

Journey Through The Wind Turbine R&D History.
By Carl J. Friis-Hansen.

This is my story about the people I met, the start of the wind turbine industrialization and my involvement in measurement, generation and politics surrounding the large scale wind turbines.

I may criticize some individuals along the way, but let it be known that offering unparalleled viewpoints is a needed maturation process, in order to achieve best overall results. In a scientific community you come up with ideas to improve a concept, and let this idea be contested and reviewed and weighted against current or other solutions.

In the industry it has been the norm to do a feasibility study on a chosen concept, in order to avoid producing something that is financially or technically unsound. In the private industry it is essential to ensure that your investments are long term profitable and competitive.

As I will explain later on, sound science and economics are often ignored in cases where political influence and large scale lobbying is applied. Also, when political influence, and subsidies play a major role, this will dictate social norm, which is extremely difficult to counter – follow the stream or get expelled from the good and easy life, both economically and socially.

I have not always been so lucky as I am now. Retired a year ago, it is limited what sanction can be thrown at me, and it was encouragement from some of my American friends, which empowered me to write about this journey from my childhood in the 1950's and 1960's to where I am now in 2019. You will most likely enjoy and recognize much of what I have experienced, in your own life.

I think it is vital that some of us, at least, will put the details of our lives down to paper, as we can better understand the present when we recall and compare with the past.

Note:

<https://www.fyens.dk/erhverv/De-kalder-ham-Mr-Windpower/artikel/2665802>

Om Henrik Stiesdal

The 1950's Outskirt Of Copenhagen.

Mum and dad, brothers, nanny and housekeeper, lived in 30 by 8 meter two storage wooden "summerhouse" 14km north of Copenhagen center in small town named Springforbi, which translates Jump Past. Yes, you are right, lots of people thought it was funny, and today the town is an unnamed area of grassland and a few remaining houses.

But back in the 50's and 60's there was a grocery store and a railway station with goods terminal and post office, a research laboratory for the forestry and agriculture. To the east of the Springforbi was a fantastic view over the water towards Sweden. To the north, the river Mølleåen passed through a dam and a small combined hydro plant and air compression facility called Strandmøllen. To the west, there is a big deerpark, 28km circumference, called Dyrehaven. Sort of in the middle of this park, you will find a tiny royal castle called Erimitage Castle, which royalties used as a base for their deer hunting parties. There are still hunting party once a year, but these days with no riffles, just one or two riders symbolically leading with fox-tails attached to their backsides. Never enjoyed the races, named Hubertus Hunt, myself. However, even as a spectator it is great fun. Not far from the sweet castle, we have the awesome 18 hole Copenhagen Golf Club, which I was a member of a few years during my early teens. The deerpark and the golf cause blend so beautifully, and if you go there one day, you may have a duck for dinner, as one lucky golfer once did, when he accidentally hit a duck with his golf ball.

Life in village of Springforbi was fascinating in that it sustained all walks of life, from the most high society people, over the middle class, to the people with nothing left to loose, as Janis Joplin passionately sings. This town taught me a lot about the value of respecting all kinds of people, their contribution to our country and the richness they gave to our culture, but these values were for from evident in everybody eyes. I was often confronted with: "Oh, your parents are so rich and high class, we will not play with you, you are not our kind." But after knowing me better, they would normally come to enjoy my company very much. It was often just a language problem. We all spoke Danish, but there was the King's Danish and the Worker's Danish. Changing the wording and intarnation a bit, would normally clear me from the snob-tag.

The railway station was a central facility of the village Springforbi and was known as Springforbi Station. About half the trains would stop at Springforbi Station, where the train would exchange passengers and goods. Half the trains would have a steam locomotive and the other half would have diesel electric locomotives. The steam locomotives would normally be fueled with heavy fuel oil, but some were still fueled with good old coal. Crossing from one platform to the other, was unguarded. You had to be seriously observant when walking over the tracks. Just north of the station a curve made it impossible to see the trains coming full speed, and it was really difficult to hear the steam locomotives, if the was just a slight breeze.

Regularly a goods train would stop and high pressure bottles for Strandmølleverket would be exchanged and driven by truck to the factory a few kilometers away. It was the job of the storage worker to handle the heavy bottles between the hand pulled four-wheel trailer and the train wagon. The storage worker was really poorly paid, and slept during night in the storage barn with a snaps bottle in his hand. He was not very talkative, always drunk and his life ended one day he crossed the tracks away from the wooden path, he was too drunk to climb up on the other side and got his one leg cut by an oncoming train. He screamed so loudly, he was heard many kilometers away in the neighboring village.

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The storage worker was a stark contrast to the station manager. The station manager was a friendly warm person with one and a half arm. He took care of post office service, train arrivals and departures, telegraph, telex and phones. Right, back then the five track telegraph was still used. A narrow tape was punched. There was, what you in modern computer times, would call a pre-punched clock track and a row of needles would punch holes at either side of this track, according to a specific coding. I am not sure what messages came on the tape and how intensely it was used.

Heating our homes in the village happened in many different ways. Some used coal in small furriness in their living room. This worked for small apartments and houses, where heat from the living room would propagate adequately to adjacent bedrooms and kitchen. Often the toilet would be down in the courtyard, without heating and freaking cold in winter. Others in small apartments and houses, would use kerosene heated small stoves. They would have two 10 liter blue bottles delivered regularly and the carrier would take the empty back to be refilled. Using kerosene was cleaner, handier and much easier to regulate, than the coal burners. A few of the larger homes where heated with city gas in a central heating system. It was very noisy and was therefore only an option in larger homes, where there was a suitable cellar where the gas burner could noise away. It was also the more expensive heating, as city gas was not as cheap as heating oil, kerosene and coal. Most villas though, where heated with heating oil in a central heating system. It was cheap, clean, comfortable and very little maintenance was needed.

Using heating oil became trendy after WWII and was the norm in Danish villas until Al Gore and James Hansen explained fossil fuel was bad for us and the tax on fuel rose considerably. In 1949 the oil company replaced our coal fired central heating with a heating oil burner – for free. There was, at the time, a huge demand for gasoline, but little use of diesel and light heating oil in comparison. Thus, in order to promote the use of heating oil, the oil companies installed the hardware for free. We had 10,000 liter tank in the ground, which was topped up once a year with about 5 to 7 thousand liter.

Electricity supply was stable and good quality, but a bit on the expensive side. Although virtually all electricity at the time was generated from Polish coal, the transport of the electricity was relative wasteful, which may have been a factor in the the kWh price. We did not use much electricity though. Most of our light bulbs spanned between 15 to 40 Watt. The radio in the kitchen was about the only electric utility we has. It was great when all the staff and us kids sat around the radio and listened to Gunner “now” Hansen commentate the sucker match between Denmark and Sweden or listen to the weekly radio show with exiting stories like The Hound of the Baskervilles and the like. But most of all, we would just listen to the daily news broadcast.

Granddads apartment in the center of Copenhagen.

Once in a while we kids would travel with our parents to our grand dad on our mother's side. He lived in a 13 room apartment on King's New Square in the very heart of Copenhagen. There was a fireplace in nearly all the rooms and a large kitchen with a firewood heated stove, in Danish called a Komfyr. In the early morning hours, the firewood in the stove would be lit with a crumbled newspaper and kept burning until late in the evening. The stove had a water tank build in, to keep hot water for the dishes and washing. The housekeepers lived in two rooms behind the kitchen and would lite a fire in one or two of the fireplaces where my grand father incidentally felt like sit and read. I loved his head housekeeper and saw her a bit like a substitute for my grandmother, who sadly died long before I was born.

My granddad's lifestyle and apartment was even then back in late 50's and early 60's like being thrown 50 years further back in time. He was certainly not poor, but he did not offer the slightest modernity or luxury to his servants and in reality not to himself either.

Once in a while, the whole family would come to dinner at his place. We would sit at an enormous table, where we would enjoy a three to five cause meal, and debate religion, world travel, books and the usual chit chat about family, abs and friends. We would at times also discuss environmental improvements, industrial achievements and the governments demand for more tax money. I do believe all of us enjoyed coming there, it was like participating in a cultural time travel, where the host was full of life experience.

When my grandfather was invited to a formal dinner, he would read two subjects from Salomon's Conversation Lexicon the evening before. He wanted to make sure that he would have a fluent conversation with the lady beside him at the table. He knew that sometimes you get lost for conversation material and he did not want to suffer that embarrassment.

Aristocrats are called 'blue bloods' because ...?

In the context of big houses and poor heating my mother, who was just as British as she was Danish, answered that. She explained to me that in the good old days, elderly aristocrats were sitting in their enormous houses with four meters to the sealing, a single inefficient fireplace and virtually no insulation in the walls, avoiding sun and hard work, freezing most of the time. This way the skin becomes more transparent with poor blood circulation. Normally one would laugh and I think I did. Later when I came to live in Scotland, I realized what my mother told me back then was real and true, but more about that later.

Postal and Phone Service in Springforbi Village.

We are in the early 1960's, the dog is out in the courtyard running after it's tail, playing sucker with the neighbor kids, when the postman arrives dressed in black uniform in his black air cooled VW beadle. He puts our daily post on the kitchen table and picks up whatever post we may have laid there for posting. Then he goes out again to play five or ten minutes with our golden retriever and continues on his route. Maybe we will see him later in the afternoon if there is some special delivery for us later that day. We never locked the doors, even during short holidays. If strangers came to nose around in the village, they would be approached by neighbors, we all knew each other, so theft was virtually unheard of. The postman could have money with him for the pensioners, without risk of being rubbed. You could put money on the kitchen table for stamps, for the postman to collect, and the postman could just leave valuable parcels on the doorstep or in the house. These kind of thing would obviously not work in medium and large cities, but worked fine a bit out in the country side.

As most Danes at the time, we has telephone. We had three of them coupled in parallel in addition to a big external bell. Our telephone number was Bellevue 222. So the local telephone exchange was called Bellevue and our number at that exchange was 222. To make a call, you would press the red button and crank the dynamo handle two or three rotations. Then you would go off hook and wait for one of the ladies at the exchange to say Bellevue. At this point you would ask to be connected to the destination number, and maybe ask the lady what time it is now that she was on the line. The lady at the exchange would phone the destination and connect you if answered, otherwise she would tell you the destination was busy or did not answer. If the destination was unreachable at the time, you could always ask to be connected to another number of your choice. My mother often called her girlfriends in the US. Calling overseas was very expensive compare tot today. Amplification was not the best, so you had to shout loudly to keep the conversion going. Remember, back then the signal was going through cobber wires on land and under the Atlantic with multiplexed trunk signals amplified with good old radio tubes. During my electronic engineering studies I learned that there were many amplifier on the undersea cable over the Atlantic. The amplifiers all came in triples due to the life expectancy, so the first number of years the first was active, then the next amplifier would be active for the next number of years and so on. Later I will describe how concession for phone companies worked in Denmark and the special connection to the small island of Hesselø 30km out to sea.

“Knokkelroden” (The Knuckle Root) in the village of Taarbæk.

South of my home village Springforbi, you will find the beautiful village Taarbæk. In my early years, it was a functional fisher village with harbor, school, many shops, library medical doctor and veterinary, police station, commune office, bank, church, park and all you could wish for. Five in the morning most of the village would echo with the sound of small fishing boats warming up their one or two cylinder glow-head medium compression kerosene engines. For me this sound is closely connected with the smell of fish and something fundamental in life. Many of these engines came from motor factory in the coastal town of Hundested in Denmark, which is why these engines were often called Hundested Motors. The creator and factory owner was called Niels Højsgaard, with whom I have sailed with a few times from Hundested to Hesselø island. The engines footprint and weight was large compared to their horse power. They were a science to start, but incredible reliable and functionally very simple and uncritical with fuel quality. There were various ways to start different variant of these engines, but the two most common was probably a propane torch or a gunpowder capsule. The engines would idle at about 30 RPM and 100 RPM at cruise speed. On standard small commercial fisher boats, the engine would drive a 24V generator attached to a battery of Ni-Fe cells or similar. It is the same sort of batteries that are called Edison batteries these days. They were widely used as backup on telephone exchanges, are a bit expensive, but use environmentally friendly electrolyte and appears to last forever, no matter how abusive you are to them. We used them on two small power plants on Hesselø island, which I will elaborate on later.

Back to the harbor in the fishing village Taarbæk. During WWII Jewish families were hunted by the Germans all over the occupied Denmark, but Sweden was so bravely neutral, sold the Germans some cannons from the Beaufort factory and kept the Nazis away. One option for the Jewish was to escape to Sweden during night in local fishing boats. At the local Inn the Jewish were assembled behind a fake wall at the end of the dance hall. Late night the men, women and children would be taken out to a fisher boat and sailed to the town of Landskrona in Sweden. One of the skippers was nicknamed Knokkelroden, not a very flattering name, but I never got to learn his real name. Knokkelroden was very successful in shipping the Jewish, he never got caught and appeared to have earned a considerable “tax free” fortune during the five years. He was very brave, so personally I don’t see anything wrong in him charging accordingly.

Hesselø, a very special island.

Hesselø is located 28.5km north of the mainland. The island is 1.5x1.0km with an adjacent reef extending the north-west of the island. The island has had several private owner throughout the last century, but was owned by the FLSmidth & Co. A/S engineering company for many years, and today back in private hands again. Towards the southern end, a tall lighthouse points into the sky, surrounded by building for the lighthouse caretakers. Further to the south-west is a farm and to the right of the farm is the school. On the north side is an an insanely beautiful house named Hesselhus, build by Martin Nyrop, the same architect who build Copenhagen City Hall.

The mega binoculars.

I used to spend a lot of time on Hesselø with and without my family. My dad had a pair of binoculars produced by the Germans for adjusting an optical distance measuring system. My dad and my uncle took this and other equipment at another island called Fany, as the Germans were forced to leave all equipment there at the end of WWII. These binoculars had great amplification of 12 with wide field and a clarity and light intensity I have never seen since. We would place it in the window and study seals, birds and the occasional ship in the horizon. TV and Youtube has never come close to the same satisfaction. There was something new all the time, you can never get tired of such a close encounter with this amazing nature.

Igor the seal.

It must have been around 1959 where we were down on the north-west to have our usual morning swim in the ocean. We would dive in from the remains of a tiny harbor the Germans build during the war, we called it therefore Tyskerhavn (German Harbor). After a short swim we discovered a baby seal, which we observed for a while on a distance. After we returned to Tyskerhavn we went over to see how the little baby seal was doing. After having kept an eye on him for a number of hours, we decided to say hello to him. The little fellow was all so happy to make our acquaintance, so it appeared more and more obvious that he had lost his mother.

It was dad who swiftly named him Igor. During that summer, Igor became my best friend ever. I could sit for a long time and pet him, talk to him and listen to his replying barking. A few times I managed to get him to pull my small rubber dingy. Igor would come each morning to meet us when we went swimming. He became bigger and healthier, thus he was clearly old enough to catch fish, but just simply missed his mothers company.

Journey to the reef through seal swarm.

One day we decided to swim out to the north-west reef where many seals enjoy sunbathing. We all had a bit of reservation due to long stretch of deep and open water between the island and the reef. In the end we dared. Midway a whole horde of seals surrounded us, it was frightening. Remember, they are predators with sharp teeth, and although we are not on their menu, a bit of playfulness or slight aggressiveness from their side, can be seriously dangerous. However, the seal horde let us swim all the way to the reef, where we sunbathed together with the seals for about two hours, before

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swimming uneventful back to the island. It was great to have done it, but I would not do it again and not suggest others to do it.

Von Platen came by air.

One rainy day we saw from the windows of Hesselhus a small airplane attempting to land on the short landing strip on the North-West. We went down the brink to the landing zone to welcome the plane and get rid of any gees walking around on the strip. The plane landing fine. The pilot was named Von Platen and the airplane was an old single propeller with a wooden propeller. As far as I know, Von Platen enjoyed flying around in Scandinavia, visiting interesting locations. He left Hesselø later in the evening. His take-off was a bit nerve racking, it was raining, it was getting dark, the plain was old and due to the direction of the wind, he would have to take the strip south-east towards a 30 meter high slope covered by trees. All went well.

My first tethered “drone”.

Got you there with that headline. No, back in the early 60's we did not have DJI drones with Zenmuse or Hasselblad cameras and GPS/GLONASS. What I has to play with, was a model single engine aircraft with remote control via strings. It would have been great if it was radio controlled, but you know, radio receivers back then were still mostly with tubes, heavy weight and bulky. Nevertheless, it was still fun and thought I would mention this after the story of Von Platen. Today though I do fly drones commercially and that is even more exciting.

Fuldemandstårnet (Drunk Man's Tower)

Towards the west coast of Hesselø you will find a tower made of granite stones. Nothing exciting about the inside of the tower, just empty space and about 6 meters to a concrete sealing. The fun part, when you are not drunk, is to manage the outside spiral stairway up to the platform on the top of the tower. There is no railing, and a fall from six or seven meter is not healthy, so have a wild guess why we called it Drunk Man's Tower. The trees surrounding the tower have grown taller than the tower, so as an observation post, it cannot match the lighthouse. I believe to recall that my mum told me it was a former owner of the island, who just had nothing else constructive to do and build the tower for the fun of it.

Karl Gustav on Icy Ground with His Harley.

For a long period Karl Gustav was lighthouse caretaker. He cleaned the rotating mirrors around the kerosene burner and all the class windows. In his spare time he was mostly drunk and/or trying to shoot seals hoping no one saw it. He was single, lonely and not very bright. I never talked much with him, it appeared he was never in the mood to.

One winter day he was so pissed and drunk, that he decided he wanted to go to the mainland right now on his Harley-Davidson motorbike. He claimed it would be no big deal, as ocean had frozen over. He was told to piss-off, no one believed he would actually attempt the insane stunt.

Granted there was actually ice as far as you could see, but certainly not all 30km to the mainland, not to speak about thickness and continuity. The rest of us would only dare to go a few meter out equipped with ice pegs.

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Now, Karl Gustav stuck to his plan. Started his old Harley, however he got it started, and drove out on the ice covered ocean. We were screaming after him that he should come back, but sadly he never did.

Trespassing Visitors Forced to Swim Away.

At a time where none of us were on the island, the farmer, Egon Jensen, was walking along the beach to collect driftwood. Then he spotted a family of four; mum, dad and two teenagers. They came from direction of one of the houses. Egon explained to them that this is a private island, thus they were trespassing by going further from the beach than to the green grass. Okay, they promised to not leaving the beach and row their dingy back to their sailboat.

Thirty minutes Egon met the family again, coming from another house. Egon had run out of patients with them, loaded his shotgun and shot some good holes in their dingy. The dingy was now no better than drift-plastic. Screaming and yelling a lot of bad words, the family swam the 100 meters out to their anchored sailboat, never to be seen again. What is it people don't understand with privacy?

1800 gees and a South American Plant.

During Easter I stayed with the farmer Egon Jensen and his wife. Egon had just bought about 1800 gees, which were intended to grow fat on the grassland on the island. It sounded like a good business, they could walk freely around, the ocean was a natural boundary.

However, more and more gees got sick. They rotated their head almost 360 degrees and were not able to eat. I could rotate their head back in correct position, dip their beak in the food, but they still did not eat at all. Egon shipped a number of the dead or dying ones to the state veterinarian laboratory, where the animals were checked and analyzed. It was not possible to diagnose the reason for the illness. A new batch was shipped to the laboratory and finally they found traces in the gees' throat of a plant that is only known to grow in South America. The gees farming thereby came to an abrupt end.

Strange though, because horses and cattle have grassed on the island since eons. Maybe migrating birds from South America have landed on the island at some point.

A Tired Migrant Gets to Rest in the Kitchen.

One day a big bird landed not far from Hesselhus unable to get in the air again. The dear bird could hardly walk, so we took it into the warm kitchen, gave it some bread and water, and left it to sit and rest. After a short week in the kitchen, and a bit of shit on the floor, the bird appeared to be in much better condition. We took it out and it successfully got air under the wings, circled a bit and flew away in north-easterly direction. I suppose it's destination was somewhere in northern Sweden and fuel had simply run out. We felt good having saved this big bird.

Electricity Generation on the Farm.

The farm needed electricity primarily for milking machine, deep freezers and tools, but also for electric light, TV and other modern facilities. There were no longer employed farmhands, it was time to join the twentieth century. It was decided to equip the farm with two Zolar Oil driven generators, a large N-Fe bank of batteries and a number of rotating converters to transform 110V

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DC to 220V AC 50Hz. The Zolar Oil was similar to jet fuel, thus a variation of standard kerosene. Charging from one generator alone would take about 8 hours, and the charge would last about two days. All lights were run off the 110V DC grid. TV and freezers were powered by rotating converters. Milking machine was using 110V universal motor, which runs equally good on DC as well as AC. Ten years later I happened to pay a visit to the island, the generator system was still working fine.

The lighthouse quarters had a somewhat similar generator system long before the farm, but in the mid 60's the lighthouse was converted to bottle gas, automated and the staff relocated. So, the generator system at the lighthouse became disused. The generators are likely rusted solid by now, but is the Ni-Fe batteries are still there, I bet they would easily be reconditioned and fully working again.

There are Devils on the Island.

Before I was born, Hesselø was owned by a man with a sense of adventure. During a visit to Australia, he managed to have two grownup kangaroos shipped to Hesselø. Not so sure kangaroos thrive in the cold climate in Denmark, but never mind.

The owner forgot to tell about the the the new Australian inhabitant, when one of the lighthouse keepers came back from holiday to the island, had a beer or two ... or five, went for a walk in the forest; and suddenly saw two brown faces with horn staring at him from between the tree trunks. The lighthouse keeper ran home to the lighthouse, woke up the lighthouse master and his wife, and explained he had just seen a two headed devil in the forest.

Stone Age under the Trees.

There is a narrow path in between the trees at the NW of the island. Follow that path and you will see hundred of flint stones laying on the ground between the leaves and the gravel. It appears to be a place where Fred Flintstone and Barney have been making their knives and spear ends. Obviously this cannon stem from the time of the Flintstones, but no one have been able to explain the origin. My personal guess is that someone in the past has suffered from boredom and found it entertaining to sit and make flint tools in the same way as in the stone age. My brothers and I have made the same attempt with a few stones, but never with several hundred!

Økuller (isla mania).

A tiny island you can walk around in one hour, is not for everybody. A nice lady had gotten permission to put up a tent on the island and celebrate a weeks holiday there. All fine, she arrived with the post boat and would be picked up again in seven days. There were few people on the island at the time, so she was pretty much left to enjoy the nature alone. All went well until the next day. The next day she had packed her tent and suitcase, and was yelling at the beach towards the mainland. She wanted to go back right away.

In the end, the farmer had to call an airplane to bring her to the mainland. This isla mania can get serious if sustained for a long time and I have heard it happen for some people an way larger island too. Sad end on her holiday.

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From Hesselø in Beaufort 10.

Sailing is not always smooth. I remember one time going with the post boat Tunny from the island to Hundested on the mainland. The sea was getting more and more rough, the rain was coming down almost horizontally and the boat was less than 20 ton. Half way to Hundested you could see two big ships some 500 meter apart crossing our path. Our skipper anticipated to pass between the two ships, but a few minutes later it appeared they had both stopped. We continued with the same bearing. When we passed the foremost ship, we could see that the one was tucking the other. I take the hat off for the captains of the two ships – it could have ended very badly if we had hit the towline between them. The trip took over two hours, where it would normally take one hour and the only one who had not vomited, was our dog who had slept all the time under the steering wheel in the wheelhouse.