

Global Green New Deal: A Global South perspective

The Economic and
Labour Relations Review
2021, Vol. 32(2) 170–189

© The Author(s) 2021

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/10353046211015765

journals.sagepub.com/home/elra



Ying Chen

The New School, USA

An Li

Sarah Lawrence College, USA

Abstract

Most proposed solutions in the Global Green New Deal literature involve finance and technology transfers to address the imbalance between the Global North and Global South, while providing little discussion of the internal socioeconomic structures within countries in the Global South. This article uses China as a case study to show that without addressing the issue of domestic informality, the potential benefits of a Global Green New Deal are less likely to be fully realised in the Global South. We use the Input-Output method and our originally constructed data on formal and informal employment to calculate the informal employment share in two exemplary renewable energy sectors: solar and wind. We find that more than half of the jobs created in the solar and wind energy sectors, with a given level of spending, will be in the informal economy, and hence are associated with low wages and little social welfare protection. The results imply that, without addressing informality, both renewable energy sectors perpetuate the informal structure in the broader economy. We also question the capitalist nature of ‘green jobs’ created by the Green New Deal. Based on the results, we call for a more organic integration of a Global South perspective in the studies of a Global Green New Deal.

JEL Codes: Q01, E26, N55

Keywords

China, Global South, Green New Deal, informal economy

Corresponding author:

Ying Chen, Department of Economics, The New School, 79 Fifth Avenue, #1125, New York City, NY 10003, USA.

Email: yingc@newschool.edu

Introduction

The current pandemic-induced economic crisis has revived the interest in a Global Green New Deal (Global GND), which was first proposed as a solution to the 2008–2009 global economic recession. Due to the similarity between the current global economic recession and the post-2008 recession, and the worry that the pandemic and its ensuing recovery will transform into an ecological crisis, the idea of using a Global GND to promote economic growth, generate employment and combat the threat posed by climate change has become increasingly appealing.

Acknowledging the unique challenges faced by the poor, the current Global GND proposals include poverty reduction as one of the top priorities (Barbier, 2010). Most proposed mechanisms that speak to this aim can be boiled down to finance and technology transfers from the Global North to the Global South. These proposals, unfortunately, give insufficient consideration to the internal socioeconomic structure within the Global South countries and the unequal global division of labour, both of which could render those finance and technology transfer solutions inadequate. What is lacking is the acknowledgement that when capital enters the Global South, as it is capable of doing conveniently under global neoliberalism, it immediately seeks a way to take advantage of domestic economic structures to secure profits at the cost of labour; informality is one of the most salient examples of this.

This article uses China as a case study to show that without addressing the issue of informality, the potential benefits of a Global GND are less likely to be fully realised in the Global South. Although China is a major investor in green technologies both domestically and internationally, it still is part of the Global South.¹ Hence, we use China as an example in which a GND may not reach its full ecological and economic potentials, despite its massive financial and technological capacity to build a green economy. Specifically, we use the Input-Output (I-O) method and our originally constructed data on formal and informal employment to calculate the informal employment share in two exemplary renewable energy sectors: solar and wind. We find that more than half of the jobs created in the solar and wind energy sectors, with a given level of spending, will be in the informal economy, and hence are associated with low wages and little social welfare protection. The results imply that, without addressing informality, both sectors perpetuate the informal structure in the broader economy.

This article proceeds as follows. In section ‘The Global GND and the Global South’, we critically review the Global GND literature and note the absence of a Global South perspective. Section ‘Informal employment in the economy’ provides a description of the meaning of informal employment in the context of China. We also calculate the informal share in the economy. Section ‘Informal employment in the renewable energy sectors’ calculates the informal share in the wind and solar sectors in particular and shows that the informal structure will persist in the green sectors. Section ‘Are green jobs good jobs?’ discusses the results and concludes the article.

The Global GND and the Global South

In this section, we first detail the main points made in the Global GND literature. We will focus on the Global GND proposals that mainly target Global South countries. Then we will present our critiques from a Global South perspective.

Table 1. Working-hour and job losses by world and regions.

Region	2020 Quarter 1		2020 Quarter 2	
	Number of full-time equivalent jobs (millions)	Percentage working-hour lost (%)	Number of full-time equivalent jobs (millions)	Percentage working-hour lost (%)
World	185	5.4	480	14.0
Northern Africa	2	2.5	11	15.5
Sub-Saharan Africa	9	2.4	43	11.4
Latin America and the Caribbean	10	3.6	55	20.0
Northern America	3	1.8	25	15.3
Arab States	2	3.1	10	13.2
Eastern Asia	115	11.6	100	10.4
Southeastern Asia and the Pacific	7	2.1	44	12.6
Southern Asia	26	3.4	135	17.9
Northern, Southern and Western Europe	8	4.2	29	15.7
Eastern Europe	3	2.6	15	11.6
Central and Western Asia	2	2.7	10	13.6

Source: ILO (2020).

ILO: International Labour Organization.

A full-time equivalent job is defined as 40 hours per week.

The relevance of Global GND in the current crisis

The concept of the Global GND can be traced back to the 2007–2008 global financial crisis and the ensuing global economic recession. As the capitalist world economy faced the worst unemployment spike, negative economic growth and financial market crash since the emergence of neoliberalism, the United Nations Environment Programme commissioned a report that was aimed at reshaping the post-recession economy in a way that would achieve not only economic prosperity but also environmental sustainability and poverty eradication (Barbier, 2010). The proposals contained in the report as a whole constitute the ‘Global Green New Deal’.

More than a decade later, the world economy is caught in a similar situation. The coronavirus disease, which first emerged in China as an exogenous shock in late 2019 and early 2020, is causing a series of negative economic effects that greatly resemble the aftermath of the 2007–2008 financial crisis. Such effects include disruptions in global production and trade, collapse of the global financial system and commodity markets, widespread layoffs and social unrests. The International Labour Organization (ILO, 2020) estimated that, in the first quarter of 2020, the world lost 185 million full-time equivalent jobs, or 5.4% of total working hours, and in the second quarter, the world lost 480 million full-time equivalent jobs (defined as 40 hours per week), or 14% of total working hours.

At the same time, a host of countries in the Global South are experiencing much worse job losses than the rest of the world. As is shown in Table 1, during the second

quarter of 2020, Northern African countries lost 15.5% of their total working hours; the Latin American and the Caribbean countries lost 20%; and the Southern Asian countries lost 17.9%. Although countries in other Global South regions – sub-Saharan Africa, the Arab States, Southeastern Asia, Eastern Europe, and Central and Western Asia – lost a smaller percentage of their total working hours, considering the low economic wellbeing of the general public in those regions before the pandemic, their actual economic hardship and welfare loss could be much worse than those in relatively more developed regions.

Due to the similarity between the current pandemic-induced global economic recession and the previous recession caused by the 2007–2008 financial crisis, there is a renewed interest in adopting the Global GND as not only an immediate solution to current economic problems but also a viable alternative to global neoliberalism (Ghosh, 2020). Moreover, Pegels et al. (2020) have argued that parts of the GND such as green public work programmes might become easier to implement than they were before, as the disruptions caused by the crisis might open windows of opportunity to radically rethink and restructure our economies. In the context of a global economic recession, the most important merit of the Global GND is its potential to create a large amount of jobs in the short run (Pollin, 2015).

According to Barbier (2010), the objectives of the Global GND are threefold: promoting economic growth and creating employment opportunities; reducing carbon dependency, ecosystem degradation and water scarcity; and ending extreme world poverty. The objectives are in line both with the United Nations Millennium Development Goals for 2015 and the Sustainable Development Goals for 2030. In the Global GND framework, the essential mechanism for achieving these objectives is by developing a ‘green economy’ that will lead the global economy to a low-carbon economic growth path. This entails a series of national medium-run and long-run strategic actions. The most important actions include (1) investing in energy efficiency and renewable energy strategies (such as retrofitting buildings, expanding mass transit and freight rail, constructing new electrical grids and developing renewable energies); (2) removing fossil fuel subsidies; (3) enhancing the sustainability and efficiency of natural resource uses; (4) re-investing financial returns from natural resources in industrial activities, infrastructure, health services and education; and (5) improving clean water and sanitation for the poor.

Among the five actions, the last two are specifically geared towards the Global South. According to Barbier (2010), countries in the Global South face a number of challenges in achieving low-carbon economic growth. At the top of the list is the ‘capital gap’, meaning access to financing. Large-scale adoption of low-carbon and clean energy technologies in the Global South requires a massive injection of capital investment. Except for a few large emerging economies such as China, Russia and India, most Global South countries do not have sufficient domestic public and private investment and foreign investment, debt financing and assistance to support their transfer to a low-carbon economy. A second challenge is the ‘skills and technological gap’, meaning a shortfall of sufficient workers with the complementary skills needed for low-carbon technologies and low domestic capacity in clean technologies. Most Global South countries rely on international transfers of skills and technologies to facilitate the development of a domestic low-carbon economy, and an important channel for such transfers is through foreign

direct investment. Both challenges are further exacerbated by increased uncertainty in the international trade and financial system, which may deter foreign investors from lending to Global South countries. In addition, with growing volatility of commodity prices, Global South countries relying on the exports of agricultural produce and natural resources may have unstable financial returns from global trade, which is a major source of financing for investing in industrial activities, infrastructure, health services and education.

Critiques from the Global South perspective

Apparently, the Global GND framework has a clear emphasis on finance and technology in the implementation of GND in Global South countries. These two factors are indeed crucial. However, by only focusing on them, the orthodox version of the Global GND has also completely dismissed the external and internal structural factors that countries in the Global South may face, even with adequate financial and technological support from the Global North. Without the acknowledgement of those structural factors and the deliberations of policy interventions to counter their effects, not only will the Global South fail to gain the full benefits of a Global GND, it might even lead to consequences that contradict the original objectives of creating decent employment opportunities, reducing carbon dependency and ending poverty laid out in the plan for a Global GND (Barbier, 2010). Ultimately, such a Global GND is still biased towards the benefits of the North.

This North-centric perspective is not uncommon and has been criticised in depth in the literature on decolonising nature (Obeng-Odoom, 2020). It is argued that in both the conventional wisdom (i.e. Neoclassical Economics and Institutional Economics) and the Western Liberal Consensus (i.e. some variants of Marxist Economics), the centre of analysis always lies in the metropolitan North, while discussion of the Global South is treated as ‘digressions’. The implication is that the Southern version of GND and the Northern counterpart can be implemented consistently, simultaneously and separately, and both would achieve the same results as is promised in the Northern case, including employment generation, renewable energy application and energy efficiency implementation.

What is missed here is the analysis of the historical and persistent interaction between the North and South that would affect the results of a Global GND. This problem is particularly prevalent in analyses founded on neoliberalism and its byproduct – green neoliberalism – though Obeng-Odoom (2020) suggests that it ‘could also be regarded as an effect of longer process of colonialism, neocolonialism, and bigger issues of modern global imperialism’ (p. 22).

Green neoliberalism has become the dominant solution to the global ecological crisis (Bakker, 2010; Brondo, 2013; Devine and Baca, 2020). Global trade and financial liberalisation since the 1970s have allowed capital to seek the cheapest labour, land and resources. This mechanism implies that industries that are both pollution- and labour-intensive tend to relocate to countries in the Global South. As a result, the working class in the Global South is both economically and ecologically exploited – they receive the lowest share of value in global value chains but are exposed to disproportionately high levels of environmental and ecological degradation (Foster and Clark, 2020; Pellow,

2007). Even seemingly 'green' global economic practices would cause environmental harms in the Global South. For example, in the plastic waste recycling business in West Africa, workers rarely wear protective gears in the process of collecting, storing and disposing of domestically produced and imported plastic waste, thus subjecting themselves to multiple health risks such as bronchitis, injuries and sores. The lack of regulation in waste disposal also gives rise to public health risks, such as a possible outbreak of cholera (Obeng-Odoom, 2014). The condition of the working class in 19th-century England described by Engels resurfaces in the Global South.

Although the Global South countries have high levels of territorial emissions of greenhouse gases, a significant share of the territorial emissions are associated with the production of goods exported to the Global North countries. For instance, Figure 1 depicts the carbon deficit for six groups of countries: Organisation for Economic Co-operation and Development (OECD) countries and non-OECD countries; Kyoto Protocol Annex B countries and non-Annex B countries; and the US and China mainland. A country's carbon deficit is defined as the difference between its production- and consumption-based carbon emissions. Production-based carbon emissions are territorial emissions that happen within a country's border, and they do not take into account the transfer of emissions through imports and exports. By comparison, consumption-based carbon emissions adjust for international transfers by subtracting emissions associated with a country's exports and adding emissions associated with a country's imports. For example, if a good is produced in China and consumed in Japan, then the carbon emissions associated with the production of the good will be counted as Japan's consumption-based emission. It can be seen that since 2000, countries in the Global North enjoy a consumption-based carbon surplus, while countries in the Global South are faced with a consumption-based carbon deficit.

In addition to the hierarchical structure in the current global division of labour and the imbalances of carbon consumption, another important issue that warrants more attention from both GND scholars and policy makers is the informal economy in Global South countries, which is also the focus of this article. The informal economy plays an important role in Global South countries. For many Global South countries, the informal economy employs more persons than the formal sector. The ILO (2018) estimated that for African countries, 85.8% of total employment was informal. For those in the Asia and Pacific region, 71.4% of total employment was informal. The informal employment ratios for the Arab states and the region of the Americas are 68.6% and 53.8%, respectively. Europe and Central Asia were the only regions where the share of informal employment in total employment was less than 50%. As the majority of the informal employment is outside the scope of current laws and regulations, those who hold informal jobs tend to lack social security coverage and employment benefits such as annual paid leave or paid sick leave. Because of the temporary and part-time nature of informal employment, workers who hold informal jobs as their main job are both more likely to be underemployed and more likely to be exposed to long hours of work (ILO, 2018).

The key issues regarding the relationship between the informal economy and the Global GND are twofold (1) will the presence of a sizable informal economy promote or hinder the growth of a green economy? and (2) will the green economy re-enforce or alleviate the job insecurity and low wage issues associated with the informal sector?

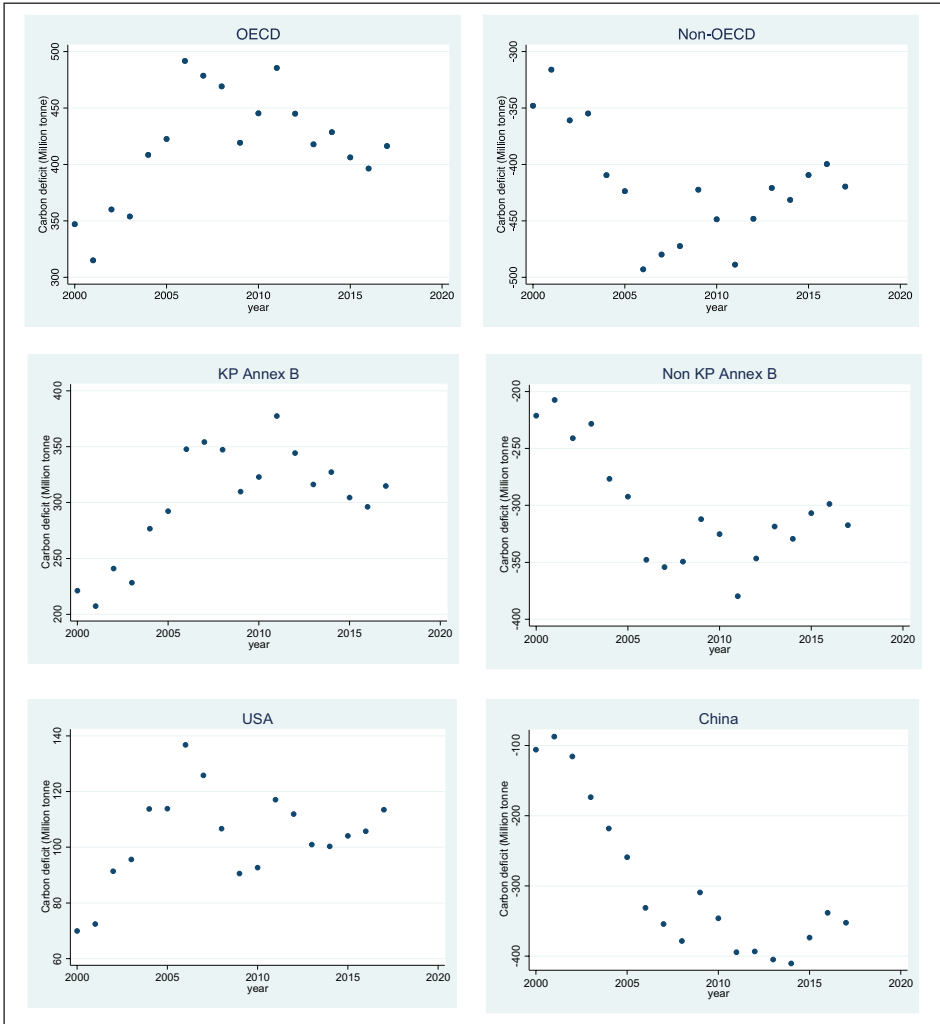


Figure I. Carbon deficit comparisons of Global North and Global South countries.
 Source: Friedlingstein et al. (2019).

Smit and Musango (2015) explored the connections between the informal economy and green economy in Global South countries. They argue that, on one hand, the informal economy consists mainly local people with close ties to the community, so any adoption of green practices such as waste management and recycling can quickly spread within the network and contribute to a rather smooth transition into a green economy. On the other hand, many activities in the informal economy are innately environmentally destructive and exploitative as a result of the cost-saving imperative. Thus, an important implication for a Global GND is to maximise the traits of the informal economy that are conducive to a green economy, while minimise the traits that are against an inclusive green economy.

Table 2. Economy-wide informal employment share, 2007–2018.

Category	2007	%	2012	%	2017	%	2018	%
Urban total employment (million)	293.5	100	371.0	100	424.6	100	434.19	100
Urban-unit employment (urban formal employment)	120.2	41.0	152.4	41.1	176.4	41.5	172.74	39.8
State-owned units	64.2	21.9	68.4	18.4	60.6	14.3	57.4	13.2
Collective-owned units	7.2	2.5	5.9	1.6	4.1	1.0	3.47	0.8
Other ownership units	48.8	16.6	78.1	21.1	111.7	26.3	111.87	25.8
Urban informal employment	173.3	59.0	218.6	58.9	248.2	58.5	261.5	60.2
Urban private enterprises	45.8	15.6	75.6	20.4	133.3	31.4	139.52	32.1
Self-employment	33.1	11.3	56.4	15.2	93.5	22.0	104.4	24.0
Not formally counted	94.4	32.2	86.6	23.3	21.5	5.1	17.5	4.0

Authors' calculation is based on the method in Huang (2009), and data are from China Labour Statistical Yearbook.

In a report by the International Institute for Environment and Development (IIED, 2016), it is argued that ‘inclusive green growth agendas cannot afford to ignore the informal economy’ (p. 2) for three reasons: (1) ‘most of the world’s poorest and most vulnerable people live and work in the informal economy’; (2) in many Global South countries, the informal economy both depends on the state of the environment and contributes to the deterioration of the environment and global warming and depletion of natural resources; and (3) the informal economy, as an important source of jobs, is likely to persist in the long run. Thus, to build an inclusive green economy, policy makers and scholars need to recognise the importance of the informal sector and make policies that increase the resilience of the informal economy in the short run and gradually transform (formalise) them in the long run.

Despite the crucial role of informality in Global South countries, discussions on the connections between informal economy and green economy are still relatively rare. In what follows, we show that under global neoliberalism where financial and trade liberalisation and deregulation allows capital to seek labour and resources with low costs, a Global GND without addressing informality in Global South countries may increase the environmental injustice between the Global South and the Global North and increase the informal employment in the Global South. Our analysis will be in the context of China.

Informal employment in the economy

Since 2007, the informal sector has constituted about 60% of the urban employment in China. Table 2, below, presents the percentage of economy-wide informal sector employment in total employment for 2007, 2012, 2017 and 2018. The calculation is based on the methodology discussed in Huang (2009), who provided an original interpretation of employment statistics in the Chinese context. According to Huang (2009), because urban-unit employment (*Chengzhen Daiwei Jiuye*) is associated with regular wages, normal working hours, standard benefits and job security, it provides the most reliable estimate for urban formal sector employment in China. This measure is strictly defined as

Table 3. Average size of the urban informal economic units, 2007–2018.

	Number of entities (millions)			Total employment (millions)			Average employment (total employment/entity)		
	2007	2012	2018	2007	2012	2018	2007	2012	2018
Urban private enterprises	5.5	10.9	31.4	72.5	113.0	213.8	13.2	10.4	6.8
Self-employment	27.4	41.0	73.3	55.0	86.3	160.4	2.0	2.1	2.2

Authors' calculation is based on China National Statistics.

only including the employment in three types of officially registered economic units (or *Danwei*), namely the state-owned units, urban collectively owned units and mixed-ownership units (i.e. enterprises jointly funded by public investments and domestic and foreign private investments).² It can be seen that the urban formal employment share in total urban employment is stable and stayed at around 40% since 2007, despite a slight decline in 2018.

The share of urban informal employment can be obtained by subtracting the urban-unit employment from the urban total employment. Urban informal employment has three major components: urban private enterprises, self-employment and other forms of urban employment that are not detailed in the official statistics. In the context of China, the concept of 'private enterprises' does not simply mean non-governmental enterprises as in the common dichotomy between the public and the private. Instead, they are defined as enterprises invested, owned and operated by 'natural persons' (*Ziranren*). They are mostly micro and small businesses who employ a small number of employees on an informal basis. Table 3 shows that the average size of the urban private enterprises has declined from 13.2 persons per entity (including employers) in 2007 to only 6.8 in 2018, which is a reduction of almost one half.

Self-employment (e.g. small shop and stall owners, artisans and apprentices, proprietors of small eateries and food stalls and repair shop owners) represents about 160.4 million persons from 73.3 million entities in 2018, which suggests an average of 2.2 employed persons per entity. As we can see from Table 3, this number remains relatively stable at around two persons per entity since 2007. These self-employed economic entities are usually composed of relatives or friends.

Finally, there is a group of informal sector workers who are not formally counted in the official statistics. Based on the method in Huang (2009), they can be calculated as the statistical discrepancy between total urban informal employment and the sum of urban private enterprises and self-employment. This group has shown a declining trend. In 2007, it was 32% of total urban employment, amounting to about 94.4 million people (Table 2). In 2018, it declined to only 17.5 million and about 4% of the total urban employment. They are best understood as those experiencing underemployment. On the one hand, they are not officially unemployed, as they have been counted as being unemployed. On the other hand, they are not affiliated with any types of official employment. The declining trend suggests that this statistical discrepancy is becoming less significant over time.

Table 4. Estimated informal employment shares in 2013.

Sector	Informal share (%)
Agriculture, forestry, animal husbandry and fishery	72.3
Mining	35.5
Manufacturing	47.3
Production and supply of electricity, heat, gas and water	40.4
Construction	66.4
Wholesale and retail trades	76.8
Transport, storage and post	54.7
Hotels and catering services	74.3
Information software and information technology	55.1
Financial intermediation	39.4
Real estate	52.0
Leasing and business services	71.7
Scientific research and technical services	44.2
Management of water conservancy, environment and public facilities	35.5
Service to households, repair and other	67.4
Education	36.4
Health and social service	61.5
Culture, sports and entertainment	45.5
Public management, social security and social organisation	35.7

For each sector, informal share is estimated based on the methodology in Liang et al. (2016).

The composition of informal employment varies by sectors. Table 4 reproduces the estimates of the share of informal employment by sector from Liang et al. (2016). Based on surveys from 2013, Liang et al. (2016) estimated the probability that a person working in each of the 19 sectors could be informally employed. By extrapolating to the whole sector, we could interpret these probabilities as the share of informal employment by sector.

The informal economy is defined by the ILO as ‘all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements’ (OECD and ILO, 2019). In the Chinese context, the rural migrant workers constitute the majority of the informal workers because of their extremely low bargaining position. They normally work in low-skilled, temporary jobs and receive lower pay and negligible social benefits than their formal sector peers. As seen in Table 5 below, they are mostly concentrated in the manufacturing (27.9%); construction (18.6%); wholesale and retail (12.1%); domestic work (service to households, repair and others, 12.2%); hotels and catering services (6.7%); and transport, storage and post (TSP) sectors (National Bureau of Statistics (NBS), 2019b). Table 5 also presents the wage gap between urban formal employment and the rural migrant workers in these six sectors. The largest wage gap is found in the wholesale and retail sector, where the annual average income of the rural migrant workers is less than half the annual average income of urban formal employed persons.

Table 5. Wage gaps between rural migrant workers and formal employees in 2008.

Sectors	Share of rural migrant workers	Average annual income of rural migrants (RMB)	Average annual income of urban formal employment (RMB)	Rural migrant income as a percentage of urban formal worker income (%)
Manufacturing	27.9	44784	72088	62
Construction	18.6	50508	60501	83
Service to households, repair and others	12.2	38424	55343	69
Wholesale and retail	12.1	39156	80551	49
Hotels and catering services	6.7	37776	48260	78
Transport, storage and post	6.6	52140	88508	59

Source: NBS (2019a, 2019b).

NBS: National Bureau of Statistics.

In addition to receiving significantly lower wage payments, rural migrant workers are provided with little protection from the Labour Law and the social insurance schemes. According to Zhang (2019), only 35% of the rural migrant workers had signed labour contracts with their employers. The majority of the rural migrant workers, either being self-employed or working part time, are considered being in an atypical employment status. These workers show extremely low enrolment rate of social benefits. For instance, only 27% of the rural migrant workers were enrolled in the Employment Injury Insurance Scheme; only 22% were enrolled in the Basic Medical Care Insurance for Urban Employees; and only 17% were enrolled in the Unemployment Insurance Scheme. The rural migrant workers' low enrolment in social benefits happens mainly for three reasons (Zhang, 2019). First, because the rural migrant workers' employers contribute little to the workers' benefits, the workers must pay for all or the majority of the benefits themselves. But due to their low income, the rural migrant workers must prioritise their essential or immediate needs, and thus are less able to pay for social benefits. Second, the enrolment of rural migrant workers in social benefits is voluntary, while the urban formal workers' enrolment is mandatory. Third, the social benefits designed for the rural migrant workers cannot be transferred between cities. Thus, the rural migrant workers, who frequently change their city of work or residence, are reluctant to enrol in the social benefit schemes.

Informality also has strong gender implications. Women account for 96% of China's domestic service employment, which is a rapidly growing informal sector in the recent decade (Liu, 2017). However, less than 10% of the domestic service workers has signed contracts with their employers, which means that the vast majority of them are not being protected by the Labour Law (Liu, 2017). This situation renders them vulnerable to 'long working hours, unguaranteed leave and vacation, below-average accommodation conditions, sexual harassment, and lack of social insurance for injuries and serious medical problems' (Liu, 2017: 5).

In what follows, we show that informality is not only a significant issue for the economy as a whole but also an important challenge for the green economy.

Informal employment in the renewable energy sectors

Scholars have offered two contrasting views on the informal economy in Global South countries. Some view the informal economy as an important source of jobs, the locale of innovation and a symbol of grassroots autonomy (Moser, 1994). Accordingly, policies to promote the development of the informal economy could ‘help the poor without any major threat to the rich’ and could balance the ‘pressures for the redistribution of income and wealth’ and ‘the desire for stability on the part of economic and political elites’ (Bromley, 1978: 1036). By comparison, neo-Marxist scholars view the informal economy as the inevitable consequence of capitalist development in the peripheral countries, where there is harsher exploitation; hence, they call for a more radical transformation of the informal economy (Moser, 1994).

In China, the informality in the newer green energy sectors mirrors the informality in the more traditional industrial sectors in the economy. According to the official economic policies, there is not a clear indication that the government would make any efforts to improve the working conditions of the informal economy or to ‘formalise’ it. Instead, from the ‘maker movement’ to the recent ‘stall economy’, which was openly praised by the Premier Li Keqiang, there is a long history of romance with the informal economy as job generators (Yuan, 2020)

In this section, using wind and solar energy sectors as examples, we show how the issue of informality could be intensified in the renewable energy sectors. We start by calculating the output-investment (O/I) ratios using China’s 149-sector I-O table for 2017 (Appendix 1). This generates a 149×149 matrix that provides information on how much output (measured in US\$) will be generated with increases in final demand.

Then we calculate employment-output (E/O) ratios for both the formal and informal sectors at a 35-sector break-down level and extrapolate the ratios to the 149-sectoral level. Since a more detailed break-down for employment data by sector is not available, especially not for the informal part of the workforce, we will use a more aggregated I-O table (35 sectors) to match with the 20 industrial-level employment measures for the calculation of E/O ratios.

The informal employment data are not comprehensive for all sectors, so some extrapolation work is required. However, we know from Table 2 that the aggregation of urban private enterprises (133.3 million) and self-employment sector (93.5 million) amounts to 226.8 million in 2017. However, the available data for the seven sectors add up to 193.9 million, leaving about 32.9 million distributed across all the remaining sectors. We assume that the employment share of each sector in the informal economy is proportional to that of the formal sector and extrapolate the relevant data for the 12 sectors. We then extrapolate the unregistered informal employment by assuming a constant ratio between registered and unregistered informal employment across sectors. The ratio is calculated from Table 2 (9.5%) and is applied to all seven sectors, which results in 18.4 million employed persons. We then use the same method to extrapolate the data for the remaining sectors.³

Table 6. Total and informal employment-output ratio.

	Total employment-output ratio (jobs per million US\$)	Informal employment-output ratio (jobs per million US\$)
Agriculture, forestry, animal husbandry and fishery	120.3	118.9
Mining	4.8	1.5
Manufacturing	4.3	1.7
Production and distribution of electricity, gas and water	1.8	0.6
Construction	10.8	3.3
Transport, storage and post	12.4	4.7
Information transmission, computer service and software	12.4	4.7
Wholesale and retail trades	57.5	53.1
Hotels and catering services	41.7	37.1
Financial intermediation	8.4	2.7
Real estate	7.8	2.5
Leasing and business services	18.6	15.1
Scientific research, technical services and geological prospecting	40.9	12.9
Management of water conservancy, environment and public facilities	3.7	1.2
Services to households and other services	62.6	35.1
Education	40.9	12.9
Health, social securities and social welfare	18.9	6.0
Culture, sports and entertainment	62.6	35.1
Public management and social organisation	62.6	35.1

The only adjustment we do here is for the agricultural sector. We use the three industrial-level data from the 2017 NBS and put 209.44 million as the total employment for the agricultural sector. Then accepting that 2.6 million is the number of formal sector jobs, the remaining 206.84 million are all considered informally employed in the agricultural sector. The resulting E/O ratios are reported in Table 6.

Next, we use the weighting scheme (Chen, 2019) for solar and wind energy sectors to consolidate the two renewable energy sectors from the I-O sectors and calculate the employment generation effect for each US\$1 million of investment in the two renewable energy sectors. The results are presented in Table 7.

For every US\$1 million investment spent on the solar energy sector, a total of 36 jobs will be created, as compared to a total of 35 jobs if the investment is made in the wind energy sector. However, among all the created jobs in both renewable energy sectors, 19 jobs belong to the informal economy. The results are striking in the sense that, in both solar and wind energy sectors, informal employment takes about 55% of all the generated employment. This ratio is above the weighted average ratio informal share across all

Table 7. Job impact per million of US\$.

Industry	Total employment	Informal employment	Share of informal employment (%)
Solar	36.0	19.8	54.97
Wind	35.1	19.3	55.01

Authors' calculation.

sectors (51.3%) as reported in Table 4, which implies that, if the current economic structure persists, the GND will perpetuate the informality issue, if not exacerbating it.

The informal employment in both sectors could be explained by their reliance on the construction sector, which itself contains 66.4% informal employment, and the manufacturing sector, with 47.3% informal employment. As we have shown in Table 5, these two sectors are also the top two industrial sectors where rural migrant workers are concentrated, both with extremely precarious work conditions and sizable wage gaps compared to formal employment in each. Without moderate policies targeted at improving the working conditions in the informal economy, or more radical policies to formalise the informal economy, the GND will fail to become an inclusive economic and ecological programme.

Are green jobs good jobs?

Informality, although a domestic structural issue, should not be treated as independently existing in the South. Instead, it is an inevitable consequence of neoliberalism, which has led to both a stagnating wage share in the North as well as high labour intensity and worsening working conditions in the South. The thin profit margin for capital in the South allows only a small portion of labourers to be absorbed into the formal economy with decent living wages and standard benefits. Hence, the expansion and contraction of the informal economy is largely correlated with the capital accumulation pace (Chen and Xu, 2017) and directly impacted by how global capitalism is structured.

A fundamental contradiction of current Global GND proposals is that they do not challenge the logic of capital accumulation and the commodification of nature and labour, but seek to solve the planetary crisis by combining 'state-directed technocratic planning and market regulation with proposals for more equitable income distribution' (Foster and Clark, 2020: 273). A main feature of most GND proposals is that they would create 'green jobs' in the economy through investments in energy efficiency and clean renewable energy. However, having a large number of green jobs does not necessarily mean that these jobs are good jobs for a sustainable society.

In GND proposals, state-directed technocratic planning and market regulations as well as industrial, fiscal, monetary and environmental policies promote the development and deployment of renewable energy and higher energy efficiency technologies. They also limit and reduce reliance on fossil fuel energies. Proposals for a more equitable income distribution involve creating jobs to offset the job destruction caused by the phasing out of fossil fuel industries and reshaping labour market institutions to enhance the bargaining power, income and social benefits of workers. Under this framework, a GND

proposal will typically include massive fiscal subsidies or tax cuts for sectors that utilise renewable energies, direct governmental spending on building 'green' infrastructure, a green financial architecture that favours investments that have a potential to cut carbon emissions and a plan for reducing or eliminating carbon emissions (Chomsky and Pollin, 2020: 73–134). These proposals are usually followed by statistical estimations that show how they would create jobs, raise income, reduce poverty and cut further global warming.

Compared with the inadequate – or even complete lack of – actions from major carbon-emitting countries (Climate Analytics and NewClimate Institute, 2019), the GND proposals are progressive, in that they call for immediate actions before the climate emergency and its impacts on humanity and nature become irreversible, and for expansionary fiscal and monetary policies that would create a large number of 'green jobs' for the working class. However, under capitalism, labour – the relationship between human society and nature – takes the form of wage employment, and the capitalist class structure dictates that the labour process creates exchange value and surplus value by degrading nature. Without challenging this nature of work under capitalism, such 'green jobs' would still be sources of surplus value. Although the labour process may generate lower carbon emissions, there is no guarantee that the system of capitalism would not drive the human society into breaking other planetary boundaries (Foster, 2017). Besides this, due to the short-run wage-profit dynamics of capitalist economies (Boddy and Crotty, 1975), the GND would eventually run into its own contradictions when the increasing labour share of income threatens the profitability of the green capitalists.

This is especially relevant for the Global South since it is usually the place where such contradiction shows itself. The UN Reducing Emissions from Deforestation and Forest Degradation (REDD) programme was initially designed to mitigate climate change by enhancing forest management in Global South countries. However, because the programme was based on monetary valuation of forests and cost-benefit analyses, it ended up displacing sustainable forest management practices in the participating Global South countries, disrupting local peoples' livelihoods, causing food insecurity, increasing illegal land acquisitions and introducing monoculture plantations that generate value for outside stakeholders (Bayrak and Marafa, 2016). If the creation of surplus value is still the ultimate goal, then the international green finance regime, designed as part of the Global GND, may still risk displacing sustainable labour activities in the Global South.

Thus, to have a sustainable society in the future, it is necessary to transform the meaning of work in society, such that labour is no longer the source of exchange values and surplus values, and jobs are no longer the means to earn wages and salaries. Instead, labour would focus on creating use values, and labourers would be motivated 'to create and to contribute in one's life to the social reproduction of humanity as a whole, coupled with the higher norms enforced by collective labour, provide powerful stimuli for continuing free human development' (Foster and Clark, 2020: 189).

Conclusion

This article uses the case of China to show that even with financial and technological capacity to build a green economy, informality will remain as a barrier for it to fully realise the employment benefits of a GND. We find that more than half of the jobs created in the

solar or wind energy sectors, with a given level of spending, will be in the informal economy, and hence are associated with low wages and little social welfare protection. Such a barrier and its consequence should apply to most countries in the Global South.

The results call for a more organic integration of a Global South perspective in the studies of a Global GND. Current literature has correctly raised the importance of international coordination, not only in terms of facilitating financial and technological support to the Global South but also with regard to implementing a concerted policy mechanism in both Global South and North so that policy efforts in one region do not simply result in 'shifting business from one country to another' (Barbier, 2010: 833). We welcome such critique speaking to these external factors, specifically the hierarchical structure among countries that prevents the Global South from enjoying a greener environment. Nonetheless, our article contributes to the understanding of how internal structures, with informality as one example, would also lead to some similar unintended distributional consequences.

We maintain that informality is a direct outcome of the global neoliberal regime. It impacts both the North and the South, with the South bearing more ecological, social and economic costs. More and more low-quality jobs, which are repetitive, monotonous and environmentally destructive, are outsourced to the South, as a result of global capital taking advantage of the lenient labour and environmental laws and relatively less powerful labour organisations. At the same time, with thin profit margins in the South and the stagnation of capital accumulation, the state is more likely to collaborate with the capitalist class to repress organised labour (Xu and Chen, 2019). Hence, we argue that the massive scale of informality in the green economy requires a deliberate anti-neoliberal, or more radically, an anti-capitalist solution.

In the short run, this means enhancing the social benefit provisions supported by higher levels of taxation on corporations who have benefitted from the neoliberal path of development in both the Global North and South. It also implies that policies such as a living wage and stricter implementation of labour laws to guarantee standard benefits for and legal protection of labour should be applied to the informal economy as well. In the long run, it calls for a structural reorganisation that leads to a re-formalisation of the increasingly precarious work conditions, which is based on redefining the meaning of work and reimagining of the development model that transcends the endless accumulation of capital. Last but not least, state policies and civil organisations that could contribute to the strengthening of labour bargaining power and their involvement in the decision-making process of the Global GND should be greatly encouraged. Considerably more work will need to be done to determine the short- and long-run policy interventions on the informality issue, which is potentially persistent in a green economy.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

Notes

1. Although this categorisation has become increasingly controversial, we maintain this labelling based on the relatively low profitability of capital and relatively inferior working conditions of labour in China, which is more similar to countries in the Global South than those in the Global North.
2. State-owned units include both state-owned enterprises and state-holding enterprises. State-holding enterprises refer to those mixed-ownership enterprises where the government holds the largest share of equity capital among all shareholders. See ‘Explanatory Notes on Main Statistical Indicators’ in the China Labour Statistical Yearbook (2019).
3. Total unregistered informal employment is 21.5 million, which implies 3.1 million in the remaining 12 sectors.
4. This output-investment (O/I) ratio corresponds to the Leontief inverse coefficient, generated through matrix manipulation on the raw I/O data.

References

- Bakker K (2010) The limits of ‘neoliberal natures’: debating green neoliberalism. *Progress in Human Geography* 34(6): 715–735.
- Barbier E (2010) *A Global Green New Deal: Rethinking the Economic Recovery*. Cambridge: Cambridge University Press.
- Bayrak M and Marafa L (2016) Ten years of REDD+: a critical review of the impact of REDD+ on forest-dependent communities. *Sustainability* 8(7): 620–642.
- Boddy R and Crotty J (1975) Class conflict and macro-policy: the political business cycle. *Review of Radical Political Economics* 7(1): 1–19.
- Bromley R (1978) Introduction—the urban informal sector: why is it worth discussing? *World Development* 6(9–10): 1033–1039.
- Brondo K (2013) *Land Grab: Green Neoliberalism, Gender, and Garifuna Resistance in Honduras*. Tucson, AZ: University of Arizona Press.
- Chen M (2007) Rethinking the informal economy: linkages with the formal economy and the formal regulatory environment. Available at: www.un.org/esa/desa/papers/2007/wp46_2007.pdf (accessed 14 January 2021).
- Chen Y and Xu Z (2017) Informal employment and China’s economic development. *The Chinese Economy* 50(6): 425–433.
- Chen Y (2019) Renewable energy investment and employment in China. *International Review of Applied Economics* 33(3): 314–334.
- China Labour Statistical Yearbook (2019). Available at: <https://www.chinayearbooks.com/tags/china-labour-statistical-yearbook> (accessed 14 April 2021).
- Chomsky N and Pollin R (2020) *Climate Crisis and the Global Green New Deal: The Political Economy of Saving the Planet*. London: Verso.
- Climate Analytics and NewClimate Institute (2019) Governments still showing little sign of acting on climate crisis. Available at: https://climateactiontracker.org/documents/698/CAT_2019-12-10_BriefingCOP25_WarmingProjectionsGlobalUpdate_Dec2019.pdf (accessed 14 January 2021).
- Devine JA and Baca JA (2020) The political forest in the era of green neoliberalism. *Antipode* 52(4): 911–927.
- Foster J (2017) The long ecological revolution. *Monthly Review* 69(6): 1–16.
- Foster J and Clark B (2020) *The Robbery of Nature: Capitalism and the Ecological Rift*. New York: Monthly Review Press.

- Friedlingstein P, Jones MW, O'Sullivan M, et al. (2019) Global carbon budget 2019. *Earth System Science Data* 11: 1783–1838.
- Ghosh J (2020) How to build the Global Green New Deal. *Progressive International*, 7 May. Available at: <https://progressive.international/blueprint/80b03a68-68ca-4322-a3ad-c91775f167b9-jayati-ghosh-how-to-build-the-global-green-new-deal/en>
- Huang P (2009) China's neglected informal economy: reality and theory. *Modern China* 35(4): 405–438.
- IIED (2016) Informality and inclusive green growth. Available at: <https://pubs.iied.org/sites/default/files/pdfs/migrate/17365IIED.pdf> (accessed 14 January 2021).
- ILO (2018) *Women and Men in the Informal Economy: A Statistical Picture*. Geneva: ILO.
- ILO (2020) ILO monitor: COVID-19 and the world of work. Available at: www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_749399.pdf (accessed 14 January 2021).
- Liang Z, Appleton S and Song L (2016) Informal employment in China: Trends, patterns and determinants of entry. *IZA Discussion Paper 10139*. Available at: <http://ftp.iza.org/dp10139.pdf> (accessed 14 May 2021).
- Liu M (2017) Migrants and cities research report on recruitment, employment, and working conditions of domestic workers in China. ILO Conditions of Work and Employment Series no. 92. Available at: https://labordoc.ilo.org/discovery/fulldisplay/alma994958292902676/41ILO_INST:41ILO_V1
- Moser C (1994) The informal sector debate, part 1: 1970–1983. In: Rakowski C (ed.) *Contrapunto: The Informal Sector Debate in Latin America*. Albany, NY: State University of New York Press, pp. 11–29.
- National Bureau of Statistics (NBS) (2019a) *China Statistical Yearbook*. Beijing, China: China Statistical Press.
- National Bureau of Statistics (NBS) (2019b) Rural migrant worker monitoring and survey report. Available at: www.stats.gov.cn/tjsj/zxfb/201904/t20190429_1662268.html (accessed 14 January 2021).
- Obeng-Odoom F (2014) Green neoliberalism: recycling and sustainable urban development in Sekondi-Takoradi. *Habitat International* 41: 129–134.
- Obeng-Odoom F (2020) *The Commons in an Age of Uncertainty: Decolonizing Nature, Economy, and Society*. Toronto: University of Toronto Press.
- OECD and ILO (2019) *Tackling Vulnerability in the Informal Economy*. Paris: OECD Publishing.
- Pegels A, Brandi C and Altenburg T (2020) Can the global Green New Deal movement survive the pandemic? Available at: www.greengrowthknowledge.org/blog/can-global-green-new-deal-movement-survive-pandemic (accessed 14 January 2021).
- Pellow D (2007) *Resisting Global Toxics: Transnational Movements for Environmental Justice*. Cambridge, MA: MIT Press.
- Pollin R, Heintz J and Garrett-Peltier H (2009) *The economic benefits of investing in green energy: How the economic stimulus program and new legislation can boost US economic growth and employment*. Amherst, MA: Political Economy Research Institute, University of Massachusetts at Amherst.
- Pollin R (2015) *Greening the Global Economy*. Cambridge, MA: MIT Press.
- Smit S and Musango J (2015) Towards connecting green economy with informal economy in South Africa: a review and way forward. *Ecological Economics* 116: 154–159.
- Xu Z and Chen Y (2019) Spatial shift in China's labor struggles: evidence and implication. *Journal of Labor and Society* 22(1): 129–138.

Yuan L (2020) China's street vendor push ignites a debate: how rich is it? *New York Times*, 11 June. Available at: https://www.nytimes.com/2020/06/11/business/china-street-vendors-stall-economy.html?_ga=2.176719713.532672558.1592918474-387192117.1590459334 (accessed 2 September 2020).

Zhang Y (2019) Improving social protection for internal migrant workers in China. Report, ILO Country Office for China and Mongolia, Beijing, China.

Author biographies

Ying Chen is an Assistant Professor of Economics at the New School and holds a PhD in Economics from the University of Massachusetts Amherst. Her work mainly explores the contradictions within capitalism and how they exhibit themselves across time and space. Topics she has studied include economic development, labour and climate change, with a special focus on the global south.

An Li is John A. Hill Chair in Economic Analysis Assistant Professor at Sarah Lawrence College in New York. His current research interests include the political economy of environmental justice, environmental justice in developing countries, property right regimes and the environment, the global outsourcing of pollution-generating activities and the interaction between economic inequality and the environment.

Appendix I

Input-Output model

This article mainly builds on the Input-Output (I-O) methodology adopted in studying the United States case in Pollin et al. (2009) and the weighting scheme for the Chinese case (Chen, 2018) to estimate the employment impacts in the two renewable energy sectors. A typical I-O model records detailed information on the supply and demand relationships between various industrial sectors and distinct categories of final demand in the economy. The I-O model is as follows

$$X_i = a_{i1}X_1 + a_{i2}X_2 + \dots + a_{ij}X_j + D_i \quad (1)$$

$$X = AX + D \quad (2)$$

$$(I - A)X = D \quad (3)$$

$$X = (I - A)^{-1}D \quad (4)$$

In the first equation, X_i indicates the output produced by the i th sector and a_{ij} indicates the required input from the i th sector to produce output for the j th sector. Equation (2) contains the same information as in equation (1), only is written in the vector form, where notation A indicates an i by j matrix containing all elements of a_{i1} through a_{ij} . Equation (3) is a re-writing of equation (2) where notation I indicates an identity matrix. Equation (4) expresses X in terms of all the other components in the equation with the assumption that $(I - A)$ is invertible.

The I-O model shows how much materials (input) from each sector in the economy are used up by economic sector X to produce the goods and services (output) for the consumption of households, private business investment, government expenditures and exports. Given this information, we can estimate that following an investment (one element of the final demand) increase in, say, the solar energy industry, how the relevant sectors such as those manufacturing solar panels, and those producing steels or plastics for the manufacturing of solar panels, respond to the change.

One challenge in using an I-O model to estimate how the increase in spending in certain renewable energy sectors affects the whole economy is that these renewable energy sector activities are not yet specified into distinct industrial sectors, such as 'solar energy sector' or 'wind energy sector'. To solve this issue, I use information on the cost components of such investment from the existing literature and then use the existing sectors within the I-O model to construct a new renewable energy sector based on the weighting structure that reflects such cost composition. The first step in the estimation is to calculate the output/investment (O/I) ratio, meaning how much change in output will be induced by a change in the investment level, as is discussed above.⁴ The second step is to calculate the employment/output (E/O) ratio, which indicates how much employment is required to produce a certain output level of renewable energy goods. Assuming a linear model, the multiplication result of the row vector E/O and the matrix O/I implies the E/I ratio, suggesting the total employment generation from investment in the renewable energy goods.