해외출장복명서

기　간:　2014. 2. 10 ~ 2. 15

출장지:　미국 (워싱턴DC, 뉴욕)

출장자:　서민호 책임연구원

국토연구원 국토관리·도시연구본부

Ⅰ. 출장개요

1. 출 장 지: 미국 뉴욕 및 워싱턴 DC

2. 출장기간: 2014. 2. 10 ~ 2. 15

3. 출 장 자

소속	직급	성명	비고
국토연구원	책임연구원	서민호	
국토교통부	과 장	구헌상	
국토교통부	사무관	정덕기	

4. 출장목적

□ World Bank(세계은행)는 글로벌 기후변화 대응을 위해 우리나라와 세계 각국 중앙정부 협력으로 4천만불 규모의 Green Growth Trust Fund를 운영하고 있으며, 관련 정부·기관간 협력 프로그램을 시행 중

□ 금번 세계은행 주최 Korea Green Innovation Days는 우리나라 국토교통부·산업자원부·한국수출입은행·국제금융공사·에너지관리공단·서울시 등을 중심으로 한국의 지속가능개발과 녹색성장 사례를 발표하고 세계에 공유하기 위한 국제회의임

- 월드뱅크에서는 Korea Green Innovation Days와 관련하여, 국토교통부와 국토연구원에 도시·교통 유관 전문가 참여를 공식적으로 요청

□ 이에 본 원에서는 기존에 연계·협력을 추진 중인 세계은행 Green Growth 사업 과정과 국제협력 프로그램에 대한 협력방안을 국토교통부와 공동으로 모색하고자 하며, 녹색성장 관련 선진 사업인 뉴욕의 통합가로와 대중교통-보행-자전거 통합체계를 현지답사함

- 상기 출장자는 월드뱅크 Green Growth Trust와 관련한 국제협력사업 운영 가능성을 검토하고, 녹색성장 관련 한·미 전문가 정책 워크숍에 정부기관 자문을 위해 참석함
- 아울러 국토교통부와 공동으로 도시·교통 분야의 대표적 Green Growth 프로그램으로 알려진 Sustainable Street(뉴욕) 구축 프로젝트 실태 파악을 위해 현지 답사함

II. 출장일정

날짜	출발지	도착지	방문기관/장소	주요 수행업무	관계자
2.10 (월)	인천	뉴욕	이동	(10:05) 인천 출발 (10:00, 현지시간) 뉴욕 도착	-
	뉴욕		미드타운	(13:00) Sustainable Street 현지 조사 - 대중교통·보행·자전거 통합체계 및 통합가로 구축 현황 조사	-
2.11 (화)	뉴욕		미드타운	(9:00) Sustainable Street 현지 조사 - SBS 서비스 및 대중교통중심도로 조사	-
			이동	(16:00) Prep. 미팅 및 리셉션 참석 - World Bank 주최	World Bank 관계자
2.12 ~2.13 (수·목)	워싱턴		세계은행	Korea Green Innovation Day 참석(전일 일정) - 지속가능도시·교통 정책·사례 발표 - 한국-월드뱅크 전문가 워크숍 참석 - Green Growth 추진사례 공유 및 확산 논의	World Bank 관계자 및 한국 관계자 (김상협 전 청와대 녹색성장비서관 등)
2.14 ~2.15 (금·토)	워싱턴	인천	이동	(11:50) 워싱턴 출발 (16:20, 익일) 인천 도착	-

* World Bank 관계자 : Adam Stone, Joanne Kim, Eun Joo Yi 등(Green Growth Trust Fund 운영 및 추진 관계자)

III. 수행사항

1. Korea Green Innovation Day 참석

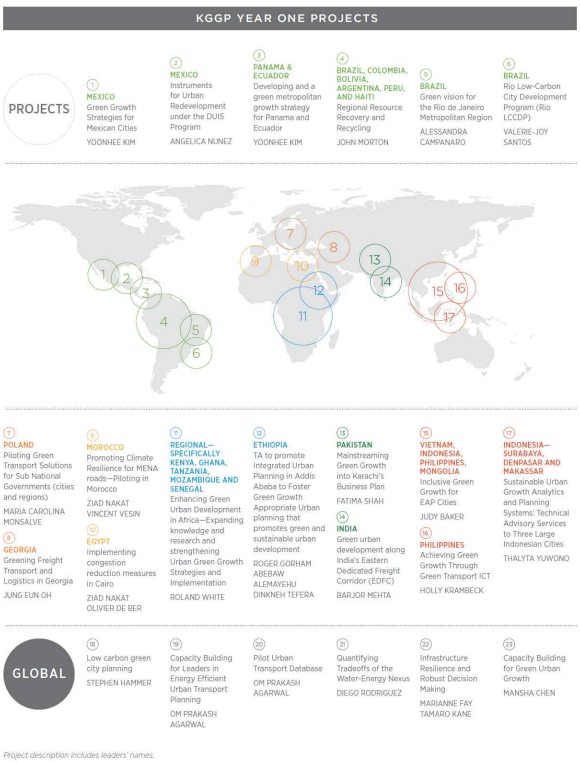
□ 일시 및 장소: 2014. 2 12 ~ 13(목) / 미국 워싱턴 D.C. 월드뱅크 프레스톤홀

□ 참석자: World Bank Group, 국토교통부, 산업자원부, 서울시, 한국수출입은행, 국제금융공사, 에너지관리공단 등 관계자 60여명

【 Korea Green Innovation Days (Green Growth Trust) 개요 】

◈ **(주제)** 포괄적 Green Growth – 신화인가 현실인가 (6개 세션별 주제발표 및 토론)

- 녹색기술과 ICT, 녹색개발 국제경제협력프로그램 논의
- 한국의 도시·교통, 에너지·수자원, 녹색산업 정책 추진사례 발표
- 녹색개발 비즈니스 모델과 국가적 대응전략, 국제개발금융 등



□ 주요 수행 내용

① 전국호환 교통카드 정책의 진행과정·현황 및 향후 계획 등 논의 (국토교통부 발표 지원)

ㅇ (질의/답변) 전국호환교통카드 정책 추진 시 가장 어려운 문제 및 극복 과정

- 전국호환교통카드는 2007년부터 단계적으로 추진되어 표준양식 개발 등 기술적인 문제는 크지 않았으나,
- 이해당사자들(기존업자 등)의 소극적인 참여가 가장 큰 장애였으며 이를 해결하기 위해 1여 년간 설득과 언론 홍보활동을 병행함

ㅇ (홍보) 전시공간 마련 및 교통카드 샘플·브로셔 배포 및 홍보영상 상영

ㅇ (성과) 전국호환 교통카드 도입전략, 지자체·이해관계자 협의방식,기대효과에 대한 참가기관의 높은 관심과 호응 유도

- 세계은행 및 향후 관심국가(인도 등)에 관련 정책조언, 사업자 연계 등 적극 협력추진

② 세션별 발표 및 토론, 세계은행 관계자 면담을 통해 녹색성장 노하우와 컨설팅 공유 논의

ㅇ 한국수출입 은행과 LG CNS 대중교통 운영인프라 수출사례를 통해 기금과 연계한 신교통기술·해외진출에 대한 정책 시사점 도출

- 콜롬비아 보고타에 LG CNS가 서울의 대중교통시스템(환승체계, 교통카드지불방식, 운영시스템)을 수출한 사례로
- 구축 시, 지속적인 관리가 필요한 도시·교통 인프라 기술 해외진출을 통해 새로운 산업창출 등이 가능 할 것으로 예상

ㅇ 그 외 녹색성장, 녹색기술과 혁신, 도시교통분야·수자원분야·기후적응산업 사례 등 발표

ㅇ (성과) 녹색성장에 대한 전반적인 이해를 도모하고, 녹색성장 및 녹색기금과 연계한 도시·교통 관련 정책의 국토연구원 컨설팅 필요성 및 해외협력 추진에 대한 시사점 도출

- 세계은행 관계자(Joanne Kim, Eun Joo Yi) 면담을 통해 세계은행 KGGP 프로젝트와 관련한 연구 및 사업추진에 있어 국토연구원 협력 및 참여 논의
- 2013년 KRIHS-World Bank 협력성과 세미나 등과 유사한 협력 프로그램을 워싱턴과 한국에서 연례 개최하는 방안과 필요성, 세부 프로젝트 협력에 대한 실무진 협의 공감

▲ 세계은행 KGGP 국토교통부 발표 세션

▲ 출장자 현장 사진

▲ 세계은행 KGGP 발표 및 토론 사진

2. 뉴욕 통합가로와 대중교통-보행-자전거 통합교통체계 구축 현장 조사

□ 일시 및 장소: 2014. 2. 10(월) 오후, 뉴욕 미드타운 Sustainable Street 사업구간 전역

□ 답사자: 서민호 책임연구원(국토연구원), 구헌상 과장, 정덕기 사무관(국토교통부)

□ 주요 조사 내용

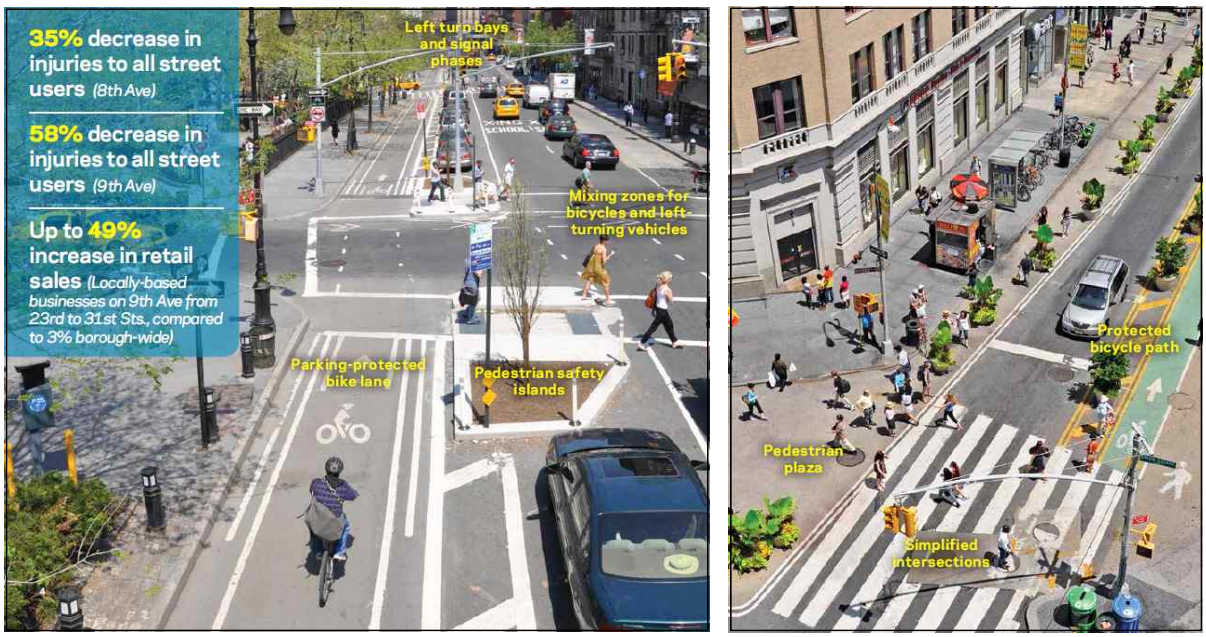
▲ 조사지 위치도

① Broadway (Times Square ~ Herald Square)

- **(목적)** 복합 교차로에서의 안전성 증진, 보행자 희망선(desire line) 확충, 차량 감속, 자전거도로 향상, 횡단보도 안전성 증진, 휴게공간 및 공공공간 확충
- **(사업내용)** 브로드웨이 차선 수 감소, Medison Square와 Union Square 사이 구간에 보행섬 설치, 자전거도로 추가(14~17th St.), 노상 보행 광장 설치
- **(효과)** 교통사고 횟수 65% 감소, 보행 광장 주변 상업 활성화

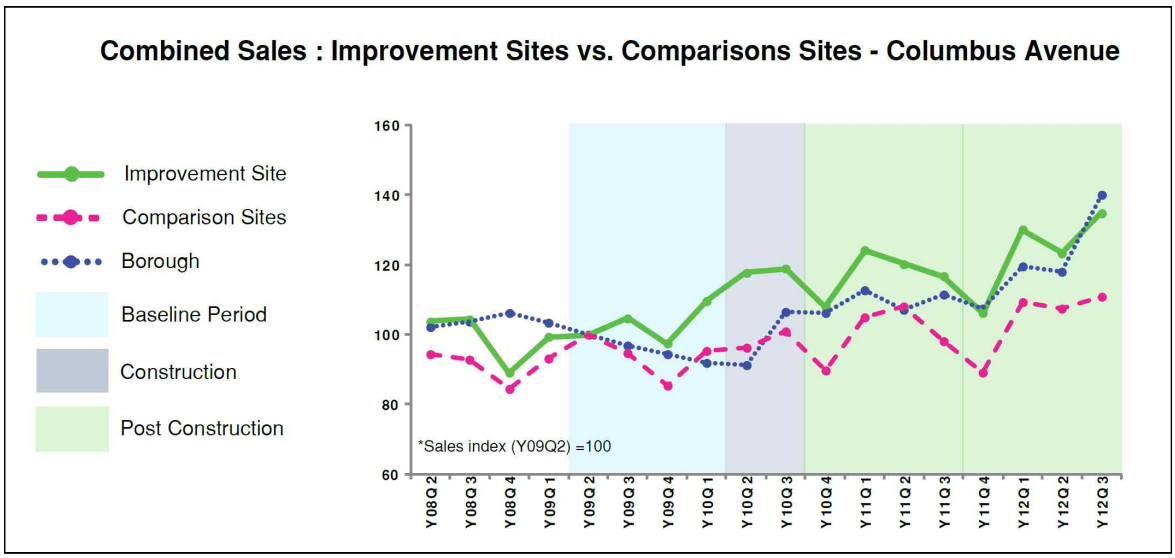
② 8th ~ 9th Street (Times Square ~ Herald Square)

- **(사업내용)** 가로 연접 주정차공간과 자전거도로 입지 교환, 보행·자전거 연계동선 전환, 자건거·자동차 안전위협 제거 등
- **(효과)** 가로 이용자 충돌위험 35%~58 감소, 주변 상권 매출 49% 증대 등



③ Sustainable Streets, Columbus Avenue (77 ~ 96th street)

- **(목적)** 자전거 네트워크 연결성 향상, 보행자 횡단거리 단축
- **(사업내용)** 차로 폭 감소를 통한 자전거도로 확충, 자전거 신호 체계 확립, 보행섬 확충.
- **(효과)** 사업후 지역 매출 20% 향상(주변 유사 지역 대비 2배 이상 증가), 자전거-차량 간 충돌 감소, 보행자 안전 증대 등

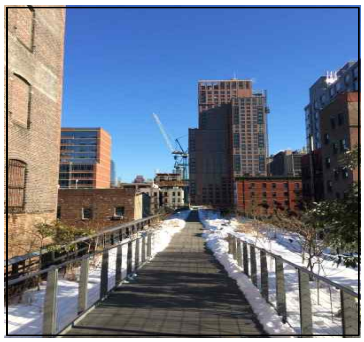


④ 34th Street (Select Bus Service)

- **(목적)** 버스이용객 이용시간 단축, 맨하탄 동서횡단간선축인 34th Street를 대중교통회랑으로 개발, Bus Rapid Transit 체계 적용
- **(사업내용)** 버스전용차로 확보, 차선폭 확장 및 도로다이어트(6차선→5차선)로 대중교통중심회랑 개발, 연접지 복합토지이용 강화
- **(효과)** M34 이동시간 15% 감소 및 버스 통행속도 11% 증가, 대중교통이용자 4000명(/일) 증가, 교통신호 대기 시간 29% 감소 등


⑤ High Line Project

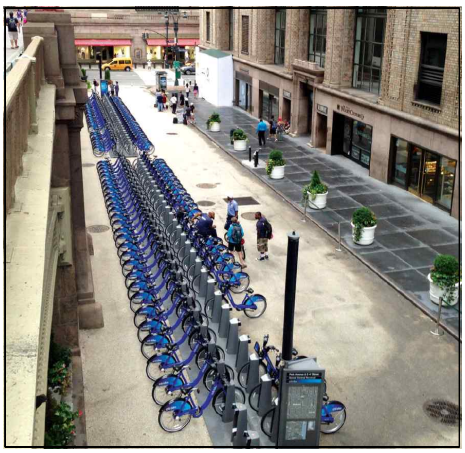
- **(목적)** 화물철도 운행중단으로 20년간 방치되어 있던 고가철로를 역사적 도시 구조물로 보존하고 생태공원화하여 공공공간 확충
- **(사업내용)** 맨하탄 남서부 끝에 위치한 Meatpacking District와 Chelsea 지역에 걸쳐 있는 2.5km 연장의 고가철도를 공원화하고, 주변 지역 개발을 법적으로 제한하거나 용도·기능 다변화
- **(효과)** 경제적 개발압력이 가장 높은 지역 중 하나인 뉴욕 맨하탄에 대규모 공공공간을 확충하고 주변지역 재생 촉진


⑥ ParkSmart and Citibike (Greenwich Village)

- **(사업내용)** 가로변 불법주정차 방지와 효과적 운영관리 목적의 Smart Parking toll 시스템을 구축하고, 민간협력(Citibank)을 통한 공공자전거 도입으로 승용차 이용 저감 및 지속가능성 증대

- **(효과)** 가로변 주정차량 점유율 감소(77%→69%), 불법주정차 감소, 2013년 공공자전거(Citibike) 시행 이후 세계 대도시 최고 수준의 공공자전거 이용률(5.96회/일·자전거, 파리 5, 런던 3.64) 및 이용량(150일간 5백만통행, 일평균 31,000통행 이용)



Ⅳ. 부록

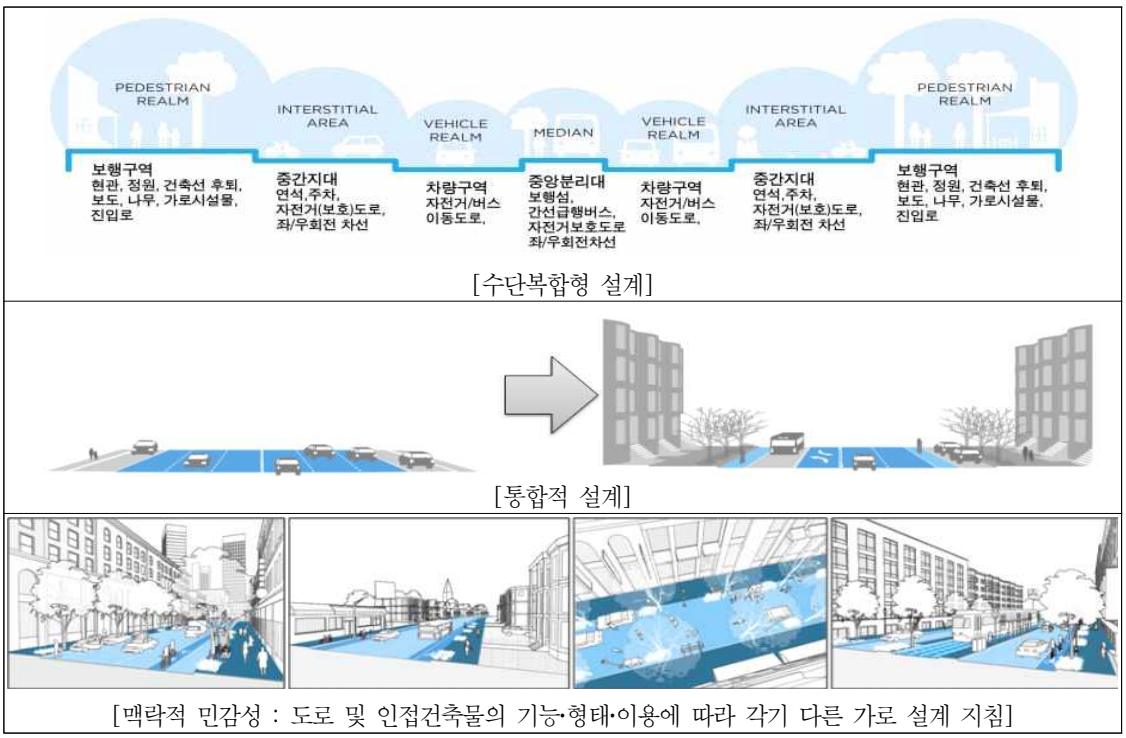
□ 미국의 통합가로와 뉴욕의 대중교통-보행-자전거 통합체계 구축 정책

1) 미국의 통합가로(Complete street) 정책

○ **(정의)** 연령 및 능력(보행자·교통약자·고령자), 통행수단(승용차·대중교통·자전거)에 관계없이 안전하고 쾌적하게 통행할 수 있는 '모든 사람들을 위한 가로(street for everyone)'

○ **(계획 원칙)** 다양한 교통수단이 공존하는 사람 중심 통행 체계로의 전환을 통해 통행권을 확보하고, 도로를 보행·자전거·커뮤니티 친화적 환경으로 조성

- (수단복합형 설계) 모든 도로(간선 및 보조간선 포함)들을 모든 종류의 교통수단이 공존하는 수단복합형 회랑으로 구축
- (통합적 설계) 보도·차도를 물리·경관적으로 개선하고, 주변 공공공간·건축물을 함께 고려해 재생사업 추진
- (맥락적 민감성(Context Sensitivity)) 주위 맥락(context)을 고려, 이를 반영할 수 있는 설계



[수단복합형 설계]

[통합적 설계]

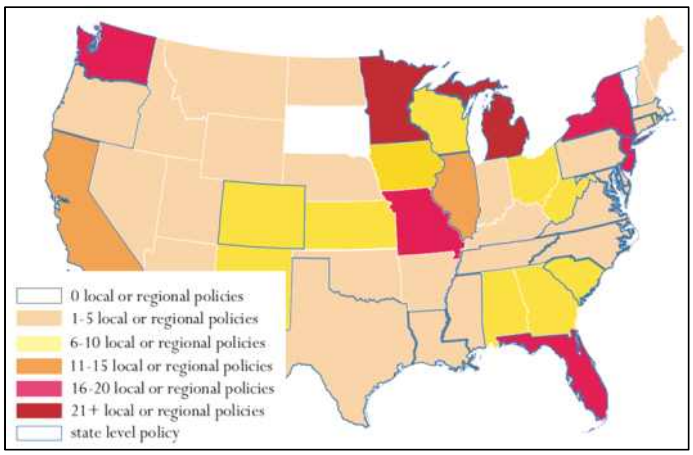
[맥락적 민감성 : 도로 및 인접건축물의 기능·형태·이용에 따라 각기 다른 가로 설계 지침]

출처 : (상) Chicago Department of Transportation, 2013, Complete Streets Chicago, (중·하) Boston Transportation department, 2010, Boston Complete Streets Guidelines

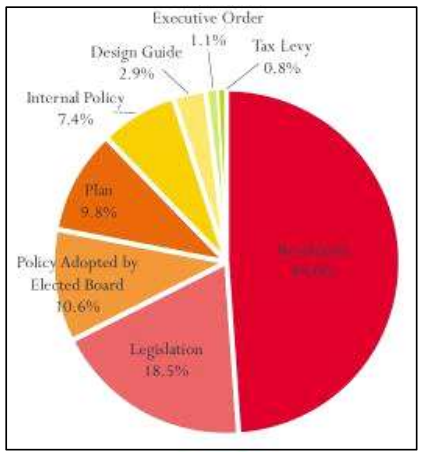
○ **(추진 현황)** 2011년 203개 통합가로 관련 정책 수립·시행되고 있으며, 연방/주정부, MPO, 시 및 자치구 등이 도입하여, 조례·교통계획·가로디자인매뉴얼 등 다양한 정책 차원에서 추진

- 시카고는 2017년까지 자전거와 보행 사고 근절 및 8km 이하 이동 시 5% 이상의 자전거 이동을 목표로 2006년 통합가로 디자인가이드라인을 작성하고, 정책 집행 및 가이드 업데이트를 담당하는 통합가로준수위원회(Complete Streets Compliance Committee) 설치

통합가로 정책 시행 지자체(2011년)



통합가로 정책틀(2011년)



출처 : smart growth america, national complete street coalition, 2011, COMPLETE STREETS : policy analysis

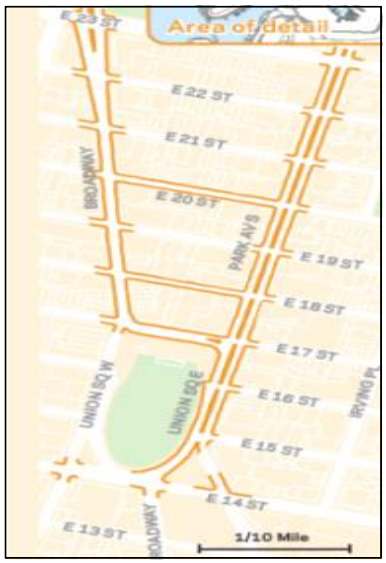
○ **(뉴욕 사례·효과)** 대중교통·보행·자전거 이동 편의 증가를 목표로 하는 Sustainable Streets 계획(2008)*, 모든 교통수단 및 모든 이용자를 고려하도록 하는 Complete Streets Act(2011)* 등에서 통합가로 정비 추진

- 교통사고 사망률 50% 감소, BRT 도로 정비, 자전거 이용 200% 증가 등
- (대중교통 이용 증가) 2000년 이후 자전거 통근 200% 증가(2008년 한 해에 자전거 통근자 35% 증가)했고, Select Bus route의 경우, 주중 30%이상 버스 이용객 증가
- (교통 안전 확보) 브로드웨이-타임스퀘어의 경우, 보행친화적 환경 정비로 교통사고 피해 보행자 및 오토바이 운전자 63% 감소[1)]
- (시민 만족도 증가) 맨하탄 Flatiron지구 주민 및 지역 사업·근로자 86%가 매디슨 스퀘어에 조성된 공공공간에 만족

1) http://www.livingstreets.org.uk/professionals/street-design-and-management

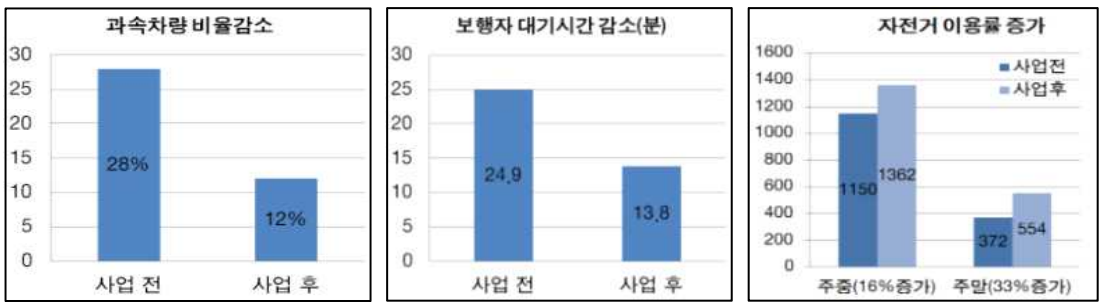
- (뉴욕 유니언 스퀘어 통합가로) 교통 안전 및 보행 안전 도모, 차량 속도 감소, 자전거 도로 개선, 가로 휴게 시설 증가를 목표로, 2008년 정비사업 착수, 2010년 완공
- (정부-민간-주민 참여) 교통국, 지역 Business Improvement District(BID), Union Square-14th Street community 구성원으로 이루어진 Union Square Partnership 및 Manhattan Community board 5 등 지역 커뮤니티 참여
- (안전 확보) 도로다이어트(17가의 경우 양방향에서 일방통행으로 변경, 자전거 도로 및 주정차 공간 정비) 등을 통해 교통안전 도모하여 부상 26% 감소, 과속 차량 16% 감소
- (기타 효과) 자전거 이용자 증가(주중 18%, 주말 49%) 뿐 아니라, 상업 활성화(20%의 점주가 증언) 등의 경제적 효과 창출

Union Square 범위



Union Square공사 후

뉴욕 통합가로 사업 결과



출처 : New York City department of transportation, 2011, Broadway: Union Square

2) 뉴욕의 대중교통·보행·자전거 통합체계 구축 정책

○ **(대중교통당국)** MTA(Metropolitan Transportation Authority) 대중교통국이 여러 교통기관*을 서비스 공급 확대 등 운영 및 관리유지

- New York 지하철, MTA Staten Island Railway(지하철의 일부 포함),MTA Long Island Rail Road, MTA Long Island 버스, MTA, Metro-North Railroad 등

○ **(대중교통 정책)** 정시성 확보를 위해 버스 우선 정책 실시, 접근성 확보를 위한 기존 지하철역 개보수(물리적) 및 장애인 요금 할인(사회적 접근), 대중교통·보행·자전거 이동을 장려하는 통합가로 정책 실시

○ **(보행자 정책)** 2000년대부터 유럽 및 미국 도시계획에서 보행자 교통의 중요성 재인식[2)]

- (Midtown Manhattan Pedestrian Network Development 계획) 대상지역의 현황조사 및 분석*을 통해 보행환경의 특성과 문제점을 도출, 이를 근거로 타임스퀘어 일대의 특성에 맞는 보행환경 개선방안을 수립
- 대상지역의 보행활성화시설, 보행자 교통사고 지점, 교통 및 보행노드 파악, 주차공간 및 휴게공간 현황, 보행밀도가 높은 보행회랑
- 뉴욕 타임스퀘어 임시 보행전용 구간으로 정비되었던 일부 구역(2009년)이 2010년 보행친화구간으로 변모

○ **(자전거 정책)** 자전거네트워크개선프로그램(Bicycle Network Development Program) 등 자전거 이용 여건 개선을 통해 이용 활성화를 유도

- 자전거도로 마스터플랜 수립(350마일의 자전거도로 계획) 및 자전거 교통지도 제작
- 편의시설의 계획·설치·개선, 주무부서와 관련단체들의 프로그램 조정 등에 이르기까지 포괄적 계획 수립, 시행

○ **(뉴욕 공공 자전거 대여 프로그램 (New York City Bike Share))** 뉴욕시의 자전거 단기 대여 프로그램으로 2013년 1차 사업이 시작됨

- (사업규모) 예산 5,200~6,200만 달러로 맨하탄 남쪽부터 브루클린 서북쪽 구역에 1차로 자전거

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2) http://www.walkeurope.org/uploads/File/background/358-MoU.pdf, Cédric Feriel, « Le piéton, la voiture et la ville. De l'opposition à la cohabitation », *Métropolitiques,*
10 avril 2013. URL : http://www.metropolitiques.eu/Le-pieton-la-voiture-et-la-ville.html

대여소 겸 주차장을 설치

· 정류장 333개소(맨하탄 261개소, 브루클린 70개소), 자전거 6000대 운영

· 이후 맨하탄, 브루클린, 퀸즈의 정류장 600개소 설치, 자전거 10000대로 대여로 프로그램 확장 계획

- **(재정지원)** Citibank 4100만 달러, mastercard 650만 달러 지원

- **(사업절차)** 2011년 사업 계획이 시의회 상정된 후, BID 및 주요 지주와 협의를 거쳐 지역주민협의체인 커뮤니티보드와 주·시의원, 시민들에게 정책 홍보 및 의견수렴, 최종안 결정

- **(이용방법)** 연간이용자는 제공된 키를 사용하고, 일일/일주일 이용자는 정류장에서 발부되는 디지털 코드를 사용하여 자전거 이용하며, 일일 횟수 제한 없이 회당 최대 45분 자전거 이용

· 하루 정기권 비용은 $9.5+세금, 일주일 정기권은 $25+세금, 일년 정기권은 $95+세금으로 책정

뉴욕 Citibike

자전거대여소·주차장 위치

출처: (좌) http://www.nytimes.com/2012/05/08/nyregion/new-york-cycle-sharing-gets-a-name-citi-bike.html
(우) http://a841-tfpweb.nyc.gov/bikeshare/station-map/

☐ Korea Green Growth Action 강연 자료 (최상대 수석이코노미스트, 세계은행)

GREEN GROWTH IN ACTION

KNOWLEDGE NOTE SERIES 01

Korea Green Growth Partnership

THE WORLD BANK

THE GREEN GROWTH MOVEMENT IN THE REPUBLIC OF KOREA: **OPTION OR NECESSITY?**

SANG DAE CHOI SENIOR ECONOMIST, TRANSPORT, WATER, AND INFORMATION & COMMUNICATION TECHNOLOGY (TWI), SUSTAINABLE DEVELOPMENT NETWORK, WORLD BANK

I. OVERVIEW

When the former Korean president, Lee Myung-bak, took office in 2008, he proclaimed "Low Carbon, Green Growth" as the Republic of Korea's new national vision. The most important driver of this vision was public recognition that high levels of carbon-dependent economic growth were not sustainable. This vision aimed to shift the existing development paradigm of quantity-oriented, fossil fuel-dependent growth to one of quality-oriented growth, with more emphasis placed on energy independence and sustainability through such means as increasing the use of new and renewable energy resources. From this standpoint, the green growth movement in the Republic of Korea appeared to be less an option than an essential path to achieving its vision of sustainable economic growth and the well-being of its people.

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To achieve the new national development vision, Korean leadership took a strategic approach in which the government played an active role, similar to the visionary approach used to achieve rapid economic development in the 1960s and 1970s. The government established a legal framework on low carbon and green growth, set up a governance structure to implement green growth initiatives systematically, and established fiscal policies and budget resources to support the initiatives firmly.

The purpose of this note is primarily to explain why Korea adopted a green growth strategy as a new national development paradigm and how it was implemented by the government. Section II illustrates why green growth was a necessity in Korea; Section III describes how green growth was implemented by the Korean government, particularly with respect to institutional arrangements and fiscal adjustments for green growth; Section IV presents the key outcomes thus far; and lastly, Section V identifies lessons that could be applied in other countries.

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With the arrival of the era of resource shortages and intensifying environmental crises, many nations identified climate change and energy issues as their most dire problems... Korea was not exempt from the global environmental and energy crises...

II. AN ESSENTIAL PATH

With the arrival of the era of resource shortages and intensifying environmental crises, many nations identified climate change and energy issues as their most dire problems. They were required to focus all their efforts on promoting the efficient use of energy and resources as well as minimizing environmental pollution. Korea was not exempt from the global environmental and energy crises and embraced green growth to address (i) the need for a new economic growth engine; (ii) the need to improve the population's quality of life; and (iii) domestic concern about climate change and the importance of adapting to it.

1. Korea adopted green growth as a new economic growth paradigm to create new growth engines and jobs through green technology and greening industries. Since the 1960s, Korea had achieved rapid economic growth through the development of heavy chemical industries, using an export-led strategy. Following this, development of the IT industry led to the creation of another growth engine. However, since the second half of the 1990s, the country struggled with low and jobless economic growth, which spurred the quest for a new growth engine.

According to data from the Korea Energy Economics Institute, in 2010, Korea was the tenth largest energy consumer in the world and imported 97 percent of its total energy need, with over 80 percent of energy coming from fossil fuels, compared with 73 percent in Japan, 64 percent in the U.S., and 53 percent in France. More importantly, the types of industries that constituted 75 percent of the nation's industrial output, such as oil, chemicals, and steel, were all high consumers of energy. It was inevitable, therefore, that such a high-energy-consuming structure would be extremely sensitive to energy price fluctuations, and as a result, Korea's economy suffered a devastating impact each time the price of energy rose sharply. Korea's economic health was vulnerable, with its economic fate susceptible to dramatic changes caused by external factors. Given Korea's high dependence on foreign energy resources and fossil fuels, it was imperative that the country adopt a low-carbon, energy-efficient strategy as a way to create a new engine for growth.

2. Green growth was necessary in Korea not only for economic growth, but also to improve the quality of life. Economic growth, while vital, is not the only contributing factor to a population's well-being. Quality of life, including the state of health and environmental quality, is also critical, as well as material living conditions such as income and wealth. According to a Gallup World Poll conducted in 2010, showing the average self-evaluation of life satisfaction on a scale from 0 to 10 in 34 OECD countries, Korea ranked below average, at position 27. It was evident that government policies aimed at improving quality of life were sorely needed in Korea.

Some of the environmental externalities that affect health and quality of life are fundamental to human well-being, such as reducing air pollution and providing access to clean water. According to the OECD Better Life Index in 2011, Korea's level of atmospheric PM10—tiny air pollutants small enough to enter and cause damage to the lungs—was 33 micrograms per cubic meter, which was considerably higher than the OECD average of 21 micrograms per cubic meter. Korea also ranked below the OECD average in terms of water quality, as 78 percent of the population was satisfied with the quality of water, compared with an OECD average of 84 percent. Therefore, one of the main objectives in Korea's green growth strategy was to raise the quality of life through developing green cities, building green transportation infrastructure, and improving water management.

3. It was necessary to set a GHG reduction target in order to satisfy domestic interest in policy shifting as well as contribute to international efforts to respond to climate change. Korea actively participated in global efforts to mitigate climate change. It set the target for midterm GHG mitigation to be reduced by 30 percent by 2020 from the business as usual baseline. The target set by the Korean government was the highest level of mitigation recommended by the Intergovernmental Panel on Climate Change (IPCC) for developing countries in order to stabilize the global temperature increase at less than 2°C.

Economic growth, while vital, is not the only contributing factor to a population's well-being. Quality of life, including the state of health and environmental quality, is also critical, as well as material living conditions such as income and wealth.

In addition to voluntary contributions to global climate change adoption and mitigation, however, Korea had its own incentive to change. The rise in temperature in Korea had exceeded the global average and the frequency of droughts and flooding was predicted to increase. While the average global temperature rose 0.74°C from 1906 to 2005 (IPCC, 2007), it rose 1.7°C from 1912 to 2008 in Korea (Korea's National Institute of Meteorological Research, 2009). Essentially, in Korea, the temperature was more than double the global average, demonstrating an alarmingly fast progression of climate change, even considering the effects of rapid industrialization and urbanization. In addition, considering Korea's high dependency on fossil fuel energy, in cases where obligations to reduce GHG were imposed by the international society, the burden on Korea's economy was expected to be immense. Given its susceptibility and vulnerability with respect to the environment and energy, Korea chose to join the international movement for climate change adoption and mitigation, unlike many other vulnerable countries.

III. GOVERNMENT'S ACTIVE ROLE

In order to achieve the national vision of green growth, the Korean government got actively involved. The government made institutional arrangements and either scaled up or developed the appropriate fiscal adjustments to achieve green growth. Effective governance was important to make the national vision a reality, and without fiscal support, most green growth initiatives could not be implemented.

A. Institutional Arrangements for Green Growth in Korea

There are three key elements of the institutional arrangements made by the government: (i) a strategy and an action plan; (ii) high-level visibility for green growth policy; and (iii) the involvement of all related ministries, with particular emphasis on the private sector as a core contributor.

1. The National Strategy for Green Growth was adopted along with the Five-Year Plan for Green Growth. The National Strategy (2009–2050) was the central government's plan for green growth and envisaged three main objectives with ten specific policy directions. In addition, to implement the agenda set out in the National Strategy in a systematic and consistent manner, the government developed the Five-Year Plan (2009–2013), which had been a very effective tool during the early stages of the Korean economic boom.

The first objective was to deal effectively with climate change and attain energy independence. This objective called for actions such as setting medium- to long-term mitigation goals, increasing the use of new and renewable energy sources, and strengthening the nation's adaptation capacities to counter the adverse impacts of climate change. The second objective was to create new engines of growth on multiple fronts. Emphasis was placed on increasing strategic investments in the research and development of green technology, establishing the structure for green finance, and introducing tax incentives for eco-friendly activities. The third objective was to raise the overall quality of life for the people and to enhance contributions to the international community through strong advocacy for green growth. Taking the importance of behavior change into account, the government implemented public campaigns, like the Green Start movement[1], designed to enhance citizens' understanding and participation.

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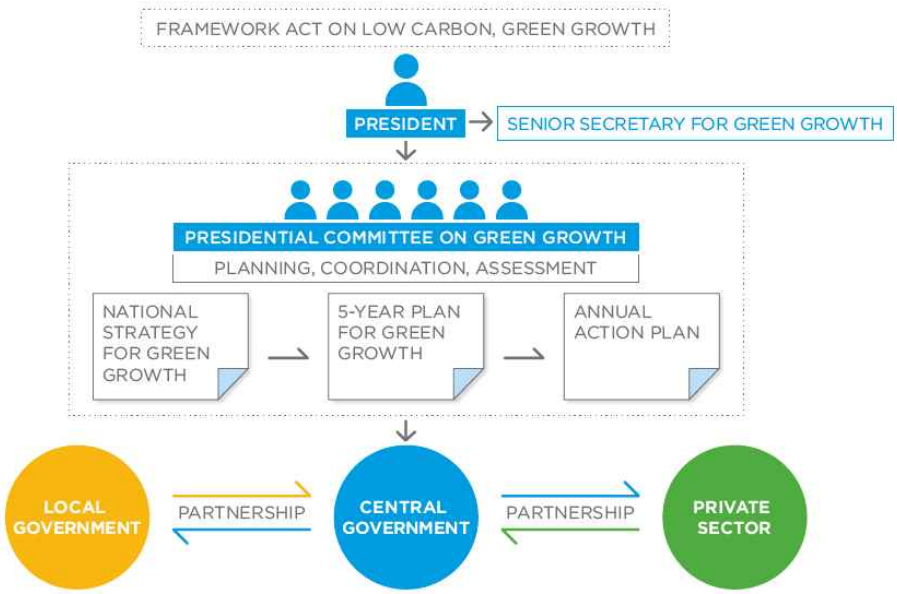
[1] *The Green Start movement aimed to reduce GHGs and realize low-carbon green growth by establishing green lifestyles in the non-industrial sector, including homes, transportation, and businesses, through cooperation among the government, industries, and civic groups.*

FIGURE 1. THREE OBJECTIVES AND TEN DIRECTIONS OF GREEN GROWTH

MITIGATION OF CLIMATE CHANGE & ENERGY INDEPENDENCE	CREATING NEW ENGINES FOR ECONOMIC GROWTH	IMPROVEMENT IN QUALITY OF LIFE AND ENHANCED INTERNATIONAL STANDING
Effective mitigation of greenhouse gas emissions	Development of green technologies	Development of green cities, construction of green transportation infrastructure, and improvement of water management
Reduction of the use of fossil fuels and the enhancement of energy independence	Greening of existing industries and promotion of green industries	Bringing green revolution into our daily lives
Strengthening of the capacity to adapt to climate change	Advancement of industrial structure	Becoming a role-model for the international community as a green growth leader
	Engineering of a structural basis for green economy	

2. The Lee administration established the new position, Senior Secretary for Green Growth, in the Presidential Office. The position was first called the Secretary of Future Vision, but was later renamed and promoted, taking on a monitoring role for the "Low Carbon, Green Growth" strategy and playing a key role in transforming presidential endorsement into actual implementation of green growth initiatives. Through the collaborative teamwork between this position and the Presidential Committee on Green Growth (PCGG), Korea was able to scale up the governance structure not only for formulating green growth strategies and policy, but also for monitoring them constantly, allowing for policy and technical adjustments as needed.

FIGURE 2. INSTITUTIONAL FRAMEWORK FOR GREEN GROWTH



Private sector participation was also imperative in order to prompt behavior change within the private sector and resulted in the launch of five Green Growth Private Sector Consultative Bodies, bringing business, scientists, civil society, information technology, and financial leaders together to obtain expert advice and promote private sector involvement in green growth policies.

3. Korea established the PCGG as the highest inter-ministerial institution, with broad engagement from the private sector. This Committee was co-chaired by the Prime Minister and a representative of the private sector, and consisted of relevant government ministers and representatives from private stakeholders. The Committee's mandate was to discuss all subjects relevant to pursuing green growth, as well as coordinate government work in this area. Similar to the central PCGG, a Regional Committee on Green Growth was composed to deliberate on matters relating to green growth policy formulation and implementation at the local government level. Through these central and regional committees, the planning and implementation of green growth initiatives were monitored and encouraged to achieve planned outcomes. Private sector participation was also imperative in order to prompt behavior change within the private sector and resulted in the launch of five Green Growth Private Sector Consultative Bodies, bringing business, scientists, civil society, information technology, and financial leaders together to obtain expert advice and promote private sector involvement in green growth policies.

B. Fiscal Adjustments for Green Growth

With regard to fiscal adjustments that enabled Korea to implement green growth, there were four noteworthy points considered: (i) green growth needed to be monetized in the form of a budget policy; (ii) the central finance and planning agency had to play a leading role; (iii) a green growth budget increase should not necessarily require a decrease in health and education budgets; and (iv) reallocation of budget resources for green growth was needed in some expenditure sectors.

1. There was no separate green stimulus package. Green growth was fully integrated into Korea's April 2009 supplementary budget. From late 2008 into early 2009, countries around the world began issuing economic stimulus packages to address the global financial crisis. In view of the degree to which Korea was affected by the crisis, it also needed to join this undertaking.

In January 2009, the government launched the Green New Deal, which identified key projects focused on renewable energies, energy efficient buildings, low-carbon vehicles and railroads, and water and waste management. For this New Deal, the government established an investment plan of KRW 50 trillion (USD 38.5 billion) for 2009 to 2012. At the same time, the supplementary budget was prepared, of which the green stimulus package—including infrastructure investment to revitalize the economy and create green jobs—was a key component. At KRW 17.9 trillion, 6.3 percent of the original FY2009 budget, the supplementary budget was the largest in Korea's fiscal history, and many green growth-related programs were included in the expenditure increases.

2. One of the key success factors was that the central finance and planning agency proactively supported integration of green growth programs into national budget allocation. Green growth was a priority during the Lee administration. In order to link the administration's agenda and public spending, the Ministry of Strategy and Finance (MOSF), the central finance and planning agency in Korea, accorded high priority to green growth initiatives when formulating medium-term expenditure plans and compiling annual budgets. Thus, the request for fiscal support in the Five-Year Plan for Green Growth was fully reflected in the Five-Year National Fiscal Management Plan (2009-2013), Korea's medium-term expenditure plan, as well as in subsequent annual budgets.

The government also established the "2 percent budget rule", a policy whereby 2 percent of GDP would be allocated over five years for the implementation of green growth strategies. The total amount projected over the five-year period was KRW 107.4 trillion, with actual expenditure expected to be KRW 110.6 trillion (Figure 3). Of the three priority objectives, adaptation to climate change made use of the highest portion of funds (55 percent) due mainly to the Four Major River Restoration Project[2], which totaled KRW 14.3 trillion over the period (Figure 4).

FIGURE 3. GREEN GROWTH BUDGET (IN KRW TRILLION)

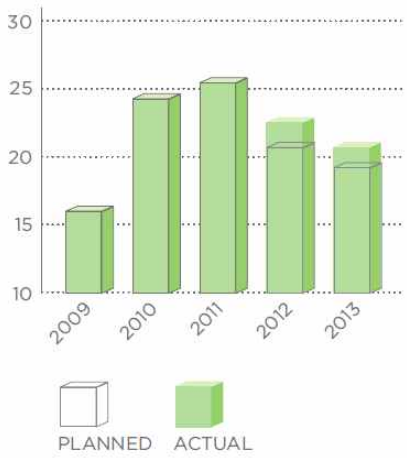
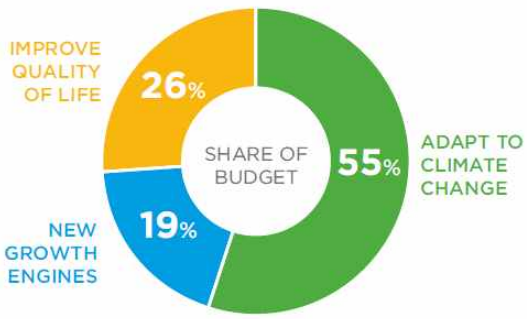


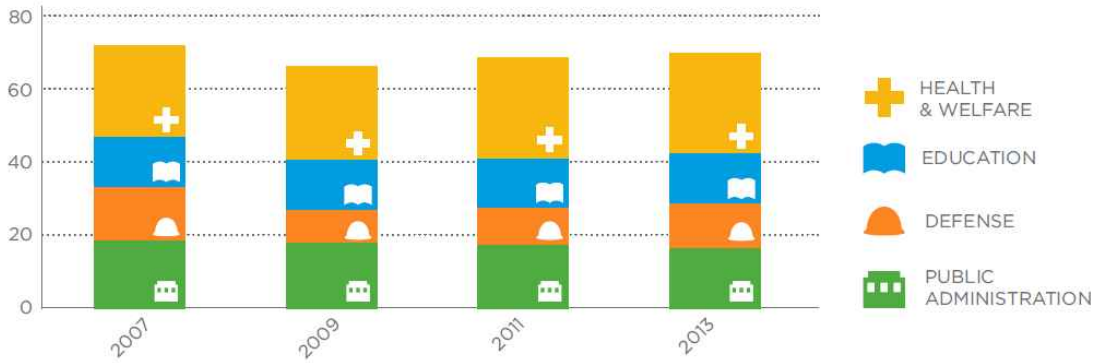
FIGURE 4. SHARE OF BUDGET (2009–2013)



[2] *The Four Major River Restoration was a water project that constructed barrages and dredged in the four main rivers of the Republic of Korea, with the following objectives: (i) secure abundant water resources to combat water scarcity; (ii) implement comprehensive flood control measures; (iii) improve water quality and restore ecosystems; (iv) create multipurpose spaces for local residents; and (v) pursue regional development centered around rivers.*

3. At the outset, there was concern that a green growth budget increase could come at the expense of other crucial budget items. However, data since 2007 shows this was not the case. The national budget was reprioritized by the MOSF to include green growth among expenditure sectors, without having an adverse effect on budget allocations for important public goods, such as health and welfare and education. In fact, the budget amounts and the share of the overall budget allocated to such public goods were continuously increased—health and welfare increased from 25.8 percent in 2007 to 28.5 percent in 2013, while education increased from 13 percent to 14.6 percent over the same period (Figure 5). The necessary funds were mobilized through an expenditure review process by cutting expenditure on programs with low execution rates and poor performance. Additional resources were made available following efforts to reduce public administration expenses by 10 percent.

FIGURE 5. BUDGET TREND BY SECTORS (SHARE OF TOTAL BUDGET, %)



4. Fiscal adjustments in budget allocation were made within specific expenditure sectors. In the transport sector, for example, budget priority was transferred from roads to railroads in pursuit of green growth, resulting in an increase in the share of the budget allocated to railroads from 19 percent in 2007 to 25 percent in 2013. Following this, the ratio of roads over railroads in the transport budget decreased from 1.6 to 1.2. Additionally, in the R&D sector, greater priority was accorded to investment in green R&D, resulting in an increase of the proportion of green R&D to total R&D from 16.5 percent in 2009 to 22.2 percent in 2012.

IV. KEY OUTCOMES

It is too early to comprehensively evaluate the results of Korea's green growth as only five years have elapsed since Korea launched green growth as a national development strategy. However, some outcomes are already evident.

1. Most significantly, Korea's green growth policy has given a boost to the development of green technology and the green industry. The renewable energy industry has grown 6.5 times in terms of sales and 7.2 times in terms of exports since 2007 (Figure 6), while the green R&D budget has more than doubled from 2008 to 2012. Moreover, private green investment was invigorated, with green investment by the top 30 conglomerates showing a 75 percent annual increase between 2008 and 2010 (Figure 7). The field showing the most notable achievements is the new growth engine field. This includes the completion of the world's largest electric car battery factory, which placed second in terms of LED production and posted a drastic turnaround from a trade deficit to a surplus in 2010. These large gains were due mainly to the first mass production of 40-inch LED TVs in the world (Figure 8) and the launch of Korea's first mass-produced electric car.

FIGURE 6. RENEWABLE ENERGY INDUSTRY (IN USD BILLION)

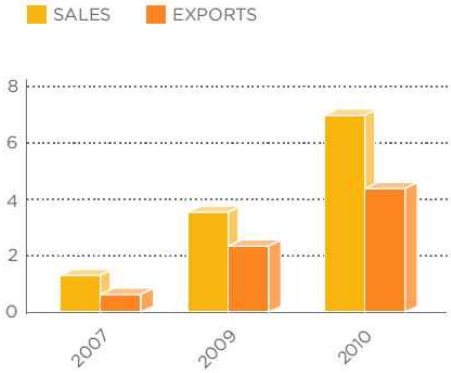


FIGURE 7. GREEN R&D AND INVESTMENT (IN KRW TRILLION)

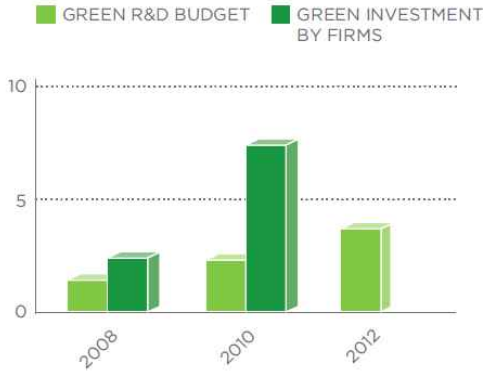


FIGURE 8. TRADE BALANCE OF LED (IN USD BILLION)

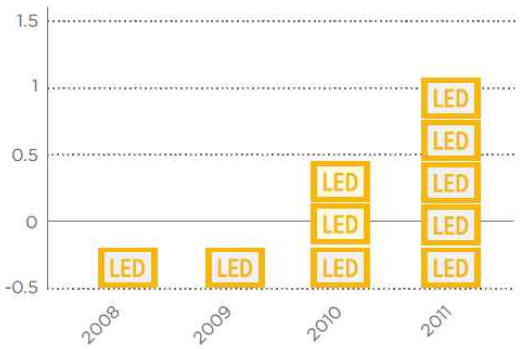
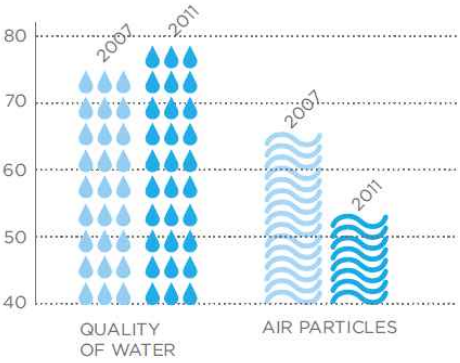


FIGURE 9. QUALITY OF ENVIRONMENT (%, MICROGRAMS)



2. Climate resilience has been strengthened, and quality of life has improved. The ability to respond to the effects of climate change on water resources and natural disasters has been enhanced. One of the most notable achievements is that stable water resources, which act as a contingency in the event of droughts and flooding, have been secured through the Four Major River Restoration Project and the construction of small and large eco-friendly dams. Furthermore, the quality of life has been enriched as air and water quality in urban areas has improved. For example, the proportion of quality water rose from 75 percent in 2007 to 78 percent in 2011, and whereas air particles were measured at 65 micrograms in 2007, they had dropped to 54 micrograms by 2011 (Figure 9).

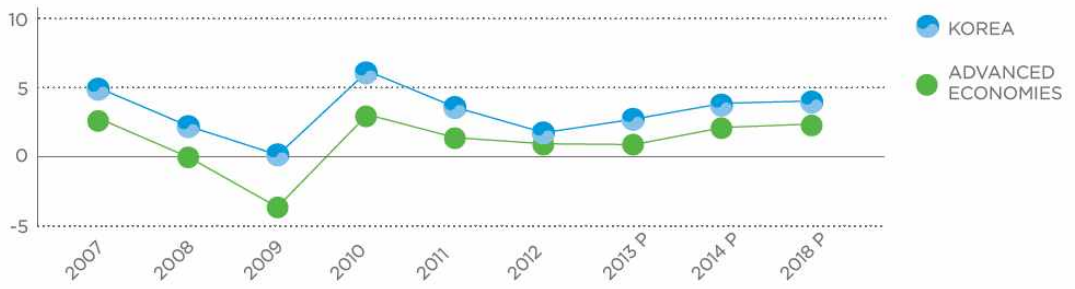
V. LESSONS LEARNED

Although the green growth movement in Korea has only recently been launched as a long-term strategy until 2050, several lessons can be learned from the experience thus far.

1. Environmental awareness and economic development are not mutually exclusive and can be balanced. As shown in Figure 10, the Korean economy rapidly recovered in 2010 from the global financial crisis, and the real GDP growth rate has increased at a similar pace overall since 2007 as that of advanced global economies. There is no evidence to date that green growth implementation in Korea had and shall have an adverse effect on its economic growth. In particular, for countries like Korea with a high dependence on foreign energy resources and fossil fuels, a low-carbon strategy would be imperative for sustainable economic growth in the medium to long term.

In addition, fiscal support for green growth did not prove detrimental to other crucial budget items. Some may argue that health and education budgets must be cut in order to increase the green growth budget. However, by taking measures to reallocate budget resources among expenditure sectors and to reprioritize among budget programs, for example roads and railroads, Korea was able to mobilize resources for green growth while increasing budget allocations for health and education. Evidently, budget allocation among green growth and other critical sectors does not need to be a zero-sum game.

FIGURE 10. REAL GDP GROWTH RATE (%) *Source: World Economic Outlook (IMF, 2013)*



2. Participation in a global drive to mitigate climate change can prove beneficial to a country's domestic interests. Korea actively took part in the global movement to be a responsible member of the global community. It may be argued that compliance with the global movement to reduce GHG emissions presents threats to a country's economic development. However, Korea's participation in this international movement did not require a trade-off against its domestic interests. In view of the rapid rise in temperature and Korea's highly fossil fuel-dependent industry structure, Korea urgently needed to contribute actively to the global movement to ensure its own sustainable economic growth and improvement of the quality of life.

3. Effective institutional arrangements are critical to the success of a national green growth vision. A national vision may have strong support from the President, but it cannot produce concrete results without systemic institutional measures to support the vision. As the green growth agenda is a multifaceted issue with many stakeholders, an inter-ministerial body was invaluable in providing oversight and for the design, coordination, and monitoring of the green growth strategy and related policies. The Presidential Committee on Green Growth acted effectively in this capacity, along with the Secretary to the President for Green Growth, and was endowed with the authority to implement, monitor, and make adjustments as needed.

4. The likelihood of success is greater when the central finance and planning agency plays an active role. In general, the central budget agency has a tendency to have a conservative approach to new, large-scale expenditure. There were several elements in Korea, however, that made the agency take a proactive stance in leading fiscal support for green growth programs. First, green growth was a priority on the presidential agenda and the PCGG communicated continuously with the agency. Moreover, the Five-Year Plan for Green Growth included an investment plan for 2009 to 2013, which set forth the total amount projected and main programs targeted, all of which was agreed with the agency. Finally, Korea's budget process and practice have been well aligned so to integrate policy into budget allocation in both annual and medium-term plans. Therefore, the Five-Year Plan for Green Growth was fully integrated into the Five-Year National Fiscal Management Plan.