



Green Future for Narrow Gauge Railways Vision and Reality in Hungary

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Abstract

The history of narrow gauge railways starts at 1870 in Hungary. The first lines were constructed for industrial purposes: timber and stone delivery in **forests**, local logistic services in **mines** and in **agriculture**. Later narrow gauge railways began to have a role in regional and suburban transport too. Six thousand km long lines of such railways operated financially efficiently by 1914. Similar trends were Austria, Germany or Scotland. The nature of traffic began to change after 1920; public passenger transport gained more importance. After 1945 reconstruction supported the recovery of the agricultural sector. After 1968 many railway lines have been closed by political decision.

For 2015 Hungary had 29 **separate lines and companies with a total length of 503 km**. [24 lines - 224 km are in operation.] The main present function of these "light railways" is green tourism. Only two forestry rail lines deal with freight transport. We have some 3800 passengers/day, 1,3 million passengers annually. [5000 to 380000 per company.] Currently operation is co-financed by "cross-financing subsidy" of the owner and/or the state. The Hungarian Co-ordination Centre for Transport ["KKK"] ordered a **study** concerning that topic in 2015. Our team has studied the present situation in the field of **regulation, funding and investment**. After consultations with local rail companies development proposals were collected. Finally we made some ranking concerning realistic proposals. The main considerations were:

- Improvement of narrow gauge railways connected to tourism and to regional development objectives.
- Green education for future generations. Introducing the Industrial Heritage to families, to "rail fanatic people".
- Promoting public service, enhancing competitiveness.
- Better system performance facilitating "intermodal connections".

Keywords: narrow gauge railways, policy, tourism, infrastructure development

1 History

The history of narrow gauge railways in Hungary starts in the 1870's. The first lines were constructed for industrial purposes: timber and stone delivery in **forests**, local logistic services in **mines** and in **agriculture**. 20 years later narrow gauge railways began to have a role in regional and suburban transport. By the beginning of World War I. 6000 km of narrow gauge rail tracks were in the country. (see Figure 1.) The nature of traffic began to change after 1920; public passenger transport gained more and more importance, long suburban vicinal lines were built. After World War II. the rapid reconstruction process and further improvement of the narrow gauge railways assisted to the recovery of the agricultural sector. The golden age ended in the late 60's, a significant proportion of railway lines have been discontinued by political decision. We have to admit, rail traffic could not compete with cars and busses, freight traffic was cheaper and more competitive on roads.

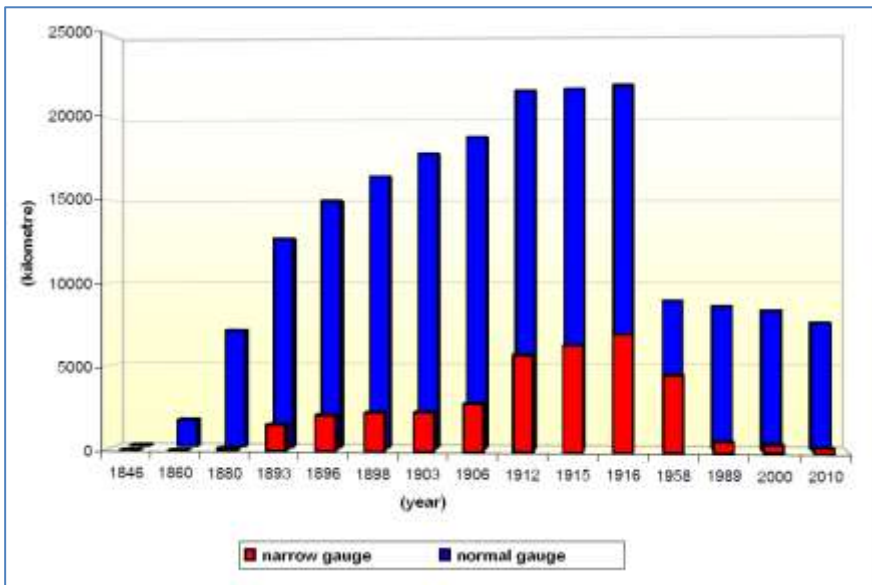


Figure 1. Length of normal and narrow gauge railway network in Hungary 1846-2010 [1]

2 Narrow gauge railways in Hungary in 2015.

For 2015 Hungary had **29 separate lines and companies with a total length of 503 km** (224 km was in operation.) – see Figure 2. Nowadays the main function of these “light railways” is **green tourism**. Only two forestry railways are dealing with freight transport and one destination is involved in regional public transport. Table 1 shows the main characteristics of Hungarian narrow gauge railways: location [b], function [d], and technical features [e-f-g-h-i]. We can make the following general observations:

- The most common narrow track gauge is 760 mm in Hungary,
- The vast majority of locomotives are with diesel engine, but there is a strong aspiration is to replace the fleet with green vehicles (hybrid or solar propulsion),
- About ownership we can say that
 - 188 km (37%) are owned by Hungarian State Railways, but only 12 km is in operation,
 - 223 km (46%) are owned by state forestry,
 - 6 lines (50 km, 10%) are owned by municipalities,
 - other 8 lines (50 km) are owned by other companies (eg. national park, museum).

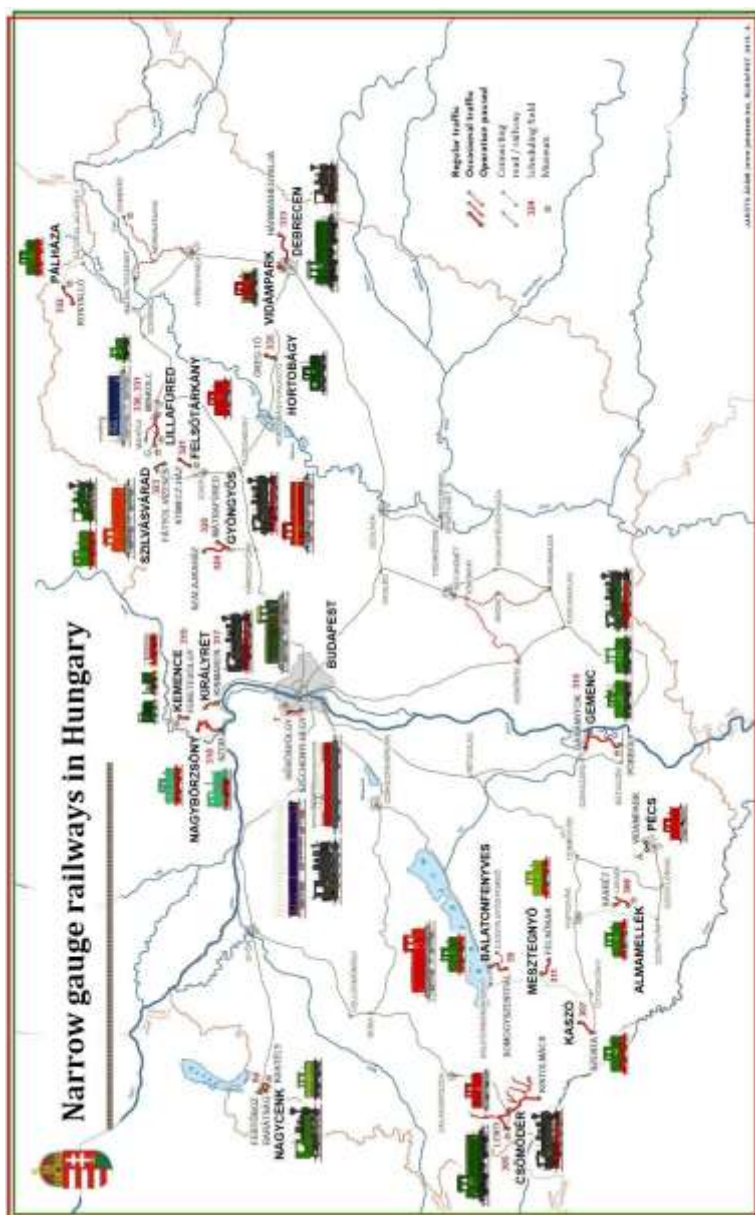


Figure 2. Narrow gauge railways in operation in Hungary in 2015. © Jakóts Ádám

Table 1. Narrow gauge railway lines with important data in Hungary, 2015. [3]

Name	Location	Owner	Function	Traction	Gauge	Length	No. of locomotives	No. of rail wagons	Profile
[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]	[i]	[j]
1 Almameléki State Forest Railway	Baranya County	Mecsek Forestry Ltd.	Tourism	diesel	600 mm	8 km	2	4	small
2 Balatonfenyvesi Field Railway	Somogy County	Hungarian State Railways Ltd.	Commuter traffic, Tourism	diesel	760 mm	12 km	6	26	large
3 Csongrádi State Forest Railway	Zala County	Zala Forestry Ltd.	Freight, Tourism	diesel/steam-engine	760 mm	90 km	15	59	large
4 Debreceni Amusement Park Railway	Hajdú-Bihar County	Debrecen Municipality	Tourism	diesel	760 mm	1,1 km	1	4	small
5 Fehér-tavi Fish Farm Railway	Csongrád County	Szegedfish Ltd.	Freight	diesel	600 mm	7,5 km	9	69	small
6 Felsőtűz-Vál-Valley Light Railway	Komárom-Esztergom County	Foundation for Youth Football Development	yet not in service (Tourism)	diesel	760 mm	5,7 km	2		large
7 Felsőpányi Mine Railway	Nagyrad County	Clay Mineral Ltd.	out of service (Tourism)	diesel/electric	600 mm	5 km	4		small
8 Felsőiskolai State Forest Railway	Heves County	Eger Forestry Ltd.	Tourism	diesel	760 mm	5 km	2	9	small
9 Gemenc State Forest Railway	Tolna County	Gemenc Ltd.	Freight, Tourism	diesel/steam-engine	760 mm	30 km	5	78	large
10 Children's Railway, Budapest	Budapest	Hungarian State Railways Ltd.	Tourism	diesel/steam-engine	760 mm	11 km	7	30	large
11 Horobágy, Öreg-tó Railway	Hajdú-Bihar County	Horobágy National Park	Tourism	diesel	760 mm	5 km	1	8	small
12 Kaszói State Forest Railway	Somogy County	Kaszó Forestry Ltd.	Tourism	diesel/steam-engine	760 mm	8 km	2	5	small
13 Kécskeméti Railway	Bács-Kiskun County	Hungarian State Railways Ltd.	out of service (Commuter, Tourism)	diesel/steam-engine	760 mm	98 km	4	41	large
14 Kemencei Forest Museum Railway	Pest County	Ipoly Forestry Ltd.	Tourism	diesel/electric	600 mm	5 km	20	46	small
15 Királyréti Forest Railway	Pest County	Ipoly Forestry Ltd.	Tourism	diesel/electric	760 mm	10 km	6	29	large
16 Ilfürdői State Forest Railway	Borsod-Abaúj-Zemplén C.	Northern Forestry Ltd.	Tourism	diesel/steam-engine	760 mm	27 km	7	49	large
17 Mátravölgyi Öngyógyászati Állami Park Railway	Heves County	Eger Forestry Ltd.	Tourism	diesel/steam-engine	760 mm	20 km	10	20	large
18 Mecsek Amusement Park Railway	Baranya County	Pécs Municipality	Tourism	diesel	760 mm	0,6 km	1	3	small
19 Mésztegyöldi State Forest Railway	Somogy County	SEFAG Ltd.	Freight, Tourism	diesel/steam-engine	760 mm	9 km	3	38	small
20 Nagybörzsönyi Forest Railway	Pest County	Nagybörzsöny Municipality	Tourism	diesel	760 mm	8 km			small
21 Nagyecskai Sztéchenyi Múzeum Railway	Győr-Ménfő-Sopron C.	Hungarian Museum of Science, Technology and Transport	Tourism	diesel/steam-engine	760 mm	5 km	2	12	small
22 Nyírvideki Railway	Szabolcs-Szatmár-Bereg C.	Hungarian State Railways Ltd.	out of service (Commuter, Tourism)	diesel	760 mm	67 km	7	35	large
23 Pálházi State Forest Railway	Borsod-Abaúj-Zemplén C.	Észak Forestry Ltd.	Tourism	diesel	760 mm	8 km	2	11	small
24 Szentendrei Múzeum Railway	Pest County	Hungarian Open Air Museum	Tourism	diesel	1435 mm	2,2 km	1	2	
25 Szilvásvárdi State Forest Railway	Heves County	Eger Forestry Ltd.	Tourism	diesel/steam-engine	760 mm	5 km	6	21	large
26 Szob-Nagybörzsöny Forest Railway	Pest County	Szob and Mérianosztra Municipality	Tourism	diesel	760 mm	22 km	8	12	large
27 Tiszakécskei Railway	Bács-Kiskun County	Tiszakécske Municipality	out of service (Tourism)	diesel	760 mm	1,2 km	1	2	small
28 Tömördényi Fish Farm railway	Csongrád County	Tömördényi Agricultural Ltd.	Freight, Tourism	diesel	760 mm	15 km			small
29 Zsuzsi Forest Railway, Debrecen	Hajdú-Bihar County	Zsuzsi Forest Railway Nonprofit Ltd.	Tourism	diesel/steam-engine	760 mm	17 km	4	26	large

503,3 km 130 639

The annual number of passengers carried is around 1.3 million: varies between 5,000 and 380,000 per company – see Figure 3. According to the annual performance we can divide the individual lines to small- or large-profile railway group (Table 1, column [j]). Railways under 30,000 passenger/year can be considered small-profile railway. They differ in terms of

- rail system (rail profile 9-23,6 / 23,6-48 kg per meter),
- vehicles (engine power output),
- braking mode (hand brake / air brake),
- travel speed (15 / 20-40 km/h),
- schedule (timetable throughout the year or seasonal).

The most visited site is the Children’s Railway with 380,000 passengers per year. Except the train driver, and one adult per station all of the posts are operated by children aged 10–14. The railway is financially strongly supported by Hungarian State Railways, and plays an educational role as well. The financially most efficient light railway is “Szilvászvárad State Forest Railway”. The line is relatively short (3.6 km), and the site attracts many visitors.

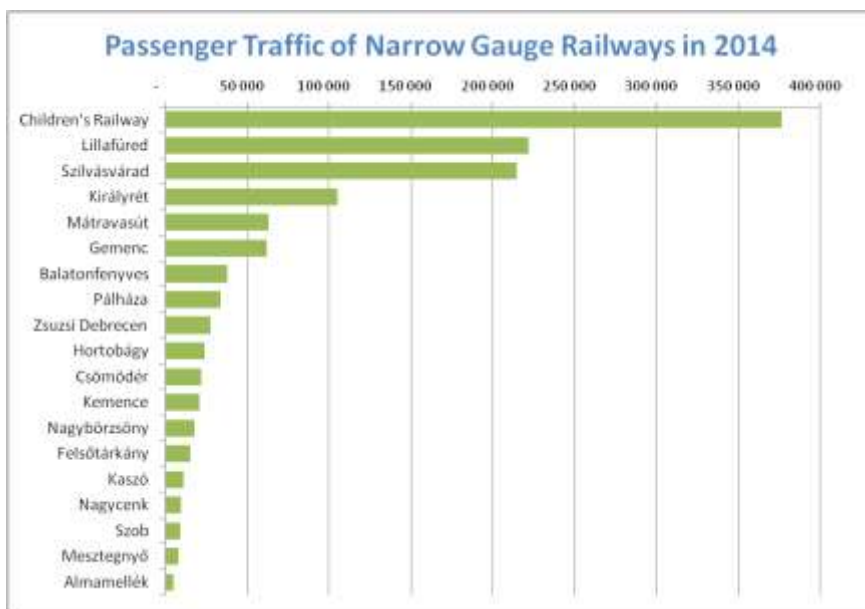


Figure 3. Annual Passenger Traffic of Narrow Gauge Railways in 2014. [3]
[Other data can be found in alphabetic order in Table 1.]

Currently operation is co-financed by “cross-financing subsidy” of the owner and/or the state. Only a few large-profile railways can cover 60-100% of the cost of operation by ticket revenues, small-profile railway are able to finance only 10-40% of costs. Operation subsidies and development funds are not equally available to all participants.

Standards created for international railway network and applied for narrow gauge railway imposes disproportionate burdens both in technical and in financial sense.

3 Strategy for the future

The Hungarian Co-ordination Centre for Transport (Hungarian Transport Administration, “KKK”) ordered a study concerning that topic in 2015. The aim of the Narrow Gauge Railway development Concept was to give a comprehensive “state of the art” report on a less preferred area in the railway sector, and to prepare the 2014-2020 EU planning period complying a list of feasible and green development projects.

The scope of the railways to be examined comprised narrow gauge railways dealing with passenger transport (existing or under implementation) and planned developments identified in the National Regional Development Concept and in County Development Plans.

Our team has studied the present situation in the field of regulation, funding and investment. As the different narrow gauge railway lines are supervised by different ministries it was a considerable challenge to harmonize a common and valid database.

- Problems, development solutions, safety issues and requirements usually occur at the National Transport Authority;
- Public transport, public funding and transport development belongs to the Ministry of National Development;
- Ministry of National Economy is responsible for tourism, nature tourism and tourism development funds.

Our proposals to rationalize the **legal-regulatory area** that the rules and standards should reflect on railways safety risks. This may result that some areas - compared to the national networks – will be under-regulated, while others get more attention. The conditions should be determined according to risk, leaving out certain elements of the licensing process or different (lower) requirement should be set.

After consultations with local rail companies development proposals were collected. Finally we made some ranking concerning realistic proposals. As “light railways” cannot cover even their running costs, investments can be hardly recoverable. Scarce resources should be devoted to the busiest lines, long and unused extensions should be avoided.

The main considerations of the study were:

- Improvement of narrow gauge railways connected to tourism and to regional development objectives.
- Green education for future generations. Introducing the Industrial Heritage to families, to “rail fanatic people”.
- Promoting public service, enhancing competitiveness.
- Better system performance facilitating “intermodal connections”.

This is a brief summary of a long study of 170 pages and Annexes. Furthermore we prepared 5 pre-feasibility studies of 5 narrow gauge railway networks selected by the principal. We have analyzed several development options, and estimated costs, benefits and potential traffic.

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