

# Cairngorm funicular railway: Written submission from Graham Nugent, 15 December 2025

## A Study into the Cairngorm funicular.

My expertise is twofold.

Firstly, I am from a railway background and spent a lot of time assisting my grandfather, a permanent way inspector, with permanent way maintenance and my father, a carriage and wagon inspector, with work for the rail networks as well as working on what is now the tramway museum at Critch in my late teens and early twenties when not working as a local government officer in Derby. This fostered a lifelong interest in light rail transport.

Secondly, most of my adult life since then, some 50 years, has been spent in the ski industry as a ski professional working in resorts all over Europe and in the States as well as earlier working on Cairngorm in the '70s and '80s as an instructor.

From the combination of these two aspects I have therefore gained considerable expertise and knowledge in the operation and management of ski areas with particular reference to forms of uplift and their suitability in various situations.

The purpose of a funicular is to be a prime mover of large numbers between a main hub i.e. town or village to a specific point in order for the people to access further lifts, services etc.

Also they are used to access glacier skiing where the terrain, weather conditions etc. make other methods of uplift non viable. Generally these are underground but some have overground sections. In almost all cases if there are overground sections these are completely separated from the skiable areas.

It should also be noted that the vast majority of funiculars in Europe are in Switzerland and Austria. If they access communities, however small, they are eligible for state subsidy being classified as railways, in most cases because the available roads are not suitable for buses, whereas gondolas, cable cars etc. are classified as ropeways.

Although these are the rulings in Switzerland, in Italy the gondola service not 100m from my apartment in Champoluc is subsidised to run on an hourly basis from 7.00 hrs. until 23.00 hrs. each day as it not only serves the ski area but also the community at the base of the ski area which has no suitable access for road transport for over 6 months of the year. The Frachey funicular serving the same ski area is also subsidised to run a similar hourly service to serve the restaurants and people who live in the Mandria area. It is interesting to note that without this subsidy on a popular ski area which approaches 100

miles of piste this funicular would not be viable.

**We know of no other areas within mainland Europe where a funicular is used as a secondary mover or where one is used purely through areas which are used primarily for recreation.**

In the right places and where there can be no possible conflict of interest, funiculars perform a necessary and useful service to the local population as well as carrying snowsports and mountain enthusiasts.

In the wrong place they are no more than a financial drain as the power consumption and maintenance costs of any railway are very high in comparison to other forms of transport. For example the gondola referred to earlier has a power consumption substantially less than that of the funicular, although it runs an hourly service throughout the year as well as a continuous service in the snowsports season and the maintenance costs of it are at least a third less than those of the funicular.

(The figures have come from the management of the Monterosa lift company.).

Taking all this into account, I cannot see any way in which the Cairngorm funicular can ever be viable, even with major modifications and a complete, not a partial, upgrade. It has too many inbuilt restrictive practices and problems:-

(1) It has a poor station layout at the base with the holding pen arrangement restricting the number of possible runs per hour due to the amount of time taken between the holding pen and boarding of the train. There is the same problem at the top. **This leads to customer dissatisfaction.**

(2) as far as is known there is only one ticket scanner, located between the pen and the loading platforms. This leads to more lost time and crush situations as people can only pass through one at a time. **This is a safety issue!** On my local system in Italy, the ticket scanners are located before one enters the waiting/loading area. There are three loading platforms, one being at ground level with steps up to the other two, each of which can comfortably hold up to 20 at any one time. The loading is fully automated with no staff involved and when the loading number has been reached for the next train, the scanners automatically shut down and reopen as the train leaves, thus no crush can form and there is no lost time.

(3) As the middle station is substantially below the passing loop, this means two stops per journey when required. During the snowsports season this is potentially on every journey, slowing journey times even further, leading to more customer dissatisfaction, and also entailing extra use of power leading to higher running costs.

(4) The track is not a straight line. Curves produce more wear and tear on the running gear and rails. This leads to corrugations forming in the rails, in railway terms "roaring rails", which, if left unchecked, can in turn cause high frequency vibration in the rail ultimately bringing about cracking and splitting of the rail and damage to the concrete supports. Corrugations are usually taken out of the rails by grinding, however to my knowledge this has never

regularly been done at Cairngorm. **This is a safety issue!** (see notes on corrugations.)

(5) The carriages are of poor design inasmuch as they are multi-compartmented. They have a resemblance to an old Southern Region commuter train and customer comments to me are that one has a better experience on the Northern Line at rush hour! On the Frachey funicular the carriages are of the same size, but with only three compartments. This leads to faster loading through larger doors and the ability to carry a range of items easily.

Even if all these inbuilt problems are removed from the equation, maintenance and power costs v capacity alone would still not make the funicular viable without either (a) a major increase in the uplift price or (b) a regular large subsidy. Option (a) results in a major reduction in potential customers, while (b), a burden on the public purse which, impacting on available finance for other projects particularly in the Highlands, does not give sufficient discernable value to the resident population of the Highlands. This is seen by many as unacceptable.

### **What can the funicular be replaced with?**

There are a number of options. To get an all year round trade, the simplest and most viable option is a gondola. These can move people on demand – when it is quiet fewer cars can be in operation, thus giving substantial savings in running costs. Also the line speed can be adjusted to suit the type of clientele, full speed during busy periods to give the maximum per hour potential, slower speed during the summer so that it can form a viewing platform for users. As an aerial lift it has minimal environmental impact and frees up a large area which has in the past been extensively used by snowsports enthusiasts, unuseable since the advent of the funicular. The current funicular base station and top station could be used for a gondola, additionally providing parking space for gondolas not in use in the current tunnel. A new middle station drop off/pick up area would probably be required. Using 10 seat cars, this could more than double the current capacity of the funicular, leading in turn to greater customer satisfaction. The argument being used against a gondola is that a funicular can work in higher wind speeds, however, with modern infrastructure and techniques, gondolas using a twin cable set up can mitigate this as proved in several places in the Alps, e.g. Val Thorens have a gondola of this type at some 10,000ft. in a notoriously windy part of the resort. Such a gondola would not be affected by heavy snowfall which often stops the funicular opening when snow conditions are at their best for snowsports. **More customer dissatisfaction and frustration.**

The modern view in the Alps is that ground based lifts are a thing of the past as are structures using multiple piers/pylons. Technology has moved on. The

predecessor of the gondola mentioned earlier had 10 supporting pylons and was shorter. The current one has 6 over a distance of 2km, a length not much different from the bottom station to the top station on Cairngorm. This is possible through computerised rope tensioning rather than counterweights and it works safely in winds as high or higher than on Cairngorm!

Non ground based lifts have a lower impact on the environment nor do they restrict the available areas usable for snowsports, mountain biking, walking etc., unlike ground based lifts and the funicular.

Costs? Ropeways such as gondolas and modern high capacity chairlifts are far cheaper to maintain and operate than a funicular. It is also possible to buy them refurbished. This is how resorts in the poorer countries in Europe can afford to upgrade their areas.

### Management .

A lot of avoidable mistakes have been made in the past 30-35 years, mainly from employing people who, although they had business acumen, were not knowledgeable about mountain, outdoor or snow environment related work. There was one exception. This also proved to be a problem in the USA. They overcame it by the setting up of courses to degree level which covered all aspects relevant to the management and running of mountain based activities and taught by suitably experienced people. Now still it would appear that expert knowledge has not been sought of appropriate people who have an understanding of what is and what is not feasible from working in the relevant disciplines, so good money being thrown after bad. There are experts in the field of mountain and snowsports area development available in Europe and a growing community in the local area who are no longer trusting in HIEs judgement and ability to move Cairngorm forward.

### Notes:-

(i) The Cairn Gorm funicular was based on the one at Ellmau, which served as access to the Kaiserskiwelt in Austria. This was a prime mover to take people to the base of the main snowsports area. Unfortunately it had a number of similarities to Cairngorm . It had a middle station and then terminated near to the top of a hill and had a restaurant adjacent to it. Visible from there was one ski tow which served a nursery area. Had the representative from the Cairngorms General Management at the time, who visited it in the summer, bothered to walk along a track and through some trees, he would have found two parallel chairlifts connecting up to the main ski area of the Kaiserskiwelt. Unfortunately he did not appear to have done this and assumed it was the same as the Ptarmigan with a nursery area and marking for one blue/red run going downward in the direction of the base of the funicular. I visited Ellmau and rode this funicular. I had the opportunity to speak with the Head of Engineering and discovered from him that the funicular had turned out to be a bit of a nightmare for them from an engineering point of view and was proving to be more of a liability than an

asset. The middle station was there for casualty and emergency use only, not for regular use by the public. It was removed in 2015 and replaced by a gondola. It was far from life expired but had proved to be a white elephant.

## **(ii) Funiculars and Vibrations.**

Basically vibrations come from two sources.

### **The movement of the train.**

The wheel arrangement - one side is a plain wheel, on the other side of the axle is a slotted wheel. This gives 2 flanges on one side and no flange on the other side. The steel tyres, wheel bearings and primary and secondary suspension have to be kept in good condition at all times to minimise the vibration from them. If the tyres are worn, this leads to a sideways movement between the tyre and the rail, which in turn wears down the side of the rail and this, along with the vibration of the wheel turning on the rail, sets up a high frequency vibration undetectable by the human ear.

### **Rail corrugation.**

The above sets up a further vibration which can be heard as a roaring noise and also further high frequency vibrations. Along with this, but not so damaging, is the movement of both the towing and tail rope in turn sets up a further high frequency vibration.

If the funicular is supported on steel with sufficient ballast, the ballast and steel will absorb most of the vibration, however concrete cannot absorb it, only exacerbate it and transmit the vibrations directly into the ground below. This produces cracking in the concrete and in the rock structure underneath. On top of this, as there is nowhere for the vibrations to go other than through the structure, the rails themselves try to absorb more than they can handle and fine cracking is produced in the rails. This over time leads to rail failure and breakage with potentially disastrous consequences.

Also, vibration from the rails is normally absorbed by ballast under and around the track area. In order to reduce vibration the chairs that the rails sit on are normally set on rubber of a thickness which can be calculated to match the potential vibration and the attaching bolts are set at a tension which is calculated to allow slight movement.

It may be thought that I am anti-rail. Nothing could be further from the truth – I am supporter of rail transport in all its various forms,. I am from a railway background and have worked on rail and tram transport in my youth including work at Critch tramway museum in its early days. However there are places which are appropriate for rail transport and places which are not. It is great for moving people quickly as part of a transport system where conditions are unsuitable for access by other public transport, or where it complements existing public transport systems. It is not suitable in the middle of a

mountain, 9 miles from the local village, with the only access to being by a minor road climbing up through snow collecting areas to reach it's base.

It is hoped that the above can be accepted as a submission and considered by the PAC when they meet to discuss the submissions relevant to Cairngorm and the funicular. It might give the committee food for thought. Unfortunately I cannot attend the meeting on the 14th Jan due to work commitments in Italy.

Yours sincerely,

Graham Nugent.