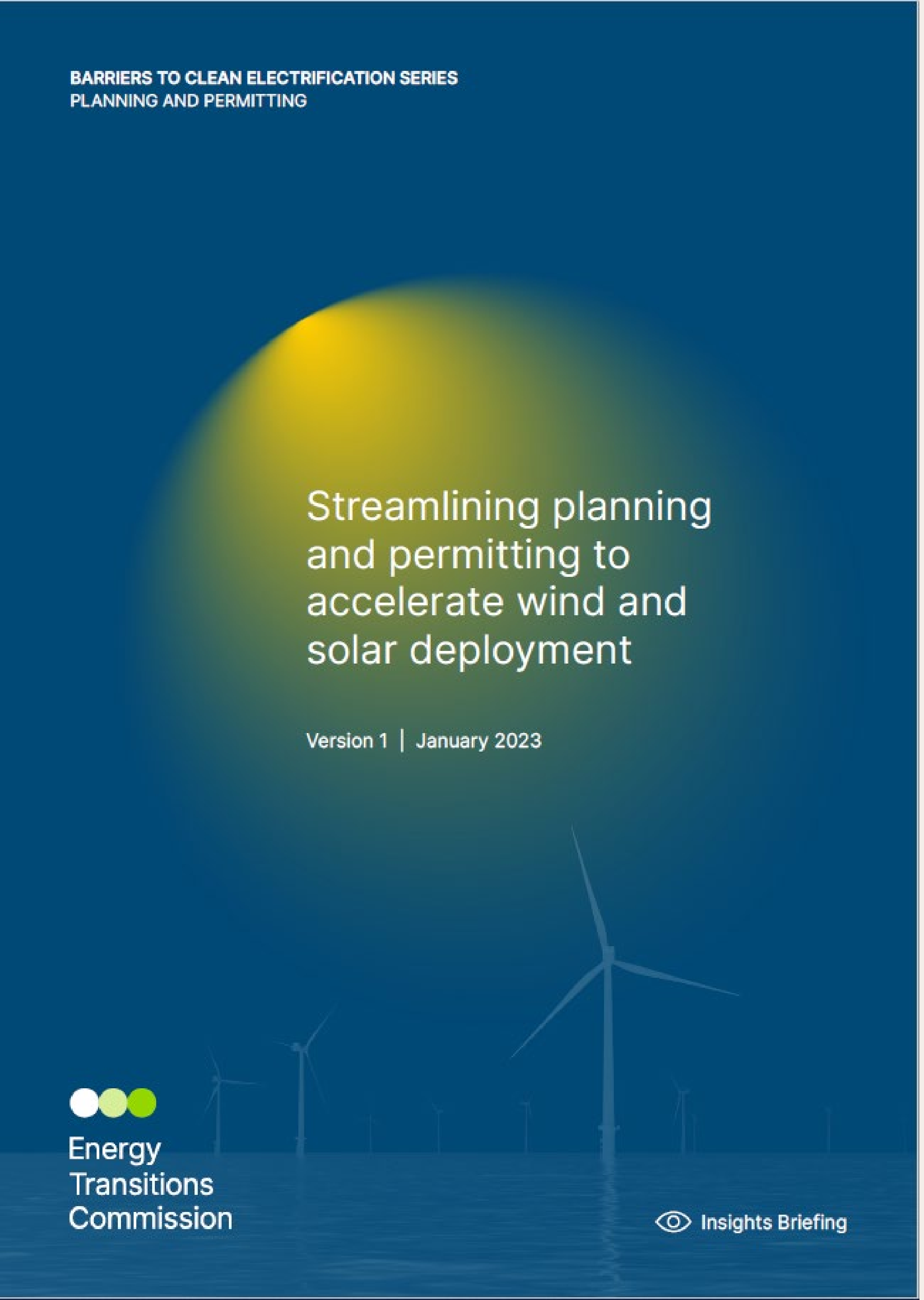
Energy Transitions Commission

The **Barriers to Clean Electrification** Series

Streamlining planning and permitting to accelerate wind and solar deployment

January, 2023

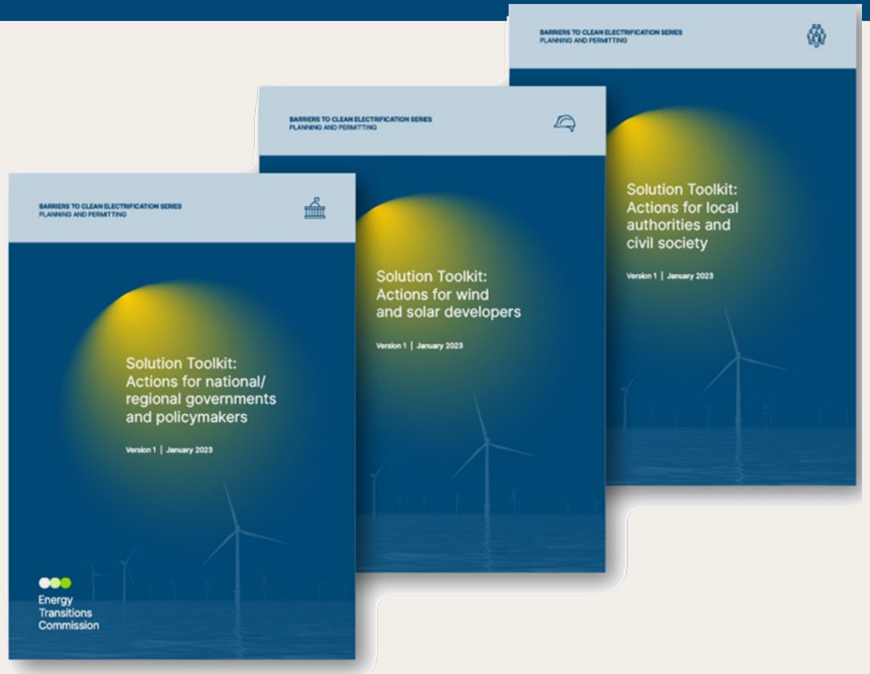


Barriers to Clean Electrification Series

The ETC's *Barriers to Clean Electrification* series focuses on identifying the key challenges facing the transition to clean power systems globally and recommending a set of key actions to ensure the transition is not derailed in the 2020s.

To address the barrier of slow planning and permitting for wind and solar deployment, an Insights Briefing has been developed, which covers the context and major challenges, and assesses the impact of deploying key solutions.

Three solution toolkits have also been created, which lay out a set of key actions that need to be taken by the most important groups of stakeholders, and outline supporting case studies.



Streamlining planning and permitting is essential to ensure the world does not fall behind against clean electricity generation targets

Key takeaway messages:

- **The world is set to miss out on up to 3,500 TWh of clean electricity generation from wind and solar in 2030** (a 20+% shortfall in generation under current forecasts vs ETC targets), due to key barriers to wind and solar deployment - including as a result of **cumbersome and time-costly planning and permitting policies.**

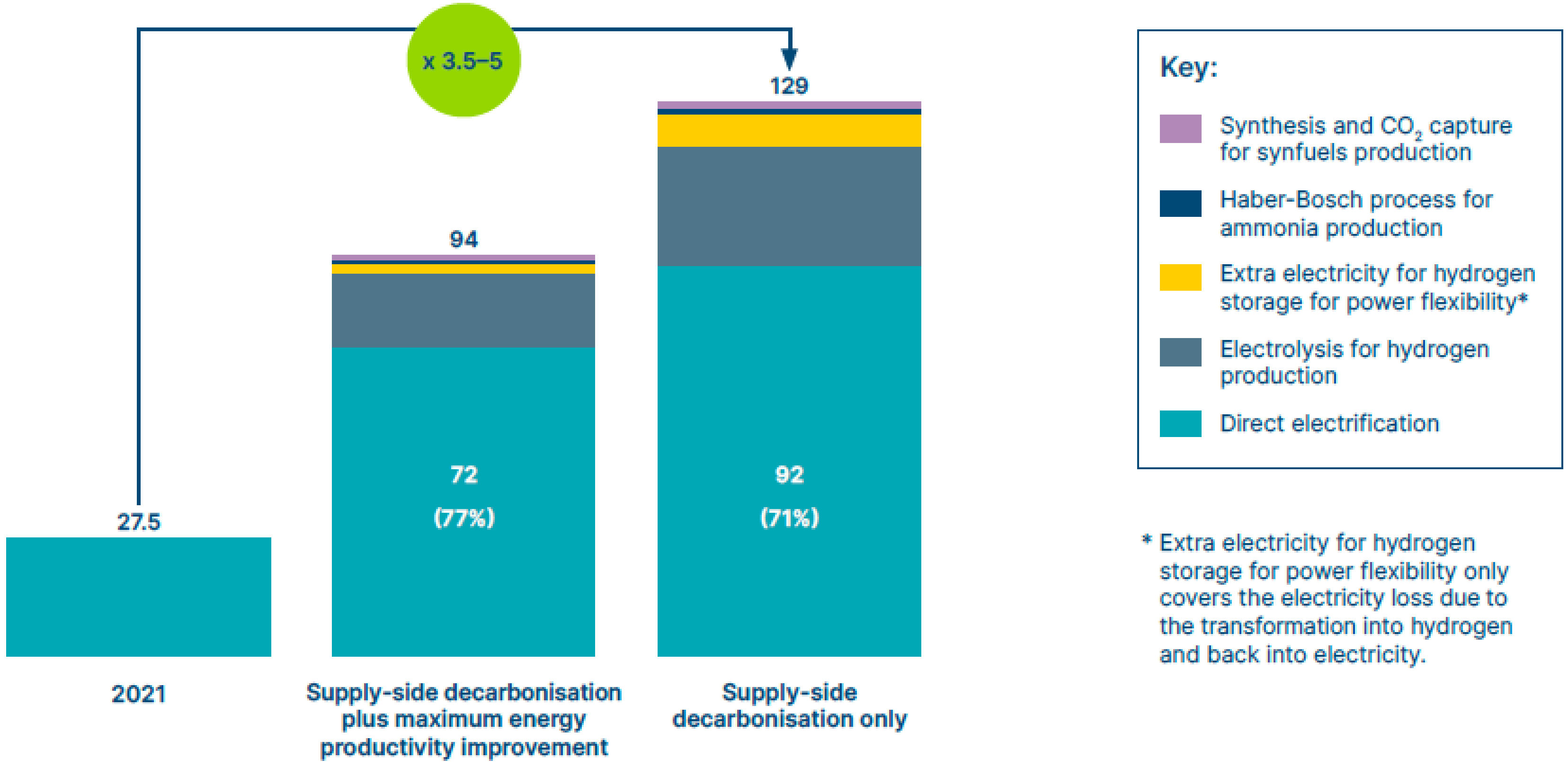
- ETC analysis, grounded in real-world case studies and discussions with leading renewable developers, shows that **putting into place simple measures to streamline planning and permitting can reduce project times by more than half for wind and solar projects.**

- **National and regional governments and policymakers bear the largest responsibility** for driving progress and taking bold action to drive renewables deployment, by streamlining approvals processes, providing a vision for ambitious renewable deployment and deciding where renewable projects must take priority. There is also a role for developers, local government and civil society.

Clean electrification represents the major avenue for decarbonisation of the economy; by 2050, global electricity demand expected to grow 3.5-5x to 90-130,000 TWh

Gross electricity generation will reach ~90,000 to ~130,000 TWh/year

Total electricity generated by 2050 in the ETC indicative pathways
000 TWh/year

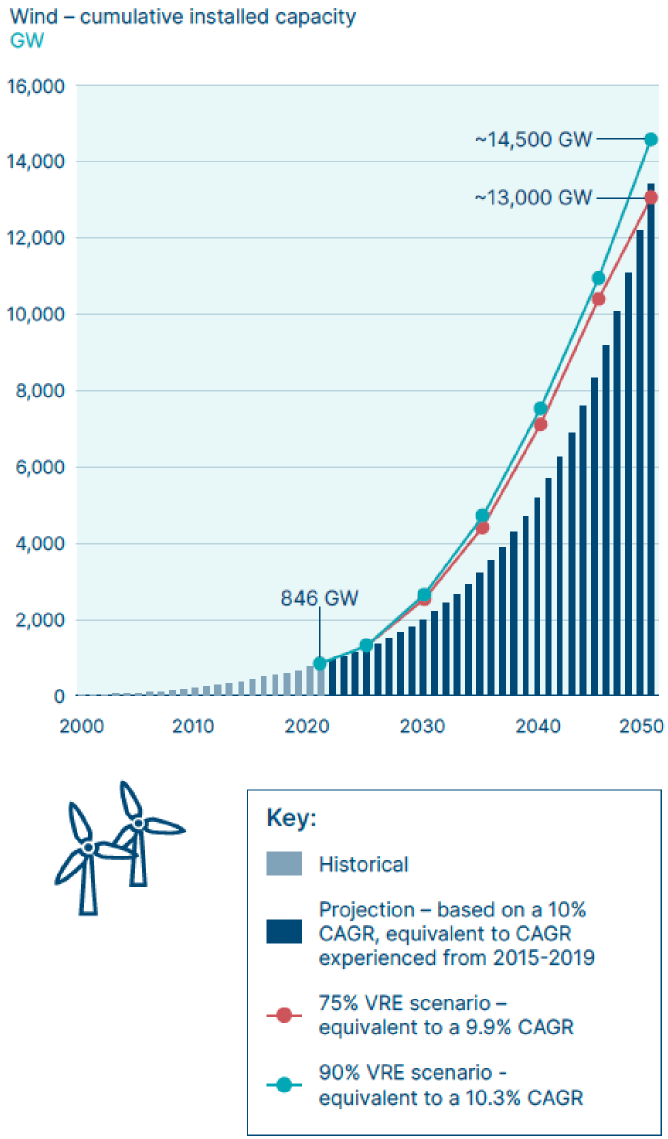


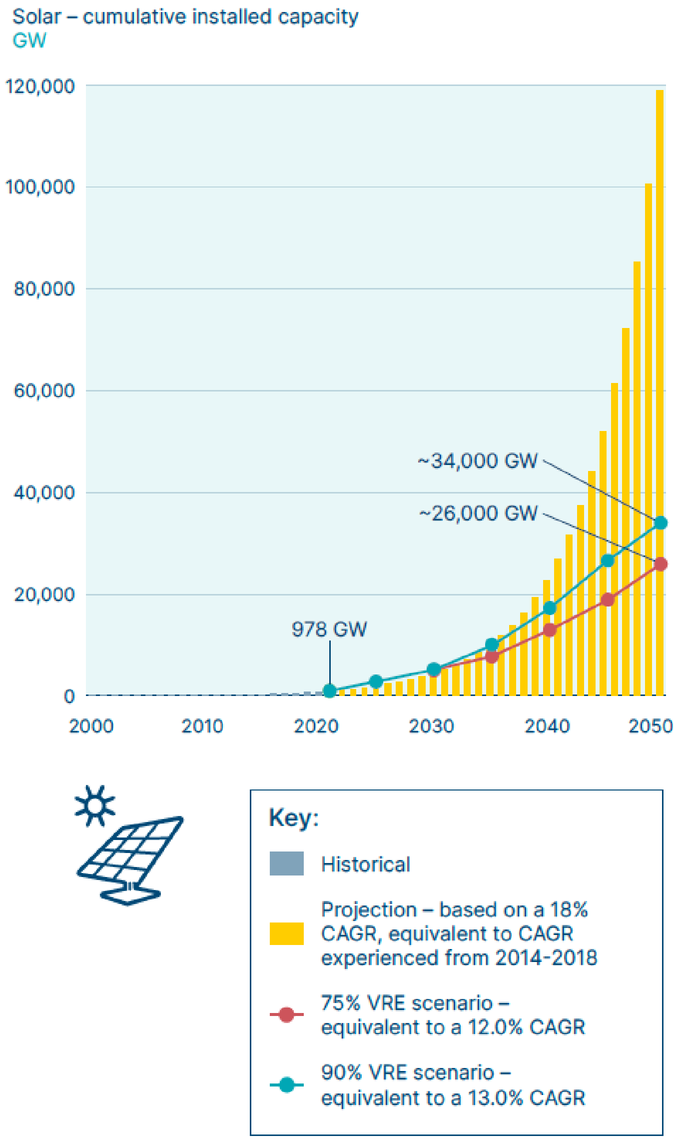
* Extra electricity for hydrogen storage for power flexibility only covers the electricity loss due to the transformation into hydrogen and back into electricity.

Note: Assumes 85% green hydrogen production in 2050.

Source: Systemiq analysis for the Energy Transitions Commission (2021); EMBER (2022), *Global Electricity Review* (2022).

To deliver growth in clean power supply, wind and solar capacity must grow dramatically





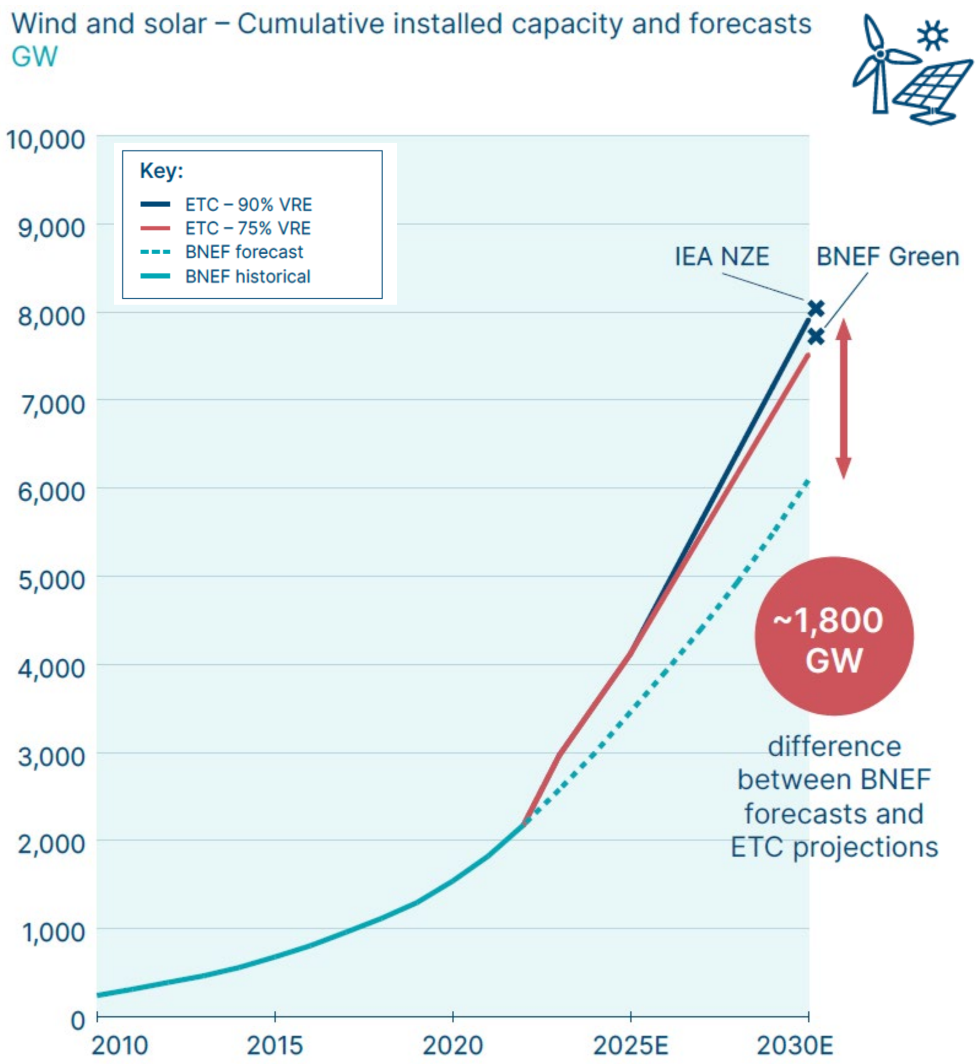
To be on track for a power system built on 75% - 90% renewables by 2050:

- Installed **wind** capacity needs to grow three-fold from around **850 GW in 2021** to **~2,600 GW in 2030**
- Installed **solar** capacity needs to grow almost five-fold from around **1,000 GW in 2021** to **~4,900 GW in 2030**

Note: CAGR = Compound Annual Growth Rate; VRE = Variable Renewable Electricity (i.e. wind and solar).

Source: BNEF (Accessed October 2022), *Global Installed Capacity*; Systemiq analysis for the Energy Transitions Commission (2022).

Despite recent growth in wind and solar capacity, current forecasts lag behind ETC's vision for 2030



- Strong growth in wind and solar capacity in recent years (>25% increase in GW installed in 2022 compared with 2021) is expected to continue
- However current forecasts show that we are set to be **~1,800 GW behind** the ETCs 7,500 GW target in 2030 (24% behind target)
- This would lead to the world missing out on up to **3,500 TWh of clean electricity** generation from wind and solar by 2030 (an over **20% shortfall in generation** vs ETC targets)
- This is equivalent to lost emissions savings of around **2.2 GtCO2 per annum in 2030*** (a cumulative 9.5 GtCO2 from 2023–2030)

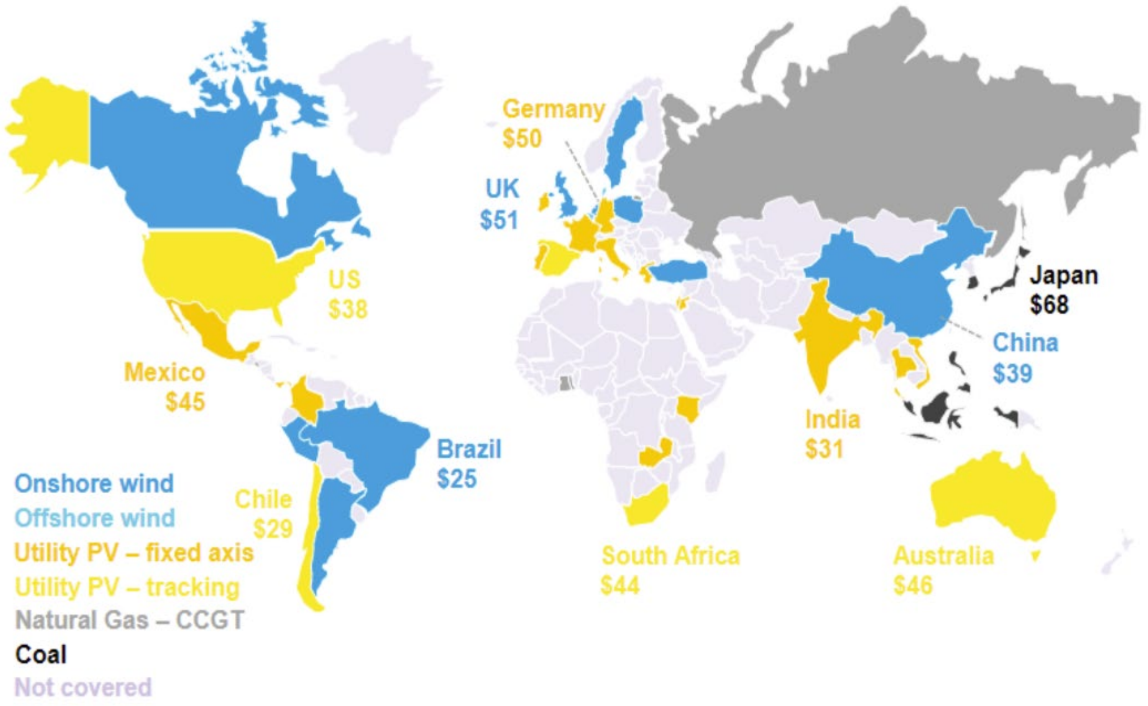
Notes: BNEF forecast is the base case to this analysis. *Assumes new wind and solar deployments directly replace electricity generated through gas and coal from power generation in equal measure at emissions factors of 0.40 kgCO2/kWh and 0.85 kgCO2/kWh respectively.

Sources: ETC (2021), Making Clean Electrification Possible; BNEF (2022), Global Installed Capacity; BNEF (2021), New Energy Outlook ('Green' scenario); IEA (2021), Net Zero by 2050 (NZE scenario).

There are strong foundations in place for the power sector transition as wind and solar power generation remains cost-competitive against both new and existing fossil in most of the world…

New build wind and solar vs new build fossil

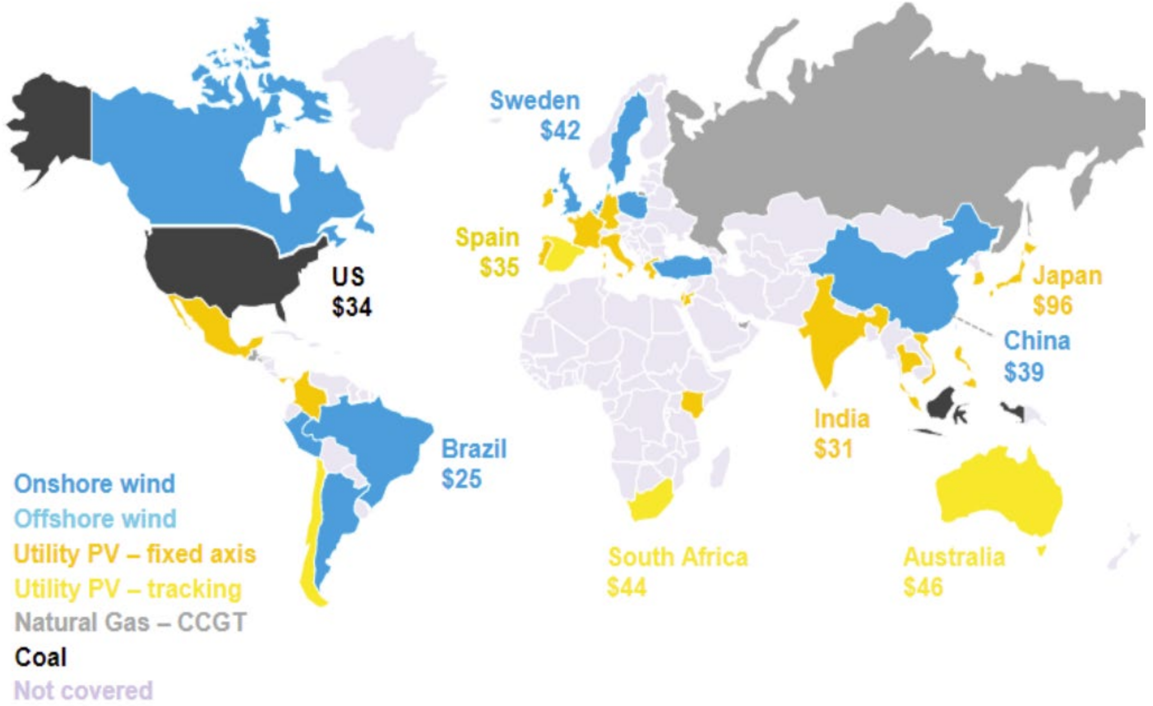
Cheapest source of bulk generation globally, 1H 2022



Wind and solar cheaper than new fossil in countries representing over 90% of electricity generation

New build wind and solar vs existing fossil

Cheapest source of bulk generation globally, 1H 2022



Wind and solar cheaper than existing fossil in countries representing 2/3rds electricity generation

Note: The maps indicates for each country the technology with the lowest cost of electricity for new-build solar and wind plants or short-run marginal costs for coal and gas-fired power plants. Marginal costs include a carbon price where applicable. The dollar numbers below the country name denote the per-MWh levelized cost of that technology. All LCOEs (levelised costs of electricity) are in nominal terms. Calculations exclude subsidies, tax-credit or grid connection costs. CCGT is combined-cycle gas turbine

Source: BNEF (2022), *2H 2022 LCOE Update*.

… But several barriers are slowing wind and solar deployment, planning & permitting is a key issue

Focus of this analysis

Planning and permitting

- Defined as issues stemming from adverse **regulation**, **administrative** challenges, and a lack of **societal support**.
- These are holding back project pipelines, leading to **undersubscribed auctions** and **slowing down projects in development** (e.g., offshore wind can take 12 years instead of 5.5).

Supply chain issues

- Supply chain issues across wind and solar technologies can lead to **price volatility** and potential **shortages in key components**.
- **Most major issues are expected to be resolved** shortly with new capacity coming online (e.g., polysilicon production) and improved transport logistics.

Network availability

- A lack of network availability **prevents new grid connections** for national wind and solar projects.
- This is delaying project pipelines, with an increasing number of projects **unable to deploy** (e.g., the US currently have **1.4 TW** of renewables projects waiting for a grid connection).

Sources: Wind Europe (2022), Messy permitting leads to yet another undersubscribed wind auction in Italy; Bloomberg (2022), The Supply Chain to Beat Climate Change Is Already Being Built; Berkeley Lab (2022), Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection as of the End of 2021.

Several types of barriers contribute to slowing deployment rates…

Regulatory	Administrative	Societal support	Network availability
Lack of strategic vision	Multiple authorities in charge of permitting	Understanding scale up challenge	Network system capacity
Lack of dedicated land	Lack of capability and resources	Protecting biodiversity	Queues to connect to grid
Complex regulation	Lack of digital permitting infrastructure	Local socio-economic concerns	Lack of strategic infrastructure planning
Inflexible permits	Lack of data aggregation		(Network availability will be the focus of a forthcoming briefing)
Adverse legal system			
Land ownership issues			

…Mostly affecting 4 key project stages

Site mapping and selection, where local opposition and planning regulations can severely restrict sites available for development.

Environmental Impact Assessments, (based on a number of environmental surveys) which - while necessary to protect biodiversity - have tended to grow in length and complexity, placing an extra burden on those charged with preparing and reviewing them. These frequently require over 10,000 pages.

Permit applications and examinations, largely due to administrative issues associated with processing permit examinations such as lack of resourcing and use of paper-based systems

Legal challenges, as excessive challenges can often be made (e.g., each permit can generally be challenged in a court of law multiple times), and in some instances, the window where legal challenges can be made can stretch across the entire project development cycle, adding uncertainty and further delay.

There are a number of key actions to overcome regulatory barriers

Solution group	*Key actions*	
1 **Strategic vision**	➢ **Create** a strategic vision of the power system with medium-term targets	
2 **Ensure renewables are appropriately prioritised in law and land use**	➢ **Assign** priority status to renewable energy projects	➢ **Dedicate** sufficient land to renewable projects
3 **Reduce the time taken in permitting stages**	➢ **Set** streamlined permitting targets	➢ **Enforce** permitting targets
4 **Increase the flexibility of permits**	➢ **Streamline** repowering processes	➢ **Utilise** 'box permits' which enable some permit flexibility
5 **Streamline and clarify the legal process**	➢ **Limit** the number and extent of legal challenges	
6 **Establish legal ownership**	➢ **Assign** property rights where these are limited	

Key actor

National/regional governments and policymakers

There are several other key actions to overcome administrative barriers

Solution group	*Key actions*		
1 Speed permitting applications and examination	➢ **Create** one-stop-shops for permitting	➢ **Sufficiently** staff permit roles	➢ **Digitalise** the application and permitting process
2 Create better environmental mapping tools	➢ **Better** government environmental data banks	➢ **Digital** mapping tools to aid deployment planning	

Key actors

National/regional governments and policymakers

Wind and solar developers

There are also various key actions to increase societal support

Solution group

Key actions

Solution group	Key actions	
1 Stakeholder engagement	➢ **Ensure** effective stakeholder engagement	
2 Responding to local concerns and benefits-sharing	➢ **Ensure** benefits sharing with local communities	➢ **Improve** aesthetic design of renewable technology
3 Biodiversity conscious development	➢ **Implement** biodiversity-conscious approaches to siting and construction	➢ **Implement** company-level biodiversity positive strategies
4 Community awareness	➢ **Maximise** community-readiness for the energy transition	
5 Tender processes which recognise non-price factors	➢ **Recognise** biodiversity and social effects in auction tender processes	

Key actors

- Wind and solar developers
- Local authorities and civil society

Streamlining planning and permitting can reduce project development times by more than half for wind and solar projects

Offshore wind

÷2

From a 12 year indicative timeline to a 5.5 year expedited timeline.

Onshore wind

÷2

From a 10 year indicative timeline to a 4.5 year expedited timeline.

Solar

÷4

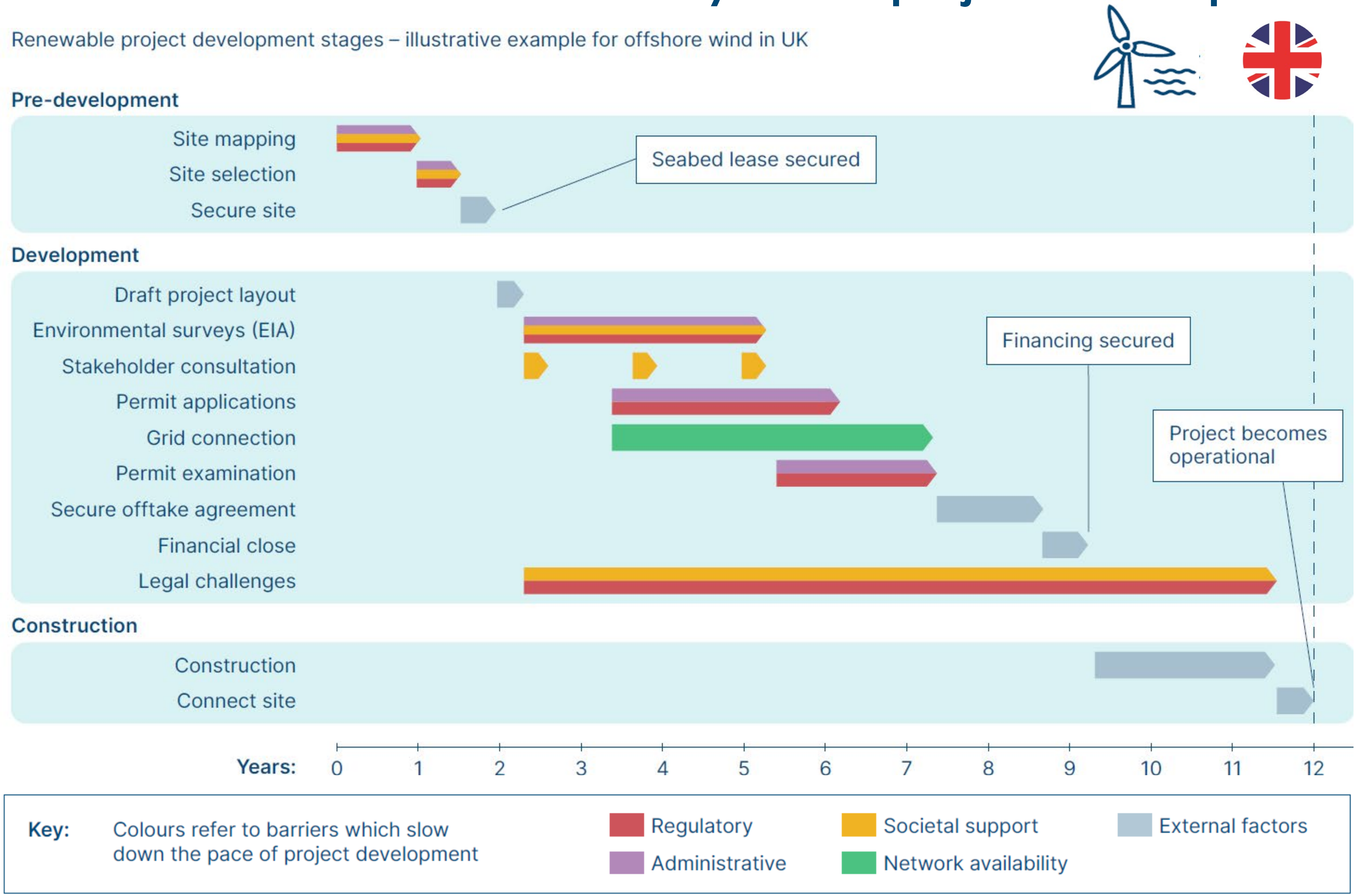
From a 4 year indicative timeline to a 1 year expedited timeline.

- Expedited timelines assume that **social and environmental standards** for projects are **either maintained or strengthened.**
- To achieve maximum project time savings, it is likely that the **entire set of proposed solutions** would need to be implemented where these are not currently utilised in respective countries, and **more stages of project development** would need to be **conducted in parallel**.

Note: Project development time savings are illustrative examples for countries with strong democratic processes. Illustrative examples of good practice project development timelines have been indexed against: UK for offshore wind, Spain for onshore wind, France for utility-scale solar.

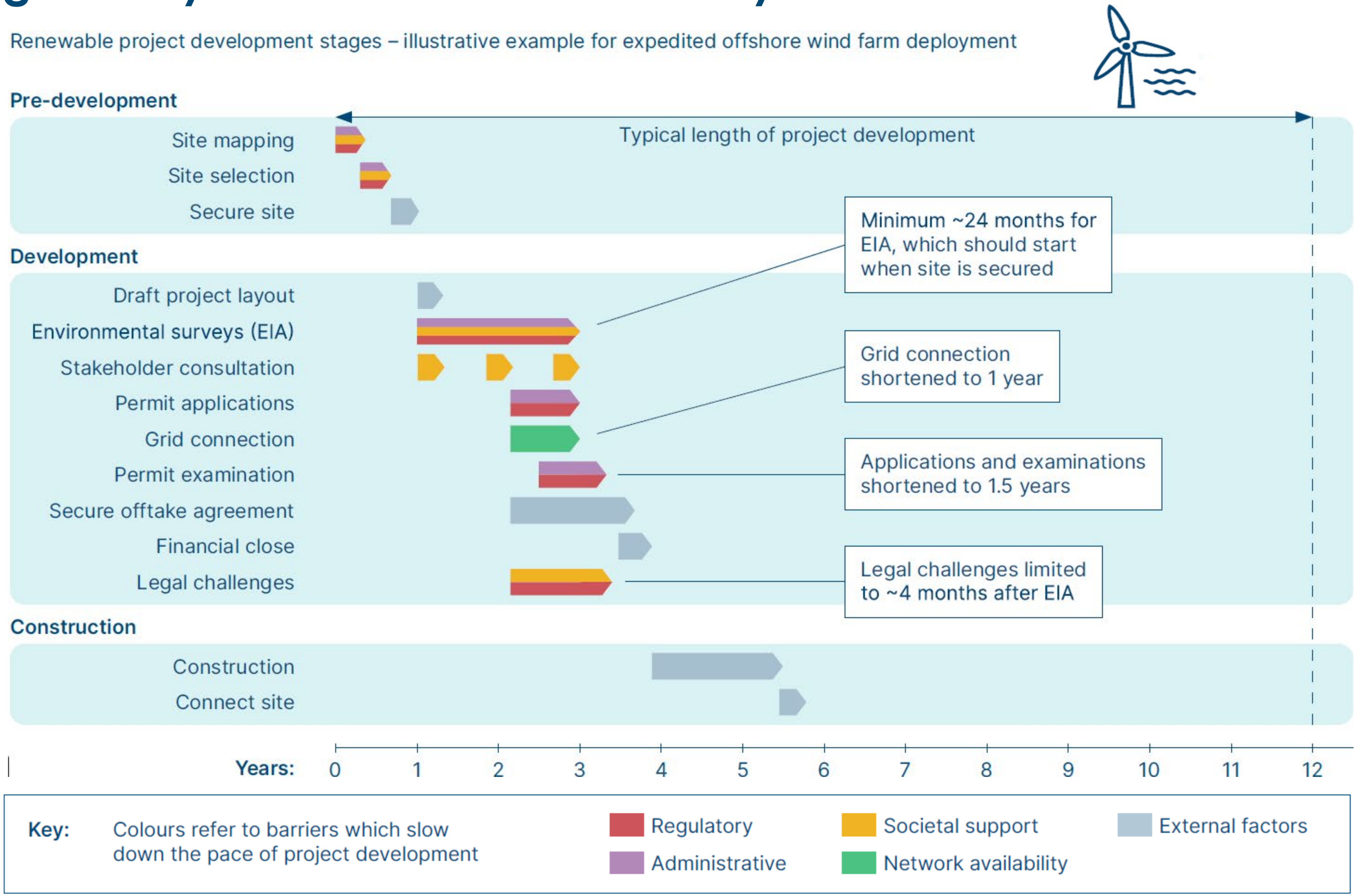
Offshore wind in the UK can take around 12 years of project development…

Offshore



… Mitigating the key barriers can save over 6 years

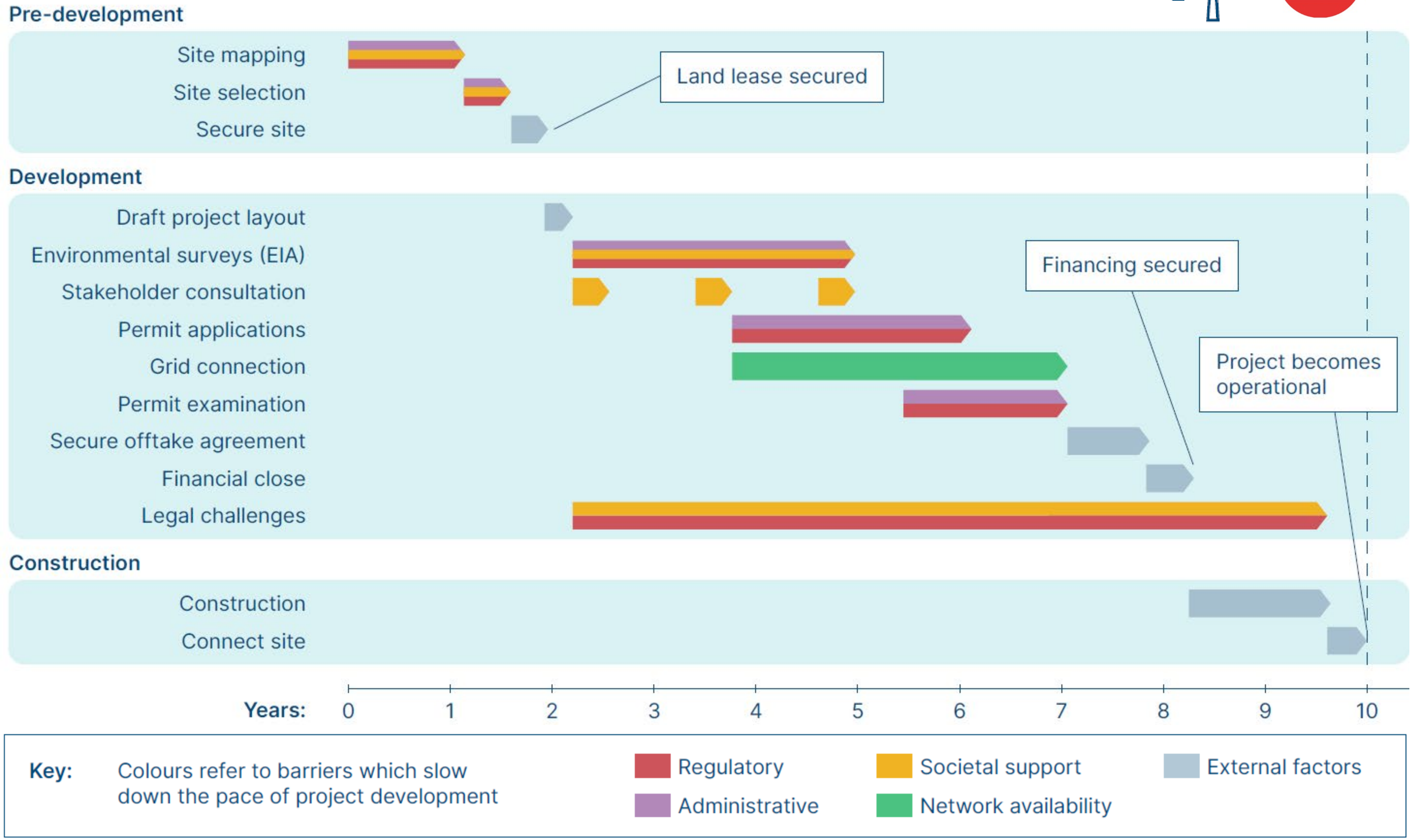
Offshore



Onshore wind in Spain can take around 10 years of project development…

Onshore

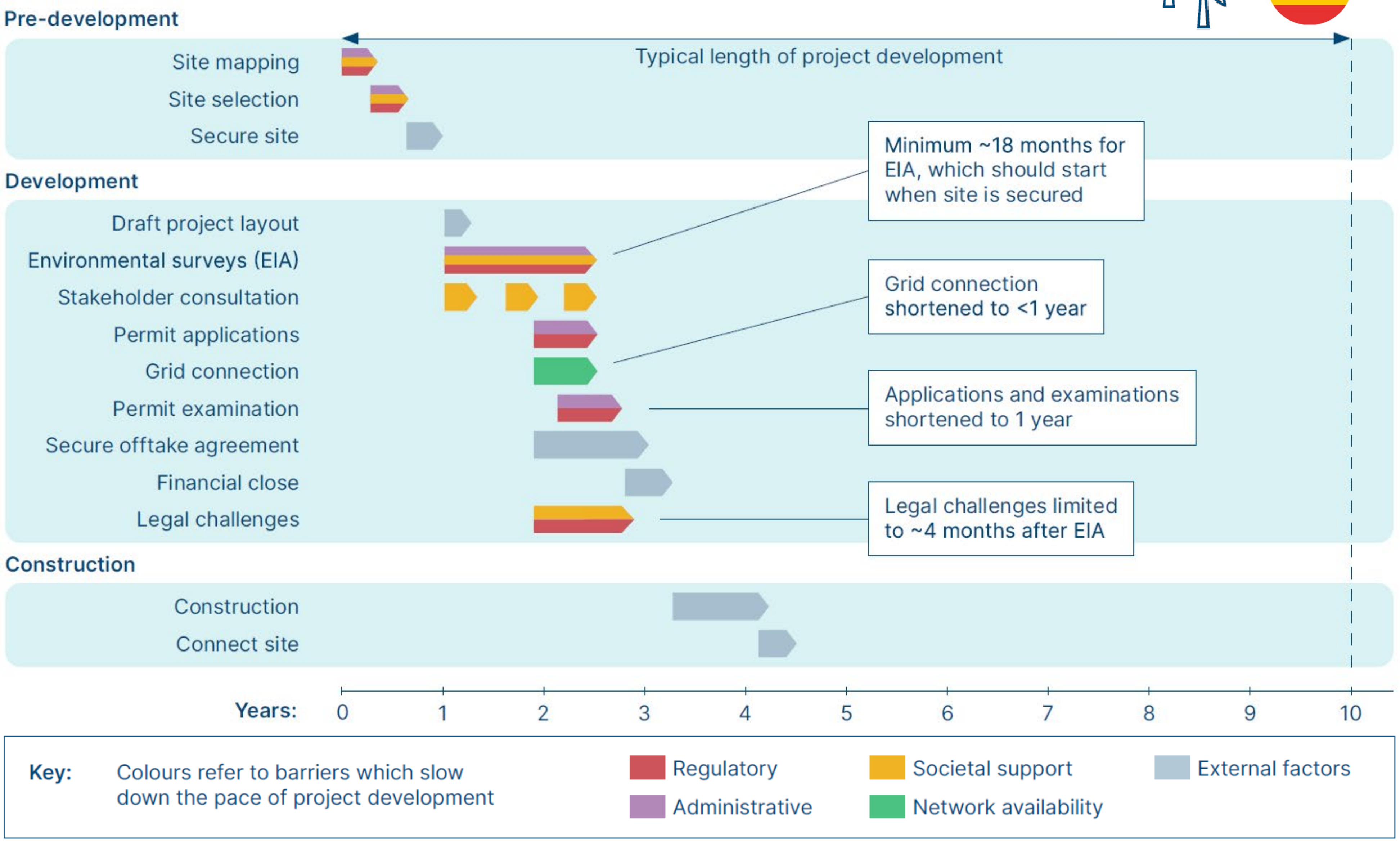
Renewable project development stages – illustrative example for onshore wind in Spain



…Mitigating the key barriers can save over 5 years

Onshore

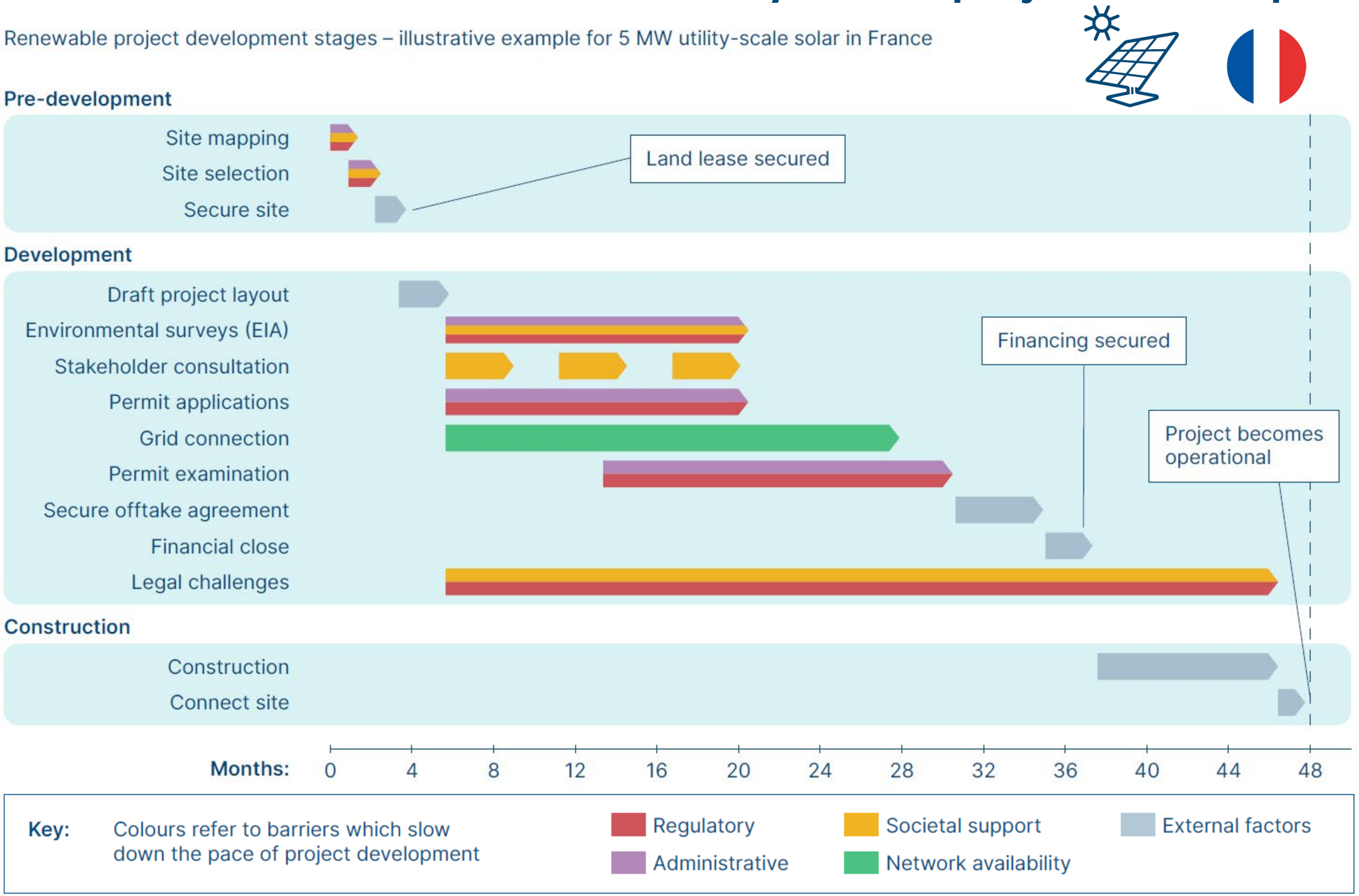
Renewable project development stages – illustrative example for expedited onshore wind farm deployment



Utility-Scale solar in France can take around 4 years of project development…

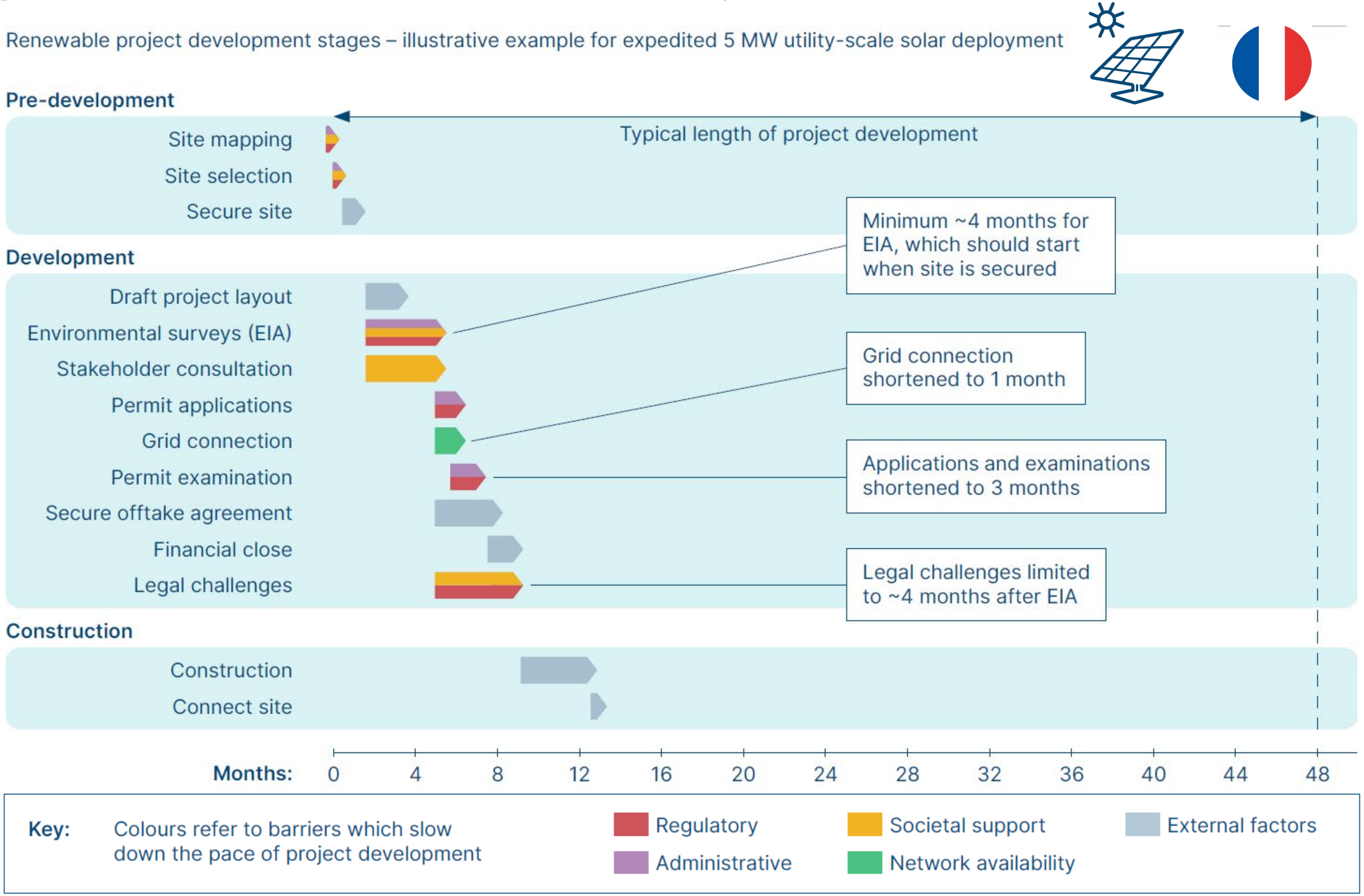
Solar

Renewable project development stages – illustrative example for 5 MW utility-scale solar in France



…Mitigating the key barriers can reduce project timelines by three quarters

Solar



Regional considerations: challenges vary across countries

Regional groups	Extent of planning and permitting challenges
Centrally-led countries e.g., China, Vietnam, UAE	• Less scope for legal challenges, so less of an obligation to conduct extensive stakeholder consultation and environmental surveys. • Generally results in less severe planning and permitting barriers.
Countries with strong democratic processes e.g., Europe, United States	• Regulatory and administrative challenges lead to long drawn-out processes, often delaying deployment by many years. • Organised local opposition and rigid legal systems can further exacerbate planning and permitting challenges.
Highly land-restricted countries e.g., Japan, South Korea	• Land restrictions on top of planning and permitting challenges leads to an accumulation of disadvantages, often further delaying deployment. • May require more severe actions to allocate sufficient land and sea space.
Infrastructure-constrained countries e.g., South Sudan, Burundi, Niger	• Generally bigger issues than planning and permitting when it comes to the deployment of renewables. • If there is not a sufficient grid in place and land ownership is disputed, it is much harder to deploy renewables at scale.

Action required in the short term, with a critical role for governments

- **National/regional governments and policymakers bear the largest responsibility for driving progress** given that they can unlock most regulatory and administrative barriers. They must take bold action by:
  - setting a strategic vision for the power system;
  - improving permitting processes and enforcement;
  - enabling better information and systems.

- In the short term, governments should prioritise solutions such as:
  - giving priority status for land available for wind and solar projects;
  - applying the "rule of positive silence" which automatically grants permit applications after a period of time has elapsed,
  - encouraging solar panel installations on all suitable public buildings,
  - and ensuring sufficient staffing within permitting departments.

- **Wind and solar developers** should use best-practice to deliver projects that minimise environmental and social impacts and work for local communities.

- **Local authorities and civil society** should increase community awareness of the energy transition and contribute to effective stakeholder engagement.