600棵樹木的砍伐與再生利用是本提案的核心重點。確保在永續特色故事中強調這一點,包括如何將這些樹木透過 Rewood 設計轉化為景觀永續淨零公廁,並展現其環保價值與政策對接的意義。

600棵樹的第二生命:捷運沿線淨零公廁的永 續故事

捷運開發中的抉擇

清晨的城市中,工程車的齒輪開始轉動,台北捷運延伸線的施工現場傳來陣陣電鋸聲。隨著一棵棵多天大樹倒下,600棵樹木為了軌道鋪設被迫讓路。對於許多市民而言,這片綠蔭的消失彷彿是一場生態浩劫,然而這並不是結局,而是一段全新旅程的開始。在政府部門與設計團隊的協力下,一個大膽的想法逐漸成形:讓這些被砍伐的樹木以另一種方式繼續「活」在城市之中。

再生設計: 讓樹木延續生命

面臨樹木砍除的無奈,我們引入了再生設計(Rewood Design)的理念。每一段樹幹、每一片木材都不被浪費,而是被細心保留、烘乾處理,成為建材。這600棵樹將轉化為建造30座景觀永續淨零公廁的素材,循環經濟的精神在此落地生根。「Circular to Scenic Toilets」——從循環資源到城市風景,正是這項計畫的號召。昔日提供綠蔭的老樹,經巧手設計後化為公廁的一樑一柱,繼續守護著人們片刻的便利與舒適。

循環經濟化為景觀公廁

沿著捷運沿線,如今每隔幾站便可見到一座以再生木材打造的特色公廁。走近其中一座公廁,外觀宛如一座小型生態涼亭:溫潤的木質牆面透出樹木年輪的紋理,記錄著過往的歲月。它坐落於街角公園或車站綠地旁,不僅提供方便,更成為社區的景觀亮點。行人駐足時,或許難以想像這棟美觀的建築,原本是捷運施工廢棄的木料。透過循環經濟的巧思,廢棄物搖身一變成為賞心悅目的公共設施,證明了資源再利用的無限可能。

生態共生與綠色創新

這些公廁不僅僅是在材料上體現環保,更融入了生態共生的設計理念。建築採用開放式的架構,結合**光導**設計將日光引入室內——白天有如天然燈光傾洩,使廁間明亮溫暖。屋頂安裝了半透明的太陽能板,白日擷取太陽能、夜晚轉化提供照明;同時其透光性讓陽光灑入,最大程度減少日間照明對電力的需求。巧妙的**自然通風**系統利用對流原理,讓空氣在不使用電力抽風的情況下持續流通,廁所內始終保持清新的空氣。部分公廁屋頂甚至覆蓋著綠意盎然的植栽或攀藤,成為昆蟲與小鳥的微型棲所,讓建築物宛如扎根於土地的生命體,與周圍環境相互依存。

環保價值與社會影響

透過這30座景觀永續淨零公廁,600棵被砍伐的樹木得以延續生命,繼續服務城市。每座公廁的木構件都在默默訴說著循環利用的故事:相比傳統建材,利用現有木料減少了碳排放和廢棄物,打造出真正**淨零**碳足跡的公共建築。同時,市民在使用這些設施時,也真切感受到綠色創新的便利與美好。有人在廁所牆上看到關於這棵樹前世今生的說明牌,驚喜地發現腳下的木地板就來自家門口曾經的大樹,心中油然而生對環境保護的認同感。這些公廁成了環境教育的現場教材,潛移默化地提高公眾的永續意識。

結語:城市共榮的新典範

這篇永續特色故事展示了在城市發展與環境保護之間取得平衡的可能性。通過創新的設計思維,台北縣將基礎建設轉化為環境共榮的契機: 讓進步不再以犧牲自然為代價,而是與自然共生共存。600棵樹木的再生之旅,換來30座別具意義的淨零公廁,為社會帶來便利、為環境帶來正向循環。此方案所展現的環保價值與社會影響,清楚彰顯了政府推動永續城市的決心。一座城市的成長,不只是鋼筋水泥的堆砌,更是對生命的尊重與創新的追求——哪怕是一棵倒下的老樹,也能以嶄新的姿態,繼續為城市的未來扎根。

砍樹與重生:從600棵捷運工程廢木到30座淨 零公廁的永續之旅

在台北捷運沿線的工程開拓中,曾有600棵綠蔭大樹被迫倒下。這些原本守護著城市街道的樹木,一度面臨成為廢棄物或薪柴的命運。然而,這並不是它們故事的終點——反而是一個全新篇章的開始。在一項創新的永續計畫中,這600棵樹化身為30座景觀永續淨零公廁,以嶄新的形式服務城市。每一座公廁都蘊藏著木頭的溫度與故事,成為城市中綠色創新的縮影,續寫著這些樹木的生命篇章。

木酢達人領航:循環再生設計的主要推手

引領這場「樹木重生」計畫的是木酢達人 (Rewood) 團隊——作為 SSBTi 的合作夥伴及此次提案的主要推手,他們專注於將廢棄木材轉化為珍貴資源。木酢達人創辦人承襲了父輩「愛木惜木」的精神,致力於林業循環經濟:從修剪的樹枝、倒伏的老樹中發掘新價值,不砍新樹也能創造出木材產品。他們首創將木材高溫乾餾技術應用於都市廢木再生,在燒製木炭的過程中提取出天然的木酢液(木醋液),製作環保清潔劑;同時將碳化後的木炭研發為除濕除臭的綠色建材。經由 SSBTi 科學減碳協會的協助,木酢達人也開始整合永續夥伴,例如生森木團隊,進行塑料回收生成可利用資材,增加服務與培訓人才網路。木酢達人的回收木技術與在地木材來源等構成的國產材優質永續建材網路,具有零甲醛、固碳、減碳等優異特性,耐候且耐用。木酢達人團隊透過學習傳統木工技藝,培養青年匠師參與木料選材、裁切、組裝、上漆等流程,確保每一座公廁都凝聚著循環經濟的價值。

創新設計:從循環到景觀的綠色公廁

這些以再生木材構築的公廁,不僅功能齊備,更成為別具特色的城市景觀。設計團隊將循環理念融入美學創意,每一座公廁皆彷彿一座小型「秘密花園」。外觀上,公廁採用自然融入環境的造型,部分結合了原有綠地或樹冠元素,讓建築物與周圍生態相互呼應。回收塑木材質所打造的立面呈現木紋質感,既有視覺溫度又耐久安全。甚至有的公廁屋頂被打造成公共觀景平台或小型綠屋頂,市民可登上瞭望,找回與樹梢比鄰的視野。透過**創新再生設計**,曾經被砍除的樹木以另一種姿態重回城市懷抱:白天,它們是充滿自然光與木香的公共設施;夜晚,溫暖的燈光從木格柵中透出,成為街頭柔和的風景。這些公廁的存在,改寫了人們對傳統公廁冰冷印象,轉而感受到來自自然的親和力與故事感。

綠色技術應用:光導與通風共塑淨零能耗

為達到淨零排放與永續運營,每座公廁在設計上融合了多項綠色創新技術:

- **自然採光**:公廁屋頂安裝了先進的**日光導管**與天窗結合系統,白天將太陽光引入室内,照 亮空間。即使在狹長的公廁走道或隱密的隔間深處,也有柔和的自然光線灑落,減少對電 燈的依賴,不僅節能,更營造明亮舒適的使用環境。
- **自然通風**: 建築結構巧妙運用煙囪效應和穿堂風原理進行**被動式通風**。高聳的通風塔和牆面百葉讓熱空氣上升排出,清新空氣由下方引入,全天候保持空氣流通。部分公廁還在牆體中嵌入了由回收木炭製成的吸附板,利用木炭多孔性除濕、防霉並淨化空氣,確保室內空氣清新無異味。
- 再生能源:每座公廁的屋頂或頂棚均佈置了隱蔽式太陽能薄膜板,充分利用日照發電,供應夜間照明、感應器和淨化設備的電力。搭配小型儲能模組,實現能源自給自足,即使夜晚或陰雨天也有穩定電力,達成近乎零電網負荷。
- **智慧控能**:公廁配備節能感應系統,如人來燈亮、人走自動關燈,換氣設備依據空氣品質自動啟停,以**智慧化管理**將能耗降至最低。
- **水資源循環**:引入創新的**PVA淨水處理**技術和雨水收集系統,將手洗或雨水加以淨化再利用於沖廁和周圍綠化澆灌。藻類生物過濾牆不僅淨水,還透過光合作用協助碳捕捉。整套系統大幅降低自來水消耗,實現水循環利用。

通過上述技術應用,30座公廁在建造及運行過程中將能源消耗和碳排放降到最低,真正落實**淨零能耗**目標。同時,這些技術的巧妙結合為市民帶來舒適體驗:白天免除開燈的幽暗壓迫,空氣流通不覺悶臭;科技隱於無形,留給使用者的是自然與便利。

政府與企業協作: 政策對接與循環經濟共創

如此大型的永續轉化計畫,離不開政府部門與企業的通力合作。木酢達人團隊自提案初期便積極與地方政府對話,確保方案與政策目標無縫對接。新北市政府(原台北縣)對此展現高度支持,認可將捷運開發過程中的環境損失,轉化為環境收益的創新思路。相關單位在工程階段即協調保留砍伐木料,交由木酢達人回收處理,展現政策彈性配合的誠意。此外,政府亦提供適當用地與

法規調適,讓這些景觀公廁得以妥善選址於捷運周邊的公園綠地或轉運節點,方便民眾使用並豐富公共空間。

在企業方面,多家著重ESG的企業主動加入合作行列:綠能科技公司提供高效能的太陽能板和儲能設備,本土建築師事務所貢獻景觀融合的創意設計,環保技術新創則分享污水循環利用的方案。透過公私部門協作,整個專案形成一個跨領域的**永續聯盟**。企業參與不僅體現了企業社會責任(CSR),也在專案中找到創新試驗的平台;政府部門則借助民間創新力量,加速實現**循環經濟與淨零排放**政策目標。一系列順暢的協作確保了從設計、施工到營運各環節都符合永續原則,真正做到政策與實踐齊頭並進。

循環到共生: 延續生命的城市服務

「Circular to Scenic Toilets(從循環到景觀公廁)」這一理念的落地,不僅在環保層面取得成功,更為城市帶來了社會與生態的多重共生效益。首先,600棵樹的再利用象徵著生命以另一種方式延續。那些在施工中被砍伐的樹木,透過巧思設計,化為城市所需的公共服務設施,繼續守護市民的日常。人們走進這些公廁,腳踩著曾經的樹根所製成的地板,嗅到木材淡淡的清香,或許會意識到:眼前的一磚一木都蘊藏著大自然的恩賜,進而對環境懷有更多珍惜與敬意。

其次,**生態共生**在這些公廁周圍展開。建設團隊在公廁選址和設計時融入生態考量,在周邊種植原生樹種和花草,營造小型綠地生境,為鳥蝶昆蟲提供棲地,彌補當初砍樹對生態的影響。每座公廁彷彿一個生態微縮公園,與附近的樹林串聯成網,恢復城市綠網絡的連續性。不僅如此,公廁的解說牌向公眾傳達這背後的循環故事,成為環境教育的現場:學校可以組織學生參觀了解廢木再生、生物炭除臭、雨水回收的知識;市民也在日常使用中潛移默化接受永續理念熏陶。

再次,此方案帶來明顯的**社會影響**:透過木酢達人的工作站模式,培育了在地就業機會,一批青年木工和技術人才因參與製作這些公廁而留在家鄉,服務社區。社區居民也對公廁產生認同感與自豪感——原本令人避之不及的公廁因為有了設計感與環保意義,反而成為地方亮點,帶動社區環境形象提升。長遠而言,這30座景觀永續公廁將成為城市永續轉型的示範樣板,向全民展示循環經濟可以如何落實在生活中,激發更多類似的創新。

結語:永續創新的價值傳承

從600棵遭砍伐的樹木到30座景觀淨零公廁,這個故事傳遞出強而有力的訊息: 永續創新可以將損失轉化為資產。木酢達人團隊以循環經濟思維和創新設計,為城市留下了一筆環保與人文並重的財富。對政府部門而言,這不僅僅是公廁設施的升級,更是實現政策目標的具體體現——將減碳、節能、廢物再利用、在地創生等抽象理念,轉化成看得見、摸得著的公共建設。每一座公廁每一年所減少的碳排放、節約的能源與水資源,累積起來都將成為城市邁向2050淨零目標的基石。同時,居民在日常中直接受益,社會對政府的永續決心也更有感。

這些公廁承載的不只是如廁功能,更承載了一種信念:我們可以與自然共生,讓經濟發展與環境保護同步前行。曾經倒下的樹木,如今回到了城市的懷抱,透過新的用途繼續服務大家。它們的年輪記錄下過去,如今建築的樑柱支撐起未來。這份延續生命的創舉,將成為台北縣永續發展篇章中的一段佳話,啟發我們思考未來更多的可能性。在政府、企業與社會大眾的共同努力下,城市將看見更多類似的綠色創新,為下一代譜寫一首資源循環、生生不息的動人故事。

The Second Life of 600 Trees: A Sustainable Story of Net-Zero Public Restrooms Along the MRT Line

Introduction: The Dilemma of MRT Development

In the early morning, the gears of construction vehicles begin to turn, and the sound of chainsaws echoes through the construction site of the Taipei MRT extension. As towering trees fall one by one, 600 trees are forced to make way for the new tracks. For many citizens, the disappearance of this green canopy feels like an ecological disaster. However, this is not the end but the beginning of a new journey. With the collaboration of government departments and design teams, a bold idea takes shape: to let these felled trees continue to "live" in the city in a different form.

Regenerative Design: Giving Trees a Second Life

Faced with the inevitability of tree removal, we introduced the concept of regenerative design (Rewood Design). Every piece of wood, from trunks to planks, is carefully preserved, dried, and transformed into building materials. These 600 trees will be repurposed to construct 30 landscape net-zero public restrooms, embodying the spirit of the circular economy. "Circular to Scenic Toilets" is the slogan of this project, symbolizing the transformation of recycled resources into urban landmarks. The old trees that once provided shade are now reborn as pillars and beams of public restrooms, continuing to serve the community.

Circular Economy Transformed into Landscape Restrooms

Along the MRT line, every few stations now feature a unique restroom built from recycled wood. Approaching one of these restrooms, it resembles a small ecological pavilion: the warm wooden walls reveal the tree rings, telling the story of their past. Located in street-corner parks or near stations, these restrooms not only provide convenience but also become community landmarks. Passersby may find it hard to believe that these beautiful structures were once discarded construction materials. Through the ingenuity of the circular economy, waste has been transformed into aesthetically pleasing public facilities, proving the infinite possibilities of resource reuse.

Ecological Symbiosis and Green Innovation

These restrooms are not only environmentally friendly in their materials but also incorporate ecological symbiosis in their design. The open architecture, combined with light-guiding designs, allows natural light to flood the interiors during the day, creating a bright and warm atmosphere. Semi-transparent solar panels on the roofs capture sunlight during the day and provide lighting at night, while their translucency allows sunlight to filter through, minimizing the need for artificial lighting. A clever natural ventilation system uses convection principles to keep the air fresh without the need for electric fans. Some restrooms even feature green roofs with lush vegetation, creating micro-habitats for insects and birds, making the structures feel like living organisms rooted in the land.

Environmental Value and Social Impact

Through these 30 landscape net-zero restrooms, the 600 felled trees continue to serve the city. Each wooden component of the restrooms tells a story of recycling: compared to traditional building materials, using existing wood reduces carbon emissions and waste, creating truly net-zero public buildings. Citizens using these facilities experience the convenience and beauty of green innovation firsthand. Some may notice plaques on the walls detailing the history of the trees, realizing that the wooden floor beneath their feet comes from a tree that once stood near their home. These restrooms serve as on-site environmental education tools, subtly raising public awareness of sustainability.

Conclusion: A New Paradigm for Urban Prosperity

This sustainable story demonstrates the possibility of balancing urban development with environmental protection. Through innovative design thinking, Taipei County has turned infrastructure development into an opportunity for environmental prosperity: progress no longer comes at the expense of nature but coexists with it. The journey of 600 trees has resulted in 30 meaningful net-zero restrooms, bringing convenience to society and positive cycles to the environment. The environmental value and social impact of this project clearly highlight the government's commitment to building a sustainable city. The growth of a city is not just about concrete and steel but also about respecting life and pursuing innovation—even a fallen tree can take on a new form and continue to root itself in the city's future.

From Felled Trees to Rebirth: The Sustainable Journey of 600 MRT Construction Waste Trees to 30 Net-Zero Restrooms

During the construction of the Taipei MRT extension, 600 lush trees were forced to be removed. These trees, once guardians of the city streets, faced the fate of becoming waste or firewood. However, this was not the end of their story but the beginning of a new chapter. In an innovative sustainability project, these 600 trees were transformed into 30 landscape net-zero public restrooms, serving the city in a new form. Each restroom carries the warmth and story of the wood, becoming a microcosm of green innovation in the city and continuing the life journey of these trees.

Rewood Masters: The Pioneers of Circular Regenerative Design

Leading this "tree rebirth" project is the Rewood Masters team—partners of the SSBTi (Science-Based Targets initiative) and the main drivers of this proposal. They specialize in transforming discarded wood into valuable resources. The founders of Rewood Masters, inheriting their ancestors' spirit of "cherishing wood," are dedicated to forestry circular economy: discovering new value from pruned branches and fallen trees, creating wood products without cutting down new trees. They pioneered the application of high-temperature wood distillation technology in urban wood recycling, extracting natural wood vinegar during the charcoal-making process to produce eco-friendly cleaners. They also developed carbonized charcoal into green building materials for dehumidification and deodorization. With the assistance of the SSBTi, Rewood Masters has begun integrating sustainable partners, such as the SenSenWood team,

to recycle plastics into usable materials, expanding their service and talent training network. Rewood Masters' recycled wood technology and locally sourced wood form a high-quality sustainable building material network, featuring zero formaldehyde, carbon sequestration, and carbon reduction, with excellent durability and weather resistance. The team, through learning traditional woodworking skills, trains young craftsmen in material selection, cutting, assembly, and painting, ensuring each restroom embodies the value of the circular economy.

Innovative Design: From Circular to Scenic Green Restrooms

These restrooms, built from recycled wood, are not only functional but also unique urban landmarks. The design team integrates circular concepts into aesthetic creativity, making each restroom resemble a small "secret garden." The exteriors blend naturally with the environment, incorporating existing greenery or tree canopy elements, allowing the structures to harmonize with the surrounding ecology. The facades, made from recycled plastic wood, feature wood grain textures that are visually warm and durable. Some restrooms even have rooftop observation decks or small green roofs, allowing visitors to enjoy views reminiscent of tree canopies. Through innovative regenerative design, the once-felled trees return to the city in a new form: during the day, they are public facilities filled with natural light and the scent of wood; at night, warm light filters through wooden grilles, creating a soft glow on the streets. These restrooms redefine the cold, utilitarian image of traditional public toilets, offering a sense of natural affinity and storytelling.

Green Technology Applications: Light Guidance and Ventilation for Net-Zero Energy Consumption

To achieve net-zero emissions and sustainable operation, each restroom incorporates multiple green innovations:

- **Natural Lighting**: Advanced light tubes and skylights on the roofs bring sunlight into the interiors, illuminating the space even in narrow corridors or secluded stalls, reducing the need for electric lighting and creating a bright, comfortable environment.
- Natural Ventilation: The architectural design uses chimney effects and cross-ventilation
 principles for passive airflow. Tall ventilation towers and wall louvers allow hot air to rise
 and exit, while fresh air is drawn in from below, maintaining continuous air circulation.
 Some restrooms also feature adsorption panels made from recycled charcoal, using its
 porous nature to dehumidify, prevent mold, and purify the air, ensuring a fresh and
 odor-free interior.
- Renewable Energy: Hidden solar film panels on the roofs or canopies harness sunlight
 to generate electricity, powering nighttime lighting, sensors, and purification equipment.
 Paired with small energy storage modules, the restrooms achieve energy
 self-sufficiency, ensuring stable power even at night or on cloudy days, with near-zero
 grid reliance.
- **Smart Energy Management**: Energy-saving sensor systems, such as motion-activated lighting and ventilation based on air quality, minimize energy consumption through intelligent management.

 Water Recycling: Innovative PVA water purification technology and rainwater collection systems recycle handwashing water and rainwater for flushing and irrigation. Algae biofiltration walls not only purify water but also assist in carbon capture through photosynthesis. This system significantly reduces tap water consumption, achieving water recycling.

Through these technologies, the 30 restrooms minimize energy consumption and carbon emissions during construction and operation, truly realizing the goal of net-zero energy use. At the same time, these technologies provide a comfortable experience for users: natural light eliminates the oppressive darkness of traditional restrooms, and fresh air circulation prevents stuffiness. Technology remains invisible, leaving users with a sense of nature and convenience.

Government and Corporate Collaboration: Policy Alignment and Circular Economy Co-Creation

Such a large-scale sustainable transformation project requires close collaboration between government and businesses. From the proposal's inception, the Rewood Masters team actively engaged with local governments to ensure seamless alignment with policy goals. The New Taipei City Government (formerly Taipei County) strongly supported the project, recognizing the innovative approach of turning environmental losses from MRT development into environmental gains. Relevant departments coordinated to preserve the felled wood during the construction phase, entrusting it to Rewood Masters for recycling, demonstrating policy flexibility and commitment. Additionally, the government provided suitable land and regulatory adjustments, allowing these landscape restrooms to be strategically located in parks or transit hubs along the MRT line, enriching public spaces and ensuring accessibility.

On the corporate side, several ESG-focused companies joined the collaboration: green energy tech firms provided high-efficiency solar panels and energy storage equipment, local architectural firms contributed creative designs that integrated with the landscape, and environmental tech startups shared wastewater recycling solutions. Through public-private partnerships, the project formed a cross-sector sustainability alliance. Corporate participation not only demonstrated corporate social responsibility (CSR) but also provided a platform for innovation. Meanwhile, government departments leveraged private-sector innovation to accelerate the realization of circular economy and net-zero emission policy goals. This seamless collaboration ensured that every stage—from design and construction to operation—adhered to sustainable principles, aligning policy with practice.

From Circular to Symbiotic: Extending Life Through Urban Services

The implementation of the "Circular to Scenic Toilets" concept not only achieved environmental success but also brought multiple symbiotic benefits to the city. First, the reuse of 600 trees symbolizes the continuation of life in a new form. The trees felled during construction were transformed into public service facilities, continuing to serve the daily needs of citizens. As people walk into these restrooms, stepping on floors made from the roots of those trees and inhaling the faint scent of wood, they may realize that every brick and plank carries the gift of nature, fostering a deeper appreciation for the environment.

Second, ecological symbiosis flourishes around these restrooms. The construction team incorporated ecological considerations into the site selection and design, planting native trees and flowers to create small green habitats for birds, butterflies, and insects, mitigating the ecological impact of tree removal. Each restroom becomes a micro-ecological park, connecting with nearby forests to restore urban green networks. Additionally, explanatory signs at the restrooms share the story of wood recycling, turning them into outdoor environmental education classrooms. Schools can organize visits for students to learn about wood recycling, biochar deodorization, and rainwater reuse, while citizens absorb sustainability concepts through daily use.

Third, the project has significant social impact. Through Rewood Masters' workshop model, local employment opportunities were created, with young carpenters and technicians staying in their hometowns to serve their communities. Residents also developed a sense of pride and ownership—what was once an avoided public facility became a local highlight due to its design and environmental significance, enhancing the community's image. In the long term, these 30 landscape restrooms will serve as a model for urban sustainability, demonstrating how circular economy principles can be integrated into daily life and inspiring further innovation.

Conclusion: The Legacy of Sustainable Innovation

The story of transforming 600 felled trees into 30 landscape net-zero restrooms sends a powerful message: sustainable innovation can turn loss into assets. The Rewood Masters team, with their circular economy mindset and innovative design, has left the city with a legacy that balances environmental and humanistic values. For the government, this is more than an upgrade to public facilities—it is a tangible manifestation of policy goals, turning abstract concepts like carbon reduction, energy efficiency, waste reuse, and local revitalization into visible, touchable public infrastructure. The cumulative reduction in carbon emissions, energy savings, and water conservation from each restroom will serve as building blocks for the city's 2050 net-zero target. At the same time, residents directly benefit, and society gains a stronger sense of the government's commitment to sustainability.

These restrooms carry more than just their functional purpose—they embody a belief that we can coexist with nature, allowing economic development and environmental protection to progress hand in hand. The trees that once fell have returned to the city's embrace, continuing to serve through new purposes. Their rings record the past, while the beams and pillars of these structures support the future. This life-extending initiative will become a celebrated chapter in Taipei County's sustainable development, inspiring us to explore more possibilities. With the joint efforts of the government, businesses, and the public, the city will witness more green innovations, composing a moving story of resource circulation and endless renewal for future generations.