

Touch&Heat NFC Enabled Appliances for Energy Sustainability

NFC and user interfaces that are delivered as mobile apps improve energy efficiency by simply making advanced programmable features more accessible and easier to use.

Context

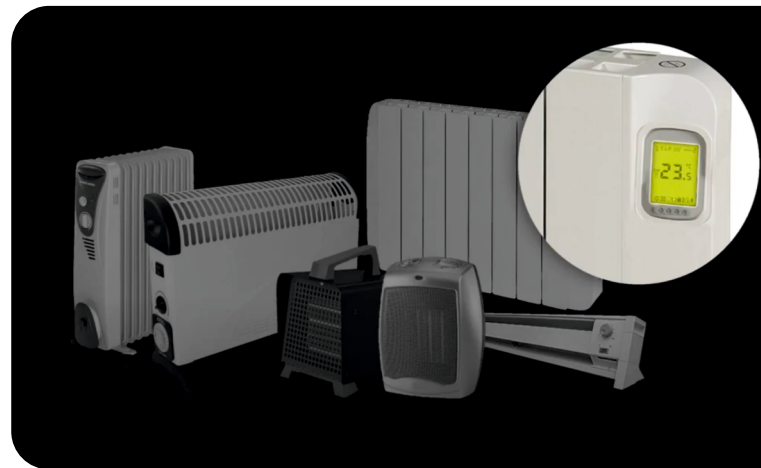
The first use of NFC in electric radiators resulted, in part, from European regulations aimed at reducing energy consumption. Electric space heaters are common across Europe, and used as principal heating, or as complements to central heating. EU regulations aimed at these products are encouraging the use of features like programmable heating schedules, open-window detection, and detection of human presence.

Among these features, regulations required that electric heating appliances be 'programmable'. The products must at a minimum allow users to program the appliance to automatically heat when needed and go into a lower consumption mode when not needed.

For example, this type of feature provides daily and hourly scheduling so that owners program space heaters, radiators or towel radiators in a bathroom to operate at a "comfort" temperature each morning when the bathroom is most heavily used and then switch to a reduced temperature "economy" mode for the rest of the day.

These regulations will eliminate electric heating products that functioned using a simple intensity dial or other non-programmable controls. According to the ADEME (French Agence de la Transition Ecologique), using a programmable heating product can **reduce energy consumption of these appliances by up to 15%**.¹ So, these regulations are of interest to both consumers looking to save money on their heating bill, and European countries intent on achieving their sustainability objectives for energy consumption.

Note 1: ADEME infographic "Comment mieux se chauffer ? ", https://multimedia.ademe.fr/infographies/infographie_mieux_se_chauffer/



Challenges of Programable Controls

The first solution adopted by appliance designers was to add controls that consisted of a thermostat with scheduling software, an LCD and pushbuttons for viewing, navigating, and setting programmable options.

These interfaces were intended to be used by both installers and owners of the electric heaters. Installers use the controls for initial configuration. Owners use the controls periodically through the life of the product to (re)program the appliance according to their routines.

Installers had two problems with the LCD/push button controls:

- Making settings took too much time on each product they had to install. Depending on the detail of the initial program, an experienced installer could take from 10 to 20 minutes to set up a single product. The same process then had to be repeated for each installed product – even if the program applied was the same for all the products!
- Training the owner to use their product took too much time. Most often a perfunctory demonstration was done and a user documentation was left with the customer.

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For owners, the problems included:

- Making settings required the owner to kneel near the radiator while holding a manual and trying to manipulate the controls.
- Programming required navigation of menus and settings using only 4 push buttons.
- The process was complex enough to require having the user manual in hand.
- The LCD offered poor visibility of the resulting configuration.
- The programming process could take from 10 to 20 minutes per product if everything went well.

All of these points contributed to owners being uncomfortable during the programming process, inefficient at it, and uncertain of the final result.

Manufacturers estimated **fewer than 20% of owners programmed their products** in spite of the advantages that programming offered them to reduce energy consumption and heating costs.

The Manufactures' Dilemma

For manufacturers of electric heaters, there were multiple problems, not the least of which was that the programmable features were simply not used.

Problems for appliance manufacturers included:

- The high costs of developing the hardware,

electronics and software to support the feature.

- The added components and logistics costs for manufacturing the products with an LCD interface.
- The low degree of flexibility in updating or improving the user interface design.
- The inefficiency in the installation of the products.
- Owners not using and even ignoring the existence of the programmable features.

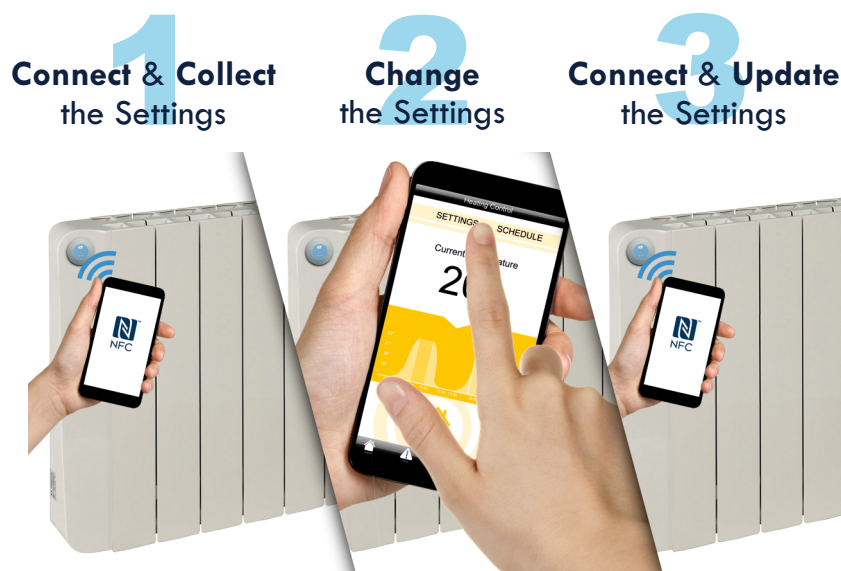
To compound these problems, the EU regulations marked the start of a race between manufacturers to provide even more programmable features and options aimed at optimizing energy consumption.

The NFC / Mobile App Solution

With the advent of new 'no code' solutions that make Near Field Communication (NFC) and mobile apps² more easily accessible to appliance designers, some manufacturers saw an opportunity. Instead of forcing users to adapt to the manufacturers' user interface (UI), they decided to put their appliance UI on their customers' smartphone.

They did this by exploiting the NFC interface that is present on virtually all mobile phones reaching the market today.

To connect a mobile phone to an appliance, the solution uses a simple technique called **NFC 3-Stroke Configuration**.



Note 2: *IoTize TapNLink* NFC modules ease integration by providing a ready-to-employ NFC design based on STMicroelectronics' ST25DV dynamic NFC tag, and a software ecosystem for creating user interfaces as mobile apps automatically and without writing any code.

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This is an intuitive three-step process in which:

1. The user **approaches the mobile to the NFC way-finding mark** on their appliance. With this gesture, a secure bi-directional communication channel is established, the appliance configuration is collected, and the app is launched.



2. The user then **views the configuration and modifies the schedule in the app** on their mobile. This is a device that they are familiar with, and that offers them UI controls that they know and use daily. The smartphone display makes it much easier to read and understand the configuration options. And, when the user is satisfied with their configuration, they can save these changes on their mobile phone.

3. Then, the user **approaches the mobile to the NFC way-finding mark a second time** to transfer the new configuration on their appliance.

NFC & Mobile Apps Improve Access to Appliance Configuration

The advantages of this solution for appliance installers:

- They make settings takes less time.
- Stored configurations are efficiently transferred to multiple appliances that they are installing.
- They can comfortably show and explain the configuration process to the appliance owner.

The advantages for the owner:

- Connecting is simple, intuitive and requires no special codes.
- After the configuration is collected from the appliance, the owner can sit comfortably



anywhere and modify it.

- Owners are familiar with their mobiles and the menus, and graphical controls in apps.
- Tactile screens provided easier control of navigation and settings.
- Large screens on mobiles are easier to read, help owners rapidly understand parameters, and eliminate the need for printed user manuals. ³

The familiarity and comfort of using an app allow owners to make the desired modifications more rapidly. Storing their configuration on their mobile also makes it a reference that they can easily and conveniently refer back to when they want.

Note 3: Traditional user manuals can be provided electronically through the mobile app, as can links to the manufacture's support and after-sales-service.

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The advantages for appliance manufacturers:

- All aspects from the electronic design to the creation of customized user interfaces are done more easily and rapidly with IoTize's pre-implemented NFC modules and their supporting app generator.
- The LCD, pushbuttons and associated electronic components could be entirely removed from the design, replaced by the NFC mobile phone and the supporting app. This eliminated costs related to component purchasing and logistics. It simplifies the overall design and improves design durability.
- The solution improves design flexibility making it possible to deploy updated or new user interfaces as mobile apps and distribute them to users more easily.
- Installers become more efficient in installation and training of customers causing them to favor the new NFC products for large installations.
- Mobile apps on owners' smartphones make owners more aware of the programable features, but also serve as a means of promoting future features.

While initial sales of NFC-enabled heating products only began in France in 2021, and more widely in the European Union in 2022, results of field testing already indicate that NFC and mobile apps significantly improve the use of programable features.

Contacts

For more information about this NFC solution and derived products and appliances, contact any of the **Touch&Heat** companies listed below:

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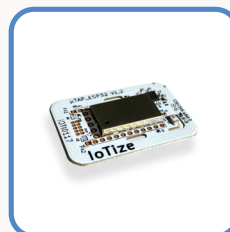


Touch&Heat Companies and Products



Lucht LHZ (www.lucht-lhz.de) manufactures and distributes electric heating systems under its own brand and internationally as an OEM partner. Products include surface storage heaters, night storage heaters, direct heaters, convectors, infrared heaters and bathroom heaters. Lucht supplies hundreds of specialist dealers in more than 30 countries worldwide.

Cotherm (www.cotherm.com) designs and produces thermal controls for equipment manufacturers in a wide range of application sectors including heating, ventilation, food service, industrial equipment, pool & spa, and energy management.



IoTize (www.iotize.com) designs and manufactures a range of wireless modules and devices (NFC, Bluetooth, Wi-Fi, LoRa, LTE-M) for microcontroller-based systems and for retrofit of industrial equipment.

The IoTize 'no code' solution pre-implements the protocols, security and data handling features required in systems that connect to mobiles or the cloud thus reducing the time-to-market and risks associated with migrating products to the IoT.

The project is supported by DigiFed (digifed.org) for European funding that has helped the project partners accelerate the development, testing and deployment of the new NFC heating products.

