

Setting the scene: National systems of innovation

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United Nations Climate Change
Technology Executive Committee

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Definition: What is a national system of innovation (NSI)?

“a network of **actors, institutional contexts & linkages** that underlie national technological change”, for example by initiating, modifying, importing and diffusing innovations & new technologies.

Actors

Organizations that participate in technology development & transfer e.g. technology firms, universities & financiers

Institutional contexts

Norms, cultural practices & laws that shape actor efforts e.g. government policies that affect how the private sector invests in a particular sector

Linkages

Interactions & relations between the actors & the institutional context e.g. flows of information & knowledge, & collaboration between firms, universities & research institutes



Linkages: What is the interplay of NSI and climate action?

When looking at an initiative aiming to foster innovation for climate action at the national level (NSI), this may cover different governance levels, technologies and sectors:

**Regional/local
systems of innovation**

**Sectoral systems of
innovation**

**Technological innovation
systems**

The key to utilizing these interlinkages is taking a systemic approach – one that is:

- Aligned with national climate and development priorities;
- Informed by an understanding of the local context and adaptable to new circumstances; and
- Enriched by the participation of various innovation actors to facilitate alignment.



Role: What are the functions of NSI?

NSI may perform the following functions, across different stages of the technology cycle - research & development, demonstration, market introduction & commercialization, and diffusion:

- **Knowledge development and diffusion** -knowledge expansion, dissemination & combination
- **Entrepreneurial experimentation** - with new technologies, applications & strategies
- **Market formation** - demand and choices, product positioning, standards & rules of exchange
- **Influence on the direction of search** e.g. technologies, problems & solutions, resource allocation
- **Resource mobilization** - financial & human resources, infrastructure
- **Legitimation** - regulative, normative & cognitive legitimacy by stakeholders
- **Development of positive externalities** - pooled labor markets, complementary technologies & specialized suppliers



Actions: How can NSI be strengthened?

Strengthening NSI requires three key complementary actions:

1. Develop the fundamental elements, e.g.

- build a strong education system
- invest in research, development & demonstration
- implement enabling policies, including to support market creation

2. Focus on specific climate technologies e.g.

- identify the stages of the technology cycle that might require most support
- undertake technology demonstration & deployment
- help overcome barriers to innovation

3. Develop national strategic & coordination capabilities e.g.

- identify roadmaps to meet innovation priorities for climate & development
- identify innovation gaps to be addressed to successfully progress on these roadmaps
- coordinate activities across the innovation cycle



Strengthening NSI: What are key policy areas & actors?

Key policy areas

- Innovation policies
- Higher education policies
- Intellectual Property Rights policies
- Sectoral policies & targets
- Regulatory policies & instruments
- Fiscal & financial incentives & risk-capital policies
- International agreements, policies & technical norms

Key actors

- Governments
- Universities & scientific societies
- Private sector
- Finance providers
- International actors
- Media



Challenges: What are systemic barriers for NSI?

- **Infrastructural failures** – Absence or inadequate quality of infrastructure (e.g. knowledge & physical)
- **Hard** (e.g. laws, regulation) **and soft** (e.g. culture, social norms) **institutional failures** - Absence or inadequate capabilities of institutions
- **Interaction failures** (strong and weak network failures) – Absence, inadequate quality or intensity of interactions
- **Capability failures** relating to firms and other actors - Absence of required/relevant institutions or their inadequate capabilities
- **Lock-in** in systems, institutions, infrastructures & technologies
- **Directional, reflexivity, and coordination failures**



Financing NSI: Strengthening enablers & overcoming barriers

- Exploring **innovative, customized & flexible funding frameworks**
- Developing financial instruments that **reduce the risk & opportunity cost for local actors**
- Facilitating **private sector participation** in strengthening NSI e.g. by regulatory reforms & incentive programs
- Strengthening **entrepreneurial ecosystem** to enhance effectiveness of NSI e.g. incubators & accelerators
- Maximizing productive engagement with **international actors & opportunities**

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2015



2017



2018



2018



2023



Conclusion

Developing countries can strengthen the financing of National Systems of Innovation (NSI) by adopting diverse and flexible funding approaches beyond government resources, including private sector and international support. Key strategies include reducing investment risks through tailored financial instruments, improving the business environment to attract private sector participation, and strengthening entrepreneurial ecosystems through incubators and accelerators.

Engagement with international partners is also critical, as they provide expertise, resources, and opportunities for collaboration. Overall, a coordinated and innovative financing approach is essential to overcoming systemic barriers and enhancing innovation for climate action.

