**<a> ANNEX I**

**Summary of studies using the TIS approach to analyse the drivers and barriers to RETs.**

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| **Paper** | **Scope (technology, period, country, stage)** | **Aim** | **Theoretical framework** | **Method** |
| **1. Darmani et al. (2014)** | W, S, B, WVUntil 20127 EU countries. | To analyse the drivers of the development of RETs, focusing on the formative phase of TIS (development) | Structural  | Review of literature |
| **2. Eleftheriadis and Anagnostopoulou (2015)**  | Wind and PV2013Greece  | To identify the main barriers to the diffusion of PV and wind in Greece | Functional | 34 interviews (firms in the RES sectors) |
| **3. Reichardt et al. (2017)**  | W (off-shore)Undefined periodGermany | To assess the impact of the underlying policy-making processes (particularly the style of these processes) on the functioning and performance of the TIS. Policy style is captured by three categories (science of muddling through, adaptive and participatory policy making)(diffusion) | Functional | Desktop research + 15 expert interviews (different types of stakeholders) |
| **4. Wieczorek et al. (2013)**  | Wind (off-shore)20114 EU countries | To assess the offshore wind TIS of four countries in order to provide recommendations for strengthening the overall European offshore wind innovation system (development + diffusion) | Functional + structural | Review of literature, patent data, other sources, 30 stakeholder interviews. |
| **5. Huang et al. (2016)**  | PV (manufacturing industry, not electricity generation)1985-2012China | To understand the rapid rise of the Chinese PV industry and its impact on the global PV industry.  | Functional | Event historical analysis+8 expert interviews |
| **6. Wieczorek et al. (2015)**  | W (off-shore)2010-2011North-Western Europe | To explore how the spatial dimension of TIS matters using the case of off-shore wind. | Functional+structural | Interviews with 30 stakeholders + other sources. |
| **7. Jacobsson and Karltorp (2013)**  | W (off-shore)20115 EU countries | To analyse the factors obstructing the development of the Northern European wind off-shore TIS | Functional+structural | Interviews with 36 stakeholders + other data sources |
| **8. Karltorp et al. (2017)**  | W2012China | To describe the dynamics of the Chinese wind power industry, focusing particularly on financial resource mobilization and the reasons behind the financial constraints turbine manufacturers met. | Functional | Interviews with 16 stakeholders + other data sources  |
| **9. Gosens and Lu (2013)**  | W2012China | To use the TIS framework to evaluate the emergence of China's wind power innovation system vis-à-vis the global forefront. | Functional | Event sequence analysis (desktop) + 18 expert interviews  |
| **10.** **Kebede and Mitsufuji (2017)** | PV2016Ethiopia | To empirically investigate the formationof a diffusion-based solar photovoltaic (PV) TIS in Ethiopia | Functional  | Event historical analysis (desktop + 35 stakeholder interviews). |
| **11. Bento and Fontes (2015)**  | WPortugal 1988-2013 | To analyse the process of construction of a new innovation system based on wind energy in a “follower” context. The TIS framework is used to analyze the process of technology diffusion as well as the emergence of a new wind sector in Portugal. Research question: Which were the main drivers of the spatial transfer of wind energy technology and its adoption in the case of Portugal? | Functional  | Interviews + desktop (EHA) |
| **12. Tigabu et al. (2015b)**  | Biogas (biodigesters)1957-2010Kenya and Rwanda | To analyse the role of TIS in fostering technology diffusion of biogas digesters, comparing Kenya and Rwanda. | Functional | Desktop + 55 interviewsProcess analysis |
| **13. Tigabu et al. (2015a)**  | Biogas2000-2011Rwanda | To anayse the development of a TIS for bio-digestion in Rwanda between 2000 and 2011Four research questions: What are the functions of the bio-digestion TIS in Rwanda? How have these functions emerged during the period? What are the functional strengths and weaknesses of this TIS? How have these TIS functions influenced the diffusion of biogas digestion technologies to households and institutional users? They evaluate current strengths and weaknesses of the TIS and identify blockages to the functioning as it relates to diffusion of biogas. | Functional | Desktop + 31 interviewsProcess anaysis |
| **14. Andersson et al. (2017)**  | Marine energy1975-2014Sweden | The paper uses the TIS approach to analyse the development and diffusion of Swedish marine energy until 2014. | Structural+functional | Desktop + 25 stakeholder interviews |
| **15. Al Saleh (2011)**  | Saudi ArabiaAll RES2008-2009 | To explore a range of drivers and barriers currently affecting the establishment of a sizable renewable energy industry in Saudi Arabia. It is assessed how well each of the seven functions is currently fulfilled in the Saudi energy system. | Functional | 15 interviews |
| **16. Malonzo and Posadas (2016)**  | PhillipinesUndefined periodPV, W, H, B. | To analyze the local TIS for the core technology of each renewable energy resource covered in the feed-in tariff. The goal is to identify any potential pitfall and to find a way to foster design and development, and manufacturing capability build-up using the framework. | Functional | Desktop |
| **17. Tigabu (2017)** | BiogasRwanda, Kenya1950-2011 | The purpose of the paper is three-fold: 1) to show that the renewable energy policy interventions in Africa should follow a systematic approach that takes into account technological factors, beneficiary characteristics and the institutional context in which technologies, technology suppliers and adopters are embedded; 2) to review 4 case studies and show that institutional functioning around new RETs explains the low level of diffusion of RETs; 3) to provide a simplified framework for evaluating the institutional context of RETs in Africa. | Functional | Interviews + desktop (EHA) |
| **18. Chikezie and Luke (2017)**  | Sierra LeoneUndefined periodRETs | To provide recommendations on how Sierra Leone can use the TIS framework to develop, support and eventually sustain a renewable energy sector.  | Functional + structural | Desktop |
| **19. Vidican et al. (2010)**  | Abu Dhabi2010Solar (PV + CSP) | Two research questions: (1) What are the dynamics in the emerging innovation system in Abu Dhabi?; (2) What are the driving factors that could sustain the transformation process, and what factors could potentially undermine the development of an innovation system locally? | Functional+structural | 20 interviews + event analyss. |
| **20. Walz et al. (2016)**  | WChina, Germany2014 | To analyse the feasibility to apply a system dynamics model to the assessment of RETs. A feasibility analysis should contain the conceptual basis for analysing the dynamics which drives the development of the system to be modelled. A feasibility analysis for a case study is performed. The drivers of wind energy TIS development in China and Germany are compared. | Functional | Secondary sources |
| **21. Jacobsson and Lauber (2006)**  | GermanyWind, PV1974-2003 | To explore the reasons for the rapid spread of PV cells and wind turbines in Germany.We trace this diffusion to the nature of the policy instruments employed and to the political process which led to theadoption of these instruments. | Functional + structural (implicit)\* | Desktop |
| **22. Jacobsson (2008)**  | SwedenBiopower1990-2007 | To analyse the evolution of a biopower TIS in Sweden and to the driving forcesand obstacles to a large-scale diffusion of biopower. | Functional + structural | 10 stakeholder interviews (mostly companies) + secondary sources |
| **23. Zou et al. (2017)**  | ChinaPV (manufacturing)2014 | To examine the blocking and inducement mechanisms of China's PV industry development from the perspective of technological innovation. | Functional | Secondary sources |
| **24. Vasseur et al. (2013)**  | PVThe Netherlands and Japan2000-2011 | To investigate the development and diffusion of PV technology in Japan and The Netherlands.  | Functional + structural  | Desktop + interviews |
| **25. Mignon and Bergek (2016)**  | RETs (PV, W, B, H)Undefined periodSweden, France | To identify the main challenges faced by adopters of renewable electricity technologies under different institutional frameworks as well as their strategies for overcoming them. | Functional + innovation adoption approaches | 28 interviews |
| **26. Edsand (2016)**  | WUndefined periodColombia | To analyse the slow diffusion of windenergy in Colombia, by evaluating the functions of the TIS along with the influence of the wider context (Landscape Factors). Two research questions: 1) What can explain the slow adoption of wind energy in Colombia?; 2) In what waydoes the wider context in Colombia influence the transition to windenergy and other RETs? | Functional | combination of expert evaluations(structured and semi-structured interviews) and a history event analysis |
| **27. Quitzow (2015)**  | PVChina and India1999-2011 | To propose a new approach for capturing the global dynamics of innovation and industrial development in emerging technology fields, focusing crystalline-based PV technologies, | Functional | 35 stakeholder interviews + desktop (primary and secondary sources). |
| **28. Dewald and Truffer (2012)**  | PV (solar initiatives)Germany1990s-2011 | To introduce a conceptual framework for analyzing the spatial characteristics of market formation processes in emerging TIS and to apply this conceptual framework to explain the uneven geography of PV market formation in Germany | 20 expert interviews (questionnaire filled by 107 solar initiatives, 16 interviews with chairmen of solar initiatives | Functional (focus on market formation)+ context (spatial dimension) analysis |
| **29. Bergek et al. (2008b)**  | RETsSweden2000s | To contribute to an improved understanding of the formative phase of new TIS by outlining a framework for analysing TIS dynamics in terms of structural growth and functions and by discussing two of these functions in depth: “legitimation” and “development of positive externalities”. Empirical examples are provided from case studies on renewable energy technologies in Sweden. | Functional  | Case studies |
| **30. Hansen and Coenen (2017)**  | BiorefineriesUndefined periodSweden/Finland | To unpack resource mobilisation for biorefineries by studying investment decisions of incumbent pulp and paper firms in Sweden and Finland. | Functional complemented with management literature | Desktop + 21 stakeholder interviews. |
| **31. Hanson (2017)**  | PVNorway1980-2014 | To explore if emerging industries can benefit from the resources embedded in established industries. To explore under which conditions established industries can contribute to new TIS formation. The framework is applied to the analysis of the emergence of a PV industry in Norway. | Functional+structural | Desktop + 8 stakeholder interviews (exploratory case study) |
| **32. Dewald and Truffer (2011)**  | PVGermany 1990s – 2010  | To propose a conceptual framework for analyzing TIS substructures oriented atspecific end-user markets. This framework is applied to the creation and maturation of different market segments for PV applications in Germany. | Functional | 20 stakeholder interviews+ survey of citizen initiatives. |
| **33. Simensen (2012)**  | RETsNorway2007-2012 | It investigates the Norwegian TIS for RETs, aiming to identify hampering factors for the development and diffusion of RETs | Functional | 7 stakeholder interviews, desktop research, secondary sources |
| **34. Dewald and Fromhold-Eisebith (2015)**  | PVGermany1983-2012 | To show how dynamics at different geographical scales need to productively interact to shape the generation, application and proliferation of sustainability-enhancing technologies and how these scalar configurations significantly change over time. | TIS (structural + functional) + multiescalar (geographical) perspective | Literature review + desktop |
| **35. Negro et al. (2007)**  | Biomass digestion 1974-2004The Netherlands | To create insight into the underlying factors of the slow large-scale diffusion of biomass digestion in the Netherlands by applying the ‘Functions of Innovation Systems’ framework. To test the ‘Functions of Innovation Systems’ approach by applying it to structure empirical work. | Functional | EHA (desktop) |
| **36. Karltorp (2016)**  | Biomass gasification +off-shore windEurope2012 | To analyse the challenges of mobilizing financial resources (financing) for the development and large-scale diffusion of biomass gasification and offshore wind power in Europe and to suggest how these challenges can be overcome. | Functional (only one function) | 22 interviews (technology developers and financial institutions) + deskstop (for triangulation) |
| **37. Markard et al. (2009)**  | BiomassSwitzerland2006 (but focus on future variants) | To develop and apply the so-called variation analysis, which is a methodology to identify coherent socio-technical and organizational variants within a specific innovation field. | Structural | 14 expert interviews + desktop |
| **38. Negro et al. (2008b)**  | Biomass gasificationThe Netherlands1980-2004Development | To apply the functional approach of the TIS in order to provide an explanation of thesuccess or failure (inducement and blocking mechanisms) of an emerging technology, i.e. biomass gasification.  | Functional | Desktop |
| **39. Reichardt et al. (2016)**  | Wind off-shoreGermany1993-2013 | To analyze interdependencies between the policy mix and the TIS by shedding light on the role of the policy mix for TIS functioning and performance as well as how TIS developments influence the evolution of the policymix. These interdependencies are explored for the case of offshore wind in Germany. | Mostly functional | EHA (desktop + 16 expert interviews) |
| **40. Gosens and Lu (2014)**  | WindChina 2005-2011 | To review developments in China’s domestic wind turbine market using the TIS framework. The paper analyzes the pressure to innovate arising from market competition and assesses the prospects for global expansion of Chinese wind turbine manufacturers. | Functional | Desktop research + 18 expert interviews. |
| **41. McDowall et al. (2013)**  | WindChina, U.K., Germany, USA.1974-2010 | To analyse the development of wind energyin the EU, USA and China. It focuses on the interactions over time between policy and innovation system dynamics.policymaking. it extends the analysis from the formative and growth phases of theTIS to the globalisation and transfer phase. | Functional | EHA based on desktop |
| **42. Jacobsson and Bergek (2004)**  | W, SGermany, Norway, Sweden1990-2001 | To analyse the conditions under which blocking mechanisms in some cases have been overcome, and a process of cumulative causation started, or how the evolution of a new TIS in RETs has been stunted. To identify policy challenges.  | Functional | Secondary sources and official data |
| **43. Hellsmark and Jacobsson (2012)**  | Gasified biomassEU 2010 | To identify policy challenges and discuss options for moving to a larger scale diffusion of gasified biomass in the EU. | Neither functional nor structural | Desktop |
| **44. del Río et al. (2018)**  | CSPSpain2016 | To identify the most relevant drivers and barriers for the deployment of concentratedsolar power (CSP) in the EU in a 2030 horizon | Combination of the TIS and other approaches | Literature review + 11 expert interviews. |
| **45. Klagge et al. (2012)**  | WChina (manufacturers)2010-2016 | To identify the innovation activities of the Chinese wind industry. Challenges and obstacles in the development of an innovation-driven wind industry in China are identified and discussed. | Structural (combination of TIS, NIS and SIS) | Secondary sources + 52 expert interviews. |
| **46. del Río and Bleda (2012)** | Several countries from around the world, all RETs, 1990-2011 | To provide a comparative assessment of the innovation effects of instruments which support the diffusion of RETs with a functions-oriented technological innovation system perspective | Functional | Theoretical analysis, literature review, qualitative |
| **47. Nevzorova and Karakaya (2020)** | TIS for biogas in a systematic literature review on seven mature biogas markets: Austria, France, Germany, Italy, Sweden, the Czech Republic and the United Kingdom | To answer the question: what are the driving forces behind biogas technologies? | Focus on system drivers (“beyond functions”) | a systematic literature review on seven mature biogas markets: Austria, France, Germany, Italy, Sweden, the Czech Republic and the United Kingdom |
| **48. Esmailzadeh et al. (2020b)** | Iran, PV, 2019 | Reviewing the indicators introduced to the functional analysis of TISs and modifying these indicators based on developing countries’ circumstances. Second, applying this framework to the specific case of Iran’s renewable energy program by using these indicators for analyzing Iran’s photovoltaic TIS to identify the problems. Accordingly, they review indicators used for a functional analysis by considering the needs of developing countries, and they propose a list of indicators that can be used for assessing functions in developing countries’ TISs. | Functional | Expert interviews |
| **49. Potts and Walwyn (2020)** | South Africa, CSP, 2019 | to understand the factors that are currently prohibiting the country from being a global leader in CSP. The level of the sector’s maturity, based on an analysis of the seven functions of the TIS, was assessed. | Functional | qualitative, exploratory approach(expert interviews) |
| **50. Gandenberger and Strauch (2018)** | Brazil and China, wind, 2000-2013 | To analyse the linkages between local and global actors in TIS formation in emerging economies as well as to the use of domestic versus foreign technology. | Functional | 11 semi-structured interviews conducted with wind energy experts from companies, industry associations, development agencies and research institutes in China and Brazil. Furthermore, policy documents and findings from the academic literature were systematically analysed. Patent and publication analyses, and publicly available data about market, industry and technological development in China and Brazil. |
| **51. Hanson (2018)** | Norway, PV, 1980-2010 | To analyse the relations between technological innovation systems (TISs) and context, with a particular focus is placed on the role of established industries, which possess important resources for TIS formation.Research question: how, and under which conditions, can an established industry contribute to TIS formation? | Functional +structural | explanatory case study strategy: 8 interviews + secondary material |
| **52. Andersson et al. (2017)** | Tidal kyte, Sweden | The purpose of this paper is to show how the TIS approach can be used to identify and analyze factors that shape spatial trajectories of emerging technologies. It proposes an adapted analytical framework that expands the conventional focus on one-dimensional supporting and blocking factors, to shaping factors that incorporate the spatiality of innovation. The approach is illustrated by examining innovation in tidal kite technology. | Functional  |  |
| **53. van der Loos et al. (2020a)** | The Netherlands and Norway, wind off-shore | To investigate the co-evolution of industry formation, innovation systems and context over time through an analysis of offshore wind in the Netherlands and Norway | Functional | 56 semi-structured expert interviews with Dutch and Norwegian offshore wind companies, networking organizations and government officials |
| **54. Shubbak (2019)** | China, PV, 1995-2015 | This research paper studies the Chinese technological system of production and innovation in the field of photovoltaics (PV). It aims to contribute to a better understanding of the emergence and development of the system by utilizing three levels of analysis: the institutional framework of the system, the market dynamics of production and deployment, and the composition of innovation-related activities. | Structural and “catch-up cycles”. | Analysis of the evolution of several indicators over time: share of global annual PV capacity by country, share of global cell production by country, Market share of the leading silicon feedstock producers, Market share of the top 10 solar PV cell manufacturers, Size of Chinese PV firms by number of employees, Chinese firms’ economic performance, Net charges for the use of IPR, R&D expenses of Chinese PV firms and patents. |
| **55. van der Loos et al. (2020b)** | Offshore wind, the Netherlands, 2018-2019 | Their research question is: How and under what circumstances can firms access international markets in the absence of a commercial home market and what are the implications for industry formation and innovation system policy? | Functional | 28 semi-structured interviews + publicly available documents, (press releases from offshore wind companies or organizations and industry news journals) |
| **56. Palm (2015)** | building-sited PV systems, Sweden | the emerging innovation system for the deployment of building-sited PV systems in Sweden is analysed in order to identify and assess drivers and barriers to diffusion, using a technological innovation systems (TIS) approach. | Functional | Semi-structured interviews and secondary material |
| **57. Karanasios and Parker (2018)** | Canada (remote indigenous communities in Northwest Territories (NWT) and Ontario), all RETs, 2000-2016 | The study examines the diffusion of RETs in the context of remote indigenous communities in Canada during the 2000–2016 period, identifies the systemic and transformational failures responsible for the functional performance of the TISs, and generates insights about factors that have the potential to sustain the development of RET projects | Structural+Functional | Event Historical Analysis (EHA): Literature reviews of academic and policy documents and key informant interviews |
| **58. Vidican et al. (2012)** | UAE, solar, 2009 | They apply the sectoral innovation systems (SIS) approach to analyze the emergence of a solar energy sector in the United Arab Emirates (UAE), a hydrocarbon-rich Middle Eastern nation with limited industrial and technological capabilities. Using qualitative research, they examine two research questions: (1) What is the current performance and functional patterns within the emerging solar system of innovation (SI), and (2) What are the main factors that have the potential to either sustain or potentially undermine the development of a SI in the country? | Structural+functional | 20 semi-structured interviews with various experts in the solar energy field (business owners, government officials and representatives of local utilities) |
| **59. Kiefer and del Río (2020)** | EU, CSP, past and future (up to 2030) | To analyse the drivers and barriers to CSP deployment in the EU on two levels (System/grid or macro level and project/investment or micro level) | Undefined | Survey of firms, expert consultation. |
| **60. Foxon et al. (2005)** | Renewable energy technologiesW,PV,WVUK | To analyse current innovation systems for renewable energy technologies, and generates policy recommendations for improving the effectiveness of these. | Structural+functional. | Expert analysis with interviews |
| **61. Bauer et al. (2017)** | B (biorefineries)EU, USA | To synthesize knowledge about biorefinery technologies development, deployment and diffusion, and to identify relevant actors and institutions  | Structural+functional. | Literature review  |
| **62. Furtado and Perrot (2015)** | WSouth Africa and Brazil | To analyse the systemic features that block or induce the transition to wind energy industries in two fossil-fuel dependent, developing countries | Structural+functional. |  |
| **63. Walz and Delgado (2012)** | WChina and India | To identify success factors to the development of domestic wind turbine industries and to perform a cross-country analysis.  | Structural+functional | Bottom-up case studies |
| **64. Hillman et al. (2008)** | B (biofuels)the Netherlands and Sweden | To analyse and compare two TIS trajectories in the sector of biofuels  | Structural+functional | Comparative case study |
| **65. Jacobsson et al. (2004)** | SGermany | To analyse the formation and growth of the German solar TIS and to identify key challenges for policy makers | Structural+functional | Case study and literature review |
| **66. Binz et al. (2017)** | S, W, BChina | To develop a framework of policy mixes for different industry types with the aim of providing key resources required for technology catch-up: knowledge, market access, financial investment and technology legitimacy. To apply the framework.  | Structural+functional (implicit, selective)  | Literature review (academic and policy documents) and expert interviews |
| **67. Hu et al. (2018)** | WChina (Denmark, Germany, USA) | To identify indicator sets and to develop an indicator framework for measuring energy innovation | Structural+functional | Framework development and case study application |
| **68. Carstens and Cunha (2019)** | SBrasil  | To identify challenges and opportunities of PV energy in Brasil | Functional | Data analysis, policy literature review and expert interviews  |
| **69. Corsatea (2014)** | WV (marine)10 European countries | To identify bottlenecks in the mobilisation of public and private innovation efforts at various stages of the technology life cycle, using a functional TIS approach. Specifically, to identify drivers and barriers to each TIS function.  | Functional | Mixed methodology with data recollection for each function (including counting papers, patents, projects, business conferences, R&D investment, etc.) |
| **70. Gosens et al. (2015)** | Renewable energy,Emerging economies ("latecomers") (example of China) | To analyse TIS development in emerging economies with a focus on a "transnational dimension" (a special geographical perspective). | Structural+functional | Literature review |
| **71. Rohe and Chlebna (2021)** | WGermany | To identify the spatial dimension of institutions and dynamics influencing legitimacy with a focus on public decision makers. | Structural+functional with a focus on one function (legitimization) | Survey and expert interviews |
| **72. Sawulski et al. (2019)** | WPoland | To apply the TIS approach to a "follower country" and to identify specific drivers and barriers for offshore wind technology deployment in Poland | Structural+functional | Desk research and stakeholder interviews |
| **73. Esmailzadeh et al. (2020a)** | PVIran | To review Iran's "renewable energy program" with a focus on PV using a functional TIS approach. To adjust existing and to develop new TIS function indicators to a developing country.  | Functional | Literature review, structured andsemi-structured expert interviews |
| **74. Uriona-Maldonado et al. (2018)** | PVBrazil | To assess the critical processes and their performance in the PV supply chain in Brazil | Functional | Desk research |
| **75. Zhang et al. (2021)** | PVChina | To investigate the historical trajectory of the Chinese PV TIS and to identify domestic and international/transnational influencing factors | Functional | Semi-structured interviews |
| **76. Temmes et al. (2021)** | Renewable energyFinland | To investigate the role of mainstream financing in the clean energy transition between early commercialization and full commercialization/large-scale diffusion (the so-called "second valley of death") | Structural+functional with a focus on one function (resource mobilization) | Mixed methods, including desk research and expert interviews |
| **77. de Jesus Fernandez and Watson (2022)** | PV (and geothermal)Mexico | To evaluate the effectiveness of Mexican energy policy on promoting renewable energy. To assess the effects of changes in this policy two national TIS's (PV and geothermal) | Functional | Comparative case study based on desk research and expert interviews |
| **78. Schaube et al. (2022)** | PV (distributed)Argentina | To identify why, despite huge potential, PV only provides a small proportion of Argentina's electricity mix. To examine the dynamics that driver or hinder the diffusion of distributed PV. | Functional | Mixed methods including a literature review, expert interviews and surveys  |
| **79. Vroon et al. (2022)** | PV (building-integrated)The Netherlands | To analyze the development of building-integrated PV. To elaborate a review of the systematic problems that hinder further diffusion of that technology. | Structural+functional | Mixed methods including desk research and semi-structured interviews |
| **80. Nevzorova and Kutcherov (2021)** | S, W, BRussia | To combine the TIS with the advocacy coalition framework (ACF) and to apply it to a country (Russia).  | Structural+functional with a focus on one function (creation of legitimacy) | (Grey+policy) literature review |
| **81. Potts and Walwyn (2020)** | CSPSouth Africa | To investigate the barriers that impede a wider diffusion of CSP | Functional | Literature review and semi-structured interviews |

Source: Own elaboration. W= Wind, S = Solar, B= biomass, WV=wave, PV = photovoltaics; CSP = concentrated solar power; H = hydro \* Some are changes in structural components (institutional change and entry of new actors (firms)), other relate to 2 functions (market formation and legitimacy)