

AUTHOR: EDOARDO CIAMPELLETTI - TRADEMARKED PAPER ®

# Stadiums Sector.

## Worldwide Overview and Europe's Position

### 2024

## Summary

Summary	2
General Introduction	3
The Global Stadium Construction Boom	3
Africa	4
Stadiums built and opened / Upcoming projects	4
Latin America	6
Recently built stadiums	6
North America	7
Recently completed stadiums	7
Upcoming stadium projects (2024-2030)	8
Asia	8
Recently completed stadiums	9
How does Europe place itself in such a “stadium boom”.	10
Key European stadium projects in the last 10 years	10
Upcoming or planned projects (including bidding phase)	11
The strange case of Italy: a football superpower with crippling stadiums	11
Current state of Italian stadiums	12
Recent Developments	12
Renovations work in Stadium specific sectors	12
Future challenges	13
Upcoming projects and future prospects	13
The case of Greece: renovations at the Olympic Stadium and the Friendship Stadium and new Panathinaikos Arena	14
A model Indoor Arena: The Peace and Friendship Stadium	14
Key Features of the Peace and Friendship Stadium	14
Implications for new stadiums	15
The Turkish Dominance in the Stadium Building Sector	15
Europe	15
Asia	16
Africa	16
Middle East	17
Camp Nou-Limak Holdings Case Study	17
Chinese Contractors and Stadium Diplomacy	18
Upcoming Projects (2024-2030)	19
European Stadium developers outside of Europe: expertise and innovation	19
Case Studies	20
Smart stadiums in Europe and worldwide	20
What are Smart Stadiums	20
Key features of Smart Stadiums	20
Benefits of Smart Stadiums	21
Examples of Smart Stadiums Worldwide	21
Conclusions	23
Sources and bibliography	24

## General Introduction

The global stadium construction sector is experiencing a significant boom, driven by the increasing demand for modern, multifunctional, and technologically advanced sports venues. This surge is influenced by factors such as the hosting of major international sports events, urban development projects, and the evolving expectations of fans for enhanced in-stadium experiences. This paper provides an overview of the worldwide stadium construction boom, highlighting Europe's leading role, with a special focus on Italy's struggle for new Stadiums projects and developments.

## The Global Stadium Construction Boom

### THE STADIUM CONSTRUCTION BOOM CAN BE ATTRIBUTED TO SEVERAL KEY FACTORS:

#### 1. Major International Sports Events

- Hosting events such as the FIFA World Cup, Olympic Games, and continental tournaments (e.g., UEFA Euro, Asian Cup) drives the need for new or upgraded stadiums.
- Countries view these events as opportunities to showcase their development and infrastructure capabilities, often leading to substantial investments in sports facilities.

#### 2. Technological Advancements

- The integration of IoT, advanced security systems, high-density Wi-Fi, and mobile applications enhances the fan experience and operational efficiency.
- Smart stadium technologies include real-time data analytics, mobile ticketing, and contactless payment systems, which are becoming standard in new constructions.

#### 3. Urban Development and Regeneration

- Cities use stadium construction projects as catalysts for broader urban development and regeneration efforts.
- These projects often include the development of surrounding areas, improving transport infrastructure, and creating new commercial and residential spaces.

#### 4. Increased Fan Expectations

- Fans seek comprehensive entertainment experiences.
- This includes high-quality food and beverage options, comfortable seating, immersive audio-visual displays, and interactive features.

The global stadium construction sector is in the midst of a significant boom, driven by technological advancements, major sports events, and evolving fan expectations. Europe, particularly Italy, plays a leading role in this boom, setting benchmarks in stadium design and functionality. Despite challenges such as cost management and sustainability, the future of stadium construction looks promising, with smart, sustainable, and multifunctional venues set to dominate the landscape.

The past two decades have seen a significant boom in stadium construction across Africa, Latin

America (Latam), Asia, and North America. This expansion is driven by the hosting of major sports events, urban development initiatives, and the growing demand for modern, multifunctional sports venues. This paper explores key stadium projects completed in the last 19 years (2015-2024) and highlights upcoming projects in these regions.

## Africa

### STADIUMS BUILT AND OPENED / UPCOMING PROJECTS

#### 1. Cape Coast Sports Stadium, Ghana

- Location: Cape Coast, Ghana
- Opened: 2016
- Capacity: 15,000
- Features: This modern facility includes high-quality seating, a tartan track, and facilities for various sports, supporting local and regional events.

#### 2. Limpopo Stadium, South Africa

- Location: Polokwane, South Africa
- Opened: 2016
- Capacity: 40,000
- Features: Designed to host football and rugby matches, the stadium includes high-density Wi-Fi, modern seating, and advanced security systems.

#### 3. Adama Science and Technology University Stadium, Ethiopia

- Location: Adama, Ethiopia
- Opened: 2017
- Capacity: 25,000
- Features: The stadium supports local sports teams and includes modern facilities, high-speed internet, and sustainable features.

#### 4. Japoma Stadium, Cameroon

- Location: Douala, Cameroon
- Opened: 2021
- Capacity: 50,000
- Features: This state-of-the-art stadium includes high-density Wi-Fi, advanced security systems, and extensive hospitality areas. It is designed to host football matches, athletics, and other events

#### 5. Nelson Mandela Stadium, Algeria

- Location: Algiers, Algeria
- Opened: 2021
- Capacity: 40,000
- Features: Incorporates sustainable design, energy-efficient systems, and advanced technology for digital ticketing and crowd management.

#### 6. **New National Stadium, Côte d'Ivoire**

- Location: Abidjan, Côte d'Ivoire
- Planned Opening: 2024
- Capacity: 60,000
- Features: Built for the 2023 Africa Cup of Nations, featuring modern facilities, high-speed internet, and sustainable design elements.

#### 7. **Paul Biya Stadium, Cameroon**

- Location: Olembe, Yaoundé, Cameroon
- Opened: 2021
- Capacity: 60,000
- Features: Includes training grounds, a sports academy, and a hotel. Equipped with high-density Wi-Fi, digital ticketing, and modern security systems.

#### 8. **Stade du Sénégal, Senegal**

- Location: Diamniadio, Senegal
- Opening: 2023
- Capacity: 50,000
- Features: Modern design, advanced technology, and sustainable features. Designed to host football matches, athletics, and concerts.

#### 9. **Baraki Stadium, Algeria**

- Location: Baraki, Algiers, Algeria
- Planned Opening: 2024
- Capacity: 40,000
- Features: High-tech facilities, sustainable practices, and community engagement, with capabilities for hosting a variety of events.

#### 10. **Grand Stade de Casablanca, Morocco (Upcoming)**

- Location: Casablanca, Morocco
- Planned Opening: 2026
- Capacity: 93,000
- Features: One of the largest stadiums in Africa, with state-of-the-art technology, energy-efficient systems, and a focus on sustainability.

#### 11. **Dodoma Stadium, Tanzania (Upcoming)**

- Location: Dodoma, Tanzania
- Planned Opening: 2025
- Capacity: 50,000
- Features: Advanced seating, high-density Wi-Fi, hospitality areas, and a design that supports football matches, athletics, and large events.

#### 12. **Abuja National Stadium (Renovation), Nigeria**

- Location: Abuja, Nigeria
- Planned Completion: 2025
- Capacity: 60,000
- Features: Renovations include modern amenities, upgraded seating, high-density Wi-Fi, and enhanced hospitality areas.

## Latin America

Latin America has seen a surge in the construction of new stadiums, reflecting the region's passion for sports and its desire to host major international events. This paper highlights recently built stadiums and upcoming projects from 2024 to 2030, with a special focus on developments in El Salvador.

### RECENTLY BUILT STADIUMS

#### 1. Estadio Nacional de Costa Rica

- Location: San José, Costa Rica
- Opened: 2011
- Capacity: 35,175
- Features: This modern stadium includes high-density Wi-Fi, a dedicated app for fan engagement, and a sustainable design with solar panels. It hosts football matches, concerts, and other events.

#### 2. Arena Corinthians, Brazil

- Location: São Paulo, Brazil
- Opened: 2014
- Capacity: 49,205
- Features: Built for the 2014 FIFA World Cup, it features high-density Wi-Fi, a mobile app for ticketing and in-stadium purchases, and extensive use of digital displays for real-time information.

#### 3. Estadio BBVA, Mexico

- Location: Monterrey, Mexico
- Opened: 2015
- Capacity: 53,500
- Features: Known for its state-of-the-art design, the stadium offers high-speed internet connectivity, advanced security systems, and a dedicated mobile app for fan engagement.

#### 4. Estadio Nacional Julio Martínez Prádanos, Chile

- Location: Santiago, Chile
- Opened: 2010 (Renovated in 2020)
- Capacity: 48,665
- Features: This renovated stadium includes modern seating, high-density Wi-Fi, and advanced audiovisual technology, making it a premier venue for football matches and concerts.

#### 5. Estadio Rodrigo Paz Delgado, Ecuador

- Location: Quito, Ecuador
- Opened: 1997 (Renovated in 2020)
- Capacity: 41,575
- Features: The stadium features modern amenities, high-density Wi-Fi, and extensive hospitality areas, supporting local and international events.

## 6. New El Salvador Stadium (Upcoming)

- Location: San Salvador, El Salvador
- Planned Opening: 2024
- Capacity: 50,000
- Features: Modern Facilities: Equipped with high-density Wi-Fi, advanced security systems, and extensive hospitality areas.

## 7. Nuevo Estadio Nacional, Peru (Upcoming)

- Location: Lima, Peru
- Planned Opening: 2025
- Capacity: 60,000
- Features: High-Density Wi-Fi: Ensuring connectivity for all attendees.  
Advanced Security: Implementation of the latest security technologies.  
Focus on environmentally friendly construction practices.

The period from 2015 to 2030 has seen and will continue to see significant stadium construction and renovation projects across Asia and North America. These developments are driven by the desire to host major international sports events, improve local sports facilities, and integrate modern technologies and sustainability practices. This paper highlights key stadiums recently completed and upcoming projects in these regions.

## North America

### RECENTLY COMPLETED STADIUMS

#### 1. Mercedes-Benz Stadium, USA

- Location: Atlanta, Georgia
- Opened: 2017
- Capacity: 71,000
- Features: Retractable roof, 360-degree HD video halo board, advanced crowd management, and sustainable design elements.

#### 2. SoFi Stadium, USA

- Location: Inglewood, California
- Opened: 2020
- Capacity: 70,240
- Features: State-of-the-art stadium with a massive 4K HDR video board, extensive hospitality areas, and sustainability focus.

#### 3. Banc of California Stadium, USA

- Location: Los Angeles, California
- Opened: 2018
- Capacity: 22,000
- Features: Home to Los Angeles FC, it features high-density Wi-Fi, modern amenities, and extensive use of digital displays

#### 4. Allegiant Stadium, USA

- Location: Las Vegas, Nevada
- Opened: 2020
- Capacity: 65,000
- Features: Home to the Las Vegas Raiders, it includes a retractable field, advanced technology, and extensive hospitality areas.

### UPCOMING STADIUM PROJECTS (2024-2030)

#### 1. New Buffalo Bills Stadium, USA

- Location: Orchard Park, New York
- Planned Opening: 2026
- Capacity: 60,000
- Features: Advanced technology, modern amenities, and a focus on fan engagement.

#### 2. Toronto Waterfront Stadium, Canada

- Location: Toronto, Ontario
- Planned Opening: 2028
- Capacity: 40,000
- Features: Sustainable design, high-density Wi-Fi, and state-of-the-art facilities for football and other events.

#### 3. New York City FC Stadium, USA

- Location: New York City, New York
- Planned Opening: 2025
- Capacity: 25,000
- Features: Modern design, advanced technology, and a focus on sustainability and fan experience.

#### 4. Estadio Azteca Renovation, Mexico (Upcoming for World Cup 2026)

- Location: Mexico City, Mexico
- Planned Completion: 2026
- Capacity: 87,000
- Features: Upgraded seating, advanced audiovisual systems, improved accessibility, and sustainable practices.

## Asia

### RECENTLY COMPLETED STADIUMS

#### 1. Hangzhou Olympic Sports Center Stadium, China

- Location: Hangzhou, China
- Opened: 2018
- Capacity: 80,000
- Features: Designed for the 2022 Asian Games, the stadium includes modern amenities, advanced technology, and sustainable features.



## 2. Saitama Super Arena, Japan

- Location: Saitama, Japan
- Opened: 2000 (Renovated in 2019)
- Capacity: 37,000
- Features: This multi-purpose arena is equipped with high-density Wi-Fi, digital displays, and advanced security systems.

## 3. Rajamangala National Stadium (Renovation), Thailand

- Location: Bangkok, Thailand
- Renovated: 2019
- Capacity: 49,722
- Features: The renovation included modern seating, high-speed internet connectivity, and improved accessibility.

## 4. Khalifa International Stadium, Qatar

- Location: Doha, Qatar
- Opened: 1976 (Renovated 2017)
- Capacity: 40,000

## 5. Lusail Iconic Stadium, Qatar

- Location: Lusail, Qatar
- Planned Opening: 2022
- Capacity: 80,000
- Features: Advanced cooling technology, high-density Wi-Fi, and sustainability focus. Built for the 2022 FIFA World Cup.

## 6. New National Stadium, Japan

- Location: Tokyo, Japan
- Planned Opening: 2023
- Capacity: 68,000
- Features: State-of-the-art technology, energy-efficient systems, and a focus on sustainability. Built for the Tokyo 2020 Olympics.

## 7. Bukit Jalil National Stadium (Renovation), Malaysia (Upcoming)

- Location: Kuala Lumpur, Malaysia
- Planned Completion: 2025
- Capacity: 87,411
- Features: Upgraded seating, advanced audiovisual systems, and improved accessibility. Focus on modern amenities and sustainability.

## 8. Ahmed bin Ali Stadium, Qatar

- Location: Al Rayyan, Qatar
- Planned Opening: 2023
- Capacity: 40,000
- Features: Built for the 2022 FIFA World Cup, features include sustainable design, advanced cooling technology, and high-speed internet.

## HOW DOES EUROPE PLACE ITSELF IN SUCH A “STADIUM BOOM”

Over the last decade, Europe has witnessed a substantial boom in stadium construction and renovation, driven by the need to host major sports events, cater to increasing fan expectations, and utilize cutting-edge technology. This paper explores key stadiums built or significantly renovated in Europe over the past ten years and highlights upcoming projects that will continue to shape the continent’s sports infrastructure.

### KEY EUROPEAN STADIUM PROJECTS IN THE LAST 10 YEARS

#### 1. Tottenham Hotspur Stadium, UK

- Opened: 2019
- Capacity: 62,850
- Features: This state-of-the-art stadium includes a retractable pitch, high-density Wi-Fi, advanced crowd management systems, and extensive use of digital displays. It also features the world’s first stadium microbrewery and a skywalk attraction.

#### 2. Wanda Metropolitano, Spain

- Opened: 2017 (Rebuilt)
- Capacity: 68,456
- Features: Home to Atlético Madrid, the stadium boasts modern amenities such as advanced audiovisual technology, extensive hospitality areas, and a focus on sustainability with energy-efficient systems.

#### 3. Parc Olympique Lyonnais, France

- Opened: 2016
- Capacity: 59,186
- Features: This modern stadium includes high-speed internet, a dedicated mobile app for fan engagement, and extensive use of renewable energy. It hosted matches during UEFA Euro 2016 and the 2019 FIFA Women’s World Cup.

#### 4. Puskás Aréna, Hungary

- Opened: 2019
- Capacity: 67,215
- Features: Built on the site of the former Ferenc Puskás Stadium, it features modern amenities, high-density Wi-Fi, and extensive hospitality facilities. It hosted UEFA Euro 2020 matches.

#### 5. Friends Arena, Sweden

- Opened: 2012
- Capacity: 50,000
- Features: Sweden’s national stadium features a retractable roof, advanced audiovisual systems, and multifunctional use for sports and concerts. It is also one of the most sustainable stadiums in the region.

#### 6. Johan Crujff Arena, Netherlands

- Renovated: 2018
- Capacity: 54,990
- Features: This iconic stadium was upgraded with smart technology, including IoT

sensors for real-time monitoring, energy-efficient systems, and a comprehensive digital infrastructure for enhanced fan experiences.

### UPCOMING OR PLANNED PROJECTS (INCLUDING BIDDING PHASE)

#### 1. San Siro (Stadio Giuseppe Meazza) Replacement, Italy

- Planned Opening: 2026
- Capacity: 65,000
- Features: The new stadium aims to be a multifunctional venue with advanced technology, sustainable design, and extensive commercial and hospitality areas. It will replace the historic San Siro.

#### 2. Stadio della Roma, Italy

- Planned Opening: 2025
- Capacity: 55,000
- Features: Designed to be a modern, fan-focused venue with high-density Wi-Fi, extensive hospitality options, and a focus on sustainability. It will be home to AS Roma.

#### 3. Everton Stadium, UK

- Planned Opening: 2024
- Capacity: 52,888
- Features: Located at Bramley-Moore Dock, this new stadium will include advanced crowd management systems, high-speed internet, and sustainable design practices. It aims to boost the local economy and community engagement.

#### 4. Nou Mestalla, Spain

- Planned Opening: 2026
- Capacity: 55,000
- Features: Valencia CF's new stadium will feature modern amenities, advanced audiovisual technology, and a focus on fan engagement and sustainability.

#### 5. Eurostadium, Belgium

- Planned Opening: TBD
- Capacity: 60,000
- Features: Proposed to be the new national stadium in Brussels, featuring modern design, advanced technology, and sustainable building practices. It aims to host international events and serve as a multifunctional venue.

## The strange case of Italy: a football superpower with crippling stadiums

Italy, known for its rich football heritage, faces significant challenges in modernizing its stadium infrastructure. Many of its stadiums, iconic yet outdated, require extensive renovations to meet contemporary standards. Additionally, the construction of new stadiums is often hindered by bureaucratic, financial, and regulatory obstacles. This paper examines Italy's recent

developments in stadium renovations, the challenges faced, and the future outlook for its sports infrastructure.

## CURRENT STATE OF ITALIAN STADIUMS

Many of Italy's stadiums were built in the mid-20th century and have not undergone significant renovations since. This has led to issues such as outdated facilities, inadequate amenities, and poor spectator experiences. Major stadiums like the San Siro in Milan and the Stadio Olimpico in Rome exemplify these challenges.

## RECENT DEVELOPMENTS

### 1. Juventus Stadium (Allianz Stadium), Turin

- Opened: 2011
- Capacity: 41,507
- Features: One of Italy's most modern stadiums, featuring high-density Wi-Fi, extensive hospitality areas, and a focus on sustainability with energy-efficient systems.

### 2. Stadio Friuli (Dacia Arena), Udine

- Renovated: 2016
- Capacity: 25,132
- Features: Upgraded to include modern amenities, improved seating, and advanced security systems, making it one of the more contemporary stadiums in Italy.

### 3. Stadio Benito Stirpe

- Location: Frosinone, Italy
- Opened: 2017
- Capacity: 16,227
- Features:
  - Modern Design: Stadio Benito Stirpe is designed with modern architectural elements, providing a contemporary look and feel.
  - Fan Experience: The stadium includes high-density Wi-Fi, comfortable seating, and a dedicated mobile app for ticketing and in-stadium purchases, enhancing the overall fan experience.

### 4. Stadio Renato Dall'Ara, Bologna

- Planned Renovation Completion: 2024
- Capacity: 38,279
- Features: Upgrades include modern amenities, improved seating, advanced security, and sustainability measures.

## RENOVATIONS WORK IN STADIUM SPECIFIC SECTORS

### 1. Stadio Olimpico, Rome

- Renovated: 2020
- Capacity: 70,634
- Features: While an older stadium, recent renovations have improved seating, accessibility, and incorporated high-density Wi-Fi and advanced security systems.

## 2. San Siro (Stadio Giuseppe Meazza), Milan

- Future Plans: The historic San Siro is set to be replaced by a new, modern stadium.
- Challenges: The project has faced delays due to bureaucratic hurdles and local opposition, but it aims to provide a state-of-the-art facility with advanced technology and sustainability features.

### FUTURE CHALLENGES

- **Bureaucratic and Regulatory Hurdles**
  - Complex Approval Processes: Italian stadium projects often face long delays due to complex approval processes involving multiple levels of government and extensive regulatory requirements.
  - Local Opposition: Community resistance to new constructions or major renovations can slow down or halt projects, as seen with the San Siro replacement plans.
- **Financial Constraints**
  - Funding Issues: Many Italian clubs lack the financial resources needed for largescale renovations or new constructions. Public funding is limited, and private investment is often necessary but challenging to secure.
  - Economic Impact of COVID-19: The pandemic has further strained financial resources, impacting the ability to fund new projects.
- **Aging Infrastructure**
  - Maintenance Costs: Older stadiums require significant maintenance, which can be costly and inefficient. These venues often lack the modern amenities and technologies that enhance the spectator experience.
  - Safety Concerns: Ensuring safety in aging stadiums is a priority, necessitating regular updates to meet current standards.

### UPCOMING PROJECTS AND FUTURE PROSPECTS

#### 1. New Casertana Stadium

- Location: Caserta, Italy
- Planned Opening: 2025
- Capacity: 12,000
- Primary Use: Home to Casertana FC (football club) and other sports and entertainment events. It features a modern structure and a recycling center.

#### 2. New San Siro Stadium, Milan (Planned)

- Planned Opening: 2026
- Capacity: 65,000
- Features: Advanced technology, sustainability focus, extensive commercial and hospitality areas. Designed to replace the historic San Siro.

#### 3. Stadio della Roma, Rome (Planned)

- Planned Opening: 2025
- Capacity: 55,000
- Features: LEED certification, sustainability focus, extensive commercial and hospitality areas, various data centers. Designed to replace the historic Olimpico.

## The case of Greece: renovations at the Olympic Stadium and the Friendship Stadium and new Panathinaikos Arena

Several new stadium projects and renovations are underway in Greece, especially in Athens:

1. **Panathinaikos New Stadium (Votanikos Stadium):** This multi-use sports complex, expected to be completed by 2026, will host football, basketball, and volleyball arenas. The construction, which began in April 2023, is part of a significant redevelopment in the Votanikos neighborhood, transforming a dilapidated area into a modern sports hub.
2. **Renovation of the Athens Olympic Sports Centre “Spiros Louis”:** This major project involves modernizing the Athens Olympic Stadium with a budget of over €43.5 million. The renovation aims to enhance sustainability by replacing materials with environmentally friendly alternatives and creating more green areas. This project is part of Greece’s National Recovery Plan and is expected to significantly increase visitor numbers and create jobs.
3. **Recently Completed OPAP Arena (Agia Sophia Stadium):** This new stadium for AEK Athens, located in Nea Filadelfeia, opened in 2022. It has a capacity of 32,500 and was built on the site of the old Nikos Goumas Stadium. The construction cost around €80.7 million, and the stadium features modern amenities, including an underground road system for team access.

## A model Indoor Arena: The Peace and Friendship Stadium

The Peace and Friendship Stadium (Stadio Eirinis kai Filias), also known as SEF, located in Piraeus, Athens, serves as an excellent model for modern sports arenas. It is renowned for its multifunctional use, infrastructure, and significant events hosted since its inception.

### KEY FEATURES OF THE PEACE AND FRIENDSHIP STADIUM

1. **Multi-purpose Design:**
  - **Sports Events:** Primarily used for basketball, it is the home ground of Olympiacos B.C. The stadium also hosts other sports events such as volleyball and athletics.
  - **Concerts and Cultural Events:** Besides sports, SEF hosts concerts, exhibitions, and cultural events, making it a versatile venue.
2. **Capacity and Infrastructure:**
  - **Seating Capacity:** The stadium can accommodate approximately 14,000 spectators for basketball games.
  - **Modern Amenities:** It features modern locker rooms, training facilities, VIP lounges, and media facilities, ensuring comfort and convenience for athletes, officials, and spectators.

### 3. Location and Accessibility:

- Strategic Location: Situated near the port of Piraeus, it is accessible by various modes of transport, including metro, buses, and trams, enhancing its connectivity.
- Parking Facilities: SEF offers extensive parking space, catering to large crowds during major events.

### 4. Historical Significance:

- Olympic History: The stadium was a key venue during the 2004 Athens Olympics, hosting volleyball events.
- Major Events: Over the years, SEF has been the site of numerous significant sports competitions, including European and World Championships.

### 5. Sustainability and Renovations:

- Upgrades: The stadium has undergone several renovations to improve its facilities and infrastructure, ensuring it meets modern standards.
- Sustainable Practices: Efforts have been made to incorporate sustainable practices in its operations and maintenance.

## IMPLICATIONS FOR NEW STADIUMS

The Peace and Friendship Stadium's successful blend of versatility, modern infrastructure, and strategic location can serve as a blueprint for new stadiums in Greece and beyond. Key takeaways include:

- Versatility: Designing stadiums that can host multiple types of events maximizes their usage and revenue potential.
- Modern Amenities: Incorporating state-of-the-art facilities ensures a high-quality experience for all stakeholders.
- Accessibility: Strategic location and robust transport connectivity are crucial for attracting large audiences.
- Sustainability: Implementing eco-friendly practices in construction and operations aligns with global trends towards sustainability.

By following the model of SEF, new stadiums can achieve a balance of functionality, modernity, and sustainability, ensuring long-term success and community engagement.

## Contractors building stadiums worldwide

### THE TURKISH DOMINANCE IN THE STADIUM BUILDING SECTOR

Turkish construction companies have made a significant impact on the global stadium construction market. Leveraging their expertise, competitive pricing, and strategic use of stadium diplomacy, these companies have built several high-profile stadiums across different continents. Here are some notable examples of Turkish-built stadiums around the world.

#### EUROPE

##### 1. Camp Nou, Barcelona, Spain

- Location: Barcelona, Spain

- Original Opening: 1957
- Current Capacity: Approximately 99,354
- Contractor: Limak Holdings
- Renovation Start: 2022
- Expected Completion: 2026
- Post-Renovation Capacity: Around 105,000

## 2. Baku Olympic Stadium, Azerbaijan

- Built By: Tekfen Construction
- Opened: 2015
- Capacity: 68,700
- Features: This multi-purpose stadium in Baku was constructed for the 2015 European Games and has since hosted various international events, including UEFA Euro 2020 matches. The stadium boasts modern facilities, extensive use of LED lighting, and advanced crowd management systems.

## 3. Astana Arena, Kazakhstan

- Built By: Sembol Construction
- Opened: 2009
- Capacity: 30,000
- Features: Astana Arena features a retractable roof and modern amenities. It serves as a venue for football matches and other events, reflecting the increasing sports infrastructure development in Kazakhstan.

## ASIA

### 1. Turkmenbashi Olympic Stadium, Turkmenistan

- Built By: Polimeks
- Opened: 2017
- Capacity: 30,000
- Features: This stadium is part of the larger Ashgabat Olympic Complex, constructed for the 2017 Asian Indoor and Martial Arts Games. It features modern sports facilities, advanced seating arrangements, and state-of-the-art technology integration.

### 2. New Islamabad International Cricket Stadium, Pakistan

- Built By: Fayat Group (including Turkish subcontractors)
- Expected Completion: Under construction
- Capacity: 50,000
- Features: This upcoming stadium aims to be a landmark cricket venue in Pakistan, featuring modern amenities, VIP lounges, and advanced sports technology.

## AFRICA

### 1. Amahoro Arena, Rwanda

- Built By: Summa
- Opened: 2024
- Capacity: 50,000



- Features: This multi-purpose arena is designed for football and other sports. It features high-speed internet connectivity, modern seating, and advanced event management systems.

## 2. Dakar Arena (Diamniadio), Senegal

- Built By: Summa
- Opened: 2018
- Capacity: 15,000
- Features: Another project by Summa, Dakar Arena is designed for basketball and other indoor events. It incorporates modern design elements, high-density Wi-Fi, and advanced security systems.

## MIDDLE EAST

### 1. Al Thumama Stadium, Qatar

- Built By: Tekfen Construction
- Opened: 2022
- Capacity: 40,000
- Features: Built for the 2022 FIFA World Cup, Al Thumama Stadium features a unique circular design inspired by the 'gahfiya,' a traditional woven cap worn by men in the region. It includes advanced cooling technology to combat the extreme heat, making it a

Turkish construction companies have established themselves as major players in the global stadium construction market, particularly through their involvement in high-profile projects across Europe, Asia, Africa, and the Middle East. Their strategic use of stadium diplomacy, combined with competitive pricing and expertise, has enabled them to build state-of-the-art sports venues that enhance the spectator experience and contribute to the development of sports infrastructure worldwide. As the demand for modern, technologically advanced stadiums continues to grow, Turkish contractors are likely to play an increasingly prominent role in this sector.

## CAMP NOU-LIMAK HOLDINGS CASE STUDY

Camp Nou, the iconic home of FC Barcelona, is undergoing significant renovations to transform it into a modern, state-of-the-art stadium. The renovation project, led by Limak Holdings, a prominent Turkish construction firm, aims to enhance the fan experience, incorporate advanced technologies, and ensure sustainability. This paper examines the details of the Camp Nou renovation project, Limak Holdings' role, and the expected outcomes of this major development.

### Company Profile

- Company: Limak Holdings
- Headquarters: Ankara, Turkey
- Industry: Construction, Energy, Cement, Tourism, Infrastructure, and Aviation
- Founded: 1976

Limak Holdings is a well-established Turkish conglomerate with extensive experience in large-scale construction projects, both domestically and internationally. The company's expertise in

delivering complex and high-profile infrastructure projects has made it a suitable choice for the Camp Nou renovation.

#### **Responsibilities:**

- **Project Management:** Overseeing the entire renovation process, ensuring that the project is completed on time and within budget.
- **Construction:** Carrying out the construction work, including structural modifications, installation of new facilities, and upgrades to existing infrastructure.
- **Coordination:** Collaborating with various stakeholders, including FC Barcelona, local authorities, and subcontractors, to ensure smooth project execution.
- **Sustainability Initiatives:** Implementing sustainable construction practices and integrating energy-efficient systems to meet environmental goals.

#### **Expected Outcomes:**

- **Enhanced Fan Experience:** The renovated Camp Nou will offer fans a significantly improved experience, with modern amenities, advanced technology, and increased comfort. The addition of new VIP areas and improved sightlines will enhance the overall viewing experience.
- **Increased Revenue:** The expanded capacity and modern facilities are expected to increase revenue opportunities for FC Barcelona through higher ticket sales, more extensive hospitality services, and the ability to host a wider range of events, including concerts and corporate functions.
- **Sustainability:** The incorporation of sustainable practices and renewable energy sources will reduce the stadium's environmental footprint, aligning with global trends towards greener infrastructure.
- **Global Showcase:** The successful renovation of Camp Nou will serve as a showcase for Limak Holdings' capabilities, potentially leading to further opportunities in stadium construction and renovation projects worldwide.

### **CHINESE CONTRACTORS AND STADIUM DIPLOMACY**

Chinese contractors have also become significant players in the stadium construction arena, utilizing their vast resources and government-backed initiatives to expand their influence.

#### **Key Players:**

- **China State Construction Engineering Corporation (CSCEC):** One of the largest construction companies globally, involved in numerous stadium projects.
- **Beijing Construction Engineering Group:** Known for its role in building the iconic Bird's Nest Stadium for the 2008 Beijing Olympics.

#### **Stadium Diplomacy:**

- **Strategy:** Chinese contractors often operate under the Belt and Road Initiative (BRI), using stadium construction as a means to enhance diplomatic relationships and economic ties.
- **Examples:** The National Stadium in Costa Rica and the FNB Stadium in South Africa are part of China's broader strategy to strengthen its presence in Latin America and Africa.

## UPCOMING PROJECTS (2024-2030)

### 1. New Phnom Penh National Stadium, Cambodia

- Location: Phnom Penh, Cambodia
- Planned Opening: 2024
- Capacity: 60,000
- Contractor: China State Construction Engineering Corporation (CSCEC)
- Features: Modern design, advanced technology, sustainable practices, and multipurpose use.

### 2. Baghdad Sports City, Iraq

- Location: Baghdad, Iraq
- Planned Opening: 2025
- Capacity: 65,000
- Contractor: China Machinery Engineering Corporation (CMEC)
- Features: Advanced technology, high-density Wi-Fi, modern amenities, and designed for football matches and other events.

### 3. Al Bayt Stadium, Qatar

- Location: Al Khor, Qatar
- Planned Opening: 2024
- Capacity: 60,000
- Contractor: China Railway Construction Corporation (CRCC)
- Features: Modern amenities, sustainable design, advanced cooling systems, and part of the 2022 FIFA World Cup.

## European Stadium developers outside of Europe: expertise and innovation

European developers bring a wealth of expertise and innovation to stadium construction projects globally, often focusing on integrating advanced technologies and sustainable practices.

### Key Players:

- Populous: A global architectural firm with headquarters in the UK, known for designing iconic stadiums like Wembley Stadium in London and the Emirates Stadium for Arsenal FC.
- AECOM: A multinational engineering firm involved in various high-profile stadium projects worldwide.

### Role in Africa, Latam, and Asia:

- Africa: European developers are often involved in projects aimed at modernizing infrastructure and promoting sustainability. For instance, Populous has been involved in the design of the Cape Town Stadium in South Africa.
- Latin America: European firms bring their expertise in creating multifunctional and technologically advanced stadiums, such as the Estadio BBVA Bancomer in Mexico, designed by Populous.
- Asia: European developers contribute to projects that emphasize cutting-edge

technology and innovative design. The Tokyo National Stadium, designed by Kengo Kuma with contributions from European firms, exemplifies this trend.

### CASE STUDIES

#### 1. Africa: Cape Town Stadium, South Africa

- Developer: Populous (UK)
- Features: The stadium incorporates sustainable design elements, high-density Wi-Fi, and a focus on enhancing the spectator experience through technology.

#### 2. Africa: Olembè Stadium, Cameroon

- Developer: Gruppo Piccini (Italy)
- Features: The stadium incorporates sustainable design elements, high-density Wi-Fi, and a focus on enhancing the spectator experience through technology.

#### 3. Latin America: Arena Corinthians, Brazil

- Developer: AECOM (UK/US)
- Features: Advanced connectivity solutions, mobile app integration, and extensive use of digital displays for real-time information.

#### 4. Asia: Tokyo National Stadium, Japan

- Developer: Kengo Kuma with contributions from European firm

## Smart stadiums in Europe and worldwide

### WHAT ARE SMART STADIUMS

Smart stadiums are technologically advanced venues that incorporate various digital and IoT technologies to offer a superior experience to fans, streamline operations, and optimize resources. These stadiums use interconnected devices, sensors, and systems to collect and analyze data in real-time, enabling venue operators to make informed decisions and enhance overall functionality.

### KEY FEATURES OF SMART STADIUMS

- **Connectivity and Wi-Fi**
  - High-Density Wi-Fi: Smart stadiums are equipped with robust Wi-Fi networks capable of handling high volumes of traffic, ensuring that all spectators can stay connected.
  - 5G Integration: The adoption of 5G technology provides faster internet speeds and lower latency, enhancing the digital experience for fans.
- **Mobile Applications**
  - Ticketing and Entry: Mobile apps facilitate digital ticketing, reducing the need for physical tickets and streamlining entry processes with features like mobile scanning and biometric verification.
  - In-Stadium Navigation: Apps provide real-time navigation assistance, helping fans find their seats, restrooms, concession stands, and other facilities easily.
  - Engagement and Information: Apps offer live updates, replays, and other interactive features to keep fans engaged during events.

- **IoT and Data Analytics**
  - Sensors and Monitoring: IoT sensors monitor various aspects of stadium operations, such as crowd movement, energy consumption, and equipment performance.
  - Data Analytics: Collected data is analyzed to optimize operations, improve security, and enhance the fan experience by predicting and addressing issues proactively.
- **Enhanced Security**
  - Facial Recognition: Advanced security systems use facial recognition technology to ensure quick and secure access for fans and staff.
  - Real-Time Surveillance: Smart cameras and surveillance systems provide real-time monitoring and analytics to ensure safety and security within the stadium.
- **Sustainability and Energy Efficiency**
  - Smart Lighting: Energy-efficient LED lighting systems that can be controlled and optimized based on real-time needs.
  - Renewable Energy: Integration of solar panels and other renewable energy sources to reduce the stadium's carbon footprint.
  - Waste Management: Smart waste management systems that optimize waste collection and recycling processes.
- **Personalized Fan Experience**
  - Customizable Content: Tailored content delivery through apps and digital screens based on individual preferences.
  - Premium Services: Offering premium services such as in-seat food and beverage delivery, personalized merchandise recommendations, and exclusive access to certain areas.

## BENEFITS OF SMART STADIUMS

- **Enhanced Fan Experience**  
Improved connectivity and interactive features keep fans engaged and satisfied, leading to a more enjoyable and memorable event experience.
- **Operational Efficiency**  
Real-time data and analytics enable venue operators to optimize various aspects of stadium operations, from crowd management to energy usage, resulting in cost savings and improved performance.
- **Increased Revenue Opportunities**  
Digital ticketing, targeted advertising, and premium services offer new revenue streams for stadium operators, maximizing profitability.
- **Sustainability**  
Energy-efficient systems and renewable energy sources reduce the environmental impact of stadium operations, promoting sustainability.

## EXAMPLES OF SMART STADIUMS WORLDWIDE

### 1. Tottenham Hotspur Stadium, UK

- Location: London, UK
- Opened: 2019
- Capacity: 62,850
- Key Features:
  - Retractable Pitch: The stadium has a unique retractable pitch, allowing it to host

both football matches and NFL games.

- High-Density Wi-Fi: Provides seamless internet connectivity for all spectators.
- Mobile App Integration: Fans can use the app for ticketing, in-stadium purchases, and navigation.
- Advanced Security Systems: Includes facial recognition technology for secure and efficient entry

## 2. Allianz Arena, Germany

- Location: Munich, Germany
- Opened: 2005 (Renovated for smart features in 2018)
- Capacity: 75,000
- Key Features:
  - LED Facade: The stadium's exterior features a dynamic LED lighting system that can change colors.
  - Biometric Security: Advanced biometric systems ensure high security.
  - Mobile Applications: Enhance the fan experience with real-time updates and in-stadium services.
  - Sustainability: Energy-efficient systems and waste management practices.

## 3. Johan Cruyff ArenA, Netherlands

- Location: Amsterdam, Netherlands
- Opened: 1996 (Renovated for smart features in 2018)
- Capacity: 54,990
- Key Features:
  - IoT Sensors: Deployed throughout the stadium for real-time monitoring of various parameters, including energy use and crowd movement.
  - Energy Management: Utilizes solar panels and second-life batteries from electric vehicles to power the stadium.
  - Smart Lighting: LED lighting systems that adjust based on real-time needs.
  - Sustainability Initiatives: Extensive recycling and waste management systems.

## 4. Wembley Stadium, UK

- Location: London, UK
- Opened: 2007 (Rebuilt)
- Capacity: 90,000
- Key Features:
  - Retractable Roof Sections: Provides flexibility for various events.
  - High-Density Wi-Fi: Ensures robust connectivity for spectators.
  - Mobile Apps: For ticketing, navigation, and in-stadium purchases.
  - Advanced Audio-Visual Systems: Enhance the fan experience with high-quality displays and sound systems.

## 5. San Mamés Stadium, Spain

- Location: Bilbao, Spain
- Opened: 2013
- Capacity: 53,000

- Key Features:
  - Sustainable Design: Focus on energy efficiency and the use of renewable energy sources.
  - High-Speed Internet: Ensures seamless connectivity for fans.
  - Interactive Fan Experience: Mobile apps provide real-time updates, replays, and other interactive features.
  - Advanced Security Systems: Includes facial recognition technology and real-time surveillance.

#### 6. Tottenham Hotspur Stadium, UK

- Opened: 2019
- Features: High-density Wi-Fi, mobile app integration for ticketing and in-stadium purchases, retractable pitch, and extensive use of IoT for operational efficiency.

#### 7. Levi's Stadium, USA

- Opened: 2014
- Features: High-speed internet, mobile app for navigation and fan engagement, solar panels, and advanced waste management systems.

#### 8. Allianz Arena, Germany

- Opened: 2005 (renovations for smart features in 2018)
- Features: Advanced crowd management systems, biometric security, mobile applications, and a distinctive LED facade.

#### 9. Mercedes-Benz Stadium, USA

- Opened: 2017
- Features: Retractable roof, 360-degree HD video halo board, high-density Wi-Fi, and energy-efficient systems.

### CONCLUSIONS

The trends in stadium building and smart stadium development from 2024 to 2030 indicate a future where technology, sustainability, and fan engagement are paramount. The integration of advanced technologies and sustainable practices will redefine the stadium experience, creating venues that are not only environmentally friendly but also highly efficient and engaging. As these trends continue to evolve, the global sports and entertainment landscape will witness the emergence of increasingly sophisticated and versatile stadiums, setting new standards for infrastructure and fan experiences.

Research produced by Edoardo Ciampelletti for the EPSI Observatory.

## Sources and bibliography

- <https://en.reformsports.com/how-a-stadium-is-built/>
- <https://sportsrender.com/2024/06/09/under-construction-stadiums-around-the-world/>
- <http://stadiumdb.com/>
- <https://medium.com/@qaraqra/building-stadiums-and-alliances-chinas-diplomatic-approach-to-dominance-6a6ce8842643>
- <https://www.nytimes.com/2024/02/10/world/africa/china-africa-stadiums.html>
- <https://www.nytimes.com/2024/02/10/world/africa/china-africa-stadiums.html>
- <https://www.hurriyetdailynews.com/turkey-very-active-in-stadium-construction-uefa-140639>
- <https://www.ssalt.com/news-resources/qatari-turkish-jv-wins-deal-to-build-2022-world-cup-stadium/>
- <https://www.webuildgroup.com/en/business-areas/green-buildings/stadiums/>
- <https://worldofstadiums.com/>
- <https://www.limak.com.tr/sectors/construction/projects/international/barcelona-spotify-campnou-renovation-and-expansion-project-spain>
- <https://hradf.com/en/renovation-of-olympic-athletic-centre-of-athens-oaka/>
- <https://www.thestadiumbusiness.com/2024/02/14/athens-olympic-stadium-set-to-reopen-ahead-of-coldplay-gigs/>
- <https://www.olympiacosbc.gr/en/team-en/sef-en.html>