COBENEFITS POLICY REPORT

September 2022

Maximising co-benefits of the energy transition: Enabling policies in countries worldwide

IASS POTSDAM

UfU Independent Institute for Environmental Issues

COBENEFITS

IKI INTERNATIONAL CLIMATE INITIATIVE

Imprint

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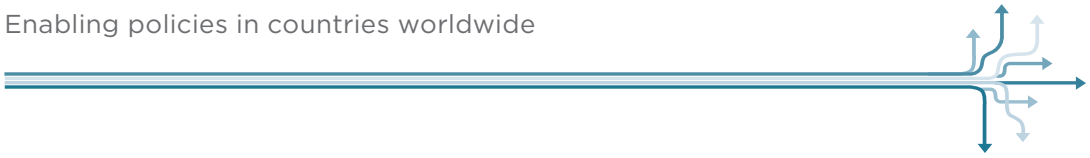

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Seizing the co-benefits of following the renewable energy pathway

An extensive range of studies in countries with different socio-economic circumstances give evidence that power generation with a high share of renewable sources goes hand in hand with a high potential to similarly profit from a wide range of social and economic opportunities, so-called co-benefits (IASS 2017).

The COBENEFITS project has identified and quantified several co-benefits that countries can leverage if they follow a pathway of ambitious decarbonisation of power generation with a high share of renewable energies such as solar or wind.

The co-benefits of renewable energies range from climate change mitigation and resilience-building to ecological benefits, political-institutional benefits, and social benefits, to improvements in food and water security, and people's well-being and health. Economic benefits complement the picture. They include opportunities for energy security, the stimulation of technological change and private investment, enhancement of fiscal sustainability, and generation of (local) jobs and employment, among others.

Figure 1: Mobilising interest-oriented co-benefits of climate change mitigation: key performance categories.

Source: IASS 2017b

Policy makers and electricity project planners mostly view socio-economic co-benefits as an unintended by-product of their initiatives, or ignore them altogether. A change in electricity planning approaches from unintended co-benefits towards proactively seizing the social and economic opportunities of local energy products increases the positive contributions of energy-sector investments to the well-being of individuals and communities (IASS 2021a).

Create an enabling environment to seize co-benefits

Expanding the share of renewable energy sources in electricity generation is a crucial measure to mitigate climate change and its negative consequences. The expansion of renewables itself is also the most important action and prerequisite for unlocking the related socio-economic co-benefits of the energy transition for local communities and stakeholders.

However, the full socio-economic potential of the energy transition can only be unleashed if rapid decarbonisation of the power sector goes hand in hand with policies that create an enabling environment to seize co-benefits (so-called enabling policies).

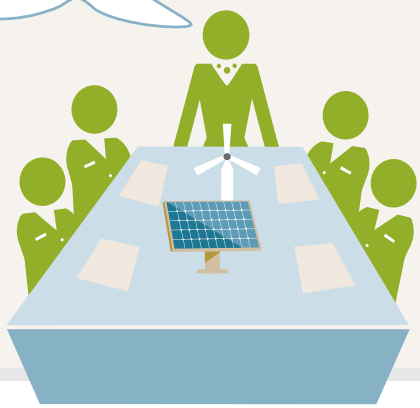
Such enabling policies can, for example, reduce barriers that currently prevent local communities from benefiting from existing socio-economic co-benefits. Other policies can contribute to a just transition by ensuring that disadvantaged groups are the main beneficiaries of co-benefits.

This COBENEFITS report gives an overview of enabling policies that have high potential to make fair use of the maximum potential of co-benefit opportunities that can be unlocked by following the pathway of a high share of renewable energies in the power sector. They are presented according to the different COBENEFITS categories (see Figure 1).

Enabling policies for renewable energy (RE) co-benefits and their specification and implementation are highly context-specific. They need to take into account the context of the country or region they are planned for, and need to be tailored to remove specific barriers preventing communities from unlocking them (IASS 2021a). Therefore, each enabling policy option presented in this report is accompanied by a short summary of an initial situation that they might solve or improve.

In the last chapter, the dialogic co-benefits approach and process is outlined as a tool to engage, bring together, and align decision makers from differing sectors to identify, tailor, and implement context-specific enabling policies and to work towards the implementation of a just transition to decarbonising the energy system with the participation of local communities and stakeholder groups (Sperfeld & Helgenberger 2020).

Enabling policies therefore differ from policies and actions that merely promote a higher share of renewables in the power sector. They go beyond these conventional energy policies by linking the energy sector with activities and policies in other sectors.



Renewable energies promoting economies, local businesses, and jobs

The transition to a climate-friendly energy sector opens new business fields and creates millions of jobs. Nowadays, around 12 million people are employed in the renewable energy sector. If the world follows a 1.5°C compatible pathway, around 38 million jobs are predicted to be created by 2030, and 43 million by 2050 (IRENA & ILO 2021). Industries around the world can profit from new innovations related to renewable energies. Job- and industry-related co-benefits go often hand-in-hand. This is why enabling policies to unlock co-benefits in the employment dimension should ideally be complemented by respective enabling policies for industries.

Maximise co-benefits for employment

The COBENEFITS studies and related research show that: Following renewable energy pathways when planning power generation can create millions of new employment opportunities.[1] However, increased domestic production, installation, and maintenance of RE equipment requires a more highly skilled workforce. This can be achieved by a range of policies in the sector of education and related activities.

ENABLING POLICIES FOR EMPLOYMENT CO-BENEFITS

- Develop or reshape vocational training curricula and university education programmes to consider renewable energy technologies as a focus topic
- Establish a high-level authority, responsible for the re-skilling of workers transitioning from the conventional power sector
- Remodel infrastructure, and establish alternative job models to “get the right jobs in the right place”
- Establish an expert group and an assessment scheme to certify RE study and training programmes, as well as companies in the RE sector
- Conduct information campaigns, information events, and job fairs to attract people, for skilling and education in the renewable energy sector
- Initiate career-guiding and empowerment activities for female workers in the RE sector and make female employment mandatory for public RE projects

INITIAL SITUATION

Highly- and middle-skilled workers from local communities can only partially meet the demand from the RE industry for workers with the necessary middle- and high-level education, skills, and capacities for the planning, development, and maintenance of renewable energy projects and infrastructure.

[1] All COBENEFITS studies can be found at: www.cobenefits.info

ENABLING POLICY

- **Develop or reshape vocational training curricula and university education programmes to consider renewable energy technologies as a focus topic**

New jobs in the renewable energy sector present opportunities for increased local value creation and community well-being – if the RE industry's needs can be met by RE engineers, wind turbine technicians, and RE marketing experts from local communities. Easily accessible yet high-quality education programmes oriented towards the opportunities offered by the RE sector can serve as entry points to ensure that the socio-economic advantages of renewables benefit local communities.

The development and implementation of a strategy and implementation plan for reshaping vocational training curricula and university programmes to focus on renewable energy technologies is a promising method for addressing current and potential skill gaps in the RE sector, and to enable local communities to gain their share of the socio-economic benefits available from the expansion of renewable energies (MNREa). To this end, it is crucial to develop new – or re-shape existent – education or skilling programmes with the continuous cooperation of appropriate departments and other relevant stakeholders, including (local) RE businesses and representatives of local communities.

GOOD PRACTICE EXAMPLE

With its Human Resource Development Programme in New and Renewable Energy, India educates and prepares experts for the transition towards renewables.

The programme combines RE- education formats for civil servants, the promotion of RE-related R&D at educational institutions, and support to develop (updated) model curricula for the integration of RE content into vocational and university training. It also grants 400 fellowships for RE-related education and research (MNREa).

INITIAL SITUATION

Although the transition towards RE-based power generation results in net job gains, the simultaneous loss of jobs will occur in the conventional energy sectors. This, in turn, can lead to related social hardships for certain groups of workers, especially for those not possessing formal educational qualifications.

ENABLING POLICY

- **Establish a high-level authority, responsible for the re-skilling of workers transitioning from the conventional power sectors**

Although decarbonisation of the power sector and the related expansion of renewable energy sources will create many new jobs, this process might be accompanied by the loss of jobs related to electricity generation from conventional sources (see for example IASS/IET/CSIR 2022 for Mpumalanga, South Africa). A just transition process needs to offer former coal workers and other employees new employment options. This can be realised by offering these groups of workers easily accessible and high-quality opportunities for re-skilling and training that are ideally localised in close spatial proximity to previous workplaces or places of residence.

A central authority, responsible for the re-skilling of coal and conventional energy sector workers, can provide workers who risk facing economic hardship with the support necessary to gain a foothold in other sectors.

A related authority can deal as a central contact point that offers these occupational groups support that is tailored to their individual needs (IASS/UfU/TERI 2020). At minimum, this must include information campaigns about re-skilling opportunities; consultation of interested workers, to identify and attest existing capacities and interests; and refining existing skills and capacities to prepare participants for future job markets, including the renewable energy sector (Ibid.).

The creation of new jobs in renewable energy can compensate for declining employment in the coal energy sector, because the skills and capacities of (former) coal and conventional energy workers are also of value for the RE sector. It is thus very beneficial to accompany government programmes for the expansion of renewable energy with government-financed re-skilling programmes for jobs in the renewable energy sector (IASS/UfU/IET/CSIR 2020, IASS/UfU/TERI 2020).

Particular attention should be given to those workers in conventional energy sectors who lack formal educational qualifications but have gained knowledge and practical skills through their work. Here, a formal process that measures and compares non-formal learning against the requirements for advancement in the formal education and training system can be a powerful tool for making the most of existing vocational talents.

INITIAL SITUATION

Although the decarbonisation of the power sector generates new jobs, their locations might not match those of previous jobs.

ENABLING POLICY

- **Remodel infrastructure; establish alternative job models to "get the right jobs in the right place"**

A challenge for a just transition in the employment sector remains the spatial dimension of job changes. In general, compared with centralised coal power plants, solar PV deployments provide jobs across a wider geographical area, which in turn can positively impact rural areas and communities (Donker & van Tilburg 2019). It is thus important to initiate enabling policies to "get the right jobs in the right place". This can be achieved through a combination of policies to develop infrastructure, diversify jobs, and offer social plans in negatively impacted regions, including skill transfer programmes for local people to ensure that a qualified workforce is available "on site" to repair defects and keep renewable energy systems running (IASS/UfU/GreenID 2020, Climate Analytics 2018).

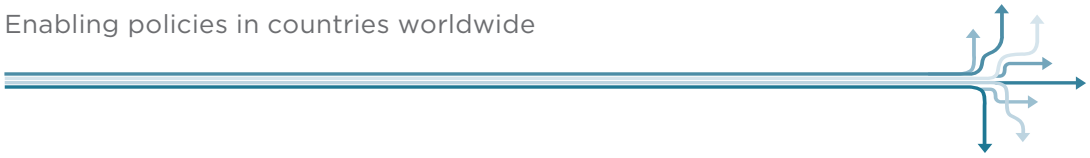
INITIAL SITUATION

Constant new developments in the RE sector call for workers whose skills are regularly updated to deal with emerging technologies and innovations.

ENABLING POLICY

- **Establish an expert group and an assessment scheme to certify RE study and training programmes, as well as companies in the RE sector**

The renewable energy sector is constantly evolving, incorporating the latest innovations and technologies. This makes it crucial to ensure that university programmes and vocational training for renewable energy jobs meet high quality standards and are constantly updated.



Constant upgrading can be achieved by setting up an expert group that:

- carries out regular data collection to gain an overview of educational and training programmes offered for the RE sector,
- establishes occupational standards and recognised codes of practice in cooperation with the domestic RE sector,
- regularly refines such training programmes, to address the needs of all target groups, and
- ensures the implementation and the accreditation of standards and quality assurance mechanisms for RE training (e.g., through regular accreditation processes and train-the-trainer courses; Vallvé et al. 2019).

This can be combined with the introduction or refinement of a mandatory certification scheme for companies operating in the renewable energy sector. Such quality assurance on the RE company side incentivises companies to contribute to the constant upgrading of RE education and training in their country, and to proactively connect with future graduates of vocational training and university courses.

INITIAL SITUATION

Suitable candidates for jobs in the RE sector prefer to take jobs in other fields.

ENABLING POLICY

- **Carry out information campaigns, information events, and job fairs to attract people for skilling and education in the renewable energy sector**

The renewable energy sector is a promising job market, offering employment opportunities not only for highly skilled workers and university graduates. In countries with young RE sectors, target groups are not always aware of the opportunities offered by this innovative and future-oriented industry.

It is thus recommended to develop and implement a set of measures to inform potential job-seekers about advantages and job perspectives in the RE sector and to provide interested individuals easy access to vocational training, RE education, and job opportunities by connecting them to appropriate contact persons.

Such a package of measures could ideally be coordinated by a network consisting of stakeholders from the educational, public, and private sectors. This way, individual initiatives – such as, e.g., information campaigns for universities; job fairs, consultation, and information events for (former) workers in the conventional energy sector; or job information days and innovation competitions by the RE sector at schools and universities – can be bundled and tailored to the actual needs of the target groups and the RE sector alike.

INITIAL SITUATION

The low percentage of female managers in the RE sector indicates existing barriers for women seeking to pursue these professions, which in turn results in existing potentials being underutilised.

ENABLING POLICY

- **Initiate career-guiding and empowerment activities for female workers in the RE sector and make female employment mandatory for public RE projects**

According to IRENA (2019), women hold around 32 per cent of jobs in the renewable energy sector. This is more than their share of 22 per cent in the oil and gas sectors, but far below the global job market of 47 per cent. Countries and businesses that work towards greater gender diversity in the renewable energy sector not only profit from the economic potential of a substantial proportion of the workforce; They can also leave behind outdated career patterns and increase the sector's innovative and creative potential and openness (Vangchuay & Niklaus 2021).

Measures supporting gender equality should be tailored to individual contexts, planned in an integrative way, and applied simultaneously at different leverage points – according to the gender-mainstreaming approach. Measures can comprise awareness-raising activities for gender-inclusive careers, including: the promoting and portraying of education and career paths through hands-on career guidance activities; activities for the empowerment and skilling of women, such as the provision of maintenance and operation skills for women's groups in community centres or making skilling and female employment mandatory parts of public RE projects; and ensuring gender-sensitive recruitment processes by diversifying shortlisting and selection panels (GWNET 2020, Vangchuay & Niklaus 2021).

This can be complemented by measures to support more gender-inclusive employment opportunities, e.g., by providing day-care facilities for working parents or offering paid maternity and paternity leave, and the implementation of mentoring programmes to encourage more women to take on leadership responsibilities (IEA & CEEW 2019). Basic requirements for measuring the status and progress of a gender-inclusive energy transition include country-specific data, combined with appropriate indicators covering more aspects than merely GDP (Vangchuay & Niklaus 2021).

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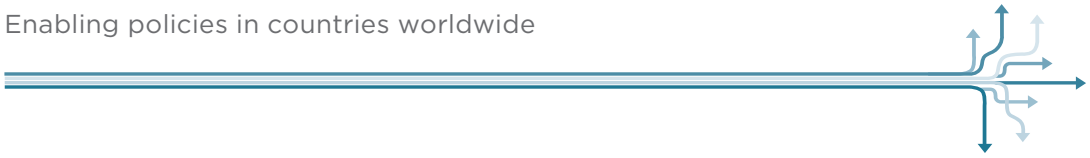


Maximise co-benefits to increase industrial competitiveness

The decarbonisation of the power system through renewable energies offers development opportunities for the industrial sector. A higher share of renewables raises local investment levels, closes technology gaps, and drives innovation. In turn, this can lead to the improvement of domestic SME value chains and manufacturing, increased industrial competitiveness, and the creation of new and future-oriented jobs. Businesses can also benefit financially from the use of RE-based power, due to cheaper and more stable prices and reduced dependencies on strongly fluctuating but rising energy market prices, especially when they opt for RE generation for self-consumption. Studies show how a greater share of renewable power generation may affect electricity consumption in the industrial sector; future savings; savings due to the prevention of grid instabilities, blackouts, and price shocks; and effects on wholesale and retail electricity price development and related industrial competitiveness (IASS/IPC 2019).

From COBENEFITS policy roundtables, and papers and further co-benefits studies carried out so far, there seems to be one main barrier that might impede the realisation of the full potential of industry-related co-benefits in affected regions:

INITIAL SITUATION

Market and state failures, such as imperfect information or policy uncertainty as well as long-term investment risks, hinder the ability of local industries to benefit from accelerated renewable energy development. This may impede not only the fair distribution of the co-benefits of renewable energies for industries, but also make local industries reluctant to invest and enter value chains related to the developing RE sector.

Initial findings from COBENEFITS studies and related research show that this barrier can be overcome if the transition towards a higher share of REs is coupled with coordinated, context-specific, and stable measures that support the contribution of domestic industries to the RE value chain.

If the transition towards a higher share of renewables in power generation is implemented in tandem with the enabling policies presented in this chapter and the proposed policies outlined in the chapter on job-related enabling policies, then the benefits of RE for industry can unleash even greater opportunities in the job market for communities and local people.

ENABLING POLICIES FOR CO-BENEFITS FOR THE INDUSTRIAL SECTOR

- Develop and implement an industrial strategy for RE target segments and sectors
- Grant tax reductions for locally-produced and labour-intensive RE contents, to support a high share of local content in products intended for renewable energy generation
- Establish and manage local energy transition clusters
- Initiate a RE-related research and development scheme and provide regular exchange formats to link R&D to the private sector
- Provide expert consultations and financing schemes, supporting businesses to build up renewable energy capacities for off-grid prosumption (i.e., producing and consuming their own renewable electricity)

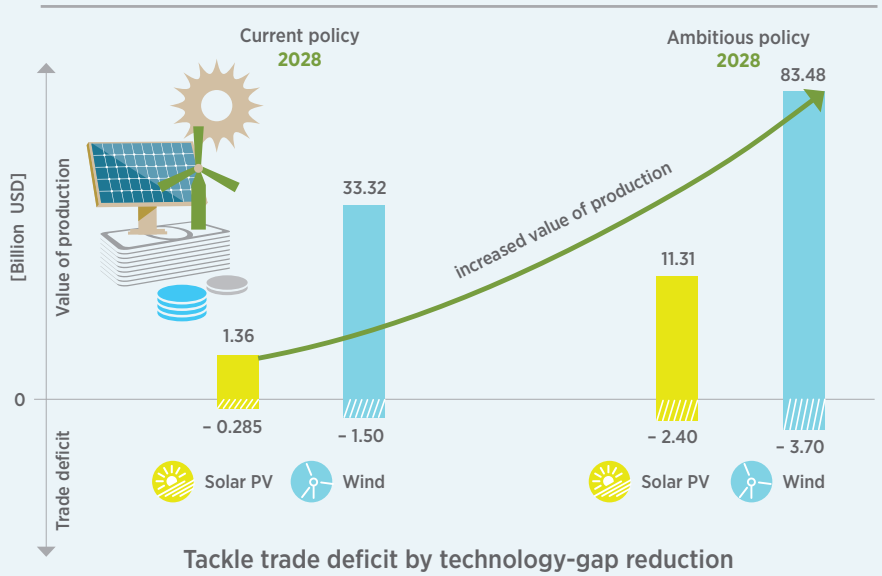
ENABLING POLICY

Develop and implement an industrial strategy for RE target segments and sectors

The co-benefits of decarbonising the power sector can be best translated into benefits for local communities if they go hand in hand with a tailored strategy supporting local industries actively in the RE sector and/or related industries, by removing existing barriers to the development of a domestic RE manufacturing industry (IASS/IPC 2019).

Based on a long-term perspective to increase the competitiveness of domestic industries, a strategy for RE industries and suppliers can summarise consistent actions to improve manufacturing capacities, and to foster RE deployment in – and local value creation by – small- and medium-sized enterprises active in target sectors and segments for the production of RE technologies (Vallvé et al. 2019).

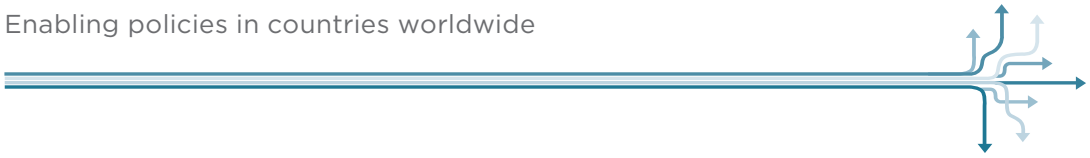
Increased renewable energy capacity can significantly boost industrial production in Turkey by 2028.



Tackle trade deficit by technology-gap reduction

GOOD PRACTICE EXAMPLE

Canberra's ACT Renewable Energy Industry Development Strategy from 2015 bundles actions and initiatives to develop a vibrant and export-oriented RE- industry in the Australian capital. Part of the strategy involves support schemes to build local expertise and facilitate strategic cooperation between businesses, government institutions, investors, and universities in the RE-sector. This includes various institutional support programmes and an RE-innovation fund (ACT Government 2015).



It is suggested that the development of an RE strategy and related actions targeting industry should begin with a comprehensive analysis of the country's or region's value chains, its competitive position and strategic advantages for certain parts and segments of renewable energy equipment, as well as its strengths and weaknesses in regional and global RE markets (Hagemann et al. 2019). The results of this analysis will allow suitable interventions to be identified and elaborated with respective stakeholders (ACT Government 2015). Experience from Tunisia and Egypt has proven that actions supporting and ensuring the high quality of manufactured RE components are especially important (Lehr et al. 2016, Lehr et al. 2017).

ENABLING POLICY

■ Grant tax reductions for locally-produced and labour-intensive RE contents, to support a high share of local content in products utilised for renewable energy generation

Co-benefits for industry can be best translated into socio-economic benefits for local communities if local content is increased. In particular, increased local shares of labour-intensive parts for the production of new components (plus the maintenance of existing plants) can create jobs and attract investment in local industries if designed carefully and tailored to potential opportunities for developing supply chains within the country (Hagemann et al. 2019).

Various mechanisms are available to ensure a minimum level of local content in RE equipment for the energy transition: Local Content Requirements (LCRs) determine that projects must use locally manufactured products or parts. They can be implemented as official requirements for international investors, or specified within public tendering procedures or private project procurements (IASS/CSIR 2019).

In order to counteract large price increases for RE equipment and a related slowdown in the expansion of RE-based power generation, LCR policies shall include measures promoting the cost competitiveness of local content in RE products (Donker et al. 2019).

Other measures to support local contents in RE projects include financial incentives such as tax reductions and exemptions, low-interest loans, the development of local RE clusters, or support for land acquisition and infrastructure (Vallvé et al. 2019).

ENABLING POLICY

■ Establish and manage local energy transition clusters

If renewable energy sectors and suppliers are still under-developed, the establishment of a RE cluster might provide a means of linking the energy transition with support for local manufacturers, businesses, and innovative start-ups.

An energy transition cluster can spur innovation and the productivity of the local RE sector, and unlock political and financial support programmes. It does so by connecting technology-specific companies and start-ups with industry associations, financial institutions, and interest groups, and by building up a coordinated representation of (political) interests (Vallvé et al. 2019). Energy transition clusters can further provide fiscal, advisory, and administrative services and communication networks to share data and information, or assist companies with training, education, and other technology-specific forms of support.

The development of an energy transition cluster in regions experiencing a structural transformation originating from the coal phase-out can offer these regions new socio-economic opportunities through the establishment of RE technology-driven small and medium-sized enterprises (SMEs) and businesses and the related creation of new, sustainable, and healthy businesses and jobs (Heinbach, Rupp & Hirschl 2017).

ENABLING POLICY

- **Initiate a RE-related research and development scheme and provide regular exchange formats to link R&D to the private sector**

The RE industry is an innovative sector characterised by the constant improvement and creation of new technologies; other industrial sectors also benefit from these innovations and technologies. Decision makers should thus prioritise measures to support new research and development schemes for renewable energy technologies.

Policies to create a favourable environment for innovations comprise measures to further improve the cooperation between universities, public research institutes, and the private sector; and financial support for public research in renewable energy technologies and related basic research.

INITIAL SITUATION

Local industries are trapped by their dependence on using electricity from the grid and are thus vulnerable to rising electricity prices and price fluctuations. This prevents them from taking advantage of (partially) independent power generation by renewables.

ENABLING POLICY

- **Provide expert consultations and financing schemes, supporting businesses to build up their renewable energy capacities for off-grid prosumption**

In times of increasing and strongly fluctuating energy prices, RE-based power prosumption can provide a good opportunity for local businesses and industries to make their power less dependent on market prices, and to cushion them against related price-shocks. RE electricity prosumption facilities are wind, small hydro, or wind power facilities owned and installed by companies and businesses, which produce electricity for the company's own consumption.

Governments can encourage the development and use of renewable energy-based prosumption facilities through the implementation of enabling policies that reduce the main barriers to a high share of RE prosumption. Such barriers include high initial investment costs, investment risks, and information deficits, among others (IRENA 2018). Information campaigns and the provision of expert consultation for interested businesses is a proven way of making local companies aware of the opportunities of RE-prosumption.

Another concept is the provision of development and incentive programmes, as well as financing schemes and capital cost subsidies to handle high initial investment costs and to incentivise companies to invest in installations for solar and wind-power prosumption in key industrial clusters (IRENA 2021b). In this context, it is crucial that funding programmes and financial schemes are designed for the long term, in order to reduce planning uncertainties for companies (IRENA 2021a). Other ways to incentivise investment by local industries might include making RE prosumption investments eligible for tax relief, such as by exempting SMEs from the value added tax that is typically due on self-produced electricity from RE sources.

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Renewable energies improving people's health and well-being

The decarbonisation of existing power sectors, and prioritisation of renewables in the planning of future energy systems, can save millions of lives by reducing present – and avoiding future – ambient air pollution. In turn, this can avoid costs amounting to billions of dollars for public and private health care, as well as monetary losses due to lost working time (Huxley et al. 2021).

Most of these positive effects are unbundled automatically if electricity systems are converted towards the extensive use of renewables combined with simultaneous reduction of coal, oil, and gas dependence. However, some specific policies are able to enhance the positive effects of air quality-related co-benefits by ensuring that they unfold where communities benefit most or at locations that are most affected.

ENABLING POLICIES FOR AIR QUALITY AND HEALTH BENEFITS

- Carry out structured, indicator-driven decommissioning of coal-fired power plants
- Improve data collection, monitoring, and data transparency in the power sector–air quality–health nexus
- Support interdisciplinary research and knowledge exchange programmes on the power generation–air quality–health nexus
- Build up inter-ministerial working groups for cooperation and power-sharing, to seize the air quality and health opportunities of decarbonising the power sector
- Convert municipal power supplies for public buildings and spaces to RE-based sources, to improve air quality in and around urban centres
- Initiate a planned decommissioning process that takes aspects of inequality and environmental justice into account

INITIAL SITUATION

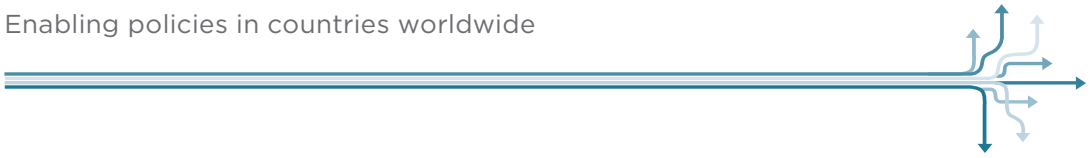
The exact health risks of individual coal-fired power plants are often not quantified or are not (sufficiently) considered when planning the decommissioning of coal-fired power plants; this prevents the priority closure of those coal-fired power plants posing the highest risks to public health.

ENABLING POLICY

- **Carry out structured, indicator-driven decommissioning of coal-fired power plants**

Once coal-fired power plants can be retired and their existing capacities replaced by renewables, the decommissioning process should be planned and implemented in a manner that maximises public health benefits.

A suitable tool to achieve this goal is a nationally coordinated decommission planning process utilising a health-based matrix for decision making (Huxley et al. 2021). Such an indicator-driven process is also suitable for identifying existing information gaps and organising



the collection of respective data. Key indicators defined in the matrix could include, for example, plant emission levels, projected deaths caused by air pollution from the plant, and the population density of affected areas in the immediate vicinity of the plant (IASS/UfU/TERI 2020).

With this mainstreaming of health-related aspects in the decommissioning process, the priorities for the retirement of power plants can be planned in such a way that those plants being particularly hazardous to public health are taken off-line first. In turn, this can maximise co-benefits in the area of public health by closing the most polluting plants at the earliest stage in the decommissioning process.

GOOD PRACTICE EXAMPLE

The C40 Network has created a coal phase-out scenario for cities in major coal-consuming countries. The trajectory aims to maximise the climate and health benefits accompanying the decarbonisation of the power sector. The model includes several indicators on which a calculation of the health impacts of electricity generation for cities are based, including (among others) the age, technology, and water and air pollution impacts of individual coal plants (Huxley et al. 2021).

INITIAL SITUATION

There is a lack of accurate, reliable, and continuous data to evaluate the impacts of the power sector on air quality and public health, and to monitor the effects of measures taken to reduce negative impacts.

ENABLING POLICY

- **Improve data collection, monitoring, and data transparency in the power sector–air quality–health nexus**

Reliable and up-to-date data sets are essential for producing high-quality modelling scenarios in order to quantify the health and air quality impacts of the power sector. This comprises data related to the power sector, emission sources and quantities; ambient air quality; and health-related data such as mortality and morbidity statistics, health system costs, or parameters such as exposure–response relationships. Often, data are not collected at many locations and/or on a continuous basis, resulting in low accuracy and reliability. In other contexts, not all necessary data are available to scientists or citizens.

An analysis of existing data gaps – and their causes – in the power planning–health nexus are prerequisites for incentivising action to improve the collection and exchange of data and broadening the access to relevant information for researchers. Based on the results, decision makers can tailor enabling policies for improved data collection and processing.

Example policies to support the collection and transparency of emission and air quality data include support for programmes to install, maintain, and evaluate automatic air-quality monitoring stations – with a focus on areas that have dense populations, power generation facilities, or heavy industrial complexes; the development and implementation of policies making the operation of continuous emission monitoring systems (CEMS) with automatic data transfer a precondition for operating power production facilities and heavy industry complexes; and the establishment of independent emission monitoring and law enforcement for power plants through third-party assessments, including provisions for the necessary finance and personnel (IASS/UfU/GreenID 2020). This can be combined with programmes for health-related research that support more systematic collection and analysis of mortality, morbidity, and other health-related data in the context of the power sector, as well as more in-depth analyses of the connections between air quality and health issues (IASS/IPC/UfU 2020).

Scientists and researchers can take action by making the methodologies, assumptions, and associated implications used in modelling the health impacts of the power sector transparent to the public, and by opening them to consultation and discourse among citizens and stakeholder groups (IASS/UfU/IET/CSIR 2020). Their research can thereby gain greater credibility among stakeholders and form part of the negotiation process for planning and implementing a just transition.

INITIAL SITUATION

Research and knowledge on the interconnections between power sector system planning, ambient air quality, public health, and related cost factors are still in their early stages.

ENABLING POLICY

- **Support interdisciplinary research and knowledge exchange programmes on the power generation–air quality–health nexus**

In many countries, research on the interconnections between power system planning, air quality, and health is still in the early stages. Thus, accelerated background research on the health externalities of different types of power generation technologies is needed to facilitate informed planning in the energy sector. Possible activities to expand research in the power planning–air quality–health nexus include measures to unbundle financial and political support for projects and programmes that incentivise an interdisciplinary knowledge exchange among scientists working in these disciplines (IASS/UfU/GreenID 2020). This can be accompanied by the expansion of (international) technology transfer programmes and incentives, including mutual learning formats about internationally acknowledged methods for modelling pollutant dispersion and exposure (IASS/UfU/IET/CSIR 2020).

Another option for scientific and budget synergies is to make use of overlapping measurement technologies for air pollution reporting and the reporting of greenhouse gases as defined in the Paris Agreement. With scenario-based assessment tools such as LEAP (Low Emissions Analysis Platform), pollution and greenhouse gases in National Communications and Biennial Reports can raise awareness of the close connections between the dissemination of renewable energies, climate change mitigation, and air quality, plus health co-benefits, and record accomplishments in all areas (Dominican Republic & SEI 2021).

INITIAL SITUATION

Silo mentalities in decision making; barriers between institutions responsible for air quality, health, and energy planning; and between governance levels prevent energy planning that takes into account co-benefits for affected populations

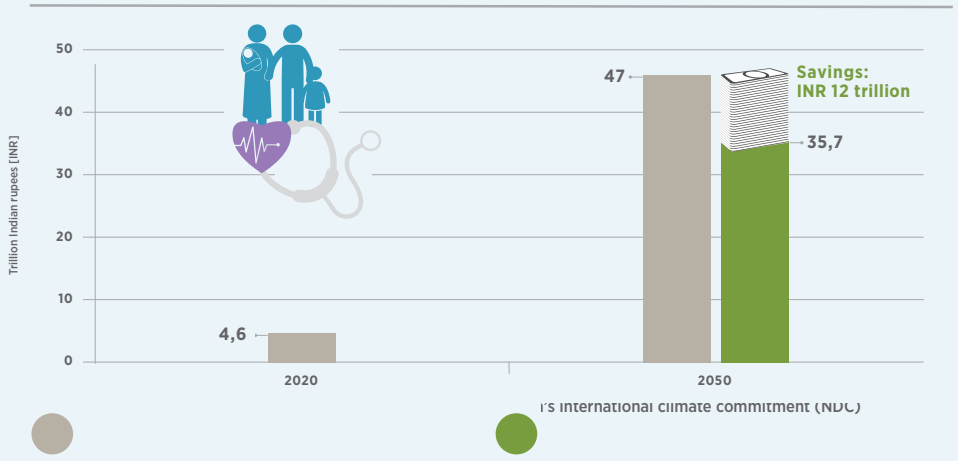
ENABLING POLICY

- **Build up inter-ministerial working groups for cooperation and power-sharing, to seize the air quality and health opportunities of decarbonising the power sector**

The air quality and health co-benefits of decarbonising the power sector are well documented. Often, cost–benefit problems present barriers to increasing the share of renewables in the power sector and to profiting from related health benefits: For example, the costs and efforts of planning and implementing a transition to renewable energy are a matter for energy ministries, whereas the air quality and public-health improvements resulting from these investments benefit the objectives of other ministries. This and similar problems of non-holistic planning are often the cause of delays in the expansion of renewables, even if the initial monetary costs are outweighed by the resulting health benefits.

It is thus essential to create incentives for sectoral departments with decision-making powers to follow a forward-looking programme of power planning, considering air quality and health benefits and thus improving the overall balance of co-benefits, even if the decision-making or funding department might not benefit directly. This can be implemented best by breaking down institutional barriers, creating bridges between sectors, and by strengthening inter-ministerial coordination between governmental departments such as energy, environment, air quality, and the department of health, or similar.[2] A first step towards this aim could be the establishment of an interdisciplinary co-benefits council, as was implemented in the COBENEFITS focus countries.

India can significantly unburden health budgets by greening the economy and deploying renewable energy.



ENABLING POLICY

■ Convert municipal power supplies for public buildings and spaces to RE-based sources, to improve air quality in and around urban centres

Many of the potential beneficiaries of air quality and health improvements from the closure of coal power plants live in urban areas.

Increasing the influence of city governments and citizen initiatives in power sector planning processes can thus make it easier to integrate air quality and health co-

[2] According to results from expert working groups in the COBENEFITS Climate Opportunity Conference, 2019.

benefits into energy-related decision making that directly benefits affected populations in metropolitan areas.

Increased ambition for integrated air quality and climate change planning at the city or regional level provides opportunities for health-sensitive power sector planning (MNREb). Indications, ideas, and demands from city authorities should be accorded sufficient weight in national electricity planning. This can be achieved through direct and indirect approaches, depending on the extent to which decision-making competencies for power sector planning are devolved to more localised policy-making levels.

The participation of city governments in national and regional power planning can ensure that a majority of affected citizens benefit from existing opportunities to improve co-benefits relating to air quality and health. Participation in regional and national air quality planning may be especially necessary where urban air pollution levels exceed national standards at locations where large emission sources such as coal-fired power plants lie outside the city's administrative boundary (Huxley et al 2021).

GOOD PRACTICE EXAMPLE

Since 2020, the city of Sydney has powered all municipal infrastructure, such as depots, pools, sports fields, and the lighting of streets and buildings, with 100% locally generated and renewable electricity. This reduces the municipality's own air pollution emissions, thereby contributing to better ambient air quality in and around the city (City of Sydney).

INITIAL SITUATION

Low-income and/or underprivileged communities do not enjoy a fair share of the air quality- and health-related co-benefits of power sector decarbonisation

ENABLING POLICY

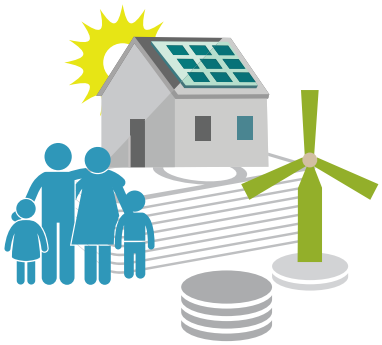
- **Initiate a planned decommissioning process that takes aspects of inequality and environmental justice into account**

Studies (Lane et al 2022; Gouveia et al 2022) show that low-income and underprivileged communities are often disproportionally affected by hazardous air pollution. Diana et al. (2021) and Richmond-Bryant et al. (2020) found that in the USA, People of Colour would benefit less from power system decarbonisation processes than would White Americans, if such processes failed to consider social aspects.

Air quality improvements that go along with the transition towards higher shares of renewables in the power system create opportunities to advance issues of environmental justice by reducing existing inequalities. However, related studies also showed that these issues are not solved by the implementation of decarbonisation policies alone: It is also necessary to include aspects of environmental justice in the design of power sector policies (Boyce et al. 2018).

A planned decommissioning process that takes inequality aspects into account is an example of a combination of both aspects. Another option is the establishment of regulations obliging electricity companies to include both an increase in RE shares and measures to reduce injustices experienced by underprivileged communities within the company's power planning (Diana et al. 2021). First assessments show that the introduction of environmental justice aspects in power planning can be implemented at a reasonable cost (Ibid).

Renewable energies giving access to secure and affordable power for all



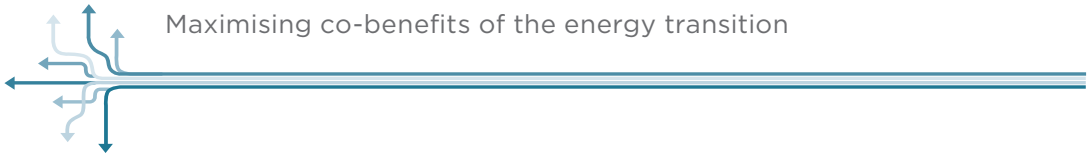
In this COBENEFITS performance category, two types of co-benefits were assessed: First, energy access, defined as the electrification of communities currently lacking access to electricity. Second, energy security and income at the household level, which includes more complex aspects of access to energy: The focus lays here on the provision of income and other assets at the household level, which ensure the uninterrupted availability of energy sources at an affordable price and over the short, mid- and long-term.

Maximise co-benefits of increasing energy access for underprivileged and rural communities

In 2019, more than 770 million people worldwide still lacked adequate access to electricity (IEA a). Most of them live in remote, rural areas where connection to the centralised grid is difficult. Off-grid and mini-grid solutions, so-called decentralised renewable energy (DRE) solutions, are often the best and cheapest way to electrify these areas (IEA et al. 2019; IASS/GreenID 2019). Opening access to electricity with these additional RE solutions gives people in remote areas access to related socio-economic opportunities (Power For All 2021). The promotion of power sector decarbonisation should thus be accompanied by enabling policies that support communities in harnessing the full potential of energy access opportunities and related secondary benefits (IASS 2021a).

ENABLING POLICIES FOR CO-BENEFITS IN THE DIMENSION ENERGY ACCESS

- Integrate Distributed Renewable Energy (DRE) solutions into electricity sector strategies and into state legislation, plans, and programmes
- Plan and carry out easily accessible education and advocacy campaigns tailored to communities in rural areas
- Plan and implement a strategy for the extension of DRE access that actively identifies, considers, integrates, and supports marginal communities interested in DRE solutions
- Consider electricity supply for community facilities when planning and implementing a DRE extension strategy and untangle further rural development opportunities
- Integrate the expansion of decentralised RE into rural and agricultural development strategies
- Establish and maintain a systematic database on mini/off-grid programmes, and tailor indicators to local circumstances by making use of community participation programmes
- Keep mini-grid and off-grid renewables as alternatives and backup options



INITIAL SITUATION

A focus on grid extension as the dominant solution to energy access can hinder the use of RE mini-grids and RE stand-alone options as suitable and low-cost alternatives for the electrification of remote areas

ENABLING POLICY

- **Integrate Distributed Renewable Energy (DRE) solutions into electricity sector strategies and into state legislation, plans, and programmes**

Various scientific studies have shown that mini-grids based on renewable energies are and will be the least-cost electrification solution for millions of people (Kahlen et al. 2021). This is especially true for remote areas, where costs for grid extension are high and average prices for connections to mini-grids are estimated to fall (Ibid).

Despite their clear advantages, the potential of RE mini-grids and off-grid solutions to support energy access in remote areas still seems to be underestimated. Thus, electricity access plans and electricity sector development and planning should give greater consideration to the expansion and integration of RE mini-grids and other off-grid solutions (IASS/GreenID 2019).

Suitable steps to elevate the status of mini-grid and off-grid RE solutions to support energy access in remote areas can include assessments that calculate and compare the costs of different options for rural electrification (ideally including a price for carbon) and, based on the assessment results, the elaboration of clear plans and strategies to support the dissemination of mini-grid and off-grid solutions. To reduce uncertainties for investors regarding electricity demand, it is crucial to find suitable ways to align the use of RE mini-grid and off-grid solutions to the extension of the grid (Kahlen et al. 2021).

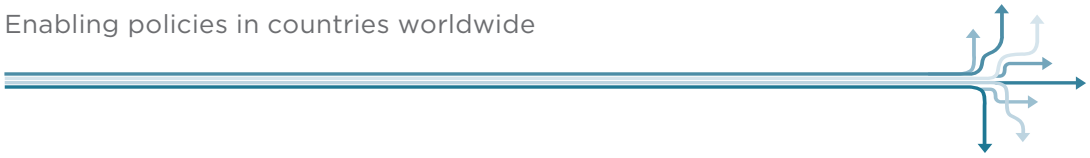
INITIAL SITUATION

Communities may be unfamiliar with stand-alone and mini-grid systems and sceptical of their access and reliability

ENABLING POLICY

- **Plan and carry out easily accessible education and advocacy campaigns tailored to communities in rural areas**

There is often a lack of awareness and trust in renewable energy systems, especially among communities that are not grid-connected. Many of these concerns are still based on outdated information that do not take into account the rapid development of DRE solutions in recent decades. With well-planned education and advocacy campaigns focusing on communities in rural areas not connected to the grid, these outdated concerns can be addressed and communities can be convinced of the many benefits of using Distributed Renewable Energy solutions. Campaigns should be easily accessible, tailored to the individual circumstances in rural areas, and proactively contact local communities.



INITIAL SITUATION

In the process of establishing DREs and related subsidies, the most vulnerable and marginalised sections of society are often overlooked, not prioritised, or difficult to reach

ENABLING POLICY

- **Plan and implement a strategy for the extension of DRE access that actively identifies, considers, integrates, and supports marginal communities interested in DRE solutions**

Although DRE provides some of the best options for ensuring access to energy by underprivileged communities living in remote areas, it is the case that communities in the "last mile" are not reached by electrification programmes (Practical Action 2019). There are multiple reasons for such failings.

DRE programmes should therefore include mechanisms and solutions to ensure that very remote and socio-economically disadvantaged households, including those that might not be listed in official resident registration registers, can access off-grid renewables. Most state-planned electrification programmes are based on a top down planning processes, building up upon central planning data rather than on information collected with communities at the location itself. Planning processes should thus be complemented by critical bottom up planning elements. This includes, for example, the use of indicators developed with the participation of affected local communities, the outcomes of participatory planning workshops, results from on-site surveys, and flexibility in the coverage of non-electrified households when realities differ from official resident registration data (Ibid). Another aspect to be considered in the preparation of DRE electrification programmes is strategies and indicators supporting greater inclusion of women in related energy access strategies.

INITIAL SITUATION

Community co-benefits of DRE extension are not fully unlocked because energy access planning and implementation focuses on private households and lighting

ENABLING POLICY

- **Consider electricity supply for community facilities when planning and implementing a DRE extension strategy and untangle further rural development opportunities**

When expanding decentralised renewable energy sources to improve energy access, strategies should not be limited to household lighting. Despite being an important step towards energy access, lighting alone does not ensure comprehensive improvement in the broader range of socio-economic living conditions associated with electricity provision (IASS/SERC 2021). Going beyond households, and incorporating the electrification of community facilities into DRE-based energy access plans, unbundles greater opportunities for further socio-economic development in rural communities.

Socio-economic co-benefits appear to be especially comprehensive when the electrification of community education and health facilities, such as rural clinics, schools, and streetlights, form part of DRE access strategies (Kahlen et al. 2021). Studies show that the proposed extension of energy access programmes does not result in significantly higher costs (Power for All 2019); On the contrary: It untangles additional benefits from which the most vulnerable communities benefit the most. Furthermore, investments in education and health facilities are also among the highest priorities for most communities in rural areas.

Rural communities should be involved from the outset in planning for the expansion of energy access with DRE. In this way, relevant priorities and 'low-hanging fruit' – that can successfully unlock the co-benefits of expanding energy access through distributed renewable energy – can be identified and leveraged.

INITIAL SITUATION

A lack of coordination between authorities responsible for rural development and energy access can cause existing co-benefits to be overlooked and thus unfulfilled

ENABLING POLICY

Integrate the expansion of decentralised RE into rural and agricultural development s trategies

The expansion of energy access and agricultural development are affected by similar market failures, e.g., in the areas of consumer financing, last-mile distribution, and access to market intelligence (IFC 2019). Through the intelligent integration of electrification and agricultural transformation strategies and by making use of technologies at the intersection of renewable energies and farming, synergies can be leveraged to overcome these market barriers.

GOOD PRACTICE EXAMPLE

The National Electrification Strategy of Kenya included the systematic integration of off-grid RE solutions for power generation, such as stand-alone solar home systems, into priority options to expand electricity access in rural and remote areas across the country (Government of Kenya 2018).

Especially when extending energy access to cover the daytime periods of higher consumption, electrical appliances used in various agricultural value chains seem to be suitable transition technologies (IFC 2019). Cooperation among public administrations responsible for agriculture and rural development, and authorities responsible for the energy sector can support these developments This can also lead to the establishment of innovative business models in the agricultural sector (Power for All 2020).

INITIAL SITUATION

Incomplete data on energy access and mini/off-grid programmes, and differing definitions of terms and indicators related to energy access, result in an only limited understanding of what access should look like and what types of RE tools should be prioritised.

ENABLING POLICY

- **Establish and maintain a systematic database on mini/off-grid programmes, and tailor indicators to local circumstances by making use of community participation programmes**

Energy access policies are mostly based on incomplete data and also suffer from inconsistent definitions of terms. Indicators for measuring energy access are often subjective, and their choice always includes a normative component (Pachauri et al 2012). It is thus necessary to utilise local knowledge to design appropriate indicators, taking into account the needs of beneficiaries, as well as the living conditions of families and communities targeted by energy access policies (IASS 2017a).

A first step towards improving these necessary data sources can involve providing funding for the development and maintenance of a systematic database on important trends, and for the monitoring and evaluation of mini-grid and off-grid programmes (IASS 2016b).

Another key action to improve data collection and indicator development is support for community participation. Through well-financed and well-managed community participation programmes designed for long-term involvement, local knowledge can be utilised and scaled up to practical application: This can be used to tailor suitable indicators and to collect and systematise the necessary data.[3]

[3] These suggestions were collected by experts during the Deep Dive Workshop Energy Access at the Climate Opportunity 2019 conference, taking place on 15 and 16 October 2019 in Berlin, Germany.

INITIAL SITUATION

The arrival of the central grid at previously unconnected locations supplied with mini-grids and off-grid renewables might displace installed RE capacities due to lower, subsidised "grid" electricity prices

ENABLING POLICY

- **Keep mini-grid and off-grid renewables as alternatives and backup options**

Experience from India has shown that the stress test for mini-grids and off-grid renewables occurs when the central grid arrives at their locality and brings less expensive electricity (IASS/TERI 2019).

Here, policies and initiatives need to be established that prevent a price-induced halt to mini-grid and off-grid renewables. This includes mechanisms to ensure the co-existence of mini-grids with the central-grid, and establishing mini-/off-grids as an alternative in case of power outages and similar (Ibid). Options here include innovative and strategic policies, and integrated implementation strategies that incorporate both complementary grid and off-grid solutions (IEA 2020). This includes incentive schemes to enhance individual mini-grid capacities to keep renewables competitive with the central grid, and to enable mini-grid developers to transfer the assets of their system to state-owned facilities once the central grid arrives (IASS/TERI 2019).

Maximise co-benefits, increasing income and energy security at the household level

Electricity from renewable energy sources generates financial profits, especially after the usually high investment costs have been repaid after several years.

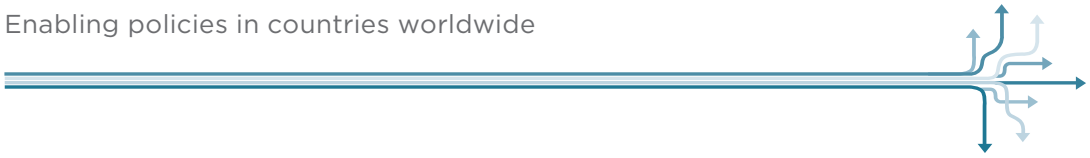
Thus, renewable energies also have the potential to provide financial relief to disadvantaged households. This in turn can improve energy security and free up financial resources for households, which then can be used to improve education, nutrition, and other needs.

However, the coupling of renewable energy rewards to the improvement of (financial) energy security is not a 'no-brainer' (Pereira et al. 2021). Rather, it depends heavily on the design of individual projects defining who will share the financial gains from renewable energy generation.

A well-conceived enabling policy framework can encourage equitable sharing of surpluses from RE deployment with consumers and citizens, which can in turn lead to greater income generation for households and to improved household energy security. This might consist of the following enabling policies:

ENABLING POLICIES FOR CO-BENEFITS CONCERNING ENERGY SECURITY AND INCOME AT THE HOUSEHOLD LEVEL

- Support community-oriented ownership schemes and prosumer options for small- and mid-scale RE projects
- Incentivise reinvestment of RE surpluses into projects and initiatives supporting local social infrastructure, communities, and households and make female employment mandatory for public RE projects



INITIAL SITUATION

Profits from RE projects do not reflect the contributions of local communities

ENABLING POLICY

- **Support community-oriented ownership schemes and prosumer options for small- and mid-scale RE projects in villages**

Local communities and households that can participate economically in renewable energy projects have the opportunity to directly gain from the resulting surpluses (IASS/CONECC/GIZ 2019). Furthermore, share-holding by local households can establish confidence and increase local support for renewable energy options.

Community-oriented ownership schemes such as community shares, mini bonds, revenue-based financing, and co-investment in communal off-grid solar are proven tools that simultaneously increase the financial ownership of local citizens, improve household income and energy security, and increase local private investment (Ibid). They should be explored by local and regional governments, to reach out to smaller-scale investors and to foster locally shared investments. To create suitable conditions for economic participation by citizens and local households, state governments can introduce national programmes that support initial investment by municipalities, households, and small businesses in renewable energy projects. Meanwhile, local governments can explore ways to cooperate with local banks and investors to foster civic or citizen-owned businesses and initiatives in the renewable energy sector (Heinbach et al. 2017).

Local ownership initiatives should be accompanied by an assertive communication strategy to encourage potential local investors; and by guidance documents for decision makers at all levels, sharing details on how and when to engage with local stakeholders and communities, and on suitable methods and examples of good practice (IASS/UfU/IET/CSIR 2020).

INITIAL SITUATION

Profits from RE projects do not reflect the contributions of local communities

ENABLING POLICY

- **Incentivise the reinvestment of RE surpluses into projects and initiatives supporting local social infrastructure, communities, and households**

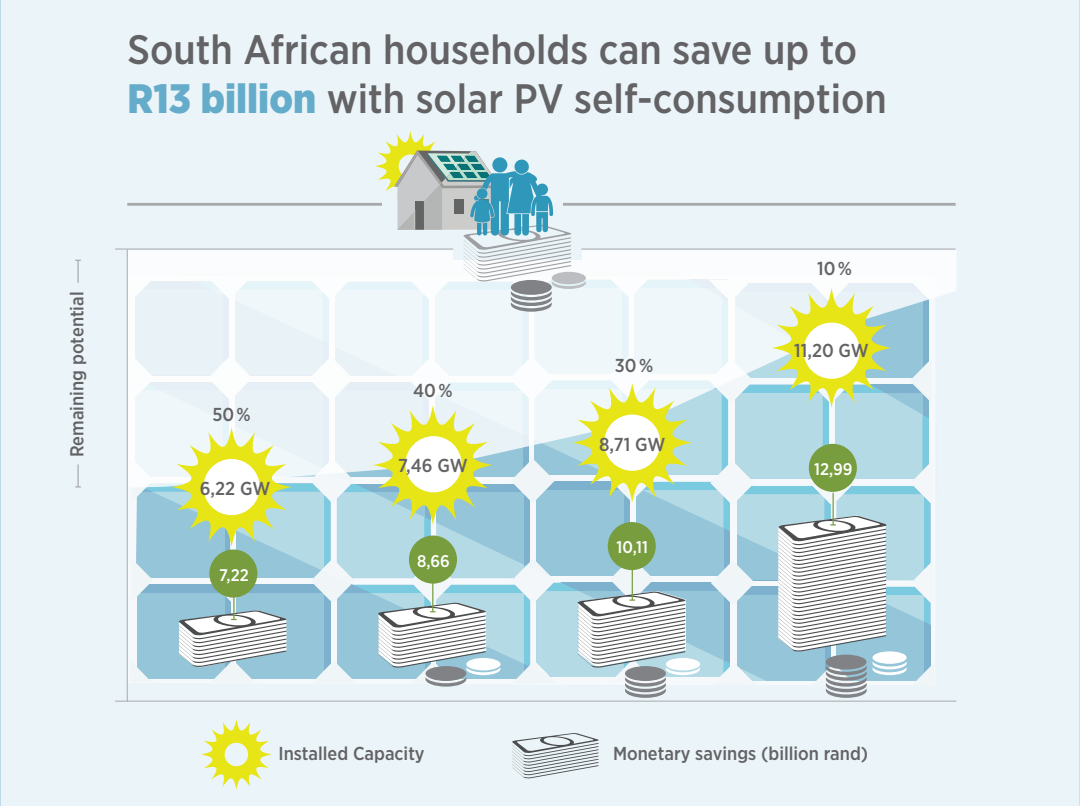
If surpluses from renewable energy generation are shared in ways that take social aspects into account and ensure appropriate involvement of local residents, this can directly and indirectly improve local household incomes. This can contribute to greater energy security at the household level. Such reinvestments can be fostered in various ways:

Surpluses can be taxed such that the resulting revenue is ringfenced for investment in social infrastructure supporting disadvantaged households. Energy- and revenue-generating institutions and companies can be required, through corresponding guidelines in tendering processes, to ensure the financial participation of local (disadvantaged) households. Another way to ensure this is the implementation of a framework promoting local community support (IASS 2022, IASS/CSIR 2019).

For public schools and hospitals, authorities at the municipal level can establish incentive mechanisms, so that they benefit directly from the potential energy costs savings and GHG mitigation reductions associated with RE projects (Ibid). They can ensure that users of public facilities benefit from better social infrastructure, which in turn often leads to cost savings for households.

GOOD PRACTICE EXAMPLE

The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) of South Africa is a unique procurement policy channelling the benefits of RE deployment from independent power producers (IPPs) to local communities near RE project sites. To this end, a suitable legal framework and respective measures were established. This includes local employment quotas, community ownership in RE projects, and a settlement with IPPs to allocate a proportion of their revenue to socio-economic development (SED) and enterprise development (ED) spending (IASS/CSIR 2019)



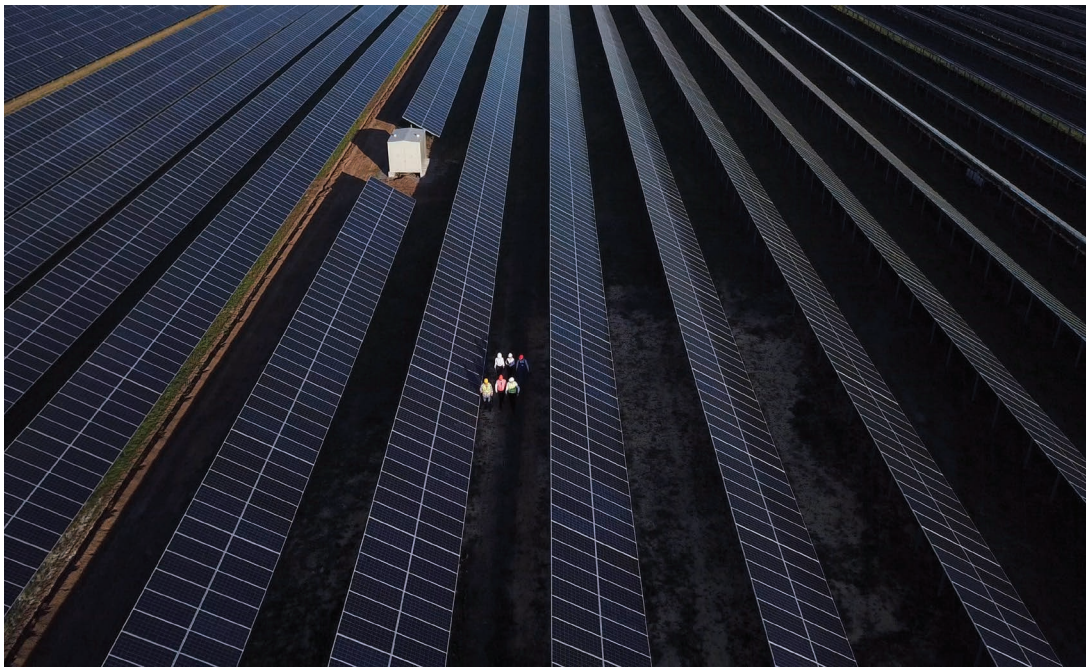
Renewable energies mitigating conflicts over scarce resources

A higher share of solar PV and wind in power generation systems reduces the need for land and water. These co-benefits automatically accompany decarbonisation of the power sector if land is not utilised for bioenergy. However, when combined with further enabling policies, land and water use can be further reduced, or reduced at the most suitable location. In this way, the potentials of renewable energies to mitigate conflicts over scarce resources can be maximised.

Maximise co-benefits supporting reduction of land-take for energy production

Electricity generation and transmission/distribution structures significantly affect soils and disrupt landscapes. With the exception of biomass and large hydropower projects, renewable energies have relatively small direct land use footprints, especially when compared to other sources such as coal, nuclear, or petroleum-based fuels. The mostly non-intensive land use of renewables also allows – in contrast to most non-renewable sources – other simultaneous land uses on the same area (Hertwich et al. 2015). A major advantage of renewable energies is that a sustainable management plan allows the repeated use of the same site for energy generation, whereas conventional "extractive" energy sources need to expand their land-take once a site's resources have been depleted (Trainor, McDonald & Fargione 2016).

Regarding land use, a higher share of renewables in power generation is thus clearly advantageous to fossil energy options. The COBENEFITS project did not publish its own study to quantify land-use related co-benefits of RE generation. Therefore, a short overview is presented, of enabling policies to maximise the co-benefits for land use, which is based on a study by Fritsche et al. (2017) conducted for UNCCD and IRENA. Given the high need for biomass-related land use options and the complex issues surrounding reduction of land-take for bioenergy purposes, the proposals presented here focus on solar PV and wind power generation only.



ENABLING POLICIES FOR CO-BENEFITS FOR LAND USE

Develop and monitor socio-cultural project standards	The development and implementation of socially inclusive and actor-oriented, systemic indicators for sustainable land use of RE deployment can mitigate conflicts, increase the acceptance of renewable energies, and help to identify regionally adapted solutions (IASS 2022). Indicators should take non-economic values of land for local communities into account, and should be developed and monitored in partnership with them.
Use potentials of smart land use planning	Land use planning can further reduce land conflicts when it encourages the adoption of those uses that best meet people's needs, when it respects non-economic and traditional values of land, and when it safeguards valuable resources for future generations. Therefore, land use planning should always consider the avoidance of land uses associated with non-renewable energy, especially coal (Fritsche et al. 2017).
Reduce transmission infrastructure	The support of smaller-scale, decentralised RE systems and combined solar/wind operations have potential to reduce the area necessary for power transmission (Ibid).
Support RE co-location	So-called co-location technologies and approaches combine land uses for renewable energies with other productive land uses, such as food or bioenergy production. This can mitigate potential sources of conflict and further reduce the land footprint of electricity generation projects (Ibid).
Use potentials of marginal and degraded land	The use of contaminated land unsuitable for agriculture (such as post-mining areas) for power generation from solar and wind has the potential to further decrease the already small land use effects of renewables (Hartmann et al. 2016).

Maximise co-benefits supporting efficient use of water

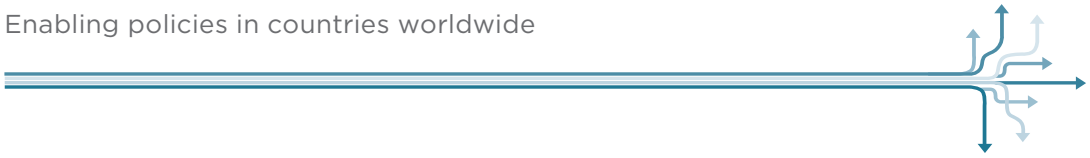
Present forms of global power generation are water intensive: All parts of the electricity generation process, which globally is mostly based on oil, coal, and gas, require significant water inputs. Shifts in water availability and quality, caused by greater water demand, an increase in competitive water uses, and the impacts of climate change, are among the reasons for reduced reliability of supply and sub-optimal operation of the energy system, which can in turn lead to higher energy production costs and electricity prices (IRENA 2015).

Nuclear power, gas, oil, coal, and also biofuels are all water-intensive sources of electricity. The broader use of wind and photovoltaics in electricity generation, however, can significantly reduce water consumption compared to the use of fossil fuels (IEA 2020). Therefore, the transition towards a higher share of less water-intensive, low-carbon technologies in the power generation system offers the opportunity to tackle both climate change and water shortages.

Enabling policies to deliver water-related co-benefits include:

ENABLING POLICIES FOR CO-BENEFITS CONCERNING WATER AND WATER USE

- Prioritise the installation of renewable energies in areas where water is already scarce or is predicted to be scarce in the near future
- Integrate indicators for water planning into energy-planning software and tools
- In rural and focus areas, introduce and support RE technologies and solutions that provide and secure access to clean drinking water



INITIAL SITUATION

Energy generation is planned in an area defined as water-scarce or as being at risk of water scarcity in the future and/or subject to the effects of climate change

ENABLING POLICY

- **Prioritise the installation of renewable energies in areas where water is already scarce or is predicted to be scarce in the near future**

Solar PV and wind power are less water-intensive technologies for power generation. Because electricity generation based on these renewable sources emits only very low amounts of greenhouse gases, they also support the mitigation of climate-change-induced water risks (Helgenberger 2016). Decision makers should therefore give solar PV and wind energy priority in electricity generation and supply planning for water-scarce regions. They also need to work towards increasing the shares of solar and wind in the power generation matrix. This development should ideally go hand-in-hand with the earlier retirement of older, less efficient, and thus usually more water-intensive coal power plants in regions of water scarcity or at risk of future water scarcity (World Bank Group 2018).

Management of water resources within the energy sector can be further improved by charging power plant operators an appropriate price for water. Especially in water-scarce regions, a pricing structure that reflects the actual costs of water supply can accelerate the transformation of the power sector towards a greater share of less-water-intensive renewables (World Bank Group 2017).

The incorporation of regional water costs and water supply constraints into energy models for power planning is a suitable tool to support the introduction and expansion of water-smart decision making and planning in the energy sector (World Bank Group 2018).

INITIAL SITUATION

A silo mentality among the separate authorities responsible for energy and water planning, as well as a lack of water–energy interactions prevent the integrated planning of both sectors

ENABLING POLICY

- **Integrate indicators for water planning into energy-planning software and tools**

Interdisciplinary research and coordinated energy and water planning are in many countries still in their infancy, resulting in a shortage of data, models, and future scenarios necessary for informed decision making (IASS 2016a).

Activities that support interdisciplinary research and that create closer institutional ties between key water- and energy-planning authorities offer great opportunities to establish an integrated policy and planning framework for addressing water–energy challenges (World Bank Group 2017).

A first step is to establish interdisciplinary, inter-authority working groups, working with scientists from both fields to identify underlying water risks associated with energy planning and to propose possible solutions. A joint, easily accessible database for the energy–water nexus, which also includes data on renewable energy and water demand, can support further research and enable better-informed decision making for energy–water issues (Dahl & Drews 2019).

GOOD PRACTICE EXAMPLE

South Africa embedded water supply and infrastructure options, water constraints, and a spatial dimension of water demand into an energy planning tool at the national level. The South African government was thereby able to explore the water-related impacts of different energy policy scenarios, which in turn helps to avoid stranded energy and water investments and to reduce power-related water shortages (World Bank Group 2017).

INITIAL SITUATION

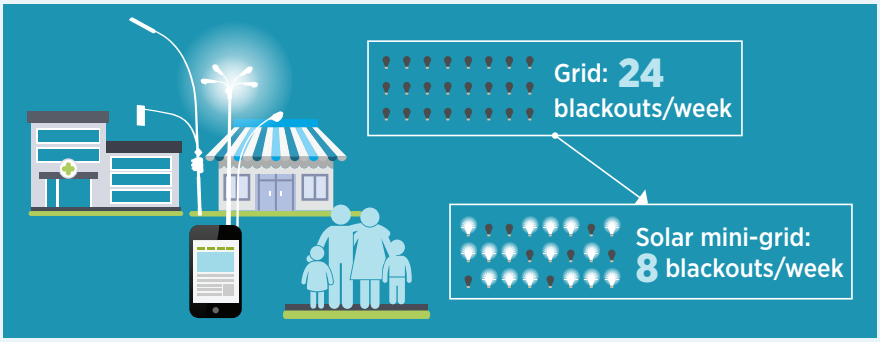
Inhabitants in rural areas lack regular access to both clean drinking water and energy

ENABLING POLICY

- **Introduce and support RE technologies and solutions that provide and secure access to clean drinking water in underprivileged and rural areas**

Around two-thirds of the inhabitants of rural areas that lack access to clean drinking water also have no access to electricity. Many solutions and technologies that provide access to electricity are also useful to deliver access to water (Walton 2019). This tandem approach creates opportunities to use these technologies to coordinate solutions providing access to both water and electricity. Here, renewable energies are a crucial part of the solution: RE mini-grids can, for example, produce the necessary electricity to power reverse osmosis systems and other water filtration systems, and solar PV water pumps can enable water pumping or replace more expensive hand-powered and diesel pumps to receive drinking water and water for agriculture (Ibid). For those systems, high investment costs are the main barrier. Setting up financing schemes such as affordable credit mechanisms contributes to more widespread adoption of these opportunities, as do awareness-building campaigns in rural areas and capacity-building programmes that provide technical skills for system maintenance (IRENA 2015).

In rural India, mini-grids significantly improve the reliability of supply for municipal services and basic household energy needs.



No regret: Enabling policies supporting all co-benefits

The COBENEFITS project has identified a number of activities that could create an enabling environment to tap the full potential of various co-benefits covering multiple dimensions of community well-being. Their influence goes beyond maximising the co-benefits of individual categories.

Establish spaces and opportunities for continual, goal-oriented cooperation and coordination across sectors, public authorities, and stakeholders

A just transition, combining the decarbonisation of the power system with widespread socio-economic co-benefits for local communities, requires coordinated planning and implementation across sectors, authorities, and stakeholders. At national and regional levels, the COBENEFITS project established inter-ministerial co-benefits councils. With their focus on a collective leadership process, co-benefits councils have great potential to align and engage diverse departments in a common course of action to maximise the positive co-benefits of RE deployment.

GOOD PRACTICE EXAMPLE

South Africa, Vietnam, and other focus countries of the COBENEFITS project established inter-ministerial working groups as a platform to engage departments in a common course of action to maximise the co-benefits of RE deployment. Joint activities in the CobCons included the prioritisation of co-benefits, and the planning and coordination of joint actions to create an enabling environment to harness co-benefits.

In the case that the majority of the structural changes associated with the energy transition occur in specific focus regions, it is recommended to establish an inter-sectoral body to regulate and accompany these structural changes and their many aspects in the affected regions. Such an institution can monitor the various aspects of change; solicit necessary studies and expert consultations; initiate, moderate, and lead inter-sectoral discussions between stakeholders; and establish coordinating governance structures that integrate various policy sectors to support common objectives.

Increase the collection and inter-sectorial availability of co-benefit-related data

Limited data about many co-benefits categories, together with constrained data compatibility and a lack of data exchange between sectors, remain the primary obstacles to scientifically assessing the socio-economic benefits of the transition towards renewable energies. However, country-level assessments provide a basis for incentivising decision makers to raise RE ambitions and implement enabling policies.

To gain more profound knowledge of the interactions between RE deployment and resulting co-benefits, it is crucial to foster the systematic and continuous collection of basic data, with a special focus on local data and underprivileged communities. This can be realised by the establishment of research networks that explicitly integrate smaller research institutions. Research networks should start the development of

data collection processes by identifying existing data gaps that currently hinder assessment of the most important co-benefits.

Decision makers should also work on improving data availability and transparency for scientists and researchers across sectors. Modern technologies can allow researchers to access data required for scientific studies while also protecting personal data on sensitive topics.

A third aspect relates to the harmonisation of data to enable their trans-disciplinary use without extensive data restructuring. A first step towards data harmonisation is the inter-sectoral definition of common terms, definitions, and indicators, which can be achieved through increased support for inter-disciplinary research and related conferences and workshops.

■ Ensure early, regular, and comprehensive participation of local communities

The highly context-specific nature of RE co-benefits demands the continuous participation of local communities and diverse stakeholders in the development of enabling policies, starting in the early stage of policy planning and co-benefit definition and prioritisation. Local stakeholders and communities need to be actively integrated in processes to identify functionings and facilitators of their well-being, and to define the respective indicators for measuring and monitoring these (IASS 2021b). The provision of adequate budgets and trained experts for co-creation of an enabling environment is a first step in this direction. A second step concerns the availability of information to local communities. This also includes ensuring a high level of transparency, particularly concerning financial flows within RE projects and procurement decision frameworks (IASS/GIZ 2019).[4]

■ Integrate co-benefits reporting into NDC and SDG reporting schemes and reports

Integrating co-benefits into international NDCs and SDG reporting schemes provides visibility for the positive effects of increasing the share of renewables in a country's power sector. Processes such as the global NDC stocktake schemes for reporting progress on climate mitigation and adaptation, or the index reporting on the Sustainable Development Goals (SDGs), are excellent opportunities to communicate a strong and consistent narrative on the social and economic opportunities that can be catalysed through ambitious climate action (IASS/UfU/TERI 2020). This might also motivate other countries to follow more accelerated RE pathways.

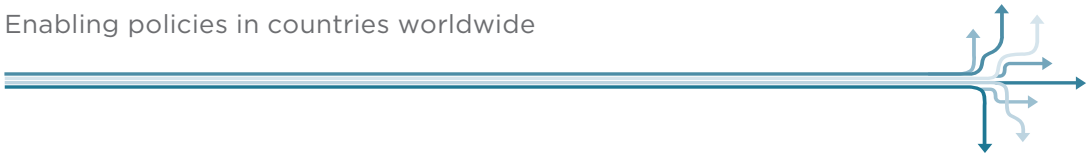
Improved visibility is often followed by greater political ambitions to profit from given opportunities, e.g., by the development of enabling policies and the establishment and support of structures for regularly measuring and monitoring co-benefits, such as a common database.

Adding a chapter on socio-economic co-benefits reporting into a country's contribution to the global NDC stocktaking scheme and the SDG index report are thus 'low-hanging fruit' that simultaneously support measures to unlock co-benefits from different categories.

GOOD PRACTICE EXAMPLE

Vietnam included in its updated NDCs from November 2020 a chapter on the socio-economic co-benefits of an ambitious climate policy. The report confirmed high to very high synergies between climate change mitigation actions in the energy sector and socio-economic development in the country. Highlighting these inter-actions is a first step in initiating action to unlock and enhance socio-economic co-benefits (Government of Vietnam 2020).

[4] Co-benefits: How the Energy Transition Contributes to Sustainable Development in Mexico. (2020). IASS Study, November 2020.



Identify and tailor enabling policies to local contexts

The COBENEFITS studies and other scientific literature have identified concrete intervention points or enablers to ensure and increase the positive contributions of power sector decarbonisation to different aspects of individual and community well-being (IASS 2021a).

However, it is important to understand that there are no "one-size-fits-all" enabling policies to seize the co-benefits of a transition to renewable energies; instead, policies for creating an enabling environment need to consider individual contexts.

Such policies need to be identified, tailored, and implemented through collaboration of experts with stakeholder groups representing the interests, needs, conflicts, and aspirations of and within the communities involved, and by taking regional scopes, environments, and circumstances into account.

Enabling policies also need to translate into an environment that can deliver these opportunities for individuals and communities in a tangible, timely, and traceable manner (Ibid.).

The co-design of research projects and co-creation of knowledge by academia and society, such as the dialogic co-benefits approach, supports the transition towards clean and low-carbon energy systems with the seizing of social and economic opportunities for – and the empowerment of – communities involved. The dialogic co-benefits approach also defines ways to demonstrate the social achievements of the transition towards renewable energies, and can increase the ownership of RE deployment and related outcomes within local communities (IASS 2021b).

The dialogic co-benefits process presented in this chapter forms part of the dialogic co-benefits approach. It is a tool to identify, plan, and implement policies supporting a just transition and the creation of an enabling environment to seize co-benefits for local communities.[5]

The dialogic co-benefits process combines two parallel paths: A systematic, scientific, and indicator-driven social performance assessment (data analysis and research), combined with an integrated and collective policy-making process based on the participation of political and administrative decision-makers from different sectors, together with local communities and other stakeholders (expert judgement & consensus). This structure allows it to engage and align diverse stakeholders in a common course of action to create an enabling environment for co-benefits. Thus, the dialogic co-benefits process itself is as important as the documents and strategies resulting from it.

Inter-ministerial steering groups (co-benefits councils) for collective planning occupy a central position in the dialogic co-benefits process. They are working groups for cross-sectoral cooperation, consisting of representatives of different departments and agencies involved in climate and energy policy-making, and of ministries or government agencies likely to benefit from social or economic co-benefits. This may include ministries of environment, economy, health, labour, education, and others.

The councils provide a space for exchange on the agendas of participating agencies, and are outcome- and opportunity-oriented forums for dialogue and mutual learning (Sperfeld & Helgenberger 2020).

[5] The dialogic co-benefits approach is based on the IEA's energy technology road-mapping process and IRENA's renewable readiness assessment, and has been modified and tailored to a co-benefits-related context by IASS and UfU. The energy technology road-mapping process from IEA was originally elaborated to support the development of specific types of technologies in energy planning. Through the participation and coordinated cooperation of decision makers from various disciplines, the necessary technical, policy, legal, financial, market, and organisational prerequisites for the development of new technologies are identified, as well as ways to lay these foundations.

The Renewables Readiness Assessment from IRENA is a collaborative process for better understanding the opportunities and constraints on renewable energy deployment in defined countries, and to identify pathways to create an enabling environment for renewables. Both processes are oriented on collective leadership processes.

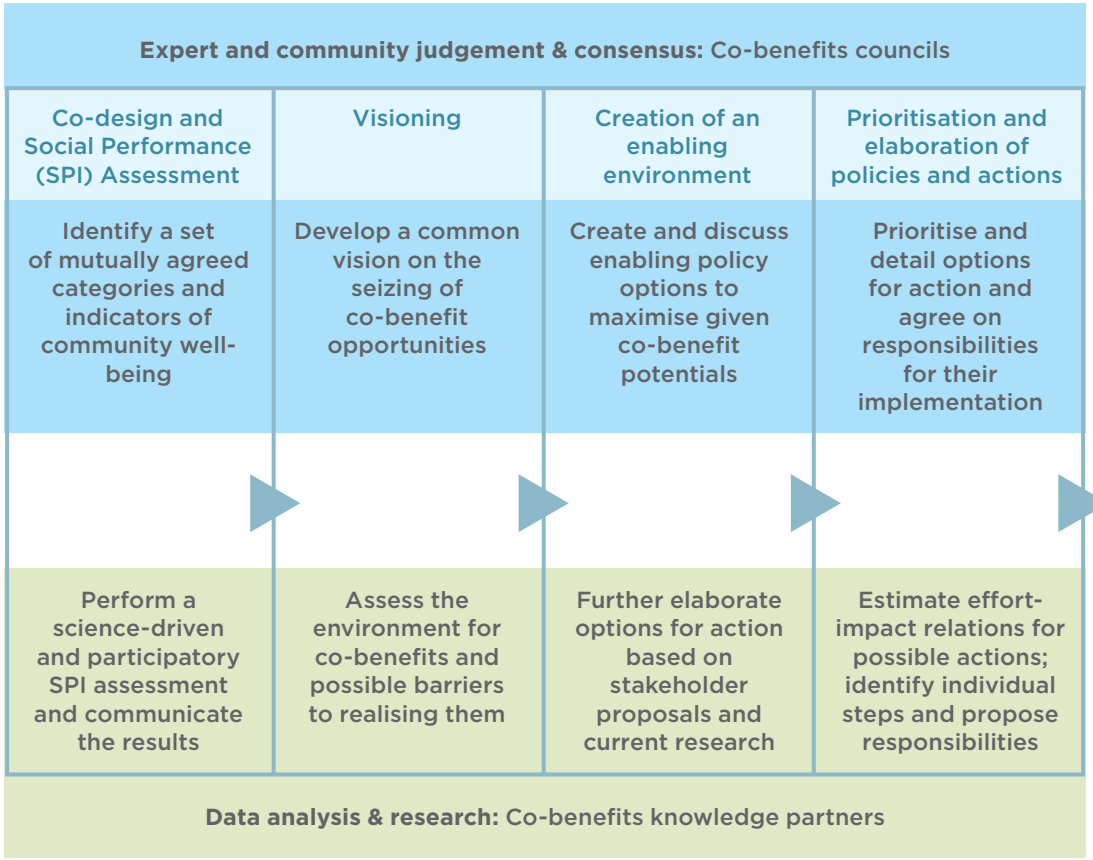


Figure 2:

The dialogic co-benefits process to implement an enabling environment for a just transition

Ideally, they build on current political developments related to power system planning or those of other participating authorities.

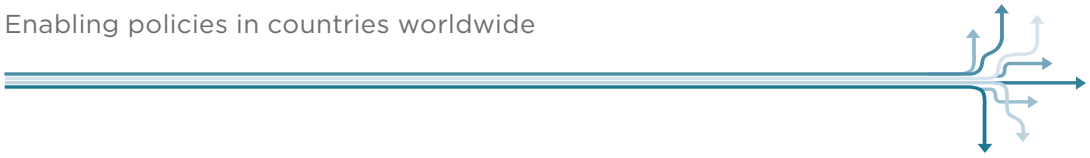
In regular meetings, the councils make collective decisions on the planning and implementation of a just transition. Their members jointly decide on the framework for preparing co-benefits assessments, prioritise topics for co-benefits studies, select energy policy scenarios to be studied, advise on appropriate methodologies, identify barriers to unlocking co-benefits, and formulate policy recommendations to remove barriers and to create an enabling environment (Sperfeld & Helgenberger 2020).

Co-benefits councils are supported by knowledge partners. These are scientists, researchers, and experts providing necessary data and information as the basis for informed decision making. The joint planning and implementation process to create an enabling environment for seizing co-benefits comprises four main steps:

Step 1: Co-design and Social Performance Assessments

The process begins with a Social Performance Assessment – a joint identification of context- and community-specific functionings of community well-being (IASS 2021b). As a second step, the council defines and prioritises those functionings and related facilitators of community well-being that are related to power generation and energy projects (= co-benefits). Based on the identified priorities, the council agrees on the co-benefits that should be assessed in depth, and defines suitable indicators for evaluating co-benefit potentials. It also defines the framing of co-benefits assessments, including regional settings and appropriate timeframes.

Scientists support the co-benefits council by conducting related co-benefits assessments of renewable energy options. Preliminary and final outcomes of the assessments are then communicated to the council by the scientific experts and facilitators.



Step 2: Visioning

The results of the co-benefits assessments give an overview of the type and extent to which co-benefits can be achieved through following different ambitions for decarbonising the power sector. They can thus serve as a basis to decide on the necessary ambitions of policies for renewable energy deployment.

Built on these assessments, the co-benefits council develops a common vision for when and how co-benefits shall be unlocked for local communities and stakeholders. If not left to the next step, the council can also initiate the identification of barriers that currently limit the unbundling of prioritised co-benefits.

Step 3: Policy creation of an enabling environment

While changes in renewable energy ambitions provide opportunities to make use of co-benefits, enabling policies can further support and increase the social performance of the transition towards a higher share of renewables in the power sector. This process is undertaken within the councils. Their members identify existing barriers to delivering co-benefits for local communities, and gather ideas for policies and solutions to overcome them. In this work, they are supported by the inputs of scientists, experts, and their studies, and by category-specific co-benefit roundtables and their outcomes.

Multi-stakeholder roundtables support the participation of different stakeholders from civil society, business, and politics in identifying pathways towards a just transition. They can be organised in a one-day format that begins by presenting the results of co-benefits assessments. Roundtable participants can then identify barriers and discuss possible solutions in small groups, and then prioritise them based on their scope and impact.

The council members consider inputs from experts and roundtables in the process of collecting and further evolving preferred solutions and policy options.

Step 4: Identification and elaboration of High-Impact Actions

After discussions and additions to the inputs from experts and roundtables, the council members prioritise enabling policies by identifying High Impact Actions. These are actions and policies having a great impact while demanding only limited effort. During co-benefits council sessions, the High Impact Actions and other prioritised enabling policies are then further elaborated. This includes the specification of concrete goals and the definition of timeframes for realising them; of leverage points for enabling policies; as well as the identification and assignment of responsible authorities and stakeholders for planning and implementation; and suitable cooperation modes across authorities.

The dialogic co-benefits process can lay the foundation for cooperation in the implementation phase by having elaborated a strategic document that includes the mutually agreed, immediate actions to be undertaken by relevant actors. This would ideally contain a clear definition of the desired outcome, a precise list of measures and priorities for the creation of an enabling environment, as well as timelines and milestones to define the means of achieving these targets. It should also specify gaps and barriers to achieving co-benefits, a list of suitable activities to overcome these challenges, and agreed modes of cooperation among authorities and other stakeholders.

Once established, the dialogic co-benefits process can serve as a suitable format for inter-disciplinary monitoring of the just transition and the identification and planning of necessary adjustments.

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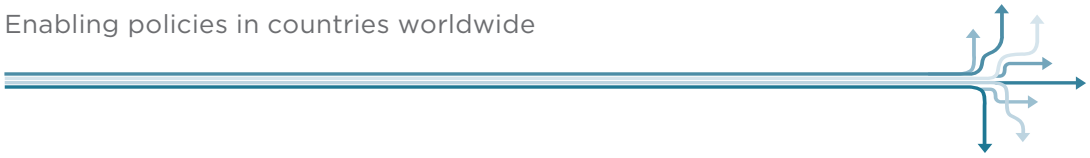

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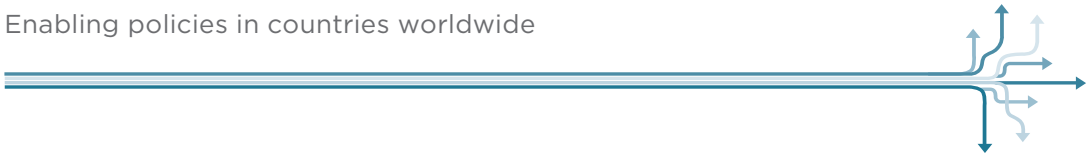

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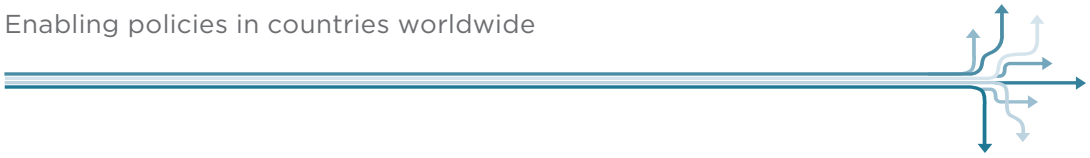

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