



Low Energy Transport for Sligo

Electric Power Assisted Bikes as a Part of an Integrated Transport Solution

Energy Challenge Competition 1998
under the INTERREG II Programme 1994-1999

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Mr. S. Concannon
Borough Engineer
Corporation of Sligo

Mr. Wilhelm Bodewigs
HBC Planning Consultants
Doon Lough, Co. Leitrim

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Participants and Contributors:

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|--|-------------------------------|
| -- Sligo Corporation
Town Hall, Sligo City Tel. 071-42141 | Project Leader |
| -- Mr. Seamus Flanagan, "Flanagan's Cycles",
Old Market Yard, Sligo City, 071-44477 | Project Operator |
| -- Mr. Wilhelm Bodewigs Dipl.Ing. SRL, HBC Consult.
Doon Lough, Co. Leitrim , 071-43452 | Project Management and Report |
| -- Mr. Jim O'Malley, BSc, CEng, ENTRAC, 071-61027 | |
| -- Sligo Town Centre Partnership, Sligo | |

1 Sligo Project Background

1.1 Urban Development

Sligo City is a regional centre with a current population of approximately 20000, a number that is growing. The daytime population including employment, shoppers and service customers is assessed at over 40000 people. The National Development Plan 2000-2006 is addressing Sligo as a focal place of the “Border, Midlands and Western Region” (1) and as an urban growth centre with an estimated increase in residential population to between 40000 and 50000 people.

Due to its key geographic location between Northern Ireland and the West of Ireland all traffic corridors and routes are affecting Sligo, its environs and its lands for urban growth. The lack of a National Road Bypass is guiding all national and regional passenger and goods traffic through Sligo’s built-up areas dating back to the 19th century and through the town centre, conflicting with local needs.

Car traffic congestion has grown already over the last years to such an extent that at off-peak time it can take up to 30 minutes to traverse the 3km city area, while at peak time this can take up to one hour. A traffic survey (2) was carried out 1993, which showed that 85% of the destinations for the people were in the city including its peripheral residential and employment areas, while approx. 45% of the people had destinations in the city centre.

Sligo and its environs are attractive tourist areas. Significant tourist destinations, in the hinterlands of Sligo City, can only be reached by car because public transport is mostly confined to the borough. The use of the conventional bike is not seen as feasible because of the many steep hills and the absence of cycling infrastructure.

1.2 Sligo Transport Hub

The main Sligo asset of local, regional and national public transport is the Railway and Bus Station. The station is situated in an attractive five minutes walking distance from the centre of the commercial core of Sligo. With Sligo as a terminus of an Intercity train service to Dublin, the route is currently subject of large investments in upgrading the tracks under a National Railway Safety Programme. This will increase the attractiveness of rail by enabling a reduction to less than three hours in the travelling time to

Dublin. First proposals of urban renewal and urban design have been presented addressing better access and more integration of all means of transport at the Sligo Railway and Bus Station (3).

This commitment to the survival and more economic viability of the railway line as the backbone of public transport has given encouragement to local promoters and operators of public transport. Local bus services of Bus Eireann received a boost with the arrival of a small fleet of Impact-Buses, which allowed for the opening of two new urban bus routes. However, the limited financial resources did not allow for a full utilisation of the Railway and Bus Station by upgrading them to be core place for the point of interchange between all bus routes and railway services. Other modes of local transport, cycling and taxi service are not organised in an attractive manner at the station.



Sligo Railway and Bus Station

Research and professional discussion on the environmental quality and economic viability of urban transport services demonstrate the need for an integrated transport solution in general but especially the need for high attention to the attractiveness of all places of interchange from one mode of transport to another. The development of Sligo’s Railway station into a regional and cross border transport hub must be seen as a key to sustainable regional transport solutions. The development of the public transport “chain” (train and bus) will contribute to less use of the car and will allow the reduction in fossil fuel consumption for transport use in the region.

To convince users to use this transport chain and to leave their cars at home, the change of the mode of transport at the Railway station and at bus stops must be smooth and fast. In the interest of lower energy consumption in transport and a

decrease of carbon dioxide emissions, the assistance of non-polluting means of transport, walking and cycling, must be encouraged.

An attractive infrastructure with cycling facilities at the Railway and Bus station of Sligo and at bus stops would encourage commuters, urban dwellers and tourists to use more public transport and bicycles thus reducing the use of cars.

1.3 The Bike Station Concept

Bike stations at the railway stations are well established in European countries like Denmark, Netherlands, Germany, Belgium, and Switzerland as well as in Japan. Governments are increasingly realising the potential of Bike stations as an integral part of the urban infrastructure, with the state of North Rhine-Westphalia (Germany) leading in the efforts to feasible solutions for cities as well as for smaller towns (4).



Service Area of Bike Station (Münster/Germany)

Services to be provided by a typical Bike Station include:

- Hire of bikes, protective gear etc.
- Repair services
- Advice on cycling and public transport in the region
- Guided tours of the city and region
- Services for disabled people using wheelchair bikes
- Courier services to co-ordinate with express deliveries from buses and trains
- Delivery services using bike trailers which can be dropped off or picked up
- Retail sales
- Tourist sales
- Safety training and cycling club activities

In countries such as the United Kingdom, Denmark, Netherlands, Germany, Switzerland and Japan, which provide suitable legislation, the hiring, charging and maintenance of electrically assisted bikes is envisaged.



Bike Facilities at Railway Station (Tegelen / Netherlands)

Carefully designed bike facilities and manned Bike Stations at the urban transport hubs are essential for the smooth and fast change between short distance and long distance means of transport (5). The contribution of electrically assisted bikes in integrated, low energy, urban transport solutions has not been examined yet in the European Union.

2 Concepts and Legislation on Electro-Bikes

The electric drive of traditional Electro- bikes has an additional system, which is fitted with hand control of the throttle. Generally, in national legislation, they are categorised as mopeds or scooters requiring duties on taxes and insurance. Most models offer motor power that is complimentary to the human power element.

The EPAC Concept (“Electric Part Assist Cycling”)

Since 1994 worldwide bike manufacturers have been introducing a new category of Electro-bikes for urban areas and commuter distances, called EPAC or pedelec bikes (6). The character of cycling -low speed, low energy, and low weight - is maintained but a small electric engine is only activated when the pedal is moved by muscle power. Because of this the human power element

is always dominant. The spontaneous, flexible and urban characteristic of cycling is enhanced; the sportive and healthy element of cycling is maintained.

Countries world-wide, first in Japan, have already sanctioned a legislation which allows for **the exemption of duties on taxes and insurance**. The main essentials for this exemption are seen as follows (with national variations):

- a) The character of a bicycle has to be maintained. The additional power can only be released by movement of pedals.
- b) The strength of the additional power (in Watt) shall not exceed the power provided by the cyclist.
- c) The maximum power to the support of the cyclist shall be 250 Watt (approx. 1/4 hp).
- d) The maximum speed of the drive supported by additional power shall be 25 km/h (15 miles/h).

In Europe it is the United Kingdom (7), Denmark, Finland, Germany, Netherlands, Belgium, France, Switzerland, Austria and Italy where legislation on EPAC bikes is in place. The European Commission has installed a “CEN - Technical Commission” (8), and in an amendment to the Council Directive 92/61EEC (Type Approval of Two or Three Wheel Motor Vehicles) it is proposed that EPAC bikes are excluded from type approval legislation. The category of exemption is established as outlined above with the maximal strength of engines specified as “250 Watt continuous”. European member states are currently waiting for the Council and Parliament’s decision.

In Ireland there is clear legislation only on electric mopeds and scooters, i.e. vehicles which are permanently mechanically propelled. No attention had given in the Irish Republic, until now, to the new category of EPAC - bikes.

3 Consideration for Project under “Energy Challenge Programme”

A private examination in 1999 of all cars passing Carraroe roundabout (3km south of Sligo City) or Bundoran Road (North of Sligo) towards Sligo City has shown that more than 90% of cars had only one occupant. In congested traffic the driver of an average car will need 1 litre of petrol for his daily trip from the outskirts of Sligo and return (6km).

Park- and Ride facilities outside Sligo City, offering buses into the centre, would reduce the environmental and financial burden significantly. Cycling to the P&R facility or bus stop would be feasible for the residential population within a radius of 3 km, if bikes could be stored safely at the bus stops. Cycling into the centre would be of great environmental benefit, but very slow due to the topographic situation, which has up to 50m of difference in height on main roads. The topographic situation of Sligo and its environs make it a challenge and an ideal location for a research project evaluating low energy solutions in daily transport.



Traffic in Sligo City Centre

Electro- or electrically assisted bikes could make a huge contribution to assist the commuter for distances up to 5 km without loss of time:

- An average speed of approx. 20km/h will allow the commuter to arrive at a destination fast, without the time required to find a place to park the car,
- The energy consumption for this trip for electrical charging shows the equivalent of less than 1l fuel/100km (9), which is

approx. 1/16 of the consumption of the car.

- Cycling with EPAC bikes would lower the car-related pollution in the city centre.

Low speed, zero emission vehicles like bikes or EPAC bikes are increasingly seen as an integral part of sustainable and decentralised tourist concepts.



City Bike with EPAC Drive

The manufacturers of EPAC - bikes are specifying the need for one charging cycle between 0.6kWh and 0.9kWh, causing costs of up to 8p (daytime charging) or 3p (nighttime charging) for one full charge of the bike. Manufacturers are outlining that this full charge will allow for power-assisted cycling of up to 30 km.

The low energy requirement for this mode of transport would allow for the use of recharging facilities utilising renewable energy from small hydro-, wind- or solar plants.

These considerations were encouraging to the Corporation so application was made for a pilot project offering electrically assisted bikes to public in Sligo as an element of a Low Energy Transport Solution. All participants have shared the view that the instalment and test of EPAC bikes would not conflict with Irish legislation due to their main elements and handling being the same as conventional bikes.

4 First Project Phase: Design and Installation of Bike Station

4.1 Operator and Location

The scheme encouraged private operators to participate in a Public Private Partnership with local authorities. Mr. Seamus Flanagan of “Flanagan’s Cycles” has been the partner of Sligo Corporation for the investment of matching funds and the operation of the scheme.

The project framework and allocated money allowed only for an investment into a fleet of ten electrically assisted bikes and related infrastructure. The reduced size of the financial support had ruled out the chance to initiate integrated services at the Railway and Bus Station of Sligo, the most important point of interchange.

It was therefore decided to install facilities adjacent to the retail shop of “Flanagan’s Cycles” at the Old Market Yard in Sligo, only a short distance (1-5 minutes walking) to the weekly market, Sligo Corporation Offices, Sligo Tourist Office and the retail core of Sligo. The need for a planning application was avoided by choosing this location for the project.

4.2 Concept and Investments

The aim of the project was to promote the use of part assisted, electric bikes, and to offer the bikes for rent or lease to reduce dependency on the car

- to demonstrate and convince city dwellers that there are alternatives to the car for short distances,
- to demonstrate practically the reduction of “Greenhouse gas” pollutants, especially Carbon Dioxide,
- to demonstrate to commuters from the close environs of Sligo that the bike offers a flexible access into town without loss of time,
- to convince local employers that their staff should use these bikes during working hours allowing significant time savings in Sligo’s congested city streets,
- to convince tourists that Sligo environs’ places of natural, cultural, archaeological and general tourist interest can be discovered by EPAC - bike without physical exhaustion and in

close contact to the people and countryside of Sligo.

In general to introduce to Sligo a feasible, cheap, flexible, socio friendly and day-by-day solution with low energy requirements.

The following investments were undertaken before commencing the project:

- Three EPAC city bikes from “Heinzmann”, Germany, 400 W max. rated output /310 Watts continuous output,
- Six EPAC drives from “Heinzmann”, Germany, same output,
- Six Mountain Bikes “Trekking Fox” for the fitting of the drives,
- One EPAC city bike “Piaggio Albatross”, Italy, 250 Watts max. rated Output,
- Three bike garages made by “Stöhr GmbH”, Germany, for the safe store and protected overnight charging of EPAC bikes

The EPAC bikes “Heinzmann” were considered as especially suitable for the difficult topographic situations of the North West of Ireland because the manufacturer is situated and has adjusted their bikes to the Black Forest Mountain area of Germany.

“Danfey Ltd.” the Irish importers of the world’s leading manufacturer of EPAC bikes, “Yamaha”, contributed to the project with an EPAC city bike “XPC 26” with 235 Watts rated output for the duration of the project.

The funds allocated included a position to select and purchase further street bike stands during the operation of the project, stands that would be suitable for the upgrading to charging facilities.

4.3 Charging Facilities

Each of the EPAC bikes purchased for the project was supplied with its own charging unit for domestic use. For the rent and lease of the bikes the following options were proposed:

- The main place for the charge of the bike batteries was installed at “Flanagan’s Cycles” which had secured the full technical back up of a technology new to Ireland.

- For Sligo Companies and public bodies it had been planned to offer the lease of the EPAC bike in combination with a charging unit already installed inside the bike garage. The bike garage system was designed as a temporary installation and no planning application was required. One bike garage for charging was installed at the Old Market Yard for permanent use.



Charging Garage at Old Market Yard, Sligo

Three selected places of tourist interest around Sligo were selected for a charging facility operated by the local private owners. A bike garage was offered free of charge for the duration of the project at all three places but it was not seen as essential to start with.

These three places are:

- The Visitor Centre of W.B. Yeats Cemetery, Drumcliff (7 km distance),
- The Riding Stables / Megalithic Tombs at Carrowmore (4km distance),
- The Strand Cafe, Strandhill, (8 km distance from Sligo City Centre)

These three places were chosen at distances from Sligo so increasing the area, which could be reached by bike with comfort. Their location also provided security in the unlikely event that the remote recharging station was not open as the return to the Bike Station could be accomplished without recharging of the batteries. The locations also included the more attractive destinations for day trips, for example Sligo City - Yeats Cemetery - Glencar Valley, - Sligo City.



*Charging Point at Yeats Visitor Centre,
Drumcliff*

It was agreed that the costs of charging (up to 7p) were absorbed by the operators of the remote tourist locations, as their contribution to the provision of a quality tourist environment.

4.4 Financial Concept

4.4.1 Utilisation of Grant

The grant allocated under the “Energy Challenge Programme 1999” had an amount of max. £ 8000.00. The total investment until the end of the project has been £ 10500.00 of which approx. £ 5250.00 have been provided through the grant. Each of the EPAC bikes should allow for revenue of £ 1050.00 over a period of three years (the depreciation period accepted in the bike industry).

With a lifetime of the electric drive to be expected at 1000 charges / not less than 15000 km length of electrically assisted drive, the revenue created per km drive of rented/leased bikes should be not less than 8 pence (including charging costs).

With an average speed estimated at 15 km/h, the average usage time of the bike should not be less than 1000 hours during the life cycle of the bike; or approx. 330 hours annually.

4.4.2 Services and Charges

Based on the experience of Mr. Flanagan, an operator of bike services for over 10 years, the following tariffs were agreed:

-- **Rent of Bikes**
Sligo residents and tourists were offered to rent the EPAC bikes at prices as follows: Daily tariff: £ 15.00
Weekend tariff: £ 30.00
Full week tariff: £ 50.00
All interested customers were offered free test-drives through the centre of Sligo City.

-- **Lease of Bikes**
Leasing services including full charging facilities -garage- and technical maintenance were offered to commercial and professional parties with single users at the following prices:
Monthly lease: £ 120.00+ VAT

-- **Sales**
The retail outlet of Mr. Flanagan has been established as the first place in Ireland offering practical solutions and rolling stock for this innovative scheme of human-powered mobility with suitability for urban and rural areas.

4.5 Signs, literature and maps

Based on concepts and signpost systems developed by the “Landesverband NRW (Germany) of the ADFC (General Cycling Federation) (10) a sign for the marking and identification of charging facilities of EPAC bikes has been produced.



Sign of Recharging Logo 140 x140mm

A basic leaflet for tourists describing the technical aspects and handling of EPAC bikes has been produced (appendix A). The leaflet contains a simple b/w map showing the safest, quietest and most attractive routes to the three tourist destinations with recharging facilities. This map is understood as a sheet to accompany the regular tourist guides.

5 Second Project Phase: The Course of the Project

5.1 Official Launch and Training

The Energy Challenge project “Low Energy Transport for Sligo” was officially opened by the Major of Sligo City, Mrs. Rosaleen O’Grady, and Mr. David Taylor, the Director of the Irish Energy Centre, on 10th of May 2000 (see appendix B, report of the local newspaper).

All staff at “Flanagan’s Cycles” and at the three charging points were trained in the aspects of this new technology, especially the connection modes and charging periods of the chosen type of battery (Nickel-Cadmium), which need full charging cycles to avoid a loss of charging capacity (“memory effect”).

5.2 Project Duration

From the beginning in May 2000 all participants were encouraged to daily use of the bikes and practical demonstrations in Sligo’s congested streets. It has been obvious that they provided fast and flexible access options, superior to the slow moving cars. The climbing up of the hill streets of Sligo Town (up to 15%) was achieved with ease and received great attention. The lack of local cycling infrastructure - safe bike stands - has forced the participants to lock their EPAC bikes in the most prominent locations possible thus receiving the attention of the public and providing an additional safety measurement against theft.

The publicity created since the official opening has drawn a huge regional attention to the Sligo project, which is reflected in the many enquiries, and inspections of people beyond the area of “bike enthusiast” (see also: views of the operator, Mr. Flanagan).

As a surprising development, people showed a huge interest in Northern Ireland, where an

adequate legislation for electric bikes was in place since 1983. Sligo participants have assumed the following reasons for this renewed interest:

- Until today batteries allowed only for power assistance for very short distances,
- Bikes were too heavy with lead-batteries,
- The difficult topographies typical of the North and West of Ireland were not taken into account by the specifications of the manufacturers,

By June the first leasing arrangements with local agencies and commercial outlets were in place. It was at this stage that an official of Garda Siochana Sligo visited the Bike Station stating that all bikes used for the project would be subject to road tax and insurance. Business partners in Dublin were informed by the Revenue Commissioner that an import tax of 10% would apply to Electro - bikes.

The uncertainty in legal matters forced Mr. Flanagan to reduce his services with EPAC bikes to the minimum until a proper legal situation was established. The questions of public liability and insurance claims in case of accidents have to be addressed in a completely different way if the EPAC bikes are subject to the same conditions as high-speed moped or scooters. The situation appeared additionally complicated because Irish Insurers do not offer an insurance tariff for commercial operators renting out mopeds or scooters.

With the full support of Sligo Corporation a presentation of the EPAC concept and a practical demonstration was made to the Garda Siochana Sligo in August. It is thanks to the positive understanding and careful attention to the situation by the Garda Siochana, especially Supt. John Fitzgerald, that the view of the project promoters was endorsed; cycling with EPAC bikes was recognised to retain all characteristics of cycling. However, Supt. Fitzgerald pointed out that his view would have to be confirmed by the Department for the Environment.

Although this supportive attitude allowed for the orderly finalisation of the project in October 2000, the most prestigious feature, the “low energy” tourist routes to charging destinations around Sligo, had to be cancelled for the current “tourist” season due to the legal uncertainties.

5.3 Experiences of Operators and Participants

5.3.1 The commercial operator, Mr. Seamus Flanagan

Mr. Flanagan has reported that the manufacturers provided rolling stock and equipment in high quality. The cases of the charging equipment and the type of controls, especially, were robust enough for a daily use over a long period. The brakes chosen by the manufacturers were adjusted to fully satisfy the total weight of the bike, approx. 28 kg. The connectors between the bike battery and charging unit were well designed and allowed for regular charging at outside weather conditions.

The operator found that the time spend on instructing people using the EPAC bike has been very short because the character of cycling is retained with EPAC bikes. More attention had to be given to the capacity of the batteries and coverage of electrically assisted cycling. The claims of the manufacturers - electrical power for 30 to 40 km - were never met. The steep and frequent hills of Sligo's landscape, reduced this coverage by up to 50 %.

The achieved publicity for the project in Ireland was very helpful for the sale of five EPAC bikes from his shop while the project was in operation (two to Northern Ireland, three in the North West). Mr. Flanagan stated that he could see a huge market for this new way of mobility if the battery capacities were increased. The retail price needed to be established at under £ 900 for city bikes and under £ 1000 for long range bikes for use in rural areas.

His main concern was for the need for new Irish legislation, which would provide for the exemption of taxes and insurance on electrically assisted bikes as they are retaining the low speed, human centred characteristics of cycling. A satisfactory resolution of this concern was essential if private operators were to become service providers for this type of day-by-day mobility and tourist service.

Mr. Flanagan's earnings from the EPAC bike services in the year 2000 have been significantly below the anticipated level. But Mr. Flanagan intends to continue his "Bike Station" services and to enlarge on rental services if the legislation for EPAC bikes is put in place.

Additional obstacles described by Mr. Flanagan were related to the increasing car traffic in Sligo

and the ongoing planning and construction of urban streets and main roads without consideration for cyclists. Several customers who used the bike for recreational and sportive reasons were clearly stating that they couldn't encourage other members of their family to cycle on Sligo's main roads because of extremely dangerous road situations.

5.3.2 Operators of Charging Facilities outside Sligo

Individual charging tests took place with the participants in the project. The unresolved legal issue did not allow for further promotions of the service in the year 2000. However, if the necessary legislation is in place, all three operators are fully committed to offer their services again free of charge in next years' tourist season.

5.3.3 Private customers and tourists renting an EPAC bike

Some Sligo residents have rented an EPAC bike on a day- or weekly base to test the feasibility at short urban routes, especially students with daily routes to the Institute of Technology approx. 2 km outside Sligo City Centre. Their savings in time for the journey were highly appreciated. But major obstacles were seen in the dangerous and narrow streets of Sligo, lack of safe cycling facilities, lack of co-operation by car- drivers, and lack of suitable bike parking spaces, especially at times of heavy rainfall.

Tourists renting the EPAC bikes and cycling the recommended tours to the charging facilities gave a mixed picture. The two routes West of the City Centre to Carrowmore and Strandhill were seen as acceptable regarding traffic density, distance to cars, and state of surfaces of the roads. Tourists visiting the visitors centre at Drumcliff reported that recent road enhancement at the main road through Drumcliff were extremely dangerous for cyclists.



Cycling Situation at Yeats Visitor Centre

The road space would be too narrow to be shared between bikes and cars, and the gradients and lowered steps of new kerbstones would be dangerous for cyclists even at low speed. Road crossing would be extremely dangerous because no provisions have been installed for cyclists and pedestrians in an area where cars are passing with speed of up to 50 miles/h. Separate cycling tracks or lanes were stated as an essential for cycling on main rural roads.

5.3.4 Commercial enterprises leasing an EPAC bike

One EPAC bike had been leased to the regional office of the “Irish Energy Centre” situated in the Finisklin Industrial Estate, 2 km from Sligo City Centre.

The bike had been used daily between home, Finisklin Ind. Est. and the city centre mainly for professional use including business meetings. The daily distances of the cyclist have been between seven and twelve km in an urban environment without hills.

Mr. Ivan Sproule, the user of the bike, expressed his satisfaction with the technical features of the bike, especially with the battery capacity and strength of the brakes. Recharging was only needed after four or five days of use. Frequent metering of the charging needs confirmed that on average a charge of 0.33 kWh was required to replenish the battery to the fully charged state. This cost approximately 3 pence.

He found that the EPAC bike was easy to control and behaved like an ordinary bike in daily traffic. The time of the lease agreement had been too short for an installation of a bike garage outside his office. Increased research would be needed to design safe and standardised charging facilities to complement the outside of buildings.

But his main concerns were focussed on general road safety issues where he identified the urgent need to educate car drivers to more co-operation and an understanding of shared road spaces. A general nation-wide safety campaign addressing the specific needs of cyclists was very urgently required.

Mr. Sproule considered that he and his agency would recommend EPAC bikes as a readily available and technically feasible solution for many mobility situations. He said that the costs for the leasing over a period of three months were fully justified and the benefits in time and reduction of car use were significant.

Two more EPAC bikes (“Heinzmann” and “Yamaha City Bike” model) were leased by the Sligo buildings consultants HBC. Different cyclists examined the bike’s suitability for various daily distances and different topographic situations. It was found that the capacity of the batteries of both bike models was strongly reduced if cycling took place mainly on the hilly situations around Sligo. However, the Heinzmann bike offered significantly more time of electrically assisted drive than the “Yamaha City Bike” which is clearly designed for flat urban areas.

In general it was found in Sligo that industrial employers should be approached only if a suitable legislation is in place.

Both models were also tested in Dublin by HBC and “Klee Paper”, an enterprise at North Circular Road, which runs daily delivery tours into the city centre of Dublin. Trials were taken for the transport of office materials with a bike carrier. It was found that the weight of the entire system (cyclist, bike and loaded trailer) could exceed the maximal weight specified by the manufacturer of the EPAC bike (130kg). The vibrations found during cycling were considered as unacceptable.



Dublin Trial of Urban Delivery Service

Due to the ideal topography of Dublin both EPAC bike models were found suitable for a return trip between North and South Circular Road with one battery charge.

The reporter of this project, who is a partner in HBC, used the EPAC bike from North Circular Road to visit clients and shops in the city centre. Findings after spending six hours in the city centre were that seven instead of five visits/stops had been achieved, that nine pounds of parking fees and two litres of petrol were saved, and the feeling of physical relaxation at the end of the tour. Cycling with the EPAC bike at the strategic bus corridors had been a pleasure because it was easy to keep up with buses: the average speed of buses and bikes were nearly identical. There was a lack of safe and lockable storage facilities for bikes in the city centre except at the "Squarewheel Cycleworks", Temple Bar.

(C) Partnerships and Dissemination

Additional publicity has been achieved with the co-operation of Northern Ireland Electricity plc, who have used the Sligo project as an excellent opportunity to promote their "Green Tariff", i.e. electricity supplies from hydro and wind sources. Consumers choosing the "Green Tariff" are offered EPAC bikes with significantly lowered purchase cost (see appendix C). This promotion has been spread all over Northern Ireland and has achieved an excellent publicity for the Sligo project.

The reporter of the Sligo project has been contacted by some Secondary Schools in Northern Ireland. Teachers have asked for more detailed information to report on the Sligo

project as a sample of advanced environmental transport solutions.

The Sligo project assisted the Energy Centres of Co. Galway and Mayo in the preparation of the "Car Free Day 2000".

6 Conclusions of the Reporter

6.1 Transport Mode

The project has demonstrated that cycling with electrically assisted bikes can make a significant contribution to the mobility needs of citizen in urban and rural areas. The low cost, low energy, immediate availability and time saving elements, its suitability of integration with other means of transport can be seen as one key element of a sustainable transport system. The option of elimination of fossil fuel for transport purposes - recharging from renewable sources - can be understood as a sample of excellence in environmental education and practise.

Customers and participants in the project have confirmed that they were determined to use the EPAC bike in daily life and that the handling is acceptable to the non-technical person.

Using the EPAC bike for short urban distances, feeder routes to bus stops or on tourist routes will reduce the import of fossil burn materials into the region. The guidelines of the Department for the Environment on Cycling Infrastructure (11) are a strong tool for the increase of cycling to over 20% of the urban/suburban modal split. With a suitable legislation in place and a dedicated cycling infrastructure a share of EPAC bikes of 5% in Sligo's model split can be envisaged.

6.2 Energy Savings

The year 2000 figure of cars entering the Borough of Sligo City at peak time can be estimated with 2000 - 2500 cars/h. The daily figure of cars which are travelling a return trip of 6 km in congested traffic can be estimated at 6000 and more.

The fuel consumption for this fleet of cars in congested traffic is approx. 6000 litres daily and 1800000 litres annually, at costs of £1200.000.00 annually.

A share of 5% of EPAC bikes for these urban routes would save the import of 90000 litres into the region with savings of £ 60000.00 annually. These savings would be fully utilised if the electricity for the charging of EPAC bikes – estimated at 27000 kWh/h annually – would be provided by a supply from regional renewable sources. (Total mileage of car fleet in congested traffic annually: 10800000 km, of which 5% would be served by EPAC bikes. 1 kWh is covering approx. 20 km EPAC cycling).

These benefits would be drastically further increased if Sligo residents and employees would use EPAC bikes for short urban distances of up to 5 km where they achieve their largest benefits in time savings and comfort.

Energy savings through the increased utilisation of EPAC bikes in the tourist sector would be less significant but it would create excellent opportunities in the promotion of Sligo's outstanding natural and cultural features in a holistic approach.

6.3 Technical Feasibility

The technical features of today's EPAC bikes allow for a daily use without specialised maintenance. Limitations in the storage of energy are still the low capacity of batteries (Nickel-Cadmium) and their reduction of capacity during use ("Memory-Effect"). Manufacturers are currently preparing for the introduction of a new generation of batteries (Nickel-Hybrid) which will eliminate these obstacles.

The professional discussion on electrical bikes is addressing the obstacle of low energy efficiency, i.e. the transmission losses of up to 90% between the energy input at electricity generation and power supply at the bike. It is the shared experience of all participants in the project that the benefits in energy savings against the car, the immediate availability and flexibility of use and the space saving characteristics in an urban environment are more important than this obstacle.

6.4 Legislation

The proposals to exclude EPAC bikes from type approval have been instigated by the Technical Commission of the European Commission and presented to the Council and European

Parliament. It is especially important that this proposal is suggesting that the allowed engine power of 250 Watt max. refers to "continuous output", and not to the "rated output", as the current directive is referring to. If the modification is made then it will allow increasing the strength of the drive motor (approx. 20%) and from the experience of the Sligo project this change is highly welcomed to satisfy the needs of users in the many hilly environments of Ireland.

The key elements of European guidelines are clearly defined. The exemption of taxes and insurance on EPAC bikes in Ireland can take place without waiting for further amendments of the EU directive related to EPAC standards.

The Sligo project has also demonstrated that efforts must be made in the technical standardisation of charging facilities. Batteries and charging units of the different brands are not compatible. It is proposed that the Technical Committee CEN 333 be contacted to discuss solutions for the standardisation of the recharge of EPAC bikes. Currently the committee is focussing on safety issues. Delegates from Ireland are not participating in the Technical Committee CEN 333.

6.5 Infrastructure

Cycling with an EPAC bike retains all characteristics of non- - motorised cycling except the external needs for suitable charging facilities. All participants reported that a safe street environment is the key for more use of bikes and EPAC bikes to achieve a higher share of human focussed, non-polluting transport solutions.

The implementation of the National Irish Manual "Provision of Cycle Facilities" into County planning is strongly recommended by all participants. It is further recommended that the standards and solutions provided by this manual are implemented in the smaller towns and villages, and that the National Roads Authority incorporate this National Manual into their guidelines on National Road Design.

It was strongly stressed by clients and customers of the Project operator, Mr. Flanagan, that it appeared that Sligo ignored the guidelines of the Department for the Environment on the needs of cyclists when planning and constructing roads.

7 Proposed Developments

7.1 Bike Stations and Cycling Infrastructure

The requirements in design and technology to make low energy transport solutions an option for smaller towns and rural areas must be examined. Further investigation is required to maximise the use of a Bike Station as a part of an integrated and sustainable transport solution for Ireland's growth centres and rural areas. Safe and attractive cycling facilities are essential to convince people that the alternative public transport chain is superior to car based solutions.

7.2 Further Research

7.2.1 Renewable Energy Supplies

The use of electricity from renewable sources for transport solutions has been demonstrated as feasible. Providers of "Green Electricity" in the Republic must be encouraged to offer attractive conditions in these low energy solutions. The utilisation of smaller, "off-network" wind turbines for decentralised charging facilities should be examined.

7.2.2 Services, Projects

It is proposed that the needs of user groups including commuters, shoppers, tourists, disabled people, as well as commercial users like couriers and postal services be further examined.

Green Travel Plans for companies and employers should include the EPAC bike as a crucial element.

Local authorities, regional development agencies and the Irish Energy Centre are called to develop integrated, low energy transport solutions with a strongly increased share of cycling. Projects developing the Bike Station concept further and promoting increased mobility through EPAC bikes are key elements in this model.

The Sligo growth centre with its low density in population and its daily long distances of travelling requires a sustainable transport solution.

It is proposed that Sligo's local and regional transport hub at the Railway and Bus Station will be planned with cycling infrastructure including bike stands and that the feasibility of employment at a Sligo Bike Station will be examined.



Sligo Trial of EPAC Bike with Rain Cover

References:

- (1) Ireland: “The National Development Plan 2000 – 2006”, page 147 ff; The Stationary Office of the Irish Government, Dublin 2000
- (2) Sligo Corporation: “Sligo Traffic and Transportation Study”; Sligo 8/1995
- (3) W. Bodewigs: “City Development and Mobility – Proposals for Sligo City” Sligo Town Centre Partnership 1999
- (4) A. Sully/W.S. Atkins: “100 Bicycle Station in North Rhine-Westphalia”, in: Velo Borealis, UK 1998
- (5) as (4)
- (6) H. Neupert: “More Power to You”, in: Encyclopedia 2001, UK 2000, ISBN 1898457069
- (7) UK: “The Electrically Assisted Pedal Cycles Regulations” (Road Traffic Regulation 1983 No. 1168)
- (8) (CEN - TC No. 333; Sub-Committee 5 on EPAC - bikes)
- (9) as (6)
- (10) Lohmeyer / Thomeczek: “Radstation”, ADFC Entwicklungsagentur, Düsseldorf/Germany 1997
- (11) “Provision of Cycle Facilities”, National Manual for Urban Areas, Department for the Environment 1998, ISBN 0-7076-4975-7

Appendixes:

- A. Project Leaflet
- B. The Sligo press on the Official Opening
- C. Leaflet of Northern Ireland Electricity plc

Sligo Champion 10 May 2000



Wilhelm Bodewigs, Sligo Town Centre Partnership, Seamus Flanagan and Jim O'Malley, ENTRAC Consultants, preparing for the official opening taking place today of the first Irish Bike Station including a recharging garage for electrical bikes.

E-bike has one up on Sligo hills

THIS morning, Sligo hosted the launch of the first Irish e-bike project. The Mayor, Rosaleen O'Grady, and Mr. David Taylor, Director of the Irish Energy Centre, introduced a complementary mode of transport which combines well with the public transport system and offers an attractive and efficient alternative to conventional cycling.

The new electrically assisted bicycle or e-bike allows users to exercise (and save time and fossil fuel) on their daily way to work or to explore the town and the surrounding hills of Sligo with only 50% of pedal power compared to regular push-bikes.

The secret of this novel style of cycling is a small sensor-activated electric motor supplying half the 'horse power' in response to the pedalling action.

Combined power

Sligo hills and headwinds will no longer pose a problem to cyclists. Combining motor power and pedal power, Sligo residents and visitors alike have the best of both worlds: a pleasant and healthy way of moving about and a potential solution to the emerging traffic problem.

The e-bike project is a cross-border partnership effort in conjunction with Fermanagh District Council and Northern Ireland Electricity. It is part-funded

by the Department of Public Enterprise under the EU Interreg Programme. Participating in the planning group are ENTRAC Consultants, Sligo, Parry Consultants, West Midlands, and the ADFC, the General German Cycling Federation.

Public representatives and Sligo enterprises have taken a keen interest and a first leasing arrangement has already been negotiated.

It is planned to incorporate in a leasing agreement the use of garage facilities for safe parking as well as for service and maintenance. Mr. Seamus Flanagan of Flanagan's Cycles is the operator of a small fleet of e-bicycles who has generously and enthusiastically supported the project from its inception.

Sligo residents wishing to combine e-cycling with the use of buses or trains will be able to safely lock away their e-bikes during the day knowing that expert help is at hand if needed.

Flanagan's e-bike facilities represent the first phase in a development towards professional e-bike services at the Sligo Railway and Bus station. Signs and logos advertising this service are currently being printed.

Said a spokesperson: "Providing speedy access to the bus and rail network, the e-bike project has been identified as an essential link in the public transport system and as an integrated element

of a comprehensive social and environmental policy concept."

"This is of particular interest also to the tourism industry where quality environmental projects have been identified as the way forward in tourist transport. Since the battery operated motor of the e-bike needs recharging, charging points will be set up this summer at various locations around the town at Carrowmore Tombs/Riding Stables, at the Strand Cafe in Strandhill and at the Drumcliff Visitors Centre. Recharging your batteries in the literal sense does not cost the earth. Due to the 'energising' generosity of the enterprises involved the price for recharging at these service points will be absorbed. A new generation of batteries coming on the market this year will facilitate reaching more pedal-ambitious destinations later this year", the spokesperson explained.

Cost

Further down the road, the use of renewable energy sources as a viable alternative to fossil fuels will be explored and it is planned that green energy sources made available nation-wide following the example of Northern Ireland Electricity. And at an energy input of 8 pence per 15 miles the e-bike is a small offender in terms of environmental strain.

"The Sligo e-bike project is

timely indeed and fits in with the Irish government's commitment to sustainable regional development. Both urban and rural traffic situations require strategic solutions in view of the challenges of global warming and daily commuters. An integrated public transport system catering for both short and long haul traffic would form part of a comprehensive strategy of reducing the use of petrol and other fossil fuels", said the spokesperson.

The Sligo e-bike project coordinator, Mr. Wilhelm Bodewigs, says it is vital to record developments and results of the project during its initial phase.

"While the Sligo community has a vested interest in following the advance of the e-bike, political representatives on a national level will also require facts and figures in their effort to implement adequate legislation supporting the e-bike movement.

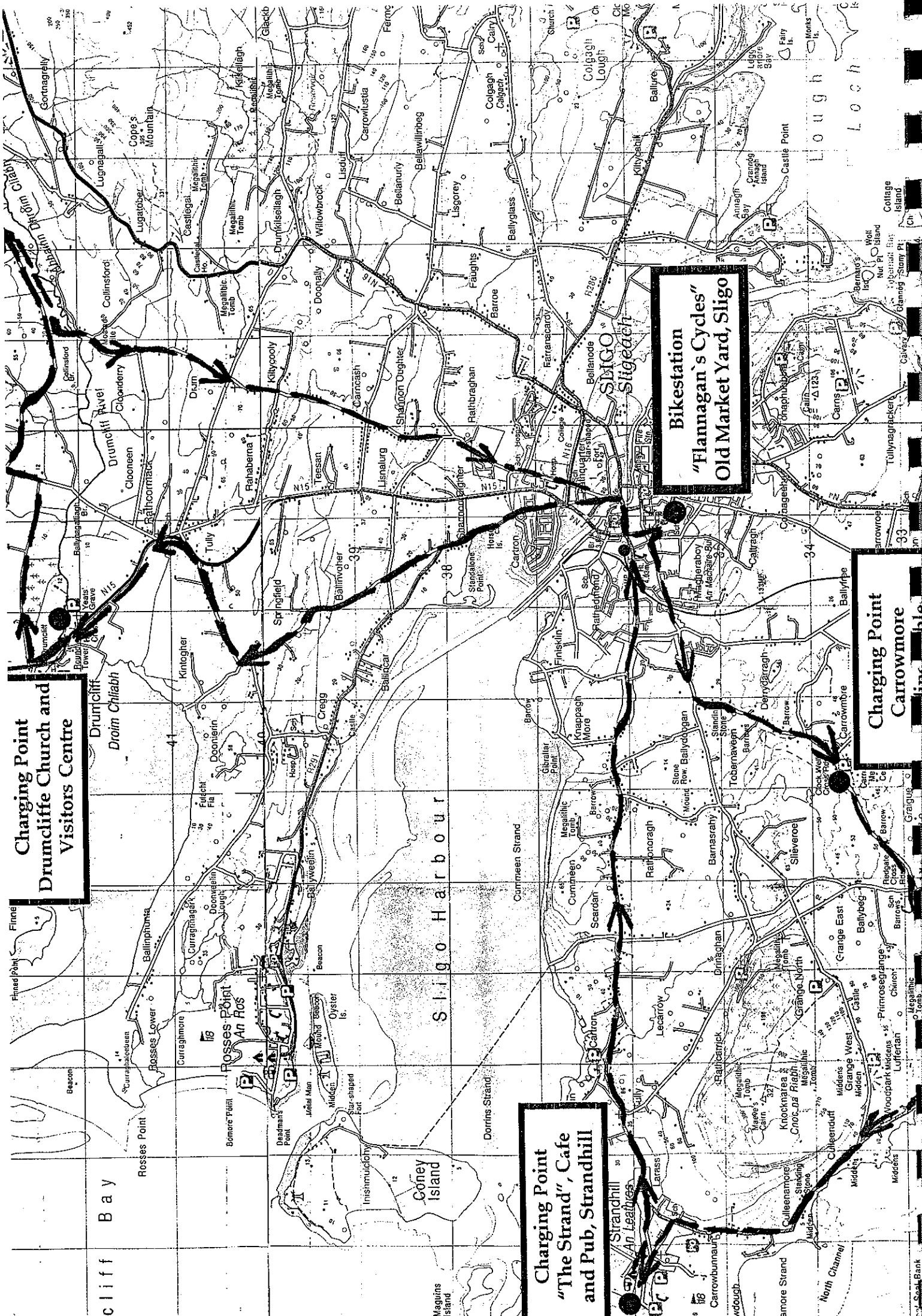
"Most EU member states including the UK have legislation in place supporting the exemption of e-bikes from tax and insurance. Implementing similar legislation in Ireland would be an essential precondition for this environmentally friendly mode of transport to gain ground", says Mr. Bodewigs who is a member of the German Institute of Town Planning.

**Charging Point
Drumcliffe Church and
Visitors Centre**

**Charging Point
"The Strand", Cafe
and Pub, Strandhill**

**Bikestation
"Flannagan's Cycles"
Old Market Yard, Sligo**

**Charging Point
Carrowmore**



The Sligo Electrobike Station: Launch of an innovative local transport service

Now electrically power assisted bikes are available for rent and purchase to Sligo citizen and tourists at "Flanagan's Cycles", Old Market Yard, Sligo (3 min. walk from O'Connell Street).



FLANAGAN'S CYCLES

MARKET YARD • SLIGO • TELEPHONE: 071-44477



What are e-bikes?

The idea is to retain the healthy and sportive characteristics of cycling but to make cycling much easier. This is made possible now by a small electric engine which is activated when you move the pedals. The harder you pedal, the higher the output developed. So its now possible to cope with uphill climbs, headwinds or carrying luggage without sweating or getting aching muscles. The reason is that up to 20 km/h, the motor does half the work for you. Driving faster, you depend on muscle power only.

E-bike has one up on Sligo hills

Sligo hills and headwinds will no longer pose a problem to cyclists. Combining motor power and pedal power Sligo residents and visitors alike have the best of both worlds: a pleasant and healthy way of moving about and a potential solution to the emerging traffic problem of this small urban centre.

Which services are offered at the Bikestation in Sligo?

"Flanagan's Cycles" offers short and long term rent and lease of e-bikes to local citizen, operators, employers but also to the tourist who wish to discover the outstanding beauty of Sligo and its environs in a gentle and easy way.

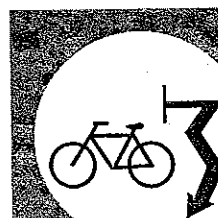
Sligo residents wishing to combine e-cycling with the use of buses or trains or walking to their place of work will be able to safely lock away their e-bikes during the day for recharging and will also know that expert help is at hand if needed.

What if the battery is low during my trip?

Basically, you still have a high quality bike under your feet with seven gears which allows you to finish comfortably the journey. However, **three charging points** have already been established at various locations around the town: at Carrowmore Tombs /Riding Stables, at the Strand Cafe in Strandhill and at the Drumcliff Visitors Centre.

Free Charge

Recharging your batteries does not cost the earth. The enterprises involved have decided to provide the recharge for free. **Recharging of battery will need 2 1/2 hours max. Recharging Points can easily be identified with the sign shown to the right:** These points are shown in the map overleaf.



Prices for Rent Services are:

One Day	£ 15.00
Weekend (incl. charger)	£ 30.00
Full Week (incl. charger)	£ 50.00

Commercial prices for Leasing of Bike & Garage on request.

Enjoy the Ride !



Northern
Ireland
Electricity



Electric Bike



Flowline's Donna Irwin

In line with Northern Ireland Electricity's environmental objective to minimise the impact of our fleet on the environment, we are carrying out a trial on an electric bicycle.

Riding an electric bike can improve your health, impact on the environment, and reduce transport costs. These benefits extend beyond the personal to the global. The reason most people use an electric bike is for the enjoyment it brings. The bicycle offers an alternative mode of transport for anyone who lives within a seven mile radius of their place of employment or for short journeys.

Electric bikes are everyday bicycles with an added battery-powered electric motor. The motor propels you whenever you want. Electric bikes make cycling quick, safe, and lots of fun!

They offer a great mid-point option between walking and driving.

For some, it will get us to work faster than driving - and with less stress, missing out on all the traffic congestion! Electric bikes provide the advantages of an extra car without the demanding costs. In addition, electric bikes combine well with bus and train for point-to-point transportation.

With the introduction of city bike lanes, NIE's Environmental Services Group have linked up, as part of a cross border initiative to promote two wheeled electric transport, with Wilhelm Bodewigs from Sligo Town Centre Partnership. Environmental Services initially intend to trial the bike, which can be powered by renewable energy. Staff will identify its benefits and potential for resolving inner city congestion.

