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Preliminary draft report on keeping the system of European time zones

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I. – Introduction

For ages, human beings have organised their activities and lives around the annual, seasonal and daily rhythms of nature, which are governed by solar cycles. The changing seasons over the year and the alternation of day and night are objective and self-evident facts which human beings took some time to understand, but which they have never pretended to ignore nor, still less, thought able to alter.

No one has yet considered of shifting the seasons, as the absurdity of such an undertaking is too obvious. However, experimenting with time seems to be less impossible, and the twentieth century has offered some examples in this area, the most recent being the system of "summer time" which we now have in Europe.

This system, which involves putting the clocks one or two hours forward during the "summer" period, is popular in some countries and unpopular in others. As, however, is always the case when we attempt to manipulate the laws of nature, it has an impact on certain natural mechanisms that ultimately determine the state of the environment and human wellbeing.

- **General background**

Nature's daily rhythm is based almost without exception on the solar cycle – the natural world awakes after sunrise, is active during daylight, quietens down again after sunset and sleeps during

darkness. Quite naturally, the functioning of the human body and the rhythm of our activities are also more or less precisely determined by the sun as the primary source of time.

In addition, it is the solar cycle that is used to set the clocks that determine artificial time, midday being the time when the sun is at its highest point above the horizon.

Obviously, solar midday does not occur at the same time in places at different longitudes. However, human society cannot function smoothly unless the same time is observed throughout a given territory, which is why "standard time" was introduced.

- **Washington Treaty**

In addition, in order to harmonise the standard times observed in the various regions of the world, a system of "universal time co-ordinates (UTC)" was adopted at the Washington Congress in 1887. The globe was divided into 24 time zones of 15° longitude corresponding to the 24 hours of the day, the starting point being set at the 0° meridian (Greenwich Mean Time or GMT). Depending on their situation and size, all countries therefore found themselves in one or other or several of these time zones.

Although some adjustments have been made, this system of subdivision still applies in continental-sized countries such as the United States, Canada, Russia and Australia, and to some extent also in Europe.

- **Historical development of standard time in Europe**

During the first world war, several countries decided to take greater advantage of daylight, and thus save on the cost of lighting, by moving their clocks forward an hour in summer and returning to their local meridian time in winter. This arrangement continued in some countries until the outbreak of the second world war, during which the occupied countries had Berlin time imposed on them and thus ended up two hours ahead of their natural time in summer.

After the second world war, certain west European countries (in the GMT zone) gave up the six-monthly changing of the clocks but adopted Central European Time (GMT + 1) as their standard time.

Following the oil crisis of the Seventies, the idea of using summer time to save energy was reintroduced in France[1] and gradually spread to all European countries.

To avoid confusion surrounding the changing of the clocks to summer time and back to winter time, the member states of the EEC in 1980 asked the European Commission to harmonise the dates of the time changes throughout the Community[2]. Other European countries have adopted the same dates as the Community.

- **Double summer time**

The combination of adopting Central European Time while also observing summer time means that five European countries[3] are out of step with solar time the whole year round and are over two hours ahead of it in summer (in the westernmost regions). This situation, which is known as double

[1]The United Kingdom and Ireland applied summer time from 1916, and Italy did so from 1966.

[2]The 8th "Summer Time" directive currently in force covers the period from 1998 to 2001.

[3]Belgium, France, Luxembourg, the Netherlands and Spain.

summer time, produces a number of phenomena that are directly or indirectly harmful to the environment and public health and have implications in other areas, and is unpopular with a fairly large section of the population.

- **Context of the report**

It can be assumed that these negative effects also apply, albeit to a lesser extent, in those countries where the simple summer time is adopted. However, as not enough data is available on the matter and the populations of the countries concerned seem to be satisfied with the existing system of summer time, I do not intend proposing that it should be abolished.

The report will thus analyse the factors that have negative effects on the environment and human wellbeing and which result from the application of summer time by the five countries whose standard time is not that of their geographical time zone.

- **Sources**

The various consequences of the application of summer time have been considered in numerous scientific studies[4], reports and publications, which this report draws on in substantial measure.

I am particularly grateful to the representatives of the various associations[5] and to the experts[6] who supplied me with the findings of their research and took part in the hearings held in connection with the preparation of this report.

I have also consulted the report submitted by the European Commission to the European Parliament and the Council of the European Union with a view to the adoption of the 8th "Summer Time" directive. The report sets out to highlight the benefits of the summer time system, using econometric calculations to demonstrate them, and tends to minimise the disadvantages.

II. – Consequences of double summer time

The combination of non-solar standard time (+ 1 hour) and summer time (+ 1 hour) means that all daytime and night-time activities are two hours ahead of natural time. This results in colder and darker mornings and longer and warmer evenings. At solar midday, the standard time is 2 pm.

- **Air pollution**

Double summer time increases the concentrations of toxic pollutants in the atmosphere.

The pollutants present in the atmosphere can be divided into two categories: primary pollutants emitted by sources of pollution (sulphur dioxide, nitrogen oxides, volatile organic compounds, etc)

[4]As regards pollution, these include studies by Dr W Hecq (Free University of Brussels), Prof. H Poppe (Catholic University of Leuven) and Dr JC Déchaux (Lille Science and Technology University), as well as research done in the United States by M Cohen. The functioning of our biological clocks and the effects of summer time on health have been studied by V Mahé and JF Chevalier, G Lac, G Clevidy and A Robert, and Prof. B Sandler.

[5]Ms E Gabarain of the French association against double summer time, Ms A Hoff, Mr E Baele, Mr W Deboeverie and Mr G Luyckx of the Belgian association against summer time, and Mr J Denis and Mr L Lebergé of the Association for the return to meridian time.

[6]Prof. Besançon, Mr Charbit, Mr Christiansen, Mr Gonnot, Mr Meyer and Prof. Sandler.

and secondary pollutants formed as a result of the physical and chemical transformation of primary pollutants (sulphuric and nitric acid and their derivatives, photochemical oxidants).

Photochemical pollution is a factor that is raising new air pollution concerns. This type of pollution is mainly the result of the action of solar radiation (UV) and high temperatures on nitrogen oxides and hydrocarbons, pollutants which are emitted by human activities (as the combustion products of fossil fuels, in particular those used by motor vehicles) and certain natural sources.

It leads to the formation of "photochemical oxidants". These pollutants include ozone (O_3), peroxyacetyl nitrate (PAN), free radicals, formaldehyde (HCHO), nitric acid (HNO_3), aerosols, etc.

Moving the clocks forward two hours in summer contributes to a build-up of primary pollutants in the atmosphere and causes the period of heaviest traffic in urban areas (2–5 pm) to coincide with that of the highest temperatures and strongest sunshine. This boosts the formation of photochemical oxidants. Various studies conducted in France, Belgium and the United States have shown average increases of between 6% and 10% in ozone concentrations and of between 7% and 16% in PAN concentrations.

It should be stressed that these pollutants, in particular ozone and PAN, are known to the medical world for their toxic effects. The main health problems they cause are migraine, respiratory difficulties and irritation of the eyes. The number of deaths related to ozone has been rising for some years.

At the same time, a new phenomenon of die-back in forest ecosystems has been observed in Europe and the United States over the last fifteen years or so. It has been suggested that this is also the result of ozone, which increases cell permeability and thus causes trees to lose nutritive elements through their leaves more easily.

It should also be noted that a further effect of higher concentrations of chemically aggressive pollutants (ozone, acids, etc) is the rapid degradation of works of art and historic monuments that are part of humankind's cultural heritage.

- **Public health and wellbeing**

The difference of two hours (and more in some regions of western France and Spain) between people's circadian rhythms and the solar cycle causes sleeping difficulties which, in turn, have an impact on general wellbeing, physical equilibrium and intellectual performance.

While the existence of a biological clock in mammals was regarded as self-evident, human beings felt until recently that they had freed themselves from nature's rhythms.

Recent research in chronobiology has, however, shown that the human body also has a biological clock that organises the time aspects of our lives. The time and date when most vegetative and hormonal functions occur are not therefore a matter of chance, but are precisely regulated.

Our biological clocks are automatically reset by outside synchronisers – primarily the sun – through a complex mechanism in which a key role is played by the pineal gland or epiphysis, which is sensitive to light. In the absence of daylight, it secretes a hormone, melatonin, which is needed for sleep. Secretion stops when daylight returns.

The discrepancy between the time people live by and solar time upsets their biological clocks. The effect is most pronounced among children and elderly people, but can also be seen in adults. In the countries with double summer time, people's organisms are obliged to operate one hour ahead of

The summer time system has a negative effect on the working conditions, rest, leisure activities and family lives of farm workers (nature, which sets the rhythm, does not change its clocks, but the families have to live by standard time) and of people who have to start work early in the morning or finish late in the evening.

Moreover, people who work in the open air (building sector, etc) start work again after lunch at the very time when the sun is shining most strongly and the temperature is highest.

- **Leisure activities**

This sector is often said to benefit most from summer time, as the longer evenings mean that people can engage in outdoor activities (sport, walks, visiting cafés, etc) after work during the week. However, this needs to be put into perspective, as the summer time system works against playing sport in the morning and early afternoon, and also against night-time entertainment events. Moreover, extended activities in the evening add to the general levels of fatigue, as they sometimes replace sleep.

It should also be noted that not all the various socio-occupational categories are able to profit from the longer evenings to the same extent. It is mainly urban dwellers working in the tertiary sector who benefit most, while workers in tiring jobs have neither the energy nor the inclination to engage in sport in the evening and also have difficulty in getting to sleep.

Although its consequences vary according to several factors (latitude and longitude, time of year, climatic conditions, local traditions, etc), it can be concluded that the overall impact of double summer time is negative both for human beings and for nature.

- **Public opinion**

This conclusion is borne out by public opinion in the countries that are two hours ahead of solar time in summer. Opinion surveys have shown that 64% of the French public and 50% of the Belgian public are opposed to the current system. It is in these countries that associations against summer time are very active.

The more reserved position of the Spanish people is due to the fact that working hours have been adjusted to reduce the negative effects of summer time.

Public opinion in the countries where summer time is only one hour ahead of solar time is somewhat less clear-cut and varies from country to country. People in the Nordic countries greatly appreciate the long summer evenings, which make up for the lack of daylight in winter. In contrast, the Swiss are against the system and have rejected it in a referendum.

- **Decision-making procedure**

In most countries, the summer time system was introduced by government regulation. Except in a few cases, the population was not consulted in advance, and indeed does not have any opportunity of democratically expressing its opinion on this system whose pointlessness has become obvious. This undermines the legitimacy of the system, which people see as a technocratic intrusion into private life and an attack on the fundamental parameters of our existence.

- **Competence for decision-making**

Through carelessness or because of restricted powers, decision-making on the application of summer time thus escapes the democratic control of parliaments. At the same time, the

governments of the member states of the European Union refer to EU directives, which they say they are only applying strictly. Some confusion therefore exists as to the respective powers of the legislative, executive and European authorities in the area of standard time.

There can, however, be no doubt that the power to decide on the matter lies with individual states, and the European Union's only role is to harmonise the dates summer time begins and ends, given that all states have decided to apply it.

Moreover, it is the EU transport ministers who are responsible for discussing the "Summer Time" directives and deciding to renew them. Without wishing to deny the importance of these decisions to the transport and communications sector, one might ask whether - given the environmental and health problems caused by the summer time system – that really is the most appropriate forum.

III. – Conclusions and proposal

When all the effects of summer time are taken into account, I believe that the best solution would be for all European countries to stop manipulating time zones and revert to the strict application of the Universal Time system both in summer and in winter. This would bring standard time into line with our biological clocks and help reduce pollution.

In taking this step, the countries which so wish could adapt working hours in order to derive maximum benefit from daylight.

Nevertheless, I realise that not all countries are prepared to take a step of this kind, which cannot be imposed by any outside body and must be the result of careful democratic decision-making.

Moreover, the unilateral abandonment of summer time by any one country would damage its trade with its neighbours and would detract from harmonisation and European unity.

Yet it would be unfair if the price of harmonisation was to force some nations to live under less favourable conditions than others.

I therefore believe that the realistic solution would be for all states to keep to their own geographical time zone in winter and to continue to move the clocks forward one hour in summer.

Although this would not completely eliminate the negative effects of the summer time system, it would have the advantage of alleviating their seriousness and bringing human beings closer into line with nature.

In practice, it would mean that the countries that currently have double summer time, those which so wished could revert to the GMT zone.

The original division of Europe into time zones would thus be restored – for the benefit both of humankind and of nature.

I should like to point out that states of continental proportions - the USA, Canada, Russia and Australia among others - respect the time zone system without this disturbing either the operation of their economies and their institutions or people's day-to-day lives and relations with the rest of the world.