

# Future developments in BIPV and energy efficiency in the fight against climate change

**BIPV** | Building-integrated PV has yet to live up to its promise, remaining a niche sector of the solar industry. However, as Silke Krawietz writes, European and international climate and energy goals, and a chance of reviving the European PV manufacturing industry, all offer BIPV the opportunity of becoming a mainstream technology

**B**uildings represent the largest energy-consuming sector in the global economy, account for over one-third of global final energy use, half of global electricity and about a fifth of all greenhouse gas (GHG) emissions. In Europe, buildings account for around 40% of total energy consumption and 36% of CO<sub>2</sub> emissions and therefore present a huge potential for energy efficiency and incorporation of renewable energy technologies, in particular PV and building-integrated PV. Under business-as-usual projections, global energy use in buildings could double or even triple by 2050.

As such, the relationship between buildings and energy must by necessity form a core element of discussions taking place towards the end of this year at the United Nations' COP21 climate talks. Although buildings at the moment are key GHG emitters, the development of low-carbon and energy efficiency technologies, in particular PV and BIPV, offer huge potential for meeting energy efficiency and renewable energy deployment goals, and therefore the deep cuts the international community must agree to in December.

In a report published earlier this year, *Energy and Climate Change*, the International Energy Agency (IEA) underlined the importance of the talks: "The importance of the 21st Conference of the Parties (COP21)... rests not only in its specific achievements by way of new contributions, but also in the direction it sets. .... The overall test of success for COP21 will be the conviction it conveys that governments are determined to act to the full extent necessary to achieve the goal they have already set to keep the rise in global average temperatures below 2

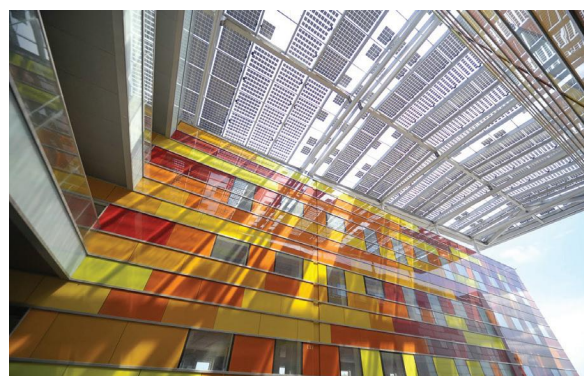
degrees Celsius (°C), relative to pre-industrial levels." [1]

According to the IEA, under the pledges so far made by nations in advance of COP21, the Intended Nationally Determined Contributions (INDCs) Scenario, growth in global energy-related GHG emissions slows, but there would be no peak by 2030. The link between global economic output and energy-related GHG emissions weakens significantly, but is not broken. Renewables become the leading source of electricity by 2030, as average annual investment in non-hydro renewables is 80% higher than levels seen since 2000.

The IEA report proposes a so-called 'bridging strategy' that could deliver a peak in global energy-related emissions by 2020. A commitment to target such a near-term peak would send a clear message of political determination to stay below the 2°C climate limit. The peak could be achieved by relying solely on proven technologies and policies, without changing the economic and development prospects of any region. Two of the key measures in the IEA's 'bridge scenario' would have a key bearing on the ongoing deployment of energy efficiency and renewable energy measures, presenting huge opportunities for BIPV and energy efficiency in buildings:

- Increasing energy efficiency in the industry, buildings and transport sectors.
- Increasing investment in renewable energy technologies in the power sector from \$270 billion in 2014 to \$400 billion in 2030. [1]

BIPV also has a potentially central role to play in helping the European Union



Credit: Laurent Lacombe, Wikimedia Commons

## **BIPV and energy efficiency measures in buildings offer options for policy makers seeking to reduce global emissions.**

meet its energy efficiency and low-carbon energy goals. Energy efficiency is one of the main pillars within the newly created Energy Union (02/2015), which states as one of its aims "... fundamentally rethinking energy efficiency and treating it as an energy source in its own right so that it can compete on equal terms with generation capacity". [2] The Energy Union will ensure that renewable energy is mainstreamed and fully integrated into a fully sustainable, secure and cost-efficient energy system.

Meanwhile, the EU's Strategic Energy Technology (SET) Plan aims to accelerate the deployment of low-carbon technologies by encouraging greater cooperation on research and development between EU countries. Together the SET Plan and the Energy Union, through energy efficiency measures and the integration of renewable energies, lead the way to Nearly Zero Energy Buildings (NZEB) and possible future energy-plus buildings.

And the recast directive on the energy performance of buildings (EPBD) also stipulates that all new buildings constructed within the European Union after 2020 should reach nearly zero-energy levels.

This means that in less than five years, all new buildings must demonstrate very high energy performance, and their reduced or very low energy needs will be significantly covered by renewable energy sources. BIPV is clearly an excellent option in achieving this goal.

### Collaboration needed

In the context of these international and European energy and climate objectives, BIPV looks particularly attractive. In Europe, the potential development of BIPV from a niche market as it is today into a mainstream one could also bring the additional benefit of reviving the continent's ailing PV manufacturing industry, which has been in decline for a number of years.

For this to happen, however, close collaboration between the PV industry, the building industry, including architects and engineers, will be crucial to ensure the creation of innovative, competitive BIPV products; so far, despite the huge potential of BIPV to play a role in meeting European and international objectives, this level of cooperation between the building industry, architects and the PV industry has been the missing ingredient in bringing BIPV into the mainstream.

The building industry is making huge progress with the implementation of energy efficiency measures, new technologies and innovations in building and construction; the PV and BIPV industries should now consider using the enormous possibilities outlined above, in supporting the achievement of European and international climate goals, to spur closer collaboration with the building industry in the field of innovation, new materials and the development of highly energy-efficient building components through the integration of renewable energies, in particular BIPV.

Collaboration among the above mentioned sectors is crucial for enhancing the innovation and competitiveness of the industry and research and development sectors related to energy efficiency and renewable energies. The positive factors are the creation of jobs and rise of competitiveness in the world market of European industry and research institutes.

The building industry, which is rapidly developing, and the BIPV industry, which is following a slower path, have common issues: energy efficiency in buildings and production of renewable energies in the buildings, in order to reach the EU and international goals. This scenario presents an important opportunity and challenge and

strengthens the market opportunities for energy efficiency business and BIPV towards to NZEB and energy-plus buildings.

### Unlocking the potential of BIPV

Unlocking the immense energy saving potential of buildings requires not only ambitious legislative frameworks and policy programmes, but also the continued research and development of innovative building techniques and technologies, and the dissemination of learnings from real-world best-practice projects. To address the challenges of transforming the energy use in buildings and to allow for their better integration into the future energy systems, a long-term and multi-dimensional perspective is required.

Today both sectors are disconnected, and insufficient collaboration is happening between the two industries and the various stakeholders. The disconnection can be seen in the development of both industries, but not the creation of new innovative products of BIPV based on common research initiatives. The collaboration today is not happening.

One positive step forward for BIPV and energy efficiency in buildings would be the creation of a dedicated task force, to initiate this closer collaboration among the described stakeholders and policy makers. Such a body is needed for the realisation of the goals of the Energy Union and to reach the international climate targets.

It would function as a forward-looking alliance for international collaboration, to define and develop the requested business strategy further and to stimulate investment in the concrete development of measures and products for advanced energy efficiency with renewable energy integration into buildings. The task force would, together with the various stakeholders, identify barriers to market development and initiate work on issues of common interest, leading the way to NZEB and possible future energy-plus buildings. The energy efficiency and BIPV task force is being initiated by SETA Network, an international consulting firm, based in the UK, specialised in energy efficiency in buildings, renewable energies and, in particular, BIPV.

The existence of such a body would help join up the dots between the various disconnected elements of the BIPV industry and help instigate the needed paradigm shift within the PV industry that makes full use of the huge market potential of BIPV and to develop new innovative products, in close collaboration with the building

industry, architects and engineers. The SETA Network and other stakeholders are intending in the near term to propose the task force to the European Commission and Energy Union figures, as well as to the European Investment Bank for support. The intention is as soon as possible to establish it as the 'Energy Efficiency and BIPV Alliance'.

### Opportunities for BIPV innovation to drive the PV market

Besides supporting European and international energy and climate goals, the further strong development of BIPV technologies and products, developed in close collaboration possibly with the building industry, could also be an important driver for the PV market generally, following the well-known problems and downturn of the European PV industry and research facilities in recent years. Therefore BIPV offers huge potential for the European PV sector overall.

The forthcoming COP21 talks, the path to NZEB and energy-plus buildings in Europe by 2020 and the opportunity to reverse the European photovoltaic industry's recent downturn all offer huge potential for BIPV to develop from a niche market into a future large-scale market of the photovoltaic industry, creating innovative products and jobs with the necessary financial support.

Crucial for this are the close collaboration of the PV industry with the building industry and the creation of innovative competitive BIPV products to promote NZEB and possibly future energy-plus buildings. The potential for collaboration between the building industry (in the frame of enhanced energy efficiency) and the renewable energy sector (in particular the PV and BIPV industries) is enormous and could help put the world on a more sustainable path. ■

### Author

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