transportation while promoting urban sprawl is also counterproductive. And of course attempting to change the paradigm of personal transport, without actively managing demand through financial and other incentives, will simply not work. Let us make the more difficult choice, and look to the entirety of the system.

I am looking forward to stimulating conversation – and the kind of innovative ideas that are born from such discussion.