AGENDA ANNEX 7b **Germany**
Agenda Item 13.6 j)
F1Q 3.Q.2a

a) For models with energy limiters. The allowed energy amount starts to be calculated with the launch of the model **and finishes when the ESC has stoped supplying energy to the motor.** If the energy limiter does not have the capability of detecting the launching moment it may start its calculation from the beginning of the motor run. The measuring device **(EL)** has to calculate the energy consumed in real time. After coming to the end of the limited energy supply, the motor(s) must stop irreversibly. **The energy limiter must interrupt the impulse signal from the timer to the ESC and cuts off the motor(s) in the moment the given energy limit is reached, without need of interaction of other devices. The ESC must always operate via its series connection to the energy limiter and not with direct connection to the timer.** The timer stays independent, but the energy limiter may inform the timer about the end of the energy supply.

Reasons:
The current F1Q rules demands that the timer has to be independent of the energy limiter. The limiter is the only device which had to stop the motor at the end of energy limit. To do this, the limiter must have the capability to interrupt the impulse from the timer to the ESC. This means, the signal MUST pass the limiter. Only this way is technical proper limiter functionality and can fulfil the rule requirement "*The motor(s) must be stopped irreversibly by the end of the limited energy supply*." If the "limiter" does only count the energy and signalise the end to the timer that the timer executes the motor stop, it isn't true energy limiter functionality. In this case the possibility for abuse and manipulations is given. The timer is to control the maximum allowed motor time and to cut the motor run in case the energy hasn't been not completely consumed at the end of this time. This should work independent of the limiter. To avoid wrong understanding of these facts the paragraph should be amended.

Supporting Data:

This is also so described in the rules of the other (F5) FAI classes who use energy limiters.
See here:
Part five-Technical regulations for radio controlled contests
(5.5.1.4)
In classes where an energy limit is defined an energy limiter device must be used. The energy limiter cuts off the motor when the given energy limit is reached. The energy limiter is located in the electric circuit between the battery and the motor. The interruption must either persist permanently or for a defined period of time.
Appendix A F5J
2. Installation environment
c) The ESC must always operate via its series connection to the altimeter / motor run timer and not with direct connection with to the receiver.

The difference between the wording "***finishes when the motor has stoped***" and " ***finishes when the ESC has stoped supplying energy to the motor"*** is the follow issue: The prop accumulate some kinetic energy by the start of the motor what is to see in the current peak. This energy is counted from the EL. This kinetic energy will let rotate the prop a short time after the ESC stopped supplying energy to the motor.

Maybe it's time to think about some features, which are helpful for the free flight usage. Such details can be:
- the limiter must store the energy for displaying after the flight
- the limiter must also store the altitude of the flight
These data must be erased from the memory if the limiter will be connected next time with the battery. Such a procedure makes it impossible to conduct a ground run during model retrieving with an allowed amount of energy if during the scored flight the energy was too high. In this case the altitude data will not be available. That requires a firmware within the limiter, which prevents from writing a new data set from an external device into the limiter. Therefore commercially manufactured units should be preferred. In the R/C classes this way is usual and reliable.