Promoting Clean Urban Public Transport in Kazakhstan
Designing a green investment programme

POLICY HIGHLIGHTS
The OECD and Kazakhstan’s Ministry of Energy joined forces to analyse how a public investment programme could spur the development of cleaner public transport, and reduce air pollution and greenhouse gas (GHG) emissions from the public transport sector in large urban centres in the country. This work was carried out as part of the OECD project on “Promoting Green Growth and Low-Carbon Development: Analysis and Support to Policy Dialogue on Key Governance Elements of the Green Economy Concept in Kazakhstan” (2015-2016). The main focus of the investment programme was on supporting the shift to modern buses powered by clean fuels, such as compressed natural gas and liquefied petroleum gas.

This collaboration led to the development of the Clean Public Transport (CPT) Investment Programme, and a step-by-step guidance on its design and implementation in two phases:

- **Phase 1** (pilot phase) that will cover two cities - Kostanay and Shymkent; and

- **Phase 2** that will be extended to cover most major urban centers in Kazakhstan.

Two different scenarios were developed and costed for Phase 2 of the CPT Programme and three possible investment project pipelines were identified and analysed. The pipelines focus on the replacement of the old bus fleet in urban centres with modern buses fuelled by compressed natural gas (CNG), where available and liquefied petroleum gas (LPG). The other option identified was to continue with diesel-fuelled buses, but considering the import of EURO V and EURO VI fuel (until respective fuel standards are implemented in Kazakhstan).

The OECD also developed an accompanying model, called OPTIC (Optimising Public Transport Investment Costs) (Box 2), to estimate costs and benefits of the CPT Investment Programme, under several scenarios.
Why a clean public transport programme?
The context

The vehicle transport in Kazakhstan is responsible for 88% of GHG emissions in the transport sector and contributes to the already high carbon intensity of the Kazakh economy. Most of the transport vehicles in Kazakhstan are more than ten years old. Cars and buses run mostly on diesel (about 80% of the fuel used) while diesel engines hardly correspond to the EURO IV standard compared to EURO VI used in Europe. These structural and technical features make vehicle transport an important contributor to a poor quality of air in many cities in Kazakhstan.

The Intended Nationally Determined Contribution, presented by Kazakhstan at the UN Climate Conference in Paris in 2015, set the target of reducing GHG emissions by 15%-25% by 2030, compared to the 1990 levels. The basic policy and regulatory framework that can support the advancement of clean public transport is in place but Kazakhstan still lags behind in the development of modern emission norms for both passenger cars as well as heavy-duty truck and bus engines.

Although the government has committed to the development of energy-efficient local public transport changing this situation will require significant resources, both private and public. Transport fares are low, at about USD 0.2 per ride, and the access to credit that can allow the purchase of modern fleet is constrained by high interest rates on credit, ranging between 13% and 19%. Without state support and/or tariff increases, the modernisation of the public transport fleet will continue to lag.

Figure 1. GHG emissions generated by the transport sector in Kazakhstan

Source: National Inventory Submissions to UNFCCC 2015.
Key policy messages

The analysis and consultations with the Kazakh stakeholders have brought to light some key barriers to the development of clean public transport in the country, and identified policy actions needed to overcome these barriers.

KEY BARRIERS

- **Lax diesel engine emission norms**: Kazakhstan is far behind in the development of modern emission norms for both passenger cars, as well as heavy-duty truck and bus engines. The equivalent of the EURO IV emission standard has still not been implemented while in the EU this standard was introduced in 2005, and in 2014 the EURO VI standard was put in place.

- **Low diesel fuel standards**: Diesel engine emission norms cannot be introduced if the available fuel does not meet certain standards. This is because engines contain equipment that is sensitive to low-quality fuel and because SO₂ emissions directly depend on the sulphur content in the fuel.

- **Weak technical inspection standards**: Although buses must pass technical inspection, it is not strict on emissions thus there is no signal to bus owners to improve emissions standards.

- **Inadequate pricing signals**: Although CNG and LPG are cheaper than diesel, the buses are more expensive (or require installation of additional equipment) and operators receive a very weak signal to switch to clean fuels.

- **Insufficient support to producers for clean buses**: Although some bus production in Kazakhstan exists (in Kostanay, Semey), there is no incentive for producers to move to manufacturing clean engines.
POLICY ACTIONS TO OVERCOME THE BARRIERS

- **Inter-ministerial co-operation in greening the transport strategy.** While experience from other projects has shown that such co-operation can be difficult to implement effectively, the involvement of other ministries, in addition to the Ministry of Energy, may increase the probability of the CPT programme success. This is particularly true for the Ministry of Investments and Development and its Transport Committee. The Ministry of Finance and the Ministry of Economy could also support the programme and contribute more effectively to achieving low-carbon mobility in the country.

- **Changes in the fare system for public urban transport.** Tariffs should be designed to maximise the social welfare of both passengers and public transport providers, subject to budget and capacity constraints.

- **Changes in public tenders for providing public transport in urban centres.** Shifting from short-term contracts that encourage a short-term perspective among operators (and, therefore, discourage investments) toward a medium or long-term approach – together with a good fare system, regulatory improvements and financial support from the state – is more likely to lead to the modernisation of bus fleets.

- **Incentives for CNG/LPG vehicles.** Analysis conducted by various institutions (e.g., UNDP) state a need for tax exemptions for CNG/LPG vehicles and owners of re-fuelling stations. Experience from other countries shows that such incentives could effectively promote the use of CNG/LPG vehicles.

- **Promoting local production of clean engines.** Kazakhstan, which is rich in natural gas, should promote local production of clean engines that would stimulate the use of clean fuels. While this Programme focuses on providers of public transport services, there should be another programme to introduce incentives for the manufacturing and procurement of efficient buses running on alternative fuels (CNG, LPG) with lower CO₂ emissions.

- **Encouraging energy efficiency in public transport.** Fuel, and therefore cost, savings can be achieved by making the operation of public transport more efficient. For example, dedicated bus lanes can reduce the need to use inefficient mechanical braking. Eco-driving – a driving awareness technique that can reduce fuel consumption – can be introduced and promoted at schools for bus drivers.

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Essential elements of a green public investment programme

In establishing and managing green public investment programmes, the public financier needs to ensure that such programmes are designed in line with good international practices. These practices are defined in terms of essential elements that public investment programmes should be built around which represent a set of minimum requirements to ensure transparency and cost-effectiveness of public spending (see below).

- Clearly defined objectives and priorities – these objectives should be specific, measurable, realistic and time-bound and priorities should be few and unambiguous
- Clearly defined timeframe of the programme
- Specified cost estimates of achieving the objectives
- Specified sources of financing, specified eligible project types and eligible beneficiaries
- Clearly defined terms of financing including, among others, financial instruments (eligible form of subsidy), co-financing requirements, minimum/maximum level of support
- Well-documented principles, rules and operating procedures for project cycle management
- Clearly defined and robust criteria for appraisal, selection and financing of investment projects


A public investment programme consists of two main stages: programme analysis and design (defining programme essential elements) and programme implementation. Implementation requires that public authorities select the best institutional arrangement, ensure stable and predictable sources of finance for the programme and hire qualified staff to manage the programme. While these elements may look rather obvious and logical their practical application is often quite challenging.

BOX 1. OECD TOOLBOX FOR STRENGTHENING GREEN PUBLIC FINANCE IN EECCA

The OECD has assisted the countries of Eastern Europe, Caucasus and Central Asia (EECCA) to improve the management of their public resources allocated for green investments. The OECD toolbox includes a number of practical tools that can be used in the preparation of public investment programmes:
- An Excel-based model called model for Optimising Public Transport Investment Costs (OPTIC) and methodology to support the design of green public investment programmes in the public transport sector and calculate main programme financial and environmental parameters, developed as part of the study on Kazakhstan
**STAGE I. Programme analysis and design**

**STEP 1: Determining the focus of the programme**

What is the main focus of the programme in Kazakhstan?

The main focus is greening the public transport sector in Kazakhstan and encouraging low-carbon mobility by switching to modern buses that run on clean fuels, such as compressed natural gas and liquefied natural gas.

How was programme focus determined?

Defining the focus of the programme is a political decision. In this case, the decision was made by the Ministry of Energy in discussion with main stakeholders in the country both government and non-governmental actors.

**STEP 2: Defining programme objectives**

What are the main objectives and why were they selected?

The Clean Public Transport (CPT) Investment Programme is designed to contribute to national objectives related to the country’s climate change mitigation efforts and the transition to a greener path of development. The CPT Programme objectives are to help:

- Reduce emissions of hazardous air pollutants in urban areas in Kazakhstan.
- Reduce GHG emissions.
- Modernise the urban transport fleet, increasing the reliability and efficiency of public transport.
- Stimulate the domestic market to produce, or at least assemble, modern buses and use domestic natural gas.

How were the objectives defined?

A market analysis was undertaken to determine the need for public support in the public transport sector given programme objectives. It reviewed the current status of the existing bus fleet (ownership status, age, fuel type used), the market for compressed natural gas and liquefied natural gas as transport fuels, domestic production and import of buses, bus fares for urban transport, and the co-financing available for investment projects.
**STEP 3: Specifying programme targets**

**Climate and air quality related targets**
- To reduce CO₂ emissions in Kazakhstan in the public transport sector by 1% after the pilot phase, by 7% after Phase 2, Scenario 1, and by 10% after Phase 2, Scenario 2 (compared to a 2015 baseline);
- To reduce emissions of air pollutants in the public transport sector (CO, NOₓ, PM₂.₅, and SO₂) by 3% after the pilot phase, by 16% after Phase 2, Scenario 1, and by 24% after Phase 2, Scenario 2 (compared to a 2015 baseline);

**Public transport and bus production related targets**
- To increase the ratio of buses less than 5 years old used for urban public transport in Kazakhstan from the current 39.2% to 42.6% after the pilot phase, to 60% after Phase 2, Scenario 1, and up to 70% after Phase 2, Scenario 2;
- To increase the annual domestic production of modern buses fuelled by compressed natural gas, liquefied petroleum gas and EURO VI diesel by 300 vehicles for Phase 2, Scenario 1, and by 500 vehicles for Phase 2, Scenario 2 (compared to 2015 baseline).

**How were the targets defined?**
The market study analysed the feasibility of the programme targets. The amount of pollution reduction that could be achieved through the replacement of outdated buses was determined using the OPTIC model developed for this study. The model optimises the return on investment for service providers with the amount of subsidy required to stimulate the market for the given pollution reduction target. This model also determined the amount of financing necessary to meet the target and analysed if financing could be raised for the programme.
**STEP 4: Setting programme timeframe**

**What is the timeframe for implementing the programme?**
The proposal is that the Clean Public Transport (CPT) Investment Programme be implemented in two phases.

The first phase is designed to be implemented in two pilot cities (Kostanay and Shymkent) and is expected to last for one year. The results of this first phase should be evaluated to decide whether the programme will continue. In case of a positive decision a second phase will be launched to include additional cities. This second phase – designed to last for a period of 5 years – will require that a programme implementation unit be established at the national level (see Step 8).

Before the pilot phase of the programme is launched, a preparation period will be needed to:

1. incorporate the programme into the state budget process; and
2. identify and apply for funding from additional financing sources (including donors) (if needed).

**How was the timeframe determined?**
The timeframe was decided after discussions with stakeholders and analysis of the experience of other countries with similar publicly supported investments. This timeframe also accounts for the time needed for buses to be assembled in the country.
STEP 5: Estimating programme costs and level of subsidy

What are the costs of implementing the CPT Programme?
The pilot phase of the programme – which covers the cities of Kostanay and Shymkent – is expected to run for a period of one year. It is assumed that during this phase, 200 buses in Kostanay will be replaced with modern models that run on LPG. In Shymkent, it is assumed that 100 buses will be replaced with modern CNG-fuelled engine buses. The total investments for this first pilot phase are estimated at KZT 9 952 million (USD 29 million).

Two scenarios for the programme extension (Phase 2) were proposed and costed:

- **Scenario 1**, the cost of replacing 1 827 buses (excluding minibuses) that are more than 15 years old is estimated to be KZT 61 526 million (USD 179 million), of which the public financing amounts to KZT 30 399 million (USD 89 million).

- **Scenario 2** takes into account the replacement of all buses (excluding minibuses) that are now more than 10 years old. This would involve the replacement of 2 783 buses with modern vehicles powered with clean fuels, at the cost of KZT 94 581 million (USD 276 million), of which KZT 46 602 million (USD 136 million) is required for public co-financing.

The main difference between these two scenarios is that Scenario 1 envisages that the replacement only of buses that are more than 15 years old will be financed through the programme, while under Scenario 2, the programme will also pay for the replacement of buses that are more than 10 years old.

How were the costs and level of subsidy calculated?
The OPTIC model was developed to calculate programme costs, emission reductions and the optimal level of subsidy that should be offered to providers of public transport services. Given the social nature of public transport investments, the model is built to take into account the fact that the investments should generate at least a minimum return for the providers of such services. A social discount rate of 5% was used to determine the net present value (NPV) of an investment needed to replace an old bus. This discount rate is similar to the rate used by other public financing institutions that support similar investments. The subsidy is then determined at the level at which NPV is equal to zero. The economic significance of this calculation is that the subsidy will encourage potential beneficiaries to participate in the CPT Programme without allowing them to generate a profit based on the subsidy.
Main results of the modelling work
The main results of the modelling work are summarised in Table 1 below. These show the number of new clean buses that can be purchased in each phase of the programme, expected emission reductions and the cost of these investments for both the public financier and the private sector.

Table 1. Results of modelling

<table>
<thead>
<tr>
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<th>New buses</th>
<th>Emission reduction per year</th>
<th>Investment costs (min USD)</th>
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<tr>
<td></td>
<td>Diesel</td>
<td>CNG</td>
<td>LPG</td>
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<tr>
<td>Pilot phase</td>
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<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Phase 2</td>
<td>0</td>
<td>386</td>
<td>1 441</td>
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<td>Scenario 1</td>
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<td></td>
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<tr>
<td>Phase 2</td>
<td>0</td>
<td>953</td>
<td>1 830</td>
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<tr>
<td>Scenario 2</td>
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Source: OECD calculations, OPTIC model.
STAGE II. Programme implementation

STEP 6: Determining the sources of programme financing

What are the sources for co-financing the programme?
The CPT Programme can be financed by a mix of public funds (state and/or international) and private funds. The programme can be financed by the state budget within the medium-term expenditure framework process. In the programme preparation phase, the Government may seek to obtain additional financing from donors.

The main source of financing will be bus operators’ own financial sources (revenue, profits, commercial loans). On the other hand, the main source of revenue for bus operators is the transport fare which is currently very low in Kazakhstan. Under these conditions, bus operators alone will not be willing to make investments in new clean buses. To speed up the shift to low-carbon mobility the government can offer financial support to providers of public transport services.

Determining the right level of public transport prices is a major policy issue and needs serious debate.

Figure 5 shows the estimated co-financing split between private and public sector financiers in the pilot phase and in the two scenarios of the second phase of the CPT programme. The leverage ratio is about 1:1 with a slight prevalence of private financing.
STEP 7: Defining eligible projects and beneficiaries

What are the eligible project types?
The main types of eligible projects identified to be supported through the CTP programme include:

- Projects that aim to replace buses that are more than 10 years old and that provide public transport services in urban centers with environmentally-friendly diesel models equipped with EURO VI engines, or with buses equipped with CNG- or LPG-powered engines. Since Kazakhstan’s bus fleet is ageing, the proposed pipelines are intended to support the purchase of new buses, not simply the modernisation of bus engines.

- Other investments such as studies, construction of CNG filling stations, creation of maintenance workshops for new buses, as well as additional investments that improve public transport services that accompany the replacement of buses in the three pipelines (CNG, LPG and diesel).

All eligible costs are strictly related to individual project investment expenditure needed to achieve the project’s stated objectives. General investment costs not attributable to the achievement of project objectives are excluded.

Who are the eligible beneficiaries?
The following types of beneficiaries are eligible to receive support from the CPT Programme:

- private public transport operators that currently provide services in eligible urban centres;
- municipal public transport operators that already provide services in eligible urban centres;
- city administration – for the preparation of necessary studies;
- providers of natural gas for CNG filling stations.
**STEP 8: Choosing financial instruments**

What are the financial instruments that can be used to disburse programme resources?
The financial support can be provided in the form of:
- grant co-funding; and
- equity co-financing.

How were these instruments chosen?
Grants and public equity are traditional financial instruments that the government of Kazakhstan already has a lot of experience with. The proposed financial support schemes are easier to implement if most of the investment costs are co-financed by public sources.

**STEP 9: Selecting programme institutional set-up**

To facilitate future programme implementation, the OECD study has developed some supporting materials which include, among others:

- a proposal for institutional arrangements to manage the CPT Programme comprising three levels:
  - **Programming entity (PE)**: The PE is responsible for the design of the programme. The Ministry of Energy could play this role.
  - **Implementation unit (IU)**: The IU is charged with the drafting of the programme’s operating regulations (marketing the programme, announcing calls for proposals, collecting applications, appraising and selecting projects for financing, disbursing funds, and monitoring and evaluating the programme rollout and results).
  - **Technical support unit (TSU)**: The TSU provides specialised assistance, advice and expertise in the areas of energy and fuel efficiency, CNG and LCP buses, modern diesel buses and air pollution and GHG emission reductions.

Regardless of the institutional form, the programme management should involve an institutional structure and procedures that promote environmental effectiveness, embody fiscal prudence, and utilise financial and human resources efficiently.
Further reading


This study was conducted within the framework of the OECD-Kazakhstan Co-operation Programme. The work was carried out jointly by the OECD GREEN Action Task Force and the Ministry of Energy of Kazakhstan. The project was financially supported by the Government of Kazakhstan.

The OECD provides the secretariat for the GREEN Action Task Force which has for more than 20 years been supporting the countries of Eastern Europe, Caucasus and Central Asia (EECCA) to integrate environmental considerations into mainstream economic, social and political reforms. The programme on public environmental finance in EECCA was one of the first work streams of the Task Force and it continues to evolve.

For more information:
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