Name of the technology: 2.2 Solar electric / Roof PV Systems

Stage of development:

Widely used technologies (the technology is used by many actors on global/EU level).

Technical application:

Typical applications for electricity generation.

Short summary (up to 200 characters):

A Building Integrated Photovoltaics (BIPV) system consists of integrating photovoltaics modules into the building envelope, such as the roof or the façade. By simultaneously serving as building envelope material and power generator, BIPV systems can provide savings in materials and electricity costs, reduce use of fossil fuels and emission of ozone depleting gases, and add architectural interest to the building.

Justification – why was this technology selected (up to 500 characters).

One of the benefits of grid-tied BIPV systems is that, with a cooperative utility policy, the storage system is essentially free. It is also 100% efficient and unlimited in capacity. Both the building owner and the utility benefit with grid-tied BIPV. The on-site production of solar electricity is typically greatest at or near the time of a building's and the utility's peak loads. The solar contribution reduces energy costs for the building owner while the exported solar electricity helps support the utility grid during the time of its greatest demand.

Characteristics (up to 500 characters):

There are two basic commercial PV module technologies available on the market today:

Thick crystal products - include solar cells made from crystalline silicon either as single or poly-crystalline wafers and deliver about 10-12 watts per ft² of PV array (under full sun).

Thin-film products - typically incorporate very thin layers of active photovoltaic material placed on a glass superstratum or a metal substrate using vacuum-deposition manufacturing techniques similar to those employed in the coating of architectural glass. Presently, commercial thin-film materials deliver about 4-5 watts per ft² of PV array area (under full sun). Thin-film technologies hold out the promise of lower costs due to much lower requirements for active materials and energy in their production when compared to thick-crystal products. A photovoltaic system is constructed by assembling a number of individual collectors called modules electrically and mechanically into an array.

Photovoltaics may be integrated into many different assemblies within a building envelope:

- Solar cells can be incorporated into the façade of a building, complementing or replacing traditional view or spandrel glass. Often, these installations are vertical, reducing access to available solar resources, but the large surface area of buildings can help compensate for the reduced power.
- Photovoltaics may be incorporated into awnings and saw-tooth designs on a building façade. These increase access to direct sunlight while providing additional architectural benefits such as passive shading.
- The use of PV in roofing systems can provide a direct replacement for batten and seam metal roofing and traditional 3-tab asphalt shingles.
- Using PV for skylight systems can be both an economical use of PV and an exciting design feature.

Impact on the economy (up to 1000 characters):

The benefits of power production at the point of use include savings to the utility in the losses associated with transmission and distribution (known as 'grid support'), and savings to the consumer through lower electric bills because of peak shaving (matching peak production with periods of peak demand). Moreover, buildings that produce power using renewable energy sources reduce the demands on traditional utility generators, often reducing the overall emissions of climate-change gasses. The PV modules serve the dual function of building skin—replacing conventional building envelope materials—and power generator. By avoiding the cost of conventional materials, the incremental cost of photovoltaics is reduced and its life-cycle cost is improved.

Global development (up to 1000 characters):
The "Global Market Outlook for Photovoltaics 2013÷2017" includes PV market figures for 2012 and makes forecasts for the next five years for global and European markets. The world added more than 31 GW of new solar photovoltaic (PV) capacity in 2012. This significant market growth came even during a period of economic crisis and industry consolidation.

The report's major findings include:

- 31.1 GW of PV systems were installed globally in 2012, up from 30.4 GW in 2011; PV remains, after hydro and wind power, the third most important renewable energy source in terms of globally installed capacity;
- 17.2 GW of PV capacity were connected to the grid in Europe in 2012, compared to 22.4 GW in 2011; Europe still accounts for the predominant share of the annual global PV market, with 55% of all new capacity in 2012;
- Germany was the top market in 2012, with 7.6 GW of newly connected systems; followed by China with an estimated 5 GW; Italy with 3.4 GW; the USA with 3.3 GW; and Japan with an estimated 2 GW;
- For the second year in a row, PV was the number-one new source of electricity generation installed in Europe; PV now covers 2.6% of the electricity demand and 5.2% of the peak electricity demand in Europe;
- Under a pessimistic Business-as-Usual scenario, the global annual market could reach 48 GW in 2017; under a Policy-Driven scenario, it could be as high as 84 GW in 2017.

Milestones[1] *(List at least one milestone per year against which the progress towards the achievement of the local/regional 2020 targets can be measured)*

Given the scope of the roadmaps (municipally or regionally based) technological improvements that would require major research and development processes would tend to fall outside of the scope of these roadmaps. This does not necessarily mean that such technological improvements cannot be used as milestones, but that before any such technological improvements are stipulated in the milestones, the capacity of the municipal and/or regional stakeholders, and the capacity of the municipality/region to collaborate with external partners, should be carefully considered.

Milestones more likely to fall within the scope of this roadmap are those that are able to help measure desired changes in the deployment and/or wider usage of the previously identified key energy technologies or those that measure the effects of this changed deployment or usage (i.e. production of thermal energy (GWh); increase of thermal energy production (%); installed capacity (GW or m2); increase of installed capacity (%); CO2 reduction (t)).

Year	2015	2016	2017	2018	2019	2020
Milestones		**250 kWe installed capacity**	**250 kWe installed capacity**			

The group assumed a hypothetical amount of 500 kWe of roof top installed and building integrated PVs, grid connected, until 2020.
They assumed an installed capacity of 250 kWe per year in 2016 and 2017.

Financial Gaps

(List financially related challenges that need to be addressed in order to increase the uptake/wider usage of this technology)

1. **Lack of predictability when launching the financial instruments at national level.**
2. **Lack of institutional capacity of existing Programs Implementation Units (ESIF)**
3. **Overcompensation generated by beneficiaries receiving both state aid ans subsidies for green certificates**
4. **Lack of cooperation between public authorities and private investors.**

Policy Gaps

(List important policy gaps that prevent the uptake/wider usage of the key technology)

1. **Contradictions and major issues in promoting, developing, implementing and operating RES in terms of financial and legal environment**
2. **Lack of interest and active involvement on behalf of local authorities**
3. **Lack of interest from projects developers for disseminating, sharing experience, know-how and best practice**
4. **Lack of awareness-targeting actions meant to increase knowledge on legislative provisions, financial and technical solutions**
5. **Lack of institutional transparency and high bureaucratic public procurement procedures.**

Financial Instruments and Period of Implementation

(List all relevant financial instruments that can address the above financial gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the financial instrument.)

1. **Support Actions for public-private partnership (PPP)**
2. **Financial Incentives for individuals to use green energy (building tax deduction for a percentage of project value)**

Policies and Period of Implementation

(List all relevant policies that can address the above policy gaps and will contribute to the uptake/wider usage of the key technology. Please add the start year and years of important developments for the policy.)

1. **Rising the level of importance and involvement of the local authorities**
2. **Creating an association of stakeholders for submission of applications to the energy funds and for building a reputation that may help in applying for public procurement contracts in the future**

Stakeholders

(List all relevant stakeholders for the implementation of the policy and/or financial instrument above)

1. **Municipalities, administrations, ministries.**
2. **Building associations, corporations.**

Policy Recommendations

(*Relevant policies for this particular technology have already been identified above. This section aims to provide the steps needed for the practical implementation of the policies and financial instruments listed above.)*

1. **Identification of "Champions" that could be the motivated players in starting the association.**
2. **Organise meetings to develop the association.**
3. **Formally launch association and start procuring PV at preferential prices.**