



# Green Windows of Opportunity: Catching Up in Developing Countries

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The green transition holds some **challenges** but also many **opportunities** for developing countries to upgrade their productive and innovative capabilities and narrow the gap with developed countries in green sectors.

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By Annita Elissaiou | EURACTIV.com | Est. 3min

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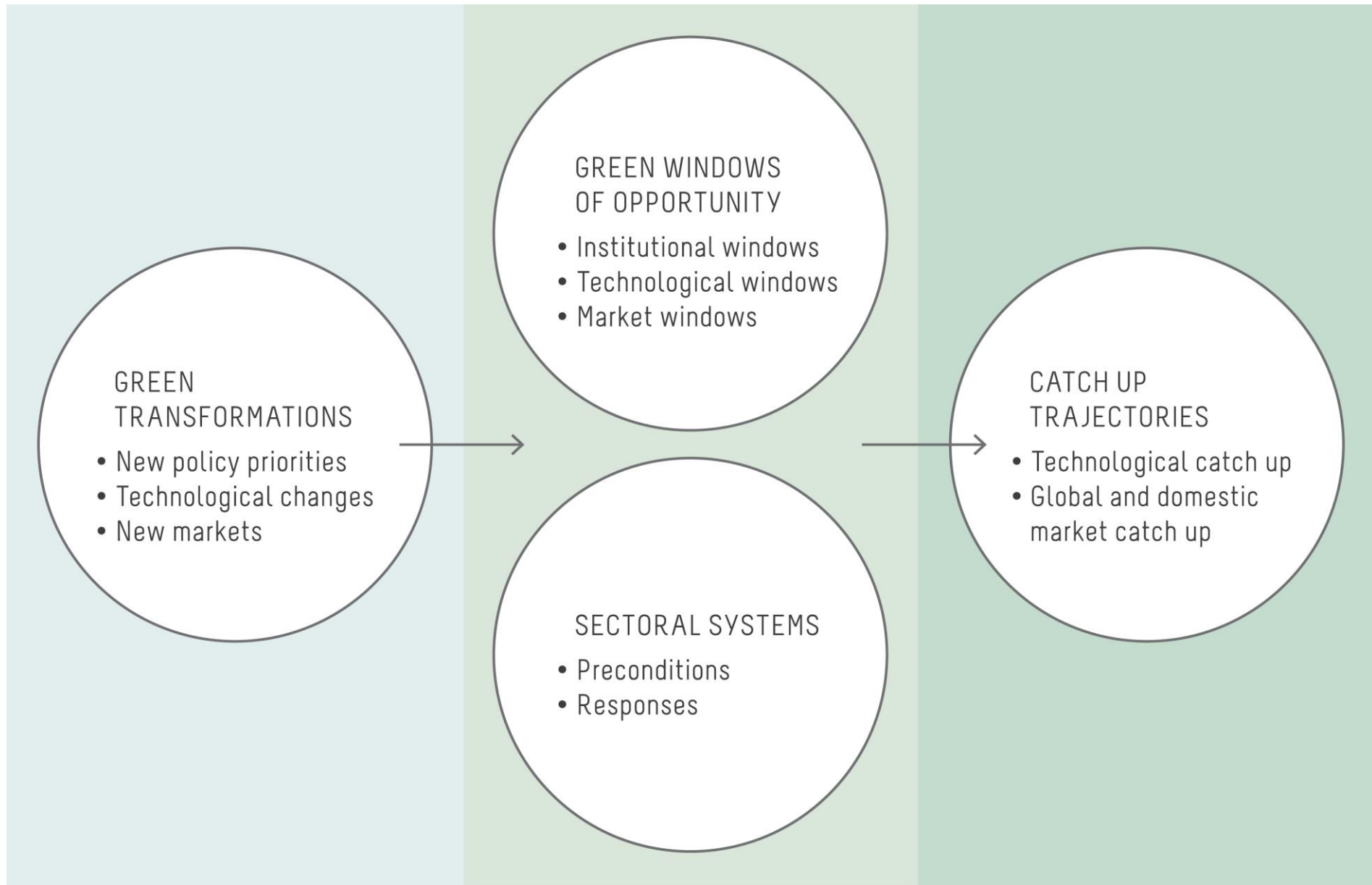
# Developing countries need to address the following questions

What characterizes the capacity to seize the opportunities?

- *What is the role of **innovation systems** to increase the green innovative capabilities?*
- *What are the prospects for **joining green GVCs and upgrading** within them?*

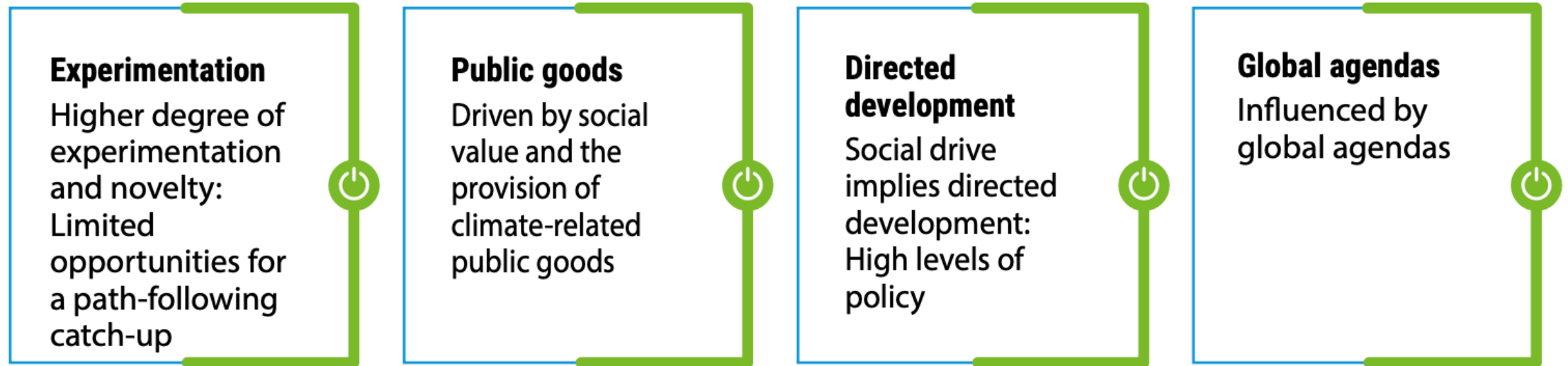
What **policy options** can support their efforts to take advantage of Green Windows of Opportunities?

# The GWO framework



# What is different in the green techno-economic paradigm

## Catching up with green innovation



Source: UNCTAD.

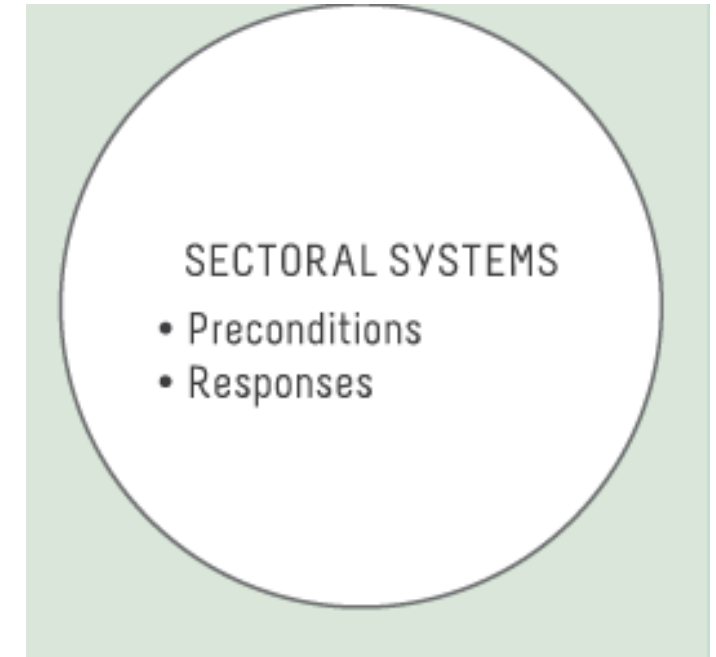
# Green windows of opportunity

- GWO are mainly endogenous, created by governments and influenced by *domestic and global* environmental and industrial policies;
- Examples are:
  - **China:** 2006 Renewable Energy Promotion Law; Golden Sun Demonstration Program; Ride the Wind Program.
  - **Brazil:** Sugarcane-based ethanol fuel program.
  - **India:** 2020 National Electric Mobility Mission Plan.
  - **Brazil, Chile, Uruguay, Viet Nam, Turkey, Morocco, Namibia and South Africa:** existing or forthcoming green hydrogen national strategies.



# Sectoral systems: preconditions & responses

- The ability to take advantage of GWOs in developing countries differs across green technologies and countries.
- To investigate and understand how they differ, we focus on the two components of the sectoral system:
  - the preconditions to take advantage of the opportunity
  - the strategic responses of public and private actors for seizing the GWOs
- Responses to GWOs differ depending on technological maturity and tradability.



The maturity and tradability levels of technologies affect GWOs

- ❌ Immature technologies require stronger initial conditions in science and R&D
- ✅ Mature technologies tend to entail more market competition
- ↔ Tradability involves different dimensions that influence the competitive dynamics and modes of technological learning

# Seizing GWOs: four scenarios

## Four green window scenarios

Responses Preconditions	Strong	Weak
<b>Strong</b>	<p><b>Scenario 1: Windows open</b></p> <p>Solar PV, Biomass, CSP – China</p> <p>Bioethanol – Brazil</p> <p>Hydrogen – Chile (potentially)</p>	<p><b>Scenario 2: Windows to be open</b></p> <p>Solar PV – India</p> <p>Biogas – Bangladesh</p> <p>CSP – Morocco</p> <p>Wind – China</p>
<b>Weak</b>	<p><b>Scenario 3: Windows within reach</b></p> <p>Biomass – Thailand and Viet Nam</p> <p>Hydrogen – Namibia</p>	<p><b>Scenario 4: Windows in the distance</b></p> <p>Wind – Kenya</p> <p>Bioenergy – Mexico and Pakistan</p>



# Scenario 1: Windows open

## Example: Renewables in China

### Preconditions:

- Large internal market,
- Diversified industrial structure
- Well-developed related capabilities

### Responses:

- Co-design of environmental and industrial policies
- Diffusion of knowledge among firms and institutions, such as government stimulation of knowledge spillovers with loose enforcement of property rights and diffusion through state-owned design institutes in biomass
- Acquisition of foreign technology through licensing activity and cross-border acquisitions of foreign firms in solar PV and biomass
- Public R&D experimentation in CSP

# Scenario 3: Windows within reach

## Example: Biogas in Thailand

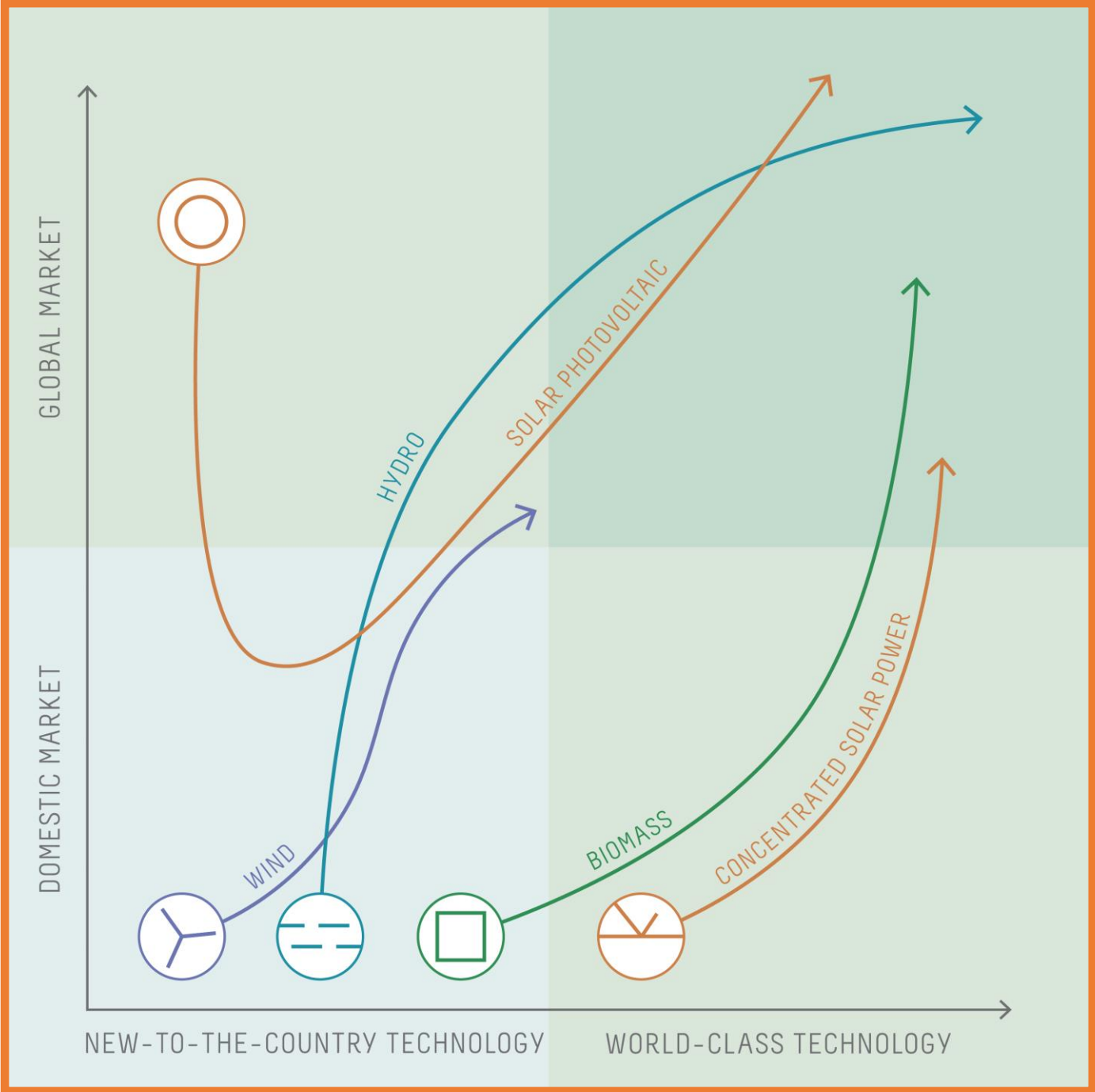
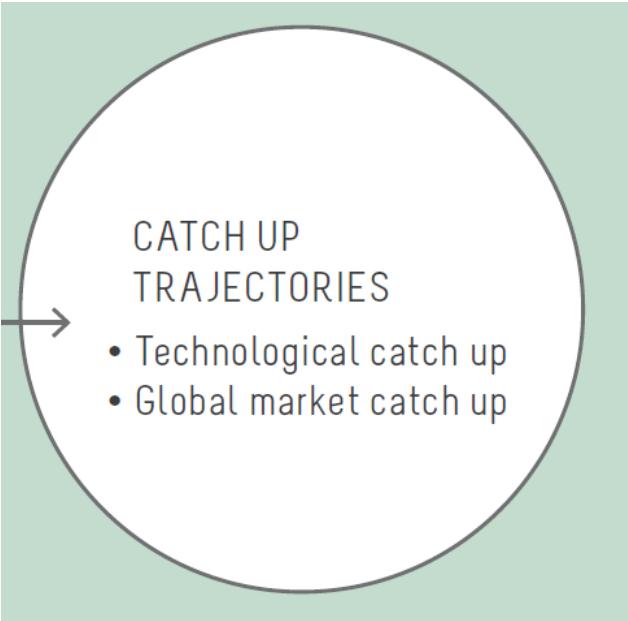
### Preconditions:

- Limited initial experience, absence of domestic firms and fragmentation of actors
- Factories (e.g., of casava starch) were not interested to invest in biogas production due to high investment costs
- Pilot projects supplied by foreign firms (no domestic suppliers in the 1990s/2000s)

### Responses:

- Proactive strategy of the Minister of Energy to attract private investors to the biogas industry
- Financial subsidies for the construction and design of biogas production plants, tax incentives for firms involved in waste transformation
- Small Power Purchase Tariff program for increasing the proportion of electricity generation from biogas
- Enforcement of an environmental law taxing companies producing pollution
- Support for the strengthening of the sectoral innovation system

# Catch-up trajectories

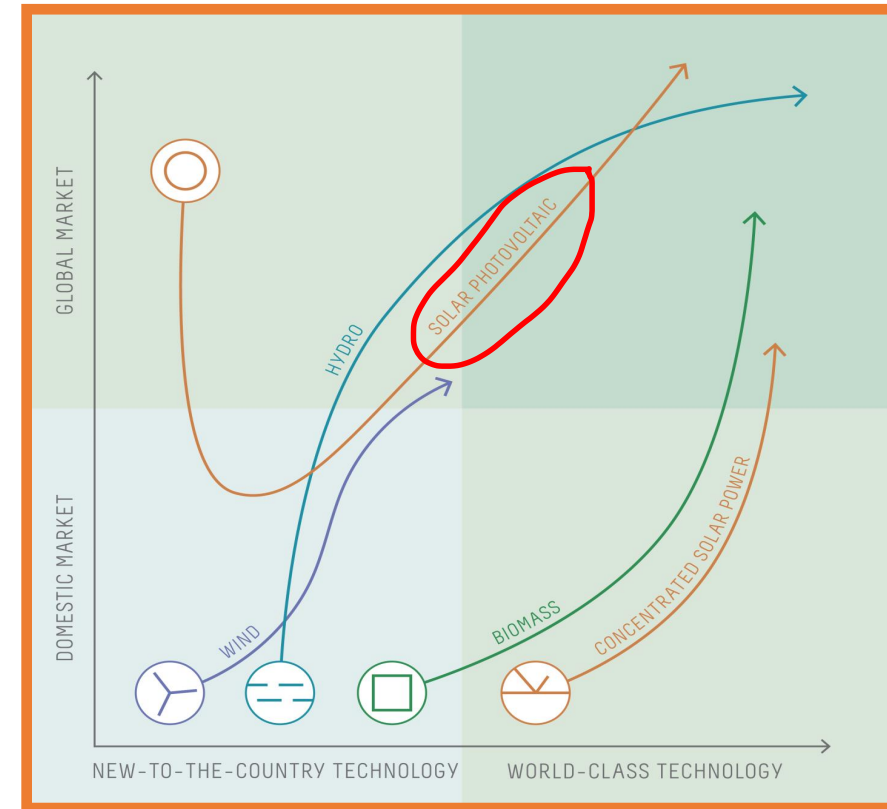


# The Chinese Solar PV Industry

## From learning from exporting to domestic strengthening and to global leadership

### Chinese Solar PV Industry

- ❖ Started in the global market exporting solar panels made with imported technology (learning from export)
- ❖ After a fall in global demand, Chinese companies substituted the international demand with domestic demand thanks to the incentives created by public policy
- ❖ Huge investments in building domestic technological capacity and domestic capacity in the whole solar value chain
- ❖ Chinese companies went back to international markets as technological and market leaders



# Opening green windows

*Table 5: Policies for seizing GWOs*

Open and augment GWOs	<ul style="list-style-type: none"><li>• Select policy instruments and calibrate the policy design to different local objectives and features Combine relevant policy instruments</li><li>• Invest in demonstration programs</li><li>• Support policy interventions with external contributions</li><li>• Invest in demonstration programs</li></ul>
Assess, address, and sustain sectoral systems	<ul style="list-style-type: none"><li>• Evaluate preconditions</li><li>• Enable and shape responses</li><li>• Align environmental and energy, STI and industrial policies</li><li>• Access external knowledge</li><li>• Invest in domestic R&amp;D</li><li>• Build domestic capabilities along the value chain</li><li>• Invest in human capital</li><li>• Involvement in international collaboration projects</li><li>• Diffuse knowledge within the domestic sectoral system</li></ul>

# The role of international cooperation

- Consistency between international agreements on trade, intellectual property and climate change is critical for the green technology revolution;
- Trade rules should allow developing countries to protect infant green industries through tariffs, subsidies and public procurement;
- Intellectual property should have greater flexibility for green technologies in developing countries;
- The financial constraint should be addressed by international cooperation. Resources made available so far have been insufficient.

To seize GWOs strong national and international political will is needed to catch the green technological revolution early.

