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UNECE STANDARD ON PPPs IN
URBAN RAIL TRANSIT PROJECTS

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**Implementing the United Nations 2030 Agenda for Sustainable Development
through effective “People-First Public-Private Partnerships”**

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Abbreviations and Terms	Meaning
UN	United Nations
PPP	Public Private Partnership
SDG	Sustainable Development Goal
DBOT	Design-Build-Operate-Transfer
BOT	Build-Operate-Transfer
O&M	Operate & Maintenance
TOT	Transfer-Operate-Transfer
ICO	Investment & Construction-oriented
SOE	State-Owned Enterprise
IOO	Investment & Operation-oriented
EMO	Equipment & Maintenance-oriented
SPV	Special Purpose Vehicle
VFM	Value for Money
EAM	Enterprise Asset Management
MTR	Mass Transit Railway
UNECE	United Nations Economic Commission for Europe
ECE	Economic Commission for Europe
BOOT	Build-Own-Operate-Transfer
DBFOT	Design-Build-Financing-Operate-Transfer
TOD	Transit-Oriented Development
UNESC	UN Economic and Social Council
VGF	Viability Gap Funding
PFS	Project Feasibility Study
NPV	Net Present Value
IRR	Internal Rate of Return
FNPV	Finical Net Present Value
FIRR	Finical Internal Rate of Return
ENPV	Economic Net Present Value
EIRR	Economic Internal Rate of Return
SA	Social Assessment
PID	Public Participatory Development
CIECC	China International Engineering Consulting Corporation
PfPPP	People-first Public-Private-Partnership
WP	Working Party

83 **I. Introduction**

84 The United Nations (UN) has identified Public-Private-Partnership (PPPs) in infrastructure
85 and public services as a means to achieve the Sustainable Development Goals (SDGs)¹. The
86 UN has further introduced the concept of “People-first” PPPs (PfPPPs) which means the
87 primary objective of a PPP project should be to maximize the utility of the project to people
88 and facilitate governments achieving the SDGs, including poverty reduction and overall
89 promotion of shared prosperity.

90

91 Many countries have implemented PPPs through their domestic institutions and frameworks
92 resulting in many varieties depending on the context of the country, sector, and project. The
93 purpose of this standard in Urban Rail Transit is therefore not to unify the various urban rail
94 transit PPP forms, but rather to identify successful approaches and key concerns that will
95 assist governments in orienting their urban rail transit PPP projects towards the interest of
96 people. Precisely, this and other UNECE PPP standards are designed to provide public and
97 private partners with guidance on how to implement a PPP project that would achieve the
98 SDGs.

99

100 This standard was developed through the analysis of Urban Rail Transit PPP cases around the
101 world, and compares various PPP models, summarizes key factors needed to implement a
102 People-first PPP, and identifies common requirements across a number of steps in PPP
103 project implementation.

104

105 **II. Objectives of the Standard**

106 The objective of this standard is to provide guidance to stakeholders of Urban Rail Transit
107 PPP projects on how to achieve SDGs by applying a “people-first” PPP model. It will assist
108 governments in their decision making and help design appropriate PPPs that meet People’s
109 interests. Use of the standard will also create incentives for private partners to positively
110 correlate their commercial interest with the enhancement of public good. The standard not
111 only fosters an effective enabling environment by aligning policy with practice, but also
112 identifies important implementation steps of a people-first Urban Rail Transit PPP project.
113 By applying the standard, Urban Rail Transit PPPs can:

114

- 115 a) Goal 3: ensure healthy lives and promote well-being for all at all ages
- 116 b) Goal 8: promote inclusive and sustainable economic growth, employment and decent
117 work for all
- 118 c) Goal 9: build resilient infrastructure, promote sustainable industrialization and foster
119 innovation
- 120 d) Goal 11: make cities inclusive, safe, resilient and sustainable

¹ SDG 16 and 17

121 e) Goal 17: reinforce the means of implementation and revitalize the global partnership for
122 sustainable development.

123 **III. Scope of the Standard**

124
125 The recommendations of the standard are based on a global review and distillation of recent
126 and near recent Urban Rail Transit PPP projects and derived from both developed and
127 developing countries.

128
129 Urban Rail Transit projects are often highly capital and technology intensive and hence
130 require long-term financing as well as strong design, construction, operation and maintenance
131 capacity if they are to be successful. Public authorities often adopt PPPs for Urban Rail
132 Transit projects in order to leverage funds, improve efficiency, and supplement capacity
133 where they may have difficulties in achieving the project solely by themselves. Urban Rail
134 Transit PPPs have different models according to the specific project requirements; however,
135 the standard looks into the most prevalent types such as DBOT, BOT, O&M, and LBOT.

136
137 The standard is also project-centric in that it acknowledges certain important sectoral policy
138 issues but focuses more on specific project elements that need to be achieved in order to
139 realize the SDGs through Urban Rail Transit To this end, it combines some general rules of
140 PPP with distinct factors of the transport sector and Urban Rail Transit projects.

141 142 **A. Standard type**

143 The standard is also project-centric in that it acknowledges certain important sectoral policy
144 issues but focuses more on specific project elements that need to be achieved in order to
145 realize the SDGs through Urban Rail Transit To this end, it combines some general rules of
146 PPP with distinct factors of the transport sector and Urban Rail Transit projects.

147 148 **B. Sector focuses of the standard**

149
150 Urban Rail Transit projects vary in size and complexity but most present a high degree of
151 complexity and require significant experience and skill in planning, design, financing,
152 construction, operation, maintenance and management. Several key issues that impact PPPs
153 in Urban Rail Transit include:

- 154 1) Project complexity
- 155 2) Project readiness and suitability for PPP
- 156 3) Route selection
- 157 4) Natural resources along proposed routes
- 158 5) Level of private activity in investment, construction, operation and maintenance
- 159 6) Tariff flexibility
- 160 7) Selection of capital-intensive equipment such as rolling stock
- 161 8) Public sector capacity, experience, and reliability

162

163 In addition, the complex and massive nature of Urban Rail Transit investments has a direct
164 effect on the type and form of private sector involvement, and ensuring adequate public and
165 private sector funding requires a major investment by the grantor in commitment, time, and
166 resources. Developing Urban Rail Transit projects through PPP arrangements therefore
167 requires rigor and a structured approach that will satisfy both public and private sector
168 objectives.

169

170 **C. Geographic coverage of cases in the standard**

171 The standard is based upon review and analysis of Urban Rail Transit cases from both
172 developing and developed countries including China, Philippines, France, Canada, Brazil and
173 others. The full list of projects and programs is available in annex 3 and accessible on the
174 project team webpage at <https://wiki.unece.org/display/pppp/Urban+Rail+Transit>.

175

176 **IV. Central Question**

177

178 ‘People first’, SDG compliant Urban Rail Transit PPP projects should achieve the following
179 goals and address these core issues:

180

181 Goal 3: ensure healthy lives and promote well-being for all at all ages

182 1.1 Focus on the influence of urban rail transit project implementation on the spread
183 of disease.

184 1.2 The project should improve people’s ability to obtain medical services and other basic
185 public services for related communities;

186 1.3 provide convenient public transit services for urban residents and promote healthy
187 lifestyles by reducing air pollution and protecting the environment;

188

189 Goal 8: promote inclusive and sustainable economic growth, employment and decent work 190 for all

191 2.1 The implementation of urban rail transit project should consider the goal of full
192 employment;

193 2.2 provide a decent working environment and labour safety protection measures for workers;

194 2.3 Emphasize the training of labour skills and legally employ the workers, with equal
195 remuneration for work of equal value;

196

197 Goal 9: build resilient infrastructure, promote sustainable industrialization and foster 198 innovation

199 3.1 Optimize the urban rail transit construction scheme, and adopt clean and environmentally
200 sensitive technologies that improve resource utilization efficiency and ensure the project
201 construction scheme is resilient;

202 3.2 Promote the development of inclusive and sustainable urban rail transit industry;

203 3.3 Promote technological development, research and innovation in investment and
204 construction of urban infrastructure;

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Goal 11: make cities inclusive, safe, resilient and sustainable

- 4.1 Promote inclusive, safe, resilient and sustainable urban rail transit construction;
- 4.2 Provide safe, barrier-free, affordable and sustainable urban rail transit service;
- 4.3 Pay special attention on the needs of vulnerable groups, women, children, the disabled and the aged and their ability to use urban rail transit facilities;
- 4.4 Focus on the protection of urban cultural heritage;

Goal 17: reinforce the means of implementation and revitalize the global partnership for sustainable development

- 5.1 Optimize any subsidy or scheme of governmental fiscal support for the urban rail transit project through PPP model;
- 5.2 Optimize the financing approach to promote project viability;
- 5.3 Relieve governmental debt associated with projects and promote debt financing, debt relief and debt restructuring to realize sustainability of long-term debt;
- 5.4 Promote technical cooperation and promote knowledge sharing through the PPP model;
- 5.5 Promote international cooperation and capacity building in construction and management of projects;
- 5.6 Promote international cooperation in equipment trade and service provision;
- 5.7 Promote innovation in management systems and local government governance mechanisms, including strengthening policy coordination and building sustainable development policies;
- 5.8 Establish multi-stakeholder partnerships, and encourage effective public, public-private and civil society partnerships in Urban Rail Transit.

A. Project Types and Examples of Urban Rail Transit PPPs

A1. Criteria of project sample selection

The standard relied upon project samples that were:

- 1) From solid and reliable sources.
- 2) Representing a distinct type of PPP model.
- 3) Successfully applied in a developing or developed country.
- 4) Able to provide transferable experience and lessons learnt.
- 5) impactful in the development of the Urban Rail Transit sector.

A2. Project types

Urban Rail Transit PPP projects can generally be divided into four types that represent the typical contractual arrangements:

245 (1) Design-Build-Operate-Transfer (DBOT). DBOT is a full project-cycle PPP which
246 starts with designing Urban Rail Transit lines and continues until project completion,
247 operation, and eventual transfer back to the public partner.
248

249 (2) Build-Operate-Transfer (BOT). BOT is the most common type of PPP in Urban Rail
250 Transit projects where design remains primarily with the public partner but construction
251 and operational risk is transferred to the private partner.
252

253 (3) Operate-Maintenance (O&M). O&M focuses on the later phase of Urban Rail Transit
254 project and aims at improving the level of public service provision.
255

256 (4) Transfer-Operate-Transfer (TOT). TOT is an approach often used to enhance Urban
257 Rail Transit asset management and transfers the ownership of an existing Urban Rail
258 Transit project during its operational period to a private partner who in turn operates and
259 maintains the system for a period of time.
260

261 As a public service, Urban Rail Transit is most often implemented by governmental
262 institutions and/or public utilities. However, a well-functioned Urban Rail Transit line
263 requires large investment, high-quality construction and equipment, professional operation
264 and maintenance and in order for it to remain effective and efficient. This range of
265 responsibilities is difficult for a single governmental body or a public utility to fulfil, and
266 government entities often take on significant risks during the full project cycle of an Urban
267 Rail Transit line. Therefore, cities that plan to have an Urban Rail Transit project often need
268 to leverage support from the private sector to supplement their capacity and mitigate the risk
269 that the project presents. Governments that apply PPP therefore aim to solve a number of
270 different problems. Hence, another way to categorize Urban Rail Transit PPPs is to divide
271 them based on the public sector entity's objectives and what risks they hope to mitigate, share,
272 and/or transfer.
273

274 (1) Investment & Construction-oriented (ICO) PPP. ICO PPP procures a construction
275 firm who is to provide not only high quality construction but also shares in the risk of cost
276 overruns during construction. The need for a high capacity to deliver on complex
277 construction elements while attracting investment are the primary motivations under this
278 PPP model. City governments often adopt this type of PPP to address fiscal stress during
279 the construction period and as an approach to controlling the risk of construction cost.
280 The construction firm is therefore responsible for providing investment as well as
281 construction to the project. The construction cost is often paid by the government through
282 government subsidies. In this model, the operation and maintenance will still be
283 conducted by the government institution or public utilities.
284

285 For example, the Barcelona urban rail line 9 &10 adopted this type of PPP to procure
286 construction firms with the capacity to invest in metro stations and provide advanced
287 technology for station construction. The private party was awarded the concession right to

288 construct the stations, and perform the maintenance work of the stations, for 30 years, in
289 return for a fixed sum paid early

290

291 For those countries where domestic construction firms do not have adequate capacity or
292 experience to construct urban rail lines, this type of PPP can also help bring international
293 experience and capacity to construction.

294

295 (2) Investment & Operation-oriented (IOO) PPP. IOO PPPs aim at improving investment
296 efficiency and operational service to Urban Rail Transit systems. Under this model,
297 governments select private companies with proven capacity to invest and operate an
298 Urban Rail Transit line. The private company and, typically, a city government establish a
299 SPV which undertakes the investment and operations, while outsourcing the construction
300 through competitive bidding process. The SPV gets a return usually from user fees and
301 often some degree of government subsidy that can be tied to the private partner's
302 satisfactory performance.

303

304 For example, in China the Zhengzhou-Gongyi-Luoyang Urban Rail Transit PPP project
305 adopted the IOO PPP model and selected a private company with the capacity to invest in
306 its system and assume operations. It was the first Urban Rail Transit project in China with
307 such a private investor and operator approach. The project otherwise was a DBOT and
308 had a subsidy scheme that featured the provision of land development rights along the rail
309 line.

310

311 (3) Equipment & Maintenance – oriented (EMO) PPP. EMO PPPs target the producers of
312 high-tech equipment, which for Urban Rail Transit systems are often train or rolling stock
313 producers. This equipment accounts for a large percentage of the total equipment
314 investment needed for an Urban Rail Transit project, and in fact are the core parts of an
315 Urban Rail Transit line. Similar to construction-oriented PPP, this type of arrangement
316 also helps government to control the risk of equipment cost and ensure sufficient
317 maintenance of core assets of the system.

318

319 For example in Brazil, the São Paulo Metro Line 4. During phase 1, the Companhia do
320 Metropolitano de São Paulo—the public authority that owns the underground network—
321 was responsible for constructing the tunnelling, track, and metro stations. The private
322 sector contractor, under a 30-year concession agreement, was responsible for the supply,
323 operation, and maintenance of the rolling stock (14 metro trains with six cars each) and
324 operating the systems (a train signalling and control system and a mobile voice and data
325 communications system). During phase 1, according to the state's time frame, six stations
326 were to be built by the first quarter of 2010. The second phase, which was subject to
327 further studies and market demand, would require the private sector contractor to open
328 additional stations on the existing line and add between five and 15 more trains, at the
329 discretion of the State of São Paulo, at any time after the second year of commercial
330 operations.

331

332

333 **B. Pros and cons of PPPs in the Urban Rail Transit Sector**

334 Based upon the empirical evidence of the project cases reviewed for this standard, in
335 particular an analysis of their and project design, transaction structure, financial arrangement,
336 risk allocation scheme and contract management, the following lessons may be learnt from
337 both successful and failed cases.

338

339 **B1. Core elements of successful Urban Rail Transit PPPs**

340 An examination of recent PPP projects from both developed and developing countries
341 provides useful insights on why some PPP projects appear to be more successfully than
342 others. The core elements enable a successful Urban Rail Transit PPP include:

343

344 1) **Clearly and firmly put forward the primary objective of applying PPP in Urban**
345 **Rail Transit projects.** The primary objective is significant to PPP project design, as it
346 determines the selection of the PPP model, and is closely linked to the choice of
347 implementation solutions offered through PPP.

348

349 2) **Align projects with national economic development and urban sector development**
350 **strategy.** Urban Rail Transit PPPs that serve the national development strategy help
351 achieve and accelerate national development, in addition to sector development goals,
352 and thereby bring increased benefits to people's livelihood.

353

354 3) **Early and continued consultation with stakeholders-particularly the private parties**
355 **during the feasibility and design stages is critical to achieving an optimal outcome.**

356

357 4) **Conduct effective value for money evaluation in the design and implementation of**
358 **the PPP.** Value for money analysis provides public decision makers with information on
359 whether PPP is a better option than traditional governmental delivery of an Urban Rail
360 Transit projects. An effective value for money evaluation will take full consideration of
361 and clearly link the project context, project demand, and the proposed solution instead of
362 arbitrarily justifying the endeavour.

363

364 5) **Achieve full project cycle fiscal affordability.** Urban Rail Transit PPP projects may
365 require fiscal subsidy to ensure asset availability and continuity of operations. If so,
366 public authorities should set limits on the percentage of subsidy that would come from
367 fiscal revenues. For example, if a subsidy demand exceeds a prescribed limit, public
368 authorities could give the SPV other 'in kind' support such as other developable
369 resources, adjusting tariff rates, or negotiated tax benefits that would mitigate the subsidy
370 demand. These approaches can help mitigate fiscal risks and ensure the fiscal
371 affordability of an Urban Rail Transit project.

372

373 6) **Strongly link investment with operations in the design of Urban Rail Transit**

374 **projects.** Urban Rail Transit involves large capital investment and recurrent financial
375 input. The return for the private sector is mainly derived from operations. Therefore,
376 governments should create a close link between the return on investment and successful
377 operation. This will create strong incentives for the private party to maintain or improve
378 public service level which results in a faster capital payoff, and vice-versa.

379

380 7) **Open and competitive bidding procedures.** Procurement of private parties of Urban
381 Rail Transit PPPs needs to follow an open and competitive selection procedure such as
382 tendering, competitive negotiation, etc. The evaluation should examine not only the
383 historical achievement of bidding companies, but also their capacity and willingness to
384 share and/or partner on project risks with the public partner.

385

386 8) **Carefully systematic management.** Abandoning a functioning Urban Rail Transit
387 system is politically unacceptable in most cases, making the strong case for trying to get
388 it right from the earliest stages. As a result, the complete process requires careful
389 systematic management, with resources and focus adapted to suit the specific needs of
390 each project stage and targeted to delivering a high quality long lasting project.

391

392 9) **A clear and fair method for dealing with demand risk.** Governments and partners
393 must manage fares intelligently, including a clearly defined mechanism for any subsidy
394 that may be afforded (taking into account incentives for the private sector).

395

396 10) **Subsidy scheme that reflects risk sharing and creates the right incentives of**
397 **improving public service.** Many PPP schemes have mechanisms to provide for capital
398 subsidies, because capital development costs are often far in excess of the capacity of the
399 fare revenue to fund them. However, unconditional return of that capital is unrealistic
400 and proper performance incentives need to be put in place to ensure operational success
401 and a high level of public service provision is met.

402

403 11) **Allocate risks to the party that can afford best.** Risk allocation of urban rails projects
404 should comprehensively look through the scope of government responsibilities and
405 clarify which risks are allocable to the private parties, and which are not. This can be
406 different from project to project and from country to country, but often risks regarding
407 project approval, planning, land acquisition, policy and regulation change, and those
408 things squarely within the power of the public sector to control should be retained by the
409 public sector; whereas risks of investment, construction, operation, maintenance, and
410 resource development and optimization should be taken by the private sectors.

411

412 12) **Good governance and enforcement of the contract under a healthy rule of law.** Both
413 public and private parties are equal subjects of a PPP contract. In more successful urban
414 PPPs, good governance and a healthy rule of law enables the effective implementation of
415 the PPP contract, which furthermore pushes forward a sustainable project and good
416 operations.

417 **B2. Lessons learnt from unsuccessful Urban Rail Transit PPPs**

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Some Urban Rail Transit PPPs have completely failed or at least resulted in negative outcomes in the transport or financial objectives of the project. These elements are key challenges that can threaten the success of an Urban Rail Transit PPP:

- 1) **Delinking PPP objectives and selecting the wrong PPP model.** For example, in China, while the objectives of PPP are often to control local government debt and improve the public service level, some city governments chose financial institutions which did not have the capacity or experience in Urban Rail Transit projects. This resulted in huge implicit local government debt, which frustrated a key motivation of the project which was to control debt limits with respect to infrastructure.
- 2) **Inadequate consultation with stakeholders.** Urban Rail Transit projects involve many stakeholders, such as local government approvals and supervising bodies, financial institutions, impacted users, etc. Lack of consultation increases the danger of opposition, and if performed late in the process, can lead to delays or even cancellation.
- 3) **Overlook construction in favour of financing.** Some Urban Rail Transit projects took advantage of PPP by using the criteria of investment to select construction contractors without adequately examining their construction capacity and standards. This results in the risk of increased construction costs and lower construction quality. Countries with a highly competitive market of Urban Rail Transit construction should be mindful to carefully evaluate both financial and construction capacity bidders.
- 4) **Unclear obligations and rights in PPP contracts.** Urban Rail Transit PPP contracts without clear obligations and rights can result in ineffective allocation of risks and interests and a contract that does not achieve its intended purpose. It also increases the chance of default. Lack of clarity in a PPP contract can furthermore affect the overall likelihood of successful project implementation and negatively impact intended service levels.
- 5) **Lack of effective control on fiscal and financial risks.** Public authorities may underestimate fiscal and financial risks in Urban Rail Transit PPPs by committing excessive fiscal subsidies to make the Urban Rail Transit PPP more attractive to the private sector, or overestimating projected fiscal revenue increases. Consequently, if the promised subsidy is established but then not available at that excessive level, the project will most often be suspended or the private party may choose to lower the quality or service level to overcome the shortfall. A similar negative outcome can occur with excessive, or simply unanticipated, contingent liabilities become payable.

- 460 **6) Use PPP as method of government borrowing.** Urban Rail Transit projects contain
461 large investment, and some city governments are constrained to issue sufficient debt
462 to finance Urban Rail Transit projects, thus PPP becomes an ‘attractive’ option
463 because it makes the project happen, but disguises the government borrowing. When
464 a government promises a fixed return to financial institutions or provide certain
465 guarantees for private parties’ borrowing, it not only increases the government
466 implicit debt, but also expands the systematic financial risks among the government,
467 private party and financial institutions.
468
- 469 **7) Unreasonable risk allocation between public and private parties.** Both public and
470 private parties have impulse to transfer the risks to the other party. However, if one
471 party has to take the risks beyond its management capacity, for example the private
472 party taking on the risk of land acquisition, or the public authority taking on the risk
473 of project finance, it can results in project failure.
474
- 475 **8) Large deviation between actual traffic and forecast traffic.** Urban Rail Transit is
476 most often a user-charge public service. Future traffic is therefore a foundation to
477 justifying the feasibility of an urban rail line project and typically is a basis for
478 project approval. As a result, there is a tendency to exaggerate future traffic volumes
479 in order to get the project approved or attract more private investors. However, an
480 unrealistic traffic forecast will fundamentally set a project on a course to fail, since
481 either the city government or the private company will have to pay for the real traffic
482 risk buried under unrealistic projections.
483
- 484 **9) Lack of effective constraints on default of public or private party.** In those
485 countries with relatively immature legal systems, it might not be easy to enforce the
486 legal terms of PPP contracts. Hence, public and private parties will tend to default
487 when the actual project implementation is not as expected, or when political change
488 or financial crisis takes place. This lack of adequate remedy increases the risk of a
489 party exercising the absolute remedy of defaulting.
490

491 **C. PPPs Meeting People First Objectives**

492

493 **C1. Demonstrate Replicability, Scalability, Equity, Efficiency, and Sustainability**

494

495 A ‘People first’ Urban Rail Transit project should meet one or more of the following
496 criteria:

- 497 (1) Accessibility & equality. A people focused Urban Rail Transit PPP project
498 should enhance people’s accessibility to job opportunities, public services and business
499 markets, and hence promote more equal development between urban and rural area, or
500 between big cities and small towns.
501

502 (2) Economic efficiency & sustainability. The Urban Rail Transit PPP project should
503 increase economic efficiency by reducing travel time and/or transport cost. Urban Rail
504 Transit as a public transport service reduces the pollution from motorized transport,
505 which improves the sustainability of a city. Performance-based evaluation and payment
506 system also provide better incentives to enhance a project's economic efficiency and
507 sustainability.

508
509 (3) Replicability & building capacity. People first Urban Rail Transit projects should
510 result in successes elsewhere and improve project outcomes for similar projects. Projects
511 should not be 'one off' projects attempted once in 50 years, they should inspire and
512 inform decision makers and stakeholders in undertaking similar projects and
513 accelerating overall development.

514
515 (4) Sustainability and climate adaptability. Private investors are more sensitive to
516 project costs throughout the full project life-cycle, and yet are more susceptible to the
517 risk of natural disasters, therefore because of the long term nature of PPPs, there is an
518 incentive and priority to build more resilient, efficient, and sustainable infrastructure that
519 will mitigate long term costs and withstand force majeure risks.

520
521 (5) Stakeholder engagement. Urban Rail Transit projects contain diverse
522 stakeholders such as the government, users, designers, construction contractors,
523 financial institutions and more. PPPs have the effect of establishing a platform where all
524 types of stakeholders can be engaged, provide project input, and participate in project
525 management.

526 527 **C2. An Urban Rail Transit PPP model to best achieve SDGs of UN**

528
529 Considering all aspects, including typical investment requirements and operation-
530 oriented issues, the DBOT PPP rail project model is best suited for Urban Rail Transit
531 projects that aim to achieve applicable SDG outcomes (SDGs 3, 8, 9, 11, and 17) and
532 put people first..

533
534 **Key attributes of investment and operation-oriented DBOT PPP:**

- 535 1) Investor as operator. Only investor and operator's interest lies in the full life cycle quality
536 and efficiency of the project, ensuring the investor as operator safeguards the full life
537 cycle quality and efficiency of the project.
- 538 2) Common interest for public and private sector. The investor and operator's interest is
539 mostly in line with the public sector, i.e. full life cycle quality and efficiency of project,
540 which builds a solid foundation for the public and private sector to form partnership,
541 share risks and reach sound agreement so as to ensure the overall quality of the project.
- 542 3) Early stage involvement of private sector improves quality and efficiency of project.
543 Entering at the design stage enables the private sector to truly utilize its advantage in

544 market-oriented operation, resource integration and innovation, optimizing the project
545 from the very beginning, realizing the potential of adopting PPP model in Urban Rail
546 Transit projects to reach best quality and efficiency of the operation and services of the
547 project.

548

549 **V. Delivering the Model**

550

551 **A. Project Selection and Baseline Requirements for Private Interest**

552

553 Governments interested in potential Urban Rail Transit PPP projects need to undertake an
554 appraisal process to ensure the rationale for developing and implementing them. For any
555 proposed PPP project, there are five key criteria that governments should consider when
556 deciding whether or not to pursue a project as a PPP:

- 557 1) Feasibility and economic viability: Developing and assessing the feasibility of the
558 project concept; Appraising whether the project is a good public investment decision
559 based on an economic viability analysis;
- 560 2) Commercial viability: whether the project is likely to attract quality investors by
561 providing robust and reasonable financial returns.
- 562 3) Value for money of the PPP: whether developing the proposed project as a PPP can
563 be expected to best achieve value for money as compared to other delivery options.
- 564 4) Fiscal responsibility: whether the projected project cost is within fiscal affordability
565 limits during the entire project cycle.
- 566 5) Project management: whether the contracting agency has the authority, capacity, and
567 fiscal resources to prepare and tender the project effectively, and to manage the
568 contract during its term.

569 **A1. Identify objectives to adopt PPP model in Urban Rail Transit projects**

570

571 It is significant for governments to be clear and insistent on achieving their objectives.
572 Different PPP models serve different purposes, but the overall objectives of a PPP in Urban
573 Rail Transit should include decreasing fiscal stress, enhancing public service levels,
574 improving investment efficiency, and promoting competition.

575

576 Governments should conduct preparatory research, as well as consult widely with
577 practitioners and experts, to understand significant dependencies, priorities, incentives and
578 other drivers of the proposed Urban Rail Transit PPP project. Governments should also
579 consider the full range of issues likely to affect their objectives, and identify the policy
580 instruments or project elements that can be used to address those issues and/or meet their
581 objectives.

582

583 **A2. Financial and legal readiness of the project**

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Once a project is established as viable, the next step is to determine whether it would be attractive to the market if structured as a PPP. Governments often assess the appetite of potential partners for a proposed PPP before taking it to market.

Generally speaking, potential rail partners will find a project commercially attractive if it offers good financial returns and requires the private party to bear reasonable levels of risk.

Assessing returns typically involves financial analysis—that is, building a project financial model and checking project cash flows, returns, and financial robustness.

Where revenue from user charges exceeds costs and yields sufficient returns to remunerate the anticipated application of capital, the project will generally be commercially attractive provided other project risks are reasonable.

In terms of legal readiness, governments should also assess and perform due diligence to identify any legal or regulatory constraints that could prevent the government from entering into the anticipated PPP contract or impair the purposes or likely structure of the contract. Governments should also examine the existing Urban Rail Transit sector, financial sector, and public policy environment, to make sure the proposed PPP model aligns with all the relevant policies.

Needless to say, institutionally, each government institution that conducts a tender for an Urban Rail Transit project should also be capable of meeting the legal requirements and following robust tender procedures and bidder selection to ensure a fair and transparent process and attract the highest quality partners. Governments should also use competitive tender procedures, avoiding single source awards, and otherwise obey applicable procurement law and regulations. This should include ensuring the jurisdiction has a competent, independent juridical institution that will supervise or oversee the entire process.

A3. Technical appropriateness of the project

Governments should analyse whether the project can be implemented as planned, using proven technologies, and not present unreasonable technical risks. This analysis needs to take into account system connectivity, links, and interdependencies of various infrastructure and transit elements, and employ a holistic view of the system in light of the technical environment.

A4. Rationalize the project preparation and implementation procedure

A4.1. Consultation with all types of stakeholders

626 The stakeholders are critical to the sustainability of an Urban Rail Transit PPP. Even if the
627 contract is awarded despite opposition, the difficulty and risk of the project increases
628 drastically if public support is not present.

629

630 Stakeholder engagement helps governments identify critical issues and prepare effective
631 strategies. In particular, it can frame discussions with beneficiaries, clarify project impacts
632 and objectives, and ultimately increase public support for a given project.

633

634 Stakeholders provide valuable input to the design and practicality of a project approach as
635 well. In fact, allowing stakeholders to comment on PPP strategies allows for a sense of buy-in
636 and can lead to innovative new ideas and approaches.

637

638 Consultation is a less formal process through which themes and points of interest are
639 discussed within or across stakeholder groups. It is intended to gather information and build
640 an understanding among the participants as to current perceptions and understanding of
641 projects and the basis of various opinions. A key part of stakeholder consultation is to
642 manage expectations with respect to the Urban Rail Transit project and identify how these
643 ideas may be incorporated into the project.

644

645 In Urban Rail Transit projects, key stakeholders can include:

646

- 647 1) Political decision makers such as local government departments that approve, supervise,
648 and/or manage Urban Rail Transit projects, as well as institutions relevant to the
649 construction management, land acquisition, planning, coordination of underground
650 pipelines or conduits that will be necessary for the system.
- 651 2) Potential private partners and suppliers such as construction firms, operation firms, and
652 equipment providers.
- 653 3) Existing and future users and those impacted by the proposed Urban Rail Transit line.
- 654 4) Financiers, investors and lenders such as banks, funds, and/or guarantors.
- 655 5) Strategic consultants such as transaction consultants, legal advisors, and financial
656 accountants.

657 **A4.2. Allocate risks between public and private parties**

658

659 Governments should identify macro-economic risks, sector risks, and project risks associated
660 with the proposed Urban Rail Transit project, and create a detailed risk matrix that is shared
661 with the private party. In most Urban Rail Transit PPP projects, risk allocation follows three
662 main principles:

- 663 1) Risks should be allocated to the party that has best manage them
- 664 2) Risks correspond with returns. The party taking higher risks should get higher return.
- 665 3) The risks should be controllable. For those risks caused by only one party, the party
666 should take responsibility of the risk.

667 Based on these premises, the main risks that should be taken by government include:

- 668 1) Feasibility risks such as planning risk, land acquisition risk, the risk of approving the
669 feasibility study, technical design, and the like.
- 670 2) Legal, policy and regulatory risks. Urban Rail Transit PPP contracts often commonly
671 have terms as long as 30-40 years, it is therefore possible that changes in law, regulation
672 and policy could seriously affect the project and impair (or enhance) its implementation
673 and long term performance. Project risks resulting from those changes should be taken
674 by the government.

675 The primary risks that the private party should bear include:

- 676
- 677 1) Investment and financing risks. Many Urban Rail Transit PPPs adopt a project finance
678 scheme under which the SPV is responsible for the debt financing. Within the SPV, the
679 private party is commonly the controlling shareholder and thus the private party should
680 be responsible for and afford the risk of attracting the investment and placing the
681 appropriate financing.
- 682
- 683 2) Construction, operation, rehabilitation and maintenance risks.
- 684

685 Both public and private parties should take responsibility for the following risks in an
686 Urban Rail Transit project.

- 687
- 688 1) Traffic demand risk. There are many factors impacting the actual traffic demand of an
689 Urban Rail Transit line, such as the alignment, the public service level, and the
690 comprehensiveness of city planning and integration of the system into other modes of
691 transit. Some of these factors belong to the government, and some are the private parties,
692 therefore, the traffic demand risk should be shared by both parties.
- 693
- 694 2) Force majeure risks such as nature disasters, wars and those events that are beyond the
695 influential scope of both parties should be borne by both parties and fair and reasonable
696 provisions that address the potential impact of force majeure events should be used.

697

698 **A5. Evaluate project performance**

699

700 **A5.1. Ensure the security of Urban Rail Transit construction and operation**

701 It is important for the government to establish a systematic performance evaluation
702 mechanism that occurs periodically and correlates to the contractual subsidy afforded within
703 the project. For example, if the SPV performs well, the government should reward it, and if
704 not, the government should punish the SPV by reducing the subsidy and encouraging
705 improved performance.

706

707 Key performance indicators of Urban Rail Transit PPP projects include:

- 708 1) Reliability and punctuality

- 709 2) Customer satisfaction
- 710 3) Cleanliness and general upkeep
- 711 4) Safety, access, and security
- 712 5) Ride quality and noise emission

713

714 **B. Financing for Urban Rail Transit PPPs**

715

716 **B1. Financial cash flow analysis**

717 **B1.1. Financial cash flow identification**

718 In Urban Rail Transit sector, revenue growth is often affected by challenges related to the
719 overall levels of ridership and the effectiveness of collection of fees. These issues can be
720 particularly difficult if the traditional under-pricing of user fees by governments is maintained
721 in order to gain political capital instead. Realistic cost recovery through fees needs to be
722 established and if necessary governmental support will be needed if a revenue gap is to be
723 accommodated, that is until tariffs would allow cost recovery.

724

725 **B1.2. Financial viability gap analysis**

726 In most Urban Rail Transit projects, the user tariff is often established by policy. While
727 politically effective, this is often insufficient to generate a level of revenue to repay the
728 project, and is further insufficient to reward the debt and equity that may have been applied to
729 cover the capital cost of the project.

730

731 If full tariff rates are not permitted, the public authority may have to entertain other
732 approaches to ensure viability. For example, pay for part of the capital cost itself at
733 implementation, thus reducing the amount of debt and equity funding required. This is
734 sometimes known as a capital contribution from the public party and makes sense in such
735 cases so long as a substantial part of the remaining capital costs still involve private capital at
736 risk (the private party continues to be properly motivated to perform well).

737

738 Another type of governmental capital contribution is to make payments during the operating
739 phase, depending on the availability and performance of the project, which, alongside some
740 level of payment from users, make up the overall revenue stream. This still requires the full
741 capital costs to be financed, but it reduces the dependence of the project on tariff revenue,
742 while strongly incentivizing operating performance.

743

744 **B2. Design project financing structure**

745

746 **B2.1. Asset-based financing model**

747 As Urban Rail Transit generates stable revenue from its operation tariff and government
748 subsidy, it is possible to refinance the project based on its cash flow during the operation
749 period. Financial institutions can issue project bonds for the SPV based on its assets and cash

750 flow. Shareholders of SPV can also increase the bond credit rating by provide guarantee to
751 the bond return. Governments should therefore anticipate refinancing of debt in Urban Rail
752 Transit PPP projects and the opportunities it may afford to the overall viability of the project
753 or realizing a return on investment for both the public and private partners.

754 **B2.2. TOD model**

755 (To be updated)

756

757 **B3. Financial Acceptance**

758

759 **B3.1. Financial Affordability**

760 Private parties should conduct financial affordability of the Urban Rail Transit project.
761 Although the PPP project finance is a non-recourse financing instrument, it still includes the
762 project debt on the private party's balance sheet, in particular if the private party holds more
763 than 50% the equity in a SPV. The financial affordability analysis should look into aspects
764 such as capital cost, traffic demand, project cash flow, operation revenue and cost,
765 government subsidy, developable resources and other such projections that would impact
766 financial affordability. A matrix of parameters can be set up depending on the individual
767 context of the project. To the private party, the project debt burden should be controlled
768 within their affordability. In addition, the private party should carefully manage the capital
769 and operational costs which also include rehabilitation and maintenance cost which is
770 generally high in an Urban Rail Transit context, to make sure to collect returns sooner than
771 later.

772

773 **B3.2. Fiscal affordability evaluation**

774 Many governments provide a subsidy in Urban Rail Transit PPPs. The subsidy, paid to the
775 SPV, is usually composed of an availability payment and/or viability gap funding. An
776 availability payment subsidizes the private partner for making the project 'available' and a
777 number of projects choose to pay a fixed availability subsidy every year through the contract
778 period. A viability fund payment subsidizes the rail's operations, and the subsidy can
779 fluctuate with the revenue-cost gap that actually occurs.

780

781 While making the project viable, the fiscal affordability of such subsidy must also be
782 evaluated and the stress of such yearly subsidy accounted for within the public fiscal
783 tolerances. Prudent governments should therefore check the available fiscal revenues for
784 transport infrastructure, or specific revenue space for PPP projects, and carefully forecast
785 future fiscal revenue growth in light of the ongoing obligation of the PPP.

786

787 **B4. Mitigation measures of financing risks**

788 Both public and private parties need to take measures to mitigate the financing risks, as
789 Urban Rail Transit projects inject significant amounts of funding to achieve just one project.
790 Some primary risk mitigation measures include:

791 1) Conducting careful fiscal and financial affordability analysis before making financial

- 792 decisions.
- 793 2) Applying a relatively flexible subsidy mechanism to respond to the uncertainty of
794 financial situation from both parties.
- 795 3) Adopt guarantee/insurance products to reduce the risks of financial loss.
- 796 4) Use refinancing tools to reduce financial stress in the operation period.
- 797 5) Separate project financial risks from the financial risks of shareholders of the SPV.

798

799 **C. Key consideration to implementing Urban Rail Transit construction, operation**
800 **and transfer**

801 **C1. Construction**

802 1. Meet the construction needs of local urban rail transit and provide good, safe and reliable
803 rail transport infrastructure in accordance with the local technical standards for construction.
804 To ensure the safety, quality, progress, technology and humanities of urban rail transit
805 projects to meet the requirements of construction standards. To achieve the overall goal of
806 overall coordination, perfect system, safe and orderly, and quality project.

807

808 2. Optimize the construction schemes of urban rail transit, promote the intelligent and
809 technological use of urban rail transit equipment, enhance rail transit technological
810 development and promote rail transit technological innovation and industrial development.
811 With a strong investment and financing capacity to ensure the project funds supply can match
812 the investment needs, also to meet the project according to the duration and the quality.
813 Strengthening the training of urban rail transit construction technicians.

814

815 3. Set up safety objectives during the construction period to meet the local related regulations
816 and requirements, combined with the actual situation of the project, establish and improve the
817 safety assurance system, formulate safety management program according to the safety
818 objectives, and organize the development and revision of all safety management systems.
819 Prepare safety plan by different sub-sections, and the implementation is ensured through the
820 project safety measures and periodic inspections. Establish emergency handling mechanism
821 and prevention of accidents.

822

823 4. Implement conscientiously with the relevant laws, regulations and compulsory standards of
824 local related quality control. According to the contract, design documents, project quality
825 management program documents and technical quality support documents, organize quality
826 inspectors to supervise the quality of the construction, and timely rectify the problems.

827

828 5. To establish a technology management system to clarify the responsibilities of various
829 posts, to supervise and implement the effective operation of the technology management
830 system. For practical work, to collect codes and standards related to the project. Before the
831 construction, carefully review the construction drawings, technical data, complete check the
832 drawings, and timely communication with the design institute. During the construction,
833 double check the various technical reviews to ensure the efficiency of the technology
834 management, timely summarize the project technical progress to ensure that the

835 implementation of the various tasks can effectively guide the continuing project. Standardize
836 the local technological achievements, formulate unified technical standards for construction
837 management, and formulate technical communication mechanism with other regions, and
838 gradually improve the international standard of urban rail transit technology.

839

840 6. To determine the schedule of project progress scientifically and reasonably, ensure the
841 overall goal of progress control throughout the full project construction period, clear
842 implementation of the project overall plan. The key point and the difficulty links are
843 highlighted, and monitoring and correction mechanism is established.

844

845 7. The conditions permitted projects can be considered to establish management institutions
846 such as construction management, EPC management, etc., to professionally manage the
847 project, plan and control the progress of project construction, leverage the project resources,
848 and undertake the response to project risks.

849

850 8. During the construction period, all the activities must comply with the local environmental
851 protection, cultural relics protection and other laws and regulations re We should also comply
852 with water saving, land saving, material saving, energy saving, minimize the negative impact
853 which harmful to the surrounding environment, and create a harmonious, stable, green and
854 sustainable development environment. The construction of the project should pay attention to
855 the protection of urban resources, historical relics and cultural heritage. We also should pay
856 attention to the participation of different races and women in urban rail transit project
857 construction, ensure the physical and mental health of workers, and strictly control the
858 incidence of occupational diseases.

859

860 **C2. Operation and Maintenance**

861 1. In accordance with the relevant laws and regulations of local rail transit operational service
862 and equipment renewal maintenance requirements, fully consider local operational
863 requirements, pay attention to the interests of passengers and humane care, taking into
864 account economic benefit and social benefit, realize the overall operation the target of
865 "people-oriented, demand oriented, dynamic improvement, quality service".

866

867 2. In the operation stage, we should carry out the advanced technology and management
868 concepts, adopt the information management systems of human resource management and
869 financial management etc. to achieve the goals of save costs and improve efficiency. The
870 concept of life cycle management of equipment and facilities is introduced, and EAM
871 management system, vehicle intelligent maintenance management system and other
872 information to achieve the link and modern management of all aspects of operation
873 management. With sufficient financial support capability and intelligent maintenance and
874 repair technology, we can ensure that the operating lines renewal, maintenance and repair can
875 match operation needs in time sequence and standard.

876

877 3.Through the concept of safety management, safety culture, science and technology and the
878 emergency rescue and other aspects, to establish safety management mechanism, and to
879 improve emergency rescue system, safety education and training should be provided,
880 strengthening security management basis, improve the level of safety management. Improve
881 the safety awareness of staff and passengers. Base on the Internet and the big data analysis to
882 establish operational security risk management data platform, to create a safe, efficient and
883 good imaged railway.

884
885 4. According to the local laws and regulations of operation and the urban operation needs,
886 formulate operation management system, technical management system and comprehensive
887 management system, to establish emergency rescue organization, information reporting
888 process and emergency response mechanism, improve the efficiency of fault disposal, And to
889 improve the level of emergency management.

890
891 5. The use of advanced information technology, to achieve the automation of the operation
892 equipment, to reduce personnel operation of the vehicle, equipment status to be monitored,
893 forecasting and early warning, real-time display the status of vehicle equipment operation,
894 and to monitor the personnel operation to ensure the safe operation.

895
896 6. Choose the right way to operate management organization can reduce the cost of operation
897 management, improve the efficiency and benefit of the project, and to provide better service
898 for the passengers. According to the actual situation of the project and the local management
899 habits, to set up the management and control mode of the project. Banding set the
900 management layer and executive layer, ensure the project can be centralized, unified, under
901 commanded, meticulous and specialized. Management layer is responsible for the operation
902 and management, financing, maintenance, safety supervision and other matters, the execution
903 layer is responsible for the depot management, vehicle management, line control and other
904 matters, and strengthen the horizontal linkages between institutions and the integration of
905 management to meet the requirements of emergency management and daily management.

906
907 7. We should pay close attention to the vulnerable groups for their needs of urban rail transit,
908 and provide safe and barrier free urban rail transit services. Considering the full employment
909 of rail transit operation industry, we can improve the employment rate and employment level
910 for local people, provide decent working environment and labour safety protections for
911 employees, especially the equal employment opportunities for different races, women and
912 different societies.

913

914 **C3. Transfer**

915 Urban rail transit projects, like all PPPs, require a stable transferring procedure. This includes
916 a well thought out plan for transferring of project assets such as civil works, equipment, and
917 intellectual property assets, as well as the transfer or reversion of the rights of concession
918 which include considering the needs of operation, rehabilitation, development and
919 maintenance of the rail system The public and private parties should agree on the pre-transfer

920 criteria in the PPP contract, and create a joint working team that includes a third party
921 evaluation to verify operational and infrastructure conditions. Ultimately it is critically
922 important to not affect the rail service and try to maintain continuity of operations during and
923 after the transfer.

924

925 **D. Legal Requirements for Urban Rail Transit PPPs**

926

927 **D1. Establishment of PPP Particular Standards.**

928

929 On the other hand, in consideration of the special features of PPP projects, such as the
930 involvement of private sector, the balance between the private sector's pursuit for profit and
931 public interests, particular industry standards and specifications shall be introduced in order
932 to safeguard the qualified provision of public infrastructure and service. These standards and
933 specifications shall be illustrated in each stage of a PPP project. For an urban rail transit PPP
934 project, how the objectives like VFM, People First and SDGs could be achieved shall be
935 taken into consideration during the design and construction stage. While performance
936 evaluation (to be linked with the payment mechanism) shall be emphasized during the
937 operation stage to avoid the detriment of public interests by excessive pursuit of profit by the
938 private sector.

939

940 **D2. Operation of the project**

941

942 As a newly-incorporated company, the SPV lacks record of construction and operation. For
943 an urban rail transit project, the long-term stable operation is particularly important. The
944 public sector shall pay sufficient attention to the operation of the rail as well as the
945 construction. Such could be achieved by detailing the relevant legislative requirements and
946 industry standards in the contract.

947

948 **D3. Management of the Contract**

949

950 PPP project involves a full set of contract agreements, namely the PPP Contract, shareholders
951 agreement, construction contract, operation contract, etc., with different priority and function.
952 All the contract agreements work together to ensure the due implementation and risk
953 allocation among the parties. Among various PPP projects, an urban rail transit project is
954 comparatively more open and more comprehensive, and imposes higher demand to the
955 parties involved. Accordingly, the terms and conditions of an urban rail transit PPP project is
956 more complicated, training is necessary to both the public sector and the private sector.

957

958 **D4. Promote Zero Tolerance to Corruption**

959

960 Urban rail transit projects involve large interests and last for a long period, zero toleration to
961 corruption need to be noted at each stage, including the project identification and preparation,
962 preparation of the implementation plan, selection of private sector, negotiation and
963 implementation of the PPP contract, management of the SPV and the transfer of the project.
964 Robust anti-corruption measures also can curb the cost of the project, improve the efficiency
965 and quality of the project, and help achieve the goals of People First and VFM.

967 **E. Feasibility for Low and Middle Income Countries**

969 **E1. Main Challenges and Opportunities of Low and Middle Income Countries in** 970 **Urban Rail Transit PPPs**

971 Urban rail transit projects are only feasible with adequate demand of fast public transport,
972 which means low and middle income countries with enough population, in particular in urban
973 settings, are likely candidates for employee the recommendations contained within this
974 standard.

975
976 Urban rail transit is relatively capital-intensive, labour-intensive and technology-intensive so
977 low and middle income countries will encounter a few challenges and difficulties in a
978 particularly acute way.

979
980 These may include:

- 981 1) Lack of a comprehensive urban rail transit network plan.
- 982 2) Lack of enabling institutional and legal environment
- 983 3) Incomplete or insufficient project finance capacity.
- 984 4) Limited fiscal and financial capacity.
- 985 5) Insufficient governmental institutional support.
- 986 6) Incomplete tendering procedure.
- 987 7) Under-developed private sector.
- 988 8) Lack of domestic construction, operation and maintenance experience and teams.

989 While most experience and lessons learnt in urban rail transit come from developed countries,
990 low and middle income countries can benefit from this experience and comparatively start
991 ‘further ahead’, with more thorough approaches to structuring transactions, more advanced
992 technology, and more mature system design. Low and middle income countries also present
993 comparatively faster urbanization processes, with a lot of potential for increases in demand
994 growth capacity.

996 **E2. Advice on how to achieve SDGs through urban rail transit PPP in low and** 997 **middle income countries**

998
999 The cases from low and middle income countries, in terms of applying PPP model in urban
1000 rail transit sector, summarized the main lessons include:

- 1001 1) Identify the main objectives at both national level, local level and project level of urban

- 1002 rail transit PPPs and keep them consistent to each other.
- 1003 2) Establish a strict legal and regulatory system for urban rail transit PPP to enforce rule of
1004 law and spirit of contract.
- 1005 3) Start with bringing in experience from the international service provider, but keep
1006 cultivating the domestic capacity.
- 1007 4) Design project financing scheme, fiscal subsidy scheme and risk allocation scheme
1008 according to the country's development stage and context.
- 1009 5) Manage risks of default by effective administrating measures and set up compensation
1010 and re-negotiation mechanism.
- 1011 6) Engage private sector stakeholders at the project feasibility phase, to make sure the
1012 economical and commercial feasibility of urban rail transit PPPs.
- 1013 7) Provide affordable urban rail public service but at the same time to ensure the fiscal
1014 subsidy within the fiscal capacity.
- 1015 8) Strengthen Inter-ministry and inter-department collaboration in terms of policy making,
1016 standard drafting and project supervision on urban rail transit PPP projects.

1017

1018 **F. Other Issues Related to Urban Rail Transit PPPS**

1019

1020 **F1. Contract management**

1021

1022 Since the PPP contract is the fundamental legal documents that specifies the essence and
1023 details of the PPP project, and is basis for dispute resolution, contract management is
1024 essential for successful implementation of urban rail transit PPP project. The following issues
1025 are of vital importance should one intend to conduct quality contract management:

1026

- 1027 1) Enforceable contract. An enforceable contract arrangement is the prerequisite for
1028 contract management. "Enforceable" does not suggest that one party shall have coercive
1029 power to make the other party conform to the contract, but rather, the contract shall be
1030 fair, reasonable and have taken into consideration of all stages of the full life cycle of the
1031 project.

1032

1033 The parties arranging a PPP contract for an urban rail transit project shall pay special
1034 attention to "all stages of the full life cycle of the project". When planning an urban rail
1035 transit PPP project, some governments tend to pay disproportionate attention to the
1036 construction stage (especially in developing countries whose local government's urge to
1037 develop is strong), neglecting key items in the later phases, however, urban rail transit
1038 PPP projects usually last for decades, and are prone to disputes over contract in the
1039 middle of the operation stage due to unrealistic demand forecast, volatility of financial
1040 market, etc. Failure to carefully consider all aspects in the operation and transfer stage
1041 undermines the prospect of sound contract management.

1042

1043 Some key items to consider when arranging an urban rail transit PPP contract:

1044 a) Force majeure. Clear definition, course of actions when took place, conditions for
1045 immunity, etc.;

1046 b) Political force majeure. Clear definition, conditions when such incidents are caused
1047 or controllable by the contracting public party, and thus who should bear the risks,
1048 not enjoy immunity and take actions or compensate to mitigate negative impact on
1049 the private sector, conditions for immunity, etc.;

1050 c) Step-in right/early termination. On what conditions and to what extent can the
1051 public sector or the creditors could step-in the management of the project or control
1052 of the project asset, etc. what triggers an early termination of contract;

1053 d) Renegotiation. Mechanisms and conditions for renegotiation of contract, etc.

1054 e) Equipment overhaul and renewal. Specific plan, careful calculation of investment
1055 needed, sound financial arrangements, etc.

1056

1057 2) Supportive legal system and political environment legal system and political
1058 environment that commits to rule of law, embraces fair, just and open market economy
1059 and protects property rights are foundations for the sound management of the contract of
1060 an urban rail transit PPP project. It is not possible to manage contracts if one is not
1061 protected and rewarded for conforming to the contract and breaching of contract is not
1062 properly punished.

1063

1064 3) Sufficient management capacity. Urban rail transit PPP contract management requires
1065 high level of professional and technical capacity, which the public sector usually lacks.
1066 However, the public sector should specify personnel with responsibilities of contract
1067 management, and depending on the resources available, provide professional and
1068 technical trainings to ensure the competency of such personnel. The public sector could
1069 seek professional service from third party institutions like accounting and legal firms,
1070 but relying entirely on third party institutions for manage contract is not recommended.

1071 **F2. Project asset management**

1072

1073 Urban rail transit asset is not only large in scale, but also with complicated structure. Proper
1074 project asset management not only contributes to the quality of asset from a financial point of
1075 view, but also helps improving the quality of operation and service. To properly and
1076 efficiently manage urban rail transit PPP project asset, one should pay attention to the
1077 following items:

1078

1079 1) Ownership of asset and allocation of asset management responsibility. While it's
1080 reasonable to explore all types of ownership structure to be economically most viable, it

1081 is advisable, due to its high operation complexity, the quality of asset has significant
1082 direct impact on the quality and efficiency of operation and service level in projects, thus
1083 it is ideal to have the operator to own and be responsible for managing all asset related to
1084 the project, so that it could manage the asset from both financial and operational point of
1085 view to reach optimized full life cycle outcome.

1086 In cases when the project operator does not own all project assets, it is important for the
1087 operator to have certain authority over the decision-making of the asset management
1088 entity so as to ensure that the quality of operation and service level would not face
1089 negative impact due to asset transactions.

1090 2) Market-oriented asset management. Urban rail transit is one of the most important public
1091 service for cities, thus the public sector tends to impose strict rules over urban rail transit
1092 asset management in order to ensure quality and security of service. However, managing
1093 large scale asset of urban rail transit requires high professional capacity as well as
1094 flexibility to cope with fast-changing environment like financial market volatility,
1095 equipment market upgrade so as to reach best financial and service outcome. Therefore,
1096 on the basis of quality and security of service, the public sector should leave room for the
1097 asset management entity to use market-oriented approach to manage urban rail transit
1098 asset.

1099 **F3. Transferring project asset**

1100 Transferring of project asset is the last stage of an urban rail transit PPP project, to safeguards
1101 smooth transferring of asset and responsibilities, the following items need careful
1102 examination:

1103 1) Start preparation for transfer early. It is advisable to form an asset transfer committee at
1104 least 24 months before the actual transfer date and start preparatory work for the transfer.
1105 The asset transfer committee should comprise of all parties related to the transfer,
1106 including the public and private sector, the successor for operation and management of
1107 asset (if the asset is not transferred to the public sector), etc.

1108 2) Specify conditions for transfer. The list of asset, status of equipment, arrangement for
1109 non-tangible asset etc. should be carefully discussed and agreed upon by the PPP
1110 contracting parties.

1111 3) Transfer due to early termination of contract. The PPP contract should consider the
1112 possibilities of transfer due to early termination of contract and design mechanisms to
1113 best protect the operation of the project and the interest of innocent contracting party.

1114 **VI. Indicators of Compliance**

1115 The indicators of compliance for an urban rail transit PPP project relate directly to the SDGs.

1116 **VII. Credits and References**

1117 These recommendations are based on a few urban rail transit PPP projects. The geographic
1118 regions include China, Spain, Canada, Brazil, Philippines and etc. These projects represent
1119 various types of PPP model in both developed and developing countries and have relatively
1120 sufficient information disclosure.

1121 We appreciate the positive engagement and knowledge contribution from team members,
1122 relevant organizations and companies.

1123 The complete list of projects from which the standard team draw lessons and experience is
1124 presented on annex 2. The Standard will be maintained by UNECE and the Urban Rail
1125 Transit PPP Standard Development Team conducted by UEECE International Centre of
1126 Excellence.

1127 **Annex 1. Case Studies**

1128

1129 **1. Case of Zhengzhou-Gongyi-Luoyang (Gongyi Section) Suburban Line PPP Project**

Project context	<p>Zhengzhou-Gongyi-Luoyang (Gongyi Section) Suburban Line PPP Project is going to be a 50 km long suburban metro line. Upon completion, the project will be able to connect Zhengzhou on the east and Luoyang on the west through Gongyi (a county level city located at the centre point of the shortest route between Zhengzhou and Luoyang). The Gongyi section is the first phase of the Zhengzhou-Gongyi-Luoyang Suburban Line, which is the 50km of metro line within the jurisdiction of the city of Gongyi.</p> <p>After competition through public bidding process, China Metro Investment Corporation, a private enterprise dedicated to the investment and operation of metro/rail line, has won the bid, and has signed PPP contract with the government of Gongyi.</p>
Type of PPP	<p>DFBOM: Design-Finance-Build-Operation-Maintenance Investment-Operation-Oriented PPP: the project emphasizes that the private party has the capacity to invest and operate.</p>
Financial arrangement	<p>Estimated investment: 18 billion RMB. 35 years of contract (including 5 years of construction and 30 years of operation). Capital investment constitute 20% of the total investment, the remaining 80% will be covered by project financing. The project recovers investment over 30 years of operation through: 1) user payment (ticket fare); 2) non-ticket income: commercial development, advertising, information services, etc.; 3) government subsidy. The subsidy scheme consists of three parts: (1) equity subsidy: the project company will transfer assets of the project line to the government after the contract expires, the government pays equity subsidy over 30 years of operation in return); (2) operation gap subsidy: The subsidy is a flexible subsidy with a cap. The public and private party will agree on an operation cost cap before the operation date. When the project company's operation cost is below the cap, and its income doesn't cover the operation cost, the project company faces negative cash flow on an operation year, the government pays the negative cash flow amount to ensure the basic operation of the line. When the operation cost exceeds the cap, the government pays the gap subsidy up to the cap, the private party covers the remaining negative cash flow; (3) reasonable revenue subsidy: When the project company does not receive operation gap subsidy, the government pays a reasonable revenue subsidy to reward the company's service. The public private party will agree on a reasonable revenue rate, and the government pays reasonable revenue subsidy up to the rate. When the project company could satisfy the reasonable revenue rate by its own, the government no longer pays reasonable revenue subsidy.</p>
Risk-sharing scheme	<p>The government mainly bears the following risk: 1) legal and policy risk; 2) regional collaboration and coordination risk; 3) government examination and approval risk; 4) fiscal risk The private party mainly bears the following risk:</p>

	<ul style="list-style-type: none"> 1) preliminary stage (feasibility) risk; 2) financing risk; 3) construction risk; 4) operation risk.
Lessons to learn	<p>Significance:</p> <p>The line is a ground-breaking metro PPP project in China in that:</p> <ul style="list-style-type: none"> 1) It is China's first metro PPP project that has awarded the contract to a private enterprise; 2) It is China's first Investment-Operation-Oriented PPP project (as opposed to the typical Chinese PPP projects that mainly focuses on construction of financing); 3) It is China's first large scale infrastructure project that has allowed a private enterprise to enter at the preliminary stage and last till the transfer stage after 35 years; 4) It is China's first metro PPP project with a sound risk-sharing scheme and a clear project boundary. <p>Purpose:</p> <p>The line is designed to serves the following purpose:</p> <ul style="list-style-type: none"> 1) Connecting line. It will connect the two largest cities in one of the most populous and fast-growing province in China; 2) Guiding line. Absent of a metro line, the construction and operation of the line alone will have significant impact on Gongyi's development in the coming decades. Gongyi's long term development strategy will adjust in accordance with the design of the line. The general planning, transport planning, land planning and many other social-economic planning is subject to revise to best utilize the benefits brought by the line, which will help to best realize the line's potential to improve the social-economic development of Gongyi in return; 3) Demonstrating line. The line will demonstrate to both central and local governments that PPP in China does not have to be PPP with Chinese characteristics, private enterprise can do a good job in implementing a full-life-cycle large scale infrastructure project; also, it has the potential to finally realize many of the familiar concept like TOD in metro rail development because the private partner enters into the project at the preliminary stage; <p>Sound subsidy scheme:</p> <ul style="list-style-type: none"> 1) the government pays a subsidy with a gap set to ensure basic public service, so as to ensure the government doesn't over subsidize and that using PPP model doesn't add extra fiscal burden on government; 2) the private partner can only profit when the project company could manage to break even by itself, which provides incentive for the private party to cut cost and improve efficiency; 3) the reasonable revenue subsidy will be a fraction of the amount the private partner saved for the government, so that the private partner does not make profit through subsidy, but rather profit through saving money for the government.
Source:	

1130

1131 **2. Case Study: São Paulo Metro Line 4, Brazil**

1132

Project context	<p>Financial close: October 2008</p> <p>Capital value: US\$392.15 million (phase 1), of which US\$309.2 million is debt (15-year A loan from the IDB for US\$69.2 million accompanied by a syndicated 12-year B loan for approximately US\$240 million) and US\$82.95 million is equity</p>
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	<p>Consortium: ViaQuatro—Concessionaria da Linha 4 do Metro de São Paulo—comprising Companhia de Concessões Rodoviarias of Brazil (68 percent), Montgomery Participações of Portugal (30 percent), RATP Development of France (1 percent), and Benito Roggio Transportes of Argentina (1 percent)</p> <p>Financiers: Inter-American Development Bank,</p>
Type of PPP	<p>The project will be implemented in two phases. During phase 1, the Companhia do Metropolitano de São Paulo—the public authority that owns the underground network—will be responsible for constructing the tunnelling, track, and metro stations. The private sector contractor, ViaQuatro, under a 30-year concession agreement, will be responsible for the supply, operation, and maintenance of the rolling stock (14 metro trains with six cars each) and operating systems (a train signalling and control system and a mobile voice and data communications system). During phase 1, according to the state’s time frame, six stations will be built by the first quarter of 2010. The second phase, which is subject to further studies and market demand, will require the private sector contractor to open additional stations on the existing line and add between five and 15 more trains, at the discretion of the State of São Paulo, at any time after the second year of commercial operations.</p>
Financial arrangement	<p>As per the concession agreement, ViaQuatro will receive its revenues from the subway fare (set at US\$1 for all trips), adjusted annually for inflation. It will receive 100 percent of the full fare for passengers using only Line 4 and 50 percent of the fare for passengers using Line 4 in connection with other metro and bus lines. In addition, ViaQuatro will receive yearly availability payments of US\$44.1 million from the government and will be allowed to obtain alternative revenues by marketing spaces in the facilities and trains, as long as they do not affect the quality and standard of services. Finally, the concession benefits from a minimum revenue-guarantee and revenue-sharing threshold, protecting the concessionaire from low revenues, but providing the state with revenue sharing if use is higher than projections.</p> <p>ViaQuatro will be assessed periodically based on three types of performance indicators: (a) operating performance indicators, (b) users’ satisfaction indicators (which will be performed by an independent institution and will assess the level of satisfaction of users of the new line by means of specific direct surveys), and (c) maintenance quality indicators. If the values of these indicators fall below certain defined limits, Via-Quatro may be penalized through a reduction of its entitlement to income associated with the services provided.</p>
Risk-sharing scheme	<p>A key risk for the project is the interface between delivery of the publicly funded civil works and the rolling-stock PPP. A complex set of contractual obligations and financial arrangements was put in place to ensure that the private partner was compensated for any delays in provision of the public works. It is too soon to know how this will work in practice, but the project has demonstrated that investors are prepared to take key interface risks if they are structured properly.</p>
Lessons to learn	<p>Performance-based Government takes the risk of construction</p>
Source:	Emerging market report

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1134

3. Case of Canada Line

Project context	<p>Canada Line will be a 19 km automated light metro implemented through a 35-year design-finance-build-operate-maintain concession signed in July 2005 with the “In Transit BC” consortium (led by SNC Lavalin).</p> <p>At its northern terminus, Canada Line will integrate with Vancouver’s Skytrain</p>
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	<p>LRT system, West Coast Express commuter rail service, bus services, Seabus (marine transit), and cruise ship terminal. An additional spur line will also provide services to YVR Airport. The Vancouver International Airport Authority has contributed towards the project's upfront capital costs in order to make this connection possible.</p> <p>Canada Line is part of a larger public transport strategy developed by the South Coast British Columbia Transportation Authority (TransLink). This strategy aims at:</p> <ul style="list-style-type: none"> • Reducing greenhouse gas emissions • Increasing the use of non-motorized transport • Using the region's transportation network as a tool for promoting economic development • Promoting the densification of jobs and housing along frequently used transit routes <p>Planners estimate that Canada Line will begin revenue services in November 2009 – in time for the 2010 Winter Olympic games in Vancouver. Although the Canada Line was not part of Vancouver's bid for the 2010 Games, the project's construction schedule was partially driven by the Games.</p>
Type of PPP	DFBOM: Design-Finance-Build-Operation-Maintenance
Financial arrangement	<p>2005 Full concession 35 years (including construction), private stakeholder In Transit BC (SNC-Lavalin) Preparing to open for revenue operations in late 2009</p> <p>Canada Line's contract ties 10% of the concessionaire's payment to the system's customer volume. Calculating this volume payment involves:</p> <ul style="list-style-type: none"> • A base forecasted credit ridership estimate (excluding 'airport only' ridership) • An agreed base volume payment • An agreed shadow fare per paying customer <p>During the system's operating phase this information determines three possible payment scenarios as follows:</p> <ul style="list-style-type: none"> • If ridership equals forecasts, the concessionaire receives the base volume payment • If ridership exceeds forecasts, the concessionaire receives the base volume payment plus the difference between actual and forecasted ridership multiplied by the agreed shadow fare • If ridership falls below forecasts, the concessionaire receives the base volume payment minus the difference between forecasted and actual ridership multiplied by the agreed shadow fare
Risk-sharing scheme	<p>During Canada Line's procurement, bidders assumed all risks associated with price fluctuations except for items included in the project's early works contract, which allowed for construction progress between commercial close and financial close. Trans Link provided full protection and 100% reimbursement for early works in the event that financial close was not possible. Other noteworthy elements of Canada Line's risk allocation structure include the following:</p> <p>Inflation during the construction period: Capital grant payments were specified as pre-agreed milestone payments during the construction period (based on nominal dollar values as negotiated at financial close). The concessionaire endures the risk of higher inflation during the construction period in addition to any effects related to delays in reaching agreed construction milestones.</p>
Lessons to learn	<p>Function of a transportation hub; Part of a large transport strategy Reasonable risk sharing mechanism The private stakeholder affords limited operation risks by only tying 10%</p>

	payment to the operation.
Source:	PSP report light rail

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4. Case of Eagle PPP project

Project context	<p>The Eagle PPP Project is being delivered and operated under a concession agreement that RTD has entered into with a "Concessionaire" that has been selected through a competitive proposal process. The selected Concessionaire is known as Denver Transit Partners (DTP), a special purpose company.</p> <p>The Eagle PPP Project concession agreement requires DTP to design-build-finance-operate-maintain (DBFOM) the East Rail Line, Gold Line, Northwest Electrified Segment (NWES) (segment 1 of the Northwest Rail Line) and the commuter rail maintenance facility, all under a single contract.</p>
Type of PPP	DFBOM: Design-Finance-Build-Operation-Maintenance
Financial arrangement	<p>RTD will retain all assets while shifting much of the risk of designing and building the project to DTP. The Concessionaire has also arranged around \$450 million of private financing for the project. This allows RTD to spread out large upfront costs over approximately 30 years, making it more affordable. In return, RTD will make annual service payments to DTP based on their performance of the operation and maintenance of the project through Dec. 31, 2044.</p> <p>First transit DBFOM (design, build, finance, operate, and maintain) PPP in the United States and the largest at a cost of \$2.2 billion (USD):</p> <ul style="list-style-type: none"> • \$460 million in "local" funds (cash, revenue bonds) • \$450 million from the Concessionaire • \$280 million Transportation Infrastructure Finance and Innovation Act (TIFIA) loan from United States federal government • \$1.1 billion United States Federal Government Grant <p>2011-2017 DTP received lump sum payments from RTD during construction for the majority of costs but had the responsibility for raising capital (Private Activity Bonds (PAB) and Equity) for the remainder of costs. See next slide.</p> <p>2017-2044 DTP will receive annual payments (secured by sales and use tax collections) from RTD for PAB repayment. These annual payments are fixed (non-indexed to inflation) based on an amortization schedule. See next slide.</p> <p>2016-2044 DTP will receive monthly service payments from RTD for operations and maintenance (see next slide):</p> <ul style="list-style-type: none"> • Base service payments by year are known and are adjusted each year for inflation (CPI, Labour and Materials indexes). Each of the three rail segments has its own service payment calculation. • Payments are adjusted according to performance criteria, such as on-time performance, fleet availability, and cleanliness. Could be a bonus or deduction. • RTD retains flexibility over the service payment when using the change order process to adjust service levels.
Risk-sharing scheme	
Lessons to learn	RTD was able to expand its system to undeserved communities, including rail transport to Denver International Airport. Despite its challenges, RTD and the Concessionaire were able to deliver the first PTC system in the country thus delivering a safer mode of transport. The Project was built on time and on

	<p>budget, although it is not fully operational by deadlines set by the United States federal government and other agreements.</p> <p>The Project has been recognized on a national level as an example of both successes and challenges associated with a PPP transportation project.</p> <p>The relationship between RTD and the Concessionaire has been challenging at times as the Concessionaire's design errors with regard to PTC has caused a breakdown in system performance and deliverability. These challenges have also impacted the public's perception of RTD.</p> <p>The dispute resolution results are unknown as of the date of this report however the end result could result in an operational structure that was unanticipated by RTD and could lead to a cancellation of the Concession Agreement. Ultimately, the design challenges have led the Concessionaire to attempt to push risk transfer back on to RTD, with risk transfer being an attractive and significant attribute of PPP's.</p>
Source:	Heather Deckard, Regional Transportation District, Denver, US

1137

1138 **Annex 2. List of projects of urban rail transit PPPs**

- 1139 1) Manchester Metrolink - United Kingdom
- 1140 2) Docklands Light Railway - London, United Kingdom
- 1141 3) The London Underground(LU) Metronet and Tube Lines- London, United Kingdom
- 1142 4) Delhi airport express rail link-Delhi, India
- 1143 5) Line 9 Urban Rail in Barcelona-Spain
- 1144 6) Kuala Lumpur STAR and PUTRA – Malaysia
- 1145 7) Gautrain Rapid Rail Link - Gauteng Province, South Africa
- 1146 8) MRT 3 'Metrostar Express' - Manila, Philippines
- 1147 9) Bangkok Skytrain – Thailand
- 1148 10) Addis Ababa Light Rail Transit, Ethiopia
- 1149 11) The Eagle PPP Project in Colorado, USA
- 1150 12) Canada Line - Vancouver, Canada
- 1151 13) São Paulo Metro Line 4, Brazil
- 1152 14) Hong Kong Mass Transit Railway, Hong Kong, China
- 1153 15) Hangzhou Metro Line1, China
- 1154 16) Fuzhou Metro line 2, China
- 1155 17) Zhengzhou-Gongyi-Luoyang Urban Rail Transit PPP, China
- 1156 18) Chongqing Rail Transit Line 2, China
- 1157 19) Beijing Metro line 4, China
- 1158 20) Chengdu Metro line 18, China
- 1159 21) Taizhou Suburban rail transit line S1, China

1160

1161 **Annex 3. Sector-specific knowledge, terms and terminology**

1162 **A. Urban rail transit**

1163 Urban rail transit is an all-encompassing term for various types of local rail systems
1164 providing passenger service within and around urban or suburban areas. The set of urban rail
1165 transit systems can be roughly subdivided into the following categories:

1166 **A1. Rapid transit**

1167 A rapid transit, underground, subway, tube, elevated, metro or Mass Rapid Transit
1168 (MRT) system is a railway—usually in an urban area—with high passenger capacities
1169 and frequency of service, and (usually) full grade separation from other traffic
1170 (including other rail traffic). In most parts of the world these systems are known as a
1171 "metro" which is short for "metropolitan".

1172 **A2. Light rail**

1173 A light rail system is a rail-based transit system that has higher capacity and speed than a
1174 tram, usually by operating in an exclusive right-of-way separated from automobile
1175 traffic, but which is not fully grade-separated from other traffic like rapid transit is.
1176 Light rail also generally operates with multiple unit trains rather than single tramcars.

1177 **A3. Commuter rail**

1178 A commuter rail, regional rail, suburban rail or local rail system operates on mainline
1179 trackage which may be shared with intercity rail and freight trains. Systems tend to
1180 operate at lower frequencies than rapid transit or light rail systems, but tend to travel at
1181 higher speeds and cover longer distances.

1182 **A4. Tram**

1183 A tram, streetcar or trolley system is a rail-based transit system that runs mainly or
1184 completely along streets (i.e. with street running), with a relatively low capacity and
1185 frequent stops.

1186 **A5. Monorail**

1187 A monorail is a railway in which the track consists of a single rail, as opposed to the
1188 traditional track with two parallel rails.

1189 **B. Urban Rail Transit Project Cycle**

1190 An urban rail transit project cycle usually comprises of the following stages:

1191 **B1. Feasibility**

1192 At feasibility stage, a city government (in some cases, a private enterprise) identifies the
1193 need for an urban rail transit. The government would come up with a concept plan or
1194 proposal to explore the necessity and feasibility of an urban rail transit project (usually,
1195 a professional third party consultancy would involve in the drafting of feasibility study).

1196 The government (or legislative body, depending on the local political system) would
1197 then decide whether to implement the project.

1198 **B2. Plan and Design**

1199 After deciding to implement an urban rail transit project, the city government would
1200 plan and design the project, the plan and design stage usually comprises of multiple
1201 stages, from the overall urban rail transit network plan, plan of the specific rail line,
1202 construction plan, all the way to working plan (working drawing). Due to its significant
1203 impact on the physical as well as economic structure of a city, the city government
1204 would usually adjust urban plan, transport plan, even economic development plan in
1205 accordance with the planning of the urban rail transit.

1206 **B3. Investment and financing**

1207 The investment and financing stage refers to the stage when the city government secures
1208 the financing of the urban rail transit project. This might not be a “tangible” or separate
1209 stage in that, usually the city government would secure the finance in the feasibility
1210 stage (e.g. a proved budget allocation for the project might be the prerequisite for
1211 passing the feasibility stage in some countries). In a PPP urban rail transit project, a
1212 public bidding process might take place to choose an investor to bear the responsibility
1213 of financing the project.

1214 **B4. Construction**

1215 After finalization of the working plan and financing in place, the project would kick off
1216 the construction. In most countries, the party responsible for the implementation of the
1217 project would choose professional constructor through a public bidding process. In a
1218 construction-oriented PPP project, the constructor would be chosen at the stage when
1219 choosing the PPP private partner.

1220 Usually, the construction of an urban rail transit project could be divided into two parts,
1221 the civil engineering part and the equipment instalment part.

1222 **B5. Operation & Maintenance**

1223 After construction, the urban rail transit project would go into the operation and
1224 maintenance stage. During which, the local urban rail transit company (in most cities a
1225 SOE, in a PPP project, the SPV formed for the management of the project) would be
1226 responsible for the operation of the urban rail transit project, including the vehicle
1227 scheduling, vehicle transport, ticketing, and all other functions relevant to the proper
1228 provision of the urban rail transit service.

1229 The operation stage is the core stage of an urban rail transit project. Once operated, the
1230 urban rail transit service will usually become the most heavily used and irreplaceable
1231 public transport service that affects millions of citizens’ daily life. An urban rail transit

1232 system that is operated on-time, stable, convenient and accessible for all requires high
1233 level of professional and technical capacity and extreme attention to details.

1234 **C. Application of the TOD Model in Urban Rail Transit PPP Projects**

1235 The concept of transit-oriented development (TOD) means the development of city centre or
1236 new urban area with predominant transit means of walking/cycling and public transport, built
1237 in the radius (radius at approximately 1,500 meters from station in terms of urban rail transit)
1238 of high-capacity public transport MRT stations and in particular at the core radius (500 – 800
1239 meters radius from the station, i.e. comfortable walking distance of around 10 – 15 minutes)
1240 by high-density clustering of business hybrids and compounding spaces. From the
1241 perspective of the entire city, what TOD advocates is the development of well-organized and
1242 aligned urban space structure by stringing the public transport MRT lines along the nodes of
1243 stations.

1244
1245 The TOD concept encompasses two aspects at its core: on the macroscopic policy level, TOD
1246 demands for matching land development with the service capabilities of public transport
1247 MRT system, by aligning high-density and high-hybrid development in areas of proximity to
1248 the stations, and lower-density development in areas further away; on the microscopic level,
1249 TOD emphasizes on constructing compact communities of mixed purposes suitable for
1250 walking, thereby organizing city life and building public space with the stations at the core,
1251 and guiding rail station areas to develop into the centre of ancillary facilities serving the
1252 surrounding areas and centre of public life and activities.

1253 **C1. Key roles**

1254 By maximizing the service capabilities of public transport MRT system, and enhancing the
1255 land use efficiency and city operation efficiency with hybrid and high-density developments
1256 in areas surrounding the stations, ultimately TOD will achieve green and sustainable
1257 environmental and financial development of public transport MRT and the city. Specifically,
1258 TOD advocates communities and commuting environment that prioritize walking and public
1259 transport wherein people can easily choose to take the public transport, cycle or walk to
1260 commute. This enables the achievement of energy saving, emission reduction and
1261 environmental protection goals. Meanwhile, clustered developments in radius of the stations
1262 not only help public transport to operate at maximum capacities, but also enhance the use
1263 efficiency of living, employment and service facilities.

1264
1265 Urban rail transit is a typical high-capacity public transport MRT system. Development along
1266 the urban rail stations under the TOD model will produce sound interaction and value-adding
1267 win-win effect between rail transit and development of areas surrounding the stations to a
1268 greater level, as rail transit brings greater customer flows that will greatly drive development
1269 of real estate and modern services and higher added value to land and properties in areas
1270 surrounding the stations, while clustered developments in these areas will increase passenger
1271 flows to rail transit, thereby providing stable and continuously growing revenue to rail transit.

1272 **C2. Core principles**

1273 In TOD practice, two principles should be observed.

1274

1275 “Rail construction necessarily entails city development”. Different from routine public
1276 transport means, rail transit can also bring about new urban development and new
1277 opportunities for the city, as well as upgrade of development capability in addition to
1278 resolving commuting needs. Rail transit impacts on a city in ways beyond transportation,
1279 extending to industry planning, urban planning, demographic distribution, social services,
1280 real estate and finance, and public policy, and transforming the commuting choices and
1281 lifestyle of residents. Therefore, when a city plans to develop rail transit, it must take full
1282 advantage of these opportunities, and embed the principle of “rail construction necessarily
1283 entails city development” in planning and construction from the earliest stage, regard rail
1284 transit as a general urban resource for development and utilization instead of a mere transport
1285 means, carry out comprehensive and in-depth TOD research and planning, to develop the
1286 foundation for sound interaction, added value and win-win result.

1287

1288 “City rail operation necessarily involves city operation”. Rail transit not only involves high
1289 construction cost, but also high operation and maintenance costs. A majority of cities is
1290 unable to rely on the market to determine the fare price due to the nature of public service of
1291 rail transit. Therefore, financially the rail transit can hardly break even with its own operating
1292 revenue. For Urban rail transit with designed life spanning a century, the government will be
1293 under huge financial burden throughout the lifecycle. The principle of “city rail operation
1294 necessarily involves city operation” dictates the need to fully take advantage of development
1295 of land in radius of stations to increase passenger flows to rail transit and resource operation
1296 opportunities to increase its own revenue on one hand, and to reasonably maximize the added
1297 value of land and properties in the TOD, and seek returns on the added value to make up
1298 deficit of rail transit construction and operation funds on the city level or project level, in
1299 particular long-term operating income of properties in holding. This is of crucial importance
1300 to the sustainable financial development of both rail transit and the city.

1301 **C3. Keys to implementation**

1302 In view of the goals of sustainable construction and operation of rail transit and sustainable
1303 development or urban space structure, we must first understand the “product” features of
1304 TOD project. TOD is a typical product that requires cross-sector, multi-discipline and multi-
1305 industry chain integration. Its implementation requires all-dimensional and end-to-end
1306 interaction and feedback, coordination and consolidation throughout the stages of
1307 development of rail transit and land development. In particular, in a TOD project where
1308 investment and financing are based on the assumption that general development gains will be
1309 used for construction and operation of rail transit, implementation of technical, market and
1310 mechanism arrangements must be simultaneous.

1311

1312 Technical implementation involves integrated strategy, planning and design with
1313 comprehensive considerations of land and other resources of rail transit and radiuses of the
1314 stations aimed at a TOD product maximizing efficiency of service and optimizing overall
1315 effects through consolidating resources. In addition to resolving the problem of spatial

1316 consolidation in rail transit and land development that arises from crossing sectors and
1317 compounding functions, emphasis should be placed on resolving planning and project
1318 interfaces from differing timings of rail transit and land development and the interconnection
1319 of works.

1320
1321 Market implementation involves in-depth research and validation of the economic attributes
1322 of TOD project, land resource selection, development positioning planning, property mix
1323 analysis, development timing and development value assessment based on market conditions,
1324 and providing feedback to optimize land use quota and rail transit design based on the
1325 analysis results. The economic analysis of TOD project should ideally correspond to the
1326 urban rail transit construction and operation financing plans and be conducted in a bottom-up
1327 market-derived method. This is especially important for TOD projects whose implementation
1328 is imminent or those under development in partnership with private sector investors.

1329
1330 Mechanism implementation: a key challenge in TOD implementation is that the existing
1331 policies, legislations, systems and mechanisms in most cities are incapable of supporting
1332 TOD product which requires cross-sector collaboration in transport infrastructure and land
1333 development, the former being by nature a public service and the latter a for-profit business.
1334 In particular, when the intention is to use gains from TOD development to support the gap in
1335 rail transit construction and operation funding, more complex issues are involved in the
1336 investment and financing model. Often this demands for optimization and reshuffling of the
1337 existing relationships of interests in the city. Therefore, analysis of policies and legislations to
1338 support implementation of TOD product and its investment and financing model and
1339 establishment of a mechanism constructive for its advancement are required to guarantee
1340 implementation.

1341
1342 The logical relationship among the above three dimensions of technical, market and
1343 mechanism implementations is that technical implementation is the goal of an ideal TOD
1344 product of the optimal added value effect with consolidation of resource, while market
1345 implementation is the driving force whereby market forces will in turn drive investment and
1346 financing model and system and mechanism reform, and mechanism is the guarantee in the
1347 sense that only with legislations suited for the characteristics of TOD product and its
1348 investment and financing model and the supporting system and mechanism, can guarantee be
1349 provided for lawful and compliant contractual arrangements that found the basis for TOD
1350 project implementation and returns on development.

1351 **C4. Approach to advancement**

1352 In the actual advancement of investment and financing-oriented TOD project, works should
1353 be carried out on different levels through different stages of the development of rail transit
1354 project in a well-organized manner.

1355
1356 In planning rail transit lines and network, TOD planning guidance on the city level and TOD
1357 strategic analysis should be carried out to direct planning of corridors and exchange hubs in
1358 the rail transit system, coordinate relationship between rail transit corridors and the city

1359 structure, road structure and main hubs, strengthening public transport support and guiding
1360 the development model of land use, and providing reference basis for overall urban planning,
1361 districted planning and adjustment as well as macroscopic policies associated with the city.
1362 During this stage, the government should take control of land resources along the rail transit
1363 lines, clarify the entity responsible for advancing the TOD project, establish cross-department
1364 coordination and decision-making settings, and activate analysis in policies and legislations
1365 required in TOD.

1366
1367 In feasibility studies of specific rail transit lines, TOD planning guide on the line level and
1368 TOD development value analysis should be carried out. TOD planning guide on the line level
1369 defines functional positioning, construction scale, requirements on transport facilities and
1370 other public facilities and requirement for guiding public space system along the rail lines and
1371 in the radiuses of the stations, thereby providing reference basis for detailed urban planning
1372 and adjustment of related areas. Meanwhile, analysis should be carried out in the real estate
1373 market along the rail transit line, to filter out lands of TOD development potential, design
1374 property mix and development timing, and estimate development value.

1375
1376 In the implementation stage of rail transit, TOD planning design guide on the station level
1377 and TOD project joint development analysis should be carried out in light of rail transit line
1378 and station designs. TOD planning design guide on the station level serves to establish the
1379 three-dimensional relationship of the rail stations and development of properties in their
1380 radiuses, commuter exchange space and urban space, provide detailed guideline requirements
1381 on the setting of station exits and entrances and pedestrian system, which should be included
1382 in the detailed land planning. The TOD project joint development analysis takes into
1383 comprehensive consideration the rail transit section, stations and the adjacent TOD projects
1384 and seeks an implementation plan of the most rational functional layout and best cost
1385 efficiency through integrated and consolidated designs and project financial analysis. In
1386 particular, it works to resolve problems of interfacing and pre-existing projects arising from
1387 the different timings of rail transit and land development.

1388
1389 Cross-sector multi-discipline integration and multi-department and multi-stakeholder
1390 collaboration are the mainline that leads through the entire TOD process.

1391

1392 **D. Financial Subsidy Models Applied in Urban Rail Transit PPP Projects**

1393 **D1. Main Reasons for Financial Subsidy for Urban Rail Transit Projects**

1394 Factors including the significantly large amount of investment in rail transit construction,
1395 high operating costs, public interest, and the need to reflect fairness make it difficult for the
1396 PPP project to break even. The long-term shortfall in financial cash flow requires subsidies in
1397 the form of fiscal funding to make PPP projects financially sustainable. The return on the
1398 investment in urban rail transit projects mainly comes from three sources: 1. ticket revenue; 2.
1399 non-ticket revenue, namely revenue from the management of the resources including
1400 commercials, communication, business and land, and 3. government subsidies.

1401 The following reasons are behind the shortfall in the financial cash flow for urban rail transit
1402 PPP projects (Financial Viability Gap):

1403

1404 1. Shortfall of operating cash flow: It normally takes a long time to increase the passenger
1405 flow of urban rail transit projects. Therefore, in the early days of the project, passenger flows
1406 are low while operating costs run high. When the actual operating revenue of the project
1407 cannot cover the actual cost, there will be a shortfall in the operating cash flow.

1408

1409 2. Debt service: From the perspective of project financing sources, in addition to equity funds,
1410 huge debt is also required. Debt service may result in a shortfall in project cash flow.

1411 3. Investment in new vehicles: During the project operation, as the passenger flow rises, new
1412 vehicles are needed. The additional investment required for the new carriages will lead to a
1413 cash flow shortfall for the project.

1414

1415 4. Equipment renovation and replacement: Urban rail transit PPP projects feature long-term
1416 cooperation. For example, the metro projects require PPP that spans for over 20 years, longer
1417 than the depreciation period of most equipment. During the long-term partnership, the
1418 equipment or facilities need to be renovated or replaced once or several times.

1419

1420 5. Intermediate repair and overhaul of vehicles: The maintenance of vehicles is the
1421 foundation for safe operation. In addition to routine maintenance, all types of running
1422 vehicles generally require intermediate repair every five years and overhaul every ten years.
1423 Vehicle repairs or overhauls will generate large maintenance costs which are not included in
1424 normal depreciation.

1425

1426 6. Apportioning of investments in public facilities: Urban rail transit lines generally develop
1427 in a networked pattern. According to the future development plans for urban rail transit lines,
1428 for the construction of new lines, we should consider the interchange with and transfer to
1429 other lines or control centres etc. The investments in the necessary public facilities need to be
1430 apportioned.

1431

1432 7. Compensation for the loss resulting from major accidents or force majeure. In the event of
1433 major accident during construction or operation, or any major damage to the rail transit
1434 tunnel works or other equipment (or facilities) due to event of force de majeure (such as
1435 strong earthquakes), compensation and remedy will be required.

1436

1437 **D2. Common subsidy estimation models used in urban rail transit PPP projects**

1438 When calculating the financial gap to be subsidized in the urban rail transit PPP model, the
1439 following methods are commonly used.

1440

1441 (I) Negotiated price method

1442

1443 The negotiated price method is also known as the shadow price method, and is a “passenger
1444 flow-based subsidy model” which measurement is based on passenger flows. Using the
1445 negotiated price method, the financial viability gap is calculated as follows:

1446 Financial viability gap = negotiated price x estimated passenger flow – actual ticket revenue –
1447 actual non-ticket revenue (1)

1448

1449 Of which, the negotiated price or shadow price (P_s) is the ticket price through simulation
1450 when the financial net present value (NPV) reaches a certain level ($NPV \geq 0$).

1451

$$1452 \quad NPV = - \sum_{i=0}^m \frac{I_i}{(1+r_o)^i} + \sum_{i=m+1}^n \frac{P_s \cdot Q_i - C_i}{(1+r)^i} \geq 0 \quad (2)$$

1453

1454 In this formula, m is the construction term (in years), n is the term of concession operation
1455 inclusive of the term of construction (in years), r_o is the discounting factor (base rate of
1456 return expected by the private sectors), I_i is construction investment in year i , C_i is the
1457 operation and maintenance costs in year i , and Q_i is the passenger flow in year i .

1458

1459 Under this subsidy model, to meet the minimum return on investment for social investments
1460 (r), the government calculates a theoretical shadow ticket price (P_s) through negotiation,
1461 which is higher than actual price. The difference between the actual price and the shadow
1462 price needs to be subsidized by the government, thereby becoming the subsidy income for the
1463 special-purpose vehicle (SPV) or social department.

1464

1465 The advantage of this model is its operability, and sufficient incentive mechanism for the
1466 private sector. The disadvantages are that it is difficult to determine a mechanism of sharing
1467 passenger flow risks, the government is prone to incur contingent liability, and misalignment
1468 between the government subsidy and actual need for funding.

1469

1470 (II) Mileage subsidy method

1471

1472 The mileage subsidy method is also known as the mileage cost method or mileage operation
1473 service fee method, and is a model that adopts the principle of government procurement of
1474 public service from the PPP special-purpose vehicle (SPV). The subsidy is calculated in a
1475 model based on the basic indicator of train operation mileage. In other words, the subsidy is
1476 calculated based on the “number of runs of the train”. The viability gap funding is calculated
1477 using the mileage subsidy method as follows:

1478

1479 Viability gap funding = agreed mileage x agreed mileage-based service price – base
1480 passenger transport revenue – base non-ticket revenue (3)

1481

1482 In the formulate, the “agreed mileage” is the mileage (sum of operating mileage of all
1483 vehicles) determined on the transit organization plan during the stage of private sector
1484 department selection; “agreed mileage-based service price” is the procurement price of
1485 mileage-based service offered by the rail transit entity by the government as agreed in the

1486 PPP contract, which initial pricing is determined in the competitive mechanism through PPP
1487 contract negotiation; “base passenger transport revenue” is the basic ticket revenue expected
1488 by the PPP SPV, calculated by multiplying the estimated passenger flow and actual ticket
1489 price per person time; and “base non-ticket revenue” is the basic requirement for non-ticket
1490 revenue in the PPP project.

1491
1492 The mileage subsidy model represents the principle of government procured service, is easy
1493 for the government to control total funding, and effectively mitigate the impact of passenger
1494 flow estimation risk as pricing is based on mileage. However, the cost-based subsidy does not
1495 constitute effective incentive for the private sector department, and the consideration of cost
1496 alone poses limitations.

1497
1498 (III) Availability payment subsidy method

1499 Calculation formula is as follows:

1500

$$\text{Amount of operating subsidy expenditure in the current year} \\ = \frac{\text{Total construction costs} \times (1 + \text{reasonable profitability}) \times (1 + \text{annual discounting factor})^n}{\text{Period of fiscal subsidy to operations}}$$

1501 + annual operating costs × (1+ reasonable profitability)

1502 amount of fees paid by users in the current year (4)

1503
1504 In the formula, n represents the number of years discounted; period of fiscal subsidy to
1505 operations is the number of years that fiscal subsidy is made to operations; annual
1506 discounting factor should be reasonably determined with consideration of the year when the
1507 fiscal subsidy expenditure is incurred and in reference to the local government bond yield for
1508 the same period; and reasonable profitability should be determined based on the medium- to
1509 long-term loan interest rate of commercial banks with full considerations given to availability
1510 payment, usage payment, performance payment and other scenarios and in view of risks and
1511 other factors.

1512
1513 In the availability payment subsidy formula, the first part reflects the all construction and
1514 investment costs apportioned to the period of subsidy and returns, and the second part reflects
1515 the difference of the annual operating costs (including reasonable profit) and operating
1516 revenue (user charge).

1517
1518 The subsidies through the years calculated using the availability payment subsidy formula
1519 appears to increase at a steady rate, which helps lower the initial fiscal expenditure. The
1520 formula is defective in the way that higher operating costs may result in more subsidies, thus
1521 countering the effort of private sector department to minimize operating costs. Also, the
1522 formula requires valuation of multiple parameters (e.g. reasonable profitability, annual
1523 discounting rate) and can be manipulated to a great extent.

1524
1525 (IV) Annuity method

1526 The annuity method converts the construction investment (including interests incurred during
 1527 construction period) to annuities by the annuity factor of paybacks, then adds to its operating
 1528 costs of the years and deducts operating revenue, to arrive at government subsidy. Detailed
 1529 formula is as follows:

1530
 1531 Amount of operating subsidy expenditure of the current year
 1532 = Total construction costs $\times \frac{\text{annual discounting factor} \times (1 + \text{annual discounting factor})^n}{(1 + \text{annual discounting factor})^{n-1}} \times$
 1533 $(1 + \text{reasonable profitability}) + \text{annual operating costs} \times (1 + \text{reasonable profitability})$
 1534 $- \text{user charge in the current year}$

1535 Wherein n represents the number of years of subsidy.

1536
 1537 The annual subsidy expenditures calculated using the annuity method appears to be evenly
 1538 distributed. However, the annual discounting factor and reasonable profitability can be
 1539 influenced by many factors, while these values have large impact on the operating subsidies
 1540 in the years and internal rate of return of the private sector.

1541
 1542 (V) Cash flow subsidy method

1543
 1544 Cash flow subsidy method is based on the PPP project financial plan cash flow statement,
 1545 estimates the cash shortfall in the cash flow statement in the principle of receipt and payment
 1546 recognition, and determines the direct payment obligation of the government. The subsidy
 1547 model breaks fiscal subsidy down to GAP and GAS.

1548
 1549 Government Aid for Project (GAP)

1550
 1551 GAP is the viability gap funding based on the project's cash flows in the financial plan, i.e.
 1552 when the cumulative result of net cash flows from operating, investment and financing
 1553 activities (cumulative surplus funds) becomes negative and the SPV is unable to resolve the
 1554 funding gap through re-financing, the government will subsidize the viability gap of the
 1555 project.

1556
 1557 In year t, the government subsidy for the project viability gap (GAP_t) is calculated as follows:

1558
$$\text{GAP}_t = | (\text{CI}_t - \text{CO}_t) + \text{ANC}_{t-1} | \quad (6)$$

1559 i.e., when $(\text{CI}_t - \text{CO}_t) < 0$, GAP_t is the absolute value in the above formula;

1560 when $(\text{CI}_t - \text{CO}_t) \geq 0$, GAP_t = 0.

1561 Wherein:

1562 t—— year t in the PPP project (generally speaking, $m \leq t \leq n$), the same applies hereinafter

1563 CI_t—— sum of cash inflows from operating, investment and financing activities in year t as
 1564 shown in the cash flow statement in the project financial plan;

1565 CO_t——sum of cash outflows from operating, investment and financing activities in year t as
 1566 shown in the cash flow statement in the project financial plan;

1567 AN_{Ct-1}—— Cumulative surplus fund in year t-1 as shown in the cash flow statement in the
1568 project financial plan.

1569 In other words, when in year t, the project's cumulative net cash flow is positive, the
1570 government does not need to provide viability gap subsidy; when the cumulative net cash
1571 flow in year t become a negative value, the government subsidy in year t is the absolute value
1572 of cumulative cash net flow of the project in year t.

1573 2. Government Aid for Social Investor (GAS)

1574 GAS is the government aid for social investor based on the cash flow statement of the private
1575 sector, i.e. when the cash inflows of project operating activities are greater than cash outflows
1576 (positive cash net flow), the government subsidizes for the funding gap to reach reasonable
1577 return on social investment or private sector based on the project's distributable profit,
1578 cumulative fund surplus and performance evaluation.

1579 (1) First, calculate the theoretical return on social investment in year t (ROSt), as follows:

$$1580 ROSt = (CI_{opt} - CO_{opt}) \times K_t \quad (7)$$

1581 Wherein

1582 When $(CI_{opt} - CO_{opt}) \leq 0$, $ROSt = 0$.

1583 CI_{opt} and CO_{opt} —— Total cash inflow and outflow from operating activities in year t in
1584 the cash flow statement of the project financial plan;

1585 $CI_{opt} - CO_{opt}$ —— Net cash flow from operating activities in year t.

1586 K_t —— Adjustment factor of reasonable return on social investment in year t.

1587 (2) Calculate government aid for social investor in year t (GAS_t) as follows:

$$1588 GAS_t = ROSt - (P_t + NC_{spt}) \quad (8)$$

1589 Wherein:

1590 When $ROSt \leq P_t + NC_{spt}$, $GAS_t = 0$.

1591 GAS_t —— The government aid for social investor in year t of PPP term at the return on
1592 investment determined by the government (ro)

1593 ROSt —— Reasonable return on social investment in year t

1594 P_t —— Actual profit distributable to social investor in year t.

1595 NC_{spt} —— After the government aid for social investor is accounted in the project financial
1596 cash flow in year t, surplus fund that can be used to pay for reasonable return on social
1597 investment.

1598

1599 **D3. Recommendations on the Selection of Subsidy Model**

1600 In selecting and applying subsidy models, the following key factors should be considered.

1601

1602 (1) Foundation of preliminary works of the project. For urban rail transit projects, if
1603 preliminary works such as passenger flow forecasts are thoroughly carried out, in particular if
1604 similar projects are in operation in the local city, the new urban rail transit PPP project may
1605 adopt the principle of same price for same network to determine the actual ticket price. In this
1606 scenario, the negotiated price method can be a good option of subsidy models.

1607

1608 (2) Expertise of the government. PPP contract performance is a joint obligation of the
1609 government and the SPV. As the ticket price mechanism and minimum passenger flow design
1610 may bring about contingent liability to the government, if the government lacks expertise in
1611 managing urban rail transit, which includes the ability of PPP contract negotiation and
1612 process supervision, it is best to avoid using the negotiated price and mileage subsidy
1613 methods.

1614

1615 (3) Fiscal ability. In designing subsidy plan, local medium- to long-term fiscal budget and
1616 expected expenditures of the project in each year need to be taken into consideration. For
1617 instance, if the local fiscal expenditure is under high pressure in recent years, the availability
1618 payment subsidy method may be a good option as the distribution of amounts of subsidies
1619 over the years appears to be “lower in the beginning and higher in later years”. Without the
1620 fiscal expenditure pressure, annuity method may be adopted. In areas with lesser fiscal
1621 strength, analysis of other operating resource support plans and TOD model feedback
1622 mechanism may be actively explored to minimize the reliance of PPP project on cash
1623 subsidies.

1624

1625 (4) Actual project funding gap. The subsidies over the years for the project should match the
1626 actual funding gaps and efforts should be made to avoid impact of subjective and manmade
1627 factors such as calculation of parameters or selection of indicators on the subsidy results. The
1628 cash flow subsidy method is exclusive and reflects the actual funding gap of project and
1629 interest claims of the parties concerned with relative objectivity.

1630 (5) Performance evaluation-based incentive mechanism. Under normal conditions, social
1631 investments or private sector should have a reasonable expectation of returns which, however,
1632 should not be a constant value guaranteed by government. The urban rail transit PPP project
1633 should have a lifecycle evaluation mechanism to link project performance evaluation results
1634 with government expenditure obligation.

1635