Purpose:
To demonstrate a quality assurance procedure using a flat-panel array that simultaneously measures the beam energy and beam symmetry, with one single measurement setup.

Methods:
The energy and symmetry of x-ray and electron beams from TrueBeam (Varian Medical Systems) were measured at various bend magnet currents and steering coil currents, using a water phantom (Blue Phantom, IBA) and an ion chamber array (IC Profiler, Sun Nuclear). With IC Profiler, the energy was measured along the diagonal; simultaneously, the symmetry was measured along the transverse as well as the radial. For x-ray, changes in energy were manifest as changes in the maximum off-axis ratios along the diagonals at Dmax (“horns”). Horns were measured with IC Profiler and Blue Phantom, and compared to the depth dose scans. For electron energy, the “field size” was measured using IC Profiler with an aluminum wedge placed along the diagonal; the results were compared to the depth dose scans by Blue Phantom. The beam symmetries measured by IC Profiler were compared to the standard measurements by Blue Phantom.

Results:
For x-rays, the diagonal “horns” changed approximately 1.2% measured by IC Profiler and approximately 1% measured by Blue Phantom. The same energy range changed the relative dose at 10 cm depth in water less than 0.4%. For electrons, the “field size” measured by IC Profiler increased 4 mm, versus R50 in water increased less than 2 mm, for the same energy change. Symmetries of x-ray and electron measured by both devices were comparable.

Conclusions:
A single setup to measure beam profiles, accomplished with a flat-panel array, can simultaneously detect whether the beam energy and symmetry are correct. The ease of setting up the array suggests that this technique could be made as part of routine QA procedures.