ARCH CU

Photographer: https://www.archdaily.com

Lecture

Creative Regeneration to Support a Decarbonised Built Environment: Notes From Europe

21 January 2025

Creative Regeneration to Support a Decarbonised Built Environment: Notes from Europe

วันที่ 21 มกราคม พ.ศ. 2568 ณ คณะสถาปัตยกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ผู้เข้าร่วมเสวนา: PROFESSOR PROFESSOR MANUELA GRECCHI , GABRIELE MASERA, AND MATTEO RUTA, FROM Department of Architecture, Built Environment and Construction Engineering Politecnico di Milano

Adaptive Reuse of Industrial Heritage: how to find new uses between historical memory and innovation

Why reuse derelict buildings?

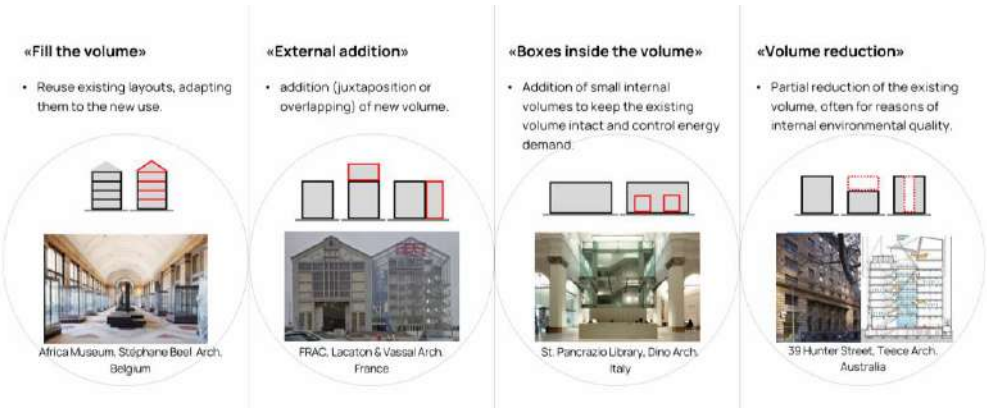
ในปัจจุบันมีความต้องการใช้พื้นที่เพิ่มขึ้นจึงเป็นเหตุผลที่ควรปรับปรุงและนำอาคารเก่ากลับมาใช้งาน แทนการรื้อถอนและสร้างใหม่ ปัจจัยสำคัญที่สนับสนุนแนวคิดนี้ ได้แก่ การเติบโตของประชากรโลกซึ่งคาดว่าจะถึง 9 พันล้านคนภายในปี 2050 โดย 70% จะอาศัยอยู่ในเขตเมือง ซึ่งหมายความว่าการขยายตัวของเมืองในแนวราบเป็นไปได้ยาก การใช้ทรัพยากรพลังงานในอาคารเก่าก็เป็นประเด็นสำคัญ เนื่องจากการปรับปรุงอาคารเดิมให้มีประสิทธิภาพด้านพลังงานสามารถช่วยลดการใช้พลังงานสำหรับระบบทำความร้อนและความเย็น และสุดท้ายคือการลดปริมาณคาร์บอนไดออกไซด์ ซึ่งอาคารเก่ามักเป็นแหล่งปล่อยก๊าซเรือนกระจกที่สำคัญ

Adaptive reuse process

ภาพจากการบรรยายของ Manuela Grecchi

ในด้านกระบวนการปรับปรุงอาคาร มีแนวทางที่สามารถนำมาใช้ได้หลายรูปแบบ โดยแนวคิดสำคัญคือ การลดผลกระทบต่อสิ่งแวดล้อม การอนุรักษ์ทรัพยากร และการตระหนักถึงคุณค่าทางสถาปัตยกรรมของอาคารที่มีอยู่แล้ว ไม่ว่าจะเป็นคุณค่าทางประวัติศาสตร์ คุณภาพของอาคาร ปัจจัยทางสังคมที่เกี่ยวข้องกับความทรงจำของชุมชน และหลักการพัฒนาอย่างยั่งยืน กระบวนการฟื้นฟูอาคารเก่ามักเริ่มจากการเก็บรวบรวมข้อมูลเชิงลึกของอาคาร รวมถึงประวัติการใช้งานและการเปลี่ยนแปลงในอดีต ก่อนที่จะนำข้อมูลมาวิเคราะห์เพื่อกำหนดวิธีการปรับปรุงที่เหมาะสม และสุดท้ายคือการวางแนวทางการใช้สอยใหม่ให้สอดคล้องกับบริบทแวดล้อม

Building on what is already built



ภาพจากการบรรยายของ Manuela Grecchi

ในเชิงสถาปัตยกรรม การแทรกแซงที่เหมาะสมควรมีความชัดเจนระหว่างโครงสร้างเดิมและองค์ประกอบใหม่ อาจใช้แนวทางต่าง ๆ ได้แก่ 1 Fill the volume : การใช้พื้นที่ภายในให้เกิดประโยชน์สูงสุด – ปรับปรุงฟังก์ชันของพื้นที่โดยไม่กระทบโครงสร้างหลัก 2 External addition : การเพิ่มส่วนต่อขยายที่แตกต่างจากของเดิม – เพื่อให้เห็นถึงการเปลี่ยนแปลงของอาคาร 3 Boxes inside the volume : การสร้างโครงสร้างภายในเพื่อควบคุมสภาพอากาศ - ลดการใช้พลังงานในการปรับอุณหภูมิภายใน 4 Volume reduction : การลดขนาดอาคารเพื่อเพิ่มประสิทธิภาพในการใช้พลังงาน - ปรับให้เหมาะสมกับสภาพแวดล้อมและแสงธรรมชาติ

Industrial heritage: the case of railway stations reuse

สถานีรถไฟที่ถูกทิ้งร้างเป็นส่วนหนึ่งของมรดกอุตสาหกรรมที่สะท้อนถึงประวัติศาสตร์การพัฒนาเมืองและระบบคมนาคมในอดีต นอกจากบทบาทดั้งเดิมในฐานะศูนย์กลางการเดินทาง สถานีรถไฟยังเป็นสถานที่แห่งความทรงจำที่เชื่อมโยงผู้คนเข้ากับอดีต ทั้งในแง่ของประสบการณ์ส่วนตัวและเหตุการณ์สำคัญทางประวัติศาสตร์ การฟื้นฟูสถานีรถไฟที่ถูกปล่อยร้างให้กลับมามี

ชีวิตอีกครั้งจึงไม่ใช่เพียงการปรับปรุงโครงสร้างทางกายภาพ แต่ยังเป็นการรักษาอัตลักษณ์ทางวัฒนธรรมและส่งเสริมความเข้าใจในอดีตของชุมชน การนำสถานีเก่ากลับมาใช้ใหม่ในรูปแบบต่างๆ เช่น พิพิธภัณฑ์ ศูนย์ศิลปะ หรือพื้นที่สาธารณะ ช่วยให้สถานที่เหล่านี้ยังคงเป็นส่วนสำคัญของเมืองและสามารถสื่อสารเรื่องราวในอดีตสู่คนรุ่นใหม่ได้

Examples

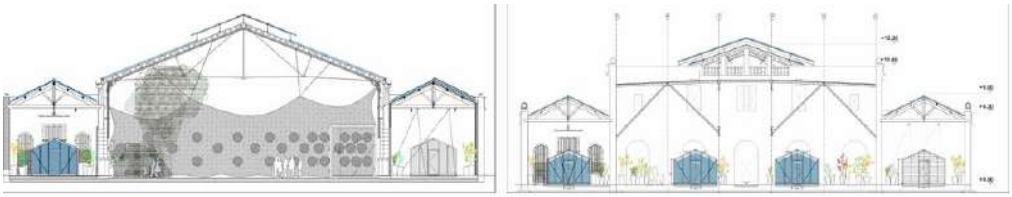
ตัวอย่างโครงการที่น่าสนใจโดยเป็นการใช้วิธี Fill the volume ลงในอาคาร เช่น Musée d'Orsay ในปารีส ซึ่งแสดงให้เห็นถึงการผสมผสานระหว่างสถาปัตยกรรมเก่ากับฟังก์ชันใหม่ได้อย่างมีประสิทธิภาพ

ภาพซ้าย D'Orsay Museum ก่อนการปรับปรุง ภาพขวา D'Orsay Museum หลังการปรับปรุง

อีกตัวอย่างหนึ่งคือ mAAch ecute Manseibashi, Tokyo: การฟื้นฟูสถานีรถไฟเก่ามันเซบาชิให้กลายเป็นศูนย์การค้าและพื้นที่สาธารณะ โดยคงโครงสร้างเดิมและผสมผสานองค์ประกอบสมัยใหม่ เปิดพื้นที่ให้ประชาชนสามารถเข้าถึงและเรียนรู้ประวัติศาสตร์ของสถานีในขณะที่ส่งเสริมการใช้พื้นที่เชิงพาณิชย์เพื่อกระตุ้นเศรษฐกิจในท้องถิ่น

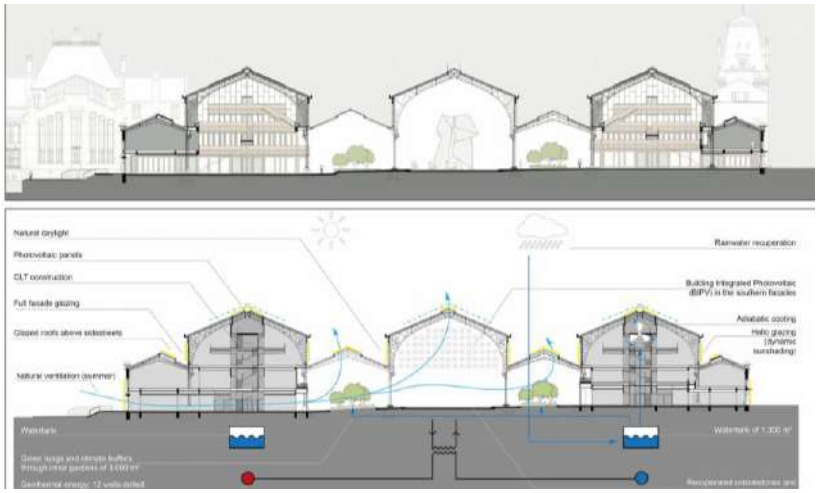
ภาพจากการบรรยายของ Manuela Grecchi

ตัวอย่างโครงการที่น่าสนใจโดยเป็นการใช้วิธี Boxes inside the volume เช่น Mediterranean House, Benalua (Spain) ที่มีการปรับปรุงอาคารเก่าให้เหมาะกับภูมิอากาศเมดิเตอร์เรเนียน เน้นการใช้วัสดุที่ช่วยระบายอากาศและแสงธรรมชาติ เพื่อลดการใช้พลังงานและสร้างสภาพแวดล้อมที่ยั่งยืน



ภาพจากการบรรยายของ Manuela Grecchi

อีกตัวอย่างหนึ่งคือการปรับปรุง Gare Maritime, Bruxelles ด้วยการฟื้นฟูสถานีขนส่งสินค้าเก่าให้เป็นศูนย์กลางเชิงพาณิชย์และพื้นที่สาธารณะ ใช้โครงสร้างไม้เพื่อลดผลกระทบต่อสิ่งแวดล้อม และปรับพื้นที่อุตสาหกรรมให้เป็นอาคารแบบผสมผสานเพื่อส่งเสริมการพัฒนาเมืองอย่างยั่งยืน

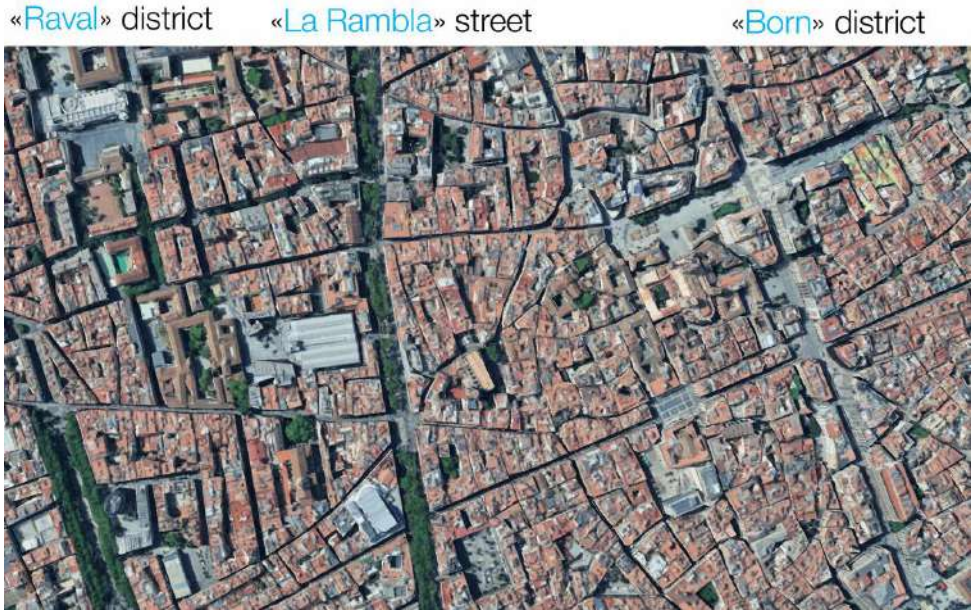


ภาพจากการบรรยายของ Manuela Grecchi

ตัวอย่างโครงการที่น่าสนใจโดยเป็นการใช้วิธี Bottom-up regeneration เช่น High Line, New York (USA) โดยการนำแนวคิดที่มาจากชุมชนและผู้คนในพื้นที่มาใช้ในการออกแบบและพัฒนาพื้นที่นี้ เพื่อให้สวนสาธารณะกลายเป็นสถานที่ที่ตอบสนองความต้องการและสร้างประโยชน์ให้กับชุมชน ทั้งในด้านการพัฒนาเศรษฐกิจและสิ่งแวดล้อม

Redesigning parts of the city by reusing disused areas and buildings: the case of Milan's railway buildings and yards

การฟื้นฟูเมืองและการพัฒนาพื้นที่สาธารณะเป็นหัวข้อที่สำคัญในวงการสถาปัตยกรรมและการวางผังเมือง โดยเฉพาะอย่างยิ่งในเมืองที่มีประวัติศาสตร์และวัฒนธรรมที่หลากหลาย เช่น บาร์เซโลนา-มิลาน การศึกษาในกรณีเหล่านี้แสดงให้เห็นถึงการเปลี่ยนแปลงที่สำคัญที่เกิดขึ้นในเมืองเหล่านี้ ซึ่งไม่เพียงแต่ช่วยแก้ไขปัญหาทางสังคมและเศรษฐกิจ แต่ยังส่งเสริมคุณภาพชีวิตของประชาชนและสร้างสภาพแวดล้อมที่น่าอยู่



ภาพเมืองบาเซโลน่า

ภาพจากการบรรยายของ Matteo Ruta

Raval district

หลังจากที่เมืองนี้เป็นเจ้าภาพจัดการแข่งขันกีฬาโอลิมปิกในปี 1992 เขตราวัล (Raval)ซึ่งเป็นพื้นที่ที่มีความท้าทายทางสังคมและเศรษฐกิจที่ซับซ้อน ได้ผ่านการปรับปรุงและโครงการพัฒนาที่สำคัญ โดยเฉพาะอย่างยิ่งการก่อสร้างพิพิธภัณฑ์ใหม่ที่ออกแบบมาเพื่อตอบสนองการใช้งานสาธารณะที่สำคัญ พิพิธภัณฑ์นี้ทำหน้าที่เป็นศูนย์กลางในการดึงดูดทั้งผู้อยู่อาศัยและนักท่องเที่ยว พร้อมทั้งส่งเสริมกิจกรรมทางวัฒนธรรมที่หลากหลายภายในพื้นที่ การดึงคนให้ออกมาใช้พื้นที่สาธารณะสามารถช่วยลดการเกิดอาชญากรรมในบริเวณชุมชนเหล่านั้นลงได้ เนื่องจากมีสายตาที่คอยสอดส่องของประชาชน

ภาพเมืองพิพิธภัณฑ์

ภาพจากการบรรยายของ Matteo Ruta

อีกหนึ่งตัวอย่างที่น่าสนใจคือการปรับปรุงตลาดซานตา คาเทอรีนา ซึ่งได้รับการปรับปรุงอย่างครอบคลุมโดยสถาปนิกที่มีชื่อเสียง Benedetta Tagliabue และ Enric Miralles การปรับปรุงนี้รวมถึงการเปิดถนนใหม่และการสร้างพื้นที่สาธารณะที่มีชีวิตชีวาและมีสีสัน โดยมีเป้าหมายหลักในการดึงดูดผู้คนให้มาใช้พื้นที่นี้อย่างกระตือรือร้น และแก้ไขปัญหาหลายประการที่เคยเกิดขึ้นในสภาพแวดล้อมรอบๆ เนื่องจากพื้นที่ตลาดเดิม

ภาพตลาดซานตา คาเทรีนา

ภาพจากการบรรยายของ Matteo Ruta

International Expo 2015

เมืองมิลานมีการเปลี่ยนแปลงที่เกิดขึ้นหลังจากงาน International Expo ในปี 2015 งานสำคัญนี้ทำหน้าที่เป็นตัวกระตุ้นในการปรับปรุงพื้นที่ขนาดใหญ่เจ็ดแห่งที่เคยถูกใช้เป็นลานรถไฟเก่าและส่วนใหญ่ไม่ได้ใช้งาน เพื่อให้เกิดการมีส่วนร่วมของประชาชนในการกำหนดวิสัยทัศน์ในอนาคตสำหรับพื้นที่เหล่านี้ มีการจัดเวิร์กช็อปหลายชุดเพื่อให้ประชาชนสามารถแสดงความคิดเห็น เสนอแนวคิดที่เป็นเอกลักษณ์ และนำเสนอแนวทางที่สร้างสรรค์ได้ ทีมสถาปนิกที่มีชื่อเสียงห้าทีมได้เข้าร่วมในเวิร์กช็อปเหล่านี้ โดยแต่ละทีมได้นำเสนอแนวคิดที่หลากหลายและน่าสนใจ แนวคิดหลักที่เกิดขึ้นจากการสนทนาในเวิร์กช็อปคือการฟื้นฟูระบบน้ำที่ซับซ้อนของเมืองมิลาน เพื่อให้สามารถคืนความมีชีวิตชีวาให้กับพื้นที่สาธารณะและส่งเสริมความหลากหลายทางชีวภาพ โดยการสร้างพื้นที่สีเขียวขนาดใหญ่ที่เหมาะสำหรับการพักผ่อนหย่อนใจของประชาชน

ภาพ International expo 2015

ภาพจากการบรรยายของ Matteo Ruta

ภาพ สถาปนิกผู้นำของทั้ง 5 ทีม

ภาพจากการบรรยายของ Matteo Ruta

Farini Scalo

โครงการที่ได้รับรางวัลสำหรับการพัฒนาเขต Farini Scalo จาก OMA โดย Rem Koolhaas ได้นำเสนอแนวคิดการออกแบบที่ยืดหยุ่นและสามารถปรับตัวได้สำหรับการเติบโตที่ยั่งยืน โครงการนี้ตั้งอยู่ในพื้นที่ที่เคยเป็นลานรถไฟร้าง ซึ่งมีศักยภาพที่จะกลายเป็นพื้นที่พัฒนาใหม่ที่เชื่อมต่อระหว่างชุมชนและเมืองอย่างมีประสิทธิภาพ

ภาพ ทางรถไฟที่จะทำการปรับปรุง

ภาพจากการบรรยายของ Matteo Ruta

Farini Scalo มีจุดมุ่งหมายเพื่อเป็นศูนย์กลางที่สามารถเชื่อมต่อชุมชนต่าง ๆ และเป็นที่พบปะสังสรรค์สำหรับประชาชน โดยการสร้างสวนสาธารณะและพื้นที่สีเขียวที่เพียงพอสำหรับกิจกรรมกลางแจ้ง ทั้งนี้ยังมุ่งเน้นไปที่การส่งเสริมความยั่งยืนในทุกด้าน ทั้งในเรื่องของการใช้วัสดุก่อสร้างที่เป็นมิตรต่อสิ่งแวดล้อม การออกแบบระบบน้ำที่จัดการได้อย่างมีประสิทธิภาพ และการสร้างฟังก์ชันที่หลากหลายเพื่อรองรับการใช้งานในอนาคต

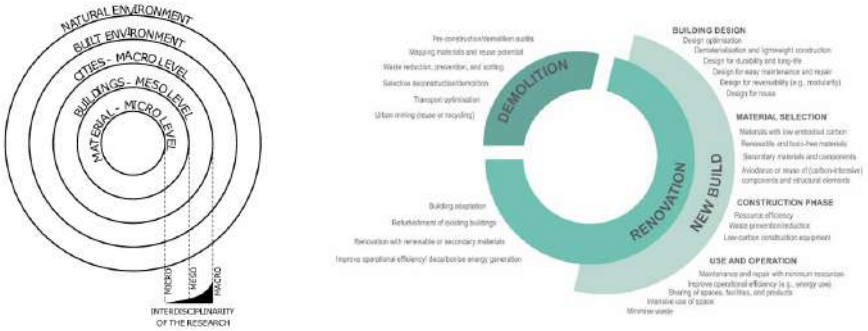
กระบวนการพัฒนา Farini Scalo คาดว่าจะมีผลกระทบที่สำคัญต่อเมืองมิลาน ซึ่งรวมถึงการเพิ่มคุณภาพชีวิต การสร้างงานใหม่ และการฟื้นฟูภาพลักษณ์เมือง การทำให้พื้นที่ที่เคยถูกมองข้ามกลับมามีชีวิตชีวาจะส่งเสริมภาพลักษณ์ของมิลานในฐานะเมืองแห่งนวัตกรรมและความยั่งยืน

A novel Design approach for Circular Building

Gabriele Masera กล่าวถึงความสำเร็จของทีมในการแข่งขัน Reinventing Cities ที่ Lambrate โดยทีมของเขาได้รับรางวัลรองชนะเลิศจากการพัฒนาโครงการที่มีเป้าหมายในการเป็นกลางทางคาร์บอนในระยะกลาง (30 ปี) การวางกลยุทธ์ในโครงการนี้ให้ความสำคัญต่อการประเมินผลตาม Key Performance Indicators (KPIs) ที่เกี่ยวข้องกับการใช้พลังงานทดแทน การจัดการน้ำ และการเลือกใช้วัสดุ ซึ่งทั้งหมดนี้เป็นการประเมินที่มีความสำคัญต่อการลดการปล่อยมลพิษและการส่งเสริมความยั่งยืนในอนาคต

Circular Building Design

Gabriele Masera ยังได้กล่าวถึงความท้าทายที่มีอยู่ในการลดการปล่อยมลพิษผ่านทางการออกแบบที่ส่งเสริมการใช้เศรษฐกิจหมุนเวียน (circular economy) โดยการนำวัสดุจากอาคารเดิมที่มีอยู่แล้วมาใช้ในการออกแบบทั่วไป โดยไม่ถือว่าการใช้วัสดุเหล่านี้เป็นสิ่งพิเศษ แต่เป็นส่วนหนึ่งของสมการในการออกแบบพร้อมกับส่วนประกอบอื่น ๆ การบูรณาการหลักการนี้ในระดับที่เล็กลง โดยเฉพาะในระดับวัสดุ เป็นสิ่งสำคัญที่ต้องพิจารณาเพื่อพัฒนากลยุทธ์การทำเหมืองเมือง (urban mining) ที่มีประสิทธิภาพ

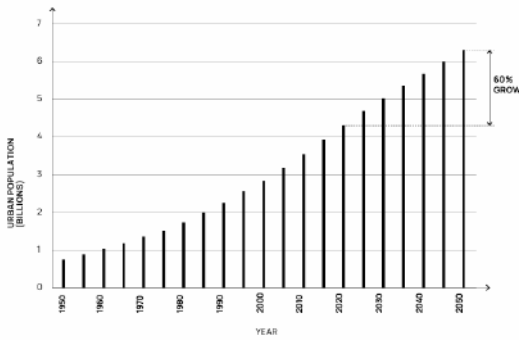


ภาพ แผนผังแสดงถึงระดับผลกระทบ(ซ้าย) และ การทำ circular building (ขวา)

ภาพจากการบรรยายของ Gabriele Masera

การศึกษาเกี่ยวกับการบริโภคทรัพยากรในอุตสาหกรรมการก่อสร้างได้แสดงให้เห็นถึงบทบาทสำคัญของอุตสาหกรรมนี้ในฐานะผู้ใช้ทรัพยากรหลัก โดยการใช้ทรัพยากรเกินกว่าความสามารถของโลกในการฟื้นฟู ดังนั้นหากแนวโน้มนี้ยังคงดำเนินต่อไป ภายในปี 2050 โลกจะต้องเผชิญกับความต้องการทรัพยากรที่เท่ากับสามโลก แม้ว่าจะมีเพียงหนึ่งโลกเท่านั้นที่เรา

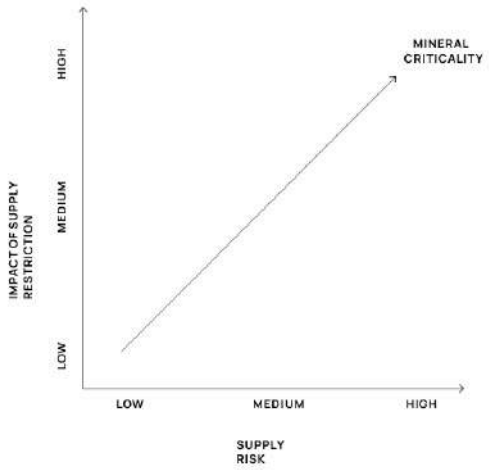
อาศัยอยู่ ตั้งแต่ต้นศตวรรษที่ 20 ปริมาณวัสดุที่ถูกนำออกจากพื้นดินและเก็บรักษาไว้ในอาคารและโครงสร้างพื้นฐานเพิ่มขึ้นอย่างมีนัยสำคัญ โดยเฉพาะอย่างยิ่งแร่ธาตุที่ใช้ในการก่อสร้างที่มีปริมาณเพิ่มสูงขึ้นถึง 34 เท่า ขณะนี้วัสดุที่สะสมในอาคารมีมากกว่าชีวมวลของทั้งโลก อุตสาหกรรมการก่อสร้างจึงมีส่วนรับผิดชอบถึง 60% ของการผลิตวัสดุทั้งหมดและใช้เหล็ก 40% และหิน กรวด และทราย 40% ของโลก



ภาพ กราฟแสดงถึงแนวโน้มการใช้ทรัพยากร

ภาพจากการบรรยายของ Gabriele Masera

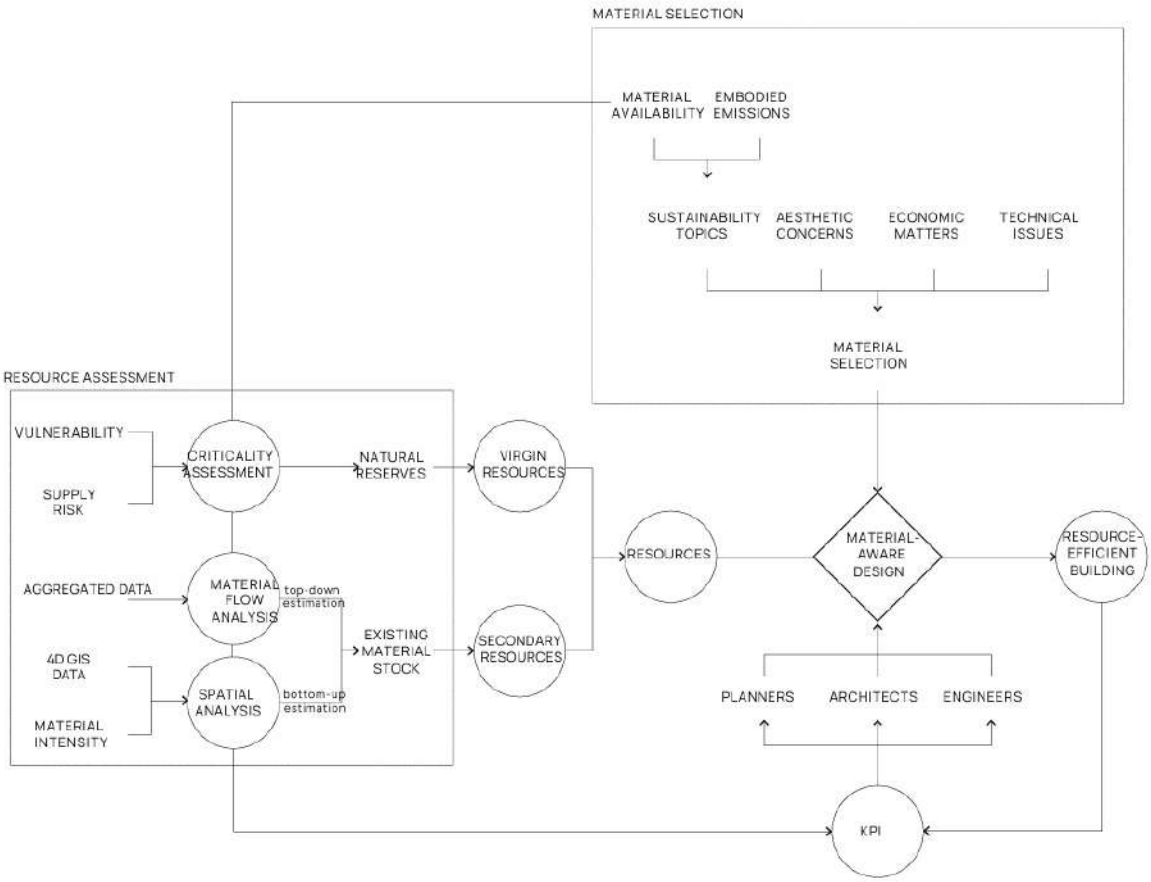
Gabriele Masera เสนอแนวทางว่าควรหันมาใช้วัสดุที่มีอยู่แล้วแทนการมองหาวัสดุใหม่ ซึ่งการนำขยะกลับมาใช้เป็นวัสดุใหม่ถือเป็นหลักการสำคัญของการออกแบบอาคารหมุนเวียน ขณะนี้ ในสหภาพยุโรปมีขยะจากการก่อสร้างและการรื้อถอนประมาณ 850 ล้านตันต่อปี แต่มีเพียงส่วนเล็กน้อยที่ถูกนำกลับมารีไซเคิล



ภาพ กราฟแสดงความเสี่ยงของจำนวนทรัพยากรที่มี

ภาพจากการบรรยายของ Gabriele Masera

เมื่อพิจารณาถึงการออกแบบอาคาร ความสำคัญของการเลือกวัสดุ จำเป็นต้องมีการเชื่อมโยงระหว่างการเลือกวัสดุ การออกแบบอาคาร และการออกแบบเมือง รวมถึงความรู้เกี่ยวกับสิ่งที่มีอยู่ในเมือง เพื่อให้การเปลี่ยนแปลงเป็นไปอย่างยั่งยืนและเป็นมิตรกับสิ่งแวดล้อม ในการออกแบบอาคาร จะต้องพิจารณาการลดของเสีย การปรับปรุงและการบำบัดวัสดุ รวมถึงการฟื้นฟูนวัตกรรมเพื่อการนำกลับมาใช้ การออกแบบต้องปรับเข้ากับข้อจำกัดด้านทรัพยากรและหาวิธีใช้วัสดุจากกระบวนการหมุนเวียน ซึ่งอาจเป็นเรื่องยาก เนื่องจากการหาวัสดุที่ไม่ใช้แล้วและความต้องการวัสดุที่นักออกแบบต้องการนั้นไม่อาจตรงกับสิ่งที่ตลาดมีให้ใช้



ภาพ แผนภูมิอธิบายขอบเขตงาน

ภาพจากการบรรยายของ Gabriele Masera

นอกจากนี้ การใช้งานวัสดุรีไซเคิลในออกแบบจำเป็นต้องอาศัยความรู้เกี่ยวกับวัสดุที่มีอยู่ รวมถึงการประเมินปริมาณวัสดุในอาคารที่มีอยู่ รวมถึงปริมาณวัสดุที่เกิดจากการรื้อถอน ปรับปรุงและเปลี่ยนแปลงในอาคาร เพื่อช่วยสร้างตลาดสำหรับวัสดุรีไซเคิล

การออกแบบอาคารที่ยั่งยืนจึงไม่เพียงแต่เกี่ยวข้องกับการพิจารณาเลือกวัสดุตามความต้องการเท่านั้น แต่ยังต้องคำนึงถึงการจัดการทรัพยากรอย่างเป็นระบบเพื่อให้เกิดการใช้วัสดุอย่างมีประสิทธิภาพและยั่งยืนในอนาคต

Creative Regeneration to Support a Decarbonised Built Environment: Notes from Europe

21 January 2025 at the Faculty of Architecture Chulalongkorn University

PARTICIPANTS: PROFESSOR PROFESSOR MANUELA GRECCHI , GABRIELE MASERA, AND MATTEO RUTA, FROM Department of Architecture, Built Environment and Construction Engineering Politecnico di Milano

Adaptive Reuse of Industrial Heritage: Finding New Uses Between Historical Memory and Innovation

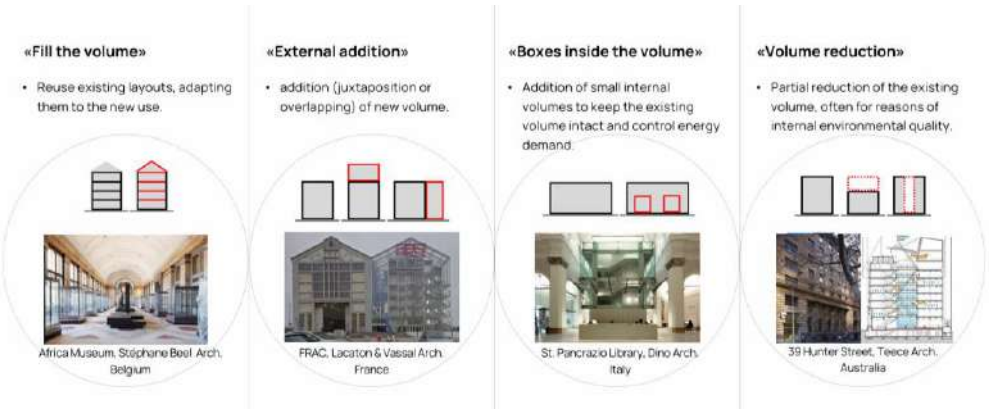
Why Reuse Derelict Buildings?

In contemporary society, there is an increasing demand for space, which serves as a compelling reason to refurbish and repurpose old buildings rather than demolish them and construct anew. Key factors supporting this idea include the anticipated growth of the global population, which is projected to reach 9 billion by 2050, with 70% residing in urban areas. This growth indicates that urban sprawl is becoming increasingly impractical. Another crucial consideration is the energy consumption of old buildings; enhancing the energy efficiency of existing structures can significantly reduce the energy required for heating and cooling systems. Lastly, there is the imperative to minimize carbon dioxide emissions, as older buildings are often significant sources of greenhouse gas emissions.

Adaptive Reuse Process

In terms of the building refurbishment process, various approaches can be employed, with the central concept being to minimize environmental impact, conserve resources, and recognize the architectural value of existing structures. This includes the historical significance, the quality of the buildings, social factors related to community memory, and principles of sustainable development. The restoration of old buildings typically begins with the collection of in-depth information about the structure, including its usage history and changes over time. This information is then analyzed to determine the most suitable means of improvement, followed by the establishment of a new utilization plan that aligns with the surrounding context.

Building on What Is Already Built



From an architectural perspective, appropriate interventions should maintain a clear distinction between the original structure and the new elements introduced. Various strategies may be employed, including:

1. Fill the Volume: Optimizing the use of interior space—improving the functionality of the area without affecting the primary structure.

2. External Addition: Adding extensions that differ from the original—highlighting the transformation of the building.

3. Boxes Inside the Volume: Creating internal structures to control the climate—reducing energy consumption for temperature regulation.

4. Volume Reduction:Decreasing the building's size to enhance energy efficiency—optimizing it for the environment and natural light.

Industrial Heritage: The Case of Railway Stations Reuse

Derelict railway stations are part of industrial heritage that reflects the historical development of cities and transportation systems. Beyond their original roles as transportation hubs, railway stations serve as memorial sites that connect people to the past, both in personal experiences and significant historical events. Restoring abandoned railway stations is not merely about improving the physical structure; it is also about preserving cultural identity and fostering community understanding of history. Repurposing old stations into various forms, such as museums, art centers, or public spaces, ensures that these locations remain integral to the urban fabric and can convey historical narratives to future generations.

Examples of Successful Adaptive Reuse Projects

One intriguing project utilizing the "Fill the Volume" approach is the **Musée d'Orsay** in Paris, which effectively demonstrates the integration of old architecture with new functions.

Station interior in the early 20th century.

Inside the Musée d'Orsay

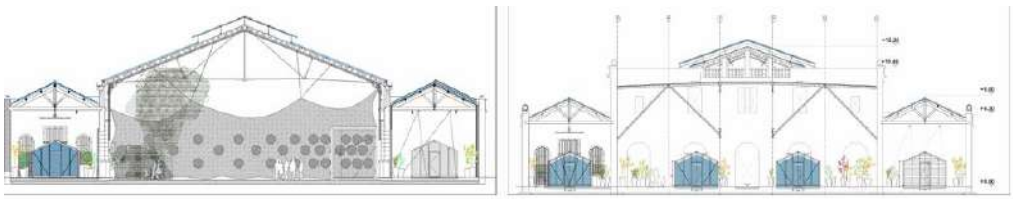
Images: Before and After Renovation of the Musée d'Orsay

Another example is the **mAAch ecute Manseibashi** in Tokyo, which transformed the old Manseibashi railway station into a shopping center and public space. The original structure was preserved, and modern elements were integrated, opening up space for

the public to engage with the station's history while promoting commercial use to stimulate the local economy.

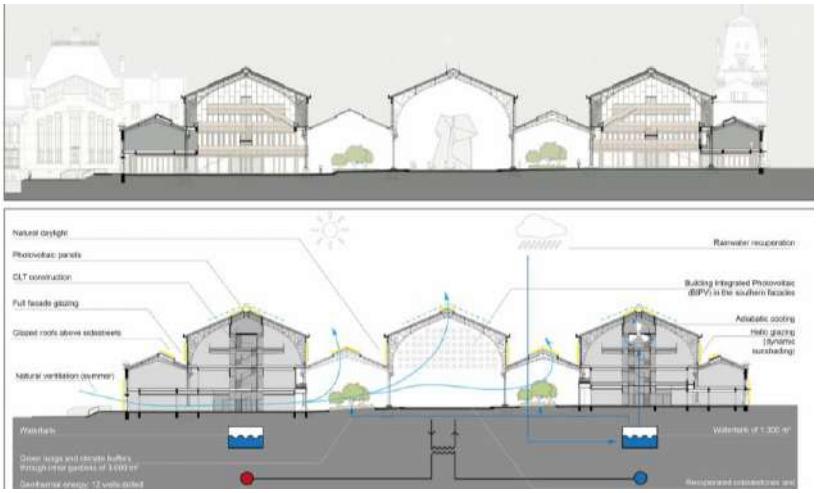
Images from the Presentation by Manuela Grecchi

An example of the "Boxes Inside the Volume" method is the **Mediterranean House in Benalua** (Spain), which rehabilitated an old building to suit the Mediterranean climate, emphasizing the use of materials that facilitate ventilation and natural light, thereby reducing energy consumption and creating a sustainable environment.



Images from the Presentation by Manuela Grecchi

Another notable project is the renovation of **Gare Maritime in Brussels**, which revitalized an old freight station into a commercial center and public space, utilizing wooden structures to minimize environmental impact while converting the industrial area into a mixed-use building promoting sustainable urban development.

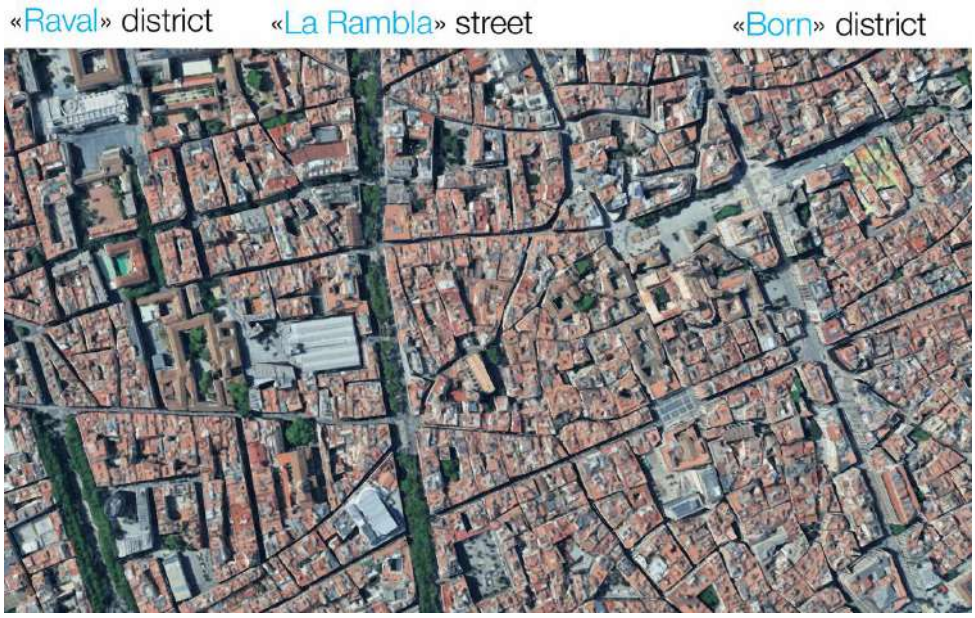


Images from the Presentation by Manuela Grecchi

Lastly, the **High Line** in New York (USA) exemplifies a bottom-up regeneration approach, where local community ideas and input were integrated into the design and development of the space. This public park has become a venue that meets community needs, fostering both economic and environmental benefits.

Redesigning parts of the city by reusing disused areas and buildings: the case of Milan's railway buildings and yards

Urban regeneration and the development of public spaces are significant topics in the fields of architecture and urban planning, particularly in cities with rich and diverse histories and cultures, such as Barcelona and Milan. Studies of these cases demonstrate the important transformations occurring within these cities, which not only address social and economic challenges but also enhance the quality of life for citizens and create a more livable environment.



Images from the Presentation by Matteo Ruta

After hosting the Olympic Games in 1992, the Raval district, which faces complex social and economic challenges, has undergone considerable improvements and important development projects. Notably, the construction of a new museum designed to fulfill crucial public functions has taken place. This museum serves as a central hub, attracting both residents and tourists while promoting a variety of cultural activities within the area. Encouraging people to utilize public spaces can help reduce crime in those communities due to the increased "eyes on the street" provided by engaged citizens.

Images from the Presentation by Matteo Ruta

Another interesting example is the renovation of the Santa Caterina Market, which was comprehensively redesigned by the renowned architects Benedetta Tagliabue and Enric Miralles. This renovation includes the opening of new streets and the creation of vibrant and colorful public spaces, with the primary goal of actively attracting people to utilize this area. Additionally, it addresses several issues that had previously arisen in the surrounding environment due to the original market's layout.

Images from the Presentation by Matteo Ruta

International Expo 2015

The city of Milan underwent significant transformations following the International Expo in 2015. This major event served as a catalyst for the revitalization of seven large areas that had previously been used as old railway yards and were largely underutilized. In order to foster public engagement in shaping the future vision for these areas, several workshops were organized to allow citizens to express their opinions, propose unique ideas, and present creative approaches.

Five renowned architectural teams participated in these workshops, each offering a variety of diverse and intriguing concepts. A central idea that emerged from the discussions was the restoration of Milan's intricate water system, aimed at rejuvenating public spaces and promoting biodiversity. This would be achieved by creating large green areas suitable for public recreation, enhancing the overall livability of the city.

Images from the Presentation by Matteo Ruta

Images from the Presentation by Matteo Ruta

Farini Scalo

The award-winning project for the development of the Farini Scalo area by OMA, led by Rem Koolhaas, proposes a flexible and adaptable design concept for sustainable growth. This project is situated in an area that was once an abandoned railway yard, which has the potential to transform into a new development zone that effectively connects the community with the city

.

Images from the Presentation by Matteo Ruta

Farini Scalo aims to serve as a central hub that connects various communities and acts as a gathering place for the public by creating sufficient parks and green spaces for outdoor activities. The project also emphasizes promoting sustainability in all aspects, including the use of environmentally friendly construction materials, the design of efficient water management systems, and the creation of diverse functions to accommodate future uses.

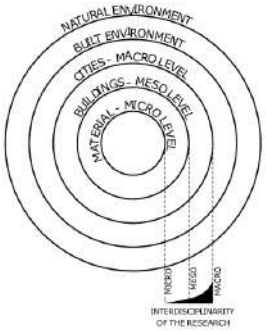
The development process of Farini Scalo is expected to have a significant impact on the city of Milan, including enhancing the quality of life, creating new job opportunities, and revitalizing the city's image. Revitalizing an area that has previously been overlooked will reinforce Milan's identity as a city of innovation and sustainability.

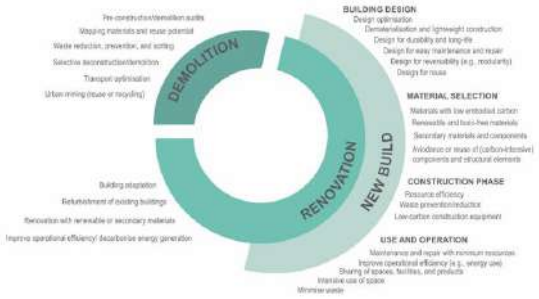
A novel Design approach for Circular Building

Gabriele Masera discussed the achievements of his team in the Reinventing Cities competition in Lambrate, where his team was awarded second place for their project aimed at achieving carbon neutrality in the medium term (30 years). The strategy of this project emphasizes evaluation based on Key Performance Indicators (KPIs) related to renewable energy use, water management, and material selection. These assessments are crucial for reducing emissions and promoting sustainability in the future.

Circular Building Design

Gabriele Masera also addressed the existing challenges in reducing emissions through designs that promote a circular economy. By incorporating materials from existing buildings into the overall design, these materials are not viewed as special but as integral components of the design equation alongside other elements. Integrating this principle at a smaller scale, particularly at the material level, is essential for developing effective urban mining strategies.

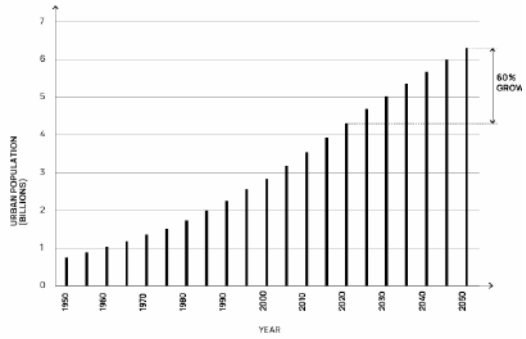




Images from the Presentation by Gabriele Masera

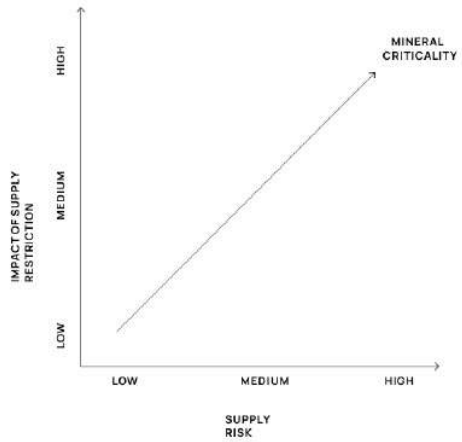
The study of resource consumption in the construction industry has shown its significant role as a major resource user, utilizing resources beyond the Earth's capacity for regeneration. Therefore, if this trend continues, by the year 2050, the world will face a demand for resources equivalent to that of three Earths, despite the fact that we only have one planet.

Since the early 20th century, the amount of materials extracted from the ground and stored in buildings and infrastructure has significantly increased, particularly construction minerals, which have surged by up to 34 times. Currently, the materials accumulated in buildings exceed the biomass of the entire planet. The construction industry is therefore responsible for 60% of the total material production and consumes 40% of the world's steel, as well as 40% of the world's stone, gravel, and sand.



Images from the Presentation by Gabriele Masera

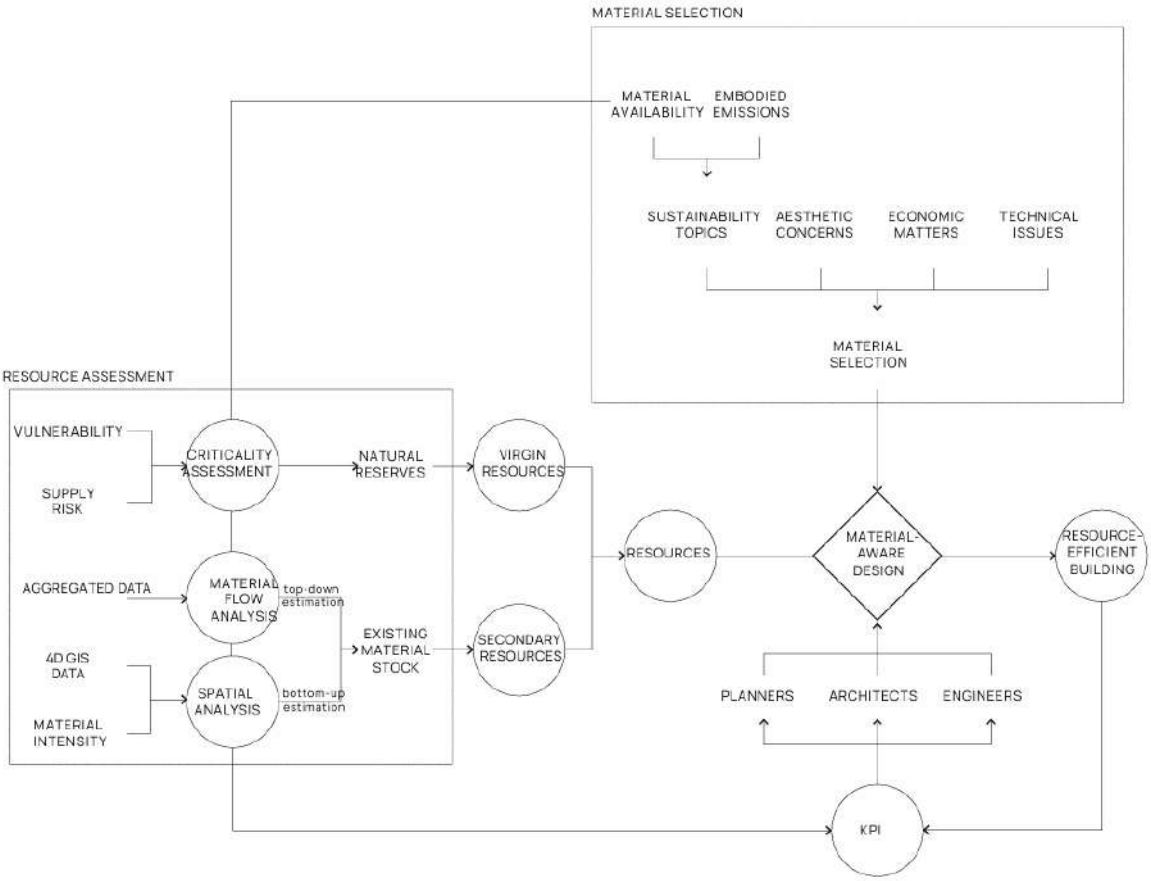
Gabriele Masera proposed an approach to prioritize the use of existing materials instead of seeking new ones, emphasizing that repurposing waste as new materials is a key principle of circular building design. Currently, the European Union generates about 850 million tons of construction and demolition waste annually, but only a small fraction of this waste is recycled.



Images from the Presentation by Gabriele Masera

When considering building design, the importance of material selection necessitates a connection between material choices, building design, and urban design, along with an understanding of what exists within the city. This approach is essential for ensuring that transformations are sustainable and environmentally friendly. In building design, considerations must include waste reduction, material reuse and treatment, as well as innovative recovery for repurposing. Designs must adapt to resource constraints

and find ways to use materials from circular processes. This can be challenging, as the availability of surplus materials and the demands of designers may not align with what the market offers.



Images from the Presentation by Gabriele Masera

Additionally, the use of recycled materials in design relies on knowledge about the materials available, including assessing the quantity of materials in existing buildings as well as the amount generated from demolition, renovation, and modification of buildings. This information is crucial for helping to create a market for recycled materials.

Sustainable building design therefore involves not only considering material selection based on needs but also systematically managing resources to ensure the effective and sustainable use of materials in the future.

Special Talk Transcription.

Topic: Creative Regeneration to Support a Decarbonised Built Environment: Notes from Europe

by : PROFESSOR PROFESSOR MANUELA GRECCHI , GABRIELE MASERA, AND MATTEO RUTA,

FROM Department of Architecture, Built Environment and Construction Engineering Politecnico di Milano

Records File:

Audio/Video Duration: 02:33:36

Date transcribed:

Time	Speaker	Audio
00:00:12	MC	Thank you for joining us today. Welcome to the Architecture and Design for Society Lecture Series, which was said before. And this is the second lecture of this semester. So there are eight more exciting sessions to come for this semester. The Architecture and Design for Society Lecture series is an academic event which will be held once or twice or even three times a month. We invite speakers with diverse expertise from various fields both nationally and internationally to share their knowledge and experience. These lectures explore the work, research, and design in the way that affects social and benefits society and public at large. And for those of you who are architects or other licensed professionals, you can earn continuing professional development credit or through by registering for an attendee lecture. And those who are attending more than 80% of the total lecture of the 2024 academic year, you can receive a certificate of completion. And this certificate can be used as part of the credit bank to request credit transfer when enrolling into programs at the faculty architecture, Chulalongkorn University. Before we move on, I would like to take a moment to thank you, our amazing sponsors, to make this lecture series possible. Thanks, NIPPON PAINT the curative

		thailand, SKUNTHAI, and WOODMARK thailand for their support of this lecture series. Before we begin the lecture, I would like to invite our deputy dean to deliver our opening remarks based on mutual outcomes for Associate Professor Waricha Wongphyat.
00:01:55	Waricha Wongphyat.	Good evening everyone. It is so fantastic to see many of you here tonight, this evening, for the Architecture and Disciple Society Lecture Series, brought to you by Faculty of Architecture, Chulalongkorn University. And as Namtip Yamali mentioned, each lecture we aim to bring in speakers from different expertise domestically and internationally to share their ideas and to tell us how they work. And this evening we are very honoured to have the politecnico faculty, Professor Manuela, Professor Gabriele and Associate Professor Matteo to share their insight into the creative region relations to support a decarbonised built environment not from Europe. And we are really excited to learn from you. And given that, given our more limited resource, adapting, reusing, repurposing our existing built environment has become essential. So I hope this lecture and discussion will shed light on how we can create a more sustainable and low-carbon society through architecture and design.

		I would like to thank you, Professor Piyalada, Professor Sirintra, and Professor Namthib for organizing the special workshop on regenerating Kuala Lumpur and allowing us to have this wonderful lecture open to the public. I hope a fruitful discussion and a successful workshop outcome for you and special thanks to our MC this evening, Professor Namthib. Thank you so much.
00:03:43	MC	There are some guests from other countries. All right, as you already know, that's our today lecture on the topic of creative regeneration to support a decarbonized built environment, insights from Europe. It's very relevant to our current situation where Bangkok is facing the PM2.5 pollution reaching the orange and red levels. So it's pushing significant health risks and highlighting the urgent needs for action. The government plays a crucial role in addressing these challenges, and today's lectures will provide valuable insight into how creative regeneration can support the transition to decarbonized, healthier, and healthier landscape. Today we have three speakers from Politecnico di Milano. The first one, Professor Manuela Grecchi, a professor of building designs. She teaches and researches on the skills of transformation and urban built environment. Other of many publications on the topic of building, renovation and adaptive reuse, she is a vice rector and responsible for the Lecco campus.

		She will talk about adaptive reuse for industrial heritage, how to find new uses between historical memory and innovation.
00:05:32		The second one, Professor Gabriele Masera, a professor at Politecnico di Milano in the field of construction technologies and digital transitions for sustainable low-carbon buildings. His research experience in this field includes national and international projects. He is a director of delegates for the International Affairs of the School of Architecture, Urban Planning and Construction Engineering. His lecture topic is on urban mining framework for low-carbon design in a resource, hungry and the last one Professor Matteo Ruta with a topic, Redefining Part of the City by Reusing this Used Area and Building, the case of Milan's Railroad Buildings and Yards. Matteo is a professor of production and management of field development in the field of innovative construction and technologies for energy-efficient buildings. He is a scientific editor of the magazine, ACAPITOL, International Reviews of Architecture and Building Engineering. His research efforts are concentrated on the technological innovations of products and on the engineering of complex projects with three-dimensional parametric design tools. Since 2023, he is a curator of the International Sustainable Innovation Arc Week, organized annually by the municipalities of Milan and Politecnico di Milano.

		Without further ado, please start me to welcome our speaker today.
00:07:11	Gabriele Masera	Thank you. Thank you so much. Thank you. Thank you. Thank you so much. Thanks for having us here. It a great honor. We did a long trip to come here to Bangkok from Milan and we super excited to start this week where we will work to the workshop together with the students that will attend or are attending already the workshop. And then we're going to have this introductory event, let's say, as a conference of this topic that Professor Namtip just described. I'm not the first speaker, indeed, but I would like to say a couple of words about why we're here, how we could travel so far, so a little bit of the framework, and then give you just Just a couple of words, a couple of info about the institution we come from, Politecnico di Milano, so from Italy. Okay, first of all, we are travelling on an exchange programme which is funded by the European Union. It's an Erasmus programme. Perhaps you've heard that we have this programme which is Europe-wide, but it also includes state from nations from across the world, which funds mobility of students and staff, teachers, also PhD students. So we had this in 2022, I think I remember, we agreed on this exchange between Politecnico di Milano and the School of Architecture, Urban Planning, Construction

		Engineering that we, all the three of us, belong to, and the Faculty of architecture of Chulalongkorn University. And within this framework, this exchange framework, we had three students from your faculty, I don't know if they are here, who spent a whole semester at Politecnico last spring and they attended courses, so the semester abroad. I'm sure they were happy because I keep seeing their posts on Instagram and so on about their Italian trip. And then we had a first workshop in LECO. LECO is one of our campus, the one that Manuela, Professor Gabriele, is in charge of. It's on beautiful Lake Como. We had a campus there. We organized the workshop in June last year. We had Professor Piyalada, Professor Sirintra, and Professor Namthib coming. This is, by the way, a part of a series of previous workshops that we had with you and the faculty here including Yardin and Farajut as well. So in this case the topic that we've chosen for these intensive two weeks that we had in LECO was the name of the workshop was International Studio on Cities and Climate Change. So we started to introduce these topics of climate change or climate crisis perhaps as we should call it now, and how cities become complex organisms that have complex behaviors, and we explore the concept of symbiosis, so how different systems play together and can be used together to improve the resilience of

		built-up environments, such as cities, to changing climate.
00:10:15		In our case, it's the warming temperatures in Italy, in the north of Italy and more intense rainfall which can create problems of course with the water. So there were some topics which are developed there. And we thought in a way that what we could bring here, the title of tonight's event, that since perhaps you've heard that the European Union is committed or has been committed until now to decarbonizing the continent by 2050 so by the middle of this century 25 years from now so moving to a decarbonized economy and essentially reducing the impacts of greenhouse gases that has big impacts of course on the built environment on how we build buildings on how we design cities and so we thought we could bring our experience part of our research experience and some projects that we have developed also with some architects, as Matteo will show, about three different scales. So we thought about the scale of the city and the transformation of these used railway yards, the scale of buildings, and the scale of the choice of materials. So we're going through these three different scales. So that's the idea for tonight's event. So once again, thanks a lot for having us. It's really an honor to be here. Thanks to you for coming. So,

		Numerous, it's very nice to see that you decided to spend some time with us. Just a couple of words I was saying about Politecnico. We have a long-standing agreement between Chulalongkorn University and Politecnico di Milano. We know that it is a healthy agreement. I mean, we do have students traveling even outside these special Erasmus projects that I mentioned at the beginning.
00:12:34		So just to give you a couple of info, I'm not going through the whole presentation, but just give you a few glimpses about our institution. We are more than 160 years old, as you see. It's an institution. It's essentially a technical university. And that in Italy means that it only deals with architecture, engineering and design, design in the sense of industrial design. So we don't do general sciences, we don't do law, we don't do economics, those are in other universities in the city of Milan. We only have these three areas. And so, okay, I'm skipping this part, we don't want to brag about it. I wanted to say something about our community. Although we have only three areas, we are still a pretty large university, especially by international standards, we're almost 50,000 students, most of them studying in the area of engineering, or engineering, I should say, the several engineering we have.

		Around 8,000 to 9,000 are in architecture and a little bit less in design, which, as you probably know is one of the core economic businesses, let's say, of Milan, something that characterizes very strongly the city and the economy of Milan. Then you have other numbers here, but you see we are pretty crowded, as you were saying. And we are in Milan, of course, in the city. We have two campuses. One is going to be extended.
00:14:11		And then we have some campuses in the region around, and some of them are devoted to special topics, for example, in Cremona, maybe you heard about Stradivari, the guy that did violins, and we have an acoustical engineering course, for example, over there, which builds on this incredible tradition of acoustics and instruments making. Then, Manuela, of course, if you want to say something specific about the LECO campus, you're very welcome to do that. And the other thing I wanted to mention, okay, education very briefly. We have essentially 26, that's why I was saying engineering, 26 different bachelor courses specializing in different engineering areas and then 46 of them in the master of science which is entirely offered in english so if you coming to study at Politecnico or for an exchange period you not going to have any problems

		in finding courses in finding an offer in english that you can attend or of course also coming for phd programs. We care very much about that the reason also why we do international exchanges like this one that brought us here and brought your professors in Milan is that we truly believe very deeply in the importance of being international, the importance of opening up to the world and the importance of building communities that go beyond our national boundaries. We are now one quarter of our students at the master level, which come from outside Italy. We're very proud of this international community that we have. We're also trying to internationalize the faculty as well.
00:15:53		And so, I mean, everyone is very welcome to come if you want to. I will just finish very briefly. Sorry if I skip. I didn't clean the presentation, but just to give you an idea, then we have research, of course, the other big business, let's say, of our institution. We have 12 departments. We have research labs, of course, but the departments, barely lived here. The three of us come from the second department on the left, architecture built environment and construction engineering. There are essentially two departments dealing with architecture. One is more at the scale of the city and territory, I would say, and urban policies, the first one at

		the top. And the second one, which is a little bit more at the scale of buildings and building technology, structures, energy efficiency, some more technical aspects if you want to kind of separate the aspects. And then we have plenty of other departments dealing with different engineering topics. Okay, and then we have infrastructure, and I think that's enough. We don't care too much about all these other aspects. And yeah, social responsibility programs. Perhaps because we talked about in the introduction of social responsibility, we do have a third line of action, which is what we give back to society as an institution. So we do have a lot of projects with the, especially the more deprived areas of the city or the more deprived part of the population. So we try to get out of our gates and try to do projects that involve the communities. And we have a very, very strong sustainability plan, equality, diversity and inclusion, and so on. And we even have some small offices in difficult neighborhoods that try to support the people in decisions like, just to make a very simple example, I want to renovate my house, what should I do? Most people don't have the tools to know what to do. They don't know that they can do, they don't know that they can access funding as well, public funding.

		So we're here to help them being there physically in these neighborhoods. And that's, I think, an interesting way to be there. Okay, polyme.it if you're interested, you're very welcome. Sorry, this is not an advertisement, just to let you know that you're very welcome to come also for a short period and I'm sure your professors will be able to guide you if your interest to come to Italy and to come to the hub of architecture and design, especially in Italy. So thanks for that. Again, I don't want to take too much time just to give a little bit of a framework. So I'm passing the microphone to Manuela for a first speech.
00:18:31	Manuela Grecchi	So, good afternoon. It's a real pleasure to meet you this night. My topic is already next. I'm a professor in building renovation. So, for me, it's something that is really important. I selected the industrial heritage and focusing on the possibility when we have to transform a huge building, what can be the approach we can follow. Of course, I have no time to explain many, many things. These are the main contents. The first one regards Why? We have to renovate and reuse existing buildings. Maybe it's easier to demolish them and redesign new buildings. The second one is the process. We typically use when we have to define what is the work according to the characteristics of the buildings we want to renovate, but how we can define

		the new function that can be really transformed and readapted an existing building. The third part is some concept related to how we can manage the transformation. So an architectural point of view, of course, each architect will develop maybe a different strategy. But what I want to focus on is our typical approach that we have in Europe. And finally, I focus on some examples that can inspire you if you attend the workshop related to the renovation of your beautiful station. So, why reuse? Of course, as you already heard a lot, we have challenges in this moment. I selected three key words. The first one regards the world population. We know and we expect that by 2050 maybe we'll be 9 billion people. It's not a problem of numbers. It's a problem where they live. So, which means that we expect that 70% of those people will be urban. So it's not possible to imagine that our cities can grow again. The second part is related to the energy problems. We know that the normally existing buildings use a lot of energy, typically for heating and cooling. So how we can manage the transformation of existing buildings?
00:21:44		We know what to do if we have to design a new building, but how we can manage the transformation and the reduction of the use of energy? And finally, the decarbonization. Again, existing buildings are

		responsible for the CO2 production. of how we can manage the transformation of them. What are the goals for building renovation? For sure, again, we have many, many different approaches. I selected some aspects. The waste impact reduction. For sure if I reuse an existing building I can in a way reduce the impact of the waste first of all. Then the resource conservation. Gabriele will introduce some aspects related to that problem. And of course, we are architects. So what is really important is recognize also the value of existing buildings. Typically we have heritage value. It's recognized, but sometimes also buildings that apparently are not a piece of architecture, for the local community they represent their memory. So that's why we have to analyze also these parts. And, of course, also if you don't transform an existing building, we have to manage the problem of energy. So what are the works we need to introduce in the existing stock? Shortly, what is the adaptive reuse process? Again, typically sometimes we select a new function to transform the building, but from a research point of view, for sure we have a specific process. We have to recognize, first of all, what is the value of the existing building and why we have to maintain and readapt it. I selected again four keywords. First of all, the historical value. We come from Italy, so Italy is

		famous for the historical buildings. We have a lot of restrictions because we don't have some time to touch monuments.
00:24:34		But again, we have also a moral duty to maintain and pass to future some aspects of our history of architecture. Another aspect important is the building quality. Sometimes, also if it's not a piece of architecture, maybe the quality of the building gives us a path to be followed. So why demolish a building that has a quality and we can renovate it? Social factors. Buildings represent, really represent something really important for the society. So analyzing very well and define what is important to be maintained and preserved or maybe also the motivation can be a strategy. And finally, sustainability, but we already talked about that. In the process, we have three main steps. How we manage all the information. The first important step regards the collection of information, because it's not possible to transform a building without knowing very well what are the characteristics of the building, what is the history, the transformation. Remember that each building has a history, so during the life of the building we recognize many, many transformations. The second step regards the organization of the information to define what are the

		quality of the building, what are the works we need to imagine, to repair, to remove deterioration and so on. The third step is really important in this moment for my lecture because it gives you information related to the possible new uses you can introduce in an existing building to transform sometimes not just the building itself but start a process of regeneration.
00:26:56		Just to give you information, we start not from the building, we start from the urban dimension because, of course, before defining what is the possible reuse, it's necessary to connect the building with the surrounding, with the neighborhood, to discover if there are some elements that can suggest the possible reuse and transformation. Of course, many, many information related to the building scale because typically we need to know dimensions, we need to reconstruct the history and transformation of the building. We need to recognize some architectural value in the building itself. And of course, one of the very important parts regarding the building technologies, it's difficult to know what are the technologies they used in the past in that specific building. But connecting main information, typically the location and the date of the building, we imagine what can be the real materials they use in the construction.

		Conservation status use or other aspects. I sum up all the process in this slide. It's a circular process, so you can see that it's important what we call a SWOT analysis. So the connection at the different scales of all the information you collect. So at the scale of the context, at the scale of the building, and for sure, all the rules related to the possibilities, because in Europe and in Italy, we have a lot of restrictions, so we cannot transform a building, for example, not considering the possibility in terms of volume, I can't realize, or some specific local rules.
00:29:08		So it's a circular process in reality because when you start to imagine possible new uses, what is important to do is the analysis of the context impact assessment because if the reuse is wrong, you stress the neighborhood. So it's important again to connect everything. Building on what is already built, of course, it's a sort of slogan. So how we can manage the transformation? We have a specific approach typically. If you have to transform a cultural heritage for sure, which means that the elements and the technology we use are light technology. Apparently we can remove it and restore the old building. It's just an approach. In reality, when you start to intervene in a building, you really transform it and touch it. and what I want to focus on is that it's important

		to recognize the intervention so the relationship between old and new is really important typically in our culture it's not possible to intervene today they did it in the past a lot with a sort of camouflage so it's important that the intervention is really recognizable. Four aspects, of course, we can find many, many, many other aspects. Again, I define the techniques fill the volume, which means that in some examples, you cannot touch the architectural value of the building. So to transform it, you have just to readapt the layout, the existing layouts and give new function to the building. External addition, if it's possible sometimes you add new volumes or new parts in the building itself. What I want to stress with this example, this image, is that it's important that the new parts are not similar to the existing, the historical buildings.
00:31:50		So you have to design a sort of dialogue between old and new. Most interesting is the boxes inside the volume. Maybe can we suggest something related to the transformation of your building in the workshop, which means that in this case, typically, we adopt this approach when we have a huge building industrial heritage. So we define what are the spaces that are – that need to be well controlled in terms of air conditioning, plants and so on, and what are the value of the other parts. But I have examples of this approach.

		And finally, of course, sometimes reduce the volume. Two main reasons. The first one is related to the equilibrium, the urban scale. Sometimes it's better to decrease the volume. Other aspects are related to the quality inside the building. Huge buildings need to have a more controlled natural light. So, for example, you can open some parts of the building, create a natrium, and so on. Industrial heritage, the case of this use railway station. Again, of course, you can find many, many examples all over the world of transformation because typically the huge stations realizing at the beginning of the 20th century maybe are now abandoned because of the changing mobility network.
00:33:47		So how we can reuse them? Sometimes it's not necessary to maintain them, but sometimes it's better to renovate and read up these railway infrastructure. To introduce the topic, typically how they are, we have two parts in the station of that period. The first one is typically designed by architects, so the value of the building is something that is the most important part of the visible, the relation of the building with the city. The second part, I like a lot the second part because it represents something really important,

		So typically the innovation in the engineering part because of the new structure that allow the construction of examples. I have to rush, no? The two first examples are two I selected maybe you know very well Garde d'Orsay in Paris maybe you visited it the second one is a transformation of a part of Manseibashi station in Tokyo Garde d'Orsay it's a museum maybe you know very well it. It was a typical station you can appreciate in the image what is the value of the building. So it wasn't possible to transform it in reality because it's a monument. When they abandoned it, they decided to transform it in a museum. So they selected the function. And architect Gae Aulenti, she's a famous Italian architect, was charged with this transformation. If you compare the two images, you can see in the upper part the old station and the intervention, you can immediately recognize that the intervention transformed the building, but all the historical building is already visible.
00:36:22		The chance was that the natural light was really good also in the original building. That's why the light that is really important in a museum was something that was in the envelope itself. So the use of materials is an aspect really important because in the meantime, for sure, you enter in the building, visit to the museum. That is a famous

		museum. There are a lot of masterpieces of impressionist and post-impressionist painters. But in the meantime, the visit is to the building because it's immediately visible what is new and what was part of the historical monument. The integration is important. So again nothing is covered by the intervention. So the relationship between the structure that was a cast iron structure really important for the period is still visible. The second example regards another station. Of course, the style is a different but the period is the same. The history of this station is that the real original station was destroyed by an earthquake and they realize, imitate the whole station but in a smaller version. What I wanted to introduce is the reuse of the viaduct. Again, for example, in Paris, but also in Italy, in many cities, you find that this is a solution, because in the past they were not used for people, they were spaces related to services that something function that was related to the use of the station.
00:38:44		It's really interesting, it's an urban-scale intervention, because the possibility to remove the original walls and open all these parts create a relation between the main square to the opposite part that is the river. Typically, we use these spaces for commercial purposes.

		In the upper part, they introduce, because the line already exists, so they introduce the small elements that are dedicated to bars. Boxes inside the volume, maybe they are really interesting for the workshop, why not? We'll discover two European examples. The first one is in Spain, in the south of Spain. This station was really important in the period because it connected this region with the capital of Spain. When they abandoned it, the local community wanted to maintain it and preserve the monument. In 2012, they wanted to reuse this building. Now is the headquarter of Casa Mediterraneo. Casa Mediterraneo is an institution, a diplomatic institution, that have to promote the common identity of Mediterranean villages. What is interesting in this case is that the designer, Manuel Ocana, had to design a building with a real low budget. So this was the original situation, it's a bit similar to your station. This is the transformation.
00:40:54		So what is important is the definition of what is temporary use and what is permanent use. The huge part that was the space where the trains arrived is an open space, is a sort of covered square where they can organize many, many different activities. So for exhibition or other things. The transformation is a light transformation in reality. They removed the original

		roof that was an opaque roof and introduced this polycarbonate surface to introduce natural light inside. I'll give you information because of blue, but at the end of this case. They removed all the windows and all the doors to create a natural ventilation inside because it's a hot region and the fan in the middle of the roof creates this movement. A screen shadow cover and protect from the direct light. What is more interesting is where they put the permanent activities related to the headquarters in small pavilions that surround around the main square. Here are the pavilions, again, not many materials. So in this case, the ceiling, the roof is transparent. So to protect the people that work inside the pavilion, the roof is opaque and the natural light is filtered by the vertical facade. Of course, these places are controlled with plants, which means that they are air-conditioned and so on.
00:43:13		Because for temporary uses, it's not necessary to, in a way, it's a passive, what we call a passive strategy. So we use the envelope to create a better climate situation. Why the colors? because they are typical of Mediterranean villages. White and blue are the two colors they use. But be careful, because when you use transparent surface, for

		sure the color of the sun will create different colors inside. The second one is similar. It's in Belgium. In this case, the huge station is really important. The strategies are totally similar, but the climate is totally different. That's why they organize in a different way. Again, they put inside the pavilions to reuse the building, but they create also protected public spaces because of the dimension of these buildings that can create also sorts of boulevards, green boulevards in between the pavilion. In this case, the material is wood. So again, not too many materials, but a typical glass for sure, wood. also for the structure and the pavilions that are three floors high.
00:44:52		Here are some images. So it really interesting because of the climate vice versa. It a rainy region so it in a colder region. So that why you can create a protected part of the city. So it a sort of building and urban scale in the meantime. It's really interesting also because it's an energy-neutral building. So they use all the main glass facade that is integrated with the solar cells. All the roofs are photovoltaic panels. And they use also geothermal energy and collect the rainwater to reuse it

		for the green site. Finally, a famous, really famous intervention, the high line I selected is one because it's a bottom-up regeneration. So what is it? Of course, it's a beautiful intervention, but what is interesting is the process. Today high line is really famous. it was a line that cut this neighborhood. When they abandoned it, for sure immediately they wanted to demolish the line because they consider it a dangerous place. Vice versa, people that lived in the surrounding, it was the neighborhood was an industrial part of a part of the city that was abandoned.
00:46:40		So the typically young people, artists, started to reuse those buildings. So they started to discover that naturally the green grow inside this line. So they wanted to maintain and convince the administration to maintain this line. They created a non-profit association, the Friends of I-LINE. They started to collect money. At the end, they started, they convinced the administration to maintain it, and they started this process of regeneration. It's an interesting approach. Today we have many similar solutions in many countries, but what happened in reality is that the original inhabitants are not still there because in the meantime, because it's a sort of passion today, so this intervention attracted a lot of real estate developments and now a lot of famous architects

		design buildings in the surrounding and now it's not, the rent of the apartments is totally different. At the end of the high line, now we have an important building that was designed by "Renzo Piano", Whitney Museum, that creates the elements that conclude this intervention. Thank you very much.
00:48:43	Matteo Ruta	Hello. Hello. Hello. Hi. I'm Matteo Ruta, nice to meet you. I'm very happy with my colleagues. I'm very excited to be here this week with you. We really need to work with you in the workshop, and so thanks again to this opportunity. This is the title of my communication of today, and this is me. I'm Professor at Politecnico di Milano. I'm also two things that I think is maybe interesting to know. The first is that I'm an editor of a magazine. To do a magazine is really, really exciting. And I'm also a curator of an architectural festival. This is ArcheTipo. I came to born in 2006, now we are in the issue 180. Every month we speak about a topic, refurbishment, hospitality, envelope, building where there is no possible enter, but are only examples. Obviously you understand the topic, the concept of the magazine, that is we need to speak about the construction of the building and we work a lot with the drawings, the technical drawings of the building that they redrawn.

		We search the drawings from architects, engineering, etc., etc., and we redraw this building. And we do something like this. This is, for example, a restaurant by Zaha Hadid in London. Here was an existing building and here is the new restaurant of Zaha. And this is, for example, a very, very complicated building named the Fundazione Prada, realized by Rem Koolhaas in Milan, in light, dry construction. From the 2024 last year, we are two editors because arrived one of my best friends, architect Benedetta Tagliabue, with co-editor with me. Benedetta has a very important studio in Barcelona, in the South of Europe, in Spain. This is one image of the studio. And with the arrival of Benedetta, the cover changed absolutely because also the style and the idea of the project of Benedetta.
00:52:03		I talk about this because the two stories that I tell you this night are very much related to the work of Benedetta. The second thing in the introduction is the festival. I think it's important to talk about this festival because Milano Arch Week is something like this. Every year for one week, all the city of Milan, our city is covered by advertising because we talk about architecture. We organize more than 100 events in all the city, the center and the peripheries, and we talk with citizens, we speak about architecture because we think the architecture is a real agent to change the society, to give a better life to the people.

		And so all the city is involved, this is one of the lecture in a park in Milan and this is the introduction, the first lecture, the opening lecture in our building in Politecnico di Milano, the old building of the Faculty of Architecture. So I start with the first story. The first story is in Barcelona, in Spain. Barcelona is a very old city, very, very particular. It's really easy to recognize Barcelona from an aerial view because there is the city center, the old center, the Gothic district with the street not large and geometry not regular. And the north part, Barcelona is very beautiful also because here there is the sea and there there is the mountain and so where you are in Barcelona you understand exactly where you are because you see always the mountain or the sea. And this new part was realized by an architect and engineer named Ildefonso Cerdá and it's very very very regular. Eixample extension. In a sample is in catalan and they speak the language of barcelona this is another image is absolutely clear the gothic district and the new part with this octagonal part. And in Barcelona, you are from Europe. In Europe, Barcelona is one of the most important cities for urban strategy to regenerate the space, the public space.

00:55:17		The Olympic Games in 1992, Barcelona had a lot of ideas to regenerate this city. Before the Olympic Games in Barcelona, there was a lot of problems. After the Olympic Games, start a lot of strategies and all the people in the world learn, study study what Barcelona do to understand how it's possible to regenerate a city. One of these strategies is in this district. This is a very old district named Raval, is a very, very problematic district. This is the Raval, this is the main street of Barcelona, pedestrian street, named La Rambla, with a lot of green. and this is another district named El Born. In this district there was a lot of problems and the strategy is we put in the district new buildings with very, very important public function. And so the first strategy is to build this museum and the second strategy is to build this museum and cinema. This is the museum realized by Richard Meier, architect, and is very related to this very old district, and the people immediately love this new museum and this space is with a lot of people every day in every hour and so the problems with the violence, with the teeth disappear because the people arrive to see the museum and so the problems disappear. This is the other building designed by José Luis Mateo. It's related to the cinema, to the cinema of this region. And you see exactly the relation from the old city, very

		old city, and this new important building. Very much in contact, the old and the new together.
00:57:58		So, we are now in Bangkok. Here in Bangkok you have a lot of markets. Market is important for you. It's not exactly the same in Europe, but in Spain is exactly the same. Also in Spain, markets are really important for the public life. And so in Barcelona exists a very, very important market named La Boqueria in Iron and Glass is the most famous, most visited market in the Rambla in the main street. But the second market is the Santa Caterina market here with the new project of Benedetta Tagliabue and Enric Miralles. There was a problem similar to the other district, the Raval, because this street was really, really not large, there is no light, and so the people escape from this district. Nobody needs to live here. And so the town hall decided to try to change this situation and launch a competition, an international competition, to reconvert, to re-transform the old market. And this is the result. you see it is very impressive the older version the previous version of the market was this was a really really hold and is a closed market it was closed the market nobody needs to enter in that district.

		And that was absolutely difficult to solve because this is the old market and the situation was that these streets are not open, was not possible to go into this part and so this part was really with a lot of problems. But there was also a lot of opportunity because here is the main cathedral of Barcelona, the Gothic cathedral, and so the market is very near, but here there was a lot of people and here nobody.
01:00:42		And so Benedetta studied a lot, studied a lot with one of the tools that Benedetta used, the collage of images, and this is the collage to understand what is around the Santa Caterina market, to understand the life before the transformation. And so she works a lot, and she decided to break the rule of the competition. Okay, the competition asks only to refurbish the market, Benedetta decides to participate with the project that don't touch only the market, but touch also all the streets and all the districts around the market. Because Benedetta has the idea to open the street and so to demolish some buildings and she says, if when a lot of tourists are in front of the cathedral, see something really interesting, really colorful there, need to go there, and if they arrive in front of the market, they see the light, they continue, and we have a lot of people in this district and so the violence disappears, the problems disappear.

		And so with many, many sketches, many, many ideas to understand the better solution, these are the sketches that understand the idea from the cathedral. You have to see the market, and so it's necessary that the roof of the market go into the street with the color and she thinks a lot of ideas, for example, the drawing of the roof are vegetables. Another sketch. And the Benedetta win the competition, reuse part of the old roof, decide don't touch the external wall and so it's very important to see always the old part and the new part. The old part is in brick and stone, the new part, the new roof is wood, steel and ceramic tiles. So, when they started with the work, they found the rest of a monastery that was here, because in Europe there are a lot of history, and so we find always something. This is a study for the pergola, a lot of maquette, Benedetta worked a lot with hands, with a maquette, with a food maquette, cardboard maquette.
01:04:04		This is always the final result. She needed to integrate also housing for elderly people because the strategy to have people here is always to have different people of different ages. This is the image from the cathedral. From the cathedral you see something like this, so there is an attraction. It is absolutely possible to work into the market and it is quite a new covered street, public street in Barcelona.

		And these are some images of the construction interior, the existing roof reused, the houses. This is a collage of material for one of the walls. It was really, really complicated to realize so much colors for the tiles. And absolutely, as always, a lot of drawings, drawings, drawings to make it possible, this construction. In the strategy of Benedetta, there is always the idea to work on public spaces, to work on landscape design because it's necessary to have the city into the building to break the difference between the interior and the exterior. And for example, this is the project for the Scottish Parliament in the north of UK where it's very cold and she designed these gardens and these public square. if she needed to use the water like an agent and element for life. This is a very big park in Barcelona with a lot of water, it was one of the very first operation of real estate in Barcelona to build a lot of new buildings, and she realized the park into this new operation. And the idea of Benedetta is always to play with forms, to play with something that is really much related to the life of the people, with colors, with curves, with surprises. This is in another city, Hamburg, in the north of Germany, where with the cold the people don't live in the streets, and Benedetta changed this idea and realized this very particular, a very designed square

		and now all the German people need to go outside and it is very important this transformation this use of the public space.
01:07:35		And this is the last, it was in Italy, in Italy there is a a very important city for the sea, named Rimini, is is like Phuket, is playing with a lot of people. Rimini had a very big problem because there was quite a separation between the sea and the city, and the idea with this project that mixed pedestrian spaces and green spaces break this division between the city. The letter R is the letter of Rimini, the first letter of Rimini, and so the lamp is referred to this. Okay, I start with the second of the story. The Second story is in Milan, our city, and Milan completely changed. Barcelona completely changed after the Olympic Games, Milan completely changed after the International Expo, this was the Expo, in 2015. know this year opened the International Expo in Osaka. 15 years before Osaka, we have in Milano this very important expo. The legacy of the expo is that after the expo, Milano completely changed. It was a city with a lot of problems, a lot of spaces like impossible to change and with this event, with this big event, also the politician, also the people, also the investor, so the private, need to arrive in Milano to do a better city.

		And so this was one of the images of the expo and for example, the really famous Bosco Verticale of Stefano Boeri is one of the architecture realized in one of the districts completely transformed after the expo.
01:10:15		And so also the enormous success of this building that is really known in every part of the world, Milano began really famous in the world, of the finance world and also the architectural world. And so we have a lot of projects now in Milano. And this is the second story. The second story is about the transformation of seven big areas in Milano. The area was the railway yard of Milan, because Milano is a city with a very interesting and recognizable geometry, because our circle, the circle was the ancient walls of the city and one of these circles was water, because Milano was like a little Venice in the past with a lot of artificial canals and so water was really important for the city of Milan and in this moment we have only one part of this canal and the other was covered to do streets with cars. This is the situation. In Milano there were seven railway yards in use. There were areas that the owner was the railway of the state, the Italian railway, And they use for operational rails, but there is no reason they don't use these areas, because the value, the economic value of these areas is really big.

		And so now we need to change this area and to create a new district. You see one of the really, really big, and then is near the Bosco Verticale, is absolutely in the center, but also this is very, very big. This is, for example, the dimension of this railway yard. Here the people can't arrive. There is a wall that is not possible to enter in this area. And so I was born in Milan and so when I was here, I understand for the first time that it's really easy to do from here to here, but I don't think that it's possible because Because usually to do this we do. And so for us it's far, but it's not far, it's really near, but it's an even space into the city. It's a great opportunity to enter in these areas, in these railways yards. This is also the main, Farini. You see, this is the centre of Milan with the skyscraper, this is Bosco Verticale. This is the second, Porta Romana. Here there is the Fondazione Prada of OMA in construction. Here we have now the Olympic Village for the Olympic Games in Milan next winter, because we have the Olympic Games next winter.
01:14:04		This is Porta Romana. So it's a really great opportunity to recover these yards, but it's absolutely really, really, really difficult because the private need to gain money, to have a lot of money with this operation, and the public, the city, need to have a park, to have public buildings, to have a better life.

		And so it's not easy to find the good solution to start this operation. And so what Milano do to start with this operation? They start with a workshop. A workshop open to all the citizens. A workshop open to all the citizens to speak about what you need in these spaces what is your idea of the life in these new spaces. And so we talked a lot for three days with a lot of people and there was five chiefs of this workshop and the chief was architects because the city needed to have five teams with five really famous architects that talk with the city to do not projects but vision, concepts. It's not as easy, don't draw, because it was not the competition to gain the possibility to design exactly these areas. It's only concept to say to the city, yes, it's necessary to do this transformation. And so, was concept for the people. Oops! We have a lot because in all the five teams there are a lot of people, sociologists, historians, urbanist, designer, etc. etc. etc. We work a lot because in only three months we have to do division for the seventh areas. And so we work a lot about the history of Milan, about the problems of Milan. We play a lot. This is the manifesto. Manifesto is manifest, but in Italian, money is hints, and so for us this is the manifesto we do with the people of the city to understand the idea of the people have about these new areas.

01:17:03		We study a lot of the story, the circle of Milan, and we start with this summary of our ideas. For each of the seven railway yards, we give a new name of this district because we think it's important to preserve the memory of this new area and so each area, the name of each area starts with the word Scalo. Scalo in Italian is a railway yard. And after Scalo, always a word that represents the main function of that area for us. And so this is the Scalo, the railway yard of innovation, the railway yard of young people, of design, of the light, of the water, of the agriculture and of creativity of design. We study a lot to arrive to these seven ideas. We do a lot of collage to understand what is really important. One of the things that was really important for us is to rediscover the water in Milan and to have water in all the seven areas. We understand that it was absolutely necessary to do a lot of strategies in all the seven areas, cool island, green areas, water, mitigation surfaces, color and material that can mitigate, of course the water, and also strategy about the shading, for example, the drain gardens, but there was a lot of words, a lot of text to explain our ideas. We study also rules for the shapes of the building, for the aids of the buildings. the technology that was

		necessary to have, the study that was necessary to do to have good buildings in that area that is into the city and so with a lot of construction, strategy, strategy, strategy, and we do a lot of collage. This is, for example, our collage for two Scali very near, San Cristoforo and Porta Genova. This is the Scalo with the water, because one of the parts of the water that exists in Milan is in this Scalo. This is real. This is the old harbor of Milan.
01:25:40		And this is the only canal that we have in this moment. The shapes of this yard are strange because it was for the train, it was not for the people. And you see, this is not a real project. This is like a concept. We say a vision. This is the impression. It's only the impression that they are not real buildings, they are not real façade. This is the brief we have. Ideal section. This is Farini, with a lot of water. For example, in this façade we have flowers, because it's concept, it's absolutely concept, vision and so the material is not important. It is important to have a skyscraper, a landmark in the middle, a lake in the middle. The idea of this building is to connect today to the next existing city, but it's only concept. And we work a lot with the collage to arrive to this idea. This is Greco, where there was a factory of cars, and so the suggestion was to use the mobility, the lights, a lot of bridges, bridges, bridges, because one of the problems of this railway yard was that it separates

		two parts of the city, and so the concept is to reconnect, to reconnect with bridges, with the passage.
01:22:22		After this, the five teams present to the city the results, the ideas during the design week that is the most important event that we have in Milan with a lot of people from all over the world that arrive in Milan and the event was in one of these scali with a lot of people that we talk about our vision this is Benedetta this is our manifesto with our collage and so after this the city decide okay for us it's okay We can set these seven areas to private to change completely these areas. Okay. For us, it's good. And so, we start with a very different situation. For example, okay, this is a number. For example, the first Scalo, the bigger, the Farini Scalo, was won in a competition won by OMA Rem Koolhaas with the Laboratorio Permanente, and they are quite starting the transformation. One of the others is always a competition, win by Arup and Barreca & La Varra and is in construction. Lambrate Yard is in a competition that we participate but we don't win. The timing? Okay. And Porta Romana also starts. I have no time to explain all, and so this is the proposal for... the winning proposal of OMA for the Sarini district. It's a very open concept, a very open project, because for the transformation of these areas, are very, very,

		very long and so maybe 40 years to completely transform these areas. And so the project of OMA is really flexible to follow what in Italy can change in these decades, in these 40 years. And so, for example, if Italy has a big disaster and exit to Europe, we built very, very low. If Milano became the most important city in Europe, we can build a lot. And this is the other scenario, maybe the proper scenario was like this. This is the second, the Greco-Pirelli is in construction. And this is Lambrate, it's our proposal for Lambrate. was a competition is really near to Polytechnico is not easy to understand what we do because was a C40 Reinventing Cities competition and we have to give a solution for seven challenges.
01:26:37		This is our proposal. We study a lot. We propose five new squares. Every square is related to an important function. And we propose a different function, housing, student housing, public spaces for association. This is the hostel for young. And we have to study a lot because there are a lot of rules to respect. We have a lot of study to do about the situation before and after the project. urban studies, landscape studies, social studies. For each of the challenges, for each of the 10 challenges, we have to explain how we solve a problem

		with materials, with installation, with the shape of the buildings, with height of the buildings, with the low carbon material used in the buildings. One of the most important things for us was to work with the people of the districts. And so, for example, the ninth challenge is inclusive action, social benefit in a community. We talked with 40 associations of citizens in the city to understand what was the better solution to have in this new district. But we lost, thank you sorry.
01:28:56	Gabriele Masera	Matteo is very modest we came second by a very very very short distance from the first one second is not winning of course, but better than that. Better than last. Okay, thank you, thanks Matteo. You've seen a number of aspects that time did not allow to go into the details of every single design decision, and there were many that had to be taken to deliver the proposal for the project, the last one that Matteo showed in Lambrate, one of the goals of the Reinventing Cities competition was to demonstrate that the development would, in the medium term, become zero carbon across the life cycle. So in 30 years time, the project should show that it has become zero carbon. Many of the strategies that Matteo just sort of anticipated were going in that direction of using, say, some KPIs probably about the

		use of renewables, about how you treat the water and keep it on site, about the use of materials and the choice of materials, and so on. So, going back to the topic of decarbonization, which was part of the two previous presentations as well, I'd like now to shift a little bit the point of view. You've seen several nice slides with projects and colors and ideas. I will be, I got to tell you, a little bit more methodological. How tired are you guys? Hmm? Okay. Good. It's all right. So you can bear with me for like 20 minutes. So, the topic I'd like to introduce now is a topic that we're working on with a research group, a small research group that is led by me, and I'm tutoring a PhD candidate at Technical University and we put together a bunch of other people to develop some numbers, a framework of course, but supported by numbers about the concept of circular economy and on how you could imagine to introduce materials coming from circular economy, loops, discussed that already previously in a normal regular design process so how do we integrate this not as a special thing that some you know very enlightened designer wants to do but something that can become part of the design equation in a way together with the other elements that we use to develop a design. And it's a... I left this for the last, in a way because it deals with a smaller scale, a more granular scale, which is the scale of materials, but on the other because it also

		touches on other aspects, the other scales that were discussed by my colleagues before, which is also meaning that we should look, understand the situation at the scale of the city or at the scale of the territory to develop effective urban mining and therefore security strategies. And then this also impacts on the design of it.
01:32:44		So it's a sort of horizontal cross-cutting challenge that we need to deal with. I don't want to say that we cracked it, I mean, not yet. But I think I hope I can give you some food for thought in terms of some of the thinking that we are doing and some of the things we see on the horizon. First, some numbers, figures, always important to open up the discussion. And figures that I got to tell you to be honest, when we started investigating this topic, we were not totally aware of how big the problem of resources is. It was mentioned in the introduction, but the built environment is a huge consumer of resources, probably more than each of us in this room thinks. Generally speaking, we are using resources beyond the capacity of the Earth to regenerate those resources. I'm pretty sure you know this. We are living now at the like if we had two Earth, two planet Earth, to support our need for resources. We don't. And if we carry on as we are doing, in 2050, we will need three planets. We don't. We have one, obviously. We know very well.

		Point one. Point two, buildings. We are a big part of the problem. So that's a big, big, big question mark for us, for our... I mean, also morally for us, what we are doing, what we are doing here on the planet, what's our role. Knowing that, from the beginning of the 20th century, as you see here, we have accumulated a tremendous quantity of materials mined from the ground, mined from the Earth's crust, and we have, like, frozen those materials in buildings, infrastructure, and the other things that we build to live the life that we live. Just construction minerals that are used for concrete, that are used for steel, and so on, increased 34 times since the beginning of the 20th century. We now have a lot more accumulated 792 gigatons of materials that we have stored in buildings that are more than the biomass of the entire planet trees, animals, whatever you want to put so, we have a problem, right? and the problem is that, in that situation the construction industry is, you see, responsible for the largest share of the world's total production of materials 60% of raw materials go in buildings and infrastructures. So we have an incredible role. 40% of steel, 40% of raw stone, gravel and sand. Gravel and sand are used to do concrete, of course.
01:35:49		We are facing a situation where, as Manuel I think said, we are going towards a situation where more and more people will want to move to cities in this century. We've got to build spaces for those people. Look at the

		amount of sand gravel and crushed rock that we will need in 2050 it's stubborn, the one we use today. Sand is already a critical material. Sand is already a material that we know we struggle finding because, well, there's a lot of people wanting to use sand. And we live in a world up to now where we design things thinking or imagining that there wasn't a limit, that we were just, you know, using a little bit of all the materials that are available on this planet. It's not like that anymore. We are reaching some limits. We are hitting some barriers. That's the big point. I don't have big answers. I don't expect that I will give you big answers. But I want to paint, okay, the picture. So increasing the population, increasing the urban fraction of the human population, so more and more buildings, of course, which will be required. So from the point of view of the mindset, what is the goal, let's say, at a higher level of thinking? Is that up to now, what we've done was, okay, we need to build something. Material stock is a very academic way to say what people what human beings have built. And well to do this in the past we have always looked at the Earth at the geological deposits of the Earth. And we said, oh, beautiful, there is some iron in the crust. Let's dig the crust and take out some iron. Let's process it and let's put it in our buildings, right?

		Now we have sort of frozen, we have invested and frozen that incredible amount of material that we've seen before, which is already extracted, it's already used in some form. In that column, we have a certain amount of sand, a certain amount of gravel, some reinforcement bars, and so forth, everything that surrounds us. And those are materials that require effort, energy, money, life, labor, to take out. So the question is, can we go to a situation instead where we find that part, at least a part of what we need come from the stock that we already have engaged now, and we don't need to go and find the materials for the future needs. We will have future needs, of course. But those future needs can be satisfied, at least in significant part, by the anthropogenic stock. And so how do we understand how we can use it? how much we can use it, how can we use it in a process, how do we modify maybe a little bit the design process in a way that we can, okay, push, gently push designers to include waste, let's call it waste, in the design process.
01:39:09		Waste as new materials, right? That can be, that can be, which is the principle of circular building design that you certainly have heard of, it's a big deal in Europe for example the European Union across the 27 states of the European Union we got 850 million tons of construction demolition waste per year it's a lot of course and only part of that is used most of that goes

		to landfills and It essentially becomes useless, it's lost, right? This is a topic that, of course, includes different scales. That's why I was mentioning before the different scales of the building or the materials and the choice of materials and components, the design of the building, the design of the city and the knowledge of what we have in the city. So it's a cross-cutting challenge in a way, something that really engages all the different phases and all the knowledge we have about the built environment. Just to mention, so different scales, different steps, we've got of course the building design which includes the material selection and there's a big moment when we can do something about it. The reduction of waste and the construction phase, the appropriate renovation and treatment of materials across the life cycle of buildings and there are different several points you see here on the right where something can be done from that point of view. In different ways, by the way, in some cases during the dismantling of a building you might recover pieces that you might reuse as they are. In other cases, the materials like that concrete column you cannot probably take it as it is and cut it and reuse it somewhere else, you've got to go down to the constituent elements and from them create new

		elements, which you can do in different ways. More or less efficient, but you can do it. So the question is, okay, we live in a world, as we said before, in a world with scarce resources. How can we imagine to adapt at least a little bit the design process to recognize these limitations and to find ways to say, okay, I want to use materials coming from circular processes, from circular loops. How do I do it? It's easier said than done, of course. How do I do it? You don't find everywhere these kind of stores and shops of decommissioned materials. It's very difficult to match the need from the designer with what the market offers at that specific point in time. There are several aspects that need to be figured out. But in a way, certainly from our point of view designers starting to think also in a way that, again, because resources are not unlimited, we should try to think that the reuse of circular materials can be part of the design decisions. Okay.
01:42:44		The several design decisions that we take as we design a building and as we select and specify the materials for that building. So, to do that, we need to form some knowledge. We need to know what is out there. So now I gave you aggregate data, but what do you do with the fact that there are 792 gigatons of materials around? Nothing, probably, right? You could say to a friend sometimes, but it is what it is.

		We got to come to estimations of the materials that are embodied in the building stock, as you see here, and understand how many and how frequently these materials come out of the existing buildings because they're demolished, because they're renovated, because they're replaced for other reasons, and to say, okay, I understand I have a certain amount of, I don't know. Concrete this year in the area of Bangkok. Okay. Can we imagine that there is a market for crushed concrete and how much can that concrete cover of the need for concrete that the Bangkok market requires every year? We don't know these things, I tell you. I mean, if you look at scientific literature, we are not having clear ideas about that. We know that these are important problems, so we... And there are some efforts that you see here, I'm not going into the details, but essentially you've got to be able to study what is the situation. You do it in different ways that can have different types of resolution, different temporal scope. Is it in future? Is it in the past? Is it what happens? What do you measure? All of the existing stock. Do you go down to the material level, to the components, the building? What do you measure? What's the metric? Size, weight, numbers? I mean you understand there are lots of things that need to be clarified and agreed upon before we start doing that.

		So we've got two ways to do that. One is top-down approach. Top-down is easier, so it takes, you know, information from producers and resellers of materials at the typically national scale. You understand what comes in, what goes out. It's relatively easy, but it doesn't give you... It's aggregated. The data are aggregated. It's very difficult to come down to the level of decisions on... Design decisions on single buildings. That means we got to go the other way around, so bottom-up. Bottom-up is more precise, but more resource-intensive, resource-intensive in the sense of our mind. So we got to do a much more precise estimation of what the built environment is made of, of the characteristics of the existing built environment, and then trying to go down deep into these elements and try to understand what materials are there.
01:46:10		And I'll show you an example shortly. Spoiler, this is the route we have taken for our study. And that is what we have in cities. That is what activates what's called urban mining. So the idea that cities are mines, so big deposits of materials that are not geological deposits are man-made, human-made deposits. And we can take the resources out of these mines, out of these deposits, exactly as we do with the natural deposits, the mines that we have in the Earth's surface. Also because, again, there's the first sentence there,

		how much is there? How much sand do we have on the planet? Is it going to last forever? Is it going to be enough for a population of 12 billion people, 70% of them living in cities and wanting to build concrete buildings? In some countries, this is already a big, big, big question mark, So, okay, there are some concepts that I'll skip because otherwise it was too long. There are aspects of criticality. So critical, there are, okay, resources that we know are not many, resources that are scarce, but we know that there are resources that are also critical, and the critical resources are the ones that can, where we know that there might be supply disruptions, and that Those disruptions could be critical on the economy and on the society. If we stop finding sand, we cannot build concrete. If we don't build concrete, we have a problem, right? So it's critical. Okay, so, question is, designer, okay, we are designers or people that work in the field of design. What is the point? find a way to match to align the need of materials that we have from buildings with the supply so the possibility of finding those resources that we want to have in this moment it's not really I mean it's pretty much approximate if there is any thinking at all about this topic and the things are mostly misaligned Because also, there's no information, no reliable information to know that. And the question is, okay, can we design a framework for material-aware design that has some info about the supply side, so what can we

		afford to use, and the demand side? Okay, this is either building, either residential building, and that building requires a certain amount of materials and so on. Can we make these two ends match? we make these alignments, which is not easy. So okay, I'm not saying too much on the framework, I want to show you the example that we're doing. But yeah, the ambition is that in a way when designers select materials, aside from technical issues, economic matters of course, which are leading aesthetic concern, there might be also sustainability topics that must be taken into construction, which are typically Today probably it's more common to find designers that are aware of carbon emissions.
01:49:38		And perhaps, okay, you say, oh, I'll take wood because it has negative carbon emissions rather than steel or other metals which have high emissions. But we would like that material availability also becomes something, becomes part of the discussion, okay? Becomes something that designers in a way become aware of. On the other hand, we have to know, as I was saying before, the knowledge about the resources that are available. And those resources might be virgin, the ones that we take from natural resources, or secondary, circular, coming from existing material stock. And how we do it, I'm sorry it has to expand, but it becomes more complicated. But virgin resources, we got to do criticality assessments and then understand

		if it is critical, how many natural reserves we have and so on. And for the existing material stock, we do material flow analysis top-down, as I mentioned before, or bottom-up estimations, okay, that tell us something about how the material is distributed. I will come to show you in a moment how this is done. But once we know the resources, so we have this info that's connected to the material availability over there, and the designer here can make informed choices at least. Knowing what he or she is doing, what is being selected, and how this selection is part of the bigger picture, which includes the limited availability of materials. And then from here, we will develop some KPIs, some indicators which should set the bar for the expectation for what to ask designers. Now there are some regulations or some standards that just say, well, you know, you should put 50% of the material from recycled sources. And so, okay, how did you decide that 50%? Just a number out of the blue? Yes, 90% of the times. So how do you decide? What was the benchmark? This is technically feasible nowadays based on the buildings we design, based on the material markets that we have, based on knowledge about urban mining and the circularity of materials. So what we've done, we started working, okay, this is the city of Milan again, now you recognize it. We took

		one district of the city of Milan, which is described in the geoportal of the municipality and from here we started to construct a model of that part of the city. A model is not the reality of course As you know very well a model is a representation of reality with a reasonable degree of approximation. And so we started from a number of sources, GIS data, information about the construction year, the topology, the height of the footprint, to essentially come through the definition of some archetypes that are repeated, and the size of the buildings, and the understanding from literature about what materials were used in different periods of time to build some types of building to try to understand, okay, how much material there is out there.
01:53:14		It's a model, okay? So, it's an approximation. It doesn't have the expectation to be precise and to know that that building exactly has those kilograms, but at least in terms of order of magnitude, that's what we wanted to do. So we started from GIS information that's publicly available about, in this case, the function of buildings, the total gross flow area, the year of construction, this is an area that you see starting late 19th century and was developed mostly during the 20th century. We defined based on literature and, you know, books of standard practice and so on. Some archetypes based on the age, we can see essentially housing being in that district most of the functions. And then,

		okay, we said, okay, that's archetype one, archetype two, three, four, five. And we had some information about the geometry, how much wall to window ratio we have, and so on. We remodeled the city by approximating and saying, okay, if the building is residential from the 1920s, very likely it would be not too different from that one. So again, it's an approximation of the reality in a model. But that allows us, okay, once you know the type of construction in different periods, we could do essentially a materials list for each of the archetypes. And then we came to what is called in literature a material cadastro, so essentially a list of the materials that you have, where they're located, and we got these diagrams that show, for example, that wood is... I'm sorry, the colors are the same even if the numbers are very different. But in each case, it's cubic meters, okay, of materials, and you can spatialize them. You can say where they're located in space. You can build a map of the city with the intensity of materials available across the city, which is different colors and so on.
01:55:22		There is a lot of bricks because that's late 19th, early 20th century, and then some other parts are also about concrete and so on. And then, final step is looking at what happens in time. I mean, those materials are

		frozen. Again are they taken out of the existing building stock and are made available for new construction. So they enter the circular economy process. To do that, we have done, again, estimations about the life cycle of the building, the age, the renovation processes, again, some assumptions. And we've seen that, okay, there are materials that become available more quickly, some other less quickly. This diagram is not entirely accurate for the moment because this is the cumulative amount of materials, but of course, you don't let them out. I mean, they're out there and potentially someone uses them, so they go away, so it should be something like more oscillating. But it is this, that we go to specialize, so we know, for example, I want to take my material in a radius of 50 kilometers, I don't know, something like that. And how much of each material is available every year or in a time step that make it possible to take decisions. Okay? So, when we know this, we can compare that availability of materials with the materials we need to build a building. And we've taken some existing buildings Park Associati, collaborating with this research. So it's a student housing here and an office building here, representative of a good bunch of new construction in Milan.

		And for each of these buildings, we try to understand the circularity potential of each of the buildings. Circularity potential in terms of, okay, now we know the materials. Can you source those materials from secondary sources, so from circular economy? Yes, no, and that might be different for each of the categories of course, materials, and we can come down to a certain circularity potential. And then, of course, there will be the market, some more or less expensive materials, there will be materials that can be found in the area, so urban mining, some other things could be from recycling off-site, so far away from the site, or directly reuse on-site of some material, if it's a demolition work, maybe you reuse the crushed concrete, for example, and so on.
02:13:36		And we started applying this to some final thesis project of final year students, the housing where we try to understand, okay, the housing, pretty regular housing, where and how much circular materials can we use here? Some of them are materials that are reused as they are, metal grills, walls, even electrical ducts that can be used or roof tiles that can be used as facade cladding, grain screen cladding. And we ended up with some... Okay, it's the first iteration. We don't... We know this is not true in general, but we came to understand that 56%, the greenish

		hues here could come from recycled materials potentially. Recycled, part of them urban mining, light gray, light green, sorry, potentially from other sources but not used, not specified in this bill. So potential 56, actual a little bit less, 38, just to give you an idea. Plus, of course, trying to find materials that are low carbon intensity such as CLT panels in timber. So once we've done that for a significant number of buildings, we would like to find benchmarks essentially and define what benchmarks are reasonable considering this availability of materials on site and then using other indicators, but that's something that is still going on. So and testing this framework that is designed here. That's the theme, and I'd like to conclude with a scientist quote by Jane Jacobs from 1969, the scholar that she was, already in 1969, said, as you see, that future cities will become huge, rich and diverse raw material mines. And these mines will differ from any now to be found because they will become richer them longer they are exploited. And new veins, formerly overlooked, will be continually opened. So I think that this is an additional layer, in a way, an additional ingredient to design that I hope will also stimulate all of you during your career. So thank you.

02:00:30	MC	Thank you very much for a very wonderful lecture. We have seen lots of examples of the project from Europe, of course, and I think there are different scales of the project and different strategies that you're dealing with, like the existing conditions and the new developing projects that integrate into different degrees. And especially the last one, I think it's beyond my imagination. I mean, I never think that the existing building could be like the material for the future design of developments like the life cycles of our architectural design. So thank you very much. And this is in Q&A sessions. If you have any questions, just raise your hand. OK.
02:01:32	Questioner 1	Thank you so much for today. my question is, is there any area of architecture you specifically looking forward to working on or explore more in the future? why is that?
02:01:47	Gabriele Masera	Area in the sense of, you mean, functions or topic more in general?
02:01:57	Questioner 1	Yeah, like the functions.
02:02:00	Gabriele Masera	Well, I mean, it depends very much on the locations. I think it's one reason we wanted to bring to you this reflection and thought about decarbonization is that you probably have noticed we didn't speak much about

		energy efficiency. In a way we feel that at this point, at least from the academic scientific point of view, most have been said, at least from our point of view as designers, architects or engineers supporting architects, that the idea that we need to build energy efficient buildings because we need to reduce the amount of energy our buildings need to be warm or cool depending on the season and the climate, I think it's now pretty much, I would say mainstream in In a way, we all know we have to do it. Out there, there are people that try to slow down, dragging their feet, but I mean, I think that direction is pretty clear. And from our European point of view, for example, the regulations about energy are pretty strict now and there is not much more we can, we see can be done by regulation alone. On the other hand, there is a new directive on the energy performance of building that came out in May 2024, less than one year ago, which started to introduce the concept of carbon impact across the whole life cycle. So the reduction of carbon impacts for materials, for the operation, and for the dismantling of the building at the end of the life cycle. And this, I mean, our feeling is that the energy aspect now is something that is a little bit outside our control because biggest problem now has moved to grids, has moved to the fuels and the sources of energy, has moved to storage of renewable energy that is not constant, so how to store it during the day and during the night.

		I mean, these are things for engineers. I'm an engineer, but I don't understand anything about this stuff. So, I mean, architecture-wise, instead, I think the attention is going to shift to materials, as we tried to highlight today, and to the impact. And that makes sense because, of course, when you look at the emissions due to comfort, So heating, cooling in particular, and when you squeeze those amounts of energy you need because you do a properly insulated envelope, well shaded, with high performance, then in proportion the weight, the importance of the emissions due to the material fabrication increase. And that is like a hard part of your total emissions balance that you don't change by, you know, modifying the energy performance of the envelope. It has a lot to do with the choice of materials. And that explains a little bit why we are starting to look at timber construction, for example. We are starting to look at different materials because there will be a moment, and in Europe that will be the end of this decade.
02:05:38		Less political, say, landscape changes, but in Europe it changes less, how can I say it in a gentle way. Changes in a less abrupt way than it does in the US, to be a little bit more progressive and slow. The directives already in 2028 you will have to provide, together with the energy certificate, you also have to provide a certificate about the total carbon emissions across the whole life cycle of it.

		That thing in the next iteration of the directive, probably in the early 2030s will become limitations to the emissions. And then again, well, how do you do it? Well, you will have to choose the right materials, low carbon intensity materials, and so on. So you add the bioregulation actually earlier in a way of complexity design because as I was saying this is the top. And, you know, this is challenging, of course, and, you know, the challenge is always then, what I'm saying now, is something that is something regulatory, it has to do with the law. How you transform the law into poetry? Into architecture, I mean. You don't do a box. You want to do architecture. You all want real. You all want to do something that is meaningful, right? How to do that? Taking these aspects into consideration and making them ingredients of this magical recipe that is architecture, this is all to us, to each and one of us to understand how to. As academics we can try to give you a framework and try to make you understand how to consider those aspects in everyday design. But then you know poetry is when you take a law and you sort of, like Matteo was saying about the competition for Santa Catalina market, and you twist a little bit the things or you look at things from a different angle and you're able to then do something that is meaningful and beautiful, beautiful in

		a different, difficult category of course. But yeah, I'm passionate about it, yes, I'm sure.
02:08:06	MC	Any more questions?
02:08:15	Questioner 2	Thank you very much for your presentation. It's very, very inspiring. I have a question about the circular economy, the presentation, the last presentation. When you did the research about the material used for each typology that you explained about each typology of the building that you have. Do you have any remarks or any information about each type that you classify for each year or each type? We would like to know if Is there any difference from each type of decarbonization that you look for?
02:09:18	Gabriele Masera	Yes, one of the obstacles here was that there's only so much, little bit, of standardized construction across Milan. A lot of prefabrication and most buildings have been built, let's say there were special single buildings designed on purpose and then the other one was different as well. We have relied on some sources that were manuals of practice until the early 20th century which were the ones that explained how to build things and we're pretty sure that those ones are reasonable enough. There are other studies that looked into standard ways of construction until the 1970s, 1980s, let's say.

		There have been studies already that try to catalog the types of construction according to age and function, so we relied on those ones. Plus we included some assumptions about potential retrofits. So for example, if we discovered some buildings were right to fit it, we assumed that some other materials were added, like insulation perhaps, and so on, but that's how we built it. So it's a mix of existing information, either from books or from other research projects that we could lean on to build this. There's some more that we need to do because of course there are some areas that are more industrial and then we have to find a way to describe warehouses for example which is not easy um school buildings but okay the majority is residential essentially apart from other areas which could be either industrial or commercial buildings so in that case we need to do some approximation it's not totally easy. The other important aspect here is that something I didn't mention in passing, but when you imagine that you use circular materials in your building, then there are two, at least two important aspects. First is the guarantees that you need and want to have on the buildings you put in your new building, of course, because the client wants guarantees. Totally reasonable. So what is the level of guarantee that you can give on some types of materials, some others perhaps not. So some materials might be used as they are with a proper

		guarantee and the others maybe have to be like downgraded, concrete has to be crushed typically and made into something else.
02:12:09		Second is finding a way to match demand and offer. So finding like hubs or something of recycled materials or salvaged materials that come from these demolition operations or renovations, perhaps not necessarily demolish everything, but hubs that in a way put in contact with designers or the construction company with those who are ready to sell the materials, the scrap materials from the existing buildings. These are two things that do not exist yet, unless in just a few instances. And they certainly need a little bit of, you know, adjustment to make it possible to use these materials in a way as regular materials. As you go out to a building component supplier and you buy windows, you buy sand, you buy everything you need to buy, right? So that would be the sort of big obstacles. There was an interesting experience, Belgium, Switzerland, part of Italy as well, some cases where they collect all these elements. Very interesting. But again, something that, by the way, has been done all the time. I was visiting Chinatown this morning, and we saw all the parts of engines, secondhand thirdhand engines. And I mean, the story of human beings has always made the most out of what we have.

		And at a certain point we started industrialization and we started to say, okay, now we don't need to reuse things. There are resources forever. There are no limits. We can reuse everything new. We don't need to reuse. We just throw everything away. We put it in a dump and it's the end. But it's not how we worked for millions of years, right? So, as I said, there is something here too. Also to think about our approach and to think about how we actually in the past we were a little bit poorer but we had to make the most out of what we had.
02:14:16	Questioner 2	Thank you
02:14:43	MC	Anyone? A question?
02:14:53	Questioner 3	So I understand that Italy has a lot of policies on sustainable design So what is in your case the most challenging regulation in terms of adaptive reuse?
02:15:14	Manuela Grecchi	It's not possible in reality to have a general approach because each building can produce a solution totally different. So, for example, we recognize starting from the age of the building, we recognize that we have to maintain the building itself so you can have a light approach. But when you are free to decide what is important to maintain and why you start the process of renovation,

		in a way it's up to the design of the decision, which means that you have to collect many, many information, you need to ask yourself why I have to maintain the building, renovate it, what will be the impact of my decision. So if you connect all the information we try to give you, in reality the urban scale, the material scale, the building scale, need to be well connected and analyzed. Of course, in Italy, we have a lot of, let's say, approaches to the history of buildings, because we are, but also you are full of history. So what is the real value? What you want to pass to the future generations of your history. When you talk about materials, how I can recognize the technology in a building. Typically, I can see the surface, the external surface, the internal one, but what was the technology? In that moment, we connect information, the data of the building, the location. For example, Gabriele showed a piece of Milan, so immediately if the building was realized in 1920, I can tell you, okay, they are bricks, burying bricks, burying walls, that's it. But if I transfer the same image in a location that is near Milan, for example, Lecco, they are not bricks. The image is the same. They are stone. Because in the past, maybe it's easier to recognize the technology, because in the past they used local materials.

		The problem is the modern architecture because now all the materials are available, so it's difficult to analyze them. How we can reuse materials? Maybe if you design a building thinking about the decommission of the building, not the moment, about the end of the life of the building, maybe you can select better what is the approach, what can be the decision related to the technologies you can introduce, what can be reused in the future, what can be the layout of the building because now we define the function, but what happen in the future. So what we call the flexibility of the buildings. So many, many, many ingredients for a project. I'm sorry, we don't have just a rule, a solution, but it's the beauty of architecture. We have everywhere the same building. Thank you very much.
02:19:29	Gabriele Masera	Sorry, you made me think about something that I formulated by the reason I put in the presentation. That the big potential, you were, we've been discussing about the specificities of sites and local traditions and the use of local materials, which was a lot of that, of course, before that, where it became a lot more interconnected. And it is quite interesting, I mean, this is purely intellectual stimulation, but we have a global problem, climate crisis, depletion of resources on the planet, something that it is a planetary scale. At the same time,

		we are, most of the time, we are looking at solutions that are local. Most of the time our solution is that look back at some characteristics of the local environment, of the local architecture, of the local culture, which doesn't mean that we go back to designing buildings as they were 200 years ago, of course. But there is a wisdom in a way in what was done in the past. Why? Well simply because our ancestors had to live with less materials. They couldn't go and buy, I don't know, marble from Brazil or timber from the forests in the north of Europe. And so, in a way, I think it's quite interesting. It's intellectually stimulating. I mean, some of the solutions we can try to use to decarbonize and try to reduce or slow down or mitigate this kind of crisis we have is reconnecting to the local scale. So when you think about glocal, this idea of glocal, I think this idea of using materials and solutions is something that is very, very appropriate in this sense.
02:21:39	MC	One more question.
02:21:43	Questioner 4	Because of building red in the old days much more global compared to the 19th century, could this solve material wasting problem? Could this solve the material wasting problem? You mean the materials that cannot be used or recycled?

02:22:06	Gabriele Masera	You mean because of the new materials that we are using now? That's a good question but I also have one feeling it is so that of course we know very well bricks we know very well concrete timber and clay tiles for roofs and so on on the other hand I also think that there is a very strong economic rationale for the recycling and the reuse of materials. We may not be aware now or not have the technologies nowadays to recycle some types of materials that are relatively new sure but again I think the ingenuity of human beings when resources become scarce so it makes economic sense to try to reuse them and recycle it means that some type of technology to solve the problem will come out I mean it's not a static thing so we had plastics in the last 60-70 years and now we do sweaters in plastic fibers coming from recycled bottles it's okay probably something that nobody would have imagined when they first introduced plastic bottles. So I think there is a degree of invention if you will in finding solutions but most materials nowadays they have recycling plants on the horizon so personally I wouldn't worry too much. I mean even PV panels. And everybody knows PV panels are very difficult. It requires a lot of energy to extract silicone. And then laminate the silicone between glazing panels with glues. And then it's very difficult to separate. And nobody cares a lot about recycling PV panels as long

		as they work well, expect a lifetime for 25-30 years, why care? It's a problem far away in the future and nobody thinks about it. Now that the first PV panels are ending their lives, yes, there are companies that started to propose solutions to recycle the components of PV panels, simply because it started to make sense. There are now a lot of people finding them. They could be.
02:24:47	MC	One last question.
02:24:48	Questioner 5	Have you faced the problem of gentrification during the process of revitalizing a building or an urban area?
02:25:22	Matteo Ruta	Short answer, yes. More articulate, more difficult cause. I mean experience, I'm trying to find a way to put it. On one hand, I mean of course, on one hand you would like to improve the situation. That's our goal in general when we do a design. And when the public bodies start to set out for an operation of renovation, you want to improve things. When you improve things, do things become gentrified? Yes. I mean, how do you go around that? How do you go around that? You go around that with a strong public body, with a strong public decision that while the most property owners in the area will be

		happy about gentrification, of course, because the value of the property grows. The question is how do we keep at least keep the people that used to live in that area, maybe are relatively deprived. They don't need to be poor. I'm using a simplified term, but they don't need to be poor to be expelled by a gentrified area, of course. There's plenty of middle class people that cannot afford areas in Milan. It's pretty clear area that the post-co verticale area that Matteo showed. The real transformation, the district behind the post-co verticale was a worker district, where 10 years ago the cost was perhaps 2,000 euros per square meter perhaps, something like that. 60,000 baht per square meter roughly. Pretty cheap, I think, also. Local standard. Now it has quadrupled in 15 years' time. Four times more. Those who are in rented apartments are being kicked off, of course. Because the landlords or landladies, they want to adjust the rent, of course. People cannot afford the rent anymore. So the point is, okay, how do you do it? Well, one way that the operation of the railway yards was trying to implement to mitigate this effect, which is again inevitable, because things are better and cost more.

		There's not much you can do about that. But it is, okay, what is the public interest that you want to preserve when you set out to do an operation like this? And just to be very clear, the operation on the railway yard started with a central rights government of the city. And they had certain ideas about the volumes that could be built and the functions and again the public amenities that would be given back to the population. And then somewhere along the process a center left, when coalition started to rule the city, and it changed a lot of things.
02:29:04		So, for example, the agreement, I'm going to do a short parenthesis here. The land that Matteo showed, railway yards, are owned by the public railway company, the Italian public railway company. So, technically speaking, they are public land where you... They do not generate building rights. They are empty and they are useless. They are wasted space in a way. They don't... The city does not interact with those spaces. So the thinking was, okay, we transform these areas that are public and cannot be built upon into areas that can be built upon. We can do a development. What do we ask developers in exchange for that because we are giving something It's public good and we are putting it out there on the market but the city, public, wants something back for

		this thing that allows private developers to do the operation. And what the city wanted back was very different when it was a right-wing government and left-wing government. I've got to tell you this. Right-wing government, center-right-wing government was very much, I would say, friend of the in a way, and the other was a little bit less. Not unfriendly, but a little bit less. So for example, they increased the size of the public parks that were required. They lowered the floor area ratio, the buildability index for the area. They stipulated a certain amount, which ended up to be like 40%, if I'm not mistaken, of the cross area dedicated to public housing a way not to push house people of this area. So there are things that I mean and it again a sequence a system perhaps of decisions and measures that you've got to calibrate and that however take political will. Of course, if there's no political will, you could be the designer with the best intentions, But then if the public body say, OK, everything goes to developers and they do shopping malls and offices. How you do not gentrify, you gentrify of course, you are gentrified. So there is a thin line in a way, right? That requires some attention, some public, some attention also from the public population that needs to request it.

02:31:57		And prices of housing and real estate in Milan have grown terribly in the past few years because the city is more attractive as Matteo said. And more people want to come to Milan. The number of new houses is not following the number of newcomers. So there are simply more people competing for more or less the same houses. And that, I mean, it's a low economy. The cost grew up, of course. Not much we can do. Unless building new houses and more houses. And that's a very important point. This happened up to a point as if it was inevitable. Now in the past year or two years perhaps this has become a big discussion also in the media and so on. And that forced politicians in a way to start to say, okay, what are the solutions we think we can implement? What do we do? More social housing? More student housing? Housing for example. Other aspects that hopefully in the medium term, because architecture requires patience we hope will cool down a little bit the temperature let say of property values. That how we see from our viewpoint of Milan. Thank you so much.
02:33:36	MC	We can continue the conversation on board, right? We can continue our conversation after like here we have

		the we have this snackbox then we can continue our talking. So I think this is very meaningful discussions and lectures I think we as architects or designers, I think this lecture is going to set an alarm that we have to think seriously about our built environment, what we design that has the impact on our and real-world tests at large. So, we can do every step of design, like from your examples, from the beginning of your concept, which is the design, and then the construction and the specification of the materials. So, thank you very much for the very interesting, wonderful lectures. And we will keep our discussions for tomorrow's lectures. And yes, this is the lecture for tomorrow. Wedding Let's Keep by Supawut Boonmahathanakorn Tomorrow, it's 5 o'clock here. Again, please come and join our lecture series. And after this, we have a sandbox. When you finish this, you can grab some downstairs. Thank you very much.