

Manufacturing the European Renaissance: Towards a New Industrial Policy Integrated System

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Outline

- 1. The new industrial policy frontier**
- 2. The new international industrial policy variety**
- 3. Emerging trends and focal policy domains**
- 4. Five propositions for a new EU industrial policy integrated system**

Recent research works

- Andreoni, A. (forthcoming, 2015) 'Varieties of Industrial Policy: Models, Packages and Transformation Cycles', in Stiglitz, J. Ocampo, J.A. and Noman, A., eds., *Industrial Policy and Transformation*, **Columbia University Press**.
- Andreoni, A. and Landesmann, M. (forthcoming, 2015) 'Industrial Policy for Europe's Periphery', working paper for the PEAC Annual Conference.
- O'Sullivan, E., Andreoni, A., Lopez-Gomez, G. and Gregory, M. (2013) 'What is New in the New Industrial Policy? A Manufacturing System Perspective', *Oxford Review of Economic Policy*, 29(2), 432-462.
- Chang, H-J, Andreoni, A. and Kuan, M. L. (2013) 'International Industrial Policy Experiences and the Lessons for the UK', in *The Future of Manufacturing*, **UK Government Office of Science, London: BIS**.

The New Industrial Policy Frontier:

- **New rationales and models for policy action**
- **New worlds of manufacturing production**

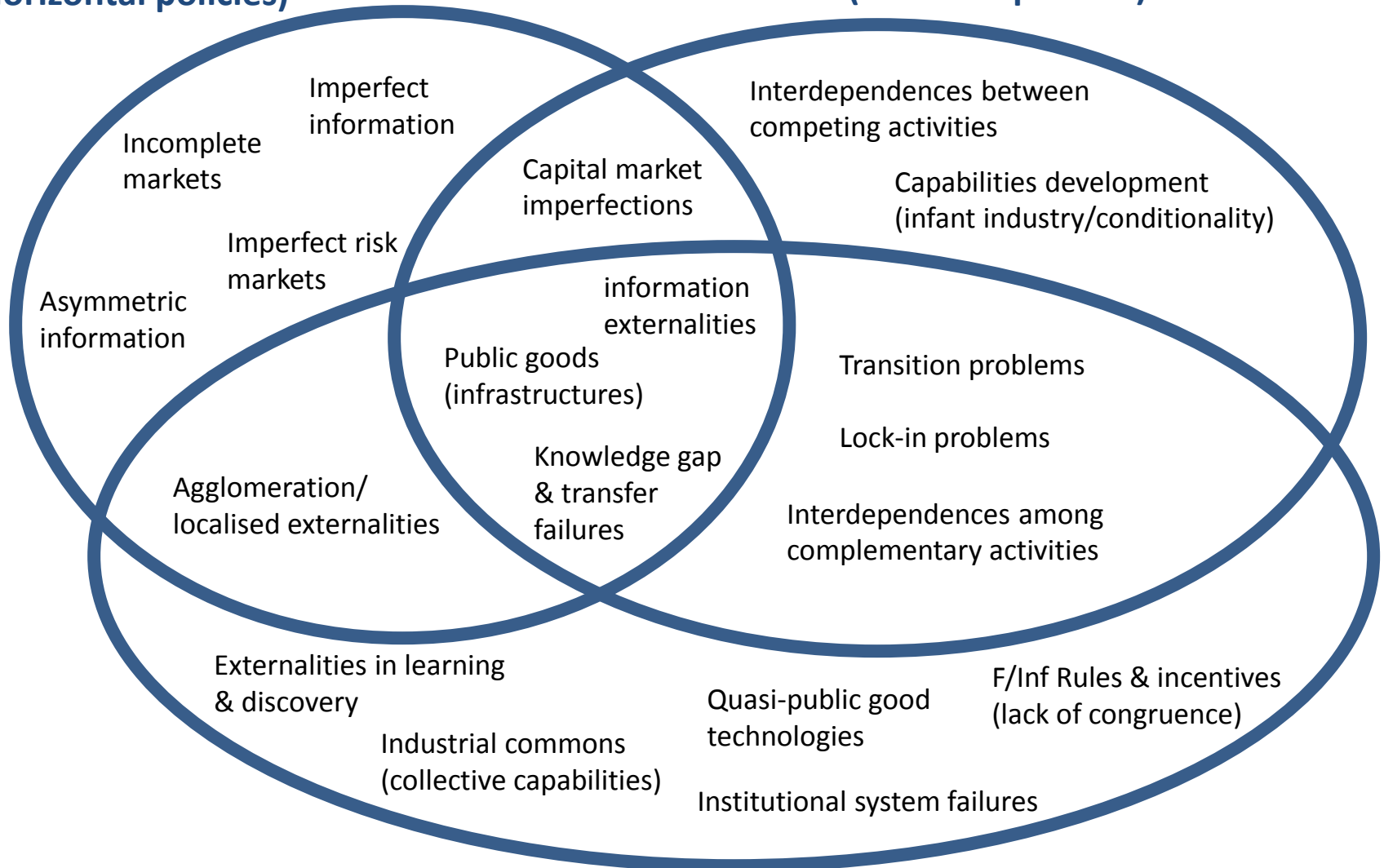
The new industrial policy frontier

Main features	First wave 40s to mid-70s	Second wave Mid-70s to 90s	Third wave 2000s	Emerging themes 2010s
Development as/through	Industrialisation and structural change	Stabilisation, liberalisation, and poverty reduction	Global knowledge economy	Learning economy and Innovation in production
Policy target/s	Creating markets Structural change and diversification	Specialisation and modernisation (Market-led)	Innovation Increasing productivity Diversification and specialisation	Industrial ecosystem development
Policy framework	Import Substitution/Export oriented Selective industrial policies Sectors development Gradual opening to competition	The best industrial policy is “no industrial policy”. Horizontal policies Exposure to competition FDI attraction	Targeted strategies in open economies Increasing national competitiveness Enabling business environment Strategic management of FDI	Smart (new selective) policies Value creation in glocal systems Value capture in production networks Competences/capabilities
Policy model	Top-down Centralised system National agencies/councils Developmental institutions	Minimal state (Weakening and/or dismantling of national institutions)	Multi-layered (Top-down/Bottom-up) Public-private identification of priorities. Science institutions	Multi-layered Institutions for public-private coordination Multi-level implementation Regional/cities clusters development
Policy package/s	Capital movement management Production-oriented finance National champions development Infant industry protection Hard infrastructure development Public funded research Compensation policies for lagging areas.	Innovation policies ICT diffusion Competitiveness programmes Human capital SMEs support (regional level)	Credits and grants for production development and innovation Public procurement Promotion of entrepreneurship (venture capital, angel investors and support to business capabilities) Hard and soft infrastructure Technical competences and skills development	Technology infrastructure & intermediate R&D&M institutions Manufacturing research Scaling up Strategic public procurement General purpose technologies Key enabling technologies Risk reduction Manufacturability challenges
Policy rationales	Market failures Structural coordination	Government failures > Market failures	Market failures System failures	Learning and System failures
Policy space	High room of manoeuvre and high political legitimacy of national development strategies	Reduction in the room of manoeuvre (WTO, TRIPS commitments, etc.) and low political legitimacy of national development strategies.	Moderate room of manoeuvre in traditional fields; regain of legitimacy of national development strategies	High room of manoeuvre in emerging fields

Industrial policy debate: rationales evolution

Market failures (Horizontal policies)

Structural coordination problems (Selective policies)



Learning and System failures (Smart policies)

New worlds of manufacturing production: beyond vertically integrated sectors

- Modern manufacturing systems, **beyond sectors and national boundaries**
 1. Modern manufacturing systems consist of **complex interdependencies, *often across a range of industries***, which contribute a variety of components, materials, production systems and subsystems, producer services and product-related service systems.
 2. Modern manufacturing companies orchestrate production processes through **complex producer networks spanning across countries**, as well as ***different industrial sectors***.

New worlds of manufacturing production:

New value creation/capture opportunities

- Processes of **value creation and national value capture** are changing in nature
 1. Value is **nested** in specific functional tasks
 2. Value is **created** through the combination (and recombination) of increasingly complex technology systems and platforms (KETs and multi-KETs pilot lines)
 3. Diffused production technologies and competences are also critical for value creation: **manufacturing scaling-up competencies** (PIE-MIT)
 4. Value is **captured** by major companies (system drivers) commanding critical stages of sectoral value chains
 5. Cross-sectoral innovations: **applications of similar technical innovative solutions *across* and *within* sectors**

The New International Industrial Policy Variety



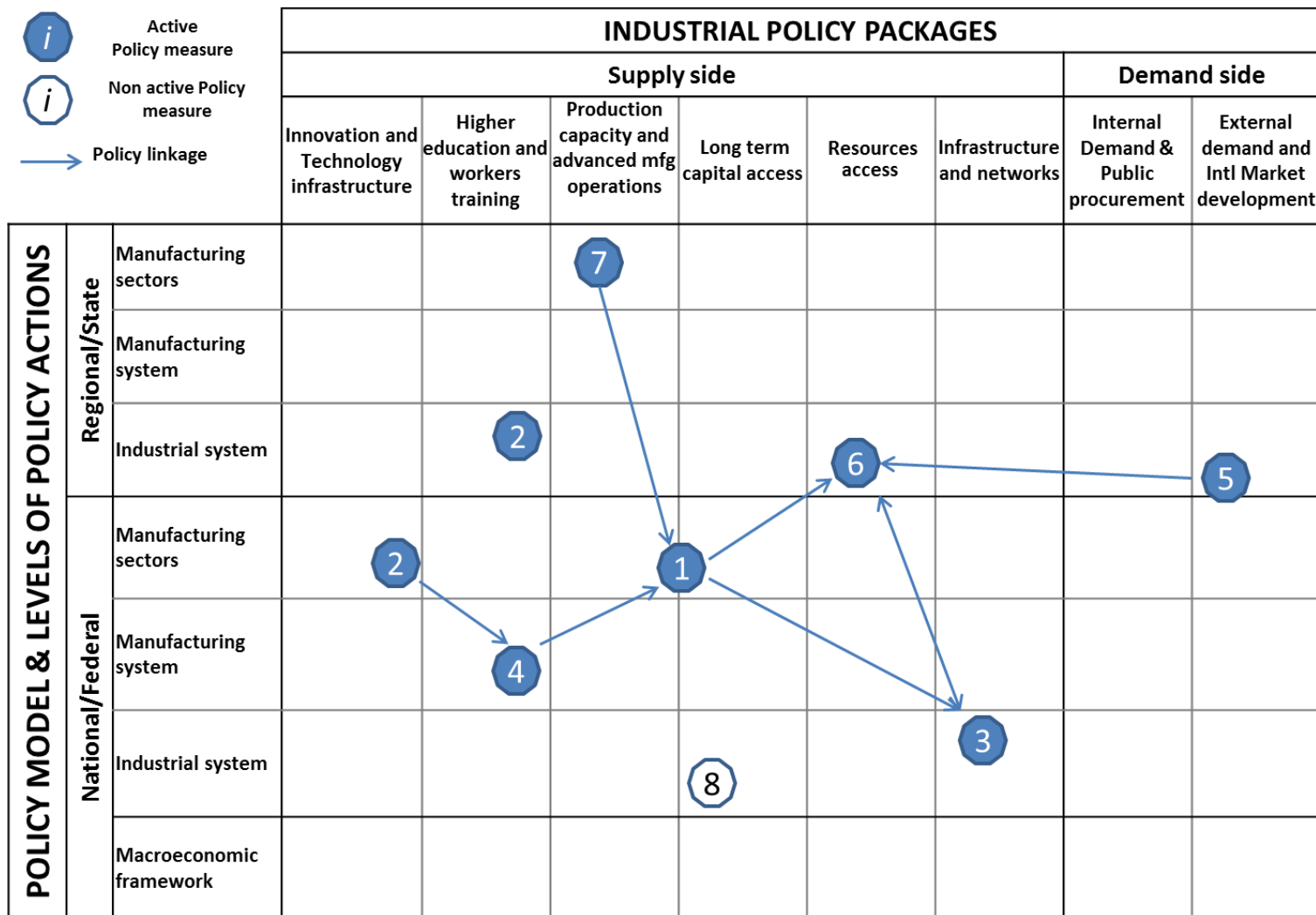
What works?

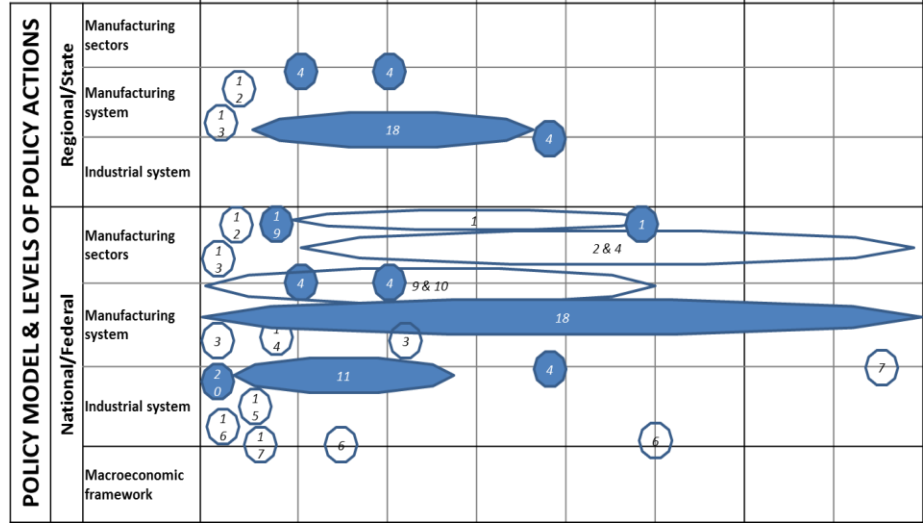
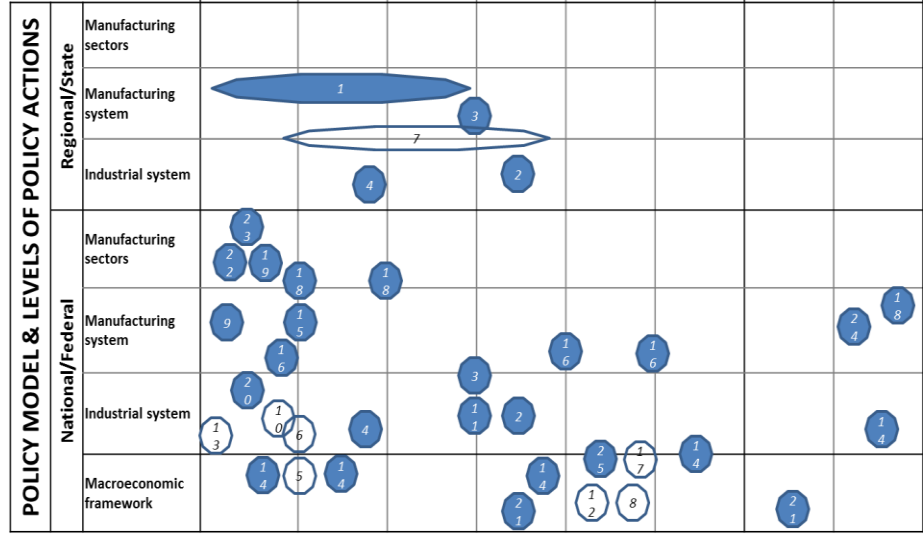
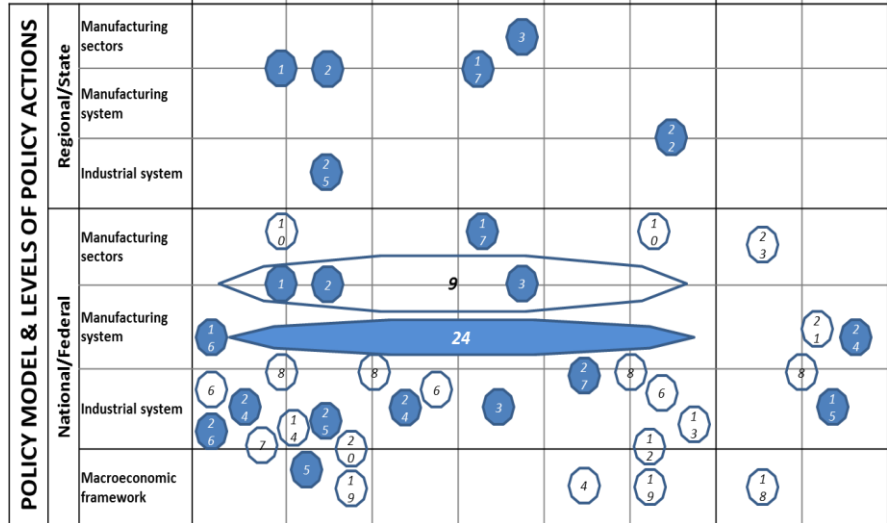
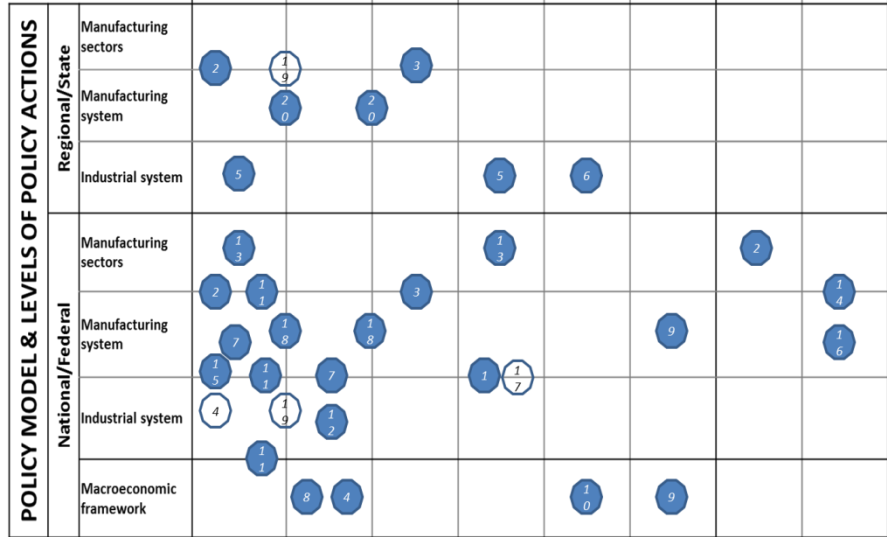
Understanding industrial policy variety

Industrial policy effectiveness depends on:

1. Industrial policy models and **governance systems**: top-down / bottom-up / multi-layered
2. Industrial policy measures and **packages of interactive measures**: policies do not work in isolation
3. Industrial policy **levels of policy actions**: sector, mfg system, industrial system and macro-framework

Understanding industrial policy variety: 'Policy package matrix' – PPM





Emerging trends and focal policy domains

Innovation and technology infrastructure



- **NNMI - National Network for Manufacturing Innovation & Mission oriented initiatives:**
 - network of regional 'Innovative Manufacturing Institutes' designed to accelerate the development and adoption of advanced manufacturing technologies, new models for workforce development and access to state-of-the-art equipment and infra-technologies
 - complemented by high-tech mission oriented initiatives (**Robotics Centre** and **Materials Genome Initiative**)



- **Fraunhofer-Gesellschaft Institutes**
 - network of 57 institutes (18,000 staff) specialising in joint pre-competitive research, prototyping and manufacturing scale-up, as well as product-idea commercialisation, bilateral applied research with individual firms and technology transfer schemes.
 - cutting-edge research includes various sectors and technology platforms such as optics, photonics, micro-electromechanical systems, advanced and composite materials, advanced machining.
 - undertake collaborative manufacturing research and address technological and manufacturing challenges for the entire industrial system (big and small companies, public sector included).



- **Kohsetsushi Centres**
 - 262 regional offices (182 centres) specialising in testing, trial production and scale-up, as well as training services
 - a number of sector-focused centres also support SMEs in the adoption of new advanced technologies and conduct joint applied research
 - complemented by cutting-edge research institutes, such as the ***National Institute of Advanced Industrial Science and Technology (AIST)***



- **Torch Programme**
 - STIPs – Science and Technology Industrial Parks
 - Productivity promotion centres
 - Technology Business Incubators

Financial infrastructure, hybrid industrial finance and strategic public procurement



- **Small Business Investment Company (SBIC) and the Small Business Innovation Research and Technology Transfer (SBIR/STTR):** combine loans, R&D grants and pre-commercial public procurement to support small businesses, OEMs and specialist manufacturing contractors



- The **Bank for Reconstruction (KfW)** operates as a long-term refinancing bank specialised in lending to banks working with industries. The financial infrastructure also includes the German Bank for Settlements (AG), special programme like the ZIM and an articulated multi-layered system of public saving banks and credit cooperatives working with SMEs.



- **Japanese Development Bank (JDB)** and other public financial institutions, such as the Long-Term Credit Bank of Japan and the Industrial Bank of Japan



- The **InnoFund** offers loan interest subsidies and equity investment to high-tech domestic SMEs (Chinese-owned companies with less than 500 employees, 30% of which technicians) willing to invest in emerging technologies and product commercialisation.

Energy-related industrial policies



- **Clean-energy initiatives**, mixing loan guarantees for renewable energies, electricity transmission projects, and smart grids, as well as grants for batteries and advanced materials. Additionally a new mission oriented research venture in energy coordinated by **ARPA-E** (Advanced Research Projects Agency—Energy).



- **German Renewable Energy Act** (and **New Energy Policy Package** including 120 measures): as a result of these energy policies, Germany is today the world's biggest photovoltaic market (75% of cell and 60% module production capacity in Europe) and had 30% of total wind power capacity in Europe (12% in the world)



- **Strategic Energy Plan** (and the **Fourth Science and Technology Basic Plan**) major reforms including the introduction of a multi-layered and diversified flexible energy supply-demand structure; the development of an advanced energy-saving society and the achievement of a grid parity in medium-long term; the re-establishment of a nuclear energy policy.



- Energy policies mainly via technology and sector-specific initiatives: for example Advanced Energy is one of the 8 R&D programs in '**cutting-edge technological areas**'

Five propositions for a new EU industrial policy system

1. EU cross-border intermediate R&D institutes
2. EU financial infrastructure: Development banks & diffused industrial finance
3. EU Energy policy for manufacturing industrial competitiveness
4. EU mission oriented initiatives for future markets & industry creation
5. EU new multi-layered governance model

(1) European 'Cross-border' intermediate R&D institutes

- **Restructuring and integration of national intermediate R&D institutes** (Fraunhofer leading model in EU but also Catapults in UK, ITT in Italy, etc.)
 - Towards better exploitation of European industrial research, 'complementarities discovery' and scale/scope economies
 - Beyond duplication efforts, regional polarisation and increasing structural dualism

- **Focal functions:**
 1. **Providing quasi-public good technologies**
 2. **De-risking investments** in emerging technologies and supporting **technology development & demonstration** (focus on critical stages/valley of death TRLs 4-7)
 3. Supporting **cross-regional systems integration**
 4. Supporting **industrial sectors restructuring and sectoral transition**
 5. Supporting the **re-building of diffused industrial competences** (i.e. industrial commons)

(2) European financial infrastructure: development banks and 'diffused' industrial finance

- **Rebuilding of the European financial infrastructure around:**
 - Development banks, both national and EIB, as critical 'operational arms' for financial support schemes *but also*
 - Diffused industrial finance, based on public financial support schemes and new industry-specific risk assessment metrics / patient capital
- **Variety of financial instruments and effectiveness**
 - Financial support schemes including **loans, long-term financing, matching grants, pre-commercial public procurement and financial guarantees**, to mention just a few are widely adopted (e.g. SBIR in US, InnoFund in China, FNDCT in Brazil, MCEP in South Africa).
 - The **effectiveness** of these schemes depends on the degree of selectivity of the financial support provided (i.e. the **investment conditionality and technological requirements** attached to it) and the presence of a broader financial infrastructure.

(3) European Energy policy for manufacturing industrial competitiveness

- **Transforming the energy constraint and international disadvantage (US States' fracking and shale gas initiatives) in an opportunity for:**
 - **Green technology development *but also:***
 - **Increasing industrial systems process efficiency**
 - **Increasing housing energy efficiency**
 - **Selective mobility infrastructures development**
 - **Levelling the playing field within Europe (energy costs as major factor affecting industrial competitiveness differentials)**

(4) EU mission oriented initiatives for future markets and industry creation

- **EU-level mission oriented initiatives focused on:**
 - **‘Global technological challenges’ and ‘lead markets of tomorrow’**
 - **European integration challenges (periphery re-industrialisation)**
- **Reaching scale for sustaining the global manufacturing and technological race**
- **Unlocking KETs and multi-KETs potential** (such as nanotechnology, micro- and nanoelectronics including semiconductors, advanced materials, biotechnology and photonics):
 - **Public industrial projects around cutting-edge technologies for de-risking first movers and creating new markets**
 - **Public industrial projects triggering inter-sectoral application and learning around multi-KETs applications**

(5) EU multi-layered governance model

- Development of a new industrial policy model and integrated governance system
 - Focusing on policy package effectiveness
 - Focusing on industrial policy coherence and alignment over time

('multi-layered' policy models are more flexible but run the risk of incoherence and different levels undermining each other)

		INDUSTRIAL POLICY PACKAGES								
		Supply side						Demand side		
		Innovation and Technology Infrastructure	Higher education and workers training	Production capacity and advanced mfg operations	Long term capital access	Resources access	Infrastructure and networks	Internal Demand & Public procurement	External demand and Intl Market development	
POLICY MODEL & LEVELS OF POLICY ACTIONS	Regional	Manufacturing sectors								
		Manufacturing system	●	●	●					
		Industrial system				●				
	National/Federal	Manufacturing sectors								
		Manufacturing system			●					
		Industrial system		●			●			
		Macroeconomic framework						●	●	●
	Supra-national level (EU)	Manufacturing sectors								
		Manufacturing system	●							
		Industrial system			●	●				
		Macroeconomic framework					●	●	●	

What is the most effective governance model (and related level of policy action)?

Regional industrial policy

National industrial policy

Supra-national (EU) industrial policy

Summing up

- 1. Understanding the new challenges at the industrial policy frontier**
- 2. Scanning international industrial policy variety**
- 3. Learning from emerging trends and focal policy domains**
- 4. Five propositions for a new EU industrial policy integrated system**

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THANKS