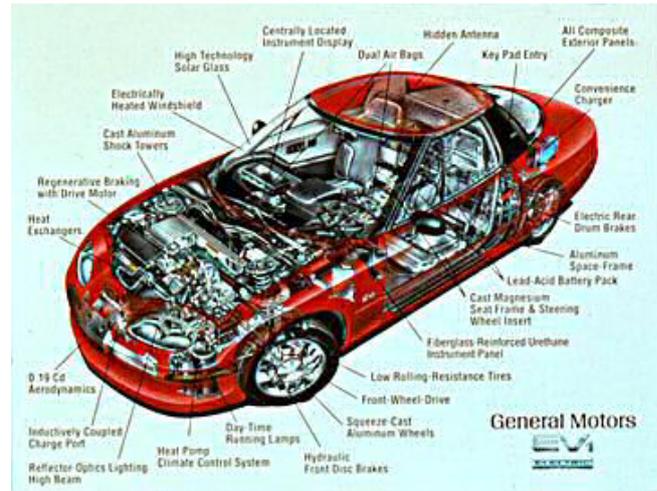
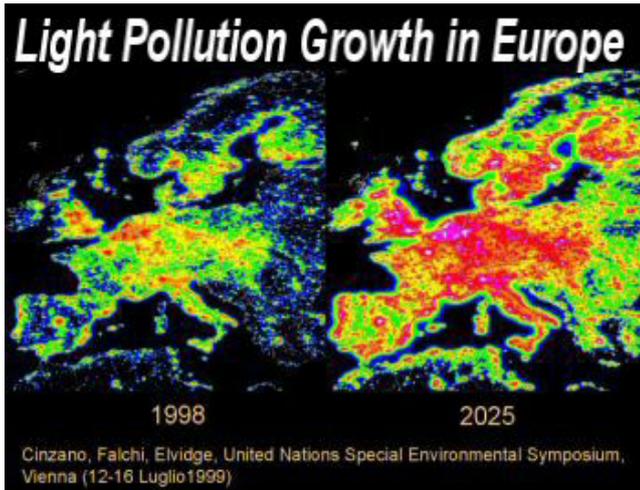


## The City "Domes" of Wasted Energy Which Should Be Charging Our EVs



Light pollution has grown alarmingly over the last 50 years. This can be seen today as the "domes" of light over modern cities. It has become common to have a presumed need for improved street lighting. We now have security lighting almost everywhere. Lighting in urban environments can be seen creating this sky glow which is there over the major cities in our world at night. Indeed these domes of light make the Earth from space look like a jewelled sphere. When night time lighting is misdirected, unshielded or excessive, it causes unintended consequences including those that are visible: sky glow overhead from upwardly directed light refracted by particulates and moisture; glare from unshielded fixtures; and light trespass extending across property lines where it is not needed or wanted. The less visible effects of night lighting on flora and fauna have only recently been examined and the findings show that the nocturnal habits of all manner of life depend on a bright day/dark night cycle for the health and survival of animal species. Sir David Attenborough concluded his BBC TV programme 'Life in the Undergrowth' with these words, "Insects - we would do well to remember them." Perhaps we should paraphrase Sir David and say that "we would do well to research the 'hidden' effects of light pollution?"

More than 10 years ago light pollution was predicted to dramatically reduce insect numbers. **"So what?"** - was the typical response. Followed by -"Fewer bugs will allow us to sit out in the evenings without being irritated." It was predicted that because light pollution was killing off insects at the base of the food chain there would be a reduced food supply for higher order animals such as bats, birds, frogs, lizards and amphibians in general. A reduction in the numbers of insects would even impact on small mammals. We are seeing many such animals now in decline and no one seems to know the reason why. A reduction in insect numbers, which pollinate flowers, would reduce flora bio-diversity. Fewer flowers, with fewer insects - a vicious circle of species decline? There has been no major research as to why this is apparently happening.

We are well aware that flora are dependent on daylight for photosynthesis, but all-night lighting can disrupt long term health by affecting growth and flowering cycles, including delaying the cycle of dormancy of deciduous trees, causing severe winter dieback. Early studies on fauna reveal behaviours (attraction and repulsion, fixation, orientation, biological rhythms, foraging, mating, movement, predator-prey relationships, nesting) are negatively impacted by light at night (LAN). Preliminary studies have begun on: bats, sea turtle hatchlings, frogs, salamanders, western long-nosed snakes, insects, birds, moths, fish, and marine birds. Migrating birds, which primarily fly at low altitudes at night and are thought to partially navigate by the stars, have been studied. The US Fish & Wildlife Service estimates over 100 million bird-kills per year because birds are susceptible to collisions with lit towers and buildings, and inexplicably circle them to exhaustion during inclement weather.

Most alarming have been new human breast cancer studies which show increased tumour growth in the presence of LAN. (Apparently the same is true for prostate cancer in males).

Efforts to address artificial night lighting and its many effects on the environment was begun twenty years ago by astronomers in Tucson, Arizona when they noticed that their telescopes, while increasing in magnifying power, were losing visibility of the stars due to increasing sky glow. The astronomers formed the International Dark Sky Association and prevailed upon the city council to enact outdoor lighting regulations to require the use of shielded fixtures to minimize light pollution. The astronomers served as our "canaries in the coal mine" and have been joined by those with concerns about the total effects of light pollution. Dark sky advocates educate the public and lobby for legislation by focusing attention on the loss of our connection with the star filled night sky and the nocturnal environment. Unlike cleaning up other pollutants clearing our skies of light pollution can be accomplished in our lifetimes and without sacrifice, including estimated savings of at least \$4.5 billion yearly in the U.S. from electricity generated primarily by burning fossil fuels. Simply turning off unnecessary outdoor lights or closing shades in empty rooms can reduce bird deaths by 75% or more, according to the National Wildlife Federation.

The few, who have raised warnings about the "hidden" problem of light pollution in the past, have been regularly dismissed as "cranks"! (In my own experience, these warnings have always been dismissed.) Statements have come from our city fathers along the lines that "I don't want my electors to see stars after being mugged because there were too few street lights to prevent crime." Implicit in this is the idea that street lighting actually prevents crime and that light pollution concerns will remove street lights. Nothing could be further from the truth and such beliefs are simple urban myth. We need light at night but it must be just enough light to do the job and no more. It needs to be where required to do that job and it should be turned off once the need is no longer there. This is no more than a part of any reasonable energy conservation scheme. We need to better manage energy use. Profligacy should become a criminal offence.

The fears over global warming and climate change have awoken public awareness of the issues of energy wastage. What more manifest energy wastage is there than the light pollution, illuminating the "bums" of birds at night, who also find their migratory flights, are compromised by over illuminated tower blocks?

There is an argument that energy used at night is not actually wasted on the cheap electricity for street lighting because management of power stations requires a consistent energy output meaning that electricity is produced at night anyway and might as well be used. But it doesn't have to be used for street lighting. There are better uses, which include the night time charging of electric vehicles, known as EVs.

In America, the debate known as, the 'long tail pipe argument', states that battery-driven electric cars are charged with electricity from the mains, the majority of which is generated by fossil fuel power stations. The argument runs that "if all road vehicles were switched to battery-driven electric it would require at least a 40% increase in electricity generating capacity" and that "electric cars would simply transfer the atmospheric pollution from the cars to the power stations." However the prime recharging window for electric vehicles is at night, when we currently over-light our streets and the night sky!

And the car that could take advantage of the off peak electricity is out there. In the dusty basements of the Chevron-Texaco corporate headquarters there is a technology that can in one swoop-slash global warming emissions, save millions of people from respiratory illnesses, and stop us trashing the Middle East to seize its oil. Yet it is being deliberately left to rot, in the hope that we will all forget about it. General Motors (GM) developed a prototype of an electric car in the early 1990's. It was a sleek, silver car that could drive at the same speed as a fossil fuel hunk of metal - only with no exhaust fumes and no carbon emissions. You simply plugged it in at night, like a mobile phone, and drove off in the morning. This was the EV1.

The first electric cars appeared on California's roads - but the people working on selling them noted something odd: GM was deliberately underselling the vehicles. Chelsea Sexton, one of the company's electric car specialists, has explained that the team had to fill in vast questionnaires for every customer, only for most to be rejected inexplicably.

GM seemed reluctant to push their product onto the consumer market. So the California State Senate decided to give the company a nudge. It passed a law that said if you want to sell cars for California's roads, a proportion of them have to be electric cars: 2% in 1998 and 10% in 2003. The state senators envisaged a day when electric cars would turn the old fossil-fuel beasts into relics. The car companies were immediately and irreparably enraged. They began a two-pronged strategy: the most grudging and stuttering possible compliance with the law, while lobbying furiously alongside Big Oil to have the law scrapped. This corporate coalition finally succeeded in repealing the law. With that law gone GM immediately called in all their electric cars and then sent them to the scrap heap.

The biggest incontrovertible drawback to the EV1 electric car had been its limited range: one charge lasted about 60 miles then the car stopped. When the EV1 appeared, battery capacity was poor. A personal memory of battery inadequacy was my first digital camera, a FUJI FILM DS7. This used 4 AA batteries. Its battery life was the "pits" and so I turned to rechargeable batteries, most of which were then Ni-Cd. These were neither cheap nor did they have massive capacity and they had the dreaded "memory" effect. They have since been replaced by Ni-MH. The earliest Ni-MH AA batteries had a capacity of about 1000mAh. I cannot now buy Ni-MH at my local store with below 2700mAh. The 60 mile limit would now be over 160 miles in an EV1 with a modern Ni-MH power pack. Bill Moore however, editor of EV World, has informed me that as far back as 1998, the Sunrise, operating on Ni-MH, had a range of "about 300 miles". The point is that battery capacity is no longer an obstacle to EV use. Why then, with the EV1 crushed and on the scrap heap, is there not now an EV2 hybrid in development? The EV1 energy management was ahead of its time but has apparently gone from modern vehicles. Is it too late to ask the question why? Note added in 2007. TESLA Sports cars now have a 2 seat sports road car capable of 0-60 in 3.5 secs and with an equivalent gas mileage of 135 mpg. Now that's technology!

Thatcho-Reaganites are always lecturing us about how unregulated markets are the best way to stimulate innovation. The story of the electric car is a parable about how, to the contrary, unregulated markets often quickly descend into a corporate oligopoly that "smothers in their cot" new technologies. Only tough democratic regulations keep markets from devouring themselves.

And only by managing our resources can we ensure that we are not mortgaging our future. Nuclear power is feared because of the risk of terrorism, but when the fossil fuels run out, as one day they surely will, what will future generations do? What will they think of today's leaders, our city fathers? I want you to make up your own minds.

We need to be charging our EVs at night and dim light pollution. This would reduce both global warming and climate change. The bonus would be a sufficiency of energy supply and kids would realise that the stars are not just movie SFX!

Graham Cliff [www.lightpollution.org.uk](http://www.lightpollution.org.uk) (with much help from Pauline Cliff.)

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This document is based on the observations and comments of:-

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