INDUSTRIAL & MOBILE HERITAGE AND FOSSIL FUELS 20230825

Report by
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***Fédération Internationale des Véhicules Anciens* – FIVA,**
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1. Halfweg [NL], Steam Pumping Station, 08.08.2021

Executive summary

ERIH, the European Route of Industrial Heritage, the Europa Nostra Industrial & Engineering Heritage Committee, FEDECRAIL and FIVA, are committed to the future of our industrial and mobile heritage. Components of this heritage depend on fossil fuels for maintenance and presentation in working condition, so essential for living history. Think of historic factories with steam engines, steam pumping stations and the mobile heritage of railways, steamships, road vehicles and aviation.

This report focuses on the need for the continued availability of fossil fuel, like coal and oil derivatives. Whilst recognizing the importance of the energy transition aimed at mediating climate change.
The negligible impact of limited fossil fuel use in the sector of industrial and mobile heritage (IMH sector) needs to be balanced against securing a positive future for the conservation and presentation of this heritage. This calls for the continued use of fossil fuel, such as coal, as a core value of industrial and mobile heritage. This calls for the continued use of fossil fuel. It is recognised that alternative fuels are under development. Should they prove viable their use will be encouraged.


2-3. Hoorn [NL], Steamtram Hoorn-Medemblik, ERIH Anchor Point.

The recent climate conference, COP26, adopted the Glasgow Climate Pact which included the target of gradually reducing coal use. FEDECRAIL, EUROPA NOSTRA, FIVA and ERIH signaled the importance of the continued use of fossil fuels, where necessary, to preserve working IMH for future generations.
It is therefore necessary to link the fossil-fuel-dependent IMH with the still active European coal mining heritage to maintain the production of 'heritage coal' or other 'heritage fuels' in preserved mines. Time is running out to meet this goal!

With a view to forging a strategic heritage coalition between producers and consumers of 'heritage coal' or 'heritage fuels', it will be important to press for recognition of the relevance of the new Working Industrial & Mobile Heritage group as a contributor to future development of the European Cultural Heritage Green Paper.

An operational platform of relevant parties can be strived for, where - on the basis of a plan - the necessary actions are to be defined, distributed and taken - a platform that is coordinated and whose budget is carried by stakeholders and other funders.

Due to the small number of coal mines currently available in Europe for heritage purposes, securing coal for the future is an issue that is extremely urgent in the short-term. Creating understanding for continued use, on a limited scale, of fossil fuels for combustion engines in historic trains, road vehicles, ships and aircraft is another objective; certainly when there are no environment-friendly alternatives available.

In addition to tactical short-term actions, it is worth considering - analogous to the organisations 'European Historic Houses' and 'European Landowners Organisation' - to acquire a contract from the European Commission to draw up a Study of Heritage Railways and mobile heritage c.a. in Europe. A strategic study in which the mobile heritage value for Europe for the 21st century will be made.

Content

1. The Fossil Fuel Issue

The times when fossil fuels like coal were a natural part of our energy supply are gradually behind us. Although a record amount of 8.3 billion tons of coal was extracted worldwide in 2013, this fuel is on the decline due to international efforts to protect the climate by limiting CO_2 emissions, among other things.
Although in many countries the dependence on coal as a source of heat and energy is still considerable, we can now speak of a revolution in energy transition, which will have consequences not only for the use and availability of coal, but in the long term also for fossil fuels such as heating oil and petrol and diesel fuel.
With the evolution of energy sources into fossil free energy, an era of more than 250 years of relatively to absolutely large-scale coal mining, in conjunction with the development of industrial production methods, is coming to an end.

Oil production and consumption in the world are still at high levels. But there is also increasing pressure not to explore for new oil reserves and to gradually reduce or even stop exploitation. However, we will not be able to do without oil completely in the future. For especially aviation and shipping and also in socially relevant areas such as defence, emergency services and disaster relief, there will be no alternative sources of propulsion to combustion technology for the foreseeable future. From this reality, a perspective can also be offered to the world of industrial and mobile heritage.

2. The gold of the Industrial Revolution

Coal served as the generator of the Industrial Revolution from the middle of the 18th century. The improved steam engine of James Watt (1736-1819), patented in 1769, created an energy-efficient and powerful source of energy that proved suitable for large-scale and continuous industrial production. In the factories in the United Kingdom and on the European Continent, the use of energy from wind and water was supplemented by steam engines. As a result, the dependence on variable natural conditions disappeared and it was possible to predict fairly precisely what results could be achieved and how these results could be marketed with the aid of an increasing network of transport facilities via water and rail. The means of transport required for this – as well as the energy sources in the factories – were primarily coal powered steam engines.

This shows to how coal became the gold of the Industrial Revolution. The development of the steam engine, primarily powered by coal, was a key enabler of the transition from hand production to mechanisation.

3. Coal interweaving with mechanisation

The powerful interweaving of coal with mechanisation to facilitate large-scale industrial production methods has produced an invaluable and multifaceted heritage. Due to the nature of the industrial and mechanical processes, this industrial heritage can be called dynamic. It derives its importance from movement and propulsion.
Keeping it in working condition makes this heritage tangible for us and for future generations to maintain awareness of the historical roots of their existence.
Think of working steam engines as museum exhibits of historic factory complexes or steam pumping stations, or the mobile heritage with its steamships, steam locomotives and steam road vehicles.

Many organisations of professionals and volunteers in Europe and globally are involved with the protection, preservation and promotion of this industrial and mobile heritage.
They provide an educational and recreational product environment that many students use for educational study and that attracts millions of visitors and watchers from all over Europe and the whole world every year. Keeping examples in working condition makes this cultural heritage tangible now and for future generations, and so they should be preserved and protected.


4-5. Halfweg [NL], Steam Pumping Station, Anchor Point of the ERIH Holland Route.

4. Oil, the fuel of 20th century transport

If the 19th Century leading power source was coal -fired steam, the 20th Century was driven further forward by the development of engines fuelled by oil based fuels. Oil based fuel contains more energy, coal typically has a calorific value in the order of 8,000 kcal per kg, oil, diesel and petrol about 11,000 kcal per kg.
Gradually, oil became the basic fuel for all transport modes.

Shipping - steamships were still in operation until the 1960s, especially in river transport and for tugboats.
The sailing heritage in Europe and the British Isles now consists mainly of small ships, built for inland navigation, for passenger traffic or as yachts. Apart from sailing ships and a more modest contingent of steamships, most of the maritime heritage fleet consists of diesel-powered ships, sometimes from manufacturers that were also active in the automotive industry. Usually, they are only used for port days or fleet days organised by towns and villages with a tradition of shipping and water sports. Sea-going historic ships are very rare.

Aviation - While normal petrol was first used, the importance of improving the power output led to special blends being created. Currently two main fuels are used in private pleasure aircraft. Avtur, a type of kerosene, used for commercial jet and turbo-prop aircraft and aviation gasoline (avgas) which is used in small piton-engined aircraft.
The National Federation of Historic Aviation (NFHL) is an alliance of organisations all dedicated to the restoration, maintenance and demonstration of airworthy historic aircraft.
A significant proportion of historic aircraft are maintained in airworthy condition. These aircraft are overseen and regulated by EASA and national aviation authorities across Europe, maintaining strict safety requirements and are a significant source of specialist employment. While the majority of this fleet is made up of smaller light vintage aircraft, there are also several hundred ex-military 'warbirds' being operated by individuals, syndicates and aviation museums.
As with historic ships, there is a significant ongoing need for fossil fuels to keep this fleet in the air, over and above the need for fuel to transport goods.


6-7. Historic vessels in action at "Dordt in stoom" 2018, a bi-annual steam event in the city of Dordrecht (NL). Left: steam tug boat 'Pieter Boele'; right: Marine tug boat 'Elbe'.

8. Replica of Blériot's cross Channel flight plane

9. Historic military aircraft type C-47 in action over Normandy, re-enactment flight, June 2014

Rail transport – only in the late 1970's the last steam locomotives for national passenger and cargo transport were taken out of service in Western Europe. In Eastern Europe steam track was in use even much longer. Of course by then most of the regular services were carried out at electrified rail networks, or by diesel-powered traction for regional lines.
In Europe alone hundreds of museum railways are attracting millions of visitors (passengers) yearly. Nearly all historic rail material is in hands of privately owned organisations, mostly foundations. They exploit both steam-powered and diesel powered historic rail material, apart from techniques typical for mountainous area, like cog railways.
Compared to regular train traffic, which still to a high extent is dependent of diesel, the fossil fuel need of historic railways is minimal.

10. The Harzquerbahn is a tourist magnet in the Harz Mountains

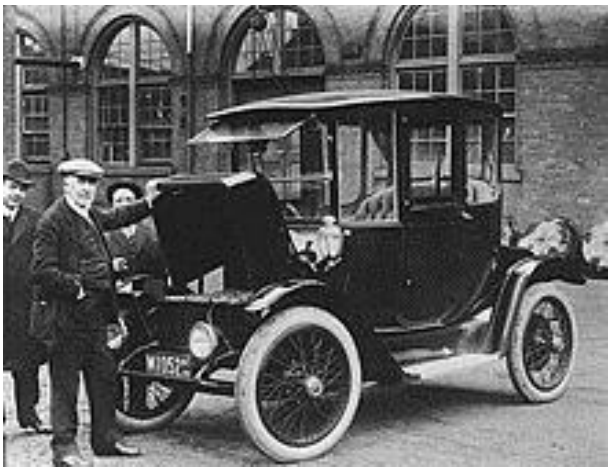
11. Dutch diesel-electric train (photo from 1934)

5. The need of fuel for combustion engines for motoring heritage

The year 1886 is usually mentioned as the year of birth of the automobile. It was then that the Benz patent car made its appearance. It was propelled by an internal combustion engine according to the concept as conceived by Nikolaus Otto. But already in 1881 an electric tricycle roamed the streets of Paris. That vehicle was a creation of Gustave Trouvé. And the lead-acid battery had already been invented in 1859. In the first years of the automobile there was a lot of uncertainty whether electric or petrol vehicles would prevail. The electric car was particularly popular in the United States in those early years. Around 1900, 40 percent of USA automobiles were powered by steam, 38 percent by electricity, and 22 percent by gasoline.

The massive exploitation of oil and the desire to use cars for longer distances led to the combustion engine car winning out. Electric cars were slow, and you could not get very far with them. And certainly with the arrival of the mass-produced car, with the T-Ford as the most famous exponent, the combustion engine won. They were, even then, much cheaper to produce as well.

12. Trouvé's 1881 tricycle



13. Thomas Edison and an electric car, 1913

14. Electric post vans in the GDR, 1950's

15. 1919 Stanley Steamer

Historic vehicles, combustion engines mainly

Roughly 99.9% of historic passenger cars and motorbikes are powered by a combustion engine. Only with historic trucks, buses and tractors there is a significant diesel share. For historic railways and historic shipping diesel powered engines are relevant, while kerosene is what most historic aircraft need.

It is not possible to say exactly how many historic vehicles, as defined by FIVA*, there are in Europe and the rest of the world. In Europe's largest countries, the proportion of historic cars in the total passenger car fleet is around 1%. There are peaks and troughs in each member state. On average, these historic cars drive no more than 1,500 km per year. For historic motorcycles this is even much less, about half of it. A very rough calculation is that historic passenger cars account for 0,1% of the current yearly consumption of petrol in Europe. The share of yearly diesel consumption is even considerably less, due to the low share of diesel historic vehicles, and the neglectable mileage done by historic trucks, buses and tractors compared to commercially used vehicles of these categories.

A driving museum that needs (E-)fuel

The vast majority of historic road vehicles are owned in the possession of private owners. Each of them acts as custodians of a piece of history on wheels. By taking the vehicle out onto the streets from time to time, a wide public can enjoy it. Usually, such public appearances take place as part of a meeting or joint tour drive. As with other cultural expressions, the aspect of a shared social experience plays an important role as well.

This multi-faceted Driving Museum must not come to a standstill. The availability of fuel, petrol or diesel - sometimes also liquid gas - at reasonable prices is an essential condition for this. Of course, it is important that the quality of the fuel is such that it does not impair the operation of the engine, and that, for example, rubber hoses are not damaged by it. But FIVA and the other organisations behind this report also attach great importance to the environmental aspects. That is why we all support initiatives to promote the development and distribution of so-called E-fuels. By e-fuels we mean all fuels that do not originate from fossil raw materials, but are produced synthetically and sustainably.

In the meantime, there are promising initiatives with e-fuels underway that will make a significant contribution to reducing the carbon footprint of internal combustion engine vehicles and to cleaner air, taking into account the huge number of internal combustion engine vehicles that will dominate the world's roads for many years, if not decades, to come. Towards the end of 2020, Porsche announced its investment in electrofuels, including the Haru Oni project in Chile, creating synthetic methanol from wind power.

And in the meantime, the E-fuel Alliance is working hard to promote the usefulness and necessity of this fuel, see https://www.efuel-alliance.eu/faq. The organisations behind this report believe that by promoting e-fuels, the Green Deal goals can be achieved sooner, and we invite policy makers to promote the development, production and distribution of e-fuels. First tests with E-fuels in historic vehicles show encouraging results. These tests will be intensified in the coming period.

* what is a historic vehicle? FIVA defines it as a mechanically propelled road vehicle at least 30 years old, preserved and maintained in a historically correct condition, which is not used as means of daily transport and which is therefore part of our technical and cultural heritage.

6. Climate Goals

We now live in the era of the major global climate conferences, in which CO_2 reduction is the dominant theme. The 2015 Climate Conference in Paris marked a turning point in which all parties involved in the climate treaty of the United Nations – UNFCCC – decided to participate. This also includes the European Union with the ambition to be one of the leading parties in the process, with a particular focus on reduced CO_2-emissions and increasing use of zero-carbon-footprint energy. To achieve these goals the European Union developed the Green Deal, embraced by the Cultural world in the Cultural Green Deal.

The recent climate conference, held in Glasgow in 2021, adopted the Glasgow Climate Pact which included:

- Gradually reduced coal use (the draft text referred to a “phasing out”, but this was refused at the last minute by China and India)
- End sales of new cars with combustion engine in major global markets by 2035 (or earlier) and globally by 2040.

7. Plan Paris

Although in the context of this report there is no doubt about the relevance of the mentioned climate measures they can have unintended, undesirable effects on the preservation of industrial and mobile heritage artefacts and for experiencing them in working condition.
The organisation FEDECRAIL – European Federation of Museum & Tourist Railways – has responded excellently to this with the document 'Plan Paris' (2017) and has made it clear that the availability of 'traditional fuel' is the basis of: *'the conceptual authenticity of the preserved railway objects like steam and diesel locomotives'*.
The Plan Paris clearly illustrates how FEDECRAIL and other stakeholders can shape their collaboration and how this collaboration can result in technical, cultural and social-economic guarantees for the preservation of mobile heritage on the basis of authenticity and integrity.

8. All-Party Parliamentary Group

Another valuable example of action is the UK All-Party Parliamentary Groups on Heritage Rail and Historic Vehicles are valuable “influencers”. The then Chairman of the Heritage Rail group - Rt Hon Nicky Morgan MP - aptly concluded its concerns in a press release dated 18 July 2019: *'Concerns about climate change have rightly led to moves to reduce the burning of fossil fuel, but the intention of Government was not to stop people enjoying the experience of seeing and riding behind a working steam locomotive. In this classic case of the law of unintended consequences, we need to find a way to enable heritage railways to continue steaming into the future. We intend to pursue this with the Government departments and ministers involved over the next months*.
Her words convincingly demonstrate how much it is necessary to actively place the subject of the availability of fossil fuels for heritage purposes on the agenda at the highest administrative and political levels.
The importance of this All-Party Parliamentary Group on Heritage Rail to the United Kingdom is recognized on the European Continent and elsewhere in the world.

9. TICCIH

An echo of the work in the United Kingdom is found in the report by Matthew Bellhouse Moran – Chair Scottish Transport & Industry Collections Knowledge Network (STICK) – in TICCIH Bulletin No. 93 (3rd Quarter 2021). This Bulletin of 'The International Committee on the Conservation of the Industrial Heritage' reaches colleagues all over the world. Moran points out:
***'The urgent move to a zero-carbon economy, however, is directly threatening this central activity of industrial heritage, as coal mining is finally ended and emissions controls limit or completely prevent burning fossil fuels'*.**

10. Connecting use with production (focusing on steam driven heritage)

The above-mentioned organisations emphasize the importance of continued availability of fossil fuels where necessary to present and interpret the enormous array of objects and sites of industrial and mobile heritage.

The time has come to actively highlight the need for strategic solutions. It is about guaranteeing the availability of these fuels in the long term. For coal this can become very difficult when mines are closed or the right types of coal are no longer mined. The same can be concluded in the longer term when the supplies of petrol and diesel are cut off, or even the production of necessary oil products is stopped.

One of the options is therefore to link the fossil-fuel-dependent industrial and mobile heritage with the still active European coal mining heritage, in order to maintain the production of 'heritage coal' or other 'heritage fuels' in preserved mines as a goal. Time is not on our side in this respect!

As coal production is under direct threat in Europe, let's look at the situation for European heritage railways, based on the research done by FEDECRAIL and its member railways: Answers to obvious question:
How much coal do we need? – Approximately 50,000 t/yr for Europe's heritage sector.
What kind of coal do we need? – Medium volatile bituminous coal, i.e. metallurgical coal. Sizing = cobbles or large nuts. Specifications for such coal have been issued and constantly updated by FEDECRAIL since 1995.

In which countries do we need the coal? – In practically all European countries; however, the Lion's share is consumed in the UK and Germany (these two countries alone account for ca. 40,000 t/yr).

How many heritage coal mines do we need? – At least two in Europe, including non-EU countries.

Which coal mines should be chosen for preservation? – Coal mines that still profitably produce the right kind of coal for historical machinery. Only then can a smooth transition from commercial to heritage operation be achieved, both technically and politically. An important point of attention in this process will be the compliance with current standards.

Which coal mine(s) should be the core of our European Steam Heritage Network? – The Mysłowice-Wesoła mine, Katowice, Silesian Voivodeship, Poland (underground mine).

How to look for solutions for the future production and use of fossil fuels for heritage combustion engines?
The need for other fossil fuels, to be used in future for the preservation in working condition of the mobile heritage that is propelled by combustion engines, so cars, trucks, buses, motorcycles, tractors and road locomotives, needs to be determined in close cooperation with FIVA and associated rail, ship and aircraft organisations.
FIVA's position paper about alternative fuel is relevant.

Now these questions have been answered, time has come to implement a European Heritage Fuel Action Plan.
This will seek to ensure the availability of heritage coal and other heritage fuel products.

This way of dealing with the matter is purely purpose driven, and that is what is needed for "fuel" policy makers to let them initiate the right actions and decisions.


16-17. Medemblik [NL], National Steam Engine Museum, ERIH Anchor Point.

11. European Cultural Heritage Green Paper

In March 2021 Europa Nostra published – in close cooperation with ICOMOS and the Climate Heritage Network – the 'European Cultural Heritage Green Paper'. This project is financially supported by the European Investment Bank and the European Commission by using the programme Creative Europe.
However, the comprehensive approach of Europa Nostra and ICOMOS in this important document currently lacks the component of relevance of fossil fuel availability for certain categories of industrial and mobile heritage.

During the first meeting of the proposed 'Working Industrial & Mobile Heritage' platform coalition on 7th July 2021, organised jointly by FIVA (Fédération Internationale des Véhicules Anciens) and FEDECRAIL, Lorena Aldana-Ortega (Europa Nostra coordinator European Cultural Heritage Green Paper) emphasised that: *'the Green Paper is intended to be viewed as a living document and this group might wish to make representations to try to secure positive recognition for industrial and mobile heritage in future updates of the Green Paper'*.
Other participants in the meeting included representatives from ERIH (European Route of Industrial Heritage), FEDECRAIL, TICCIH and the Europa Nostra Industrial & Engineering Heritage Committee.

With a view to forging a strategic heritage coalition between producers and consumers of 'heritage coal' and 'heritage fuels' in general, it will be important to enhance awareness of the new Working Industrial & Mobile Heritage group as a contributor to future development of the European Cultural Heritage Green Paper. It is important to substantiate that the use of fossil fuels for heritage purposes has a minimal effect on global CO_2 emissions. We would argue that this is outweighed by the benefits to society from heritage interest. *This statement however needs to be quantified.*

12. Platform for working industrial and mobile heritage

This brings us back to FEDECRAIL's Plan Paris from 2017, in which key elements for the development of an overall plan were so aptly indicated: Social, Economic, Cultural, Technical, Networking and Communication & Tools.

In addition to the necessary research into the many and diverse aspects of heritage fuel, quantitative and qualitative, we recognize two specific tasks:

- GENERAL politics, ***on*** the stage: social importance of industrial heritage and governmental support; and
- OPERATIONAL activities, ***behind*** the stage: discussing and negotiating the preparedness of producers and other supply chain partners, and the needed regulatory framework.

In researching - and answering - the issues, collaboration with experts in the field and their institutes is needed.

To highlight a specific example of valuable research: 'Perspektiven der Brennstoffbeschaffung für Dampflokomtiven' (Prospects for fuel procurement for steam locomotives, 2019), by Dr. rer. nat. Reinhard W. Serchinger, Consultant in applied physics, Engineering and re-engineering of locomotives and rolling-stock, Thermodynamic engineering and measurements, Emission measurements, at SePhys multiple-fuel burners, Munich, Germany.

The heritage fuel issue is a too big issue for solitary actions of for instance the Europa Nostra Industrial & Engineering Heritage Committee or ERIH. The Plan Paris foresees already a platform of organisations active in the field of working industrial and mobile heritage in order to redefine the future for this important cultural domain and find as much as possible support for the common goals. In July 2021 FIVA and FEDECRAIL initiated a first online meeting with the umbrella organisations of the industrial and mobile heritage, including well-established cultural heritage organisations. Notably Europa Nostra and TICCIH. This online meeting has been felt as the start of a new co-operational initiative, to meet the current and future challenges.

Various organisations are directly or indirectly involved in similar issues, and the future energy situation is the top theme for all of them. An operational platform of the relevant parties is seen as instrumental to develop a plan, on the base of which the necessary actions can be defined and delivered. A platform that is well coordinated and whose budget is carried by the participants and other stakeholders.


18-19. Bytom [PL], Narrow Gauge Railway, part of ERIH Silesian Regional Route.

13. ERIH European Theme Routes

Thanks to the activities of the European Route of Industrial Heritage association, the extensive industrial heritage has become known and recognisable in a network for industrial culture in Europe since 1999. In the founding countries of the European Coal and Steel Community in 1952 alone (B, D, F, IT, LUX, NL), a total of almost 700 visitable heritage sites are listed and explained on the ERIH website, and these are at the same time almost 700 small to large organisations with its many committed employees and volunteers. In fact, an extremely valuable European asset and of great importance to the history of Europe - as the first industrial continent. These treasures of the European cultural heritage make it possible, depending on personal interests, to experience the sites of historical innovation, mechanisation, work, production, monumental buildings and infrastructure.

Currently ERIH presents over 2,100 sites of all branches of industry from all European countries. The database of sites is continuously being expanded. In addition to the attractive presentation of industrial history, a key criterion for inclusion on the database is the accessibility of the site for visitors: during the main tourist summer season the location should be open at least twice a week.
Each site of ERIH's object database is assigned to one or more Theme Routes which are structured according to industrial sectors. 16 Theme Routes (with 44 sub-categories) focus on specific questions relating to European

industrial history and reveal - often in connection with the biographies - potential links between radically different industrial monuments all over Europe.

The European Theme Route on all kinds of mining contains 20 ERIH Anchor Points. That are first class points of interest, open to visitors.
In addition, 36 other ERIH Member Sites are accessible.
Finally, 92 non-member sites are included.
In total, these 148 visitable sites cover 28 European countries.
Of these 148 visitable sites, approximately 76 are related to coal mining, of which 6 are opencast and 70 are underground coal mining.
No coal is still being extracted at any of these locations. As a result, none of these museum sites are eligible to function as producers of heritage coal.

14. Fossil fuels, their production, use and appreciation as cultural heritage

The accelerated progress of the energy transformation process is a direct reason for starting the thinking process about the future availability and use of fossil fuels as an essential cultural core value of the Working Industrial and Mobile Heritage.
The gateway through which these heritage fuels will reach the world are the historic extraction and production sites, which are also given a new (museum) status as cultural heritage.
The aim is to reach and facilitate the working industrial heritage and the mobile heritage through this gateway.
We recognize a three-stage rocket of cohesive heritage:

- fossil fuels at museum extraction and processing installations;
- the museum extraction and processing installations themselves;
- the industrial heritage and mobile heritage to be facilitated.

These three stages justify each other in their inseparable connection.

Short-term
At the moment fossil fuels are still sufficiently available, but the market price has now become almost unaffordable, due to the link with the very sharply rising global energy prices.
A request has been made to FEDECRAIL from various sides to see how we can negotiate a lower, achievable price for the entire sector of usable coal through joint purchasing. *It's worth investigating!*

In the long run
For the long term, maintaining the availability of fossil fuels is essential. It must also be determined under which conditions its use is permitted. This should then be part of the European (Cultural) Green Deal.
Serious thought is now being given to keeping one or more coal mines and one or more oil production installations with refineries open. This should go hand in hand with the recognition of these installations as working museums. Not a strange thought, by the way, because so far none of the closed mines has been preserved as a working museum, nor is there a museum oil production installation with a refinery.
The museum status also makes it possible to disseminate the importance of 250 years of history of the extraction of coal, oil and gas - the fossil fuels - in a broad educational sphere.

Fossil fuel heritage
Over the past 250 years, these fossil fuels have enabled the industrial revolution. Its influence on our lives and society is undeniably great. They have brought us prosperity. We have now come to see the use of fossil fuels in a general sense as a major climatic threat. This will therefore lead to an end of the general use of fossil fuels and therefore also to the closure of commercial coal mines and, in a much longer term, commercial oil production and the associated refineries.
Those working fossil fuel museums, such as the coal mines and refineries, should then start producing fuels, which enable the production process to be experienced by museum visitors. This also offers opportunities to make these processes accessible to a wider audience including educational programmes.
Those fuels are then no longer mined and produced in a commercial environment. They are no longer part of the global fuel energy market. This process, in which fuel as fossil fuel heritage is mined and produced without a financial profit motive, with the world of Working Industrial and Mobile Heritage as the only customers. Think of steam pumping stations, ships, trains, automobiles and airplanes, etc. This process must be given a place in the European (Cultural) Green Deal.

Takeover
The shareholders of these proposed coal mine(s) and oil production resources will be bought out, so that the production process changes from a profit-oriented shareholder activity to a cultural heritage museum process for the preservation of the fossil fuel. This fossil fuel heritage can then be used in the public presentation of the Working Industrial and Mobile Heritage and is also educational material that can be used in the education of both young people and adults.

Costs and prices
For example, the prices for the museum fossil fuel producers should be adjusted to achievable affordability by the museum buyers. This requires a clear determination of the purchase price, costs of responsible maintenance, costs for personnel and training, and future investments. In addition, developing the logistical process to bring the fuels to the museum users.
In this context, a collaboration could possibly arise with the European Investment Bank, the European Union and the National Member States as a basis for the use of these recognized cultural values within the museum heritage world, with fossil fuels as an added new essential cultural value.

Green Deal
What is considered part of the Working Industrial and Mobile Heritage and therefore deserves a place in the Green Deal? The Netherlands is the only country that has a register for Mobile Heritage, in which the cultural values are recorded for the objects included in the register.
A renewal and expansion is necessary, in particular for the further European route to recognition of the Working Industrial and Mobile Heritage:

- with the addition of fossil fuels as heritage;
- the working industrial heritage, in addition to the mobile heritage;
- rolling out a registration across all 27 member states and possibly non-EU states located in Europe.

The Netherlands Register of Mobile Heritage could serve as an example for this. The question is whether the owner, the Netherlands Mobile Collection Foundation, would like to cooperate and under what conditions. The co-developer of the register and the value-setting framework for mobile heritage - the Dutch Ministry of Education, Culture and Science and the Cultural Heritage Agency - should also commit to support this development at European level.

Conceptual Authenticity
The addition of fossil fuels as a core value in the eventual integral preservation process of the Working Industrial and Mobile Heritage, strengthens the preservation of conceptual authenticity, in both a tangible and intangible sense. Preserving the conceptual authenticity contributes to the enhancement of public attractiveness. Based on this, it will be able to continue to tell the authentic story, which visitors will experience. An important Unique Selling Point (USP). This will permanently stimulate visits and thus ensure the financial basis for the survival of these museums in the long term.

Authenticity, greening and sustainability
The heritage sector is very aware of its responsibility with regard to authenticity in the conservation process and public presentation, as well as the social task of making the greatest possible contribution to making society more sustainable.
At this point you could think of:

- compensation measures, such as planting trees;
- use of heat released during the cooling of steam engines, for heating buildings;
- electric heating of steam boilers during progression from cold to working pressure/temperature;
- solar panels on museum buildings, so that the electricity used is produced mainly CO_2 free.

The coherence of both the preservation of authenticity and an active role in greening and sustainability will strengthen support for the Working Industrial and Mobile Heritage.

15. Heritage mines as working and coal producing Museums

In the future, the steam driven industrial and mobile heritage will require an entirely new category of working heritage mines that sell their production to consumers of heritage coal, for example industrial and engineering heritage sites, and mobile heritage.

The large number of mining industrial heritage sites in Europe suggests that coal mining has now ended in most European countries.
A survey of the European countries makes it clear that only in Poland and the United Kingdom there are opportunities for living heritage coal mining.
The largest underground coal mining sites are in Poland and Romania. Romanian coal, however, is not suitable for hard working steam locomotives and thus no option while coal from the Mysłowice-Wesoła mine, Katowice, Silesian Voivodeship, Poland (underground mine) is excellent locomotive coal.

The Ffos-y-fran mine, Merthyr Tydfil, Wales, UK (open cast mine) would until recently have been an option, producing coal that burns almost smokelessly. However, it was planned to close due to political pressure on 31st December 2022. It would be very appropriate if an actively producing historic mining site in the United Kingdom could remain available as a producer of heritage coal. Lobbying efforts are being undertaken by the UK Heritage Railway Association of both the UK Government and the Welsh Government to see if at least some timescale extension for operation of this mine could be authorized.

Active lobbying throughout Europe is necessary to ensure the maintenance of a working 'heritage mine' as a coal producing Museum for the production of 'heritage coal' in Europe.

The above considerations lead to the following list of candidates:

POLAND

- **Mysłowice-Wesoła**, Katowice, Silesian Voivodeship (coal tested for both suitability and environmental impact, favourite coal in Germany, best Polish candidate).
- **Staszic**, Katowice, Silesian Voivodeship (coal used by some museum railways in Germany, not yet tested for environmental impact – such a test would have to be funded).
- **Wujek**, Katowice, Silesian Voivodeship (ash fusion temperature of the coal too low for high-power operation).

20. Coal Mine Mysłowice-Wesoła [PL], hoisting towers of the Piotr (left) and Bronisław shafts

UNITED KINGDOM

- **Ffos-y-fran mine,** Merthyr Tydfil, Wales, UK (open cast mine) – despite its excellent coal the most difficult, there had been very strong political pressure to close it by the end of 2022. As mentioned above, lobbying is being undertaken to try to secure some extension of operation.


21-22. Ffos-y-fran Land Reclamation Scheme, Merthyr Tydfil [UK].

16. Some preliminary conclusions

(1) Working Industrial and mobile heritage is a very important part of the core of European cultural identity, attracting millions of people.

(2) Fossil fuels remain necessary for the dynamics of heritage machines and vehicles, their preservation and presentation of the objects preserving their conceptual authenticity as well, enabling to tell the right story in the right way. However the research for alternative fuels in the light of the Paris Agreements and the Green Deal is ongoing.

(3) Due to its very limited scale, heritage-related use of fossil fuels has hardly any measurable effect on reduction of CO_2 emissions and thus on reaching the goals set in Paris 2015 and Glasgow 2021. It is urgent to convince politicians and the public at large of this. It is about the balance between the minimal C02 footprint that the working industrial and mobile heritage world indisputably will continue to make and its importance and value for society, in terms of preserving the only artefacts of past culture and technique that can be presented in a time-machine fashion, as “living history”.

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(4) Therefore, it is in the interest of society to achieve sustainable regulation of the use of fossil fuels for the working industrial and mobile heritage.

(5) It is essential to working on a concept to safeguard the availability of fossil fuels in the context of industrial and mobile heritage and the preservation of the conceptual authenticity of the objects (artefacts) and the connected working processes in the broader perspective of heritage.

(6) The issue of sustainable availability of heritage fuels is multifaceted.

(7) To solve the issue of sustainable availability of heritage fuels, worldwide or at least European cooperation in the heritage field is essential.

(8) The issue of sustainable availability of heritage fuels must be addressed at the highest level through broad international heritage cooperation, to enable sustainable arrangements with national governments, the European Union and the United Nations.

(9) Broad international heritage cooperation can be organized and coordinated within a platform that is adequately equipped in terms of expertise and budget, based on a strategic plan.

(10) Due to the small number of coal mines currently available for heritage purposes, securing coal for the long term is an issue that is extremely urgent in the short term.

17. Perspective

In line with the latter conclusion, this reports makes clear that action is necessary in both the short and medium term to improve the availability of coal for heritage purposes and the legal possibilities for using coal for this purpose in the long term. It is fundamental to lay the foundation for continued supply of fossil fuels, or sustainable alternative fuels where acceptable in the light of preserving conceptual authenticity.

In the short term, actions should focus on securing the use of the few remaining and suitable coal mines in Europe. It must be determined which functioning coal mines exactly meet the heritage objectives. For example, the question has to be answered whether the coal mine in Senjski Rudnik (Serbia) actually produces suitable coal.
After establishing the short list, contacts at government level will be necessary in Poland, Serbia and United Kingdom.

For the short term, it is important that we have a clear presentation of the heritage issue in relation to the availability of coal.

With regard to petrol and diesel, there is a need to understand the quantitative needs, starting in the European Union, in the years up to 2050, when - at least according to EU policy makers and politicians - CO_2 neutral vehicles will have almost completely displaced fossil fuel vehicles.

As a primary goal, it is important to establish formal contact with the European Commission, in particular the supervisory directorships of Commissioner Frans Timmermans (European Green Deal) and Commissioner Mariya Gabriel (Innovation, Research, Culture, Education and Youth). Commissioner Gabriel is an important point of contact for Europa Nostra.

In connection with this governmental orientation, it is opportune to establish ties as joint industrial heritage organisations with the management boards of the mining companies to be involved.


23-24. Haaksbergen [NL], Museum Buurtspoorweg – MBS (local railway).

For the medium term, it is relevant to have a framework for the availability and legal use of coal and other fossil fuels implemented in policy documents such as the European Green Deal at the European level and similar policy documents from the national governments of Poland, Serbia and United Kingdom.

Although it will be complicated, we are convinced that we can carry out these objectives and achieve the necessary success. As collaborating and relevant heritage organisations, we will have to focus on the further steps to be taken.

It is worth considering initiating a wide-ranging study similar to those conducted by the organisations "European Historic Houses" and "European Landowners Organisation". This should be a strategic study that would highlight the added value of industrial and mobile heritage for 21st century Europe in their context and explain the social importance of their authentic preservation and presentation in working condition. It should certainly also address the need for the availability of fossil fuels and the underlying production and logistic channels, as well as the stimulation of the development of alternative fuels.

The foregoing concerns mean a major task in which cooperation and division of forces are self-evident, as well as the availability of budget, both for entering into the necessary contacts and relationships, and for the necessary research. It is recommended to use our platform to put together a joint action programme, make a budget, indicate the coverage for the costs, and divide the tasks.

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Appendix 1 – Update situation in Poland, Serbia and United Kingdom, by Dr. Serchinger (9th February 2022)

POLAND

Polish coal mines are active but as the country is heavily reliant on coal power, with fossil fuel making up almost 70 % of the country's energy mix, most of the produce is for domestic consumption in Combine Heat and Power plants (CHP).
An importer in Germany (http://www.polnische-steinkohle.de; vertrieb@polnische-steinkohle.de) had ordered 1000 t for January for his customers and has so far received merely 90 t from Poland! Some coal merchants may still have some Polish locomotive coal in stock (try https://www.bhj-brennstoffe.de).
The best locomotive coal from Poland is from the Wesoła mine and the neighbouring (5 km apart) Staszic mine. The specifications are (the volatile matter content is in both cases in the 29 – 32 % range):

Mysłowice – Wesoła

- Sizing 63 - 200 mm (cobbles) or 40 - 80 mm (large nuts)
- Lower calorific value 28.5 – 30.3 MJ/kg
- Ash 2.5 - 5 %
- Sulphur 0.2 – 0.5 %
- Moisture 5.5 - 7 %

Murcki – Staszic

- Sizing 63 - 200 mm (cobbles)
- Lower calorific value 30.977 MJ/kg
- Ash 4.01 %
- Sulphur 0.36 %
- Moisture 3.56 %
- Sizing 40 - 80 mm (large nuts)
- Lower calorific value 31.525 MJ/kg
- Ash 3.6 %
- Sulphur 0.39 %
- Moisture 2.96 %

Both the Wesoła and the Staszic mine belong to Polska Grupa Górnicza. Here is their company statement:
Polska Grupa Górnicza is a key partner in building the energy security of Poland. In response to the expectations of cheap and high quality energy, the Company strives for raising the effectiveness and optimising the production costs, maintaining high standards of environment protection, as well as health and safety issues.
Polska Grupa Górnicza has the greatest hard coal resources and extraction potential in the European Union.
The mining areas of Polska Grupa Górnicza mines are located in 42 communes of Silesia province and 3 communes of Małopolskie province. The areas of mining activities cover 603 square km and the mining areas cover 665 square km.

The present state of resources:
Balance resources - 7 812.2 million tonnes
Industrial resources - 2 910.8 million tonnes
Operative resources - 1 610.1 million tonnes
When Poland will phase out coal remains to be seen. In the law-making process under way at the moment, any year between 2035 and 2049 is being discussed.

UNITED KINGDOM

As indicated in Section 15, the Ffos y Fran mine in South Wales resumed sales of steam coal for heritage purposes in mid 2022, but extension of its operating licence remained uncertain (in early autumn 2022) and lobbying continues on this issue. A replacement product from Hargreaves is offered in the UK (https://www.supaheatfuels.co.uk/steam-raising-coal-13-c.asp). It is called Trevithick Welsh Steaming Ovoids (briquettes). According to the merchant, it has the following properties:

- 100 g size – 75 mm across longest face x 60 mm x 45 mm
- Volatiles 17 %
- Sulphur < 2%
- Ash circa 6.5 %
- Calorific value 32,500 kJ/kg
- Chlorine 0.02 %
- Volatiles will vary 14 % to 16 %

These briquettes are made from Welsh anthracite. The sulphur content < 2 % (usually approximately 1.5 %) is too high for continental Europe where regulations stipulate for < 1 %. However, as this is a briquette, if the content of combustible sulphur is < 1 %, the product would still be permissible. It will be available in continental Europe from March onwards from Hargreaves raw material services GmbH in D-47051 Duisburg.
Since Brexit, UK and foremost English environmental regulations have strayed far away from continental ones, sometimes they are stiffer, sometimes less demanding. At any rate, they are hardly compatible, which makes it difficult for both sides to adopt solutions from the respective other side of the English Channel.

Another English product is a form of briquette consisting of 50 % crushed olive stones and 50 % coal dust. This is considered "green" in England but due to its coal content not at all "green" over here.
Coal from Kazakhstan imported into the UK (https://www.cplindustries.co.uk) has a sensationally low ash content of 1.4 %, but its high volatile matter content of 39.2 % rules it out. Nevertheless, this coal will be tried out on the Leighton Buzzard Railway (610 mm gauge).

Appendix 2 - Organisations

ERIH, the European Route of Industrial Heritage, is the tourism information network of industrial heritage in Europe. The network is run by the ERIH association, which has more than 300 members in 30 countries. Over 100 member sites are Anchor Points, sites of exceptional historical importance in terms of industrial heritage which also offer a high quality visitor experience. Regional Routes introduce in more detail the industrial history of landscapes, which were particularly influenced by industrialisation. In total we present over 2,100 sites worth visiting on our website from all European countries.
For the museum operations of the ERIH network, the use of fossil fuels, such as coal and diesel fuel, is relevant at various sites to activate machines and move historical vehicles. That is why ERIH attaches importance to ensuring – in the light of international discussion about drastically reducing or even phasing out the use of fossil fuels – that safeguards are in place for museum availability. This is important for the conservation of the industrial and mobile heritage, as well as for the presentation of the industrial heritage to future generations of citizens.
In this way, ERIH promotes and interests and can hopefully do so successfully through collaboration with other heritage organisations where the same issue is addressed, such as Europa Nostra and members of the European Heritage Alliance 3.3, an informal European sectoral platform composed of 49 European or international networks and organisations active in the wider field of cultural heritage.

As the European Voice of Civil Society committed to Cultural Heritage, **Europa Nostra** acts as a relay between civil society and EU institutions, carrying out the crucial tasks of raising awareness of the value of cultural heritage for Europe, advocating to mainstream heritage into EU policies and securing adequate funding, as well as actively contributing to the EU policy debate and policy-making process.
Within Europa Nostra, the Industrial & Engineering Committee (***ENIEHC***) plays a role as the organisation's conscience, contributing to the preliminary identification and assessment of industrial heritage projects or sites that could qualify for an award or which are under threat and could justify attention as endangered cultural sites in Europe. When it can, the ENIEHC is pleased to cooperate with other international organisations which have similar ambitions, such as the European Route of Industrial Heritage (ERIH), the European Federation of Museum and Tourist Railways (FEDECRAIL), the Fédération Internationale des Véhicules Anciens (FIVA), The International Committee for the Conservation of the Industrial Heritage (TICCIH), or the International Council on Monuments and Sites (ICOMOS).

In many countries, these voluntary bodies of museum- and tourist railways have banded together to form umbrella organisations to promote their common interests on a national level. These in turn have joined forces to form ***FEDECRAIL***, the European Federation of Museum and Tourist Railways.
FEDECRAIL seeks to:

- Promote the rescue, restoration and operation of Europe's railway heritage.
- Represent its members' interests vis-a-vis international agencies and, in particular, the European Commission in Brussels and the European Parliament in Strasbourg.
- Encourage the exchange of ideas across national and cultural boundaries and foster co-operation between museum and tourist railway organisations including museums involved in railway heritage.
- Help provide advice and assistance for such organisations.
- Study and resolve problems shared in restoring and operating heritage railways.

FIVA, the Fédération Internationale des Véhicules Anciens, is a worldwide non-profit organisation dedicated to the protection, preservation and promotion of historic vehicles. Established in 1966, it is active in around 80 countries, representing millions of historic vehicle enthusiasts around the globe.
Since 2017, FIVA has been a partner of UNESCO with consultative status, representing world motoring heritage and related culture.
FIVA's primary objective is to encourage the safe road use of self-propelled, mechanical vehicles, more than thirty years old, for the benefit of both their owners, dedicated enthusiasts and the general public. FIVA is also concerned with the preservation of historic vehicles, which are accepted as being an important part of our industrial heritage.
Apart from UNESCO FIVA has forged links with ECOSOC/UNECE, the UN agency dealing with road vehicle and mobility matters. FIVA has worked hard to persuade the EU bodies to introduce a historic vehicle definition in EU legislation, first in the Directive regarding periodic roadworthiness testing of cars (EU Directive 2015/45 DIRECTIVE 2014/45/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailer) Through its Legislation Commission, FIVA has been assiduous in protecting the continued use of historic vehicles in the face of any adverse legislation.

The International Committee for the Conservation of the Industrial Heritage, better known by the more manageable ***TICCIH*** (pronounced "ticky"), is the world organization for industrial heritage. Its goals are to promote international cooperation in preserving, conserving, investigating, documenting, researching, interpreting, and advancing education of the industrial heritage.
This wide field includes the material remains of industry – industrial sites, buildings and architecture, plant, machinery and equipment – as well as housing, industrial settlements, industrial landscapes, products and processes, and documentation of the industrial society. Members of TICCIH come from all over the world and include historians, conservators, museum curators, architects, archaeologists, students, teachers, heritage professionals and anyone with an interest in the development of industry and industrial society. Although TICCIH members are both individuals and institutions, it is organized through national associations in those countries where there is a recognized national institution for industrial heritage.
TICCIH is recognized by the International Council on Monuments and Sites (ICOMOS) as a designated consultant in all matters related to the study and preservation of industrial heritage. ICOMOS is the global non-governmental organization dedicated to conservation of the world's historic monuments and sites. In particular, ICOMOS' network of experts counsels UNESCO on properties to be added to the World Heritage List. Therefore, TICCIH advises on historically significant industrial sites for the World Heritage List.

EFLEVA, the European Federation of Light, Experimental and Vintage Aircraft is an international organisation, which brings together, at a European level, the national aviation associations and national federations of amateur aircraft builders and the restorers and operators of historic/heritage aircraft.

EFLEVA was founded 2007 by twelve associations from different European countries. It currently has 16 member national associations/federations.

The main purpose of EFLEVA is to promote, support and to represent the interests of our members at the European level, concerning relevant regulatory matters.

In cooperation with relevant national and international organisations, but also operating independently, EFLEVA represents the interests and objectives of our members.

These interests include Airworthiness, Licensing, Operations and Airspace as well as specific areas such as insurance and security.

EFLEVA-Membership is open to all European, Light, Experimental and Vintage Aircraft Associations, from countries which are members of the European Civil Aviation Conference (ECAC).

In the event that the different fields (that is areas of interest) are covered by different associations, in the same country, each qualifying association may seek membership.

For more information, the website of EFLEVA is www.efleva.eu

Appendix 3 - Photo credits

Caradog Llywelyn, Wikimedia: 22
CloudSurferUK, Wikimedia: 21
Coll. Bresters: 6-11
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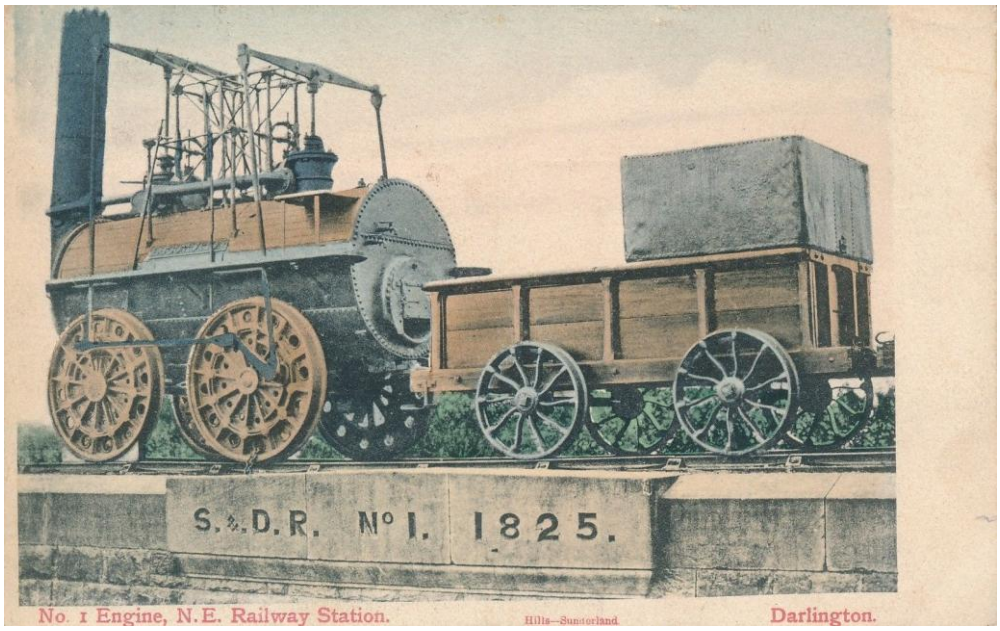
Museum Buurtspoorweg – MBS: 23-24



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