TREEDOM STANDARD

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INTRODUCTION

The Treedom standard is a carbon standard created to open the voluntary carbon market to small agricultural and forestry entities, as for example cooperatives of farmers and small scale afforestation/reforestation projects. The goal is to encourage the planting of new trees, recognizing to whoever is planting them the economic value of carbon sink performed by the trees.

The Treedom Standard can be applied in general to all the projects that require the planting of new trees.

Unlike other carbon standards, the measuring unit of Treedom Standard is the single tree, and not the carbon credit in a strict technical sense (1 credit = 1 ton of CO_2). The calculation of CO_2 absorption is indeed executed on each planted tree and not on the number of hectares involved in the project activities. The amount of CO_2 absorbed during the tree's growth is determined for every tree: the storing capacity is indicated in kgs and for this reason it will be easy to compare the numbers of corresponding carbon credits.

Setting the Treedom Standard on the individual tree allowed the creation of an operational path with start-up costs, and more significantly, certification costs that are lower than the costs necessary to generate carbon credits while operating with other carbon standards, thus creating opportunities for small entities to enter the market.

Notably, a certification procedure has been created for the occurred planting of the trees and it can be performed directly by the people who decided to plant the trees.
Although its cost is reduced, it is indeed a self-certification that offers the required transparency to prove the planting and the compensatory action. This procedure, as described in detail in this document, consists in the geolocation and acquisition of photographic images of every individual tree.

Through the acquisition of images and geographic coordinates, all the trees registered with the Treedom Standard are logged in the web platform **www.treedom.net** where they can be viewed thanks to the integration of Google Maps. The users of this platform (private citizens, companies, associations, foundations, institutions, etc.), can request the planting and claim the ownership of one or more trees:

the user who owns a tree will have an amount of CO_2 available (even if it corresponds to a fraction of a credit or to more carbon credits) and according to this methodology, it can absorbed from that same tree, and thus be used to neutralize CO_2 emissions.

This methodology describes the Treedom Standard's features, its requirements and its application procedures. It's mainly addressed to the so called project developers, who need to apply the Treedom Standard to projects carried out by themselves or in collaboration with third parties, but it also constitutes a useful description of the Treedom Standard principles and procedures, that can be viewed by any stakeholder or entity interested in delving deeper in the topics treated here.

1. PRINCIPLES

1.1 Factuality and uniqueness

The project developer must demonstrate the evidence of the occurred planting, and, consequently, of the expected environmental benefits that will be attained during the project itself.

Since the Treedom Standard is not based on land parcels but on individual trees, their planting has to be proved and it must be possible to view each tree. In particular, for each planted tree the following information have to be known:

- plant species,
- geographic coordinates,
- sharp and detailed photo,
- data photo,
- project developer in charge.

It is Treedom Standard's responsibility, to keep track of this information through its system of registers, as well as the information related to each tree, in order to avoid double counting. This information regards:

- individual owner of the tree on the web platform **www.treedom.net**
- amount of CO_2 to be stored, which can be used by the owner to neutralize CO_2 emissions,
- amount of neutralized emissions,
- amount of leftover CO_2 available for further neutralization, resulted from the elimination of previously used CO_2 kgs.

1.2 Additionality

The Treedom Standard can only be applied if the additionality principle is applied as well, as established in the Kyoto Protocol: every project has to increase the amount of CO_2 absorption compared to the absorption resulting without the project activity; in other words, it has to create an increase of carbon sink compared to the baseline scenario[1].

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1 - In exceptional cases, carefully weighed each time, the Treedom Standard can also be applied without the additionality; this is allowed only if:

a) the amount of stored CO_2 from the project is not calculated so that the carbon credits are not emitted,
b) there are solid reasons to believe that this project has a high social impact,
c) all the other principles of the Treedom Standard are respected.

1.3 Permanence

The projects' goal must be to ensure the permanence of the environmental benefits and the storing of CO_2 in particular. With this purpose in mind, the projects must never include tree cutting or deforestation, not even at the end of the project cycle or at the end of the managing and monitoring activities.

1.4 Sustainability

Execution and managing of the projects must be carried out in compliance to sustainability principles and to its environmental, social and economic aspects.

1.4.1 Environmental sustainability

The project areas must not undergo negative alterations to prepare the ground. It is strictly forbidden to remove pre-existing trees in the project site. In order to prepare and manage the ground, it's preferable to proceed manually, but it's also possible to use light mechanical operations (e.g. ploughing, decompaction) which must comply with ground conservation regulations (e.g. following the isolines).

Concerning the selection of plant species, the projects must contemplate the planting of native species or species that are at least naturalized in the focus area. The species must not be invasive, will not constitute a threat to the local flora and fauna and will not create a risk for the water reserves of the focus area.

The selection of the species will be determined by the Treedom Standard and the project developer, complying with the environmental features of the focus area, the purposes of the project and the needs of the local communities.

The Treedom Standard can be also granted to projects concerning tree species typically used for wood production: this is possible only when the project developer can prove that the trees will not be planted to be cut (which is strictly forbidden, in compliance with the permanence principle), but they are needed for a specific reason, for the positive outcome of the project. Examples of these functionalities are: shadowing other species or crops, supporting beekeeping or other productions, reintroduction of a species in the focus area ecosystem after severe deforestation.

1.4.2. Social sustainability

In addition to the mission of involving small groups of farmers and small scale projects, at the heart of the Treedom Standard is the community and its needs. The projects have to be carried out with the purpose of creating environmental benefits and simplifying the empowerment process of local communities.

The projects will never contemplate the exclusion of the local population, but on the contrary they will be actively inclusive during all the tasks of the project cycle and in other possible additional

assignments. The invitation to participate in the project has to be extended to all members of the local population without distinction of gender, ethnic background, social origin, religious faith and political orientation, assigning to everyone a role that matches their strengths.

It is the project developer's responsibility to manage and coordinate the communication with the local community in light of the principle of social sustainability.

1.4.3. Economic sustainability

The projects must create economic advantages for the local community. The first economic advantage is the grant for the planting of trees, requested by the users on the **www.treedom.net** platform.

The planting projects can bring both direct or indirect additional advantages, such as new job positions, economic retribution for environmental services, training activities, creation of parallel activities that offer an economic return, building infrastructures of social relevance in the focus areas.

In compliance with the permanence principle, the economic sustainability will not be created in any case from cutting and selling wood.

It's project developer's job to manage and coordinate the distribution of both direct or indirect economic benefits, between the people actively involved in the project and in general between members of the local community.

2. ELIGIBILITY REQUIREMENTS

The Treedom Standard has to comply to the aforementioned Principles, and fulfill the following requirements.

2.1 Activity

The Treedom Standard can be applied to all the projects involving the planting of trees and shrubs (referred to in short as "trees"), in the following eligible activities:

- afforestation,
- reforestation,
- planting of orchards,
- planting of defensive hedges,
- planting of trees in urban areas.

According to the type of activity, the tree can be planted in rows, geometrical shapes or random patterns, and/or in the presence of coexisting crops.

2.2 Project developers and participants

The application of the Treedom Standard can be carried out by partnerships or farmers cooperatives, NGOs and companies.

The individual who requests to apply the Treedom Standard is named project developer: s/he is in charge of the project management (of its operational, economic and social aspects), of writing the project documentation and of the strict application of the Treedom Standard. Where a single project involves different entities, there will be only one project developer assigned to the project.

The project developer:

- must be already active, by his/her own means or with the help of third parties, in the country where the Treedom Standard is requested,
- must prove the ability to involve the local community in the actual execution of the project,
- must prove that s/he can create social advantage and that s/he can distribute the economic benefits arising from the project, as the sustainability principle states,
- if the project is carried out by different entities, s/he has the role of coordinator between the project partners and of spokesperson with Treedom Standard.

2.3 Focus areas

The projects have to be carried out on a territory owned by the project developer and/or the participants to the project; in alternative, they must have an authorization to operate on it. The Treedom Standard recognizes the traditional land tenure, customary law, and the customs and practices existing in the various local communities. It operates against land grabbing and does not request licenses on private property.

Since the goal is to involve individual farmers, the focus area of a project does not necessarily have to be single, but it can also be fragmented in parcels, and there is not a minimum size requirement.

Where the planting is planned to protect other crops (and in such cases it will be shaped around the perimeter of the crop), the focus area will not be one single parcel of land, as long as it remains on its own, identifiable and that can be visited upon request.

The projects must be carried out in the areas where it is possible to avoid double counting. There is an increased high risk of double counting in the areas where there are other carbon standards. The Treedom Standard can be applied by project developers who are already active in the carbon market, as long as all the necessary measures to avoid double counting are in place; for this reason, it will be necessary to have a detailed separation and distinction of the project areas where the Treedom Standard is applied as opposed to the areas in which other standards are applied.

The focus areas must be identifiable and can be visited upon request by the operators of Treedom or by third parties appointed by Treedom itself.

2.4 Purpose

Except for the additionality principle, eligible projects must pursue the following goals:

- maintaining or restoring forestry ecosystem and biodiversity,
- producing fruit, food products and/or other cash crops other than wood (e.g. products used in the pharmaceutical or cosmetics industry),
- protecting and improving farming and agricultural crops,
- creating or expanding green urban areas.

2.5 Compliance with laws

Only projects that comply with the existing laws of the host country, especially regarding its land, rural and environmental issues are eligible. Only projects that respect the rights of workers and the standards set by the International Labour Organization (ILO) are eligible.

3. PROJECT CYCLE

The actual application of the Treedom Standard by the project developer is executed with the following project cycle. The project cycle concerns planning, production and monitoring the activities carried out on the field.

3.1 Request phase

First, the project developer who wants to apply the Treedom Standard has to make a formal request; for this purpose, the project developer presents the Project Idea Note (PIN), filling out the dedicated template and sending it out by e-mail to the address **standard@treedom.net** .

In the PIN the first and general information on the project that will be carried out are supplied, such as: data about the project developer and about his role in the country where the Treedom Standard is requested, information about the project and its localization, types of trees and/or shrubs that will be planted.

The Treedom Standard will analyze the PIN, carrying out a preliminary verification on the project developer and on the feasibility of the project through a remote analysis.

The verification is finished when the Treedom Standard sends a formal acceptance of the PIN. On the contrary, if the result of this first verification is negative, Treedom will tell the project developer the reasons and the critical points that made the response negative. After acknowledging these observations, if the project developer believes he can solve these critical points, s/he can submit a new PIN.

3.2 Planning phase

Acceptance of the PIN constitutes a pre-validation. In order to obtain the definitive acceptance and to start the project, the project developer is invited to create the Project Design Document (PDD), filling out the dedicated template.

The PDD has to state exactly the activities, purposes, duration, size and the peculiar characteristics of the projects that will be carried out. Also, the entities that will be involved must be stated, as well as the project's managing procedures. Ultimately, compliance with the requirements of eligibility and the application of the principles of the Treedom Standard must be proved.

Together with the PDD, the Forestry Plan has to be submitted, where the project developer indicates in detail the amount and the species that he intends to plant during the first year of activity under the Treedom Standard.

The first draft of the PDD and of the Forestry Plan have to be sent via e-mail to the address **standard@treedom.net**.

The Treedom Standard checks the PDD and the first draft of the Forestry Plan and agrees with the project developer to carry out a check on the project site. The mission has the following purposes:

- verify the project feasibility,
- evaluate the project sustainability,
- verify the truthfulness of the information in the first draft of the PIN and PDD,
- verify if in the project areas it would be appropriate and sustainable to plant the species proposed in the first draft of the Forestry Plan,
- give tips to submit the final version of the PDD and of the Forestry Plan, indicating possible necessary changes and or improvements to the project plan,
- carry out the training on the geolocation activities of the trees and of its transmission to the Treedom Standard.

At the end of the mission, the Treedom staff who visited the project and carried out the due diligence will draw a report, in which an evaluation about the project developer's implementing and/or coordinating abilities will be expressed.

The project developer finalizes the PDD and the Forestry Plan and sends the final version to the e-mail address **standard@treedom.net**.

3.3 Validation

The Treedom Standard checks the PDD and the mission report, and based on it, it issues a validation or refusal of the project. The decision focuses on the issues of environmental, social and economic sustainability, on the compliance with the principles and the eligibility requirements, and on the project developer's abilities to coordinate and manage the project. The same procedure is contemplated for the Forestry Plan.

After validation, the project is published on the web platform of Treedom, and its users can request the planting of one or more trees in the project in their names.

3.4 Operational phase

After the validation, the operational phase starts. This phase calls for the accomplishment of all the arranged operations on the field, or in other words, the required activities to plant the trees and to register them in compliance with the Treedom Standard methodology.

The project developer proceeds to the setting in a nursery (if necessary) and to the transplantation in specific times, according to the seasonal cycles, local climate and the status of the users' requests.

Once the tree has been transplanted, the project developer has to carry out the geolocation procedure, an operation which has the purpose of acquiring the following information:

- plant species,
- geographic coordinates of the place where it has been transplanted,
- clear photo of each individual tree,
- data photo.

To ensure the immediate acquisition of such information, Treedom makes the Software GIS System available. GIS System is an integrated software that runs on GPS-GIS PDAs, Windows Mobile, Android phones and on Windows. Thanks to GIS System GPS, the project developer can acquire the data of the planted trees (species selection, geolocation, photo) in a simple and easy way.

After the project validation, the software is initialized with the species list of the Forestry Plan. In order to make the relief, the operator needs only to walk next to the planted sprouts and make a photo with the GPS-GIS device. The photo has to be taken within 6 months of the transplantation and not later; it has to be sharp, in focus, and without shadows.

In addition, the photo has to be clear enough to show the seedling, so that it is impossible to mistake it for the adjacent vegetation; for this purpose, the photo can be taken from above in the case it is a seedling, or from a distance if it is a tree with a developed trunk.

After the GIS relief the information are downloaded from the GPS to the PC software and transformed in a single file with extension eXtensible Markup Language (XML).

The plant elements data so acquired are now ready to be sent to Treedom Standard (through an upload in the dedicated section), for the purposes of quality control, verification and validation (see point 5).

The project developer is responsible of the maintenance of the project and must ensure the full replacement (100%) of the failed areas/plant elements that do not take root for the first three years from the date of the transplantation.

3.5 Report phase

At the end of each year, the project developer has to submit an annual report by filling out the dedicated template, where the following has to be specified: activities, number of planted trees and the relative species, number of geolocated trees and related species, observed mortality rate, possible difficulties emerged in the daily execution of tasks. Furthermore, in the report the direct and/or indirect benefits to the local community have to be clearly stated, along with the criteria used for its quantification.

3.6 Updating activities

At the end of the first period of the project, the project developer can submit a new Forestry Plan for the following period, which has to be validated by the Treedom Standard.

3.7 Monitoring activities

In order to verify the correct development of the project in its environmental, social and economic aspects, as well as appropriate development of the operations on the field and the maintenance of the transplanted elements, Treedom has a system of quality control based on sample checks.

The staff appointed by Treedom has to visit every year at least 25% of the projects that apply the Treedom Standard, with the purpose of evaluating the quality of the work performed, compliance with the Principles and of the agreements taken. A report is drawn at the end of the mission where the appointed person judges the execution of the project, highlighting any possible critical points, and, if needed, an increase or a decrease of the project risks previously identified and assessed.

4. CALCULATING THE ENVIRONMENTAL BENEFIT IN TERMS OF ABSORBED CO_2

Thanks to an assessment model developed on commission by the Department of Biological, Agroindustrial and Forestal Innovation of the University of Tuscia, the Treedom Standard is able to calculate the environmental benefit in terms of CO_2 neutralized by planting trees.

Specifically, this ex ante assessment model indicates the amount of biomass that can be stored by single trees, of different species, in different ecological areas, thanks to available bibliographical data.

The work was developed in three phases:

- Research and cataloguing of the existing scientific bibliography, concerning biomass data relative to the indicated species.
- Once the information was collected, the data deemed necessary for the creation of an ex ante assessment model was extracted. The data was then processed in order to calculate the biomass unit per tree; when this information was not provided directly by the author, it could be extrapolated from the reported data.
- Projecting and implementing the ex ante assessment model.

The model's main goal is to facilitate the use of the collected information, starting from the tree species and genus, the geographical coordinates on the project site and the years dedicated to the project. Simultaneously, the model provides the allometric equation of the species/genus, which can be directly applied by inserting the required data.

When possible, the allometric equations were taken from the website **www.globallometree.org**; for the species missing from the globallometree database, a search was made for the equation in bibliographical references.

4.1 Bibliographic research and database

The researched biomass values concerned about 300 species and genera of tropical and subtropical ecological areas. For each species, the values for biomass, volume, carbon or CO_2 absorption, per hectare or per tree, were included. These values can be referred to different components of the population or of the plant, which means that are only relative to epigeal parts (trunk, branches and leaves) or to the total living biomass (epigeal and hypogeal parts, roots included).

4.2 The allometric equations

The allometric equations are used to predict the tree's biomass, starting from dendrometric variables, such as the diameter at breast height (DBH), the total height of the trunk or the specific weight. Trees of different species can differ by shape and wood density; for this reason it is

preferred to use diversified equations based on species or ecological areas (if present), with respect to the generally valid ones. As for the inclusion of the allometric equations in the database, the GlobAllomeTree procedure was followed: GlobAllomeTree is an international website platform that provides allometric equations for tree species from all over the world - from the boreal forests to the tropical pluvial forests (**www.globallometree.org**)

4.3 Treedom/Unitus model

The model provides the biomass increase per single tree and the allometric equations, integrating the information from the database created during the first phase of the project and user provided information. In addition to the database, the model uses user provided coordinates and two global maps to allocate the geographical classifications (nation and continent) and the biome, based on the FAO ecological classification. After determining the exact geographical point and defining the increase value per single tree, the model applies the resulting value to the years of the project and calculates the total stored carbon. Also, the user can include data regarding the tree diameter and height and apply the allometric equation to calculate the carbon currently stored by a single plant.

4.4 Result analysis

All the information included in the database represents the basis for the implementation of a mathematical model for calculating the average increase of the annual CO_2 absorption per tree [tCO_2 $tree^{-1}$ yr^{-1}]. By following criteria for selection based on the presence (or absence) of precise data, such as the number of plants per hectare, the population age etc., the model can calculate assessment data per single tree in tCO_2 $tree^{-1}$ $yr\text{-}^{1}$.

The values resulting from the elaboration of the model were mediated for genera, families and tropical areas in order to evaluate the importance of the average figures given by the model, in case some values were missing for a determined species. 167 values per tree resulted from the elaboration of all the data included in our database; without considering the various selected tree species, the average annual CO_2 absorption per tree was considered to be 0,039 tCO_2 $tree^{-1}$ yr^{-1} with a SD of + 0,053 tCO_2 $tree^{-1}$ yr^{-1}.

5. VERIFICATION AND VALIDATION OF TREES

Once the sensitive data on the plant elements have been acquired as previously described (paragraph 3.4 – operational phase), the XML file is sent by the project developer to Treedom Standard directly through the portal **www.treedom-standard.com**. The project developer has indeed a dedicated section, which is password protected, through which s/he can send the files related to the registered trees. Furthermore, in this section s/he will be able to monitor in real time the verification phase and the acceptance of the trees.

After the project developer has sent the XML file, the verification and quality control activity starts. This activity is carried out "manually" by the staff of Treedom for each planted tree and it has the following purposes:

- verifying the effective planting of each tree,
- verifying the correspondence of the planted tree with the plant species indicated by the project developer,
- verifying the correspondence of the geographic coordinates of the tree with the geographic coordinates of the project area,
- controlling the quality of the sent image: the photo has to comply with the requirements described in 4 – Operational phase-.

When the aforementioned activities have a positive outcome, the individual tree will be considered compliant to the requirements of the Treedom Standard and it will be officially validated. If not, the tree will be refused.

After validation, the tree is inserted automatically in the Register of the platform www.treedom.net and is available for the final user, notwithstanding reserve requirements.

6. RESERVE

The Treedom Standard contemplates that 5% of the planted trees is not made available on the platform www.treedom.net, but that it is put aside in the so called "Project Reserve".

The purpose of this Reserve is to have a certain amount of trees available to cover any possible loss of plant elements and of the related CO_2 absorption (e.g. trees that die after the third year of transplant, for which a substitution is not provided), as well as in other projects that apply the Treedom Standard.

When forecasting a specific reserve for each project, a certain type of reciprocal insurance is created: in case of failure of a project (in its entirety of part of it), the users that own one or more trees in that project will be assigned a certain number of trees with the same amount of stored CO_2 in another project, thanks to the reserve of this last one.

Each project's reserve is constituted by putting aside 5% of the trees of each species planted within the same project.

7. SYSTEM OF REGISTERS

In order to ensure the traceability of the trees and to avoid double counting, the Treedom Standard uses a system of registers which is closed and integrated.

The trees Register is a place to recap and check all the trees that are validated with the Treedom Standard, as it lists a series of information for each and every one of them, such as: the user who owns it, the carbon sink potential expressed in kgs of CO_2, the kgs of CO_2 available to neutralize the emissions.

Next to the trees Register, there is the neutralizations Register. As said previously, the user who owns a validated tree has a certain amount of CO_2 available to neutralize his/her emissions. The neutralization is an optional action, because a user does not always request the planting of a tree for compensative purposes. Anyway, the user who owns a tree is also owner of the amount of CO_2 which will be stored by the tree, and as such, s/he can use it to neutralize CO_2 emissions previously calculated.

In case of previous neutralization, the elimination of the kgs of CO_2 used from the related tree must be ensured. The neutralizations Register has been developed to avoid double counting; neutralizations are registered and associated with the trees that permitted its compensation.

When the neutralization has occurred, the Register of trees is modified, so that the CO_2 utilized is cancelled and the amount of CO_2 available for subsequent neutralizations is reduced.

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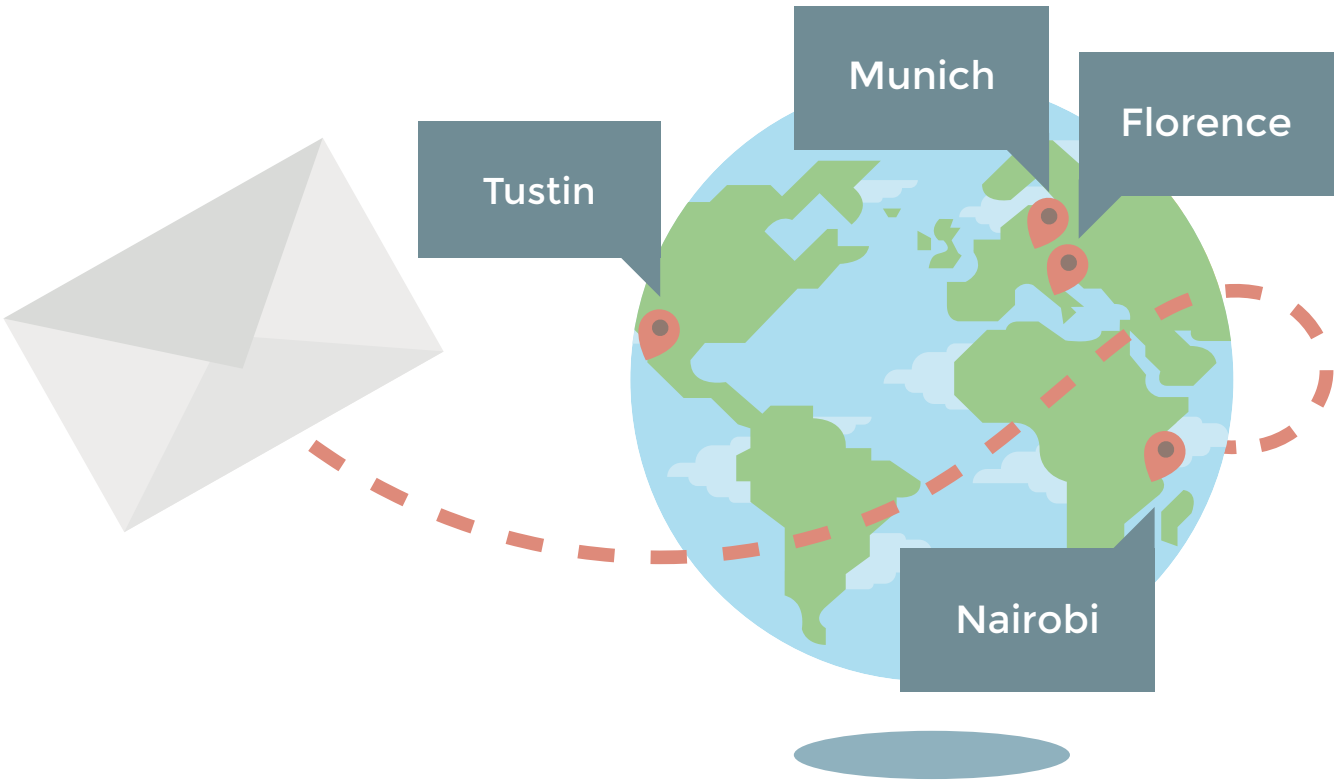

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