OUR PUBLIC TRANSPORT

PEOPLE'S PUBLIC TRANSPORT POLICY

TRADE UNIONS FOR ENERGY DEMOCRACY

CLIMATE CHANGE

This chapter was written for the ITF by Sean Sweeney and John Treat at Trade Unions for Energy Democracy (TUED) (http://unionsforenergydemocracy.org/) to inform policy proposals on addressing climate change for the People's Public Transport Policy (www.OPTpolicy.org). The ITF would like to thank TUED for its contribution.

Each chapter in the People's Public Transport Policy focuses on different policy issues related to public transport. The chapters include case studies, as well as campaign materials and educational resources.

The ITF's Our Public Transport (OPT) programme promotes a social model of public transport. A social model includes organisational and employment rights for workers and requires that any expansion of public transport guarantees decent jobs.

OPT:

- works in target cities to strengthen the voices of workers in the development of new urban transport modes, including bus rapid transit (BRT), and in negotiating the transition from informal to formal work

- campaigns to improve working conditions for all public transport workers – informal transport workers in particular – through increasing their industrial power. This includes building union networks in public transport multinational corporations, developing alliances with passengers, communities and other organisations and promoting women's employment in public transport

- works to develop an alternative public transport policy – one that is built on public ownership, public financing, decent jobs and union rights for workers

www.OurPublicTransport.org

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> **If you cannot tackle transportation, you cannot tackle climate change."**
>
> Former executive secretary of UNFCCC, Yvo de Boer[1]

1. INTRODUCTION

Public transport is an essential part of the fight against greenhouse gas emissions and climate change. Public transport is therefore vital for the future of our planet, our societies and our communities. As the ITF noted in its statement for the 2017 United Nations (UN) climate talks in Bonn, Germany (COP23): If we are to meet the goals of the Paris Agreement and address the climate crisis, an immediate and ambitious expansion of public transport globally is necessary. The environmental benefits of mass public transport are enormous, but so too are the social and economic benefits of creating a better life for all by improving access to mobility, reducing congestion and air pollution in cities and creating millions of new decent jobs.[2]

The ITF views the need to expand public transport as a crucial part of a broader set of policies to address emissions across the entire transport sector. Reducing emissions in transport also requires a 'whole economy' approach, aimed at reducing emissions in other sectors – particularly power generation. Power generation is both a major source of greenhouse gases (GHGs) and is increasingly intertwined with transport systems through the electrification of cars, buses and rail.

However, the ITF also noted in its COP23 statement that public transport is not expanding fast enough either to keep up with rapidly increasing urbanisation or to help control and then reduce transport-related emissions.[3] The ITF stated: 'A massive improvement and expansion of public transport is the only real alternative to private cars. Modal shift on a significant scale must occur to reduce transport emissions, prevent a climate catastrophe and meet the commitments of the Paris Agreement.' It called for 'ambitious public transport commitments by national governments, including the allocation of sufficient public resources to invest in and develop high-quality, modern, public transport systems.' High-quality public transport investments could create millions of direct jobs while also reducing emissions.

Drawing on this approach, transport unions could champion a range of interconnected and mutually reinforcing policies that could contribute to reducing emissions in transport and across the economy, while simultaneously pursuing a wider set of aims that advance social equity, sustainability, and quality of life in our cities. These policies are broad and overarching, and they will vary from place to place in order to suit local conditions. However, specific policies that respond to local needs and priorities must be mindful of larger challenges. Overall, there is an urgent need for greater democratic involvement at the level of public ownership and management in order to 'guarantee the delivery of the economic, social, environmental and employment benefits of public transport for all."[4]

Any objective review of both emissions trends and the effectiveness of current policies can lead to only one conclusion: the transformation we need is going to depend on workers and their allies taking decisive action, and the transformation of the transport sector along with other energy-intensive sectors will not happen without a forceful contribution from workers and their unions. Armed with a radical 'whole economy'

approach, and working in partnership with their communities and social movement allies, unions in the transport sector and beyond can help bring about the kinds of shifts in policy and politics needed to turn the situation around.

2. EMISSIONS ARE RISING AND THE PLANET IS WARMING

Over the past century, the average global temperature has risen by roughly 1C. Most of this warming has occurred over the past few decades and it continues to accelerate, with 16 of the 17 warmest years on record having occurred since 2001.[5] Rising global temperatures have placed the planet at increasing risk of dangerous changes to weather patterns, disruption of food systems, the proliferation of infectious diseases and much more.[6]

This warming has been caused overwhelmingly by emissions of carbon dioxide and other greenhouse gases (GHGs) from human activities: burning coal for electricity, gasoline and diesel for cars and trucks, oil and natural gas for heat and industrial processes. Energy-related emissions constitute the lion's share of global emissions (roughly 60 percent) and the generation of electrical power is still the largest single contributor, responsible for a quarter of energy-related emissions.[7]

Fossil fuels currently meet more than 80 percent of global primary energy demand, and CO2 from fossil fuel combustion accounts for more than 90 percent of energy-related emissions.[8] The consumption of coal, oil and gas has grown dramatically in recent decades. Not surprisingly, energy-related emissions are increasing. Global emissions currently stand at almost double those of the mid-1990s, and emissions from fossil fuel and industry rose 60 percent between 1990 and 2014.[9] Despite the decade-long growth of renewable energy, emissions from the generation of electricity alone have increased by more than 45 percent globally since the year 2000, while electricity demand has increased by more than 50 percent.[10]

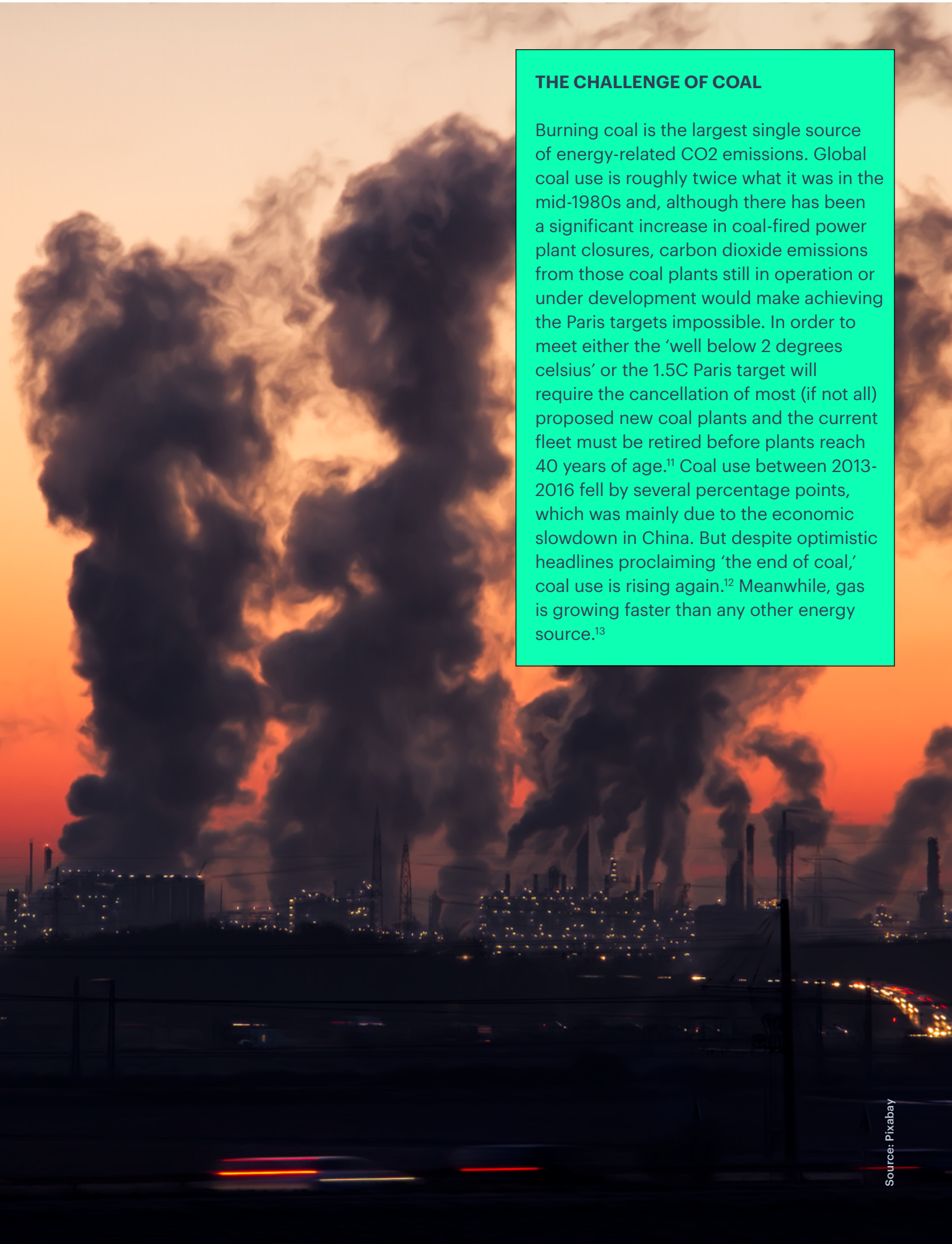
2.1 TRANSPORT RELATED EMISSIONS ARE RISING

Emissions from transport currently hover around 14 percent of total emissions and currently account for nearly one-quarter of energy-related emissions.[14] Importantly, they have risen roughly 18 percent since 2010 and are growing faster than emissions from any other economic sector. Almost three quarters of transport-related emissions come from road transport, which means that CO2 generated from cars, trucks, and motorcycles must become a policy priority.[15]

The growth of road transport is reflected in rising oil demand and use. According to the International Energy Agency (IEA): 'Global oil demand rose by 1.5 million barrels a day (mb/d) in 2017, continuing a trend of strong growth since prices fell in 2014. The rate of growth of 1.6 percent was more than twice the average annual growth rate seen over the past decade.'[16] Based on anticipated economic trends, the IEA projects that global oil consumption will soon surpass 100 mb/d and reach almost 105 mb/d by 2023.[17] Transport-related energy use is expected to increase by 1.4 percent each year from 2012 to 2040, with non-Organisation for Economic Co-operation and Development (OECD) transportation energy use increasing by 2.5 percent annually.

2.2 MORE CARS AND THE GROWTH OF URBAN TRAFFIC

Globally more than 88 million cars and light commercial vehicles were sold in 2016 – an increase of 4.8 percent from 2015, and the



THE CHALLENGE OF COAL

Burning coal is the largest single source of energy-related CO2 emissions. Global coal use is roughly twice what it was in the mid-1980s and, although there has been a significant increase in coal-fired power plant closures, carbon dioxide emissions from those coal plants still in operation or under development would make achieving the Paris targets impossible. In order to meet either the 'well below 2 degrees celsius' or the 1.5C Paris target will require the cancellation of most (if not all) proposed new coal plants and the current fleet must be retired before plants reach 40 years of age.[11] Coal use between 2013-2016 fell by several percentage points, which was mainly due to the economic slowdown in China. But despite optimistic headlines proclaiming 'the end of coal,' coal use is rising again.[12] Meanwhile, gas is growing faster than any other energy source.[13]

Source: Pixabay

fastest annual rate of growth since 2013. Annual sales are roughly four times the levels of 1965. Of those 88 million vehicles sold, just 775,000 were powered by electricity – considerably less than 1 percent of annual sales.[18]

The growth of urban traffic and car ownership plays a major role in rising emissions levels, and this is almost certain to continue without a decisive shift in both policy and practice. In the rapidly growing cities of the global south, UN-Habitat studies have shown the limited availability of public transport is a major factor driving the rise of private vehicle ownership.[19] The enormous anticipated growth in urban populations between now and 2050 (by 2-3 billion people, mostly in the global south), as well as rising levels of private vehicle ownership also mean that cities could become dramatically more congested and polluted. Modern public transport systems are needed as an important solution to the problems generated by what has been an unplanned and chaotic growth of urban populations.[20]

The World Bank's 2017 Global Mobility Report warned that, if things continue more or less as they are, by 2030 passenger traffic will exceed 80 trillion passenger-kilometres per year—a 50 percent increase over 2015. In the same period, the number of cars on the road is expected to double to nearly 2.5 billion, and global freight volumes will increase by 70 percent.[21] Global land transport emissions under a 'business as usual' scenario could grow to 13 gigatonnes (GTs) per year by 2050 as a result of a near tripling of transport emissions in developing countries – several times higher than the 2-3GT by 2050 considered compatible with the Paris goal of global net zero emissions and science-based temperature limits. Transport-related emissions from developed countries are also projected to increase by roughly 17 percent in the same period.[22]

The growth in vehicle ownership has slowed in some developed countries, but globally the pace of growth is much faster. This has been accompanied by a trend towards larger, less fuel-efficient vehicles, particularly (but not only) in the USA. According to the IEA: 'the share of SUVs and light trucks [in the USA] increased from 47 percent in 2011 to around 60 percent of total sales in 2017, bringing up the share of these vehicles in the total passenger car fleet to almost half.'[23] In the USA, transport is now the leading source of CO2 emissions.[24] But larger and less fuel-efficient vehicles are also growing elsewhere. In the European Union, this trend has helped fuel a rise in oil demand, which increased by 2 percent in 2017 – the highest annual rate of growth since 2001.[25]

Clearly, addressing the rise in emissions from road transport as well as transport-related emissions more generally presents many challenges. Transport is in many respects the engine that drives the global economy – an economy that reflects the priorities of growth, accumulation, and consumption. Emissions from transport are also dispersed, and every truck, airplane, container vessel etc, is part of the emissions problem. This means the solutions must take effect at the very heart of the global economy and this will have a major impact (not all of it negative) on lifestyles and culture.

Furthermore, whereas low-carbon alternatives to fossil fuels exist for electrical power generation, food and agriculture, and energy use in buildings – all of which are major sources of emissions – there is currently no widely available low-carbon alternative to the fossil-based fuels used in transport (such as petrol, diesel, kerosene etc). An additional challenge is the growth of road transport in the global south, where transport emissions are projected to grow 2-4 times faster than emissions across the whole economy.[26] Key governments in the south – such as China and India – see private vehicle ownership as a metric of economic development and rising prosperity.

3. SUSTAINABLE MOBILITY AND DECARBONISATION

For at least a decade before the 2015 UN climate talks in Paris, France, major global institutions—having assessed the scientific evidence of climate change and its civilisational implications – had come to realise that emissions from transport and other energy intensive sectors would need to be reduced dramatically as part of a comprehensive strategy to limit the rise of global temperatures.

But the 'decarbonisation' of transport is both a major goal of climate policy as well as being an important part of the effort to establish what has been termed 'sustainable mobility.' During this period the number of studies and reports devoted to advancing sustainable mobility has increased dramatically, as have the number of organisations attempting to influence policy makers. Some examples of this include the Urban Electric Mobility Initiative (UEMI), which aims to increase the share of electric vehicles. The C40 Cities Climate Leadership Group, which has pledged to only procure zero-emission buses by 2025 and to ensure that major areas of cities are zero-emission by 2030. Other initiatives include Cycling Delivers on the Global Goals, EcoMobility Alliance, EV100, Global Strategy for Cleaner Fuels and Vehicles, Intelligent Transport Systems for the Climate (ITS4C), MobiliseYourCity, Navigating A Changing Climate, Taxis4SmartCities, and the Global Fuel Efficiency Initiative.

The International Association of Public Transport (UITP) has been a leading voice in the effort to have policy makers prioritise public transport, and seeks to double the market share of public transport worldwide by 2025.[27] In its Declaration on Climate Leadership, the UITP put public transport systems at the forefront, emphasising planning for long-term improvements in public transport systems and the need for a modal shift to low-carbon public transport within cities. The Declaration also calls for cities to: 'design public policies that limit urban sprawl and allow integrated public transport systems to expand in parallel with urban development,' and to 'support the development and use of technological innovations in the public transport sector that lay the foundations for the sustainable smart city.'[28] Another important voice is the Partnership on Sustainable Low-carbon Transport (SLoCaT), a multi-stakeholder partnership of more than 90 organisations active at the UN level.

A 2016 report from the World Resources Institute (WRI) analysed the emissions reduction potential from a range of global transport-related initiatives proposed under the UNFCCC-affiliated Paris Process on Mobility and Climate and Lima-Paris Action Agenda. Looking in detail at seven such initiatives – which involved a range of proposed efforts in 'planning, non-motorised transport, public transport, freight, aviation, fuel economy, intelligent transport systems, and electric vehicles' – the paper found that the greatest emissions reduction potential could come from modal shifting to public transport and rail. But the paper also noted that such shifts would require a 'very high level of effort' to achieve. It also emphasised that, given the increasingly interdependent nature of transport and power generation, as well as the realities of manufacturing in a world of limited materials, possibilities for emissions reduction depend significantly on minimising both overall energy demand and the total number of vehicles in use – an issue to which we return below.[29]

3.1 A PROGRESSIVE VISION EMERGES

Taken as a whole, the advocacy work of organisations working to advance sustainable mobility has registered an impact on high-level global commitments around sustainable mobility, such as those contained in the New

Urban Agenda adopted by the UN Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, Ecuador in 2016[30] and the Ashgabat Statement on sustainable transport released in November 2016.[31] In making such statements and commitments, UN officials, multilateral development banks, leading corporations and NGOs have emphasised the enabling power of sustainable transport and its multiple roles in supporting the achievement of the Sustainable Development Goals. These and other commitments and declarations by government representatives and multilateral bodies repeatedly reference the need to expand the public transport sector, and to make it multi-modal (road, rail, ferry, cycling, walking, etc) in order to facilitate interconnected door-to-door connectivity.[32]

In the case of the UN's New Urban Agenda, the proposals point to the need for national and municipal governments to build up and exercise their capacities to plan smart cities, making use of 'opportunities from digitalisation, clean energy and technologies, as well as innovative transport technologies, thus providing options for inhabitants to make more environmentally friendly choices and boost sustainable economic growth and enabling cities to improve their service delivery.' This will require 'better and coordinated transport land-use planning.'[33]

Few transport unions would argue with the intentions expressed in these documents. But the proliferation of commitments and statements has seldom been matched by anything like the required level of action. There are three main reasons for this. First, many of the proposals to support sustainable mobility come up against powerful corporate interests – such as car manufacturers and real-estate developers – that profit from existing economic arrangements. This is seldom explicitly acknowledged, but it goes a long way towards explaining why progressive transport policy often remains on the margins.

Secondly, what is needed in order to advance sustainable mobility at the speed and scale required is a clear 'public goods' approach to transport (including public transport) and decarbonisation – one that puts social and environmental needs before private profit. But such a perspective is pushed off the radar by the fixations of neoliberal policy makers who, in the face of indisputable evidence to the contrary, display an unshakable faith in market forces and the need to mobilise the private sector.

Thirdly – as we will discuss below – the proposals often make little or no reference to the millions of workers who deploy their labour to provide transport and the hundreds of millions of people living in communities who comprise the riders and passengers of that transport. Without their voices and support, sustainable mobility will be caught in an unwinnable fight with powerful interests that are content with, and benefit from, the existing economic model.

3.2 THE PARIS AGREEMENT – THE EMISSION REDUCTION DEFICIT

The ratification of the Paris Climate Agreement in 2016 by the UN Framework Convention on Climate Change (UNFCCC) raised hopes that countries were about to get serious about reducing emissions across the global economy in order to address the climate crisis. But, here again we see how the vision of a low-carbon world is out of step with existing policy commitments. Behind these inadequate commitments lies the political power of business as usual.

Under the Agreement, governments from 195 countries acknowledged the need to limit average global warming to 'well below 2 degrees' (compared to pre-industrial levels), and to try to limit that warming to just 1.5C. The Agreement stated that governments understood the need for emissions to peak 'as soon as possible' leading to 'rapid reductions

thereafter in accordance with best available science' in order to achieve 'a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century' – a state commonly referred to as net zero emissions.[34]

However, the Agreement openly acknowledged that the emissions reduction pledges submitted by governments – called Nationally Determined Contributions or NDCs– were not consistent with the 'well below 2 degrees celsius' target, let alone the 'safer' 1.5C target. Even if fully implemented, the NDCs would lead to a continuing rise in emissions until 2030, and would likely produce an overall average temperature increase of 3C or more by 2100.[35] As the IEA starkly put it: 'There is no peak in sight for world energy-related CO2 emissions in the [NDC] Scenario: they are projected to be 8 percent higher than 2013 levels in 2030.'[36] Similarly, the OECD's International Transport Forum has concluded: 'the estimated aggregate annual global emission levels resulting from the implementation of the [NDCs] do not attain 2C scenarios by 2025 or 2030.'[37] But the NDCs are not only inadequate; in the period since the Paris talks, there are clear signs that the major industrialised countries are failing to meet even those inadequate pledges.[38]

As a result, the gap between what is happening and what needs to happen continues to grow. This has been described as a problem of political will or 'insufficient ambition,' but the problem goes much deeper.[39] The inadequacy of the Paris commitments exposes the chasm between what science says is needed and the woefully inadequate best-case scenario offered by those who work within the ideological and systemic confines of competition and accumulation.

To get even close to net zero emissions in the time agreed will require dramatic changes in the global political economy. The dominant business-as-usual paradigm – of extraction, accumulation, and consumption, wrapped up in the ideology of perpetual growth – is incompatible with true ecological sustainability or a stable climate.

3.3 WHAT TO DO ABOUT TRANSPORT

The Paris talks acknowledged that transport systems would need to be radically changed, having documented that transport-related emissions are currently 'growing faster than any other energy end-use sector.'[40] The UNFCCC has itself warned that keeping the average global temperature increase to below 2C 'requires changing [the] transport emissions trajectory.'[41]

But it is strikingly clear that trends in transport (such as rising vehicle ownership) mean that the current emissions trajectories will not change without a radical change of course. According to The Partnership on Sustainable Low-carbon Transport (SLoCaT), business as usual will lead to a massive 55 percent increase in annual transport CO2 emissions by 2030 compared with 2010 levels.[42] There are clear signs that the global CO2 budget allocation for transport – the total amount of CO2 that can be emitted by the transport sector, as a proportion of emissions from all sectors, before we pass key points of danger in our impact on the climate – will have been exhausted by around 2036 for the 2C target, and by 2024 for 1.5C.[43]

SLoCaT also concluded that achieving net zero emissions across the whole economy by mid century would be impossible without the extensive transformation of the transport sector, especially from 2030 onward. Reaching the net-zero target would require reducing emissions from transport by 4.6 percent every year from 2030 until 2050. The report also found that any delay in preparing for such massive change in the years leading

up to 2030 would make such a transformation essentially impossible.[44]

Reports sounding the alarm about transport-related emissions are mostly diagnostic and end in calls for action and for the international community to show political will and higher levels of ambition. But some go further. A 2017 report released by the Paris Process on Mobility and Climate (PPMC) spelled out a Global Macro Roadmap in order to make transport part of a net-zero emissions economy. It concluded that reducing annual transport-related emissions to between one-third and one-quarter of current levels – a reduction by mid century from 7.7 gigatonnes emissions per year down to 3 gigatonnes (for 2C) or 2 gigatonnes (for well below 2C)—was 'an ambitious but realistic goal.' However, the remaining 2 gigatonnes would need to be 'sequestered' (ie buried) or offset by some other means.[45]

According to a UNHabitat study of the Paris Agreement, the overwhelming majority of Nationally Determined Contributions (NDCs) that were submitted by governments (113 of the 164 total) contain commitments to sustainable mobility. However, barely one-third of the NDCs submitted make specific reference to transport-related emissions, and only 15 country submissions give any indication of plans to address their upward course.[46] According to the PPMC's Global Macro Roadmap, the commitments 'do not yet provide a credible pathway for the comprehensive transformation of the transport sector towards a net-zero emission, resilient economy, which will be required by 2050 and beyond.'[47]

Meanwhile, even the World Bank has concluded:

> **The world is off track to achieving sustainable mobility. The growing demand for moving people and goods is increasingly met at the expense of future generations. It is urgent to reverse this trend. The costs for society... are simply too high.'**[48]

Source: Pixabay

3.4
NEW MOBILITY SERVICES

Despite the transport sector being so badly off track from the necessary evolution required to address emissions targets, it is nevertheless currently undergoing dramatic changes. Driven by the limitless possibilities opened up by emerging mobile communications technologies, the rise of new mobility services (NMS) has created levels of excitement perhaps unmatched since the days when we were promised personal jetpacks.

By enabling real-time tracking and co-ordination of ride-hailing, scheduling, routing, payments, feedback and more, such technologies have spurred a rapid development and proliferation of both scheduled and on demand transport services, ranging across car-hailing services, such as Uber and Lyft, pre-arranged or zone-based services like Chariot, and a variety of flexible, route-based, shared taxi services that span a wide range of vehicle and service types. Too often, the proliferating options are viewed alongside the spectre of artificial intelligence (AI) and driverless vehicles, and the combination of the two is offered up as a magic bullet that will address all future mobility needs and enhance transport's contribution to the effort to reduce emissions. A detailed examination of the full range of such services – how they are evolving and interacting with other elements of transport systems – would be a major undertaking even for a given major city (and would go far beyond the scope of this chapter), but a few general observations can be made.

First, it should be noted that such developments open up real possibilities for meeting the needs of working people for safe, accessible, affordable and sustainable mobility, particularly in making 'first mile / last mile' connections to core public transport services (subways, buses, trains). However, if left subject to the incentives of profit and competition, such services also pose a serious threat to public transport services, and to the ability of the transport sector, and public transport in particular, to contribute to the urgent task of decarbonising our economies.

A 2018 report by the US-based Transit Cooperative Research Program found that such services have potential to complement public transit, reduce vehicle miles travelled (VMTs) by diverting some drive-alone trips, and expand access in underserved or hard-to-serve communities. But it also found that they can 'contribute to conflicts over use of street space and public rights-of-way' without prudent regulation, and that whatever safety benefits they bring come mainly from reductions in per capita VMTs.[49]

Evidence regarding the emissions-reduction potential of car-sharing services and fleets is mixed. Another detailed study in South Korea found contradictory impacts from car sharing, with reduced CO2 emissions due to fewer vehicles on the road and the greater average fuel efficiency of shared cars, but an increase in emissions due to people switching from the use of mass public transit to car sharing. On balance, the study found that the positive effects do not necessarily offset the negative ones.[50] According to another report, Uber's introduction of reduced fares and optimised pickup points that algorithmically recreate bus stops, created conditions where, without appropriate policy interventions, the service could turn out to be more disruptive to public transport than to personal vehicles.[51] Perhaps unsurprisingly, the ultimate impact of such services depends largely on how they are integrated into an overall transport system, so that VMTs are minimised, and competition with more efficient public transport options is avoided.

Secondly, it seems clear that the specific ways in which new mobility services and their impacts evolve will depend significantly

on whether and how transport workers and their unions prepare and take action to shape the process. Transport workers and their unions cannot afford to place their faith in any suggestion that technical developments in communications or automation or an evolving transport landscape will necessarily provide any solution to the climate crisis or the mobility needs of working people and communities if left to its own devices. As with all past technological innovations, the key to ensuring that such changes meet the needs of workers will lie in informed and determined action by workers themselves, based on a solid grasp of the facts and sound analysis of their implications.

One particular challenge to be confronted in order to achieve this will be to gain access to the data necessary for adequate planning and integration of such services. As a report from the Carnegie Endowment notes, private providers of such services have been reluctant to share such data with local authorities, although those local authorities could employ a number of bargaining chips to gain access to such data. Offering 'airport pickup lane access, streamlined payment with public transit services, the inclusion of qualifying services into HOV or other specialised lanes, or even subsidising certain trips,' could all prove effective negotiating strategies to get data.[52] Of course, an approach rooted more firmly in public ownership and control could assert even more decisive influence through aggressive licensing and regulatory approaches, even without attempting to assert full public ownership over such services themselves.

Thirdly, it should be noted that the emergence of new mobility services at a time when policy debates around the provision of public services like transport have been shaped so profoundly by the neoliberal project of liberalisation and marketisation—often through public-private partnerships (PPPs) – means that discussions around NMS are vulnerable to the imposition of private, for-profit interests into discussions concerning the provision of public transport services. Therefore, ITF affiliates should be vigilantly sceptical of the claimed benefits and fundamental necessity of PPP approaches in discussions around NMS. In addition, discussions of PPPs in this context should serve as a reminder of a crucial fact: extending sufficient public and democratic control over such elements of the transport sector to allow their successful integration in ways that advances both the public good and meets the challenge of decarbonisation, will require a substantial increase in public finance.

4. POLICY AT THE CROSSROADS

Along with other major global institutions, the World Bank wants to reverse climatically destructive trends in transport without changing policy to address the underlying causes. The pro-market, neoliberal approach to economic policy has put profit before people and the planet. That policy framework has compromised the capacity of national and local governments to both invest in a sustainable future and partner with workers and communities. Transport policy is held captive to this theoretical model. From both a social and a climate perspective, the need to invest in modern public transport systems is urgent, but levels of investment remain too low and the investment committed is often tied to conditions designed to remove investor risk and to guarantee private profit.

It also needs to be acknowledged that the neoliberal narrative has infiltrated the wider policy discussions to the point that it has become a hardened dogma, one that sustains itself by ignoring the facts. In recent years the idea that 'the private sector must lead' has nevertheless been subjected to intense interrogation – largely because its

endorsement of full-on privatisation has led to widespread and well-documented failures. But the policy mainstream (including many key environmental NGOs) has not yet embraced the logical alternative: one that would accept that the public sector must play a leading role. Instead of embracing this alternative, the emerging mainstream narrative points to a multi-stakeholder approach anchored in public-private partnerships (PPP). This messaging is framed in politically seductive, crisis-centred tropes of 'we're all in this together,' which serve to obscure the key qualitative difference between investing for the public good and investing for private gain.

For example, the Paris Process on Mobility and Climate (PPMC) views the challenge posed by rapidly rising emissions from transport as one that 'calls for an unprecedented immediate and co-ordinated mobilization of all transport sector stakeholders, public and private, including policy-makers and representatives of the business sector, and requires the full participation of civil society.'[53] Similarly, the Ashgabat Statement on sustainable transport, released in November 2016, referred to 'the vital role of public finance, both domestic and international, in meeting sustainable transport needs and in catalysing all sources of finance, including traditional official development assistance, domestic resource mobilization, direct private investment and a wide array of partnership models, including Public-Private partnerships (PPPs).'[54] Also echoing such an approach, the SLoCaT report notes that domestic, public sector funding 'is still the major source of finance for transport today,' but claims it is nonetheless 'insufficient to meet the investment needed to address the growing demand for transport (passenger and freight) globally.'[55]

Public finance is therefore seen as playing the minor, catalysing role because, in the words of the Ashgabat statement: 'Mobilizing finance for sustainable transport will be an enormous challenge, especially given the strain on public finances that exists in many countries.'[56] Of course, it was the neoliberal prescriptions around 'structural adjustment' that put the strain on public finances in the first place – prescriptions that entailed the selling off and/or reduction of public services.

4.1 THE INVESTMENT CHALLENGE

Attempts to quantify total global investment in transport show wide variation. For example, research from the Institute for Transport and Development Policy (ITDP) put the figure at about USD900 billion per year in 2010. More recent projections from the International Energy Agency (IEA) suggest a figure of USD2.6 trillion. Such variation is due to the complexity and diversity of financial flows involved and the lack of publicly available data.[57] Importantly, transport investment is concentrated in a few rich countries led by the USA and Japan.[58] According to a 2014 World Resources Institute study, global transport investment by governments ranges between USD569 billion and USD905 billion. However, 'The private sector has shown willingness to invest substantially in high-income countries, suggesting that risk aversion plays a large role in limiting private investment elsewhere.'[59] The data on investment is not separated out by modes, so it is difficult to know how much money is being invested in public transport systems.

Either way, radical emissions reductions, not only in the transport sector but also throughout the economy, will therefore require high levels of financial investment. The policy mainstream assumes that the bulk of the required investment must come from private sources, and the role of those public funds that are available – including through international mechanisms like the Green Climate Fund – must be used to catalyse or unlock private investment by eliminating investor risk, laying the groundwork for 'bankable' projects, and underwriting profits.

Estimates for the total investment necessary to meet the Paris climate targets also vary considerably, depending on a range of assumptions about what the end state would look like, how to get there etc.[60] The International Energy Agency (IEA) estimates that roughly USD3.5 trillion needs to be invested annually until 2050 in order to reach the Paris 2C target.[61] The International Renewable Energy Agency (IRENA) puts the figure for total additional investment in 'low-carbon technologies' between 2016 and 2050 at USD29 trillion – or a little under USD1 trillion per year. According to the New Climate Economy Commission, infrastructure investments in the order of USD90 trillion will be needed over the next 15 years to replace ageing stock in order to keep up with growth projections, but 'the additional investments in infrastructure needed to make the transition to a low-carbon economy will be modest' – in the order of USD270 billion per year.[62] This assumes that investments in infrastructure will happen anyway, and making them 'low-carbon' will not significantly alter the overall amounts required. The influential "Mission 2020"– a group of scientists working with former UNFCCC head Christiana Figueres – concludes: 'it is clear from all of the calculations that annual investment in climate action by 2020 needs to be well beyond USD1 trillion,' and to remain at that level for 'at least the next decade and a half.'

What is clear from these numbers is that there is presently a huge gap between the levels of investment needed to decarbonise the economy and the levels of investment that are currently being 'unlocked.' This is the case across all of the major economic sectors, including transport. According to the IEA / IRENA report, transformation of the transport sector would require a cumulative investment of USD32 trillion between 2015 and 2050, roughly USD13 trillion more than the current policy commitments might be expected to generate. But the USD32 trillion figure assumes that roughly USD15 trillion will be absorbed through the electrification of vehicles, and excludes the cost of supporting infrastructure.[63]

The reasons for the investment deficit are many, but they boil down to the simple fact that many low-carbon solutions and technologies are simply not profitable or are not compatible with the interests of investors seeking either rapid or guaranteed returns. This has been well documented by union-based research groups and their policy allies.[64] The investment deficit also draws attention to the failure of the carrot and stick approach that seeks to incentivise investing in the green economy by way of subsidies, and to discourage investing in carbon-intensive projects by way of pricing emissions.[65]

4.2 INTERNATIONAL CLIMATE FINANCE

During the last decade international climate finance became a key element in the UNFCCC debates and negotiations around climate action. It was originally used as a way of referring to flows of funds (whether real or aspirational) from richer to poorer countries, so that richer countries could discharge their ecological debt as major emitters by assisting poorer countries in lowering their emissions trajectories and adapting to climate change impacts, while still meeting their own development needs.

At COP 15 in Copenhagen in late 2009, developed countries committed to raise USD100 billion a year by 2020. The Green Climate Fund (GCF) was then established in the Cancun Agreements of 2010, intended to serve as a key delivery mechanism for this kind of international aid. The target was reinforced at the Paris COP21 in 2015, but the definition was expanded to include funding from 'a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance.'[66] As a result, not only does the GCF blur the relative obligations of public and private entities, it opened the door for the governments of rich

countries to include a wider range of financial flows within the definition, and thus to reduce their obligation to provide direct financial aid. Current estimates of total climate financial flows, from all sources, range from USD39 to USD120 billion per year.[67] When viewed alongside the levels of investment needed, these commitments, loose as they are, remain paltry.

As with the NDCs, transport projects remain on the margins of climate finance commitments. According to a report published jointly by the German international development agency GIZ and the Partnership on Sustainable, Low Carbon Transport (SLoCaT), less than 10 percent of climate change mitigation related funds from the Global Environment Fund (GEF) and 16 percent of the World Bank's Clean Technology Fund (CTF) have gone to low-carbon transport projects. For the Clean Development Mechanism (CDM), this share is even lower, with only 0.3 percent of Certified Emission Reductions (CERs) being generated from transport projects. Of the total public and private climate finance flows devoted to mitigation, a mere six percent are estimated to be for sustainable transport.[68] A World Resources Institute paper estimates that climate funds and institutions generate barely 0.5 percent of all transport investments, and Overseas Development Assistance (ODA) generates around 2 percent.[69]

As noted above, the transport sector is responsible for roughly one-quarter of energy-related global GHG emissions – but this is clearly not reflected in the share of transport-related projects receiving climate finance. And although there has been an increase in the number of countries applying climate finance to transport-related projects, nearly 140 countries still have no transport projects funded by any of the major climate finance initiatives.[70]

The GCF – which was supposed to serve as the key mechanism through which international climate finance would flow –

Passengers getting on a bus through flood water in Bangkok
Source: Alamy

is far from reaching its stated goal of USD100 billion a year by 2020, and the prospects for it doing so appear bleak.[71] As of May 2018, the fund had raised just over USD10 billion in pledges from 43 national governments[72] – one-tenth the requirement for this crucial seed fund, expected to play a central role in unlocking the trillions of investment dollars needed each year. In terms of overall investment needs, the GCF is a drop in a very large bucket – and the proportion being dedicated to transport falls short even of that sector's contribution to emissions. Worse still, the GCF's lack of funding, and the rising mistrust and acrimony it has spurred within the fund's oversight board, may recently (mid-2018) have brought the fund to the brink of collapse.[73]

4.3 PUBLIC-PRIVATE PARTNERSHIPS (PPPs)

The reality of inadequate investment draws attention to the limitations of public-private partnerships (PPPs). The mainstream commitment to PPPs is not limited to the transport sector, but has been advanced as the central mechanism for investment in decarbonisation throughout the economy. The justification for relying on PPPs has been that they would generate up-front capital for infrastructure projects that capital-starved governments could not generate themselves.

The results of this approach have betrayed the vision. Private-sector insistence on reaping the benefits of such partnerships, while avoiding the risks, has led to a failure to generate sufficient capital, and has resulted in financial and social costs externalised onto the public. The PPP model has also proven unsuccessful in transport and in other sectors. The public absorbs the risks while the private corporations enjoy guaranteed revenue streams and profits. But according to the IEA's Renewable Energy Technology Deployment (RETD) Technology Collaboration Programme, while the public sector has been contractually forced to protect private investors from risk, it is often the case that, when it comes to transport, any degree of risk for private investors is too much.[74]

In India, an in-depth study[75] conducted by a planning commission working group on urban transport for the country's 12th five-year plan, concluded that the PPP model was especially unsuited to transport projects, noting that its research had shown that 'internationally, private investment has not been successful in urban transport projects because the usually unstable revenues of these projects make them commercially unviable.' The report noted that, of 113 world cities with metro rail, 88 percent have been developed and are operated by the public sector, and that outside of India no city in the world had attempted to provide full metro transit service through a PPP, with one exception: the failed Star Putra metro rail' experiment in Malaysia. Therefore, the report recommended that the Indian government, having 'bet big on public-private partnership' to deliver the ambitious infrastructure targets envisaged in its 12th economic plan, 'make an about turn at least in the case of urban transport infrastructure.' The working group suggested that PPPs be considered for only 20 percent of the metro projects in the country over the next five years, while the vast majority 'should be funded by central and state resources with adequate financing from domestic and multilateral lending agencies.'

We noted above that many advocates of sustainable mobility regard PPPs as a means of helping cash-strapped governments and public agencies unlock the enormous wealth held by private investors, and to access expertise in the private sector, through schemes that allocate risk appropriately. According to the UN Environment Program (UNEP), the elimination of private investor risk is a top policy priority, and the agency recommends that financial institutions and governments all around the world make use of 'instruments for de-risking clean investment.' This will require, among other things, the 'identification and removal of regulatory

hurdles, improvement of institutional capacity, and provision of bridging investment subsidies. Such financial de-risking instruments can transfer risk from private investors to public actors.'[76]

According to a 2017 World Bank report on private-sector investment in infrastructure projects,[77] the transport sector accounted for 39 percent (USD36.5 billion) of PPP investment that year, while energy accounted for 56 percent (USD 51.9 billion). PPP-related transport investment in 2017 was roughly double that of the previous year (USD18.8 billion), although the large increase was mainly due to just a few very large megaprojects – almost entirely accounted for by high-speed rail projects in China (USD 6.8 billion) and Indonesia (USD6 billion) and a large monorail project in Thailand (USD3.1 billion). Those three projects also largely account for the significant increase in overall private investment in infrastructure in the Asia-Pacific region last year.

Transport-sector PPP investment was spread across 66 projects. Of those, 39 were for roads, 15 for ports, seven for railways (mainly high-speed / intercity), and five for airports. In other words, PPP investment in transport infrastructure in 2017 was focused entirely on either accommodating more vehicle travel or expanding modes of transportation that have little to do with meeting the day-to-day mobility needs of working people.

Private investment in public infrastructure projects hinges crucially on government support. This can take two forms:

- Direct government support includes such things as direct capital expenditure on project construction costs, as well as revenue guarantees (to ensure profitability from otherwise uncertain fare-based income streams), grants of land, etc.
- Indirect support includes a range of policy guarantees involving tax breaks, exchange rates or other policy interventions to smooth the financial or economic challenges that might otherwise hinder the ability of such projects to generate returns for investors.

For transport in particular, direct capital subsidies were the most common form of government support in 2017. Of the 66 transport projects covered by the report, 24 received direct capital subsidies of one form or another. Between 2012 and 2017, transport-sector projects have received more than three-quarters (78 percent) of all direct government capital subsidies studied.[78]

What is striking about the patterns that emerge in relation to PPPs and private investment in public transport infrastructure is how little they have to do with meeting the needs for sustainable urban mobility for ordinary working people. The projects that are preferred by investors – and which therefore receive preferential treatment from most governments and development banks – are those that enhance the mobility of the business class: high-speed inter-city rail, airports etc. Such projects are rarely framed around those modes of transport that support the everyday mobility of working people.

A major reason for the lack of private-sector private investment for the kinds of urban mobility that serves working people is the unlikelihood of such projects to generate a guaranteed revenue stream that would constitute a healthy return on investment. This dilemma is highlighted in remarks from the vice president of policy for the American Public Transportation Association (APTA) Arthur Guzzetti. As Mr Guzzetti explains: "[the dedicated revenue stream] ... is what piques the private sector's interest ... . It absolutely won't work without that."[79] This presents a major obstacle to the successful use of PPPs for urban mobility that will serve the needs of working people, because public transport systems are rarely able to cover (let alone exceed) their operating costs through fares alone. The additional revenues must therefore come from other sources (such as government budgets) or by way of

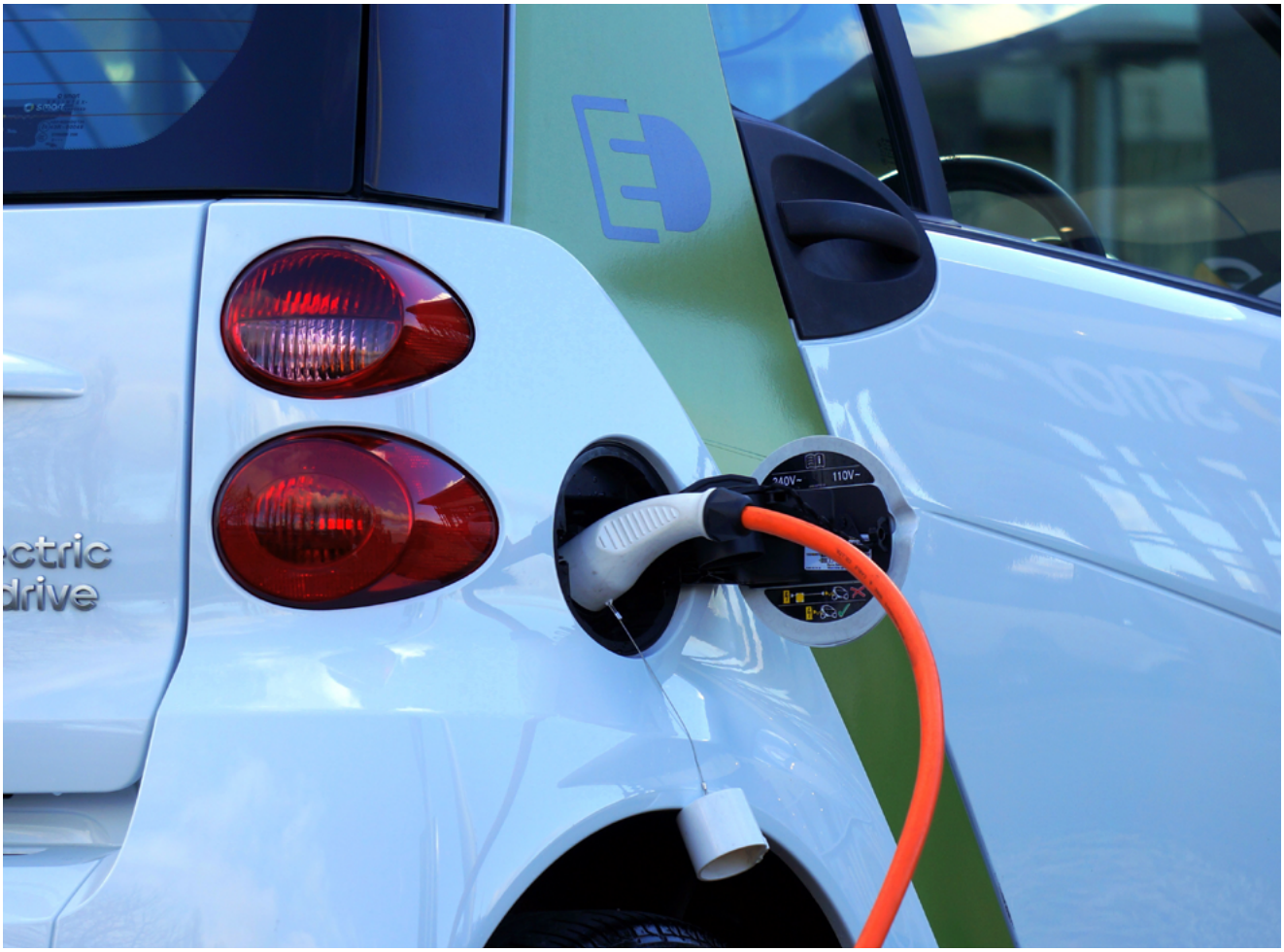
specific taxes (such as a carbon tax). But such revenues are highly vulnerable to political risk, because governments at all levels can choose to shift budgetary allocations and priorities.[80]

There are also serious technical complications when attempting to use PPPs for urban mobility infrastructure. As APTA vice president Arthur Guzzetti explains, transport projects funded via PPPs are especially difficult to integrate into an overall transport system. In order to manage the accounting associated with the project, those segments of the system that are managed under a PPP agreement must be physically and administratively separated from the rest of the system, so that the revenues can be tracked and accounted for separately. As Mr Guzzetti puts it: "If you have a line that just blends into your system, that is going to be very hard."

5. THE ELECTRIC CAR: MYTHS AND REALITIES

While the need to dramatically reduce transport-related emissions is indisputable, it is far from clear how this is to be achieved – not only in terms of finding available finance, but also in deciding how that finance should be spent. The dominant policy approach to reducing emissions in transport has focused on increasing the fuel efficiency of vehicles, reducing the carbon intensity of fuel or reducing vehicle miles travelled (VMTs).[81] Improving and expanding public transport is recognised as important, but is most often treated as a complement to fuel efficiency rather than the essential core component of the overall strategy.

Source: Pixabay



The policy mainstream has also expressed considerable faith in electrification, particularly electrification of individually owned vehicles. As the IEA notes, 'The electrification of transport plays a large role in all IEA scenarios aiming to achieve the decarbonisation of the energy system.'[82] According to the IEA and the IRENA: 'Electrifying road transport at the pace and scale required [to meet the 2C scenario] is an enormous task: the share of electric cars in passenger car sales would rise from less than 1 percent today to almost 70 percent in 2050.'[83]

The IEA has proposed a time frame for vehicle electrification – one that would require at least 20 percent of all road transport vehicles to be electrically powered by 2030.[84] UN-Habitat notes that car and battery manufacturers, energy producers, distributors – aware of what is at stake – 'will strive to increase the global market share of electric vehicles in cities to reach at least 30 percent by 2030.'[85]

The emphasis on electrification generally assumes that individual vehicles will continue to play a massive role in meeting urban mobility needs. A vision of decarbonisation based mainly on replacing internal combustion engine (ICE) vehicles with electric vehicles (EVs) fits well with current aspirations regarding individual car ownership, and the convenience, flexibility and prestige often associated with it (thanks in no small part to enormous advertising expenditure on the part of the automotive industry). If decarbonisation can be achieved by replacing ICE vehicles with EVs, so the thinking goes, then there is little need to change the ways in which we go about our lives or to think seriously about reducing the number of vehicles on the road (which would, of course, cut into vehicle sales).

There are several flaws with this vision. Firstly, if they are powered by electricity generated mostly from fossil fuels, the emissions advantage of EVs over ICE vehicles is often negligible. In the case of the EU, 'GHG emissions of electric cars range from 76 to 262 grams per passenger-kilometre (138g for the EU electricity mix) and are not significantly different from today's diesel or gasoline cars.'[86] This underscores the fact that the decarbonisation of transport is inseparably linked to the decarbonisation of electricity generation, and the more renewables become part of the energy mix, the greater the emissions advantage of EVs. Globally, the portion of electrical power generated by low-carbon sources (including large hydroelectric and nuclear power) is roughly one third, with many nuclear power stations in the OECD countries approaching retirement. A one-for-one replacement of ICE vehicles with EVs is, therefore, not going to produce the levels of decarbonisation needed to seriously address rising transport-related emissions.

Secondly – and in the context of a rapid scale-up of renewable power generation – in order for EVs to play an important role in reducing emissions, an enormous increase in their manufacture and sales from today's levels would be required. For the IEA, in order for transport to help meet even the less ambitious 2C limit, battery-powered, hybrid and fuel cell vehicles would have to reach a market share in annual sales of about 30 percent of global light-duty vehicles (LDV) sales by 2030.[87]

Looked at in isolation, the growth of EVs has indeed been impressive in recent years. Globally, sales of EVs rose from 740,000 in 2016 to 1.1 million in 2017 – an increase of just over 50 percent. In a report to investors in early 2018, Macquarie Bank stated: 'It is only a slight exaggeration to say 2017 was the year electric vehicles (EVs) became mainstream.' Sales data from China, the USA, Europe, Japan and Canada show that EVs accounted for 1.7 percent of new car sales in those markets, significantly up from their share of 1.1 percent in 2016.[88] In 2015, the

IEA had made a similar claim, even while acknowledging that those EVs in service only reduced oil demand by 10,000 barrels per day – a reduction of just 0.01 percent of daily oil consumption.[89]

But the claim that EVs are now mainstream is absurd. More than 88 million cars and light commercial vehicles were sold around the world in 2016 – an increase of 4.8 percent from the year before, and the fastest annual rate of growth since 2013. Of those 88 million vehicles sold, roughly 775,000 vehicles were powered by electricity – considerably less than 1 percent.[90] According to the IEA, the number of electric vehicles (EVs) on the road reached 2 million in 2016,[91] or around 0.16 percent of the estimated 1.2 billion global total.[92] Put differently, for every electric vehicle currently on the world's roads, there are 600 running on petroleum or diesel.[93]

Growth projections for EVs have already been shown to be over-optimistic. In 2009, the global Clean Energy Ministerial launched the Electric Vehicle Initiative, establishing a target of 20 million electric vehicles deployed globally by 2020.[94] Given current trends, this target will not be reached. Industry experts believe that – left to the market – at least some sales projections for EVs are 'unrealistic.'[95]

5.1 ELECTRIC VEHICLES AND THE LIMITS OF GROWTH

Such discrepancies should raise serious questions about the wisdom of relying so heavily on electrified personal vehicles as the core of a decarbonisation strategy for transport. But the reality is that the impediments facing a massive scale-up of electric vehicles are likely far more wide-ranging and significant than the mainstream scenarios seem to have taken into account. Among other issues, the current emphasis on widespread adoption of privately owned EVs as central to decarbonising transport pays too little attention to how such a massive scale-up might affect markets and supply chains, including for crucial raw materials.

According to a 2018 report from the AT Kearney Energy Transition Institute, three problems in particular present 'significant and underappreciated risks' to the projected growth of EVs: 'Firstly, the scarcity of natural resources used to make batteries; secondly, the current lack of effective systems and processes for recycling or reusing batteries and, thirdly, the risk that widespread use of battery electric vehicles may not actually reduce CO2 emissions below the level that would be associated with the continued use of ICE vehicles.'[96] In light of these risks, the report cautions: 'With the electric vehicle and battery markets on the brink of explosive growth, governments must proceed with caution as they manage these fast-moving industries.'[97]

For EVs to seriously assist in reducing emissions, a number of obstacles would need to be overcome. As UN-Habitat explains, achieving the rate of adoption of electric vehicles necessary to meet decarbonisation goals would require:

- advances in vehicle and battery technologies, including reduction in costs from economies of scale
- the widespread availability of charging infrastructure
- increased public awareness
- an enabling policy environment with incentives provided by governments, including city governments
- integration of electric vehicles into overall urban transportation systems would also be required – for instance, short-distance travel by electric vehicles to public transport hubs[98]

The projected growth in private EV ownership may also face serious production obstacles. Norway is the world leader in EVs per capita, with more than half of new cars sold

in 2017 electric or plug-in hybrid vehicles – a scale of uptake achieved thanks to sweeping and aggressive policy support and incentives, including extensive tax breaks and preferential lane access. But one result of such aggressive measures is that demand for EVs is currently outstripping supply. In early 2018 it was reported that thousands of Norwegians 'have been waiting for months for their new EVs and car sellers have repeatedly extended delivery dates.'[99]

US automaker Tesla has also faced serious challenges in meeting its own targets for scaling up production. In early 2016, the Tesla Model 3 was touted as setting a new standard for consumer electric vehicles, and would be part of the company's move away from producing a relatively small number of premium vehicles, towards becoming a high-volume automaker producing less-expensive vehicles for a broader, mass market.[100] At the time, company owner Elon Musk announced that Tesla aimed to produce 200,000 Model 3s in the second half of 2017, and a total of 500,000 vehicles in 2018 across all three of its models (the new Model 3 plus existing Models S and X). Through March 2018, the company had built only about 12,500 Model 3s. Musk blamed the delays on excessive reliance on automation and shut down the production line in April 2018 for retooling, in order to accommodate more human beings.

5.2 SUPPLY CHAINS AND SCARCE MATERIALS

Such production challenges may be only a foretaste of the difficulties ahead if production of EVs is to be scaled up at the rates implied by mainstream decarbonisation scenarios. Electrifying such large numbers of vehicles raises several potentially quite serious questions about supply chains, particularly for minerals that are essential for the batteries used in EVs, but also for various rare earth metals that are necessary in the construction of renewable-power-generation equipment.

Questions about materials and supply chains for EVs need to be understood on two levels. First, the mainstream decarbonisation scenarios often rely heavily on a projected transition to electric vehicles, and this on 'market' terms. But it is not at all clear that such a scale up on commercial terms is even possible – nor that it would not produce chaos if it were allowed to proceed along the lines implied by the scenarios sometimes described. Second, even a planned and co-ordinated approach to decarbonisation, and even one that emphasises mass public transport solutions, will have to operate within the practical constraints of raw material availability and affordability – constraints that will be more severe if no efforts are made to minimise the numbers of electrified vehicles that need to be built.

Expert opinion varies on the degree to which critical minerals necessary for the production of batteries – such as lithium, cobalt and nickel – and for power generation from renewable sources – mainly rare earth metals – can be made available in the quantities necessary to meet the sorts of production targets that would be consistent with meeting the Paris targets. For example, global lithium production increased by about 12 percent in 2016 (with batteries consuming roughly 39 percent of that), but despite the increase in activity, surging demand was projected to lead to a shortfall in supply as early as 2018.[101] That looming surge in demand for lithium is driving what has been called a 'scramble for lithium' around with world, in which leading EV makers are competing to lock in long-term supply contracts, and lithium-mining companies are seeing both their stock prices and their operations surge.[102] Chinese companies in particular are reported to have been aggressively moving to secure the lithium reserves needed to drive the country's projected expansion in EV production and use. According to Nikkei Asian Review: 'Chinese companies, goaded on by the government, have acquired substantial stakes in lithium mines across the world.

China already has about 20% of the world's lithium reserves, but it has acquired up to 40% of global reserves.'[103]

Cobalt raises similar questions. Globally, demand for cobalt to be used in EVs is expected to increase by nearly eight-fold by 2026, and while the commercial supply of cobalt has quadrupled since 2000, its price has increased by more than 230 percent since 2015.[104] As with lithium, China has taken a leading position in securing stocks of cobalt. In the first nine months of 2017, Chinese companies imported USD1.2 billion worth of cobalt from Congo, compared to just USD3.2 million by India, the second-largest importer.[105] According to mineral consultancy CRU Group: 'China controls 62 percent of the world's cobalt supply, with 90 percent of that coming from the Congo.'[106]

According to the independent Dutch research and advisory firm CE Delft, the additional demand for lithium and certain other rare earth metals 'can probably be met by global reserves, but production will need to expand significantly after 2020 if EV uptake accelerates.'[107] But other analysts are less certain that serious supply disruptions can be avoided, and both the US Department of Energy[108] and the European Union[109] have issued reports warning about the possibility of such shortages. Of course, the scale and speed of the increase in production to meet expanding demand will also mean a significant expansion of mining activities, with all its attendant ecological and other risks and disruptions.

Of course, the mining of these minerals also raises extremely serious questions about human rights. For instance, 54 percent of cobalt currently produced comes from the Democratic Republic of Congo, where an estimated 40,000 children work in mining – much of it for cobalt.[110] And while US automaker Tesla has stated that it will not accept cobalt mined by child labour, in practice it is very difficult to track the origins of a given stock.[111]

Many of the materials and processes involved in manufacturing the components necessary for renewable energy-based power generation capacity are also highly polluting, particularly compounds of gallium and cadmium used in manufacturing solar PV equipment. China currently dominates global reserves and production of such minerals, although its absolute dominance – once over 95 percent – has been eroded by increased operations in the USA and Australia. China's previous dominance also came at a tremendous cost: those regions in China where rare earth minerals have been mined and processed, such as Baotou in Inner Mongolia – have suffered almost incomprehensible ecological devastation.[112]

Clearly, given all of these issues, we should seek decarbonisation pathways that minimise the quantities of such minerals that must be used, and that limit the rates at which we need to scale up our exploitation of them. Again, this highlights the urgent need for greater public control and deep democratisation of the processes through which our course ahead is to be determined.

5.3 "IF YOU BUILD IT, THEY WILL COME": EVs AND CHARGING INFRASTRUCTURE

Of course, EVs must first have their batteries charged in order to run, and major questions remain about the availability and ownership of charging infrastructure. In the words of one industry analyst: "Electric vehicles are unlikely to win broad market acceptance unless they can be charged quickly and easily anywhere."[113]

But there is currently a great deal of uncertainty about how charging services should be built and who should own them. Some public utilities have sought opportunities to own and operate such stations as a source of revenue at a time when demand for electrical power, and thus revenues, has stagnated due to the combined

effect of recession and de-industrialisation. Several US states have rejected such requests from utilities, mainly on the grounds that it would involve forcing all of the utilities' customers to pay for a service that only some will use. Other states have raised concerns that utility ownership would stifle private competition. But there is also a growing recognition that failure to ensure the widespread availability of charging stations will undermine the ability to meet ambitious targets for electrification of transport and emissions reductions.[114]

A recent UK study summed up the fundamental problem of a market-led approach:

- electric transport requires an infrastructure of charging points. It is a classic infant infrastructure problem: the network is economic only when there are lots of EVs charging from it; and the EVs are worth buying only if the infrastructure is in place
- unless transport decarbonises (alongside agriculture, buildings and electricity), the overarching [decarbonisation] objective is in jeopardy. There simply may not be enough time for the various experiments to play out. Second, the coming of EVs has profound impacts on the existing electricity system
- the electricity industry is becoming part of the transport sector and vice versa[115]

6. PROBLEMS WITH THE CURRENT APPROACH TO DECARBONISATION OF TRANSPORT

There are several major problems with the dominant approach to decarbonisation that the ITF and its affiliates seek to address. The main problems are as follows:

6.1 NOT ENOUGH PUBLIC TRANSPORT

The potential contribution of public transport in helping address the climate emergency is enormous, but its promise remains unfulfilled. Public transport is currently expanding in many places, though not fast enough to halt the rise in transport-related emissions, let alone to help bring emissions down. It is also not generally advancing in ways that really address urban congestion – a complex problem that cannot be solved without a dramatic increase in public transport, but one that cannot be solved by public transport alone. More than this, reaching climate targets will require that we begin to understand public transport beyond its traditional modes and into the terrain of mobility services, one that is increasingly being occupied by private companies such as Uber (we return to this issue below).

Public transport, on average, consumes half the energy per passenger-kilometre that private cars do, and even less during rush hour.[116] Doubling the market share of public transport would prevent the emission of half a billion tonnes of CO2-equivalent by the year 2025, and currently only 10 percent of urban transport energy consumption is linked to public transport.[117] In order to improve the energy efficiency of public transport even further, the International Association of Public Transport (UITP) emphasises the importance of three main elements: 'Better integration between urban planning and public transport

development, priority to the development of public transport and the control of traffic and parking.'[118] As the UITP points out, a major shift away from individual vehicles and towards the use of public transport, walking and cycling will be necessary.[119]

The sustainable mobility literature has grown dramatically in recent years, as have the number of advocacy groups operating in national and global spaces. Here and there, cities are pursuing policies that have begun to show what can be done in terms of reducing emissions and pollution, as well as noise and congestion. But most of today's best practices are to be found in the global north, where different low-carbon modes of transport often complement the role of well-functioning public transport systems. However, it is in the ever-growing cities of global south that emissions and pollution are likely to rise far more steeply in the next 2 or 3 decades – and it is here that public transport is likely needed the most.

6.2 TOO MUCH ATTENTION DIRECTED AT PRIVATE INVESTORS

Private investors are generally not interested in public transport unless their investment is essentially guaranteed to deliver a satisfactory return on investment (ROI). The public-private partnership (PPP) model has been shown to favour a relatively small number of megaprojects (like those referred to above), which do not really serve the needs of working people. Even worse, the impacts many such projects have had on workers, who make their living as informal transport workers mostly serving poor and working class communities, is rarely taken into account.

As a means of mobilising investment for transport, the PPP approach has fallen short and will continue to do so. PPP projects accounted for considerably less than 10 percent of all capital investments in transport globally, and the majority of PPP projects are financed through debt issued at interest rates that are higher than the rate of interest normally extended to public entities.

Public transport can make an enormous contribution to the lives of working people, but it does not easily create the direct revenues necessary to satisfy private investors. Rather than continuing to try to pursue policies that remove risk in order to guarantee profits, public transport must once again become a top public investment priority for governments.

6.3 INSUFFICIENT FOCUS ON CURTAILING PRIVATE VEHICLES SALES AND VMTs

Private vehicles – internal combustion engine vehicles (ICEVs) and electric vehicles (EVs) – also compete with public transport, and congestion is a major impediment to the service quality of public transport. Despite the fact that the availability of public transport has nearly doubled since 1995, the massive growth in demand for mobility has put significant pressure on the supply. According to UITP, this tends to produce a boom in private car ownership and the share of public transport then declines. As UITP explains: 'Public transport growth is strongest where efforts to increase its supply are matched with private vehicle demand management and urban densification.'[120]

Recent UITP analysis has shown that the use of public transport in the EU has reached its highest level since 2000, with a total of 57.9 billion journeys in 2014. Encouragingly, public transport's modal share is on a growing curve again, particularly in developed economies where urban sprawl tends to be slowing. In developing cities, however, modal share of public transport has decreased, as the supply of public transport has not matched population growth.[121]

6.4 THE MISGUIDED EMPHASIS ON ELECTRIC CARS

Despite the advantages of public transport, private electric cars continue to attract an inordinate share of policy attention. Although the term EVs can include the full range of electric vehicles – from scooters and bicycles to trains, aircraft, and everything in between – much of the policy discourse and many interventions around EVs focus on electric cars and light trucks. This focus perpetuates the idea that such vehicles can and should become the dominant low-carbon transport mode, particularly in urban areas. This is a major impediment to a future in which public transport thrives, since congestion from individual automobiles severely impacts the performance of public transport.

While they may fit well with existing consumer preferences and social aspirations, EVs are 'a relatively expensive way of reducing CO2 emissions.'[122] As one industry observer notes: "Personal vehicles are probably the most challenging to electrify cost effectively (dragging one or two passengers around over long distances in a 2-ton vehicle takes a lot of energy.) The case for electrification is actually stronger for other types of vehicles." In contrast: "City transit buses are ideal candidates for electrification."[123]

Much EV policy has been shaped by an over-optimistic assessment of the potential of EVs to displace internal combustion engine vehicles (ICEVs) in a competitive market. When subsidies have been used to address this, they have proven to be expensive and ultimately difficult to sustain.[124]

Current policy also takes insufficient account of the fact that, if powered by electricity generated mostly from fossil fuels, the emissions advantage of EVs over ICEVs is often negligible.[125] In the words of UITP: 'Individual electromobility does not solve congestion, nor improve traffic efficiency in cities. A green traffic jam is still a traffic jam.'[126]

The current approach has also yet to produce a clear and convincing means to deploy the kind of charging infrastructure needed to support the widespread use of private EVs, and it has not addressed some of the supply-chain challenges (both economic and environmental) that the mass production of EVs is likely to present.

The policy emphasis on EVs has drawn much-needed attention away from the role of public transport, and has not considered the impact large-scale EV production would have on the prospects for public transport, either at the level of investment, or in terms of developing good policy that supports public, low-carbon mobility. According to the UITP: 'Individual electromobility... is depicted as the solution for future clean urban mobility.' Meanwhile, 'electrically powered public transport is already delivering low-carbon transport to many people at the moment; and it can do more.'[127]

The focus on individual EVs has also failed to deal with questions of urban congestion and infrastructure lock in, potentially condemning us to a future of ever-more congested roads and expanding car parks. This will obstruct the expansion of clean, shared public spaces free of vehicles that support a safe, dynamic and vibrant social life.

6.5 A REACTIVE APPROACH TO NEW MOBILITY SERVICES

The explosion of communications technologies has seen a sharp rise in shared mobility, particularly ride-hailing services. Urban mobility has seen dramatic changes as new companies like Uber, Lyft, Car2Go, and others have moved into urban transport markets. The policy response to new mobility services (NMS) has been to succumb to the incursions of these new platform-based, app-driven companies, operating on the belief that the response of consumers indicates that the companies are meeting a genuine

public need. The current policy approach has also looked to a PPP model, one that has attempted to integrate these new players into existing public transport systems and services. The PPP approach has also been extended to bike sharing and car sharing.[128]

Such an approach to NMS has been variously reactive, uncontrolled and unplanned, with devastating consequences on workers and communities. It also fails to make a significant contribution to emissions reductions or help address urban congestion and pollution. In cities such as New York, ride-sharing services such as Uber and Lyft have contributed to increased traffic congestion.[129] At policy level, the impact of these services on existing public transport, taxi services and informal transport networks (that had provided income for drivers and served poor and working class communities) has been largely overlooked. From a climate perspective, the rise of new mobility services has not necessarily reduced road traffic as many of its champions promised. It also risks entrenching expectations for on-demand convenience that may not be compatible with climate-friendly mass urban transport, and could severely complicate the politics around successful advocacy for public transport.

6.6 NO STRATEGY TO INTEGRATE DECARBONISED POWER GENERATION WITH LOW-CARBON MOBILITY

The decarbonisation of transport is inseparable from the decarbonisation of electrical power generation. The straight-swap scenario (where electric vehicles replace traditional petrol and diesel vehicles without reducing the number of vehicles on the road) is problematic for reasons explained above. However, public electromobility will need to be scaled up, and this will mean more all-electric buses and dedicated fleets of electric vehicles. This poses two challenges. First, there needs to be more power generation capacity in order to supply the transport sector's growing electricity demand at a time when, in many OECD countries, a lot of generation capacity is ripe for retirement. Second, to yield the significant emissions benefits required, EVs must be powered by an electricity system that increasingly relies on renewable sources.

According to the IEA and the IRENA, in order to limit average global warming to less than 2C, the share of renewable energy would 'need to increase from around 15 percent of the primary energy supply in 2015 to 65 percent in 2050.' This also assumes that overall energy demand in 2050 would remain around today's level due to extensive improvements in energy intensity between now and then, rather than continuing to grow along current trends.[130] This is an extremely hopeful assumption. But even these scenarios do not take into account the need to generate additional renewable energy in order to power massive numbers of new electric vehicles (which, again, would be even more difficult if we do not reduce the numbers of vehicles in use).

But mainstream policy voices have yet to confront the fact that the current approach to scaling up renewable energy is not producing enough generation capacity. That approach has relied on incentives and policy signals from governments that were expected to 'unlock' or 'catalyse' the levels of investment needed for a transition to renewable power, while generating reliable profits for investors over time.[131] This has not happened, and today renewable energy is still largely dependent on subsidies of various kinds. As with the PPP model in public transport, there is simply no way to reduce investor risk to a point where the required levels of investment capital will be assured.

Currently, it is impossible to see how transport-related emissions can be reduced in a manner consistent with the Paris targets without a bold approach to the deployment of renewable energy that will ensure sufficient

capacity for the decarbonisation of transport while meeting all other requirements for electrical power. For instance, in addition to their essential role in decarbonising of power generation and transport, mainstream scenarios also anticipate that renewable sources will play a major role in the decarbonisation of heating and cooling for buildings.

The prospects for decarbonisation under the current approach are grim. To date, rising deployment of renewable energy and improvements in energy efficiency have had only a minor impact on the energy mix globally, and have been completely inadequate to even begin displacing fossil fuels.

6.7 WORKERS ARE INVISIBLE; COMMUNITIES ARE PERIPHERAL

The dominant approach to decarbonisation also fails to see workers and communities as crucial actors in the effort to address the climate crisis. Whether in relatively affluent countries or in resource-starved poorer regions, workers can be engaged in the struggle for sustainable mobility at a grassroots and day-to-day practical level.

As the ITF has noted, most of the world's transport workers are informal. While informal transport work has long been seen as a phenomenon of the global south, even this is changing: the rise of NMS and increasing precariousness has meant a substantial increase in informal transport work also in the global north.[132] But whether formal or informal, workers and their unions – along with communities – need to be brought into the conversations that are shaping the future of transport.

Creating the social and political space for workers to shape decisions, over both future transport systems and their conditions of employment, is essential as a means to build the kind of broad social support needed to bring about the transport revolution we need.

OPT activists in Indonesia | Source: ITF

7. TRANSPORT UNIONS AND THE FIGHT FOR SUSTAINABLE LOW-CARBON PUBLIC MOBILITY

The ITF supports ambitious public transport commitments by national governments, including the allocation of sufficient public resources to invest in and develop high-quality, modern, public transport systems. At the same time, ITF affiliates have opposed the neoliberal model of privatisation and deregulation, supporting public ownership and investment in infrastructure and operations, as well as democratic accountability in how public money is spent.

7.1 TRANSPORT DEMOCRACY

The ITF also supports democratic public ownership to guarantee the delivery of the economic, social, environmental and employment benefits of public transport for all. Achieving these goals will require robust and vibrant democratic participation by trade unions and community organisations in decision making about public transport policy and planning, including decent work with employment and organisational rights for men and women in the formal and informal transport workforce. In our work, we will strive for the integration of informal transport workers, with guaranteed access to financing, skills development and income and social security.[133]

7.2 A JUST TRANSITION FOR TRANSPORT WORKERS

Led by the International Trade Union Confederation (ITUC), unions succeeded in getting the phrase 'just transition' into the preamble to the Paris Climate Agreement. The text affirmed 'the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities.'

The ITF's seeks a 'just transition' for workers in the existing transport sector and will strive to ensure that the transport workers of the future enjoy decent pay and conditions as well as employment stability.

If transport-related emissions are to be reduced in a manner consistent with the temperature threshold targets in the Paris Agreement, then many new jobs will be created both in traditional public transport modes and in public electromobility more broadly. The ITF is committed to ensuring that both the formal and informal transport workforce is fully engaged in the planning and implementation of these expanded public systems. Workers who drive taxis and minibuses today have the skills and experience to staff the new public mobility services of the future.

However, the decarbonisation of transport will necessarily involve a shift away from individual vehicle ownership, particularly in urban areas. This will impact workers who currently manufacture, sell, repair and dispose of vehicles, as well as those workers in petrol stations and car parks. Many of these workers can potentially be employed in public transport systems that can provide 'first mile, last mile' mobility services built around modern public bus and light rail networks.

7.3 A 'WHOLE ECONOMY' APPROACH TO TRANSPORT AND CLIMATE PROTECTION

Aware of the climate challenge and the likely consequences of rising transport-related emissions, the ITF has emphasised the vital role transportation workers have to play in promoting solutions. In preparation for its August 2010 Climate Change Conference in Mexico City (part of the ITF Congress), the

ITF presented a discussion document titled, 'Transport Workers and Climate Change: Towards Sustainable, Low-Carbon Mobility.'[134] The document looked at the transport sector's contribution to emissions, explained why transport-related emissions were rising, and outlined steps to reduce them.

For the ITF, addressing transport's contribution to climate change requires a whole-economy approach, because reducing emissions from transport will only be part of a successful energy transition if emissions in other key sectors – electrical power generation, industry, buildings, food and agriculture, and more – are also reduced. The whole-economy approach allows us to highlight the relationship between all types of transport (including freight). It also allows us to ask questions about the role of transport in our lives, how transport systems take shape, and how they are controlled and organised.

7.4 'REDUCE, SHIFT, IMPROVE' AND PUBLIC TRANSPORT

The 2010 ITF Congress document proposed a broad 'Reduce, Shift, Improve' (RSI) framework to guide efforts by transport unions interested in taking action on climate change. The RSI framework is grounded in the fact that lowering transport-related emissions involves three main approaches: (1) reducing the movement of goods and people; (2) shifting the ways in which people and goods move, away from high-carbon to low-carbon modes of transport; and (3) improving our use of both existing and new methods and technologies to promote energy efficiency. The RSI framework aimed to foster solutions for moving people and goods that combine transport modes based on cost, capability, route, speed and emissions. Public transport occupies a central space in the RSI framework.

There are many reasons to prioritise public transport, and many opportunities to make our lives better by doing so, and to make our cities safer, cleaner, healthier and more interesting and enjoyable places to be. But in order to be successful and deliver these gains, the fight for public transport has to be rooted in the recognition that profound changes are necessary throughout the transport sector and the economy as a whole. This is why the ITF also fights, for example, for public renewable energy alongside public transport. Public renewable energy is the fastest and least expensive way –and probably the only way – to generate enough renewable power to meet the demands on power generation of large-scale electrification of transportation.

Transport workers and their unions therefore have a vital role to play in addressing climate change. Part of this effort will be to help improve access to safe, sustainable and affordable mobility for working people and their communities, and simultaneously build and strengthen transport unions and the wider labour movement.

7.5 TOWARDS A POLICY SHIFT

The ITF recognises there is an urgent need for a fundamental shift towards public transport. The ITF is therefore part of a global movement for sustainable mobility. This movement recognises the potential contribution of public transport, especially when traditional public transport modes are supplemented by other low-carbon modes (bicycles, for example) and urban planning that reduces congestion (sometimes through congestion pricing and pedestrianisation of inner cities). Many of the proposals for sustainable mobility are beginning to have an impact, especially in urban settings. Traditional forms of public transport are also undergoing a significant global expansion.

Good examples, while important, do not mean that sustainable transport will soon become the norm. Neither do these examples

significantly alter the fact that transport-related emissions are rising faster than is the case in any other sector, and road transport – essentially cars, trucks, and motorcycles – amount for around 70 percent of these emissions. The increase in public transport is occurring too slowly to impede the rise in emissions or to meet the needs of a rising global urban population.

This means that transport's contribution to planetary warming and climate instability is increasing at a rapid rate. This should give extra impetus to our fight for public transport, which is already widely recognised to be a crucial component of a low carbon and truly sustainable world. Bold policies are needed to change this reality.

7.6 FOCUSING ON FINANCE

The ITF understands that achieving the kind of ambitious commitments to sustainable mobility and low-carbon transport made in numerous high-level global declarations and statements will be contingent upon the capacity to generate sufficient resources.

Currently, the primary obstacle to the qualitative expansion of public transport (and public electromobility more broadly) is the widespread perception that governments have limited financial capacities and thus there is a need to 'mobilise private sector investment.' These two perceptions have become the first and final word for the transport policy mainstream. Thus the prospects for a qualitative expansion of public transport and the determined pursuit of sustainable mobility will largely depend on challenging these perceptions and re-asserting pro-public and non-profit alternatives. Therefore many of the policies proposed below concern financing.

8. POLICY PROPOSALS

There will be no solution to the climate emergency without a radical transformation of transport in the next two or three decades. Business as usual is simply not an option. The ITF therefore proposes these ten programmatic priorities:

1. Make public transport a social and ecological priority

There needs to be more and better public transport, especially in the burgeoning cities in the global south. According to the World Bank's Global Mobility Report 2017: 'The growth in urban populations has outpaced these developments. As a result, the overall level of public transport supply per capita decreased over the observed time frame.'[135] But more investment is also needed in the developed world, where ridership is growing and per capita car ownership among certain groups are falling. Cities such as New York and Seattle have shown that investing in modern and efficient public transport systems can both boost ridership and reduce VMTs.[136]

At present there is a gap between current and projected investments and the levels of investment needed in order for transport to become part of a low-carbon future. 'The approach adopted so far,' says the World Bank's Sustainable Mobility for All consortium, 'has failed to bring the necessary scale of action and financing to unify and transform the sector.'[137] This problem must be addressed.

2. Paying for transport: a public goods approach

The upfront costs for public transport systems can be considerable, but the social and economic benefits of public transport far outweigh the costs. Improvements in public health, shortened commuter times etc, will raise productivity and improve the quality of

life for many millions of people. According to the IMF, total government investment in transport currently stands at about 6 percent of total government spending. In 2010 (the most recent data available) this amounted to an estimated USD569 billion to USD905 billion in public spending. An additional 1 percent budgetary commitment on the part of governments could generate an addition USD100 billion to USD150 billion annually, and these funds could be dedicated towards public transport specifically. This extra investment would pay for itself many times over in the form of improved productivity, better public health, and a growth in decent transport-related jobs. But investing more in public transport will reduce the need for other forms of transport-related investments (such as new roads, car parks, etc)[138] Given the threat posed by climate change, the costs of not investing more in public transport are likely to be too high to contemplate.

However, it is crucially important that any proposed public transport projects be subjected to community and worker review in order to improve their design, ensure a quality service and to control costs, and to strike the best possible balance between levels of passenger demand and the availability of the specific service.[139] This approach will help ensure that the impact of additional government resources is fully maximised.

3. Pivot away from public-private partnerships (PPPs)

While more public investment needs to be devoted to public transport in order for it to meet rising social and ecological needs, there is a need to bring to an end the policy fixation with PPPs – a fixation that is shared by many organisations involved in the fight for sustainable mobility. In practice, PPPs raise costs for governments, taxpayers and service consumers.

They introduce the requirement for profit, entail higher borrowing, transaction and competition costs and can often result in higher prices for those using the service.

Private investors are risk averse and more concerned with revenue streams and returns on investment. The needs of the public, and the environment, have little or no effect on investment decisions that see profit as the primary objective. As this has become increasingly obvious, a growing number of local governments are bringing formerly privatised public services back in house.[140]

Attempts to reduce the risks of investors through PPPs, in the hope that investment will follow revenue and profit certainties, have failed. The idea that government funds will 'unlock' large amounts of private investment capital has also been discredited. Today, most public transport infrastructure is funded by traditional public sources. PPPs have only generated a small percentage of the capital invested in transport projects, and these are often megaprojects that serve the interests of large corporate interests targeting the transport needs of the wealthier classes.

One of the myths surrounding PPPs is that private investors have a lot of available money to invest and governments, in contrast, are short of cash. But where private sector actors have invested in transport, they have in most instances resorted to debt financing, taking out commercial bank loans and, to a much more limited extent, raising capital through bond markets. Government entities can also use debt financing but at lower borrowing rates. This kind of financing is where most public services came from in the first place.

4. Ensure that climate finance is used for public transport

Discussions on climate finance are currently disproportionate to the amount of finance generated, and transport unions operating at the global level can call on global institutions (including development banks) to help countries that want to develop modern public

transport systems. Wealthy governments must stop dragging their feet on climate finance and throw their considerable political weight behind public transport as a climate solution.

This will require close co-ordination with calls for increased finance to support decarbonisation of power generation in particular, but also other sectors where investment in decarbonisation is required. Where it can be pursued, reversing privatisation and expanding public ownership can help hold down borrowing costs and eliminate the requirement to generate profits, allowing available climate finance to achieve more for less.

5. Passengers are 'climate protectors': public transport should be free

Passenger fares normally cover only a fraction of the costs of building, operating and maintaining public transport systems, and the distance between the revenue (from fares) and system costs appear to be growing.[141] The 'full cost recovery' logic of neoliberal economists encourages transport authorities to raise fares in order to cover costs. Raising fares, they claim, would stimulate the interest of private investors because strong and steady revenue streams increase the prospect of making profit. However, in practice, raising fares merely increases the use of private vehicles and, for those without cars, exacerbates social isolation.

Making public transport free at point of use would increase the number of passengers and very likely reduce congestion and CO2 emissions. If supplemented by free 'first and last mile' public mobility services the environmental, social and economic gains could be hugely significant. When workers pay for public transport in order to get to work, this equates to a subsidy to the employer – one paid for in part by the workers themselves. Free public transport helps fight both inequality and climate change.

6. Support the electrification of public fleets and transport modes

Electric vehicles using renewable energy could make an important contribution to emissions reductions, but policies should drive the electrification of public fleets, such as postal service and police vehicles, school buses, as well as BRT services.

Buses currently account for 50-60 percent of the total public transport on offer in Europe, but 95 percent of these still use diesel fuels. The electrification of buses should therefore be a top priority, as is expanding their use. More than 99 percent of the world's electric buses are in China (345,000) and China is also the world leader in sales of two-wheeled EVs, with sales for 2016 estimated at 26 million units.[142] Policies that support the electrification of buses and two-wheeled EVs need to be examined and, where appropriate, replicated.

Rail transport in urban areas already runs almost exclusively on electricity. In the last decade, passenger rail transport has decreased its specific energy consumption by 22 percent.[143] The electrification of bus fleets could produce similar outcomes.

There will also be a role for EVs in app-driven cars escorting passengers to and from public transport hubs when these are located more than a certain distance away from departure points. But these vehicles should be part of municipal or communally-owned fleets. The standardisation of fleet vehicles also provides opportunities for economies of scale and easier maintenance, as you do not have to stock parts for multiple models of vehicles etc.

Strict, time-managed regulations requiring the electrification of private delivery services is also an important policy option, especially given the rise of home delivery retail systems such as Amazon. However, delivery services should be subjected to intense social scrutiny

in order to assess their impact on emissions, high-street retail outlets, and the possible erosion of social capital.

Meanwhile, subsidising the purchase of private electric vehicles is not a good use of public funds. Instead, tax revenues from sales of private vehicles should be redirected towards public transport. Given the many social, economic and environmental benefits (not to mention the urgency and necessity of responding effectively to the climate emergency) a 'public goods' approach is fully justified.

Developing the infrastructure and inputs needed to develop public transport will create jobs. For example, large numbers of charging stations will be needed, and these should be public and their deployment should be subjected to community-level control. Essential electric vehicles need to be charged in a way that does not restrict access.

7. Dramatically reduce private vehicle traffic in urban areas

Rising private vehicle ownership currently poses a major challenge to the fight against transport-related emissions and climate change. Robust policies are needed to curtail private vehicles in public spaces. This is needed to reduce emissions and congestion, and to create space (both economic and physical) for the growth of modern public transit systems. In the words of the Institute for Transportation and Development Policy (ITDP): 'Reducing private car use not only requires improvements in public transit, cycling, and walking facilities, but also better management of private automobile use.'[144]

Major cities in OECD countries around the world have had success with policies ranging from banning diesel cars and enforcing congestion charges, to no-car zones, bike paths and bike sharing. These interventions have contributed to either lower car ownership or fewer VMTs.[145] The experiences in OECD countries are generating a growing body of knowledge and lessons that can be drawn upon in formulating policy agendas and demands in other places. In particular, bold policies are needed to reverse the global proliferation of SUVs.

8. Community-controlled car clubs and bike sharing

In the context of strict limits on private vehicle ownership, public authorities can establish public car-sharing services. A managed 'public goods' approach to car sharing could complement and help grow public transport, rather than competing with it.[146] If properly integrated into an overall public transport system, car clubs (such as Zipcar) and similar managed fleets of shared vehicles can likely make a contribution to reducing emissions, and if these fleets were powered by renewable energy, their contribution to climate protection would increase still further.[147]

Such results suggest that a managed approach to car sharing that removed commercial imperatives and that was designed to complement and help expand public transport could play a crucial role in decarbonising transport and reaching climate targets.

The standardisation of fleet vehicles also brings potentially considerable economies of scale in production and maintenance.

Less congestion also creates space for net zero vehicles to meet the mobility needs of elderly or physically challenged people.

9. Make data-driven new mobility services part of public transport

The explosion of communications technologies has seen a sharp rise in shared mobility, and new mobility services (particularly ride-hailing). New companies, such as Uber, Lyft, Car2Go and others, have

emerged. Policy makers have generally succumbed to the incursions of these new platform-based companies, or have proposed a PPP approach that gives these companies even more economic space and potential profits.[148] [149]

The full range of emerging shared mobility services should be considered for inclusion into a new vision of decarbonised public urban electromobility. Demand responsive new mobility services can be integrated into urban transportation systems. The communications technologies that provided the foundation for these services were almost invariably created as the result of public projects, and this should be part of the argument for treating such services as public. Travel data should be part of 'the commons' and managed by communities and serve the public good.

Currently, ride-hailing companies are having a predatory effect on public transport systems and often increase congestion and emissions. They also erode the living standards and quality of life of taxi drivers. App-driven shared vehicle services like Uber and Lyft have been identified as a contributing factor in several recent taxi-driver suicides in New York City.[150]

10. Two-track decarbonisation: energy democracy and transport democracy

To achieve the emissions reductions that are necessary in both power generation and transport will require revolutionary changes in the way electricity is generated, managed and used. Renewables will need to be able to produce enough electricity in order to meet most of our existing needs, but achieving electrification of transport will require much more electricity.

In 2016, a record 161 gigawatts in new renewable generating capacity was installed globally, most of it wind and solar. But this increase has had almost no impact on the use of fossil fuels, which continues to rise, particularly in oil and gas, but also coal, which is projected to increase in 2017.[151] This is because overall energy demand continues to grow even faster than renewable energy capacity – currently at around 2 percent per year. As a result, fossil fuels and renewables are expanding simultaneously.[152]

As of now, modern renewable energy has established a foothold in the electricity sector. Wind and solar provided just 5 percent of total electricity generation at the end of 2015. But the technical potential of renewable energy remains largely untapped, and market-focused approaches are impeding further advances and breakthroughs. The slow march of renewables means decarbonising transport will not be able to proceed at the pace required. This must become a policy priority.

Transport unions therefore have a visible stake in the struggle for energy democracy and public renewable power. Both the power sector and the transport sector must be subjected to more democratic participation and public ownership, so that the decarbonisation of both sectors can proceed unhindered in a planned and coordinated way.

By reducing demand for energy, restrictions on private vehicles and VMTs will also play an important role in easing the pressure on the power sector while reducing pollution, congestion and emissions. An integrated, 'public goods' approach is absolutely essential to the future of both sectors, and to the future of human civilisation itself.

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