

## Proposed Research

The price of oil affects the outlook of both incumbent and alternative fuel, and the price of oil is a function of supply and demand. Since China's demand has a substantial impact on global demand of petroleum and thus affects prices of oil. In this study, we seek to make projections of how the demand for oil in China will change based on observations of urbanization trends, advanced automotive technology, and the development of "the internet of things" that affect transportation in China. Applications such as Maps, Waze, Uber and Lyft, and mobile phone app-based load matching and routing in freight system currently under discussion, are posed to modify the Chinese transportation landscape significantly. The value of this research lies in the preeminent impact that China's demand has in global oil demand projections.

## Background

China's vehicle population has soared in the last three decades and vehicle sales exceed US in 2009 as the largest vehicle market in the world. Vehicle population could increase further if economic development is sustained. However, regulations to restrain vehicle population might appear in heavy air pollution in mega-cities such as Beijing, Shanghai, Guangzhou, Hangzhou, Tianjin etc. With the international consolidation on the GHG emission control, China has committed to a peak in CO<sub>2</sub> by no later than 2030, and a deep reduction in CO<sub>2</sub> per unit gross domestic product (GDP) in this same time frame. China has adopted the 6.9L/100km fuel efficiency regulation for 2015 and 5L/100km for 2020. Vehicle electrification promotion is also emphasized by the central government. More aggressive fuel efficiency development and vehicle electrification penetration could decrease the oil demand. The application of digital internet car-sharing phone apps like Uber and Lyft are changing the passenger vehicles travelling in US and China. Similarly, mobile phone app-based load matching and routing in freight system are under discussion and design. As China's internet user base continues to grow, and infrastructure and equipment are increasingly integrated, it can dramatically reduce the unnecessary travel.

There have been numerous projection research on China transportation oil consumption published. IEA estimates that China will exceed US becoming the largest oil consumption country in the world in 2030s (released the Energy Outlook 2015 in November). Chinese and American scholars have used the FEEI model projected the fossil-energy use, petroleum use and greenhouse gas emissions of the road-transport sector in China up to 2040 to project potential policies of vehicle fuel-consumption improvement, dieselization, vehicle electrification and fuel diversification (Huo, Wang et al. 2012). Their BAU scenario show that the road transport in China will create three to four times oil demand of the current level, and different policy scenarios can reduce the demand 10%-44%. Other researchers used the bottom-up LBNL China End-Use Energy Model assessing the energy efficiency policies potential of reducing all-sectors energy demand and emission (Zhou, Fridley et al. 2013). They find that the energy consumption in China will peak around 2030 and the transportation sector will have less contribution than power and industry sectors.

In this study, we will expand on the existing analysis with the incorporation of new diesel use projections restricted by pollution regulation and we will look into the effect of smart phone applications and traveling behavior on overall oil demand.

## Specific questions

1. How much is the economy expected to grow? (lit review)
2. How doe GDP correlate with car ownership?
3. What regulations to reduce air pollution affect car ownership?
4. How are smart phone apps reducing VMT?
5. How does this affect demand for oil in China?

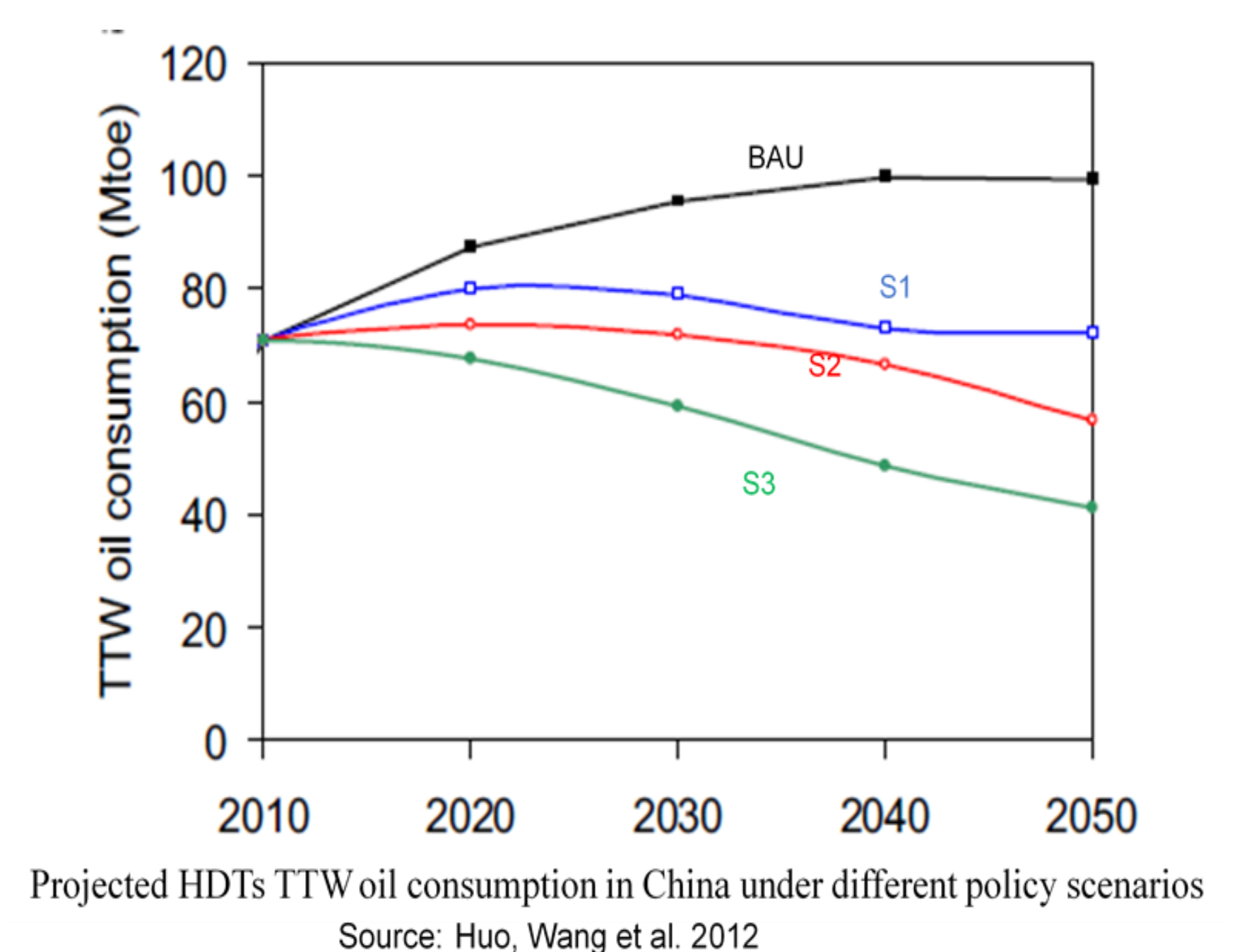
## Methodology

- Data analysis to show correlations between economic growth and vehicle ownership
- Data analysis to show correlation between economic growth and freight.
- Review existing and potential regulation restricting car ownership.
- Review regulations restricting freight activity.
- Empirical analysis of effect of smart apps on VMT of both light and heavy duty vehicles.
- Input in GCAM or similar model to project the fuel consumption on the passenger vehicles in China through 2030 and 2050.
- The projections will be conducted by five groups of scenarios: BAU, strict regulation on the passenger vehicle population, high penetration of more fuel efficient and electric vehicles, high penetration of alternative fuel in transportation sector and high-efficient transportation system.

## Expected Outcomes



The final outcome of this research is the projection of the oil consumption in China through 2015 five groups of scenarios: BAU, strict regulation on the passenger vehicle population, high penetration of more fuel efficient and electric vehicles, high penetration of alternative fuel in transportation sector and high-efficient transportation system, which is similar to the results in the right figure.



## References and Datasets

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