Workshop Numerical Exercise

• This practical session will provide participants with an opportunity to learn how to use the graphical and numerical financial simulation models of the Toolkit for PPP in Roads and Highways.

• Following completion of the exercise, the participants should be able to work on several PPP issues, such as the main factors defining the minimum toll rate (or minimum availability payment) required for a PPP project to attract private investors.
Instructions to Participants

• Please form teams with a few members each
• Teams will be numbered 1 to n
• Each team will be given basic data (or assumptions) for a proposed PPP project and will be asked questions on the financial assessment of the project
• Please choose the team member who will make a brief presentation of your team’s results, after deliberations
• Please assume that previous studies have shown that the project is economically justified, and socially and environmentally sound
Basic data (or assumptions) to be used by each team

- **Concession term**: 30 years
- **Construction Cost**: US$210 million
- **Road length**: 40 km
- **Four-year construction, with progress rates**:
  - Year 1: 15%; Year 2: 30%; Year 3: 30%; Year 4: 25%
- **Operating expenses**: $10 million per year (at opening year); no variable operating expenses
- **Capital structure**: Equity, 30%; Subsidies, 0%
- **Nominal interest rate**: 9% per year
- **Loan grace period**: 4 years
- **Loan repayment period**: 15 years
- **Discount rate (real terms)**: 8%
Basic data to be used (cont’d)

- Initial daily traffic (opening year), vehicles/day:
  - Group x: AADT = 7,500 + 2,500x, where x is the team number
- Traffic composition: cars, 70%; trucks, 25%; and buses, 5%
- Traffic growth: 3% per year
- Inflation: 4% per year
- Tax rate, VAT: 10%; Corporate tax: 11%
Financial Indicator Targets (or Constraints)

Please assume that the following targets will have to be met for the project to attract private sponsors:

• Project Financial Internal Rate of Return: FIRR ≥ 12%
• Equity Internal Rate of Return (or Return on Equity): ROE ≥ 14%
• Annual Debt Service Cover Ratio: ADSCR ≥ 1.2
Questions to each team

1. Please estimate the minimum toll rate per average vehicle, in (a) $/veh, and (b) $/veh-km, for the project to be able to attract private investors.

Note: The minimum toll rate ($/veh) can be obtained by trial and error using the “Cash Flow” sheet of the graphical financial simulation model (or the “Assumptions” sheet of the numerical model) of the Toolkit. After you have entered all the data applicable to your specific project, you can vary the toll rate so the financial indicators calculated by the model are just above the minimum required threshold.
2. Please estimate the minimum car, truck and bus toll rates, in (a) $/veh, and (b) $/veh-km, for the project to be able to attract private sponsors. Please assume the following relationships between toll rates for different type of vehicles:

- Average truck toll rate = 3 × car toll rate
- Average bus toll rate = 2 × car toll rate
- The toll rate in the graphical model (WATR) is: \[ WATR = \left( \frac{\%C \times TRc + \%T \times TRt + \%B \times TRb}{100} \right) \]

where WATR is the weighted average toll rate per vehicle; \%C, \%T, and \%B are the percentages of cars, trucks, and buses in the traffic flow; TRc, TRt, and TRb are the toll rates for cars, trucks, and buses.
Questions to each team (cont'd)

3. Closing the affordability gap with government subsidies. If the toll rates estimated under Question 2 are above road users' affordability (or willingness to pay), you may want to consider using government subsidies to reduce the toll rate required to attract private investors. Assuming that the Government is willing to contribute up to 25% of the construction cost (i.e., subsidies), please estimate the minimum required toll rate per average vehicle (in $/veh-km) that would be sufficient to attract private sponsors.
Notes regarding the solution to Question 3

(a) Changing the amount of Subsidies does not change the project’s financial Internal Rate of Return (IRR), which is independent of the project’s capital structure. Please disregard the minimum IRR requirement in this case.

(b) A minimum amount of equity is usually specified to make sure the private sponsors have “their skin in the game.” Equity, in this example, is required to be not less than 30% (see slide no. 4). The sum of Equity, Loans and Subsidies is 100 percent. Consequently, the maximum amount of Subsidies that could be considered in this case is 70%.
Questions to each team (cont’d)

4. Using the toll rate computed under Question 1, what is the amount of subsidy that the government could provide for the project to be fiscally neutral to the government?

5. How does the project financial internal rate of return (IRR) vary with the amount of subsidies? Is IRR independent from the capital structure (i.e., proportion of subsidies, equity, and credit)?

6. Is the return on equity (ROE) directly influenced by subsidies? Ceteris paribus, what would be the impact on ROE of an increase in subsidies from 0 to 10%?
Questions to each team (cont’d)

7. In case there is no political support to charge actual tolls to road users, alternative approaches could include shadow tolls or availability fees. Assuming that there will be no capital grants (i.e., no subsidies during construction), please estimate the minimum annual required payment by the government (availability fee, or availability payment, or annuity) during the first year of operation. Please use the result from Question 1a in your calculations.

Note: Availability payment = 365 * AADT * WATR

8. What financial criterion (or criteria) would you include in the bidding documents, so as to allow for an objective evaluation of financial proposals under a competitive selection of concessionaires?
9. Bridging the affordability gap with shadow tolls. In case the toll rates estimated under Question 2 are higher than the affordable toll rates in Russia (or in your province), the Government may want to consider providing a shadow toll payment to the concessionaire, so the actual toll rates can be kept within the road users’ affordability. Assuming that the maximum affordable toll rate is $0.04/car-km, and that there will be no capital grants (i.e., zero subsidies), please estimate the shadow toll payment by the government during the first year of operation, so as to complement the affordable toll rates.
Notes regarding Question 9

(a) Please use the information and results from Questions 1 and 2, as appropriate.

(b) Affordable weighted average toll rate per vehicle (WATRa):

$$ WATRa = \frac{(\%C \times TRca + \%T \times TRta + \%B \times TRba)}{100} $$

where %C, %T, and %B are the percentages of cars, trucks and buses in the traffic flow; TRca, TRta, and TRba are the affordable toll rates for cars, trucks, and buses, respectively. Note: $TRca = 40 \times 0.04 = $1.60/car

(c) Annual shadow toll payment (ASTP):

$$ ASTP = 365 \times AADT \times (WATRr - WATRa) $$

where WATRr is the required weighted average toll rate per vehicle as computed under Question 1a. The units of WATRr and WATRa should be $/veh.

(d) Payment of an ASTP by the government is somewhat similar to a minimum revenue guarantee.
Questions to each team (cont’d)

10. Time permitting, please work with the numerical financial simulation model to answer the above questions. In your view, what are the pros and cons of the two models?

11. Module 5 of the Toolkit for PPP in Roads and Highways describes the five key stages to launch a PPP project. In which one (or ones) of these stages do you think it may be necessary to carry out a financial assessment of the project?

http://ppiaf.org/documents/toolkits/highwaystoolkit/5/index.html
Questions to each team (cont'd)

12. Several assumptions have been made to run this numerical application of the Toolkit financial simulation models. Please describe the changes in assumptions that you would suggest to make this exercise more realistic for Russia (or your province).

13. Toll rates (or availability fees) are a complex issue. The toll rate that will actually be charged to road users depends on many factors, such as the degree of competition, expected and actual traffic volume and composition, loan terms, government support (if any). Please discuss.
Questions to each team (cont'd)

14. Please make a brief presentation summarizing your team's results and discussions. Please focus your presentation on the non-numerical questions.

Good luck!
Questions to focus on, in case of time constraints

- Questions 1 to 3
- Question 7
- Question 9
- Questions 11 to 14
Main Stages to Launch a PPP Project

• Stage 1: Identification, Prioritization and Selection of the PPP Project

• Stage 2: Due Diligence and Feasibility Studies: includes activities and studies to ensure the selected project is well designed and can be successfully tendered and implemented

• Stage 3: Procurement: includes prequalification of bidders and the bidding and bid evaluation process

• Stage 4: Contract Award: includes dealing with the preferred bidder(s), financial close

• Stage 5: Contract Management: deals with the construction and operation periods of a project including transfer back if relevant
Making Predictions

“It's hard to make predictions - especially about the future.”
Attributed to many people, including Yogi Berra, Niels Bohr, Samuel Goldwyn, Robert Storm Petersen, and Mark Twain

“Heavier-than-air flying machines are impossible.”
Lord Kelvin, British mathematician and physicist, president of the British Royal Society, 1895
Cesar Queiroz  
Consultant, former Highways Adviser  
World Bank  
Tel +1 202-473 8053  
Cell +1 301 755 7591  
queiroz.cesar@gmail.com