

# Saving Formula E

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Formula E, as currently conceived by the organizers, will fail. The racing will not attract fans and the high costs of competing will drive off teams (for a more detailed analysis, read '[Technical flaws that could kill Formula E](#)').

Can Formula E be saved? Possibly - with a major revision of the rules to create vibrant exciting racing at a reasonable cost.

Formula E is already facing a tight development timeline to achieve the 2014 start date. It is too late to choose a more appropriate chassis (see '[Rewriting the Rules](#)') or different venues. So what can be done to make the racing spectacular?

## Formula E Revised

First, focus on the strengths of the winged, open wheel, single-seater chassis, not the limitations. The Formula E vehicles will be extremely fast and agile if the race distance is reasonably short.

Next, emphasize the competition between the drivers, not the technology. Make each race a duel between two drivers.

Finally, distill Grand Prix racing down to the best elements. The standing start; The race into the first turn; A challenging mix of low speed turns, high speed turns, both directions with, at least, one long straightaway; The final dash across the finish line.

What will this look like?

## Formula E Revised will be exciting

Two cars line up. Staggered starting positions, the car with the inside advantage at the first turn has farther to go. The lights go out and the cars battle through the tight city streets. The track is fairly short (less than a mile) and the action intense. The results are immediate. And then, the next pair line up.

## Formula E Revised is media friendly

Each race pair is required to be waiting at the false grid a specified amount of time before their run. The drivers are belted in and no adjustments can be made on the cars. An interviewer speaks to the crew chiefs and discusses the set up choice ("I see you have gone with a high down-force set-up, are you surprised to see a low drag set-up on your opponent?") while media techs mount the in-car cameras on

standard quick mounts.

From the 'broadcast' booth, the announcers call the race. They choose what camera feeds to show and what information to put on the screen. They have access to live telemetry. Key information is displayed using the same methods used in video games. For example, an energy bar shows battery power remaining as a percentage for each car. What other information might help tell the tale of this battle: Throttle; Brake; Speed?

The suspense builds with the cars poised waiting for the lights. The cameras around the track catch all the action because there is only one battle to focus on. The GPS positioning constantly calculates who is ahead and turns that car's on screen data display to green, while the trailing car's data display flashes red.

Using a technique made popular in Downhill ski racing broadcasts, the data display freezes time and energy left at the half way point. "Car one has a three tenth of a second lead but 5% less energy left". "I do not think that will be enough, Bob."

The cars fly across the finish line. The announcers pull up slow motion replays and give their take on where and how the race was won. There is time for a commercial before the next race.

The cars trundle slowly back to a holding area where the in-car cameras are removed while the officials rule on any challenges, do weigh-in or run rule compliance checks. The drivers remove their helmets and give a quick interview. They are released and head back to the pits to digest the data and prep for their next race.

Of course, there is an App for this. The free Formula E App shows the 'broadcast' version. This allows

## From the start:

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➤The rules must strongly penalize crashing and blocking.

*The series should have experienced judges with live access to in-car cameras and telemetry. The rules need to be clearly written and fairly enforced. Rulings should be made immediately. The goal is: hard, tough racing, but always leave your opponent track space plus one inch.*

➤The technical rules must encourage passing.

*When racing cars that make major use of aeronautical down-force, the car in front, in clean air, always has a handling advantage. The rules need to encourage passing so the race to the first turn does not decide the winner each time. 'Assigned Battery Capacity' limits are one answer. Before the racing begins, the officials calculate (or test) the exact energy (Watt hours) required for a full speed flat out run through the course for a single car. Before the first two cars race, their engine management system is programmed to allow them to use that exact amount minus, say, 5%. Not enough so that a car might come to a stop on the track, but enough that the motor could cut out before the car crosses the finish line.*

*How will this create passing? The lead car still has the advantage of better grip, but the car that is behind gains an energy advantage by drafting. The car ahead must consider driving an inefficient defensive line and making minimal use of regenerative braking to keep the lead, while the car behind has the choice of attacking right away or driving efficiently and making maximum use of regenerative braking to build a power reserve for a move later in the race.*

*For example, Driver\_A over-commits to gain the lead in the first corner, brakes late and takes away the line, but must come almost to a stop to make the corner. Driver\_B quickly adjusts the brake bias to the rear which makes the car squirrely and difficult to control under braking, but allows more energy recapture from engine braking (regenerative braking). Driver\_B also drafts the lead car tightly down the straightaway, building even more of an energy advantage, and then, perhaps, moves out and fakes a try at recapturing the lead. The lead car is forced to brake hard and late trying to defend. They both fight wheel spin coming out of the final corner with the second car still trailing by a car length, but Driver\_A uses up the last of the lead car's energy about 300 yards from the finish line. The car is going fast, but cannot accelerate anymore. Driver\_B still has energy to spare and just beats Driver\_A across the finish line.*

the fans at the track to see the race live but catch the action out of their immediate view.

The premium Formula E App allows the user to choose what cameras to watch from. What data to display. How and where on the screen they want the data - energy remaining shown as a bar graph, dial or numeric display, etc... They can also choose unlimited replays - which camera, slow motion or backwards. Frame by frame. Special access to interviews and roving cameras that was not included in the 'broadcast' version.

For the fans, it is truly international. Formula E running in Miami this weekend but you are a fan in Germany? Check your cell phone and see the latest.

The Formula E website works the same way; the live free version with YouTube length videos with the commercials front loaded; the premium version with all the controls. Choose which rounds to watch when it suits your schedule.

## **Formula E Revised is promoter friendly**

The track does not need to be a closed loop. This gives flexibility in track design; Find the best sight lines; the safest course; the best combination of turns; the least traffic disruption.

The pits are part of the show. The cars return to the pits by a low speed lane where fans can be up close and see the cars. The pit area can be outside or inside (convention center, sports arena). Each crew has the same size space to work in, with glass walls so the fans can watch.

The promoter might even want to weigh opening up the spectating free to everyone. This makes a true street carnival. Premium services such as grandstands, box seating, pit viewing are a separate charge. Booth spaces for vendors and advertisers also will generate profit.

Normal electric power mains will suffice for the race teams since the cars have only run a short distance and have time to recharge.

Racing can fill the whole day without breaks. If the number of cars is low, then a 'round robin' format can be used; everyone racing everyone with top 8 going to the quarter finals. Too many cars - then use straight eliminations. Either way, the day builds to the final race between the two top cars.

## **Formula E Revised is race team friendly**

Costs are tightly controlled and definable. Each team needs only one car. No spare chassis are allowed but spare parts are encouraged. Tire compounds should be designed to last the whole event and an 8 tire per event rule should be implemented.

The race crew size should be tightly limited. Only the 6 crew members are allowed in the actual team pit

area. Driver, Chief Engineer, DAQ specialist, 3 mechanics.

There are pre-season testing limits but enough days so the crews are comfortable working together and understand how to get the most from the cars. At the races, it is about tuning the car for the track, not trying to get it to run.

Temporary street courses are difficult to model. Each driver drives the track for the first time during the first race. Their ability to master the track and their team's ability to improve the car's set up will determine how far they will advance. Each run will be faster. The team's skill will matter more than the team's ability to raise cash.

The better teams will win more often but a strong drive or a lucky set up guess will mean every team will have a chance to shine.

Every team will get media exposure. Each team co-stars in every race they are in. There are no back markers just circling the track. Sponsors want camera time and they will get it.

## Formula E Revised is EV marketing friendly

Taking a look at the comment section beneath almost every article about Formula E, we find the same thing. People think that racing electric cars is an interesting idea and they plan to try watching at least one race and see if they like it.

What will they see? Will they want to keep watching? What impression will they take away about electric vehicles?

Formula E as currently conceived will be trying to run races that are half the distance of Formula 1. Formula E cars cannot run even this distance at feeble Formula 3 speeds. Fans will be treated to the embarrassing spectacle of drivers abandoning their first car as it runs out of power, and then abandoning the second car for a (hopefully) recharged first car. Even this will require pushing the batteries well beyond their design limits, so fans will get use to the sight of cars slowing and pulling to the side of the track as their batteries fail. The competition will not be about who can drive the fastest. It will be about who can make their batteries survive. And the message: **EV's are not reliable and not much fun to watch.**

Formula E Revised is not a weak imitation of Formula 1. It is about driving electric cars the way they are meant to be driven - Short repeat trips like a daily commute or errands around town. Under this usage, SAFT specifies that the batteries will last over 1000 cycles. Cars breaking will be from too much power as the rear end steps out and smacks a wall or wheel spin snaps a half shaft. The per run energy limits should be highlighted as 'finding ways to go faster more efficiently'. Green racing; Heart stoppingly exciting! And the message: **Electric cars are fast, reliable and desirably.**

## **So what do you think?**

As a fan; As a team owner; As a racer; As a promoter; As an advertiser.

Which Formula E do you want to see?