

Announcement of 『Seoul Global Challenge 2021』

The Seoul Global Challenge 2021 provides a challenging opportunity to global innovators (such as corporations, universities, and research institutes) with themes of solving Seoul's urban problems. The Challenge aims to facilitate innovative technology and research, and thus contribute to enhancing the quality of life of its citizens. We look forward to your interest and participation.

October 14, 2020

President of Seoul Business Agency

□ Overview

- 1) Title: Seoul Global Challenge 2021
- 2) Period: Oct 2020 ~ Dec 2021
- 3) Host: Seoul Metropolitan Government
- 4) Organizers: Seoul Business Agency, Seoul Metro, Korea Society for Atmospheric Environment, Korea Society for Indoor Environment, Korea Association for Particle and Aerosol Research

5) Challenge Topics

- Technology Challenge : Reduction of particulate matters in subways
 - ① Reduction of wear particles generation (development of wear-resistant materials, immediate removal of wear particles at emission sources, etc.)
 - ② Improvement of removal efficiency (filters, etc)
 - ③ Improvement of measurement technique
 - ④ Integrated management of air quality inside subway stations

○ Academic Challenge: Improvement of air quality in subways

- ① Links between indoor and outdoor air quality in subways (KOSAE)
- ② Reduction of particulate matters in subways (KOSIE)
- ③ Reduction of viruses in subways (KAPAR)

6) Awards

| Ranking | | Commendation | Prize (KRW) | No. of selected teams | |
|-----------------------------|--|---------------------------------------|---|-----------------------|-----------|
| Total | | | 690 million | 25 teams | |
| Technology Challenge | First place | Seoul Metropolitan City Mayoral Award | 480 million | 4~5 teams | |
| | T o p i c | | Reduction of wear particles generation | 100~200 million | 1~2 teams |
| | | | Improvement of removal efficiency | 100 million | 1 team |
| | | | Improvement of measurement technique | 100 million | 1 team |
| | | | Integrated management of air quality inside subway stations | 80 million | 1 team |
| | Challenge award | | 30 million each | 5~6 teams | |
| Academic Challenge | First place (1 team per topic) | Seoul Metropolitan City Mayoral Award | 10 million each | 3 teams | |
| | Second place (1 team per topic) | | 5 million each | 3 teams | |
| | Third place (1 team per topic) | | 3 million each | 3 teams | |
| | Participation Award (2 teams per topic) | | 1 million each | 6 teams | |

- ※ Winners are subject to payment of all taxes and dues required by the relevant Korean laws in receiving the prize money.
- ※ Depending on the budget compilation for 2021 and on evaluation results, the details of the awards are subject to change; if the committee finds that there is no suitable candidate, winner for an award may not be selected.

Track1 [Technology Challenge] Reduction of particulate matters in subways

1. About the technology challenge

1) Background

- (1) While the Seoul subways are used by 7.2 million people on average per day, its underground airtight environment makes it hard to control the air quality within subways.
- (2) The Seoul Global Challenge 2020 was held to discover and apply the best existing technologies to reduce particulate matters in Seoul subway system (tunnels, platforms, trains). The Seoul Global Challenge 2021 aims to go one step further and seek new ideas to facilitate the development of related technologies.

2) Host / Organizers: Seoul Metropolitan Government / SBA, Seoul Metro

3) Title: Reduction of particulate matters in subways

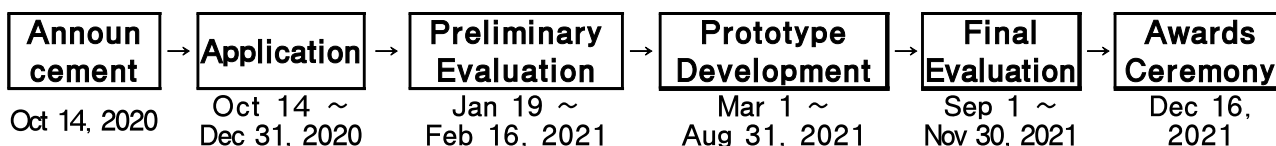
4) Topics

- ① Reduction of wear particles generation (development of wear-resistant materials, immediate removal of wear particles at emission sources, etc.)
- ② Improvement of removal efficiency (filters, etc)
- ③ Improvement of measurement technique
- ④ Integrated management of air quality inside subway stations

5) Objective : To develop prototypes by proposing economic and innovative ideas that can effectively lead to reduction of particulate matters in subways.

- It is possible to participate in more than one topic. There is no restriction to the numbers of proposals under one topic, either.
- If the proposed ideas are selected for prototype development, the corresponding participant should be able to complete developing the prototype(or complete the simulation in case of the 'Integrated management of air quality inside subway stations' topic) within the designated period.

2. Timeline



※ The timeline may change according to the progress of the project.

3. Evaluation Method

1) Evaluation Criteria

| Criteria | Specific Categories |
|----------------------|--|
| Effectiveness | ① Reduction of wear particle generation: particulate matters reduction rate ② Improvement of removal efficiency : dust collecting efficiency, pressure loss ③ Improvement of measurement technique : accuracy, durability ④ Integrated management of air quality inside subway stations: accuracy, particulate matters reduction rate |
| Economic Feasibility | - Total cost against effectiveness - Economic and social ripple effect - Market competitiveness |
| Innovativeness | - Related patents - Differentiation and innovativeness from existing technologies and products - Time required for applying the technology to products and technical difficulty |
| Practicability | - Ease of application and operation on the site - Execution capability of the participating institution - Probability of actual production(development) |

2) Evaluation Stages

| | Preliminary Evaluation | |
|-------------------|---|---|
| | Document Evaluation (Jan 19~20, 2021) | Presentation Evaluation (Feb 3~4, 2021) |
| Evaluation Method | ▫ Evaluation of proposals by the Evaluation Committee | ▫ Evaluation of presentation by the Evaluation Committee ※ Online video interview for international participants |
| Result | Selection of teams for Presentation Evaluation (Announcement : Jan 26, 2021) ※ Date may change | Selection of teams for finals (Fund for prototype development) (Announcement : Feb 16, 2021) ※ Date may change |

| | Final Evaluation | |
|-------------------|---|--|
| | Performance Evaluation (See Attachment 1) (Sep 1~Nov 29, 2021) | Comprehensive Evaluation (Nov 30, 2021) |
| Evaluation Method | ▫ Evaluation (by the evaluation committee) on the results of site or laboratory installation and operation of the developed prototype | ▫ Comprehensive evaluation of the results of performance evaluation, economic feasibility, innovativeness and practicability |
| Result | Selection of winners - Awards Ceremony : Dec 16, 2021 (See Attachment 2) | |

- ※ The output of the prototypes will be evaluated after the development period, and teams that have failed to the evaluation cannot participate in the finals(According to ‘the Seoul Metropolitan Government Regulations on the Operation of Industrial-Academic Cooperation Project’)
- ※ The detailed criteria for each evaluation will be determined by "Seoul Global Challenge Evaluation Committee" composed of competent experts. Participants are not supposed to file claims against evaluation methods and results.
- ※ Details of the evaluation materials, such as reduction rate data measured for performance evaluation, will not be disclosed.

4. Support Details

1) Support details for qualifiers of preliminary evaluation

○ Fund for prototype development

- Beneficiary: 10 teams(more or less) that have qualified the preliminaries
- Details: Differential support for prototype development, ranging from 10 million~200 million KRW
 - * The evaluation committee will decide the amount of support based on written proposals
- Payment: Payment Guarantee Insurance Policy must be issued for the whole amount of the fund by Seoul city before its payment (Warranty Period : Project Period + 6 Months)
 - * International teams will need to consult with SBA separately.

○ Mentorship Support

- Connection with mentors to provide mentorship and assistance with actualizing ideas and developing prototypes, upon request

○ Other Support

- Space for prototype development in Korea will be provided within budget upon request (only available to participants that do not have space for development in Korea). The participant may be asked to cooperate with separate verification procedures, if needed.
- The round-trip airfare and expenses for the stay will be covered within budget for international participants if required

2) Awards

○ The mayoral award and prize money awarded by type of technology

< Awards >

| Ranking | | Commendation | Prize | No. of selected teams |
|------------------------|---|---------------------------------------|----------------------------|-----------------------|
| Total | | | 630 million KRW | 10 teams |
| First place | | | 480 million KRW | 4~5 teams |
| To pic | Reduction of wear particles generation | Seoul Metropolitan City Mayoral Award | 100~200 million | 1~2 teams |
| | Improvement of removal efficiency | | 100 million | 1 team |
| | Improvement of measurement technique | | 100 million | 1 team |
| | Integrated management of air quality inside subway stations | | 80 million | 1 team |
| Challenge award | | Seoul Metropolitan City Mayoral Award | 30 million KRW each | 5~6 teams |

- ※ Winners are subject to payment of all taxes and dues by the relevant Korean laws in receiving the prize money.
- ※ Depending on the budget compilation for 2021 and on evaluation results, the details of the awards are subject to change; if the committee finds that there is no suitable candidate, winner for an award may not be selected.
- ※ Opportunity for exhibition will be provided in conjunction with the awards ceremony (to be determined)

5. Qualifications for Participation

○ Individuals, corporations, universities, research institutes, research associations, business associations, and industry-academic consortium of domestic or foreign origin that have ideas for new technology for particulate matters reduction(TRL 5 and under).

* In order to receive fund for prototype development, business registration to Korea is required before the contract with SBA is concluded.

6. Restrictions for Application

- 1) Participation in this challenge will be prohibited if, as of the date of the submission deadline, the lead organization, head and project manager of lead organization, cooperating organization, head and project manager of cooperating organization, are restricted from participating in its country's national research projects and/or R&D projects of Seoul Metropolitan City (due to reasons such as failure to complete duties such as submitting reports or paying technical fees).
- 2) The lead organization and cooperating organization(including the head and project manager of the organization) will be prohibited from participating in this challenge if the following conditions are met.
 - Defaulter employer or business whose information has been provided to credit information collection agencies of its country or whose name appeared on the disclosed list for back pay in accordance with Labor Standards Act of its country in the recent 3 years.
 - ※ If debt is withdrawn through relief of right or back pay is settled before the submission deadline, the corresponding participant will be allowed to submit its application
 - If any one of the following conditions is applicable by the submission deadline
 - Agency is undergoing bankruptcy, reorganization, receivership, or rehabilitation.
 - Agency received disposition of payment failure from the tax authorities such as national and local tax
 - Agency is on the defaulter list in accordance with Civil Execution Law of its country or registered as a defaulter by the federation of banks of its country
 - Agency has difficulties in regular financial transaction due to insolvency, rehabilitation, or exemption
 - Agency received "Denial of opinion" or "Adverse opinion" from auditors in the recent year
 - ※ International participants shall submit documents proving that they are not subject to any of the aforementioned restrictions above. To verify eligibility, participants should submit Pre-confirmation of Participation in the challenge / Consent to collection and use of Personal Information.
- 3) The winners of the previous Seoul Global Challenge(10 companies) is prohibited to participate with the same proposals.

7. Information Regarding Intellectual Property Rights

○ Since the proposed product/solution can be open to the public during the performance evaluation and award ceremony, each participant is recommended to complete patent application for the proposed product/solution before the performance evaluation. The Seoul Metropolitan Government is not responsible for any infringement of intellectual property rights due to the failure of the proposer to follow the relevant procedures, and the responsibilities such as proactive prevention are imposed on the proposer.

※ Refer to Chapter 9 of ‘the Seoul Metropolitan Government Regulations on the Operation of Industrial-Academic Cooperation Project’ for more details on research results.

8. Online Informative Session

| | |
|-------------------------|---|
| Date | 'Oct 29, 2020(Thu) 14:00 (to be determined) * Specific date and time will be confirmed later, if changed |
| Contents | Details on the purpose of the challenge, technology and academic challenge (Application method and procedure, notes, etc.) |
| Method | Broadcasting via youtube live streaming ※ Live streaming and recorded clips will be posted on the website(Korean and English). ※ Live streaming will proceed only in Korean. Video in English will be posted later. ※ Q&A session will be carried out in real-time via comments system |
| Pre-registration | Online registration : https://forms.gle/i7CuQ6tXkNfJQ1jT7 * Questions can be submitted in advance via the questionnaire. Additional questions may be asked in real-time during the live session |

※ Visit to subway site may be carried out, if needed.

9. Application

1) How to apply: sign up at the Seoul Global Challenge website, then submit application

- Website : seoulglobalchallenge.sba.kr

2) Period : Oct 14~ Dec 31.(Thu), 2020 at 18:00(KST)

3) Required Documents

| No. | Documents | Contents | Form |
|-----|---|--|--------------|
| 1 | Project Proposal | Overview, objective, details and schedule of developing technology, etc. | Attachment 1 |
| 2 | Pre-confirmation of Participation in the challenge | | Attachment 2 |
| 3 | Concent to collection and use of Personal Information | | Attachment 3 |
| 4 | Others | Other evidential documents deemed necessary * Multiple files should be compressed and submitted as one file | |

4) Note

- Application can only be submitted online, and cannot be submitted after the deadline(KST).
- Participant must choose Korean or English as the language for submitted documents.
- False documents will lead to disadvantages, such as application elimination.
- Early application is encouraged as application delays and network errors can be happened due to the overflow of submissions on the deadline date.
- Sign up at the website, write your proposal and upload.

10. Contact

| Inquiries | Contact | |
|--|---|---|
| Overall participation and business operation | Seoul Global Challenge Team, SBA | +82-2-2222-3752, 754, 726 sbatech@sba.seoul.kr seoulglobalchallenge@gmail.com |
| Performance evaluation | Urban Railway Research Institute, Seoul Metro | +82-2-6110-8191 eank78@seoulmetro.co.kr |

Track2 [Academic Challenge]

Improvement of air quality in subways

1. About the Academic Challenge

1) **Background:** It is intended to develop long-term and fundamental solutions for the improvement of air quality in subways by promoting academic research.

2) Host/Organizers

- Host: Seoul Metropolitan Government
 - Organizers: SBA, Korea Society for Atmospheric Environment(KOSAE), Korea Society for Indoor Environment(KOSIE), Korea Association for Particle and Aerosol Research(KAPAR)
- ※ The three academic societies will plan and operate each of the topics

3) Title: Improvement of air quality in subways

4) Topics

- ① Links between indoor and outdoor air quality in subways (KOSAE)
- ② Reduction of particulate matters in subways (KOSIE)
- ③ Reduction of viruses in subways (KAPAR)

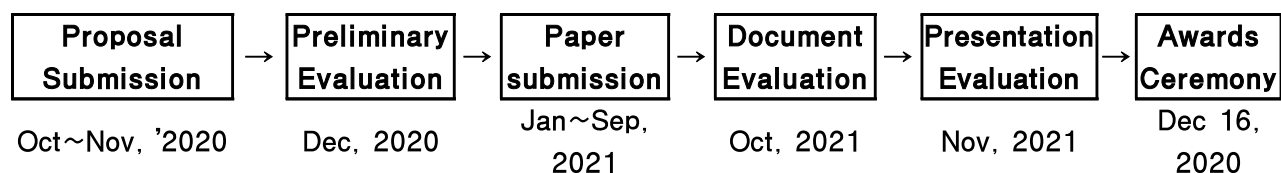
5) Details : Compose and submit a research paper on each topic

- ※ Select one or multiple topics among the three topics
- ※ There is no restriction to the numbers of proposals on each topic

6) Application : Submit applications to the academic society relevant to the topic

- ※ The specific timeline and method of application may vary depending on the society.

2. Timeline



※ The timeline may change as the Challenge progresses.

※ The specific timeline and details may vary depending on the society. They will be announced on the website of each society. (If not enough proposals are submitted, additional proposals may be accepted before the evaluation process begins)

3. Evaluation Method

○ Evaluation method and detail by step

| Sort | Preliminary Evaluation (Dec, 2020) | Document Evaluation (Oct, 2021) | Presentation Evaluation (Nov, 2021) |
|------------------------------|---|---|--|
| Evaluation Method and Detail | ▫ Evaluation of submitted proposals by committee of each society | ▫ Evaluation of submitted research paper by committee of each society | ▫ Presentation evaluated by committee of each society ▫ Winners selected by adding written evaluation(50%) and presentation evaluation(50%) results |
| Result | Teams selected for research paper (30 teams per society, more or less) (Announcement : Dec, 2020) | Teams selected for presentation (10 teams per society) (Announcement : Oct, 2021) | Winners selected (5 teams per society) (Announcement : Nov, 2021) |

※ The detailed criteria for each evaluation will be determined by the evaluation committee of each society composed of competent experts. Participants are not supposed to file claims against evaluation methods and results.

4. Evaluation Criteria

- According to the editing regulations and evaluation criteria for publications of each society

5. Awards

- The mayoral awards and prize money awards will be conferred for each topic.

< Awards >

| Ranking | Commendation | Prize (KRW) | Count |
|--|--|-------------------|-----------------|
| Total | | 60 million | 15 teams |
| First Place (1 team per topic) | Seoul Metropolitan City Mayoral Award | 10 million each | 3 teams |
| Second Place (1 team per topic) | | 5 million each | 3 teams |
| Third Place (1 team per topic) | | 3 million each | 3 teams |
| Participation Award (2 teams per topic) | | 1 million each | 6 teams |

- ※ Winners are subject to payment of all taxes and dues by the relevant Korean laws in receiving the prize money.
- ※ Depending on the budget compilation for 2021 and on evaluation results, the details of the awards are subject to change; if the committee finds that there is no suitable candidate, winner for an award may not be selected.
- ※ **Opportunity for conference presentation**
 - Opportunity for presentation at the academic session to be held in conjunction with the Seoul Global Challenge 2021 Awards Ceremony will be offered to the winners.

6. Qualifications for Participation

- No restrictions regarding application and participation eligibility
 - There is no restriction to number of papers submitted and number of authors
 - ※ Only new research papers(not published anywhere) are subject to application

7. Online Informative Session

- The information session will be held in conjunction with the ‘Seoul Global Challenge 2021’ technology challenge informative session.

| | |
|-------------------------|---|
| Date | Oct 29, 2020(Thu) 14:00 (to be determined) * Specific date and time will be announced later, if changed on the website |
| Contents | Details on the purpose of the challenge, technology and academic challenge (Application method and procedure, notes, etc.) |
| Method | Broadcasting via youtube live streaming ※ Live streaming and recorded clips will be posted on the website(Korean and English). ※ Live streaming will proceed only in Korean. Video in English will be posted later. ※ Q&A session will be carried out in real-time via comments system |
| Pre-registration | Online registration: https://forms.gle/i7CuQ6tXkNfJQ1jT7 * Questions can be submitted in advance via the questionnaire. Additional questions may be asked real-time during the live session |

8. Application

- 1) Method: Submit applications at the website of corresponding society

| Topics | Submit at | |
|---|---|---------|
| Links between indoor and outdoor air quality in subways | http://kosae.or.kr/sgc/01.html | (KOSAE) |
| Reduction of particulate matters in subways | http://www.kosie.or.kr/ytboard/board.php?id=notice | (KOSIE) |
| Reduction of viruses in subways | http://kapar.or.kr/sgc/sgc_form.php | (KAPAR) |

※ Above URL is for Korean, a URL for English will be noticed.

- 2) Period: Oct~Nov, 2020

※ The specific timeline and details will be announced separately on the website of each society.

- 3) Required documents : Application and proposal

※ The specific details will be announced separately on the website of each society.

4) Note

- Application can only be submitted online on each society's website, and cannot be submitted after the deadline(KST).
- Participant must choose Korean or English as the language for documents submitted.
- False documents will lead to disadvantages such as application elimination
- Early application is encouraged as application delays and network errors may occur on the deadline date due to the overflow of submissions

9. Contact

- SBA Seoul Global Challenge Team (+ 82-2-2222-3752, 3754, 3726, sbatech@sba.seoul.kr, seoulglobalchallenge@gmail.com)
- Contact by topic

| Topics | Contact |
|---|--|
| Links between indoor and outdoor air quality in subways | (Phone) +82-2-387-1400 (E-mail) kosae@kosae.or.kr (KOSAE) |
| Reduction of particulate matters in subways | (Phone) +82-2-2294-1510 (E-mail) kosie@hanmail.net (KOSIE) |
| Reduction of viruses in subways | (Phone) +82-2-598-8835 (E-mail) info@kapar.or.kr (KAPAR) |

Attachment:

1. Information on performance evaluation
2. Notice on awards ceremony, exhibition, and academic presentation of award-winning projects


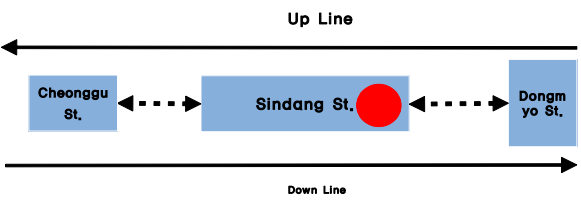
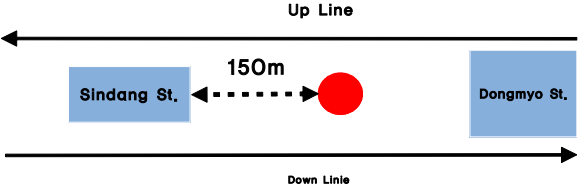
[Attachment 1]

Information on Performance Evaluation

1. Test Sites for Performance Evaluation

1) Performance evaluation for each topic shall be conducted at Osong Test Line of Korea Railroad Research Institute, the test sites in the subway stations designated by Seoul Metro and/or other laboratories.

<Table 1> Test Sites of the 「Seoul Global Challenge 2021」

| Topic | Test Site Location | |
|--|--|--|
| Reduction of wear particles generation | (Wear-resistant materials) | Measuring agency's laboratory (Test using pin-on-Disc or dynamometer) ※ It must comply with the technical standards for railway products (except type approval) |
| | (Immediate removal of wear particles, etc.) | <p style="text-align: center;">Comprehensive Test Track Osong Test Line</p> <p>- Length : 13km - Operated by KRRI</p>  |
| Improvement of removal efficiency | <p>Unused transfer passage (B1) at Sindang St., Line No.6</p> <p>- In the direction of exit no. 10 & 11, Sindang St. - H 3m × W 20m × L 50m</p> |  |
| Improvement of measurement technique | <p>Ventilation room (B2) at Sindang St., Line No.6</p> <p>- 150m from terminal in the direction of Dongmyo St. - H 5m × W 6m × L 15m</p> |  |
| Integrated management of air quality inside subway stations | Evaluation according to S/W simulation results | |

※ The location of the performance evaluation may be changed due to the circumstances of the Seoul Metro

2) For the performance evaluation, the participating teams must design the proposed product or solution according to the conditions of the test site.

- (1) The details (e.g. drawings) for the test site will be provided by Seoul Metro upon request by the participating teams.
- (2) The participating teams must meet the preconditions (Table 2) for the performance evaluation outlined by Seoul Metro when designing and managing the proposed product or solution.
- (3) If the performance evaluation cannot be carried out in the designated test sites (for reasons such as limited space, etc.), the site may be changed.

<Table 2> 「Seoul Global Challenge 2021」 Preconditions of Performance Evaluation

| Location | Preconditions |
|--|---|
| Transfer Passage and Ventilation Room | 1. Inconvenience complaints for passengers must not occur. 2. There shall be no safety-related accident concerning electric power or fire after the installation of the product or solution. 3. Installation of product/solution must be in compliance with Railroad Safety Act and relevant laws. 4. The proposer must bear the duty of installation, trial run, removal, and restoration. 5. There should be no damage done to the subway facilities due to the product/solution. The proposer is responsible for any damage or complaints that should occur. |

2. Support for Performance Evaluation

- The logistics cost such as expenses for the transportation of proposed product or solution from and to the original place and its storage fee will be reimbursed for the domestic and international teams within the budget, and the accommodation and round-trip ticket costs(for up to 2 members per team in case international teams) during the performance evaluation period will be supported within the budget.

Notice on Awards Ceremony, Exhibition, and
Academic Presentation of Award-Winning
Projects

1. The awards ceremony for ‘Seoul Global Challenge 2021’ will be held in conjunction with the exhibition and academic conference of the award-winning projects. All the winners must attend the awards ceremony and the exhibition for technical award winners or academic conferences for academic award winners.
2. An exhibition booth will be provided for each winner team of the technology challenge, and at least one person per team must be present at their booth.
3. The winners of the academic challenge must participate in the academic conference as presenters.
4. Expenses incurred for logistics such as delivery and storage of products or solutions by domestic and international teams for exhibition shall be reimbursed within the budget. In addition, round-trip airfare and accommodation during the period of Awards Ceremony, exhibition and academic conference for each international team (up to 2 persons for each team) will be provided within the budget.