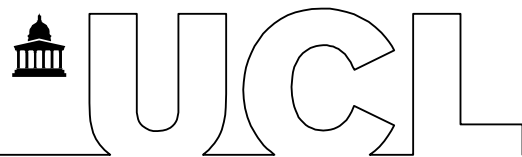


UCL DEPARTMENT OF CIVIL, ENVIRONMENTAL  
AND GEOMATIC ENGINEERING



**DEVELOPING LOW-CARBON  
TRANSPORT POLICIES IN PERU WITH  
CAPACITY BUILDING FOR THEIR  
IMPLEMENTATION**

**CAPACITY NEEDS ASSESSMENT**

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## EXECUTIVE SUMMARY

This report is the result of one of the outcomes from the project commissioned by the UK Foreign & Commonwealth Office via the British Embassy in Lima, with support of the Peruvian Ministry of Transport and Communications and the Municipality of Lima and Municipality of el Callao. University College London was appointed to carry out a capacity training needs assessment for the delivery of a low carbon transport policy.

The sources of information used in this study include stakeholders' interviews and participatory meetings, reviewing of ministries' and governments' plans as well as feasibility reports made by appointed international consultancies. All this information has been analysed and discussed in this report.

The preliminary analysis shows that the current transport situation in Peru and especially in the Lima-Callao region, is the result of, and is also exacerbated by, the lack of institutional structure. This situation has led to issues ranging from lack of enforcement of regulations, high level of traffic accidents to what is currently the most frequently cited issue – the over-supply of public transport. The danger in failing to identify and address the real cause of the problem rather than its symptoms can lead to missing the rare opportunity of the current political alignments and strong possibility to improve the situation for the citizens of Lima and Callao. An Outcomes-based problem definition strategy has been suggested as a facilitative device for the identification of this opportunity.

An apparent lack of institutional structure exacerbates the current problems of capacity gaps and training needs caused by the absence of technical leadership. This deficit leaves politicians unsupported in the development of technical and well-structured transport strategies which could help achieve their vision. In addition this lack of technical leadership creates a technical gap between a decision and its execution which leads to the chaos currently seen today. Therefore, a potential solution which involves capacity-building for the technical activity within government has been proposed. This involves a 'pyramid' of capacity requirements which covers the stages from which the vision is set by the politicians to the strategy, tactics and execution performed by different levels of technical expertise. An overall education approach to ensure its appropriate implementation and the vital role of the media in influencing this process are also included in this hierarchy. The capacity training needs vary at each level of the pyramid and in some cases it requires specific tailor-made training courses not currently available anywhere in the world. However, once these have been designed they could be applied in many countries currently going through the same situation.

Starting with the capacity-building process, two workshops were designed and implemented in January and February 2012. The former aimed at discussing and enhancing the Media's role in mobility-related subjects and the latter on decision-making for urban transport providing the initial tools for potential technical leaders to work together on defining the causes and most feasible approaches to devising solutions.

It is important that the Mayors of Lima and Callao have been reported to be fully supportive of working together in relation to the transport system in the region. To obtain the greatest benefit from this development, it is crucial that the authorities focus their intentions on solving the important institutional structure issues and invest in building a strong well-led technical capacity.

It has never been a better time to start.

## INTRODUCTION

This project was commissioned by the UK Foreign & Commonwealth Office through the British Embassy in Lima, together with the Ministry of Transport and Communications and the Municipality of Lima, in order to establish how the United Kingdom might be able to help in Peru's efforts to develop sustainable and efficient transport while meeting low carbon targets. Under the Copenhagen Accord (2009) and the Cancun Agreements (2010), as well as subsequent expressions of intent submitted by the Government of Peru as contained within Nationally Appropriate Mitigation Actions. Accordingly University College London was asked to examine the current capacity within the national and local government to deliver a low carbon transport policy, and the extent to which the UK might be able to provide some of any education and training to fill any identified gaps.

The present report describes the situation as it appears after three visits. It is therefore preliminary in nature and is presented as a document to inspire further thought on the part of both Peruvian and UK stakeholders about the needs. A variety of key stakeholders have been interviewed and various reports have been overviewed and thus this report is a statement of how the situation appears at the current stage of information gathering. Nevertheless, it is clear that certain aspects are of common concern and could be identified as sources of difficulty in the implementation process and which could be susceptible to improved and targeted education and training.

The report is structured in five parts. Section 1 explains briefly the level and nature of discussions held thus far and the sources of information used in our analysis. Section 2 outlines the problem definition strategy we have used to determine the capacity needs. Section 3 discusses our approach to potential solutions. Section 4 discusses the next steps in the project and Section 5 draws some conclusions. A summary of the current masters available in the UK related to the transport sector can be found in the appendix.

The nature of the reporting is to follow 'Chatham House Rules' – attributions are not made to statements by individuals and only where the organisational source of particularly important divergences are necessary to follow the argument will these be specifically identified.

## SECTION 2 – STAKEHOLDERS’ VIEWS

It is important to establish the views of the various transport professionals in Lima (where both the national transport authority (Ministry of Transport and Communications) and the Local Authorities (Municipality of Lima and Province of Callao) are located) as well as many other relevant organisations. To elicit the views of these stakeholders, a series of meetings and workshops were organised, in which the issues pertaining to the implementation of a transport policy aimed at a low carbon future were discussed.

The organisations involved in the discussions to date are highlighted in table 1:

**Table 1 Stakeholders involved to date**

Private Sector Stakeholder	Public Sector Stakeholder	Civil society Stakeholder
<ul style="list-style-type: none"> <li>• ARAPER</li> <li>• Asociación Automotriz del Perú</li> <li>• Banco Interamericano de Desarrollo (BID)</li> <li>• Confederación General del Transporte</li> <li>• Ecológico Vial</li> <li>• Grupo Empresarial G-9</li> <li>• Grupo MIBUS Transvial Lima SAC</li> <li>• LimaBus</li> <li>• Taxi Amarillo</li> </ul>	<ul style="list-style-type: none"> <li>• Autoridad Portuaria Nacional</li> <li>• Consejo Nacional de Competitividad</li> <li>• Ministerio del Ambiente (MINAM)</li> <li>• Ministerio de Economía y Finanzas (MEF)</li> <li>• Ministerio de Energía y Minas</li> <li>• Ministerio de Transportes y Comunicaciones (MTC)</li> <li>• Ministerio de Vivienda, Construcción y Saneamiento</li> <li>• Municipalidad del Callao</li> <li>• Municipalidad de Lima</li> <li>• Secretaría del Consejo de Transporte de Lima y Callao</li> <li>• Policía Nacional del Perú (PNP)</li> <li>• Protransporte</li> <li>• Sutran</li> </ul>	<ul style="list-style-type: none"> <li>• Cruzada Vial</li> <li>• Fundación Transitemos</li> <li>• Libélula, Proyecto MAPS</li> <li>• Lima Como Vamos</li> <li>• Luz Ambar</li> <li>• Plataforma de Transporte y Logística (PTL) –Universidad Nacional de Ingeniería (UNI)</li> <li>• Pontificia Universidad Católica del Perú (PUCP)</li> <li>• Proyecto Especial de Transporte no Motorizado MML</li> <li>• RPP</li> <li>• SENATI-CTA</li> <li>• Stakeholders Magazine</li> <li>• SwissContact</li> </ul>

At first an important conclusion to be drawn from these discussions is that there is a remarkable consensus of view about the current state of the transport problem in Lima and Peru. There was some divergence in detail about what the solution might be, but that ‘something needs to be done’ was not in dispute.

### Lima and Callao

Much of the discussion focused on the situation in Lima and Callao. This was neither surprising nor irrelevant. Although this brings a particularly local focus to the question, Lima and Callao form the backbone of the Peruvian economic activity (50% of PBI of the country (ECLAC, Foreign Investment in Latin American and the Caribbean, 2011)), in particular in relation to freight transport and the country’s international relations through its major port and international airport. Although there are clear interprovincial issues related to transport and low carbon, these are also to be found within the Lima/Callao region.

Given the contribution of the transport sector to carbon emissions, it is natural to look at the means of delivery of the transport system. However, it is important first to examine what the transport system is trying to deliver.

Lima and Callao have a combined population of approximately 8.5 million people, 1 million of whom live in Callao. Lima has a highly centralised structure and, although it covers a considerable area squeezed between the Andes mountain range and the Pacific Ocean, much of the main activity is concentrated in the centre. Several transport studies have identified the 'hourglass' shape of the city, where a lot of transport demand requires travel from one end to the other; much of this has to pass through or near to the city centre. Traffic passing through Lima with no intention to service the city can avoid the main city centre by using the Panamericana, which bypasses the city on the eastern side. The high volume of traffic in the centre results in low traffic speeds (3-4km/h in peak-times as mentioned in the Seminar on City Planning, transportation and climate change<sup>1</sup>), much delay and congestion – and thus contributes to the level of greenhouse gas emissions delivered by the transport sector (39.8%).

### **Vehicle fleet and vehicle age**

An interesting feature of the transport system in Lima is that the level of private motorisation is quite low (around 927,000<sup>2</sup>) relative to other cities, and the public transport vehicle fleet is large. This brought a lot of comment from stakeholders (including the public transport operators) about the need to reduce the public transport vehicle fleet. Another characteristic, which was the subject of much comment, was that the quality of these vehicles was very low (maybe due to large third party ownership (Bielich, 2009)), resulting in a situation where a high proportion of a large fleet is producing unnecessarily large amounts of pollution. Currently, the average age of the bus vehicles is 15 years old and there is a significant amount over 20 years old; the fuel type is in transition from biodiesel 2 to biodiesel 5 (MINAM, 2010).

### **Current transport system**

The 'fixed-route' element of the public transport system, currently entirely provided by buses, but soon to be joined by the Tren Eléctrico, and recently emphasised by the successful Metropolitano bus Rapid Transit system, is also characterised by a network design which is largely historical, unreliable and slow given the state of the traffic congestion in the centre, highly subject to delay.

Some elements of the bus system are less 'fixed' than others and there is a sense that many bus routes are variable according to the whim of the driver, which provides another source of uncertainty about journey times. This arises because the driver is attempting to maximise his income by seeking passengers where he thinks they can be found. The same incentive causes the drivers to be very flexible about stopping places, responding to demand for both boarding and alighting wherever the passengers wish.

It is notable that in the Metropolitano service, the whole system is quite different. Drivers are very carefully selected (there is a very high failure rate at the selection stage), buses are newer, stops are highly formalised and the buses can, in the main, operate independently of the adjacent traffic congestion. Importantly, the passenger behaviour is different – there seems to be no attempt to encourage the driver to stop away from the formal bus stops. This may be due in part to the location of the infrastructure, which is generally in the median of wide roads without easy access to the sides of the road except at the formal

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<sup>1</sup> Minutes of the *Diálogo Político sobre Ciudades, Transporte y Cambio Climático*. 'Planificación de Ciudades, Transporte y Cambio Climático' Seminar, November 2010. British Embassy, Lima.

<sup>2</sup> SUNARP Statistics 2007

bus stops, but it is also due to the general nature of the system, characterised as it is by relative efficiency and reliability.

Comment was made about the number of bus routes in Lima – about 450 – and that this ‘needed to be reduced’. However, it is not clear why such a reduction should be necessary or desirable, or what problem such a reduction would be attempting to solve. London, a city of similar population and also quite extensive, has a network of approximately 800 routes in addition to its extensive metro, cycling network and surface rail systems. London’s bus routes are typically much shorter than those in Lima, an adjustment that has been made to reduce problems of unreliability caused by congestion in the city centre.

Considerable comment was also made about the taxis in Lima. The number of taxis in Lima (approximately 300,000) is huge by almost any standards (London, for example, has 22,000 taxis) and the general consensus was that this number should be reduced. However, there were (slightly) different views about how large the reduction should be and about the alternatives to mitigate the consequences that this reduction may bring socially and economically.

### **Regulation and Enforcement**

There was also general consensus that a major problem with both buses and taxis is that of regulation. At a certain level, both buses and taxis are examples of an easy-entry virtually entirely free market. This is the result of the flexibility granted during the past decade where different ordinances<sup>3</sup> enabled free access to bus routes (both urban and interprovincial), permitted the import of used vehicles creating CETICOS<sup>4</sup>, ZOFRATACNA<sup>5</sup> and reduced the driver licence attainment requirements. In addition, the lack of technical capacity regarding accreditation and verification of authorised imported vehicles resulted in several numbers of old vehicles arriving in the country.

Thanks to this situation the finance arrangements for the purchase of a cheap car and the facility to obtain a license can enable anyone to start work as a taxi or bus driver. The comment was made that the transport system was seen in some circles as a solution to unemployment – people who could not find a job could, with a relatively small investment, earn something reasonably easily. However, this yielded the problem of a public transport system which was of very poor quality, unreliable and unsafe – and because of the volume of vehicles like this, perceived to be generally poor even where there are vehicles (and drivers) of much higher quality. Only Metropolitano really escaped from this criticism, even though there are taxi and bus companies, which operate with good vehicles and well-trained drivers.

Operators of buses and taxis involved in the discussions were keen to emphasise the role to be played by ‘proper’ operators – i.e. those who maintained their vehicles, complied with the law and generally aimed to provide a quality service. It was clear that operators such as these are a valuable resource in the move to improve the transport system performance in general and in terms of emissions in particular.

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<sup>3</sup> Presentación ‘Base Jurídica para la Implementación de Políticas de Prevención y Seguridad vial en el Perú’ by Paul Concha Revilla. CASAHIERRO Abogados.

<sup>4</sup> Procedures on the import and export of CETICOS - Centros de Exportación, Transformación, Industria, Comercialización y Servicios

<http://www.sunat.gob.pe/legislacion/procedim/despacho/ceticos/procGeneral/index.html>

<sup>5</sup> Procedures on the import and export of ZOFRATACNA - Zona Franca de Tacna.

<http://www.sunat.gob.pe/legislacion/procedim/despacho/zofratacna/procGeneral/index.html>

The desire to control the size of the public transport fleet was felt to be almost entirely compromised by the nature of the regulatory performance. A person seeking a licence to operate a taxi or bus service could continue to apply to different authorities until his/her application is successful. This means that, in effect, there is little or nothing that could be done to manage either the size of the fleet or the quality of vehicles or drivers – the enforcement system is simply unable to cope. It was explained to us that there were 30 inspectors in Lima to check on the 300,000 taxis – which in effect means that there is no enforcement. There is a case for considering whether other enforcement bodies, e.g. the Serenazgo (6,900 officers in Lima), Policía de Tránsito (2400 officers) and even the Policía Nacional (22,000 officers) could be integrated to the enforcement capability, this way there might be a higher quality and better spread of enforcement around the region.

### **Several Transport Studies**

There was a sense of frustration that although there had been a number of transport studies over the years, there had been little by way of implementation and many of these studies had simply been read and stored away. The evidence of the implementation of the Metropolitano system suggests that these are not all ineffective, but there does seem to be a sense amongst the stakeholders that studies are needed. It is not clear precisely what studies would be felt to be needed and it has to be said that there was also a widely held view amongst the stakeholders that actually it was actions rather than studies that should be the main focus now.

### **Mobility Projects**

The stakeholders also included representatives of groups – including some from within the Municipality of Lima – with interests in low-carbon transport, in particular for walking and cycling modes. Lima has a promising network of cycle routes and has events such as Ciclodía to promote safe and extensive cycling. There is clearly a large amount of energy here but there is a problem convincing people to use their bicycles – or even walking – when the ‘respect for the cyclist/pedestrian’ as exercised by vehicle drivers is so low. Furthermore, projects of this kind are still seen as small and not so relevant compared to the ‘serious’ projects focusing on solving the everyday chaos of the public transport. These misconceptions and level of misinformation lead to the slavish replication of strategies adopted elsewhere that may cause more harm than good. These misconceptions arise because there is a tendency to see the symptoms of the problem – the traffic congestion, ineffective supply-demand relationships in public transport, etc. – rather than the underlying causes. This leads to seeing similarly superficial considerations of the situations in other cities – observing either the presence or absence of similar symptoms – and believing that adopting the perceived cures for those symptoms in the present case will resolve the situation in Lima/Callao.

### **Education**

The stakeholders also discussed the role of education. There was agreement about the need to educate the younger generation in matters of road safety and a sense that it might also be possible to extend this to issues pertaining to the environment and carbon emission reduction. Likewise, there is a need to enhance university degrees in the transport sector and environment-related subjects to potentially upgrade the level of capacity that join the civil service. However, the lack of professional development and competitive remuneration in the sector reduce the desire for bright capable professionals to join it.

There is some provision of education and training within Peru as seen in table 2, not least within the universities offering transport related modules within their Civil Engineering courses. There is scope (and



some plans – e.g. TURBLOG<sup>6</sup>) for course development, which could be appropriate for the development and implementation of transport policy.

**Table 2 Overview of Current Level of Existing Training**

Institution	Level	Areas
Federico Villarreal	Undergraduate Specialisations	Transport Engineering
PUCP	Undergraduate Specialisations Diplomas	Civil Engineering Logistics Infrastructure Management and Mobility
Ricardo Palma	Undergraduate, Specialisations	Civil Engineering, Environmental Management and Ecology
SENATI CTA (Centro de Tecnologías Ambientales Peruano-Alemana)	Technical and Operations	Manufacture, Vehicle Maintenance Currently developing training on environmental management and eco efficiency.
UNI	Undergraduate Specialisations	Civil Engineering Science with Transport Engineering Port Logistics

### Port of Callao

Particular concerns were expressed about the forthcoming expansion of capacity of the port of Callao. The Ministry of Trade plans to triplicate the export of non-traditional goods in the next 5 years and according to Eduardo Carrillo; the new contracts with ports will multiply by 5-7 times the amount of containers to be used meaning that there will be a much larger vehicle presence in the area leading to and from the port, in particular, between the port and the Panamericana (and thus to the rest of Peru and other countries in the region). The desirability of expanding the port is not in question, as this would yield a huge potential boost to the Peruvian economy. However, the impacts on parts of Lima in terms of traffic congestion, noise and pollution need to be dealt with. The main difficulty with this is perceived to be the timescale (the port expansion is expected to be delivered within 18 months) because the length of time for delivering meaningful infrastructural support is extremely – possibly too – short. Given the situation, the real danger is that no infrastructure is started and the expansion is somehow added to the Lima traffic problem, adding significantly to the overall problem.

### Logistics in Peru

Following concern in Callao, a plan was drawn up by MTC and developed by the Advanced Logistics Group ((ALG), 2011) that aims at providing short to long term steps on how to improve transport logistics in Peru. Some of the conclusions and recommendations besides infrastructure investment regard the fact that Logistics is a trans-institutional issue; the current institutional and organisational deficit therefore requires immediate action to enable any sort of plan to be successful. Furthermore, the current technical capacity is a barrier to the progress of logistics and therefore the enhancement of port logistics, planning, monitoring and control should be a priority. Various stakeholders such as universities and port experts have agreed that the lack of capacity is limiting the possibility for the Peruvian economy to grow as well as decreasing the level of competitiveness of the Ports at a global level.

### Single Authority

Almost complete consensus was expressed that there would be great advantage if there could be a single transport authority for the whole Lima/Callao region. It was felt that this would facilitate consistent

<sup>6</sup> TURBLOG Project, UNI and the University of Leeds. Available from: <http://www.turblog.eu/>.

approaches and control over the regulatory and enforcement issues and the coordination of transport systems. Even though Callao is much smaller than Lima, all the freight and much of the passenger transport activity initiated in Callao impacts – positively and negatively – on Lima. These impacts also have negative impacts on Callao. For example, congestion in Lima results in delays for freight vehicles trying to reach the port of Callao and this is as frustrating for Callao as it is for Lima.

A number of stakeholders suggested that a useful transport investment could be the development of a metro line between the international airport and the financial/commercial/business sector of Lima, boosting access to the economic drivers of Peru from the international community beyond Peru's borders. At the moment the journey from the airport to Lima is slow, congested and unattractive – hardly the image the country wishes or needs to project to its potential investors.

### **General Frustration**

Underpinning all of the above is a sense that the stakeholders feel disempowered. Even those who have authority to act feel that they do not have sufficient practical resources to deliver what they feel is needed. Those who do not have the authority to act see the consequent delays and frustrations as evidence of nothing being done. There is a sense that the level of technical competence – at all levels, both public and private – is low and that the political interest has been directed in the past to spectacular vanity projects, which take too long to come to fruition (e.g. the Tren Electrico) or which are irrelevant to the pressing need. There is optimism now, however, because there is a sense that there may be a political alignment between the central government and the local (in particular, Lima) government, which are both recently elected. The sense that this is a golden opportunity, which must not be missed, was very strong indeed throughout all our discussions.

Tables 3 and 4 highlight the common issues discussed in the stakeholders' meetings during the October and November visits respectively, underlining individual groups' opinions.

Table 3 Stakeholder's engagement meetings analysis 10-14 October 2011

Stakeholder's engagement meetings	Political Will	One authority	Reduce Over supply	Lack of Regulation and Implementation	CO <sub>2</sub> Priority	Low Technical Capacity	Low Education capacity
<b>Education representatives</b>	The lack of political will disables the development of better professional courses.			The lack of technical expertise leads to lack of means to monitor regulations. If the ministers create a link with the universities, this might help them develop better strategies and have access to qualified personnel to address these issues.	There is an urgent need for experts in environmental related subjects as well as general technical aspects. SENATI CTA is currently developing environmental related courses. MAPs Peru is currently developing process guidance methodologies towards a national approach to greenhouse reduction.		There is a need for better training and reinforcement at schools in relation to road safety, mobility and the environment.
<b>Commercial Transport</b>	Lack of leadership and organization leads to multiple decisions. Control of vehicles entry and TAX.	Need for clarity and consistency to obtain better results. Urgent need for an integrated vision.	Urgent need to reduce the public transport supply as well as reorganising it so it reaches as many areas as possible.	There is a need to reinforce the competence within the authority to be able to create clear policies and implement them.	Urgent need for cleaner fuel. Authorities must agree with the two refineries.	Pressing need to educate police transport officers, public transport operators etc.	Better education and civic culture at all levels, especially to the community and private car drivers.
<b>Ministries</b>	Need for more technical strategies and organisation. Coordination within all ministries.	It is critical to ensure that there is one authority that regulates the system.	Need to organise and formalise the public transport.	Pressing overall need for better strategies and creation of incentives to motivate the achievement of targets.	Cleaner fuels, creation of environmental standards, and renewal of vehicle fleet.	General agreement on the urgent need in capacity training within the ministries.	Constant training at all levels.
<b>NGOs</b>	Urgent need for ethical and real will.	Crucial to have an authority to ensure continuity, long term planning and efficiency.	Reinforce capacity and organise existing operators.	NGO's are actively investigating and monitoring Lima's progress, investigating Who is Who? To find out who does what in the transport sector and by promoting healthy mobility.	One of their priorities. There are cycling campaigns and other plans.	Urgent need to train professionals, technicians and operators. Need MScs courses.	Urgent need to educate and promote sustainable mobility.

Stakeholders' engagement meetings	Political Will	One authority	Reduce Over supply	Lack of Regulation and Implementation	CO <sub>2</sub> Priority	Low Technical Capacity	Low Education capacity
<b>Operators</b>	Lack of technical knowledge leads to wrong and contradicting decisions.  In need of Political will with long term vision.	There are several authorities delivering multiple regulations. It is confusing and misleading. Need to define responsibilities.	Urgent need to reduce car fleet. Reregistration of taxis, start with experienced drivers. Re assignment of selected taxi waiting areas.	Several regulations that never get enforced. Urgent need for coordination on requirements regarding fuel, vehicle fleet renewal, etc. Urgent need for CLEAR regulations.	Lack of availability of cleaner fuels reduces the motivation for acquiring better engines.	Urgent need for capable leaders and trained drivers.	Required a holistic campaign that targets all levels of the community. Users are a massive constraint for public transport operators.
<b>Municipalities</b>	There is political will from the two municipalities (Lima and el Callao)	Partial agreement.	Partial agreement on the need to regulate and organise the sector, however el Callao already issues ID cards and training for taxi drivers.	There is not enough capability and human resources to control the vast public transport supply in Lima. El Callao (with a fraction of the problem) uses CCTV monitoring which has proved successful. In the past there has been lack of communication between the Municipalities which has led to poor understanding of each other's responsibilities and boundaries. The meeting showed positive willingness to cooperate.	Monitoring strategies are being implemented; however there is need for further technical training and capacity.	In el Callao, some of the Engineers have been continuously part of the sector for over ten years, enabling better technical capacity. MML however, has recently change the team.	There are various campaigns regarding road safety involving the community and schools. However, there is a need for an integral holistic approach.

Table 4 Stakeholder's engagement meetings analysis 7-11 November 2011

Stakeholders' engagement meetings	Political Will	One authority	Reduce Over supply	Lack of Regulation and Implementation	CO <sub>2</sub> Priority	Low Technical Capacity	Low Education capacity
<b>Municipality of Lima, urban transport department (MML)</b>	There is a political will to make things happen.	In agreement	One of their immediate/short term priorities	The immediate management team to GTU MD is currently working on ordinances and regulations to be executed before Christmas and in January in respect to the restriction of taxis in the historic centre and re registration of public transport operators.	Currently the main priority is to organize the urban transport	In agreement, and as noticed during the interviews and meetings, they did not seem to rely entirely on each other's teams for consultation on transport decisions.	They agree there is a need for better and more appropriate education among all stakeholders; not only theory but practical training on the execution of real successful projects.
<b>Peruvian National Police (PNP)</b>	Recognises that it is very important to attain change.	In agreement. The importance of integrated strategies was highlighted	Regulation and better organisation of the authorities can contribute to the control of the oversupply.	Its job is to provide monitoring support at a national level; and control, enforce and implement traffic regulation at a municipal level. There is clearly a lack of communication between the PNP and MML to enforce regulations.	It is one of their concerns.	PNP recognises the lack of technical capacity but highlights that there is a strong desire to strengthen this.	Road safety promotion and transport education awareness is one of their priorities. Further integration with other organizations seems required.
<b>Secretaria Técnica del Consejo de Transporte de Lima y Callao</b>	It is crucial to allow real change to happen.	It was created with this aim but was not given enough power to act.			Their current focus regards data collection and execution of feasibility studies demanded by authorities	The team is very small but it is supported by students doing internships.	One of their priorities was capacity training but financial restraints have restricted their execution.

In addition to the stakeholders' meetings; few reports –there are several more- have been overviewed and have been classified in the following groups:

*General Overview of Current Transport Problem:* These reports and studies highlight in detail the different public transport issues in Lima, and the causes and consequences that this is having on the community. These are the written representation of what has been discussed above and remarked in table 3. The Lima Como Vamos reports however, provide annual updates on the progress towards transport improvement<sup>789</sup>.

*Climate Change, Environment and Competitiveness of Peru:* There are other reports and studies that focus on the latest challenges that Lima is facing related to GHG emissions, economic losses and the need to start acting now. These reports agree on the lack of awareness and understanding that exists within the decision makers to envision the economic and social benefits of investing in the improvement of the transport sector. They also highlight in one way or another, the need for better coordination and alignment between all the authorities to facilitate and contribute to the implementation of future plans. In addition, there are reports that mention the potential to development that Latin American cities have - extensive emphasis on Peru- and how they should join forces with the private sector to maximise economic growth<sup>10 11 12 13 14</sup>.

*Government plans:* Impressive reports and plans have been reviewed from different government authorities; some of them featuring duplicate but separate initiatives focused on the transport sector but that unfortunately seem not to reach implementation. These well researched and well supported plans; lack feedback reports informing on their progress, barriers and changes to the original plans. As an example the programme 'Plan referencial para el uso eficiente de la Energía (2009-2018)', highlights projects such as 'Proyecto de Conducción Eficiente' from which -to the level of this study-, it is not clear whether anything has been done and whether there has been coordination between the Ministry of Energy and Mines, the municipalities and the Ministry of Transport on this matter<sup>15 16 17</sup>.

The small fraction of reports reviewed thus far, provides enough information to confirm what has been heard during the stakeholders' meetings on the situation of Peru; these reports show that there is high motivation to improve and confirm that there is not enough capacity to exploit and maximise all these efforts. Therefore it is clear that there is definitely a technical gap.

The main conclusion drawn in agreement with most of the stakeholders was that there was a need for **leadership with shared vision and technical continuity**.

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<sup>7</sup> 'Antídotos para la Congestión y la Inseguridad en el Tránsito' Proexpansion.

<sup>8</sup> 'Evaluando la Gestión in Lima 2010' by Lima Como Vamos

<sup>9</sup> 'La Guerra del Centavo' by Claudia Bielich

<sup>10</sup> 'Hacia Una Política Energética y Ambiental Sostenible en el Perú', by CONAM 2006

<sup>11</sup> 'El Perú y el Cambio Climático, segunda comunicación nacional del Perú 2010' by MINAM

<sup>12</sup> 'Rumbo a una Economía Sostenible' by Libélula

<sup>13</sup> 'Aproximación Programática para futuros mercados de Carbono en Argentina, Perú y Colombia' by Swisscontact 2010

<sup>14</sup> 'Building Globally Competitive Cities: The key to Latin American Growth' by McKinsey Global Institute

<sup>15</sup> 'Plan Referencial del Uso Eficiente de la Energía 2009-2018,' by Ministerio de Minas y Energía

<sup>16</sup> Government Plan for the municipality of Lima

<sup>17</sup> Plan Intermodal de Transportes 2004- 2023 by MTC 2005

## SECTION 3 – PROBLEM DEFINITION STRATEGY

In order to analyse the issues and the needs for training, it is important to have a clear strategy in mind that can provide a way for the problem to become resolved. For this capacity needs assessment, we are adopting an Outcomes-Based strategy, in which the overarching desired outcomes are established first, followed by the expression of the drivers and constraints that apply (See figure 1). The analysis is then to determine what can be done in order to take most advantage of the drivers while acknowledging and dealing with the constraints. This method is particularly apposite where the problem in question is likely to be intractable to a single solution and/or where compromises will be required.

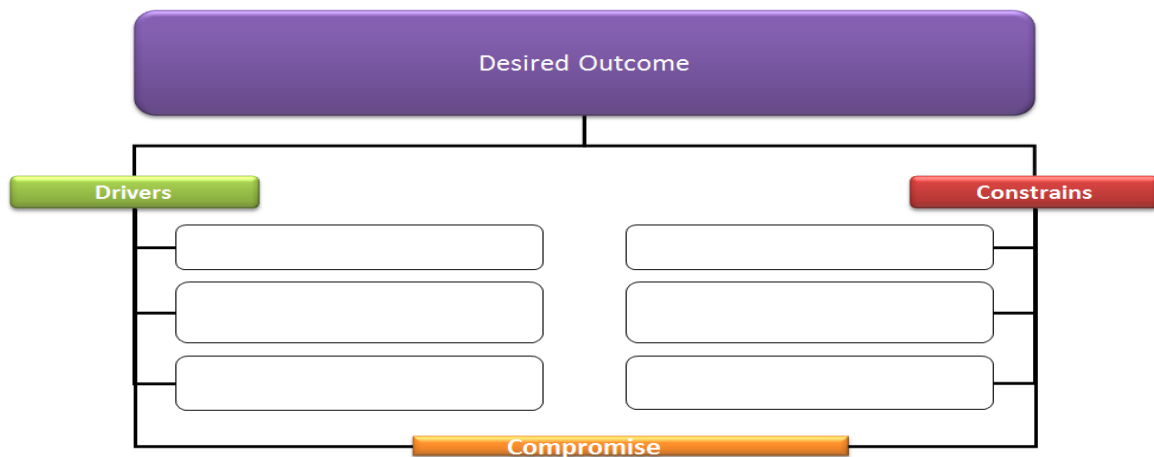


Figure 1 Outcomes-Based Strategy

### Desired Outcome

The intention behind this capacity needs assessment is to develop the ability to implement and deliver Peru's low carbon strategy, in connection with transport. Apart from the benefits to the planet in terms of less use of scarce resources and negative impacts of anthropogenic climate change, it is well known that additional benefits from the adoption and implementation of low carbon transport policies are reduced air pollution, increased fuel savings, lower health costs and avoiding congestion with its positive economic consequences. As noted above, although the national priority and that of Lima are not identical, they are symbiotic: developing the skills in Lima will facilitate the spread of skills elsewhere in the country as well as tackling the major issues in the country's major city.

The desired outcome is to ensure that Peru has the technical capability to deliver a low carbon transport strategy and therefore it is useful to unpick some of the key principles within this statement:

As implied above, the ability of the nation to deliver its low carbon strategy is heavily dependent on Lima and we should treat the two as symbiotic – not identical but impossible to exist without each other. Much of any outcome will have to be delivered by default in Lima and thus close attention needs to be paid to the capital's needs and opportunities. Many of these developments would also be applicable elsewhere, either in principle or in practice, so developing the capabilities in organisations (governmental or private) within Lima provides an opportunity for simultaneous or later diffusion.

In areas such as transport, especially where questions of national infrastructure and capability are involved, it is inevitable that the 'technical' capability is inextricably intertwined with the political capability. Infrastructure costs money and at a scale that requires political commitment; infrastructure of any complexity also requires time for development and construction and this is likely to outlive the political

cycle commonly adopted in most democracies. Very few infrastructure or major transport projects can be delivered – anywhere – in less than five years. The ‘technical capability’ needs therefore to be closely associated with the political capability to initiate, support and complete projects irrespective of the political alignments in play at any particular stage in the process. As noted above, the present national/local political alignments in Lima are auspicious, but these cannot be expected to last for the duration of the period needed for implementation and delivery.

The emphasis has to be on delivery. Many countries in the world have declared carbon-management policies/strategies. Peru has reported to the United Nations the identification of some measures expressing the intention to reduce carbon emissions by 2020 (See Appendix 1 for summary). The words are easy and it is much less clear how these will turn into, not just actions, but delivery, in the years to come. All countries are facing an unprecedented economic situation, which will colour all attempts to meet these statements of intent. Peru is no exception. The economic growth that the country needs and wishes will require – in present technological circumstances – an increase in the emission of greenhouse gases; what needs to be achieved is that this increase is managed and reduced to a globally appropriate level. ‘Delivery’ is therefore paramount: things need to be done; the population needs to see that they are being done and they need to be successful to reduce (at the individual level) the level of greenhouse gases being produced for any single unit of activity so that the rate of increase in emissions relative to the economic growth is reduced.

A low carbon transport policy ranges from the legislation enacted at national and international to local levels to the technological developments required to reduce the use of energy for the same unit of transport delivery to levels that can comply with the reduction targets. However, much more important is the need for the action to take place at the level of the individual person. A technological fix in fuel type, engine systems, or fuel technology will only produce small changes in outcome in terms of delivery and these will be tiny in comparison to the reductions that would occur if the level of transport were reduced – i.e. if motorised, energy-consuming trips were not made at all. The behavioural change required to deliver a low carbon transport policy is thus of immense and supercritical importance – we cannot rely on a technical fix which will allow us to live as we aspire to now and deliver the emissions reductions the planet needs. Facing that fact is a precursor to any action.

## Drivers

Drivers are activities that will help to achieve the desired outcome. These are not listed in any order of importance and the list is not intended to be complete.

**The availability of clean fuel:** Whatever happens, whether or not the individual or political will is evident, if the core fuels used for transport are not of sufficient quality to make low carbon transport possible, all will fail.

**Technical competence of transport professionals:** This is complex (and of key concern to this study) as the level of technical competence ranges on a number of levels. These will be discussed in Section 4.

**Political consensus:** The longevity of the problem and the means to develop appropriate solutions combine to mean that any approach will require political consensus over time so that investments are seen through to completion.



**Improved vehicle fleets:** As most transport emissions are due to the performance of individual vehicles, these need to be of a sufficient quality to be able to deliver energy (and thus GHG)- efficient performance. An improvement in the vehicle fleet is a precursor to the success of a low carbon policy.

**Reduction in transport journeys:** Whatever the technical fixes might produce, these will be as nothing compared with the benefits from reducing the number of journeys required to be made in order for people to live their economic and social lives.

**Improved public transport (1):** This will always be predominantly a bus system (as it is in every city in the world) so a direct improvement in the design and operation of the bus system is necessary to make it more useful and usable in order to reduce the need to make journeys in private vehicles.

**Improved public transport (2):** A sensible system of management and control of taxis in Lima and Callao so that quantity is sufficient to reduce the need for private vehicle journeys, dead-running is limited and quality is improved. A good taxi system is necessary to reduce the number of private vehicle journeys.

**Improved public transport (3):** A coherent mass-transport system is needed to integrate BRT and metro systems with the city population's needs and each other. As part of this, a unified fares system between bus, BRT, metro and even taxis will enable better accessibility to all parts of the city.

**Integrated urban planning:** Development of a polycentric city to enable more activities to be feasible without having to enter the city centre.

A single coherent **transport authority** to present a unified approach to design, management, control, implementation and delivery of the entire integrated transport system, including public and private passenger and freight transport, pedestrian and cycling which enables the whole city to deliver and benefit from a single transport system.

**Education of the next generation(s)** on 'good transport husbandry' – i.e. how to grow and develop sufficient transport systems through better understanding of what people want and need and the incorporation of users' views about these needs.

## Constraints

Constraints are actions that could inhibit the achievement of the desired outcome. As with the Drivers, these are not listed in any order of importance and the list is not intended to be complete.

**Lack of technical continuity in the transport sector:** At present, there is very little sense of continuity at the technical level within the transport sector beyond the continuity obtained through family-owned transport enterprises. First, the lack of continuity means that there is no institutional history or understanding so it is all too easy to repeat earlier mistakes and, with the best will in the world, new people brought in to manage a complex transport system will need a considerable learning curve to be achieved before they can have the confidence to act. Secondly, it means that there is no sense of a 'career' in the technical skills related to transport, especially in the public sector. This means that it is very difficult to attract bright young engineers and other professionals into the sector, as they see no long-term career prospects. Thirdly, the politicians are not well served in terms of the technical aspects of their decision-making as they are relying on a relatively ill-informed technical base for advice. Thus well-intentioned policies can easily come adrift because the technical constraints are not understood well enough to be avoided or mitigated. Fourthly, consultants can be hired to look at specific problems, but the in-house capability to analyse the consultants'

reports and suggestions is low, resulting in non-adoption of proposals, or adoption only of those proposals that have taken into account the prevailing desires. Finally, the lack of continuity results in bitty decisions, often taken to resolve some immediate problem or crisis, or to adopt a particular technology, which then result in continuing problems for many years to come.

**Uncoordinated enforcement:** Any regulation will require enforcement. However, if there is no coherent enforcement regime in place, that includes acceptable and accepted processes, that spreads over the entire region of interest, it will always be possible to evade the regulatory system and the regulation therefore fails. The result is that such regulation as does exist is then treated with contempt by the intended targets and this leaches into the more general consideration of other regulations. As much of the delivery of the low carbon transport strategy is going to depend on regulation – of vehicles, drivers, owners, and use – a lack of coherent enforcement will prevent success.

**Lack of technical competence:** Transport systems are extremely complex and combine a whole range of skills in almost every aspect of the decision-making process. Engineers need to understand not only the technical aspects of the engineering discipline and how this interfaces with other engineering issues, but also they need to understand the economic and behavioural responses of users and non-users. These skills are hard to come by and need to be developed. The main issue is the time it takes to develop these skills. Some can be obtained through particular courses – e.g. a Masters level course could provide some of the required competence – but there are different requirements at different levels of the system. At one extreme, how vehicles are maintained to take account of environmental concerns is an important issue for the proper performance of vehicles and requires mechanics to be trained and equipped; on the other hand, political understanding of the transport issues and the importance of combining technical understanding with the policy-making drive is something that needs to be delivered at a higher level altogether and it is not clear whether this would be in the form of a Masters type of course or a more specifically designed political leadership programme.

**Political prioritisation:** The issues – especially for Peru at present – involve needs for massive and fundamental change, including investment of money, time and other resources, in order to achieve the desired outcome. These needs have risen at a time when the pressures on the national purse are also immense and rising, so the extent to which the low carbon agenda is high on the political agenda is crucially important to ensuring that the right investments and legal changes are being promoted at the appropriate political levels. If the low carbon transport agenda is not high enough in the political priorities, the investments will not be made.

**Lack of consistently clean fuel:** several comments were received about the refineries' resistance to compliance with the requirements to produce suitably clean fuel. This makes it very hard to enforce vehicle emissions standards – if the fuel provided is dirty, so will be the emissions and this then acts as a disincentive to vehicle owners/operators to comply with emissions standards.

## Compromise

The important analysis to make at this stage is to determine, not the 'average' or 'mid-point' between actions, but to determine what can actually be done. The point about analysing drivers and constraints is to determine the actions that will be necessary to ensure that the drivers will be enacted and the constraints will be eradicated, reduced or mitigated.

From the above analysis, it seems reasonable to conclude that:

**Political will** is a necessary precursor to any further action and must be obtained. In addition, it is necessary to ensure that that will is continued over a time period, which outlasts the political cycle. This means an element of political awareness is required on the part of politicians and technicians to recognise the longevity and complexity of the solutions required to meet the political desire to enact a low carbon transport strategy.

**A single transport authority** for Lima and Callao is a necessary precursor to enacting and achieving acceptance of legislation relating to the achievement of the low carbon transport strategy. Setting this up will require political acceptance, but it should be a technical, not a political body – it is there to provide the technical authority, advice, competence and continuity required to manage low carbon transport operations in the region, not to provide a political leadership. This body could also contain the expertise necessary to support other cities and regions in Peru and thus provide support at a national level. Two major issues for this authority for immediate action are the issue of regulation and enforcement of public transport (including taxis) in the region and the ameliorative support for the increase in freight transport to be developed following the port expansion. We have looked at a number of cities, which have such an authority, including London (Transport for London (TfL)), Madrid (Consortio), Bogotá (SITP). Interestingly, although often over a different timescale, each of these authorities emerged as a result of transport chaos, not quite as different as might be expected compared with the current situation in Lima. Perhaps Transport for London offers a good match as a comprehensive authority, which includes streets and taxis as well as the more operational public transport modes in its remit and we are exploring this with TfL.

**A comprehensive and coherent approach to the development of the technical competences** is required to move the low carbon transport strategy from paper statements to 4-dimensional reality. This needs to see the issue in its completeness and complexity, from development of the skills required to develop the highest political strategies to the general level of maintenance of vehicles and other elements, which are delivering those strategies at the functional quotidian level on the street/ tracks.

The decision model described above for the capacity needs assessment can be summarised graphically as shown in Figure 2.

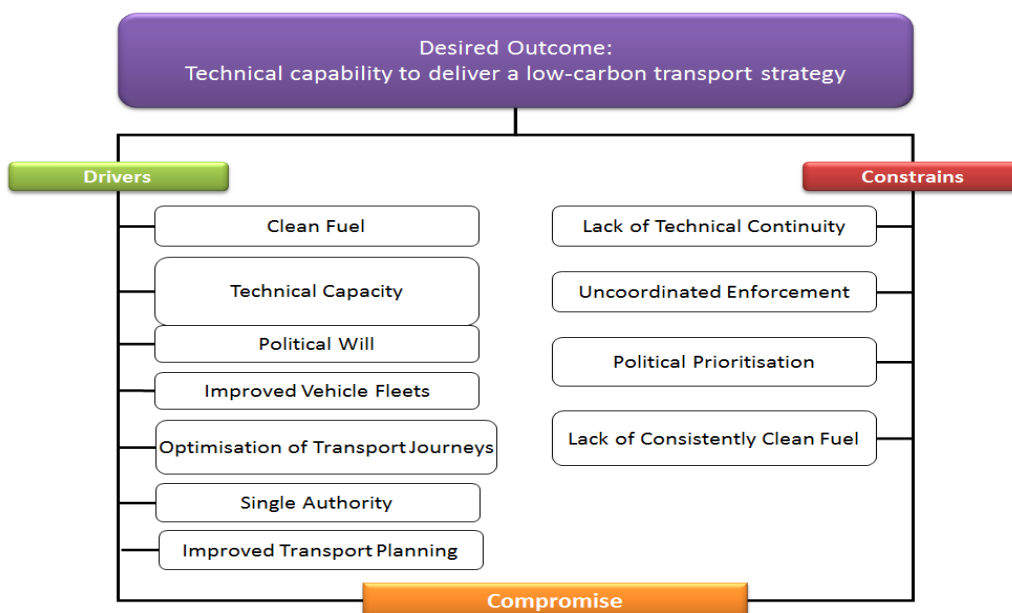


Figure 2 Capacity needs assessment decision model (summary) for delivery of low carbon transport.

An objective and pragmatic view needs to be taken of the existing public transport fleet and operations and how its quality can be improved to meet the requirements of the low carbon transport strategy. This is not another Origin-Destination study – there are recent studies of that nature to call on if necessary and appropriate – but one, which looks at how bus, rail and taxi services should be designed as a single coherent network. From that analysis, consideration can be given to the size and type of fleets required – it is tempting but not sensible to concentrate solely on the quantity problem until the proper assessment of the needs has been made.

There needs to be an integrated, comprehensive and convincing **education strategy** in place to ensure that the next generations have as strong a realisation of the importance of good energy-husbandry and the role that transport plays in delivering a better planet as well as a better lifestyle as they do of Peru’s history and cultural importance. This is not only important for the future as they grow up and start to take decisions of their own, but in the immediate term as they communicate their discoveries to their parents.

There needs to be a general education effort to improve the behaviour of public and private vehicle drivers in relation to each other, but more specifically to pedestrians and cyclists so that these become the highest level in terms of the consideration paid to road users. This will encourage more people to use these modes and this will contribute strongly to the low carbon transport strategy through the conversion of current motorised trips to future non-motorised trips.

Table 5 provides examples of cities that have experienced chaos, and that have addressed the constraints by reinforcing their drivers reaching a successful result.

**Table 5 Examples of cities that have undergone the same transport situation as Lima**

Common Transport Issues	<ul style="list-style-type: none"> <li>• Vehicle priority</li> <li>• Illegal bus routes out of control</li> <li>• Lack of urban planning and uncontrolled growth</li> <li>• Increase in vehicle fleet</li> <li>• Lack of vehicle renewal</li> <li>• Public transport did not address the customers’ needs</li> <li>• Lack of authority</li> </ul>			
Country, year	London 1933	Madrid 1986	Bogota 1994	Lima 2011
Fundamental Change	Creation of the ‘London Passenger Transport Board’	Creation of the ‘Consortio Regional de Transportes’	Political Continuity with visionary Mayors 1994-2003	?

## SECTION 4 – APPROACH TO POTENTIAL SOLUTIONS

To develop the capacity required to deliver a low carbon transport strategy, it is necessary to consider capacity-building within the framework of a hierarchy. Figure 3 suggests such a simple hierarchy:

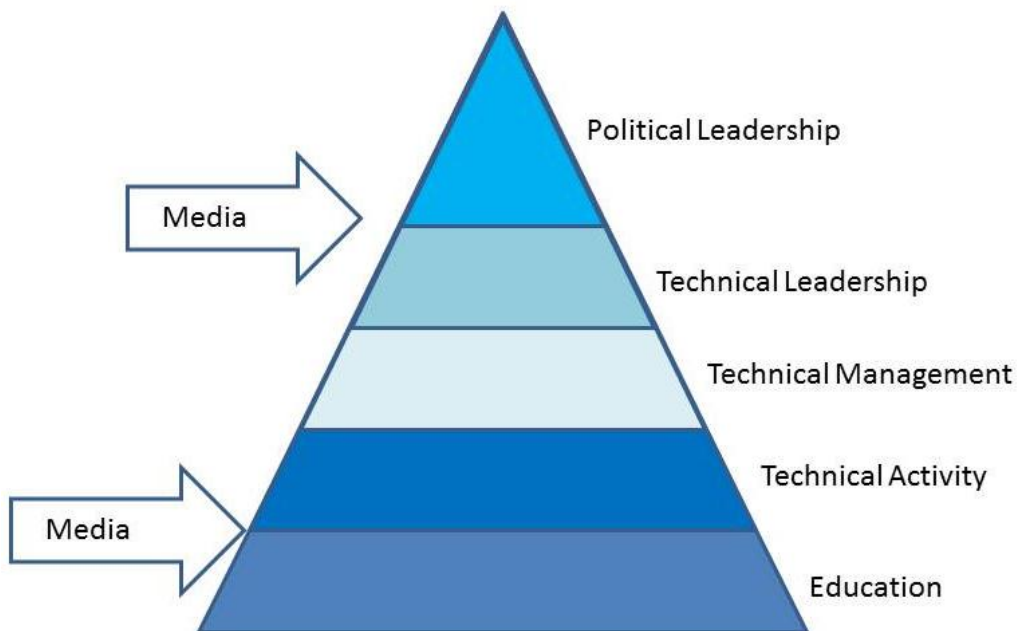


Figure 3 A Capacity Building hierarchy

In the hierarchy shown in Figure 3, the various levels of need as expressed in Section 3 have been included so that the interconnectivity can be seen. At the upper end is the need for political leadership. Further down the pyramid there are the different technical levels, each of which should provide sufficient high quality capacity to ensure the successful execution of the desired strategies. Finally, the contribution of an informed media is included to (a) inform the debate and raise the quality threshold of discussion at the politico-technical level and (b) to help in the education of the general population, including young people, in the implications and understanding of the issues involved in the implementation of low carbon transport strategies, these two contributions are explained down the hierarchy below.

### Political leadership

Political leadership is inherently connected to the technical aspects further down the hierarchy because they are entirely dependent on each other. The political leadership will fail if there is insufficient technical support to deliver the implementation of the strategy. Similarly, if the political leadership is absent or directed elsewhere, all the technical competence in the world will fail to deliver the strategy.

For the politicians it is advantageous to ensure that there is a technical hierarchy with appropriate competences in order to deliver their political will in a balanced and well executed way. As explained above, the political will in the case of a low carbon transport strategy is likely to be required for longer than the normal political cycles and thus will depend on that technical level to deliver beyond the presence of a particular politician. The case of Bogotá is instructive in the sense that the political strategy continued between politicians (Antanas Mockus, Enrique Penalzoza and back to Antanas Mockus) and has only recently begun to falter as this continuity has begun to weaken. Similarly, Curitiba has been able to deliver a highly impressive change in its transport systems over several decades because of long-term political and, importantly, technical continuity.

### Profile

This person sets the vision, is able to oversee the day-to-day issues and has an in depth understanding of long term approaches. Therefore his/her view is wider and inspired by large-scale achievements, he/she works in conjunction with the technical leader to understand limitations and reach a sensible strategy.

### Possible training

It has not yet been possible to establish the extent to which politicians in Lima and Peru require capacity-building in relation to their ability to lead on technical issues. If they do, it could be delivered through programmes designed specifically for the Peruvian situation and for the low carbon transport strategy. It is unlikely that such a course would already be in existence in the UK or elsewhere, but the skills to develop such a programme do exist. The novelty would lie in developing the connectivity between the political side and the technical support.

Leadership is a necessary prerequisite for political action, but without a highly competent technical leadership the political advances will stall as a result of the inability to provide the technical support. Therefore the next level in the framework is the Technical Leadership.

### **Technical leadership**

Technical Leaders need to be highly skilled within their area of technical expertise, but distinguish themselves as different from what we shall call Technical Managers by being able to use the thinking and philosophy behind their technical education to drive the ways in which technical solutions are derived and implemented. For instance, a Civil Engineering 'Technical Manager' would be a highly competent and well-trained civil engineer, but a Technical Leader might be a Civil Engineer who can also appreciate how to construct decisions, how to seek, obtain and use evidence to support objective conclusions, whether or not these actually relate to civil engineering. Similar analogies can be made for any other profession – Law, Finances, etc. Technical Leaders need high-level training to capitalise on what they have learnt and developed through their professional experience so that it can be elevated to a much higher level. These are people who will need to be able to deal on an equal basis with high level politicians – each respecting each other's professional status and each bringing complementary skills to bear on the problem. Such a person would work closely with politicians because they would need his/her technical viewpoint in order to hone the policies they are developing and would then work closely with their technical managers to develop the technical solutions to delivery according to the political need. The Technical Leader is a technician and not a politician and this distinction is highly important.

### Profile

This technical level has the capacity to communicate with both the political leader and the technical manager and is in charge of setting the strategy that will not only make the vision possible but robust. The technical leader is able to discuss issues at a high political level with high technical knowledge; he/she should be able to influence and help the politicians develop and implement a well-thought and evidence-based strategy for their vision with high levels of reliability. Similarly, the technical leader is able to communicate clearly with the technical management team to disseminate the vision and build up the strategy and plan of action.

### Possible training

It is likely that a Technical Leader would have a Masters degree in a subject related to their core discipline, but this might not always be the case. The Technical Leader would however require training in seeing

beyond his/her core discipline to be able to identify the problem and work a solution up from first principles, whatever the disciplinary inputs required for the development of a solution in any particular case. Such courses are also not generally available, although there is some desire to develop courses of this nature. At this juncture, the best outcome would be to develop such a technical leadership programme with Lima/Peru in mind and then open it up for application elsewhere as the market for such a programme is likely to be quite strong.

### **Intermediate layer – Transport Specialist Media**

The media has been identified as a key piece in the jigsaw to support the Political and Technical leadership levels, particularly because its influence could raise the level and quality of expert discussions regarding the transport sector. High level understanding of the complexity of transport-related issues and the efficacy to communicate these on a national public level could stimulate the positive development of better strategies.

#### Profile

This technical communicator is able to judge political and technical decisions from a reliable perspective as well as encourage better resourced strategies in the decision making process. This level could be integrated by transport experts themselves featured in the opinion sections or journalists with special professional training in the subjects.

#### Possible Training

A high level of technical expertise and understanding of the subject will be required to be able to respond to this level of responsibility. Therefore, the required training, as with the political leadership, will need to be specifically designed.

### **The Technical Management**

The Technical Manager, as noted above, is a highly competent person in their core discipline. However, it would be sensible for this level to have acquired some postgraduate qualification such as a Masters or Diploma in a relevant discipline.

The UK is particularly strong in this area and it is useful to note why. In the 1960s, in the wake of a report on transport and city development (Traffic in Towns, 1963) commissioned from Colin Buchanan, the Government decided that it needed to improve the technical competence of transport professionals in the country. It asked a number of members of Buchanan's team to set up a Masters course, but they refused, saying that it would be a lot better for the country if each set up their own Masters programme in different institutions. Their reasoning was that each had different interests and that by spreading the area of influence the UK would have a deep base of broad approaches to the discipline, united by a common desire to see highly competent and (for the time) innovative transport engineering and planning in place throughout the nation. As a result Transport Masters programmes were set up in London (UCL and Imperial College), Southampton, Newcastle and Leeds and similar programmes were set up later on in London, Bristol, Nottingham, Loughborough, Cranfield and so on. This could be an interesting model for Peru, in the sense that there are some established highly competent areas of expertise in universities in Peru and a complementary approach could maximise the use of resources and extend the range of opportunities available to students without the need for massive and duplicated investment across the country.

#### Profile

This level needs to integrate a multidisciplinary range of officials, who should include: government and municipal authorities, the police, the media, education awareness projects, NGOs, etc. The technical leader

delivers the vision and the strategic aims but works together with the technical management team to construct the tactics where each official will have a defined task to perform. The technical management team understands his/her role in the strategy and is then able to deliver this tactic to their team for execution.

#### Possible training

The ability to develop effective enforcement measures, techniques, procedures and enforceable regulations is something the UK is particularly good at and, as noted above, something that would be really useful in transforming the present situation into a low carbon improvement. Training courses for those people who are charged with writing the regulations, people who have to enforce them and people who have to deal with offenders could be developed in Peru and the UK and delivered in Peru.

In the case of transport, the UK has a well-rounded provision of Masters programmes in Transport, ranging from the hugely comprehensive to the niche, with many of the programmes being able to deliver both through the tactical selection of optional modules. Most of these include optional modules in transport-environment, economics and management as well as sustainable development. Because Transport is seen in the UK as a mainly postgraduate discipline, most of these programmes are open to people from a wide variety of disciplinary backgrounds (See Appendix 2 for Masters available).

#### **Technical Activity**

This level is responsible for the successful implementation of the tactics as well as the day-to-day resolution of issues. It covers all the range of disciplines on which the transport system depends, such as traffic engineers, route planners, monitoring and regulation, signalling etc. This level is the final stage in the process from the vision to execution. At this level careful attention should be paid to the initial vision and whether its aim has been translated appropriately across all levels.

#### Profile

The people here are the highway engineering, transport planners and so on who actually undertake the day-to-day implementation of the transport projects which will deliver the low carbon transport strategy.

#### Possible training

These will require suitable first degree status in their discipline, supplemented by appropriate short courses to provide them with focused learning experiences in specific areas of expertise. These specialist courses could range from a few days' to a few months' duration and could be delivered wherever necessary, but obviously it would be most practical to do this in Peru. The courses would be specific to the Peruvian situation and many could be delivered by current professionals in the country. Supplementary courses or content could be provided from the UK or elsewhere – especially in Latin America, where there have been many interesting developments in transport education and training (much inspired by the UK) in, for example, Chile, Brazil, Colombia and Mexico. Where appropriate, it could be useful to second people at this level to other organisations, with a specific brief and activity to learn, for periods of, say three months, in order to see at first-hand how particular issues are dealt with successfully by other organisations. For example, Transport for London could be a potential recipient of such secondees if the work/study plan was worked out and the secondment was meaningful for both parties.

#### **Intermediate layer –Media**

The media will appear as an important part to provide support during the execution and the adaptation of the strategies among the community. Its influence will provide enough useful information to understand



how the strategies will work, the time frames and implications; similarly, it will facilitate constructively the means for the community to feedback on the procedures.

### Possible Training

The capacity building needed will involve short training courses covering topics such as sustainable mobility, patterns, perceptions and behaviour change, accessibility and its advantages, etc. The understanding of the importance of positive promotion of alternative transport modes could be an important step onto an improved transport strategy.

### **Education**

Finally is the more general layer in the framework, the more general education area. As mentioned above there is a key need to ensure that the population as a whole is much more aware of the day-to-day needs for a civilised transport system. Therefore, awareness campaigns at schools, universities, private companies and the public should start parallel to the setting of the strategy (at the technical Management level) and its influence and enforcement should grow as the strategy develops into tactics and execution. Robust levels of education enforcement should be implemented in the execution strategy followed by a well-planned exit strategy.

Enhancement and upgrading of professional, technical and operational transport training should be a long term objective and should be developed in different stages. An immediate target should be the training of all the driving schools' trainers and consequently the training of drivers renewing their licences to in the long term attain a better level of driving.

There is also a really good opportunity to explore how transport issues could be brought into the school education curriculum, but this is by no means the only activity that could or should be done. Influencing storylines in soap operas has been a technique used in the UK to disseminate information that would have been less palatable coming from the government, whether this related to farming methods, to health information (e.g. diet, AIDS), to habit-management (e.g. smoking). This area is quite well developed in the UK and there could be useful training programmes which could be taken in the UK or, better, in Peru to devise appropriate insertions into such material to encourage walking, cycling, better driving behaviour, less use of motorised transport, non-use of illegal taxis and so on.

In conclusion, there is a clear need for education and training at all levels in the framework illustrated in Figure 3 and the UK can be instrumental in much of the delivery of such a programmes. However, it is also noteworthy that the current provision already available within the UK is really restricted to a strong range of Masters degree programmes and that these are only likely to be of relevance to a fairly narrow band of the people concerned with managing the change to a low carbon transport environment. Much of the success of a capacity-building programme will rest on the ability to develop and deliver a concerted programme across the entire framework; with a paramount focus on parallel and transversal communication across all levels and with the numbers of trainees increasing, and the depth/breadth of the content lightening, from top to bottom of the framework.

## SECTION 5 – NEXT STEPS

This report, as stated at the outset, can only be a very superficial discussion of the core of the capacity needs issues in relation to low carbon transport strategy in Peru. There is more to be learnt before a full case for particular detailed approaches could be developed and that work will continue.

So our proposal for the next steps is for us to continue to engage with the stakeholders in Lima and to develop more solid and relevant lines of approach for the various training needs exemplified in the framework outlined in Section 4.

We will run a half day workshop titled 'The Media's Role' designed to introduce sustainable mobility and highlight the importance and high level of influence that the media have in issues regarding its understanding at a national level. This workshop will take place on the 11<sup>th</sup> of January 2012 and will be directed to the journalists from influential Peruvian media. We expect to have around 20-25 participants and some of the issues to discuss include sustainable challenges, leisure time mobility and mobility trends.

Another workshop will be run in response to the clearly stated need for technical leadership highlighting the importance of outcomes-focused decision-making and working together, delegating and communicating effectively among different authorities and with the Media. The three-day training workshop will take place on the 28<sup>th</sup>, 29<sup>th</sup> of February and 1<sup>st</sup> of March 2012. The focus of the workshop is to equip the participants with the right tools to develop technical leadership. The course will have a range of presentations and practical activities to define and plan a single transport authority. It is believed that this course will be aligned to the current political situation in Peru where initial discussions regarding organising the transport and possibly creating a Consortium between the Mayors of Lima and El Callao have started.

We would anticipate having approximately 30 attendees, drawn from the stakeholders groups in the city and we would split these into three teams who would compete in terms of generating the best solution. The last half-day would consist of presentations from each team to the relevant leading politicians (for example, it would be good if we could encourage the Mayor and Minister for Transport to attend this session). The course would include both taught and practical components with the taught components being delivered by a teaching team from the UK, Peru and elsewhere in Latin America. A relevant senior manager from Transport for London will explain and contribute the experience of running a single transport authority in a complex city, and speakers who have been involved in different transport systems in South America can also share their experience. The taught components would include elements of the needs derived and analysed throughout the capacity needs assessment process. The final workshop proposal will be confirmed at a later stage, and therefore the report on this event will be included in the final TNA.

## SECTION 6 – CONCLUSIONS

The transport sector in Peru is suffering from critical institutional structural difficulties and the over-supply of public transport, an old vehicle fleet, high level of traffic accidents, lack of regulation and coordination, etc., are the results of, and are also exacerbated by, this deficit. Thus, it is crucial that the authorities focus their intentions on solving this important issue before venturing to duplicate failing strategies (e.g. further regulations and weak enforcement).

As a first step Peru and Lima – and El Callao in particular – should develop a strong capable authority to have the capacity to implement and deliver low carbon transport strategies.

There are several interlocking issues which need to be resolved as part of this process, including issues relating to governance and leadership as well as the development of technical capacity to deliver the required actions.

Many of the detailed actions required are complex (for example, setting up a single transport authority for Lima and Callao) and can only really be achieved once suitable technical capacity is in place.

The UK can provide much of the required training, but only a small – although highly important – proportion is currently in existence in the form of formal degree programmes. Much of the training would need to be developed for this purpose, although in many cases this would, with appropriate adjustment, be of benefit in countries other than Peru.

The process for the development and implementation of a low carbon strategy and in turn an improvement to the whole transport system will not be short; strategies require time and effort to provide successful and radical changes. It is fortunate that the change has started now and therefore Peru is a step closer to make it happen.

## APPENDIX 1 – NAMA OBJECTIVES IN THE TRANSPORT SECTOR

Medidas	Emisiones de tCO <sub>2</sub>	
	Sin aplicación de medidas	Con aplicación de medidas
Transporte		
1. Modernización del Parque automotor no mayor de 10 años (2012)	11'879,898	7'542,383
2. Eficiencia Sistema de Transporte público por día (2012)	11,979	10,218
3. 5% parque automotor híbrido (al 2012)	10'168,540	9'187,125
4. Eficiente transporte carretero nacional (al 2017)	2'293,612	1'803, 645
5. Conducción eficiente de vehículos (10% de ahorro de energía en 5 años)	Reducción de 3'000,000 tCO <sub>2</sub> /5 años	

Source: Segunda Comunicacion Nacional del Perú a la Convención de Naciones Unidas sobre Cambio Climático, pag. 113 (MINAM, 2010)

## APPENDIX 2 – CURRENT MASTERS AVAILABLE IN THE UK RELATED TO THE TRANSPORT SECTOR

The UK has a variety of Centres for Transport studies within different universities as well as a variety of specialities. The UTP (Universities Transport Partnership) group is formed of eight UK universities that provide Masters level education in transport. This group enables students to make connections between the universities and with the industry, as well as enable institutions to work together developing course contents and methods of course delivery to ensure that the courses meet constant evolving needs.

Fees for attending a Masters course and the entry requirements vary between programmes and details for these should be sought from the relevant information sources. Fees for students coming from outside the EU will range from around £15,000 to around £30,000 per year. The cost difference is due to competition for places and ‘what the market will bear’ – some of the most expensive courses are also some of the most sought after. In the UK the Masters programme is often highly intense but completed in 12 months.

In general, it is difficult to be accepted on a Masters programme in the UK with less than 60% overall performance in a relevant Bachelor degree. Most UK institutions evaluate the equivalence of degrees and marking standards around the world in order to ensure that acceptance/rejection of an application is made on similar grounds irrespective of the provenance of the qualifications. Where programmes are popular, this threshold might be increased to 70% and certain subjects (e.g. Maths) might be preferred, so that performance in some subjects might be reviewed in addition to the overall degree score. All will require a high level of competence in spoken, heard, read and written English.

For more information: <http://www.utp.org.uk/>

For the full list of Masters at UTP in the UK: <http://www.utp.org.uk/default.php?id=1002>

### University College London (UCL) – Imperial College MSc Intercollegiate

The MSc (Masters of Science) offers the transportation research and postgraduate training capacity of the Civil Engineering Departments of the two leading universities, along with 30 years’ experience as leaders in this field. The Centre for Transport Studies (CTS) is a unique source of multidisciplinary experience in transportation offered by the two departments and / or colleagues in the profession.

([http://www.ulcts.cv.imperial.ac.uk/pdf\\_files/Programme.pdf](http://www.ulcts.cv.imperial.ac.uk/pdf_files/Programme.pdf))

Duration: Full time (12 months), Part time (2-3 years)

*MSc’s offered:*

There are three MSc’s offered; Transport, Transport with Business Management and Transport with Development. All the masters require the completion of 6 core units which include: Transport and its context, quantitative methods, transport engineering and operations, transport economics, transport modelling demand and transport policy; and a variety of optional modules.

- **Transport** – This course is aimed at for those who are interested in becoming specialists in transport.

Optional modules Include (among others): Transport Engineering and Operations, Public transport, Transport in developing countries.

- **Transport with Business Management** – This course is aimed at those who are interested in combining their technical skills in transport with an understanding of the business management principles.

Optional modules Include (among others): Microeconomic Theory, Principles of Accounting and Project Management.

- **Transport with Sustainable Development** – This course aims at those who aim at directing their career towards issues related to development and redevelopment, especially in the provision of infrastructure and its renovation and renewal.

Optional modules Include (among others): Sustainable development concepts, sustainable development and engineering renovation and application of principles.

There are also a variety of MSc's related to Energy and the Environment.

## Westminster University

### MSc

The MSc's offered at Westminster University range across all main modes of land and air transport; covering freight and aviation modes as well as passenger travel.

(<http://2009.westminster.ac.uk/schools/architecture/transport>)

Duration: Full-time (12 months), Part-time (2-3 years)

There are three MSc's offered: Transport Planning Management, Logistics and Supply Chain Management, Air Transport Planning and Management. All MSc's comprise of three core modules and three specialist modules depending on the course chosen.

- **Transport Planning Management** – Core Modules: Transport Economics, Comparative transport policy and Statistics & Survey methods for transport.

Optional modules Include (among others): Transport and land use, public passenger transport and urban traffic policy.

- **Logistics and Supply Chain Management** – This course is operated with Arnhem Business School in Netherlands, Molde University College in Norway, ICN Business School Metz in France.

Core Modules: Logistics and the External Environment I, Logistics Management, Planning and Policy I (taken in Westminster) and the specialist models + dissertation are completed in any of the four universities.

- **Air Transport Planning and Management** - Core Modules: Air Transport (A.T.) Economics, (A.T) Management and Operations, AT Forecasting & Market.

Optional modules Include (among others): Transport & Land Use, Public Passenger Transport, Urban Traffic Policy.

## Loughborough University

### MSc

Loughborough University offers two MSc's; Sustainable Transport and Travel Planning and Transport Policy and Business Management.

([http://www.lboro.ac.uk/departments/cv/pg/pg\\_progs.html](http://www.lboro.ac.uk/departments/cv/pg/pg_progs.html))

Duration: Full-time (12 months), Part-time (2-3 years)

All MSc's comprise of four core modules: Applied Research Methods I, Transport Business Strategy and Management, Transport Policy and Planning, Transport and the environment.

- **Sustainable Transport and Travel Planning** - Created in partnership with Transport for London and supported by ACT (Association of Commuter Transport), Travelwise and UKLAST (UK Local Authority School Travel). The MSc aims at providing specialism in travel planning. Optional modules Include (among others): Transport Services Marketing, Travel Behaviour and Travel planning, Sustainable Cities and Transport.

- **Transport Policy and Business Management** – Aimed to equip students to address transport problems by developing transport policy and transport business management strategies. Newly introduced 2005/6.

Core Modules: Applied Research Methods II, Transport Economics and Appraisal, Introduction to Transport Modelling.

Optional modules: Transport Services Marketing, Travel Behaviour and Travel planning.

## University of Leeds

### MA and MSc (full time)

The University of Leeds offers 5 master programmes: MA Transport Economics, MSc Sustainability Transport, MSc Transport Planning, MSc Transport Planning and the Environment and MSc (MEng) Transport Planning and Engineering.

(<http://www.its.leeds.ac.uk/courses/masters/>)

Duration: Full-time (12 months), Part-time (24-32months)

- **MA Transport Economics:** Design for students with a background in economics and it is aimed to enable economic understanding before addressing transport issues.

Compulsory modules: Principles of Transport Economics, Welfare Economics & Cost-Benefit Analysis, Transport Econometrics, Principles of Transport Modelling, Transport Data Collection & Analysis, Economics of Transport Regulation, Dissertation.

Two optional modules from (among others): Analysing Transport & Society, funding for Projects and Global Issues in Transport.

- **MSc Sustainability Transport** – Provides insight into sustainable development and addresses fundamental issues such as 'how can transport contribute to more sustainable development?'

Compulsory modules: Introduction to Sustainability, Transport Planning & Policy, Transport Data Collection & Analysis, Sustainable Land-Use & Transport Planning, Global Issues in Transport, Business, Environment and Sustainability.

Two optional modules from (among others): Analysing Transport & Society, Climate Change: Impacts & Adaptation, Environmental Governance & Sustainability

- **MSc Transport Planning** – Aimed at those who intent to become transport planners, the course aims to enable understanding of core principles to ensure that transport systems are

efficient and equitable.

Compulsory modules: Transport Planning & Policy, Principles of Transport Modelling, Understanding Travel Behaviour, Transport Data Collection & Analysis, Sustainable Land-Use & Transport Planning

Three optional modules from (among others): Global Issues in Transport, Traffic Management and Funding for Projects.

- **MSc Transport Planning and the Environment** – Aimed to equip students with practical approaches to environmentally sound transport planning.

Compulsory modules: Principles of Transport Modelling, Understanding Travel Behaviour, Principles of Transport Engineering, Transport & Urban Pollution.

Three optional modules from (among others): Analysing Transport & Society, Green Logistics, and Traffic Management.

- **MSc (MEng) Transport Planning and Engineering** – Aimed at equipping students to use engineering to meet the challenges of integrating different modes of transport and make travel safer, greener and more efficient.

Compulsory modules: Principles of Transport Engineering, Principles of Transport Modelling Transport Planning & Policy, Transport Data Collection & Analysis.

Four optional modules from (among others): Traffic Network Modelling, Transport Investment Appraisal and Safety of road transport.

## Southampton University

### MSc (full and part- time)

The University of Southampton offers one master programme in Transportation, planning and engineering and also has one of the UK's longest established and leading centres for research and teaching in the transport sector, the Transportation Research Group (TRG).

[http://www.southampton.ac.uk/engineering/postgraduate/taught\\_courses/msc\\_transportation\\_planning\\_and\\_engineering.page?](http://www.southampton.ac.uk/engineering/postgraduate/taught_courses/msc_transportation_planning_and_engineering.page?)

Duration: Full-time (1 year), Part-time (2-4 years)

- **MSc Course in Transportation, planning and engineering:** Aimed to develop the skills required for effective transport planning and engineering in developed and less developed countries.

Compulsory modules: Transportation Planning: Policies and Methods, Transportation Engineering: Analysis and Design, Transport Data Analysis and Techniques. Transportation Planning: Practice, Transportation Engineering: Transport Management, Research Project: Transportation Planning and Engineering, Transport Economics, Transport Data Analysis and Techniques.

Optional modules from (among others): Passenger and Freight Transport, Highway Engineering, Transport, Energy and the Environment.



## University of Newcastle

### MA and MSc (full and part-time)

The University of Newcastle offers four MSc's, all of which have compulsory courses: Quantitative Methods, Transport Policy in Practice, Intelligent Transport Systems and e-Services, Transport Modelling, Road Safety, and Public Inquiry into a Transport Scheme, Characteristics of Public Transport Systems, Economic and Environmental Appraisal of Transport Activities.

<http://www.ncl.ac.uk/postgraduate/taught/subjects/civil-eng/courses/112>

Duration: Full-time (1 year), Part-time (2-4 years)

- **MSc Transport Business and Management:** Business Enterprise in Science and Engineering
- **MSc Transport Engineering and Operations:** Design of Transport Infrastructure, Railway Management, Economics and Planning
- **MSc Transport Planning & Policy:** Traffic and Environment Management for Sustainable Development
- **MSc Transport and the Environment:** Air Pollution, Traffic and Environment Management for Sustainability

## University of Salford

### MSc (full and part-time)

The University of Salford is a member of the national Universities Transport Partnership ([www.utp.org.uk](http://www.utp.org.uk)), it has one MSc programme which has been running for more than forty years and it is aimed at students interested in the management, engineering and planning of transport infrastructure. The programme has four modules on Transport Engineering and four Planning modules.

Duration: Full-time (1 year), Part-time (3 years)

<http://www.cse.salford.ac.uk/civilengineering/msc-transport-engineering.php>

- **MSc Transport Engineering and Planning:** Transport engineering modules relate to traffic engineering and transport systems design. Transport planning modules look at traffic and travel prediction for local, regional and national studies. Economic and environmental appraisal techniques are also covered and optional modules include: Urban public transport development, Land use planning, Current policy issues such as reducing car dependency.

## Edinburgh Napier University

### MSc (full and part-time)

The University of Napier is the only university in Scotland that offers this transport MSc, the course aims at providing insights on how transport operations are planned, designed, constructed and maintained as well as how to develop effective transport strategies.

Duration: Full time (1 year), part-time (different lengths available)

<http://www.courses.napier.ac.uk/courses.aspx?X=2&Y=2&L=E10>

- **MSc Transport Planning and Engineering:** The course is divided into three quarters, the first one covers Development Planning and Transport Assessment, Public Transport, Traffic Engineering & Control, Transport Policy, plus an optional course. The second quarter covers Traffic Management, Transport Economics & Appraisal, Transport Research Methods, Transport & Traffic Models and the third quarter is spent on the dissertation.

## BIBLIOGRAPHY

- (ALG), A. L. (2011). *Plan de Desarrollo de los Servicios de Logística de Transporte*. Lima: Ministerio de Transportes y Comunicaciones.
- Bielich, C. (2009). *La Guerra del Centavo*. Lima: Instituto de Estudios Peruanos IEP.
- ECLAC. (2010). *Foreign Direct Investment in Latin America and the Caribbean*. Santiago, Chile: United Nations.
- ECLAC. (2011). *Foreign Investment in Latin American and the Caribbean*. Chile.
- JICA, A. d. (2007). *Estudio de Factibilidad de Transporte Urbano para el Área Metropolitana de Lima y Callo en la República del Perú*. Lima: Ministerio de Transportes y Comunicaciones de la República del Perú.
- MINAM. (2010). *El Peru y el Cambio Climatico*. Lima: Ministerio del Medio Ambiente.
- MINEM. (2008). *Guia No.15, Elaboración de Proyectos de Guías de Orientación del USO Eficiente de la Energía y de Diagnóstico Energético. TRANSPORTE*. Lima: Ministerio de Energía y Minas.
- MINEM. (2009). *Plan Referencial del Uso Eficiente de la Energía*. Lima: Ministerio de Energía y Minas.
- MTC. (2005). *Plan Intermodal de Transportes 2004-2023*. Lima: Ministerio de Transportes y Comunicaciones.
- Peru, C. d. (1999). *Ley General de Transporte y Transito Terrestre, LEY No. 27181*. Lima: Congreso de La Republica del Peru.
- PROTRANSPORTE, F. (2010). *Estudio para La Consolidación del Sistema Integrado de Transporte Público en Lima*. Lima.
- SwissContact. (2010). *Aproximación Programática para Futuros Mercados de Carbono en Argentina, Colombia y Perú*. Lima: Swisscontact.