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RECORDS FORECASTED FOR 2014:

Falling costs drive record solar and wind growth

Solar Photovoltaic and wind power are set to become even cheaper and attain new heights of growth this year.

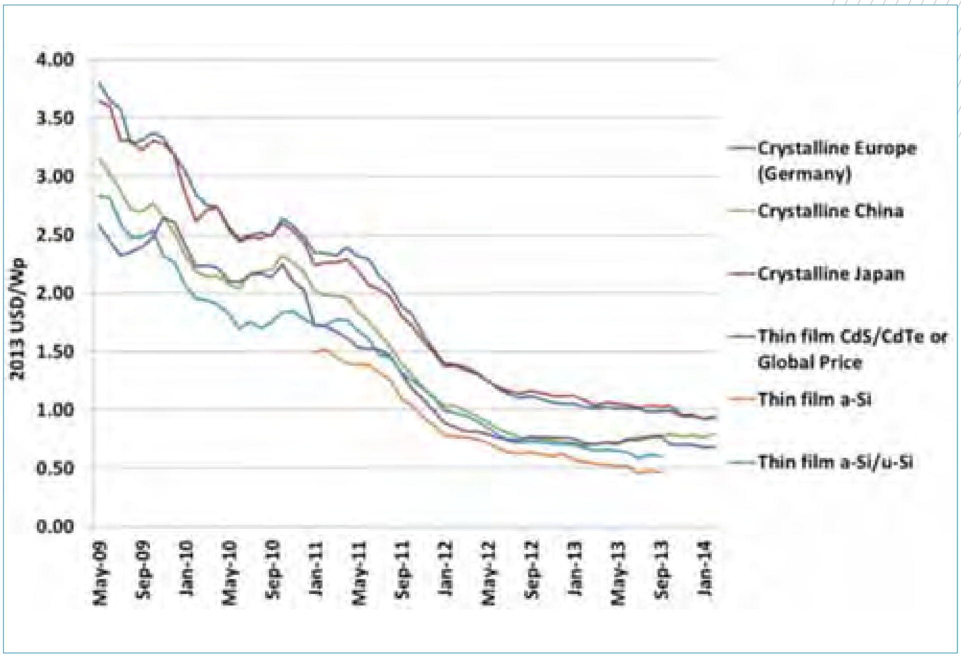
The year 2013 was a landmark one for renewables. Despite fickle policymaking and weak economic growth, overall capacity additions remained strong, with solar deployment outpacing wind for the first time. Solar photovoltaic (PV) deployment reached around 39 gigawatts (GW) for the year according to industry sources.

New wind deployment was a disappointing 35 GW, as policy uncertainty delayed projects. However, wind is set to bounce back, and 2014 looks set to be a record year for both solar PV and wind power. With firmer policy support, new solar PV installations could be 10 GW or more higher this year reaching 47-48 GW solar in 2014. Capacity additions for wind power could amount to about the same, also a new record.

Improving cost competitiveness continues to drive the deployment of both technologies. As more solar panels and wind turbines are installed, the learning effect means they become cheaper to manufacture. Renewable energy options are now the most cost effective way to obtain electricity in remote locations away from the main power grid — or in any grid using oil-fired generation — and are increasingly competitive for grid supply.

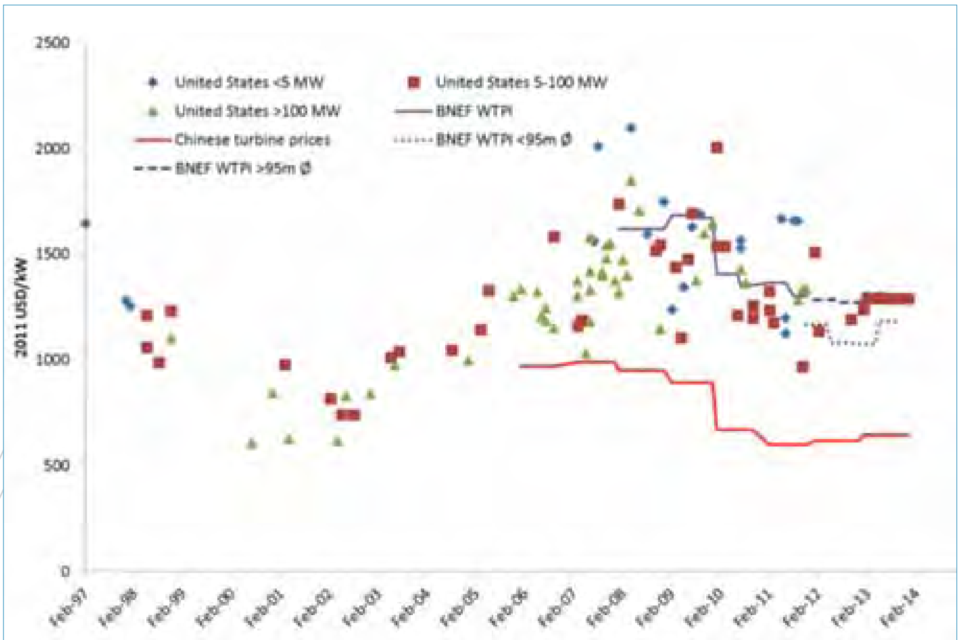
For solar PV module and wind turbine manufacturers, 2013 was a year of consolidation, when profit margins previously dented by global oversupply began to recover. Solar PV module prices declined by 65%-70% between December 2009 and December 2012, but were broadly stable in 2013. Wind turbine prices were also relatively stable in 2013, although old models are losing ground to larger, more efficient designs in developed economies like those of Western Europe and North America.

Solar PV module prices, 2009 to 2014



Source: PV exchange and Global Data, 2014.

Wind turbine price trends, 1998 to 2014



Source: Lawrence Berkeley National Laboratory (LBNL), 2013; Chinese Wind Energy Association (CWEA), 2013; Global Data, 2014 and BNEF, 2014.

Even as the solar and wind markets recover, installed costs continue to fall while the technologies keep improving. The result is lower-cost electricity from renewables. In most markets, installed costs continued to fall throughout 2013, driven by increased competition, larger-scale deployment and ongoing reductions in balance of system costs.

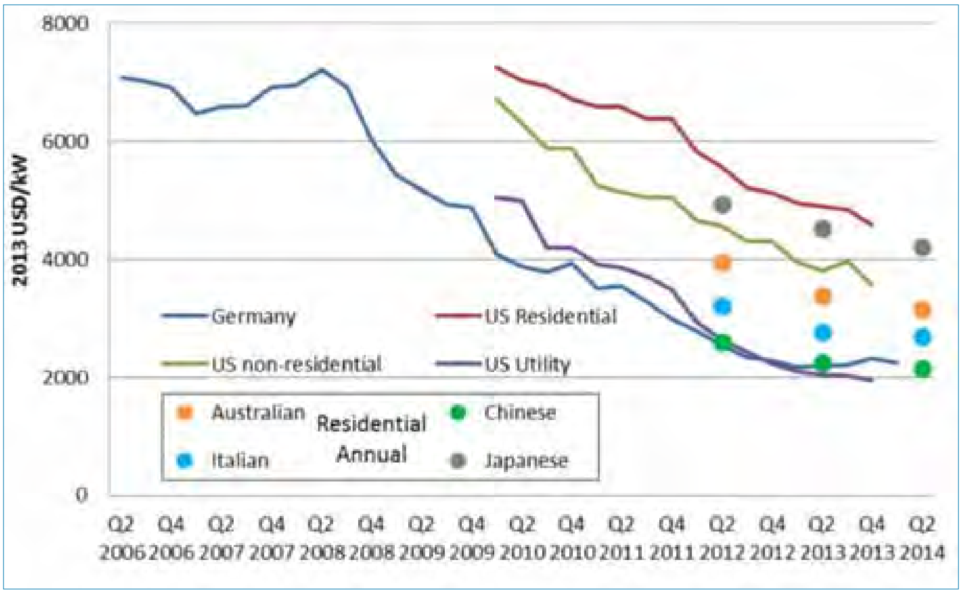
The sole exception, for solar PV at least, is Germany, the most competitive solar PV market in the world, where prices for small-scale systems reached equilibrium, while costs continued falling for larger utility-scale projects (Figure 3).

Total installed costs for wind farms have been declining since the peak in wind turbine prices in 2009. For instance, average installed wind farm costs in the United States, which dropped from an average of around USD 2 250 per kilowatt (kW) in 2009 to USD 1 940/kW in 2012, showed slight declines in 2013.

Installed costs for some United States projects were as low as USD 1 400/kW, compared to a range of USD 1200/kW to 1300/kW in China and India. In areas of excellent wind resources in the United States, wind is now competitive with gas-fired generation. Technology improvements have been the real driver of lower electricity generation cost reductions in recent years.

Higher hub heights and larger swept areas have increased the energy harvested for a given wind site, raising energy yields by 20%-30% according to Global Data (2014). As a result, onshore wind power from good resource areas is now typically competitive with, if not cheaper than, electricity from fossil-fuels.

Solar PV installed costs by country and market segment, 2006 to 2014



Source: Bundesverband Solarwirtschaft e.V. (BSW), 2014; Solar Energy Industries Association (SEIA) and GreenTech Media (GTM), 2014; and Photon Consulting, 2014.

For more information about the costs and performance of renewable energy technologies visit www.irena.org/costs.

New tools for resource assessment

The renewable energy potential in most markets is vast and largely untapped

Renewable energy systems depend on harvesting resources, including the sun, the wind and underground heat. This requires knowing when and where such resources are available, over a time span of decades.

Even so, there is no standard practice to map renewable energy potential - a headache for decision makers trying to plan long-term energy investments.

Where the analysis starts: Example of initial geospatial analysis for wind energy. The Wind Atlas of Iran highlights areas where the wind resource is above 6.4 m/s, 8.1 m/s and higher than 9.4 m/s (source: Renewable Energy Organisation of Iran). The background shows the raw wind resource from low to high wind speeds for an altitute of 50 m, ranging from blue (3 m/s), brown (9 m/s) and red (above 9 m/s). Source: 3Tier.

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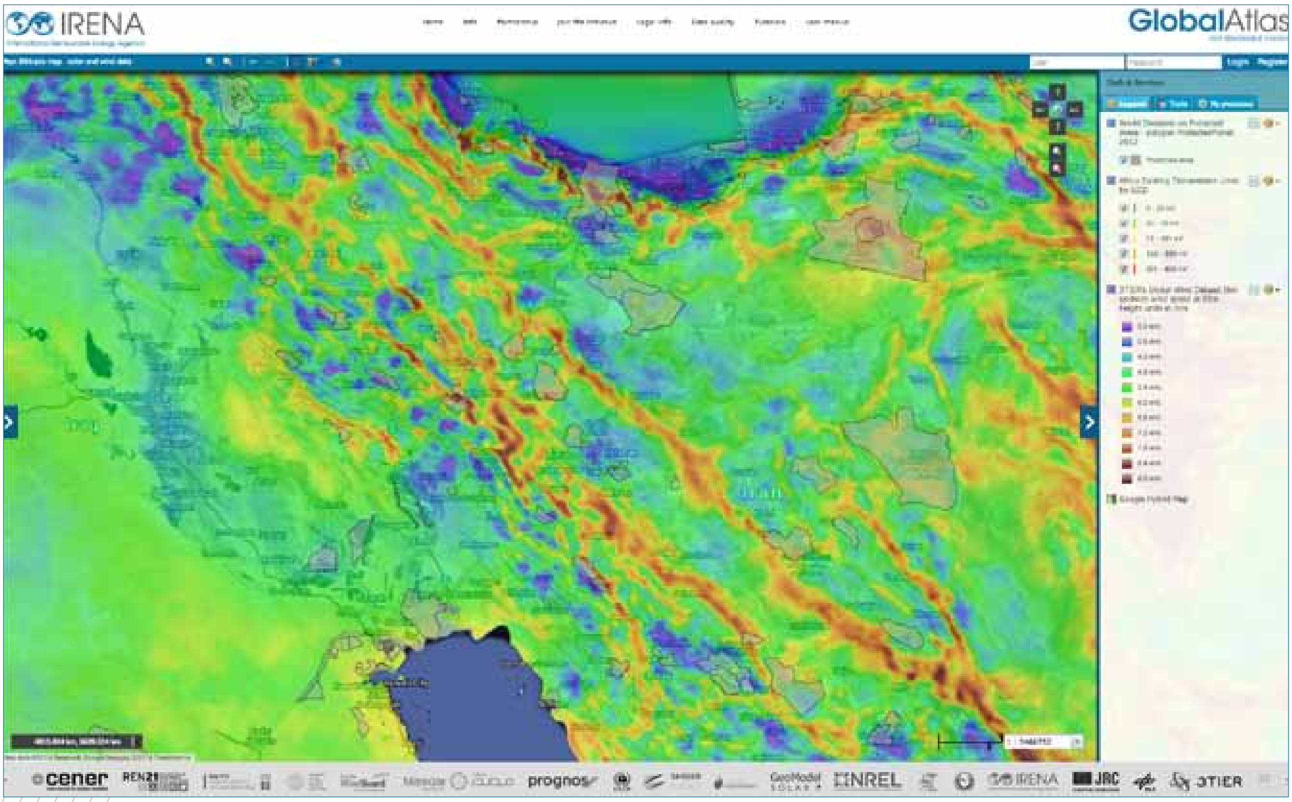
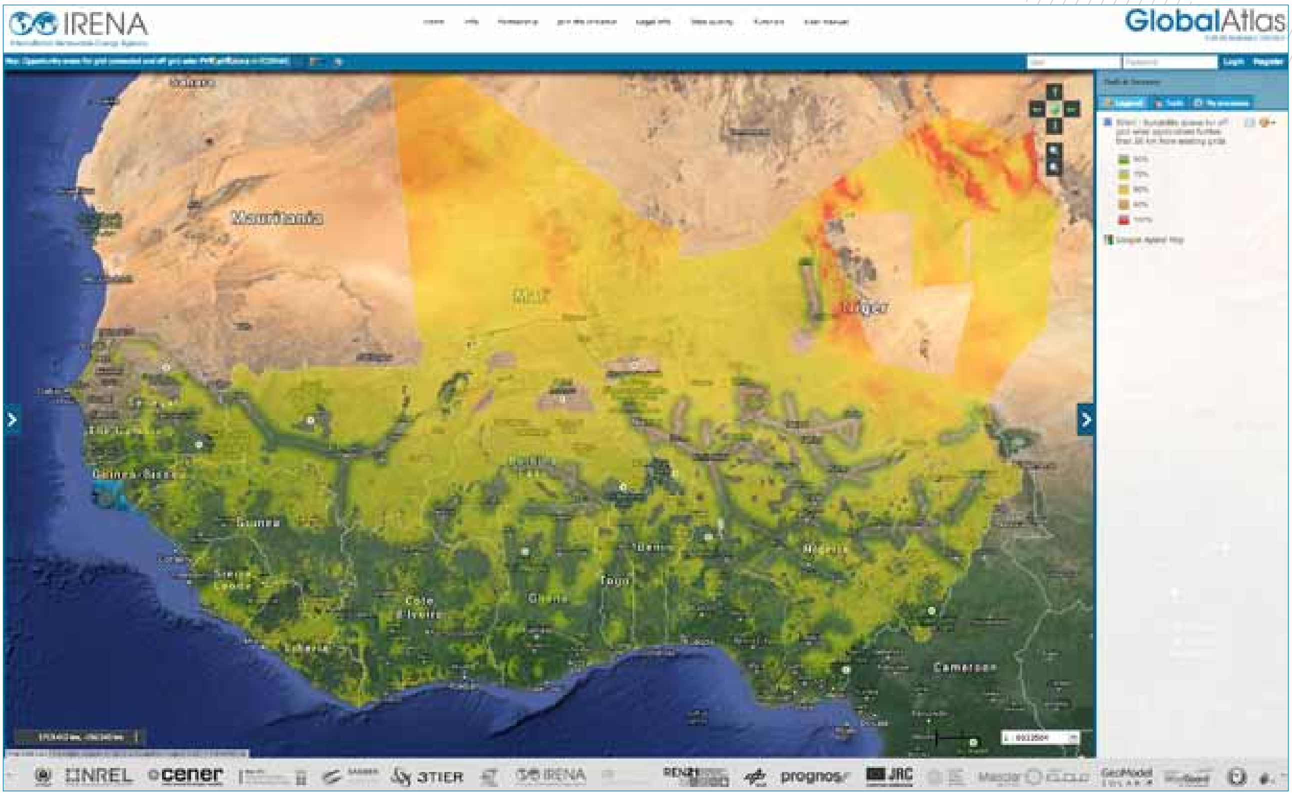


Maps indicating renewable energy potential are essential for the transition to renewable energy. They help to highlight promising zones for development, identify the most suitable technology for each location, plan infrastructure investments, and ensure an attractive regulatory framework.

In turn, transparent planning and policies at the governmental level can raise the confidence of project investors and the renewable energy industry. Lowering risk perceptions, in turn, eases access to capital. Private investors, meanwhile, also need accurate data in order to prospect new markets or propose new solutions.

To make a good renewable energy map, many factors come in to play, from current land use, topography and protected areas to technology, resources, and local laws and practices. The potential depicted, however, remains a hypothesis, open for discussion among policy makers, investors, local authorities, utilities and communities.

Example of advanced geospatial analysis: Suitability factors for off-grid wind applications further than 50 km from existing grids in ECOWAS. The scoring system takes into account the wind resource, topography, population density, slope, land cover, grid location, protected areas and altitude. Such 'opportunity-based' maps are used to initiate a discussion with stakeholders and authorities in the region in order to understand which set of assumptions best reflects the local situation. For specific areas identified as promising, more thorough investigations can be conducted.



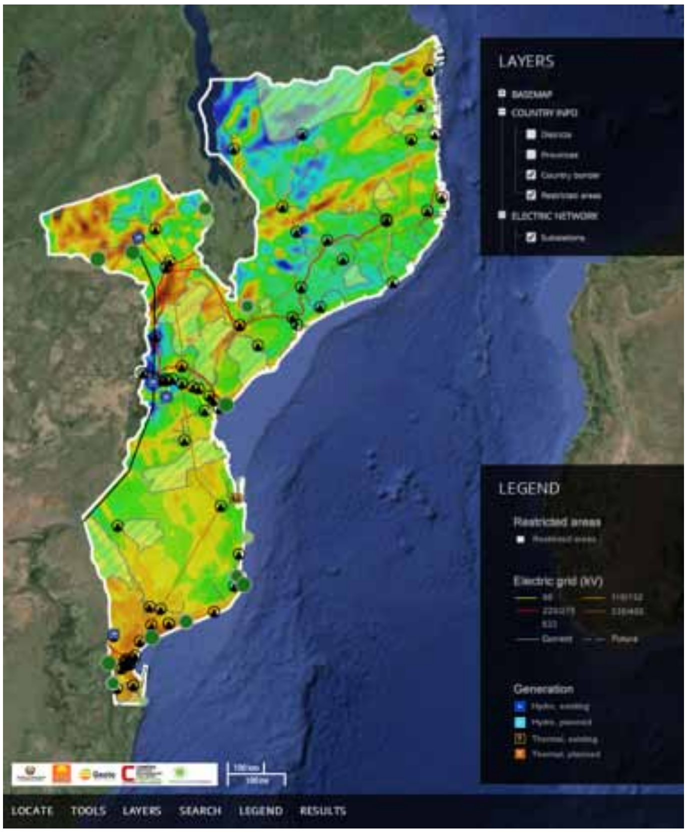
Source: IRENA, 2013.
Available at: http://globalatlas.irena.org/UserFiles/Publication/GA_ECOWAS_WIND_Web.pdf

Without validation of data, public solar and wind resource maps rarely translate into projects on the ground. Few countries have carried out a full-scale geospatial analysis, starting from validated resource maps. Often, studies are repeated needlessly with similar results.

The World Bank's Energy Sector Management Assistance Program (ESMAP) is attempting to address this challenge by investing in measurement campaigns around the world (www.esmap.org). The International Renewable Energy Agency (IRENA) hopes to direct donors to targeted measurement campaigns for selected hotspots, such as in the proposed African Clean Energy Corridor.

IRENA is also bringing together resource datasets from countries and institutes around the world. The Global Atlas for Renewable Energy, accessible through the IRENA website, is a free resource assessment tool that helps policy makers and investors alike appreciated the opportunities at their disposal.

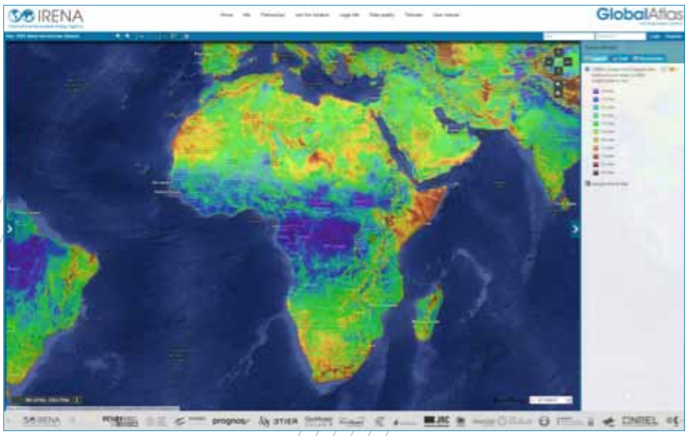
Example of full-scale analysis, where geospatial analysis translates into technical potential in megawatts, and indicates possible locations for future projects.



Source: Renewable energy Atlas of Mozambique: *http://www.atlasrenovaveis.co.mz/en/conteudo/renewable-energy-atlas-mozambique*

Renewable energy potential of Mozambique, per resource (GW)

Potential for selected key projects



Wind speed map of Africa. The simulation model provides an overview of hotspots for the continent. One average value is provided for every 5 km on this map. Private companies can sell data with much higher precision than the information available in the public domain. However the map accessible through the Global Atlas of Renewable Energy was provided by 3Tier and is the most detailed dataset available in the public domain at present.

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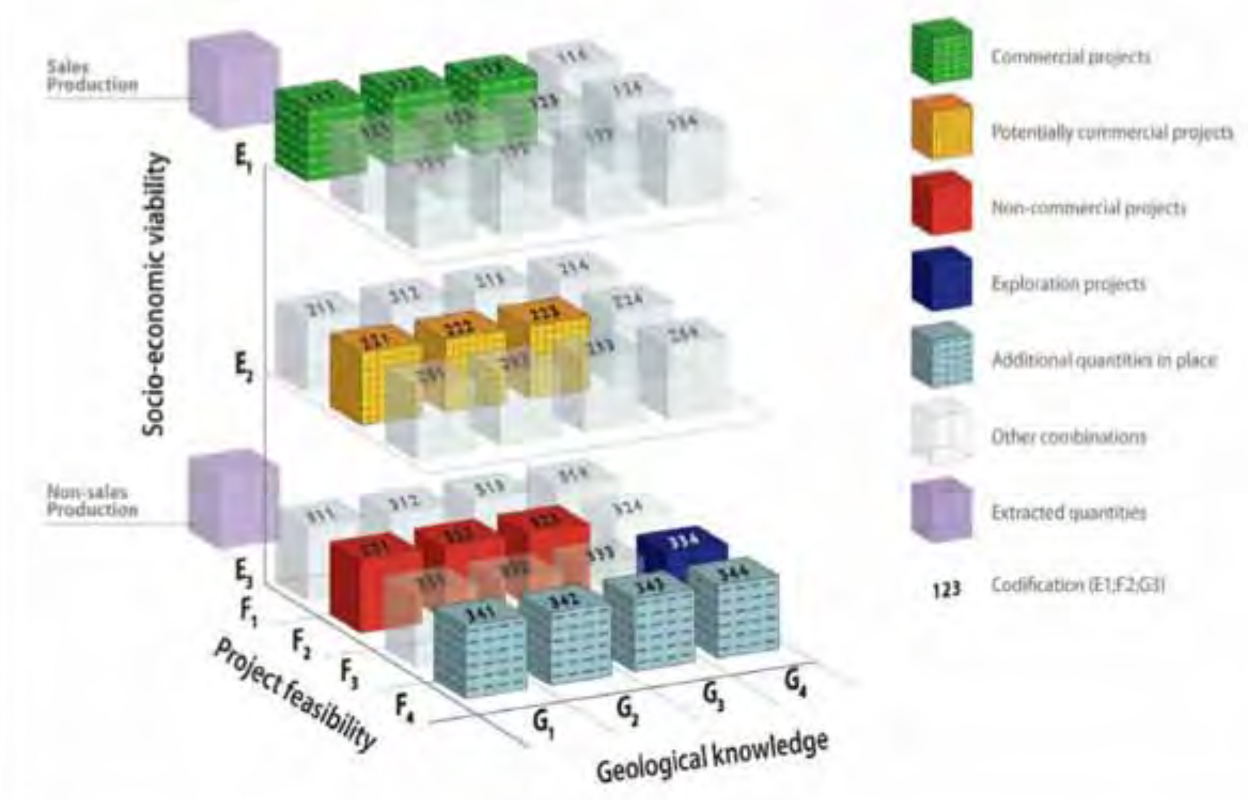
Each geospatial analysis uses different assumptions and considers different parameters. Depending on the initial assumptions and level of detail, results can be markedly different. The assumptions can also evolve with technology or cost breakthroughs.

With renewable energy developments happening worldwide, the lack of standard practices is a growing concern. International operators, financers and analysts will increasingly look for estimates and forecasts they can compare. Such estimates can also facilitate financial reporting.

Just as oil companies traditionally publish a yearly statement of their reserves, the renewable energy sector relies on estimates of potential. The United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC) assesses conventional energy projects using three main factors: geological potential, technical feasibility and socio-economic viability. These UNFC categories are now being adapted for renewable energy projects.

UNFC-2009 categories and project classes. Extract from United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009, incorporating specifications for application (ECE ENERGY SERIES No. 42)



Financing renewable energy projects

The world has enough renewable resources, even as its population swells beyond 7 billion, to meet all foreseeable energy needs. In 2013, global investment in renewable energy reached USD 214 billion, down from nearly USD 249 billion in 2012 and the record USD 279 billion in 2011, according to the latest figures from Bloomberg New Energy Finance. Still, only massive new investment can meet the needs of emerging economies and rapidly expanding cities. To reach USD 1 trillion by 2030, current investment levels need to quadruple.

Why are investors still reluctant to put their money in renewable energy, while project developers in the sector often struggle to raise upfront financing?

The International Renewable Energy Agency (IRENA) has consulted over the past two years with its member countries, as well as the private and public financial sectors. As IRENA's research confirms, the risks of investing are perceived to be higher for projects involving renewables, irrespective of the territory. Risk is the most important factor hindering private investments. Traditional energy sources, as comparatively familiar territory to most investors, are perceived as easier and more predictable.

In developing country markets, financing risks for renewables are heightened by the weakness of domestic financial markets. Financial instruments in developing countries are inadequate, especially to cover liquidity risk. Political and policy risks are even more challenging to mitigate.

In these cases, the risks apply to all energy infrastructure investments, not only renewables. Although, renewable energy projects have greater difficulty making use of the mitigation tools that already exist. Political risk mitigation, for example, often excludes or overlooks renewable energy projects, especially at the smaller scale usually found in developing countries.

Innovative solutions and instruments for mitigating policy risk are under discussion. Already, multilateral institutions have started issuing bonds in local markets, providing an alternative source of long-term local currency funding. Additionally, large private banks are coming together by providing voluntary guidelines for the development and issuance of "green bonds".

Dedicated risk mitigation facilities for renewable energy are especially effective when they focus on a specific risk type — such as exit risk, construction risk, political risk, or power off-taker risk — for a certain technology in a specific region.

Over 75% of global climate finance flows domestically, says Climate Policy Initiative. Local capital should be the key to mitigating risks, boosting local economies, and leveraging international resources for climate finance. But far more information is needed about the capacity of the local financial sector.

IRENA will continue to study investment risks and risk mitigation, seeking to stimulate renewable energy finance. For renewables to meet the world's energy needs, risk perceptions need to be addressed head on.

Samoa: Biomass gasification and biodiesel production plants on two islands

Photo: Samoa Trust Estate Corporation