

The Energy Mix and the Impact of China's Renewable Energy Development in Tibet: The Loss of Human Security

การผสมผสานพลังงานและผลกระทบต่อการพัฒนาพลังงาน
หมุนเวียนในทิเบตของจีน: ความสูญเสียต่อความมั่นคงของมนุษย์

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Abstract

China's energy situation has changed dramatically, especially after the 1990s, when the economy was growing fast that led to the increasing consumption of huge amounts of electricity. This situation led to the development of renewable energy in various areas throughout the country in the 2000s, including the Tibet Autonomous Region, which is well-equipped with water resources and has tremendous potential for generating electricity from solar energy. The growth of renewable energy investments in the Tibetan area, both hydropower and solar, has led to an attempt to analyse the role of renewable energy in the overall energy mix and its impact through the energy security and human security frameworks. The study focuses on analysing the variable energy mix after the 21st Century. In this regard, the study concentrates on how much the potential of renewable energy is to increase the energy mix. At the same time, this study explores the effects and benefits of renewable energy development at the local level, based on the case of Tibet Autonomous Region, through qualitative research based on primary and secondary data. The

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main argument of this article is the expansion of renewable energy development in Tibet which expected to serve the local people cannot fulfil those goals because this project also creates human security problems that have not happened in any case of renewable energy development.

Keywords Energy Mix, Human Security, Renewable Energy, China, Tibet

บทคัดย่อ

สถานการณ์ทางด้านพลังงานของประเทศจีนมีความเปลี่ยนแปลงมากยิ่งขึ้น โดยเฉพาะหลังทศวรรษที่ 1990 ซึ่งมีการใช้พลังงานไฟฟ้ามากยิ่งขึ้น อันเกิดจากการขยายตัวอย่างรวดเร็วของเศรษฐกิจภายหลังการเปิดประเทศ ลักษณะนี้ส่งผลให้รัฐบาลจีนต้องมุ่งพัฒนาความหลากหลายของพลังงานมากยิ่งขึ้น โดยเฉพาะพลังงานหมุนเวียนในหลากหลายพื้นที่ของประเทศรวมถึงเขตปกครองตนเองทิเบตด้วย พื้นที่ดังกล่าวมีความหลากหลายทางด้านทรัพยากรและมีศักยภาพในการต่อยอดการพัฒนาไฟฟ้า พลังงานน้ำและพลังงานแสงอาทิตย์ การเติบโตของการลงทุนด้านพลังงานทดแทนในพื้นที่ทิเบตทั้งพลังงานน้ำและพลังงานแสงอาทิตย์ได้นำไปสู่ความพยายามในการวิเคราะห์บทบาทของพลังงานหมุนเวียนในส่วนการผสมผสานพลังงานโดยรวมและผลกระทบในกรอบความมั่นคงด้านพลังงานและความมั่นคงของมนุษย์ สำหรับการศึกษานี้วิเคราะห์ตัวแปรในส่วนของ การผสมผสานพลังงานในยุคศตวรรษที่ 21 และมุ่งตอบคำถามสำคัญว่า การพัฒนาพลังงานหมุนเวียนมีศักยภาพเพียงไรในการเพิ่มสัดส่วนการผสมผสานพลังงานในเวลาเดียวกัน การศึกษานี้สำรวจผลและประโยชน์ของการพัฒนาพลังงานทดแทนในระดับท้องถิ่นโดยอิงกับกรณีของเขตปกครองตนเองทิเบตผ่านการวิจัยเชิงคุณภาพโดยอาศัยข้อมูลปฐมภูมิและทุติยภูมิ ข้อโต้แย้งหลักของบทความนี้คือ การขยายตัวของการพัฒนาพลังงานหมุนเวียนในประเทศจีนเพื่อให้บรรลุถึงความมั่นคงด้านพลังงานที่คาดว่าจะเป็ประโยชน์ต่อคนในท้องถิ่น แต่ผลการศึกษากลับพบว่าแนวคิดดังกล่าวไม่เป็นความจริง เพราะมันยังสร้างปัญหาความมั่นคงของมนุษย์ได้อีกด้วย

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1. Introduction

Chinese society is one of the most complex and diverse societies in the world, such as culture, population, politics, and economy. Understanding the state of China requires a broader picture of Chinese history because the formation of modern states in this country began to materialize during the colonial period. Before the late Qing Dynasty, China was a conservative state with no clear border (Mitter, 2008, pp. 10-11). There was no permanent boundary, and the change of political power such as the military, the economy, and the government was in accordance with the emperorship of each emperor (Fenby, 2008, pp. 3-4). Before the communist party era, the small states under the Chinese empire can be enjoyed their power, as in the case of Tibet and Xinjiang. Both states, at some point, were independent and fought against the Chinese empire (Palace, 2005, pp. 2-4). The Chinese governance during the early days of the ancient state was mutable, constantly changing, and there was no clear demarcation of authority. The pattern of change was increasingly changing as the expansion of colonialism in Asia, the collapse of Shogun system in Japan, and the rise of a conservative state into the modern state of Siam (Hsu, 2000, p. 261). These political changes in the region have resulted in the government seeking more adaptation to counter the changing world to maintain a greater influence over the regions within the Chinese empire.

However, the Qing government failed in reforming the country, this problem brought about revolution and change of government into the Republic in 1911, which is a major turning point in Chinese history (Mitter, 2008, p. 2). That revolution brought about an endless conflict that lasted nearly forty years, which reflected the final victory of the people through the Communist Party of China led by Mao Zedong. The Communist Party of China established the People's Republic of China (PRC) in 1949, which is one of the most historic moments in China's history and politics (Fenby, 2008, pp. 353-356). Mao's communist rule brought revolution and reform on several issues, including land reforms to distribute land access, reform of state-controlled production

patterns, Cultural Revolution, etc. However, the Mao's doctrine was unsuccessful, resulting in Mao's work not being completed until his death in 1976. Mao's death brought China's political turmoil again, but the situation eventually ended when Deng Xiaoping rose to power in 1977 (Hsu, 2000, pp. 849-852). The new economic policy was to open the country, which was the new way of development in China, under the Communist regime. Obviously, the economic and political reforms at that time led to large-scale exploitation of resources in response to the development and external investment, particularly in the industrial sector (Cannon & Jenkins, 1990, pp. 12-16).

The growth of the industrial sector has led to a greater use of natural resources and exploitation of the environment such as the coal, the petroleum, and the mineral since the implementation of new investment strategy. In the case of China, fossil fuels such as oil, natural gas, and coal were the main raw materials for generating the electricity before the 1990s. Therefore, the rapid economic growth in China led to the huge consumption of electricity specifically the major cities along the eastern coast. As a result, the natural resources and environment are severely affected, until some resources are inadequate for domestic growth or insufficient for the needs especially the energy resources (Howard, 1990, pp. 179-181). The lack of raw material to generate the electricity resulted in the import of large amounts of fossil fuel from abroad to reduce the gap. From 1990 to 2010, China stopped generating electricity from oil as the consumption rose from 114.4 Mt to 458.1 Mt, but the Chinese government can only produce 204.7 Mt (Leung, Li, & Low, 2011, pp. 490-492). This phenomenon has a huge impact on the energy security in China. Therefore, the Chinese government has decided to invest in the renewable energy sector to reduce its dependence on foreign energy since the end of the 20th century (Howard, 1990, p. 187). In this regard, investment in renewable energy sector, which is used to generate electricity to meet the economic growth, will continue to focus on water, solar and wind energy.

One of the key areas where the Chinese government invests heavily in renewable energy development is the Tibet Autonomous Region (TAR),

which has richness in water resource and solar radiation (Yuan, Zuo, & Ma, 2011, p. 1032). Over the years, the large dam was constructed to generate electricity in TAR. In addition, the Chinese government has spent a large sum of money on solar farms too. This led Tibet to be the largest producer of solar power in China. Therefore, Tibet becomes a key area of Chinese Renewable energy sector benefiting from clean energy and generates the electricity nearly 9 MW (Wang & Qiu, 2009, pp. 2181-2182). Currently, TAR has more than 400 solar farms and 20 hydropower stations (Walker, 2016). This renewable energy investment in TAR has led to this study, which focuses on the Impact of renewable energy sector toward Chinese energy security. The study aims to analyse the role of renewable energy in strengthening the energy mix while analysing the benefits and impacts of the people through the energy security and human security frameworks. The researcher has hypothesized that although the development of renewable energy in Tibet will help strengthen the energy mix in China, this energy transition will not directly impact the local people. In contrast, this situation only benefits the Han people in terms of employment and energy security. In this regard, the study based on the qualitative research through the analysis of primary and secondary resources. For primary data, it is based on the study of government-issued documents, legislation, and government policies aimed at developing renewable energy in the area. Secondary information is based on the quest for writings or studies related to renewable energy in TAR such as textbook, journals, articles, news, etc. In the last section, the researcher used both data to synthesize and analyse to seek answers about the impacts and benefits of investing in the renewable energy sector in Tibet.

2. The Energy Security: The Human Security and Renewable Energy Development

Since the Cold War ended in the early the 1990s, international security issues within the framework of the Neorealism have expanded. Non-traditional security becomes the new threat, especially the environmental and energy

issues. The heavy resource exploitation to serve the economic growth led to the inefficiency development. To sustain the economic expansion, energy resources specifically electricity is one of the key factors to support the economic competition (Naughton, 2007, pp. 9-10). Therefore, many countries concentrated on their energy security. The Energy Security theory emerges from the new dimension to discuss the non-traditional security. However, this theory has not been a unified definition. Therefore, this concept has much meaning based on the status of the states such as producer, consumer, or transit state (Luft, Korin, & Gupta, 2011, pp. 43-44). On the other words, energy importers need supply and price stability, while energy exporters need stability in demand and high prices. Moreover, the population growth, the economic growth, the large subsidies of electricity and the price of fuel transportation have impacted on the energy vulnerability. This is also the new challenge for the energy security in the exporting and importing countries. Today, there are two types of energy use which affect the energy security. Firstly, it is electricity that is generated from various sources. The second sector is transportation (Milstein & Cherp, 2007, pp. 238-239). For this study, it is focused on the electricity sector.

There are several ways to sustain energy resources within the country. Firstly, the states can diversify energy resources to generate electricity by moving from fossil fuel to renewable resources. There have several ways to sustain energy resources within the country. First of all, the states can be diversification of energy resources to generate the electricity by moving from fossil fuel to renewable resources. Secondly, the states should reduce the risk from energy supply through increasing independence on imported energy supplies. Thirdly, enhancing efficiency and conservation measures is also another way to support energy security (Luft et al., 2011, pp. 45-46). However, the distribution of energy resources has become a key policy choice for many countries to build domestic energy security, because it has a cheap cost and reduces dependence on foreign energy. This situation can be explained through the concept of the energy mix that reflects a usage condition, size, and energy source availability. At present, many countries are increasingly

aware of the risks of fossil fuel dependence. Renewable energy resources, which have been developed new technologies for use, have become a new choice for a diversification of energy sources (Tyler & Herremans, 2018, pp. 183-184). Consequently, increasing the proportion of energy mix through renewable energy development has become an energy policy of many countries, which is expected to foster energy security and sustainable development (Stirling, 2014, pp. 86-87).

While the theory of energy security is directly related to the issue of international relations and economy, it is also directly related to human security. The improvement of energy technology is a necessary condition for human security as they can independently access the energy sources. Today, around 2.7 billion people are unable to use modern energy in terms of heating, cooking and working. Moreover, more than 1.94 million people who live in developing states die each year from respiratory failure as an outcome of exposure to pollution from fossil fuels (Karlsson-Vinkhuyzen & Jollands, 2013, pp. 509-510). In addition, energy security also links quality of life and effective health systems that promote human security (S. Rajaratnam School of International Studies, 2014). Overall, many studies have shown that increased energy security has a significant impact on human security and a reduced risk of death. It also has an important role to play in halting poverty. Equal economic distribution and environmental sustainability are important components of human life (James, 2014, pp. 73-74). In this regard, renewable energy is the most interesting source in the investment and technology development sectors, because it can generate electricity at a low cost and can operate at a rural level that can support the accessibility of the poor people. Moreover, it also reduces the CO₂ emission from the electricity generation (Sovacool & Drupady, 2012, pp. 37-39).

At present, renewable energy is an important energy resource that has been developed in an innovative way. Many countries start promoting renewable energy investment in generating more electricity because it can be promoting energy security, increasing energy mix, and reducing dependence on

foreign energy. In essence, it contributes to promoting access to electricity in rural areas, thereby reducing inequalities in development and ineffective public health (Brugger, 2016, pp. 81-82). However, the development of renewable energy to promote energy security contributes greatly to environmental problems. The expansion of investment in hydropower plants has brought about the problem of changing ecosystems (Yang & Chen, 2014, p. 2724). In the same way, the development of solar power also has a significant impact on the environment, such as land use, habitat, water resources, and the hazards of solar cell production (Tsoutsos, Frantzeskaki, & Gekas, 2005, pp. 290-292). It is interesting that the study on the effects of renewable energy is mainly concerned with the environment, but lack of human impact studies.

3. The Renewable Energy Development and the Energy Mix: Tibet Autonomous Region

Since the 1990s, the Chinese government has begun investing large amounts in the generation of electricity from renewable sources, particularly in dam projects, where many of the investment regions are a southwest region such as Tibet and Yunnan. Meanwhile, investment in wind and solar have grown significantly in Xinjiang, Tibet, and Inner Mongolia (Naughton, 2007, pp. 341-343). However, renewable energy projects started to take place in the late 2000s. The substantial expansion of renewable energy at that time was consistent with the enactment of the Renewable Energy Law of China 2006, which is an important framework that the government is using to set goals for increasing the mix in the energy sector (Hezri & Hofmeister, 2012, pp. 55-60). In fact, Chinese potential for electricity from renewable energy was only 615,005 GWh in 2008, after the heavy investment, it rose to 1,425,180 GWh in 2015 (Guizot, 2007, p. 118).

To implement renewable energy development policy, Tibet Autonomous Region (TAR) is a land that has played a very important role in this development because the Yellow River, the Yangtze River and the Mekong River have risen in this region. All the rivers listed above are vital to the economy, transportation,

agriculture, and industry. Moreover, it also has a potential to produce electricity (Schaik, 2011, pp. 160-161). In addition to the richness of its water resources, the solar radiation in TAR is also remarkable, which is expected to be the best in the world (Li, Ma, Lian, Wang, & Liang, 2011, p. 3144). These factors led TAR to be the main investment area of hydropower plants and solar farm since the beginning of the 21st century (Caballero-Anthony, Koh, & Jamil, 2012, pp. 8-9). In 2004, the Chinese government invested huge amounts of money to develop solar power in the Tibetan area (Yue, 2010, pp. 49-52). This development directly impacted on the access to electricity in TAR because this region was abandoned in the Deng era. Therefore, TAR was underdeveloped and was the poorest region in China from the 1950s to 1990s (Cannon, 1990, p. 33).

In 2014, the renewable energy capacity in TAR accounted to 3.24 billion kWh, accounting for 89.94 percent of total electricity generation. Hydropower can generate electricity around 2.90 billion kWh or 80.64 percent of total electricity generation. Therefore, the fossil fuel to generate electricity accounted for only 10.06 percent. In addition, the successful renewable energy development to increase energy mix in TAR was better than the average level of 11.30 percent (Shan et al., 2017, pp. 858-860). Moreover, Tibet became the cleanest province in China as they can generate 97 percent of electricity from clean energy sources in 2016 (The Economist, 2018). In the same way, the 400 photovoltaic power stations in Tibet had a total capacity of nearly 9 MW in 2008, but the capacity increased to 330 MW in 2016. This is a rapid increase in the development of solar energy in Tibet (Wang, Li, & Cheng, 2012, pp. 86-87). Therefore, the expansion of renewable energy investment in Tibet has played an important role in increasing the energy mix and reducing the import of energy from abroad. Tibetan success in reliance on renewable energy has become a key model for the Chinese government to reduce the use of electricity from fossil fuels and to increase the energy mix from renewable sources (Shan et al., 2017, pp. 861-862).

In 2017, Tibet's GDP rose to 131.06 billion-yuan, while the GDP in 2000 was just 12 billion-yuan (Liangyu, 2018). Tourism is the most beneficial sector for increasing access to electricity through the renewable energy development

in the area (Barnett, 2015). By 2006, Tibet had over 2.5 million visitors, of whom 0.15 million were foreigners. After ten years, the tourists rose to 25 million in 2017 (Pengying, 2018). According to the International Energy Agency, increasing energy mix in China contributes greatly to reducing dependence on fossil fuels, particularly coal. Coal-fired power generation will decline by 15 percent in 2040 (International Energy Agency, 2017). Today, China invests and develops in the solar industry, accounting for half of all energy investment in the country, and it accounts for 40 percent of global investment. Certainly, the main area of the Chinese government's solar investments is the Tibetan region (Middlehurst, 2017). TAR is playing a huge role in increasing energy mix, leading to overall domestic energy security.

In 2000, China generated 17.87 percent of its electricity from renewable energy, with production increasing to 27.23 percent by 2015 (International Energy Agency, 2003). In addition, renewable energy such as water and solar energy, which has invested heavily in Tibet after the 21st century, has seen an interesting growth. In 2000, the proportion of electricity produced by water and solar accounted for only 1.65 percent of total electricity production, but the figure rose to 20.06 percent in 2015 (International Energy Agency, 2018). This figure clearly confirms the importance of Tibet in contributing to the energy mix in China. This factor contributes to maintaining overall energy security and economic growth in China.

4. Chinese Energy Security and The Human Security issues in TAR

Although the development of renewable energy in TAR generates many economic benefits and increases the energy mix for China, this phenomenon has created enormous problems for environmental issues (Mathews & Tan, 2015, pp. 49-51). Moreover, the benefits of such economic growth make little sense to the people in the area. The investment of hydropower plants and the solar farm projects did not create additional jobs for the Tibetans (Jue, 2011, pp. 169-170). After the operation of Qinghai-Tibet

railroad in 2006, a Chinese government planned to employ Han Chinese to work on the government project in the TAR including the dam construction and solar farm (Rivers, 2016). Tibetans became the second-ranking worker in the renewable energy development project. This situation led to more Han Chinese emigration to the region and can be traced back to the Han numbers in TAR which increased to 8 percent of this regional demography in 2011. (Asia News, 2015). In addition, the provincial bureaucracy is preserved by the Han people rather than the Tibetans. The Han proportion in the TAR's government is 66 percent of the total (Bianchi, 2006, pp. 64-66).

Moreover, the major problem is the rapid development of renewable energy in the Tibetan area, especially the hydropower plants along the major rivers, has risen the environmental problem in the area as well as problems of development and inequality in the area because more than 40 percent of Tibetans are mainly engaged in agriculture, where water and forest resources are important for cultivation (Zhang, Xu, & Cai, 2017, pp. 2-3). Interestingly, all renewable energy development projects are run by the government and are large development projects. Although there is a greater expansion of access to electricity, renewable electricity generation remains a monopoly of the government (Kahrl, Williams, & Jianhua, 2011). Therefore, the concept of renewable energy development to promote access to electricity through decentralization of electricity management is not happening in China. At the same time, renewable energies also focus on large-scale investments through government corporations, rather than encouraging people to participate, such as a solar rooftop (Walker, 2016). This reflects that Chinese renewable energy development in Tibet aims to address economic development, particularly the services and industrial sectors, rather than the improvement of the quality of life in the region. Economic data in Tibet also reflect that the industrial and tourism sectors were dominated by the Han Chinese more than 60 percent in Lhasa (Wong, 2010).

Economically, Tibetans are not directly or indirectly benefiting from the renewable energy development to strengthen energy security in China.

T Tibetans also face human security risks. Firstly, the Tibetans are mainly engaged in agriculture, where water and forest resources are important for cultivation and are also important factors in determining the climate and ecosystem (Fischer, 2011, pp. 1-3). The implementation of a large dam project to generate electricity has led to several deforestation and river flow changes, which have had a significant impact on the agricultural sector. Hydropower projects in TAR have resulted in large areas experiencing permanent water problems that trap water, lead to expulsion, and change in the way of life from agriculture to fisheries (Smil, 2010, pp. 9-13). These issues are similar to the expansion of the solar farm in Tibet, which has led to significant agricultural land loss to the Tibetans (Yuan et al., pp. 1031-1033). The employment figures for Tibetan agriculture declined from 76 percent in 1999 to 56 percent in 2008. The decline was mainly due to the loss of agricultural land for the construction of renewable energy projects (Fischer, 2011, p. 5).

This agricultural change phenomena, which are a major economic sector of Tibet, has led to other of human security problem. Those are personal security and community security. We can see that the vast renewable energy development in TAR had resulted in 2 million displaced Tibetans from 2006 to 2013 (The Telegraph, 2013). This has resulted in the insecurity of Tibetans in both economic and cultural activities. Moreover, the large number of Han emigrants has led to the promotion of marriage between the Han and Tibetans of the Chinese government (Wan & Xu, 2014). This is a very risky situation for the Tibetan people to lose their identity. The expansion of economic activity and radical demographic change from the Chinese government's policies has become a great human tragedy. The result of Chinese exploitation, especially the use of renewable energy resources, has become a threat to the culture and traditions of Tibetans. In 2013, the Tibetan population became a marginalized citizen of development in the education, social, religious and employment arenas of their own country (Tibet Nature Environmental Conservation Network, 2014a).

Finally, Chinese environmentally friendly renewable energy development results in unrelenting natural and environmental problems, as many investment areas generate massive deforestation since the 1990s (Winkler, 1996, p. 300). At the same time, the development of the dam without analysing the environmental impact of the Chinese government in Tibet's key watershed area also resulted in the changing hydrological systems within the area. The dramatic changes in natural resources from the development of these renewable energy sources have directly affected Tibetan health and food security (Kernan, 2013, pp. 8-9). Following the development of dams and solar farms in Tibetan agricultural areas, geographic data indicates that more than 272 million hectares of Tibetan land changed to be a desert, which accounted for more than 17.03 percent of the total TAR (Tibet Nature Environmental Conservation Network, 2014b). This situation creates more problems for food security in the area because Tibet has a limited area of cultivation as it located on a plateau. Therefore, the reduction of agricultural areas further reinforces the problem of access to food (Nie, Bi, & Zhang, 2010, pp. 305-306). Although the expansion of access to electricity has contributed to the development of modern health systems in Tibet, many studies have shown that Tibetans prefer traditional medicine (Wang et al., 2015, pp. 4-5). Thus, the destruction of many forest resources to develop renewable energy in Tibet has contributed to the loss of many natural and indigenous herbs that harm the Tibetan health security in the rural area (Zhang, Chen, Li, & Yao, 2002, p. 143).

5. Conclusion

Overall, the Chinese government has been extremely successful in expanding its investment in renewable energy to diversify energy sources from its dependence on fossil fuels. The expansion of investment since 2000 resulted in a significant change in the Chinese energy mix. Renewable energy can generate electricity more than 27 percent of total electricity production in 2015, from just 17 percent in 2000. These reflect the successful Chinese

large investments in renewable energy to reduce dependence on foreign energy. Tibet has become an important area where the Chinese government has invested heavily in renewable energy to promote energy security and promote economic development in the ground after being neglected for a long time. Because of this investment, Tibetan economy has grown 10 times since 2000. At the same time, more than 4 in 5 of the electricity used in Tibet comes from renewable energy. This significant change in Chinese large-scale renewable energy investment in Tibet has become a major focus on the potential of the Communist government to develop an outer mainland region or Han majority area. However, the economic growth and the rapid increase of renewable energy development to support Chinese energy security from TAR do not reflect the improved quality of Tibetan life. The benefits of both economic growth and access to electricity have fallen into the hands of Han Chinese who immigrated to Tibet after the Chinese government's investment. They monopolies service sector in Lhasa and becomes the main labour to work in the Chinese renewable energy projects.

On the other hand, the increase in energy mix from the renewable energy development in Tibet has created the problem of human security in the area. The expansion of hydropower and solar farms has resulted in the destruction of many agricultural areas. This is linked to the problem of economic and food security. Moreover, the destruction of many forests for the construction of dams and the expansion of the solar farm area have also contributed to the problems of public health and the environment. Thus, the renewable energy development in Tibet contrasts the debate and study on the benefits of renewable energy to enhance human security. The Tibetan case reflects that the increase in energy mix from renewable energy may not respond to improve the quality of life of local people as mentioned in several studies. We can call this phenomenon a paradoxical renewable energy development to promote energy security. It is a renewable energy development that serves the national interests while creating problems at the local level.

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