ACW Baseline Sub-Report:
Policies and Practices to Promote Work Enhancing Pathways in the Transition to a Low Carbon Economy

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This review gives an overview of the European policy context with regard to climate change. It identifies a new pervasive political discourse on the transition to a low carbon society which places a major issue of environmental sustainability high on the policy agenda. This is also associated with greater attention to policies on industry and innovation which overlap conventional trade union concerns. The transition policy framing highlights the need for active policy influence on transformative change.

An analysis is presented of the views of the principal Europe wide trade union organization, the European Trade Union Confederation (ETUC) on this new policy context for environmental sustainability and climate change. This is based on publicly available documentary sources along with reports on a selection of European national trade union confederation initiatives and recent developments in trade union/labour movement policy by European policy institutions and analysts.

The focus of this review is to identify new policies and practices which engage with the 'transition to a green, low-carbon economy' from the perspective of proactive initiatives to promote work-enhancing pathways. The aim is to assess recent policy reviews and proposals in order to map out a new work-enhancing green economy transition agenda. This could form the basis for subsequent action-oriented research strands with particular policy players.

Particular aspects of interest are:

- Engagement with the new framework of sociotechnical transitions in contrast to the established frameworks of ecological modernization or market based instruments. This embraces purposive transformative goals, a mix of social and technological innovation, and a key role for a diverse coalition of societal actors

- Recognition of the possibility of alternative transition pathways and that choices between them may have different implications for job creation, employment and working conditions, and skill development arising from contrasting emphases on technological production and social use, singular new products/processes versus wider system innovation, one-off skills or long term vocational change

- Action at multiple levels of governance, not just at the national or sectoral level. Of particular interest is the role of new developments in policy and practice involving partnership with cities, local authorities and regions

- Interventions, which are not simply reactive in terms of justice or job protection, but proactively intervene to shape the nature of the green transition, and promote an awareness of the potential role of trade unions as environmental actors or innovators

1. The transition to a low carbon society – a new policy context

The transition to a low carbon society/green economy is a new policy context for innovation and the challenge of climate change. The new policy discourse of the 'transition' to a 'low carbon society' or 'green economy' emerged during the first decade of the new millennium.

Narratives of the need for revolutionary and transformative responses to the crisis of environmental sustainability have moved from the political margins to the mainstream. This has been accompanied by a change in policy landscape from a focus on climate change as a scientific 'problem' to a new interest in innovation 'solutions' for a transition to sustainability.

Ambitious targets to reduce their greenhouse gas emissions are being adopted by governments across the world. From the 2008 Climate Change Act in the UK to the 2011 German *Energiewende*, the challenge of limiting the extent of harmful climate change is being expressed in new types of policy commitment. In the UK the new discourse of 'transition' was accompanied by the surprising re-emergence at the national policy level of the idea of a 'plan' expressed in the national strategy for climate and energy, the UK Low Carbon Transition Plan (HM Government 2007). Despite a change of government this new policy discourse has remained remarkably durable. The new UK coalition government has announced a strategy for 'Enabling the Transition to Green Economy' (HM Government 2011a) accompanied by a 'Carbon Plan' (HM Government 2011b). The coupling of the policy concepts of 'transition' and 'plan' is revealing. It acknowledges that addressing the challenge of climate change and environmental sustainability implies purposive societal action to influence business and consumers. This represents an intriguing break with prevailing neoliberal policy orthodoxy.

The European Union, through its Roadmap for moving to a competitive Low Carbon Economy (2011a), aims to reduce domestic European greenhouse gas emissions by 80% by the year 2050. As the world's third largest carbon emitter Europe has a crucial global role to play. The Europe Commission President Manuel Barroso claimed that 'we will take a historic step towards … the transition to a low-carbon world economy (2007).

This ambitious 2050 target implies the need for significant changes to be evident in the near term 2020s. It is apparent from the European Commission's own analysis that this implies a different order of change than has been achieved up to now. The power sector represents 25% of current emissions while nearly 75% arises from residential, industry, transport & agriculture activities. The new European recognition of the need for a 'transition to a low carbon economy' (EU 2011a) acknowledges that it is pervasive across the whole economy and wider society. The idea of such a 'transition' is now so widespread that it is easy to forget how new it is in mainstream politics.

A key turning point in the policy process was the Stern report on the economics of climate change (2006), which contributed to a sea change in outlook. There is now a widespread recognition in influential policy circles of an urgent need to fundamentally reshape the pattern of economics and society of the modern industrialized world to avert catastrophic impacts on

planet and people. One recent European policy document said that ‘our economy will require a fundamental transformation within a generation … in producer and consumer behaviour’ (EU 2011b). Addressing climate change is increasingly seen as part of a broader ‘transformation’ to a green economy.

This reveals a deeper recognition of the broad and compelling nature of the climate change problem for government policy. A key feature of this is a growing awareness that the conventional pattern of incremental innovation is insufficient to meet this challenge. The track record of such innovation in ‘green products’ and ‘greener industry’ over the past 30 years is a good one. Household appliances have become 25% - 75% more energy efficient over a 30 year period since the early 1970s (American Physical Society 2008). Analysis of global trends shows that carbon intensity (carbon emissions per unit of GDP) () has declined steadily since 1990. This also reflects a consistent pattern of emission reducing incremental innovation. However, despite this good environmental news about innovation, the bad global news is that the overall level of carbon emissions continues to increase (UNDP 2007). This has prompted greater interest in addressing the issue of consumption. Although this could open a wider questioning of the relationship between economic growth and personal wellbeing, the pragmatic policy response has been to seek a solution which does not challenge current public expectations of material prosperity. Hence the greater interest in a society-led plan for transition based on transformative innovation as an alternative to the traditional business led incremental innovation of greener products and processes.

2. Industrial and innovation policy - implications

2.1 Convergence between crises

Industrial policy and innovation policy in Europe tend to be treated as separate domains of policy practice and theory, though they share many striking similarities. In the 1960s and 1970s both were rather statist in nature with a 'vertical' focus in industrial policy on selective support for 'national champion' firms or sectors, and of innovation policy on mission oriented technological projects. These policies are often described pejoratively as a misguided endeavor to 'pick winners'. Both were reshaped in the 1980s and 1990s toward lighter touch 'horizontal' market led frameworks which restricted themselves to broader enabling measures such as fiscal regimes, intellectual property and the science base. Choices of specific strategic direction were now seen as outside of and beyond the capabilities of public policy. Although this change in emphasis was quite pervasive it never became completely consistent and there remain a patchwork of policy measures with different configurations which vary between different national contexts.

During the 2000s there is evidence in both these policy domains of a new wave of thinking which seeks to reframe them and move on from what is seen as an unduly constraining and unrewarding preoccupation with a contest between these two alternatives. This is also expressed through new policy initiatives. The purpose of this paper is to review these emerging approaches in industrial policy and innovation policy to assess whether there is a new

'industrial innovation' policy framework in the making. It is apparent from the reviews of the new thinking about models of innovation and approaches to industrial policy that they are distinct fields, with their own repertoire of concepts, and so a principal aim is to explore the degree to which they share commonalities or express difference.

The reasons for the renewal of interest in the fields of innovation policy and industrial policy, although sharing a similar time frame appear to be quite different. In innovation policy it arose principally because of recognition that the global challenge of sustainability and climate change needed a purposive transition involving a diversity of social actors which was not effectively addressed in the prevailing innovation policy system. In industrial policy it was precipitated by the experience of the financial crisis which suggested that more diverse and balanced economies displayed greater resilience and that this needed to be addressed through the more targeted measures associated with industrial policy.

Although these appear to be contrasting origins they do in fact exhibit some common characteristics. Both express a new enthusiasm for purposive policy in response to perceived crises. One has a greater emphasis on transformation and sustainability; the other on resilience and competitiveness. Together they combine the often separate global agendas of environment and economics.

Despite the different specialized conceptual terminology of the fields of innovation policy and industrial policy it is evident that there is a convergence around some of the underlying principles. These convergent principles can be summarized under four main headings:

BROAD scope: 'Industry' is broadened to explicitly include services, e-commerce and a range of knowledge based economic activities as well as the traditional focus on manufacturing. 'Innovation' extends to novelty in services, organizations and business models as well as in technology. These challenge the prevailing focus in these two policy domains.

Network capabilities: Meso-level networks of businesses and other organizations are seen as a new locus for innovation and transformation, and therefore of policy. This is an alternative to the micro level of specific projects, firms or sectors or on the macro level of general knowledge exchange contexts or market conditions. This requires new capabilities for policy makers, which are relevant to such networks and for business strategists that are not exclusively centred on their own firm but situated in a wider network of competitors, customers and suppliers.

System transformation: This new focus on meso-level networks has led to shifting the discourse towards technoeconomic or sociotechnical systems transformation instead of incremental change in the performance of singular firms or 'point' innovations of products. This raises policy challenges of appropriately defining systems. For instance an end use functional perspective (nutrition, thermal comfort, mobility) relocates policy interventions away from traditional industrial sectors towards changing the way complex multi-sector value chains deliver services to end-use consumers. One of its clearest expressions is in industrial innovation policies for transforming city wide systems of transport and the built environment.

Purposive directionality: Selective, targeted intervention in the pursuit of societal goals returns to the policy agenda but using new challenge led (climate change, reducing inequalities…) or adaptive portfolio approaches rather than 'picking winners'. It requires new modes of aligning different policy domains, of future oriented goal definition and monitoring, and a commitment to diversity with a mix of success and failure.

2.1.1 Scope of innovation and industry is broad and inclusive

In both policy domains there is a strong push to become far more inclusive than before. The 'broad model' of innovation expressly addresses novelty in services, organizations and business models as well as in technology. This is paralleled by a broader framing of industry to explicitly include services, e-commerce and a range of knowledge based economic activities as well as the traditional focus on manufacturing. This represents a profound challenge to the traditional interpretation of the domain of 'industrial innovation' which traditionally has a strong, if not exclusive, focus on technology and manufacturing. There is a case for retaining continuity with this terminology, not least because there remain business organizations and institutional arrangements at European and national level which recognize this remit. On the other hand it inevitably carries a lot of baggage, and a continuing contestation as to what it means and includes. The most desirable path would be to achieve a fundamental reframing of the meaning of 'industrial innovation' while retaining the terminology that still has resonance with key knowledge, business and policy players. This is an ambitious goal.

2.1.2 Systemic change assumes strategic significance for transformation

In addition to the broadening of what is meant by innovation and industry, there is also growing attention to influence on change in overall systems as well as in their constituent parts. This is expressed through the new language of 'system innovation', as well as in concepts such as 'industrial systems', 'balanced economy' and 'systemic competitiveness' which all highlight systemic change. It suggests an alternative to a focus on the singular 'point' innovations of firm based product innovation. The wider remit of innovation and industry is also expressed through terms such as 'sociotechnical' or 'technoeconomic' systems to deliberate span the boundary between the social, economic and technological.

It is accompanied by a lot more attention to 'place' since such systems are often very evident and linked to governance opportunities at the sub-national level in cities and regions. On the other handsome systems are supra-national in nature and need new governance arrangements. Both suggest that an undue focus on the national level is unwise. Success is judged by wider criteria of system performance than individual firms or of traditional sectors. Since systemic change is usually a long term process this introduces a new temporal dimension to policy considerations.

2.1.3 Constituency of influence is the meso-level network

Previous policy paradigms focused either on the micro level of specific projects, firms or sectors or on the macro level of general knowledge exchange contexts or market conditions. The new

thinking in both innovation and industrial policy actively explores the meso level network as an alternative to either of these. In the domain of innovation these are expressed through terms such as actor networks and ecosystems. In the domain of industry they are expressed through terms such as value chains and clusters. The thrust of this is to displace either the individual firm or the established industrial sector as the focus for policy. Instead the new constituency is a set of businesses and other organizations. A key reason for this is an acknowledgement that the transformative goals of either public policy or business strategy are unlikely to be confined within the boundaries of sectors which are defined by past success. The creative opportunities are likely to challenge these and may well involve new entrepreneurial business players. There is therefore an inherent risk of conservatism in sticking to a sectoral approach.

This reframing toward a meso level network focus has profound implications both for policy design and for business strategy. The policy maker needs new capabilities and instruments which are relevant to such networks. Business strategists need a new framework which is not exclusively centered on their own firm but situates it in a wider network of competitors, customers and suppliers. Linked to this is also recognition that the boundaries between private and public have become more permeable and that many of these networks will be hybrid in nature with a variety of sources of knowledge or finance which cross the public private divide.

2.1.4 Purposiveness of policy involves selection and targeting for directionality

The final shared feature of the two fields is a revived interest in purposive policies that pursue directionality in innovation activities or industrial practices as an explicit goal. This represents a break with a policy perspective that only entertains a role for influencing general knowledge exchange and market conditions. At the same time, this departure is usually accompanied with considerable unease at returning to a policy framework of selective support for mission oriented projects, national champions or favoured sectors.

Central, therefore, to both of the new approaches on innovation and industry is an endeavour to reintroduce goal-orientation into policy without returning to 'picking winners'. This is expressed most explicitly in the new notion of a 'challenge led' policy framework. A 'challenge' is wide enough to avoid high risk guesses as to which of a variety of potential solutions is likely to be successful, but is also sufficiently narrow to provide a meaningful focus to very general objectives such as sustainability or competitiveness.

3. Work and employment policy - implications

The new European policy context of the ‘transition to a green, low-carbon economy’ needs to be assessed from the perspective of proactive policy initiatives to promote work-enhancing pathways in this transition. Although the notions of transition and the green economy have become quite pervasive in policy circles, they are of fairly recent origin following the Stern review of 2006. They are marked by highly ambitious transformative aspirations toward a low carbon economy.

This new orientation indicates the need for interventions, which are not simply reactive in terms of justice or job protection, but proactively intervene to shape the nature of the green transition. This review starts to map out a new work-enhancing green economy transition agenda to form the basis for subsequent, action-oriented research strands with particular policy players.

There are several strands in the current EU policy agenda which are relevant. At their heart is the EU Roadmap for a Low Carbon economy. This policy context of the 'transition to a green, low-carbon economy' has enormous implications for work, workers and their trade unions. Indeed, production – the world of work - accounts for 80% of all emissions, based on UNFCC accounting and covering all greenhouse gas emissions in all aspects of the economy (energy, industrial, agricultural, waste, other) of the country of origin and its dependencies (IPCC 2006). Transition-oriented policies in Europe towards a nearly zero carbon environment have made positive references to jobs and skills. For instance, the European Commission 2012 policy communication 'Toward a job rich recovery' identifies the green economy as an area with important job creation potential (EC 2012). The Eco-innovation Action Plan identifies skills and knowledge as a key action to promote an intersection between eco-innovation and job creation. However, closer examination suggests that there are widely diverging views as to the nature and extent of new jobs and skills. Recent reviews by major European work institutions (CEDEFOP 2013; ET@UI 2014; Hurley et al 2011) indicate that the nature of job creation and skill development will depend on the choice of different transition pathways promoted by policy. For example, city-based end-use efficiency pathways will have very different work consequences from those focused on large-scale low carbon power plants. A recent comprehensive review of jobs and the green economy by the UK Energy Research Centre also shows the differing implications for jobs and skills of pathways adopted (UKERC 2014).

The 2014 IPCC assessment review acknowledges the political challenges involved in this by emphasizing the critical importance of 'co-benefits' associated with mitigation efforts that include employment, job quality and health benefits as well as wider contributions to the economy.

It is important to consider the implications of different pathways with respect to the quality of jobs and skills and not just to the quantity. The nature of employment and of knowledge, skill and competence development will also depend on the choice of different transition pathways to a green, low-carbon economy. One-off, short training courses in, for instance, insulation skills will have vastly different consequences for young people and for the labour process than comprehensive vocational education and training (VET) courses for thermal literate insulators. There may also be far reaching implications in terms of the nature of different occupations and the labour process itself. For instance, the overall report of the European Union *Build Up skills* programme (Cliquot and Gausas 2014), addressing VET requirements for low energy building, has highlighted insufficient coordination between occupations and inadequate VET as barriers to increasing energy efficiency in the built environment. The implications are that the construction labour process needs to be transformed to allow for the integrated team-working

required and VET systems restructured to become much broader and to encompass energy literacy if targets are to be met (EC 2014). This suggests the need for interventions that are not simply reactive in terms of justice or job protection, but proactively intervene to shape the nature of the green transition.

The challenge of climate change touches on many dimensions of the role of workers and trade unions in society and the principles and practices of industrial relations. As well as influences on jobs and the quality of work, there are wider questions concerning social dialogue and the promotion and shaping of the transition to a low carbon society.

The trade unions are Europe's largest civil society organizations, and are well represented in carbon-intensive, carbon-light and the emerging 'green' industries. Their members, and those who look to them for leadership, will be significantly affected by climate change. Both climate change and measures to curb its rate of growth will have a serious impact on the way Europeans work and the quality of their lives outside work. The unions are democratic organizations with differences in opinions within (and between) them. If there is to be a shift away from the production and distribution methods that make major contributions to global warming towards 'greener' forms of work and work organization, then the unions have a vested interest in ensuring change takes place fairly.

Through social partnerships to the trade, unions can also play an important role in EU policy, as recognized in the Treaty of Lisbon (Article 152) with regard to labour relations and the European social dialogue and during consultations with the Commission and the negotiation of collective agreements. Unions are, for instance, instrumental to achieving both the EU Agenda for new skills (EC 2010) and the Energy Efficiency Plan (2011). The Agenda stresses the importance of job quality and working conditions and provides four key priorities for meeting the challenges and raising employment rates substantially, particularly for women and young and older workers: better functioning labour markets; a more skilled workforce capable of contributing and adjusting to technological change with new patterns of work organization; better job quality and working conditions; and stronger policies to promote job creation and the demand for labour. A key question is the role of the trade unions in achieving these priorities with respect to the different climate change transition pathways identified.

The social dialogue between the European social partners in different sectors is also critical in fostering economic performance and the transition towards a low carbon economy by examining the impact of climate change on work and in particular the resilience of current employment strategies and their transition to 'green jobs'. In this respect, this proposal is aligned to EU policy objectives as expressed in the Europe 2020 Strategy for Growth (2010), Strengthening the Social Dimension (2013) and through Employment, Social Affairs & Inclusion: Industrial Relations in Europe 2012 (2015). As identified in the Social Dimension, social partnership is central to a European solution to employment growth, and Industrial Relations (Chapter 5) identifies numbers of social partnerships that are developing sectoral policies to address climate change. IRTUCC offers the opportunity to situate their content and their cross-

sectoral applicability in a wider national and European context. The project will provide practical examples of social partnership actions and climate change strategies so as to contribute to the macroeconomic dialogue for achieving EU sustainable work practices and to enhance the exchange of intellectual and material outputs both within the EU and the global community.

4. A new transitions orientation for trade unions

A recent study of UK unions and climate change (Hampton 2015) unpicks some of the strands within union thinking and seeks to situate them in the wider conceptual landscape of policy frameworks to address climate change – ecological modernization, neoliberalism and Marxism. The first two of these are echoed in the two prevalent frameworks in the wider debates on climate policy – state led interventions and market based instruments.

State led interventions

This framework expresses a broadly positive view of the dominant patterns of technological change and economic development in their potential to deliver sustainability but acknowledges that government policy needs proactive investment and promotion (Hajer 1995; Mol et al 2009). It found that ecological modernization is the reference point for the most common union discourse, which adds positive polices for employment and social justice. It emphasises the need to invest in green jobs and a just transition towards them. The slogan, 'Cut carbon, not jobs', summarizes this stance. It expresses itself in arguing for a 'balanced energy policy' and supports carbon capture and storage (CCS) or 'clean coal' as a way of more safely continuing to exploit carbon resources. Another focus within this first discourse is on training and retraining, learning and skills development.

Market based instruments

This framework seeks to avoid state led investment and promotion strategies and focuses attention on adjusting the market context through instruments such as emissions trading and carbon pricing (Pearce and Markandya 1989). This is also expressed in quite common union discourses that accept this 'market framing' of the issue. This approach, albeit with reservations, sees market trading in greenhouse gas emissions as a viable way of allowing 'the industrialized world to ease the cost of transition towards less polluting production and could provide developing countries with valuable foreign exchange to protect their own environment and develop clean industrial technologies'. The European ETS (Emissions Trading Scheme) is viewed as better than no action by government and employers on climate change. The approach may also support the lowering of income tax and replacing it by a consumption tax on items that create environmental damage. Another part of this framing takes place when some union leaders who represent a particular industry, such as aviation that contributes significantly to global warming, support its growth as a means of creating jobs (and members).

Hampton suggests that the only alternative to these is a Marxist model of socialist change led by the organized working class. However, there is an alternative perspective which also shares an agenda of radical transformation but does not envisage its political leadership to be narrowly class based. Instead it is likely to involve a mix of public and private economic agents and to be initiated and facilitated by a range of social actors including environmentalists. Trade unions have a key role in such a political coalition.

Sociotechnical transitions

This framework suggests that radical transformation of social and technological arrangements through a coalition of societal actors and stakeholders will be needed to ensure a transition to a low carbon society (Grin et al 2010). This can take a variety of forms and pathways with differing degrees of coordinated or decentralized actions. One expression of this is the language of a 'radical transition'. In this approach the unions challenge the distributional effects of climate policy. In part this involves arguing that climate change is such a major threat to the whole of society that to achieve the necessary carbon reductions will require integrated and publicly-owned energy supply, natural resources and transport systems. In part, too, it involves thinking more clearly about mobilization from the bottom up. This is reflected in trade unions participating actively in the mass demonstrations outside the Copenhagen COP and in dozens of European cities in 2009. It is also manifest in direct actions by trade unionists at workplace level to pressure their employers to reduce carbon emissions and to embrace green technologies: there are 'green representatives' present now in many UK workplaces, while existing trade union delegates in many other countries fulfil the same role. The concepts of 'socially/environmentally useful production' and 'extended producer responsibility' are bound up in this 'radical' discourse.

The sociotechnical transitions framework raises the wider issue of the role of trade unions as environmental actors (Snel and Fairbrother 2010) or innovators (Rathzel et al 2010). The degree to which this is emerging is unclear and contested. A recent European study identified much more extensive engagement of trade unions on environmental issues but saw this as combined with the traditional interests of such bodies (Eurofound 2011). The relationship between immediate and general interests is explored in another recent empirical study of trade unions and jobs (Rathzel and Uzzell 2011).

5. Critical choices: policy pathways and principles

Two critical choices of policy pathways need to be addressed in the current context:

Horizontal interventions vs a pragmatic "basket" of selective interventions

There remains political resistance to targeted directional policies in principle. This would restrict policy to purely horizontal interventions aimed at creating a 'level playing field' by setting favorable framework market conditions for all firms and stimulating the creation of knowledge. This position conflicts fundamentally with the aspiration of moving toward a new systemic, purposive industrial policy.

Defensive selectivity vs strategic selectivity

For the actors who do embrace a more interventionist, targeted approach this may be expressed in a 'defensive' conventional narrow promotion of manufacturing protection, revival and reshoring. In contrast a 'strategic' approach adopts a broader notion of industry with a focus on innovation with the purpose of solving societal challenges and generating future prosperity.

Technoeconomic and sociotechnical paths

A strategic innovation oriented approach can itself the take different pathways with a different emphasis on technology driven or challenge led innovation strategies:

The ***technoeconomic*** path prioritizes broad technological goals of a 'generic' nature often called key enabling technologies, lead technologies, or general purpose technologies.

The ***sociotechnical*** path seeks to identify overall societal challenges without specifying a particular technological solution and to transform end use activities such as mobility, communication and comfort to achieve societal goals such as reducing greenhouse gas emissions or increasing social inclusion.

If the argument to move to a more pragmatic mix of policy instruments with selective targets prevails then the debate shifts to what its goals should be. In the European context a number of possible strategies for European industrial policy have been discussed (Rodrik 2014). The first is 'R&D and innovation' to 'target innovation in advanced manufacturing and tradable services'. This is counterpoised as a preferable strategy against a focus on 'employment in manufacturing'**,** promoting its growth or slowing its decline through delaying deindustrialization linked to regional/cohesion/social policies. The second envisaged is an 'opportunistic industrial policy' which seeks to lift aggregate demand and demand for labour and increase productivity through public spending on infrastructure, extension of finance to SMEs and young firms, training and skill upgrading for displaced/unemployed workers. The third is 'green technologies', using the context of high energy prices to pursue the long term benefits of comparative advantage.

Although this new thinking on industrial innovation reflects a broad choice between strategic and defensive approaches it also often expresses two rather different approaches to the definition of such challenges though both seek an alternative to traditional firm based or sectoral approaches.

The 'technoeconomic' approach addresses broad technological challenges. It proposes a 'generic' rather than individual technological focus and is expressed through such terms as key enabling technologies, lead technologies, or general purpose technologies. It promotes foresight based policies to facilitate new pathways such as renewable energy production, dematerialization or smart systems. An industrial innovation approach is targeted at networks of firms, users, funders and knowledge producers to pursue these challenges. It is based on an

evolutionary economics perspective which sees generic technologies as underpinning successive long waves of economic growth. The goal of policy is to facilitate a change of technoeconomic paradigm. One of its strongest proponents is Mariana Mazzucato.

The 'sociotechnical' approach seeks to identify overall societal challenges without specifying a particular technological solution. It is end use in orientation with much more emphasis on social and organizational dimensions of innovation. It promotes back-cast based policies to transform end use activities such as mobility, communication and comfort to achieve societal goals such as greenhouse gas emissions or social inclusion. It draws on the multilevel perspective to facilitate sociotechnical transitions in systems such as transport, the built environment and food.

The promotion of an innovation oriented industrial policy rests on these critical choices about selectivity – but in any case also requires the clear expression of a limited number of principles, which are proposed below based on the prior analysis.

5.1 Broad scope

The newly broadened scope of industrial innovation does not sit comfortably with the usual policy configurations at national and European levels. Often the scope of 'innovation' policy is constrained by its legacy of policies for scientific research. Similarly the scope of 'industrial' policy is narrowly tied to its traditional manufacturing remit. While it is possible to reorient these policy domains to wider frameworks of sociotechnical innovation and socioeconomic activity, this inevitably encroaches on other policy domains. Obvious examples are those that address end uses of transport, systems of energy and land use, and societal issues of employment.

The aspirations of a new broad industrial innovation policy therefore require a new alignment of these different policy areas. It is better to think in terms of realignment rather than policy integration, which is often unrealistic and in conflict with reasonable policy goals of separation and clarity. This realignment requires two features: a clear responsibility for strategic orientation combined with a boundary spanning role to involve different parts of the policy systems. This will require clarity on remit, capability and legitimacy.

System-oriented policy instruments do not fit easily into existing institutional and departmental frameworks. New vertical and horizontal policy alignment is needed between environment and innovation, functional areas (mobility, shelter etc.) and different levels of governance. This needs significant resources, combined with cross-functional champions and the requisite policy capacity.

A new policy space needs to be created which has the remit for promoting a broad approach to industrial innovation. This will need a capacity to transcend the advocacy and promotion of specific solutions by producer groups and expert communities. The key policy requirement is the promotion of a ‘variety’ of industrial innovation pathways which have the potential to

address challenges. Preconceptions about technological options or the role of certain business sectors have to be challenged through a robust and independent policy capability.

This policy space has two complementary purposes. One purpose is to create, develop and protect a 'niche' of broadly based, practice oriented industrial innovation experimentation. Another purpose is to promote a wider landscape framework for policy proofing wider industrial initiatives against breadth and variety. Such a role needs staff who have interdisciplinary innovation and transition competence. Understanding of concepts such as the sociotechnical is central to this endeavor.

New instruments include sociotechnical experiments and sustainable places oriented to consumer and cultural change rather than the technical feasibility focus of traditional R&D/demonstration projects. 'Learning by doing' rather than go/no go investment decisions with portfolio diversity more important than early selection.

5.2 Meso-networks

New instruments include 'transition platforms' and conflict solving groups. Networks need to be broad value chains, including entrepreneurs, activists, and users. Whilst it is preferable to build on existing networks, institutional inertia means that institutional innovation is often needed. Network building has to acknowledge tensions and needs 'political' capabilities, and new intermediaries.

It is essential to ensure diversity of actors within innovation system and there needs to be a special focus on 'system' oriented actors such as municipal and regional actors, infrastructural actors and civil society actors with a clear intent to support roles of emergent entrepreneurial actors.

5.3 System transformation

The goal of system transformation focuses attention on future oriented temporal approaches and the importance of different governance levels such as local government and foreign policy. The emerging field of 'expectations' with new instruments of scenario building and shared mission communication. Visions need to step outside current framings but to connect to the present. Effective framing is often a consumption-oriented social challenge. Participative foresight with multiple scenarios is better than expert forecasting of 'best prediction'.

The appropriate context for system transformation varies between different governance levels. A multilevel approach is therefore essential. Transformative goals need to be expressed at a situated system level rather than remaining very broad and abstract. They need to define the type of system change envisaged along with pathways and time scales. Backcasting rather than forecasting is the framework.

5.4 Purposive promotion

The purposes of a new European industrial innovation policy require clear articulation through a set of desired outcomes. These are best expressed in terms of challenges. Climate change policy is unusual in that it identifies quite specific long term goals of greenhouse gas emission reductions. These may be given formal status in terms of legal commitments and translated into near term goals in terms of targets that fit real policy cycles around 5 years. Such targeted challenges need to be developed for the range of issues that are to be addressed through industrial innovation such as circularity, resource efficiency, job creation etc. This framework needs to be expressed at the European level in such a way as to engage with the global context and national policy settings. This is likely to be achieved through a set of broad principles of *Europe's challenges for industrial innovation.* These should be end use in orientation defined by broad areas of societal needs – food, shelter, mobility, comfort, communication. Without this, there remains a substantial risk that policy remains preoccupied with supply side inputs vulnerable to shaping by incumbent players. The essence of a challenge led approach is to avoid this.

The broad European challenges need to be accompanied with much more situated visions and expectations in the particular end use domains and at multiple levels of governance. Many of the elements of these challenges are expressed in existing policy frameworks but need consolidation and focus through a participative process involving stakeholders that include users as well as the traditional producers involved in conventional industrial policy.

An approach is required that addresses the multiplicity of challenges and a useful framework for this is that of co-benefits. This acknowledges that there may be multiple paths to the achievement of different challenges and that selection and steering to those that offer co-benefits is desirable.

6. Windows of EU policy opportunity

A key challenge is whether the current policy context offers opportunities for engagement with a new industrial innovation policy through the pursuit of its key elements: broad scope, network capabilities, system transformation, and purposive directionality:

- *The broad EU industrial policy context* offers new institutional arrangements with scope for better alignment of industrial policy, innovation policy and environmental policy through the newly established vice-presidency for 'Jobs Growth Investment and Competitiveness. The Europe 2020 strategy includes a number of flagship initiatives that try to introduce a timeline and procedure for moving toward future goals through measurable indicators of progress with prospects for a broader design for post-crisis growth and modernisation in Europe.

- *Specific EU policy strands and domains* show a growing interest in systemic challenge led transition oriented industrial innovation policies such as 'Smart Sustainable

specialisation' in regional policy; H2020 'societal challenges and industrial competitiveness' in innovation policy; 'systemic challenges from vision to transition' in environmental policy. Emerging areas of EU policy offering new sites for engaging with industrial innovation include the Energy Union, Circular Economy and Eco-Innovation Action Plan.

- *Influential European policy shapers* such as the OECD are promoting policy innovations which are highly congruent with those identified as underpinning a new type of industrial policy - system innovation, cities and green growth, aligning policies for a low carbon transition. The High Level group on innovation proposes an ecosystem policy approach and the European parliament advocates a renewal of a strategic and selective innovation oriented industrial policy.

- *Appropriate systemic policy instruments* have been developed in European policy actions on partnerships (Specialised partnerships, European Innovation Partnerships, Knowledge and Innovation Communities), place based innovation (clusters, challenge led demonstrators), procurement and foresight.

The prospects of renewal of industrial innovation policy depend on convergence of opportunities between policy domains, usable experience of some existing policy instruments and a broader favourable European window of opportunity with influential policy advocates. The policy developments suggest there are a number of potential opportunities emerging. Yet the realisation of this potential will need a clear framework of the policy principles that address the key challenges of broad scope, network capabilities, system transformation, and purposive directionality.

6.1 EU's current context, approach and activities

A key challenge is whether the current policy context offers opportunities for engagement with a new industrial innovation policy through the pursuit of its key elements: industrial breadth, system transformation, network capabilities and purposive directionality. This can be assessed through a number of different perspectives - the broad EU industrial policy context; the evolving framework of specific EU policy strands and domains; the focus of influential European policy shapers; and the availability of appropriate policy instruments. The emphasis in this review is to identify all developments which offer some positive scope for engagement. Nevertheless it also recognises that these emerging 'windows of opportunity' are accompanied by the persistence of policy narratives which resist the development of these new elements. The most prominent of these are therefore summarised as a counterbalance to the opportunity-seeking tendency in this review.

6.2 Europe's general industrial policy landscape

There are several recent policy developments which offer opportunities for a renewal of industrial innovation policy in Europe. The Europe2020 strategy includes a number of flagship

initiatives, including those on climate and energy, industry for a global world, and the Innovation Union. The Europe 2020 ' strategy for smart, sustainable and inclusive growth'

COM (2010) 2020' therefore recognises the interplay of industrial, innovation and environmental themes and seeks to capture these different strategic objectives in an overarching strategy. It also tries to introduce a timeline and procedure for moving toward future goals through measurable indicators of progress, monitored through the European Semester process. Although this has been of questionable success it nevertheless has begun to introduce some policy principles essential to the implementation of systemic and transformative goals. The review of the strategy which is currently being conducted by the

Commission and due for adoption next year offers an opportunity for significant changes to the strategy such as a longer overall timeframe (possibly accompanied by intermediate stages) and possibly a refreshed range and mix of flagship themes.

The newly established vice-presidency for 'Jobs Growth Investment and Competitiveness is a new institutional arrangement which offers the prospect of more effective interaction between different policy strands such as industry, competition, regional, energy and environment. The facilitation of alignment among different DGs is a key requirement for a broader industrial innovation policy.

The recent communication '*For a European Industrial Renaissance*' (COM(2014) 0014) revisits the urgency for Europe to lay the basis for post-crisis growth and modernisation and acknowledges that directionality toward more balanced and sustainable economies is a part of this.

Overall these initiatives offer scope for better alignment of industrial policy, innovation policy and environmental policy as part of a broader design for post-crisis growth and modernisation in Europe.

6.3 Specific EU policy frameworks with opportunities for new policy initiatives

6.3.1 Regional policy: Smart Sustainable specialisation

DG Regio pursues a place-based approach that is cross-sectoral, based on generic technologies, and operationalised through clusters. It adopts a clear perspective of the need for transformative innovations and systemic change which stretch far beyond the boundaries of one company or organisation. This expresses key aspects of a new industrial innovation policy and is accompanied by a commitment to the enabling of regional and local authorities to fulfil a purposive and directional role.

6.3.2 Innovation policy: societal challenges and industrial competitiveness

DG Research & Innovation has configured the Horizon 2020 programme in a novel way to address 'societal challenges' and 'industrial competitiveness' more directly and explicitly as distinctive strands to the traditional focus on 'excellent science'. The societal challenge-based

approach is of particular interest from a sociotechnical perspective since it focuses on policy priorities without predetermining the precise choice of technologies or solutions. This is accompanied by a much stronger practice orientation with a new focus on innovation related activities, such as piloting, demonstration, test-beds, support for public procurement, design, end-user driven innovation, social innovation. These all offer the potential for an EU role of knowledge-broker and facilitator of interaction for industrial innovation.

6.3.3 Environmental policy: Responding to systemic challenges from vision to transition

The European Environment Agency has recently (State & Outlook 2015) expressed a new strategic focus on informing a more systemic solutions oriented policy framework linking the environment action plan to other policy domains. This framework is highly complementary to the promotion of the key elements for a new industrial innovation policy. It elaborates the importance of production-consumption systems in a longer term transitions perspective.

6.3.4 Emerging areas of EU policy offering new sites for engaging with industrial innovation

There is a number of emerging policy domains with potential scope for synergies with the promotion of a new industrial innovation policy:

- Energy Union
  This is still in the making and its mix of conventional and renewable energies is being shaped. Its agenda of energy security, climate change and competitiveness carries strong purposive directional challenges along with engagement with a variety of business players.
- Circular Economy
  The revised policy framework is likely to be far broader in scope than waste management and will directly link to the broader policy agenda of efficiency and sustainability of the relationships of firms at different points in the value chain.
- Eco-Innovation Action Plan
  The next generation (or successor) of ecoinnovation policy is likely to continue its trajectory from the narrow green technology focus of the first generation ETAP to a broader systemic approach which will engage more explicitly with other policy domains.

Overall there is a range of developments in key policy domains which express concepts and purposes which have strong synergies with those needed for a new industrial innovation policy.

6.4 Recent proposals for new types of systemic policy interventions in innovation and industrial policy

There are a series of recent OECD reports which promote policy innovations that are highly congruent with those identified as underpinning a new type of industrial policy.

6.4.1 System innovation

The newly published OECD System Innovation Synthesis report 2015 is a very significant intervention by a highly influential shaper of national innovation policies. It embraces the new thinking on transition oriented system innovation outlined earlier in this paper.

Innovation policy is now seen to engage with transitions in sociotechnical systems, and require a set of policy interventions including demand side, behavioural, technological, policy and business practices among a variety of different innovation actors. It has more radical implications than the current OECD review of innovation policy (2015), though this also expresses a significant broadening of the innovation remit. It directs attention to 'policies for innovation' which are seen as 'much broader than the policies that are seen as 'innovation policies' in a narrow sense' e.g. addressing R&D. A consequence is the importance of 'getting the policy mix right'. The interpretation of this is still primarily addressed at horizontal policy measures to 'enhance the performance of the system as a whole' – e.g. skills, knowledge creation, business environment, governance. However, a part of the knowledge creation process is seen as needing 'direct support measures' (para 30) which will require 'selection processes.'

6.4.2 Cities and Green Growth

The OECD Green Growth in Cities report (2013) introduces a strong place based direction to the discussions on the green economy and green growth. The prospects for systemic transformation toward sustainability linked to the co-benefits of economic growth and job creation are seen to be positively linked to local urban contexts and governance. It offers a striking multilevel approach to what is often discussed only at national level. This links to the network capabilities and purposive directionality discussed earlier.

6.4.3 Policy alignment for the low carbon transition

The OECD Aligning policies for the transition to a low carbon economy report (2015) highlights the need for a systemic policy approach which brings environmental and economic domains together, not through simplistic integration but through new modes of interaction and alignment.

Together these three OECD reports offer a new steer to the broad policy sphere of industry, innovation and environment very much in tune with the framework elaborated in the earlier sections. The reframing of this cluster of issues by an influential and significant international policy actor could signify a possible tipping point.

As well as these important wider international reports there are also a number of recent proposals by European policy actors.

6.4.4 Europe's Innovation Ecosystems

The European High level group on Innovation Policy published a recent report: Inspiring and Completing Europe's Innovation Ecosystems (2014). This adopts a strong systemic focus for a new direction on innovation policy, though is less clear on the policy mix associated with it.

6.4.5 EU Industrial Policy

The Research & Energy Committee of the European Parliament published a recent review of EU Industrial Policy: Assessment of Recent Developments and Recommendations for Future Policies (Directorate General for Internal Policies 2015). While recognising a diversity of views among stakeholders, it argues that there is an important opportunity to pursue a new industrial policy which breaks with old dichotomies. It proposes that the new Vice Presidency produce a Strategic Document to facilitate broader system coordination and that the network instruments of Specialised Partnerships be promoted.

These suggest that there are proposals for industrial innovation policy reform emerging from a number of institutionally significant players in the European Union.

7. The European Trade Union Confederation (ETUC) and climate change

The ETUC is the principal representative trade union body in Europe and includes 88 National Trade Union Confederations, 37 European countries, 10 European industry federations, 60 million individual trade unionists. (ETUC 2015a). The position of the ETUC on climate change issues is therefore of broad significance.

Interestingly the ETUC played an early and active role in relation to the newly emerging discourse on trasitons in the early 2000s. In 2002 in the ETUC contribution to the Johannesburg Earth Summit (Le Blansch, Kees 2002) there was a call for:

> 'policy responses and societal strategies, which need to deliver major *transitions* and reform strategies at all levels of governance. These *transitions* will need radical medium and long-term societal developments at all levels in order to achieve major changes in the allocation of resources, to restructure power relations and to ensure interests that are currently excluded are, in the future, included.'

In its review of the broad field of sustainability it argued that 'the most serious problem is climate change resulting from emissions of greenhouse gases, whose main human-derived source is the use of fossil fuels.'

In this review the notion of transition was being interpreted primarily in relation to societal change and there is a passing reference to the notion of 'fair transitions' particularly with respect to energy where most emphasis was placed on 'energy efficiency' with some attention to 'energy sources. The contradictory consequences for employment were already evident:

> ‘The availability of and dependency on energy resources, energy costs and the energy efficiency of the production system are all factors exerting a powerful and continuing influence on employment. An unsustainable energy model results in unsustainable employment. Similarly, the use of one or another energy sources and its future development will also be decisive in determining the number and type of jobs available and future trends in this regard. The development of renewable energy and energy efficiency programmes is creating significant numbers of new jobs, which will require the adaptation and training of the workers involved. On the other hand, reductions in traditional energy sources also create employment problems, for example in the nuclear and coal industries. These problems must be tackled with the necessary mechanisms of fair transition to mitigate adverse and undesirable social effects.’

In a more positive sense the pursuit of energy efficiency as the ‘primary objective of any Community energy policy’ including industry and service suggested that ‘participation by employees and their representatives is essential for the success of such policies’.

A new role was identified for trade unions to ‘play their role in negotiating fair transitions’ which entailed the need to ‘raise competencies for workers and trade unions at company and local level’. They need to build their capacities, first of all by the process of learning by doing’ to enable qualified roles to be played, based on:

- Accurate information on the social repercussions of different developments and measures
- Resources for the measures to ameliorate and counteract such repercussions
- Inclusion of trade unions in the strategy formation process, and recognition of their role through the creation of proper rights and competencies

A year later a further report on ‘European Trade Unions as Actors for Mitigation of Climate Change’ (Le Blansch et al 2003) started with an explicit framing around the emerging concept of transition with a much stronger and explicit focus on radical technological change with pervasive social consequences:

> ‘One way to look at the upcoming implementation of the Kyoto protocol is to see it as an … attempt to effect a societal transition, including a major technological change. In turn this technological change may be expected to have serious social effects in terms of employment, qualification structures, income distribution on global, European and sectoral level.’

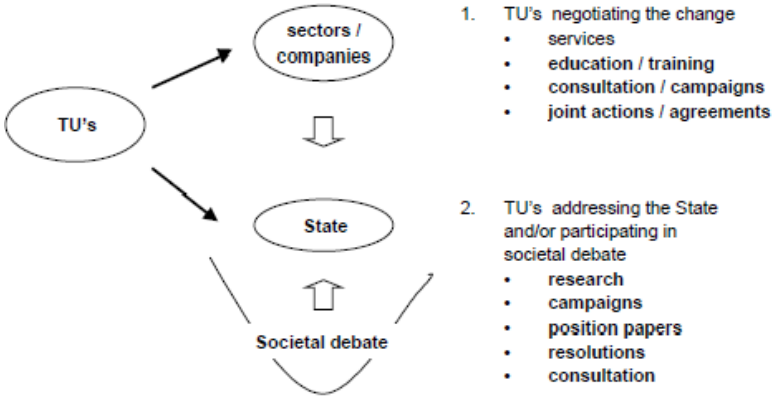
Looking at it this way, the changes that lie ahead of us are highly relevant for trade unions and the interests they represent.

This framing is set in a historical context:

> 'Historical parallels can be drawn with previous industrial and informational revolutions (from the introduction of steam engines to robotisation and computerisation of skilled work), in which workers organised in trade unions to negotiate fair technological changes. Many sources are available that point at the importance of the presence of institutionally well-embedded trade unions taking anticipating stances and involving themselves pro-actively in negotiating these changes, for those changes to occur in an equitable and socially acceptable way.'

Despite the historical parallels, there was also recognition of its novelty and 'historically unique' attempt to pursue this in an international and purposive fashion as 'globally coordinated' which highlighted the 'importance of trade unions taking anticipating stances and proactively negotiating changes in an equitable and socially acceptable way'. This would stretch from the workplace to societal and governmental roles.

Figure 1: TU involvement in Kyoto implementation



The language of transition is now being used in a much more serious conceptual framing of the climate change challenge for trade unions. However, it still rests on a rather conventional separation of technological change and its society, which sets up the principal role for trade unions as responding and ameliorating the social impacts of new technology. A more sociotechnical and systemic angle on the problem starts to be evident in the report on Climate change – avenues for trade union action (ETUC 2004).

It now talks about a 'required refocusing of production and consumption methods towards a more sustainable model' and that 'any transition towards a more sustainable energy model will entail significant changes in terms of jobs and qualifications, lifestyles, and for companies'. This new emphasis on consumption and behaviour highlights the broader systemic character of the changes required and draws attention to a much more positive perspective for trade unions than responding to negative impacts:

> ‘It constitutes a unique opportunity to make a social transition to improve the environment and to boost employment and well-being… transport, housing and urban development sectors, in particular, can bring huge environmental, social and economic benefits.’

This reorients consideration to the response of ‘the energy system in the broadest sense’, including ‘end users and other players such as designers (car manufacturers) and consultants (architects)’, rather than concentrating solely on the energy production sector. It repositions trade unions to being a core part of the transition process itself a much wider social role:

> ‘The climate change mitigation process, if globally co-ordinated and deep-rooted in a broad social consensus in Europe, constitutes a unique opportunity to make a social transition to improve the environment and to boost employment and well-being …reaching a global consensus on preventing climate change requires the support of workers.’

Interventions included the promotion of ‘massive investment programmes in which public investment will play a key role’ in the transport, housing and urban development sectors, accepting that ‘transition will entail significant changes in jobs and qualifications, life styles and companies.

This is a more positive context for its calls for ‘equitable transitions programmes’ and to ‘negotiate a social transition’ yet the formulation of these is still couched in essentially protective terms, either through public programmes:

> ‘Taking account of the social impacts of climate change and prevention policies and their effects on employment to introduce ‘the appropriate transitional measures and adjustments through the creation of a transition programme (consisting of training, income support, relocation funds, etc.) for workers at risk of losing their job’ or through bargaining and dialogue:
>
> ‘To ensure an orderly conversion for workers and affected communities with income protection, access to new jobs, educational assistance and social programs, social and employment transition measures are vital. Therefore, workers and their representatives must be able to negotiate this social transition via the social dialogue with employers, and within companies through works councils.’

There remains a tension between the positive opportunities offered by a broader systemic framing of the transition and ‘the negative repercussions on the destitute, vulnerable economic sectors … and energy-intensive sectors.’

A priority task is seen to ‘identify those sectors and regions which are benefiting and those which are losing out as well as to determine the extent to which they would be affected’.

Such findings would be needed to 'enable prevention and support measure to be put in place… as well as promoting innovation for jobs and competitiveness'. As a consequence the ETUC commissioned an extensive study to deliver these findings 'Climate Change and employment: impact on employment in the EU-25 of climate change and CO2 emission reduction measures by 2030' (Dupressoir 2007a, and b). As with several other similar studies it found that in such a transition the overall level of jobs would probably be reasonable constant, but its distribution will change radically so simplistic alternative job destruction/creation framings were not very useful.

The overall conclusion was that 'climate change must be integrated into all European Union policies, in particular industrial, trade and employment climate'. Yet there were two rather different interpretations of the consequences of this.

One was a rather general view that such policies 'should contribute to rising demand for increasingly educated and qualified workers, not only in terms of technological developments but also in innovation'. This is an optimistic view on a convergence of 'the general evolution of the economy which 'is also valid for the process of combating climate change'.

The other view gave more weight to the view that consequences for employment would be shaped by the priority given to different pathways.

The choice between these options can depend on the results of social dialogue which, by identifying opportunities and encouraging vocational transitions, can strengthen the positive aspects of the necessary changes.

These differences in emphasis lead to rather different forms of trade union policy: either welfare net accompanying a broadly desirable pattern of economic change or a more interventionist and selective industrial policy. The formulation of the 'just transition', which was subsequently embraced by the ETUC, tends toward the welfare end of the policy spectrum (Decaillon, Joel 2009a).

In 'A European approach to tackling climate change' it is stated that:

> 'just transition programs are the best way to guarantee that structural changes in employment patterns due to climate change mitigation are anticipated and that the potential for new jobs is maximised, while ensuring that workers are not forced to pay for the necessary mitigation measures through the loss of their livelihood.'

This was the focus for the ETUC interventions around COP15 in Copenhagen in 2015 and it suffered the consequences of the turn away from top down commitments. The aftermath of COP 15 coincided with a new attention to industrial policy following the economic crisis of 2008. The ETUC commissioned a major study: Climate disturbances, the new industrial policies and ways out of the crisis (ETUC, EMF, Syndex, S-Partner and WMP Consult (2009b) and this

was followed in 2010 by a new climate change initiative with a focus on a new industrial policy (ETUC 2010).

In 'Climate change, the new industrial policies and ways out of the crisis' (ETUC 2010), the just transition position was reformulated as a series of principles:

> 'A European low carbon transition strategy must be based on Just Transition principles: dialogue between Government, industry and trade unions and others on the economic and industrial changes involved; green and decent jobs; investment in low carbon technologies; new green skills.'

This was accompanied with a much more extensive policy framework for a new proactive industrial policy:

- The development of low carbon industrial strategies and the development of industrial policies is urgently needed through a modern demand-side European employment strategy guaranteeing job creation and protected mobility, not a strategy based solely on labour market deregulation.

- Skills monitoring and matching policies should be reoriented towards the anticipation of these changes.

- A fair transition guaranteeing the creation of bridges designed to help workers in shrinking sectors to find jobs in expanding sectors, while protecting their wages, their working conditions and their trade union organisations.

- Implementation of enhanced industrial and research policies, and adopting appropriate climate change legislation. It will be essential to develop a low-carbon European industrial policy based on a dynamic of EU industrial coordination that transcends intra-European rifts and the perverse effects of requirements of short-term profitability for industrial investments, and to tackle the challenges of industrial restructuring faced by the new Member States.

This a new post COP15 context:

> 'Copenhagen is a strong alarm signal to demand that its Member States develop genuine European policies, failing which it will no longer be able to make its voice heard at global level over the longer term and will contribute to an historic weakening of Europe.'

It shows a renewed focus on economy with more emphasis on 'co-benefits' of climate change policy and more 'bottom-up initiatives.

The new perspective resonated effectively with the EU Low carbon Road map launched in 2011. In its Comments on EU Roadmap 2050 (ETUC (2010) the ETUC endorsed that 'broad based

social, economic and environment alliances are built to ensure public support for the transformation necessary, and proposed that 'a strong and coordinated European and national industrial policy framework is key to guaranteeing the long-term sustainability of these jobs'.

The 5 pillars: of a just transition should be included:

1. Consultation between Government and key stakeholders, including representatives from business, trade unions, local government and regional bodies and voluntary organisations.

2. Green and decent jobs through investments in (new) low carbon technologies and R&D.

3. Green skills: Government-led, active education/training and skills strategies for a low carbon, resource efficient economy.

4. Respect for labour rights and human rights: democratic decision making and respect for human and labour rights are essential in order to ensure the fair representation of workers' and communities' interests at the national level.

5. Strong and efficient social protection systems

At the same time it urged major investments in mobility and housing:

> 'mobility and transport need to be considered as a coherent system, organised to meet specific needs.'

The ETUC calls for a renovation programme for the complete European housing stock to achieve a rapid and significant reduction of energy consumption in heating and cooling while providing targeted support to housing for people in poverty and promoting compact cities. These measures should be supported and accompanied by social dialogue, bargaining and collective agreements to develop quality jobs in the sectors involved.

Yet these are not articulated in transition terms as a choice of particular pathways and are presented as separate initiatives. They are particularly interesting because they have much greater meaning and relevance for a new emphasis on workplace action:

> 'Every workplace can be a green workplace. There is mounting evidence that unions are taking action to tackle climate change.'

The priority is presented as a demand for 'new and extended rights relating to the protection of health and of the environment at work, and for the provision of training and skills related to sustainability.' Yet actually its potential as an alternative to defensive strategies is revealed in the ETUC Green workplaces initiative (2012), which articulates a bottom up approach creating new communities of practice on behaviour change and prospects for new partnerships at local

level. Both of these have much more meaning in the pervasive domains of buildings and transport than specialised high technology low carbon paths.

In 2013 ETUC (2013a) restates that 'ambitious national objectives for 2030 will allow significant investments to be released (in particular, for transport infrastructure) and create a large number of jobs (notably in building renovation). 'However, there is a caveat that 'the energy-intensive industries, which are sometimes exposed to fierce international competition, would not be made to shoulder most of the burden.'

By refusing to frame the climate change debate as a binary choice between either the protection of the environment or an inclusive economy that is a creator of employment, the only feasible way to reconcile the two ambitions is by a 'Just Transition'. Yet there is an increasing preoccupation with applying the just transition to the energy intensive sector.

'The notion of 'Just Transition' is now an integral part of international climate negotiations. The ETUC sees here an opportunity to develop an international framework to anticipate and manage the impacts that the reduction of greenhouse gas emissions will have on the labour market and in society. The ETUC calls for more intensive work to be carried out on this theme starting with the UNFCCC and ILO. Directive 2009/29/EC foresees in Article 10b is para 6 a mechanism whereby Member States may take financial measures to help sectors that could be exposed to the risk of carbon leakage due to rising electricity prices induced by the ETS. Consequently, making this policy responsible for the lack of competiveness appears unfounded and weakening or dismantling it will not resolve the structural problems of European industry. These problems require ambitious European industrial and energy policies based on investment and support for technological innovation.'

'The ETS remains for the moment, the centerpiece of the European framework for the fight against climate change and the ETUC considers it of utmost urgency that the system, which is imperfect but can be improved, needs to be fundamentally reformed. The reform of the ETS should strike a good balance between achieving the necessary transition towards low carbon industry and energy production in Europe and the need to maintain and develop its industrial activities. With this objective in mind, and with a view to better integrating the ETS into a European strategy for a 'Just Transition', the ETUC requests that the following elements are integrated into its reform:

- An adequate price signal must create the impetus for investment in order to accelerate the 'low carbon modernisation' of European industry, without at the same time threatening the sectors most at risk from carbon leakage.

- Revenues generated by the auctioning of emission quotas should in part support low-carbon industrial innovation and the anticipation of change for workers affected by the de-carbonisation of the European economy by extensive training and requalification programmes.

- A mechanism of ‘carbon insurance’ to link the allocated quotas to support for maintaining manufacturing. The quotas distributed to a company that then closes down, or significantly restructures a production site, must be reallocated for the benefit of the workers concerned, in addition to the already existing instruments to address company restructuring.

A mechanism for carbon traceability should help reveal the carbon footprint of products imported into the EU. This mechanism would reveal the ‘carbon content’ of products put on the market and could serve as a basis for a border adjustment mechanism as a last resort.’

Following the development of a wider investment strategy, *A new path for Europe: ETUC plan for investment, sustainable growth and quality jobs* as statement in 2014 was a declaration on industrial policy, energy, and the fight against climate change ETUC (2014a).

The ETUC welcomes the fact that the issues of industrial policy, energy and the fight against climate change appear together on the Council's agenda. These three topics are closely interlinked and must be addressed in a coordinated and consistent way, in particular, to limit the risk of "carbon leakage" for the post 2020 era. Energy is a key dimension of industrial policy and manufacturing activities are the backbone of strong and resilient economies. Countries with a large industrial base have resisted the crisis better. The harmonisation of timetables is an important step in coordinating these policies, which are essential to the creation of a sustainable and socially just European economy. However, the ETUC stresses that there can be no question of establishing a hierarchy between maintaining quality employment in Europe and combating climate change. These two challenges must be tackled simultaneously and with the same determination.

The ETUC asks that ‘Just Transition’ be an integral part of the policy framework which the EU will adopt to organise the transition to a low-carbon economy beyond 2020. The notion of ‘Just Transition’, which the trade union movement has advocated for many years, aims to integrate employment demands into European and international climate policies – both quantitatively and qualitatively, including training, worker participation, social protection and trade union rights. The ETUC greatly regrets that this notion has not yet been integrated into European policies, despite being part of the international agreements which the EU signed in Cancun in 2010. The adoption of a roadmap for a ‘Just Transition’ in Europe is an essential correction to the current policy framework, which drastically neglects labour issues. Putting ‘Just Transition’ into practice will be essential to ensure that all workers support the policies aimed at greening the European economy.

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