Projection accuracy and deviations （by P. Baliozian Fraunhofer ISE）

ITRPV was first introduced in 2010 and evolves yearly to include a larger number of projected parameters. The investigated parameters are reported as median values of the past year as well as predictions for the current year and the 10 following years. An essential phase of technology roadmapping is the follow-up process, which includes the critique and validation of the roadmap [23]. As part of the follow-up process, a parameter based accuracy study is also beneficial to further understand the deviations in previous projections. The projection quality of some parameters is first discussed in Ref [22], where the plots of the different editions are superimposed, thus showing the projection trend in each edition. To further quantify the accuracy of projections, Ref [24] proposes projection deviation statistical measures such as the projection absolute deviation *（PAD）* and the projection absolute percentage deviation （*PAPD*） to further quantify the time-dependent deviations.

The projection absolute deviation is described by the equation:

$$PAD = |P - Y|$$

P is the projected value of the parameter in a previous report of a certain year and *Y* is the reference value taken to be the latest report value of the result year （for instance, this year's reference value is the 9th edition values of 2017）. The latest 9th edition result is taken as a reference value for the deviation calculations considering it the closest to the current market value.

The projection absolute percentage deviation is described by equation:

$$PAPD = PAD/Y * 100$$

The dependency of the projection deviation on the time span of the projection is shown in Fig. 68 where the projection absolute percentage deviation of the three parameter: silver amount per cell, finger width, and mc-Si wafer thickness is plotted. It becomes obvious from the given data that the *PAPD* is strongly parameter and time dependent.

The line in the plot shows the time-dependent projection deviation trend deduced in Ref [24], where six parameters were studied. The general trend shows an expected decrease in the deviation with the decrease in the projection time-span, meaning that the closer the projection to the reference the less is the deviation, overall a linear approach fits to the general trend of the analysed data. As an example of an exception to the trend, the 4th edition predicted the current value of the silver amount per cell more accurately than the 5th edition.

Having a time-dependent percentage deviation value for each parameter learned from previous reports allow not only to judge the accuracy of individual reports but also to anticipate future ranges of expected results. In other words, the uncertainty or inaccuracy of the future results can be foreseen from data taken from past editions. In the future, including further parameters can provide a holistic projection accuracy analysis of ITRPV.

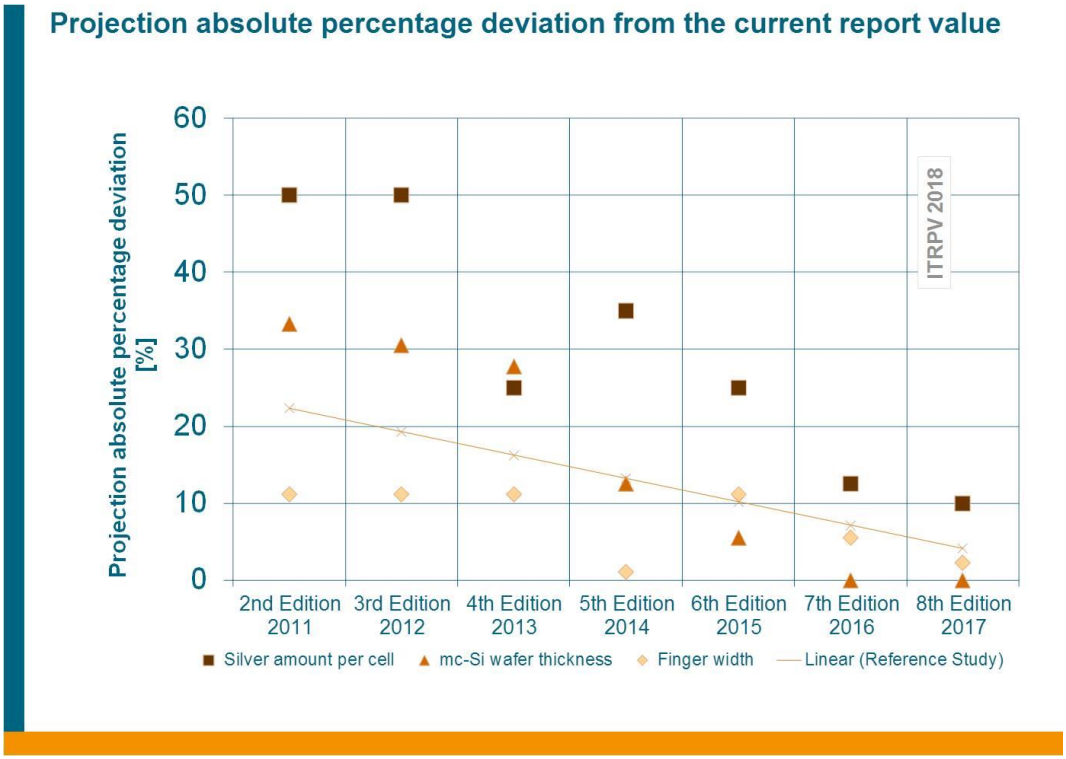

Fig. 68: The projection absolute percentage deviation from the 9th Edition 2017 values of the three chosen parameters: silver amount per cell, mc-Si wafer thickness, and finger width. The time-dependency linear trend taken from Ref [22] considers six studied parameters and shows the improvement of the projection the closer it is to the reference year.